DOE/RL-2016-54
Draft A

Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

U.S. DEPARTMENT OF ENERGY Richland Operations Office
P.O. Box 550
Richland, Washington, 99352

DOE/RL-2016-54
Draft A

Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands

A. L. Bunn
K.A. Wagner
B.G. Fritz
L.E. Bisping
J.L. Mendez
S.A. Liss
J.T. Day
A.M. Gorton
Pacific Northwest National Laboratory

Date Published
June 2017

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

U.S. DEPARTMENT OF ENERGY Richland Operations Office
P.O. Box 550
Richland, Washington, 99352

TRADEMARK DISCLAIMER

Printed in the United States of America

This page intentionally left blank.

Summary

This document presents the results of a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA)[1] remedial investigation (RI) undertaken for the 100-OL-1 Operable Unit (OU). In May 2012, the U.S. Department of Energy, U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology established the 100-OL-1 OU through the *Hanford Federal Facility Agreement and Consent Order*.[2] The OU was established to address lead and arsenic concentrations attributed to past activities with lead arsenate pesticide use in the former orchards on the Hanford Site.

The Hanford orchard lands identified as part of the 100-OL-1 OU are located from the 100 Area of the Hanford Site (south side of the Columbia River) down to the Hanford townsite. The discontinuous orchard lands cover 20.21 km^2 (4995 acres) (Figure S-1). While most of the former orchard lands were not disturbed by activities during the Manhattan Project or subsequent Hanford Site activities, some former orchard plots are on or near waste sites in the River Corridor Source OUs, or have been disturbed by Hanford infrastructure (e.g., roads, support facilities, historical living areas). Hazards associated with the former orchard lands were not included in the hazard ranking for the CERCLA National Priorities List in 1989.[3]

The RI has the following objectives:

- Describe the study area investigated.
- Provide information concerning the physical environmental setting and site characterization.
- Discuss the nature and extent of lead and arsenic contamination in the surface soils.
- Provide an overview of past studies to describe the potential for migration of lead and arsenic.
- Compare field characterization results to screening levels for potential adverse human health and environmental effects from the residual pesticide.

The RI was prepared based on information gathered from other River Corridor RIs/feasibility studies, historical information about the use of lead arsenate pesticides on or near the Hanford Site, historical information about the River Corridor, data collected from monitoring and other characterization activities, and recent field characterization activities. Information from past investigations and activities contributed to the understanding of the nature and extent of lead and arsenic, and to refinements of the conceptual site model.

---

[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002.

[2] *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)*, Document No. 89-10, as amended, Washington State Department of Ecology, Olympia, Washington.

[3] *NPL Site Narrative for Hanford 100-Area (USDOE), HANFORD 100-AREA (USDOE), Benton County, Washington*. Available at: https://semspub.epa.gov/work/10/501000178.pdf

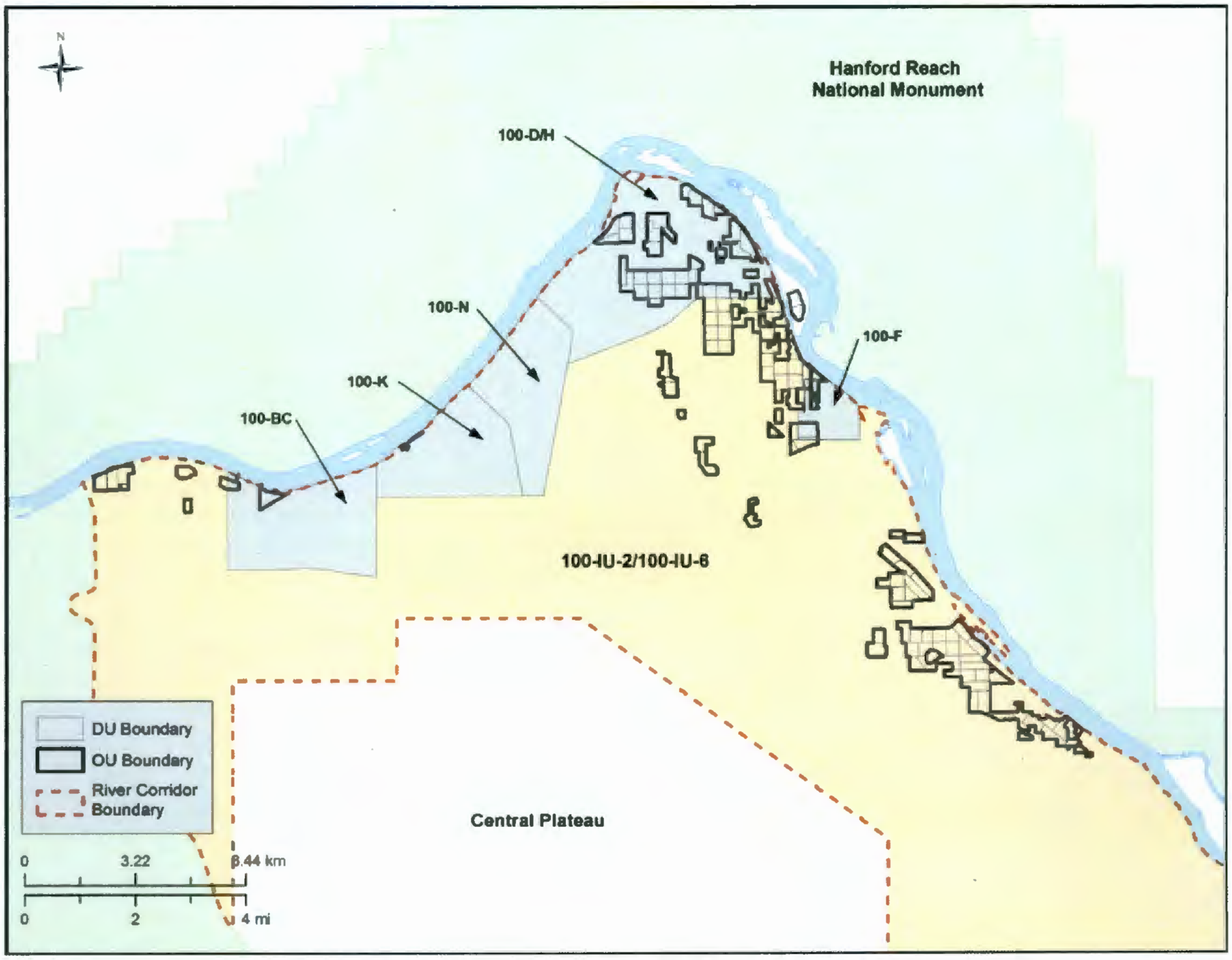


Figure S-1. The 100-OL-1 Operable Unit within the River Corridor of the Hanford Site.

Regulatory Considerations

Lead arsenate was the standard pesticide for controlling codling moths in many fruit trees from the 1890s through 1988. Although state and federal regulations controlling pesticides were not enacted until 1947, orchards on the Hanford Site generally contained lead and arsenic concentrations typical of other orchards in the area that followed recommendations for applications. The *Federal Insecticide, Fungicide, and Rodenticide Act*[4] (FIFRA) allows exemptions for contamination present through applications consistent with pesticide labels. The *Washington Administrative Code* (WAC) has an exemption from reporting releases of pesticides that were applied "for their intended purposes and according to label instructions" (WAC 173-340-3003(3)(a)).[5] Both FIFRA and WAC may be applicable.

[4] *Federal Insecticide, Fungicide, and Rodenticide Act*, 7 USC 136, et seq., Pub. L. 114-321, December 16, 2016.
[5] WAC 173-340-300(3)(a), Site discovery and reporting, "Model Toxics Control Act Regulation and Statute," Publication No. 94-06, 2013.

Additionally, there are no examples of conducting cleanup of this type of contamination for ecological risk in the State of Washington. The Asarco Tacoma Smelter plume[6] and the Asarco Everett Smelter do not evaluate ecological risk and do not identify ecological cleanup levels for actions by the state or the EPA. Further, according to the Washington State's Area-wide Soil Contamination Task Force, there is too much uncertainty to recommend an ecological protection procedure for these types of contaminants.[7] EPA at Bunker Hill Mining and Metallurgical Complex Superfund Site, Idaho, does identify a cleanup level for waterfowl and songbirds, but this is only implemented in high-quality habitat, such as waterfowl feeding areas or high-quality riparian zones.[8]

100-OL-1 Operable Unit Background

Prior to acquisition by the U.S. Department of War in February 1943 for the creation of the Hanford Site, the land along the Columbia River was home to over 1000 people and was used for farming and orchard operations by both homesteaders and commercial entities. Tree-fruit production increased around 1905, coinciding with the increased availability of irrigated water through pumping plants and canals provided by the Hanford Irrigation Company (and later the Priest Rapids Irrigation District). Control of codling moths was needed as the orchards expanded in the region. Beginning in the 1890s, lead arsenate was the pesticide of choice for codling moth control for most tree-fruits, which included apples, cherries, apricots, peaches, pears, plums, and prunes. The frequency and timing for lead arsenate applications increased in the 1920s and 1930s and then ceased as orchard activities ended on the Hanford Site.

A small fraction of the orchards on the Hanford Site continued to operate past 1943. Colonel Franklin T. Matthias, Army Corps of Engineers, who was responsible for directing construction work on the Hanford Site during the Manhattan Project, documented information about the orchards and issued contracts to continue "irrigation, pruning, spraying, picking and all other activities, incident to this work."[9] The orchards are apparent in old photographs of the reactors during the Manhattan Project, as well as aerial imagery through 1948. Contracts for the operation of orchards continued with the Atomic Energy Commission until 1954.

In some areas of the Hanford Site, there is still evidence of the old trees—stumps and branches mostly. Today, the residues from lead arsenate pesticide applications persist in soils in some areas on the Hanford Site. The OU boundary is based on these historical documents and evidence of former agricultural activities and roads that can be seen today. The OU was divided into 133 decision units (DUs) to assist with the evaluation. The DUs were defined to capture the areas where lead arsenate pesticide residues are likely to be found in the soil today from past application on orchard trees or other activities that might

---

[6] *Tacoma Smelter Plume Model Remedies Guidance, Sampling and Cleanup of Arsenic and Lead Contaminated Soils for: Formal Cleanup Sites Voluntary Cleanup Program Properties under Development*, Publication No. 12-09-086-A, Washington State Department of Ecology. *Five Year Report: Third Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington*, U.S. Environmental Protection Agency.

[7] *Area Wide Soil Contamination Task Force Report*, 2003, submitted to Washington State Department of Agriculture, Washington State Departments of Ecology, Health, and Community, Trade and Economic Development, Olympia, Washington.

[8] *Fourth Five Year Report for the Bunker Hill Superfund Site Shoshone and Kootenai Counties, Idaho*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington, U.S. Environmental Protection Agency, Region 10, *Five Year Report: Third Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington*, Seattle, Washington.

[9] Matthias FT. 1943. *Colonel Matthias's Diary*. Manuscript available at the U.S. Department of Energy Reading Room, Richland, Washington.

have contributed to lead and arsenic contamination of soil (e.g., storage, preparation of mixtures, or cleaning of equipment). Figure S-1 shows the division of DUs within the OU boundary.

Physical/Environmental Setting

The conceptual site model includes the physical and chemical characteristics of the surface soils, vadose zone, groundwater, and Columbia River environment. Physical characteristics of the study area influence the movement of contamination within the environment, including meteorology and soil disruption from activities on the Hanford Site.

The topography and soil setting for 100-OL-1 OU may have attracted former residents to plant trees. The topography is relatively flat, with elevations ranging from approximately 114 to 139 m (374 to 456 ft) above mean sea level and steep slopes along the Columbia River. Soil types vary across the Hanford Site, but the soil types within the OU provide good support and drainage for orchard activities. The soil types and topography support a variety of habitats and vegetation types; however, non-native annual plants dominate the OU and the return of native vegetation has been slow to absent.

People have been using the area that is now the Hanford Site and portions of 100-OL-1 OU for thousands of years. Euro-American settlement of the region during the 19th and 20th centuries changed the land through agricultural development, roads and railroads, and construction of small towns. Later, the mission of the Hanford Site further disturbed the soil. These activities were co-located with regions where lead arsenate pesticide residues linger in the soil and the soil was physically moved during construction and remediation activities.

Nature and Extent of Contamination

The nature and extent of lead and arsenic contamination within 100-OL-1 OU are predominantly from pre-Hanford operations and contaminant movement through release, transport, and deposition from the time of lead arsenate pesticide application to the present. Past studies in old orchards demonstrate that the lead and arsenic from pesticide applications remain in the surface soils. Transport of lead and arsenic through the subsurface into the groundwater and Columbia River environment is not apparent through monitoring activities and investigations for other OUs in the River Corridor.

The focus of the RI activities was on the magnitude and extent of lead and arsenic contamination within the boundaries of the 100-OL-1 OU. There were sources of lead and arsenic at the Hanford Site not associated with lead arsenate pesticide, including lead shielding and plumbing, metal fabrication, and industrial chemicals. However, in the 100-OL-1 OU the lead and arsenic in the soil are predominantly from past pesticide applications and can vary in the soil based on the frequency of applications within a season and duration of operating orchards in a region.

While monitoring and characterization activities for other OUs in the River Corridor have documented occasional and/or disparate results for lead and arsenic in the deep vadose zone, groundwater, and pathways to the Columbia River, the concentrations of lead and arsenic in those media are not associated with a specific location or have not shown a trend over time. Past studies within the vicinity of the Hanford Site show that most of the lead and arsenic were restricted to the upper 40 cm (16 in.) of soil. Investigations of the mobility of lead and arsenic to calculate the soil/water distribution coefficient, K_d, support the past field studies, demonstrating that lead and arsenic are bound to the soil and will require more than 1000 years to move through the soil column.[10]

The RI activities focused on field characterization of the surface soil using a field portable X-ray fluorescence (XRF) analyzer. Each DU was evaluated using a random-start, systematic-grid-sampling design with a nominal 200 sample/km^2 (0.8 sample/acre) sample density. The basis for the statistical approach was to determine with 95% confidence that the true average was less than 250 mg/kg lead or 20 mg/kg arsenic. These screening levels are based on the 2013 *Model Toxics Control Act* (MTCA) Method A unrestricted land use soil cleanup standards of the WAC,[11] 173-340-740(2). To address the concern that lead arsenate pesticide residues may be in the soil outside 100-OL-1 OU boundary, additional sample locations outside of the OU were measured with the XRF analyzer when orchard plot border concentrations were greater than or equal to 150 mg/kg lead or 15 mg/kg arsenic. This is referred to as "step-out sampling." Overall, 4127 sample locations within the OU boundary and 344 step-out locations outside the OU were measured for lead and arsenic concentrations in the surface soil.

Exposure Assessment

The exposure assessment consisted of a comparison of the exposure point concentrations (EPCs) to previously developed screening levels. This approach for the risk assessment was included in *Remedial Investigation Work Plan to Evaluate the 100 OL-1 Operable Unit Pre Hanford Orchard Lands.*[12] EPCs are a conservative estimate of the average chemical concentration in an environmental media.

For human health, the screening levels are the MTCA Method A standards for lead (250 mg/kg) and arsenic (20 mg/kg). For ecological protection, the screening level is the Tier 3 value for lead developed for the Bunker Hill Mining and Metallurgical Complex Superfund Site. The Tier 3 process included collecting multiple species of birds that use contaminated riparian habitats and analyzing their blood for lead as well as analyzing the food, soil, and sediment. The most adverse health effects as estimated by the levels of lead in blood were for the songbirds. Based on this information, the Tier 3 ecological risk level is 530 mg/kg lead.[13]

There are 23 out of 133 DUs within 100-OL-1 OU where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, which covers an area of 3.443 km^2 (848.6 acres) out of 20.21 km^2 (4995 acres), or 17% of the OU's area. Figure S-2 shows the locations of the DUs, with the color of the DU based on the level of the EPC in excess of the MCTA Method A screening levels. Of the 23 DUs where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, the acreage where only lead exceeds the EPC for MTCA Method A screening level is 0.329 km^2 (81.34 acres; 2 DUs), the acreage where only arsenic exceeds the EPC for MTCA Method A screening level is 0.618 km^2 (152.6 acres; 5 DUs), and the acreage where both lead and arsenic exceed the EPC for MTCA Method A screening levels in the remaining acreage is 2.488 km^2 (614.7 acres; 16 DUs).

---

[10] *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*. DOE/RL-2010-98, Rev. 0, 2014, U.S, Department of Energy, Richland Operations Office, Richland, Washington

[11] *Washington Administrative Code*, "Model Toxics Control Act—Cleanup, Unrestricted land use soil cleanup standards." Olympia, Washington.

[12] *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands*, DOE/RL-2012-64, Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[13] *Fourth Five Year Report for the Bunker Hill Superfund Site Shoshone and Kootenai Counties, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

Washington State's Area-Wide Soil Contamination Task Force provided a low-to-moderate range of lead and arsenic in soil "for properties where exposure of children is less likely or less frequent, such as commercial properties, parks, and camps."[14] The low-to-moderate range is 700 mg/kg lead and 200 mg/kg arsenic, and Figure S-3 shows the only DU (DU-095) where the EPC would exceed these levels. Only one DU (DU-095) has a lead EPC that exceeds the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site.[15]

---

[14] *Area-Wide Soil Contamination Task Force Report* . Submitted to Washington State Department of Agriculture, Washington State Department of Ecology, Washington State Department of Health, and Washington State. Department of Community, Trade and Economic Development, Olympia, Washington.

[15] *Fourth Five Year Report for the Bunker Hill Superfund Site Shoshone and Kootenai Counties, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

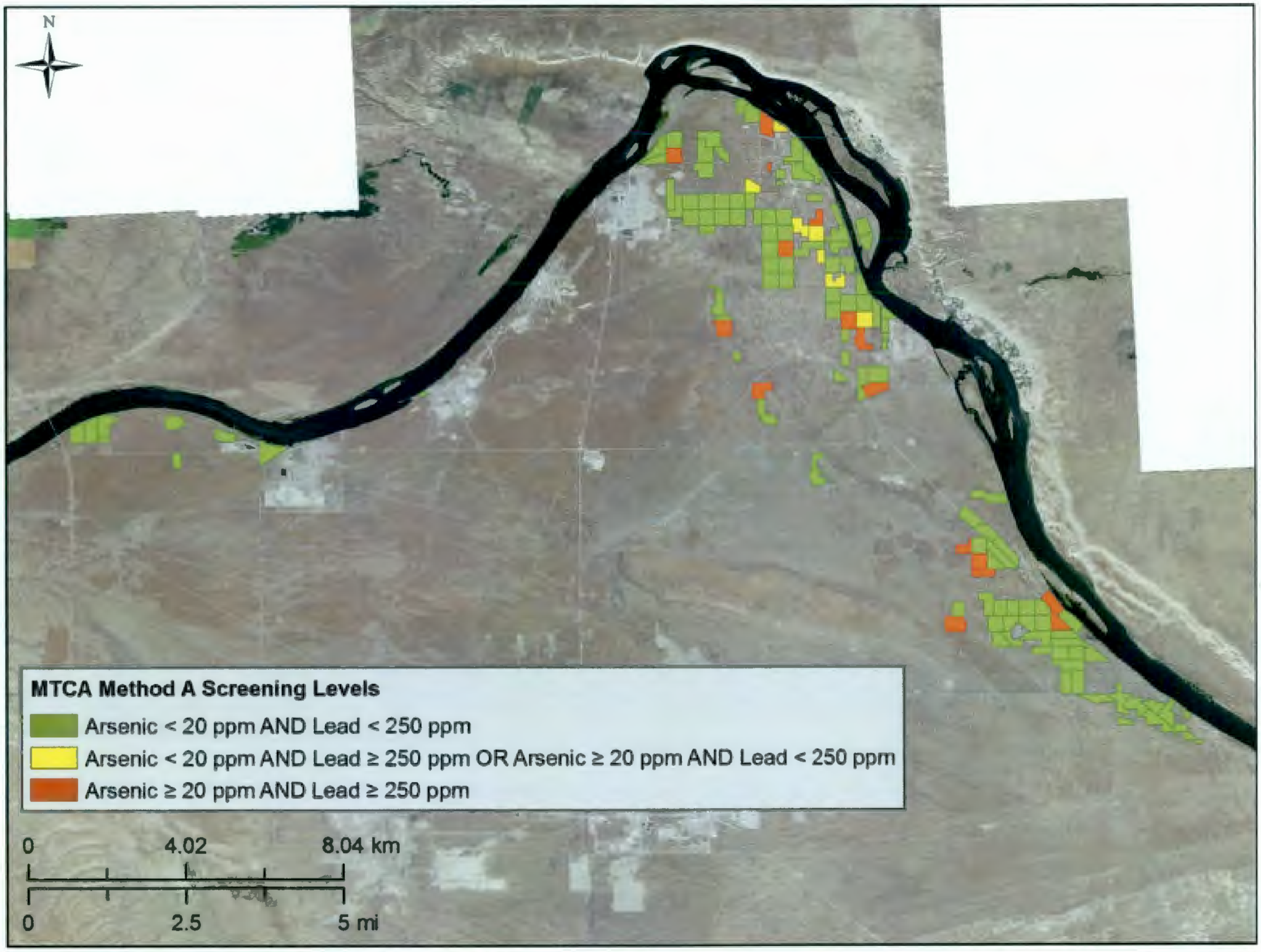


Figure S-2. Comparison of the Exposure Point Concentrations for Each Decision Unit within 100-OL-1 Operable Unit to the MTCA Method A Screening Levels for Unrestricted Use of Soil.

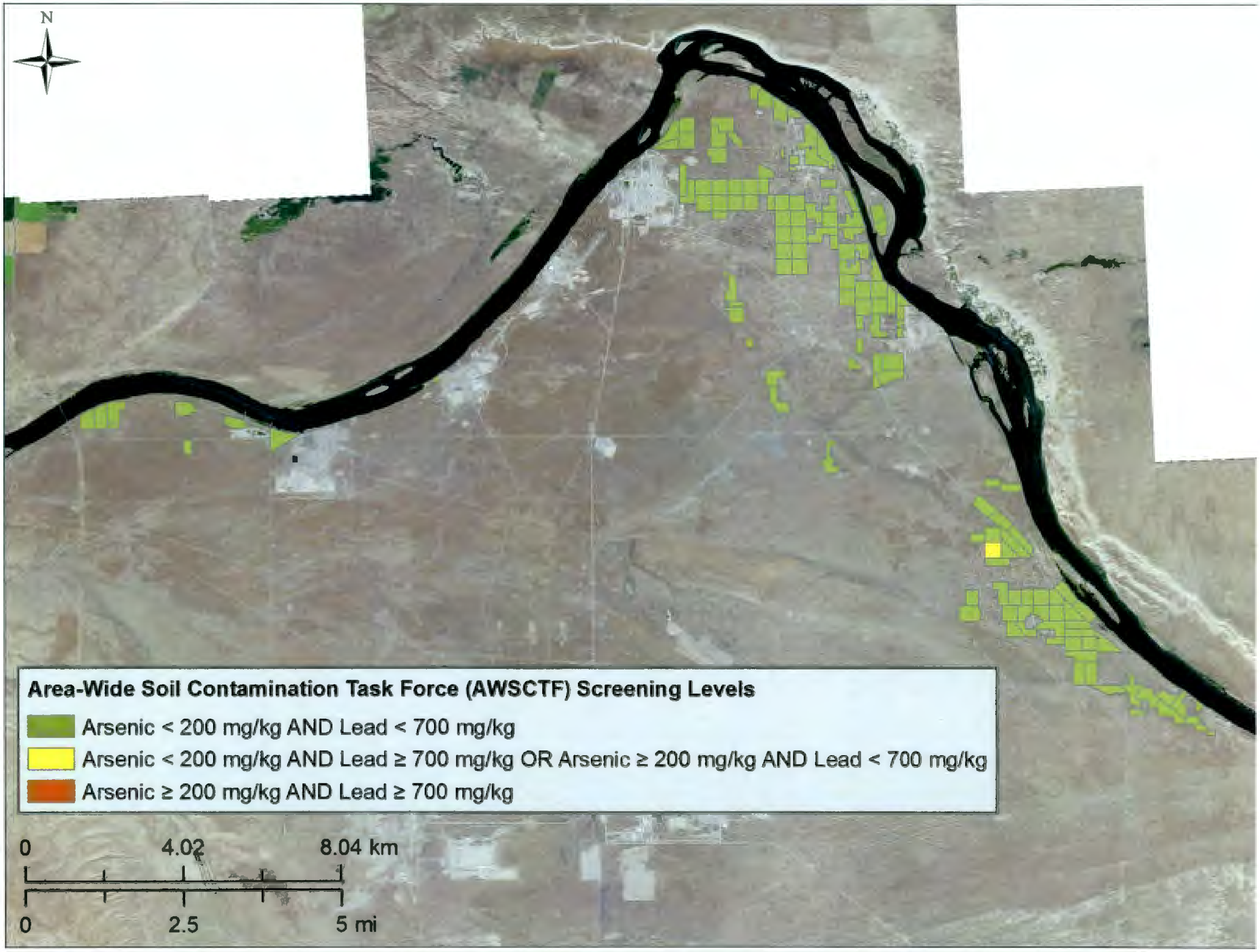


Figure S-3. Comparison of the Exposure Point Concentrations for each Decision Unit within 100-OL-1 Operable Unit to Washington State Area-Wide Soil Contamination Task Force's Low-to-Moderate Range for Properties where Exposure of Children Is Infrequent.

Acronyms and Abbreviations

<LOD	less than the level of detection
AAA	Anti-Aircraft Artillery
BCA	bias-corrected accelerated bootstrap method
BTV	background threshold value
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CSM	conceptual site model
DOE	U.S. Department of Energy
DOE-RL	DOE Richland Operations Office
DOH	Washington State Department of Health
DQO	data quality objective
DU	decision unit
DVZ-AFRI	Deep Vadose Zone Applied Field Research Initiative
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FIFRA	*Federal Insecticide, Fungicide, and Rodenticide Act*
FS	feasibility study
GIS	geographic information system
GPS	global positioning system
HEIS	Hanford Environmental Information System
HMS	Hanford Meteorological Station
ICP-MS	inductively coupled plasma mass spectroscopy
K_d	soil/water distribution coefficient
KM	Kaplan-Meier
LCS	laboratory control samples
LOAEL	lowest observed adverse effect level
MDL	method detection limit
MS	matrix spike
MSA	Mission Support Alliance LLC
MTCA	*Model Toxics Control Act*
NA	not applicable
NHPA	*National Historic Preservation Act*
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NPL	National Priorities List
NPS	National Park Service

NR	not reported
OU	operable unit
PD	percent difference
PNNL	Pacific Northwest National Laboratory
QA	quality assurance
QC	quality control
r	correlation coefficient
RCBRA	River Corridor Baseline Risk Assessment
RI	remedial investigation
RSD	relative standard deviation
Sd	standard deviation
SRM	standard reference material
SSL	soil screening level
STOMP	Subsurface Transport Over Multiple Phases
TPA	Tri-Party Agreement
UCL	upper confidence limit
UPL	upper prediction limit
USFWS	U.S. Fish and Wildlife
VSP	Visual Sample Plan (software tool)
WAC	*Washington Administrative Code*
WCH	Washington Closure Hanford, Inc.
XRF	X-ray fluorescence

Contents

Appendices

Figures

Tables

1. Introduction

In 1989, the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) (known as the Tri-Parties) signed the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), hereinafter called the Tri-Party Agreement (TPA), to provide a framework for the cleanup of the Hanford Site. The scope of the agreement addressed the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remediation of inactive hazardous waste sites and active waste management operations across the Hanford Site (42 USC 9601, et seq.).

For the purpose of CERCLA cleanup, four sections of the Hanford Site were placed on the 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Appendix B, National Priorities List (hereinafter called NPL) as separate areas: 100 Area (Reactor Operations), 200 Area (Irradiated Fuel Reprocessing and Waste Management), 300 Area (Nuclear Fuel Production and Research and Development), and 1100 Area (Equipment and Maintenance). Due to the large number of waste sites, unplanned releases, and extensive groundwater contamination, the 100 Area was further divided into source and groundwater operable units (OUs) for management of the investigation and remediation.

Some waste sites in the 100 Area contain relatively high lead and arsenic concentrations near the soil surface. This was identified as contamination associated with pesticide use in historical orchards rather than Hanford operations. Hazards associated with the former orchard lands were not included in the hazard ranking for the CERCLA NPL and thus were not part of the 100 Area source and groundwater OUs in 1989 (EPA 1989a). Waste site remediation did not continue at these locations to address historical orchard contamination, and TPA agencies determined that a new OU (designated 100-OL-1 OU) should be developed to understand the lead and arsenic contamination. This document presents the results of a CERCLA remedial investigation (RI) of the 100-OL-1 OU, which consists of 20.21 km^2 (4995 acres) of non-contiguous former orchard lands on the Hanford Site (Figure 1-1).

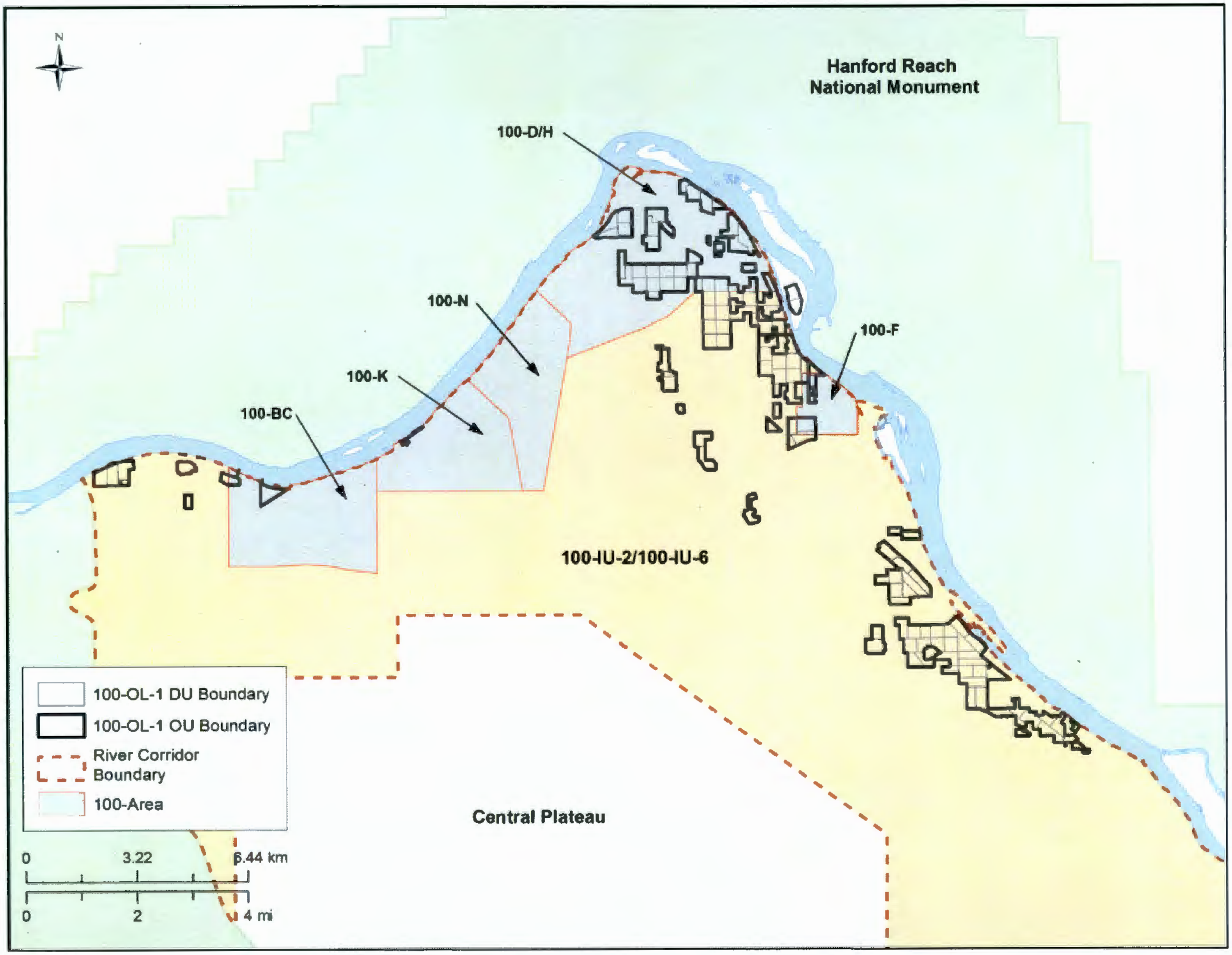


Figure 1-1. The 100-OL-1 OU and Associated Decision Units across the River Corridor of the Hanford Site.

The 100-OL-1 OU was organized using information from a number of sources on former orchard lands and farm sites where lead arsenate pesticide was likely used and where residuals of the pesticide are likely found in the soil today. This OU is similar to other OUs on the Hanford Site in that the areas identified are associated with a common waste source; however, the areas within the 100-OL-1 OU are discontinuous and spread over a wide geographical area within the Hanford Site. Most of the areas within the 100-OL-1 OU are located outside of designated reactor OUs, and relatively few of the orchard plots have been disturbed by operations within the Hanford Site. Orchards are visible in aerial photos from 1943, and this information, along with other historical reports, continues to be useful for identifying the areas to investigate for residual lead arsenate in soil on the Hanford Site.

The TPA defined the area for the 100-OL-1 OU (TPA 2012a), and a TPA milestone was identified to develop a remedial investigation/feasibility study (RI/FS) work plan to evaluate the OU (TPA 2012b). The milestone was met with the submission of the Draft A RI/FS work plan in April 2012. The Draft A document considered analysis of soil core samples to be analyzed in a laboratory, similar to the process being used for cleanup verification efforts throughout the 100 Area; however, there was a concern that the collection of soil throughout the historical regions of the OU creates unacceptable disturbances to cultural resources. TPA agencies identified the need for a pilot study to evaluate the effectiveness of using an X-ray fluorescence (XRF) analyzer to characterize the lead and arsenic on the surface of the soil in the OU (Bunn et al. 2014). The work plan for the RI was approved in 2016 (DOE/RL-2012-64, Rev. 0). The FS will be completed after the approval of the RI.

1.1 Regulatory Considerations

Under CERCLA, a release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment" (42 USC 9601, Section 101(22)). As such, the presence of lead and arsenic from historical pesticide application does not meet the definition of release. CERCLA does not allow "for any response costs or damages resulting from the application of a pesticide product registered under the *Federal Insecticide, Fungicide, and Rodenticide Act*" (FIFRA) (42 USC 9603(107)(i); 7 USC 136, et seq.).

Lead arsenate was the standard pesticide for controlling codling moths in many fruit trees from the 1890s through 1988 (Appendix E). Although state and federal regulations controlling pesticides were not enacted until 1947, orchards on the Hanford Site generally contained lead and arsenic concentrations typical of other orchards in the area that followed recommendations for applications. FIFRA allows exemptions for contamination present through applications consistent with pesticide labels (7 USC 136). The *Washington Administrative Code* (WAC) has an exemption from reporting releases of pesticides that were applied "for their intended purposes and according to label instructions" (WAC 173-340-3003(3)(a)). Both FIFRA and WAC may be applicable.

Additionally, there are no examples of conducting cleanup of this type of contamination for ecological risk in the State of Washington. The Asarco Tacoma Smelter plume (Ecology 2012a) and the Asarco Everett Smelter do not evaluate ecological risk and do not identify ecological cleanup levels for either actions by the state or the EPA. Further, according to Washington State's Area-wide Soil Contamination Task Force, there is too much uncertainty to recommend an ecological protection procedure for these types of contaminants (AWSCTF 2003a). EPA at Bunker Hill Mining and Metallurgical Complex Superfund Site, Idaho, does identify a cleanup level for waterfowl and songbirds, which is only implemented in high-quality habitat, such as waterfowl feeding areas or high-quality riparian zones (EPA 2015).

1.2 Purpose and Scope of Report

The purpose of this RI is to describe the results of the field characterization performed in accordance with the RI Work Plan (DOE/RL-2012-64) and to summarize the relevant past investigations on the Hanford Site related to the nature and extent of residual lead arsenate pesticide in the 100-OL-1 OU. The scope of this RI is limited to lead and arsenic contamination in surface soils from field characterization of the 100-OL-1 OU. Past investigations of the 100 Area source and groundwater OUs (collectively called the River Corridor Interest Area) that are co-located within the 100-OL-1 OU describe the fate, transport, and exposure of receptors relevant to understanding lead arsenate residual contamination remaining on the Hanford Site, and these investigations are summarized in this report.

The RI/FS process is outlined in EPA and DOE RI/FS guidance (*Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final* [EPA/540/G-89/004], hereinafter called CERCLA RI/FS Guidance, and *Remedial Investigation/Feasibility Study (RI/FS) Process, Elements and Techniques* [DOE/EH-94007658]). The RI/FS process is the methodology established by the *Superfund Amendments and Reauthorization Act of 1986* program for characterizing the nature and extent of contamination at uncontrolled hazardous waste sites, the risks posed by that contamination, and an evaluation of potential remedial options.

This RI was prepared in accordance with the previously referenced guidance as well as *CERCLA Compliance with Other Laws Manual: Interim Final* (EPA/540/G-89/006) and *CERCLA Compliance with Other Laws Manual: Part I* (EPA/540/G-89/009). These guidance documents provide information on the regulations and standards that govern the RI/FS process, as well as an overview of requirements for each chapter of the RI.

This RI/FS report has the following objectives:

- Describe the study area investigated.
- Provide information concerning the physical environmental setting and site characterization.
- Discuss the nature and extent of lead and arsenic contamination in the surface soils.
- Provide an overview of past studies to describe the potential for migration of lead and arsenic.
- Compare field characterization results to screening levels for potential adverse human health and environmental effects from the residual pesticide.

This document does not include the development and evaluation of remedial action alternatives for the 100-OL-1 OU. Remedial action alternatives that address unacceptable risk to human health or the environment from residual lead arsenate pesticide will be addressed in the FS.

DOE has completed the RI for 100-OL-1 OU and is issuing this report as a component of its responsibilities under the *National Contingency Plan* (40 CFR 300), acting in its role as lead agency for the cleanup. Ecology is the lead regulatory oversight agency for the OU.

The conceptual site model (CSM) used in this RI presents what is known about 100-OL-1 OU. The American Society for Testing and Materials *Standard Guide for Developing Conceptual Site Models for Contaminated Sites* (ASTM E1689-95) defines the CSM as "a written or pictorial representation of an environmental system and the biological, physical, and chemical processes that determine the transport of contaminants from sources through environmental media to environmental receptors within the system." A generalized CSM has been developed and used by the other River Corridor Interest Area RI/FSs to integrate relevant site information, determine whether information or data were missing (data gaps), and identify additional information to be collected. Figure 1-2 shows the basic elements associated with a CSM, which includes the sources, release mechanisms, transport, exposure, and receptors.

Figure 1-2. Generalized Conceptual Site Model for the 100 Area of the Hanford Site.

For the 100-OL-1 OU, the parts of the conceptual model are associated with the use of lead arsenate pesticide in relation to the operation of orchards.

- **Source**—the location of lead arsenate pesticide residuals. Aerial imagery and historical documents are the primary sources of information for the locations of orchards on the Hanford Site. Historical information about the operation of orchards within Washington State and on the Hanford Site provides useful information about the use of the pesticide. Section 1.2 provides an overview of the OU development and history of the orchards. Section 2 describes the investigations to evaluate lead and arsenic in various media throughout the OU and in the River Corridor Interest Area. Appendices A, B, C, and D include the results of field characterization and the data quality evaluations for RI activities. Appendix E provides the historical context for use of lead arsenate pesticide for orchards within Washington State and on the Hanford Site.

- **Release Mechanisms**—the actions necessary to release the lead arsenate residuals in the soil to the environment through resuspension of contaminated particulate matter, surface runoff, leaching to the vadose zone, plant intrusion, animal burrowing, erosion, or groundwater migration. Section 3 describes the release mechanisms and relevant physical features of the OU and Section 4 describes the results of field characterization efforts to determine the location of lead arsenate residuals in the surface soil of the OU. Appendix F summarizes the remaining lead and arsenic concentrations in waste sites co-located with the OU and recent groundwater and surface water measurements in the vicinity of the OU.

- **Transport**—movement of lead arsenate residuals in the environment where human or ecological exposure could occur. Application of the pesticides occurred decades ago on the Hanford Site and contaminated soil could have been transported between environmental media such as air, groundwater, and surface water because of interconnecting release mechanisms. Section 3 discusses the physical characteristics of the OU that may have contributed to the spread of lead arsenate residuals and Section 5 discusses transport.

- **Exposure**—the process by which a contaminant or physical agent in the environment comes into direct contact with the body, tissues, or exchange boundaries of humans, plants, or animals (e.g., ingestion, inhalation, dermal absorption, or root uptake). Contaminants in the environment move from sources to potential receptors via pathways. An exposure pathway is complete when a receptor encounters contaminated environmental media. Sections 6 and 7 discuss potential exposure scenarios that have been developed for the Hanford Site and are applicable to exposure of lead arsenate residuals in the soil.

- **Receptors**—humans and other organisms (e.g., plants, animals) that may come into contact with the contaminants. Section 6 evaluates exposure to receptors identified in other Hanford Site evaluations and is applicable for lead arsenate residuals in the soil.

The RI Work Plan identified the data needs in the data quality objectives (DQOs) and the sampling and analysis plan (DOE/RL-2012-64). Through development of the DQOs, a few areas were added to the original OU boundary. The RI Work Plan also includes the field sampling plan to implement the design to systematically analyze surface soil locations across the OU using a field portable XRF analyzer and the Quality Assurance Project Plan to ensure that data collected meet the appropriate quality assurance (QA) and quality control (QC) requirements.

1.3 Site Background

In 1943, orchards, farms, and ranches were prevalent as sources of water, electricity, and transportation were improving in the rural area of Benton County, Washington, when the U.S. government took possession of the land to produce weapons-grade plutonium as part of the Manhattan Project. Today, the old orchards look like abandoned agricultural areas and some still have tree stumps and branches. These old orchards are interspersed with the reactor areas and the remediated facilities, ancillary support systems, and waste sites left over from the Manhattan Project and the Cold War.

The first reactors on the Hanford Site were constructed between areas developed as orchards. The housing and administration buildings for the Manhattan Project were built in areas that were previously orchards and agricultural areas in the Hanford townsite. The reactor areas later encompassed or were developed in the old orchard areas. The development of old orchard plots includes parts of the Hanford Site's 100-B/C, 100-K, 100-D, 100-H, and 100-F Areas (Figure 1-1). These areas have collectively become the River Corridor Interest Area during the current cleanup mission. The 100-F Area includes the area around the 105-F reactor building, the former White Bluffs town and surrounding agricultural community, and the former Hanford townsite and surrounding community.

Figure 1-3 shows the first reactor built on the Hanford Site at 100 BC Area; the orchards are visible beyond the construction area, upstream along the Columbia River. Figure 1-4 shows orchards and farms among the development of a construction camp in the Hanford townsite, where the roads and homesteads originally plated north-south and east-west were transformed to roads and buildings located parallel and perpendicular to the Columbia River. At its peak occupancy, in 1944, the construction camp was reportedly the fourth largest city in the State of Washington, housing approximately 45,000 workers in various housing that consisted of 131 barracks for men, 880 hutments for men, 64 barracks for women, and 3600 trailer lots (Harvey 2000).

Figure 1-3. Orchards on the Hanford Site in June 1944 Upstream and Northwest of the 100 B Reactor and Ancillary Facilities.

Figure 1-4. Aerial Photo of Orchards and the Hanford Townsite during Construction of Worker Living Quarters in June of 1943.

1.3.1 Site Description

The extensive areas of tree-fruit production in the 100-OL-1 OU were divided into decision units (DUs) when developing the RI Work Plan (DOE/RL-2012-64). The intent was to define DUs that capture the areas where lead arsenate pesticide residues are likely in the soil today from past application on orchard trees or other activities that might have contributed to lead and arsenic contamination of soil (e.g., storage, preparation of mixtures, or cleaning of equipment). DUs encompass the source areas for the lead and arsenic contamination and the areas of potential human and ecological exposure today. The size of the DU is related to the sampling area, and the decisions associated with the sampling and characterization of the orchard area (ITRC 2012).

The process for dividing the orchards into DUs considered the location of the orchard on the Hanford Site as well as any soil disturbance, historical imagery of the orchard lands, and the size of the DU. The first criterion for division of the 100-OL-1 OU into DUs considered the presence or absence of trees in the historical aerial imagery from 1941 and 1943. The second criterion used in the creation of DUs for the 100-OL-1 OU was size. The third criterion for the division of the OU into DUs was the presence of roads. Boundaries of the DUs considered the aerial imagery from 1943 and 2013 as well as a geographic information system (GIS) layer that includes the roads on the Hanford Site. The boundary of a DU was placed down the middle of a road if it could be seen in the 1943 imagery or in the 2013 imagery (in that order). The boundaries of the OU were adjusted to capture the full extent of orchards near the DU based on both the 1943 and 2013 aerial imagery. In a few cases, the boundary was adjusted further. For example, the boundaries of a few DUs were adjusted to follow a landscape feature (e.g., a steep slope or the edge of the Hanford Irrigation Canal) to make sampling easier. From the 44 discrete areas in the map of the 100-OL-1 OU included in TPA Change Control Form C-12-02 (TPA 2012a), 133 DUs were identified when developing the RI Work Plan (DOE/RL-2012-64).

1.3.2 Early Settlers and Hanford Site History

The Hanford Site has a rich agricultural history and was home to farming communities and towns extending back to the late 1800s. The 100-OL-1 OU spans an area of 20.21 km^2 (4995 acres) and consists of former orchard lands associated with the farming communities of Hanford, White Bluffs, and Vernita-Allard. Early farmers in the area used wells and direct withdrawal techniques from the river for irrigation. These techniques were adequate for small-scale agricultural production, but presented challenges due to the river's natural grade (prior to construction of numerous upstream dams) and the limited the potential for irrigable land further away from the Columbia River. The full potential for agricultural production in the Priest Rapids Valley was not realized until the development of pumping and canal systems by private irrigation consortiums in the early 1900s. This vastly increased the amount of irrigated land and potential for agricultural growth across the Valley (and the Hanford Site). With the newly built irrigation systems, the towns of White Bluffs and Hanford began to expand and grow as land previously seen as barren and unproductive transformed to fertile and fruitful areas, full of agricultural potential.

Along with farmland, orchards (both private and commercial) were prevalent in the area. The Priest Rapids Valley was quickly recognized as a prime fruit-producing area due to its ability to produce fruit crops 2 to 3 weeks earlier than other fruit-producing areas (Sharpe 1999). While crop selection relied heavily on commodity prices, the most common fruits were apples, apricots, cherries, peaches, pears, and plums/prunes. Large processing facilities began providing services to aid in the processing of bulk fruit/produce and provided packing and cold storage services (Sharpe 1999). In addition, the establishment of the Chicago-Milwaukee-St. Paul Railroad spur line (from Beverly to Hanford) in 1913 greatly increased the speed of produce delivery, getting fruit to market quicker, and also provided a means to refrigerate local produce (Sharpe 1999). The ability to handle and process large quantities of produce along with increased speed of getting fruit to market proved successful and provided for profitable gains for the local growers of the Priest Rapids Valley. Figure 1-5 shows the Bruggemann complex and warehouse, a well-known, successful orchard and farm operation; the warehouse remains as one of the last buildings on the Hanford Site from the early settlers.

Hard times fell upon the farmers during the Depression of the 1930s. In addition to decreased land values, fluctuating commodity prices were posing serious economic problems for the growers in the area. Many farmers were forced to relocate or abandon their farms, and the towns of White Bluffs and Hanford were declining in population (Sharpe 1999). With the decrease in population and the need for irrigation water (due to decreased farmlands), the irrigation systems were no longer economically viable and many were forced to shut off water and close. Then, in February 1943, the U.S. Department of War, acting under the *Second War Powers Act*, ordered the people of the Priest Rapids Valley off their land to support the war effort through the creation of the Hanford Site for Manhattan Project operations.

Figure 1-5. Bruggemann Complex and Warehouse, Located West of 100-B Reactor.

Walking through the 100-OL-1 OU, one can still see evidence of the past agricultural community on the Hanford Site. The evidence includes changes in vegetation across an area, scattered items from households, and farm-related equipment, roads, and walking paths. Documentation from the State of Washington Agricultural Extension Service as well as oral histories from former residents provided valuable information for the RI. Appendix E provides an overview of the history and cultural resources of the 100-OL-1 OU.

1.3.3 Previous Investigations

Past investigations of lead arsenate use and residual contamination in orchards on the Hanford Site (and across the U.S.) have contributed to the RI, as have the investigations of the source and groundwater OUs on the Hanford Site that are co-located with the 100-OL-1 OU. This section summarizes these investigations and the application of the information for the RI.

1.3.3.1 Investigations of Former Orchards

Prior to the acquisition by the U.S. Department of War in February 1943, the land along the Columbia River was home to more than 1000 people, and was used for farming and orchard operations by both homesteaders and commercial entities. Tree-fruit production increased around 1905, coinciding with the increased availability of irrigated water through pumping plants and canals provided by the Hanford Irrigation Company (and later the Priest Rapids Irrigation District). Control of codling moths (*Cydia pomonella*) was needed as the orchards expanded in the region. Beginning in the 1890s, lead arsenate was the pesticide of choice for codling moth control for most tree-fruits (State College of Washington 1918, 1937, and 1942; Peryea 1998), which on the Hanford Site included apples, cherries, apricots, peaches, pears, plums, and prunes (Sharpe 1999). The application of lead arsenate ceased when orchard operations ended (Sharpe 1999; DOE/EM-0319; DOE/RL-2010-97). In some areas of the Hanford Site, there is still evidence of the old trees—stumps and branches mostly—and a few investigations have been conducted to evaluate lead arsenate residues in the soil (Yokel and Delistraty 2003; Delistraty and Yokel 2011; Bunn et al. 2014).

Previous studies of the vertical distribution of lead and arsenic through soil have indicated various depths of contamination below the surface. One consistent observation is that the arsenic is generally more mobile, moving somewhat deeper than lead. This finding would indicate that the lead and arsenic are no longer chemically associated and could be treated as two distinct contaminants, which is consistent with previous work (Renshaw et al. 2006). The vertical migration of contaminants is a function of soil type, soil chemistry, and precipitation/irrigation (Veneman et al. 1983; Newton et al. 2006; MacLean and Langille 1981; Renshaw et al. 2006; Staed et al. 2009; Delistraty and Yokel 2011). The studies of vertical migration most relevant to the former orchard properties indicate that lead could be expected to have migrated down to 0.4 m (16 in.), and arsenic to 1 m (39 in.) (Peryea and Creger 1994; Yokel and Delistraty 2003).

Peryea and Creger (1994) conducted their study of the vertical distribution of lead and arsenic in old orchards near Wenatchee, Washington, north of the Hanford Site. Most of the lead and arsenic were restricted to the upper 40 cm (16 in.) of soil. The highest concentration of lead ranged from 2.15 to 10.69 mmol/kg (445 to 2215 mg/kg); the highest concentration of arsenic ranged from 0.77 to 4.85 mmol/kg (57.7 to 363 mg/kg). The peak concentration of lead or arsenic in the different vertical replicates varied from the surface to 30 cm (12 in.) below the surface. Lead concentrations decreased rapidly after 30 cm (12 in.) below the surface, while arsenic concentrations tended to be skewed downward and were deeper than the lead peak concentration in half of the replicates. These results suggest that arsenic is more mobile than lead in their study soils. Of note, the authors mention that there was a common practice of tilling the soil between the rows in orchards for managing weeds, and that mechanical mixing of the top 15 to 20 cm (6 to 8 in.) of the soil in the study orchards had occurred regularly up to 15 years prior to the study. Peryea and Creger (1994) identified other pathways for redistribution of the lead and arsenic at depth, including plant uptake as well as release from tree leaves, prunings, and dropped fruit decaying on the surface of the soil; erosion from rill irrigation; arsenic volatilization through microbially-mediated production of volatile alkyarsines; and leaching of rather immobile lead over the decades since lead arsenate was last applied.

Concentrations of lead and arsenic in the soil of former orchards in other places are similar to the concentrations found by Peryea and Creger (1994). Frank et al. (1976) measured the top 15 cm (6 in.) of soil in 31 orchards in Ontario, Canada, and found an average lead concentration of 247 mg/kg (6.4 to 888 mg/kg range) and an average arsenic concentration 54 mg/kg (3.2 to 126 mg/kg range). Veneman et al. (1983) reported the top soil in an orchard in Hampshire County, Massachusetts, ranged from 165 to 1404 mg/kg lead and 49 to 332 mg/kg arsenic. The New Jersey Historic Pesticide Contamination Task Force (NJDEP 1999) reported a range of concentrations in soils from orchards in that state from nondetected to 924 mg/kg lead and 1.4 to 310 mg/kg arsenic. The top 7.5 cm (3 in.) of soil in Barber Orchard, Haywood County, North Carolina, had a mean value of 930±340 mg/kg lead and 240±80 mg/kg arsenic in the Lower Orchard, and 480±490 mg/kg lead and 160±150 mg/kg arsenic in the Upper Orchard (Embrick et al. 2005). Schooley (2006) evaluated a number of old orchards in Virginia and found a wide range of concentrations: 13 to 39 mg/kg lead and 5 to 7 mg/kg arsenic in Smyth and Wythe County; 104 to 701 mg/kg lead and 26 to 229 mg/kg arsenic in Waren County. Gilpin et al. (2007) measured higher concentrations in an orchard that extended across multiple counties in Virginia and West Virginia, with the top-soil ranging from 7 to 1150 mg/kg lead and 2.5 to 263 mg/kg arsenic.

Washington State has conducted numerous evaluations of lead and arsenic concentrations in former orchards in addition to the work by Peryea and Creger (1994). Wolz et al. (2003) measured the topsoil in Chelan and Douglas counties and found the top-soil ranging from 1.2 to 594 mg/kg lead and <2.5 to

103 mg/kg arsenic. To date, Ecology has reports of soil sampling at 26 public schools and parks in the vicinity of Wenatchee, Yakima, and Spokane (Ecology 2017). The initial investigations at these locations reported the highest concentrations at Eastmont Junior High School, East Wenatchee (2200 mg/kg lead and 405 mg/kg arsenic), and Lincoln Elementary School, Wenatchee (1496 mg/kg lead and 420 mg/kg arsenic) (Ecology 2010, 2007, respectively). Ecology has used a variety of remediation options at the public schools and parks to limit the exposure of lead and arsenic to children and the public in general, ranging from property deed notifications, institutional controls, removal, and capping.

Yokel and Delistraty (2003) published the first study on the characterization of lead and arsenic in former orchards on the Hanford Site. They sampled six locations, around and between 100-H and 100-F reactor areas, within areas that are now part of the 100-OL-1 OU. They also evaluated the concentrations at depth at one site. The results of the depth sampling showed that the surface sample had the highest concentrations of lead (mean of 1100 mg/kg) and arsenic (mean of 110 mg/kg). As with Peryea and Creger (1994), the highest concentrations of residual lead arsenate were at the surface or just below the surface of the soil. The vertical trend was also similar to Peryea and Creger (1994), in that the concentration of lead decreased significantly from 10 to 20 cm (4 to 8 in.) in depth, while the arsenic concentration showed a decrease from 10 to 20 cm (4 to 8 in.) and then a gradual decrease to the deepest sampling depth, 50 cm (20 in.). At 50 cm (20 in.), the average concentrations were 30 mg/kg lead and 50 mg/kg arsenic.

A second publication by Delistraty and Yokel (2011) assessed the ecotoxicity of the orchard soils from Hanford (discussed further in Section 6). In addition, they evaluated the speciation of the arsenic in the former Hanford orchards soil and found that more than 99% of the total arsenic in the soil was present as arsenic (V). Therefore, soil measurements of total arsenic evaluated in Hanford soils would be a close approximate to the sum of valence states of arsenic (both III and V) (Delistraty and Yokel 2011).

In 2014, TPA agencies identified the need for a pilot study to evaluate the effectiveness of using an XRF analyzer to characterize the lead and arsenic on the surface of the soil in the OU. The pilot study provided information to evaluate a manageable size for a DU, the number of locations to evaluate in a DU, and factors for evaluating QC and QA of the XRF analyses. Section 2 includes a more detailed discussion of the pilot study.

Some limited data from past investigations on the Hanford Site provide information on the concentrations of lead and arsenic present in the surface soil of the former orchard properties. These data provide evidence for what the expected concentrations of arsenic and lead in the upper 1 m (39 in.) might be on the former orchard sites (Table 1-1). The two studies by Yokel and Delistraty provide lead and arsenic concentrations at the surface across several areas within the OU (Yokel and Delistraty 2003; Delistraty and Yokel 2011). The pilot study for the 100-OL-1 OU (Bunn et al. 2014) determined that measured concentrations of lead and arsenic were within the range of concentrations previously observed (Table 1-1). The data in Table 1-1 from the Hanford Environmental Information System (HEIS) primarily were collected during remediation of other waste sites, and may not be representative of lead arsenate residues. While the soil samples were all taken from within the boundaries of the former orchards, the sampling sites were not evenly distributed in space, so the samples might not be representative of the orchard soil, and they might not have been derived from the surface soils. The nature of the sampling results in some of the HEIS data could have biased the average concentration of the samples compared to the true average concentration expected on undisturbed orchard soils. However, the concentrations of arsenic and lead in soil measured in these samples are consistent with soil sampling studies across the United States on orchards treated with lead arsenate pesticide.

Table 1-1. Surface Soil Concentrations of Lead and Arsenic Measured on Former Orchards on the Hanford Site, and Other Orchard Locations.

Source	Lead (mg/kg)					Arsenic (mg/kg)				
	n	Mean	Median	Sd	Max	*n*	Mean	Median	Sd	Max
Yokel and Delistraty 2003	31	220	27	460	1900	31	30	5.7	61	270
Delistraty and Yokel 2011	11	208	NR	142	390	11	39.5	NR	40.6	128
Pilot Study (Bunn et al. 2014)	160	164	33.7	390	4187	160	18	6.5	38	415
HEIS Data[(a)]	825	35	9.8	91	1240	881	8.7	4.0	14	111
HEIS Data[(b)]	78	55	23	98	665	113	8.0	5.2	7.9	54
HEIS Data[(c)]	109	113	44	173	1240	108	26	15	27	111

(a) All HEIS soil samples were taken within the boundaries of 100-OL-1 OU. Data were removed from consideration if sampling records confirmed a result was not representative of orchard surface soils. For example, sludge collected from the bottom of a sump, or soil in an excavation collected more than 1.5 m (4.9 ft) below grade, did not qualify as surface soil samples.

(b) HEIS data from one orchard were used to determine distribution of soil concentrations (DU-074, -075, -076, 116-F-1 Lewis Canal waste site). Soil sampling was conducted as part of the *Limited Field Investigation Report for the 100-FR-1 Operable Unit* (DOE/RL-93-82).

(c) HEIS data from two orchards were used to determine distribution of soil concentrations (DU-015 and -016).

Max = maximum measured concentration; *n* = number of samples; NR = data not reported; Sd = standard deviation.

1.3.3.2 Hanford Site Ongoing Investigations and Remediation

The numerous facilities and waste sites in the 100 Area that are co-located with the 100-OL-1 OU have been described by RI/FS activities for each reactor area. The most recent RI/FS documents are listed below:

- *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units* (DOE/RL-2010-96). DU-008 is along the northwestern edge of 100-BC-1 OU.
- *Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units* (DOE/RL-2010-97). DU-009 is along the Columbia River shoreline and upstream of 100-KR-1 OU. The orchards were partially covered when fill was placed between 181-KW and 181-KE River Pump Houses.
- *Remedial Investigation/Feasibility Study for the 100-DR-1, 100- DR-2, 100-HR-1, 100- HR-2, and 100-HR-4 Operable Units* (DOE/RL-2010-95). DU-011 and -013 are north and DU-016, -027, and -028 are west of 100-DR-1 OU. DU-020, -021, -025, and -026 are in 100-HR-2 OU. The land designated as DU-022, -023, and -024 is in the highly disturbed areas within the 100-HR-1 and -2 OUs.
- *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units* (DOE/RL-2010-98). DU-072, -073, -074, -075, -076, and -087 are in the 100-FR-1 and -2 OUs. The following DUs have waste sites within the 100-IU-2 and -6 OUs: DU-031, -032, -035, -036, -055, -070, -094, -095, -096, -104, -116, -117, -118, and -133.

1.4 Report Organization

This report is organized into several sections to describe 100-OL-1 OU and the CSM for the 100-OL-1 OU. Section 2 includes a description of the study area investigation and an overview of the lead and arsenic analyses in the OU. The description of the physical characteristics for 100-OL-1 OU draws upon previous investigations of the Hanford Site and is discussed in Section 3. Section 4 provides an overview of the nature and extent of lead and arsenic on and around the OU. Section 5 describes what is known about possible transport of lead and arsenic into other media on the Hanford Site. The human health and ecological risk assessment in Section 6 draws upon the other risk assessments for the 100 Areas and compares the field characterization results to selected risk-based soil thresholds and screening levels for human and ecological health. Section 7 includes a summary of the RI investigations of the 100-OL-1 OU.

The appendices include the details to support the RI report. Maps of the sample locations and associated lead and arsenic concentrations from field characterization activities within the 133 DUs are in Appendix A. The lead and arsenic concentrations for the 4127 sample locations within the 133 DUs are presented tabular form in Appendix B, and include the review and validation qualifiers. Appendix C provides an overview of the data quality evaluation activities in support of the RI report. The RI also included sampling outside of the OU where surface soil concentrations at the boundary were equal to or greater than 150 mg/kg lead or 15 mg/kg arsenic, referred to as "step-out sampling." There were 43 DUs with step-out sampling. Appendix D includes the soil sample concentrations for the step-out sampling, maps of the sample locations within the DU and step-out sampling (with the associated lead and arsenic concentrations), and summary statistics. Appendix E summarizes the historical and cultural information for the RI. Appendix F is provided for information only and includes lead and arsenic measurements in waste sites that are co-located within the 100-OL-1 OU.

2. Study Area Investigations

The study area investigations for 100-OL-1 OU combine results of previous studies and monitoring activities performed for this RI and for the River Corridor Interest Area. Previous studies include the pilot study for the OU (Bunn et al. 2014) and the field characterization activities completed for this RI. In addition, the River Corridor Interest Area has completed relevant evaluations and monitoring activities within 100-OL-1 OU concerning lead arsenate pesticide residues in soil, groundwater, sediment, and surface water. Section 2.1 identifies those studies within the River Corridor Interest Area that provide the historical and monitoring information to identify the nature and extent of contamination. Section 2.2 summarizes the field activity documentation for the RI.

2.1 Remedial Investigation Activities

This section describes the investigations within the River Corridor Interest Area that are applicable to the 100-OL-1 OU RI. A pilot study was performed to demonstrate the use of a field portable XRF analyzer to collect data of a quality suitable for this RI. The pilot study is summarized here to provide the basis for the use of the XRF and the recommendations for the sampling design of the RI activities. This section also summarizes the monitoring and relevant investigations within and near the 100-OL-1 OU to describe the environmental setting and other components of the CSM.

2.1.1 Pilot Study

The pilot study evaluated the use of a field portable XRF analyzer to obtain results of lead and arsenic concentrations on the soil surface as an indicator of lead arsenate pesticide residues in the OU (Bunn et al. 2014). The pilot study evaluated four regions within the OU that varied in size, previous agricultural activities, and level of soil disturbances since 1943. The objectives of the pilot study included evaluating a field portable XRF analyzer as the analytical method for decision-making (also called confirmatory sampling), estimating the nature and extent of lead and arsenic in surface soils in four areas of the OU, evaluating the results to optimize the sampling approach implemented in the RI, collecting information to improve the cost estimate, and planning the cultural resources review for sampling activities in the RI. The following summarizes the results and recommendations of the RI, which have been used for the DQO and incorporated into the Sampling and Analysis Plan (DOE/RL-2012-64).

XRF analysis was performed within the QC and QA guidelines for evaluating lead and arsenic in surface soils as established by EPA (2007) for the field portable instrument. The Niton XLt3 950 demonstrated that the analyses were precise, accurate, and repeatable. The sensitivity of the instrument was low enough to distinguish between concentrations below and at the soil screening criteria for lead (250 mg/kg) and arsenic (20 mg/kg). Confirmatory soil samples analyzed by inductively coupled plasma mass spectroscopy (ICP-MS) and XRF demonstrated that the XRF measurements meet QC guidelines to consider the results for screening-level data and potentially meet definitive level data criteria (EPA 2007). The pilot study recommended the work plan design the characterization efforts in the RI using XRF measurements with confirmatory ICP-MS analyses.

The evaluation of the four regions within the OU demonstrated that a consistent area size (i.e., a consistent area for each DU) was important for interpreting the results. The three areas evaluated that were less than 50 acres revealed a pattern of elevated lead and arsenic concentrations. The significance of the contamination in each area was evaluated considering three conditions: (1) the upper one-sided 95% confidence limit of the true mean soil concentration is less than the screening level, (2) no more than 10% of the samples exceed the screening level, and (3) no single sample exceeds two times the screening level (based on WAC 173-340-740(7)). The evaluation conditions are consistent with determining if the monitoring results comply with Washington State's *Model Toxics Control Act* (MTCA) Method A unrestricted land use soil cleanup standards (WAC 173-340-740(7)). All four areas evaluated in the pilot study failed the evaluation conditions. The spatial density of the evaluation of soil concentrations in the largest area (250 acres) demonstrated that lead and arsenic concentrations in some of the agricultural areas exceeded the screening criteria, but the spatial density of the results does not allow delineation of areas of concern. The pilot study recommended that the work plan establish DUs of similar defined areas, with divisions along roads or land use changes based on aerial imagery. For the most part, 40 to 50 acres was identified as the DU size because most of the orchards were in 10- to 20-acre land plots sold to owners, and the roads leading to these lands divide much of the OU into 40-acre plots (Bunn et al. 2014).

Concentrations of lead and arsenic exceeding the screening criteria were found in soil samples at locations along the borders of the areas evaluated. In some cases, the border of the area evaluated was within the border of the OU (where additional sampling would occur) rather than along the outside boundary of the OU (where no additional sampling would occur). The pilot study recommended that the work plan define the process for field investigation of soil concentrations exceeding the screening levels at the boundary of the 100-OL-1 OU.

The pilot study evaluated aspects of the sampling approach with the XRF analyzer to provide confidence in data for assessing areas above and below the lead and arsenic screening criteria. These include the number of locations to evaluate in a DU. A systematic grid with a random start was used to ensure uniform spatial coverage across the DUs. The number of samples needed in each area evaluated was 28, a number that provides 99% confidence that a DU is "dirty" if the true mean exceeds the screening criteria (250 and 20 mg/kg for lead and arsenic, respectively), with the assumptions that the data would not be normally distributed and the relative standard deviation (RSD) was 100% (DOE/RL-2014-38; Bunn et al. 2014). Because there was information suggesting that the RSD might be greater than 100%, the number of sample locations was increased to 40 for the pilot study. The average sample density for all the areas evaluated in the pilot study was 0.8 sample locations per acre. The Visual Sample Plan (VSP) software tool was used to evaluate the number of locations required to determine, with 95% confidence, that a site is "clean" for various average concentrations and RSD (Bunn et al. 2014). Based on these results, the minimal number of sample locations would be 11, the number of locations that is independent of the RSD for evaluating concentrations that are low or near background concentrations. The number of sample locations to analyze at the screening level for lead and arsenic with a 125% RSD is 39 locations. This is similar to the number of locations per area evaluated in the pilot study.

In addition, the pilot study evaluated the number of replicate soil analyses at each location and the length of count time for the XRF analyzer to meet quality criteria for lead and arsenic data. There were three replicate analyses at each sample location. Compared to the spatial variability within an evaluation area (ranging from 125% to 266% RSD), the reproducibility of a single, 60-second measurement with the XRF analyzer was adequate for characterizing a location (less than 20% RSD).

The pilot study recommended updating the DQOs for the work plan to include a minimum spatial density for each DU evaluation, and updating the XRF field parameters for collecting the data (Bunn et al. 2014).

2.1.2 Historical Information Review

Historical information on 100-OL-1 OU was researched and reviewed during 100-OL-1 OU Work Plan preparation (DOE/RL-2012-64). A summary of historical information about orchards, orchardists, and orchard practices as well as cultural resources within the OU is in Appendix E of this document.

2.1.3 Surface Features

Surface features in and adjacent to the 100-OL-1 OU were identified using prior characterization reports (DOE/RL-2010-95; DOE/RL-2010-96; DOE/RL-2010-98), aerial imagery from 1943 and 2013, and high-resolution topography maps generated from a flyover map (available from the Hanford Geographic Information System). The data were digitized in Intergraph DGN format and converted to ArcInfo coverage files using DGNARC software version 2.0. Maps are at a 1:12000 metric scale with a 2-m resolution. Section 3 presents surface topographic maps of the 100-OL-1 OU and adjacent areas based on the GIS layers, which aid in defining potential contaminant migration.

2.1.4 Contaminant Source Investigations

The process for defining the sources of lead arsenate residual contamination on the Hanford Site started with the initial investigations of the 100 Area OUs and became more focused after the establishment of the 100-OL-1 OU in TPA Change Control Form C-12-02 (TPA 2012a). The initial map of the OU in C-12-02 was created in an undocumented manner over several years in response to numerous and diverse project and program objectives. The following describes the process used while developing the work plan to produce and verify a traceable history for the GIS coverage of the 100-OL-1 OU boundaries (DOE/RL-2012-64) and the sources for investigation of lead arsenate residuals in the soil of the OU.

The first known version of the GIS coverage was a "Hanford Farm" layer. Washington Closure Hanford (WCH) inherited this GIS coverage from Bechtel Hanford, Inc. when WCH took over the contract. The origin of the initial coverage could not be verified. WCH staff modified the Hanford Farm layer based on manual inspection of and comparison with historical (1941 and 1943) and more recent (1999, 2002, and 2008) aerial photography. The modifications by WCH appear to be limited to the shifting of boundaries to better match dividing points (e.g., roads) identified in the aerial photography.

WCH used the Hanford Farm layer to identify orchards by manually noting the presence or absence of orchard trees within a particular farm in the historical imagery (1943 aerial photography). In addition, field observations performed during orphan site evaluations (DOE/RL-2010-98) and the 1943 platted lands map were used to provide evidence of orchard trees. If a farm was observed (by any method) to have evidence of orchard trees, it was classified as an orchard. If no orchard trees were observed, it was considered a farm and was not included in the "Orchards" GIS layer.

The WCH Orchards GIS layer then was used by CH2M Hill Plateau Remediation Company to prepare documentation for the DOE Richland Operations Office (DOE-RL) for the TPA Change Control Form establishing the 100-OL-1 OU. Through this process, some areas (or polygons) were added or removed. In addition, one orchard that is visible in the 1943 aerial photography was found to have been included in the Hanford Farm coverage, but not in any other versions of orchard layers. For completeness of this investigation, all versions of the Orchards GIS coverage were merged to include all potential orchard properties. The result was the 44 individual areas identified in the map included in TPA Change Control Form C-12-02 (TPA 2012a).

Two additional areas of orchards on the Hanford Site near other areas identified in TPA Change Control Form C-12-02 (TPA 2012a) were identified during the development of the work plan (DOE/RL-2012-64). One area is next to the river upstream of the 100-F Area, and the other is located southwest of the 100 F Area. These areas are now included in the 100-OL-1 OU.

The boundaries of the OU and the DUs were further evaluated during the RI. The field characterization team noted during the pilot study that there were tree stumps located outside of the OU boundary (Bunn et al. 2014). The evaluation included the following:

- Reviewing historical aerial imagery from 1943. This resulted in a revision of both OU and DU boundaries based on the visibility of old orchard lands in the 1943 imagery.
- Reviewing current aerial imagery. This resulted in a revision of both the OU and DU boundaries based on the location of current roads traversing the site.
- Reviewing site features. This resulted in a revision of both OU and DU boundaries based on the presence of site features. For example, OU and DU boundaries were revised to follow topographical features, such as land slope. Additionally, DU boundaries were revised based on the presence of historical sites, including the old Hanford High School.

The resulting OU and DU boundaries are used in this RI and are available from the Hanford Geographic Information System.

2.1.5 Ecological Investigations

Plant and animal resources on the Hanford Site are monitored and surveyed by DOE-RL: to evaluate potential exposures resulting from site activities; to assess the condition of endangered, threatened, or sensitive species; and to determine breeding and nesting locations, habitat use, and distribution of key wildlife species. Ecological information was compiled from prior RI/FS reports, the *Hanford Site National Environmental Policy Act Characterization Report* (Duncan 2007), and project-specific Mission Support Alliance (MSA) clearance letters. MSA provided the ecological clearance for conducting the field characterization, and the clearance considered a review of the 100-OL-1 OU and the procedures for *in situ* analyses as well as the soil confirmation sampling. All field investigations for the RI complied with the MSA clearance requirements. There were no ecological investigations performed for this RI. Section 3.5 summarizes the ecological resources found on the Hanford Site.

2.2 Field Characterization and Quality Assurance for the Remedial Investigation

Field investigations were conducted in 100-OL-1 OU to address data needs identified in the 100-OL-1 OU Work Plan (DOE/RL-2012-64). The results of these investigations are presented in Section 6, Human Health and Ecological Risk Assessment, and Appendices A through D.

Prior to field investigations, 100-OL-1 OU was subdivided into 133 DUs based on orchard location, soil disturbance, historical imagery, historical records, size, and presence of roads (DOE/RL-2012-64). The intent was to define regions of the OU that capture the areas where lead arsenate pesticide residues are likely to be found in the soil today. DUs encompass the estimated source areas for the lead and arsenic contamination and the areas of human and ecological exposure today. The size of the DU is related to the sampling area, and the decisions associated with the sampling and characterization of the orchard area (ITRC 2012).

Soil sample locations were selected within each DU systematically using VSP (Matzke et al. 2010) at a spatial density of approximately 200/km^2 (0.8 samples/acres). Table 2-1 lists each DU, the spatial density, and number of locations sampled within a DU. Table 2-2 summarizes the characteristics of the DUs.

At each sample location within the DU, the soil was analyzed with the XRF analyzer. The number of *in situ* analyses per DU, the QC/QA of the analyses, and the decision to examine areas beyond the boundary of the OU are aspects of the sample design and are all based on the screening levels for lead and arsenic. The DQO process identified the following decision rule for the characterization of the 100-OL-1 OU (DOE/RL-2012-64):

The decision rule for characterization of a decision unit is the screening level of 250 mg/kg lead and 20 mg/kg arsenic.

The DU spatial density is at least 200 samples/km^2 (0.8 samples/acres), with a minimum of 13 locations (Table 2-1). The sampling design for each DU was a probability-based sampling approach, which provides the best opportunity to characterize the magnitude and extent of lead and arsenic in the soil across the DU (DOE/RL-2012-64). A probability-based sampling design applies sampling theory and involves random selection of the location of the sampling. An important feature of a probability-based sample is that each member of the population from which the sample was selected has a known probability of being selected. Thus, when a probability-based design is used, statistical inferences are made about the sampled population from the data obtained; e.g., comparing the 95% upper confidence limit (UCL) for lead or arsenic in a DU to a benchmark. A random-start, systematic-grid-sampling design was used to determine the sample locations within a DU. At times, the field sample lead moved the sample location to avoid well pads, piles of rocks, cultural resources, or other features not readily observable prior to field activities. Appendix A includes maps of each DU, starting with DU-001 in the far western portion of the OU.

Table 2-1. DUs for 100-OL-1 OU.

Orchard Area DU ID	Area of DU		Spatial Density (samples/acre)	Number of Sample Locations in DU
	km^2	acres		
DU-001	0.18	44.1	0.8	37
DU-002	0.20	48.4	0.8	39
DU-003	0.20	50.0	0.8	40
DU-004	0.05	11.5	1.2	14
DU-005	0.16	40.6	0.8	33
DU-006	0.08	20.2	0.9	18
DU-007	0.14	33.8	0.8	28
DU-008	0.24	59.7	0.8	46
DU-009	0.03	7.3	2.2	16
DU-010	0.17	42.3	0.8	34
DU-011	0.12	30.0	0.9	26
DU-012	0.16	40.0	0.8	32
DU-013	0.17	41.5	0.9	36
DU-014	0.20	50.6	0.8	40
DU-015	0.20	49.3	0.8	40
DU-016	0.18	45.6	0.8	38
DU-017	0.09	22.3	0.9	19
DU-018	0.10	24.3	0.8	20
DU-019	0.17	41.5	0.8	34
DU-020	0.19	46.4	0.8	39
DU-021	0.08	19.5	0.8	16
DU-022	0.21	51.7	0.8	40
DU-023	0.21	51.9	0.8	40
DU-024	0.23	57.2	0.7	40
DU-025	0.08	20.5	0.8	16

Orchard Area DU ID	Area of DU		Spatial Density (samples/acre)	Number of Sample Locations in DU
	km^2	acres		
DU-026	0.02	5.33	2.4	13
DU-027	0.17	41.1	0.8	33
DU-028	0.16	40.0	0.8	32
DU-029	0.17	41.1	0.8	33
DU-030	0.17	41.6	0.8	33
DU-031	0.16	40.4	0.8	33
DU-032	0.16	40.2	0.8	33
DU-033	0.08	20.7	0.8	17
DU-034	0.16	40.6	0.8	33
DU-035	0.16	40.5	0.8	33
DU-036	0.16	39.5	0.8	33
DU-037	0.16	40.7	0.8	33
DU-038	0.11	27.4	0.8	22
DU-039	0.12	30.5	0.9	26
DU-040	0.09	21.6	0.8	17
DU-041	0.09	21.2	0.9	18
DU-042	0.16	38.4	0.8	32
DU-043	0.16	40.1	0.8	33
DU-044	0.17	41.9	0.8	34
DU-045	0.17	42.6	0.8	36
DU-046	0.17	42.8	0.8	36
DU-047	0.16	39.7	0.8	32
DU-048	0.16	40.3	0.8	33
DU-049	0.16	40.7	0.8	33
DU-050	0.16	40.2	0.8	33
DU-051	0.16	39.7	0.8	33
DU-052	0.16	40.1	0.8	32
DU-053	0.11	27.2	0.8	22
DU-054	0.16	39.8	0.8	32
DU-055	0.20	50.1	0.8	40
DU-056	0.07	18.5	0.9	17
DU-057	0.10	25.0	0.9	22
DU-058	0.18	45.2	0.8	38
DU-059	0.14	35.0	0.8	28
DU-060	0.14	35.7	0.8	29
DU-061	0.12	29.1	0.8	24
DU-062	0.18	43.3	0.8	35
DU-063	0.13	33.3	0.8	28
DU-064	0.18	44.3	0.8	37
DU-065	0.16	40.0	0.8	33
DU-066	0.17	42.0	0.8	35
DU-067	0.19	45.7	0.8	38

Orchard Area DU ID	Area of DU		Spatial Density (samples/acre)	Number of Sample Locations in DU
	km^2	acres		
DU-068	0.18	44.0	0.8	37
DU-069	0.07	17.7	0.8	15
DU-070	0.13	33.0	0.8	28
DU-071	0.18	44.2	0.8	37
DU-072	0.17	41.2	0.8	33
DU-073	0.18	43.6	0.8	35
DU-074	0.15	36.8	0.9	32
DU-075	0.09	22.6	0.9	20
DU-076	0.16	38.4	0.9	33
DU-077	0.19	47.4	0.8	38
DU-078	0.06	14.6	0.9	13
DU-079	0.18	44.2	0.9	38
DU-080	0.05	11.8	1.8	21
DU-081	0.17	41.5	0.9	36
DU-082	0.19	46.2	0.8	38
DU-083	0.08	20.6	0.8	17
DU-084	0.08	20.8	0.8	17
DU-085	0.20	48.7	0.8	41
DU-086	0.18	44.7	0.8	37
DU-087	0.23	57.5	0.7	40
DU-088	0.19	46.4	0.8	38
DU-089	0.20	50.1	0.8	41
DU-090	0.20	49.2	0.8	40
DU-091	0.16	39.1	0.8	33
DU-092	0.19	45.8	0.9	40
DU-093	0.11	26.3	0.9	23
DU-094	0.17	41.7	0.8	35
DU-095	0.17	41.0	0.8	33
DU-096	0.12	30.8	0.8	25
DU-097	0.21	51.3	0.8	40
DU-098	0.13	32.1	0.9	28
DU-099	0.13	32.3	0.8	27
DU-100	0.22	54.1	0.8	41
DU-101	0.19	46.1	0.8	38
DU-102	0.15	36.6	0.8	30
DU-103	0.16	39.8	0.8	32
DU-104	0.14	35.7	0.8	30
DU-105	0.12	30.8	0.8	25
DU-106	0.13	32.8	0.8	27
DU-107	0.11	27.0	0.8	22
DU-108	0.16	40.7	0.8	33
DU-109	0.14	34.0	0.8	28

Orchard Area DU ID	Area of DU		Spatial Density (samples/acre)	Number of Sample Locations in DU
	km^2	acres		
DU-110	0.14	33.8	0.8	28
DU-111	0.16	39.2	0.8	32
DU-112	0.20	49.5	0.8	40
DU-113	0.10	23.8	0.8	20
DU-114	0.17	41.8	0.8	33
DU-115	0.17	42.9	0.8	35
DU-116	0.17	41.6	0.8	34
DU-117	0.14	35.6	0.8	29
DU-118	0.16	39.7	0.8	33
DU-119	0.15	38.2	0.8	32
DU-120	0.13	33.2	0.8	27
DU-121	0.20	48.8	0.8	40
DU-122	0.18	43.3	0.8	35
DU-123	0.20	49.7	0.8	40
DU-124	0.20	48.7	0.8	40
DU-125	0.15	37.7	0.8	32
DU-126	0.20	48.8	0.8	40
DU-127	0.18	45.3	0.8	37
DU-128	0.12	30.7	0.8	26
DU-129	0.20	50.4	0.8	40
DU-130	0.16	40.0	0.8	34
DU-131	0.16	38.7	0.8	31
DU-132	0.05	11.2	1.2	13
DU-133	0.07	16.1	0.8	13

Table 2-2. Summary of Characteristics of the DUs for 100-OL-1 OU.

Total # of DUs	133
Total Area (km^2 [acres])	20.21 [4995]
Average Size of DU (km^2 [acres])	0.15 [37.6]
Maximum Size (km^2 [acres])	0.24 [59.7]
Minimum Size (km^2 [acres])	0.02 [5.33]
Total # of Analyses[(a)]	4127
Average # of Analyses/DU	31
Maximum # of Analyses/DU	46
Minimum # of Analyses/DU	13

(a) Does not include additional QC analyses.

2.2.1 Use of XRF Analyzer

Surface soil concentrations of lead and arsenic were measured *in situ* using a field portable XRF analyzer (Niton XL3t). *In situ* field investigations were completed in July 2016 and finalized in August 2016. This section describes the use of the XRF analyzer to characterize lead and arsenic in 100-OL-1 OU.

As determined by the pilot study (Bunn et al. 2014), the XRF analyzer was used to characterize surface soil concentrations of lead and total inorganic arsenic. Following the manufacturer's procedure and EPA guidance, the sample location was cleared of significant vegetation and leveled to a flat surface (Thermo Scientific XRF Resource Guide 8.2.0; EPA 2007). Sample locations were cleared and leveled with acid washed (10% nitric acid) spatulas. Each sample location was analyzed for a minimum of 60 seconds for adequate detection and precision of lead and arsenic in soil (Bunn et al. 2014). Figure 2-1 shows examples of the sample locations, looking at the cleared soil area for the XRF analysis, a view from the location looking north, and a view from the location looking east.

Figure 2-1. Selection of Photos from the 100-OL-1 OU. From left to right, view of sample point, looking north and looking east.

The most recent RI/FS documents are listed below, including a list of the DUs within 100-OL-1 OU that are near or within other 100 Area OUs:

- *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units* (DOE/RL-2010-96). DU-008 is along the northwestern edge of 100-BC-1 OU.
- *Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units* (DOE/RL-2010-97). DU-009 is along the Columbia River shoreline and upstream of 100-KR-1 OU. The orchards were partially covered when fill was placed between 181-KW and 181-KE River Pump Houses.
- *Remedial Investigation/Feasibility Study for the 100-DR-1, 100- DR-2, 100-HR-1, 100- HR-2, and 100-HR-4 Operable Units* (DOE/RL-2010-95). DU-011 and -013 are north and DU-016, -027, and -028 are west of 100-DR-1 OU. DU-020, -021, -025, and -026 are in 100-HR-2 OU. The land designated as DU-022, -023, and -024 is in the highly disturbed areas within 100-HR-1 and -2 OUs.
- *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units* (DOE/RL-2010-98). DU-072, -073, -074, -075, -076, and -087 are in the 100-FR-1 and -2 OUs. The following DUs have waste sites within 100-IU-2 and -6 OUs: DU-031, -032, -035, -036, -055, -070, -094, -095, -096, -104, -116, -117, -118, and -133.

For QA of the XRF soil characterization results, the XRF analyzer was evaluated for precision, accuracy, representativeness, comparability, completeness, and sensitivity (DOE/RL-2012-64). Precision was tested daily using site-specific reference material at low, medium, and high concentrations of lead and arsenic (EPA 2007). In addition, a duplicate check was performed after every 20 *in situ* samples and at the end of the sampling day. Accuracy of the XRF analyzer was checked at the beginning and end of each sampling day and after every 20 *in situ* samples using a standard reference material (SRM) and a blank sample (DOE/RL-2012-64). Multiple soil samples from seven DUs were used to evaluate the comparability of the XRF analyzer results to results obtained using ICP-MS (see Section 2.2.3.2). Peer review of the field characterization activities and verification and validation of the characterization results addressed representativeness and completeness of the data. The sensitivity of the XRF analyzer was evaluated to determine the method detection limit (MDL) in accordance with EPA's method for analyzing soil with an XRF (EPA 2007) and in accordance with 40 CFR 136, Appendix B. Criteria for QA measures and results of the confirmatory ICP-MS analysis can be found in Appendix C.

During field investigations, a handheld Garmin global positioning system (GPS) instrument was used to navigate to the predetermined sample locations (± 9 m [30 ft]) and the internal XRF analyzer GPS was used to record coordinates for later spatial analyses. Notations were made on field data sheets if sample locations were moved due to soil disturbance or obstructions (e.g., roads) (DOE/RL-2012-64).

To address uncertainties of lead arsenate disposition outside of the 100-OL-1 OU boundary, additional samples locations were analyzed on the outside of the OU boundary (herein referred to as step-out) when concentrations along the boundary were equal to or greater than 150 mg/kg lead or 15 mg/kg arsenic. Step-out sample locations were predetermined using a random-start systematic-grid-sampling design. Sampling continued beyond the OU boundary until the lead and arsenic concentrations along the outside of the elevated concentrations were less than 51 mg/kg lead and 15 mg/kg arsenic (DOE/RL-2012-64).

2.2.2 Step-Out Sampling Outside of the 100-OL-1 OU

To address the concern that lead arsenate pesticide residues may be in the soil outside the 100-OL-1 OU boundary, additional sample locations outside of the OU were measured with the XRF analyzer (Section 2.2.1). This is referred to as "step-out sampling" in the RI Work Plan (DOE/RL-2012-64). The additional sample locations were analyzed with the XRF instrument outside the OU when the concentration at the boundary of the OU was equal to or greater than 150 mg/kg lead or 15 mg/kg arsenic. The step-out sample locations were selected after evaluating the results collected inside the OU. A random-start, systematic-grid-sampling design was created along the border of the OU with elevated concentrations of lead and/or arsenic at the edge of the DU. The locations were equidistant to the locations within the nearest DU. Sampling of the area continued until the concentrations at the pre-selected locations outside the OU were less than or equal to 51 mg/kg lead and/or 15 mg/kg arsenic.

There were 46 out of the 133 DUs that had associated step-out sampling, or approximately a third of all the DUs in the OU (Appendix D). The DUs with step-out sampling were in the northern, central, and southern portions of the OU (Figure D-1). Appendix D, Figure D-3, is an example of the decision process used by the field characterization team on the continuation of sampling at step-out locations based on the XRF results while in the field.

2.2.3 Quality Assurance for Remedial Investigation Activities

A field portable analyzer has not been used as the main analytical tool for an RI for other 100 Area OUs, and as such, the RI focused on QA to ensure the results were definitive for further decisions for 100-OL-1 OU. This section discusses several aspects of the QA program for the RI. The approach for the QA program is discussed in Section 2.2.3.1. Confirmation of the field portable XRF analyzer results to ICP-MS results in accordance with EPA Method 6200 is discussed in Section 2.2.3.2. Section 2.2.3.3 discusses data verification and validation of the XRF analyzer results. Appendix C includes further information about the QA for the RI activities.

2.2.3.1 Quality Assurance Program

The activities for this RI were conducted as part of a QA program that is based on the requirements as defined in DOE Order 414.1D, *Quality Assurance*, and 10 CFR 830, "Energy/Nuclear Safety Management," Subpart A, "Quality Assurance Requirements." For the RI, the following consensus standards were implemented in a graded approach (ASME 2001):

- ASME NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications*, Part I, Requirements for Quality Assurance Programs for Nuclear Facilities.
- ASME NQA-1-2000, Part II, Subpart 2.7, "Quality Assurance Requirements for Computer Software for Nuclear Facility Applications,".
- ASME NQA-1-2000, Part IV, Subpart 4.2, "Guidance on Graded Application of Quality Assurance (QA) for Nuclear-Related Research and Development."

The RI was conducted as part of the Deep Vadose Zone Applied Field Research Initiative (DVZ-AFRI). The procedures necessary to implement the requirements are documented in *DVZ-AFRI Quality Assurance Plan.*[16] This QA plan conforms to the QA requirements of DOE Order 414.1D, *Quality*

[16] *Deep Vadose Zone-Applied Field Research Initiative Quality Assurance Plan.* QA-DVZ-AFRI-001, Revision 1. 2014. Pacific Northwest National Laboratory, Richland Washington.

Assurance, and 10 CFR 830, Subpart A, "Quality Assurance Requirements." The DVZ-AFRI is subject to the *Price Anderson Amendments Act*. The implementation of the DVZ-AFRI QA program is graded in accordance with NQA-1-2000, Part IV, Subpart 4.2, "Guidance on Graded Application of Quality Assurance (QA) for Nuclear-Related Research and Development."

The work for this report was performed under the technology level of Applied Research. Applied Research consists of research tasks that acquire data and documentation necessary to ensure satisfactory reproducibility of results. The emphasis during this stage of a research task is on achieving adequate documentation and controls necessary to be able to reproduce results.

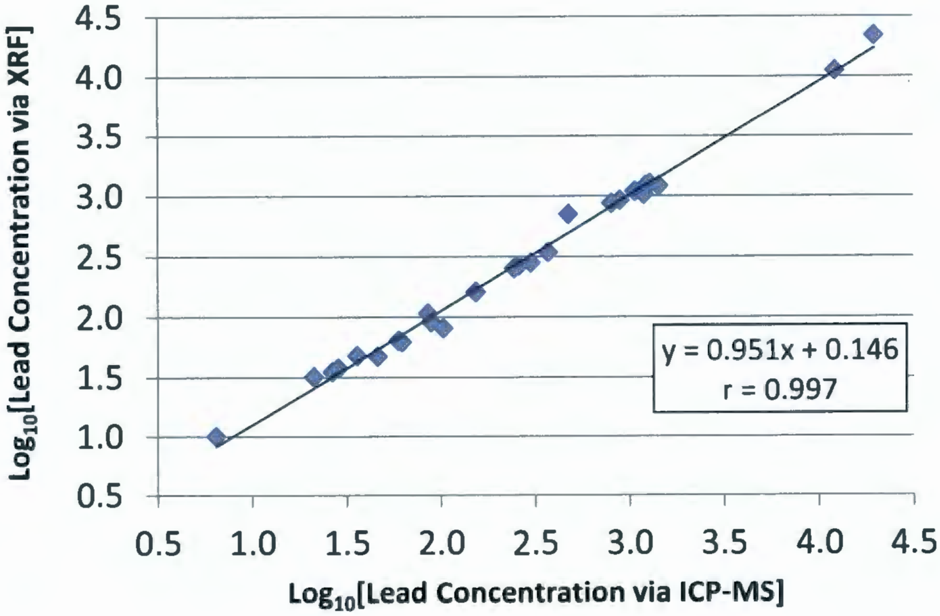
2.2.3.2 Soil Confirmatory Analyses

EPA Method 6200 recommends confirmatory analysis of samples measured by the XRF analyzer. For this study, the performance of the XRF analyzer was compared against results obtained using ICP-MS. Soil samples were collected on June 4 and July 28, 2015. These samples were collected from the top 10 cm (4 in.) of the surface soil. Acid washed scoops were used to remove soil samples, which were placed in new plastic bags. The soil was then homogenized, as recommend in EPA Method 6200. Sample homogenization first involved the removal of large non-soil particles (e.g., rocks and vegetation), after which the sample was spread out on a clean sheet of paper (Whatman Benchkote 2300-594), and non-soil particles were removed manually. Then, 150 to 200 g of soil was removed, placed on parchment paper (45 by 45 cm [17 by 17 in.]), and mixed by alternately lifting corners and rolling the soil onto itself toward the opposite corner 20 times (EPA Method 6200). Each sample was returned to a clean container once homogenization was complete. Following homogenization, samples were split; one was packaged for shipment and ICP-MS analysis and the other was packaged for analysis via XRF.

For ICP-MS analysis of the confirmatory soil samples, aliquots of the homogenized soil (15 to 20 g) were placed in pre-cleaned, pre-tarred, 50-mL polypropylene sample bottles and sent to the Pacific Northwest National Laboratory (PNNL) Marine Sciences Laboratory (Sequim, Washington) for ICP-MS analyses. The soil samples were digested using a procedure based on a modification of EPA Method 3050B (EPA 1996a). An approximately 400 mg (dry weight) aliquot of each sample was combined with a 3:1 ratio of hydrochloric and nitric acids (aqua regia) in a Teflon digestion vessel and heated in an oven at 130°C (±10°C) for a minimum of 8 hours. After heating and cooling, deionized water was added to the sediment digestate to achieve analysis volume. Digested samples were analyzed for arsenic and lead using ICP-MS. This procedure is based on two methods modified and adapted for analysis of low-level sediment and tissue samples: EPA Methods 1638 and 200.8 (EPA 1996b and 1994, respectively). The samples were analyzed within 10 days of receipt. Analytical results were reported with respect to the annual sediment MDL study derived using seven replicates of quartz sand (0.006 mg/kg dry weight lead; 0.3 mg/kg dry weight arsenic). Two method blanks were analyzed with this batch of samples. Metal concentrations above the reporting limits (0.01 mg/kg dry weight lead and arsenic) were not detected in the method blank. Two laboratory control samples (LCS) were analyzed with the batches of samples. The LCS recoveries were within the QC acceptance criterion of ±25% recovery for all metals. Three soil samples were selected for matrix spikes (MS). The MS recoveries were within the QC acceptance criterion of ±25% recovery for all metals. Precision for this set of samples was evaluated by analyzing laboratory duplicates and expressed as the relative percent deviation of replicate results. The relative percent deviation values for the duplicate samples were within the QC criterion of RSD for all metals. The SRM accuracy was expressed as the percent difference (PD) between the measured and certified or reference value for the SRM. Recovery of a particular analyte exceeded the QC criterion if the PD exceeded 20%. The SRM PACS-3 *Marine Sediment Certified Reference Material for Trace Metals and Other Constituents* was analyzed with these samples (National Research Council Canada, Ottawa, Ontario, Canada). The PDs were within the QC acceptance criterion of ± 20%.

For the XRF analysis of the confirmatory soil samples, an aliquot of soil was placed into a plastic sample cup. Sample cups were prepared according to the manufacturer's procedure (Thermo Scientific XRF Resource Guide 8.2.0), with the cups filled completely and tightly packed (no air gaps between the sample and a polypropylene window). The XRF analyzer was then placed on top of the sample cup. The site-specific reference material, blank, and SRM were all measured in the sample cups (Section 2.2.1).

A total of 30 soil samples from seven DUs were analyzed for lead and arsenic with ICP-MS and XRF. Appendix C includes more discussion on the confirmatory analyses. The results of these split sample analyses indicate that the XRF analyzer and ICP-MS report concentrations of lead and arsenic that are nominally the same. According to EPA Method 6200, the soil samples for confirmatory analyses between the two methods should have a correlation coefficient (r) of 0.7 or greater for the results to be considered "screening level data" (EPA 2007). The log-transformed data was used, as recommended by EPA Method 6200, since the concentrations of the confirmatory soil samples span more than one order of magnitude. A linear least-squares regression analysis resulted in r-values of 0.997 and 0.994 for lead and arsenic, respectively (Figure 2-2). Since the correlation coefficient for the lead and arsenic concentrations as measured by XRF and ICP-MS is greater than 0.9, the XRF data "could potentially meet definitive level data criteria" (EPA 2007).



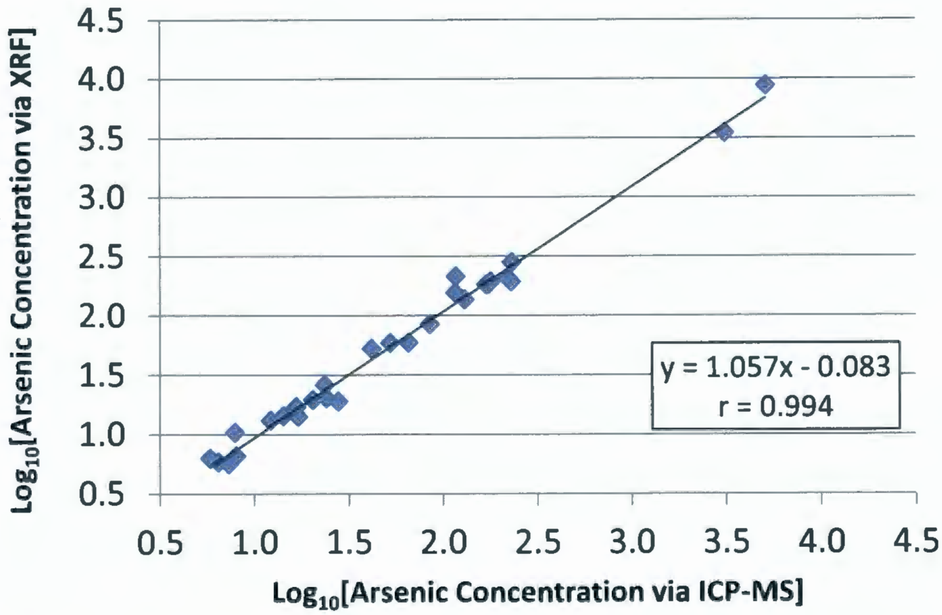


Figure 2-2. Comparison of XRF Analyses and ICP-MS Results for Confirmatory Soil Samples for Lead and Arsenic.

2.2.3.3 Data Verification and Validation

Data collected for the RI were verified and validated, conducted in accordance with the RI Work Plan (DOE/RL-2012-64), internal procedures, and the *DVZ-AFRI Quality Assurance Plan.*[17] The data verification process included evaluating 100% of the collected data for completeness, correctness, and conformance/compliance against the method, procedural, or contractual requirements.

Data validation extends the evaluation of data beyond data verification to determine the analytical quality of a specific dataset. The data validation process included evaluation of supporting documentation, precision and accuracy requirements of the analytical method, and quality goals established during the planning phase. To ensure that data are useable, 100% review of data was performed. Any outliers or questionable results identified during data review had data qualifiers applied (see Appendix B, Table B.1). Concentrations flagged with a "J" or "UJ" qualifier should be considered estimated but useable. Appendix C provides an overview of the data quality evaluation. All the field characterization data presented in Appendices A, B, and D met data quality assessment criteria for use in the RI, and are discussed further in Section 4.3 and Section 6.

[17] *Deep Vadose Zone-Applied Field Research Initiative Quality Assurance Plan.* QA-DVZ-AFRI-001, Revision 1. 2014. Pacific Northwest National Laboratory, Richland Washington.

3. Physical Characteristics of the Study Area

This section describes the physical and environmental characteristics of the 100-OL-1 OU. These physical and environmental characteristics help provide an understanding of the nature and extent of contamination (Section 4) and to develop the CSM. This chapter covers surface features, meteorology, soils, ecology, and cultural resources. The geology, vadose zone below the surface soil, hydrogeology and groundwater characteristics are more completely covered in the annual monitoring reports (e.g., DOE/RL-2014-52 for calendar year 2014 and DOE/RL-2016-09 for calendar year 2015) and River Corridor Interest Area RI/FSs (DOE/RL-2010-95; DOE/RL-2010-96; DOE/RL-2010-97; DOE/RL-2010-98).

3.1 Surface Features

The 100-OL-1 OU lies in the northern half of the Hanford Site, generally along the Columbia River. The 100-OL-1 OU covers 20.21 km^2 (4995 acres, excluding step-out areas) of non-contiguous former orchard lands. Most of the OU land has been disturbed by anthropogenic and environmental factors, including former orchard operations (see Section 2.1.2, Historical Information Review, for information regarding historical orchard operations), reactor construction beginning in the 1940s, waste site remediation activities, recent Columbia River floods, and Pleistocene flooding. Some of the former orchard lands are located in vadose zone OUs. Specifically, 100-B/C, 100-KR-1, 100-HR-1, 100-HR-2, 100-FR-2, 100-IU-2, and 100-IU-6 contain a portion of former orchard lands. Figure 3-1 through Figure 3-5 show major surface features and elevation contour lines on and adjacent to the 100-OL-1 OU. The topography is relatively flat with elevations ranging from approximately 114 to 139 m (374 to 456 ft) above mean sea level. There are steep slopes along the Columbia River near many DUs (e.g., Figure 3-3), creating a clear distinction between habitat types (see Section 3.5, Ecology, for further explanation). Though not included in the OU, Gable Butte (approximately 60 m [200 ft] above surrounding land) and Gable Mountain (approximately 180 m [590 ft] above surrounding land) lay to the south and west of 100-OL-1 OU DUs.

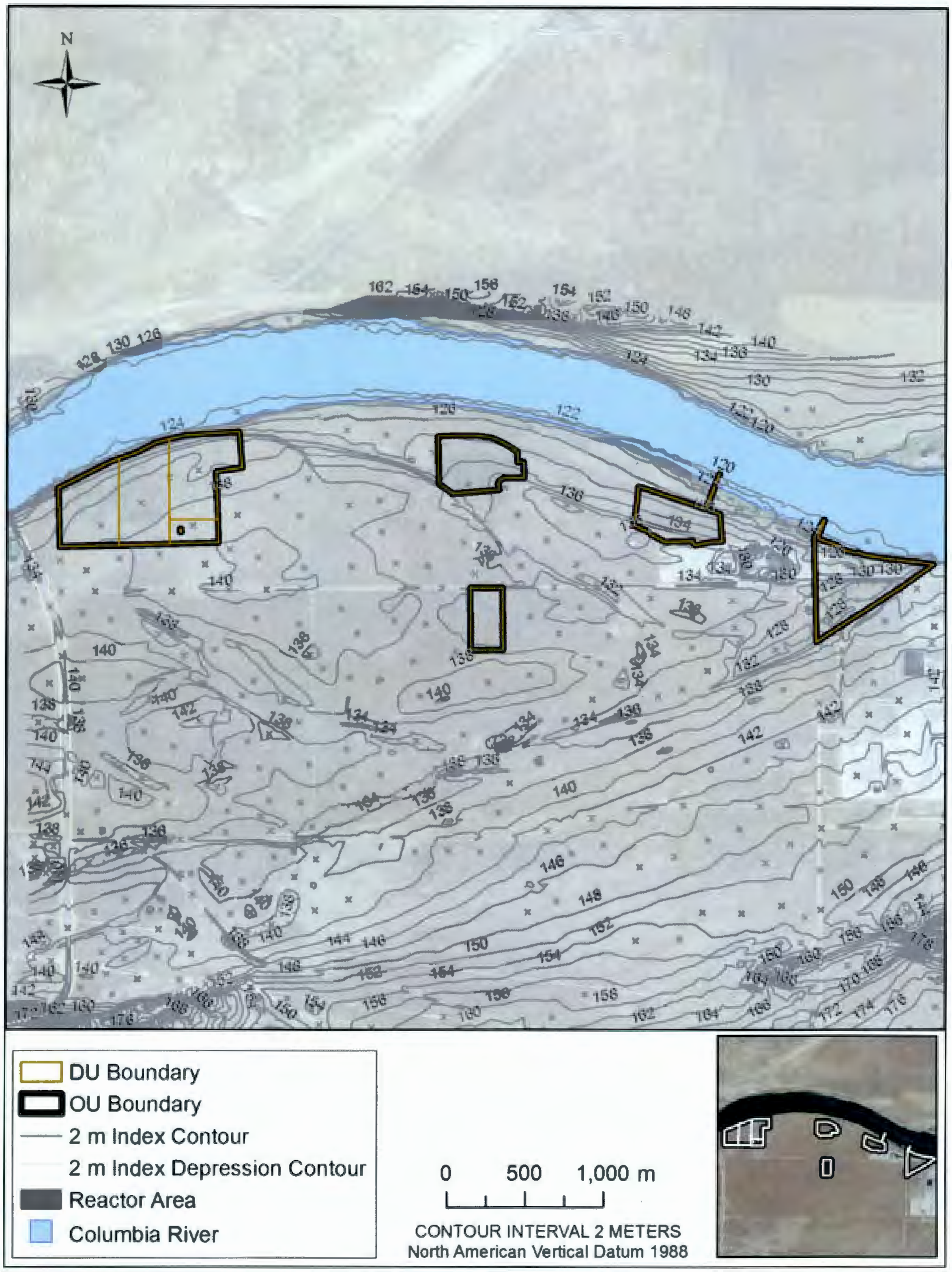


Figure 3-1. Topography of DU-001 through DU-008 of 100-OL-1 OU.

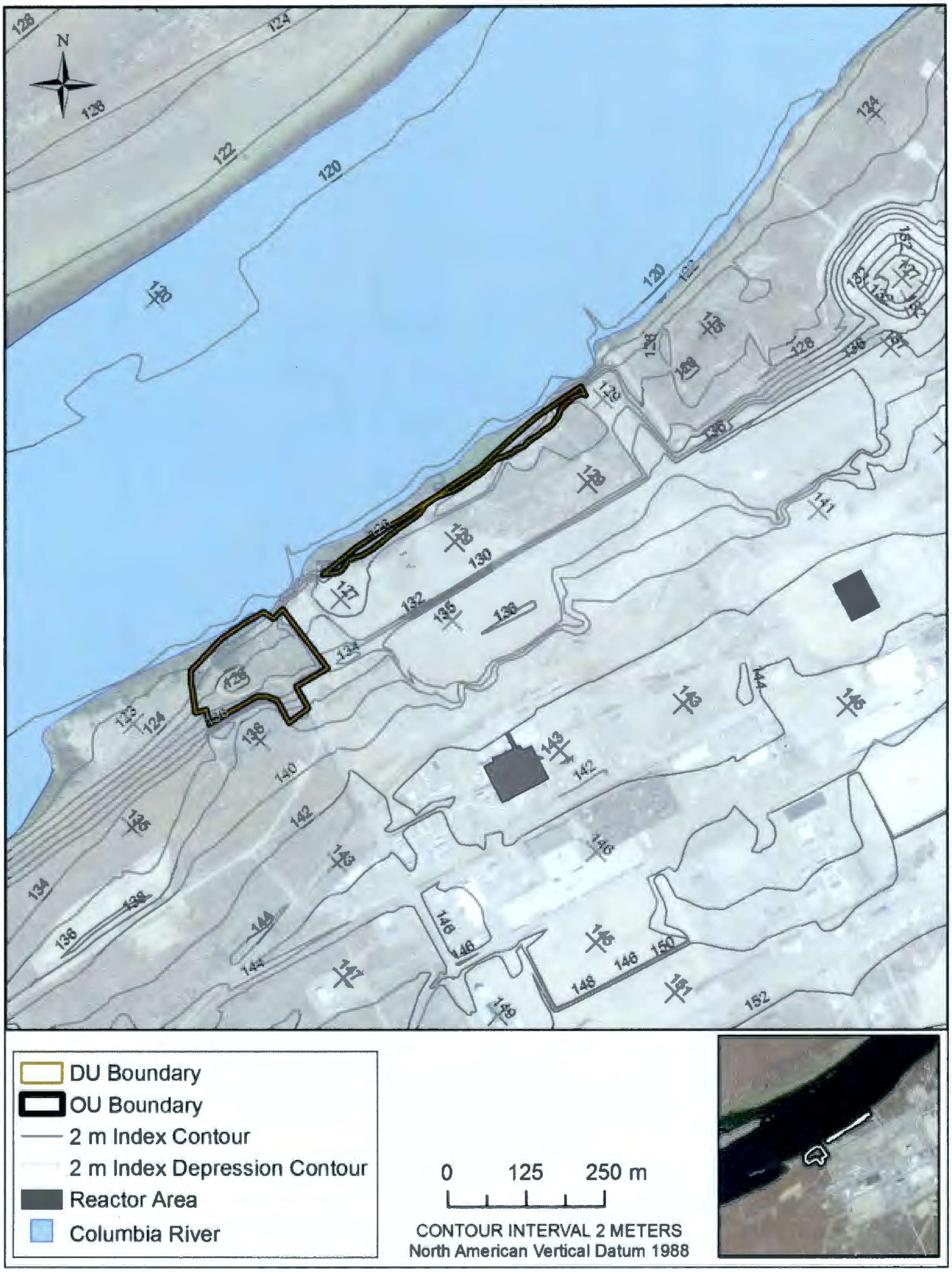
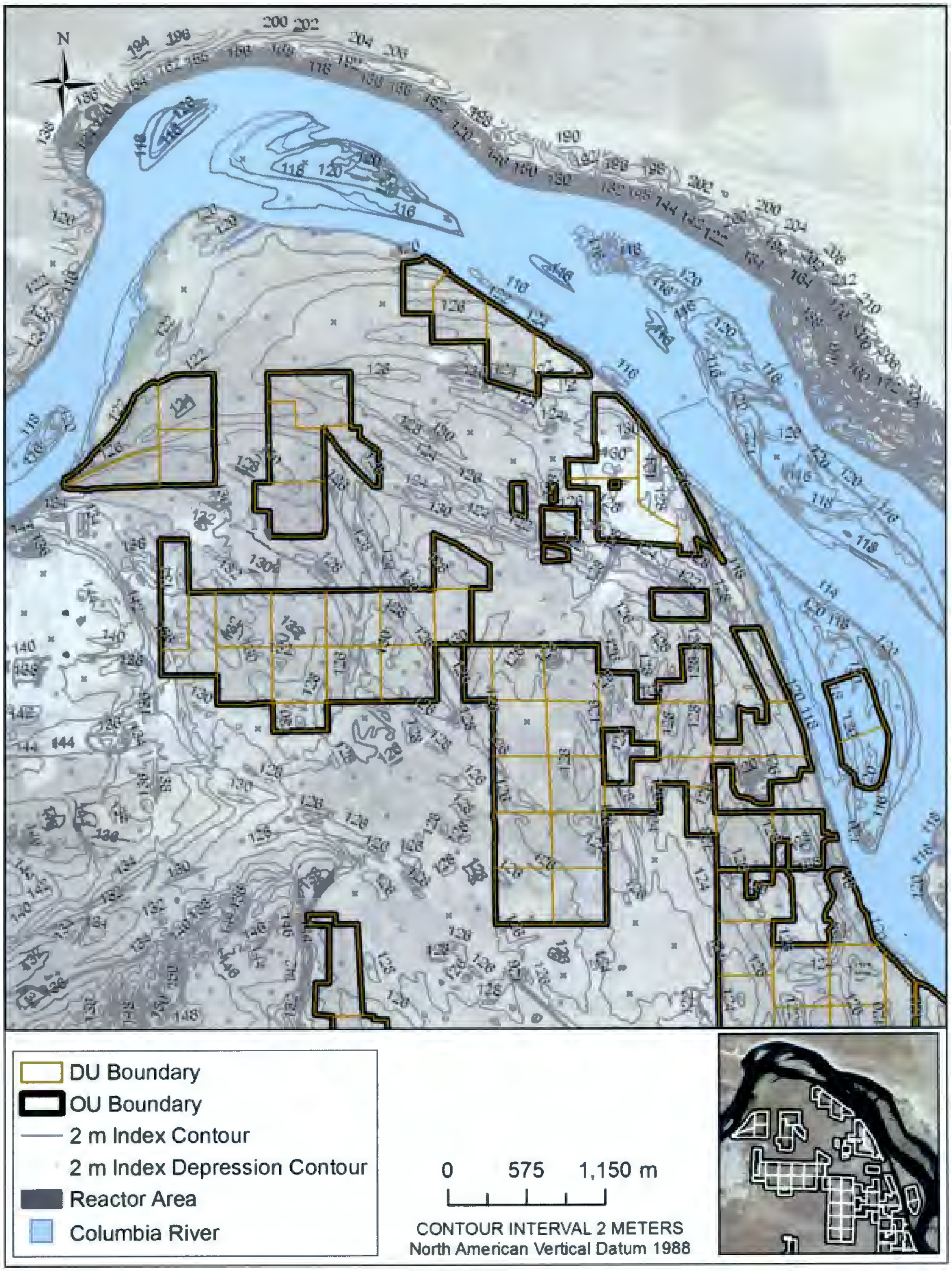


Figure 3-2. Topography of DU-009 of 100-OL-1 OU.



1
2 **Figure 3-3. Topography of DU-010 through DU-065 of 100-OL-1 OU.**
3

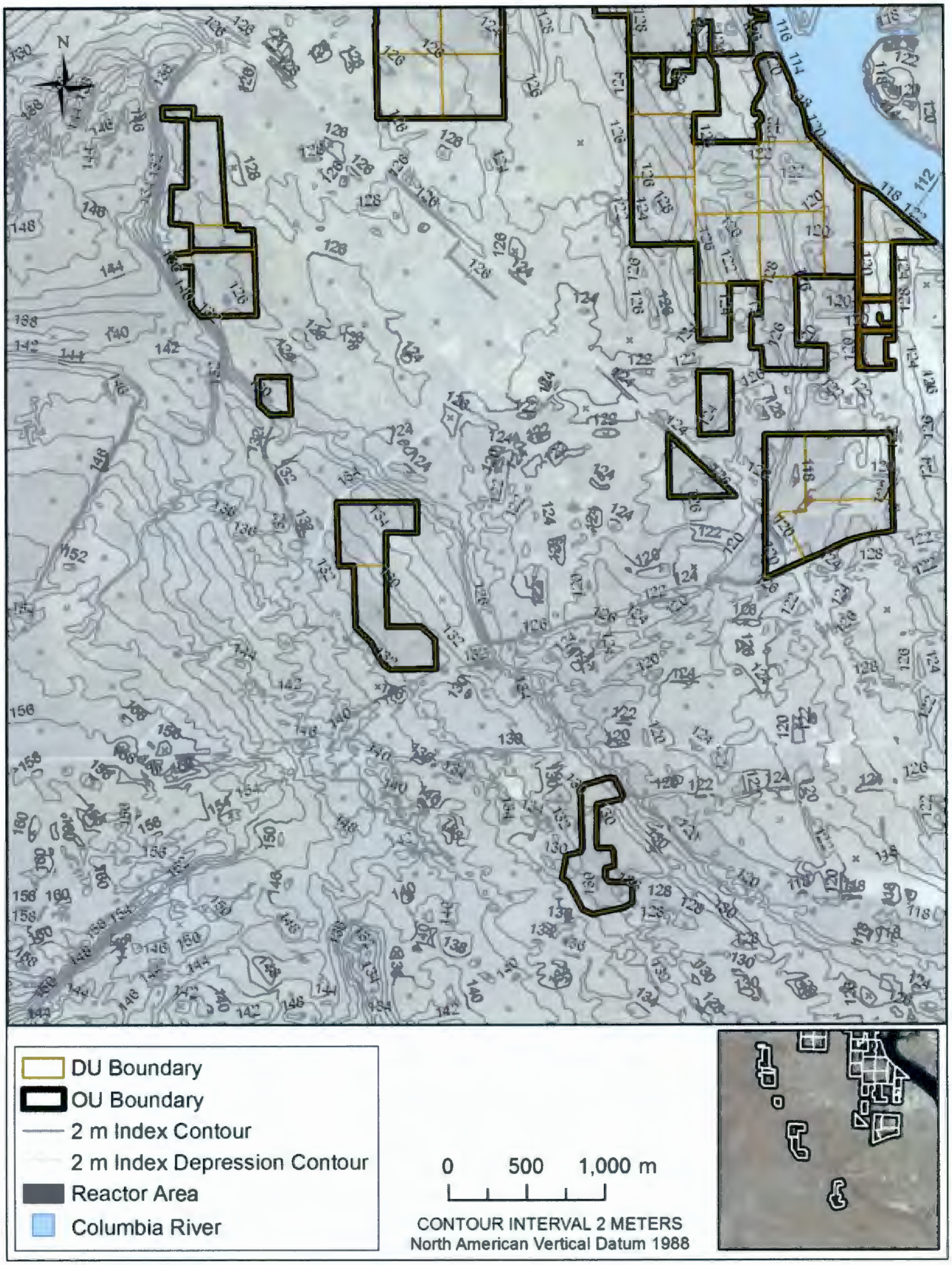


Figure 3-4. Topography of DU-066 through DU-088 of 100-OL-1 OU.

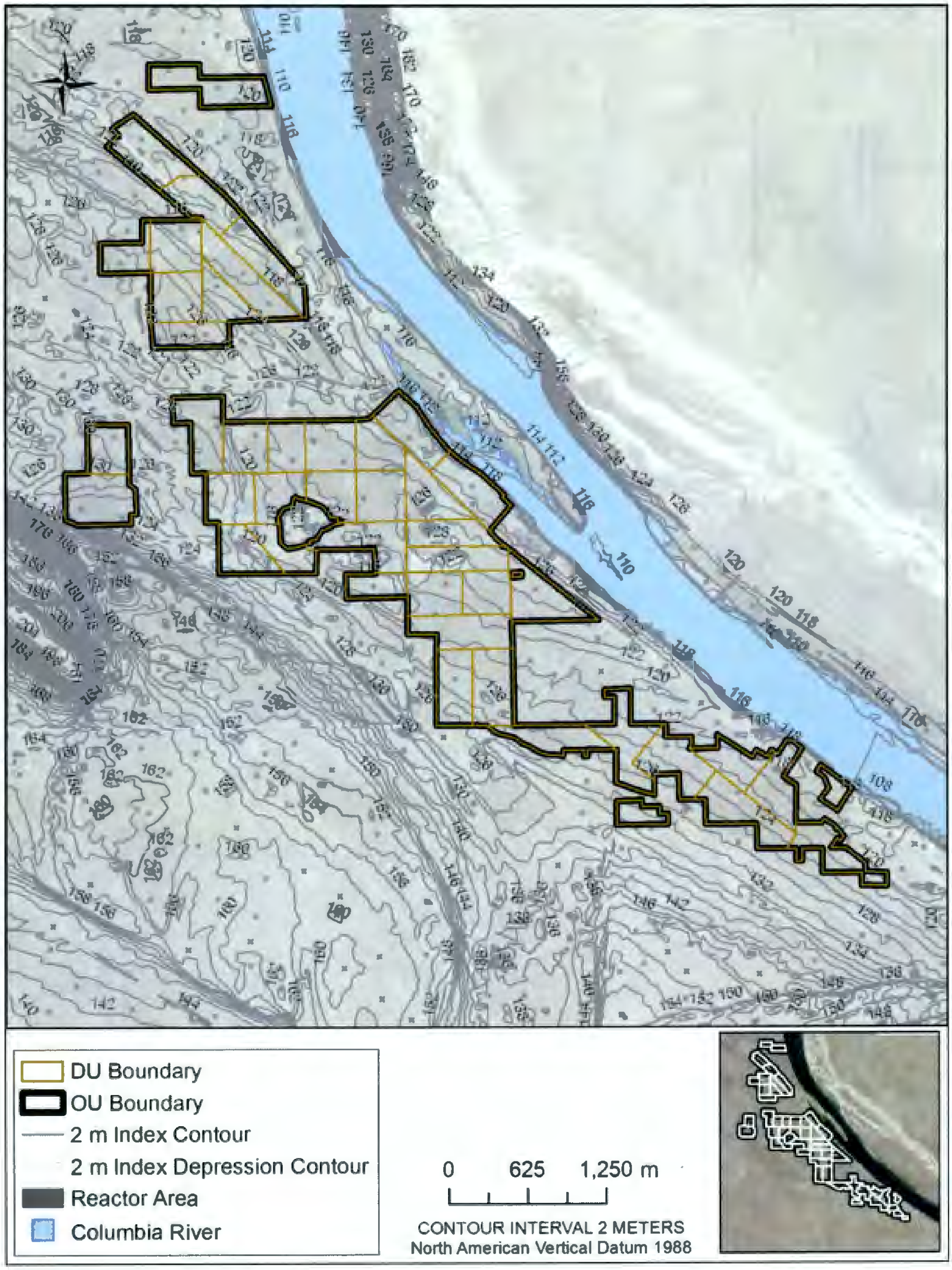


Figure 3-5. Topography of DU-089 through DU-133 of 100-OL-1 OU.

3.2 Meteorology

The Hanford Site has a semi-arid climate and is located in the driest and warmest portion of the Columbia Plateau, called the Pasco Basin. The Columbia Plateau's large size and complex topography contribute to substantial spatial variations in wind, temperature, precipitation, and other meteorological parameters (Duncan 2007). The Cascade Range, to the west of the site, creates a rain shadow effect over eastern Washington State, minimizing precipitation across 100-OL-1 OU, while the Rocky Mountains and ranges in southern British Columbia protect the area from more severe polar air masses from Canada (*Hanford Site Climatological Summary 2004 with Historical Data* [Hoitink et al. 2005]).

Climatologic data are monitored at the Hanford Meteorological Station (HMS), near the 200 Area south and southwest of 100-OL-1 OU. Data gathered at the station are representative of conditions in 100-OL-1 OU. There are 30 monitoring locations throughout the Hanford Site and vicinity that provide climate data relevant to this RI. From 1945 through 2009, the recorded maximum temperature was 45°C (113°F) during July 2002 and August 1961, and the recorded minimum temperature was -31°C (-23°F), measured twice in February 1950 (Duncan 2007). The monthly average temperature ranges from a low of -0.24°C (32°F) in January to a high of 25°C (76°F) in July. Annual average relative humidity at the HMS is 54% (Duncan 2007). It is highest during the winter months, averaging about 76%, and lowest during the summer, averaging approximately 36% (Duncan 2007).

The annual precipitation at the Hanford Site from 1947 to 2009 has varied from approximately 7.6 to 31.3 cm (3.0 to 12.3 in.), with an annual average of 17.2 cm (6.8 in.). Most precipitation occurs during late fall and winter, with more than half occurring from November through February. Snowfall accounts for approximately 38% of precipitation at the Hanford Site from December through February (Duncan 2007) and for the majority of the moisture that infiltrates the ground. Average snowfall ranges from 0.25 cm (0.1 in.) during October to a maximum of 13.2 cm (5.2 in.) during December, and decreases to 1.3 cm (0.5 in.) during March. The highest monthly snowfall recorded at the HMS was 59.4 cm (23.4 in.) in January 1950 (Duncan 2007; DOE/RL-2010-98).

Surface winds blow across the Hanford Site, predominantly from the northwest during winter and summer months, and from the southwest during spring and fall. Local winds in the 100 Area and along the Columbia River are strongly influenced by near-river topography (Duncan 2007). Average monthly wind speeds at the Hanford Site are lowest during winter, averaging 10 to 11 km/h (6 to 7 mi/h). The highest average wind speeds have been reported during summer, ranging from 14 to 16 km/h (8 to 10 mi/h). The fastest wind speeds recorded at HMS are usually associated with flow from the southwest. However, the summertime drainage winds from the northwest frequently exceed speeds of 47 km/h (30 mi/h).

These winds, and associated dust, are well known by former residents and current workers on the Hanford Site. Dust suppression measures are used in the portions of 100-OL-1 OU that are co-located within Hanford operational areas. Methods used to minimize wind-related concerns in 100-D/H include applying dust suppression water and soluble adhesives (DOE/RL-2010-95).

The wind speed class with the highest frequency of occurrence at HMS is 6.5 to 11 km/h (4 to 7 mi/h). Winds in this category occur 37% of the time. The speed class with the second highest frequency of occurrence is 13 to 19 km/h (8 to 12 mi/h), at 25%. Winds averaging over 40 km/h (25 mi/h) only occur 1% of the time on an annual basis, with the highest frequency (1.6%) in March (Hoitink et al. 2005).

3.3 Soil Setting

This section describes the shallow soils in 100-OL-1 OU. Geospatial information for this analysis is available from the Hanford Geographic Information System. Figure 3-6 shows the locations of each soil type in 100-OL-1 OU.

There are 15 described soil types on the Hanford Site (BNWL-243). Figure 3-6 shows the soil types across the River Corridor with the 100-OL-1 OU boundary. There are six soil types present in 100-OL-1 OU:

- Ephrata Sandy Loam (El) is dark-colored and medium-textured soil that is underlain by gravel. Topography where this soil type appears is generally level (e.g., DU-085 and DU-090).
- Ephrata Stony Loam (Eb) is similar to Ephrata Sandy Loam. It contains large, hummocky ridges that were released from melting glaciers, and large boulders may be present between hummocks (e.g., DU-009).
- Quincy Sand (Qy), also referred to as Rupert sand, is one of the most extensive on the Hanford Site. Quincy sand on the surface is brown to grayish-brown coarse sand that grades to dark grayish-brown sand at depth. It is developed under vegetation such as grass, sagebrush, and hopsage in coarse, sandy alluvium mantled by eolian sands (e.g., DU-010 and DU-045).
- Burbank Loamy Sand (Ba) is also extensive on the Hanford Site. Burbank loamy sand is dark grayish-brown and coarse-textured soil that is underlain by gravel (e.g., DU-035 and DU-081).
- Riverwash (Rv) consists of sand, gravel, and boulder deposits that are periodically flooded. This soil type is found adjacent to the Columbia River (DU-024 and DU-061).
- Pasco Silt Loam (P) is dark grayish-brown soil formed of recent alluvial material. The subsoil consists of stratified layers. This soil type is poorly drained and is only located in low areas adjacent to the Columbia River (e.g., DU-005 and DU-007).

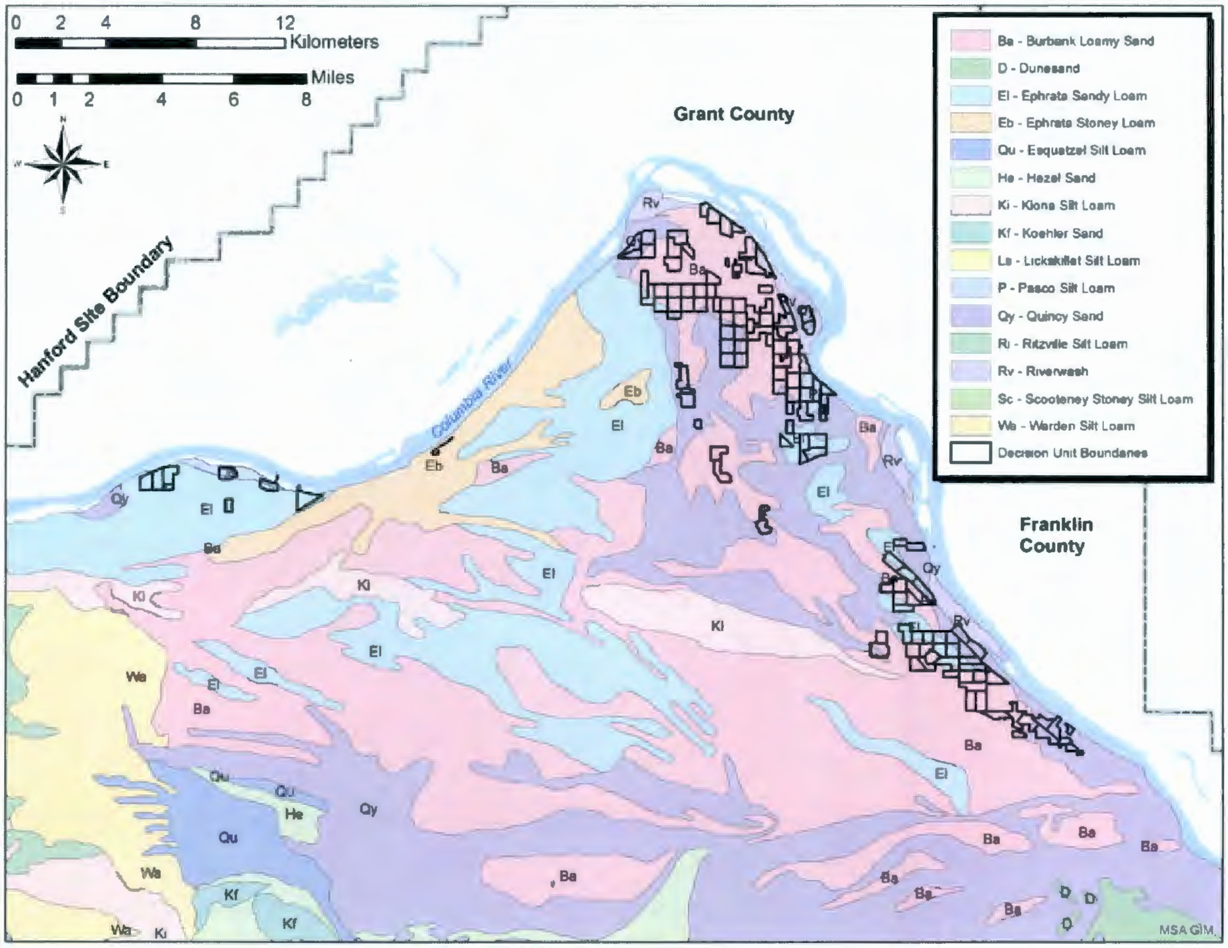


Figure 3-6. Soil Types of the 100-OL-1 OU.

3.4 Demography and Land Use

Demographics. Duncan (2007) provides a detailed discussion of the populations surrounding the Hanford Site, including the adjacent counties and cities. The 2010 population estimate from the U.S. Census Bureau was 48,058 in the city of Richland, the closest population center to the Hanford Site. In the nearby cities, the estimated populations were 11,811 in West Richland, 59,781 in Pasco, and 73,917 in Kennewick (TRIDEC 2016). Population groups near the Hanford Site include Native Americans and various ethnic minorities. Native American descendants living near the Hanford Site today include members of the federally recognized groups, including the Confederated Tribes and Bands of the Yakama Nations, the Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Confederated Tribes of the Colville Reservation. Members of other federally unrecognized Tribes include the Wanapum. There is no continuous human inhabitation in the 100-OL-1 OU.

Three major sectors drive the economy of the region near the Hanford Site: (1) DOE-RL, the Office of River Protection, and the Pacific Northwest Site Office as well as its contractors; (2) Energy Northwest, which operates the commercial nuclear power station, Columbia Generating Station, on land leased from DOE; and (3) the agricultural community and food-processing industry. Additional employment sectors that contribute to the economy are the non-DOE contractor and non-government employers, tourism, and retirees (Duncan 2007).

Land Use. The Hanford Site and 100-OL-1 OU include critical resources to Washington State, including the Hanford Reach of the Columbia River, one of the largest remaining areas of shrub-steppe habitat within the Columbia River Ecoregion as well as one of the richest cultural resource areas remaining in the western Columbia Plateau (Duncan 2007). These resources are relatively undisturbed due to the isolation of these regions from development due to the establishment of the Hanford Site. For example, plans to build a dam within the Hanford Reach were not realized because of potential interference with the mission of the Hanford Site, and today, the Hanford Reach is still a free-flowing stretch of the Columbia River. The area also has preserved agricultural information from 1900 to 1943 that has been lost from other parts of Eastern Washington (Sharpe 1999), sites with cultural materials that are thousands of years old, and traditional cultural places (Duncan 2007).

Currently, DOE's Office of Environmental Management manages land use within the 100-OL-1 OU. Two other federal agencies jointly manage portions of the 100-OL-1 OU along with DOE: The U.S. Fish and Wildlife (USFWS) manages the Hanford Reach National Monument, and the National Park Service (NPS) manages the Manhattan Project National Historic Park at the Hanford Site. The Hanford Reach National Monument was created on June 9, 2000, by a proclamation (65 FR 37253) and includes 792.6 km^2 (306 mi^2) of federally owned land within the Hanford Site, including the quarter-mile strip of the River Corridor that overlaps with 100-OL-1 OU (*Hanford Reach Study Act* [1988] as amended by Public Law 104-333). The Manhattan Project National Historic Park was created on December 19, 2014, and a Memorandum of Agreement between DOE and the U.S. Department of Interior was signed on November 10, 2015, defining the respective roles in creating and managing the park (DOE-EM 2016). At this time the regions of the Manhattan Project National Historic Park that are within 100-OL-1 OU include the warehouse at the Bruggemann's Agricultural Complex (DU-004), the old Hanford High School (DU-124), and Hanford Construction Camp Historic District (DU-101 through DU-133).

The management of the land by DOE within 100-OL-1 OU is consistent with the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222-F), and the corresponding *Supplement Analysis: Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222-SA-01) for the site. These documents identify the future use of the regions of the OU as conservation and preservation. As with the other regions of the River Corridor Interest Area, future interim action cleanup values for lead and arsenic should accommodate a variety of future land use options. The resultant cleanup actions for the OU will be protective of reasonably foreseeable land uses that DOE, the USFWS, and the NPS anticipate for the River Corridor (DOE/RL-2010-96; DOE/RL-2010-98).

There is no use of groundwater within 100-OL-1 OU except for environmental monitoring and remedial actions. The groundwater regions of the River Corridor Interest Area are discussed in Section 4.5.

Tribal Interests. Tribal fishing rights are recognized on rivers within the lands ceded by treaty, including the Columbia River, which flows through the Hanford Site. In addition to fishing rights, the Tribes retain the privilege to hunt, gather roots and berries, and pasture horses and cattle on "open and unclaimed lands." It DOE's position that the Hanford Site, which was assembled from lands acquired from private owners and lands withdrawn from the public domain into a federal enclave with no public entry, is not open and unclaimed land. While reserving all rights to assert their respective positions, the Tribes are participants in DOE's land use planning process, and DOE considers Tribal Nation concerns in that process.

3.5 Ecology

Since the early 1970s, DOE-RL has conducted ecological characterization of the Hanford Site. Sources of information concerning the ecological resources in 100-OL-1 OU include Duncan 2007, the annual Hanford Site Environmental Report (DOE-RL-2014-52), and project-specific information compiled as part of the clearance for field characterization activities.

The Hanford Site is located in the mid-latitude, semi-arid Columbia Plateau with the Columbia River flowing across the eastern and northern sections of the site. The terrestrial ecology of the Hanford Site is mainly characterized by upland and riparian habitat. There are 727 plant species on the Hanford Site (Sackschewsky and Downs 2001; Duncan 2007), with approximately 179 of those species being non-native (Rickard and Rogers 1983). The terrestrial ecology of the 100-OL-1 OU is upland habitat, with several DUs extending into riparian habitat.

Upland Zone. The upland ecological zone, adjacent to the Columbia River and above the high-water mark, is the largest zone within 100-OL-1 OU. Undisturbed areas support shrub-steppe vegetation with plants adapted to low annual precipitation (17 cm [6.8 in.]). Disturbed areas in this zone are generally dominated by annual non-native species.

Riparian Zone. The riparian ecological zone is generally narrow and located between the upland zone and the shoreline of the Columbia River, along island perimeters and along sloughs and backwaters. The vegetation in this zone consists of shrubs, trees, and herbaceous plants that require more water than that of the upland zone. In the riparian zone, the river influences soil/water availability, and species diversity can be greater than in adjacent upland stands.

3.5.1 100-OL-1 OU Flora and Fauna

The ecological communities that inhabit 100-OL-1 OU are influenced by the prior disturbance of these lands by early settlers and their homes and stores as well as farming and livestock grazing (Section 2.1.2 and Appendix D). Fires and ensuing industrial development associated with Hanford Site operations also disturbed the native vegetation and encouraged the spread of non-native species. In general, the recolonization of abandoned agricultural fields and orchard lands by native plant species on the Hanford Site has been slow to absent. Figure 3-7 shows a distribution of vegetation types near the 100-OL-1 OU. Many of the orchard lands continue to be dominated by non-native annual plants such as cheatgrass (*Bromus tectorum*), tumble mustard (*Sisymbrium altissimum*), jagged chickweed (*Holosteum umbellatum*), and Russian thistle (*Salsola tragus*). Figure 3-8 is in DU-081 (at sample location DU-081-001, looking north) and shows the "edge" of the OU boundary, with cheatgrass, tumble mustard, and Russian thistle in the past orchard area (right side), and native shrubs growing on the other side of the OU boundary (left side). Figure 3-9 provides several examples of flora observed during the RI field characterization activities in 100-OL-1 OU.

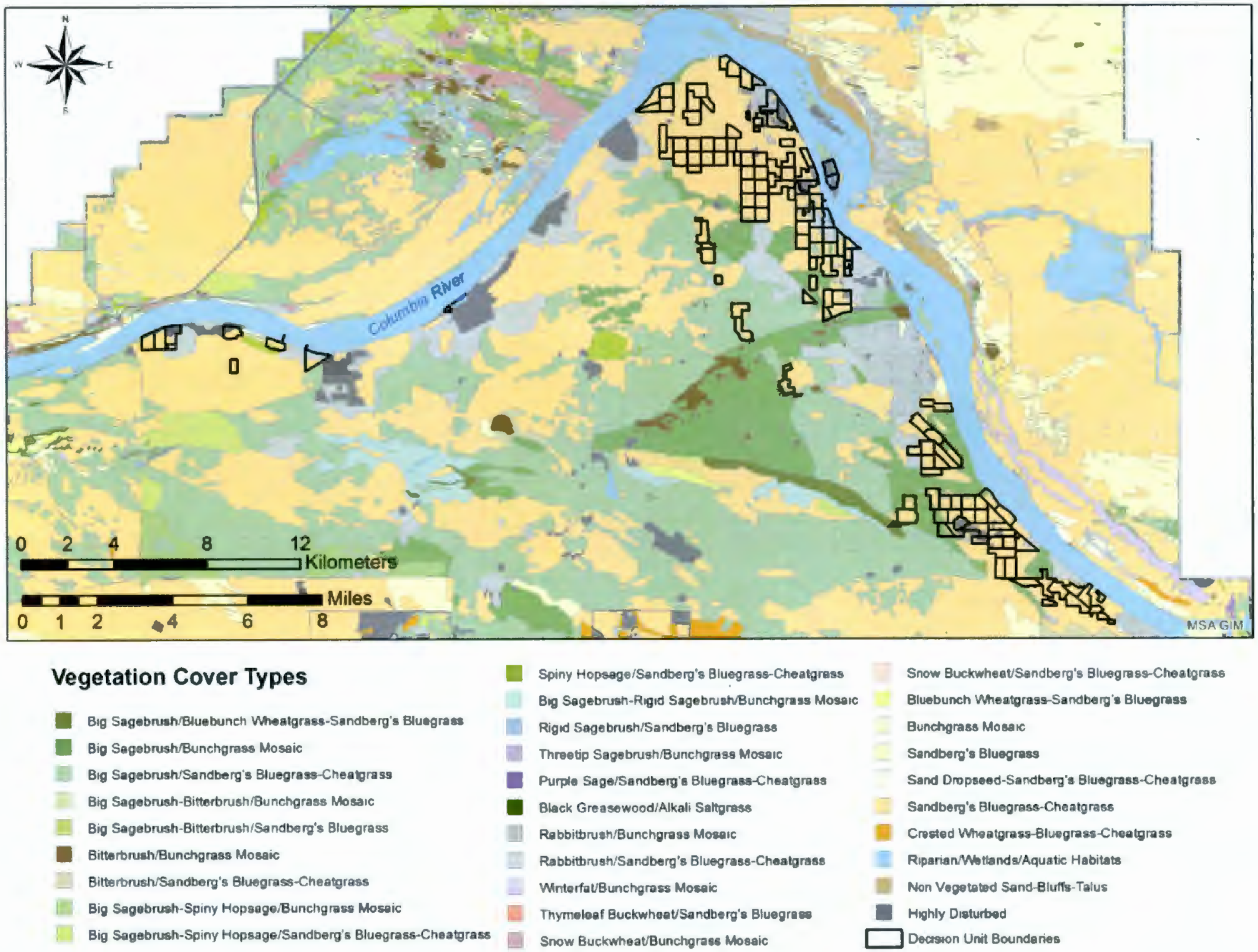


Figure 3-7. Distribution of Vegetation Types on the Hanford Site (DOE/RL-96-32, Rev. 1).

Figure 3-8. The Change in Vegetation Types Is Apparent in DU-081 (north view), where the Former Orchard Area (inside the OU boundary) is Dominated by Cheatgrass and Invasive Species (right side), and Outside the Orchard Area Has Sagebrush and Rabbitbrush (left side).

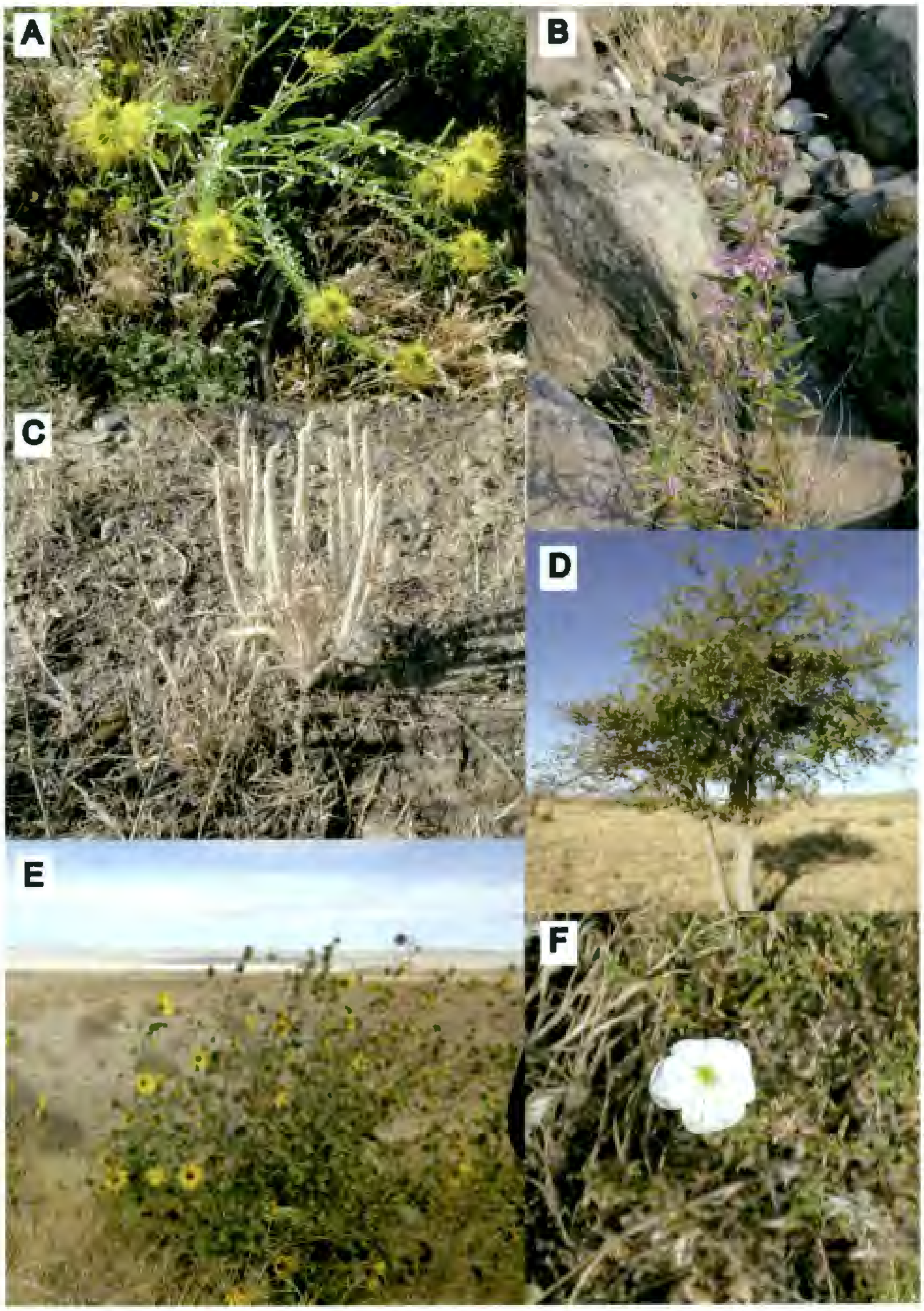


Figure 3-9. Examples of Flora Found in the 100-OL-1 OU. (A) native yellow bee plant (*Cleome lutea*) found in DU-100, (B) invasive purple loosestrife (*Lythrum salicaria*) found in DU-009, (C) native Indian wheat (*Plantago patagonica*) found in DU-117, (D) non-native apple tree found in DU-133, (E) native sunflower (*Helianthus* spp.) found in DU-016, and (F) native pale evening-primrose (*Oenothera pallida*) found in DU-032.

Cheatgrass and other non-native annuals continue to dominate previously disturbed areas such as the abandoned orchards, in part because they have excellent seed germination and dispersal, are well-adapted to the local climate, and out-compete native seedlings for resources. When plants begin to recolonize areas where ground disturbances occurred (such as plowing and grazing that break the soil surface and redistribute the soil profile), annual invasive species such as cheatgrass can readily move into the open niche areas caused by disturbance and become established. In addition, cheatgrass is a winter annual with a large cohort of seedlings that germinate after autumn rainfall and exhibit rapid root growth before cold winter temperatures prohibit growth and drive the onset of winter quiescence. Cheatgrass seedlings are already established and can out-compete native plant seedlings that germinate in the late winter and early spring. Cheatgrass can often dominate disturbed areas and persist as part of an annual grass monoculture for decades after disturbances occur. Shrub species such as green rabbitbrush (*Chrysothamnus viscidiflorus*) and gray rabbitbrush (*Ericameria nauseousa*) are early successional species, and appear to occasionally begin to colonize abandoned fields. The bunchgrass, sand dropseed (*Sporobolus cryptandrus*), has also begun to colonize discrete soil patches within the abandoned orchards. In previously disturbed farmlands that were used as part of Camp Hanford during the construction phase, some surface soils were replaced with gravels and thin asphalt where buildings and tents were located. Native plant species appear to recover more readily in these areas with thin gravelly soils. Although the roadways and sidewalks established for Camp Hanford remain, vegetation recovery on the gravelly stony soils includes scattered patches of big sagebrush (*Artemisia tridentata*) and native bunchgrasses such as sand dropseed.

Steep slopes along the Columbia River create a clear distinction between upland and riparian zones and their vegetation. Several 100-OL-1 OU DUs are located close to the river and have riparian habitats, including DU-008, -009, -010, -018, -061, -070, -114, -115, and -132. The composition of the riparian zone vegetation has been altered by changes in river elevation, which is controlled by Priest Rapids Dam, located approximately 18.5 km (10 mi) upriver from the Hanford Site. Vegetation in the riparian zone consists of various forbs, grasses, sedges, reeds, rushes, cattails, and deciduous trees and shrubs. This region includes non-natives, e.g., reed canary grass (*Phalaris arundinacea*), knapweed (*Centaurea* spp.), purple loosestrife (*Lythrum salicaria*), and yellow star thistle (*Centaurea solstitalis*), and native vegetation, e.g., sedges (*Carex* spp.), bentgrass (*Agrostis* spp.), and rushes (*Juncus* spp.). Woody shrubs and trees, e.g., the native coyote willow (*Salix exigua*) and non-native white mulberry (*Morus alba*) and Russian olive (*Elaeagnus angustifolia*), are common along the riverbanks.

Shade trees were planted around farmsteads and some still survive today—mostly black locust (*Robinia pseudo-acacia*), Siberian elm (*Ulmus pumila*), and white poplar (*Populus alba*). Fruit trees (*Prunus* spp.), including apple, pear, and peach, were also planted by early settlers and remnants remain today. Trees at homesteads and in the riparian zone provide nesting sites for numerous bird species, including Swainson's hawks (*Buteo swainsoni*), red-tailed hawks (*B. jamaicensis*), ferruginous hawks (*B. regalis*), American kestrels (*Falco sparverius*), great horned owls (*Bubo virginianus*), great blue herons (*Ardea herodias*), black-billed magpies (*Pica pica*), common ravens (*Corvus corax*), western kingbirds (*Tyrannus verticalis*), Bullocks orioles (*Icterus galbula*), and European starlings (*Sturnus vulgaris*). Some of these same trees also provide food and shade for mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus*), and porcupines (*Erithizon dorsatum*).

The cheatgrass-dominated old fields near the Columbia River provide nesting habitat for killdeer (*Charadrius vociferus*), western meadowlarks (*Sturnella neglecta*), horned larks (*Eremophila alpestris*), and long-billed curlews (*Numenius americanus*), and are grazed by large flocks of Canada geese (*Branta canadensis*) in autumn and winter. Smaller herbivores, such as Great Basin pocket mice (*Perognathus parvus*) and black-tailed jackrabbits (*Lepus californicus*), are common inhabitants of old-field habitats. Some abandoned orchards also provide important nesting habitat for burrowing owls (*Athene cunicularia*), a species of concern across much of the western United States. Bald eagles (*Haliaeetus* *leucocephalus*) use the site for overwintering and there are known roost areas near several 100-OL-1 OU DUs; however, field characterization activities for the RI occurred outside of the active time frame for overwintering bald eagles.

Several reptile species live on the Hanford Site, including the side-blotched (*Uta stansburiana*), short-horned (*Phrynosoma douglassii*), and sagebrush lizards (*Sceloporus graciosus*); the gopher snake (*Pituophis melanoleucus*); yellow-bellied racer (*Coluber constrictor*); and western rattlesnake (*Crotalus viridis*). Reptiles more commonly found in the riparian zone include the Great Basin spadefoot toad (*Scaphiopus intermontanus*), western toad (*Bufo boreas*), and tiger salamander (*Ambystoma tigrinum*).

As of 2003, there were 1679 species of terrestrial arthropods identified on the Hanford Site (Evans et al. 2003), but this number is expected to grow. Some of the insects found on the Hanford Site include butterflies, grasshoppers, and darkling beetles.

Comprehensive lists of the flora and fauna on the Hanford Site can be found in Duncan 2007. Past reports by The Nature Conservancy include more detail on the biodiversity of the Hanford Site (Hall 1998; Evans et al. 2003). Figure 3-10 shows some of the fauna seen on the Hanford Site during field sampling.

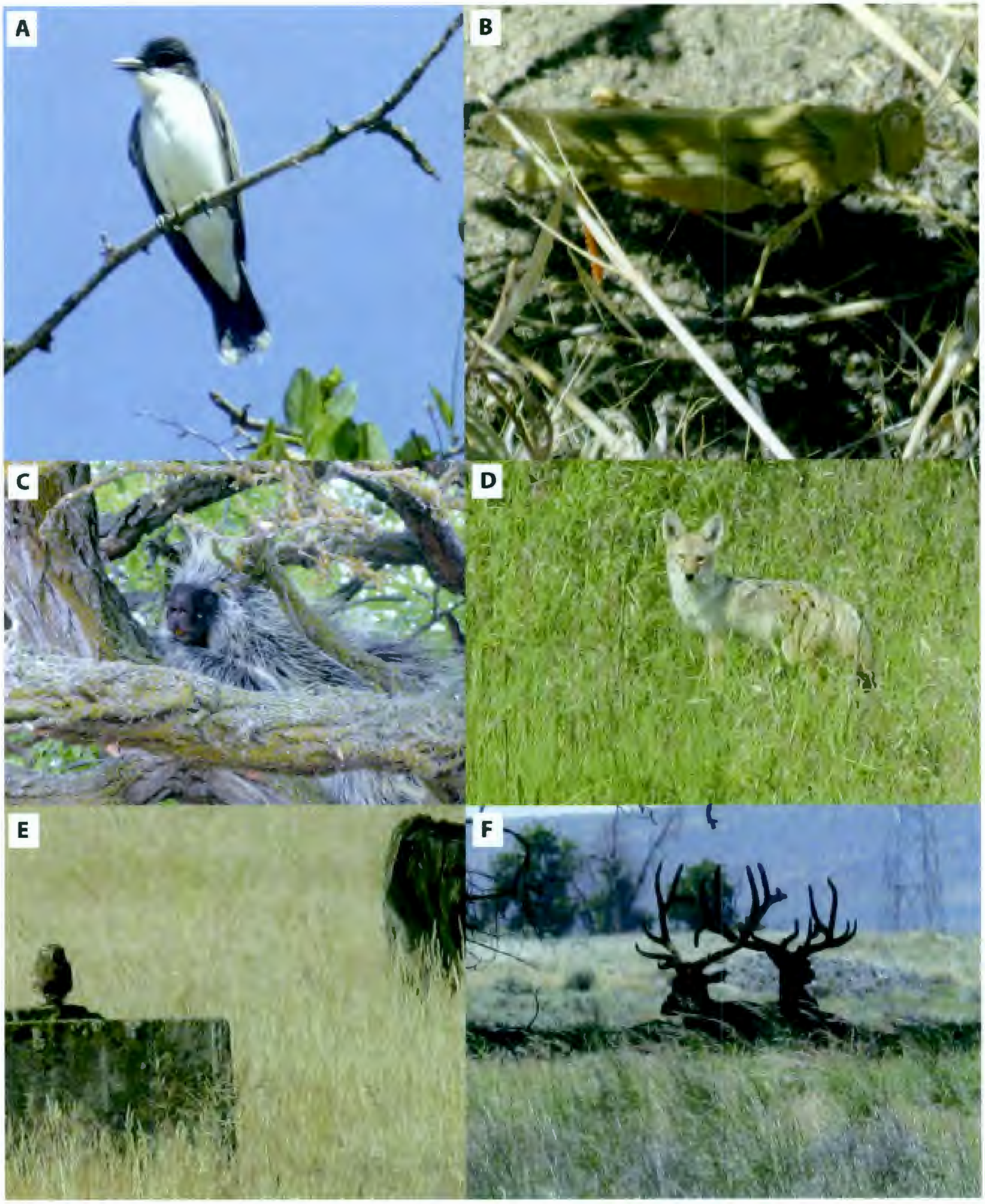


Figure 3-10. Examples of Fauna on the Hanford Site in the 100-OL-1 OU. (A) eastern kingbird (*Tyrannus tyrannus*), (B) red-legged grasshopper (*Melanoplus femurrubrum*), (C) porcupine (*Erithizon dorsatum*), (D) coyote (*Canis latrans*), (E) burrowing owl (*Athene cunicularia*, and (F) Rocky Mountain elk (*Cervus elaphus*).

3.5.2 Threatened and Endangered Species

Duncan (2007) provides a list of species of concern, including candidate, sensitive, and monitored species. No plants or terrestrial animals on the Hanford Site are listed federally as threatened or endangered species. Table 3-1 and Table 3-2 list the flora and fauna species known or thought to occur on Hanford Site that are federal- or state-listed as being threatened or endangered as well as candidate, sensitive, and monitored species (WNHP 2015).

Table 3-1. Federal and State Endangered, Threatened, Sensitive, and Candidate Flora Species on the Hanford Site.

Scientific Name	Common Name	State Status	Federal Status
Minuartia pusilla var. *pusilla*	Annual sandwort	Sensitive	--
Lipocarpha aristulata	Awned halfchaff sedge	Threatened	--
Eleocharis rostellata	Aeaked spike-rush	Sensitive	--
Hypericium majus	Canadian St. John's wort	Sensitive	--
Astragalus columbianus	Columbia milkvetch	Sensitive	Species of Concern
Rorippa columbiae	Columbia yellowcress	Threatened	Species of Concern
Nicotiana attenuata	Coyote tobacco	Sensitive	--
Cryptantha scoparia	Desert cryptantha	Sensitive	--
Cuscuta denticulata	Desert dodder	Threatened	--
Oenothera caespitosa	Desert evening-primrose	Sensitive	--
Eremothera (Camissonia) pygmaea	Dwarf evening-primrose	Sensitive	--
Astragalus geyeri var. *geyeri*	Geyer's milkvetch	Threatened	--
Ammannia robusta	grand redstem	Threatened	--
Cryptantha leucophaea	gray cryptantha	Sensitive	Species of Concern
Aliciella leptomeria	Great Basin gilia	Threatened	--
Corispermum villosum	Hairy bugseed	Sensitive	--
Pediocactus nigrispinus (P. simpsonii var. *robustior)*	Hedgehog cactus	Sensitive	--
Lomatium tuberosum	Hoover's desert parsley	Sensitive	Species of Concern
Loeflingia squarrosa var. *squarrosa*	Loeflingia	Threatened	--
Rotala ramosior	Lowland toothcup	Threatened	--
Erigeron piperianus	Piper's daisy	Sensitive	--
Calyptridium roseum	Rosy pussypaws	Threatened	--
Eremothera (Camissonia) minor	Small-flowered evening-primrose	Sensitive	--
Cryptantha spiculifera (C. interrupta)	Snake River cryptantha	Sensitive	--
Erythranthe (Mimulus) suksdorfi	Suksdorf's monkey flower	Sensitive	--
Eremogone (Arenaria) franklinii var. thompsoni	Thompson's sandwort	Sensitive	--
Eriogonum codium	Umtanum desert buckwheat	Endangered	Threatened
Physaria douglasii spp. *tuplashensis*	White Bluffs bladderpod	Threatened	Threatened
Eatonella nivea	White eatonella	Threatened	--

Table 3-2. Federal and State Endangered, Threatened, Sensitive, and Candidate Fauna Species on the Hanford Site.

Scientific Name	Common Name	State Status	Federal Status
Pelecanus erythrorhynchos	American white pelican	Endangered[(a)]	--
Haliaeetus leucocephalus	bald eagle	Sensitive[(b)]	Species of Concern
Lepus californicus	black-tailed jackrabbit	Candidate	--
Athene cunicularia	burrowing owl	Candidate	--
Aechmophorus clarkii	Clark's grebe	Candidate	--
Gomphus lynnae	Columbia clubtail (Dragonfly)	Candidate	--
Cicindela columbica	Columbia River tiger beetle	Candidate	--
Gavia immer	common loon	Sensitive	--
Buteo regalis	ferruginous hawk	Threatened	--
Otus flammeolus	flamulated owl	Candidate	--
Aquila chrysaetos	golden eagle	Candidate	--
Centrocercus urophasianus	greater sage grouse	Threatened	Candidate
Melanerpes lewis	Lewis' woodpecker	Candidate	--
Lanius ludovicianus	loggerhead shrike	Candidate	--
Sorex merriami	Merriam's shrew	Candidate	--
Accipter gentilis	Northern goshawk	Candidate	Species of Concern
Falco peregrinus	peregrine falcon	Sensitive	Species of Concern
Oreoscoptes montanus	sage thrasher	Candidate	--
Sceloporus graciosus	sagebrush lizard	Candidate	--
Artemisiospiza nevadensis (Amphispiza belli)	sagebrush sparrow	Candidate	--
Grus canadensis	sandhill crane	Endangered	--
Masticophis taeniatus	striped whipsnake	Candidate	--
Urocitellus townsendii	Townsend's ground squirrel	Candidate	--
Urocitellus washingtoni	Washington's ground squirrel	Candidate	Candidate
Aechmophorus occidentalis	Western grebe	Candidate	--
Bufo boreas	Western toad	Candidate	--
Lepus townsendii	white-tailed jackrabbit	Candidate	--

(a) The American white pelican is proposed for down listing to state threatened.
(b) The bald eagle is proposed for delisting at state level.

3.6 Cultural Resources

The Hanford Site contains some of the most important archaeological sites in the western Columbia Plateau. Hanford Site cultural resources are diverse and span from early prehistoric times through the Atomic Age. In addition, other natural resources and sacred sites of continued importance to the present Tribal Nations (Confederated Tribes of the Umatilla Indian Reservation, Yakama Nation, Nez Perce Tribe, and the Wanapum) are preserved at the Hanford Site (*Data Compendium for the Columbia River Comprehensive Impact Assessment* [PNL-9785]). Restricted access for more than 50 years has minimized looting and vandalism of historic, cultural, and archaeological sites, providing a unique window into the Hanford Site's past land use and occupational histories. Furthermore, hydroelectric and agricultural developments have not destroyed these culturally significant sites, as has happened elsewhere in the Columbia River Basin.

This section summarizes the 100-OL-1 OU cultural resources and discusses DOE-RL's *National Historic Preservation Act* (NHPA) compliance activities, archaeological resources, Native American and ethnographic landscape, early settler/farming landscape, and Manhattan Project and Cold War landscape.

3.6.1 NHPA Section 106 Compliance

While rapid development during the initial construction and operations of the Hanford Site did not accommodate protection of important resources early on, Hanford Site planners, directors of onsite construction activity, and Tribal Nation leaders now work together to protect important resources and historic properties. Cultural resources reviews, investigations, and surveys are routinely conducted as part of DOE's NHPA compliance activities to ensure the consideration and protection of important resources (DOE/RL-98-10). NHPA Section 106 and implementing regulation, 36 CFR 800, requires federal agencies to account for the effects of their undertakings on historic properties in consultation with consulting and/or interested parties (including Tribal Nations and the State Historic Preservation Office, the Advisory Council on Historic Preservation, and other interested parties). Cultural resource reviews are conducted in accordance with applicable laws and regulations for actions that have the potential to affect cultural and/or historic resources. Through the cultural resources review process, DOE, contractor cultural resources staff, Tribal Nations, and project/site planners are able to work together to protect resources important to the Native American community and other interested parties.

3.6.1.1 NHPA Section 106 Compliance for the 100-OL-1 OU Remedial Investigation Field Activities

DOE's contractor, MSA, reviewed the field activities associated with this RI (including the use of the portable XRF and soil sampling) considering the NHPA Section 106 (MSA-1501980 and MSA-1602182). It was determined that the use of the field portable XRF analyzer was a non-intrusive activity that would not cause any ground disturbance, and as such, it was not subject to any additional review. However, due to the ground-disturbing nature of the activity, the collection of soil samples for confirmatory analyses (Section 2.2.3.2) at several locations within the OU (DU-008, -020, -072, -095, -122, -123, and -127) required a cultural resources assessment be conducted by MSA's Cultural and Historic Resources Program. The assessment determined that all NHPA Section 106 requirements for the collection of soil samples at the pre-selected locations had been previously met as documented in several completed cultural resources reviews for the following activities:

- Confirmatory sampling within the 600-186 waste site
- Remediation, sampling, backfill, and revegetation of 37 waste sites in the White Bluffs Historic District, located in the 100-IU-2 and 100-IU-6 areas of the Hanford Site
- Disposition actions for area exit items and remedial actions for miscellaneous restoration items identified in the 100-B/C Area of the Hanford Site

All confirmatory soil sampling activities within DU-020, -095, -122, -123, and -127 were monitored by MSA cultural resources staff (MSA-1402281; MSA-1501980; MSA-1602182). In addition, DOE-RL provided Tribal cultural resources staff with a notification of scheduled field activities to participate in the monitoring efforts. The sampling activities were completed in compliance with outlined work controls and stipulations, and no cultural resources were impacted due to project activities.

3.6.2 Archaeological Resources of the 100-OL-1 OU

A total of 88 archaeological surveys, conducted between 1987 and 2016, have been performed in the past over portions of the 100-OL-1 OU. These surveys have covered the vast majority of the OU, with only a few isolated areas unrepresented. Most of the DUs that lie within the River Corridor have been surveyed (with the exception of small portions within the 100-F and 100-H OUs), with data gaps present throughout portions of the 600 Area. Based on a review of records, the portions of the OU that remain un-surveyed for cultural resources are located within the interior of the site (DU-077 through -088) and a few of the DUs located northwest of the Hanford townsite (DU-099 through -113).

As detailed above, these surveys are typically completed in conjunction with NHPA compliance activities (Section 106 and Section 110) and result in the recordation of archaeological resources and historic properties. In addition, per 36 CFR 60, these sites/resources are often evaluated for listing in the "National Register of Historic Places" (36 CFR 60).

The Hanford Site comprises a series of cultural landscapes containing the cumulative record of multiple occupations by both Native and non-Native Americans. The *National Register of Historic Places Multiple Property Documentation Form – Historic Archaeological and Traditional Cultural Properties of the Hanford Site, Washington* (DOE/RL-97-02) summarizes the descriptions and types of resources found on Site. For management and interpretive purposes, there are three cultural resources landscapes:

- Native American and Ethnographic
- Early Settler/Farming
- Manhattan Project and Cold War

These landscapes contain numerous, well-preserved archaeological and above-ground resources representing pre-contact, ethnographic, and historic periods. Period resources include sites with cultural materials that are thousands of years old, traditional cultural places, and buildings and structures from the pre-Hanford, Manhattan Project, and Cold War eras.

3.6.3 Native American and Ethnographic Landscape

The lands both within and around the Hanford Site have been used for thousands of years by Native American groups. Historically, these groups included the Yakama, the Umatilla, the Walla Walla, the Wanapum, the Palouse, the Nez Perce, and the Columbia. In 1855, the U.S. Government signed treaties with representatives from many of the different Native American groups in the southern Plateau, including the Yakama Nation (who ceded the western portion of the present-day Hanford Site) and the Umatilla, Walla Walla, and Cayuse groups (who ceded the eastern portion of the present-day Hanford Site). While the Columbia, Palouse, and Wanapum did not sign any treaties, they continued to live on and use the land in and around the Hanford Site (Duncan 2007). Today, the descendants of those groups with historical ties are represented by the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, the Confederated Tribes of the Colville Reservation, and the Wanapum. The evidence of past Native American land use is represented by the archaeological sites, resources, and places of continued traditional/cultural importance (traditional cultural places) that are located across the Hanford Site.

A total of 28 archaeological sites and eight archaeological isolates representing the Native American and Ethnographic landscape are located within the 100-OL-1 OU. Of the 28 recorded archaeological sites within the OU, 7 have been determined eligible for listing in the "National Register of Historic Places," and 3 have been determined contributing components to several important archaeological districts. These districts include the Washington State Heritage Register listed Wahluke Archaeological District, the National Register listed Locke Island Archaeological District, and the National Register eligible Nookshai/Gable Mountain-Gable Butte Archaeological District.

Almost all of the archaeological resources associated with this landscape are located within 400 m (1300 ft) of the Columbia River (aside from three archaeological isolates located further inland) and are scattered along the entire shoreline expanse of the OU. The Columbia River, especially the Hanford Reach, is known for its nearly continuous string of prehistoric camps, villages, and pre-contact resources. In addition, two areas of traditional significance to Native American groups (one that expands from 100-K to 100-N Area and one further inland in the 600 Area) overlap with the OU and one historic Native American cemetery is located in the 100-F vicinity, near (but outside of) the OU. One National Register eligible ethnohistoric trail, the White Bluffs Road, also overlaps with the OU. This trail was a major transportation route prior to the arrival of the first Euroamerican settlers to the region, and continued in importance through the early settler/farming period on the Hanford Site.

Archaeological sites and resources that have been recorded within the OU that represent this landscape include housepit villages and open campsites, trails, burials/cemeteries, lithic/tool scatters (DOE/RL-97-02), and traditional cultural properties (Duncan 2007). The *National Register of Historic Places Multiple Property Documentation Form – Historic, Archaeological and Traditional Cultural Properties of the Hanford Site, Washington* (DOE/RL-97-02) provides more information on these sites.

3.6.4 Early Settler/Farming Landscape

The Early Settler/Farming landscape is composed of archaeological sites and resources associated with the mainly Euro-American settlement of the region during the 19^{th} and 20^{th} centuries (DOE/RL-97-02). Evidence of land use and occupation during the Early Settler/Farming period are represented in the archaeological sites, buildings/structures, and traditional cultural places located throughout the Hanford Site. The following is an overview of the Early Settler/Farming Landscape; Appendix E offers more details, particularly on the orchard operations and use of lead arsenate pesticide.

A total of 145 archaeological sites and two archaeological isolates representing the Early Settler/Farming landscape are located within the 100-OL-1 OU. Of the 145 archaeological sites, 12 have been determined eligible for listing in the National Register of Historic Places (while 27 have been determined not eligible), and two sites have been determined as contributing components to the National Register eligible White Bluffs Townsite Historic District.

In addition, several historic archaeological features intersect with the 100-OL-1 OU. Portions of the National Register eligible White Bluffs Road (mentioned above) intersect the OU boundary. This was an important ethnohistoric trail that served as a major transportation route prior to the arrival of the first Euroamerican settlers to the region, and continued in importance through the Early Settler/Farming period on the Hanford Site. In addition, the National Register eligible Hanford Irrigation Canal and associated laterals intersect with (and in some cases define) the 100-OL-1 OU boundary. The canal and laterals, built in the early 1900s, were instrumental in the rise of the region's agricultural production potential. Many of the orchards identified within the OU depended on water provided through the canal for successful irrigation, cultivation, and production. Lastly, portions of the Hanford Branch of the Chicago Milwaukee St. Paul Railroad Line (which later became the Hanford Site Plant Railroad) also intersect the OU boundary. The railroad played a pivotal role in opening the towns of Hanford, Allard, and White Bluffs to the outside world, while also providing for a means to export produce from the flourishing area to external markets for commercial gains.

Throughout the OU there are archaeological resources associated with this landscape. Many of the archaeological site boundaries correspond with the OU boundaries due to their operations as historical orchards during the early 20th century. A good example of this is the National Register eligible Bruggemann agricultural complex and associated warehouse (Figure 1-5), which overlaps with DU-001 to -004. In addition, the OU overlaps lands that were located in the platted townsites of Hanford (600 Area), White Bluffs (eastern portion of the Columbia River Horn), and Allard (100-K Area). Many of the orchards within the OU belonged to residents of these historic towns. Several historic structures still remain within the OU, including Bruggemann's Warehouse and Hanford High School, and these structures and the fence lines surrounding them have been excluded from inclusion within the OU boundary. The Bruggemann Agricultural Warehouse Complex, the Hanford townsite, and Hanford High School have been identified as part of the Manhattan Project National Historic Park by the NPS. The types of archaeological sites and resources that have been recorded within the OU that represent this landscape include historic debris scatters/concentrations/dumps, trails/roads, railroads, townsites, homestead/farmstead remains and associated features (i.e. outbuildings, outhouses, irrigation systems, cisterns, wells), agricultural complexes/orchards, irrigation canals, ditches, and flumes. For descriptions of these site/feature types, see DOE/RL-97-02.

3.6.5 Manhattan Project/Cold War Era Landscape

The Manhattan Project/Cold War Era landscape is represented by the post-1943 occupation of the site by the U.S. Government and military through the end of the Cold War during the 1990s. The federal government selected the Hanford Site as the location for the Manhattan Project in 1942 and acquired the Hanford Site lands in 1943 in support of the war effort. Manhattan Project operations on the Hanford Site focused on plutonium production for the manufacture of atomic weapons during World War II. Plutonium production at the Hanford Site continued until 1965, when President Lyndon Johnson declared that the nation's plutonium stockpile had exceeded its needs, and the production of plutonium was gradually decreased. The shutdown of N Reactor in 1986 and its transition to cold standby in 1989 with the end of the Cold War signaled the close of the production mission at the Hanford Site and the start of its environmental cleanup mission, which continues in earnest today (DOE/RL-2010-95). In addition to plutonium production operations, evidence of various military maneuvers, occupations, and installments exists across the site. Because of the sensitive nature of Manhattan Project operations, a network of Anti-Aircraft Artillery (AAA) site and other military occupations were established at the Hanford Site for defense purposes. Military operations in various forms took place on site from World War II to the early 1960s.

A total of 12 Manhattan Project/Cold War Era archaeological sites and one archaeological isolate are located within the 100-OL-1 OU. Of these 12, 4 have been determined eligible (and 6 not eligible) for listing in the National Register of Historic Places. In addition, segments of one historic resource, the Hanford Site Plant Railroad (a National Register eligible property and contributing component to the Manhattan Project and Cold War Era Historic District), are located within the boundary of the OU.

The remains of two military installations are located within the OU. One AAA site base camp (BC-130) overlaps with DU-020 (DOE/RL-97-1047). This National Register eligible military site was used in the early 1950s, and while it did not contain gun emplacements, it was included as part of the Hanford Site AAA battery site network. In addition, a 1950s Army camp was located in what has now been bounded as DU-014. A large number of DUs overlap the boundary of what was the former Hanford Construction Camp (and before that, the Hanford townsite). This area was used to house the workers who built and constructed the Hanford Site. According to DOE/RL-97-1047, "Construction workers, as many as 45,000, moved into the Hanford construction camp located where the town of Hanford had been, near the reactor construction areas…In addition to housing, the workers had mess halls, recreational facilities, and various services."

Archaeological resources associated with this landscape are found throughout the OU; however, they are concentrated in areas associated with Manhattan Project/Cold War operations (Hanford Construction Camp, 100-D, 100-H, and 100-F vicinities). Most of the remains from this period are represented by the built environment and industrial landscape (buildings, structures, production facilities, environmental monitoring equipment, etc.). The Hanford Site's buildings and facilities have been documented as a historic district (Hanford Site Manhattan Project and Cold War Era Historic District) and a Programmatic Agreement (DOE/RL-96-77) and associated Treatment Plan (DOE/RL-97-56) were created to manage, inventory, assess, and mitigate contributing properties. As described above, the types of archaeological sites and resources that have been recorded within the OU that represent this landscape include military sites, railroads, the Hanford Construction Camp, and debris scatters/concentrations/dumps.

3.7 Summary of Physical Setting

This section of the report has discussed the key elements of potential pathways for lead arsenate residuals to move within the Hanford environment. These include a number of important elements for the CSM such as the interrelationships between the soil, ecology, meteorology, and early settlers' orchard use of lead arsenate as well as subsequent activities on the Hanford Site.

4. Nature and Extent of Lead and Arsenic Contamination

This section discusses the nature and extent of lead and arsenic within the 100-OL-1 OU. The DQO for the RI Work Plan (DOE/RL-2012-64) stated the boundaries of the RI were surface soil sampling and evaluation of lead and arsenic within the 100-OL-1 OU. This section also provides information on the background concentrations of lead and arsenic in the local soils relative to other soil background values in the vicinity. The sources of lead and arsenic in the soil are discussed, considering pesticides and sources of lead and arsenic from operations of the Hanford Site. Other OUs that are co-located with 100-OL-1 OU have evaluated lead and arsenic in groundwater, Columbia River water, and biota. The OUs within the River Corridor Interest Area that are co-located with 100-OL-1 OU are 100-B/C, 100-KR, 100-HR-D, 100-HR-H, and 100-FR. This section also summarizes those analyses from the River Corridor Interest Area documents. Finally, the sources and known contamination of lead and arsenic are incorporated into the CSM.

4.1 Background Concentrations

This section discusses background concentrations for lead and arsenic determined on the Hanford Site, in the region, and across the nation. Several key reports (highlighted below) provide a range of expected background soil concentrations of lead and arsenic on and around the Hanford Site; the relevant background concentrations for arsenic and lead are provided in Table 4-1. This information is relevant to the required analytical sensitivity for the soil analyses and to identify statistically significant differences between potentially contaminated orchard properties and areas that have not been contaminated by lead arsenate pesticide residuals.

Table 4-1. Relevant Background Concentrations (in mg/kg dry weight) for Lead and Arsenic.

Analyte/Location	Mean	Standard Deviation	Range	90th Percentile
Lead (mg/kg dry weight)				
Hanford Site[a]	6.3	NA	NA	10.2
Hanford Site[b]	6.3 (5.45)[c]	3.46	1.1–26.6	10.2
Hanford Site[d]	10.3	7.67	3.21–60.3	NA
Eastern Washington[e]	6.4[c]	2.69[f]	4.2–11.7	9.85
United States, podzols and silty soils[f]	17	NA	<10–70	NA
United States, loess and silty soils[g]	19	NA	10–30	NA
United States, loamy and clay soil[g]	22	NA	10–70	NA
Arsenic (mg/kg dry weight)				
Hanford Site[a]	4.2	NA	NA	6.47
Hanford Site[b]	4.2 (3.55)[c]	1.68	3–11.4	6.47
Hanford Site[d]	3.11	2.04	1.1–22	NA
Eastern Washington[e]	2.53[c]	2.52[f]	0.5–7.19	5.76
United States, podzols and silty soils[g]	5.1	NA	<0.1–30	NA
United States, loamy and clay soils[g]	7.7	NA	1.7–27	NA

(a) ECF-HANFORD-11-0038
(b) DOE/RL-92-24, as reported in the document
(c) Median value, not mean
(d) Fritz 2009
(e) San Juan 1994, specifically for Group E, Benton, Spokane, Lincoln, Adams, Okanogan, and Whitman counties
(f) Calculated from reported data as 90th percentile minus median, divided by 1.28
(g) Kabata-Pendias and Pendias 2001
NA = not applicable

Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes. This document (DOE/RL-92-24) provides the results of sampling and analysis activities designed to characterize the composition of soil background concentrations for nonradioactive analytes in the vadose (unsaturated) zone of the Hanford Site. For this study, samples were selected to provide a random, unbiased distribution of concentrations within the Hanford vadose zone; there were 104 samples with both arsenic and lead. While the samples consisted of soil taken from throughout the vadose zone, the soil model assumed that there would be very little depth variability in the concentrations of metals in the Hanford vadose zone. This is due to the nature of the Hanford Site vadose zone formation, namely, the reworking and deposition of the soil by the Missoula Floods. The results were analyzed using both log-normal and Weibull distribution techniques. In Table 4-1, only the log-normal distribution statistics are included because they are more directly comparable to other data sources; however, for lead and arsenic there was very little difference between the log-normal and Weibull distribution statistics. In 2012, CHPRC re-evaluated soil background concentrations and found the same results for lead and arsenic (ECF-HANFORD-11-0038).

A Review of Metal Concentrations Measured in Surface Soil Samples Collected on and around the Hanford Site. Fritz (2009) collected surface soil samples (top 2.5 cm [1 in.]) on and around the Hanford Site, primarily at undisturbed locations away from site operations. The concentrations of lead and arsenic measured were similar to the background concentrations determined for the Hanford Site and Eastern Washington (Table 4-1). Soil and sediment samples along the shoreline of the Columbia River had the highest lead and arsenic concentrations. Columbia River sediment along the Hanford Reach is known to have higher concentrations of metal than local soil as a result of upstream mining operations (Patton and Crecelius 2001; DOE/RL-2008-11).

Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State. This study (PTI 1989) was designed to identify "the concentrations of high-priority contaminants that are representative of background (or ambient) conditions in the water, soil, and air of Washington state." Increased awareness of environmental concerns over industrial pollution (e.g., the Asarco Smelter in Tacoma) prompted the study in order to increase understanding of the natural concentrations of certain elements in the environment. Although the record copy of the document states "the information in this document is dated and should not be used to establish background concentrations at a site," the development of cleanup standards for MTCA ultimately used the information from this study for background concentrations of lead and arsenic (information not included in Figure 4-1).

Natural Background Soil Metal Concentrations in Washington State. San Juan (1994) characterizes the natural background concentrations of metals in surface soils in Washington State. The State defines background concentrations as the "concentration of a hazardous substance consistently present in the environment which has not been influenced by localized human activities." The State of Washington was divided into 12 regions based on soil type, and samples were collected in each region. The Hanford Site lies within the Central Columbia Basin Region, which is defined as having unconsolidated windblown and alluvial materials on the surface. This study used a compositing scheme to remove extremely localized effects (e.g., deposition from smelter operations); however, only three composite samples were collected from the Central Columbia Basin Region. Apparently for this reason, the average concentrations within the Columbia Basin Region were not calculated, but instead were combined with several other areas in Eastern Washington State. The background concentrations reported for this region (referred to as region "E" in San Juan 1994) are similar to the background concentrations identified for the Hanford Site (Table 4-1).

The trends in soil concentrations across Washington State differed for lead and arsenic. For lead in soil, San Juan (1994) stated that the data set was "unique in that it appears to mimic statewide population trends." The higher values of lead were detected in more densely populated regions (Seattle, Vancouver, Yakima, and Spokane) and were probably due to "fallout from automobile exhaust." The statewide distribution of arsenic in soil was remarkably uniform. However, the 90th percentile value for arsenic was higher in Eastern Washington, "probably due to the extensive use of arsenic-based pesticides in the Yakima Basin." Values greater than 50 mg/kg arsenic were detected in the Tacoma vicinity, probably due to the Asarco Smelter.

Trace Elements in Soils and Plants. Kabata-Pendias and Pendias (2001) provide a comprehensive review of published concentrations of metals in soils across the planet. For lead and arsenic, concentration ranges are provided for various soil types in multiple countries. Podzol and sandy soils in the United States were chosen as the type most representative of the Hanford Site (Table 4-1). The ranges of background concentrations reported for arsenic and lead across the United States in podzol and sandy soil are somewhat higher than the background concentrations reported closer to the Hanford Site.

4.2 Sources

There are both natural and anthropogenic sources of lead and arsenic on the Hanford Site. The natural sources are mainly from the geology of the region and are similar to the background conditions discussed in Section 4.1. Anthropogenic sources include the lead arsenate and other arsenical-pesticides, discharges from operations, and other Hanford Site activities. Further information on the history of lead arsenate and other pesticides is included in Appendix E. The anthropogenic sources are discussed further in the following subsections.

4.2.1 Pesticide Sources

Today, the residues from lead arsenate pesticide applications to control codling moths in tree-fruits persist in soils at the Hanford Site as they do in other former orchard areas across Washington State and the nation. From 1910 to 1920, almost 14 million kg (30 million lb) of lead arsenate were used annually in the United States (ODEQ 2006). The levels of arsenic and lead in the soil from former orchard activities vary based on several factors: the number of applications in a season of production; the form of application (powder or solution); soil characteristics (soil texture, pH, organic matter, clay minerals, hydrous metal oxides, calcite); and precipitation rates. The acidic form of lead arsenate, $PbHAsO_4$, was the most common type applied in Washington State (Frank et al. 1976; Maclean and Langille 1981; Veneman et al. 1983; Peryea and Creger 1994; Elfving et al. 1994; Peryea and Kammereck 1997; Peryea 1998; Sharpe 1999, 2000; Kabata-Pendias and Pendias 2001; Yokel and Delistraty 2003; Newton et al. 2006; Renshaw et al. 2006; Staed et al. 2009; Cadwalader et al. 2011; Sloan 2011; Delistraty and Yokel 2011).

Arsenical pesticides other than lead arsenate were also available for agricultural application, e.g., calcium arsenate. Parker (1986) discusses an advertisement for attracting new orchardists to the Priest Rapids Valley, which recommends growing other crops in between the rows of newly planted tree-fruits for 3 to 5 years to have an income while the trees mature. One of the common crops was strawberries. Calcium arsenate controls weevils in strawberries, and thus residual arsenic may be found in the soil.

Insect management was used in the orchards to control codling moths, scale, and mites (State College of Washington 1918, 1937, and 1942; Sharpe 1999). The acidic form of lead arsenate, $PbHAsO_4$, was the most common type applied in Washington State (Peryea 1998). Lead arsenate could be sprayed as a powder or mixed in a solution and applied as a mist. Lead arsenate could be mixed with soaps or oils to improve the spray coverage of the fruit and residue removal from the fruit after harvest (State College of Washington 1937 and 1942). Other insecticides included cryolite (sodium aluminum fluoride) for codling moths, "lime sulphur" to control scale, and "lime sulfur, atomic sulphur, or "flours of sulphur" to control various orchard mites (State College of Washington 1937 and 1942; Sharpe 1999). Some extension service bulletins mentioned calcium arsenate as an alternative control for fruit-tree pests, but lead arsenate was highly recommended (State College of Washington 1937).

Specific directions on the formulation of the lead arsenate, as well as the spraying schedule and the number of applications for lead arsenate, were available to the orchardist in the White Bluffs Spokesman, State College of Washington extension bulletins, and other news sources. Typically, applications of lead arsenate contained 2.7 kg (6 lb) of paste or 1.4 kg (3 lb) of powder to 757 L (200 gal) of water. The schedule for spraying and the number of applications depended on the development of the fruit and changed over time as codling moths became resistant to lead arsenate (Sharpe 1999). Appendix E provides more information about the recommendations for application of lead arsenate pesticide in the early 1900s.

The highest concentrations of lead arsenate residues are likely to be in the soil and within the boundaries of the 100-OL-1 OU. Evaluations of lead arsenate dispersal on the Hanford Site have been limited to a few special studies (e.g., Yokel and Delistraty 2003; Delistraty and Yokel 2011; Bunn et al. 2014); waste site evaluations have assessed for the presence and determined the potential risk of lead and arsenic in soils and sediments from former orchard activities (e.g., DOE/RL-2007-21; DOE/RL-2010-97; DOE/RL-2010-98; DOE/RL-2010-117; DOE/RL-2011-01).

Dispersal in the soil beyond the boundaries of the 100-OL-1 OU would be minimal on the Hanford Site. Numerous studies have shown that there is limited potential for lead arsenate residues to move overland when water (irrigation or precipitation) is limited (Frank et al. 1976; MacLean and Langille 1981;

Veneman et al. 1983; Peryea and Creger 1994; Elfving et al. 1994; Peryea and Kammereck 1997; Peryea 1998; Kabata-Pendias and Pendias 2001; Newton et al. 2006; Renshaw et al. 2006; Staed et al. 2009; Cadwalader et al. 2011).

4.2.2 Hanford Operations Sources

Lead and arsenic sources at the Hanford Site consisted of solid materials and liquid waste, and often contaminants that were associated with other materials used with general plant operations at the reactor areas. Lead sources included shielding, plumbing/solders, and paint, as well as deposition from combustion of leaded gasoline by vehicles (DOE/RL-2010-95). Arsenical pesticides for insects and rats were used throughout operations to control these pests in and around facilities (DOE/RL-2010-95). Other site operations that were sources of lead and arsenic included metal fabrication and the use of industrial grade acids (e.g., sodium dichromate) and other chemicals (DOE/RL-2007-21; DOE/RL-2010-97). Contamination from these sources has been found during characterization efforts of the River Corridor, and is described in the following sections on the vadose zone (Section 4.4) and groundwater (Section 4.5).

4.3 Surface Soil Contamination

This section discusses the field characterization results from the 100-OL-1 OU RI. Supporting information about field characterization of 100-OL-1 OU is included in Appendices A, B, C, and D.

4.3.1 100-OL-1 OU Field Characterization Results

The sampling design for the RI field characterization included the recommendations from the pilot study and the DQOs from the RI Work Plan (DOE/RL-2012-64). The last known application of lead arsenate occurred in the orchards on the Hanford Site several decades ago, and over time environmental conditions (e.g., wind, precipitation, wildfires) and Hanford operations have changed the soil and vegetation in the former orchard lands.

Table 4-2 provides information about the field characterization for each of the133 DUs and statistical summaries. Table 2-1 includes the size of each DU and the sample density. Table 4-2 also summarizes the results for lead and arsenic, including the number of non-detected values, number of samples above the screening levels (250 mg/kg lead and 20 mg/kg arsenic), maximum and minimum detected result, average, standard deviation, RSD, and recommended 95% UCL. For purposes of calculating the summary statistics, when the XRF analyzer recorded "<LOD" (less than the level of detection), the value was replaced by the MDL (DOE/RL-2012-64), which was 5.68 mg/kg lead and 3.98 mg/kg arsenic for the RI activities. Appendix C includes more information about the replacement of the non-detected values.

The recommended 95% UCL in Table 4-2 is based on an evaluation of the distribution of the data and the number of non-detected values within a DU. The approach described here is consistent with the approach in the River Corridor RI/FSs (e.g., DOE/RL-2010-98). Rigorous statistical methods can be used to compute reliable estimates of population parameters, and the statistical software program, ProUCL (EPA 2016, ver. 5.1), has multiple methods for calculating and evaluating alternative distributions to recommend the method with the best fit of the data. The objective of ProUCL "is to compute rigorous statistics to help decision makers and project teams in making good decisions at a polluted site which are cost-effective, and protective of human health and the environment" (EPA 2016). The use and applicability of the UCL depends on the data size, data skewness, and data distribution. ProUCL not only considers commonly used methods (e.g., Central Limit Theorem and Student's t-UCL), but also several other methods including adjusted gamma-UCL, Chebyshev UCL, and bootstrap-t UCL (EPA 2016). The analyses in this RI used ProUCL version 5.1, as have other evaluations in the River Corridor Interest Area.

The selection of the 95% UCL based on the recommendations of ProUCL is provided based on the requirements in the RI Work Plan (DOE/RL-2012-64). The following logic was used to select the 95% UCL in Table 4-2:

- If a 95% UCL could be calculated, then the highest potential 95% UCL value (if ProUCL recommended more than one UCL value) was selected.
- If the 95% UCL could not be calculated by ProUCL because there were not enough detected results (i.e., < 2 detected results within a DU), then the maximum detected concentration was selected (e.g., DU-078).
- If the 95% UCL could not be calculated by ProUCL because all concentrations were measured at less than detect (i.e., <LOD), then the MDL was selected (e.g., DU-004).

ProUCL will not compute a 95% UCL for datasets with fewer than two detected results. When datasets have two to three detected results, ProUCL generates warning messages regarding the potential deficiencies with a low number of detected results, and reliable statistics cannot be calculated. In these instances, the computed 95% UCL for a DU was selected and the warning was included in Table 4-2.

For some DUs, ProUCL computed an *H*-statistic 95% UCL with the warning that the calculation is unstable and can result in high or low values for the 95% UCL. In these cases, if more than one 95% UCL was recommended, a different UCL was selected (not the *H-statistic* 95% UCL). For DUs where only an *H*-statistic 95% UCL was recommended, the UCL was reported with the warning from ProUCL (13 out of 133 DUs, for lead). A question on the use of ProUCL that has arisen with other evaluations (e.g., DOE/RL-2010-98), but was not the case for this RI, is what to select when the maximum 95% UCL reported by ProUCL is greater than the maximum detected value. None of the reported 95% UCLs for the 133 DUs exceeded the maximum detected concentrations for a specific DU.

Appendix A includes maps of the results and compares the results to the human health and ecological screening levels identified in the DQOs from the RI Work Plan (DOE/RL-2012-64). Section 6 discusses the selection of the human health and ecological screening levels in the maps of results. The legend for interpreting the results on each map is shown in Figure A.2. Figure A.3 provides examples for interpreting the legend in the maps for each DU. Figures A.4 through A.136 are the maps of results for DU-001 through -133.

Appendix D includes maps of the concentrations inside the OU boundary and the step-out results, using a similar format to the maps in Appendix A. The results of the step-out sampling indicate that 12 of the 46 DUs (26%) had lead and/or arsenic concentrations exceeding the MTCA Method A screening levels (250 mg/kg lead and 20 mg/kg arsenic) outside the OU boundary:

- DU-020
- DU-021
- DU-022
- DU-026
- DU-076
- DU-081
- DU-086
- DU-090
- DU-093
- DU-095
- DU-114
- DU-131

Table 4-2. 100-OL-1 OU Summary of Field Characterization Results.

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-001	37	Lead	0	0%	0	52.2	12.0	22.2	7.87	36%	24.4	95% Student's-t UCL	--	24.4
		Arsenic	29	78%	0	6.88	3.98	4.27	0.69	16%	4.48	95% KM (t) UCL	--	4.48
DU-002	39	Lead	0	0%	0	41.0	7.76	18.5	7.13	39%	20.6	95% Adjusted Gamma UCL	--	20.6
		Arsenic	28	72%	0	6.25	3.98	4.35	0.69	16%	4.56	95% KM (BCA) UCL	--	4.56
DU-003	40	Lead	0	0%	0	52.7	11.0	18.1	6.74	37%	19.7	95% Adjusted Gamma UCL	--	19.7
		Arsenic	29	73%	1	96.7	3.98	6.67	14.5	217%	17.1	95% KM (Chebyshev) UCL	--	17.1
DU-004	14	Lead	0	0%	0	48.0	10.4	18.2	9.17	50%	22.5	95% Student's-t UCL	--	22.5
		Arsenic	14	100%	0	3.98	3.98	3.98	0.00	0%	3.98	MDL	A	3.98
DU-005	33	Lead	0	0%	0	30.6	12.1	18.6	5.73	31%	20.3	95% Student's-t UCL	--	20.3
		Arsenic	29	88%	0	6.62	3.98	4.16	0.57	14%	4.35	95% KM (t) UCL	--	4.35
DU-006	18	Lead	0	0%	0	22.0	7.16	14.2	4.24	30%	15.9	95% Student's-t UCL	--	15.9
		Arsenic	15	83%	0	6.28	3.98	4.18	0.57	14%	4.46	95% KM (t) UCL	C	6.28[d]
DU-007	28	Lead	0	0%	0	23.4	5.87	15.0	4.06	27%	16.3	95% Student's-t UCL	--	16.3
		Arsenic	22	79%	0	6.71	3.98	4.22	0.66	16%	4.45	95% KM (t) UCL	--	4.45
DU-008	46	Lead	0	0%	0	53.6	7.97	19.3	10.3	53%	21.8	95% Adjusted Gamma UCL	--	21.8
		Arsenic	25	54%	1	55.1	3.98	5.86	7.44	127%	10.8	95% KM (Chebyshev) UCL	--	10.8
DU-009	16	Lead	0	0%	0	42.0	8.19	22.9	8.08	35%	26.4	95% Student's-t UCL	--	26.4
		Arsenic	9	56%	1	22.9	3.98	5.96	4.81	81%	11.6	95% KM (Chebyshev) UCL	--	11.6
DU-010	34	Lead	0	0%	0	180	8.46	44.2	46.8	106%	79.2	95% Chebyshev (Mean, Sd) UCL	--	79.2
		Arsenic	24	71%	0	14.2	3.98	5.34	2.88	54%	6.22	95% KM (t) UCL	--	6.22
DU-011	26	Lead	0	0%	0	69.4	7.57	21.4	11.4	53%	25.2	95% Adjusted Gamma UCL	--	25.2
		Arsenic	19	73%	0	8.11	3.98	4.53	1.07	24%	4.92	95% KM (t) UCL	--	4.92
DU-012	32	Lead	0	0%	0	33.9	10.4	15.4	5.33	35%	17.0	95% Student's-t UCL	--	17.0
		Arsenic	26	81%	0	7.04	3.98	4.11	0.53	13%	4.31	95% KM (BCA) UCL	--	4.31
DU-013	36	Lead	0	0%	7	1690	12.9	161	291	181%	372	95% Chebyshev (Mean, Sd) UCL	--	372
		Arsenic	14	39%	3	289	3.98	16.9	46.8	277%	51.7	95% KM (Chebyshev) UCL	--	51.7
DU-014	40	Lead	0	0%	0	22.8	9.74	15.8	3.23	20%	16.7	95% Student's-t UCL	--	16.7
		Arsenic	31	78%	0	6.06	3.98	4.21	0.51	12%	4.35	95% KM (t) UCL	--	4.35

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-015	40	Lead	0	0%	0	53.8	9.32	21.8	9.67	44%	24.5	95% Adjusted Gamma UCL	--	24.5
		Arsenic	26	65%	0	7.31	3.98	4.43	0.80	18%	4.65	95% KM (t) UCL	--	4.65
DU-016	38	Lead	0	0%	0	48.9	11.2	22.4	9.92	44%	25.1	95% Student's-t UCL	--	25.1
		Arsenic	24	63%	0	7.28	3.98	4.53	0.97	21%	4.81	95% KM (t) UCL	--	4.81
DU-017	19	Lead	0	0%	0	119	8.88	20.6	24.1	117%	44.7	95% Chebyshev (Mean, Sd) UCL	--	44.7
		Arsenic	13	68%	0	6.98	3.98	4.42	0.86	20%	4.79	95% KM (t) UCL	--	4.79
DU-018	20	Lead	0	0%	0	106	11.7	31.1	22.6	73%	40.0	95% H-UCL	B	40.0
		Arsenic	12	60%	0	9.80	3.98	5.21	1.80	35%	5.96	95% KM (t) UCL	--	5.96
DU-019	34	Lead	0	0%	1	385	9.98	41.0	70.8	173%	93.9	95% Chebyshev (Mean, Sd) UCL	--	93.9
		Arsenic	24	71%	0	13.6	3.98	4.77	1.83	38%	5.93	95% KM Adjusted Gamma UCL	--	5.93
DU-020	39	Lead	0	0%	15	3000	9.66	287	532	186%	658	95% Chebyshev (Mean, Sd) UCL	--	658
		Arsenic	15	39%	14	372	3.98	27.6	60.4	218%	56.5	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	--	56.5
DU-021	16	Lead	0	0%	1	437	20.2	122	100	82%	181	95% Adjusted Gamma UCL	--	181
		Arsenic	1	6%	5	94.0	3.98	23.0	21.1	92%	42.1	95% GROS Adjusted Gamma UCL	--	42.1
DU-022	40	Lead	2	5%	0	231	5.68	30.7	40.0	130%	58.7	95% KM (Chebyshev) UCL	--	58.7
		Arsenic	21	53%	2	46.8	3.98	7.23	7.19	100%	12.3	95% KM (Chebyshev) UCL	--	12.3
DU-023	40	Lead	1	3%	0	81.3	5.68	22.6	16.4	73%	27.2	95% KM H-UCL	--	27.2
		Arsenic	20	50%	1	31.4	3.98	6.43	4.88	76%	7.16	95% KM H-UCL	--	7.16
DU-024	40	Lead	0	0%	0	159	9.78	36.1	33.1	92%	43.4	95% H-UCL	B	43.4
		Arsenic	24	60%	2	36.6	3.98	7.53	7.44	99%	10.3	95% GROS Adjusted Gamma UCL	--	10.3
DU-025	16	Lead	0	0%	0	79.8	12.6	27.1	17.6	65%	36.0	95% Adjusted Gamma UCL	--	36.0
		Arsenic	9	56%	0	9.96	3.98	5.03	1.80	36%	5.88	95% KM (t) UCL	--	5.88
DU-026	13	Lead	0	0%	3	543	28.6	183	168	92%	316	95% Adjusted Gamma UCL	--	316
		Arsenic	3	23%	5	97.3	3.98	20.3	23.4	115%	40.4	95% KM H-UCL	--	40.4
DU-027	33	Lead	0	0%	0	17.6	6.42	12.1	2.41	20%	12.8	95% Student's-t UCL	--	12.8
		Arsenic	28	85%	0	4.71	3.98	4.04	0.17	4%	4.10	95% KM (t) UCL	--	4.10
DU-028	32	Lead	0	0%	0	17.0	9.25	12.9	1.99	16%	13.5	95% Student's-t UCL	--	13.5
		Arsenic	23	72%	0	6.13	3.98	4.25	0.53	12%	4.42	95% KM (t) UCL	--	4.42

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[(a)]	Minimum Detected Result (mg/kg)[(a)]	Average Result (mg/kg)	Standard Deviation (mg/kg)[(b)]	Relative Standard Deviation[(b)]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[(c)]	EPC (mg/kg)[(d)]
DU-029	33	Lead	0	0%	0	239	10.4	25.4	38.8	153%	54.8	95% Chebyshev (Mean, Sd) UCL	--	54.8
		Arsenic	25	76%	0	7.23	3.98	4.30	0.75	18%	4.54	95% KM (t) UCL	--	4.54
DU-030	33	Lead	1	3%	0	32.5	5.68	15.3	4.96	32%	16.8	95% KM (t) UCL	--	16.8
		Arsenic	27	82%	0	5.90	3.98	4.13	0.42	10%	4.26	95% KM (t) UCL	--	4.26
DU-031	33	Lead	0	0%	0	24.7	7.95	14.8	3.83	26%	15.9	95% Student's-t UCL	--	15.9
		Arsenic	24	73%	0	7.60	3.98	4.24	0.70	16%	4.49	95% KM (BCA) UCL	--	4.49
DU-032	33	Lead	0	0%	0	45.5	9.32	14.5	7.52	52%	16.7	95% Student's-t UCL	--	16.7
		Arsenic	23	70%	0	7.09	3.98	4.23	0.64	15%	4.42	95% KM (t) UCL	--	4.42
DU-033	17	Lead	0	0%	0	35.5	10.5	13.9	5.80	42%	16.4	95% Student's-t UCL	--	16.4
		Arsenic	10	59%	0	5.86	3.98	4.30	0.56	13%	4.56	95% KM (t) UCL	--	4.56
DU-034	33	Lead	0	0%	0	16.1	9.00	13.2	1.98	15%	13.8	95% Student's-t UCL	--	13.8
		Arsenic	25	76%	0	4.76	3.98	4.06	0.18	5%	4.12	95% KM (t) UCL	--	4.12
DU-035	33	Lead	0	0%	0	23.2	10.3	14.0	3.09	22%	14.9	95% Adjusted Gamma UCL	--	14.9
		Arsenic	29	88%	0	5.19	3.98	4.06	0.25	6%	4.14	95% KM (t) UCL	--	4.14
DU-036	33	Lead	0	0%	0	24.1	6.73	12.7	3.40	27%	13.7	95% Student's-t UCL	--	13.7
		Arsenic	25	76%	0	5.90	3.98	4.20	0.47	11%	4.35	95% KM (t) UCL	--	4.35
DU-037	33	Lead	0	0%	0	26.9	9.75	15.5	3.80	25%	16.7	95% Adjusted Gamma UCL	--	16.7
		Arsenic	19	58%	0	7.65	3.98	4.42	0.76	17%	4.65	95% KM (t) UCL	--	4.65
DU-038	22	Lead	0	0%	0	49.3	13.4	24.1	9.05	38%	27.4	95% Student's-t UCL	--	27.4
		Arsenic	10	46%	0	6.79	3.98	4.82	0.99	21%	5.20	95% KM (t) UCL	--	5.20
DU-039	26	Lead	0	0%	1	541	11.9	63.5	114	180%	161	95% Chebyshev (Mean, Sd) UCL	--	161
		Arsenic	13	50%	3	54.8	3.98	9.18	12.2	133%	20.0	95% KM (Chebyshev) UCL	--	20.0
DU-040	17	Lead	0	0%	0	207	15.0	94.6	70.6	75%	125	95% Student's-t UCL	--	125
		Arsenic	5	29%	1	20.7	3.98	9.32	5.50	59%	11.8	95% KM (t) UCL	--	11.8
DU-041	18	Lead	0	0%	0	22.2	9.97	15.1	3.06	20%	16.4	95% Student's-t UCL	--	16.4
		Arsenic	14	78%	0	6.55	3.98	4.32	0.73	17%	4.66	95% KM (t) UCL	--	4.66
DU-042	32	Lead	0	0%	0	137	11.2	26.8	30.5	114%	50.3	95% Chebyshev (Mean, Sd) UCL	--	50.3
		Arsenic	28	88%	0	10.7	3.98	4.44	1.41	32%	4.93	95% KM (t) UCL	--	4.93
DU-043	33	Lead	0	0%	0	69.3	10.1	19.8	12.4	62%	23.5	95% Student's-t UCL	--	23.5
		Arsenic	20	61%	0	10.6	3.98	4.77	1.72	36%	5.31	95% KM (BCA) UCL	--	5.31

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-044	34	Lead	0	0%	1	266	10.4	25.3	43.9	173%	58.1	95% Chebyshev (Mean, Sd) UCL	--	58.1
		Arsenic	21	62%	0	12.6	3.98	4.66	1.58	34%	5.19	95% KM Adjusted Gamma UCL	--	5.19
DU-045	36	Lead	0	0%	0	27.3	9.42	15.4	3.28	21%	16.3	95% Student's-t UCL	--	16.3
		Arsenic	28	78%	0	5.38	3.98	4.14	0.36	9%	4.25	95% KM (t) UCL	--	4.25
DU-046	36	Lead	0	0%	0	16.2	9.29	11.9	1.52	13%	12.4	95% Student's-t UCL	--	12.4
		Arsenic	28	78%	0	5.29	3.98	4.12	0.33	8%	4.21	95% KM (t) UCL	--	4.21
DU-047	32	Lead	0	0%	3	300	11.1	65.6	80.8	123%	128	95% Chebyshev (Mean, Sd) UCL	--	128
		Arsenic	25	78%	2	27.2	3.98	6.93	6.33	91%	8.98	95% KM (t) UCL	--	8.98
DU-048	33	Lead	0	0%	1	337	9.39	43.6	66.9	153%	94.4	95% Chebyshev (Mean, Sd) UCL	--	94.4
		Arsenic	19	58%	2	25.6	3.98	6.70	5.54	83%	9.47	95% GROS Adjusted Gamma UCL	--	9.47
DU-049	33	Lead	0	0%	12	2320	16.5	367	506	138%	557	95% Adjusted Gamma UCL	--	557
		Arsenic	7	21%	14	273	3.98	36.6	53.7	147%	61.4	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	--	61.4
DU-050	33	Lead	0	0%	0	35.7	8.72	17.2	6.16	36%	19.0	95% Adjusted Gamma UCL	--	19.0
		Arsenic	25	76%	0	6.53	3.98	4.26	0.61	14%	4.46	95% KM (t) UCL	--	4.46
DU-051	33	Lead	0	0%	0	25.5	9.23	15.5	4.27	28%	16.8	95% Student's-t UCL	--	16.8
		Arsenic	26	79%	0	6.06	3.98	4.25	0.61	14%	4.44	95% KM (t) UCL	--	4.44
DU-052	32	Lead	0	0%	2	1480	13.8	107	262	246%	308	95% Chebyshev (Mean, Sd) UCL	--	308
		Arsenic	14	44%	3	166	3.98	12.2	28.3	232%	12.5	95% KM H-UCL	--	12.5
DU-053	22	Lead	0	0%	5	2240	9.23	240	495	206%	699	95% Chebyshev (Mean, Sd) UCL	--	699
		Arsenic	8	36%	6	161	3.98	21.0	35.4	169%	46.3	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	--	46.3
DU-054	32	Lead	1	3%	5	784	5.68	106	180	169%	247	95% KM (Chebyshev) UCL	--	247
		Arsenic	11	34%	5	90.2	3.98	13.9	20.5	147%	30.1	95% KM (Chebyshev) UCL	--	30.1
DU-055	40	Lead	0	0%	3	355	10.4	60.6	92.3	152%	124	95% Chebyshev (Mean, Sd) UCL	--	124
		Arsenic	22	55%	3	32.0	3.98	7.03	6.86	98%	11.9	95% KM (Chebyshev) UCL	--	11.9
DU-056	17	Lead	0	0%	2	612	9.72	78.0	151	194%	238	95% Chebyshev (Mean, Sd) UCL	--	238
		Arsenic	7	41%	1	75.4	3.98	10.1	16.7	166%	28.7	95% KM (Chebyshev) UCL	--	28.7

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-057	22	Lead	0	0%	0	185	9.09	30.6	40.2	132%	68.0	95% Chebyshev (Mean, Sd) UCL	--	68.0
		Arsenic	12	55%	0	8.73	3.98	4.72	1.19	25%	5.18	95% KM (t) UCL	--	5.18
DU-058	38	Lead	0	0%	0	90.8	10.2	30.8	19.7	64%	36.5	95% Adjusted Gamma UCL	--	36.5
		Arsenic	16	42%	1	22.6	3.98	5.76	3.27	57%	6.91	95% GROS Adjusted Gamma UCL	--	6.91
DU-059	28	Lead	0	0%	0	48.3	10.2	18.5	9.83	53%	21.7	95% Student's-t UCL	--	21.7
		Arsenic	15	54%	0	7.33	3.98	4.56	0.82	18%	4.84	95% KM (t) UCL	--	4.84
DU-060	29	Lead	0	0%	0	34.8	12.9	19.7	5.66	29%	21.6	95% Adjusted Gamma UCL	--	21.6
		Arsenic	18	62%	0	6.84	3.98	4.38	0.68	16%	4.61	95% KM (t) UCL	--	4.61
DU-061	24	Lead	0	0%	0	49.3	8.08	17.7	8.25	47%	20.6	95% Student's-t UCL	--	20.6
		Arsenic	14	58%	0	6.80	3.98	4.38	0.69	16%	4.63	95% KM (t) UCL	--	4.63
DU-062	35	Lead	0	0%	3	505	8.81	94.7	111	117%	151	95% H-UCL	B	151
		Arsenic	14	40%	3	57.2	3.98	9.88	10.1	102%	16.0	95% GROS Adjusted Gamma UCL	--	16.0
DU-063	28	Lead	0	0%	1	320	6.20	54.9	73.2	133%	115	95% Chebyshev (Mean, Sd) UCL	--	115
		Arsenic	15	54%	1	41.0	3.98	6.84	7.22	106%	7.80	95% KM H-UCL	--	7.80
DU-064	37	Lead	0	0%	6	776	8.25	106	193	183%	244	95% Chebyshev (Mean, Sd) UCL	--	244
		Arsenic	17	46%	6	71.1	3.98	10.9	15.0	138%	22.0	95% KM (Chebyshev) UCL	--	22.0
DU-065	33	Lead	0	0%	0	198	11.0	35.3	40.9	116%	66.3	95% Chebyshev (Mean, Sd) UCL	--	66.3
		Arsenic	19	58%	0	16.2	3.98	5.32	2.67	50%	6.27	95% KM Adjusted Gamma UCL	--	6.27
DU-066	35	Lead	0	0%	0	166	6.75	31.7	33.9	107%	56.7	95% Chebyshev (Mean, Sd) UCL	--	56.7
		Arsenic	23	66%	0	13.3	3.98	5.06	2.23	44%	5.73	95% KM (t) UCL	--	5.73
DU-067	38	Lead	0	0%	0	122	9.81	20.9	19.1	91%	26.1	95% Student's-t UCL	--	26.1
		Arsenic	31	82%	0	8.65	3.98	4.27	0.85	20%	4.53	95% KM Adjusted Gamma UCL	--	4.53
DU-068	37	Lead	0	0%	2	2510	8.93	98.5	413	420%	395	95% Chebyshev (Mean, Sd) UCL	--	395
		Arsenic	25	68%	2	310	3.98	13.8	49.8	362%	51.1	95% KM (Chebyshev) UCL	--	51.1
DU-069	15	Lead	0	0%	0	22.5	11.7	16.4	3.04	19%	17.7	95% Student's-t UCL	--	17.7
		Arsenic	13	87%	0	5.80	3.98	4.12	0.45	11%	4.41	95% KM (t) UCL	C	5.80[d]

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-070	28	Lead	0	0%	0	52.3	6.04	18.6	11.7	63%	22.5	95% H-UCL	B	22.5
		Arsenic	23	82%	0	10.5	3.98	4.29	1.22	28%	4.76	95% KM (BCA) UCL	--	4.76
DU-071	37	Lead	0	0%	0	116	10.7	29.0	24.1	83%	46.2	95% Chebyshev (Mean, Sd) UCL	--	46.2
		Arsenic	22	60%	0	12.0	3.98	5.01	1.89	38%	5.62	95% KM Adjusted Gamma UCL	--	5.62
DU-072	33	Lead	0	0%	4	1050	11.9	133	244	183%	318	95% Chebyshev (Mean, Sd) UCL	--	318
		Arsenic	21	64%	5	121	3.98	13.6	24.0	176%	15.8	95% KM H-UCL	--	15.8
DU-073	35	Lead	0	0%	7	726	11.7	145	200	138%	292	95% Chebyshev (Mean, Sd) UCL	--	292
		Arsenic	15	43%	6	60.6	3.98	13.0	15.4	118%	22.9	95% GROS Adjusted Gamma UCL	--	22.9
DU-074	32	Lead	0	0%	0	184	8.90	31.6	31.9	101%	38.3	95% H-UCL	B	38.3
		Arsenic	18	56%	0	14.3	3.98	5.37	2.67	50%	6.21	95% KM (t) UCL	--	6.21
DU-075	20	Lead	0	0%	0	189	14.4	53.4	43.4	81%	70.1	95% Student's-t UCL	--	70.1
		Arsenic	7	35%	0	18.1	3.98	6.87	4.28	62%	8.59	95% KM (t) UCL	--	8.59
DU-076	33	Lead	0	0%	0	160	11.5	51.9	41.6	80%	66.2	95% Adjusted Gamma UCL	--	66.2
		Arsenic	5	15%	3	61.7	3.98	12.5	11.0	89%	18.9	95% GROS Adjusted Gamma UCL	--	18.9
DU-077	38	Lead	0	0%	0	34.8	6.52	14.7	4.19	29%	15.9	95% Adjusted Gamma UCL	--	15.9
		Arsenic	27	71%	0	6.71	3.98	4.32	0.64	15%	4.72	95% KM Student's-t UCL	--	4.72
DU-078	13	Lead	0	0%	0	33.4	11.6	18.5	6.88	37%	22.9	95% Adjusted Gamma UCL	--	22.9
		Arsenic	12	92%	0	4.36	3.98	4.01	0.10	3%	4.36	Maximum Detected	C	4.36
DU-079	38	Lead	0	0%	21	1820	24.1	398	364	92%	516	95% Adjusted Gamma UCL	--	516
		Arsenic	19	50%	16	229	3.98	28.4	45.0	159%	47.1	95% KM H-UCL	--	47.1
DU-080	21	Lead	0	0%	0	34.6	8.68	18.5	6.78	37%	21.1	95% Student's-t UCL	--	21.1
		Arsenic	14	67%	1	42.3	3.98	6.15	8.12	132%	14.5	95% KM (Chebyshev) UCL	--	14.5
DU-081	36	Lead	0	0%	18	1120	15.4	292	242	83%	361	95% Student's-t UCL	--	361
		Arsenic	4	11%	19	185	3.98	30.2	33.6	111%	46.2	95% GROS Adjusted Gamma UCL	--	46.2
DU-082	38	Lead	0	0%	0	21.9	6.71	13.0	3.38	26%	13.9	95% Student's-t UCL	--	13.9
		Arsenic	20	53%	0	7.09	3.98	4.41	0.63	14%	4.6	95% KM Adjusted Gamma UCL	--	4.6
DU-083	17	Lead	0	0%	0	34.7	6.38	15.9	6.75	42%	18.8	95% Student's-t UCL	--	18.8
		Arsenic	15	88%	0	4.42	3.98	4.01	0.10	3%	4.07	95% KM (t) UCL	C	4.42[d]
DU-084	17	Lead	0	0%	0	209	11.9	47.0	51.9	110%	69.8	95% H-UCL	B	69.8
		Arsenic	9	53%	2	27.5	3.98	7.82	6.93	89%	11.0	95% KM (t) UCL	--	11.0

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-085	41	Lead	0	0%	1	327	6.09	27.3	53.4	196%	63.6	95% Chebyshev (Mean, Sd) UCL	--	63.6
		Arsenic	31	76%	1	25.0	3.98	4.88	3.42	70%	7.34	95% KM (Chebyshev) UCL	--	7.34
DU-086	37	Lead	0	0%	11	876	22.1	187	198	106%	290	95% H-UCL	B	290
		Arsenic	8	22%	13	71.6	3.98	19.9	18.5	93%	32.0	95% GROS Adjusted Gamma UCL	--	32.0
DU-087	40	Lead	0	0%	3	882	9.50	68.7	181	263%	194	95% Chebyshev (Mean, Sd) UCL	--	194
		Arsenic	25	63%	3	90.7	3.98	9.65	16.8	174%	10.1	95% KM H-UCL	--	10.1
DU-088	38	Lead	0	0%	0	114	6.66	25.2	24.3	96%	42.4	95% Chebyshev (Mean, Sd) UCL	--	42.4
		Arsenic	21	55%	0	11.1	3.98	5.16	1.91	37%	5.70	95% KM (t) UCL	--	5.70
DU-089	41	Lead	0	0%	6	784	11.3	109	155	143%	214	95% Chebyshev (Mean, Sd) UCL	--	214
		Arsenic	29	71%	4	53.6	3.98	9.10	11.5	126%	12.2	95% KM (t) UCL	--	12.2
DU-090	40	Lead	0	0%	2	307	10.0	55.5	72.0	130%	105	95% Chebyshev (Mean, Sd) UCL	--	105
		Arsenic	13	33%	2	42.1	3.98	8.46	7.61	90%	13.8	95% KM (Chebyshev) UCL	--	13.8
DU-091	33	Lead	0	0%	0	41.5	8.44	16.2	5.65	35%	17.8	95% Adjusted Gamma UCL	--	17.8
		Arsenic	23	70%	0	6.26	3.98	4.31	0.60	14%	4.50	95% KM (t) UCL	--	4.50
DU-092	40	Lead	0	0%	0	231	8.35	32.0	45.1	141%	63.1	95% Chebyshev (Mean, Sd) UCL	--	63.1
		Arsenic	22	55%	1	20.9	3.98	5.24	3.06	59%	6.18	95% KM (BCA) UCL	--	6.18
DU-093	23	Lead	1	4%	3	1020	5.68	120	221	184%	326	95% KM (Chebyshev) UCL	--	326
		Arsenic	13	57%	3	87.8	3.98	13.0	23.2	178%	35.2	95% KM (Chebyshev) UCL	--	35.2
DU-094	35	Lead	0	0%	4	303	12.6	73.9	85.4	115%	137	95% Chebyshev (Mean, Sd) UCL	--	137
		Arsenic	16	46%	5	44.2	3.98	10.4	10.2	98%	17.0	95% GROS Adjusted Gamma UCL	--	17.0
DU-095	33	Lead	0	0%	17	2580	17.2	546	665	122%	1050	95% Chebyshev (Mean, Sd) UCL	--	1050
		Arsenic	5	15%	18	339	3.98	73.6	89.8	122%	112	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	--	112
DU-096	25	Lead	0	0%	4	735	11.8	130	170	131%	306	95% H-UCL	B	306
		Arsenic	6	24%	7	66.6	3.98	14.3	14.6	102%	21.2	95% KM H-UCL	--	21.2
DU-097	40	Lead	0	0%	3	365	11.1	60.4	85.4	141%	119	95% Chebyshev (Mean, Sd) UCL	--	119
		Arsenic	24	60%	2	54.8	3.98	7.43	8.78	118%	10.7	95% KM Adjusted Gamma UCL	--	10.7
DU-098	28	Lead	0	0%	0	65.3	12.7	25.0	12.4	50%	29.0	95% Student's-t UCL	--	29.0
		Arsenic	12	43%	0	7.45	3.98	4.93	1.18	24%	5.33	95% KM (BCA) UCL	--	5.33

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[(a)]	Minimum Detected Result (mg/kg)[(a)]	Average Result (mg/kg)	Standard Deviation (mg/kg)[(b)]	Relative Standard Deviation[(b)]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[(c)]	EPC (mg/kg)[(d)]
DU-099	27	**Lead**	**0**	**0%**	**0**	**29.5**	**6.34**	**12.6**	**4.22**	**34%**	**14.0**	**95% Student's-t UCL**	**--**	**14.0**
		Arsenic	14	52%	0	6.29	3.98	4.42	0.68	15%	4.65	95% KM (t) UCL	--	4.65
DU-100	41	**Lead**	**0**	**0%**	**5**	**937**	**8.55**	**97.9**	**227**	**232%**	**252**	**95% Chebyshev (Mean, Sd) UCL**	**--**	**252**
		Arsenic	21	51%	5	97.8	3.98	12.7	22.9	181%	28.7	95% KM (Chebyshev) UCL	--	28.7
DU-101	38	**Lead**	**0**	**0%**	**0**	**35.9**	**8.49**	**15.2**	**6.60**	**44%**	**17.0**	**95% Student's-t UCL**	**--**	**17.0**
		Arsenic	21	55%	0	12.1	3.98	4.94	1.66	34%	5.46	95% KM Adjusted Gamma UCL	--	5.46
DU-102	30	**Lead**	**0**	**0%**	**0**	**223**	**9.76**	**28.2**	**42.6**	**151%**	**62.1**	**95% Chebyshev (Mean, Sd) UCL**	**--**	**62.1**
		Arsenic	18	60%	0	9.86	3.98	5.03	1.80	36%	5.61	95% KM (t) UCL	--	5.61
DU-103	32	**Lead**	**0**	**0%**	**0**	**25.2**	**8.34**	**13.9**	**3.84**	**28%**	**15.0**	**95% Student's-t UCL**	**--**	**15.0**
		Arsenic	17	53%	0	6.44	3.98	4.44	0.60	14%	4.63	95% KM (t) UCL	--	4.63
DU-104	30	**Lead**	**0**	**0%**	**0**	**17.3**	**7.72**	**12.4**	**2.79**	**23%**	**13.3**	**95% Student's-t UCL**	**--**	**13.3**
		Arsenic	21	70%	0	5.21	3.98	4.19	0.38	9%	4.31	95% KM (t) UCL	--	4.31
DU-105	25	**Lead**	**0**	**0%**	**2**	**327**	**8.52**	**56.8**	**75.7**	**133%**	**80.5**	**95% H-UCL**	**B**	**80.5**
		Arsenic	7	28%	2	30.5	3.98	10.5	7.04	67%	13.0	95% KM (t) UCL	--	13.0
DU-106	27	**Lead**	**0**	**0%**	**0**	**143**	**10.7**	**26.5**	**33.1**	**125%**	**54.2**	**95% Chebyshev (Mean, Sd) UCL**	**--**	**54.2**
		Arsenic	17	63%	1	27.4	3.98	5.89	5.12	87%	10.4	95% KM (Chebyshev) UCL	--	10.4
DU-107	22	**Lead**	**0**	**0%**	**0**	**57.9**	**10.7**	**16.9**	**9.67**	**57%**	**20.4**	**95% Student's-t UCL**	**--**	**20.4**
		Arsenic	14	64%	0	5.85	3.98	4.23	0.45	11%	4.40	95% KM (t) UCL	--	4.40
DU-108	33	**Lead**	**0**	**0%**	**0**	**163**	**9.37**	**39.9**	**35.0**	**88%**	**51.7**	**95% H-UCL**	**B**	**51.7**
		Arsenic	13	39%	0	19.7	3.98	5.92	3.01	51%	7.31	95% GROS Adjusted Gamma UCL	--	7.31
DU-109	28	**Lead**	**0**	**0%**	**0**	**89.9**	**9.78**	**30.4**	**21.9**	**72%**	**38.6**	**95% Adjusted Gamma UCL**	**--**	**38.6**
		Arsenic	10	36%	0	11.2	3.98	5.21	1.66	32%	5.85	95% KM Adjusted Gamma UCL	--	5.85
DU-110	28	**Lead**	**0**	**0%**	**2**	**818**	**11.4**	**77.7**	**161**	**207%**	**210**	**95% Chebyshev (Mean, Sd) UCL**	**--**	**210**
		Arsenic	13	46%	2	25.5	3.98	6.62	5.30	80%	11.1	95% KM (Chebyshev) UCL	--	11.1
DU-111	32	**Lead**	**0**	**0%**	**3**	**937**	**16.1**	**125**	**176**	**141%**	**176**	**95% Adjusted Gamma UCL**	**--**	**176**
		Arsenic	6	19%	5	46.9	3.98	11.5	9.42	82%	18.0	95% GROS Adjusted Gamma UCL	--	18.0
DU-112	40	**Lead**	**1**	**3%**	**0**	**59.7**	**5.68**	**18.9**	**12.1**	**64%**	**27.3**	**95% KM (Chebyshev) UCL**	**--**	**27.3**
		Arsenic	16	40%	0	8.64	3.98	4.97	1.26	25%	5.35	95% KM Adjusted Gamma UCL	--	5.35
DU-113	20	**Lead**	**0**	**0%**	**1**	**878**	**11.1**	**58.0**	**193**	**333%**	**246**	**95% Chebyshev (Mean, Sd) UCL**	**--**	**246**
		Arsenic	11	55%	1	23.1	3.98	5.53	4.13	75%	9.79	95% KM (Chebyshev) UCL	--	9.79

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-114	33	Lead	0	0%	6	960	8.67	137	238	173%	318	95% Chebyshev (Mean, Sd) UCL	--	318
		Arsenic	9	27%	6	153	3.98	17.9	31.0	173%	22.1	95% KM H-UCL	--	22.1
DU-115	35	Lead	0	0%	3	1260	6.97	81.6	218	267%	242	95% Chebyshev (Mean, Sd) UCL	--	242
		Arsenic	11	31%	2	78.5	3.98	8.83	13.0	148%	18.6	95% KM (Chebyshev) UCL	--	18.6
DU-116	34	Lead	0	0%	12	751	12.0	225	242	107%	330	95% Adjusted Gamma UCL	--	330
		Arsenic	7	21%	14	85.8	3.98	22.2	21.8	98%	37.2	95% GROS Adjusted Gamma UCL	--	37.2
DU-117	29	Lead	0	0%	0	195	9.76	42.5	46.5	110%	55.6	95% H-UCL	B	55.6
		Arsenic	10	35%	2	34.6	3.98	7.71	7.01	91%	13.5	95% KM (Chebyshev) UCL	--	13.5
DU-118	33	Lead	0	0%	0	247	10.8	50.2	51.0	102%	88.9	95% Chebyshev (Mean, Sd) UCL	--	88.9
		Arsenic	8	24%	2	32.8	3.98	9.01	6.40	71%	13.0	95% GROS Adjusted Gamma UCL	--	13.0
DU-119	32	Lead	0	0%	0	52.2	10.1	20.3	8.67	43%	22.9	95% Student's-t UCL	--	22.9
		Arsenic	16	50%	0	6.92	3.98	4.67	0.86	19%	4.93	95% KM (t) UCL	--	4.93
DU-120	27	Lead	0	0%	0	175	14.7	34.6	32.4	94%	61.7	95% Chebyshev (Mean, Sd) UCL	--	61.7
		Arsenic	20	74%	0	13.1	3.98	5.03	2.42	48%	5.89	95% KM (t) UCL	--	5.89
DU-121	40	Lead	0	0%	0	44.2	11.9	20.2	7.25	36%	22.1	95% Student's-t UCL	--	22.1
		Arsenic	21	53%	0	7.46	3.98	4.68	1.04	22%	4.96	95% KM (t) UCL	--	4.96
DU-122	35	Lead	0	0%	0	138	12.5	31.1	25.0	81%	49.5	95% Chebyshev (Mean, Sd) UCL	--	49.5
		Arsenic	13	37%	1	34.3	3.98	6.47	5.06	78%	8.10	95% KM (BCA) UCL	--	8.10
DU-123	40	Lead	0	0%	0	240	10.9	26.6	35.5	134%	51.1	95% Chebyshev (Mean, Sd) UCL	--	51.1
		Arsenic	26	65%	0	10.9	3.98	4.61	1.28	28%	4.96	95% KM (t) UCL	--	4.96
DU-124	40	Lead	0	0%	0	63.3	11.6	22.9	9.33	41%	25.3	95% Adjusted Gamma UCL	--	25.3
		Arsenic	24	60%	0	8.37	3.98	4.59	1.03	22%	4.89	95% KM Adjusted Gamma UCL	--	4.89
DU-125	32	Lead	0	0%	1	250	11.8	45.0	53.9	120%	86.6	95% Chebyshev (Mean, Sd) UCL	--	86.6
		Arsenic	16	50%	1	32.8	3.98	6.55	5.50	84%	9.43	95% GROS Adjusted Gamma UCL	--	9.43
DU-126	40	Lead	0	0%	0	95.5	8.47	24.5	19.1	78%	37.7	95% Chebyshev (Mean, Sd) UCL	--	37.7
		Arsenic	22	55%	0	10.8	3.98	4.76	1.39	29%	5.16	95% KM (BCA) UCL	--	5.16
DU-127	37	Lead	0	0%	0	212	9.05	32.6	34.8	107%	57.5	95% Chebyshev (Mean, Sd) UCL	--	57.5
		Arsenic	22	60%	1	21.0	3.98	5.44	3.05	56%	6.46	95% KM Adjusted Gamma UCL	--	6.46
DU-128	26	Lead	0	0%	2	374	12.5	65.2	85.4	131%	91.0	95% H-UCL	B	91.0
		Arsenic	11	42%	2	50.7	3.98	8.99	10.2	114%	18.0	95% KM (Chebyshev) UCL	--	18.0

Decision Unit	Total Samples	Analyte	Total Non-Detects	% Non-Detects	Total Above Screening Levels(e)	Maximum Detected Result (mg/kg)[a]	Minimum Detected Result (mg/kg)[a]	Average Result (mg/kg)	Standard Deviation (mg/kg)[b]	Relative Standard Deviation[b]	ProUCL Recommended 95% UCL (mg/kg)	ProUCL Recommended 95% UCL Basis	ProUCL Comment[c]	EPC (mg/kg)[d]
DU-129	40	**Lead**	0	0%	2	312	10.2	52.8	71.6	136%	102	**95% Chebyshev (Mean, Sd) UCL**	--	102
		Arsenic	15	38%	2	27.2	3.98	7.17	5.34	74%	10.9	95% KM (Chebyshev) UCL	--	10.9
DU-130	34	**Lead**	0	0%	0	155	8.13	32.5	36.3	112%	59.6	**95% Chebyshev (Mean, Sd) UCL**	--	59.6
		Arsenic	19	56%	1	22.5	3.98	5.96	3.93	66%	6.68	95% KM H-UCL	--	6.68
DU-131	31	**Lead**	0	0%	3	271	14.4	72.3	82.4	114%	137	**95% Chebyshev (Mean, Sd) UCL**	--	137
		Arsenic	11	36%	3	23.2	3.98	8.26	6.05	73%	13.1	95% KM (Chebyshev) UCL	--	13.1
DU-132	13	**Lead**	0	0%	1	281	12.8	37.1	73.4	198%	126	**95% Chebyshev (Mean, Sd) UCL**	--	126
		Arsenic	8	62%	1	34.0	3.98	6.75	7.92	117%	8.74	95% KM H-UCL	--	8.74
DU-133	13	**Lead**	0	0%	0	51.9	10.6	25.6	16.2	63%	39.5	**95% H-UCL**	**B**	39.5
		Arsenic	6	46%	0	7.95	3.98	4.96	1.35	27%	5.67	95% KM (t) UCL	--	5.67

(a) When the XRF analyzer recorded "<LOD" (less than the level of detection), the value was replaced with the MDL (5.68 mg/kg lead and 3.98 mg/kg arsenic).

(b) The standard deviation and relative standard deviation are reported as 0.00 or 0.00%, respectively, when there is only one sample location or when all samples are reported as <LOD for a DU.

(c) ProUCL Comment provides the following comments:

A: "Warning: All observations are non-detects (NDs); therefore, all statistics and estimates should also be NDs! Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! The project team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV)."

B: "ProUCL computes and outputs *H*-statistic based UCLs for historical reasons only. *H*-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the technical guide. It is therefore recommended to avoid the use of *H*-statistic."

C: The warning by ProUCL identified one to three distinct data values were detected. "The project team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV)." In the case of only one detect, the 95% UCL could not be computed and the maximum detected was reported.

(d) The maximum detected concentration was used as a conservative assumption of the exposure point concentration instead of the reported ProUCL 95% UCL because less than 20% of the data were distinct detected values; thus, the 95% UCL calculation is likely inaccurate.

(e) Screening levels are 250 mg/kg lead and 20 mg/kg arsenic, based on MTCA Method A (WAC 173-340-740).

BCA is bias-corrected accelerated bootstrap method; BTV is background threshold value; EPC is exposure point concentration; KM is Kaplan-Meier; MDL is method detection limit; Sd is standard deviation; UCL is upper confidence limit; UPL is upper prediction limit.

4.3.2 Summary of Field Characterization Information within the OU

The nature and extent of lead and arsenic concentrations varied throughout 100-OL-1 OU. The information in Table 4-2 and Appendices A, B, and D is extensive. The following summarizes key findings for some of the DUs within the OU:

- **DU-003**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-003-029, which had an arsenic concentration of 96.7 mg/kg (Figure 4-1).
- **DU-004**: All concentrations for arsenic were below the level of detection by the XRF analyzer, and the results were replaced with the MDL, 3.98 mg/kg. This was the only DU without XRF detectable results for arsenic, and the 95% UCL for arsenic reported as the MDL.
- **DU-008**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-008-023, which had an arsenic concentration of 55.1 mg/kg.
- **DU-009**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-009-015, which had an arsenic concentration of 22.9 mg/kg.
- **DU-013**: The southern portion of the DU has high concentrations of lead and arsenic, including several locations that exceed the lead and arsenic screening levels, while the northern portion of the DU has relatively low lead and arsenic concentrations.
- **DU-020**: Lead and arsenic concentrations measured along the river exceeded screening levels. Step-out sampling locations were adjusted by the field characterization team to address steep terrain and saturated soil at the river's edge. This DU was evaluated twice during the pilot study, and the region of high concentrations for lead and arsenic is consistent with the findings of that study (Bunn et al. 2014).
- **DU-021**: Lead and arsenic concentrations measured along the river exceeded screening levels. Step-out sampling locations were adjusted by the field characterization team to address steep terrain and saturated soil at the river's edge. Sample locations DU-021-002 and DU-021-003 are approximately 168 m (551 ft) apart due to a remediated 128-H-1 (100-H burning pit waste site) in the southwest area of the DU.
- **DU-022**: Lead and arsenic concentrations along the northern portion within the DU and outside of the OU exceeded screening levels. Step-out sampling supports consideration for boundary modification of this DU.
- **DU-023**: The region has been heavily disturbed, most recently from remediation of facilities and waste sites around 105-H reactor building. All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-023-039, which had an arsenic concentration of 31.4 mg/kg. In addition, sample locations DU-023-004 through -006 and DU-023-014 through -015 were relocated away from a large excavation pit.
- **DU-026**: Throughout the DU, there are locations with lead and/or arsenic concentrations exceeding the screening levels. Step-out sampling supports consideration for boundary modification of this DU. The final duplicate check within the DU sampling failed QA criteria (>20% difference). The validation of these results indicates that the failure with the final duplicate readings is a minor deficiency with no significant impact to the quality of the data, and

associated data were qualified as estimated (i.e., "QJ"). More explanation about QA of sample results is in Appendix C.

- **DU-042**: A duplicate check failed QA criteria (>20% difference). The validation of these results indicates that the failure with the duplicate readings is a minor deficiency with no significant impact to the quality of the data, and associated data were qualified as estimated (i.e., "QJ"). More explanation about QA of sample results is in Appendix C.
- **DU-043**: One sample location (DU-043-028) is located outside of the DU, but within acceptable limits of the tolerance for GPS devices used to site the location.
- **DU-049**: This DU has some of the highest measured values of lead and arsenic, and the average concentrations and 95% UCL exceed the screening levels for both lead and arsenic. A duplicate check failed QA criteria (>20% difference). The validation of these results indicates that the failure with the duplicate readings is a minor deficiency with no significant impact to the quality of the data, and associated data were qualified as estimated (i.e., "QJ"). More explanation about QA of sample results is in Appendix C.
- **DU-052**: Five of the 32 locations measured had lead and/or arsenic concentration exceeding the screening levels. These locations were spread across the DU.
- **DU-053**: This DU was evaluated in the pilot study, and the region of high concentrations for lead and arsenic is consistent with the findings of that study (Bunn et al. 2014). During the RI, the northern portion of the OU was extended to include the region in 1943 imagery that suggested orchard activities. For this DU, the extended areas appear to have included the lead arsenate residual contamination as step-out sampling beyond the OU was below screening levels.
- **DU-054**: The concentrations of lead and arsenic in the eastern portion of the DU exceed screening levels while the concentrations in the western portion of the DU have relatively low concentrations of lead and arsenic.
- **DU-058**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-058-006, which had an arsenic concentration of 22.6 mg/kg.
- **DU-061**: One sample location (DU-061-001) is outside of the DU, but within acceptable limits of the tolerance for GPS devices used to site the location.
- **DU-064**: The southwestern portion of the DU has concentrations that exceed the screening levels for lead and arsenic, while the remaining area of the DU is relatively low in concentration.
- **DU-068**: The distribution of results had the greatest variability of all the DUs, with an RSD of 420% for lead and 362% for arsenic. Figure 4-1 shows sampling at one of the locations. The highest concentrations of lead and arsenic are at the northwest corner of the DU (2510 mg/kg lead and 310 mg/kg arsenic) and appear to be in an orchard that had been cut down prior to aerial imagery available for 1943 (image not included).
- **DU-069**: One sample location (DU-069-003) is outside of the DU, but within acceptable limits.
- **DU-074**: Two pre-selected sample locations were south of the main part of the DU (near southern portion of DU-076). Per a phone call to the sample lead, the field team lead decided to add two sample locations to the north end of the DU (DU-074-031 and DU-074-032) to ensure the sample density for the DU was met.

- **DU-076**: This DU is the region of 116-F-1 waste site (Lewis Canal), and most of the DU has been disturbed. The field characterization team moved several sample locations (DU-076-011 through DU-076-014) to avoid a large pit (Figure 4-1). Step-out sampling supports consideration for boundary modification of this DU.
- **DU-079**: This DU had concentrations that consistently exceeded screening levels of lead and/or arsenic. There are piles of trees, with evidence of structures and orchards rows, indicating that the area had been an active orchard. The southwest edge of the DU borders the Hanford Irrigation Canal. In that region, step-out sampling continued up to the canal but not at locations across from the canal.
- **DU-080**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-080-016, which had an arsenic concentration of 42.3 mg/kg.
- **DU-081**: This DU has concentrations that consistently exceeded screening levels of lead and/or arsenic. Step-out sampling supports consideration for boundary modification of this DU.
- **DU-082**: Lead and arsenic concentrations across this DU are relatively low, similar to background concentrations and the XRF analyzer detection limit. One of the blank checks did not have consecutive readings, which is a minor deficiency with no significant impact to the quality of the data, and associated data were qualified accordingly. More explanation about QA of sample results is in Appendix C.
- **DU-086**: Lead and arsenic concentrations were consistently above screening levels, particularly along the borders of the DU. While the border of the OU was adjusted in this area during the RI review of the OU boundary, step-out sampling supports consideration for boundary modification of this DU.
- **DU-090**: There are a few locations within this DU where lead and arsenic exceeded screening levels. Step-out sampling supports consideration for boundary modification of the northern portion of this DU.
- **DU-093**: To the north of the DU, tree stumps were visible outside of the OU, warranting additional step-out sampling. Step-out sampling supports consideration for boundary modification of this DU.
- **DU-095**: This DU has the highest concentrations of lead and arsenic within the OU: The 95% UCLs are 1050 mg/kg lead and 112 mg/kg arsenic (Table 4-2). The south central border included confirmatory soil sampling. Tree stumps in the southeastern portion of the DU show signs of bark stripping and banding (see discussion in Appendix E). Step-out sampling supports consideration for boundary modification of this DU. Figure 4-1 shows sampling at one of the locations.
- **DU-098**: Sample location DU-098-25 was relocated due to a burrowing owl nest.
- **DU-100**: The north central part of the DU has concentrations exceeding the screening levels for lead and arsenic. Tree stumps are present. Step-out sampling was not conducted along the edge of the portion with high concentrations because the associated location in the southwestern edge of DU-099 had relatively low lead and arsenic concentrations.
- **DU-101**: One sample location (DU-101-020) is outside of the DU, but within acceptable limits of the tolerance for GPS devices used to site the location.

- **DU-105**: The field characterization team reported that finding suitable sampling locations within the DU was difficult because of the remains of an old airport runway.
- **DU-112**: Gravel pit and foundation are present within the DU.
- **DU-113**: All concentrations of lead and arsenic were below screening levels, except for sample location DU-113-011, which had concentrations of 878 mg/kg lead and 23.1 mg/kg arsenic.
- **DU-114**: All sample locations were qualified with a "Q" due to an incomplete blank check in the middle of the sampling event. The validation of these results indicates that the failure to complete a blank check in the middle of the sampling event is a minor deficiency with no significant impact to the quality of the data, and associated data were qualified as estimated (i.e., "QJ"). More explanation about QA of sample results is in Appendix C. Step-out sampling indicated that concentrations exceeding screening levels for lead and arsenic extended to the river, where additional sampling with the XRF was not possible.
- **DU-116**: The distribution of concentrations exceeding screening levels for lead and/or arsenic extends throughout the DU. The concentrations in the soil are low around the 600-350 waste site (PNL Water Catchment Experiment) and where there have been other soil-disturbing activities.
- **DU-122**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-122-030, which had an arsenic concentration of 34.3 mg/kg.
- **DU-127**: All concentrations of lead and arsenic were below screening levels, except arsenic for sample location DU-127-002 (Figure 4-1), which had an arsenic concentration of 21.0 mg/kg.
- **DU-131**: Step-out sampling activities occurred over 2 days because additional pre-selected locations were needed to follow the areas of contamination outside the OU. DU-131S-05 was sampled twice, but in a slightly different location. Both data points were kept to provide better resolution of the soil characteristics. Within this DU, the trees in the orchards up to 1943 were removed and new roads and buildings were built in 1943 or later, creating considerable soil disturbance (Appendix D, Figures D-66 and D-67). Step-out sampling supports consideration for boundary modification of this DU.

Figure 4-1. Sampling Locations Noted in Summary of Field Characterization Activities. From left to right: view of sample point, looking north and looking east.

4.4 Vadose Zone Contamination

Contamination of lead and arsenic varies throughout the vadose zone, from below the surface of the soil down to the groundwater. Previous studies of vertical distribution of lead and arsenic in historical orchards are discussed in Section 1.3.3.1. The River Corridor RI/FSs include characterization of waste sites with lead and arsenic concentrations above background soil concentrations. Results of lead and arsenic remaining in waste sites are provided for information only in Appendix F.

4.5 Groundwater Contamination

Groundwater was not sampled as part of this RI. Summaries of groundwater contamination in the groundwater interest areas associated with the 100-OL-1 OU are included in the following reports:

- Hanford Site Groundwater Monitoring Reports for each calendar year. The latest report is for 2014 (DOE/RL-2016-09). These reports include an annual discussion of groundwater monitoring in the groundwater interest areas co-located with the 100-OL-1 OU, including 100-B/C, 200-BP, 100-HR-D, 100-HR-H, 100-FR-3, and 200-PO.
- *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units* (DOE/RL-2010-96). DU-008 is along the northwestern edge of 100-BC-1 OU.
- *Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units* (DOE/RL-2010-97). DU-009 is along the Columbia River shoreline and upstream of 100-KR-1 OU. The orchards were partially covered when fill was placed between 181-KW and 181-KE River Pump Houses.
- *Remedial Investigation/Feasibility Study for the 100-DR-1, 100- DR-2, 100-HR-1, 100- HR-2, and 100-HR-4 Operable Units* (DOE/RL-2010-95). DU-011 and -013 are north and DU-016, -027, and -028 are west of 100-DR-1 OU. DU-020, -021, -025, and -026 are in 100-HR-2 OU. The land designated as DU-022, -023, and -024 are in the highly disturbed areas within the 100-HR-1 and -2 OUs.
- *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units* (DOE/RL-2010-98). DU-072, -073, -074, -075, -076, and -087 are in the 100-FR-1 and -2 OUs. The following DUs have waste sites within 100-IU-2 and -6 OUs: DU-031, -032, -035, -036, -055, -070, -094, -095, -096, -104, -116, -117, -118, and -133.

A review of these reports indicates that there are infrequent analyses of the groundwater for lead and arsenic and there are no trends that indicate the contaminants in the groundwater are from lead arsenate residues in the 100-OL-1 OU.

4.6 Surface Water and Sediment Contamination of the Columbia River

The surface water and sediment investigations of the Columbia River along the River Corridor Interest Area and the shoreline of the 100-OL-1 OU include annual environmental monitoring reports (e.g., DOE/RL-2014-52 for calendar year 2014) as well as investigations for each reactor operations area (DOE/RL-2010-95; DOE/RL-2010-96; DOE/RL-2010-97; DOE/RL-2010-98). These reports include information about the pore water along the shoreline. The River Corridor Baseline Risk Assessment (RCBRA) (DOE/RL-2007-21) and the Columbia River Component Risk Assessment (DOE/RL-2007-21) provide assessments of lead and arsenic in the various media associated with the Columbia River. A review of these reports indicates that the lead and arsenic in the surface water and sediment of the Columbia River along the River Corridor Interest Area do not show trends that indicate the contaminants are from lead arsenate residues in the 100-OL-1 OU.

4.7 Biota

There was no biota sampling specifically for the 100-OL-1 OU. Sampling and analysis of biota in the 100-OL-1 OU River Corridor is discussed in the following reports:

- *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units* (DOE/RL-2010-96). Report includes biota sampling and plant tissue results for the BC Pilot Study and RCBRA, as well as the annual environmental monitoring program for plant tissues.
- *Remedial Investigation/Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units* (DOE/RL-2010-97). Report includes biota sampling and plant tissue results from RCBRA.
- *Remedial Investigation/Feasibility Study for the 100-DR-1, 100- DR-2, 100-HR-1, 100- HR-2, and 100-HR-4 Operable Units* (DOE/RL-2010-95). Report includes biota sampling and plant tissue results from the annual monitoring program and RCBRA.
- *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units* (DOE/RL-2010-98). Report includes the results of biota and plant tissue sampling from the annual monitoring program and RCBRA.

4.8 Air

Wind could redistribute soil contaminated by lead arsenate residues. The pilot study for the 100-OL-1 OU compared the distribution of lead and arsenic results to the direction and frequency of wind based on the closest meteorological monitoring station to the four areas evaluated. The study concluded that, while the wind over the 70-plus years since the last application of lead arsenate pesticide probably dispersed some contaminated soils, the very low concentrations of lead and arsenic where trees are apparent in the 1943 aerial imagery is likely not due to wind scouring the contaminated soils away (Bunn et al. 2014).

Air monitoring at the Hanford Site has focused on protecting workers, the public, and the environment. Nonradiological releases to the atmosphere (e.g., lead) are monitored as criteria and toxic air pollutants. Criteria and toxic air pollutants are those emitted from chemical-processing and electricity-generating engines fueled by petroleum and are monitored when activities are known to release pollutants of concern, such as particulate matter, sulfur oxides, nitrogen oxides, volatile organic compounds, carbon monoxide, and lead. Note, arsenic is not monitored as an air pollutant. The Hanford Site Environmental Reports summarize the total annual releases of these constituents and report in accordance with the air quality standards established in WAC 173-400, "General Regulations for Air Pollution Sources."

4.9 Summary of Nature and Extent of Contamination

Due to the delay between the use and application of lead arsenate on the Hanford Site and the characterization of lead and arsenic in the soil for this RI, the CSM for the 100-OL-1 OU includes the sources from pre-Hanford operations and the time for release, transport, and exposure that has happened until the present. Figure 4-2 provides a pictorial CSM for these periods to show the sources, release mechanisms, and potential transport. The former orchard properties on the Hanford Site have residual lead arsenate contamination in the soil as a result of pesticide use in the first half of the 20th century (Figure 4-2, top). This condition is consistent with orchard properties across Washington State and the United States where lead arsenate pesticides were applied to a variety of fruit trees (AWSCFT 2003a; Hood 2006; Schooley et al. 2008). The concentrations of lead and arsenic are expected to be highly variable across the Hanford Site orchards because of the differences in spraying practices, the number of years each orchard was in production, irrigation during orchard operation, the physical form of the pesticide when applied, the physical properties of the soil at each orchard, and the amount of contaminant loss from individual orchards. In addition, activities on the Hanford Site have occurred and continue to occur in areas that once were occupied by orchards. From the time that the orchards were in operation to today, the soil has been disturbed in regions within 100-OL-1 OU such that lead arsenate residues have been moved, excavated, and/or buried (Figure 4-2, bottom).

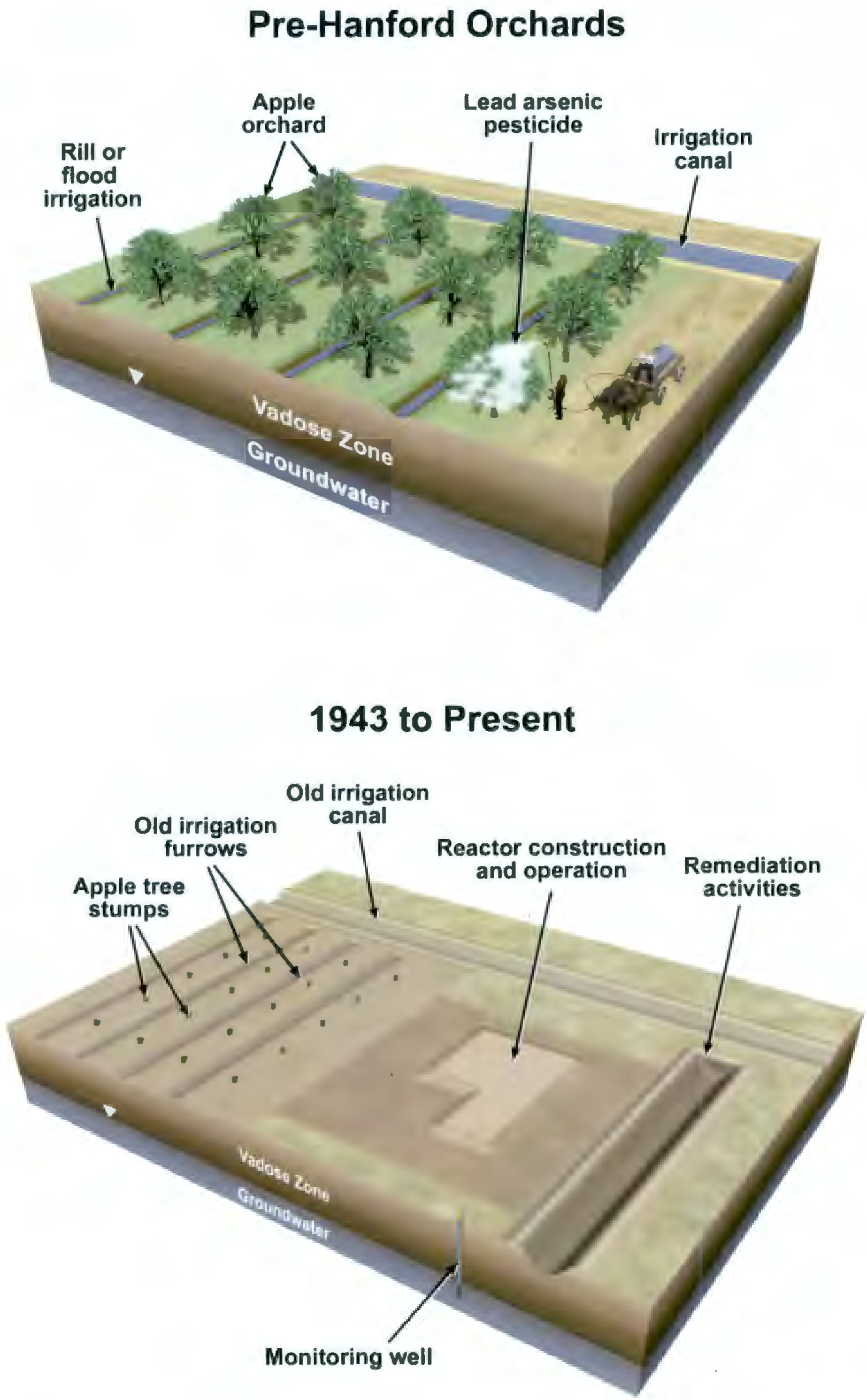


Figure 4-2. Conceptual Site Model for Lead Arsenate Pesticide Residues in Orchard Lands on the Hanford Site Prior to 1943 (top) and from 1943 to Present (bottom).

This page intentionally left blank.

5. Contaminant Fate and Transport

The persistence of lead arsenate pesticide in the 100-OL-1 OU is a function of the routes of migration in air, soil, and water pathways. The release of lead arsenate pesticide in the orchards decades ago has not degraded, and since the release of the pesticide the lead and arsenic have dispersed based on their behavior in the environment. This section provides an overview of lead (Pb) and arsenic (As) fate and transport evaluations on the Hanford Site.

5.1 Chemical Properties of Lead and Arsenic

Lead is naturally occurring in soil (Section 4.1) and is an important metal used for many industrial purposes. Lead is used for pipes and welds in homes as well as in facilities at Hanford. Dispersion of lead in the environment occurs through the burning of gasoline with lead additives and other fossil fuels, mining and smelting, and manufacturing. Lead is a cationic metal, a chalcophile (ore-loving), and as such, its primary form in the natural state is galena (PbS). Lead occurs mainly as Pb2+, and it forms several other minerals that are quite insoluble in natural waters. When soluble lead is added to soil, lead reacts with clays, phosphates, sulfates, carbonates, hydroxides, and organic matter such that its solubility is greatly reduced. As lead weathers in soil, lead sulfides slowly oxidize and can form carbonates and become incorporated in clay minerals, in iron and manganese oxides, and in organic matter. The presence of lead near the soil surface in most soil profiles is primarily related to the surficial accumulation of organic matter. The greatest lead concentrations are often found in the organically rich top horizons of uncultivated soils. Thus, organic matter should be considered as an important sink of lead in soil (EPA 1992; Kabata-Pendias and Pendias 2001).

Arsenic is also naturally occurring in the soil (Section 4.1), yet rarely is it found as a free element. More commonly, arsenic exists in other forms, such as arsenide (e.g., nickel diarsenide, copper diarsenide), sulfide (e.g., arsenic trisulfide), or adhered to iron oxides (Basu 2009). The oxidation states of arsenic are -3, 0, +3, and +5. In the soil environment, arsenic exists as either arsenate, +5 (AsO_4^{3-}), or as arsenite, +3 (AsO_2^-) because of the ranges Eh and pH in soil. The complex anions AsO_2^-, AsO_4^{3-}, $HAsO_4^{2-}$, and $H_2AsO_3^-$ are the most common mobile forms of arsenic, with sorption to materials (e.g., soil) at a pH range of 7 to 9. The behavior of arsenate (AsO_4^{3-}) is similar to that of phosphate because of their chemical similarity. Bacterial action can lead to methylation and alkylation of arsenic, depending on the aerobic conditions of the media. In soil, the behavior of arsenic is generally governed by its oxidized state (EPA 1992; Kabata-Pendias and Pendias 2001). Delistraty and Yokel (2011) analyzed the speciation of arsenic in the soils from orchards at Hanford and found that As+5 was the dominant form. Arsenate ions are known to be readily fixed by soil components like clays, phosphatic gels, humus, calcium, and hydrated iron and aluminum oxides. In contrast, arsenite compounds are reported to be 4 to 10 times more soluble than arsenate compounds. Strongly absorbed arsenic in soil is unlikely to be desorbed again, and generally the retention of arsenic by soil progresses with the years (EPA 1992; Kabata-Pendias and Pendias 2001).

5.2 Potential Routes of Migration

Potential routes of migration for the lead arsenate pesticide have changed over time. That is, the historical use of the lead arsenate may have distributed the pesticide in ways that are different from the migration routes today for the residues remaining in the soil.

During historical field applications of lead arsenate pesticide, there were several pathways for contaminant migration: soil, water, air, and biota (Figure 4-2, top). The orchardists applied the lead arsenate pesticide onto individual fruit trees to deter codling moths from laying eggs on the fruit or leaves.

Extension bulletins over time recommended more frequent applications of lead arsenate, with increasing saturation applications through the trees as well as on the trunk (State College of Washington 1918, 1937, and 1942). Pesticide would have dripped from the trees onto the soil, lead arsenate powder or solution would have spilled onto the soil, and dead leaves and fruit contaminated with lead arsenate would have accumulated on the soil. Accumulation of lead arsenate residues in the soil would have been the most significant source for lead and arsenic over time.

Less significant migration routes during historical field applications would have included wind and water dispersion and the movement of people and animals through the orchards. Applications during windy conditions also could have led to dispersion of the lead arsenate beyond the orchards. Irrigation water (flood irrigation was common) could have carried lead and arsenic away from the orchards in regions where applications were substantial. Overland flow (surface runoff) from precipitation or irrigated water could have contributed to lead and arsenic in surface water sediments. In addition, human and animal activity could have tracked lead and arsenic away from the orchards. Certainly, the people who sprayed the lead arsenate and the ecological receptors using the orchards during pesticide application were exposed to the lead and arsenic.

The current route of migration for lead arsenate residue in soils from historical field applications includes wind dispersion of the soil and soil disturbances relocating contaminated soil (Figure 4-2, bottom). While wind is certainly a common event as gusts and sustained winds mobilize soil particles in the air (Section 3.2), there is no monitoring information to support the prevalence of lead or arsenic at concentrations of concern (Section 4.8). The pilot study looked at wind dispersion compared to the distribution of lead and arsenic within the study areas, and did not find a strong correlation (Bunn et al. 2014).

Soil disturbances relocating contaminated soil within the 100-OL-1 OU are evident in a couple of ways. The orchards in the Hanford townsite were removed and the roads and buildings were constructed in the area with a different configuration. Appendix D, Figure D-65 through Figure D-67, shows the roads are in different locations in 1943 and 2013, and field characterization results show the presence of high concentrations above screening levels for lead and arsenic in locations that do not look like orchards in images from 1943. Soil with lead arsenate residue may have been mixed with deeper soils during Hanford construction activities (Appendix F).

Soil characterization for the RI included sampling outside the OU. The historical and current routes of migration mentioned above could be responsible for some of the high concentrations found in step-out sampling (Section 2.2.2 and Appendix D). Overall, the soil characterization activities demonstrated that the highest concentrations of lead and arsenic are within the boundaries of 100-OL-1 OU.

5.3 Contaminant Persistence

DOE/RL-2010-95 defines contaminant persistence as "how long it takes a particular contaminant to be transformed into a less toxic or less available form, or how long it takes the contaminant to physically leave the affected area." Persistence in the vadose soils is influenced by soil type, the cation exchange capacity of the soil (the ability to hold cations [that is, positively-charged ions] under a given condition), pH, and the presence of other metals. In general, lead is considered to be more persistent, or less mobile, than arsenic, as discussed in Section 1.3.3.1. Peryea and Creger (1994) demonstrated the persistence of lead arsenate residues in orchard soils. The profiles of lead and arsenic concentrations by depth in soils from orchards in central Washington State (Peryea and Creger 1994) are similar to the depth profiles from soils at locations within the 100-OL-1 OU (Yokel and Delistraty 2003).

5.4 Contaminant Migration

One of the most important properties influencing contaminant migration in the soil is a measure of mobility called the soil/water distribution coefficient, or K_d value. This parameter is dependent on the context of the soil, including the relative abundance of different cations and anions, pH, oxidation-reduction potential, cation exchange capacity, and the organic carbon content. As mentioned earlier, arsenic has more than one oxidation state, trivalent (+3) and pentavalent (+5), and these oxidation states have different mobilities and toxicities (EPA 1992).

DOE/RL-2010-98 includes an evaluation of vadose zone modeling and development of groundwater/surface water protection values for soil screening level (SSL) that are applicable to the understanding of lead and arsenic migration in the 100-OL-1 OU. These evaluations included batch leach tests on soils similar to and co-located within the 100-OL-1 OU (DOE/RL-2008-46-ADD4), and modeling with STOMP (Subsurface Transport Over Multiple Phases). DOE/RL-2010-98 reported that the K_d values were calculated based on the results of the batch leach from samples out of three wells. Lead was detected in only one of the three samples from the saturated zone in 100-FR-3, and two of the ratios tested (1:1 and 1:2.5 g soil/mL of water) did not detect the contaminant in the extract. One test (1:5 g soil/mL of water) resulted in a K_d of 70.8 mL/g for lead. All three of the samples from the saturated zone in 100-FR-3 include arsenic, but 5 of the 18 batch leach tests (with varying ratios of soil and water) did not detect the contaminant in the extract. K_d values were calculated based on the 13 detected batch leach ratios, and ranged from 12.1 to 244 mL/g arsenic, with an average of 75.5 and a median of 59.4 mL/g. DOE/RL-2010-98 concluded that the calculated K_d values for lead and arsenic based on these batch leach test indicate that neither of these constituents is substantially leachable.

Simulations with STOMP for arsenic and lead were not used to develop SSL because the simulations would not produce breakthrough of the metals from the soil into the groundwater within 1000 years. That is, the K_d values for lead (30 mL/g) and arsenic (29 mL/g) considered for the STOMP simulations are greater than 22 mL/g, which is the breakthrough threshold for calculating SSL for groundwater and surface water protection with STOMP.

DOE/RL-2010-98 identified uncertainties in the vadose zone and groundwater modeling associated with excluding lead and arsenic as contaminants for further evaluation. Conservative assumptions for the K_d and other parameters were used in the models. The resulting bias to the model results in more protective values for use in remedial action decision-making. Thus, it is estimated that the lead and arsenic likely would not break through from the soil into groundwater for at least 1000 years.

Empirically, the evaluation of lead and arsenic migration in the soil to groundwater and surface water, or the lack thereof, is evident from the presence of high concentrations at the soil's surface in the field characterization for this RI. As discussed in Section 4.5, monitoring results of groundwater include lead and arsenic concentrations above detection levels, but the frequency and location of the monitoring results within the River Corridor has not reached levels for remediation consideration (DOE/RL-2010-95; DOE/RL-2010-96; DOE/RL-2010-97; DOE/RL-2010-98; DOE/RL-2016-09). The modeling results are consistent with field characterization results, and indicate that the lead arsenate residues are not migrating from the soil into other media.

5.5 Summary

Evidence today is that the most significant concentrations of lead and arsenic in regions of the 100-OL-1 OU are in the soil surface and just below the surface. The chemical properties of lead and arsenic indicate that the metals bind to the soil, and unless additives (e.g., solutions of high or low pH) to the soil change their properties, lead and arsenic will remain in the soil. The soil types within the OU have characteristics that will react and retain lead and arsenic, increasing their persistence in the soil. Based on field characterization results, the most significant redistribution of lead arsenate residues has been from soil disturbances during construction or remediation activities. The mobilization of lead arsenate residues in surface soil into the groundwater is unlikely considering the soil/water distribution coefficients (K_d) for lead and arsenic are high and breakthrough from soil into groundwater is considered to be greater than 1000 years. As such, the RI/FSs for the River Corridor Interest Area have not prepared groundwater/ surface water protection values for SSL based on modeling efforts for lead and arsenic. The exposure pathways for receptors should focus on the concentrations of lead and arsenic found in the soil surface.

6. Human Health and Ecological Risk Assessment

The risk from lead arsenate to humans and the environment is an important part of the discussion for future actions with the 100-OL-1 OU. DOE/RL-2012-64 limited the human health and ecological risk assessment for the RI to a comparison of the field characterization results to established risk-based screening levels identified for Hanford and Washington State (Section 6.1). Sections 6.2 and 6.3 provide a conceptual exposure model for human health and ecological risk, respectively. The data analysis for the risk assessment and discussion of the field characterization results collected during this RI is provided in Section 6.4. Section 6.5 discusses the determination of exposure point concentrations (EPCs) for the DUs in the OU. The summary of risk for the DUs and the uncertainty of the risk characterization are discussed in Section 6.6.

6.1 Relevant Federal and Washington State Screening Levels for Protection of Human Health and the Environment

The complexity of lead and arsenic, varying toxicity effects based on exposure pathways, and natural background levels have resulted in numerous screening levels for the protection of human health and the environment. Lead is known to cause neurological damage, particularly for prenatal and young children (Hood 2006; ATSDR 2007a). Arsenic is a known carcinogen (Hood 2006; ATSDR 2007b). While acute effects are known for humans exposed to high concentrations of arsenic and lead, there are no reported cases of acute effects from exposure to lead arsenate residues in soils from the former orchard sites (Hood 2006). Effects from exposure to lead and arsenic have been documented for plants, animals, and other ecological receptors (Eisler 1988a, b; Elfving et al. 1994; Schooley et al. 2008; Delistraty and Yokel 2011). To date, scientific studies have not found conclusive evidence that exposure of low-to-moderate levels of lead and arsenic contamination in soil has caused or is causing deleterious health effects (AWSCTF 2003a).

6.1.1 Lead and Arsenic Contamination in Washington and Vicinity

Several actions in Washington State concerning lead and arsenic are appropriate to consider for characterization of former orchards at the Hanford Site. Following are summaries of several actions in Washington State addressing lead and arsenic soil contamination. These reports have established approaches for evaluating contaminated areas and action levels for remediation.

Asarco Tacoma Smelter Superfund Site, Ruston and Tacoma, Washington. Lead and arsenic are the primary contaminants of concern at the Asarco Tacoma Smelter Superfund site, located along the Commencement Bay shoreline within the municipal boundaries of the town of Ruston at the southern end of the main basin of Puget Sound. The site is an operational unit of the larger Commencement Bay Nearshore/Tideflats Superfund site, which was listed on the interim priority list by EPA in 1981 and included in the first published National Priorities List in September 1983. Operation of the Asarco smelter for over 95 years resulted in contamination, primarily by lead and arsenic, of the smelter site, offshore sediments, and the surrounding residential area. The former copper and lead smelter specialized in processing ores with high arsenic concentrations, and recovered arsenic trioxide and metallic arsenic as byproducts. In 1993, EPA issued the first Record of Decision for Ruston/North Tacoma Study Area OU 04, and identified the remedial action levels for soil removal of residential soil as 500 mg/kg for lead and 230 mg/kg for arsenic (EPA 1993). The 2014 Fourth Five-Year Review Report of the site stated that the cleanup actions were completed in 2012. Currently there are community protection measures in place for areas that have soil concentrations between the MTCA Method A cleanup level of 20 mg/kg arsenic and the EPA action level of 230 mg/kg arsenic (EPA 2014).

Area-Wide Soil Contamination Task Force, Washington State Department of Ecology. The State of Washington created a task force in the early 2000s to develop a strategy for addressing "area-wide" soil contamination. Area-wide soil contamination refers to low-to-moderate-level lead and arsenic soil contamination dispersed over a large area in Washington State, and the efforts of the task force are being used to address contamination from the Asarco Tacoma Smelter plume, the Everett Smelter, and at schools built on former orchard lands across the state. In 2003, the findings and recommendations of the Area-Wide Soil Contamination Task Force were published (AWSCTF 2003a). The task force identified six categories of protection: (1) education programs, (2) public health programs, (3) individual protection measures, (4) land-use controls, (5) physical barriers, and (6) contamination reduction. The task force used Ecology's current views of "low-to-moderate" levels of lead and arsenic in soil. In general, for schools, childcare centers, and residential land uses, the low-to-moderate range is 500 to 700 mg/kg for lead and up to 100 mg/kg for total arsenic. For properties where exposure of children is less likely or less frequent, the low-to-moderate range is 700 to 1000 mg/kg for lead and up to 200 total mg/kg for total arsenic (AWSCTF 2003a, b).

Asarco Tacoma Smelter Site Final Interim Action Plan for the Tacoma Smelter Plume. While EPA's Asarco Tacoma Smelter Superfund site is remediating the facilities and immediate area, Ecology is addressing air pollution contamination from the smelter in an area of over 2600 km^2 (1000 mi^2). The 2012 interim action plan describes how Ecology will remediate some of the Tacoma Smelter Plume and manage risk (Ecology 2012a). Ecology plans to take four actions regarding the Tacoma Smelter Plume: (1) clean up home yards in the worst areas of the plume; (2) cleanup play areas at schools, childcare centers, parks, camps, multi-family public housing, etc.; (3) educate people about the risk and how to protect themselves; and (4) encourage soil testing and cleanup during property development. Interim actions are a mix of physical cleanup methods (excavating, mixing, capping, etc.) and institutional controls (property use restrictions, environmental covenants or deed restrictions, zoning overlays, outreach, etc.). The action plan is divided into two phases. The first phase focuses on areas where children play and people live, and the second phase focuses on those areas not covered in the first phase. Action levels for each phase are divided into moderate zones and high zones. The moderate zone has an average concentration of 250 to 500 mg/kg lead (maximum concentration of 500 to 1000 mg/kg lead) and an average concentration of 20 to 100 mg/kg arsenic (maximum concentration of 40 to 200 mg/kg arsenic). The high zone has an average concentration of >500 mg/kg lead (maximum concentration >1000 mg/kg lead) and an average concentration of >100 mg/kg arsenic (maximum concentration >200 mg/kg arsenic).

Health Consultation Evaluation of Soil Contamination at Washington Schools in Eastern and Central Washington. The Washington State Department of Health (DOH) in cooperation with the Agency for Toxic Substances and Disease Registry put together a health consultation to evaluate whether soil lead and arsenic levels found by Ecology between 2003 and 2006 on playgrounds at 113 eastern and central Washington elementary schools pose a health concern to children and residents in the nearby communities (DOH 2008). Of these 113 schools, 51 had maximum and/or mean lead and arsenic soil concentrations that exceeded the MTCA Method A standards of 250 mg/kg lead and 20 mg/kg arsenic (WAC 173-340-740). The results were summarized, and of the "51 elementary schools, 22 schools had 95% UCL (upper confidence limit) and/or mean values for lead and/or arsenic that exceeded MTCA Method A standards, and four schools exceeded both MTCA and Ecology's [Interim Action Levels]" (500 mg/kg lead and100 mg/kg arsenic) (DOH 2008). DOH recommended reducing or eliminating exposure to lead and/or arsenic at the schools where these contaminants exceed MTCA Method A cleanup levels and/or Ecology's Interim Action Levels.

Bunker Hill Mining and Metallurgical Complex Superfund Site, Coeur d'Alene River Basin. Lead and arsenic are major contaminants at the Bunker Hill Mining and Metallurgical Superfund site, located in the Coeur d'Alene River Basin of Northern Idaho. Bunker Hill is one of the largest historical mining areas in the world, with over 100 years of commercial mining, milling, and smelting. In September 1983, the

Bunker Hill Mining site was placed on the NPL, and consists of three OUs. The site covers a historical location of ore-processing/smelting (21 square-mile area), identified as OU1 and OU2, as well as all areas of the Coeur d'Alene Basin outside OU1 and OU2 where mining-related contamination is located (OU3). OU3 includes 45 miles of the South Fork of the Coeur d'Alene River, and its tributaries, and including the main stem of the Coeur d'Alene River down to the depositional areas of the Spokane River, which flows from Coeur d'Alene Lake into Washington State. OU3 consists of the mining-related contamination in the broader Coeur d'Alene Basin, primarily the floodplain and river corridor of the Coeur d'Alene River (including Coeur d'Alene Lake) and the Spokane River (extending into Washington State), as well as areas where mine wastes have come to be located as a result of their use for road building or for fill and construction of residential or commercial properties (EPA 2015). In the 2002 Record of Decision for OU3, EPA directed cleanup action for areas with concentrations in soil greater than 700 mg/kg lead and 100 mg/kg arsenic (EPA 2010).

As part of long-term and remedial effectiveness within OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site, additional biological and habitat-specific indicator monitoring of habitats led to the establishment of an ecological risk cleanup level of 530 mg/kg lead in soils as protective of songbirds and waterfowl (EPA 2015). The American robins (*Turdus migratorius*), song sparrows (*Melospiza melodia*) and Swainson's thrushes (*Catharus ustulatus*) were selected as representative ground-feeding songbirds because they are relatively abundant in the lead-contaminated basin, previous data for these species had been collected, and the basin-wide ecological risk assessment concluded that these three species were at relatively high risk (Sample et al. 2011). These songbirds eat invertebrates (including insects), but their exposure to the soil is different because of their foraging styles. Robins and sparrows are ground feeders, thrusting their bills into the ground or scratching the soil to dislodge invertebrates (respectively). While Swainson's thrushes may forage along the ground, they mostly peck and glean insects from litter and foliage as well as capturing insects in the air (Hansen et al. 2011). Hansen et al. (2011) found a correlation of blood lead values and biomarkers in these songbird species to their exposure to soil, with robins having the highest concentration and Swainson's thrushes the lowest concentration. EPA selected the site-specific lead cleanup level of 530 mg/kg in soil because the value would be protective of songbirds and waterfowl as well as the value was comparable to the preliminary remedial goals developed for soil invertebrates, wildlife populations, and human health (EPA 2015).

6.1.2 Relevant Federal and Washington State Human Health Risk-based Screening Levels

Federal and state risk-based soil thresholds and screening levels have been established for lead and arsenic. Table 6-1 includes selected soil thresholds and screening levels for the protection of human health relevant to soil exposures at the Hanford Site.

DOE/RL-2010-95 and DOE/RL-2010-98 have evaluated the basis for MTCA Method A standard for arsenic to support the Record of Decision. The soil risk assessment goal for arsenic under the interim action Records of Decision is 20 mg/kg, based on the Tri-Party Agreement (Ecology et al. 1989) stipulation to use the MTCA 1996 Method A value (WAC 173-340-740(2)). The MTCA 2007 Method A value is also 20 mg/kg. However, the 20 mg/kg value for arsenic MTCA 2007 Method A exceeds the 1×10^{-6} individual cancer risk based on the MTCA 2007 Method B value (0.67 mg/kg)(WAC 173-340-740(3)) and the MTCA groundwater protection value (0.00737 mg/kg) (WAC 173-340-747(3)(a)). Both of these values are below the Hanford Site arsenic background concentration of 6.47 mg/kg (Table 4-1). The MTCA Method A level (20 mg/kg) is proposed for continued use, which is consistent with other cleanup actions throughout the state.

Table 6-1. Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of Human Health.

Exposure Scenario and Pathway	Lead (mg/kg dry wt)	Arsenic (mg/kg dry wt)	Reference
1×10^{-6} cancer risk for humans, unrestricted land use (soil ingestion, dermal contact)	NA	0.67	Ecology 2012b
Unrestricted land use soil cleanup standards, Washington State, MTCA Method A	250	20[a]	WAC 173-340-740
Schools, childcare centers, and residential land uses, low-to-moderate range for Area Wide Soil Contamination, Washington State	500-700	100	AWSCTF 2003a, b
Properties where exposure to children is less likely or less frequent, such as commercial properties, parks, and camps, low-to-moderate range for Area Wide Soil Contamination, Washington State	700-1000	200	AWSCTF 2003a, b
Tacoma Smelter Plume, moderate zone, average concentration (maximum concentration)	250-500 (500-1000)	20-100 (40-200)	Ecology 2012a
Tacoma Smelter Plume, high zone (maximum concentration)	>500 (>1000)	>100 (>200)	Ecology 2012a
Remedial action goals for Ruston/North Tacoma Site	500	230	EPA 1993
No action goals for Bunker Hill	700	100	EPA 2010
Remedial action goals for 100 Area remaining sites interim remedial action, direct exposure cleanup level	353	20	DOE/RL-96-22

(a) Value defined as natural background for arsenic (Ecology 2013).
NA = not applicable.

6.1.3 Ecological Risk-based Screening Levels

Table 6-2 summarizes ecological risk-based concentrations for soil based on scientific studies and guidance for calculating screening levels. The process for calculating ecological risk-based concentrations in soil involves developing a framework in which an iterative approach incorporates additional information and improves the values with more site-specific and biologically realistic conditions at each tier. The following summarizes the tiers that are consistent with EPA and Ecology guidance for ecological evaluations (EPA 1997; WAC 173-340-7492; WAC 173-340-7493):

- Generic screening levels represent initial, conservative screening values from readily available published literature and agency sources.
- Tier 1 values are also based on agency-developed or -accepted methods, which have been calculated specifically for classes of animals (e.g., birds and mammals).
- Tier 2 values represent site-specific values. Tier 2 values build on the approach used in Tier 1, but differ in that they incorporate additional site-specific data.
- Tier 3 values represent waste-site-specific or location-specific risk-based concentrations. These values incorporate data (e.g., bioaccumulation sampling, bioassays, and exposure factors) collected from specific locations.

All but Tier 3 values have been used in other Hanford Site risk assessments. Values have been prepared for the no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL).

The NOAEL is the highest dose that does not cause a statistically significant adverse effect. The LOAEL is the lowest dose that causes a statistically significant adverse effect (Table 6-2).

The ecological risk assessment for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site developed a Tier 3 value for lead. The Tier 3 process included collecting multiple species of birds from contaminated riparian habitats and analyzing their blood for lead as well as analyzing the food, soil and sediment. The most adverse health effects as estimated by the levels of lead in blood were for the songbirds. Based on this information, the Tier 3 ecological risk level was established at 530 mg/kg lead (EPA 2015).

Table 6-2. Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of the Environment.

Screening Level Basis	Lead (mg/kg dry wt.)	Arsenic (mg/kg dry wt.)	Reference
Plant, soil screening level	120	18	EPA 2005a, b
Plant	50	NR	WAC 173-340
Soil preliminary remediation goal for plants	9090	128	CHPRC 2012
NOEC for lettuce and earthworm bioassay	390	128	Delistraty and Yokel 2011
Soil biota	500	NR	WAC 173-340
Soil preliminary remediation goal for invertebrates	1700	128	CHPRC 2012
As (V): All wildlife, risk-based soil concentration for Generic - MTCA	NA	132	WAC 173-340
Pb: All wildlife, risk-based soil concentration for Generic - MTCA	118	NA	WAC 173-340
Pb: songbird and waterfowl	530	NA	EPA 2015
California quail, LOAEL-based Tier 2	559	4776	CHPRC 2013
Western meadowlark, LOAEL-based Tier 2	664	7403	CHPRC 2013
Killdeer, LOAEL-based Tier 2	156	2284	CHPRC 2013
Red-tailed hawk, LOAEL-based Tier 2	2300	40,102	CHPRC 2013
Great Basin pocket mouse, LOAEL-based Tier 2	2672	201	CHPRC 2013
Deer mouse, LOAEL-based Tier 2	1578	127	CHPRC 2013
Grasshopper mouse, LOAEL-based Tier 2	3807	302	CHPRC 2013
Badger, LOAEL-based Tier 2	3966	847	CHPRC 2013

Eco SSL = ecological soil screening level
LOAEL = lowest observed adverse effect level
MTCA = *Model Toxics Control Act*
NA = not applicable
NOEC = no observed effect concentration
NR = not reported

6.2 Exposure Assessment for Human Health Risk

Figure 6-1 summarizes a potential human health exposure model for the 100-OL-1 OU. The receptors are the same as those considered by other River Corridor Interest Area RI/FSs (DOE/RL-2010-95; DOE/RL-2010-96; DOE/RL-2010-97; DOE/RL-2010-98). The exposure assessment is also consistent with EPA risk assessment guidance (EPA 1989b, 2001, and 2004b). The exposure model includes how lead arsenate was used when the orchards were active on the Hanford Site and how the residues in the soil were potentially disturbed over time, leading to current exposure pathways to receptors. The conceptual exposure model identifies the sources of lead and arsenic contamination, transport release mechanisms, and transport release media that are most likely for potential exposure routes to people.

An exposure pathway is the linkage between the contaminant source and the receptor. Receptors are living organisms. The exposure pathway is the route through which the lead and/or arsenic from the lead arsenate residues is released to a receptor. To be complete, an exposure pathway for the lead or arsenic has to include a direct exposure or mechanism for release and transport of the environmental transport medium, an exposure point, a feasible route of intake and exposure, and a receptor. An exposure pathway is incomplete in the absence of any one of these components (EPA 1989c).

DOE's future land use of conservation and preservation (DOE/EIS-0222-F; DOE/EIS-0222-SA-01) covers the 100-OL-1 OU. Based on DOE land use for conservation and preservation, only the casual recreational user is likely to be exposed through dermal contact, inhalation, or incidental ingestion of surface soils, as shown in Figure 6-1. All receptors are likely to be exposed through dermal contact, inhalation, and incidental ingestion of surface soils. Only two receptors include consumption routes of exposure. As discussed in Section 5, lead and arsenic from past applications of lead arsenate pesticide do not reach groundwater with a frequency or location that warrants consideration of ingestion of groundwater as a complete or potentially complete pathway for the receptors.

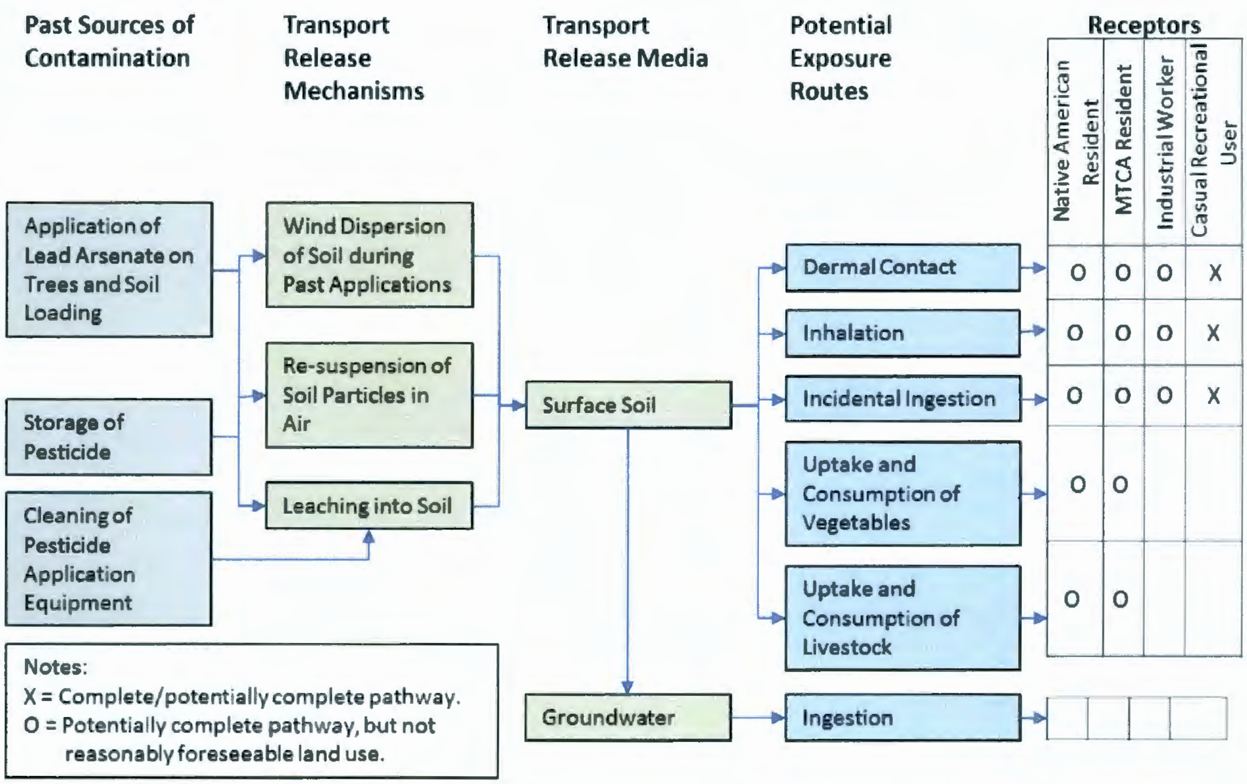


Figure 6-1. Conceptual Exposure Model for Human Health.

6.3 Exposure Assessment for Ecological Risk

Similar to the human health risk exposure assessment, Figure 6-2 shows a conceptual exposure model for ecological risk. The majority of the OU is within shrub-steppe habitat. Only DU-009 has riparian habitat and is along the Columbia River at 100-K Area, but there is no wetland habitat in 100-OL-1 OU. Section 3.5 includes an overview of the ecological resources at the Hanford Site and within the 100-OL-1 OU. The terrestrial ecological resources with potential exposure pathways include: soil biota, terrestrial invertebrates, plants, herbivores, insectivores, omnivores, and carnivores. There is an incomplete pathway for the aquatic resources because there is a low potential for the lead arsenate residues from groundwater or overland flow to transport lead and arsenic into surface water.

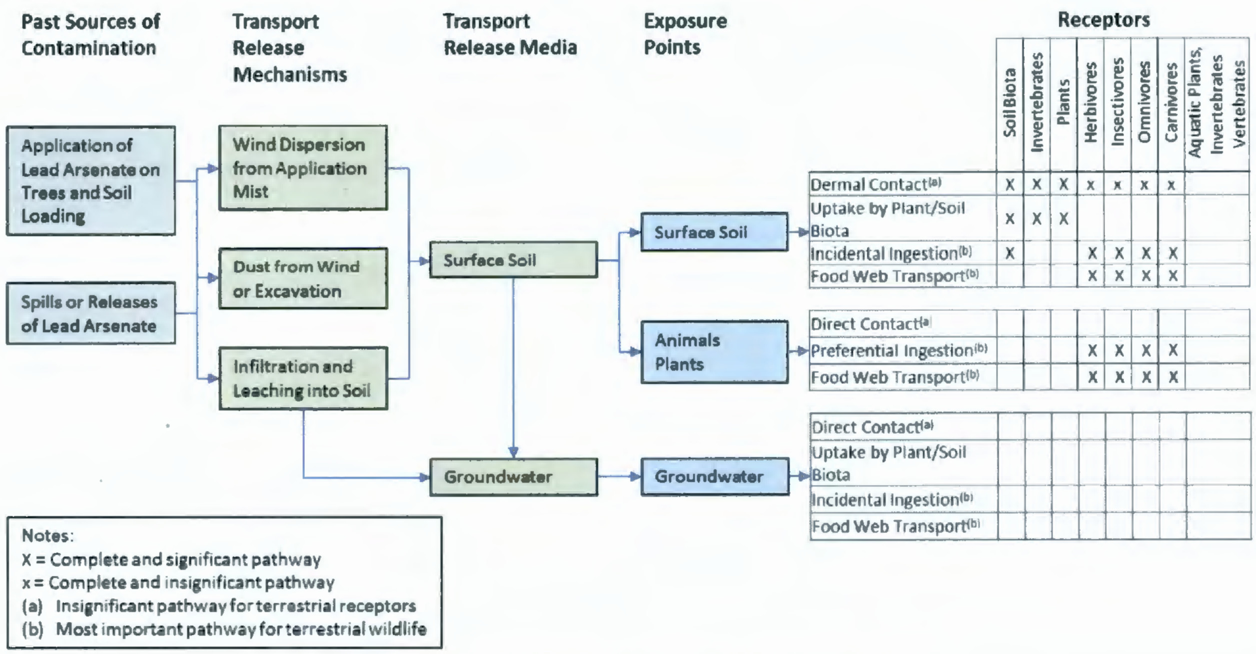


Figure 6-2. Ecological Conceptual Exposure Model.

6.4 Data Analysis

The data used in this risk assessment consist of the field characterization results collected in the 100-OL-1 OU in accordance with the sampling and analysis plan in the RI Work Plan (DOE/RL-2012-64). Appendix B includes the data from all the sample locations within the OU. Appendix D includes the data from the step-out sampling locations outside the OU boundary (step-out sampling). In accordance with DOE/RL-2012-64, 100% of the data collected for the RI was verified and validated. Section 2.2.2 and Appendix C describe the QA programs and procedures as well as the data quality evaluation activities for data collected inside the OU and step-out sampling. The data in Appendix B include any qualifiers for the data applied as a result of validation. In some cases, the field team returned to the field to collect additional data at sample locations rather than incorporating rejected data in the RI. The number of sample locations within a DU (Table 2-1) equaled or exceeded the number required by DOE/RL-2012-64.

A field portable XRF analyzer was used to collect the lead and arsenic measurements on the soil surface throughout the 100-OL-1 OU (Section 2.2.1). Past use of field portable instrumentation on the Hanford Site has been primarily as a screening tool, not for the collection of data for decision-making in an RI. EPA Method 6200 includes a process for confirming the XRF results to a standard method, e.g., ICP-MS. DOE/RL-2012-64 identified quality requirements that are consistent with the *Hanford Analytical Services*

Quality Assurance Requirements Document (DOE/RL-96-68) and EPA methods for both ICP-MS and XRF analyses (EPA 1994, 1996b, and 2007). Section 2.2.3.2 and Appendix C describe the confirmatory analyses for the RI. The correlation of the XRF and ICP-MS analyses of soil collected from several DUs met the EPA criteria for "definitive level data criteria" (EPA 2007). The lead and arsenic data set for the RI meets criteria for use in a risk assessment as described in *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual* (EPA 1989b).

6.5 Exposure Point Concentrations and Upper Confidence Limits

EPA (2002) defines an EPC as a conservative estimate of the average chemical concentration in an environmental medium:

> "The EPC is determined for each individual exposure unit within a site. An exposure unit is the area throughout which a receptor moves and encounters an environmental medium for the duration of the exposure. Unless there is site-specific evidence to the contrary, an individual receptor is assumed to be equally exposed to media within all portions of the exposure unit over the time frame of the risk assessment."

In order to determine an average concentration for use as an EPC, EPA recommends using the 95% UCL, and the process for the calculation should be robust enough to address various distributions (normal or lognormal) of the contaminant in the environment (EPA 2002).

The process for determining the EPC for the DU is consistent with the process used in the latest efforts within the River Corridor Interest Areas. Table 4-2 includes the summary statistics for all 133 DUs in the 100-OL-1 OU. Section 4.3.1 describes the use of EPA's ProUCL statistical software package, which meets the guidance by EPA (2002) for computing 95% UCLs. The recommended 95% UCL is based on the output from ProUCL ver. 5.1. The software accounted for varying distributions of lead or arsenic in the soil across a DU. The software also managed the varying number of measurements with concentrations below the detection for the XRF analyzer (i.e., non-detects) within the DU.

Table 6-3 lists the selected EPCs for lead and arsenic by DU and includes the basis for the EPC (e.g., 95% UCL or another value). For most of the 133 DUs, the 95% UCL is selected as the EPC. The selection of the 95% UCL for the EPC is consistent with the approach used in DOE/RL-2010-98:

- The samples were collected using a statistical sampling design (i.e., random-start systematic-grid-sampling design).
- A valid UCL can be calculated, and the highest potential UCL (if more than one potential UCL value is recommended) is selected.

There are a total of 266 EPCs, one for lead and one for arsenic in each of the 133 DUs. The 95% UCL is appropriate for selection of 248 EPCs. However, there are 18 EPCs that should use a value other than the 95% UCL or where the 95% UCL is likely inaccurate.

The alternatives for the EPC other than the 95% UCL are described in Table 4-2. The alternatives include the MDL (DU-004 arsenic), maximum concentration (DU-069 arsenic), and the *H*-statistic (DU-117 lead). Of these, the EPC determined using the *H*-statistic is consistent with EPA's methods for calculating an EPC (EPA 2002, 2016) as well as with the method used in DOE/RL-2010-98.

6.6 Uncertainties in the Risk Assessment

The purpose of this risk assessment is to identify the existing or potential risks from the lead arsenate residues in the soil to human health and the environment, and to provide input to the development and evaluation of any future actions under CERCLA for the 100-OL-1 OU. There are inherent uncertainties in evaluating health risk from exposure to lead and arsenic concentrations in soil to risk-based screening levels. These uncertainties reflect the knowledge limitations and the simplifying assumptions in this evaluation. There are uncertainties associated with the sampling design, sample results, the EPCs, and the selected risk-based screening levels.

The sampling design was based on recommendations from the pilot study, and uncertainties with the sample design include the minimum number of sample locations and the determination of the sample density. The results from the pilot study (Bunn et al. 2014) provided the guidance for the number of locations to sample in a DU, or the spatial density. The spatial density of nominally 200 samples/km^2 (0.8 samples/acre) was based on a set of assumptions for the average concentrations of both lead and arsenic with varying RSDs. The pilot study found that, with 95% confidence that a site is "clean", a minimum of 11 sample locations needs to be evaluated in a DU for concentrations of lead and arsenic set to 1/8th the MTCA screening levels (30 mg/kg lead and 2.4 mg/kg arsenic). For the RI, DU-026, -078, -132, and -133 had the minimum number of sample locations for the sample design (13 locations) (Table 2-1). The average lead and arsenic concentrations for DU-078, -132, and -133 (Table 4-2) were below the average concentrations considered in the assumptions for the minimum number of samples, thus meeting the minimum sample locations for the average concentrations in the DU to be considered "clean" with 95% confidence. DU-026 had higher average concentrations for lead and arsenic (Table 4-2), suggesting that more sample locations would be needed to conclude that the DU is "clean" with 95% confidence. In this case, DU-026 does not border any other DU in the OU. Several concentrations around the DU border exceeded the lead and/or arsenic criteria for step-out sampling, as discussed in Section 2.2.2 and the step-out samples indicated the potential for modifying the boundary for this DU (Figure D.15 and Table D-7 of Appendix D). Overall, the minimum number of sample locations and the spatial density for the DUs in the 100-OL-1 OU met the assumptions used in the sample design (DOE/RL-2012-64).

The determination of the sample density in the sample design considered higher average lead and arsenic concentrations and the RSD (Bunn et al. 2014). With higher average concentrations, the assessment of the number of sample locations considered a range of RSDs from 100% to 250%. For the RI, the range of RSDs for lead was 12.8% (DU-046) to 420% (DU-068), and for arsenic was 0% (DU-004; no samples were above the MDL) to 362% (DU-068) (Table 4-2). For lead, where the RSD exceeded 125% (i.e., likely to exceed the minimum number of sample locations for evaluating the assumptions for determining with 95% confidence that the true mean concentration of lead does not exceed the MTCA screening level), the DU had concentrations of concern (as summarized in Table 4-2) or had average concentrations well below the MTCA Method A screening level. In DU-020, -049, -052, -053, -056, -068, -093, and -113, the assumptions for number of sample locations in the pilot study (Bunn et al. 2014) were exceeded based on the concentration of lead and the RSD. All of these DUs are summarized in Table 4-2, and the uncertainty in the values based on the number of sample locations should be considered before using the data to evaluate different conditions (e.g., a hot spot analysis). In DU-022, -029, -044, -057, -090, -102, -123, and -132, the average lead concentrations were below the MTCA Method A screening level and ranged from 25.3 mg/kg with 174% RSD to 55.5 mg/kg with 130% RSD (DU-044 and DU-090, respectively). For these DUs, more sample locations were included in the analysis of the DU than estimated for the average lead concentration and the corresponding RSD considered in the assumptions used to determine the sample density in the sample design. For all the DUs where the RSD exceeded 125% for arsenic, the concentration exceeded the MTCA Method A screening level, and the uncertainties of these DUs are similar to those for DUs with high concentrations of lead.

The sample design for the RI field characterization included analyzing the surface soil with an XRF instrument. The sample design does not address uncertainties of lead and arsenic concentrations below the soil surface. The penetration of X-rays from the XRF into the soil surface is sufficient for representing only the concentration of lead and arsenic in the top millimeters of soil. In order to place the XRF on the soil, a spatula was used to clear away vegetation to expose the soil surface, which could have removed more topsoil in some locations than others. (Figure 2-1 and Figure 4-1 show the cleared area of soil for the XRF analysis.) As shown by Peryea and Creger (1994) and Yokel and Delistraty (2003), there could be higher concentrations of lead and arsenic below the soil surface. Experience with collecting soil for the confirmatory analyses indicated that the depth of concentration varied considerably. At times, the XRF measurement of the soil prior to soil removal was lower than the XRF measurement after removal of soil to a depth of 4 in. At other times, the soil concentration was higher on the surface than 4 in. below the surface. (Appendix C includes confirmatory sample analyses.)

The EPCs for the majority of the DUs were the 95% UCL as calculated by ProUCL and consistent with the recommendations of EPA (2002). However, for some DUs there were too many non-detected values to calculate a 95% UCL, as discussed in Section 6.5. In these cases, the EPC for arsenic was the MDL (DU-004) or the maximum concentration (DU-006, -069, -078, and -083). In all of these cases, the lead and arsenic EPCs were well below the MTCA criteria and enough sample locations were evaluated to support the assumptions for the sample design. The selection of the risk-based screening levels for evaluation of lead and arsenic concentrations within 100-OL-1 OU includes Washington State's unrestricted use values and Tier 2 ecological risk levels. These screening levels do not consider all possible human receptors for future use of the OU. The ecological screening levels could be further refined by using site-specific information from the OU.

This discussion indicates that there are uncertainties with the risk characterization of the sample design and EPC selection. However, the evaluation of the RI activities results does not indicate further field characterization needs to be performed to compare the results to the screening levels relevant to the 100-OL-1 OU.

6.7 Summary of Risk within 100-OL-1 OU

This section brings together the screening levels with the data collected for the RI and the selection of EPCs for the DU in the 100-OL-1 OU. The decision rule established in the DQOs for the RI Work Plan selected the MTCA Method A unrestricted land use soil cleanup standards as the risk-based screening levels for human health (DOE/RL-2012-64): 250 mg/kg lead and 20 mg/kg arsenic. Additional human health risk-based screening levels to consider are the values established by Washington State Area-Wide Soil Contamination Task Force's low-to-moderate range for properties where exposure of children is infrequent: 700 to 1000 mg/kg for lead and up to 200 total mg/kg for arsenic (AWSCTF 2003a). The lowest Tier 2 ecological risk-based screening levels are 156 mg/kg (dry weight) lead (LOAEL for the killdeer) and 127 mg/kg (dry weight) arsenic (LOAEL for the deer mouse). The Tier 3 ecological risk level of 530 mg/kg lead set for soil cleanup for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site is relevant since the same types of songbirds are using the 100-OL-1 OU habitats (EPA 2015).

Table 6-3 summarizes the lead and arsenic EPCs, maximum values, and percent of sampling locations for each DU that exceeds the values for MTCA Method A and for the Area-Wide Soil Contamination Task Force's low-to-moderate range for properties where exposure of children is infrequent. There are 23 out of 133 DUs within 100-OL-1 OU where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, which covers an area of 3.434 km^2 (848.6 acres) out of 20.21 km^2 (4995 acres), or 17% of the OU's area. Of the 23 DUs where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, the acreage where only lead exceeds the EPC for MTCA Method A screening level is

0.329 km^2 (81.34 acres; 2 DUs), the acreage where only arsenic exceeds the EPC for MTCA Method A screening level is 0.618 km^2 (152.6 acres; 5 DUs), and the acreage where both lead and arsenic exceed the EPC for MTCA Method A screening levels in the remaining acreage is 2.488 km^2 (614.7 acres; 16 DUs).

Washington State Area-Wide Soil Contamination Task Force's low-to-moderate ranges of lead and arsenic in soil "for properties where exposure of children is less likely or less frequent, such as commercial properties, parks, and camps" are 700 mg/kg lead and 200 mg/kg arsenic. Only DU-95 exceeds the Washington State Area-Wide Soil Contamination Task Force's low-to-moderate range of 700 mg/kg lead; none of the DUs exceed the low-to-moderate range of 200 mg/kg arsenic. The only DU has a lead EPC that exceeds the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site is DU-095 (EPA 2015). DU-095 is 0.17 km^2 (41.7 acres) and 0.8% of the OU.

Table 6-3. Summary of Exposure Point Concentrations, Maximum Values and Percent Exceedance for Lead and Arsenic by DU.

Decision Unit	Lead Exposure Point Concentration (mg/kg)	Lead Maximum Detected Result (mg/kg)	% Lead Samples Exceeding 250 mg/kg	% Lead Samples Exceeding 700 mg/kg	Arsenic Exposure Point Concentration (mg/kg)	Arsenic Maximum Detected Result (mg/kg)	% Arsenic Samples Exceeding 20 mg/kg	% Arsenic Samples Exceeding 200 mg/kg
DU-001	24.4	52.2	0	0	4.48	6.88	0	0
DU-002	20.6	41.0	0	0	4.56	6.25	0	0
DU-003	19.7	52.7	0	0	17.1	96.7	3	0
DU-004[(a)]	22.5	48.0	0	0	3.98	3.98	0	0
DU-005	20.3	30.6	0	0	4.35	6.62	0	0
DU-006	15.9	22.0	0	0	6.28	6.28	0	0
DU-007	16.3	23.4	0	0	4.45	6.71	0	0
DU-008	21.8	53.6	0	0	10.8	55.1	2	0
DU-009	26.4	42.0	0	0	11.6	22.9	6	0
DU-010	79.2	180	0	0	6.22	14.2	0	0
DU-011	25.2	69.4	0	0	4.92	8.11	0	0
DU-012	17.0	33.9	0	0	4.31	7.04	0	0
DU-013	372	1690	19	3	51.7	289	8	3
DU-014	16.7	22.8	0	0	4.35	6.06	0	0
DU-015	24.5	53.8	0	0	4.65	7.31	0	0
DU-016	25.1	48.9	0	0	4.81	7.28	0	0
DU-017	44.7	119	0	0	4.79	6.98	0	0
DU-018	40.0	106	0	0	5.96	9.80	0	0
DU-019	93.9	385	3	0	5.93	13.6	0	0
DU-020	658	3000	38	10	56.5	372	36	3
DU-021	181	437	6	0	42.1	94.0	31	0
DU-022	58.7	231	0	0	12.3	46.8	5	0
DU-023	27.2	81.3	0	0	7.16	31.4	3	0
DU-024	43.4	159	0	0	10.3	36.6	5	0
DU-025	36.0	79.8	0	0	5.88	9.96	0	0
DU-026	316	543	23	0	40.4	97.3	38	0
DU-027	12.8	17.6	0	0	4.10	4.71	0	0
DU-028	13.5	17.0	0	0	4.42	6.13	0	0
DU-029	54.8	239	0	0	4.54	7.23	0	0
DU-030	16.8	32.5	0	0	4.26	5.90	0	0
DU-031	15.9	24.7	0	0	4.49	7.60	0	0
DU-032	16.7	45.5	0	0	4.42	7.09	0	0

Decision Unit	Lead Exposure Point Concentration (mg/kg)	Lead Maximum Detected Result (mg/kg)	% Lead Samples Exceeding 250 mg/kg	% Lead Samples Exceeding 700 mg/kg	Arsenic Exposure Point Concentration (mg/kg)	Arsenic Maximum Detected Result (mg/kg)	% Arsenic Samples Exceeding 20 mg/kg	% Arsenic Samples Exceeding 200 mg/kg
DU-033	16.4	35.5	0	0	4.56	5.86	0	0
DU-034	13.8	16.1	0	0	4.12	4.76	0	0
DU-035	14.9	23.2	0	0	4.14	5.19	0	0
DU-036	13.7	24.1	0	0	4.35	5.90	0	0
DU-037	16.7	26.9	0	0	4.65	7.65	0	0
DU-038	27.4	49.3	0	0	5.20	6.79	0	0
DU-039	161	541	4	0	20.0	54.8	12	0
DU-040	125	207	0	0	11.8	20.7	6	0
DU-041	16.4	22.2	0	0	4.66	6.55	0	0
DU-042	50.3	137	0	0	4.93	10.7	0	0
DU-043	23.5	69.3	0	0	5.31	10.6	0	0
DU-044	58.1	266	3	0	5.19	12.6	0	0
DU-045	16.3	27.3	0	0	4.25	5.38	0	0
DU-046	12.4	16.2	0	0	4.21	5.29	0	0
DU-047	128	300	9	0	8.98	27.2	6	0
DU-048	94.4	337	3	0	9.47	25.6	6	0
DU-049	557	2320	36	18	61.4	273	42	3
DU-050	19.0	35.7	0	0	4.46	6.53	0	0
DU-051	16.8	25.5	0	0	4.44	6.06	0	0
DU-052	308	1480	6	3	12.5	166	9	0
DU-053	699	2240	23	14	46.3	161	27	0
DU-054	247	784	16	3	30.1	90.2	16	0
DU-055	124	355	8	0	11.9	32.0	8	0
DU-056	238	612	12	0	28.7	75.4	6	0
DU-057	68.0	185	0	0	5.18	8.73	0	0
DU-058	36.5	90.8	0	0	6.91	22.6	3	0
DU-059	21.7	48.3	0	0	4.84	7.33	0	0
DU-060	21.6	34.8	0	0	4.61	6.84	0	0
DU-061	20.6	49.3	0	0	4.63	6.80	0	0
DU-062	151	505	9	0	16.0	57.2	9	0
DU-063	115	320	4	0	7.80	41.0	4	0
DU-064	244	776	16	3	22.0	71.1	16	0
DU-065	66.3	198	0	0	6.27	16.2	0	0
DU-066	56.7	166	0	0	5.73	13.3	0	0

Decision Unit	Lead Exposure Point Concentration (mg/kg)	Lead Maximum Detected Result (mg/kg)	% Lead Samples Exceeding 250 mg/kg	% Lead Samples Exceeding 700 mg/kg	Arsenic Exposure Point Concentration (mg/kg)	Arsenic Maximum Detected Result (mg/kg)	% Arsenic Samples Exceeding 20 mg/kg	% Arsenic Samples Exceeding 200 mg/kg
DU-067	26.1	122	0	0	4.53	8.65	0	0
DU-068	395	2510	5	3	51.1	310	5	3
DU-069	17.7	22.5	0	0	5.80	5.80	0	0
DU-070	22.5	52.3	0	0	4.76	10.5	0	0
DU-071	46.2	116	0	0	5.62	12.0	0	0
DU-072	318	1050	12	6	15.8	121	15	0
DU-073	292	726	20	3	22.9	60.6	17	0
DU-074	38.3	184	0	0	6.21	14.3	0	0
DU-075	70.1	189	0	0	8.59	18.1	0	0
DU-076	66.2	160	0	0	18.9	61.7	9	0
DU-077	15.9	34.8	0	0	4.72	6.71	0	0
DU-078	22.9	33.4	0	0	4.36	4.36	0	0
DU-079	516	1820	55	11	47.1	229	42	3
DU-080	21.1	34.6	0	0	14.5	42.3	5	0
DU-081	361	1120	50	3	46.2	185	53	0
DU-082	13.9	21.9	0	0	4.60	7.09	0	0
DU-083	18.8	34.7	0	0	4.42	4.42	0	0
DU-084	69.8	209	0	0	11.0	27.5	12	0
DU-085	63.6	327	2	0	7.34	25.0	2	0
DU-086	290	876	30	3	32.0	71.6	35	0
DU-087	194	882	8	5	10.1	90.7	8	0
DU-088	42.4	114	0	0	5.70	11.1	0	0
DU-089	214	784	15	2	12.2	53.6	10	0
DU-090	105	307	5	0	13.8	42.1	5	0
DU-091	17.8	41.5	0	0	4.50	6.26	0	0
DU-092	63.1	231	0	0	6.18	20.9	3	0
DU-093	326	1020	13	4	35.2	87.8	13	0
DU-094	137	303	11	0	17.0	44.2	14	0
DU-095	1050	2580	52	33	112	339	55	9
DU-096	306	735	16	4	21.2	66.6	28	0
DU-097	119	365	8	0	10.7	54.8	5	0
DU-098	29.0	65.3	0	0	5.33	7.45	0	0
DU-099	14.0	29.5	0	0	4.65	6.29	0	0
DU-100	252	937	12	5	28.7	97.8	12	0

Decision Unit	Lead Exposure Point Concentration (mg/kg)	Lead Maximum Detected Result (mg/kg)	% Lead Samples Exceeding 250 mg/kg	% Lead Samples Exceeding 700 mg/kg	Arsenic Exposure Point Concentration (mg/kg)	Arsenic Maximum Detected Result (mg/kg)	% Arsenic Samples Exceeding 20 mg/kg	% Arsenic Samples Exceeding 200 mg/kg
DU-101	17.0	35.9	0	0	5.46	12.1	0	0
DU-102	62.1	223	0	0	5.61	9.86	0	0
DU-103	15.0	25.2	0	0	4.63	6.44	0	0
DU-104	13.3	17.3	0	0	4.31	5.21	0	0
DU-105	80.5	327	8	0	13.0	30.5	8	0
DU-106	54.2	143	0	0	10.4	27.4	4	0
DU-107	20.4	57.9	0	0	4.40	5.85	0	0
DU-108	51.7	163	0	0	7.31	19.7	0	0
DU-109	38.6	89.9	0	0	5.85	11.2	0	0
DU-110	210	818	7	4	11.1	25.5	7	0
DU-111	176	937	9	3	18.0	46.9	16	0
DU-112	27.3	59.7	0	0	5.35	8.64	0	0
DU-113	246	878	5	5	9.79	23.1	5	0
DU-114	318	960	18	6	22.1	153	18	0
DU-115	242	1260	9	3	18.6	78.5	6	0
DU-116	330	751	35	6	37.2	85.8	41	0
DU-117	55.6	195	0	0	13.5	34.6	7	0
DU-118	88.9	247	0	0	13.0	32.8	6	0
DU-119	22.9	52.2	0	0	4.93	6.92	0	0
DU-120	61.7	175	0	0	5.89	13.1	0	0
DU-121	22.1	44.2	0	0	4.96	7.46	0	0
DU-122	49.5	138	0	0	8.10	34.3	3	0
DU-123	51.1	240	0	0	4.96	10.9	0	0
DU-124	25.3	63.3	0	0	4.89	8.37	0	0
DU-125	86.6	250	3	0	9.43	32.8	3	0
DU-126	37.7	95.5	0	0	5.16	10.8	0	0
DU-127	57.5	212	0	0	6.46	21.0	3	0
DU-128	91.0	374	8	0	18.0	50.7	8	0
DU-129	102	312	5	0	10.9	27.2	5	0
DU-130	59.6	155	0	0	6.68	22.5	3	0
DU-131	137	271	10	0	13.1	23.2	10	0
DU-132	126	281	8	0	8.74	34.0	8	0
DU-133	39.5	51.9	0	0	5.67	7.95	0	0

(a) Non-detected arsenic concentrations are reported as the MDL; 3.98 mg/kg arsenic.

This page intentionally left blank.

7. Summary of 100-OL-1 OU Remedial Investigation

The history and current investigations of the 100-OL-1 OU demonstrate the presence of lead and arsenic in the soil across the River Corridor of the Hanford Site. Many of the areas that had trees in aerial photos taken in 1943 and where the land still appears to be previously developed agricultural fields or orchards do not show evidence of lead arsenate pesticide residues in the soil. Approximately 17% of the 20.21 km^2 (4995 acres) of the OU has lead and arsenic EPCs greater than the MTCA Method A unrestricted land use soil cleanup standards. Considering other relevant screening levels, only DU-95 within the OU has a lead EPC greater than the Area-Wide Soil Contamination Task Force's low-to-moderate range for properties where exposure of children is infrequent (AWSCTF 2003a). DU-95 is also the only DU within the OU that exceeds the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site (EPA 2015). This RI has summarized the physical environment and the nature and extent of contamination to support a CSM for evaluating the risk to human health and the environment from the lead and arsenic in the OU.

7.1 Summary

Historical use of lead arsenate pesticides in orchards on the Hanford Site is still evident in the soil today. The nature and extent of lead and arsenic in the soil today relates to the chemical properties of the pesticide and the changes in the environment of the OU that transport the pesticide residues away from the areas of application. Field characterization of the OU with an XRF analyzer provided a systematic approach for analyzing lead and arsenic across the DUs and, where higher concentrations were found at the border of the OU, analyses of lead and arsenic outside the OU boundary. These results are summarized in Table 4-2 and Appendices A, B, and D. Handheld portable instrumentation, e.g., the XRF analyzer, has not been used to provide analytical results for decision-making in the past at the Hanford Site, and Appendix C provides further information on the QA of the instrument's performance compared to traditional analytical procedures as well as the quality of the data collected for the RI. Appendix E provides the historical context for the orchards on the Hanford Site and the use of lead arsenate pesticide in orchards.

Understanding the fate and transport of lead arsenate residues supports the sampling approach and emphasis on determining the nature and extent of lead and arsenic in the surface soils. Lead occurs mainly as Pb^{2+}, and it forms several other minerals that are quite insoluble in natural waters. Arsenate ions (AsO_4^{3-}) are known to be readily fixed by soil components like clays. Past studies of lead arsenate residues in orchard soils near and on the Hanford Site indicate that the peak concentration of lead or arsenic varied from the surface to 30 cm (12 in.) below the surface. Investigations of the mobility of lead and arsenic (estimating the K_d, or soil/water distribution coefficient) in soil from the Hanford Site demonstrated that lead and arsenic are bound to the soil and may require more than 1000 years to move through the soil column. Monitoring results and other investigations within the River Corridor do not show a frequency of lead or arsenic results at a specific location or indicate a trend in groundwater, porewater, or surface water samples. Remediation activities within the River Corridor indicate high concentrations of lead and arsenic in the soil at depth (>1 m [3 ft.]), and attributed the contamination to past orchard operations. Appendix F summarizes the lead and arsenic results from verification sampling in remediated sites co-located within 100-Ol-1 OU. Past investigations and results from remediation and monitoring activities indicate that the lead arsenate pesticide residues are in the surface soils and are not currently in the groundwater, suggesting minimal transport of lead and arsenic currently. Transport of the surface contamination outside the boundaries of the OU (by wind transport, historical spills of lead arsenate outside the orchard, etc.) was investigated in the step-out sampling, and is discussed further in Appendix D.

The risk assessment focused on comparing the summary statistics for each DU in the 100-OL-1 OU to human health and ecological screening levels (Section 6). The human health screening levels, as selected in DOE/RL-2012-64, are the MTCA Method A unrestricted land use soil cleanup standards: 250 mg/kg lead and 20 mg/kg arsenic. The ecological risk screening levels are the Hanford Site Tier 2 LOAEL: 156 mg/kg lead and 127 mg/kg arsenic. Section 6.5 describes the EPC for each DU.

There are 23 out of 133 DUs within 100-OL-1 OU where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, which covers an area of 3.434 km^2 (848.6 acres) out of 20.21 km^2 (4995 acres), or 17% of the OU's area. Of the 23 DUs where the EPCs exceed the MTCA Method A screening levels for lead and/or arsenic, the acreage where only lead exceeds the EPC for MTCA Method A screening level is 0.329 km^2 (81.34 acres; 2 DUs), the acreage where only arsenic exceeds the EPC for MTCA Method A screening level is 0.618 km^2 (152.6 acres; 5 DUs), and the acreage where both lead and arsenic exceed the EPC for MTCA Method A screening levels in the remaining acreage is 2.488 km^2 (614.7 acres; 16 DUs). Figure 7-1 shows the location of the DUs, with the color of the DU based on the level of the EPC in excess of the MCTA Method A screening levels. Only DU-95 exceeds the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site (EPA 2015).

Washington State Area-Wide Soil Contamination Task Force's low-to-moderate range of lead and arsenic in soil is "for properties where exposure of children is less likely or less frequent, such as commercial proper-ties, parks, and camps." The low-to-moderate range is 700 mg/kg lead and 200 mg/kg arsenic; Figure 7-2 shows the only DU where the EPC would exceed these levels, which is DU-095. Only DU-095 exceeds the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site (EPA 2015).

7.2 Conclusions

The characterization of the 100-OL-1 OU summarized in the RI shows that, in general, the concentrations of lead and arsenic in soil are typical of concentrations from lead arsenate pesticide residues in other former orchards. Orchardist had access to information on the application of lead arsenate for the control of codling moths from agricultural agencies (Appendix E). The pesticide residues in the soil from typical applications resulted in concentrations of lead and arsenic that are common in former orchards in Washington State, the U.S., and Canada (Section 1.3.3.1) as well as in the OU (Table 4-2 and Table 6-3). The characterization results demonstrate that the use of lead arsenate in the former orchards in the OU is consistent with intended purposes of the pesticide, even though the application in the OU was primarily before the registration of lead arsenate as a pesticide in accordance with FIFRA (7 USC 136 et seq.).

Under CERCLA, a release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment" (42 USC 9601, Section 101(22)). As such, the presence of lead and arsenic from historical pesticide application does not meet the definition of release. CERCLA does not allow "for any response costs or damages resulting from the application of a pesticide product registered under the" FIFRA (42 USC 9603(107)(i); 7 USC 136 et seq.). FIFRA allows for exemptions for contamination present through applications consistent with pesticide labels (7 USC 136). The WAC has an exemption from reporting releases of pesticides that were applied "for their intended purposes and according to label instructions" (WAC 173-340-3003(3)(a)).

The one exception within the OU is DU-95, where the EPC for lead exceeds the MTCA Method A level (WAC 173-340-740(2)), the Area-Wide Soil Contamination Task Force provides a low-to-moderate range for properties where exposure of children is infrequent (AWSCTF 2003a), and the Tier 3 ecological risk level for OU3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site (EPA 2015). The concentrations found in this DU may indicate excessive use of the pesticide.

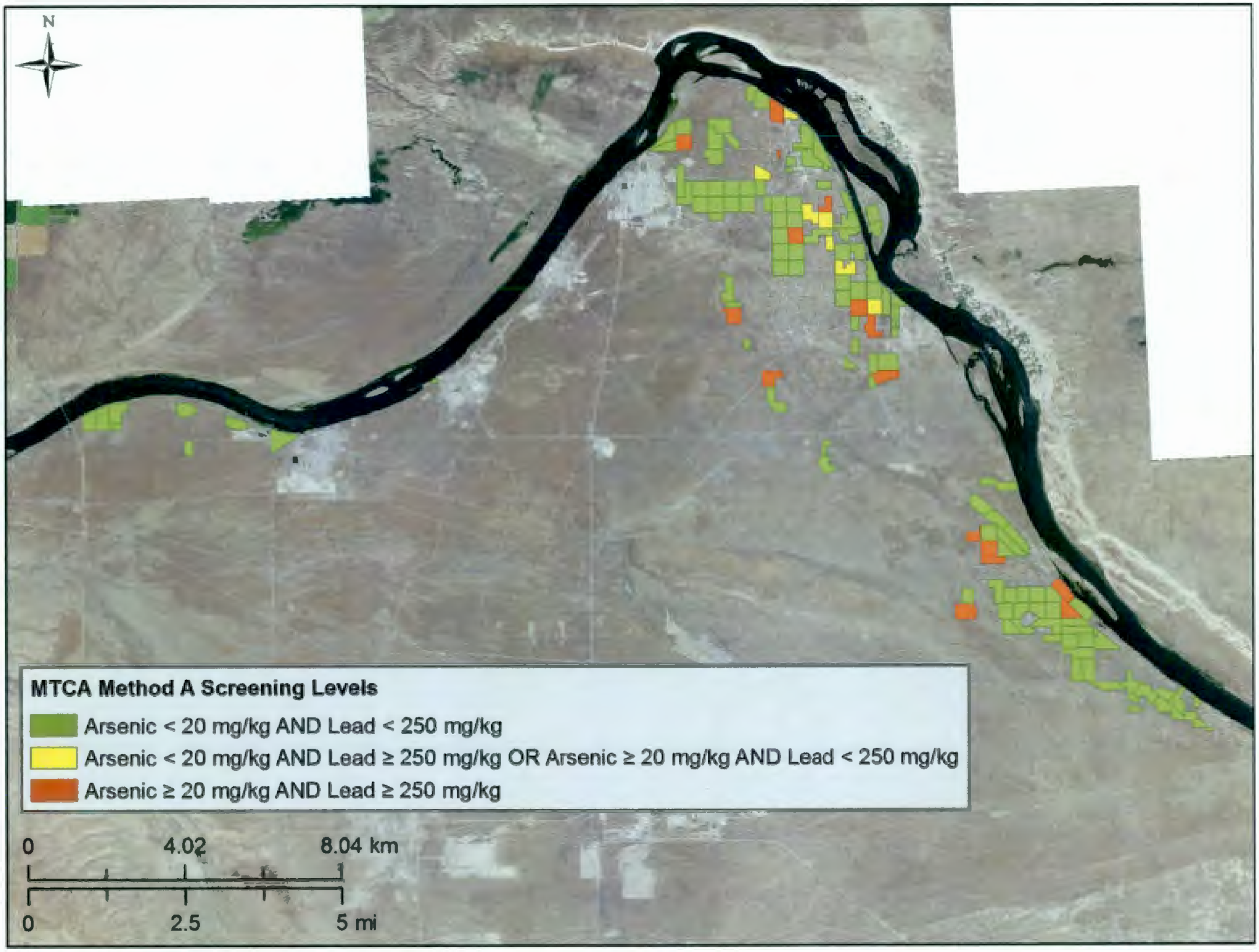


Figure 7-1. Comparison of the Exposure Point Concentrations for each DU within 100-OL-1 OU to the MTCA Method A Screening Levels for Unrestricted Use of Soil.

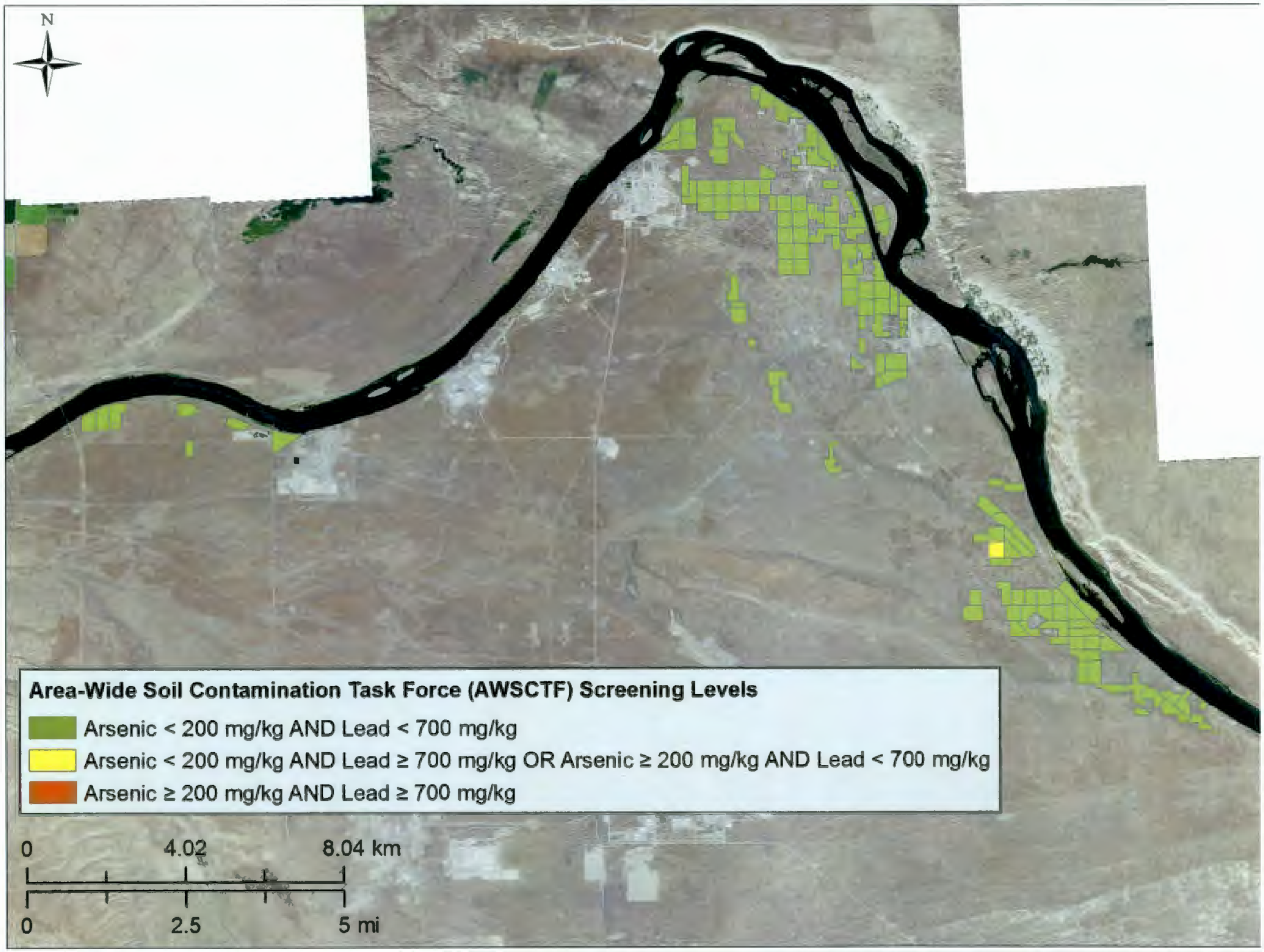


Figure 7-2. Comparison of the Exposure Point Concentrations for each DU within 100-OL-1 OU to Washington State Area-Wide Soil Contamination Task Forces' Low-to-Moderate Range for Properties where Exposure of Children is Infrequent.

8. References

10 CFR 830, Subpart A. 2010. "Nuclear Safety Management." Subpart A, "Quality Assurance Requirements." *Code of Federal Regulations*, U.S. Department of Energy. Available at: https://www.nrc.gov/docs/ML0522/ML052280016.pdf

36 CFR 60. "National Register of Historic Places." *Code of Federal Regulations*, National Park Service, U.S. Department of the Interior. Available at: https://www.nps.gov/nr/regulations.htm

36 CFR 800. "Protection of Historic Properties." *Code of Federal Regulations*, Advisory Council on Historic Preservation. Available at: http://www.achp.gov/regs-rev04.pdf

40 CFR 136, Appendix B. "Definition and Procedure for the Determination of the Method Detection Limit – Revision 1.11." *Code of Federal Regulations*, Environmental Protection Agency. Available at: https://www.gpo.gov/fdsys/granule/CFR-2011-title40-vol23/CFR-2011-title40-vol23-part136-appB/content-detail.html

40 CFR 300.440. 2012. "National Oil and Hazardous Substances Pollution Contingency Plan, Procedures for Planning and Implementing Off-Site Response Actions." *Code of Federal Regulations*, U.S. Environmental Protection Agency. Available at: http://edocket.access.gpo.gov/cfr_2009/julqtr/40cfr300.440.htm

42 USC 9601, et seq. *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*. Public Law 96-510, as amended.

54 USC 300101, et seq. *National Historic Preservation Act of 1966* (NHPA). Public Law 102-575, as amended. Available at: http://www.achp.gov/docs/NHPA%20in%20Title%2054%20and%20Conversion%20Table.pdf

65 FR 37253. "Establishment of the Hanford Reach National Monument." *Federal Register* (June 9, 2000). Available at: http://www.gpoaccess.gov/cfr/index.html.

7 USC 136, et seq. *Federal Insecticide, Fungicide, and Rodenticide Act*. Public Law 114-321, December 16, 2016.

ASME. 2001. *Quality Assurance Requirements for Nuclear Facility Applications*. ASME NQA-1-2000, American Society of Mechanical Engineers, New York, New York.

ATSDR (Agency for Toxic Substances and Disease Registry). 2007a. *Lead – ToxFAQs™*. CAS # 7439-92-1, U.S. Department of Health and Human Services, Public Health Service, Division of Toxicology and Environmental Medicine, Atlanta, Georgia. Available at: https://www.atsdr.cdc.gov/toxfaqs/tfacts13.pdf

ATSDR (Agency for Toxic Substances and Disease Registry). 2007b. *ToxGuide™ for Arsenic As*. CAS # 7440-38-2, U.S. Department of Health and Human Services, Public Health Service, Division of Toxicology and Environmental Medicine, Atlanta, Georgia. Available at: http://www.atsdr.cdc.gov/toxguides/toxguide-2.pdf

AWSCTF (Area Wide Soil Contamination Task Force). 2003a. *Area Wide Soil Contamination Task Force Report*. Submitted to Washington State Department of Agriculture, Washington State Department of Ecology, Washington State Department of Health, and Washington State Department of Community, Trade and Economic Development, Olympia, Washington. Available at: http://www.ecy.wa.gov/programs/tcp/area_wide/final-report/PDF/TF-Report-final.pdf

AWSCTF (Area-Wide Soil Contamination Task Force). 2003b. *Area-Wide Soil Contamination Strategy: Implementation of Task Force Recommendations.* Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/documents/0309102.pdf

Basu P. 2009. "Arsenic." *Molecular Nutrition & Food Research* 53:529-530.

Bunn AL, BG Fritz, BA Pulsipher, AM Gorton, LE Bisping, JM Brandenberger, C Pino, DM Martinez, K Rana, and DM Wellman. 2014. *100-OL-1 Operable Unit Pilot Study: XRF Evaluation of Select Pre-Hanford Orchards*. PNNL-23868, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23868.pdf

Cadwalader GO, CE Renshaw, BP Jackson, FJ Magilligan, JD Landis, and BC Bostick. 2011. "Erosion and physical transport via overland flow of arsenic and lead bound to silt-sized particles." *Geomorphology* 128:85–91.

CHPRC (CH2M Hill Plateau Remediation Company). 2012. *Tier 2 Terrestrial Plant and Invertebrate Preliminary Remediation Goals (PRGs) for Nonradionuclides for Use at the Hanford Site*. ECF-HANFORD-11-0158, Rev. 0, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081636H

CHPRC (CH2M Hill Plateau Remediation Company). 2013. *Tier 2 Risk-Based Soil Concentrations Protective of Ecological Receptors at the Hanford Site*. CHPRC-01311, Rev. 1, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088115

Delistraty D and J Yokel. 2011. "Ecotoxicological Study of Arsenic and Lead Contaminated Soils in Former Orchards at the Hanford Site, USA." *Environmental Toxicology.* doi:10.1002/tox.20768.

DOE Order 414.1D. 2011. *Quality Assurance*. U.S. Department of Energy, Washington, D.C.

DOE/EIS-0222-F. 1999. *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement.* U.S. Department of Energy, Washington, D.C. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158842
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158843
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158844
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158845
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158846
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D199158847

DOE/EIS-0222-SA-01. 2008. *Supplement Analysis: Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, Draft. U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06917281.

DOE/EM-0319. 1997. *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences*. U.S. Department of Energy, Office of Environmental Management, Washington, D.C. Available at: http://energy.gov/sites/prod/files/2014/03/f8/Linking_Legacies.pdf

DOE/RL-2007-21. 2010. *River Corridor Baseline Risk Assessment, Volume II: Human Health Risk Assessment*. Volume II, Part 1, Draft C, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084096

DOE/RL-2008-46-ADD4. 2010. *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan, Addendum 4: 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*. Rev. 0, Reissue, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1006220804

DOE/RL-2010-117. 2012. *Columbia River Component Risk Assessment, Volume 1: Screening-Level Ecological Risk Assessment, and Volume II: Baseline Human Health Risk Assessment*. Volume 1, Part 1, Rev. 0, and Volume II, Part 1, Rev. 0, U.S. Department of Energy, Richland Operations Office Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0092299 and http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1203090191

DOE/RL-2010-95. 2014. *Remedial Investigation/Feasibility Study for the 100-DR-1, 100- DR-2, 100-HR-1, 100- HR-2, and 100-HR-4 Operable Units*. Rev. 0, U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078016H

DOE/RL-2010-96. 2013. *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units*. Working Draft A, U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0089052

DOE/RL-2010-97. 2011. *Remedial Investigation/ Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units*. Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093615

DOE/RL-2010-98. 2014. *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units*. Rev. 0, U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085352

DOE/RL-2011-01. 2011. *Hanford Site Groundwater Monitoring Report for 2010*. Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/c.cfm/sgrp/GWRep10/start.htm

DOE/RL-2012-64. 2016. *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands*. Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076311H

DOE/RL-2014-38. 2014. *100-OL-1 Operable Unit Field Portable X-Ray Fluorescence (XRF) Analyzer Pilot Study Plan*. Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23471.pdf

DOE/RL-2014-52. 2015. *Hanford Site Environment Report for Calendar Year 2014*. Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://msa.hanford.gov/page.cfm/EnvironmentalReports2011-latest

DOE/RL-2016-09. 2015. *Hanford Site Groundwater Monitoring Report for 2015*. Rev 0., U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://higrv.hanford.gov/Hanford_Reports_2015/Hanford_GW_Report/

DOE/RL-92-24. 2001. *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*. Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-93-82. 1995. *Limited Field Investigation Report for the 100-FR-1 Operable Unit*. Revision 0. U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196005401

DOE/RL-96-22. 2009. *100 Area Remedial Action Sampling and Analysis Plan*. Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1112281626

DOE/RL-96-32. 2013. *Hanford Site Biological Resources Management Plan*. Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/files.cfm/DOE-RL-96-32-01.pdf

DOE/RL-96-68. 2014. *Hanford Analytical Services Quality Assurance Requirements Documents*. Volumes 1, 2, 3, and 4, Rev. 4, U.S. Department of Energy-Richland Operations Office, Richland, Washington. Available at: http://www.hanford.gov/files.cfm/DOE-RL-96-68-VOL1-04.pdf

DOE/RL-96-77. 1996. *Programmatic Agreement Among the U.S. Department of Energy, Richland Operations Office, the Advisory Council on Historic Preservation, and the Washington State Historic Preservation Office for the Maintenance, Deactivation, Alteration, and Demolition of the Built Environment on the Hanford Site, Washington.* U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available: http://pdw.hanford.gov/arpir/pdf.cfm?accession=1504280760

DOE/RL-97-02. 1997. *National Register of Historic Places Multiple Property Documentation Form – Historic Archaeological and Traditional Cultural Properties of the Hanford Site, Washington.* U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=0084900

DOE/RL-97-1047. 2003. *Hanford Site Historic District: Historic of the Plutonium Production Facilities 1943-1990.* Battelle Press: Columbus, Ohio. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096062

DOE/RL-97-56. 1998. *Hanford Site Manhattan Project and Cold War Era Historic District Treatment Plan*. Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081103H

DOE/RL-98-10. 2003. *Hanford Cultural Resources Management Plan*. U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088380

DOE-EM. 2016. *Manhattan Project*. U.S. Department of Energy, Office of Environmental Management, Washington, D.C. Available at: http://www.energy.gov/management/office-management/operational-management/history/manhattan-project

DOH. 2008. *Evaluation of Soil Contamination Washington Schools Eastern and Central Washington*. Publication No. DOH 334-167, Washington State Department of Health, Office of Environmental Health Assessments, Olympia, Washington. Available at: http://www.doh.wa.gov/portals/1/Documents/Pubs/334-167.pdf

Duncan JP, ed. 2007. *Hanford Site National Environmental Policy Act (NEPA) Characterization*. PNL-6415, Rev. 18, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-6415Rev18.pdf

ECF-HANFORD-11-0038. 2012. *Soil Background for Interim Use at the Hanford Site*. Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088381

Ecology, EPA, and DOE. 1989. *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)*. Document No. 89-10, as amended, Washington State Department of Ecology, Olympia, Washington. Available at: http://www.hanford.gov/page.cfm/TriParty/TheAgreement

Ecology. 2007. Interim Action Report: Abraham Lincoln Elementary School, Wenatchee, Washington. Washington State Department of Ecology, Toxics Cleanup Program, Central Region Office, Union Gap, Washington.

Ecology. 2010. Periodic Review: Eastmont Junior High School, Facility/Site ID # 83426|117. Washington State Department of Ecology, Toxics Cleanup Program, Central Region Office, Union Gap, Washington.

Ecology. 2012a. *Tacoma Smelter Plume Model Remedies Guidance, Sampling and Cleanup of Arsenic and Lead Contaminated Soils for: Formal Cleanup Sites Voluntary Cleanup Program Properties under Development*. Publication No. 12-09-086-A, Washington State Department of Ecology, Toxics Cleanup Program, Lacey, Washington.

Ecology. 2012b. *Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation (CLARC/MTCA)*. Version 3.1. Publication No. 94–145, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

Ecology. 2013. *Issues Associated with Establishing Soil Cleanup Levels for Arsenic*. Memorandum from Dave Bradley, Toxic Cleanup Program, to Jane Hedges and John Price, Nuclear Waste Program. June 11, 2013. Washington State Department of Ecology, Toxics Cleanup Program, Olympia, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=1309180453

Ecology. 2017. *Toxics Cleanup Program, School and Park Cleanups on Former Orchard Lands*. Washington State Department of Ecology, Olympia, Washington. Available at: http://www.ecy.wa.gov/programs/tcp/area_wide/2012/schools-parks.html

Eisler R. 1988a. *Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. Biological Report 85 (1.14), Contaminant Hazard Reviews Report 14, U.S. Fish Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland. Available at: http://www.pwrc.usgs.gov/eisler/CHR_14_Lead.pdf

Eisler R. 1988b. *Arsenic Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. Biological Report 85 (1.12), Contaminant Hazard Reviews Report 12, U.S. Fish Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland. Available at: https://www.pwrc.usgs.gov/eisler/CHR_12_Arsenic.pdf

Elfving DC, KR Wilson, JG Ebel Jr, KL Manzell, WH Gutenmann, and DJ Lisk. 1994. "Migration of Lead and Arsenic in Old Orchard Soils in the Georgian Bay Region of Ontario. *Chemosphere* 29:407–413.

Embrick LL, KM Porter, A Pendergrass, and DJ Butcher. 2005. "Characterization of lead and arsenic contamination at Barber Orchard, Haywood County, NC." *Microchemical Journal* 81:117-121.

EPA. 1989a. NPL Site Narrative for Hanford 100-Area (USDOE), Hanford 100-Area (USDOE), Benton County, Washington. Superfund Records Collections, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington D.C. Available at: https://semspub.epa.gov/work/HQ/185138.pdf

EPA. 1989b. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)*. EPA/540/1-89/002, Interim Final, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington D.C. Available at: https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part

EPA. 1989c. *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media*. EPA 230/02-89-042, U.S. Environmental Protection Agency, Statistical Policy Branch, Washington, D.C. Available at:

EPA. 1992. *Ground Water Issue: Behavior of Metals in Soils*. EPA/540/S-92/018, U.S. Environmental Protection Agency, Technology Innovation Office, Office of Research and Development, Office of Solid Waste and Emergency Response, Washington, D.C. Available at: http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=39EE3B85A3CCDFECCE36FABC296C3154?doi=10.1.1.397.9045&rep=rep1&type=pdf

EPA. 1993. *Superfund Record of Decision: Commencement Bay, Nearshore/Tide flats, EPA ID: WAD980726368, Operable Unit 04, Ruston/North Tacoma Study Area, Ruston and Tacoma, Washington*. EPA/ROD/R10-93/062, U.S. Environmental Protection Agency, Office of Environmental Cleanup, Region 10, Seattle, Washington.

EPA. 1994. *Method 200.8: Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry*. Rev. 5.4, U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Office of Research and Development, Cincinnati, Ohio. Available at: https://www.epa.gov/sites/production/files/2015-08/documents/method_200-8_rev_5-4_1994.pdf

EPA. 1996a. *Method 3050B: Acid Digestion of Sediments, Sludges, and Soils*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-06/documents/epa-3050b.pdf

EPA. 1996b. *Method 1638: Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma – Mass Spectrometry*. U.S. Environmental Protection Agency, Office of Water, Engineering and Analysis Division, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-10/documents/method_1638_1996.pdf

EPA. 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*. EPA-540-R-97-006, Interim Final, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://rais.ornl.gov/documents/intro.pdf

EPA. 2001. *Risk Assessment Guidance for Superfund (RAGS) Part D. Volume I Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments*. Publication 9285.7-47, Final, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-09/documents/front_2001.pdf

EPA. 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*. OSWER 9285.6-10, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. Available at: http://epa.gov/oswer/riskassessment/pdf/ucl.pdf

EPA. 2004a. *National Recommended Water Quality Criteria*. 4304T, U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: https://hero.epa.gov/hero/index.cfm/reference/download/reference_id/644569

EPA. 2004b. *Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*. EPA/540/R/99/005, Final, U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-09/documents/part_e_final_revision_10-03-07.pdf

EPA. 2005a. *Ecological Soil Screening Levels for Arsenic: Interim Final*. OSWER Directive 9285.7- 62, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-09/documents/eco-ssl_arsenic.pdf

EPA. 2005b. *Ecological Soil Screening Levels for Lead: Interim Final*. OSWER Directive 9285.7-70, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-09/documents/eco-ssl_lead.pdf

EPA. 2007. *Method 6200: Field Portable X-ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-12/documents/6200.pdf

EPA. 2010. *Five Year Report: 2010 Five-Year Review Report for the Bunker Hill Mining and Metallurgical Complex Superfund Site Operable Units 1, 2 and 3, Idaho and Washington*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: https://www3.epa.gov/region10/pdf/sites/bunker_hill/bunkerhill-3rd-fyr-111810.pdf

EPA. 2014. *Five Year Report: Fourth Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Pierce County, Washington*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: https://www3.epa.gov/region10/pdf/sites/cb-nt/4th_fyr_cbnt_2014.pdf

EPA. 2015. *Fourth Five Year Report for the Bunker Hill Superfund Site Shoshone and Kootenai Counties, Idaho*. U.S. Environmental Protection Agency, Region 10, Seattle, Washington. Available at: https://quicksilver.epa.gov/work/10/500018092.pdf

EPA. 2016. *ProUCL Version 5.1: Technical Guide. Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. EPA/600/R-07/041, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. Available at: https://www.epa.gov/land-research/proucl-version-5100-documentation-downloads

Evans JR, PL Marita, and PW Dunwiddie. 2003. *Biodiversity Studies of the Hanford Site, Final Report: 2002-2003*. The Nature Conservancy, Washington Field Office, Seattle, Washington. Available at: https://www.fws.gov/uploadedFiles/Region_1/NWRS/Zone_2/Mid-Columbia_River_Complex/Hanford_Reach_National_Monument/Documents/biodiversity.pdf

Frank R, HE Braun, K Ishida, and P Suda. 1976. "Persistent Organic and Inorganic Pesticide Residues in Orchard Soils and Vineyards of Southern Ontario." *Canadian Journal of Soil Science* 56:463–484.

Fritz BG. 2009. *A Review of Metal Concentrations Measured in Surface Soil Samples Collected on and Around the Hanford Site*. PNNL-18577, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-18577.pdf

Gilpin RR, P Larkins, CJ Boughton, BW Reed, and PL Sibrell. 2007. "Assessment of contamination from arsenical pesticide use on orchards in the Great Valley region, Virginia and West Virginia, USA." *Journal of Environmental Quality* 36:654-663.

Hall JA, ed. 1998. *Biodiversity Inventory and Analysis of the Hanford Site: 1997 Annual Report*. The Nature Conservancy of Washington, Seattle, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=1603310631

Hanford Reach Study Act. 1988. Public Law No. 100-605 as amended by Public Law 104-333.Available at: http://206.61.210.104/pl/iap/html/body_apx-a.htm

Hansen JA, D Audet, BL Spears, KA Healy, RE Brazzle, DJ Hoffman, A Dailey, and WN Beyer. 2011. "Lead Exposure and Poisoning of Songbirds Using the Coeur d'Alene River Basin, Idaho, USA." *Integrated Environmental Assessment and Management* 7:587-595.

Harvey D. 2000. *History of the Hanford Site: 1943-1990*. PNNL-SA-33307, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.osti.gov/scitech/biblio/887452

Hoitink DJ, KW Burk, JV Ramsdell, and WJ Shaw. 2005. *Hanford Site Climatological Summary 2004 with Historical Data*. PNNL-15160, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-15160.pdf

Hood E. 2006. "The Apple Bites Back: Claiming Old Orchards for Residential Development." *Environmental Health Perspectives* 14:A471–A476.

ITRC. 2012. *Incremental Sampling Methodology*. ISM 1, Interstate Technology & Regulatory Council, Incremental Sampling Methodology Team, Washington, D.C. Available at: http://www.itrcweb.org/ism-1/pdfs/ISM-1_021512_Final.pdf

Kabata-Pendias A and H Pendias. 2001. *Trace Elements in Soils and Plants*. CRC Press, Boca Raton, Florida.

MacLean KS and WM Langille. 1981. "Arsenic in Orchard and Potato Soils and Plant Tissue." *Plant and Soil* 61:413–418.

Matzke BD, JE Hathaway, LH Sego, BA Pulsipher, SA McKenna, JE Wilson, ST Dowson, NL Hassig, and CJ Murray. 2010. *Visual Sample Plan Version 6.0 User's Guide*. PNNL-19915, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://vsp.pnnl.gov/docs/PNNL%2019915.pdf

MSA-1402281. 2014. *Ecological and Cultural Clearance for 100-OL-1 Orchards Operable Unit Remedial Investigation and Feasibility Study in the 600 Area, Hanford Site, Benton County, Washington (HCRC# 2011-600-025, HCRC# 2013-100-019, ECR-2014-618)*. Mission Support Alliance, LLC, Richland, Washington.

MSA-1501980. 2015. *Ecological and Cultural Clearance for 100-OL-1 Orchards Operable Unit Remedial Investigation and Feasibility Study in the 600 Area, Hanford Site, Benton County, Washington (ECR-2015-619, HCRC# 2010-600-042, HCRC# 2011-600-018, HCRC# 2013-100-018)*. Mission Support Alliance, LLC, Richland, Washington.

MSA-1602182. 2016. *Ecological and Cultural Clearance for Ecological Renewal of 100-OL-1 Orchards Operable Unit Remedial Investigation and Feasibility Study in the 600 Area, Hanford Site, Benton County, Washington (ECR-2016-617, HCRC# 2010-600-042, HCRC# 2011-600-018, HCRC# 2013-100-018)*. Mission Support Alliance, LLC, Richland, Washington.

NJDEP. 1999. *Findings and Recommendations for the Remediation of Historic Pesticide Contamination*. New Jersey Department of Environmental Protection, Site Remediation Program, Trenton, New Jersey.

Newton K, D Amarasiriwardena, and B Xing. 2006. "Distribution of Soil Arsenic Species, Lead and Arsenic Bound to Humic Acid Molar Mass Fractions in a Contaminated Apple Orchard." *Environmental Pollution* 143:197–205.

ODEQ (Oregon Department of Environmental Quality). 2006. *Guidance for Evaluating Residual Pesticides on Lands Formerly Used for Agricultural Production*. DEQ-06-LQ-011, Land Quality Division, Cleanup Program, Portland, Oregon. Available at: http://www.pacaglab.com/media/pdfs/DEQ%20pesticides%20guidance.pdf

Parker MB. 1986. *Tales of Richland, White Bluffs & Hanford 1805-1943, Before the Atomic Reserve*. YE Galleon Press, Fairfield, Washington.

Patton GW and EA Crecelius. 2001. *Simultaneously Extracted Metals/Acid-Volatile Sulfide and Total Metals in Surface Sediment from the Hanford Reach of the Columbia River and the Lower Snake River*. PNNL-13417, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-13417.PDF

Peryea FJ and R Kammereck. 1997. "Phosphate-Enhanced Movement of Arsenic Out of Lead Arsenate-Contaminated Topsoil and Through Uncontaminated Subsoil." *Water, Air, and Soil Pollution* 93:243–254.

Peryea FJ and TL Creger. 1994. "Vertical Distribution of Lead and Arsenic in Soils Contaminated with Lead Arsenate Pesticide Residues." *Water, Air and Soil Pollution* 78:297–306.

Peryea FJ. 1998. "Historical Use of Lead Arsenate Insecticides, Resulting Soil Contamination and Implications for Soil Remediation." *Proceedings of the 16th World Congress of Soil Science*, Montpellier, France. Available at http://soils.tfrec.wsu.edu/leadhistory.htm

PTI. 1989. *Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State*. Draft Report, PTI Environmental Services, Bellevue, WA. Available at: https://fortress.wa.gov/ecy/publications/publications/8909006.pdf

Renshaw CE, BC Bostick, X Feng, CK Wong, ES Winston, R Karimi, CL Folt, and CY Chen. 2006. "Impact of Land Disturbance on the Fate of Arsenical Pesticides." *Journal of Environmental Quality* 35:61–67.

Rickard WH and LE Rogers. 1983. "Industrial Land Use and the Conservation of Native Biota in the Shrub-Steppe Region of Western North America." *Environmental Conservation* 10:205-211.

Sackschewsky MR, and JL Downs. 2001. *Vascular Plants of the Hanford Site*. PNNL-13688, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/pnnl-13688.pdf

San Juan C. 1994. *Natural Background Soil Metals Concentrations in Washington State*. Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/documents/94115.pdf

Schooley TN. 2006. Historical use of lead arsenate and survey of soil residues in former apple orchards in Virginia. Master's Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Schooley T, MJ Weaver, D Mullins, and M Eick. 2008. "The History of Lead Arsenate Use in Apple Production: Comparison of its Impact in Virginia and Other States." *Journal of Pesticide Safety Education* 10:22–53.

Sharpe JJ. 1999. *Pre-Hanford Agricultural History: 1900-1943*. BHI-01326, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

Sharpe JJ. 2000. *Phase II of the Pre-Hanford Agricultural History: 1900-1943*. BHI-01422, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

Sloan J. 2011. *Ecological Soil Screening Levels for Arsenic and Lead in the Tacoma Smelter Plume Footprint and Hanford Site Old Orchards*. Publication No. 11-03-006, Toxics Studies Unit, Environmental Assessment Program, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/documents/1103006.pdf

Staed JB, DM Miller, KR Brye, TC Daniel, C Rom, and EE Gbur. 2009. "Land Use Effects on Near-Surface Soil Arsenic in the Ozark Highlands." *Soil Science* 174:121–129.

State College of Washington. 1918. *Codling Moth Spraying*. Entomology Extension Circular, No. 4, Extension Service, State College of Washington, Pullman, Washington.

State College of Washington. 1937. *Recommendations for Codling Moth and Orchard Mite Control in Washington for 1937*. Extension Bulletin 233, Extension Service, State College of Washington, Pullman, Washington.

State College of Washington. 1942. *Recommendations for Codling Moth, Orchard Mite and Scale Control in Washington for 1942*. Extension Bulletin 279, Extension Service, State College of Washington, Pullman, Washington.

TPA. 2012a. *Change Control Form: Creation of New Operable Unit for Pre-Hanford Orchard Lands Along the River Corridor of the Hanford Site*. TPA-C-12-02, May 7, 2012, U.S. Department of Energy, Richland Operations Office, U.S. Environmental Protection Agency, and Washington State Department of Ecology, Richland, Washington.

TPA. 2012b. *Change Control Form: Establish a New Milestone to Develop a Remedial Investigation/Feasibility Study Work Plan to Evaluate the 100-OL-1 Operable Unit*. TPA-M-15-12-02, May 7, 2012, U.S. Department of Energy, Richland Operations Office, U.S. Environmental Protection Agency, and Washington State Department of Ecology, Richland, Washington.

TRIDEC. 2016. *2016 Fact sheet*. Tri-City Development Council, Kennewick, Washington. Available at: https://www.tridec.org/wp-content/uploads/2016-Fact-Sheet-Updated-April-2016-for-TRIDEC-Website.pdf

Veneman PLM, JR Murray, and JH Baker. 1983. "Spatial Distribution of Pesticide Residues in a Former Apple Orchard." *Journal of Environmental Quality* 12:101–104.

WAC 173-340-300(3)(a). 2013. "Model Toxics Control Act Regulation and Statute." Publication No. 94-06. *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-300

WAC 173-340-720(4)(b)(iii)(A) and (B). 2003. "Model Toxics Control Act—Cleanup; Groundwater Cleanup Standards." *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-720

WAC 173-340-740(2). 2007. "Model Toxics Control Act—Cleanup; Unrestricted land use soil cleanup standards." *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-740

WAC 173-340-7492. 2003. "Model Toxics Control Act—Cleanup," "Simplified Terrestrial Ecological Evaluation Procedures." *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-7492

WAC 173-340-7493. 2003. "Model Toxics Control Act—Cleanup," "Site-Specific Terrestrial Ecological Evaluation Procedures." *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-7493

WNHP. 2015. *2015 Endangered, Threatened, and Sensitive Vascular Plant List. Washington Natural Heritage Program*. Washington Natural Heritage Program, Washington State Department of Natural Resources, Olympia, Washington.

Wolz S, RA Fenske, NJ Simcox, G Palcisko, and JC Kissel. Residential arsenic and lead levels in agricultural community with a history of lead arsenate use. *Environmental Research* 93:293-300.

Yokel J and DA Delistraty. 2003. "Arsenic, lead, and other trace elements in soils contaminated with pesticide residues at the Hanford Site (USA)." *Environmental Toxicology* 18:104–114.

Appendix A

Results of Field Characterization by Decision Unit

This page intentionally left blank.

Appendix A

Results of Field Characterization by Decision Unit

This appendix includes all the field characterization results for the 133 decision units (DUs) in the 100-OL-1 Operable Unit (OU). The Hanford orchard lands identified as part of the 100-OL-1 OU are located from the 100 Area of the Hanford Site (south side of the Columbia River) down to the Hanford townsite (Figure A-1). The discontinuous orchard lands cover 20.21 km^2 (4995ac), and the OU is divided into 133 DUs.

The figures in this appendix convey the field characterization results, an interpretation of the sample results to human health screening levels, and the summary statistics for each DU. Figure A-2 is a legend for the field characterization results. The legend applies to all the figures of field characterization results in each DU. Figure A-3 provides examples for interpreting the field characterization results compared to screening levels illustrated as pie charts (Section 6.1.2). The human health screening levels for the MTCA Method A levels for unrestricted use of the soil (WAC 173-340-740(2)) are: 250 mg/kg lead and 20 mg/kg arsenic. The Washington State Area-Wide Soil Contamination Task Force's screening levels for properties where exposure of children is infrequent (AWSCTF 2003) are: 700 mg/kg lead and 200 mg/kg arsenic. The centroid for each pie chart is geographically located over the sample location for the XRF analysis of the surface soil.

Figure A-4 through Figure A-136 display the results for DU-001 through DU-133, respectively. All units for measured concentrations and summary statistics are in mg/kg, unless otherwise noted. There are some figures where the sample locations appear to be very close due to the perspective of the figure, and in these cases there is a box drawn around the locations and the region is shown at a higher resolution to assist the reader (see Figure A-12, DU-009). Some sample locations appear to be outside the OU boundary, but the location is inside the OU boundary (see Figure A-25, DU-022). The GPS for the Niton XL3t XRF analyzer has a resolution of ± 9 m (30 ft). The quality assurance process (Section 2.2.3 and Appendix C) includes evaluating the location with regard to the OU boundary, and determining the locations are within the OU boundary (as shown here and listed in Appendix B). When the XRF analyzer recorded "<LOD" (less than the level of detection), the value was replaced by the MDL (DOE/RL-2012-64), which was 5.68 mg/kg lead and 3.98 mg/kg arsenic for the Remedial Investigation activities (Section 4.3.1 and Appendix C). For Figures A-7 and A-81, the number of samples with <LOD was substantial enough that the calculation of the 95% upper confidence limit required replacement with the MDL. Appendix D discusses the step-out sampling, if warranted by higher concentrations along the OU boundary. Each figure includes the summary statistics for the results within the DU. Table 4-2 provides the basis for the 95% upper confidence limit (UCL) and other associated summary statistics.

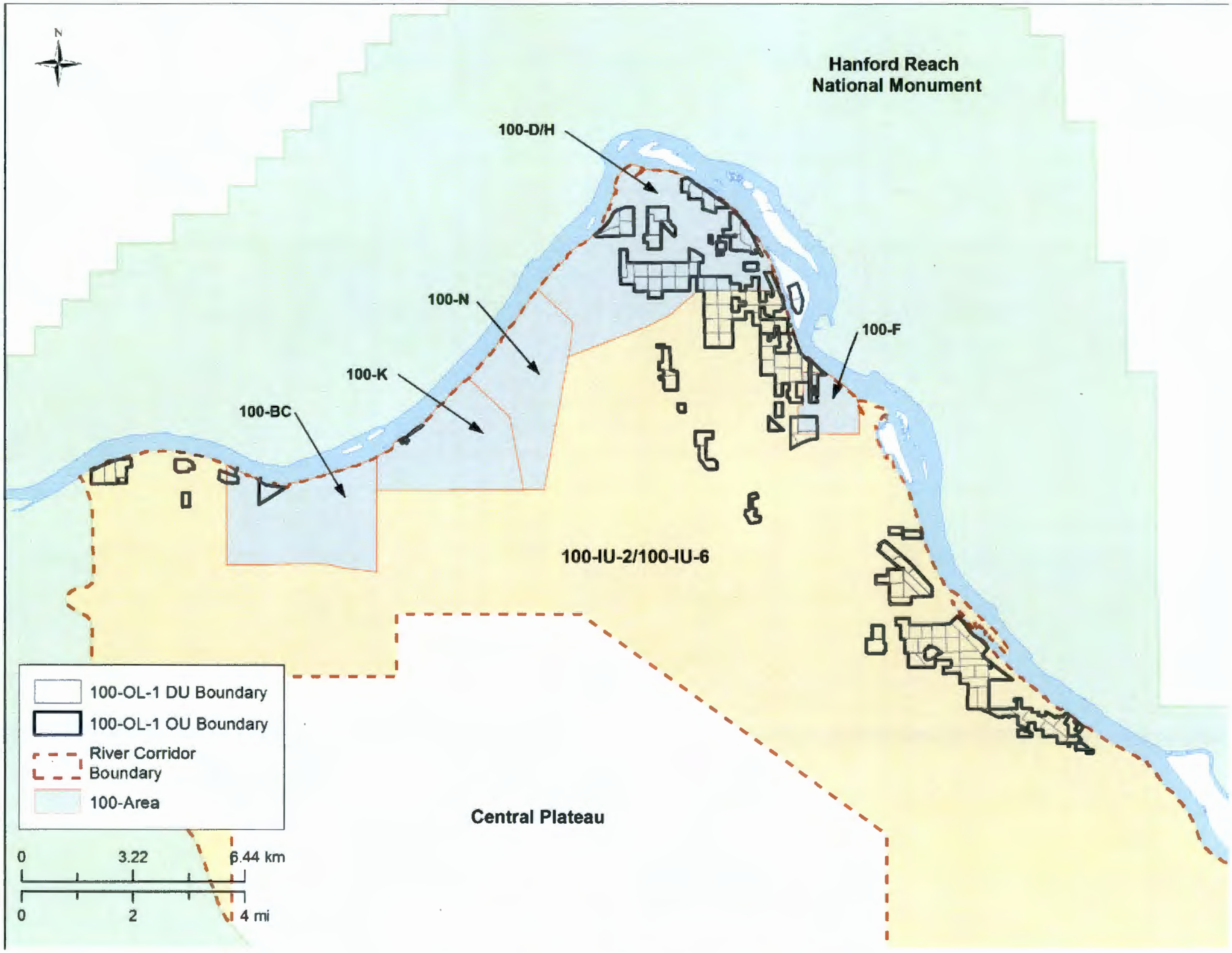
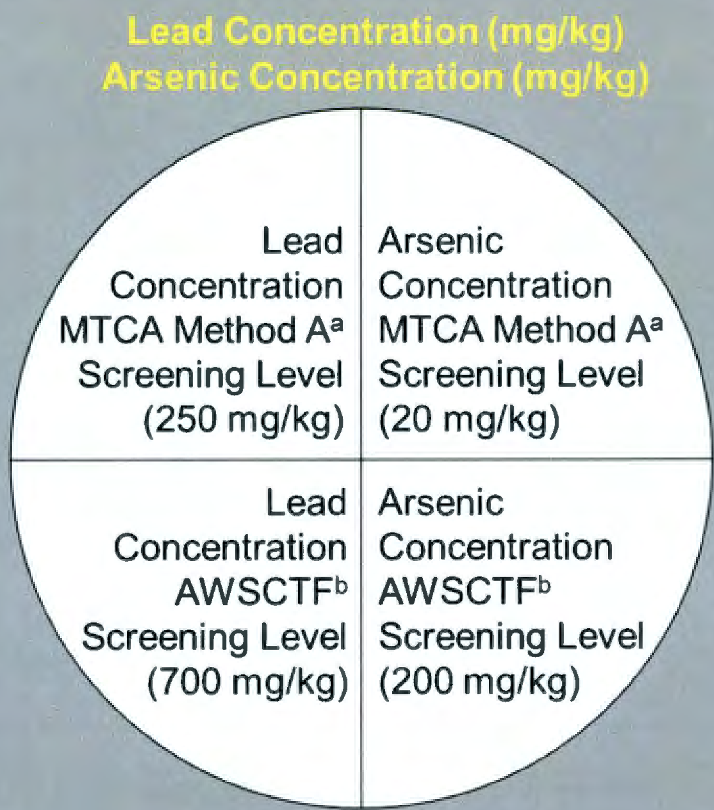


Figure A-1. Map of 100-OL-1 OU and DUs.



Red quadrant: Concentrations equal to or above screening level(s)

Green quadrant: Concentrations below screening level(s)

Centroid of pie chart: Geographic location of XRF measurement

Footnotes:

(a) WAC 173-340-740(2)

(b) AWSCTF (Area-Wide Soil Contamination Task Force) based on low-to-moderate range for properties where exposure of children is infrequent

Figure A-2. Legend for the Figures in Appendix A.

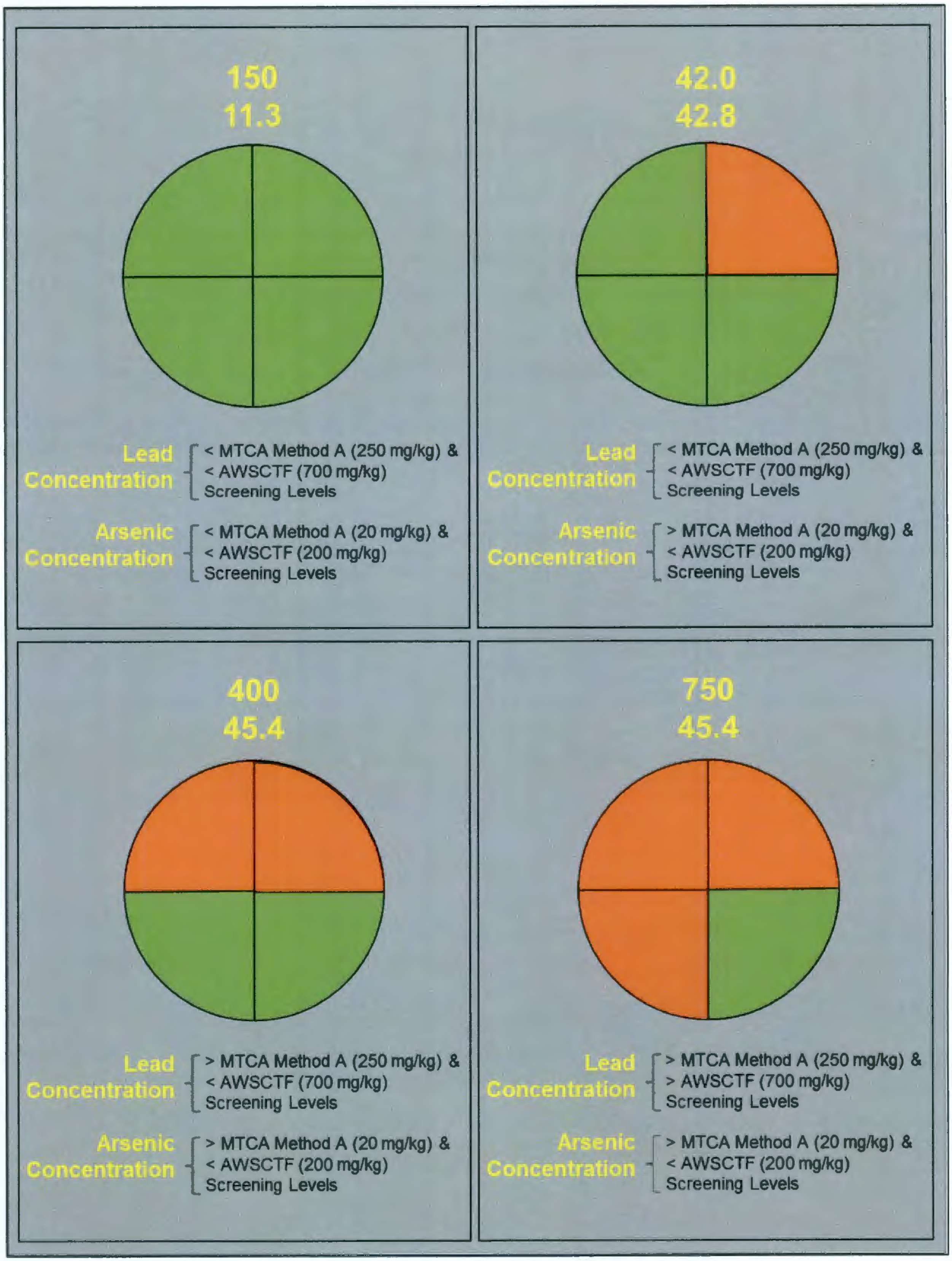
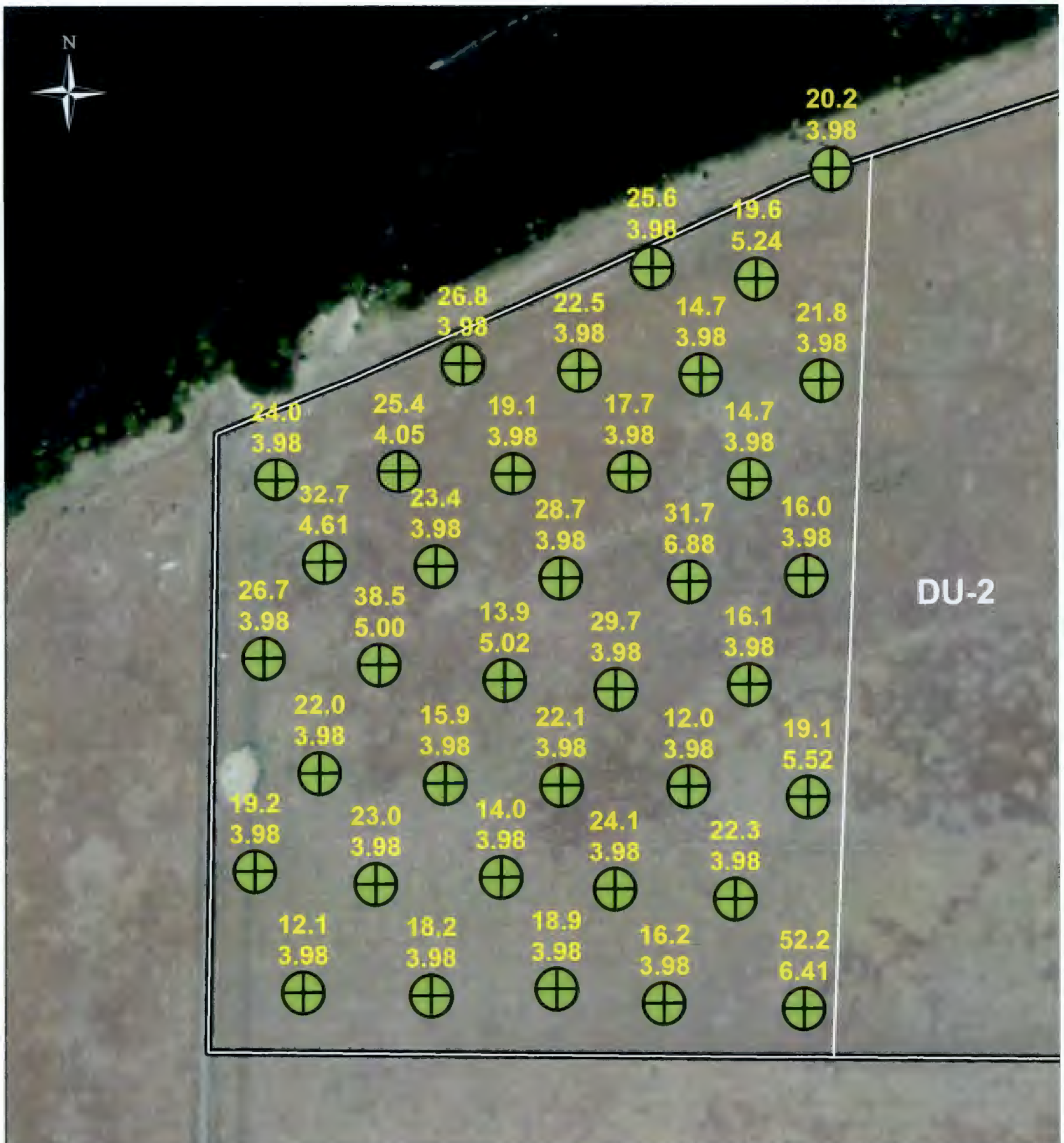


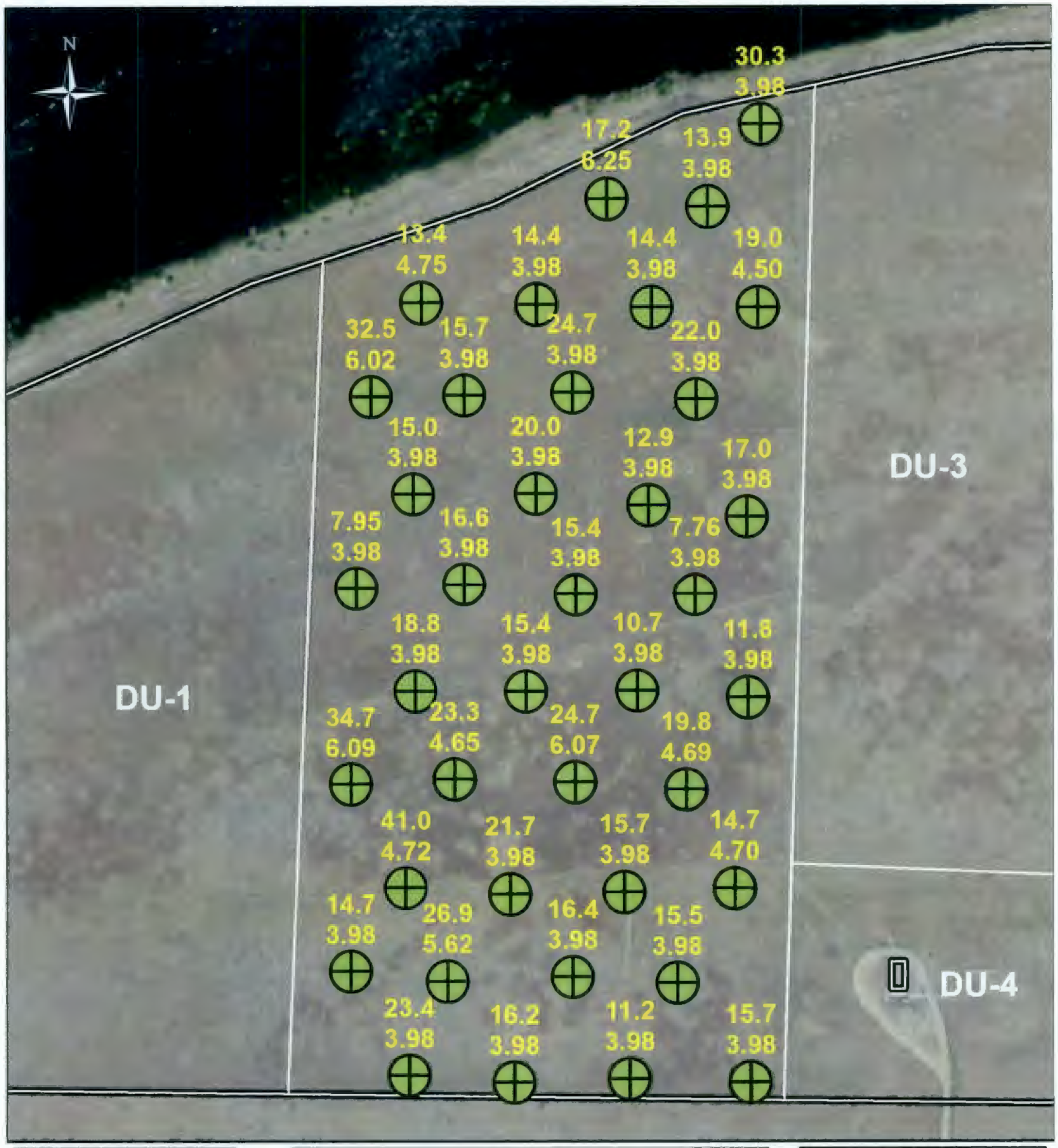
Figure A-3. Interpreting the Legend for the Results in the Figures of Appendix A, Using Examples from DU-024.



DU-001		
Summary Statistics	**Lead**	**Arsenic**
Average	22.2	4.27
Standard Deviation	7.87	0.69
RSD	35.5%	16.1%
95% UCL[1]	24.4	4.48

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

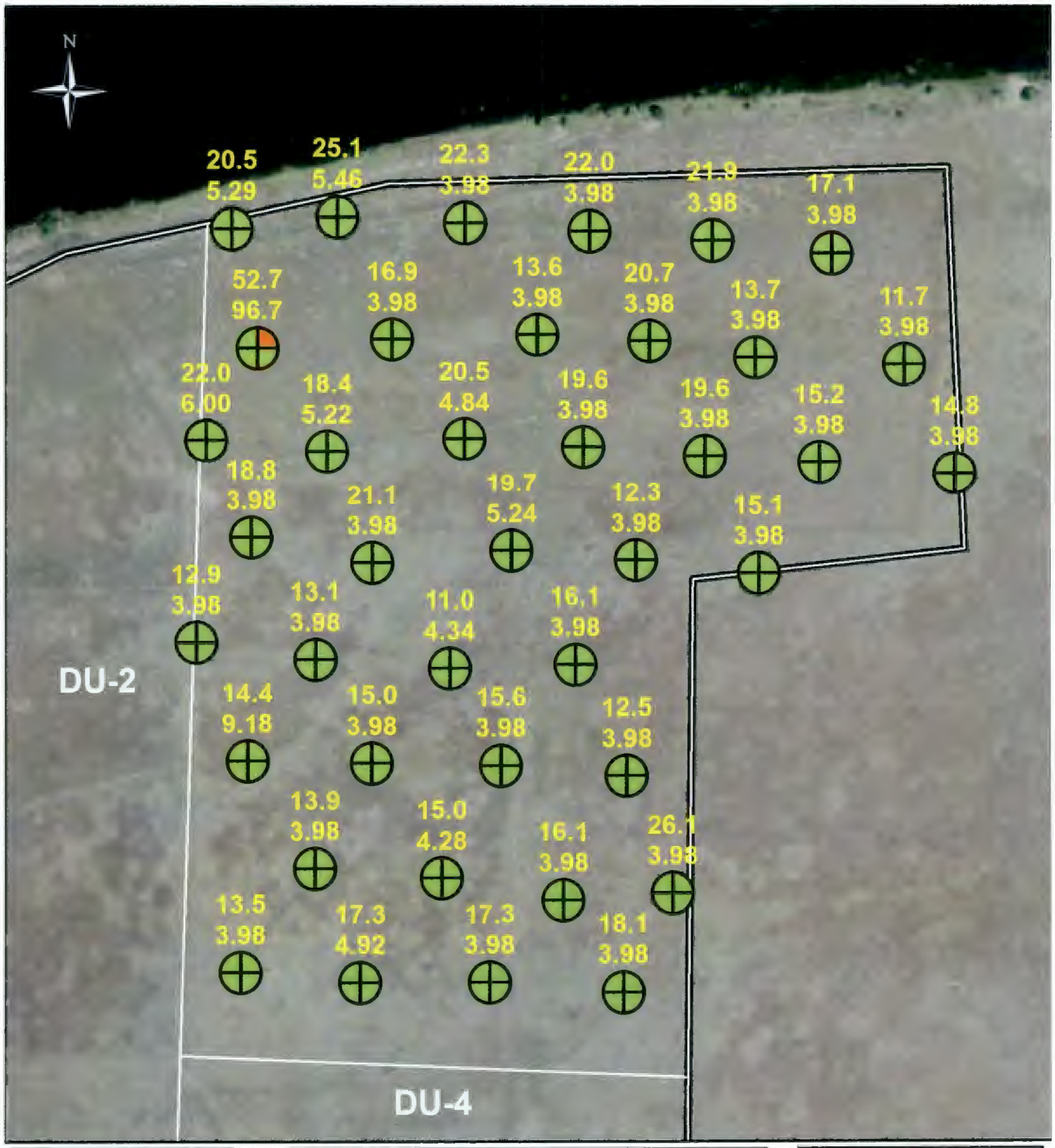
Figure A-4. DU-001 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

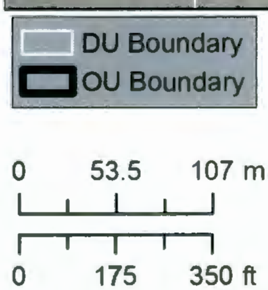


DU-002		
Summary Statistics	Lead	Arsenic
Average	18.5	4.35
Standard Deviation	7.13	0.69
RSD	38.5%	15.8%
95% UCL[1]	20.6	4.56

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-5. DU-002 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

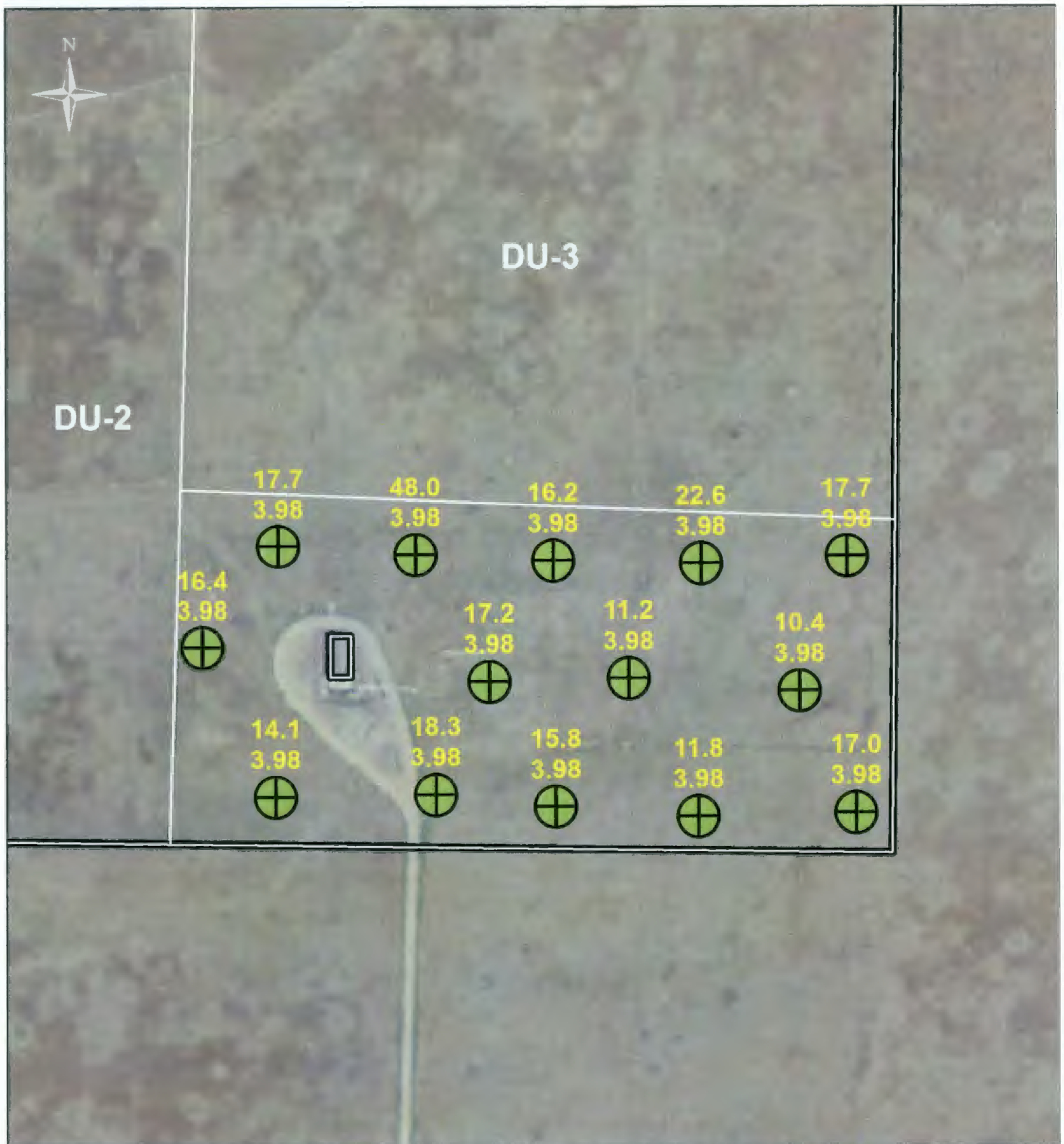


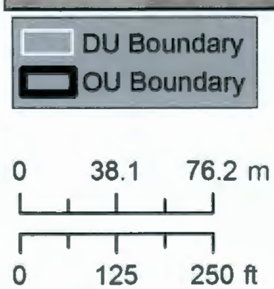


DU-003		
Summary Statistics	**Lead**	**Arsenic**
Average	18.1	6.67
Standard Deviation	6.74	14.5
RSD	37.3%	217%
95% UCL[1]	19.7	17.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-6. DU-003 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

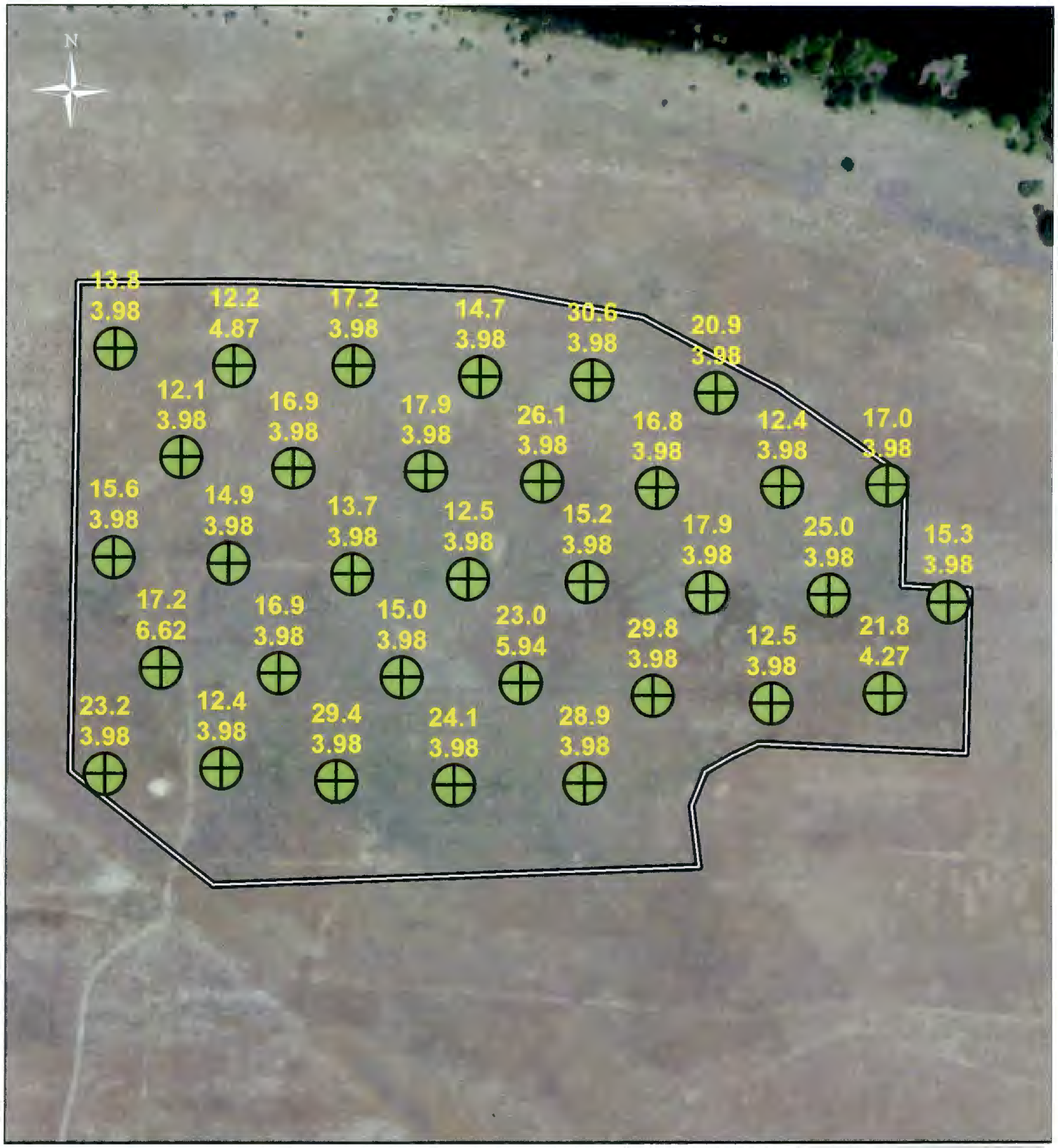




DU-004		
Summary Statistics	**Lead**	**Arsenic**
Average	18.2	3.98 (mdl)
Standard Deviation	9.17	0.00
RSD	50.4%	0.00%
95% UCL[1,2]	22.5	3.98

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.
[2]Insufficient samples above detection to compute 95% UCL for arsenic; value replaced with MDL.

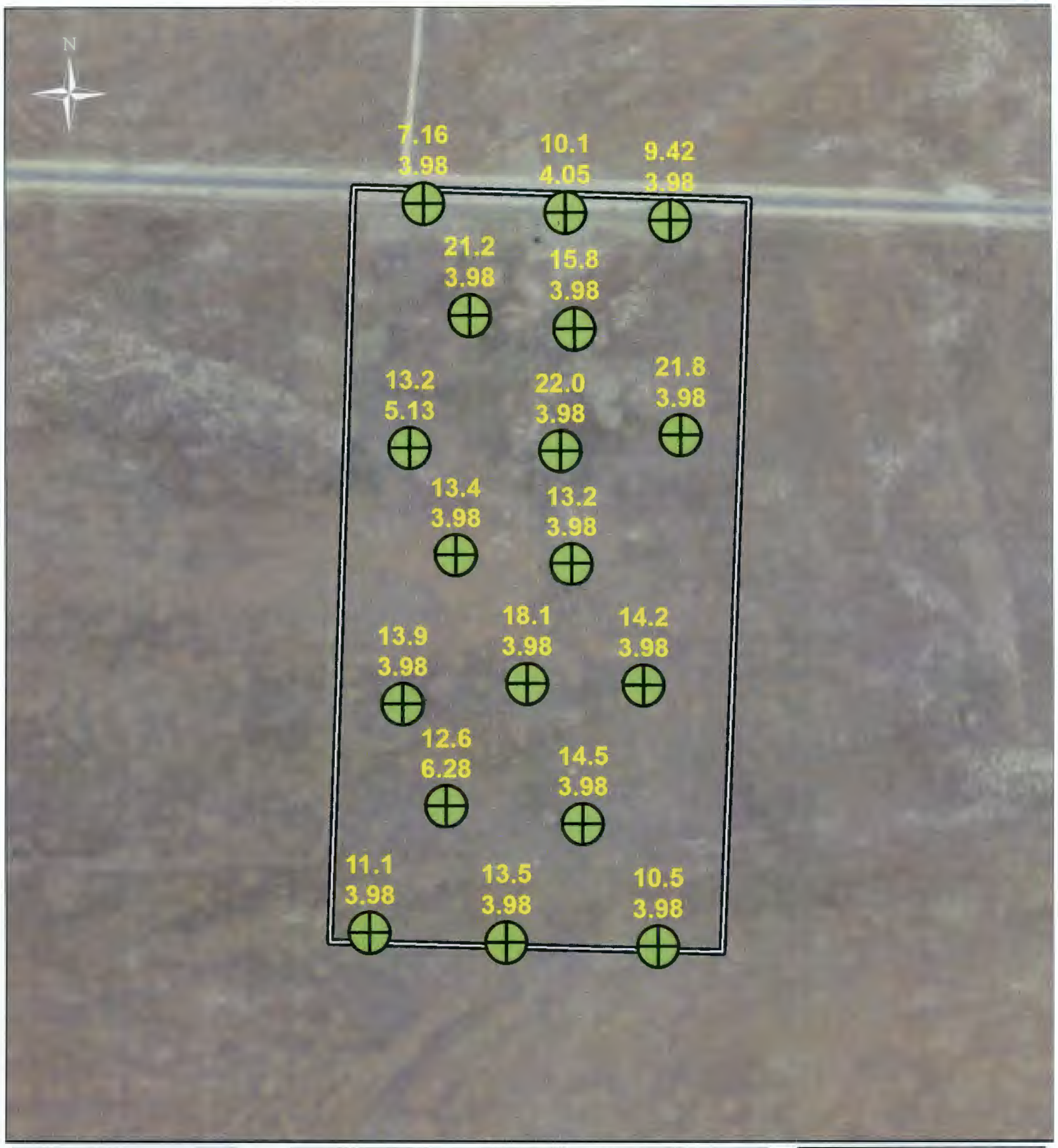
Figure A-7. DU-004 Field Characterization Results (mg/kg, unless otherwise noted). Bruggemann's Warehouse (Square) is Not Included in the OU. Display of results described in Figure A-2.



DU-005		
Summary Statistics	Lead	Arsenic
Average	18.6	4.16
Standard Deviation	5.73	0.57
RSD	30.8%	13.7%
95% UCL[1]	20.3	4.35

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-8. DU-005 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-006		
Summary Statistics	**Lead**	**Arsenic**
Average	14.2	4.18
Standard Deviation	4.24	0.57
RSD	29.8%	13.7%
95% UCL[1]	15.9	4.46

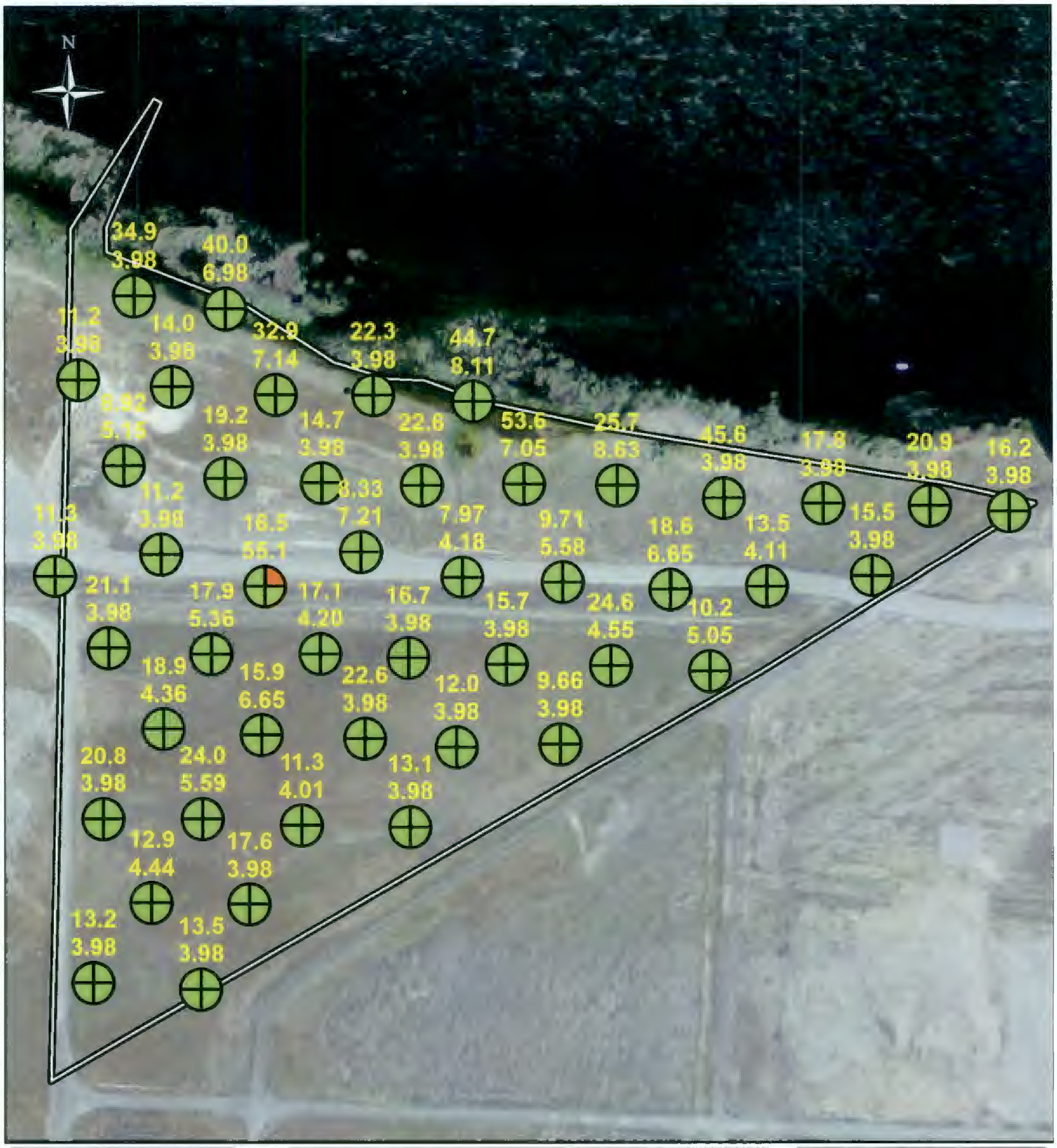
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-9. DU-006 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

DU-007		
Summary Statistics	**Lead**	**Arsenic**
Average	15.0	4.22
Standard Deviation	4.06	0.66
RSD	27.1%	15.8%
95% UCL[1]	16.3	4.45

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

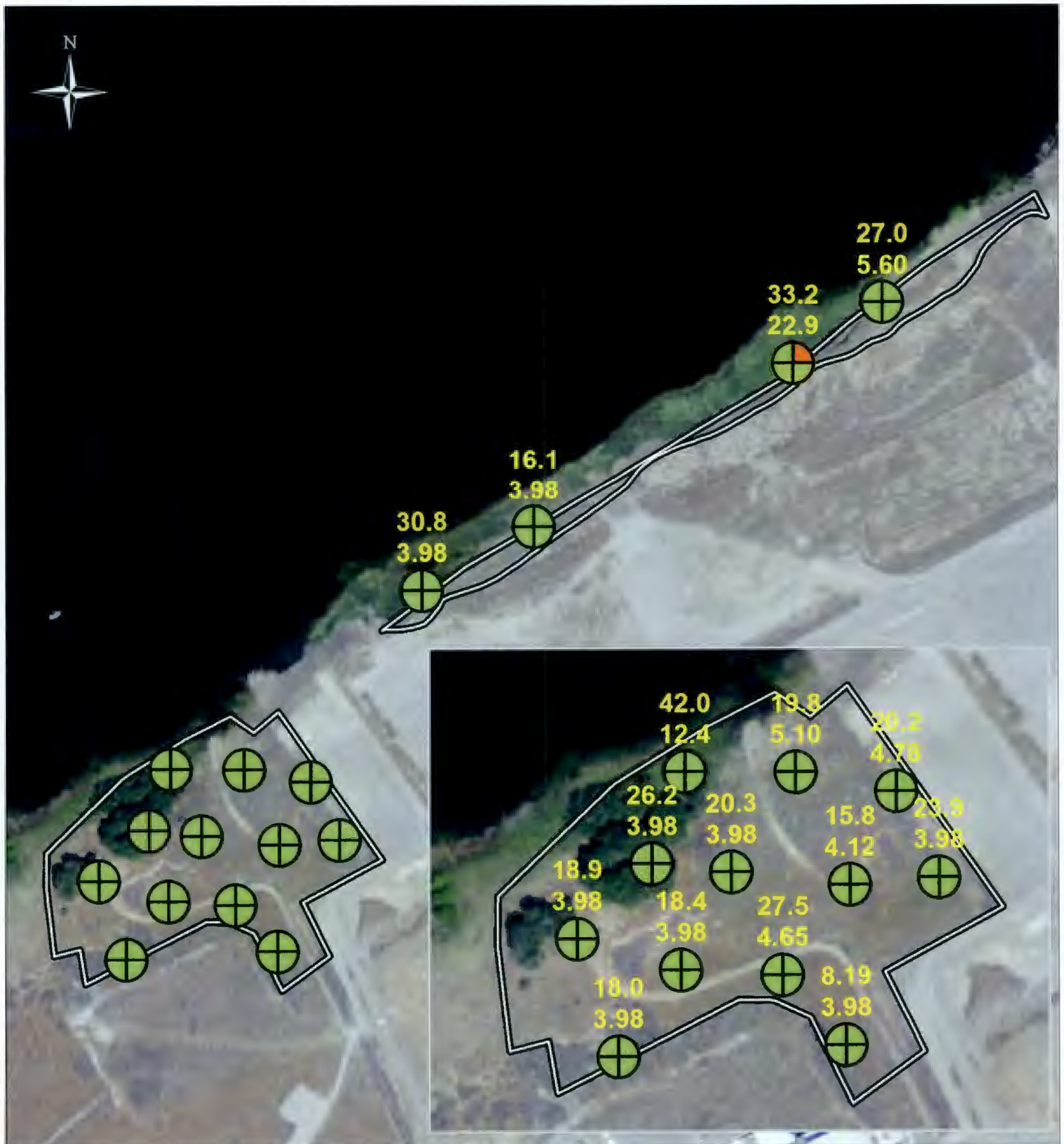
Figure A-10. DU-007 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-008		
Summary Statistics	Lead	Arsenic
Average	19.3	5.86
Standard Deviation	10.3	7.44
RSD	53.3%	127%
95% UCL[1]	21.8	10.8

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

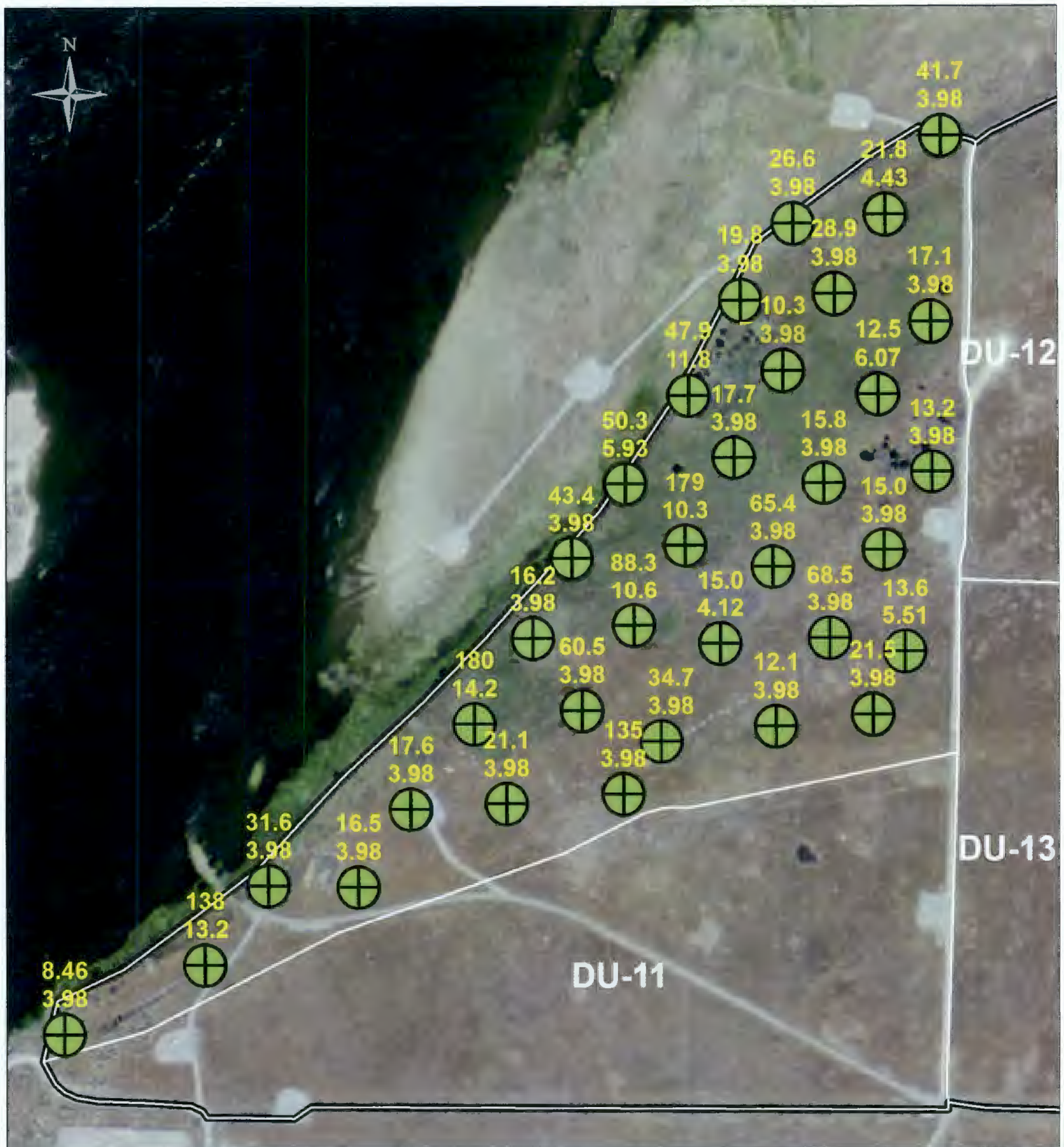
Figure A-11. DU-008 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

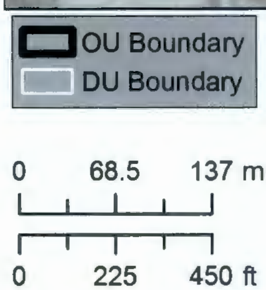


DU-009		
Summary Statistics	**Lead**	**Arsenic**
Average	22.9	5.96
Standard Deviation	8.08	4.81
RSD	35.3%	80.7%
95% UCL[1]	26.4	11.6

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-12. DU-009 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

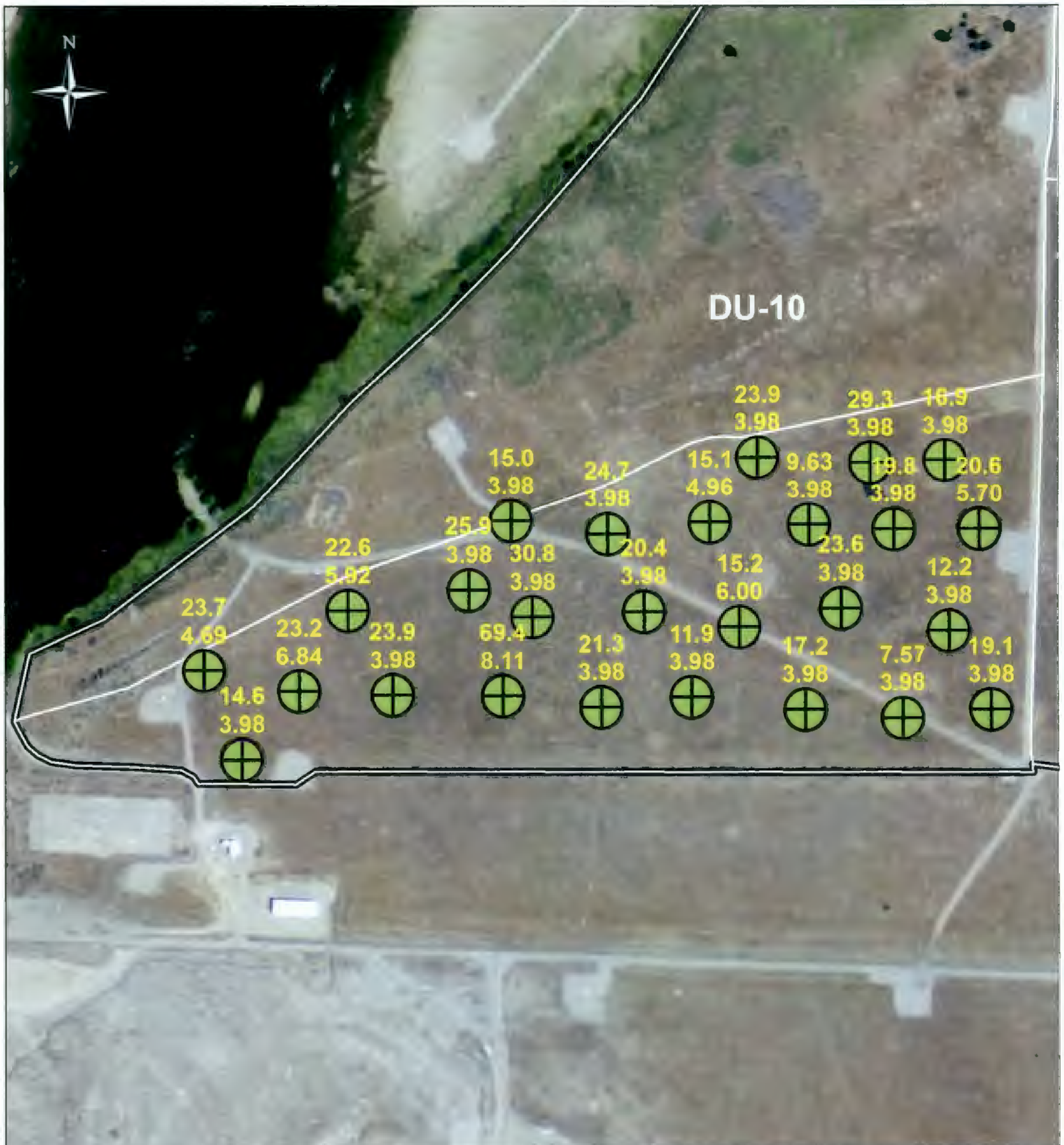




DU-010		
Summary Statistics	Lead	Arsenic
Average	44.2	5.34
Standard Deviation	46.8	2.88
RSD	106%	53.8%
95% UCL[1]	79.2	6.22

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

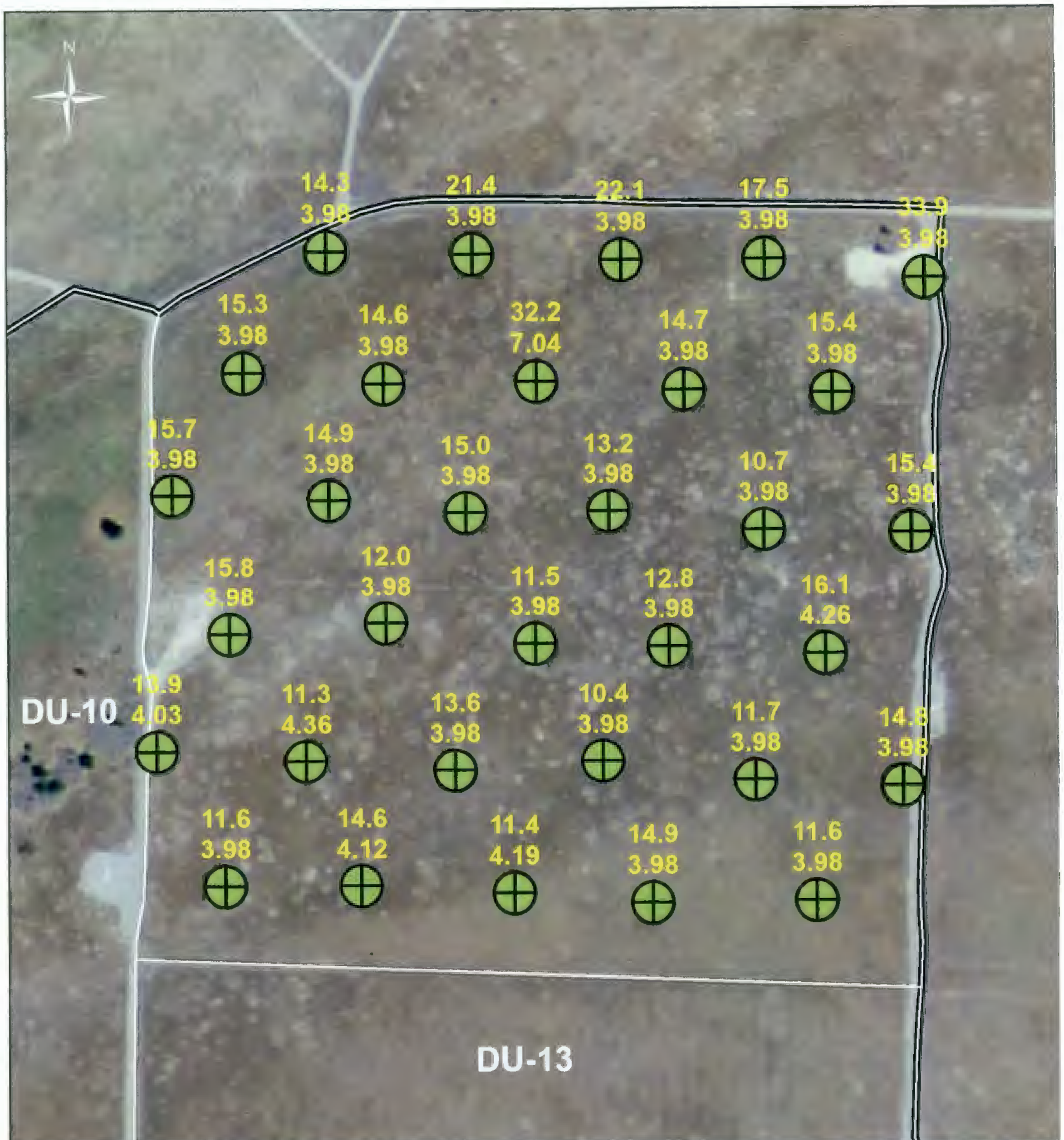
Figure A-13. DU-010 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

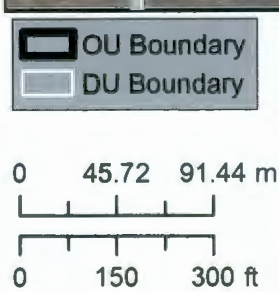


DU-011		
Summary Statistics	Lead	Arsenic
Average	21.4	4.53
Standard Deviation	11.4	1.07
RSD	53.0%	23.5%
95% UCL[1]	25.2	4.92

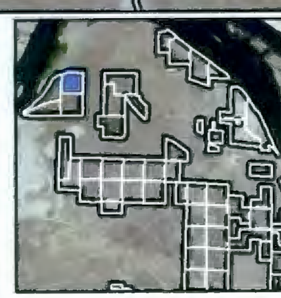
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-14. DU-011 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



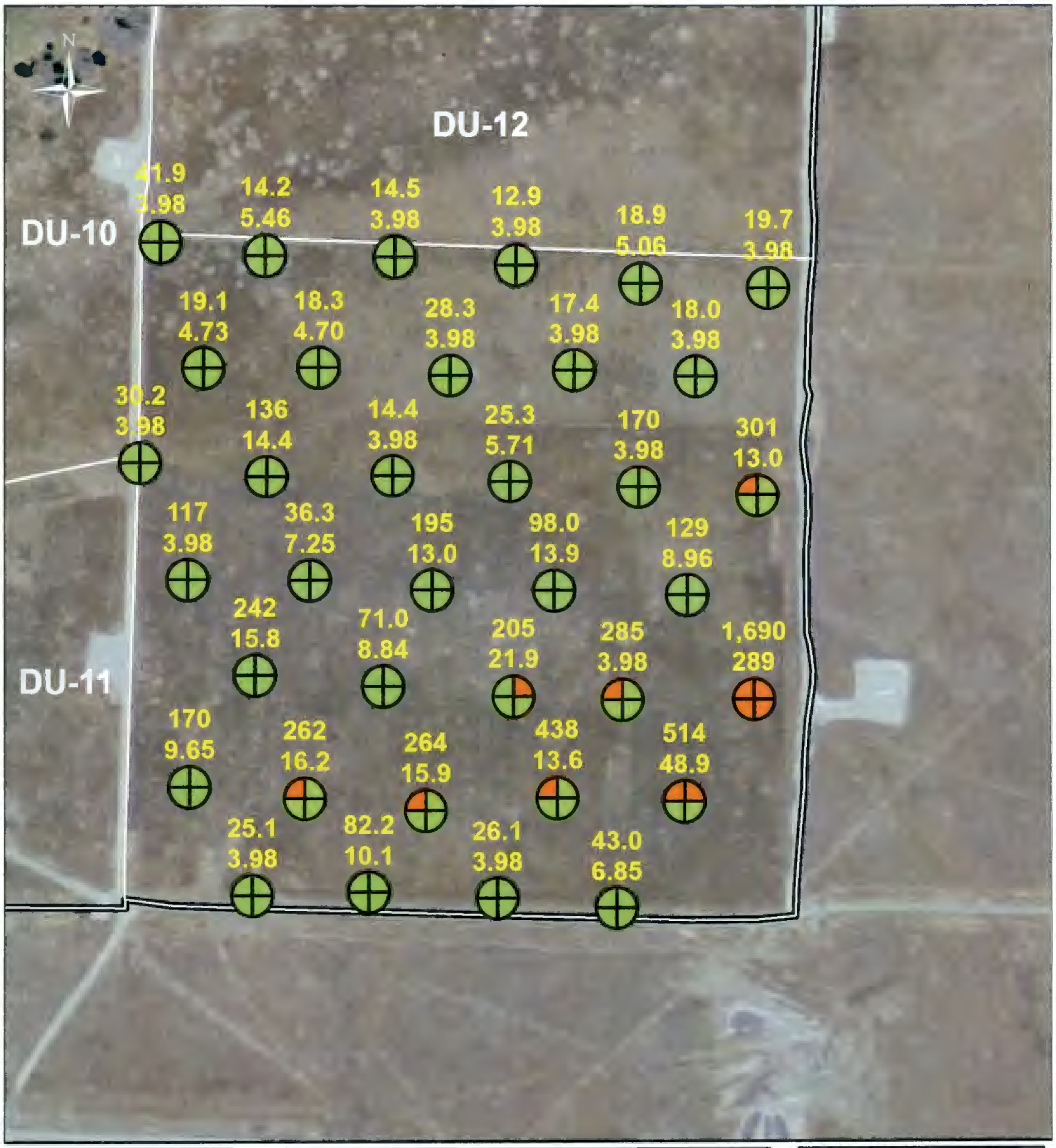


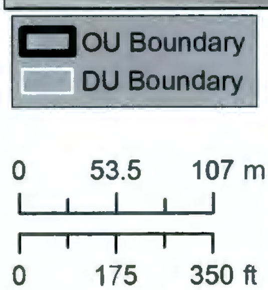
DU-012		
Summary Statistics	Lead	Arsenic
Average	15.4	4.11
Standard Deviation	5.33	0.53
RSD	34.5%	13.0%
95% UCL[1]	17.0	4.31



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-15. DU-012 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

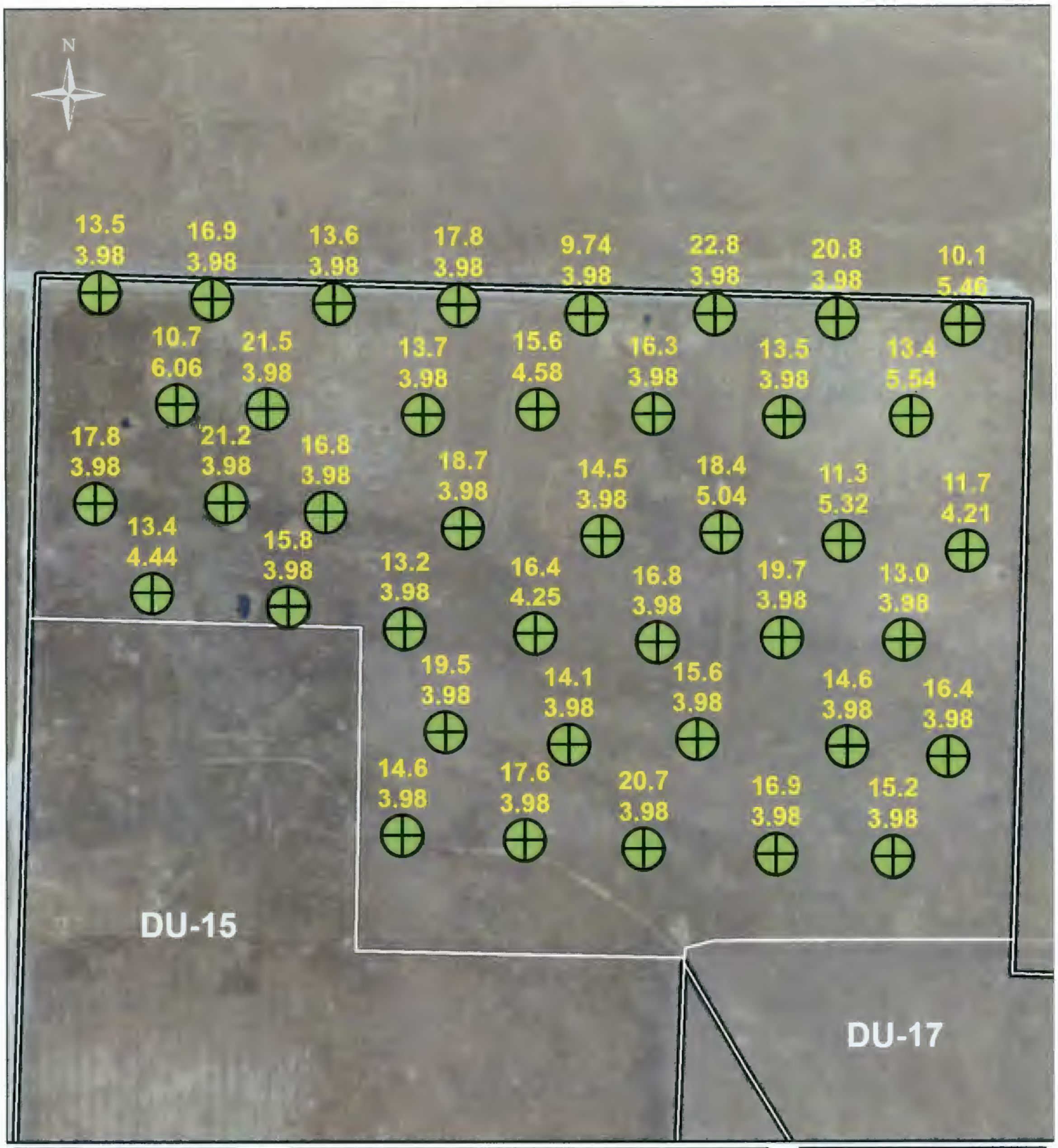




DU-013		
Summary Statistics	**Lead**	**Arsenic**
Average	161	16.9
Standard Deviation	291	46.8
RSD	181%	277%
95% UCL[1]	372	51.7

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

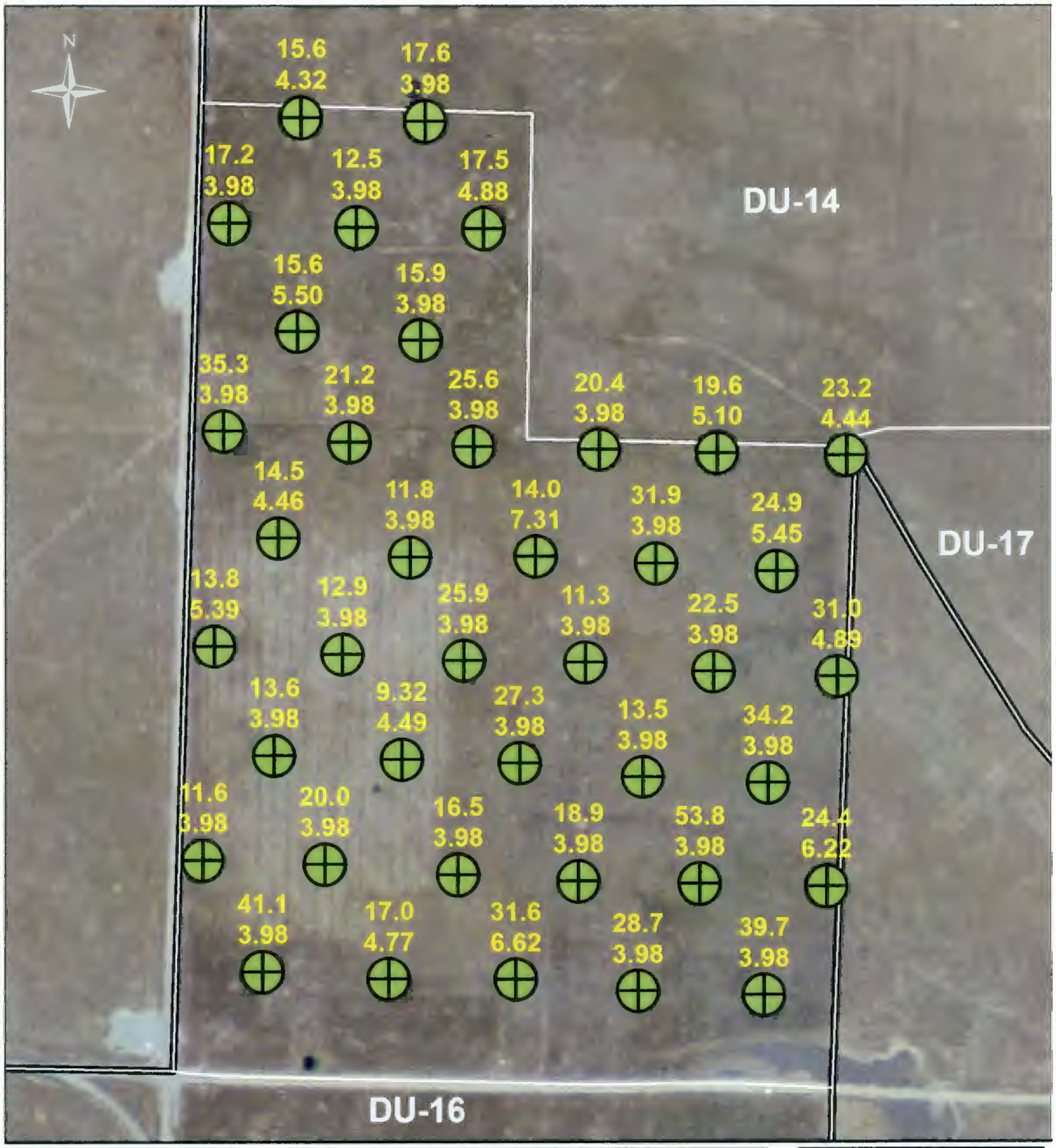
Figure A-16. DU-013 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



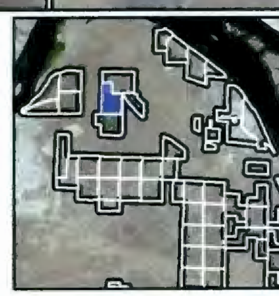
DU-014		
Summary Statistics	Lead	Arsenic
Average	15.8	4.21
Standard Deviation	3.23	0.51
RSD	20.4%	12.2%
95% UCL[1]	16.7	4.35

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-17. DU-014 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

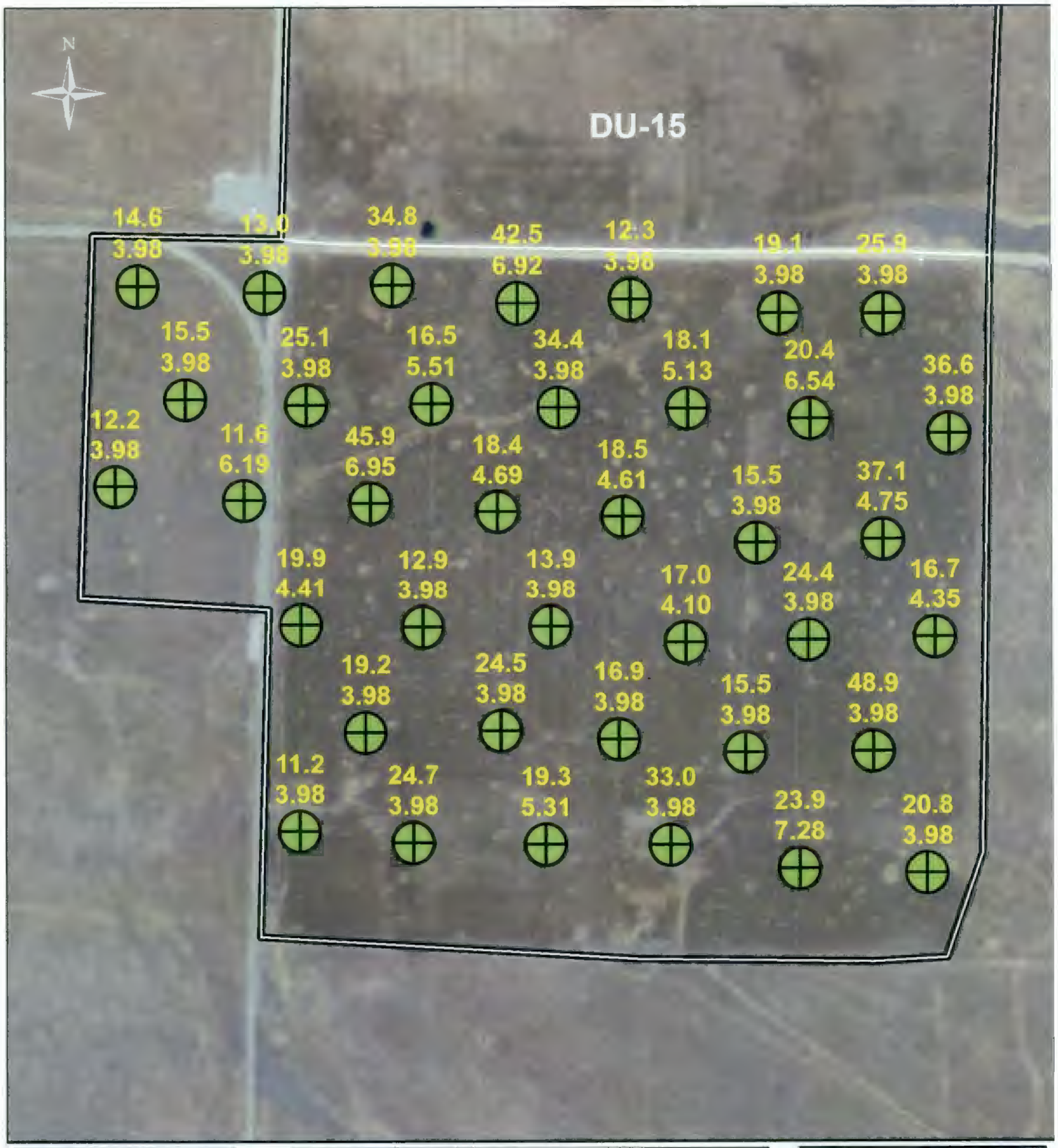


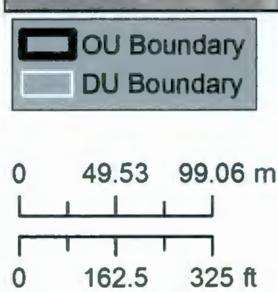
DU-015		
Summary Statistics	**Lead**	**Arsenic**
Average	21.8	4.43
Standard Deviation	9.67	0.80
RSD	44.3%	18.1%
95% UCL[1]	24.5	4.65



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-18. DU-015 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

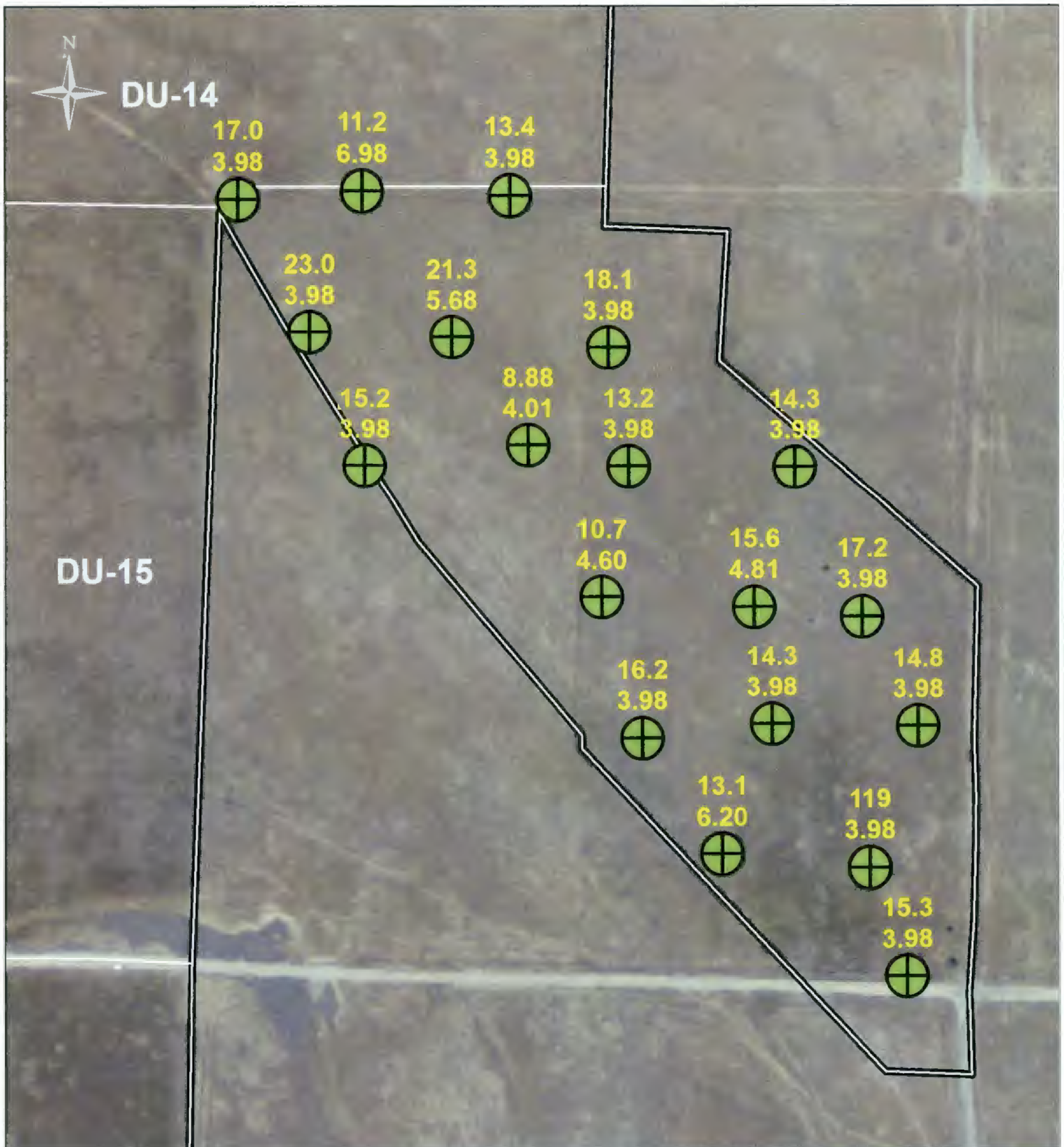




DU-016		
Summary Statistics	Lead	Arsenic
Average	22.4	4.53
Standard Deviation	9.92	0.97
RSD	44.3%	21.3%
95% UCL[1]	25.1	4.81

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

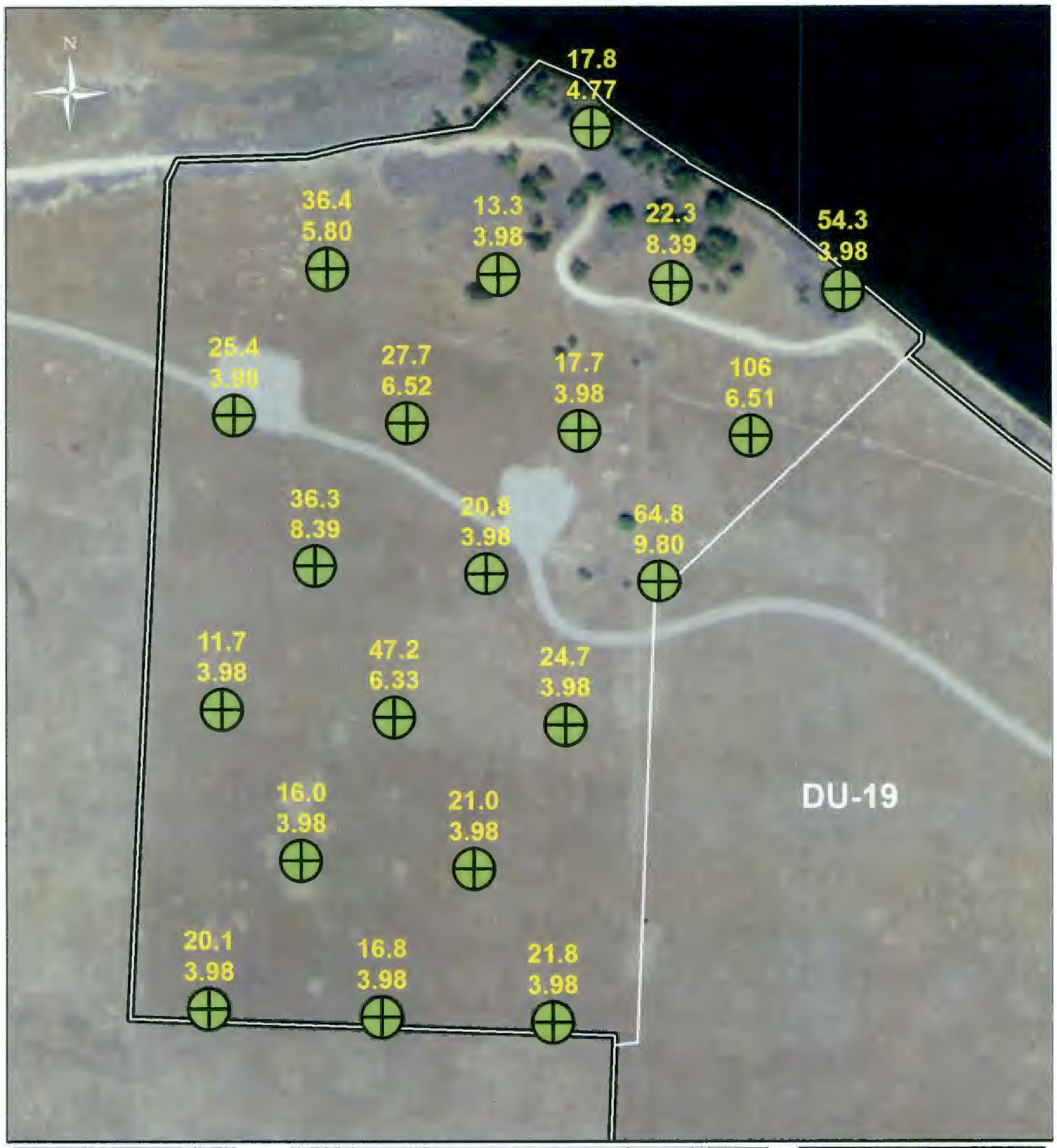
Figure A-19. DU-016 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

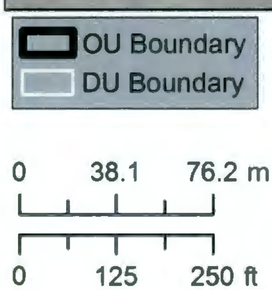


DU-017		
Summary Statistics	**Lead**	**Arsenic**
Average	20.6	4.42
Standard Deviation	24.1	0.86
RSD	117%	19.5%
95% UCL[1]	44.7	4.79

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-20. DU-017 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

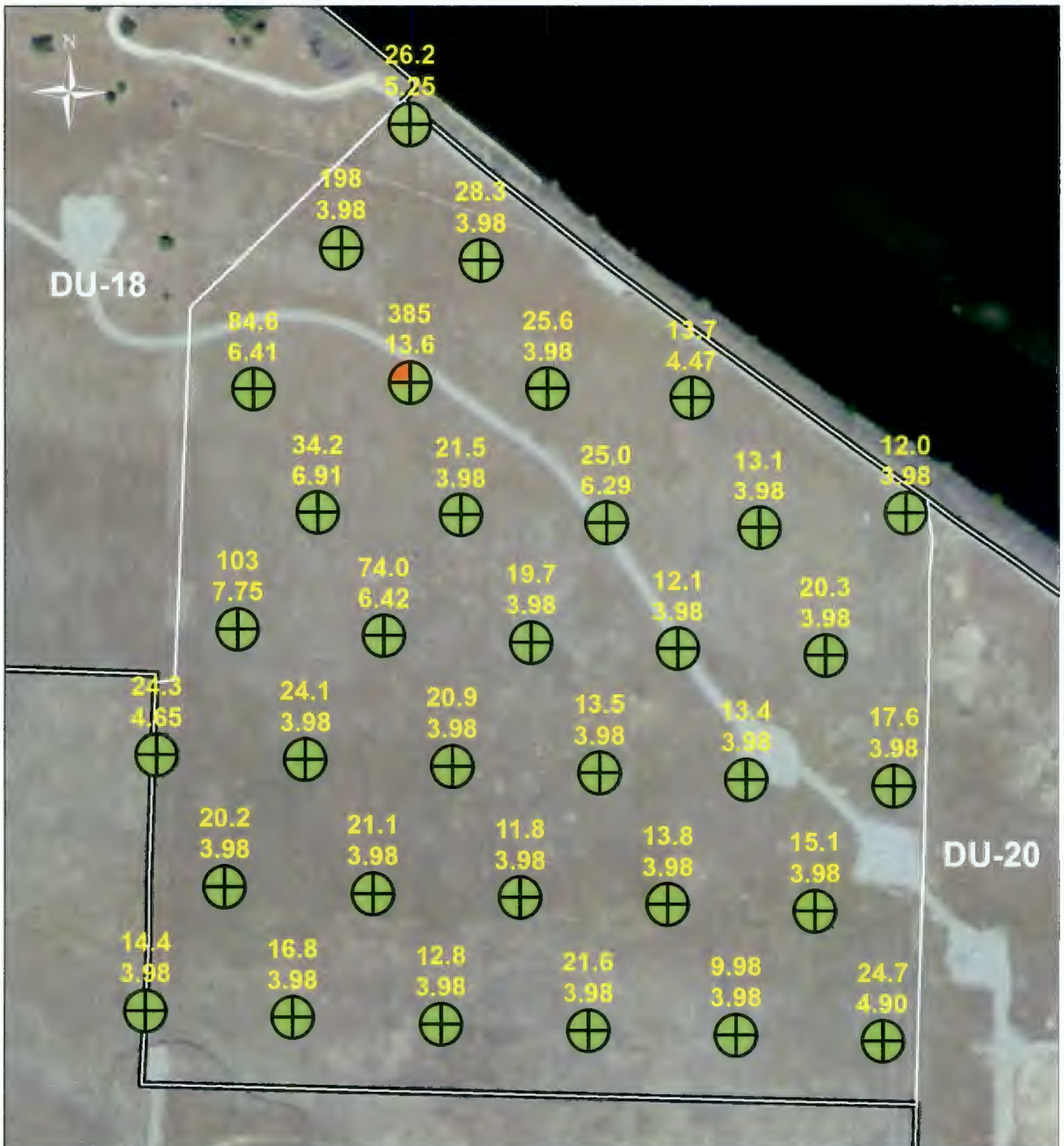


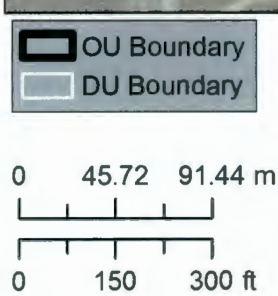


DU-018		
Summary Statistics	**Lead**	**Arsenic**
Average	31.1	5.21
Standard Deviation	22.6	1.80
RSD	72.5%	34.5%
95% UCL[1]	40.0	5.96

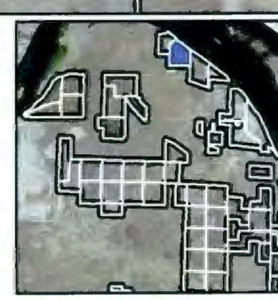
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-21. DU-018 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



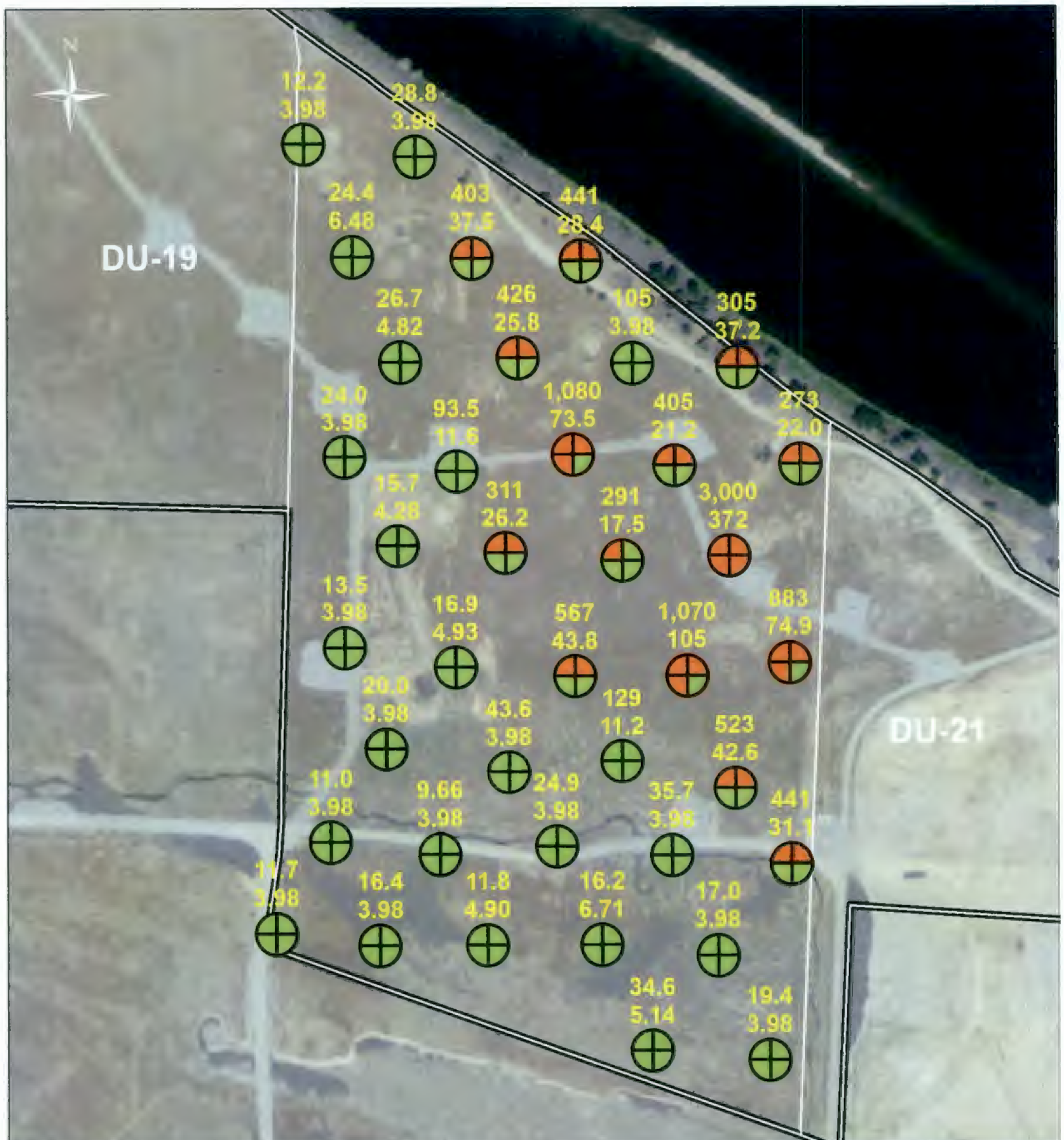


DU-019		
Summary Statistics	**Lead**	**Arsenic**
Average	41.0	4.77
Standard Deviation	70.8	1.83
RSD	173%	38.4%
95% UCL[1]	93.9	5.93

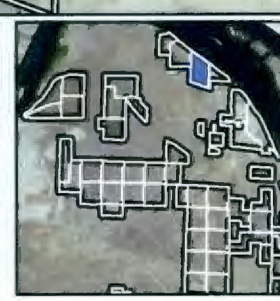


[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-22. DU-019 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

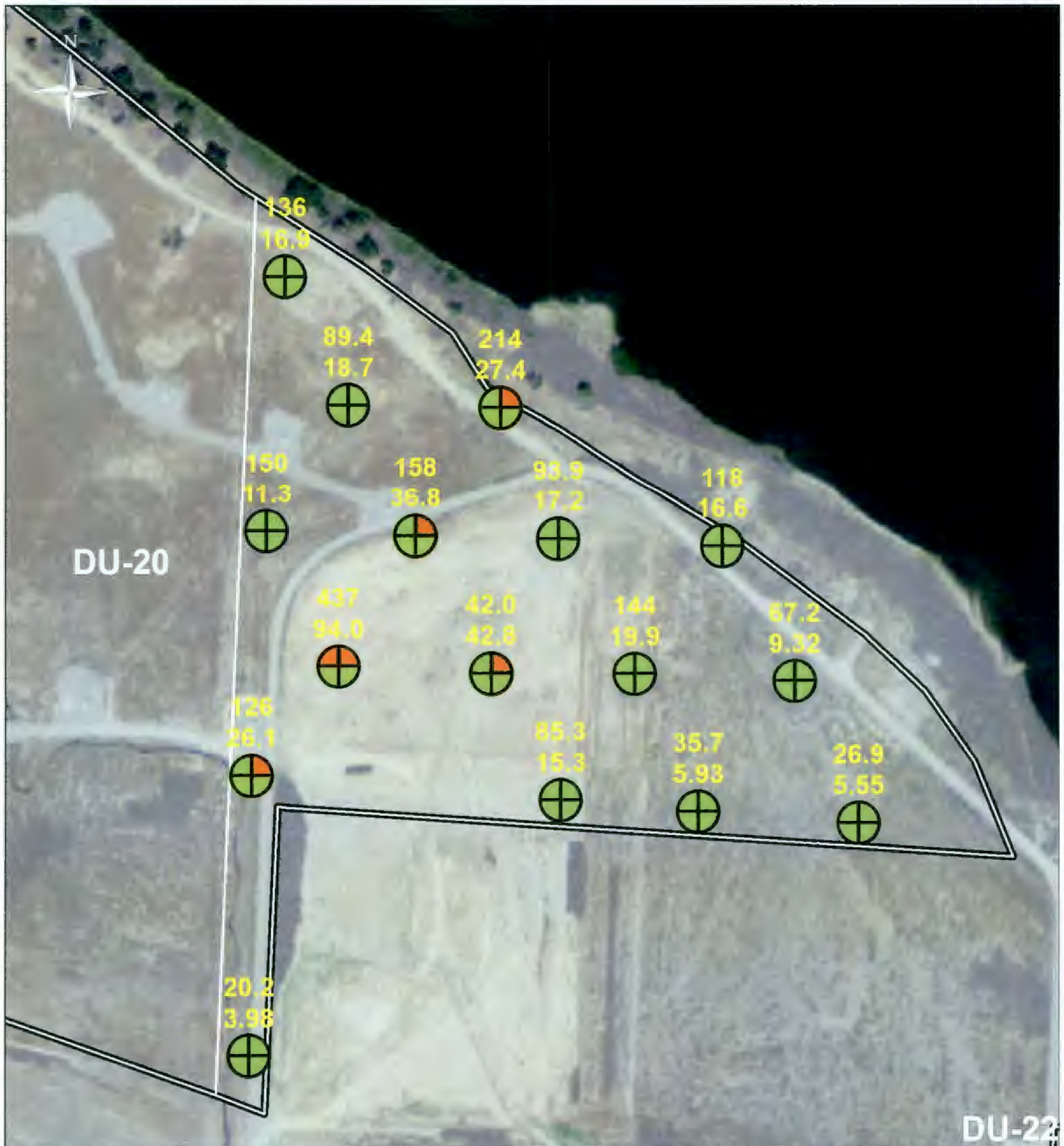


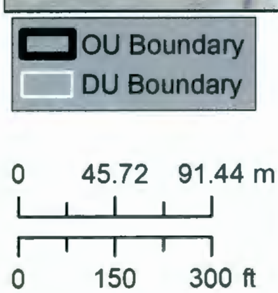
DU-020		
Summary Statistics	Lead	Arsenic
Average	287	27.6
Standard Deviation	532	60.4
RSD	186%	218%
95% UCL[1]	658	56.5



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-23. DU-020 Field Characterization Results (mg/kg, unless otherwise noted). Dashed boxes show a close-up view of the indicated sample locations and results. Display of results described in Figure A-2.

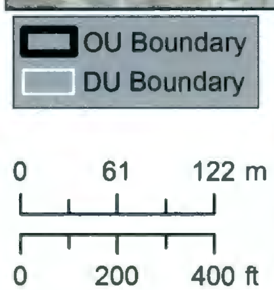




DU-021		
Summary Statistics	Lead	Arsenic
Average	122	23.0
Standard Deviation	99.9	21.1
RSD	82.2%	91.9%
95% UCL[1]	181	42.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

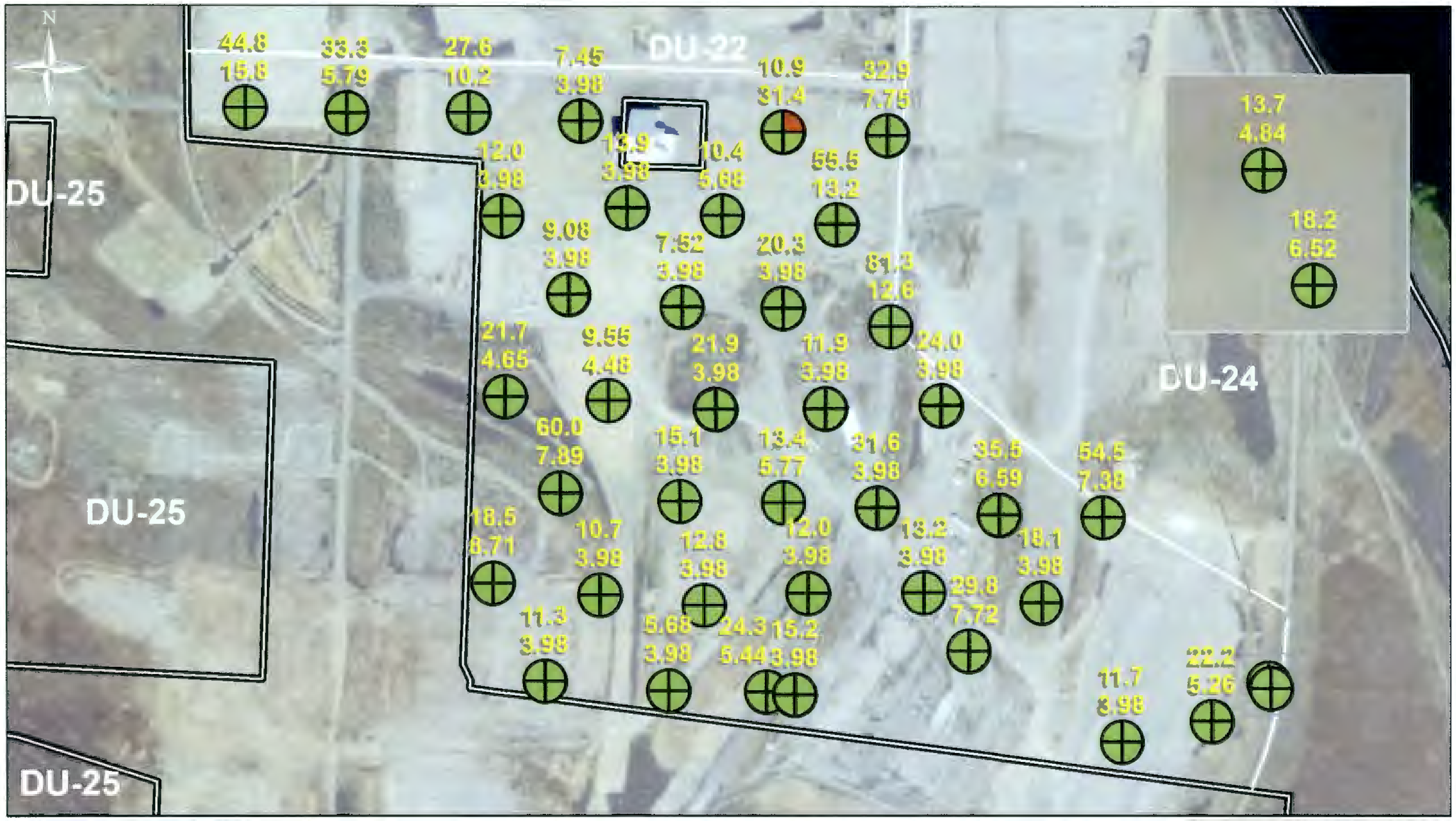
Figure A-24. DU-021 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

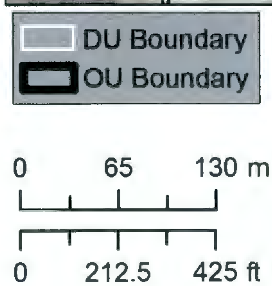


DU-022		
Summary Statistics	**Lead**	**Arsenic**
Average	30.7	7.23
Standard Deviation	40.0	7.19
RSD	130%	99.5%
95% UCL[1]	58.7	12.3

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-25. DU-022 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.





DU-023		
Summary Statistics	**Lead**	**Arsenic**
Average	22.6	6.43
Standard Deviation	16.4	4.88
RSD	72.5%	75.9%
95% UCL[1]	27.2	7.16

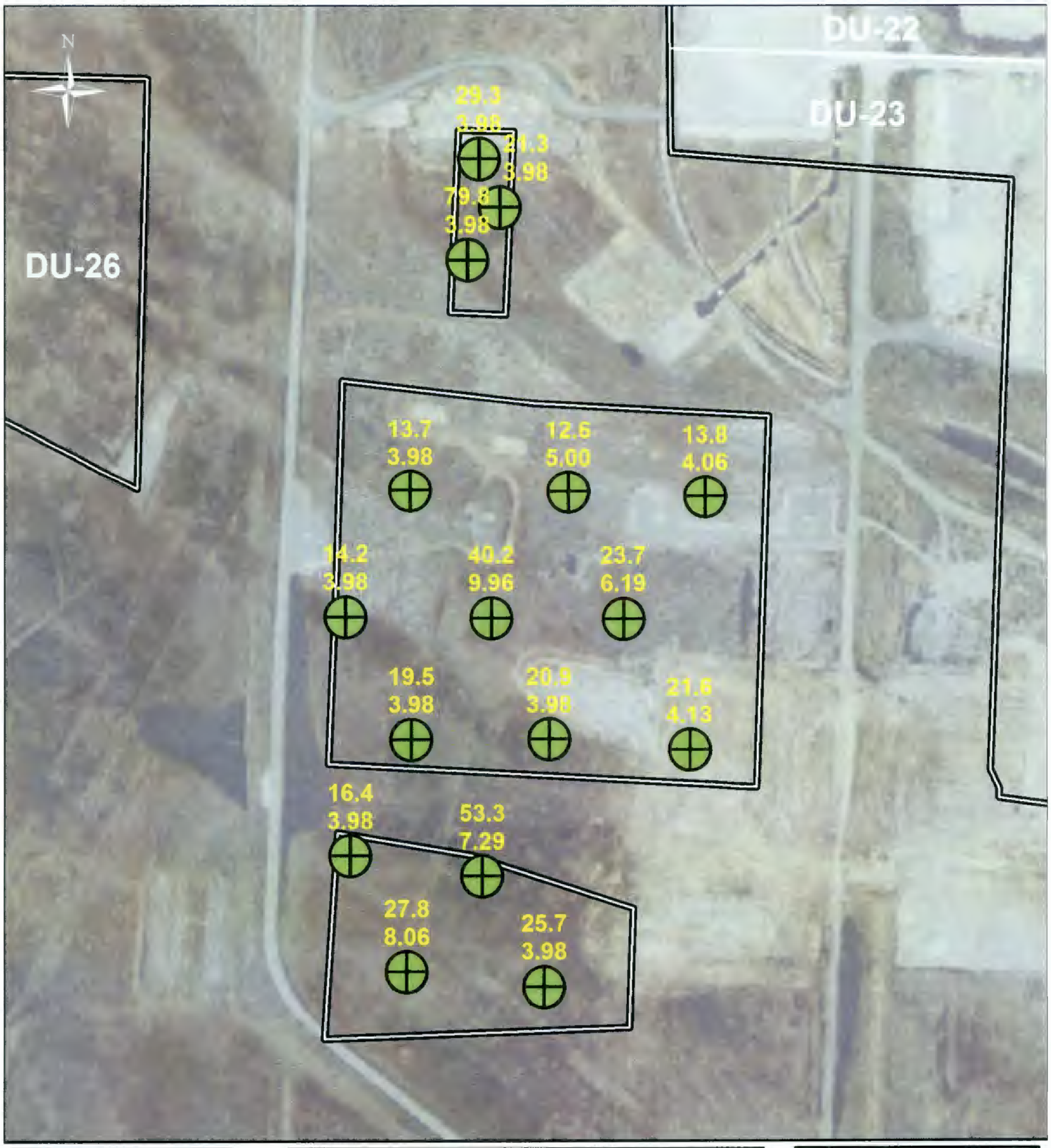
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-26. DU-023 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

DU-024		
Summary Statistics	Lead	Arsenic
Average	36.1	7.53
Standard Deviation	33.1	7.44
RSD	91.7%	98.8%
95% UCL[1]	43.4	10.3

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

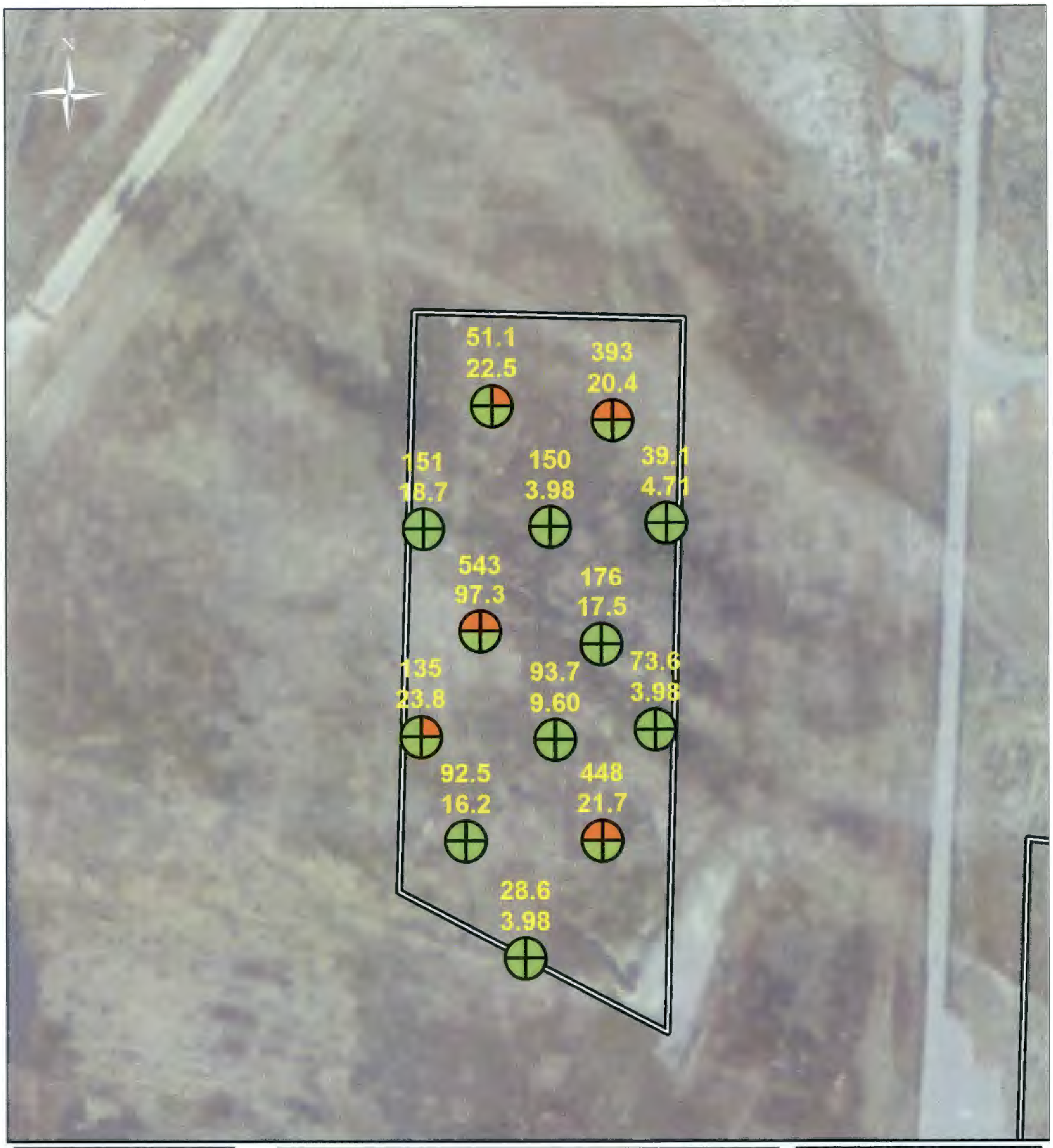
Figure A-27. DU-024 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

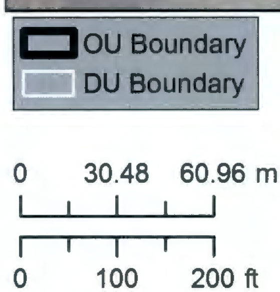


DU-025		
Summary Statistics	Lead	Arsenic
Average	27.1	5.03
Standard Deviation	17.6	1.80
RSD	65.1%	35.7%
95% UCL[1]	36.0	5.88

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-28. DU-025 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.





DU-026		
Summary Statistics	Lead	Arsenic
Average	183	20.3
Standard Deviation	168	23.4
RSD	91.9%	115%
95% UCL[1]	316	40.4

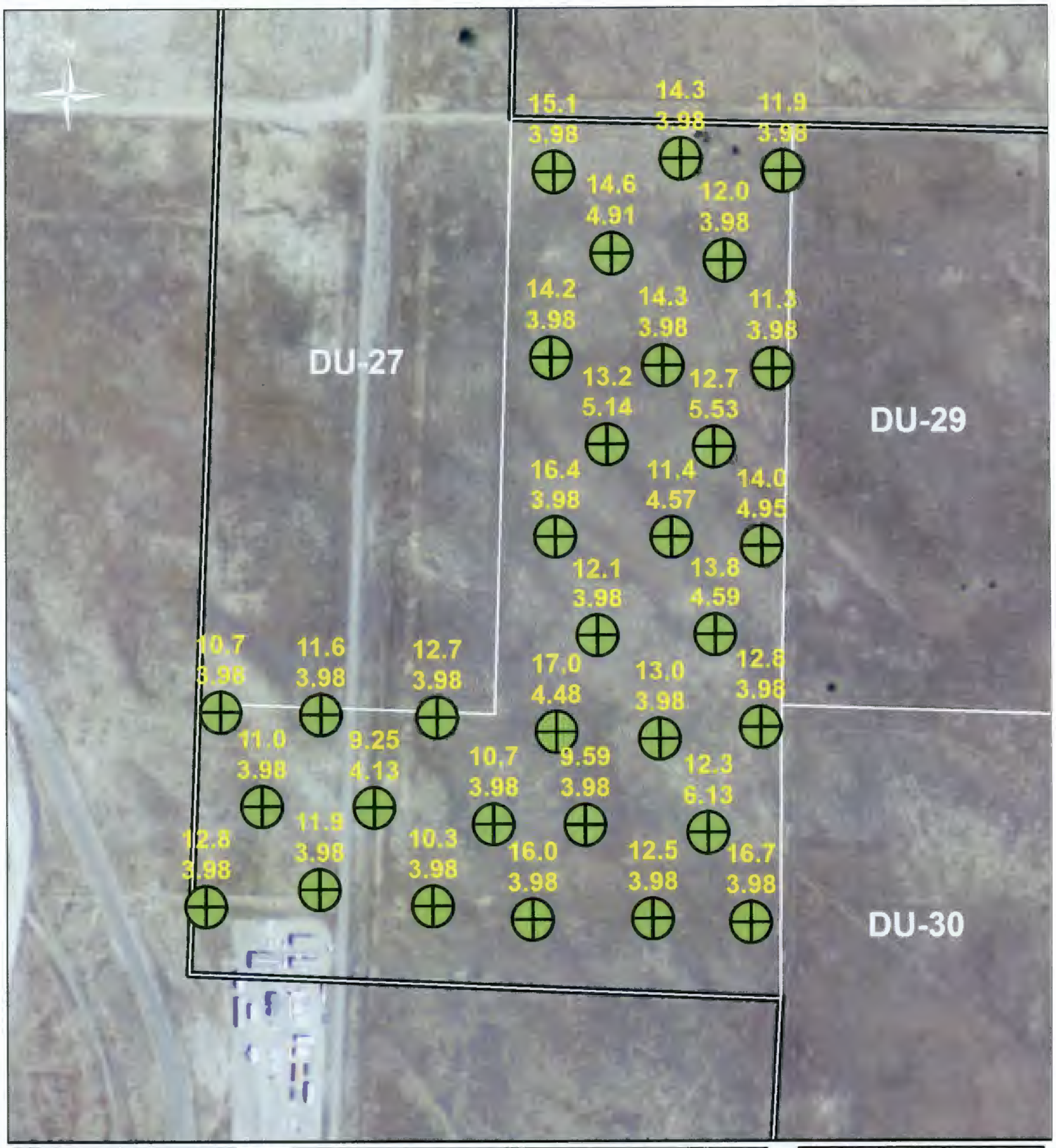
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-29. DU-026 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

DU-027		
Summary Statistics	**Lead**	**Arsenic**
Average	12.1	4.04
Standard Deviation	2.41	0.17
RSD	19.9%	4.29%
95% UCL[1]	12.8	4.10

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

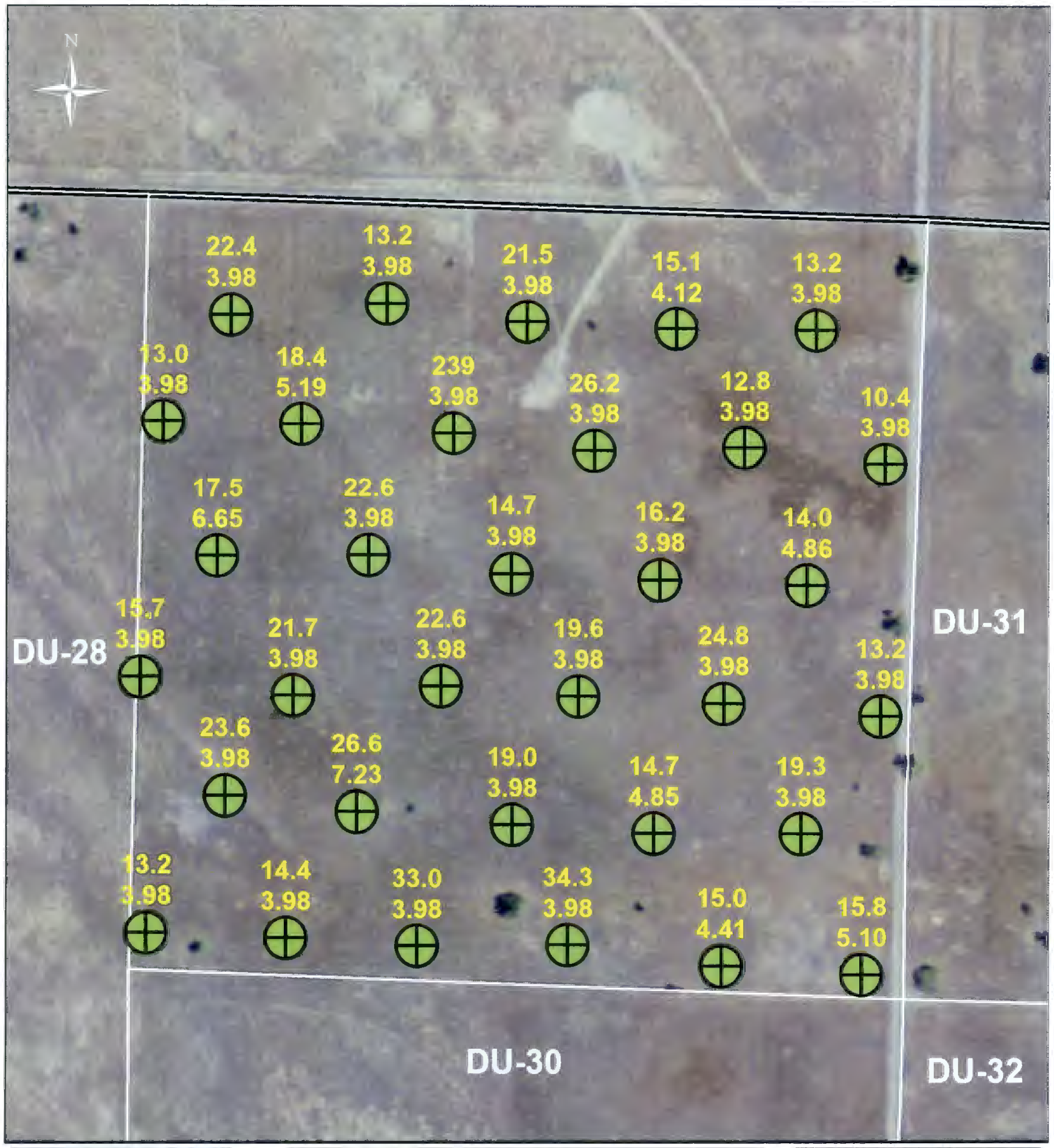
Figure A-30. DU-027 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

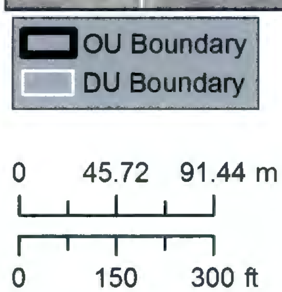


DU-028		
Summary Statistics	Lead	Arsenic
Average	12.9	4.25
Standard Deviation	1.99	0.53
RSD	15.5%	12.4%
95% UCL[1]	13.5	4.42

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-31. DU-028 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

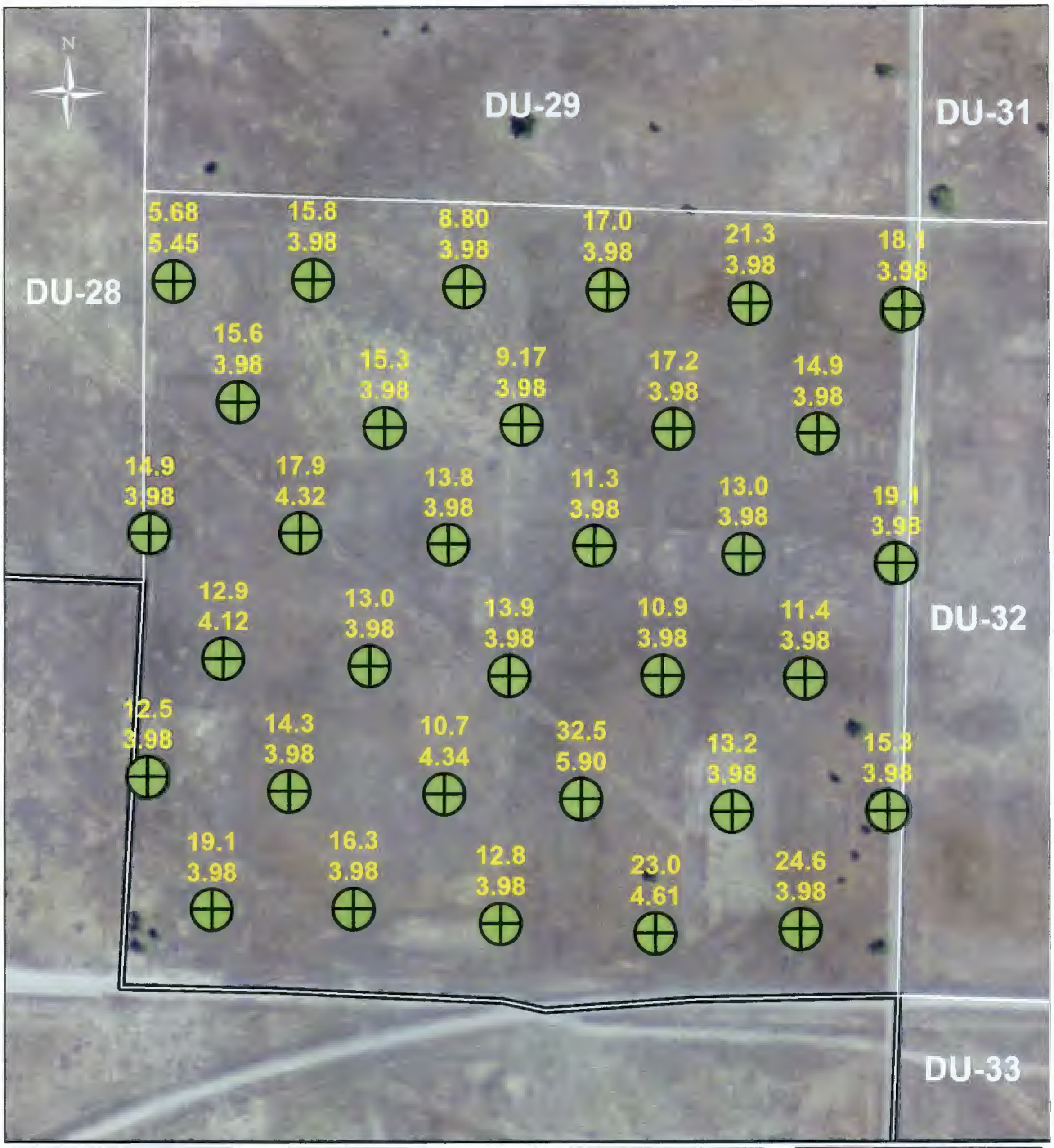


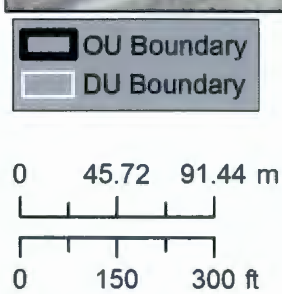


DU-029		
Summary Statistics	Lead	Arsenic
Average	25.4	4.30
Standard Deviation	38.8	0.75
RSD	153%	17.5%
95% UCL[1]	54.8	4.54

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-32. DU-029 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

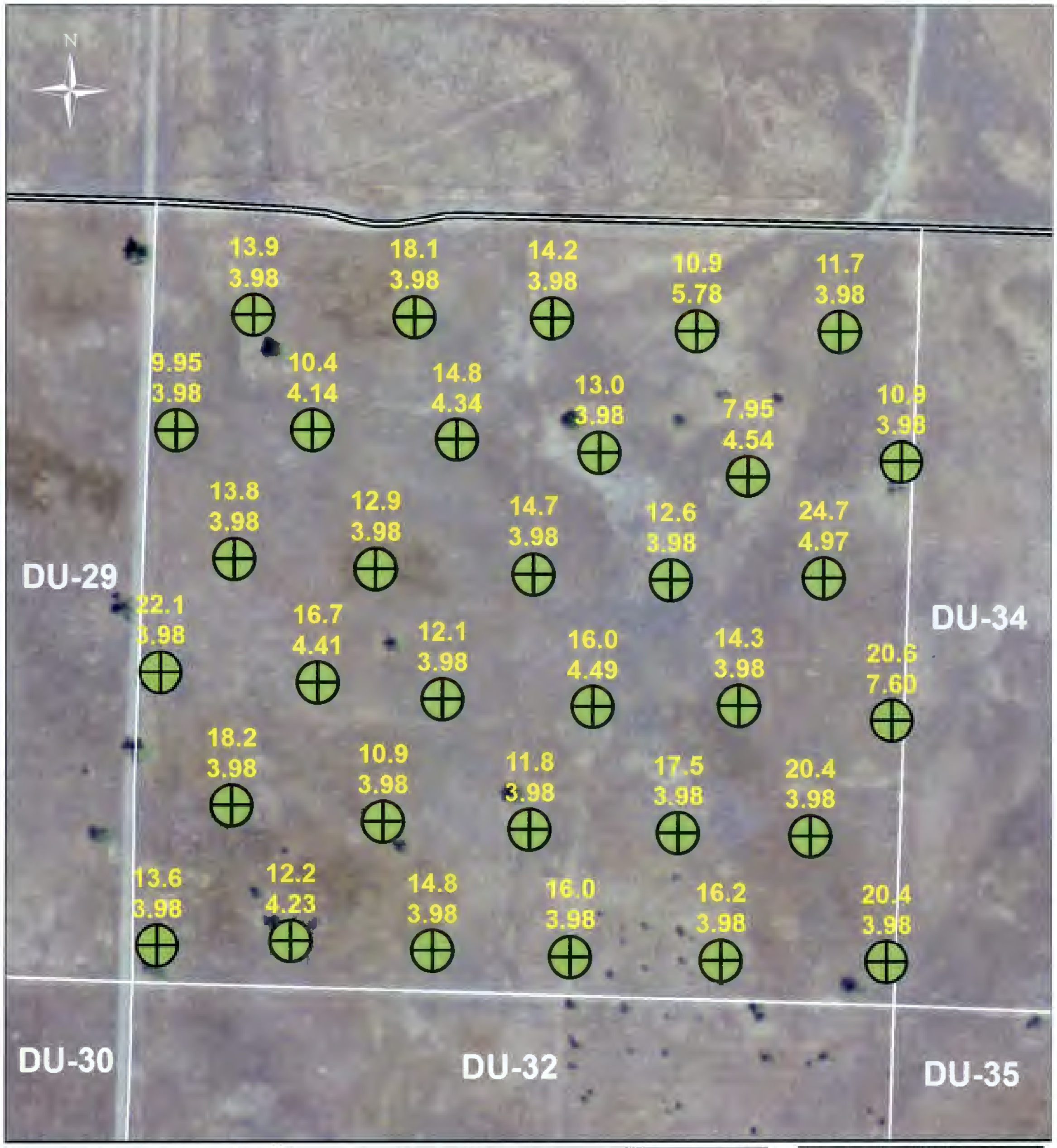


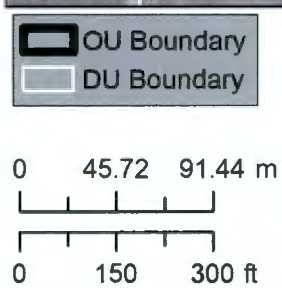


DU-030		
Summary Statistics	Lead	Arsenic
Average	15.3	4.13
Standard Deviation	4.96	0.42
RSD	32.4%	10.2%
95% UCL[1]	16.8	4.26

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-33. DU-030 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

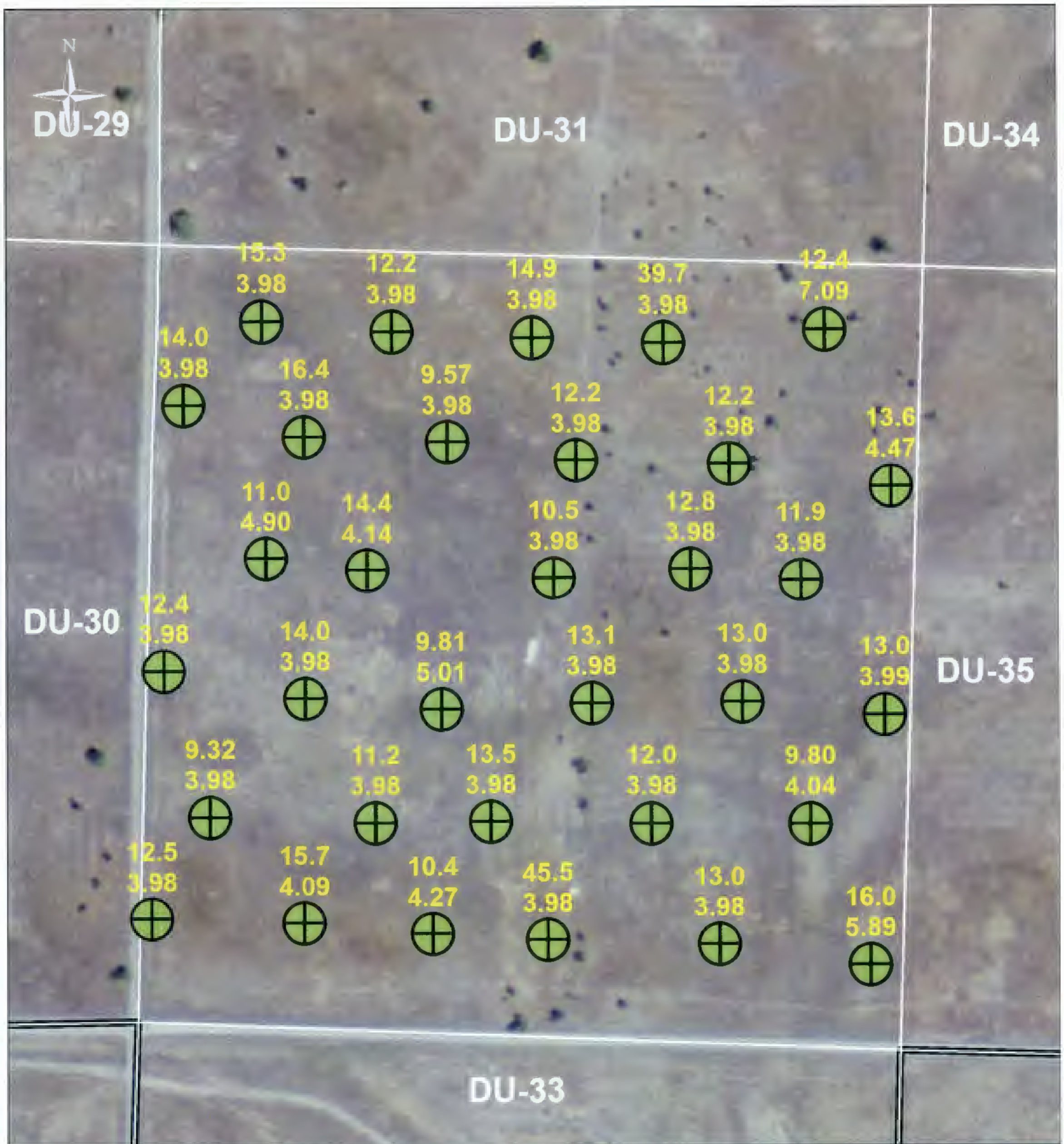


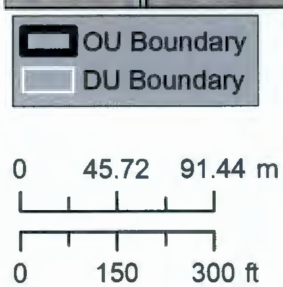


DU-031		
Summary Statistics	**Lead**	**Arsenic**
Average	14.8	4.24
Standard Deviation	3.83	0.70
RSD	25.9%	16.4%
95% UCL[1]	15.9	4.49

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-34. DU-031 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

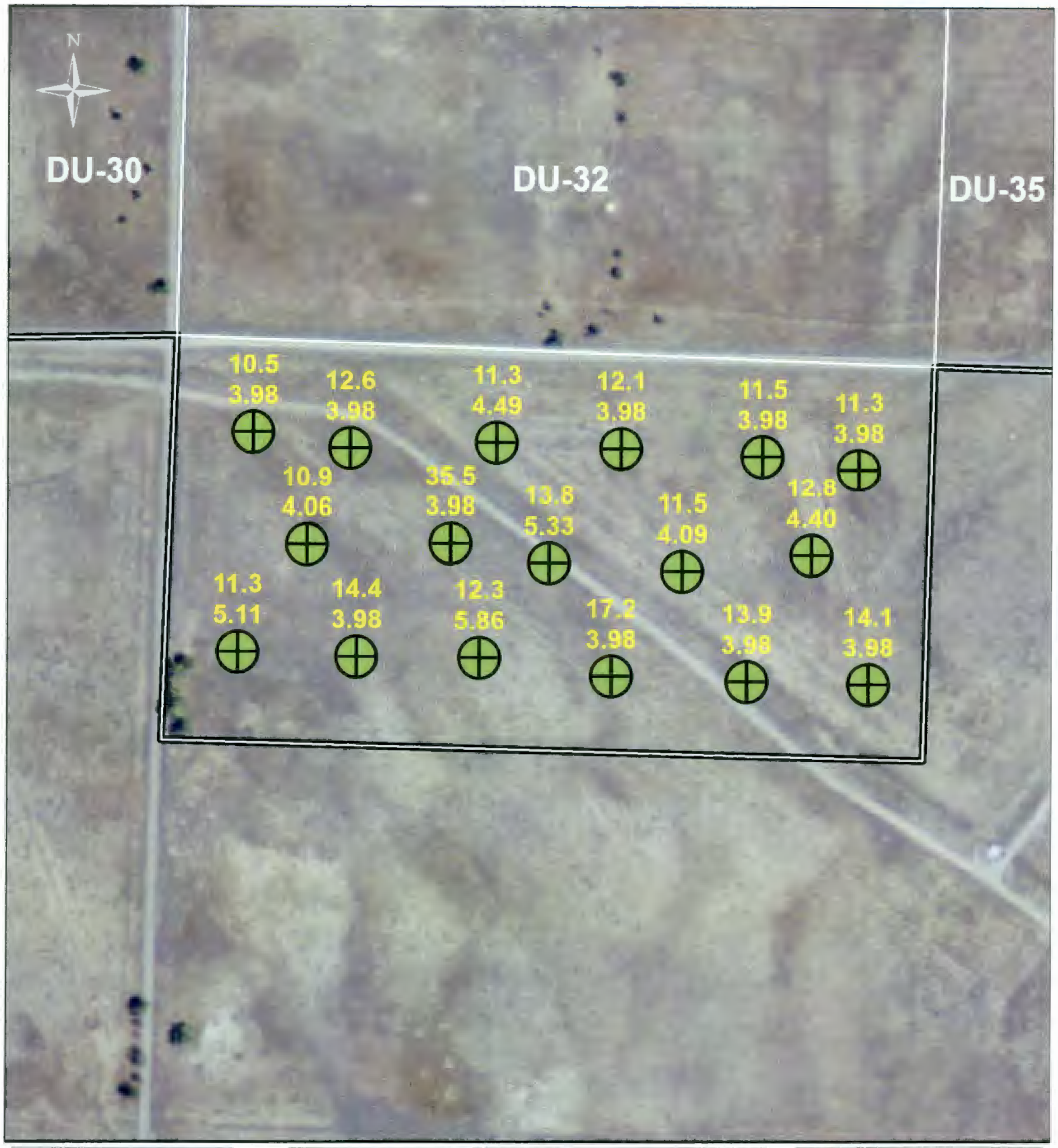




DU-032		
Summary Statistics	**Lead**	**Arsenic**
Average	14.5	4.23
Standard Deviation	7.52	0.64
RSD	52.0%	15.2%
95% UCL[1]	16.7	4.42

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

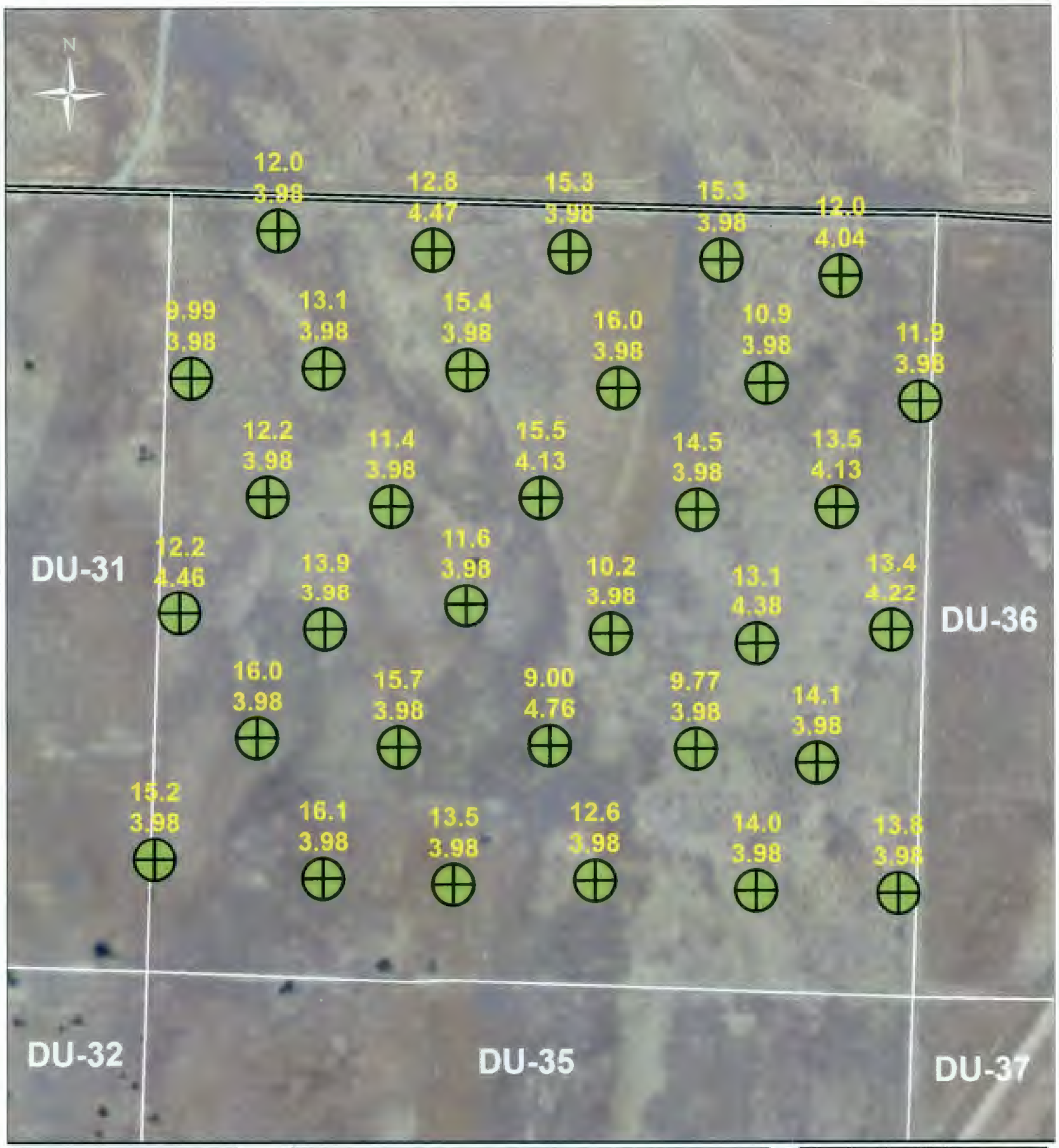
Figure A-35. DU-032 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

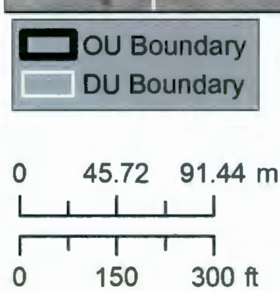


DU-033		
Summary Statistics	**Lead**	**Arsenic**
Average	13.9	4.30
Standard Deviation	5.80	0.56
RSD	41.6%	13.0%
95% UCL[1]	16.4	4.56

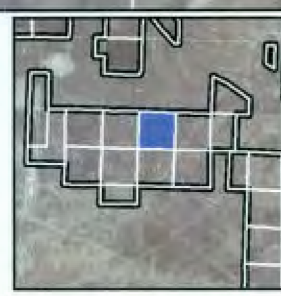
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-36. DU-033 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



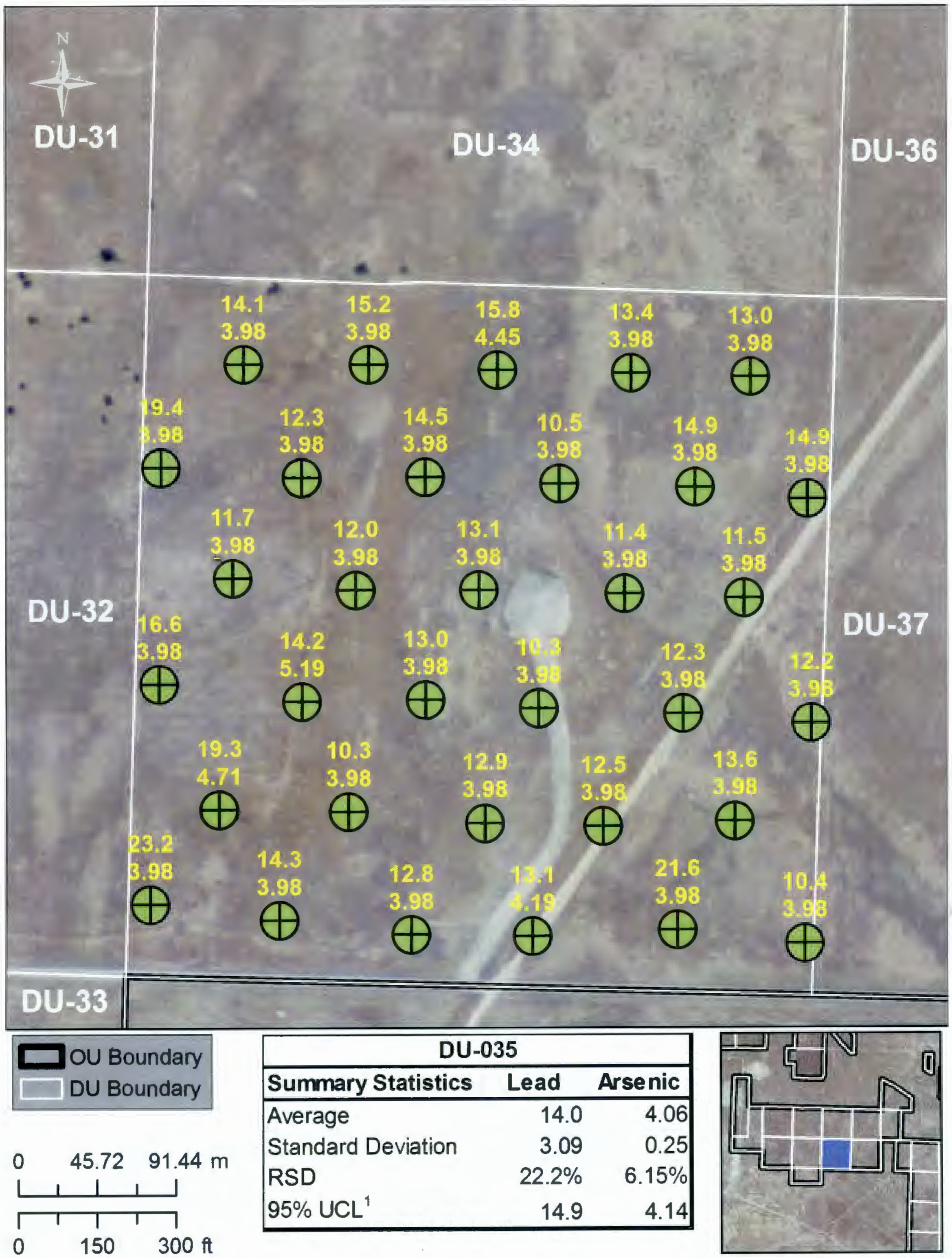


DU-034		
Summary Statistics	Lead	Arsenic
Average	13.2	4.06
Standard Deviation	1.98	0.18
RSD	15.0%	4.53%
95% UCL[1]	13.8	4.12



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

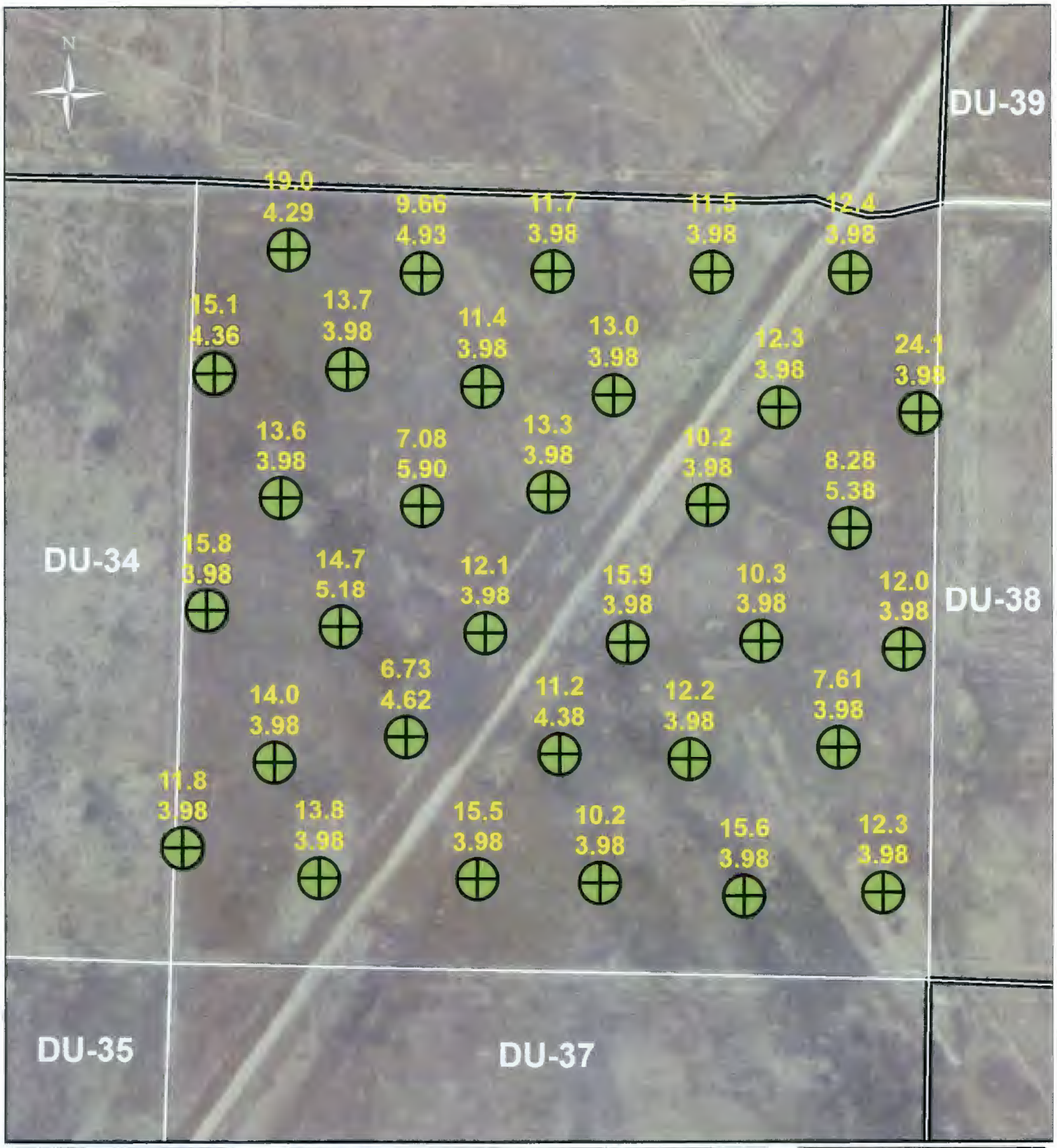
Figure A-37. DU-034 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

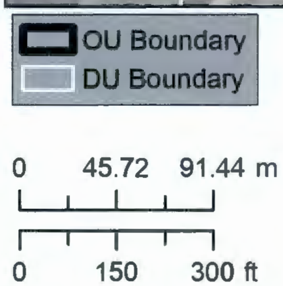


DU-035		
Summary Statistics	Lead	Arsenic
Average	14.0	4.06
Standard Deviation	3.09	0.25
RSD	22.2%	6.15%
95% UCL[1]	14.9	4.14

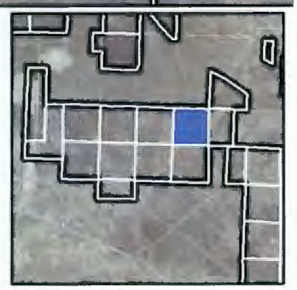
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-38. DU-035 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



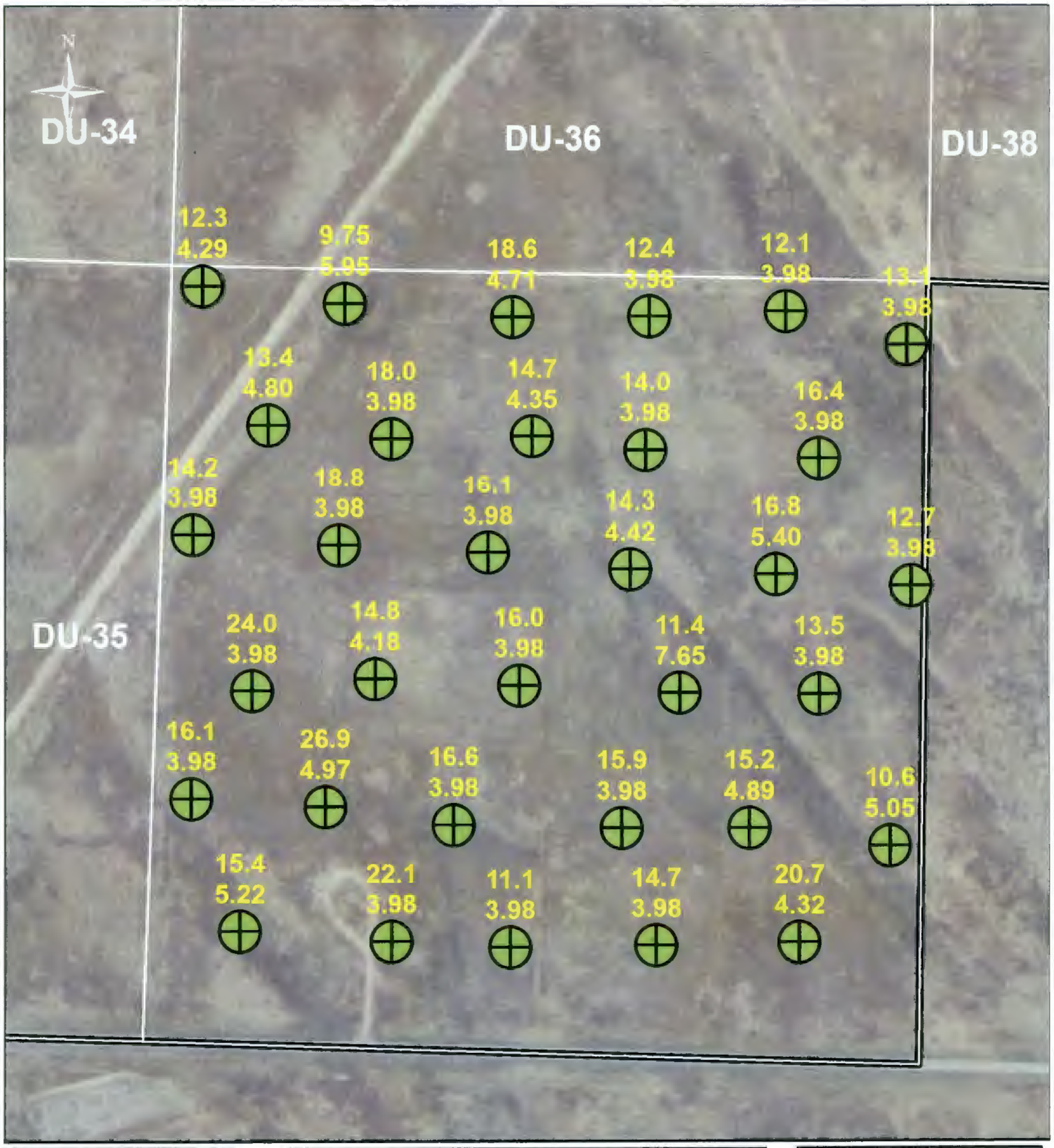


DU-036		
Summary Statistics	Lead	Arsenic
Average	12.7	4.20
Standard Deviation	3.40	0.47
RSD	26.8%	11.2%
95% UCL[1]	13.7	4.35



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-39. DU-036 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

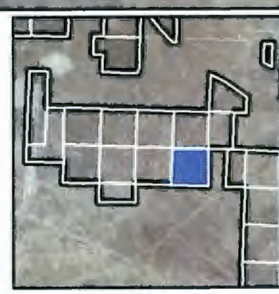


OU Boundary
DU Boundary

0 45.72 91.44 m

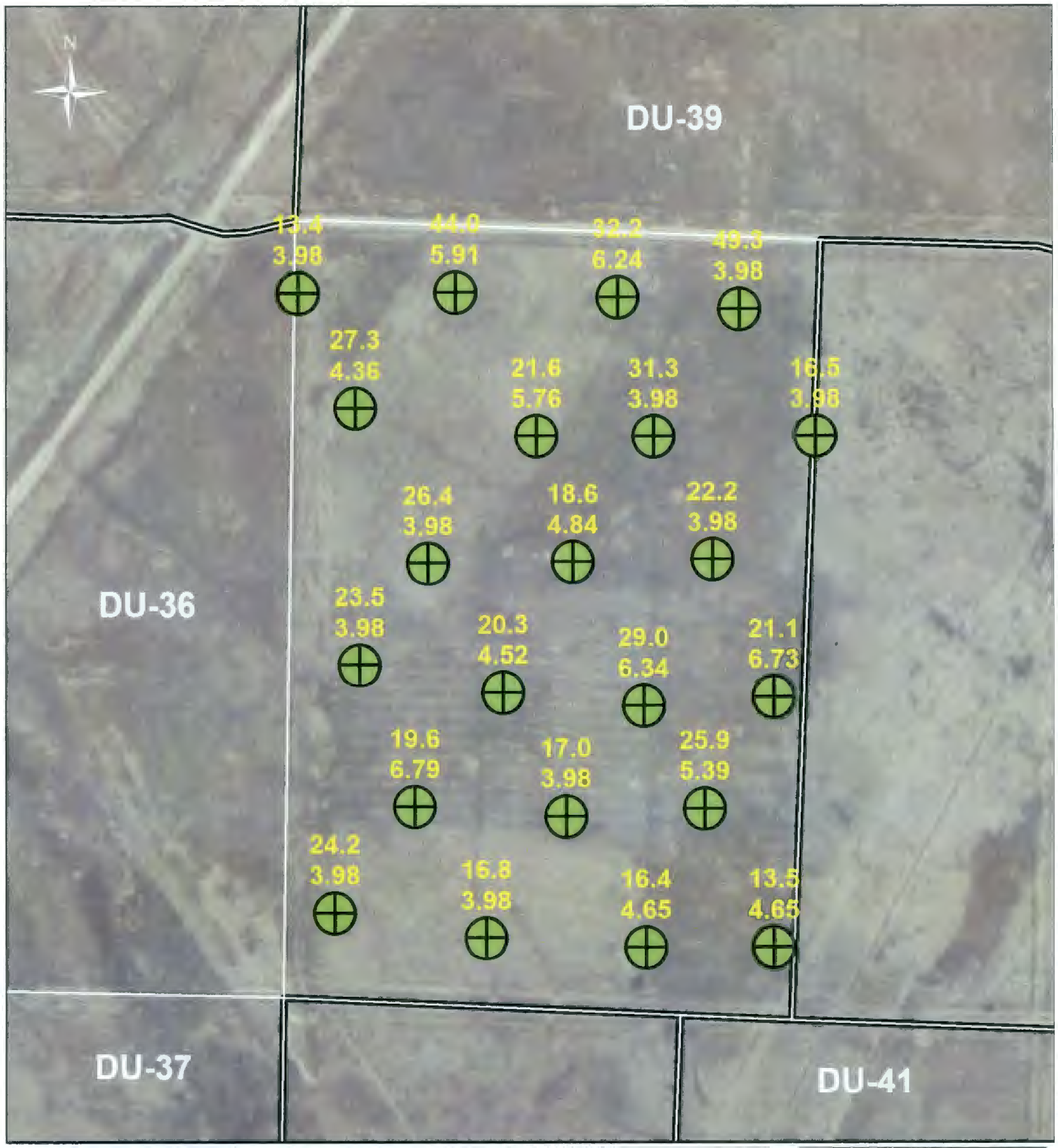
0 150 300 ft

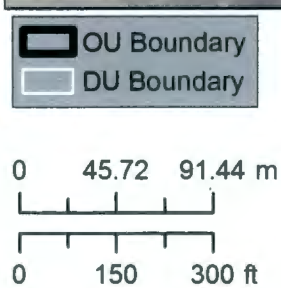
DU-037		
Summary Statistics	**Lead**	**Arsenic**
Average	15.5	4.42
Standard Deviation	3.80	0.76
RSD	24.5%	17.3%
95% UCL[1]	16.7	4.65



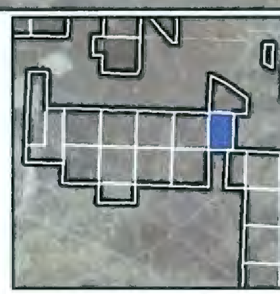
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-40. DU-037 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



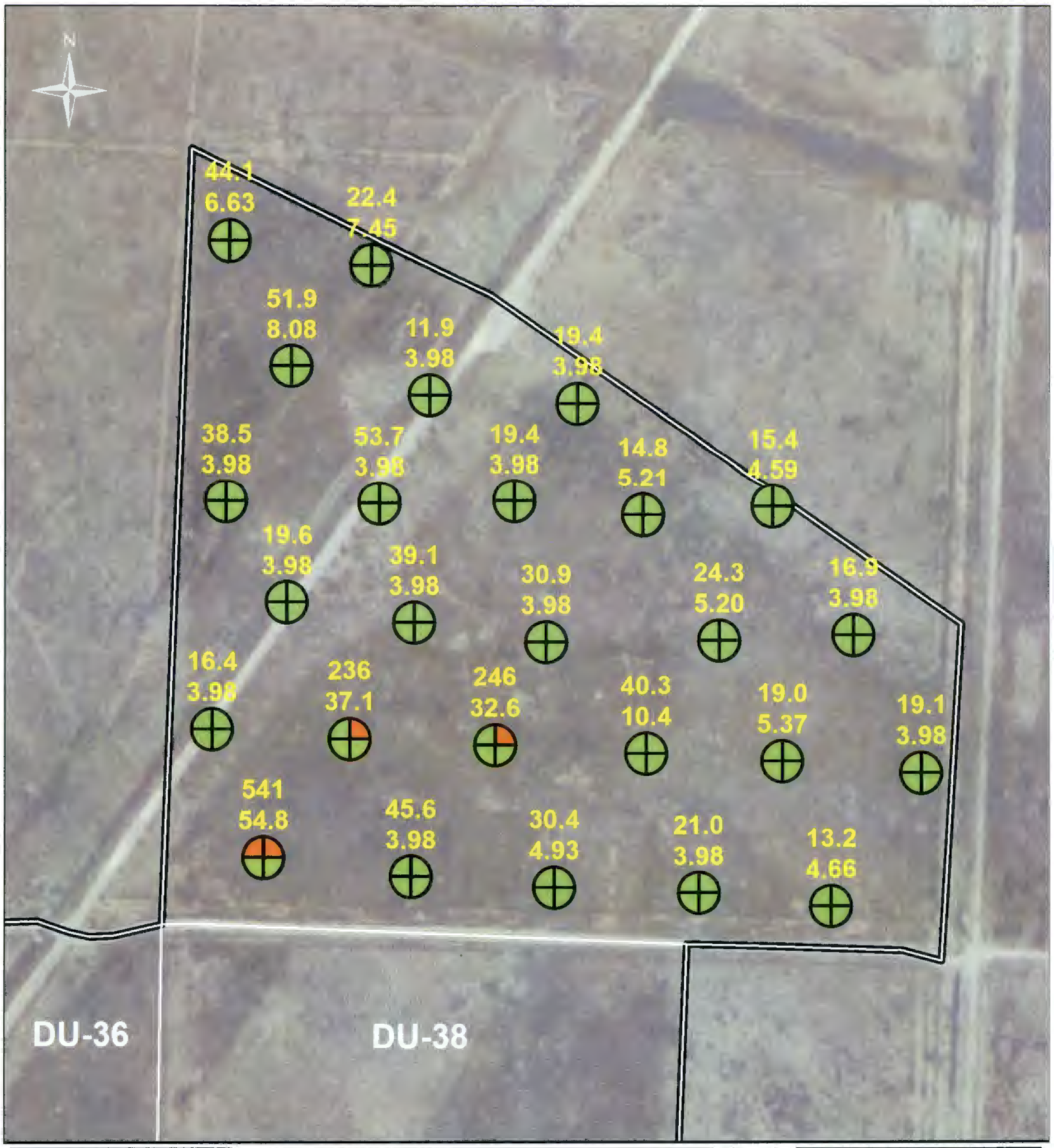


DU-038		
Summary Statistics	**Lead**	**Arsenic**
Average	24.1	4.82
Standard Deviation	9.05	0.99
RSD	37.6%	20.6%
95% UCL[1]	27.4	5.20



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

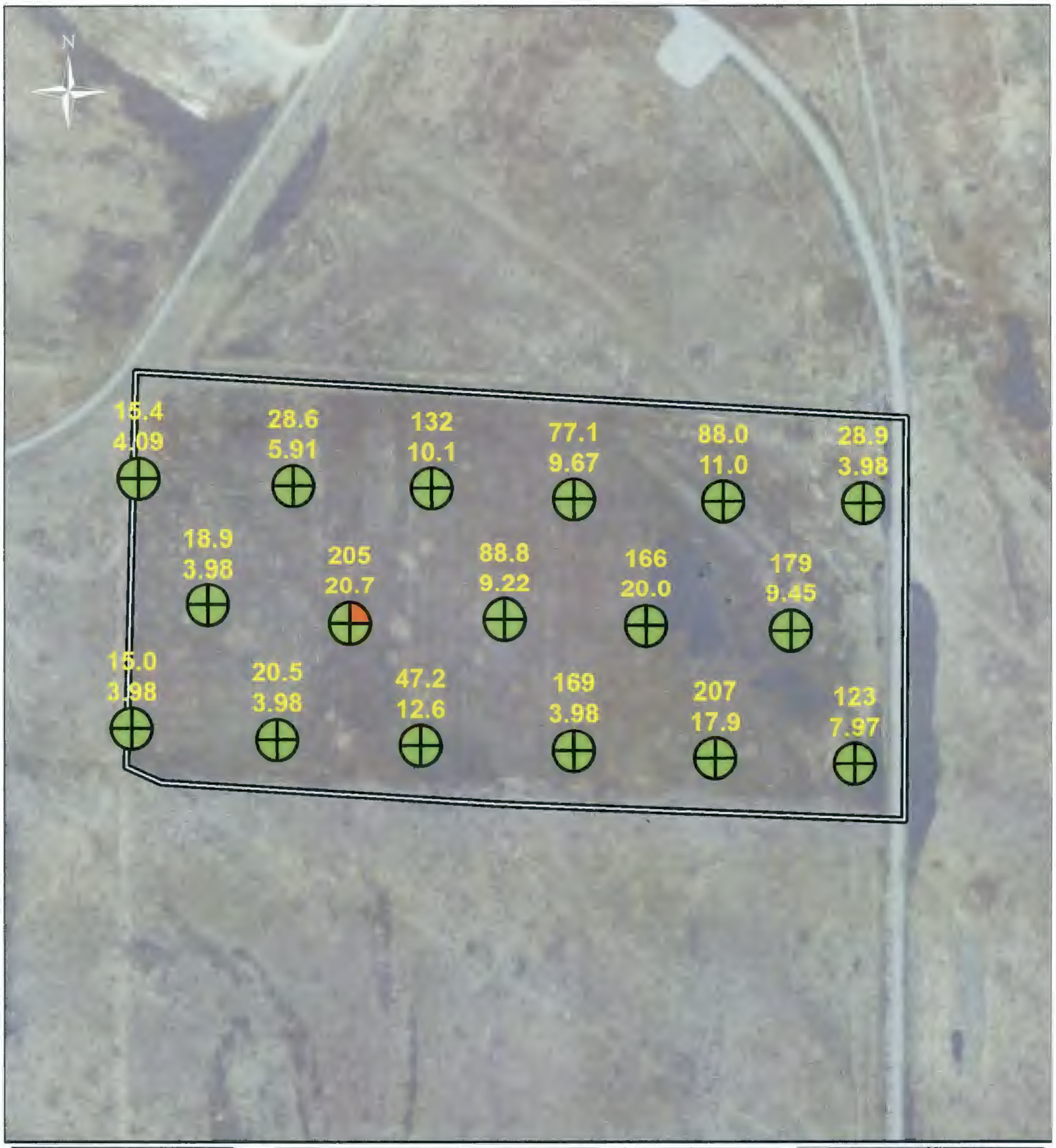
Figure A-41. DU-038 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

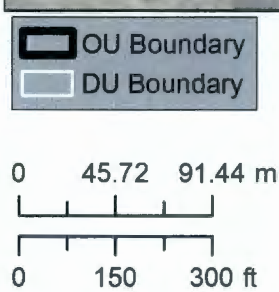


DU-039		
Summary Statistics	**Lead**	**Arsenic**
Average	63.5	9.18
Standard Deviation	114	12.2
RSD	180%	133%
95% UCL[1]	161	20.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-42. DU-039 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

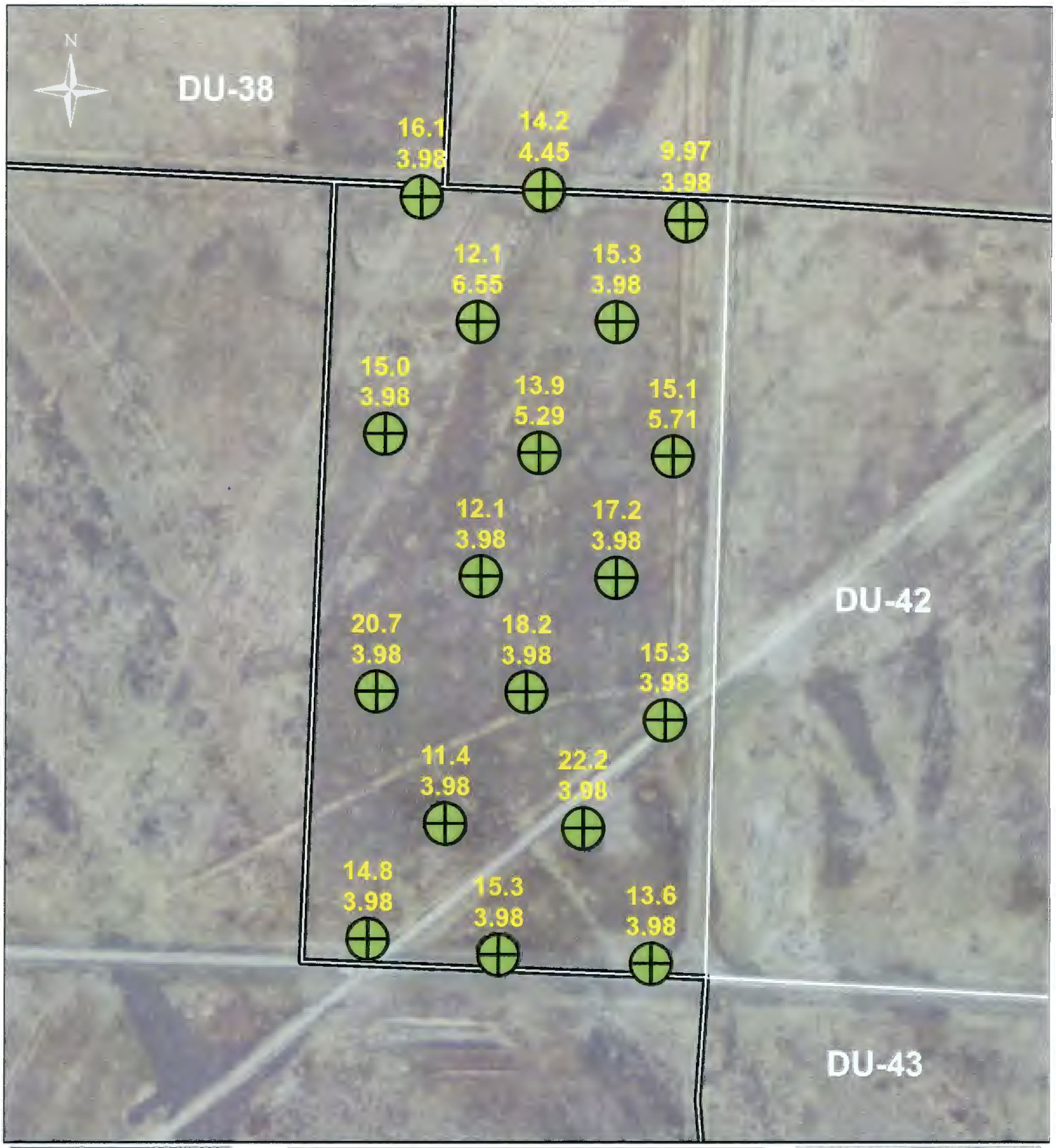




DU-040		
Summary Statistics	**Lead**	**Arsenic**
Average	94.6	9.32
Standard Deviation	70.6	5.50
RSD	74.6%	59.0%
95% UCL[1]	125	11.8

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

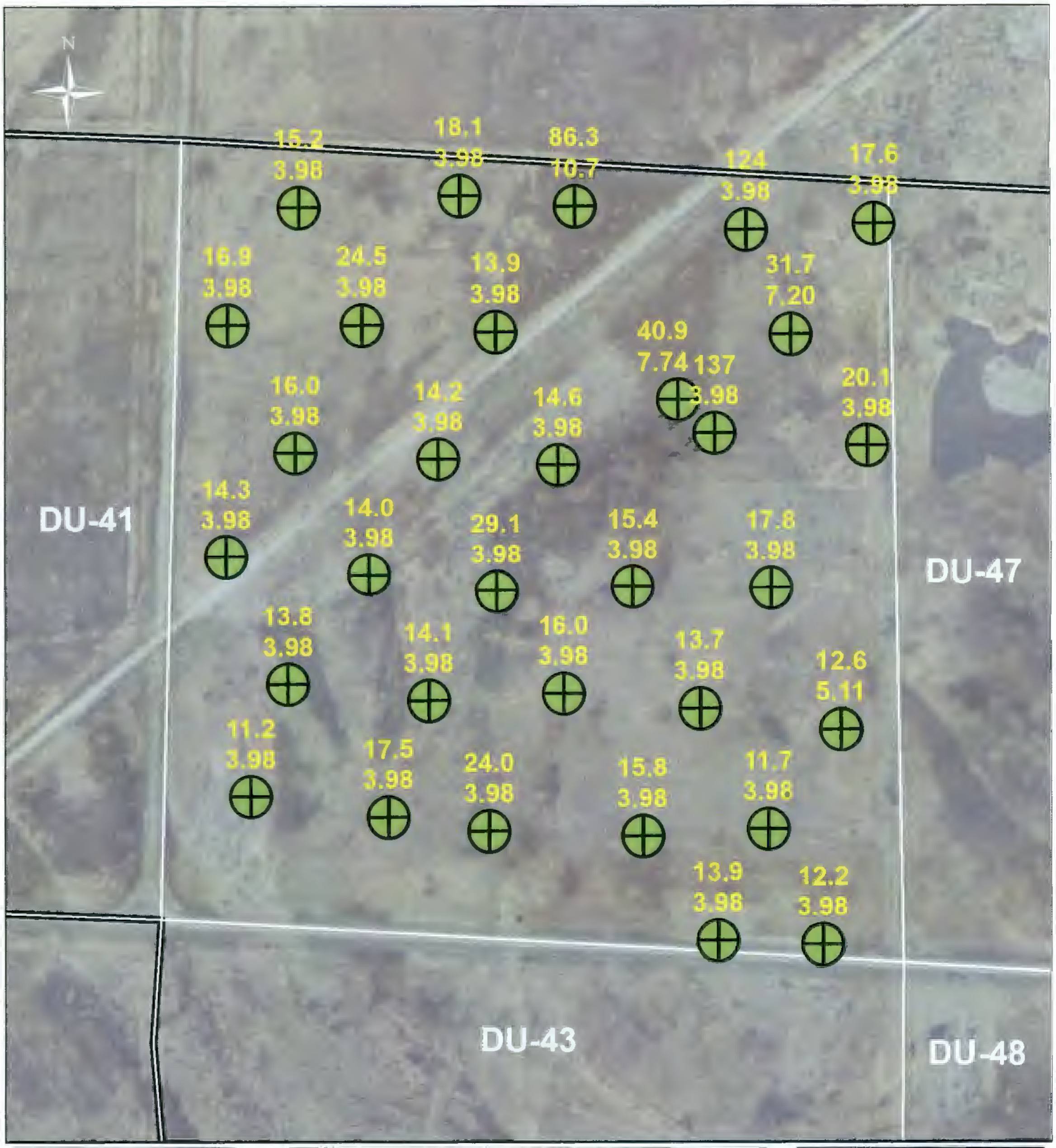
Figure A-43. DU-040 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

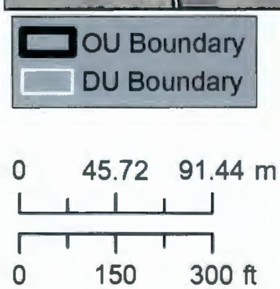


DU-041		
Summary Statistics	**Lead**	**Arsenic**
Average	15.1	4.32
Standard Deviation	3.06	0.73
RSD	20.2%	16.8%
95% UCL[1]	16.4	4.66

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-44. DU-041 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

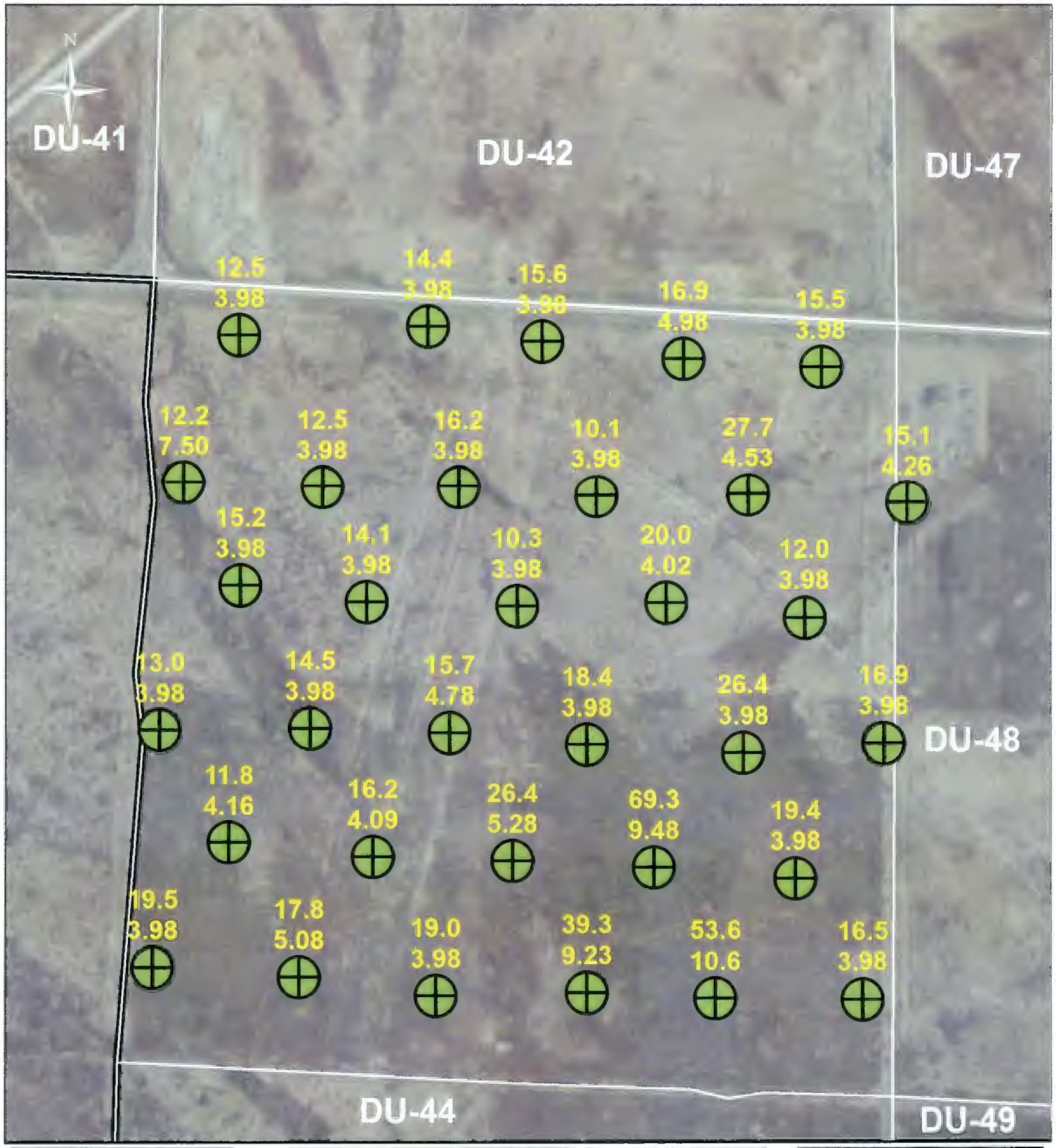


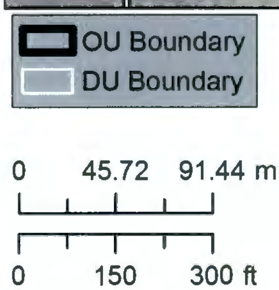


DU-042		
Summary Statistics	**Lead**	**Arsenic**
Average	26.8	4.44
Standard Deviation	30.5	1.41
RSD	114%	31.8%
95% UCL[1]	50.3	4.93

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-45. DU-042 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

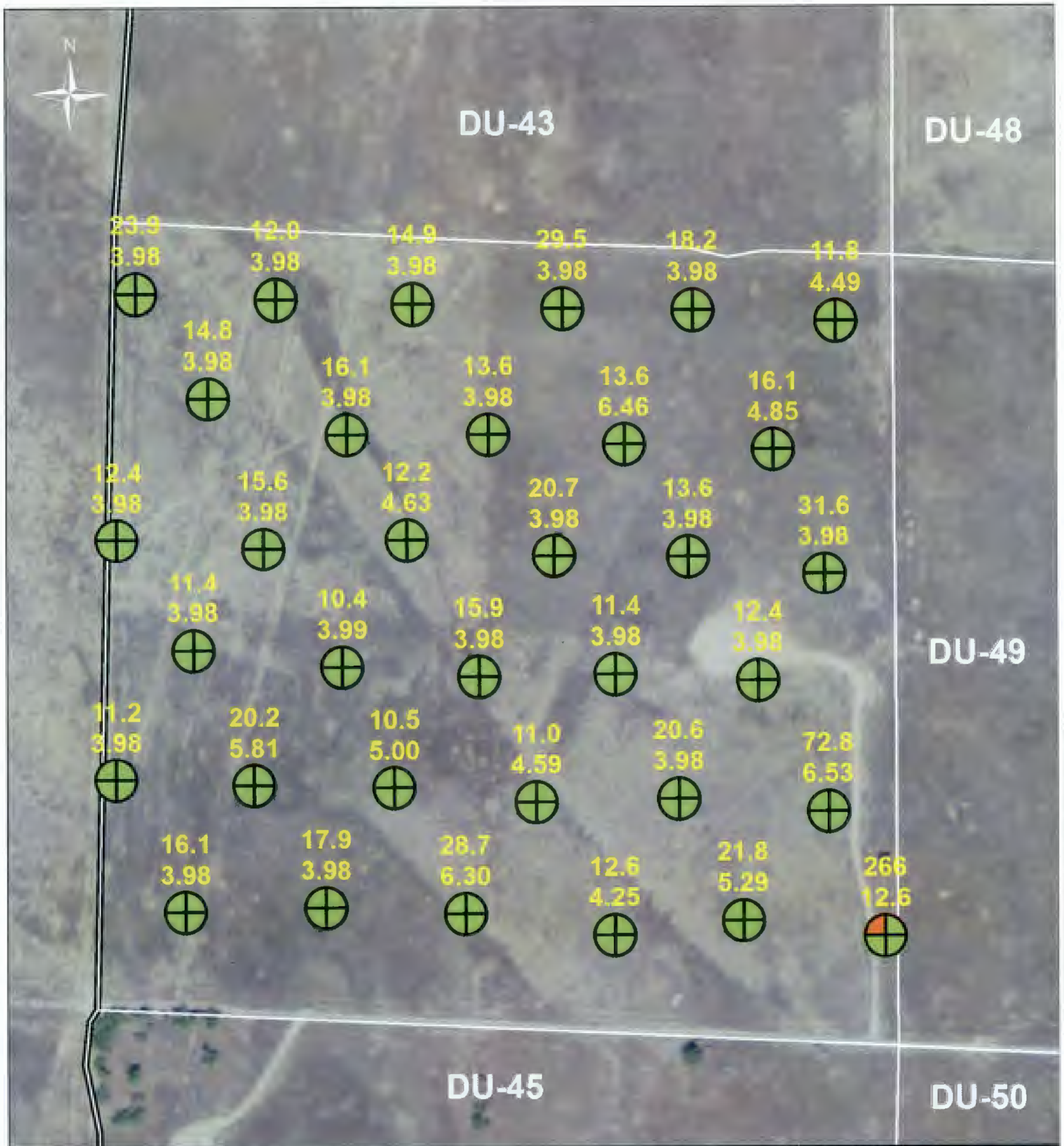




DU-043		
Summary Statistics	Lead	Arsenic
Average	19.8	4.77
Standard Deviation	12.4	1.72
RSD	62.4%	36.1%
95% UCL[1]	23.5	5.31

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

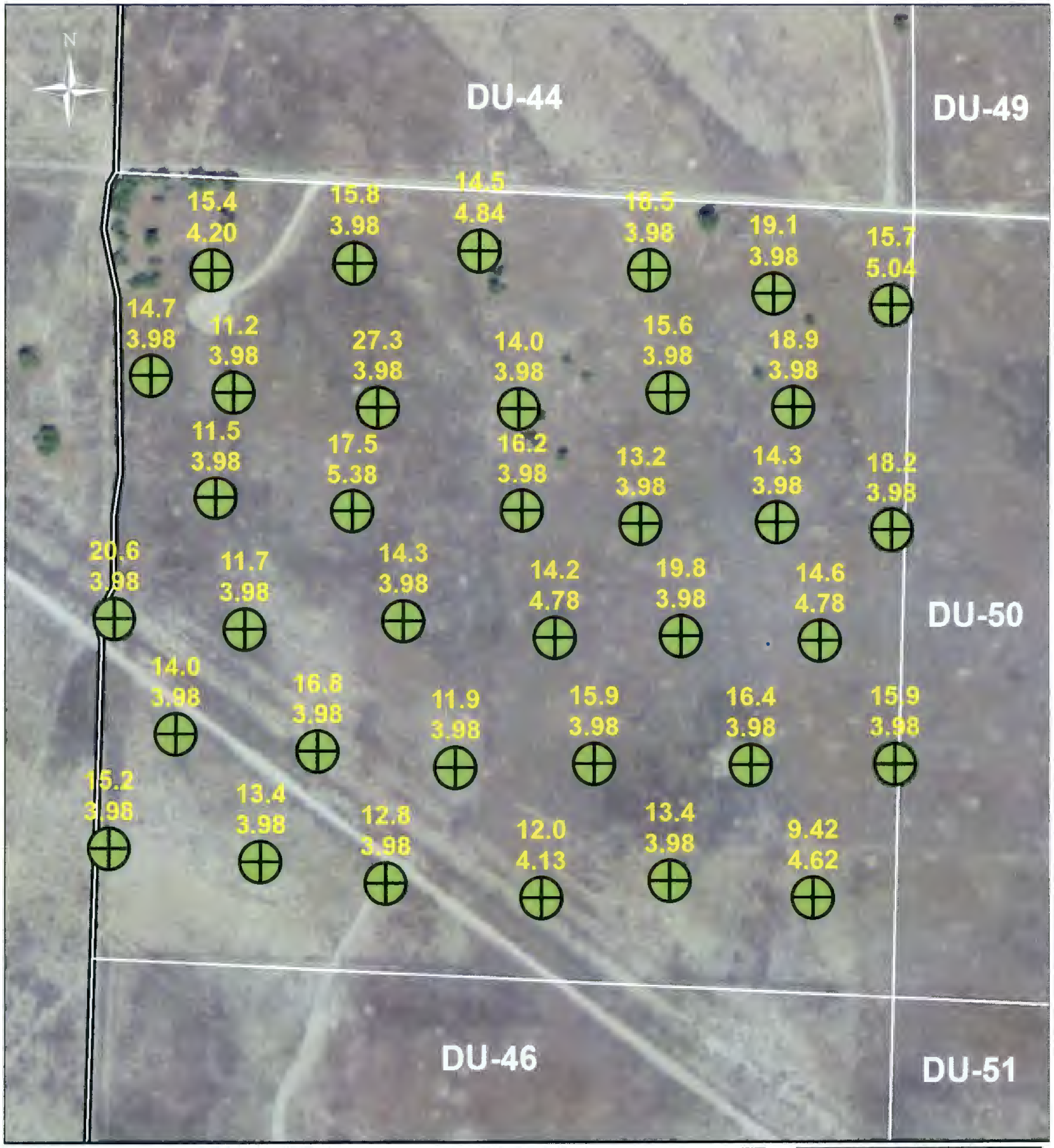
Figure A-46. DU-043 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-044		
Summary Statistics	Lead	Arsenic
Average	25.3	4.66
Standard Deviation	43.9	1.58
RSD	173%	33.9%
95% UCL[1]	58.1	5.19

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

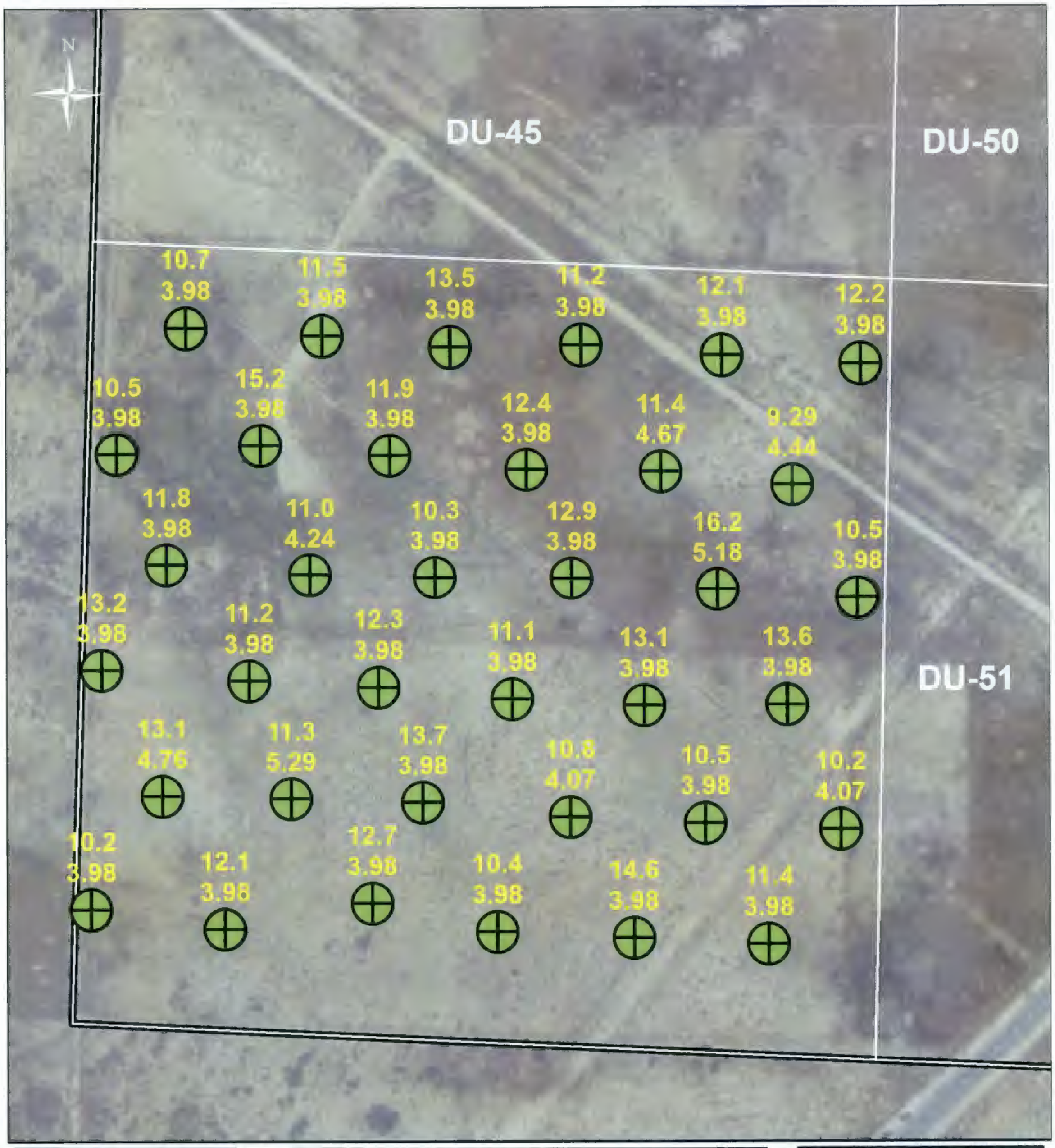
Figure A-47. DU-044 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

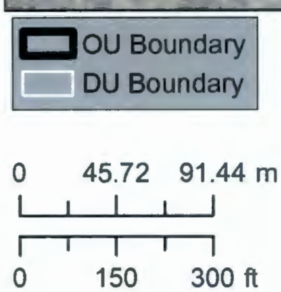


DU-045		
Summary Statistics	**Lead**	**Arsenic**
Average	15.4	4.14
Standard Deviation	3.28	0.36
RSD	21.3%	8.63%
95% UCL[1]	16.3	4.25

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-48. DU-045 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.





DU-046		
Summary Statistics	Lead	Arsenic
Average	11.9	4.12
Standard Deviation	1.52	0.33
RSD	12.8%	7.97%
95% UCL[1]	12.4	4.21

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-49. DU-046 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

OU Boundary
DU Boundary

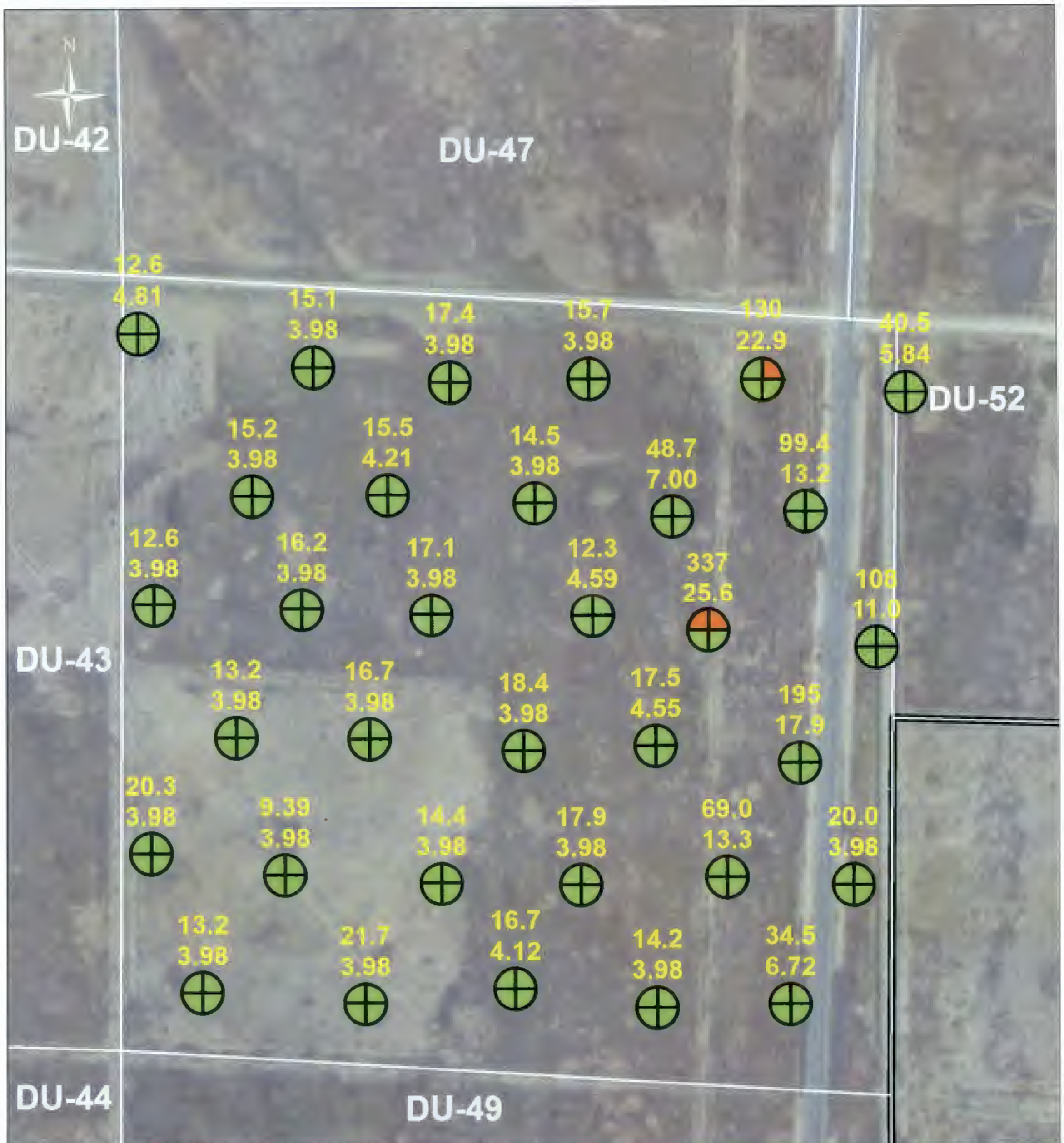
0 45.72 91.44 m

0 150 300 ft

DU-047		
Summary Statistics	Lead	Arsenic
Average	65.6	6.93
Standard Deviation	80.8	6.33
RSD	123%	91.3%
95% UCL[1]	128	8.98

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-50. DU-047 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



OU Boundary
DU Boundary

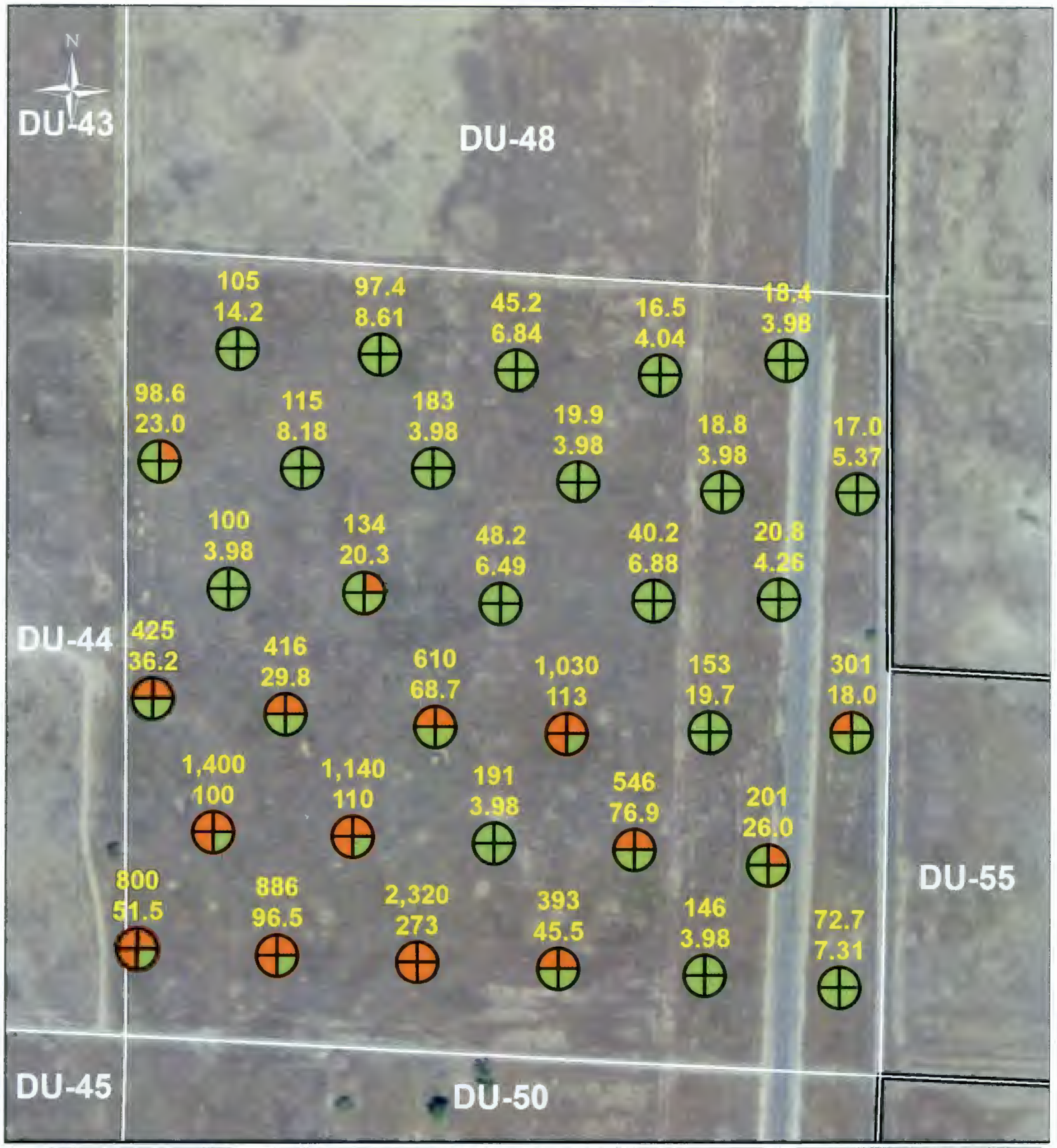
0 45.72 91.44 m

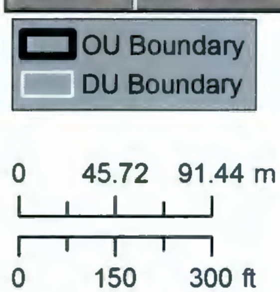
0 150 300 ft

DU-048		
Summary Statistics	Lead	Arsenic
Average	43.6	6.70
Standard Deviation	66.9	5.54
RSD	153%	82.7%
95% UCL[1]	94.4	9.47

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-51. DU-048 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

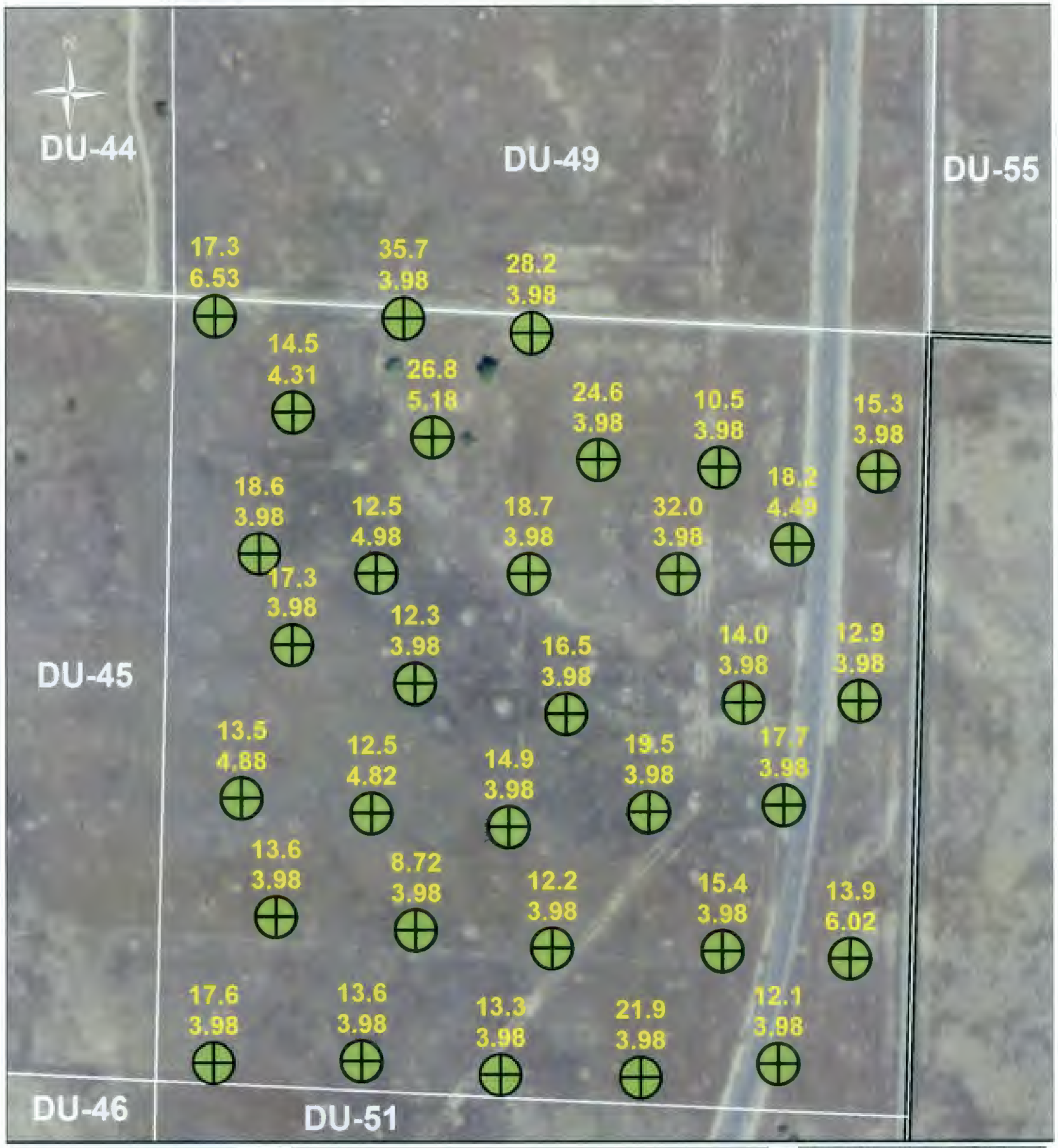


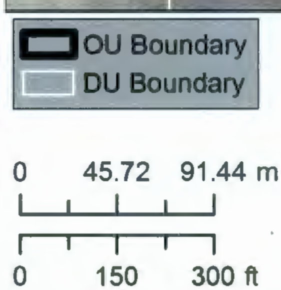


DU-049		
Summary Statistics	**Lead**	**Arsenic**
Average	367	36.6
Standard Deviation	506	53.7
RSD	138%	147%
95% UCL[1]	557	61.4

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-52. DU-049 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

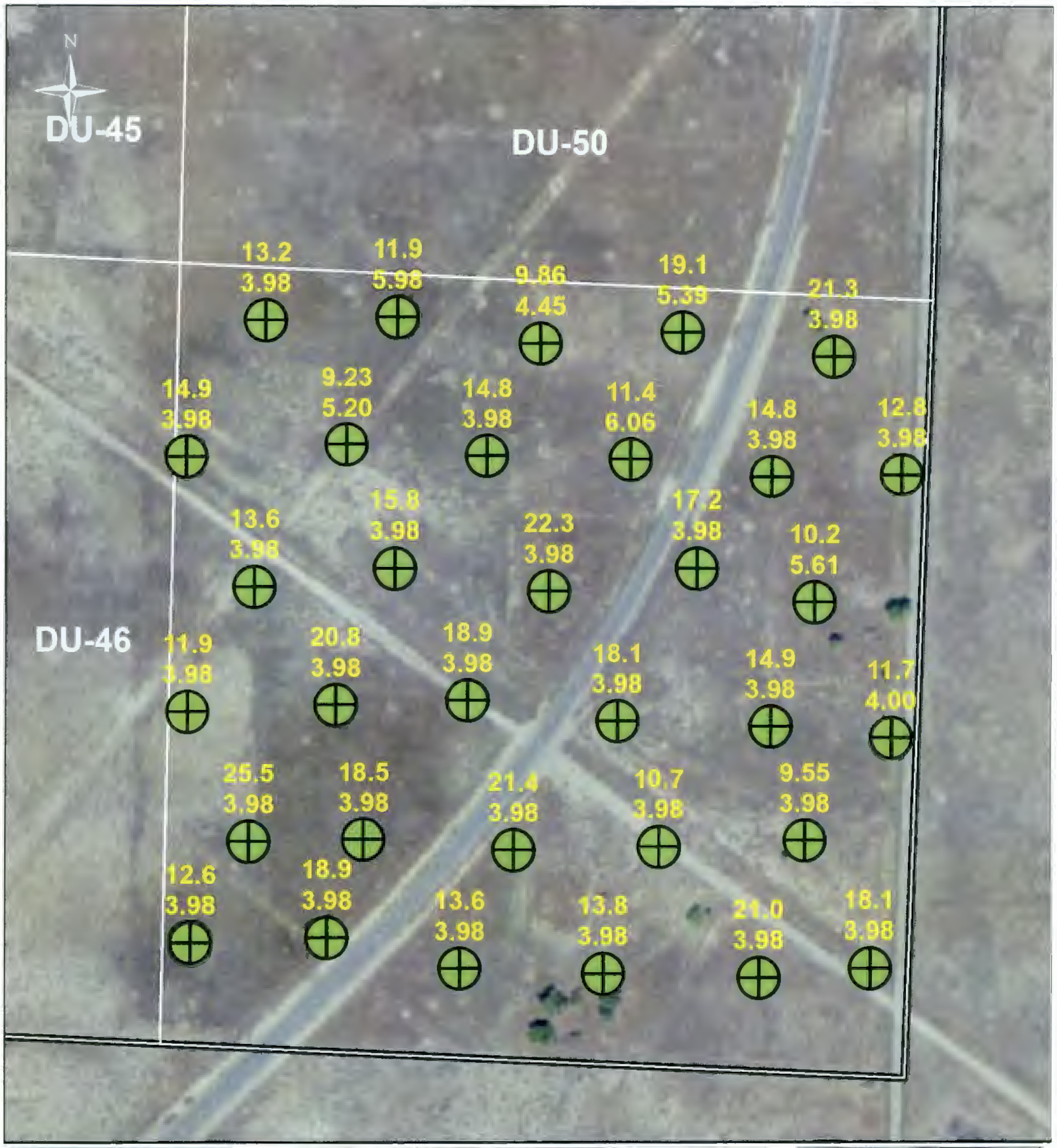




DU-050		
Summary Statistics	**Lead**	**Arsenic**
Average	17.2	4.26
Standard Deviation	6.16	0.61
RSD	35.9%	14.3%
95% UCL[1]	19.0	4.46

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

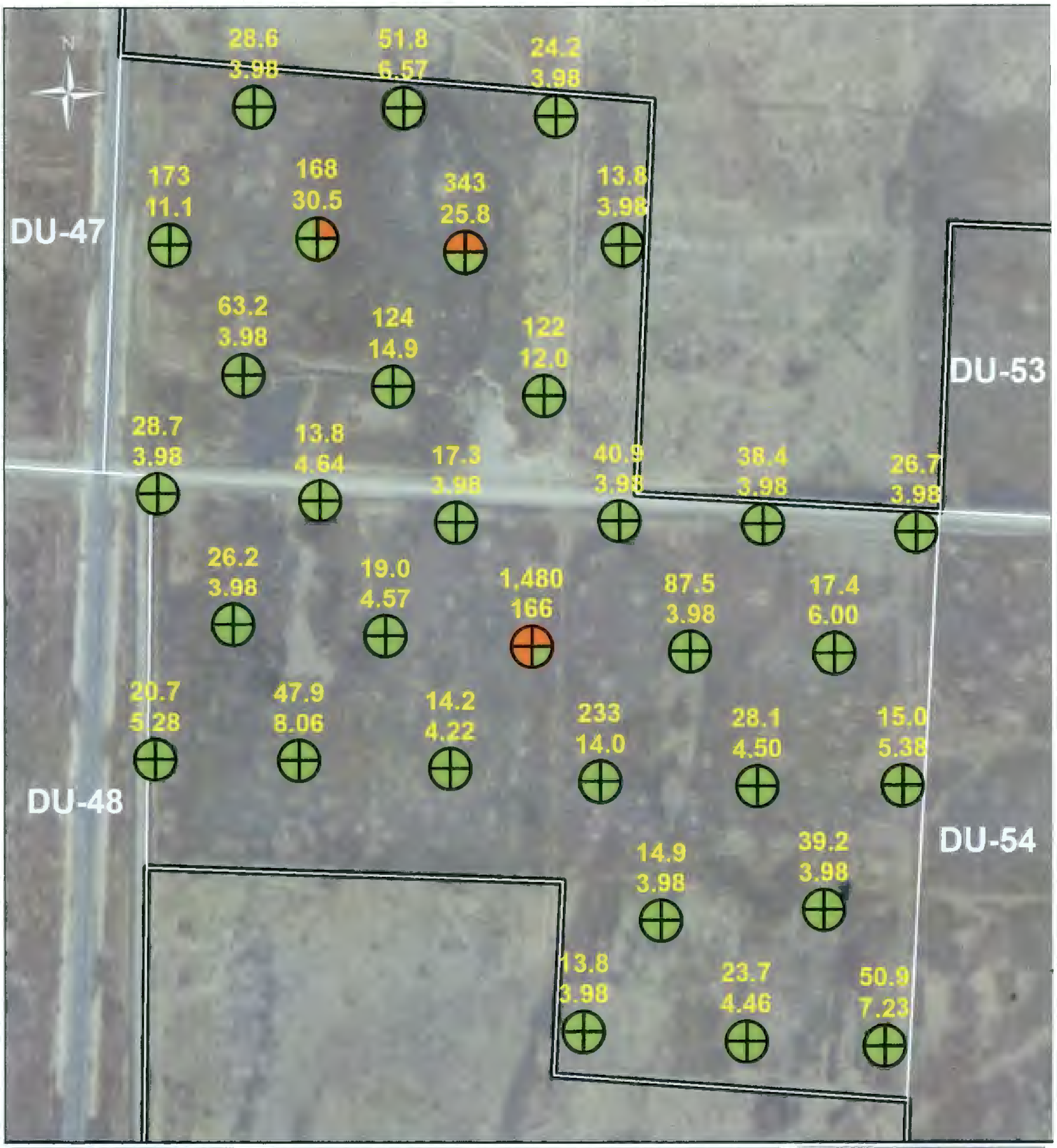
Figure A-53. DU-050 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

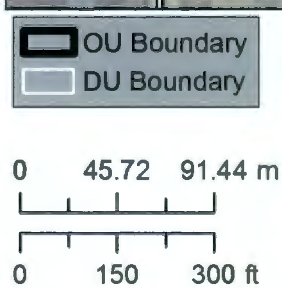


DU-051		
Summary Statistics	Lead	Arsenic
Average	15.5	4.25
Standard Deviation	4.27	0.61
RSD	27.5%	14.4%
95% UCL[1]	16.8	4.44

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-54. DU-051 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

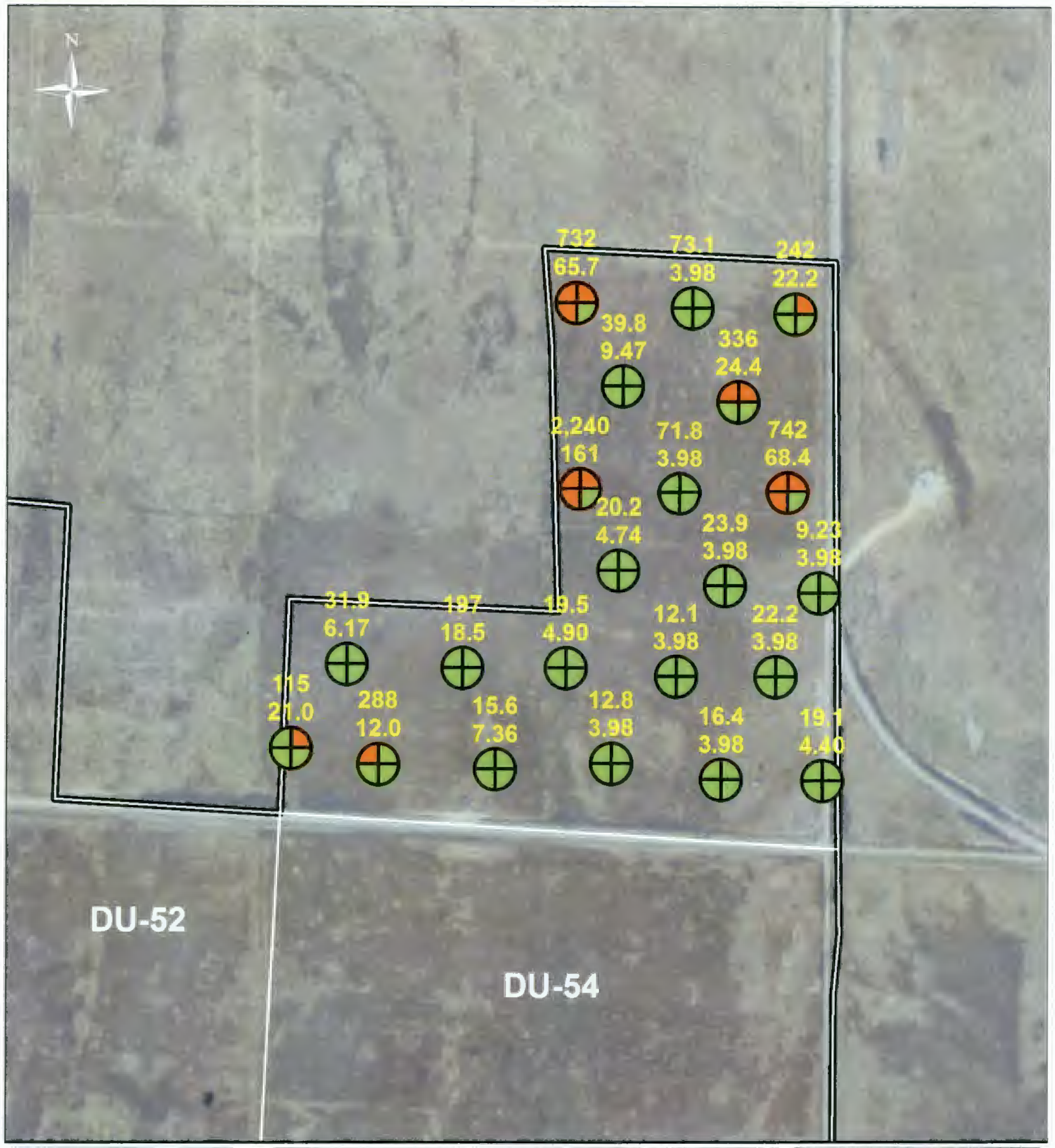


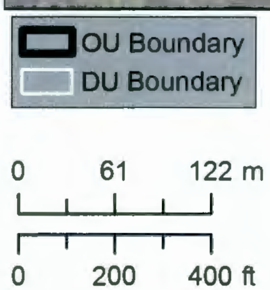


DU-052		
Summary Statistics	**Lead**	**Arsenic**
Average	107	12.2
Standard Deviation	262	28.3
RSD	246%	232%
95% UCL[1]	308	12.5

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-55. DU-052 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

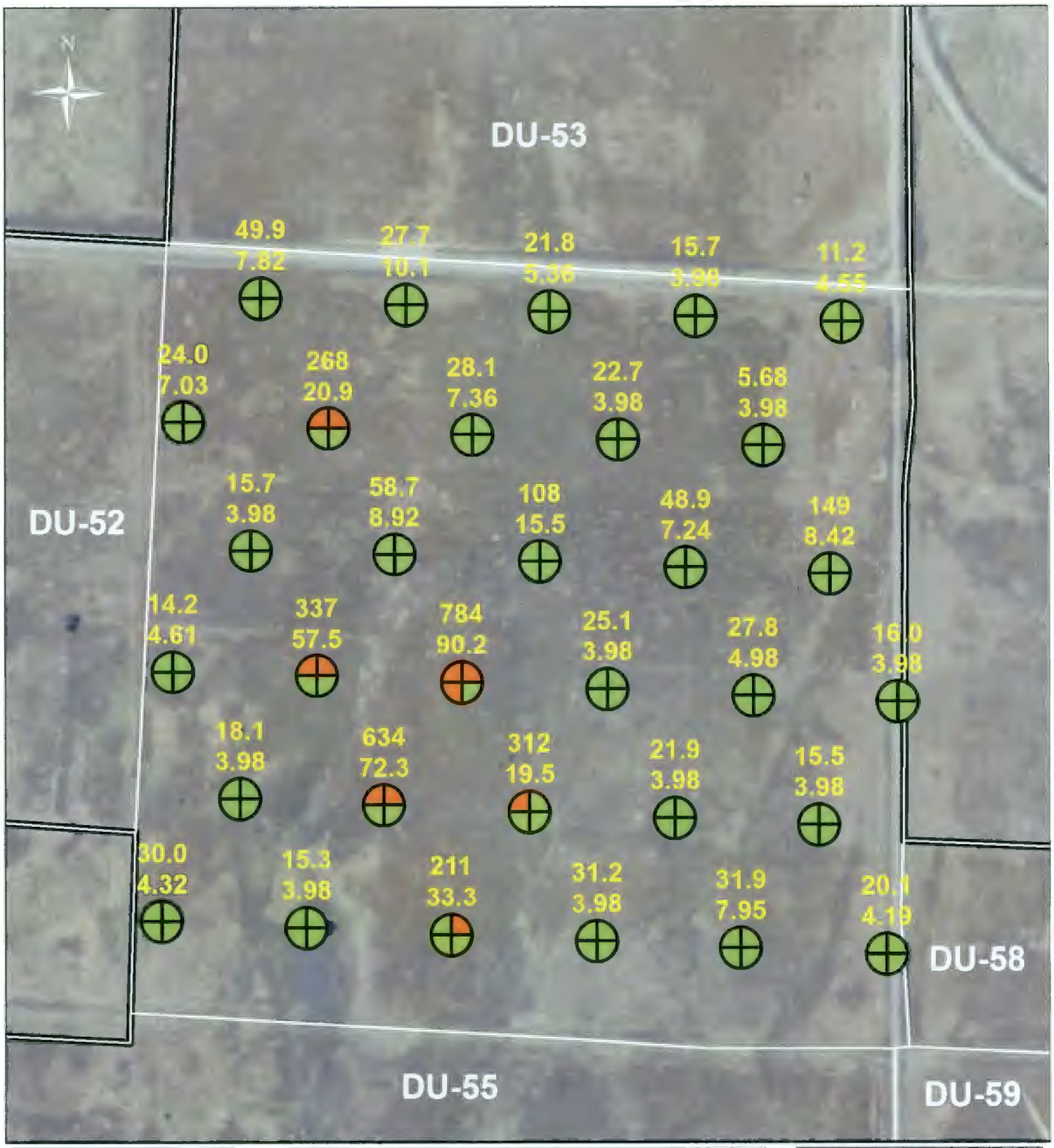


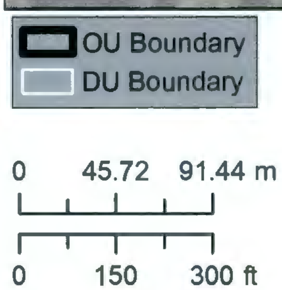


DU-053		
Summary Statistics	Lead	Arsenic
Average	240	21.0
Standard Deviation	495	35.4
RSD	206%	169%
95% UCL[1]	699	46.3

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-56. DU-053 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

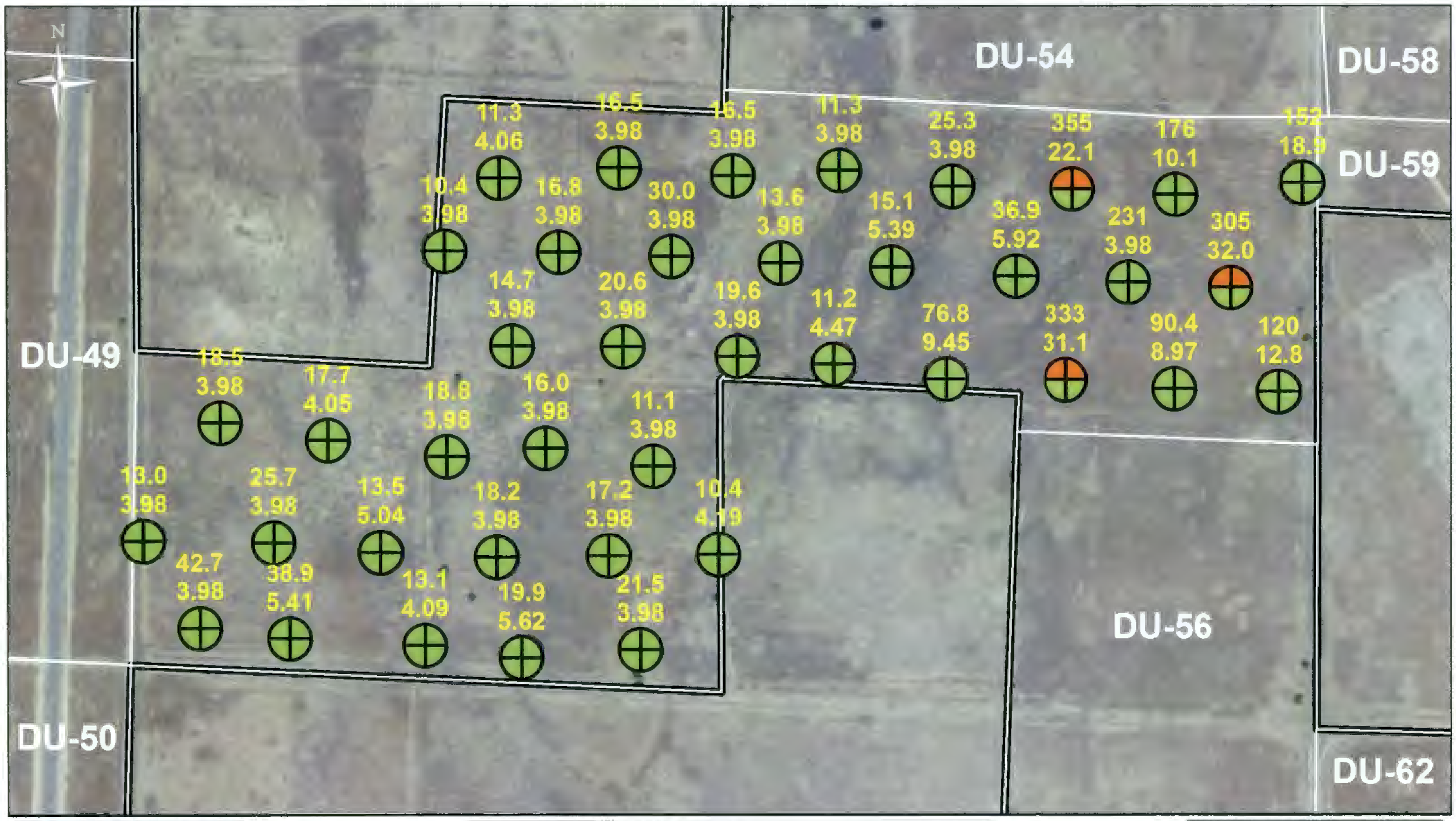


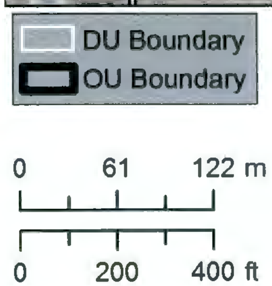


DU-054		
Summary Statistics	**Lead**	**Arsenic**
Average	106	13.9
Standard Deviation	180	20.5
RSD	169%	147%
95% UCL[1]	247	30.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-57. DU-054 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

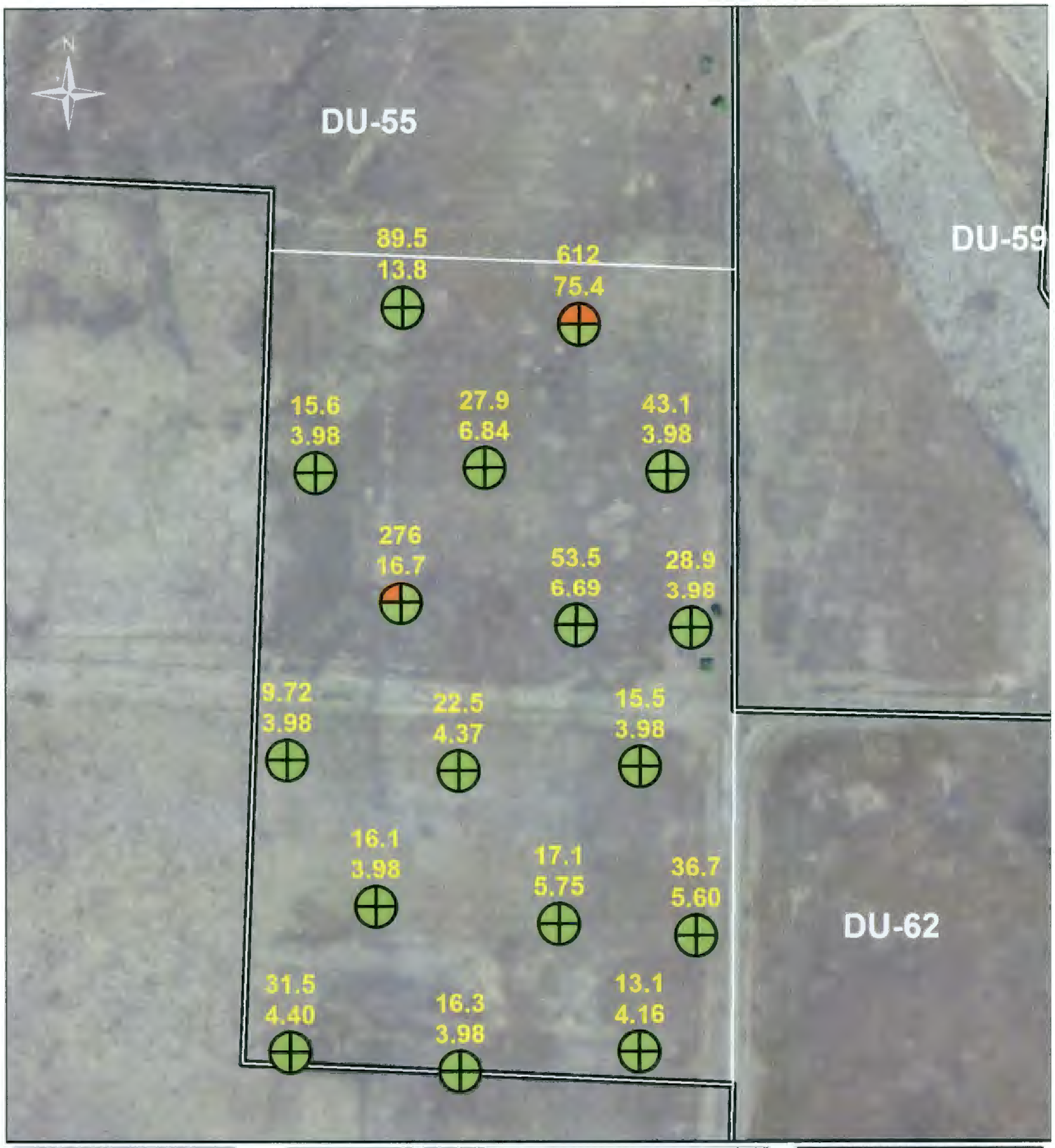


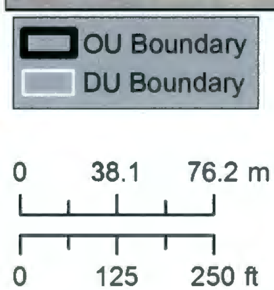


DU-055		
Summary Statistics	**Lead**	**Arsenic**
Average	60.6	7.03
Standard Deviation	92.3	6.86
RSD	152%	97.6%
95% UCL[1]	124	11.9

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-58. DU-055 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

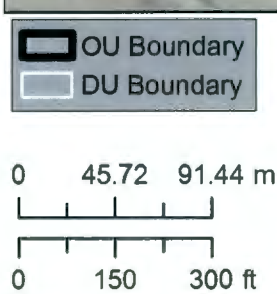




DU-056		
Summary Statistics	Lead	Arsenic
Average	78.0	10.1
Standard Deviation	151	16.7
RSD	194%	166%
95% UCL[1]	238	28.7

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

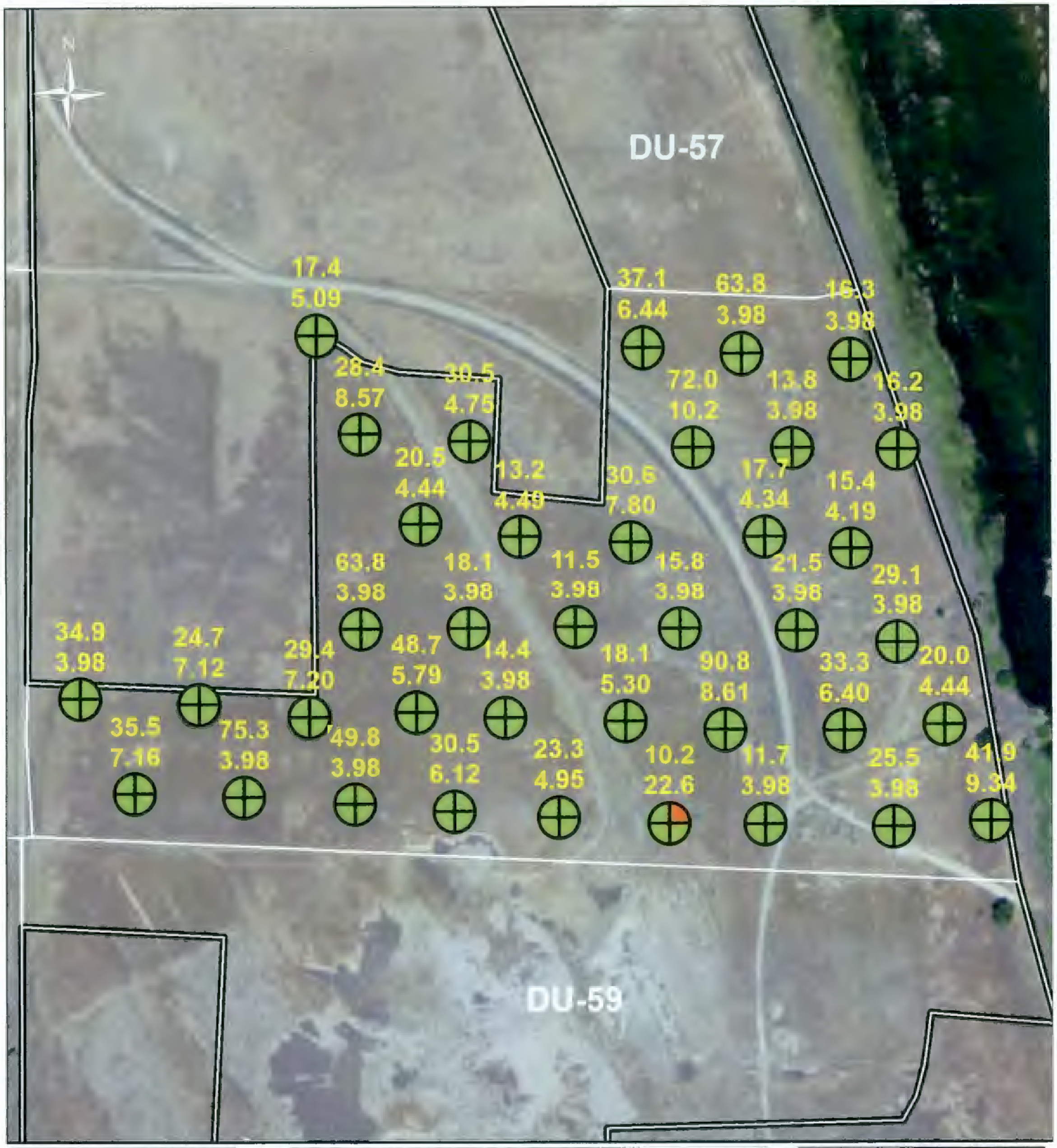
Figure A-59. DU-056 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-057		
Summary Statistics	Lead	Arsenic
Average	30.6	4.72
Standard Deviation	40.2	1.19
RSD	132%	25.1%
95% UCL[1]	68.0	5.18

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-60. DU-057 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



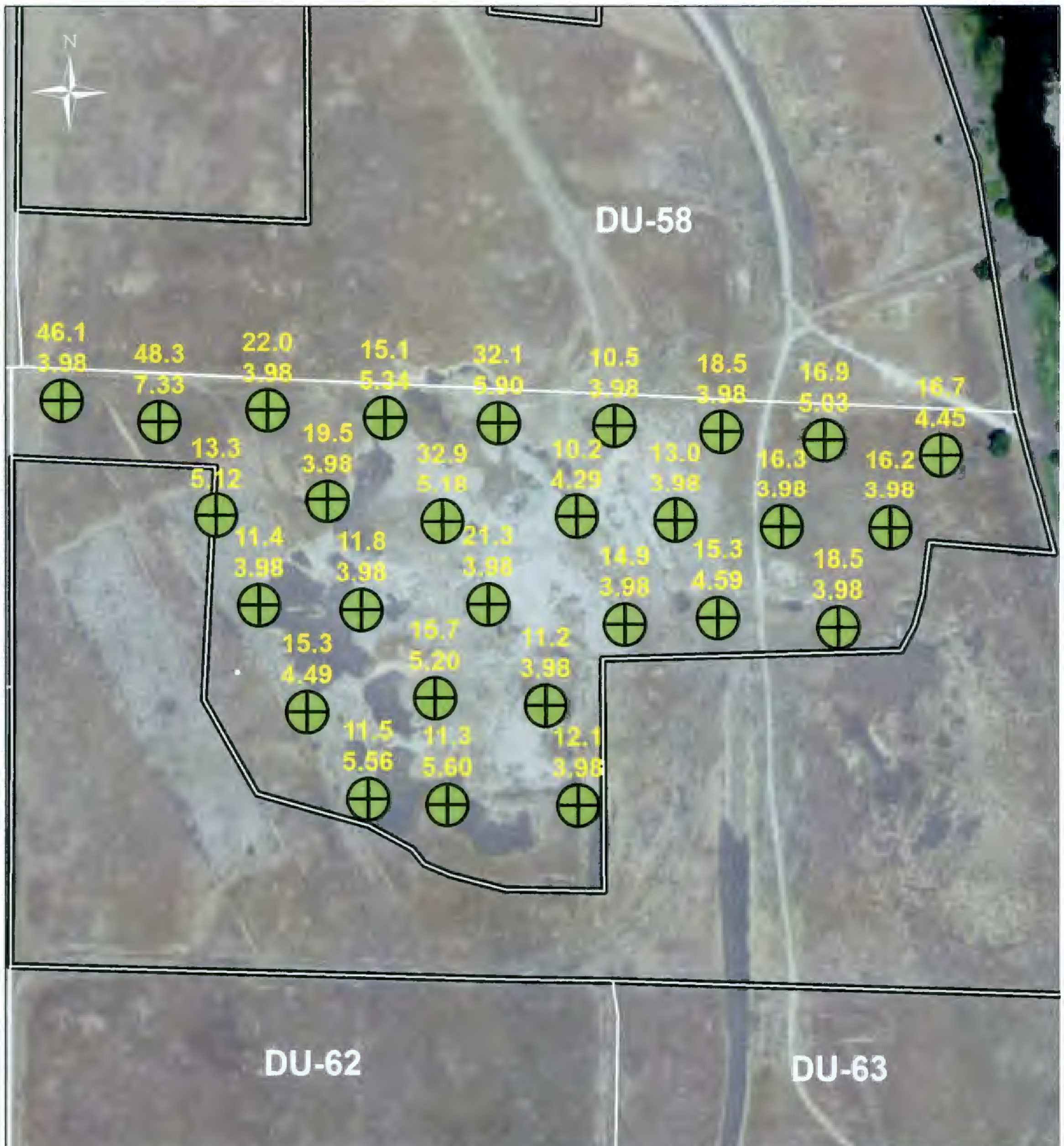
OU Boundary
DU Boundary

0 61 122 m
0 200 400 ft

DU-058		
Summary Statistics	Lead	Arsenic
Average	30.8	5.76
Standard Deviation	19.7	3.27
RSD	64.0%	56.7%
95% UCL[1]	36.5	6.91

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

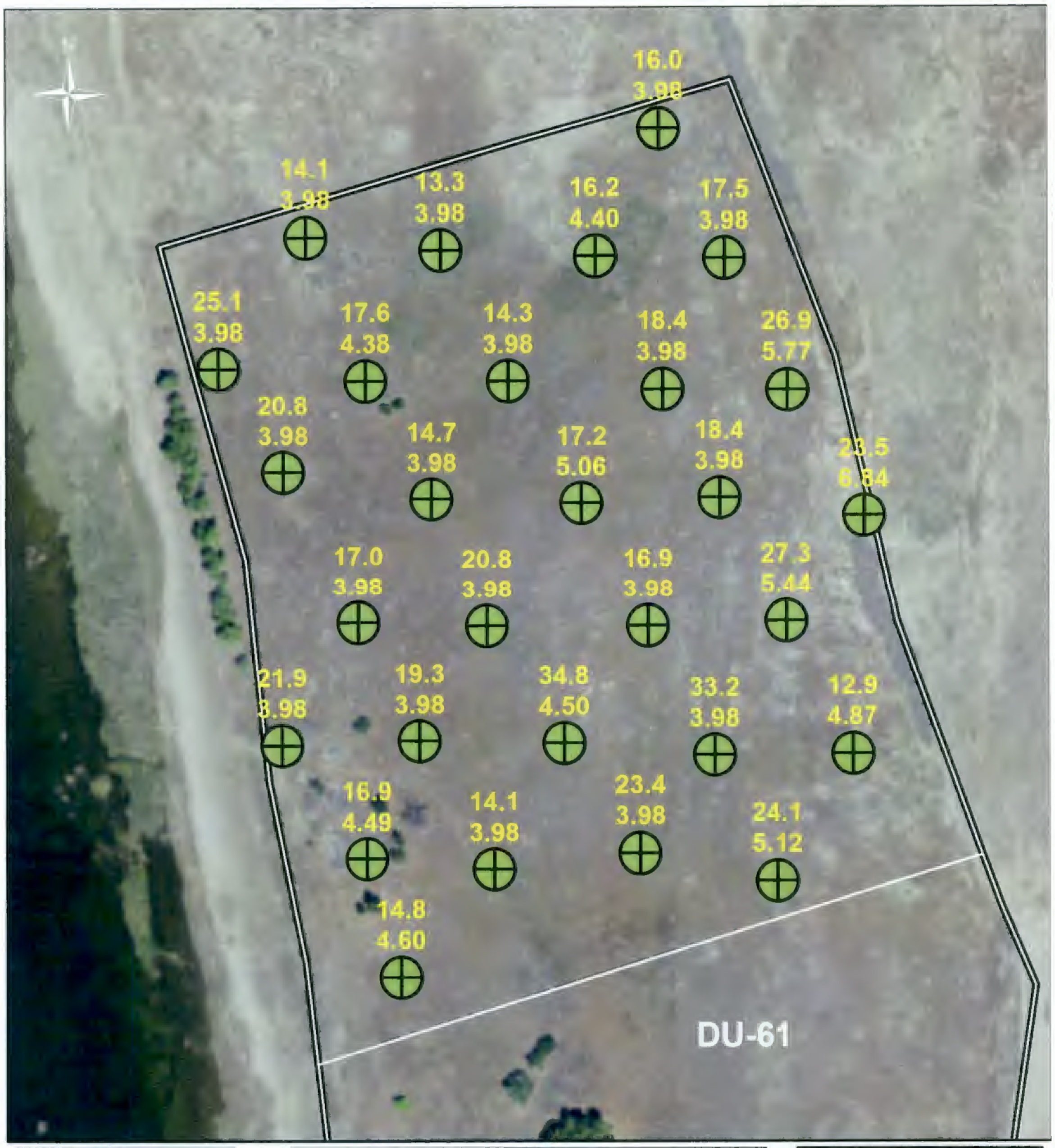
Figure A-61. DU-058 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

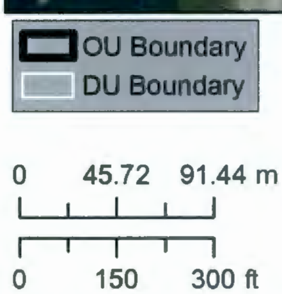


DU-059		
Summary Statistics	**Lead**	**Arsenic**
Average	18.5	4.56
Standard Deviation	9.83	0.82
RSD	53.2%	17.9%
95% UCL[1]	21.7	4.84

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-62. DU-059 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

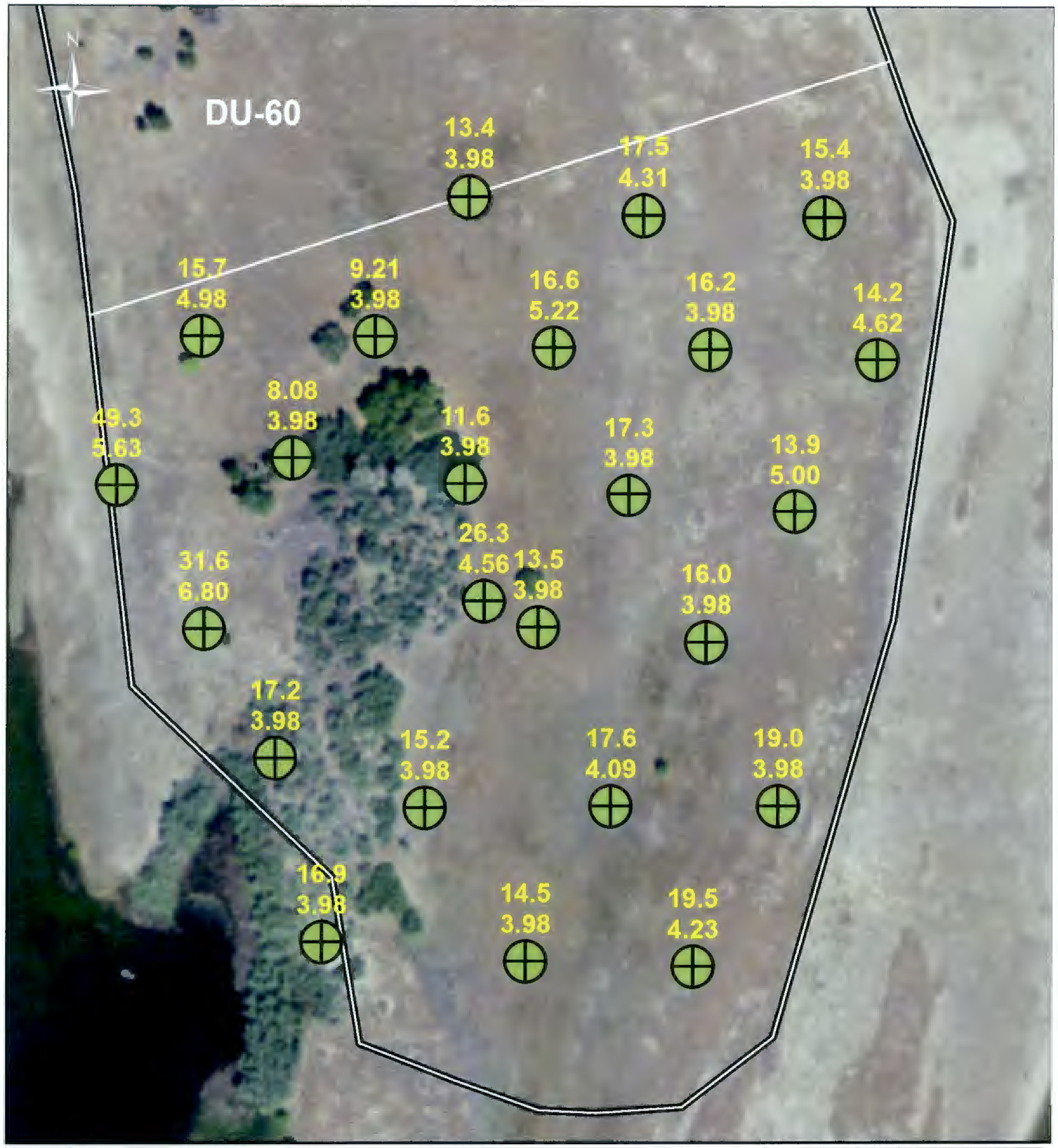


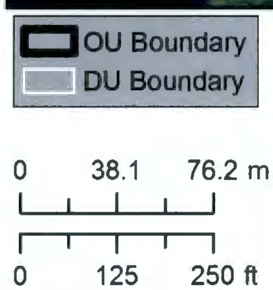


DU-060		
Summary Statistics	Lead	Arsenic
Average	19.7	4.38
Standard Deviation	5.66	0.68
RSD	28.8%	15.5%
95% UCL[1]	21.6	4.61

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-63. DU-060 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

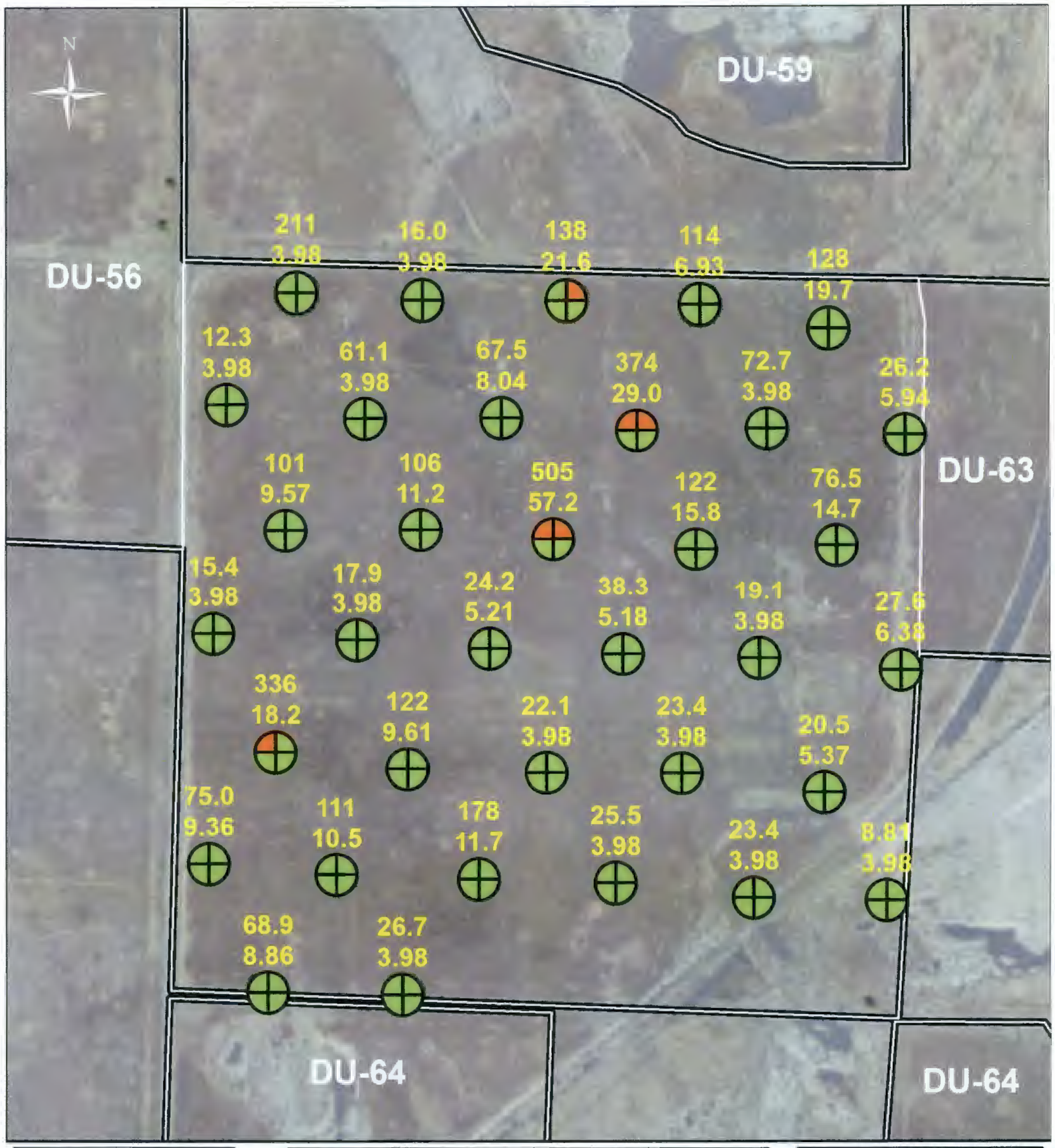




DU-061		
Summary Statistics	Lead	Arsenic
Average	17.7	4.38
Standard Deviation	8.25	0.69
RSD	46.5%	15.7%
95% UCL[1]	20.6	4.63

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

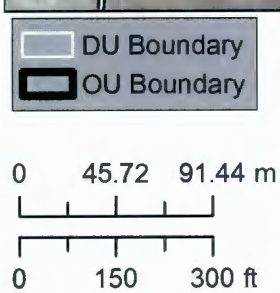
Figure A-64. DU-061 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-062		
Summary Statistics	**Lead**	**Arsenic**
Average	94.7	9.88
Standard Deviation	111	10.1
RSD	117%	102%
95% UCL[1]	151	16.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

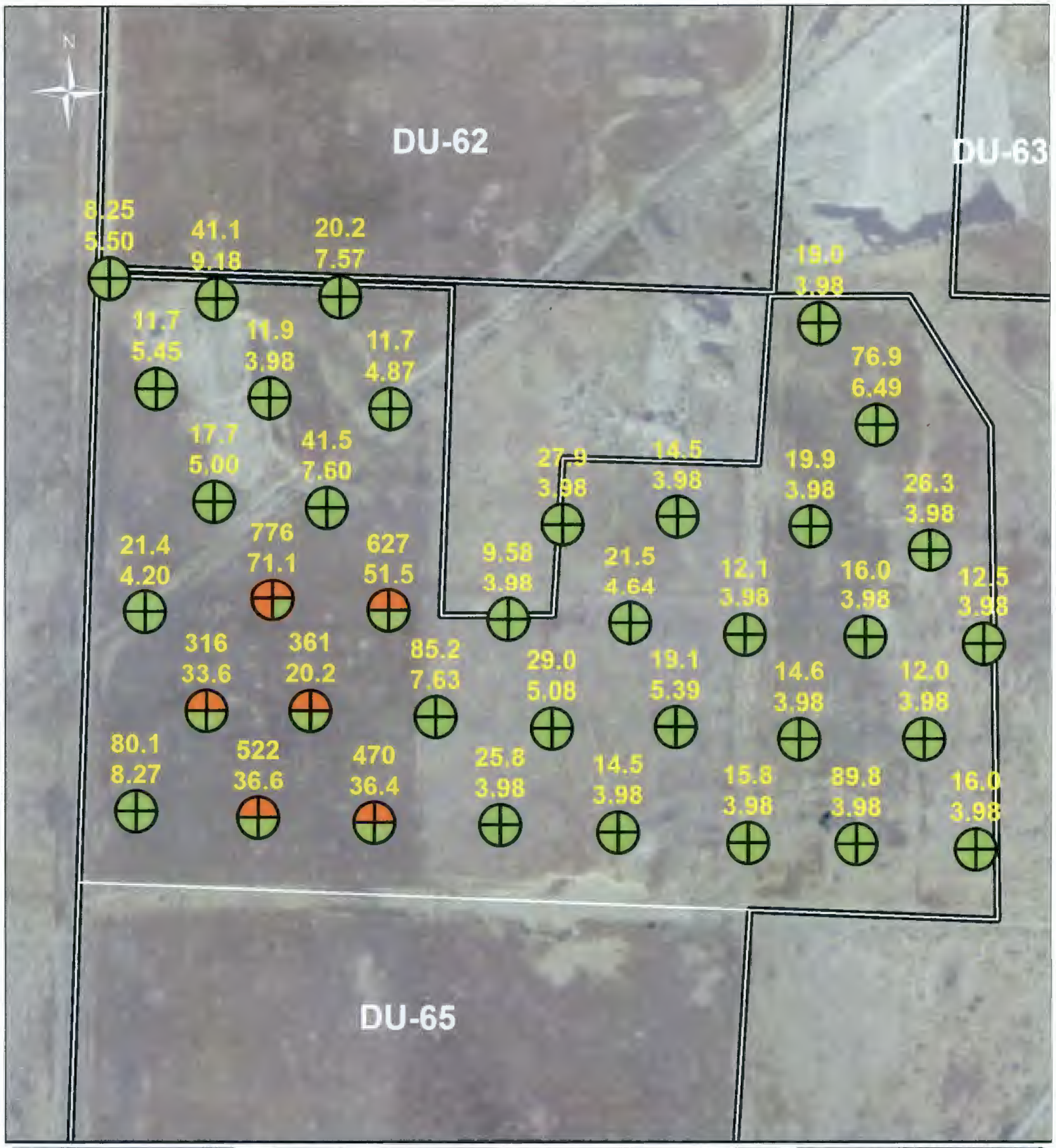
Figure A-65. DU-062 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

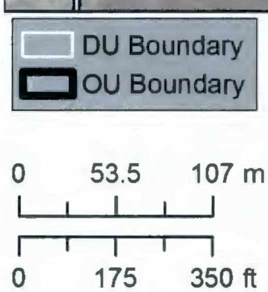


DU-063		
Summary Statistics	**Lead**	**Arsenic**
Average	54.9	6.84
Standard Deviation	73.2	7.22
RSD	133%	106%
95% UCL[1]	115	7.80

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-66. DU-063 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

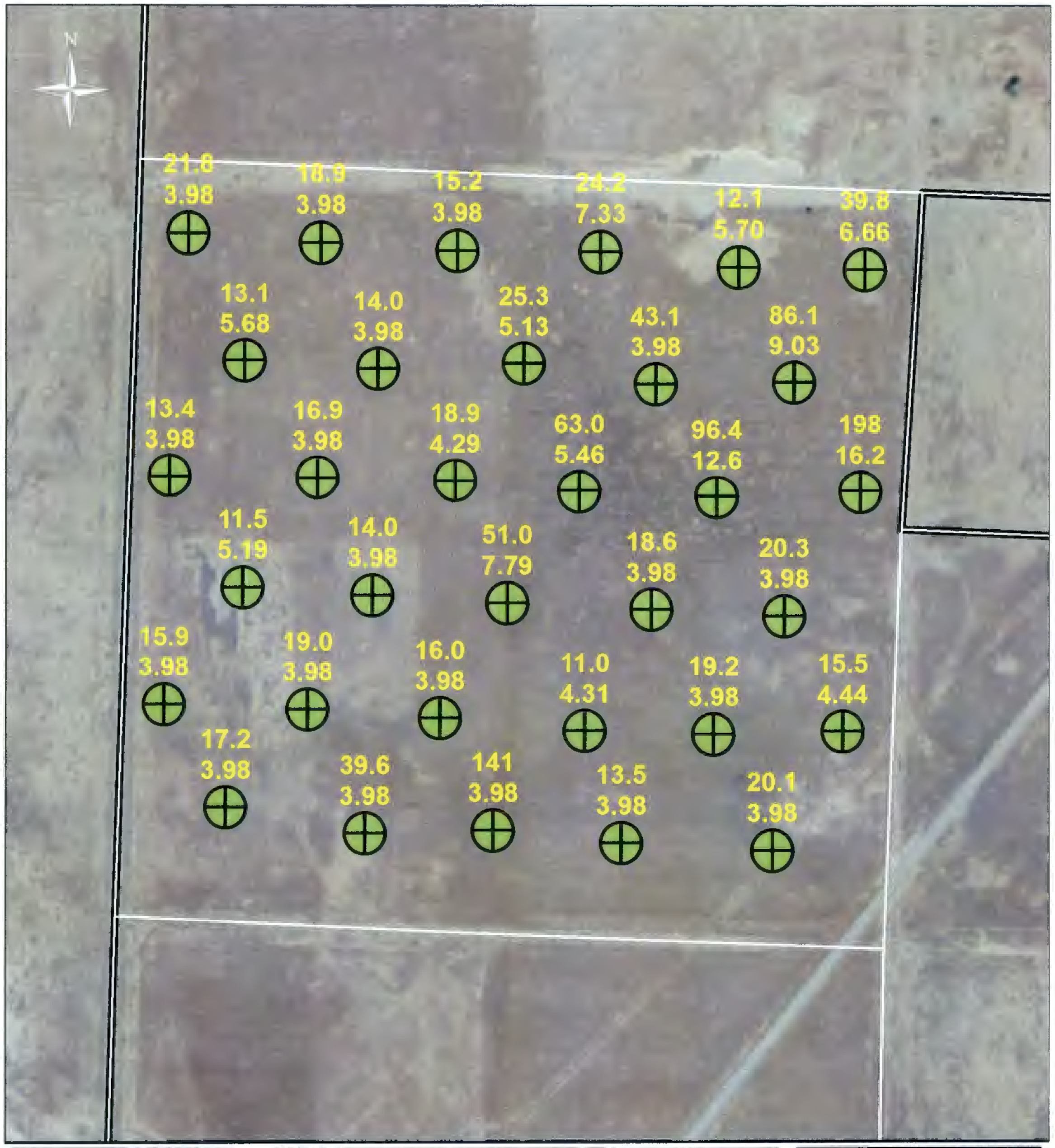




DU-064		
Summary Statistics	Lead	Arsenic
Average	106	10.9
Standard Deviation	193	15.0
RSD	183%	138%
95% UCL[1]	244	22.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

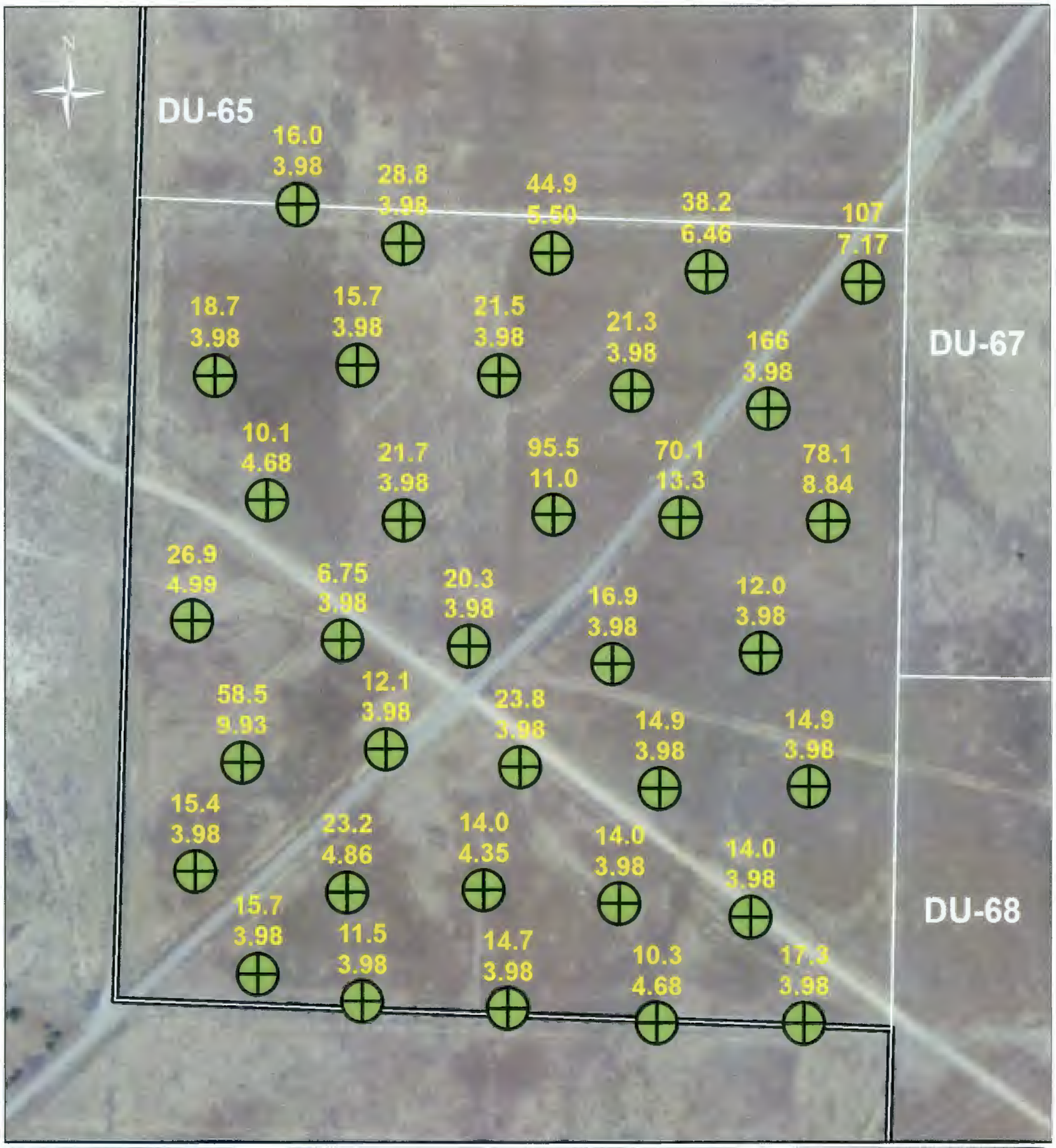
Figure A-67. DU-064 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-065		
Summary Statistics	**Lead**	**Arsenic**
Average	35.3	5.32
Standard Deviation	40.9	2.67
RSD	116%	50.1%
95% UCL[1]	66.3	6.27

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-68. DU-065 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU Boundary
OU Boundary

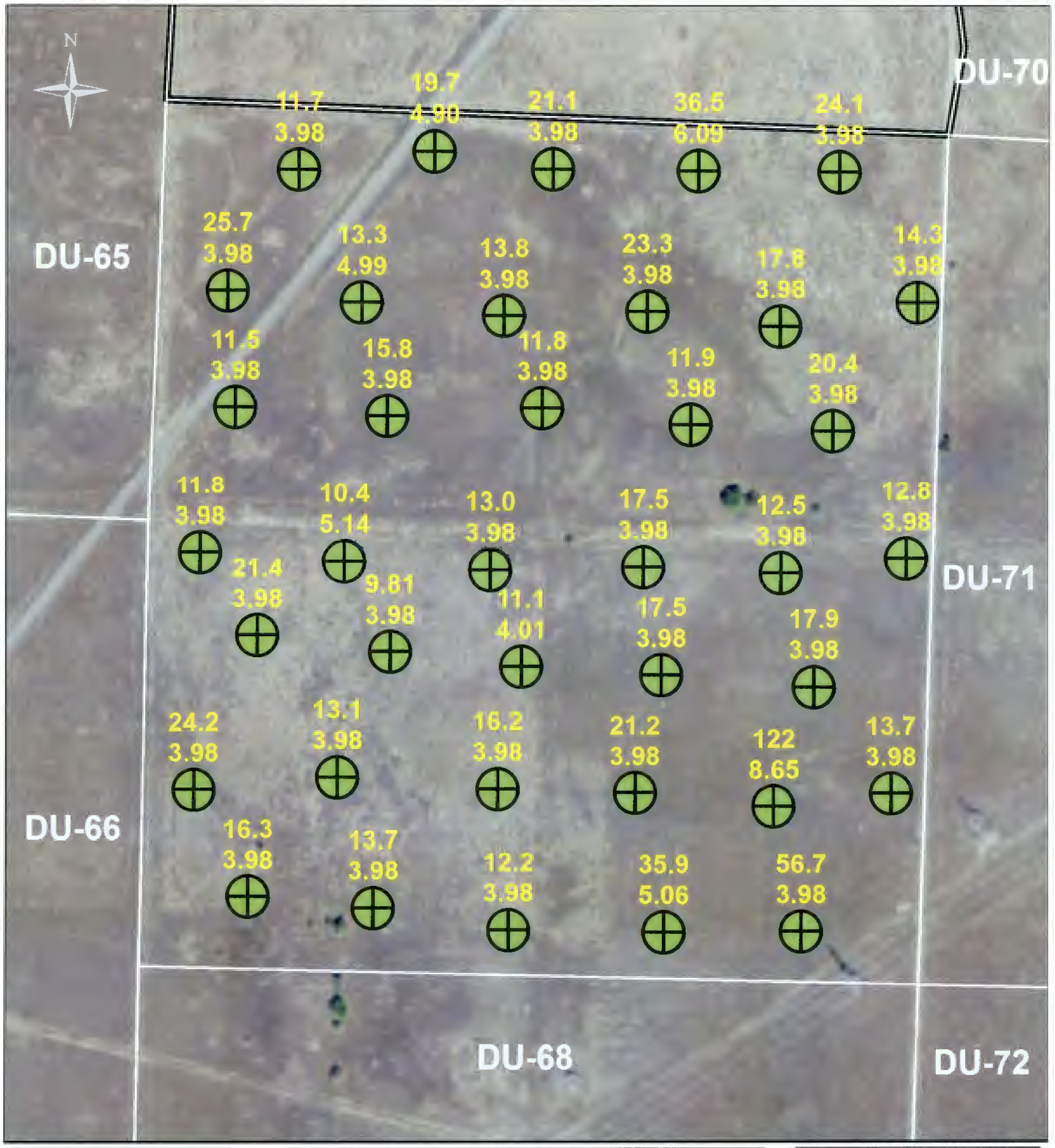
0 45.72 91.44 m

0 150 300 ft

DU-066		
Summary Statistics	**Lead**	**Arsenic**
Average	31.7	5.06
Standard Deviation	33.9	2.23
RSD	107%	44.1%
95% UCL[1]	56.7	5.73

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-69. DU-066 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU Boundary
OU Boundary

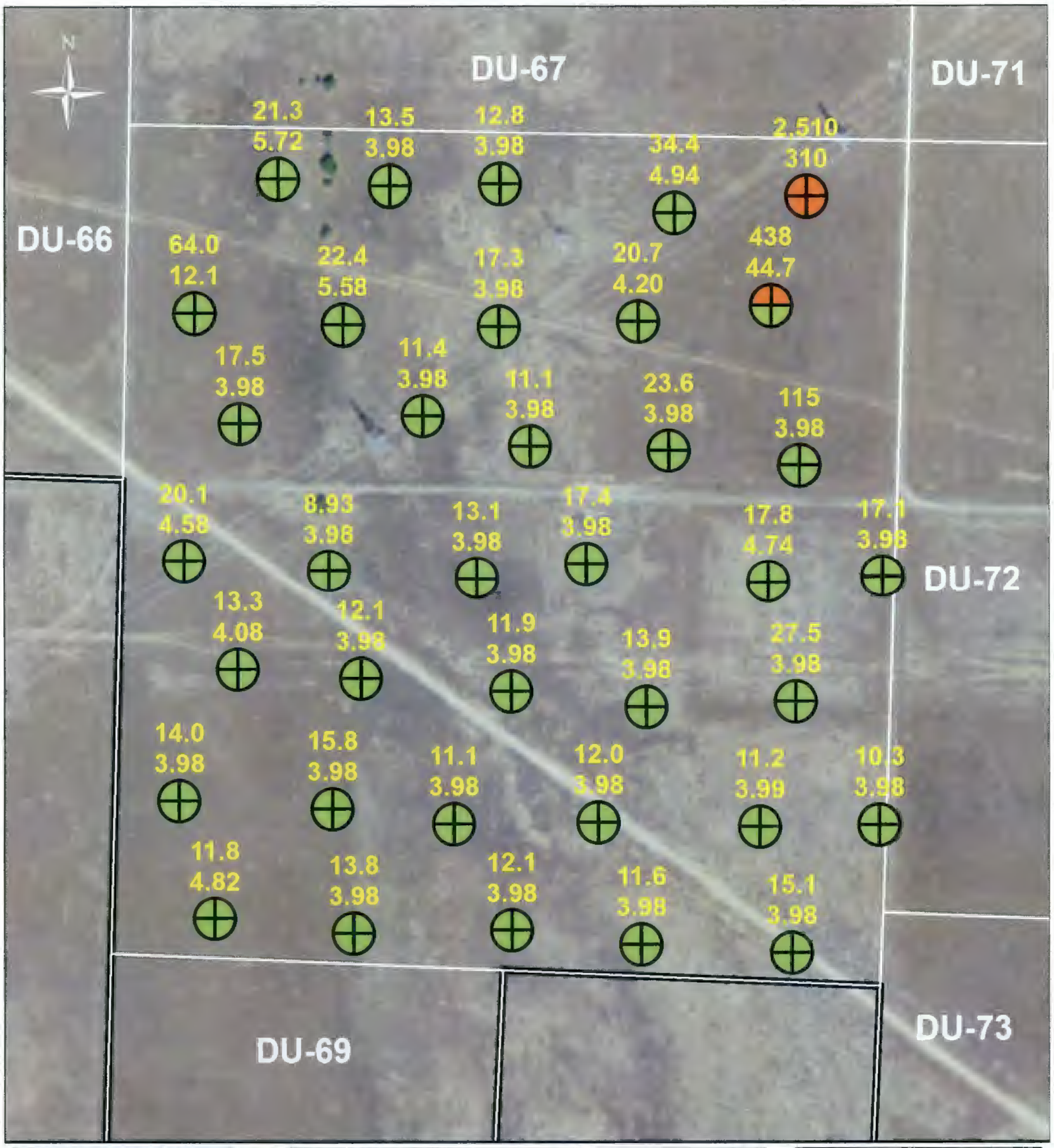
0 45.72 91.44 m

0 150 300 ft

DU-067		
Summary Statistics	**Lead**	**Arsenic**
Average	20.9	4.27
Standard Deviation	19.1	0.85
RSD	91.4%	19.9%
95% UCL[1]	26.1	4.53

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

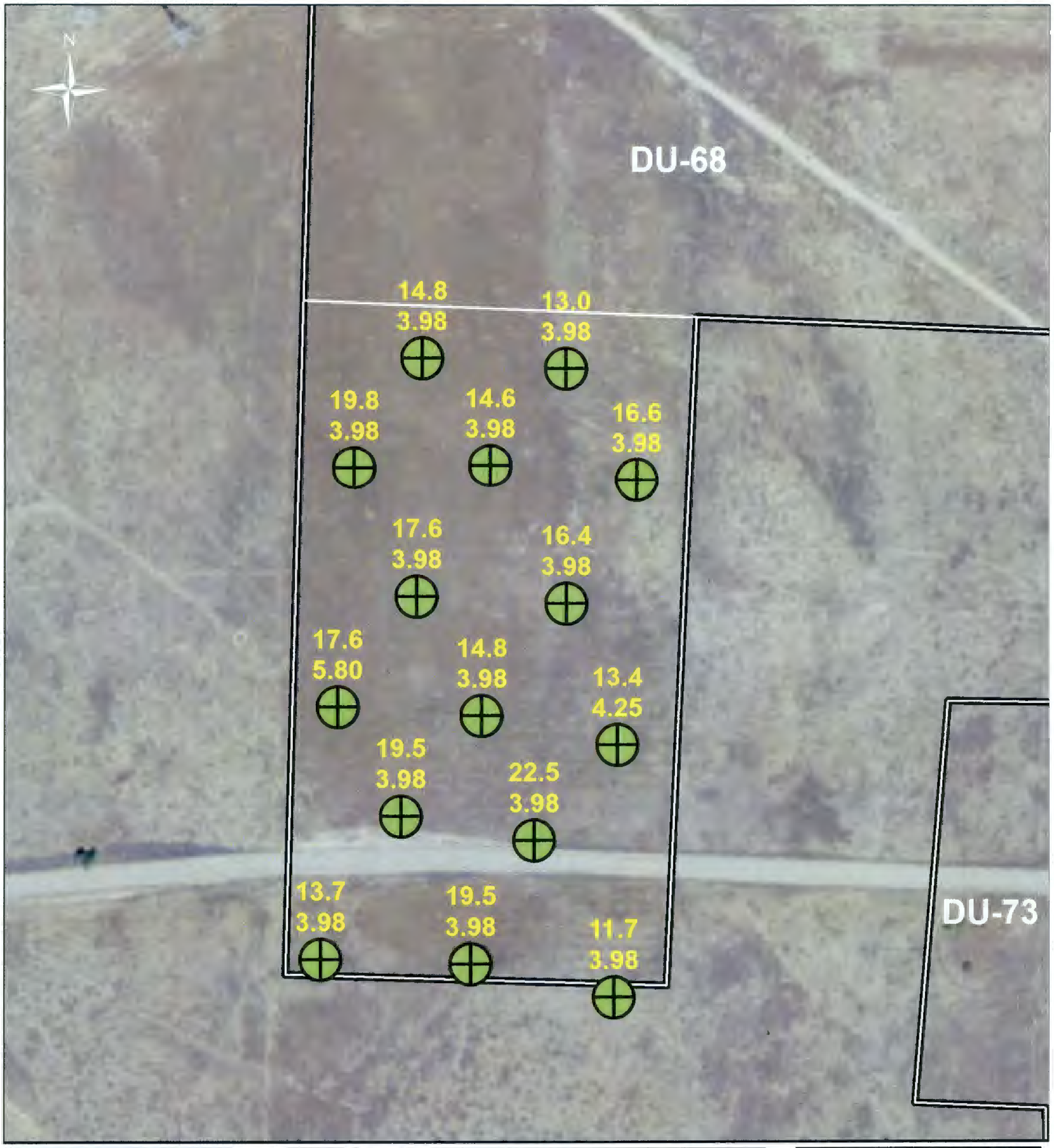
Figure A-70. DU-067 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

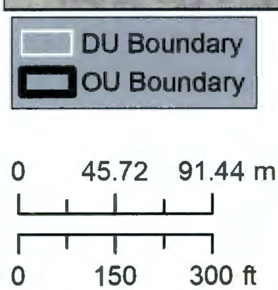


DU-068		
Summary Statistics	Lead	Arsenic
Average	98.5	13.8
Standard Deviation	413	49.8
RSD	420%	362%
95% UCL[1]	395	51.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-71. DU-068 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

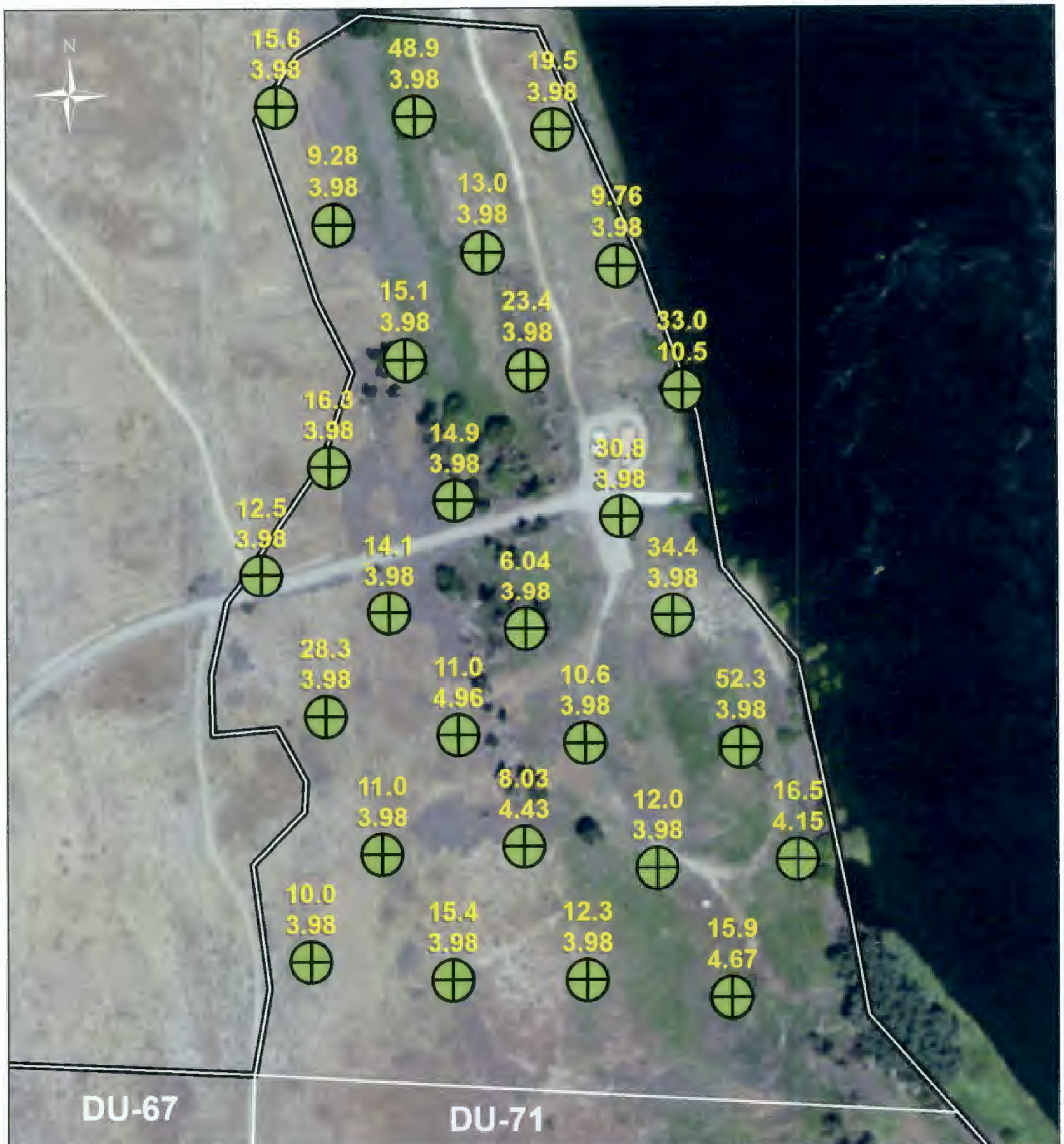


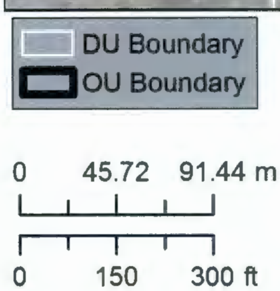


DU-069		
Summary Statistics	Lead	Arsenic
Average	16.4	4.12
Standard Deviation	3.04	0.45
RSD	18.6%	11.0%
95% UCL[1]	17.7	4.41

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-72. DU-069 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

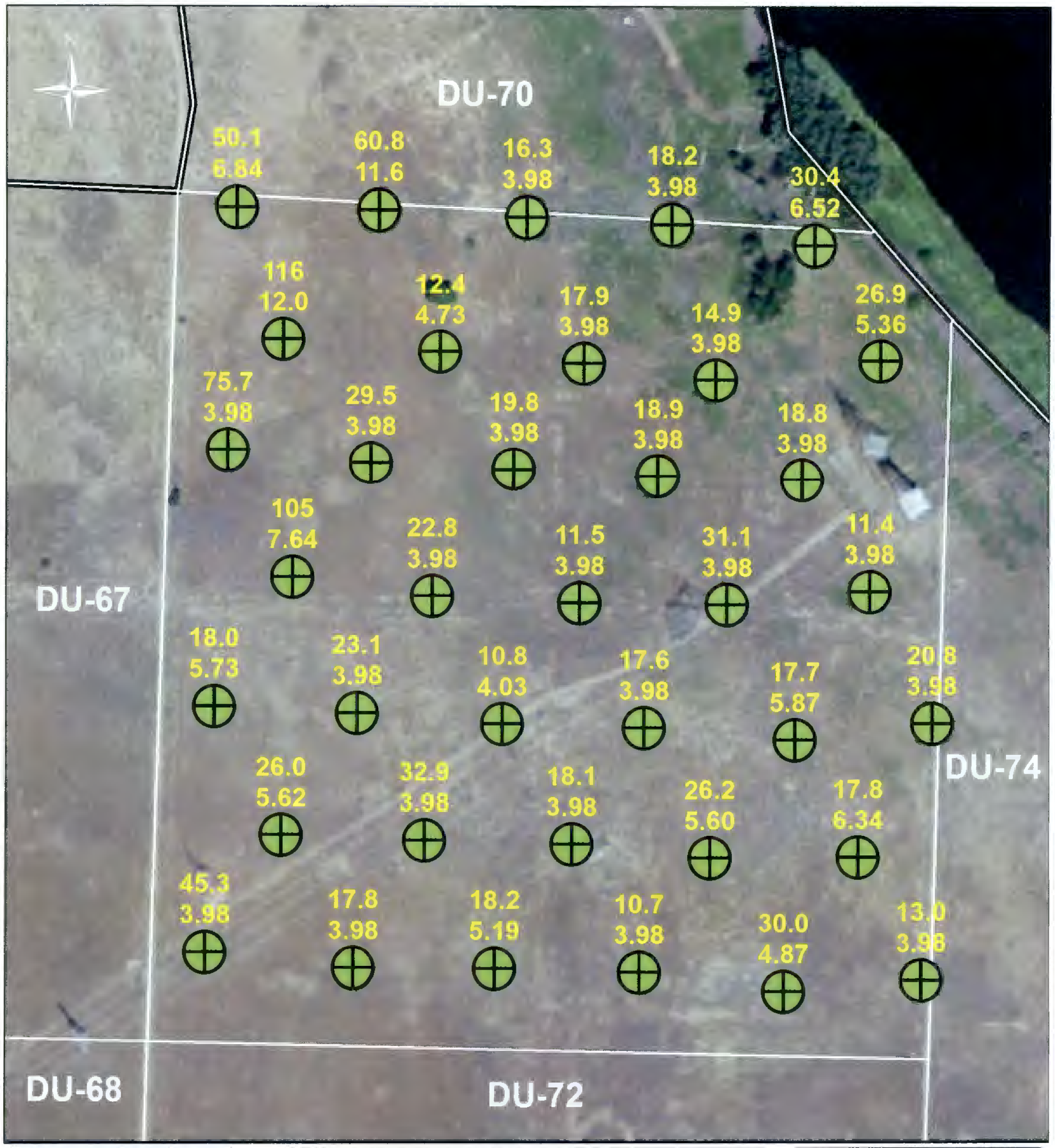


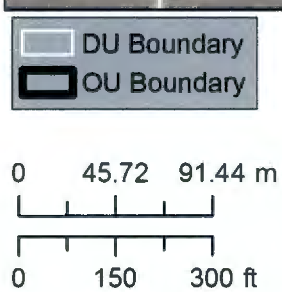


DU-070		
Summary Statistics	Lead	Arsenic
Average	18.6	4.29
Standard Deviation	11.7	1.22
RSD	63.0%	28.3%
95% UCL[1]	22.5	4.76

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-73. DU-070 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

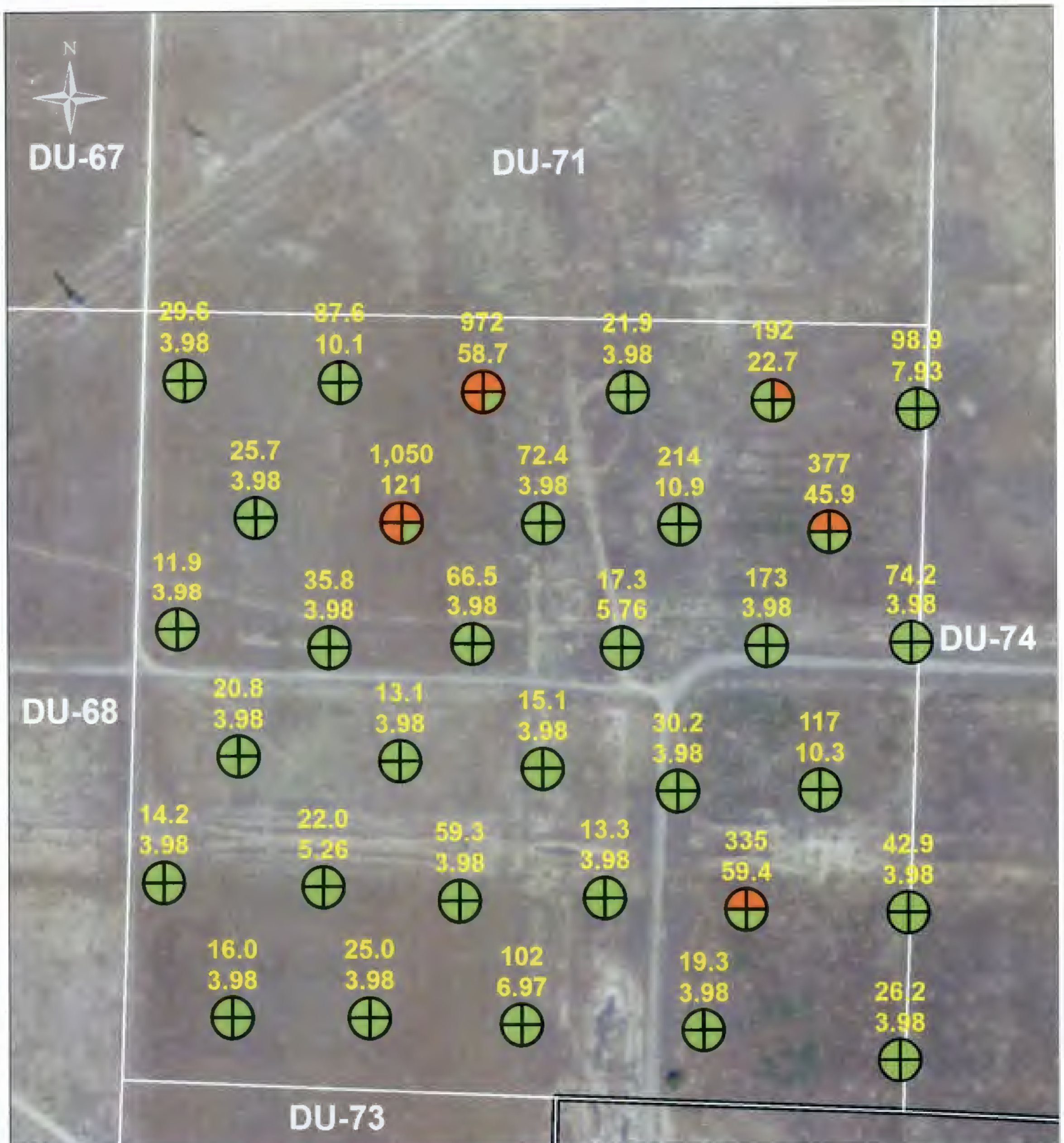


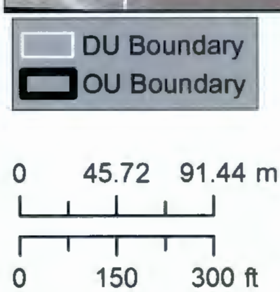


DU-071		
Summary Statistics	**Lead**	**Arsenic**
Average	29.0	5.01
Standard Deviation	24.1	1.89
RSD	83.1%	37.8%
95% UCL[1]	46.2	5.62

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-74. DU-071 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

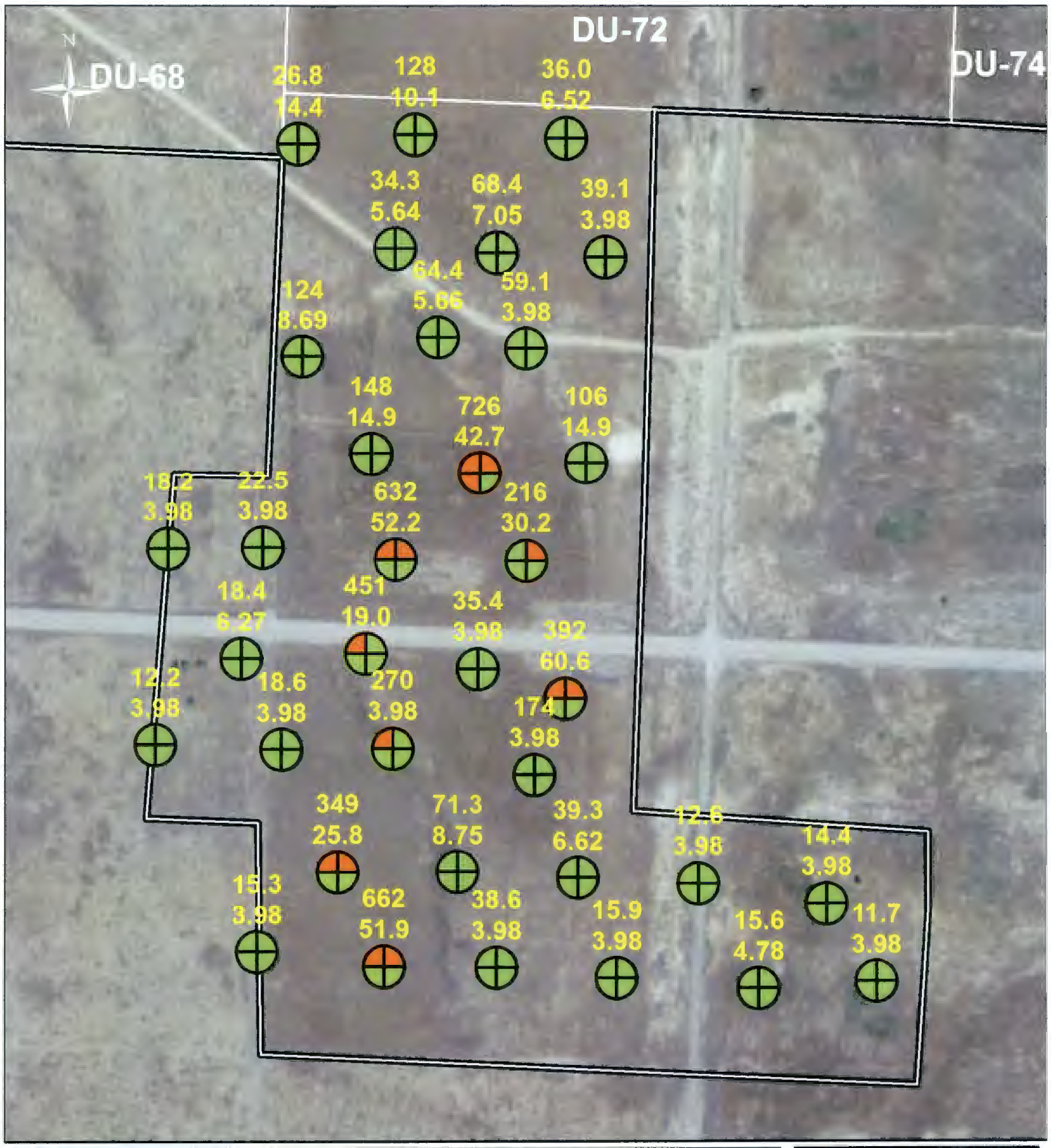




DU-072		
Summary Statistics	Lead	Arsenic
Average	133	13.6
Standard Deviation	244	24.0
RSD	183%	176%
95% UCL[1]	318	15.8

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

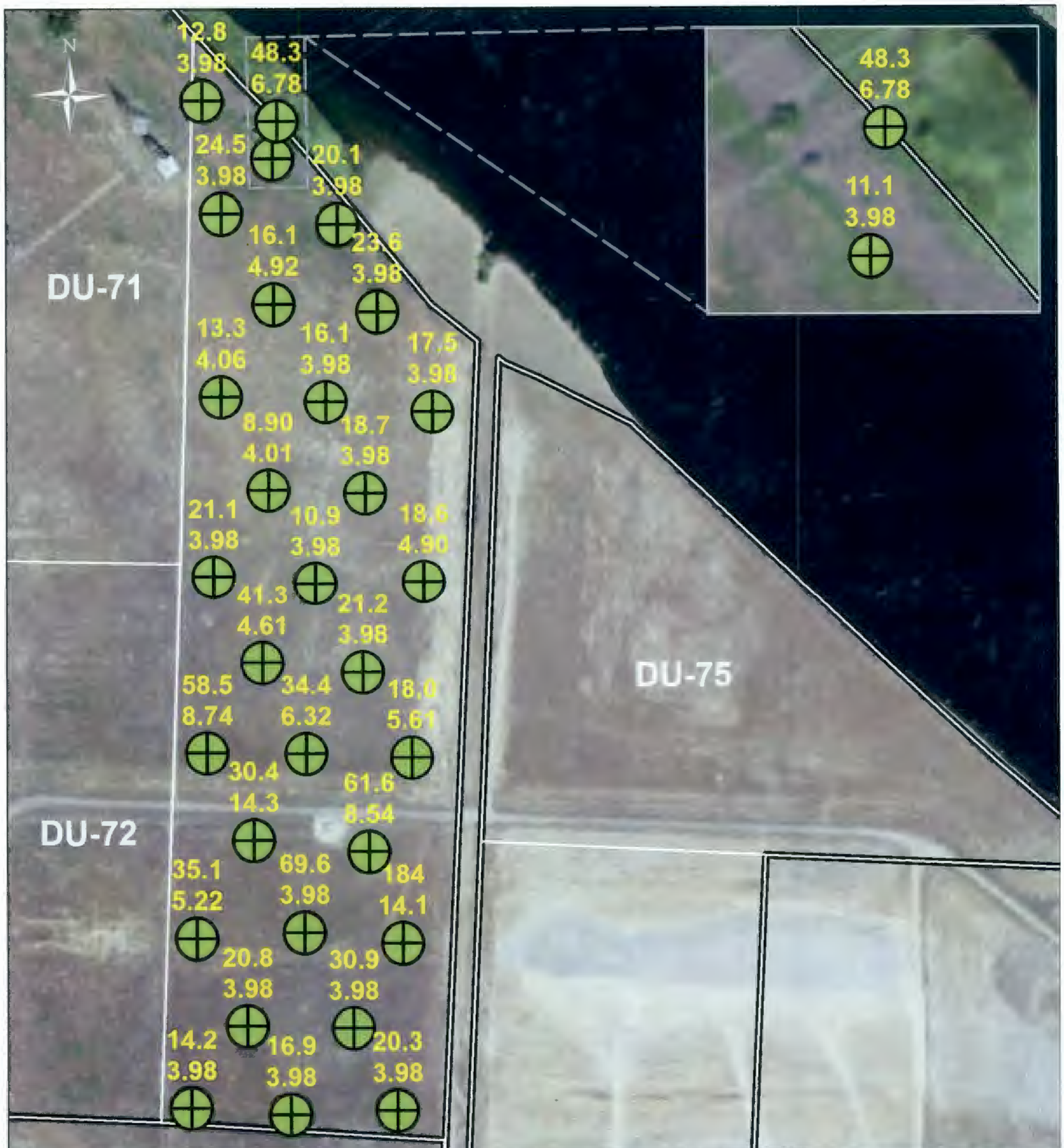
Figure A-75. DU-072 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

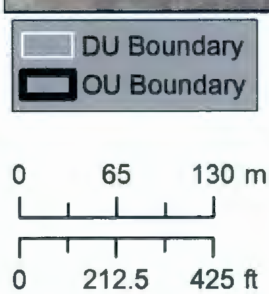


DU-073		
Summary Statistics	**Lead**	**Arsenic**
Average	145	13.0
Standard Deviation	200	15.4
RSD	138%	118%
95% UCL[1]	292	22.9

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-76. DU-073 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

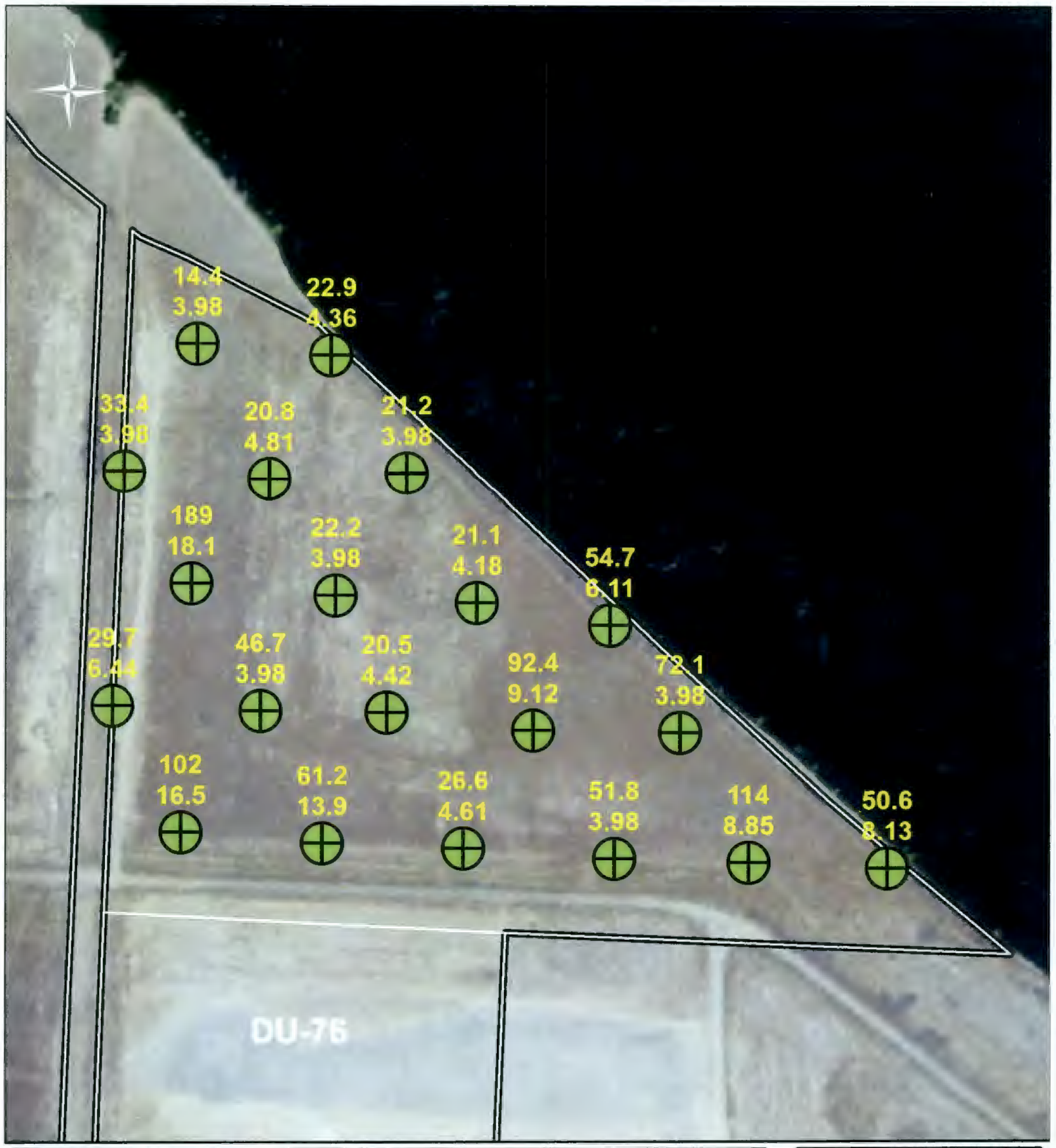




DU-074		
Summary Statistics	**Lead**	**Arsenic**
Average	31.6	5.37
Standard Deviation	31.9	2.67
RSD	101%	49.7%
95% UCL[1]	38.3	6.21

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-77. DU-074 Field Characterization Results (mg/kg, unless otherwise noted). Dashed boxes show a close-up view of the indicated sample locations and results. Display of results described in Figure A-2.



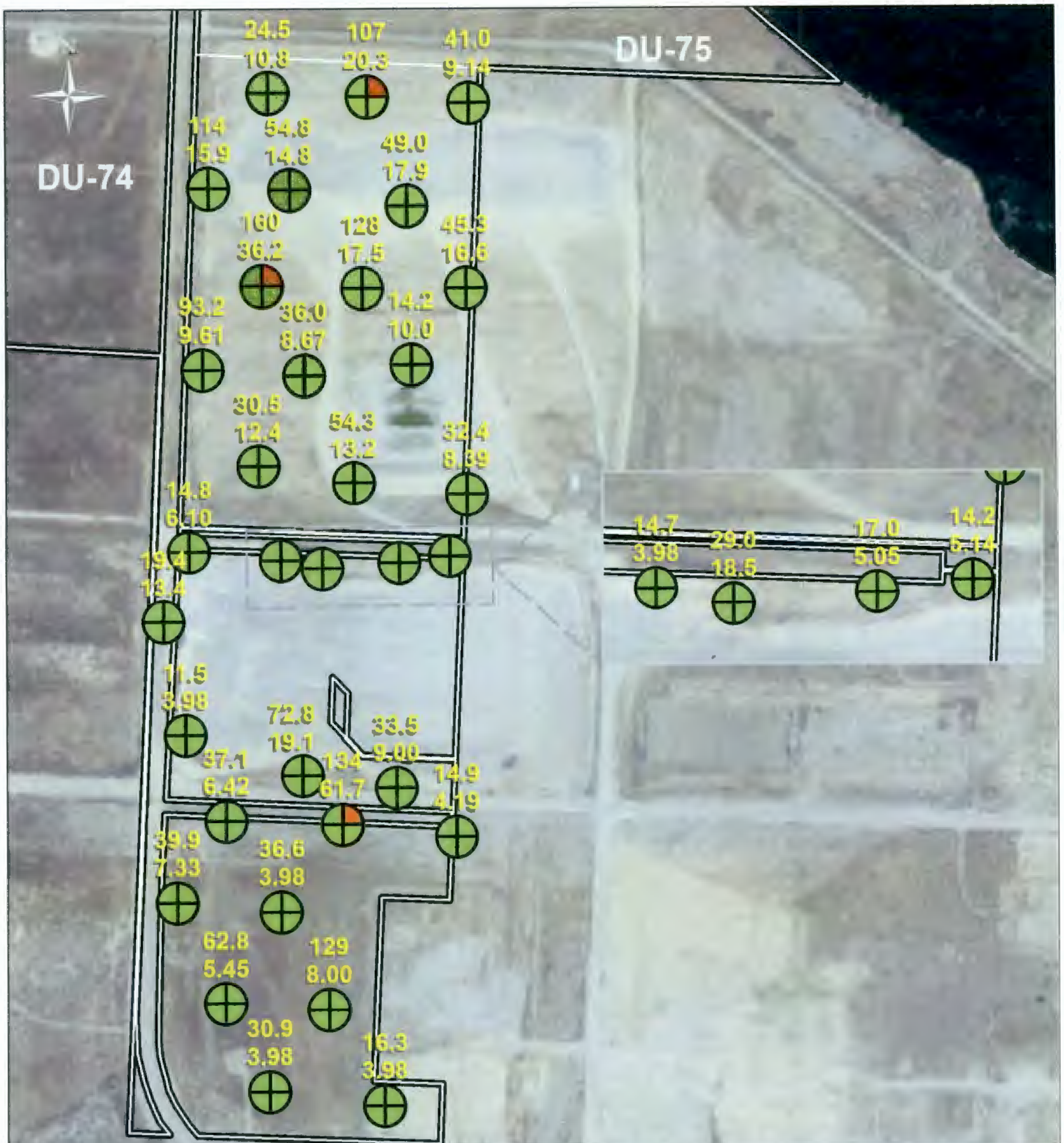
DU Boundary
OU Boundary

0 45.72 91.44 m
0 150 300 ft

DU-075		
Summary Statistics	**Lead**	**Arsenic**
Average	53.4	6.87
Standard Deviation	43.4	4.28
RSD	81.3%	62.4%
95% UCL[1]	70.1	8.59

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

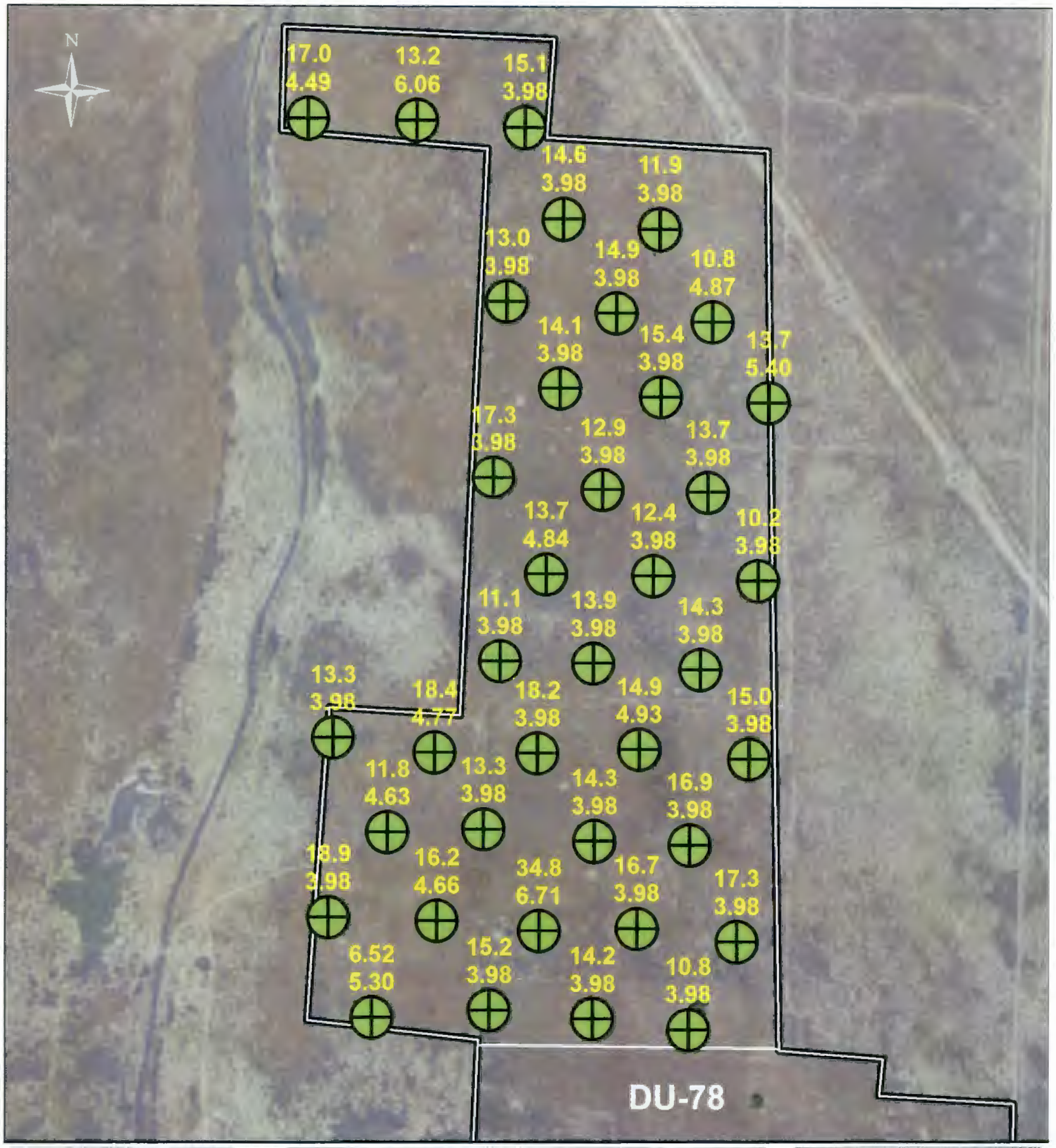
Figure A-78. DU-075 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-076		
Summary Statistics	Lead	Arsenic
Average	51.9	12.5
Standard Deviation	41.6	11.0
RSD	80.2%	88.5%
95% UCL[1]	66.2	18.9

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

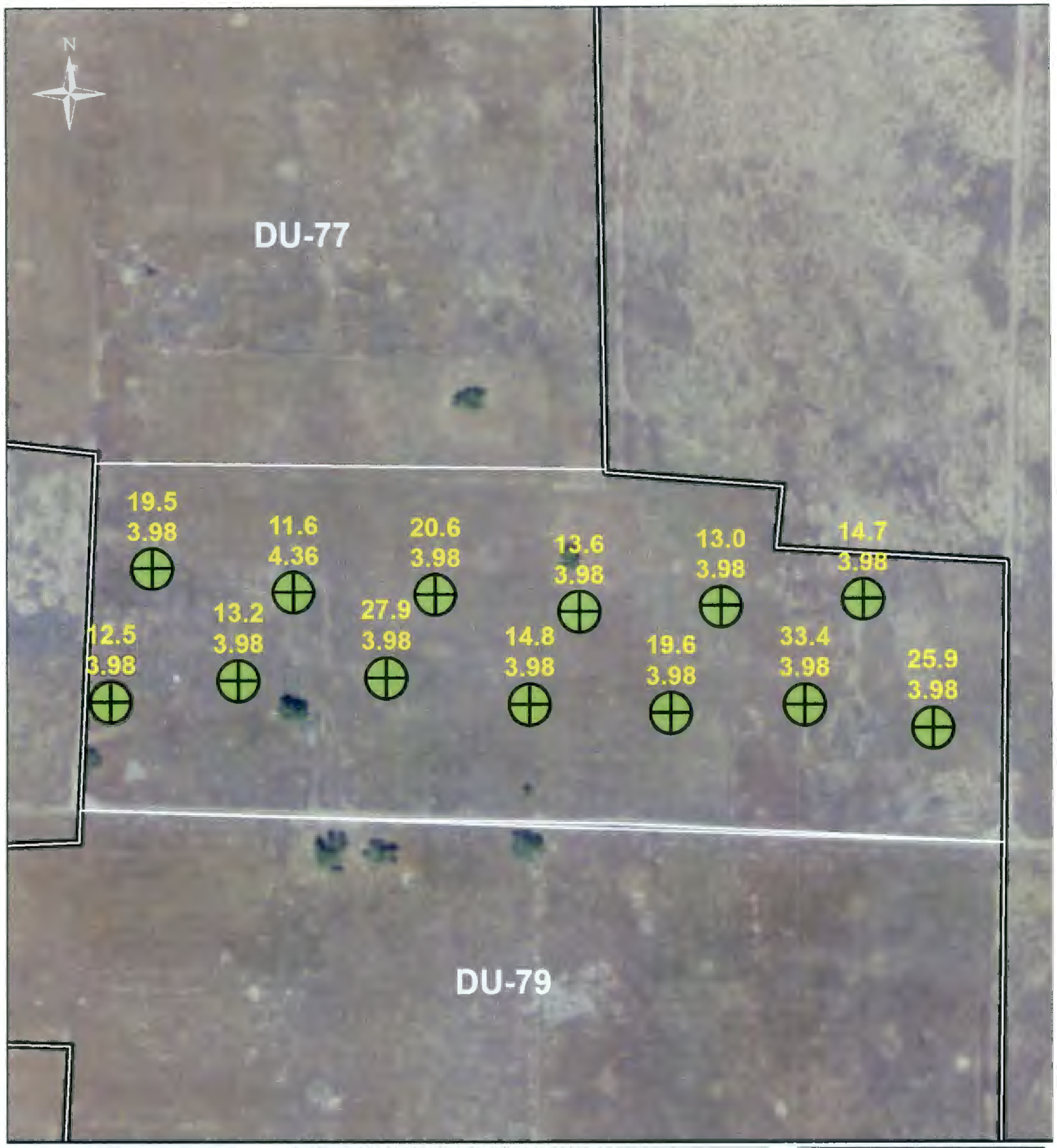
Figure A-79. DU-076 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-077		
Summary Statistics	**Lead**	**Arsenic**
Average	14.7	4.32
Standard Deviation	4.19	0.64
RSD	28.5%	14.7%
95% UCL[1]	15.9	4.72

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

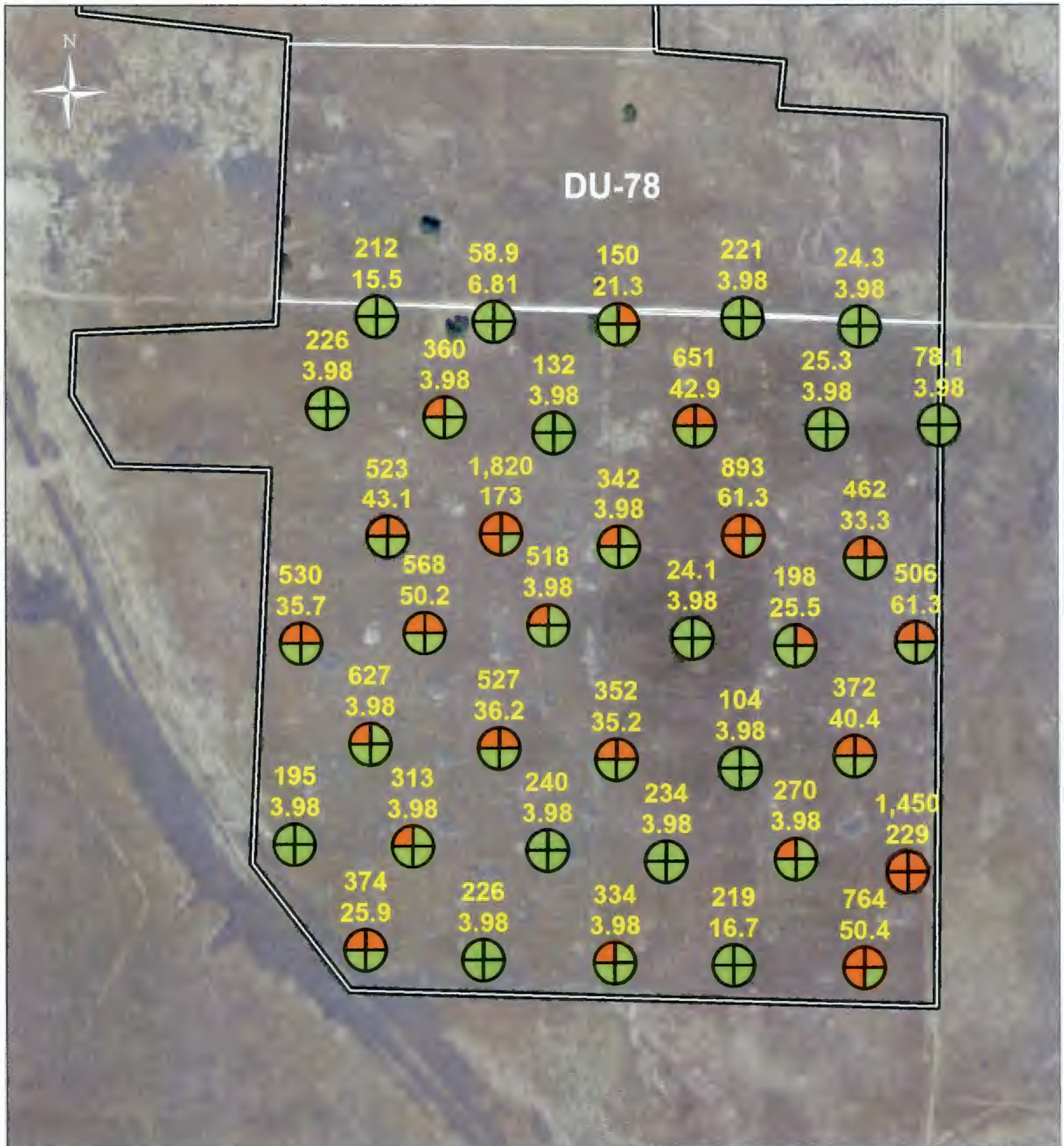
Figure A-80. DU-077 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-078		
Summary Statistics	Lead	Arsenic
Average	18.5	4.01
Standard Deviation	6.88	0.10
RSD	37.2%	2.53%
95% UCL[1,2]	22.9	4.36

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.
[2]Insufficient samples above detection to compute 95% UCL for arsenic; value replaced with MDL.

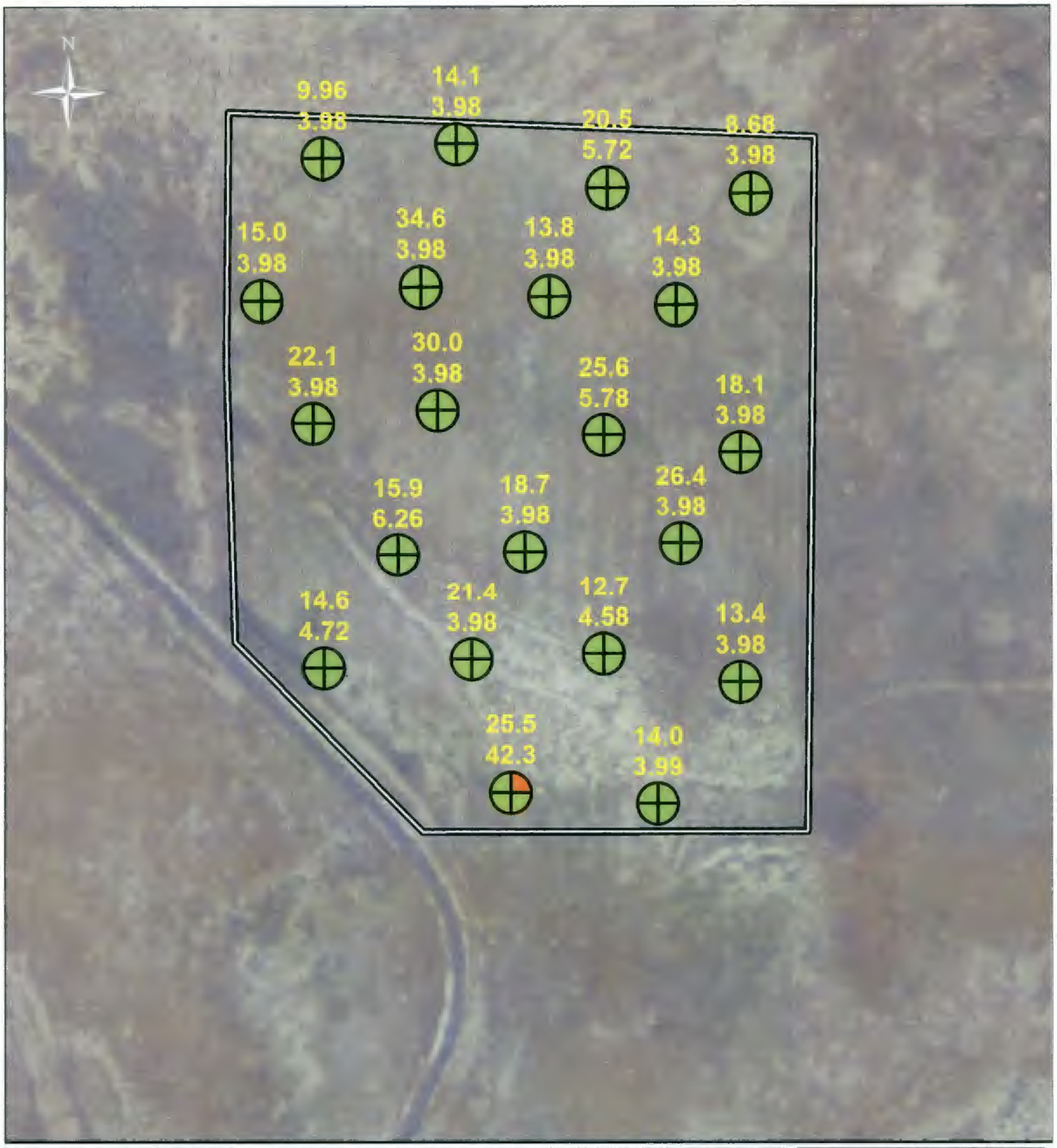
Figure A-81. DU-078 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

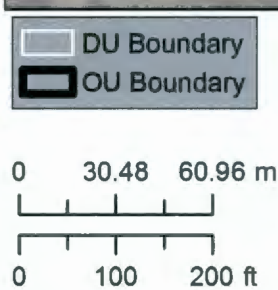


DU-079		
Summary Statistics	**Lead**	**Arsenic**
Average	398	28.4
Standard Deviation	364	45.0
RSD	91.5%	159%
95% UCL[1]	516	47.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-82. DU-079 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

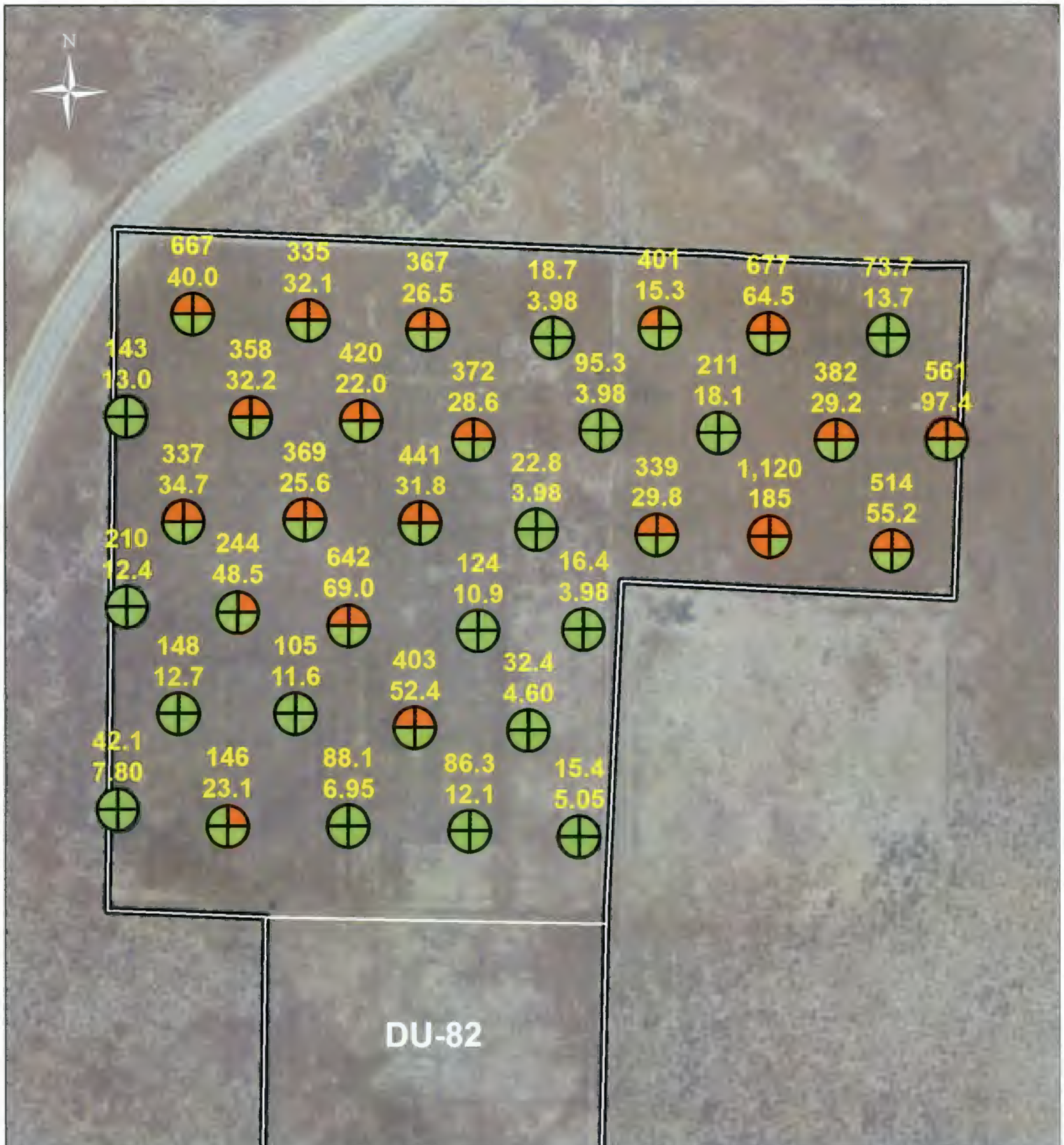




DU-080		
Summary Statistics	Lead	Arsenic
Average	18.5	6.15
Standard Deviation	6.78	8.12
RSD	36.6%	132%
95% UCL[1]	21.1	14.5

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

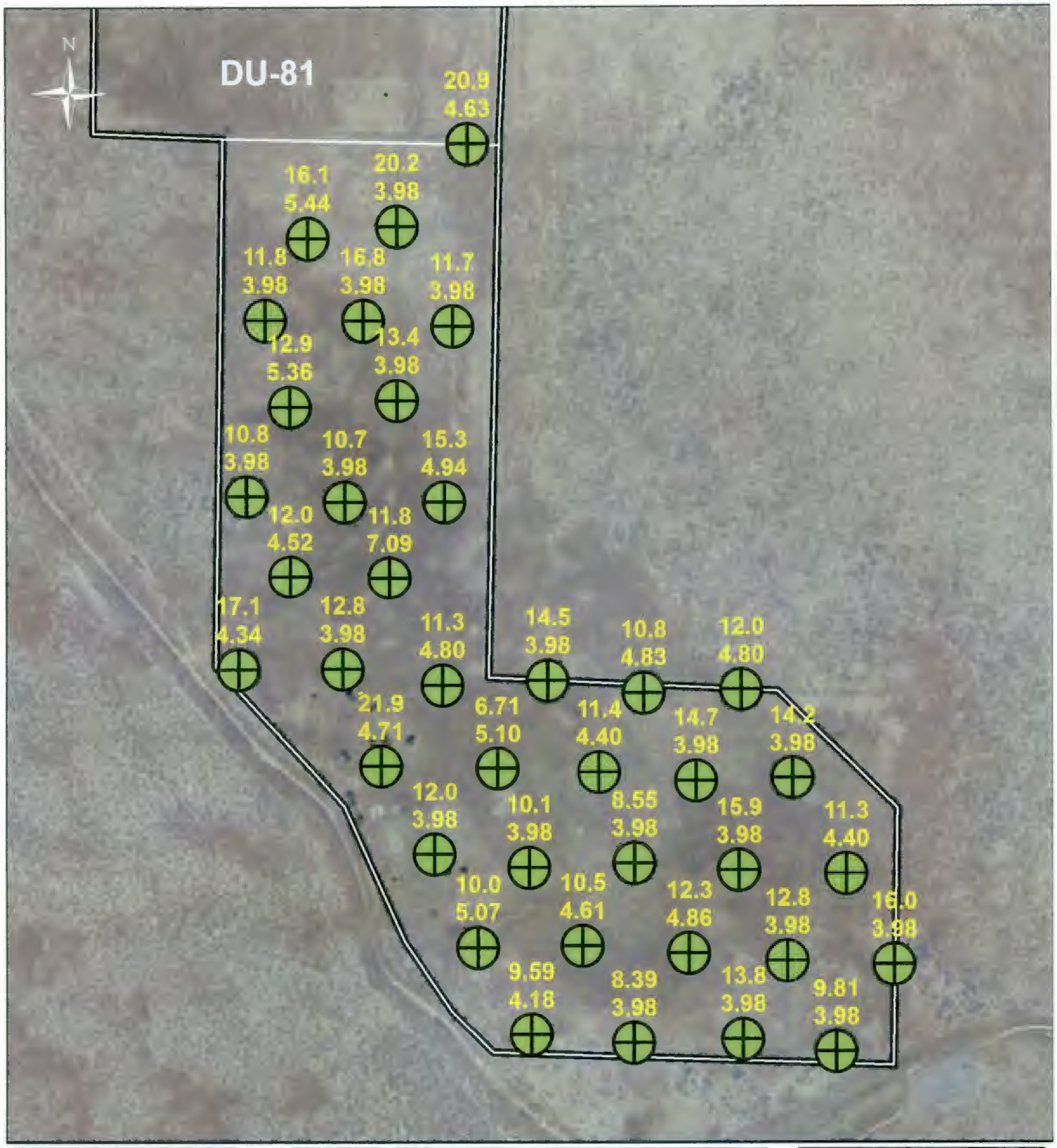
Figure A-83. DU-080 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

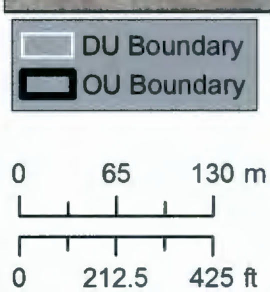


DU-081		
Summary Statistics	**Lead**	**Arsenic**
Average	292	30.2
Standard Deviation	242	33.6
RSD	83.0%	111%
95% UCL[1]	361	46.2

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-84. DU-081 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

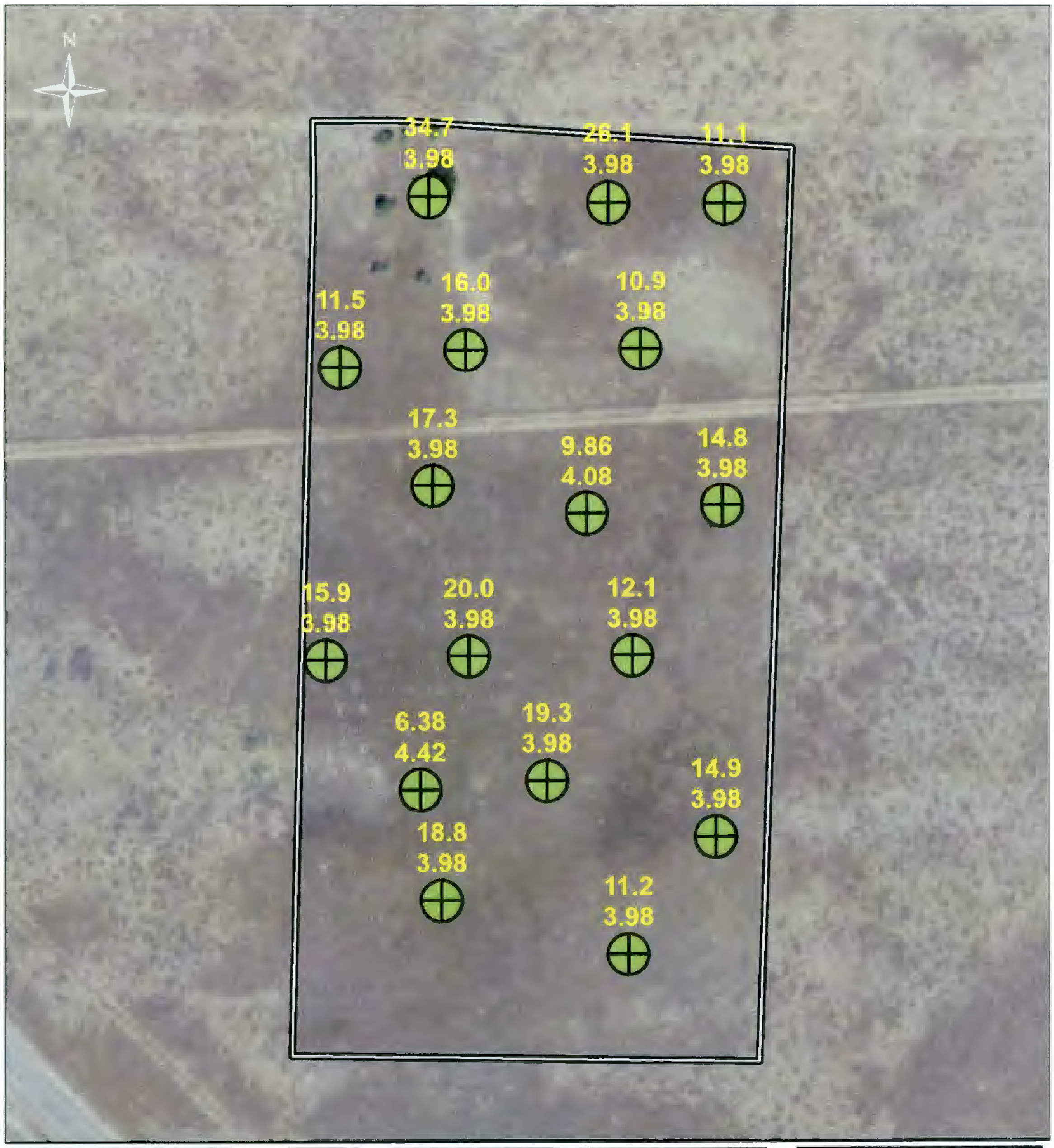




DU-082		
Summary Statistics	**Lead**	**Arsenic**
Average	13.0	4.41
Standard Deviation	3.38	0.63
RSD	26.1%	14.2%
95% UCL[1]	13.9	4.60

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

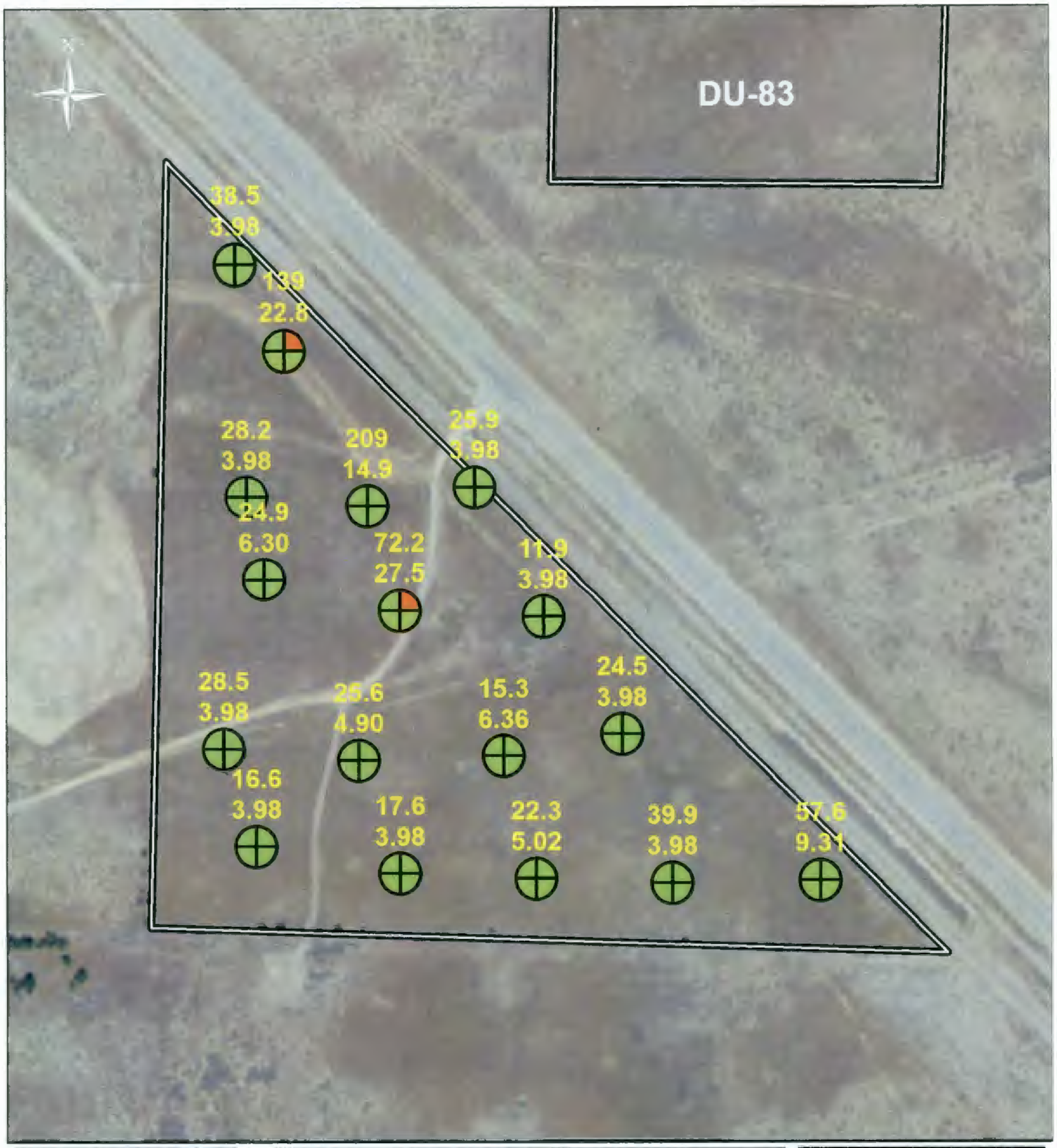
Figure A-85. DU-082 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-083		
Summary Statistics	**Lead**	**Arsenic**
Average	15.9	4.01
Standard Deviation	6.75	0.10
RSD	42.4%	2.61%
95% UCL[1]	18.8	4.07

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

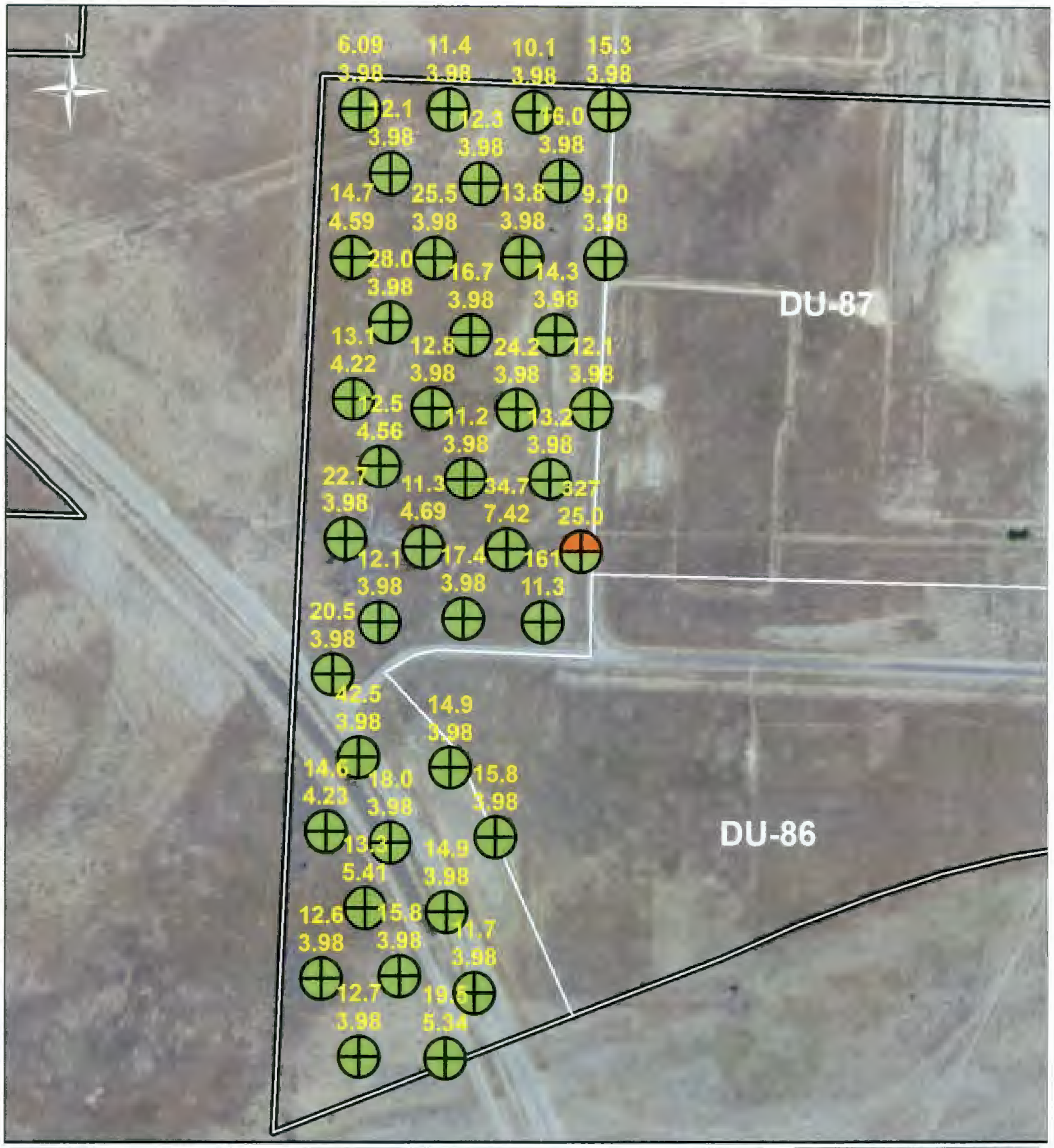
Figure A-86. DU-083 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

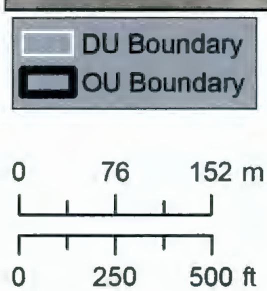


DU-084		
Summary Statistics	Lead	Arsenic
Average	47.0	7.82
Standard Deviation	51.9	6.93
RSD	110%	88.6%
95% UCL[1]	69.8	11.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-87. DU-084 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

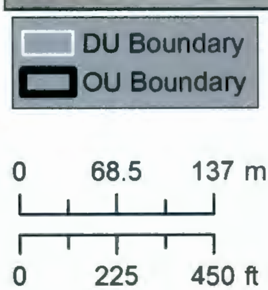




DU-085		
Summary Statistics	**Lead**	**Arsenic**
Average	27.3	4.88
Standard Deviation	53.4	3.42
RSD	196%	70.1%
95% UCL[1]	63.6	7.34

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

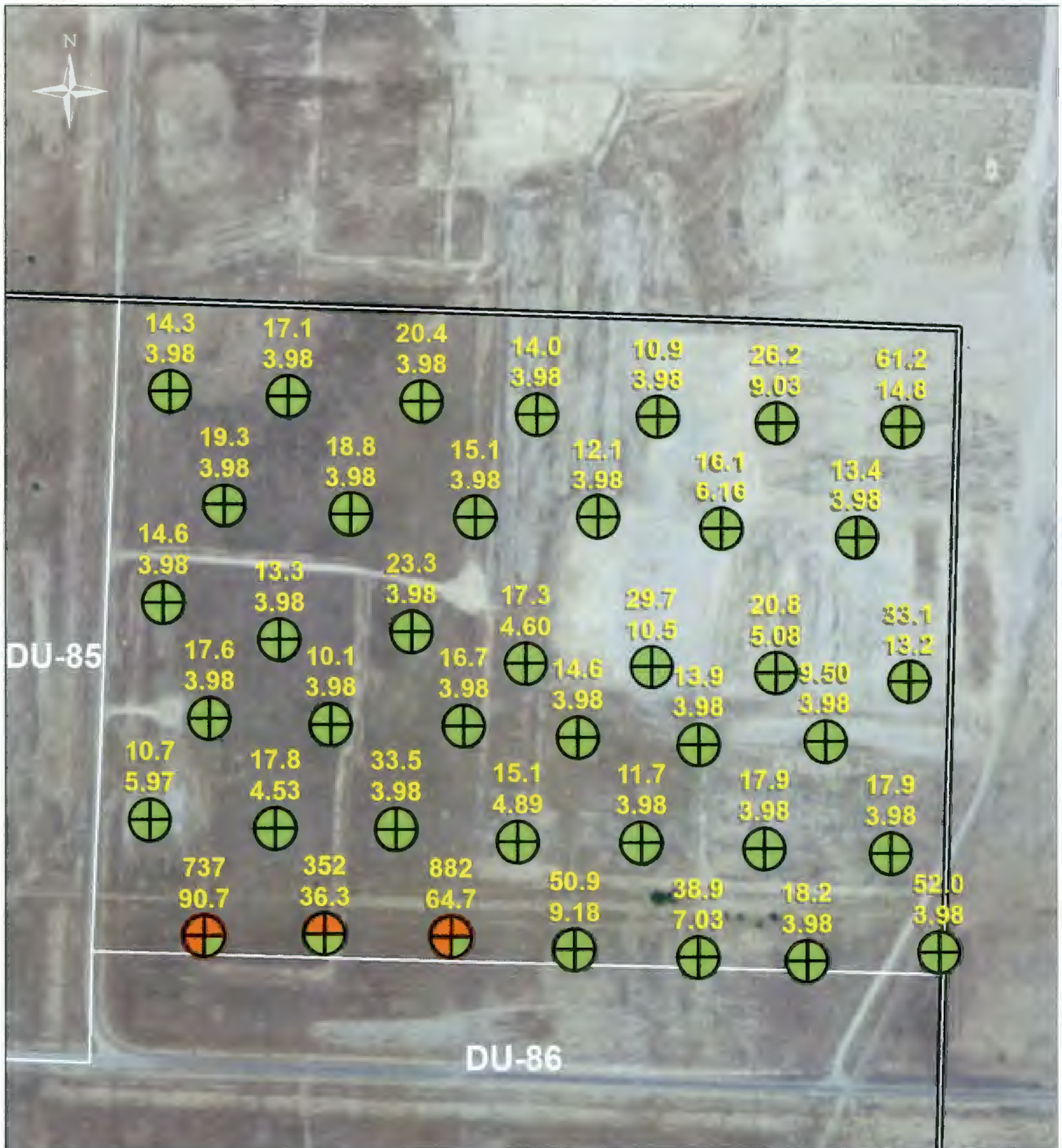
Figure A-88. DU-085 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

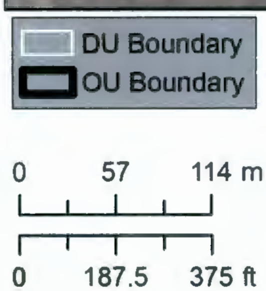


DU-086		
Summary Statistics	Lead	Arsenic
Average	187	19.9
Standard Deviation	198	18.5
RSD	106%	93.3%
95% UCL[1]	290	32.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-89. DU-086 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

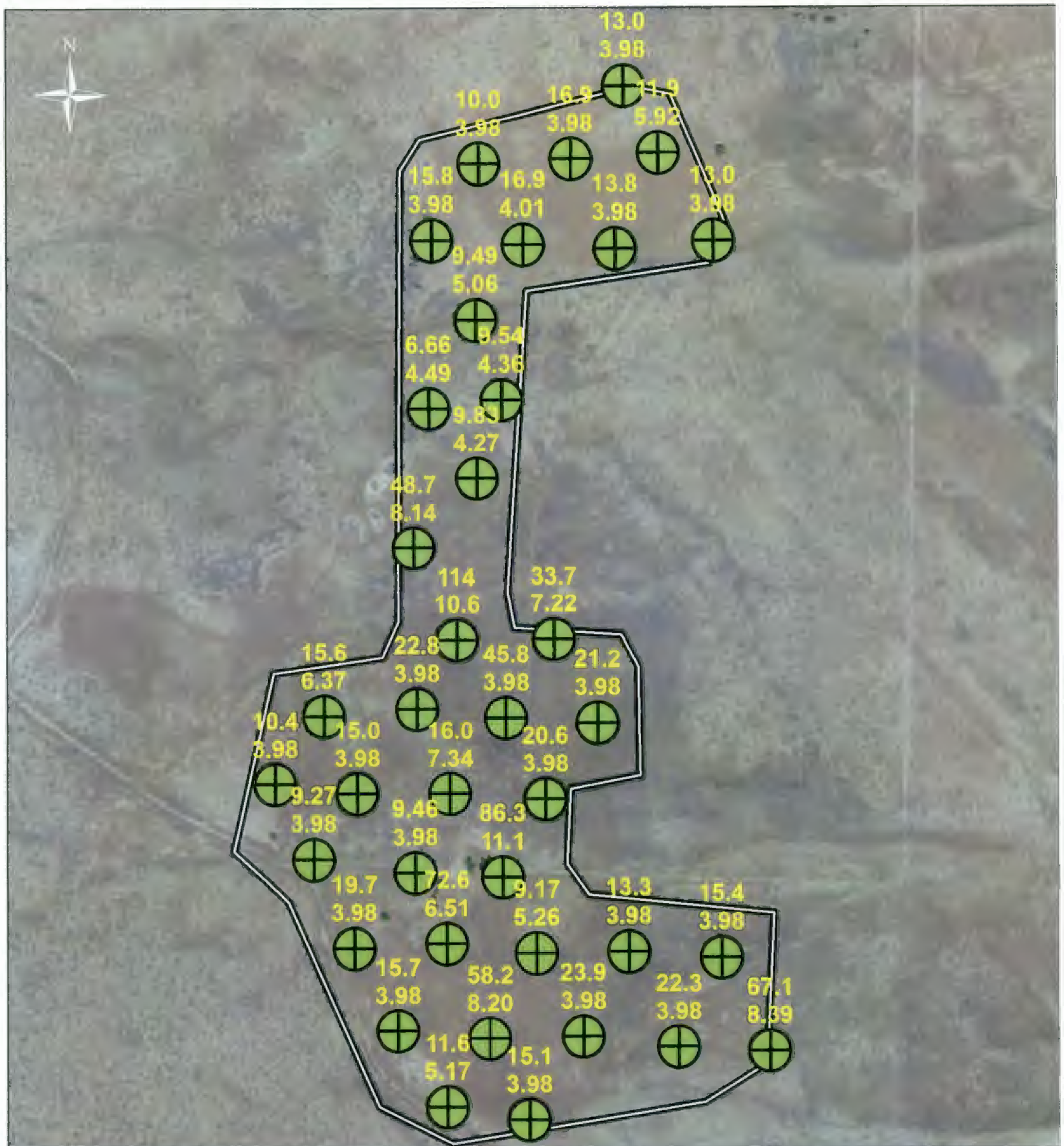


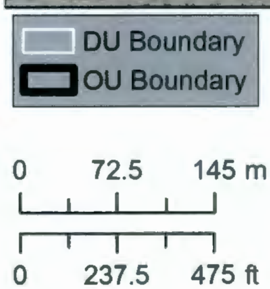


DU-087		
Summary Statistics	**Lead**	**Arsenic**
Average	68.7	9.65
Standard Deviation	181	16.8
RSD	263%	174%
95% UCL[1]	194	10.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-90. DU-087 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

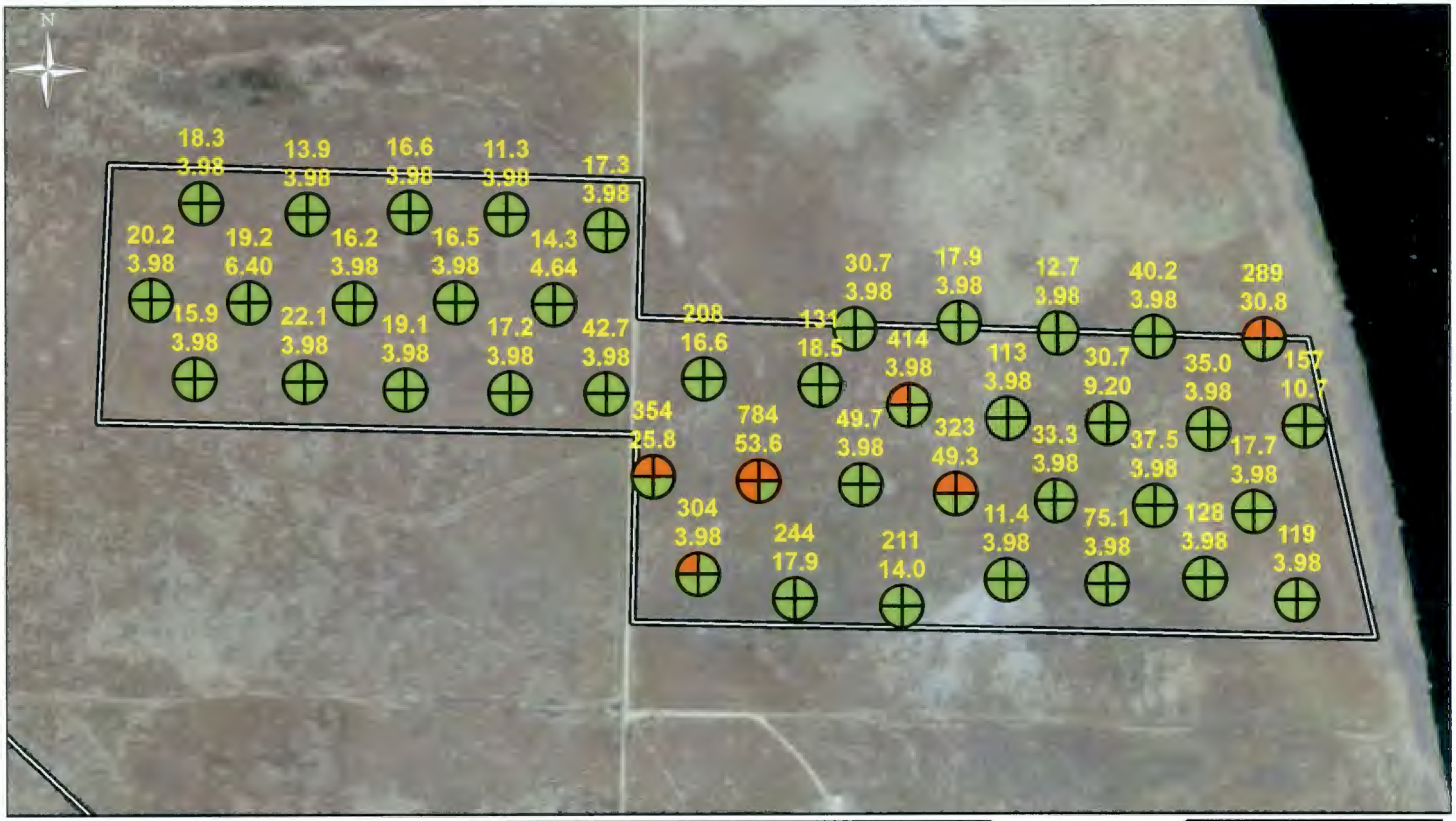


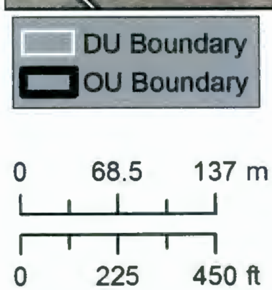


DU-088		
Summary Statistics	Lead	Arsenic
Average	25.2	5.16
Standard Deviation	24.3	1.91
RSD	96.1%	37.1%
95% UCL[1]	42.4	5.70

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-91. DU-088 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

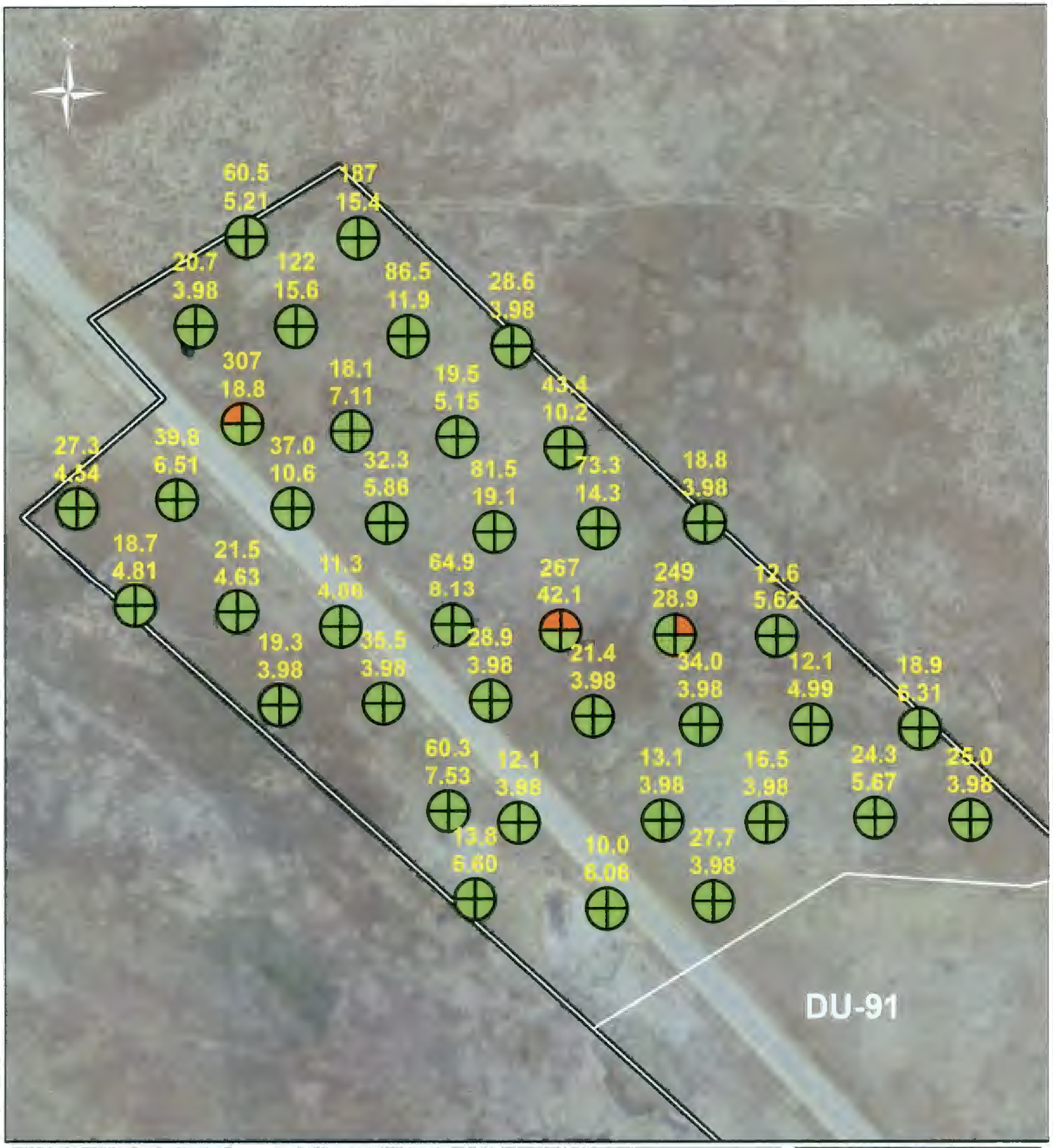


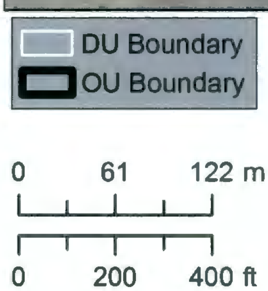


DU-089		
Summary Statistics	**Lead**	**Arsenic**
Average	109	9.10
Standard Deviation	155	11.5
RSD	143%	126%
95% UCL[1]	214	12.2

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-92. DU-089 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

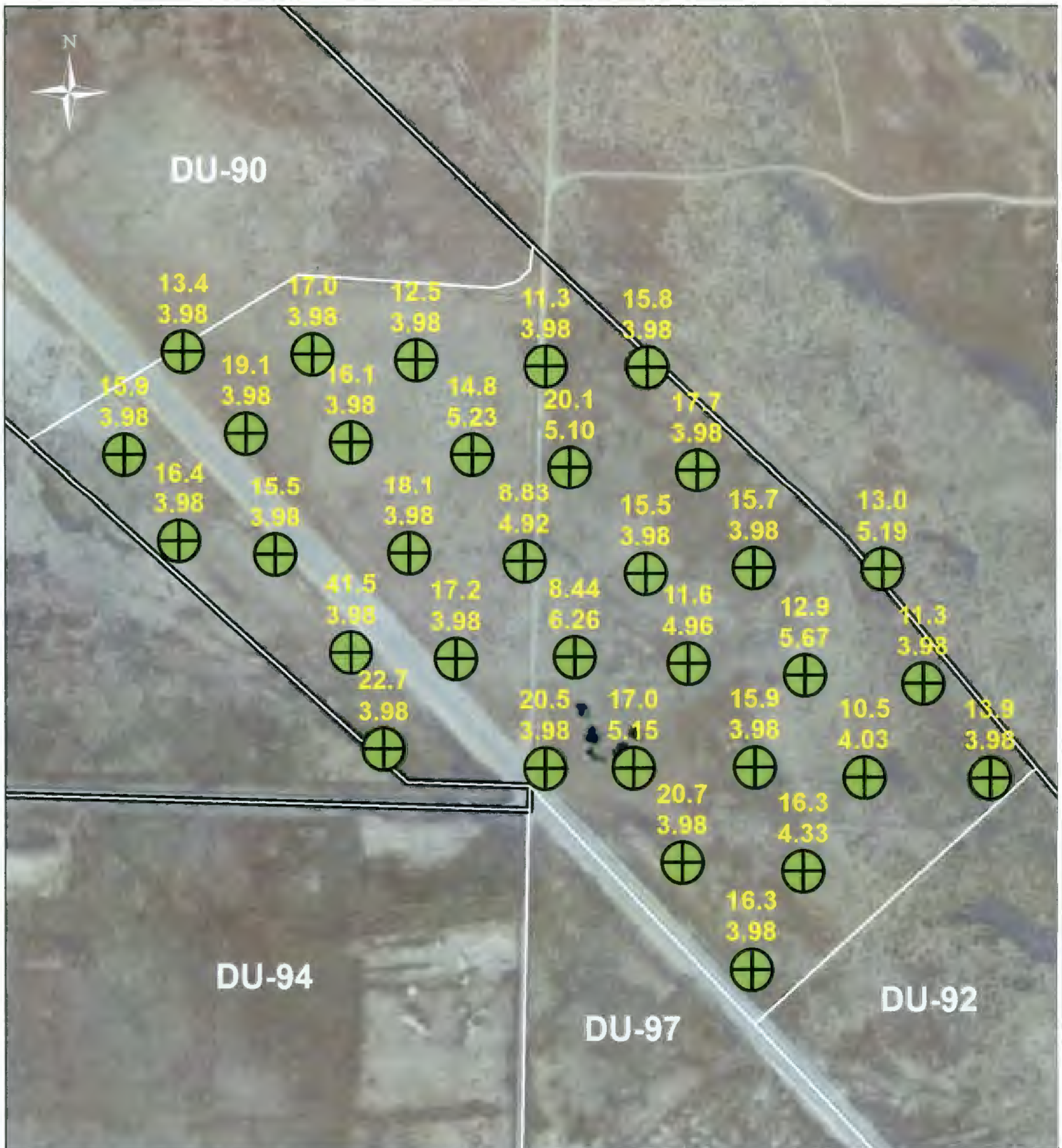




DU-090		
Summary Statistics	**Lead**	**Arsenic**
Average	55.5	8.46
Standard Deviation	72.0	7.61
RSD	130%	90.0%
95% UCL[1]	105	13.8

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

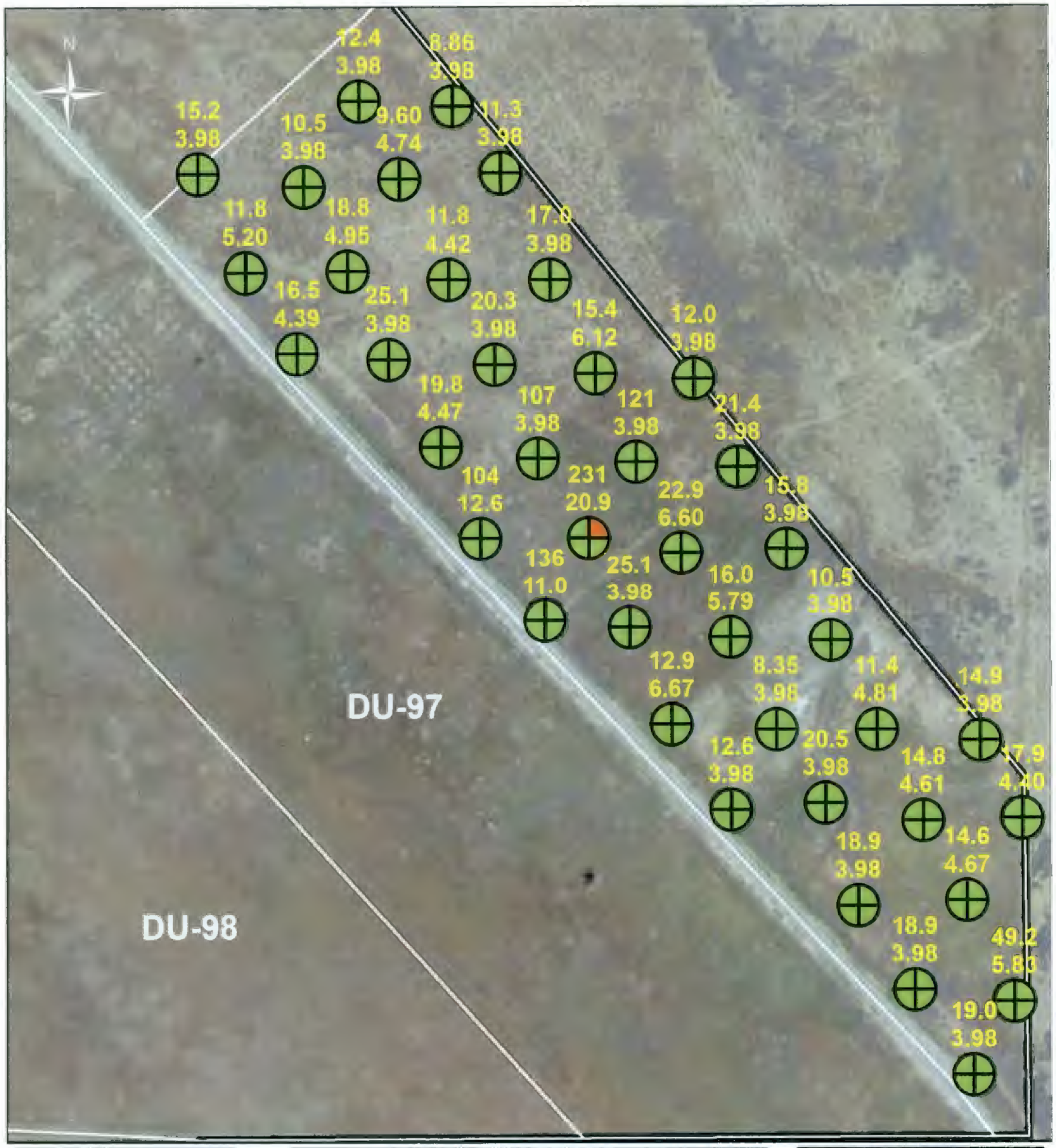
Figure A-93. DU-090 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-091		
Summary Statistics	Lead	Arsenic
Average	16.2	4.31
Standard Deviation	5.65	0.60
RSD	35.0%	14.0%
95% UCL[1]	17.8	4.50

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

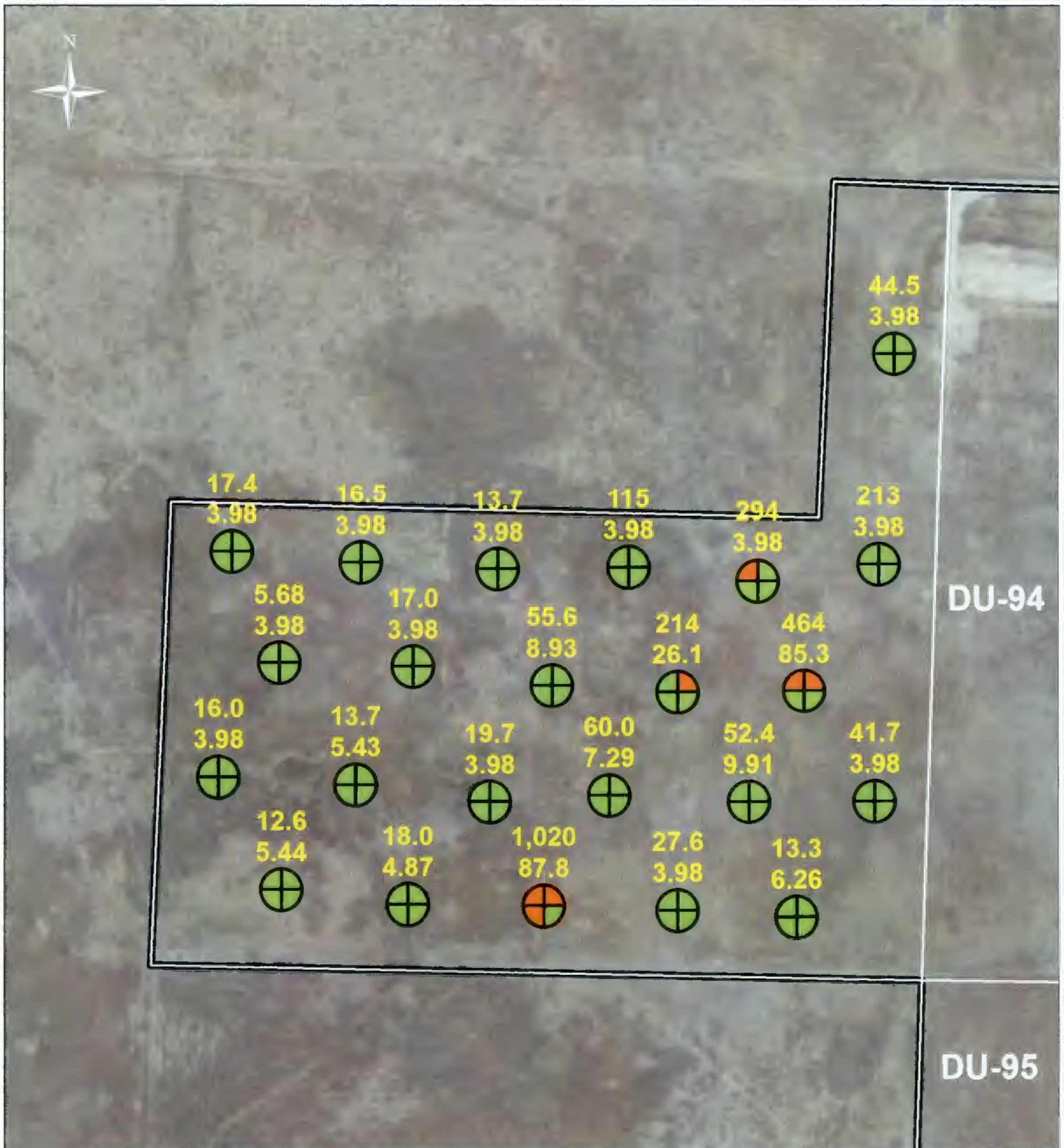
Figure A-94. DU-091 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

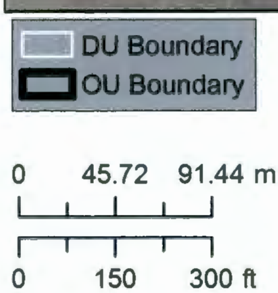


DU-092		
Summary Statistics	Lead	Arsenic
Average	32.0	5.24
Standard Deviation	45.1	3.06
RSD	141%	58.5%
95% UCL[1]	63.1	6.18

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-95. DU-092 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

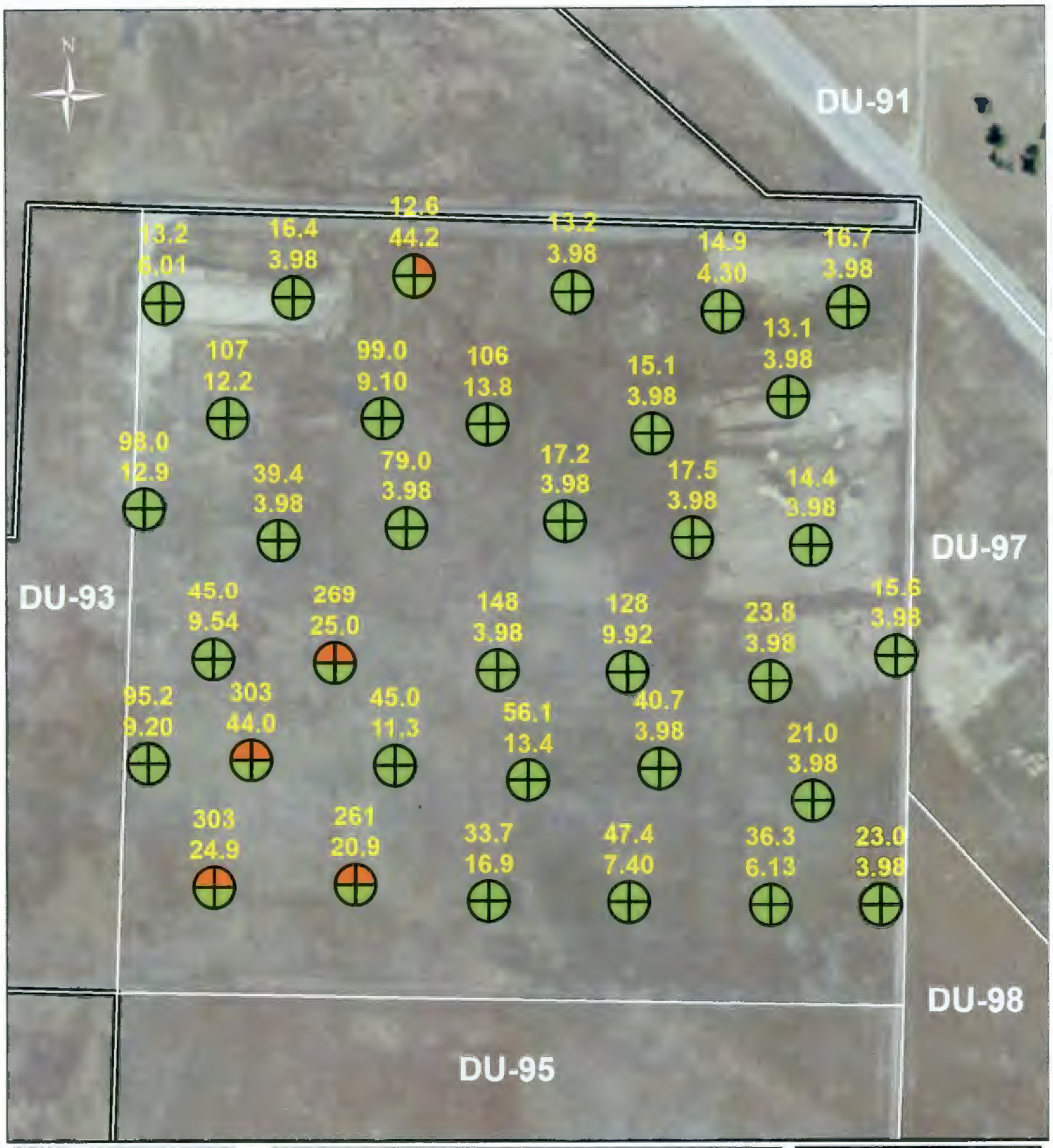


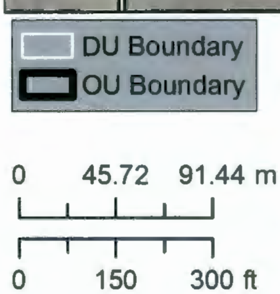


DU-093		
Summary Statistics	**Lead**	**Arsenic**
Average	120	13.0
Standard Deviation	221	23.2
RSD	184%	178%
95% UCL[1]	326	35.2

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-96. DU-093 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

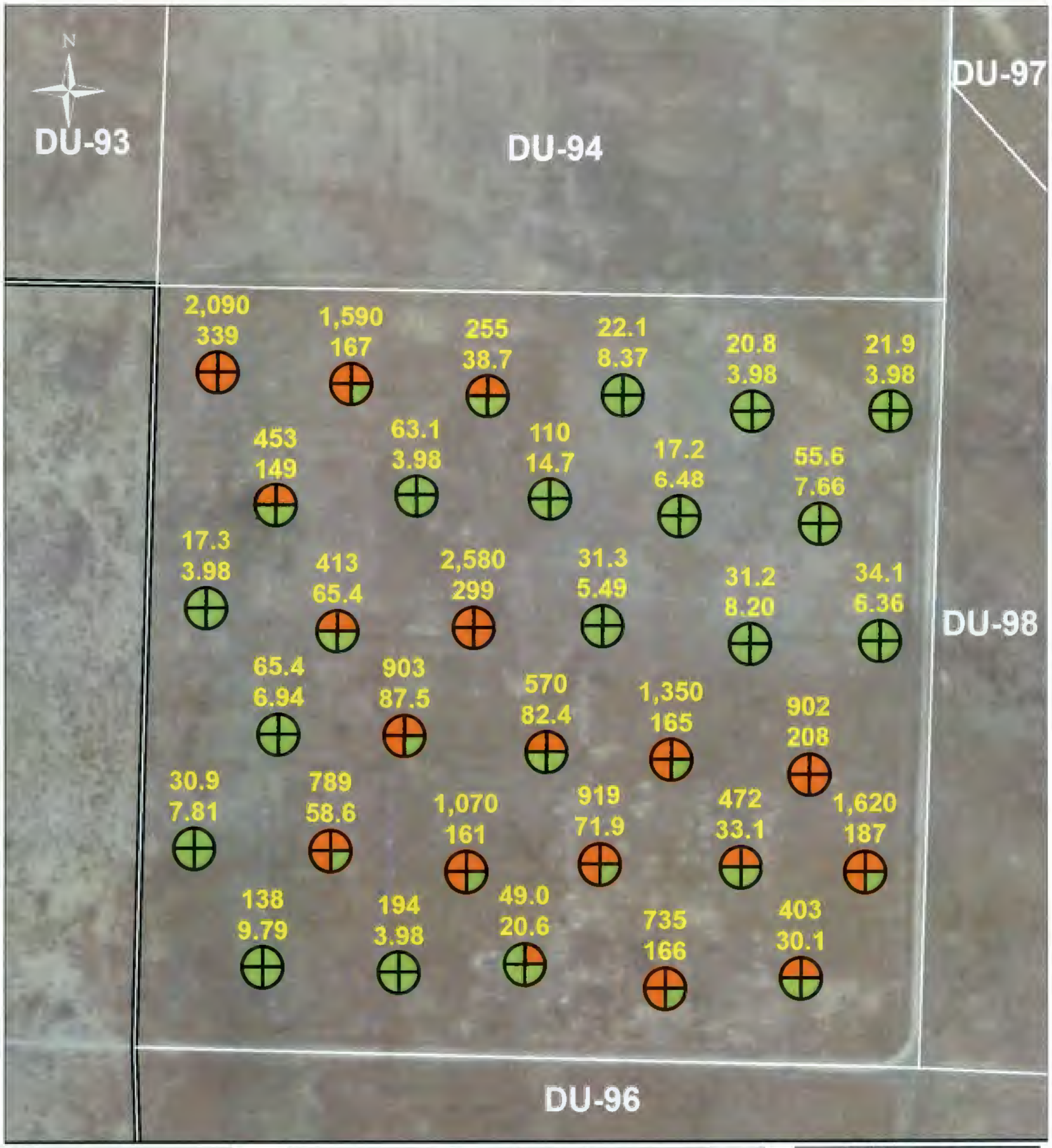




DU-094		
Summary Statistics	**Lead**	**Arsenic**
Average	73.9	10.4
Standard Deviation	85.4	10.2
RSD	115%	97.6%
95% UCL[1]	137	17.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

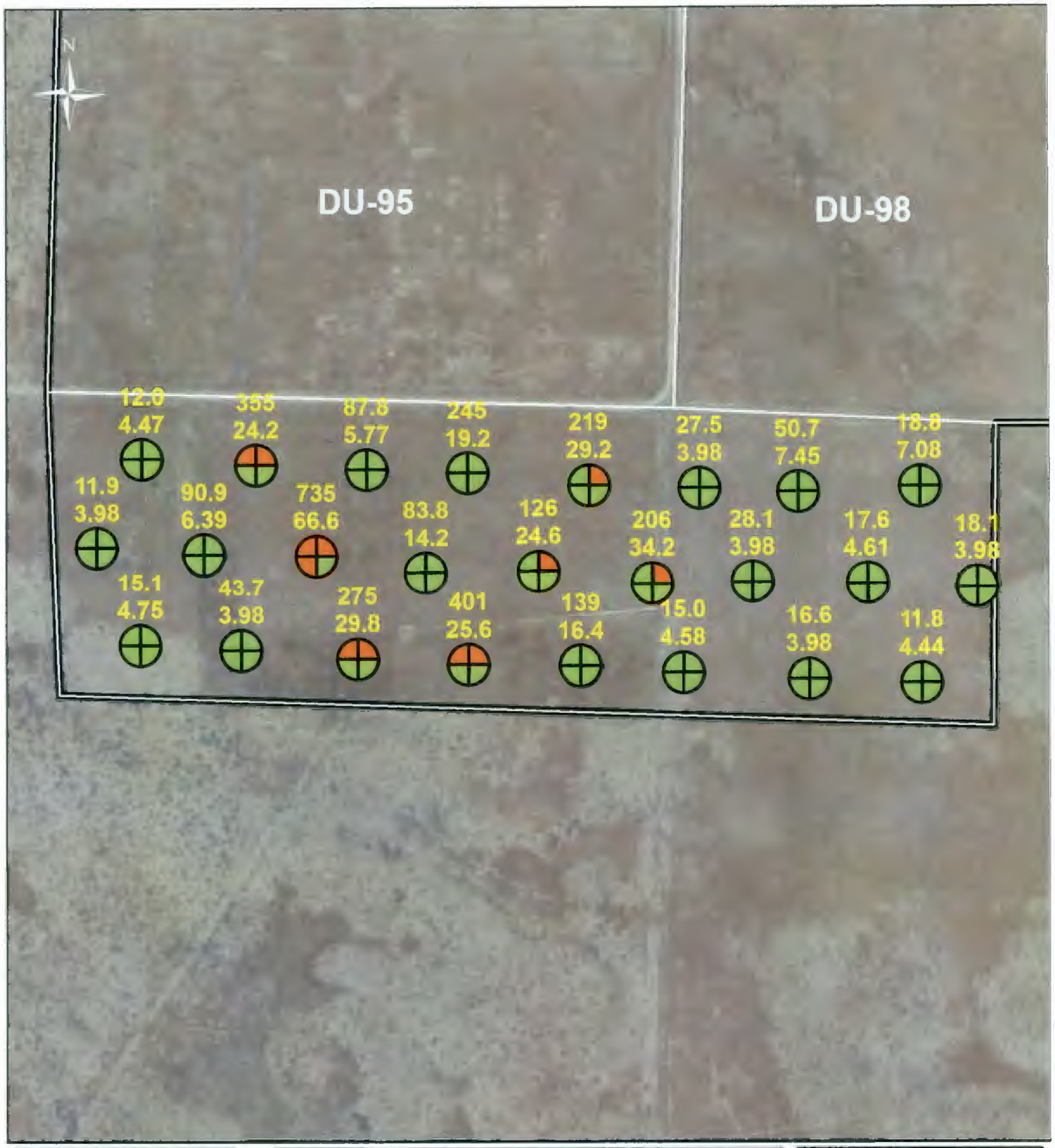
Figure A-97. DU-094 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-095		
Summary Statistics	**Lead**	**Arsenic**
Average	546	73.6
Standard Deviation	665	89.8
RSD	122%	122%
95% UCL[1]	1050	112

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

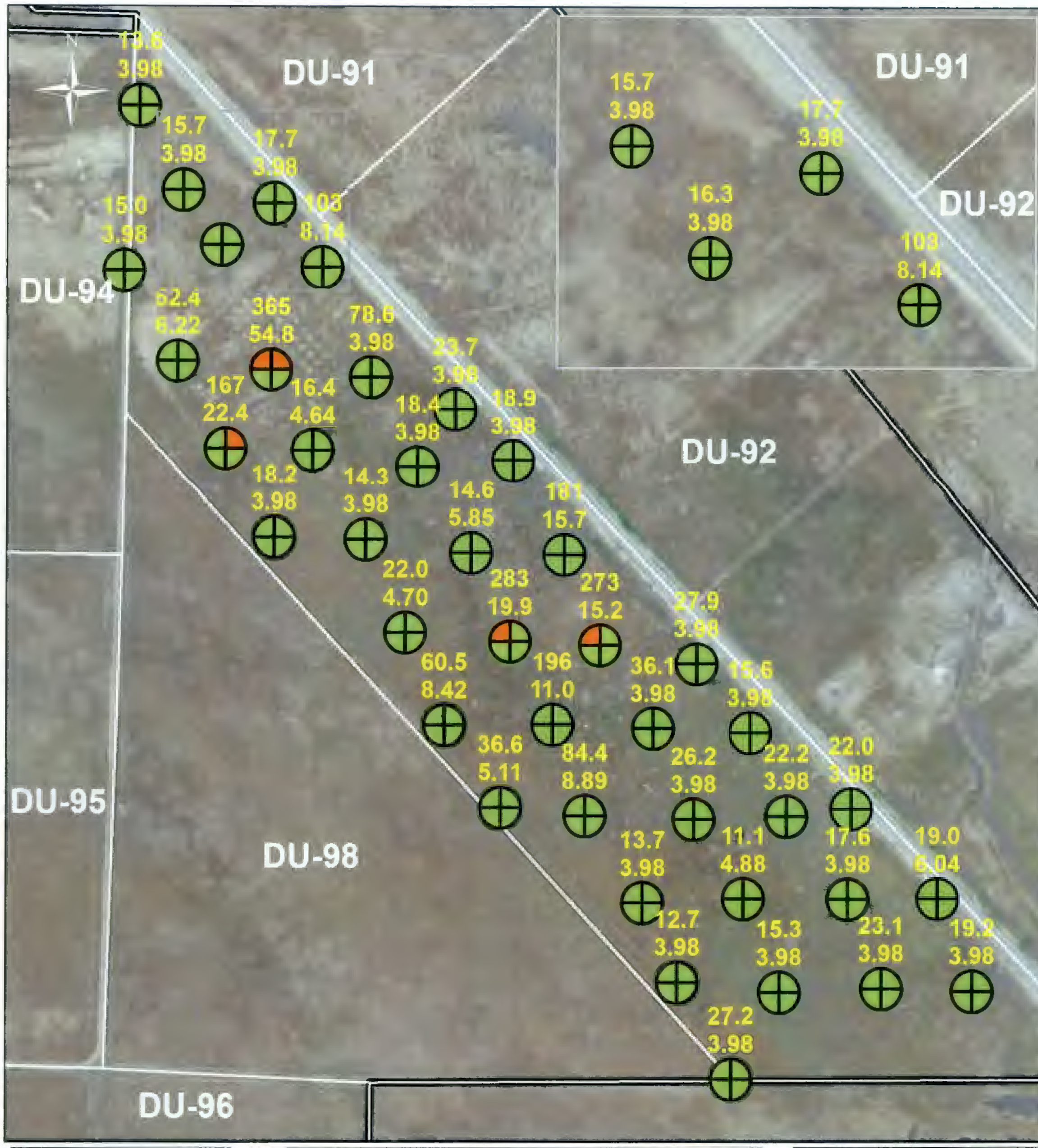
Figure A-98. DU-095 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

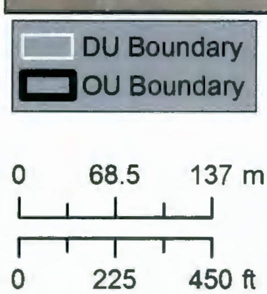


DU-096		
Summary Statistics	Lead	Arsenic
Average	130	14.3
Standard Deviation	170	14.6
RSD	131%	102%
95% UCL[1]	306	21.2

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-99. DU-096 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

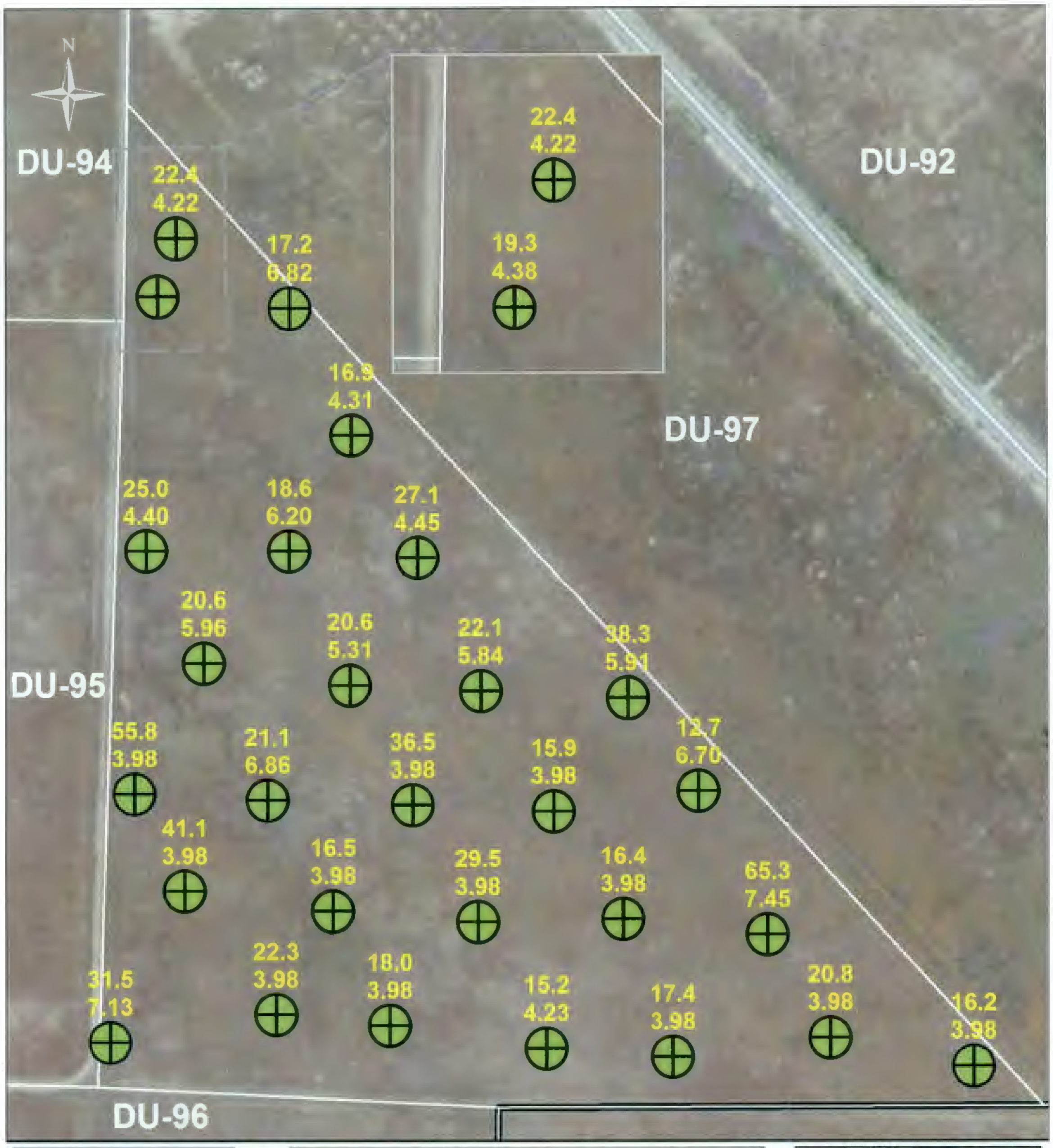




DU-097		
Summary Statistics	**Lead**	**Arsenic**
Average	60.4	7.43
Standard Deviation	85.4	8.78
RSD	141%	118%
95% UCL[1]	119	10.7

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

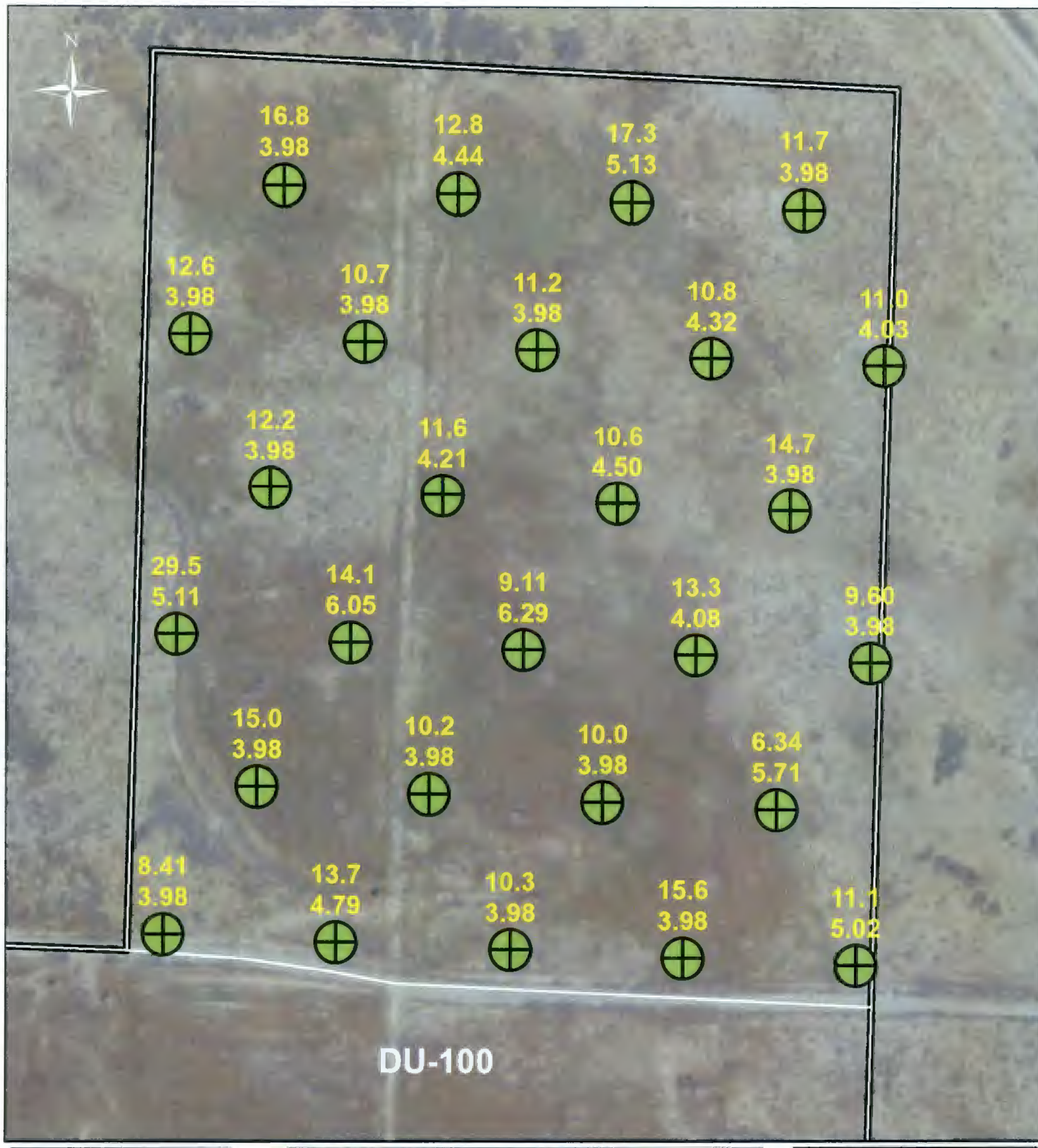
Figure A-100. DU-097 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-098		
Summary Statistics	Lead	Arsenic
Average	25.0	4.93
Standard Deviation	12.4	1.18
RSD	49.7%	24.0%
95% UCL[1]	29.0	5.33

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

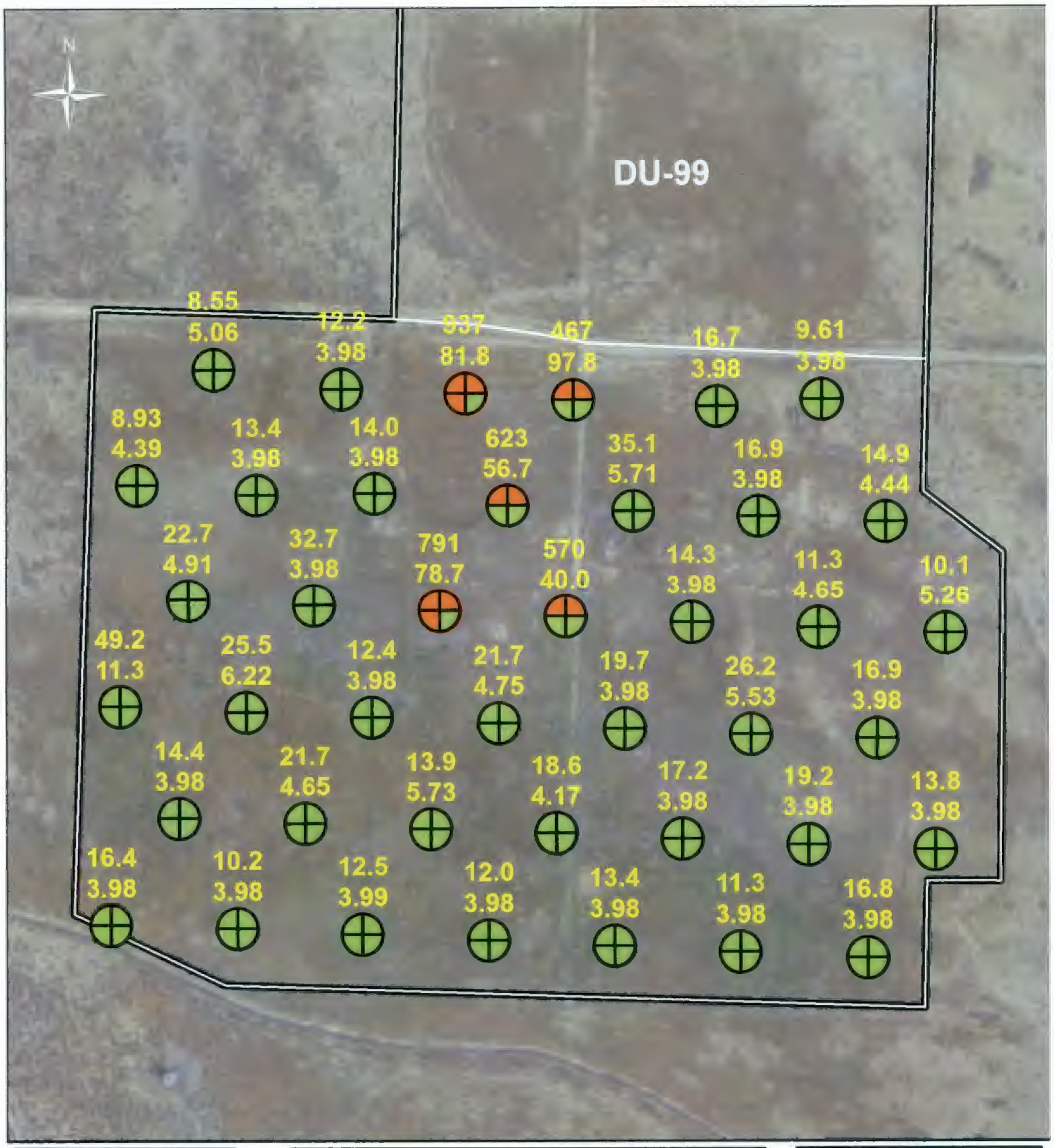
Figure A-101. DU-098 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

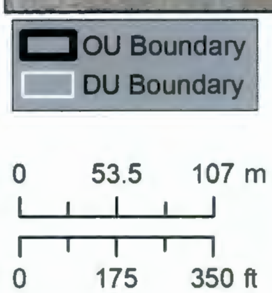


DU-099		
Summary Statistics	Lead	Arsenic
Average	12.6	4.42
Standard Deviation	4.22	0.68
RSD	33.5%	15.3%
95% UCL[1]	14.0	4.65

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-102. DU-099 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

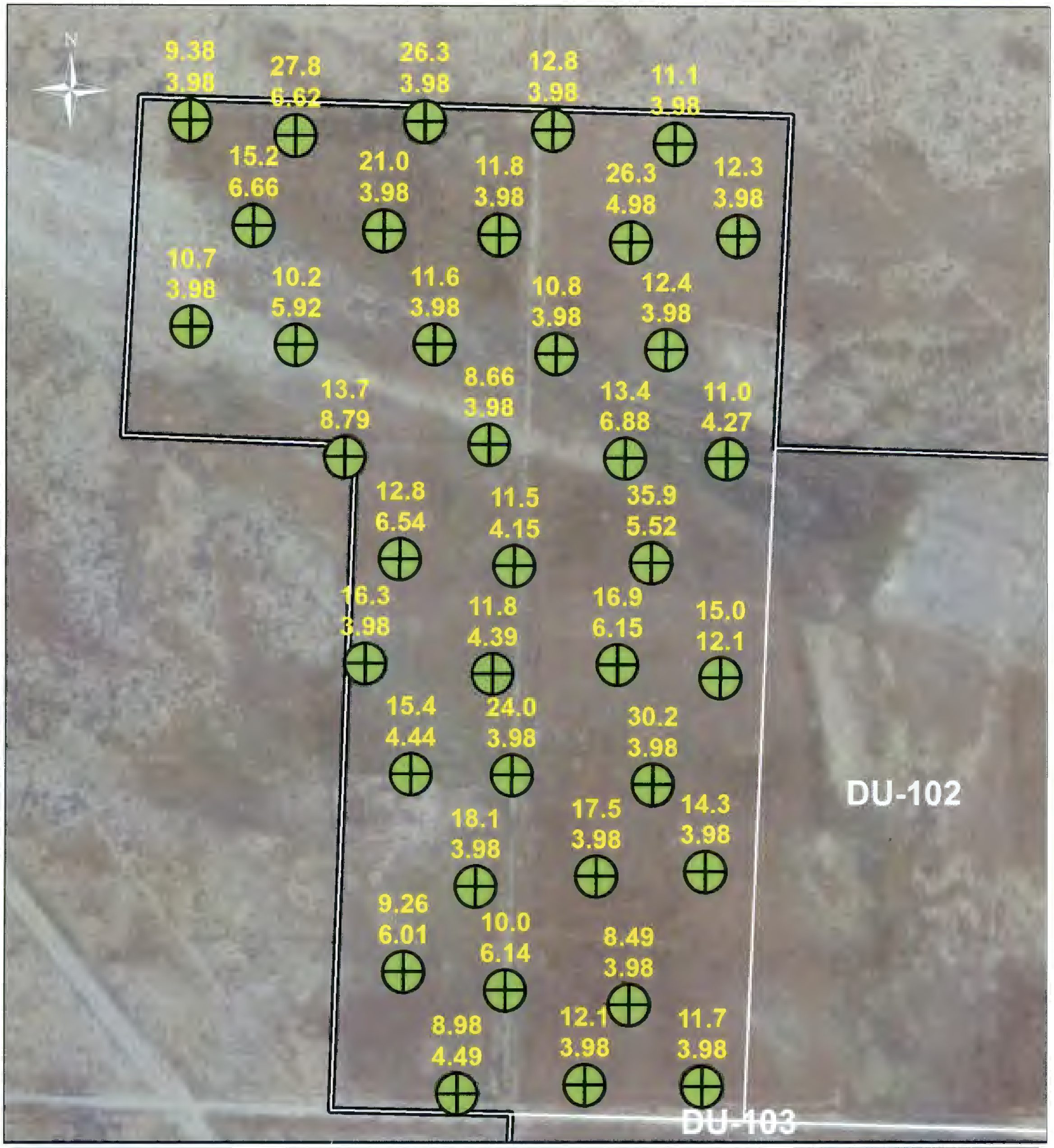


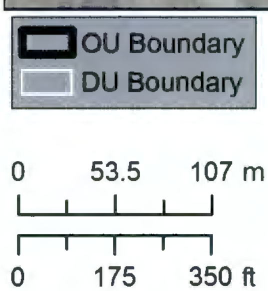


DU-100		
Summary Statistics	Lead	Arsenic
Average	97.9	12.7
Standard Deviation	227	22.9
RSD	232%	181%
95% UCL[1]	252	28.7

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-103. DU-100 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

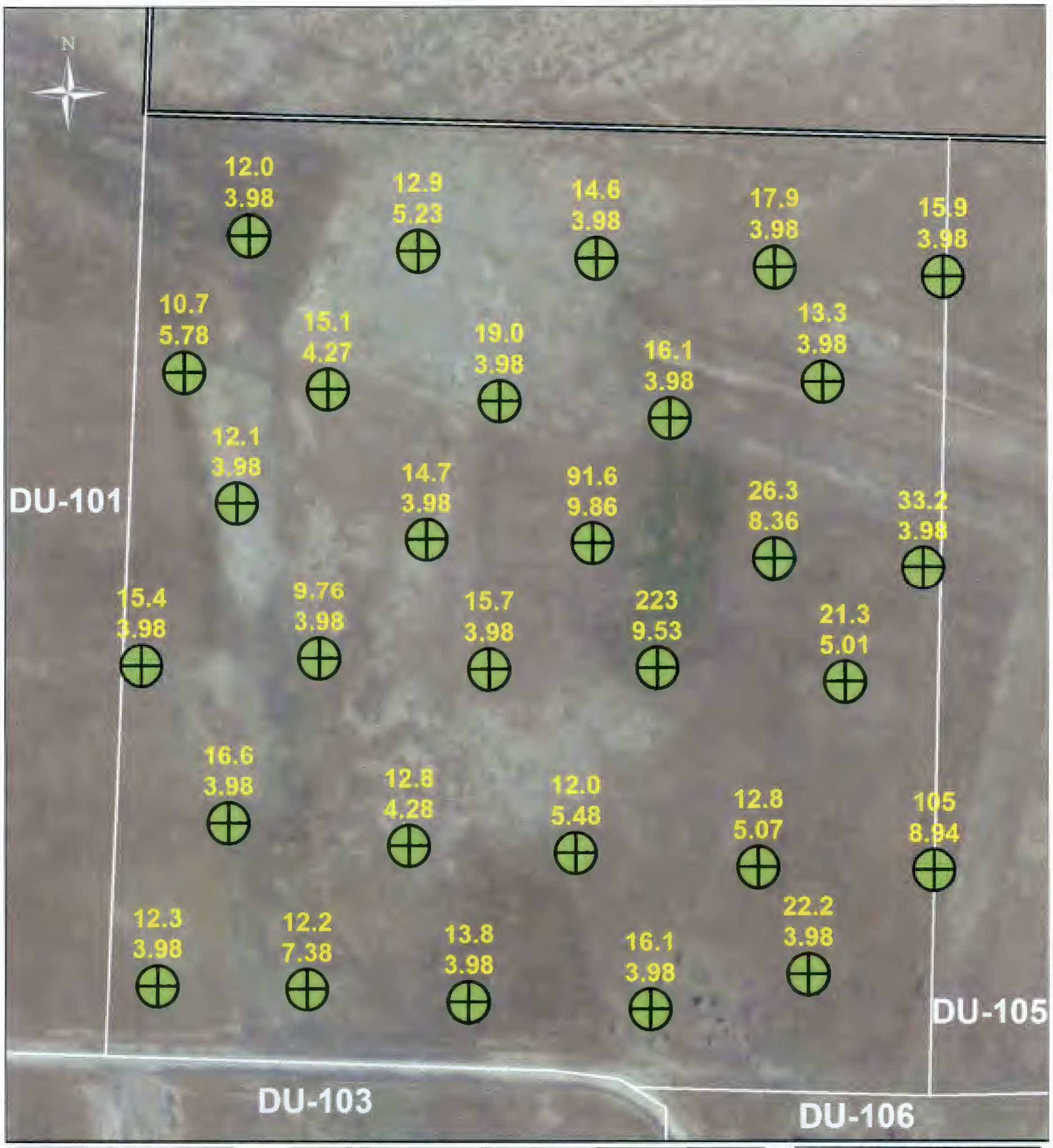


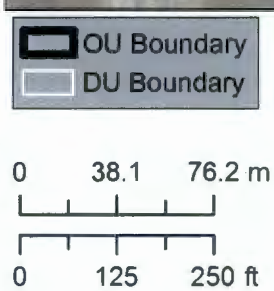


DU-101		
Summary Statistics	**Lead**	**Arsenic**
Average	15.2	4.94
Standard Deviation	6.60	1.66
RSD	43.5%	33.6%
95% UCL[1]	17.0	5.46

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-104. DU-101 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

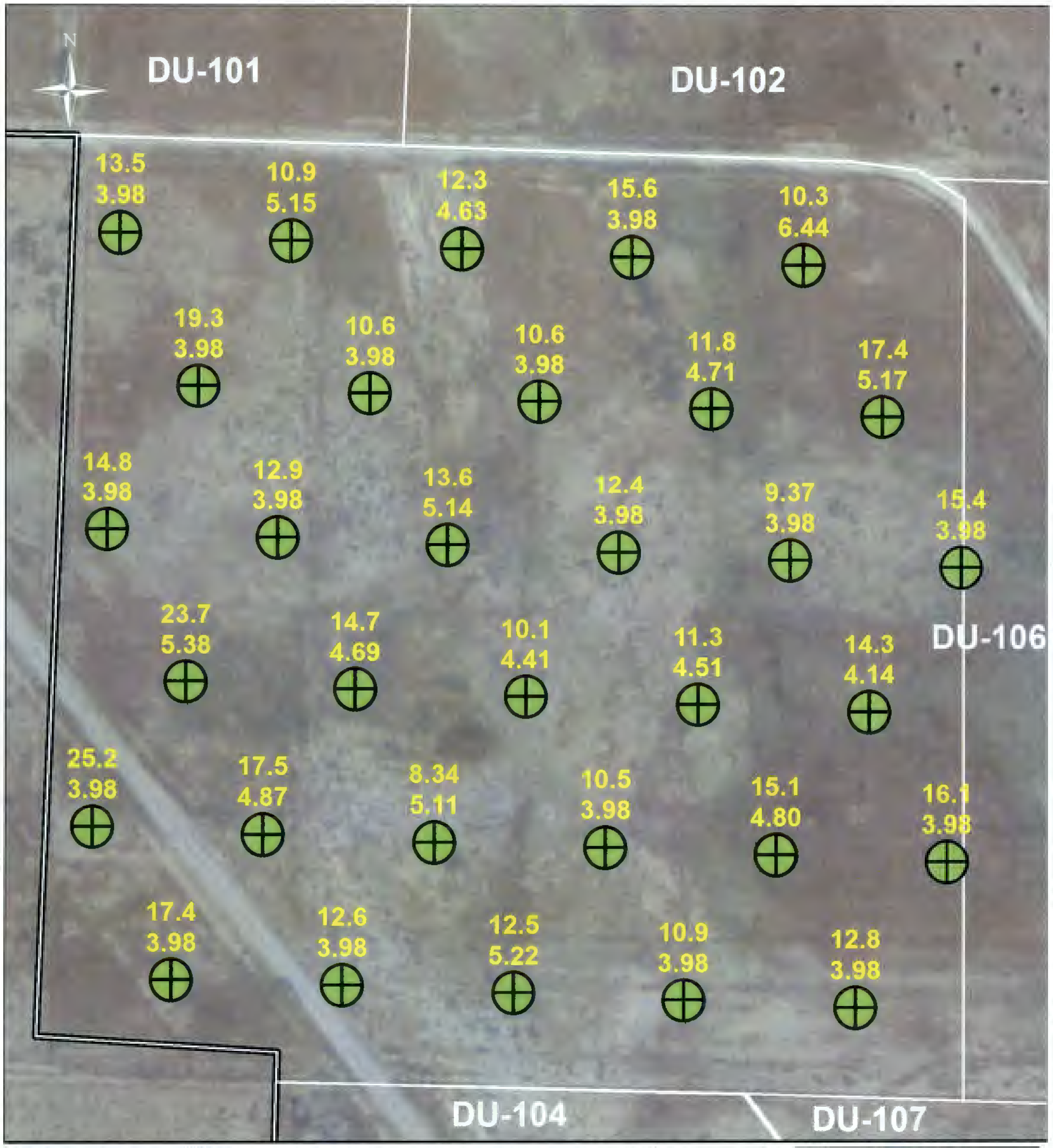




DU-102		
Summary Statistics	**Lead**	**Arsenic**
Average	28.2	5.03
Standard Deviation	42.6	1.80
RSD	151%	35.8%
95% UCL[1]	62.1	5.61

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

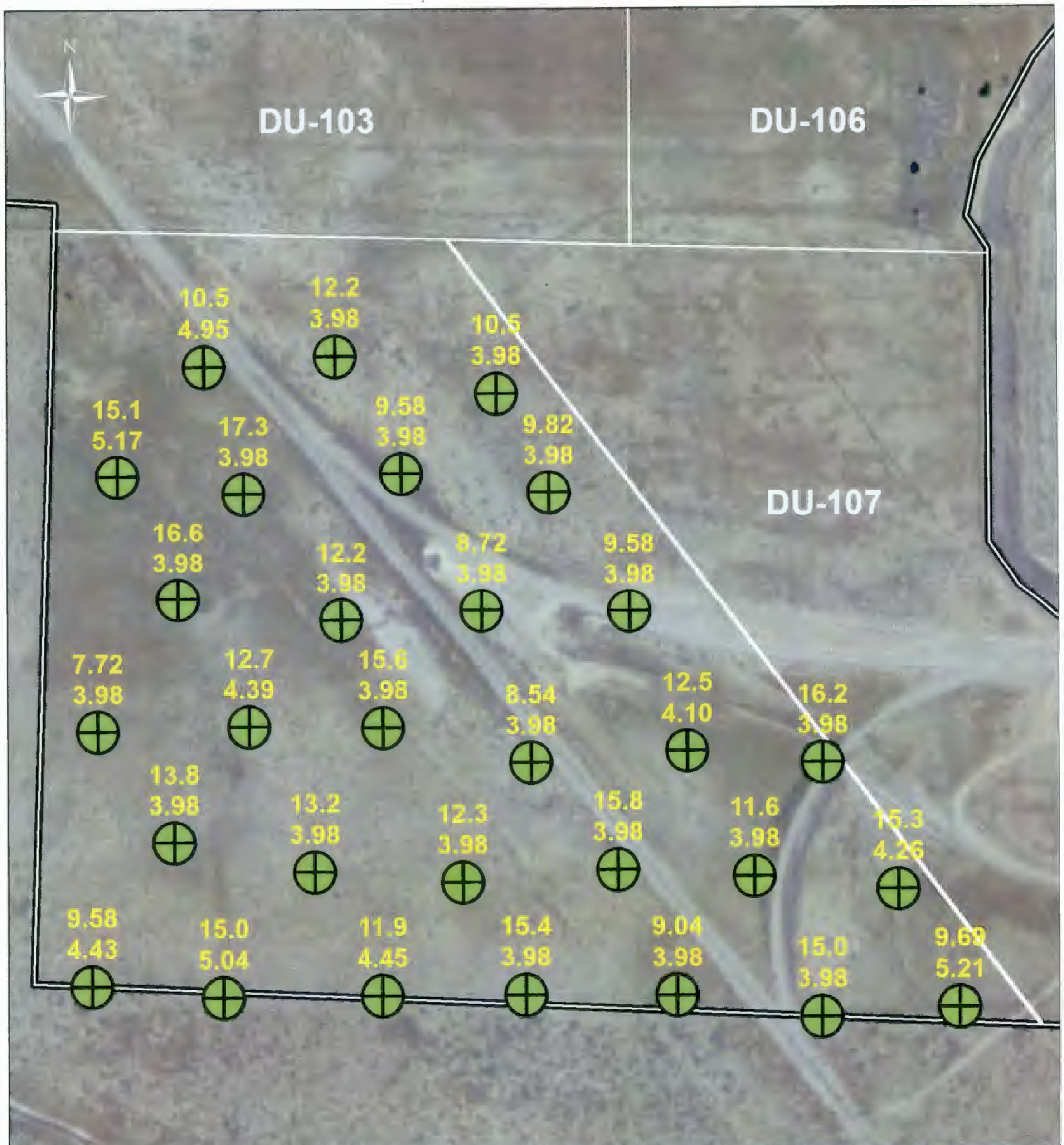
Figure A-105. DU-102 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-103		
Summary Statistics	**Lead**	**Arsenic**
Average	13.9	4.44
Standard Deviation	3.84	0.60
RSD	27.7%	13.6%
95% UCL[1]	15.0	4.63

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-106. DU-103 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



OU Boundary
DU Boundary

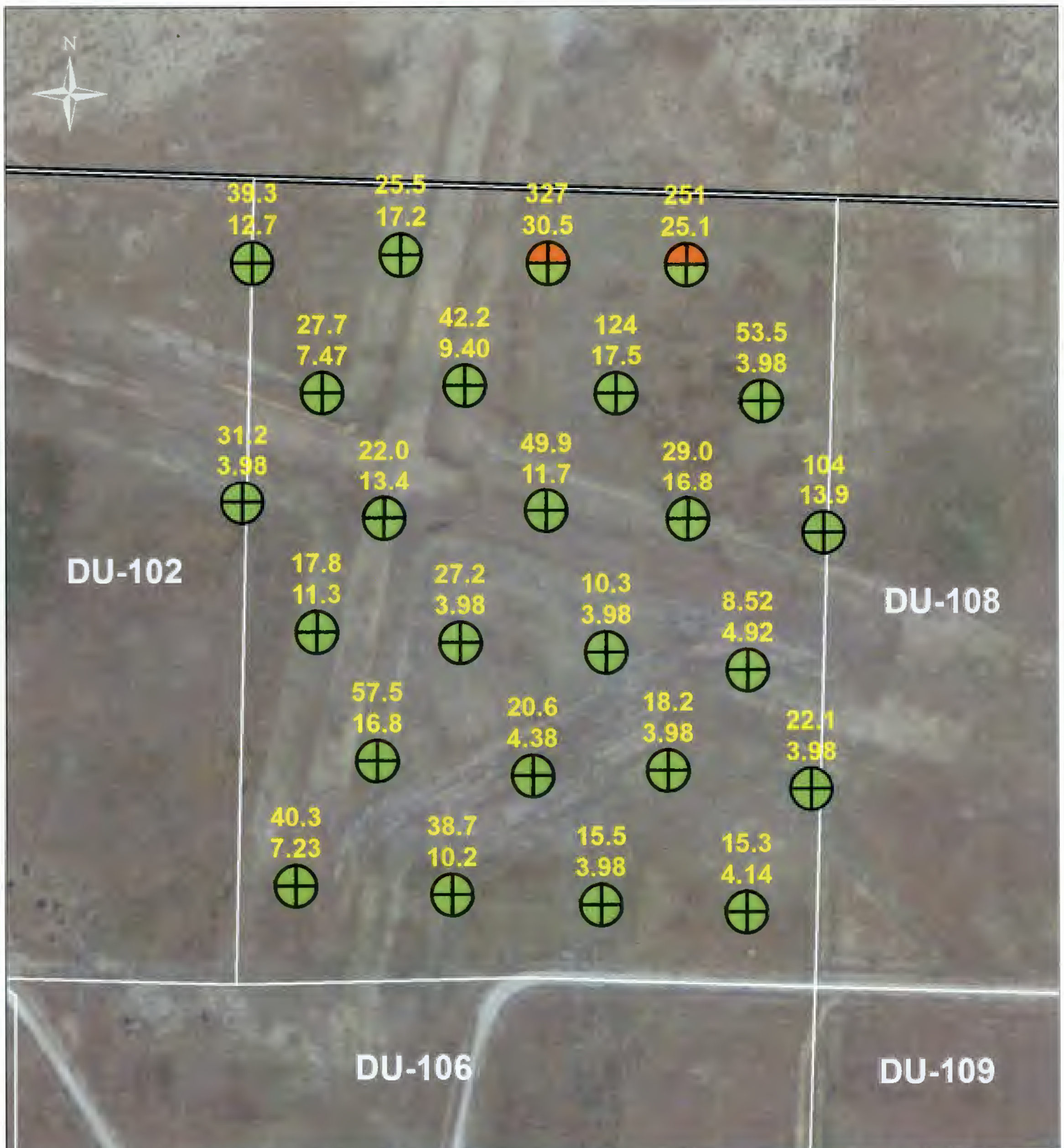
0 45.72 91.44 m

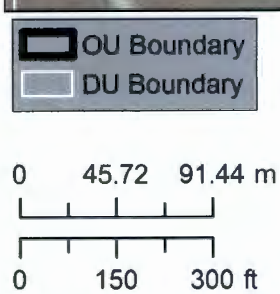
0 150 300 ft

DU-104		
Summary Statistics	**Lead**	**Arsenic**
Average	12.4	4.19
Standard Deviation	2.79	0.38
RSD	22.5%	9.15%
95% UCL[1]	13.3	4.31

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-107. DU-104 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

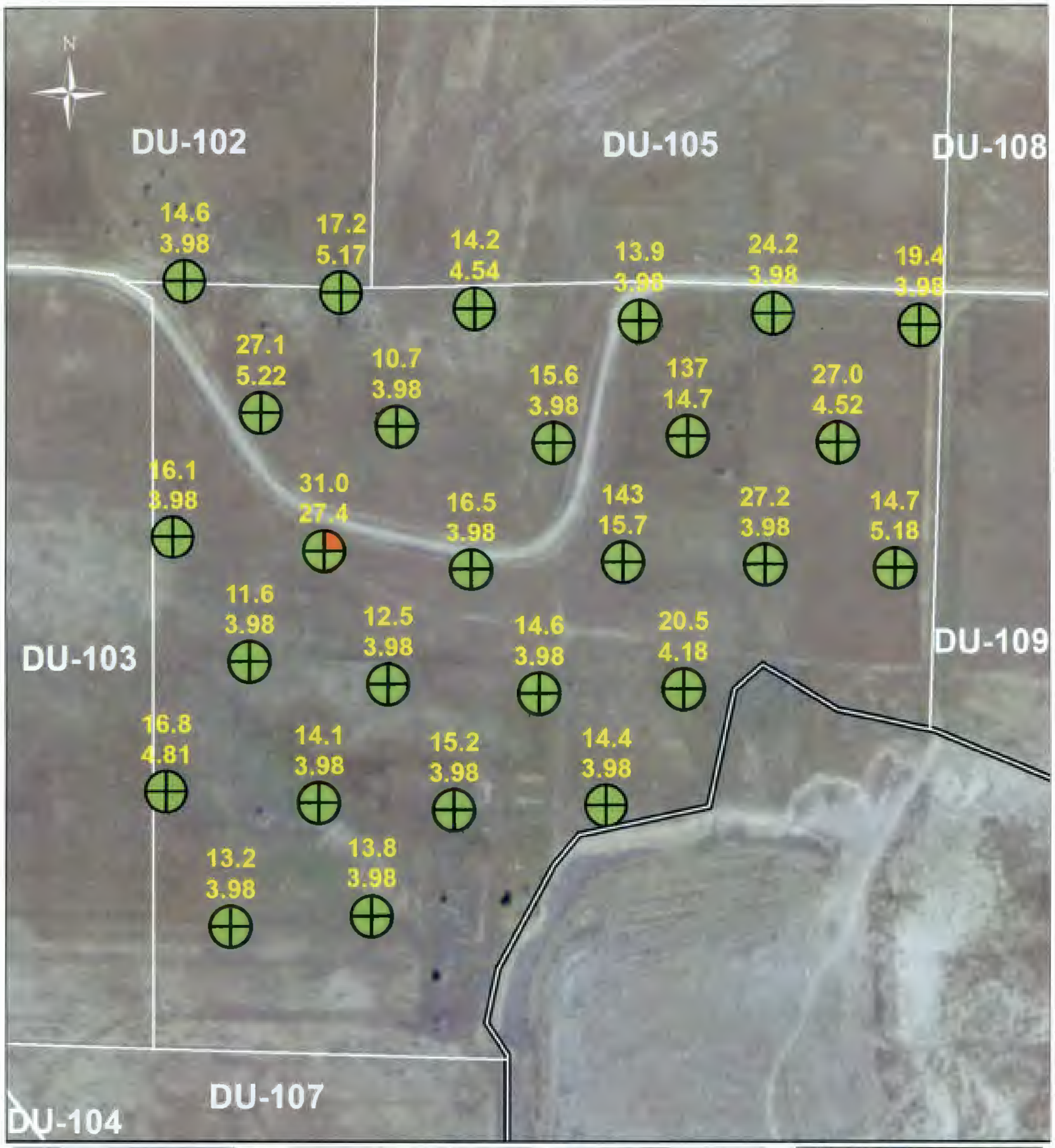


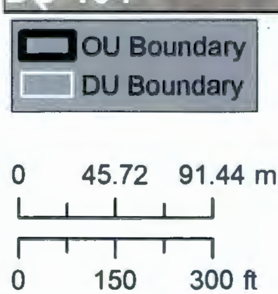


DU-105		
Summary Statistics	**Lead**	**Arsenic**
Average	56.8	10.5
Standard Deviation	75.7	7.04
RSD	133%	67.1%
95% UCL[1]	80.5	13.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-108. DU-105 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

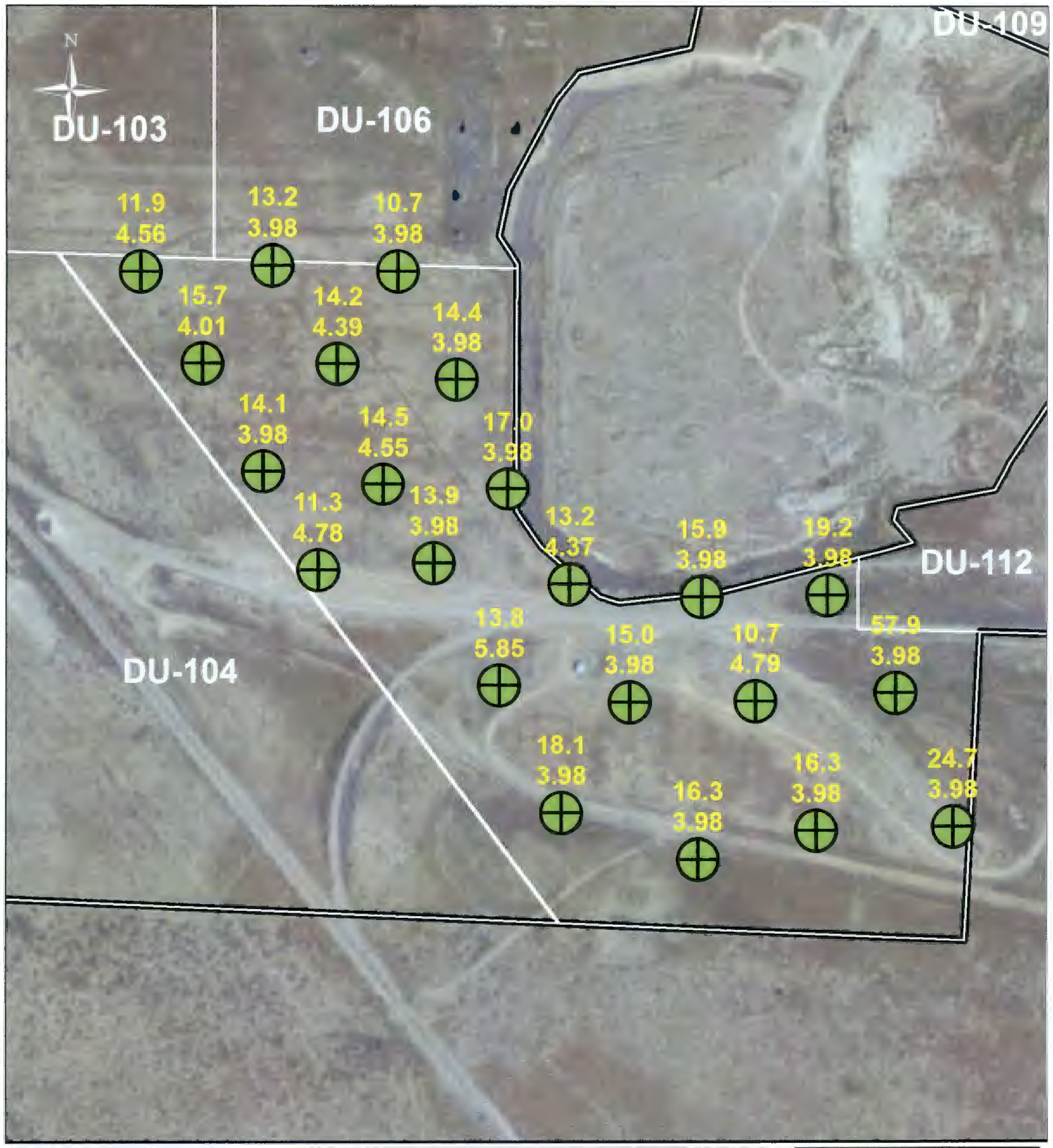


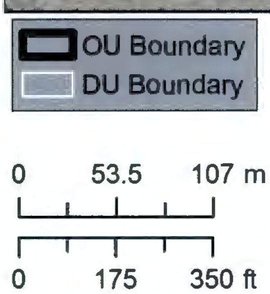


DU-106		
Summary Statistics	**Lead**	**Arsenic**
Average	26.5	5.89
Standard Deviation	33.1	5.12
RSD	125%	86.9%
95% UCL[1]	54.2	10.4

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-109. DU-106 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

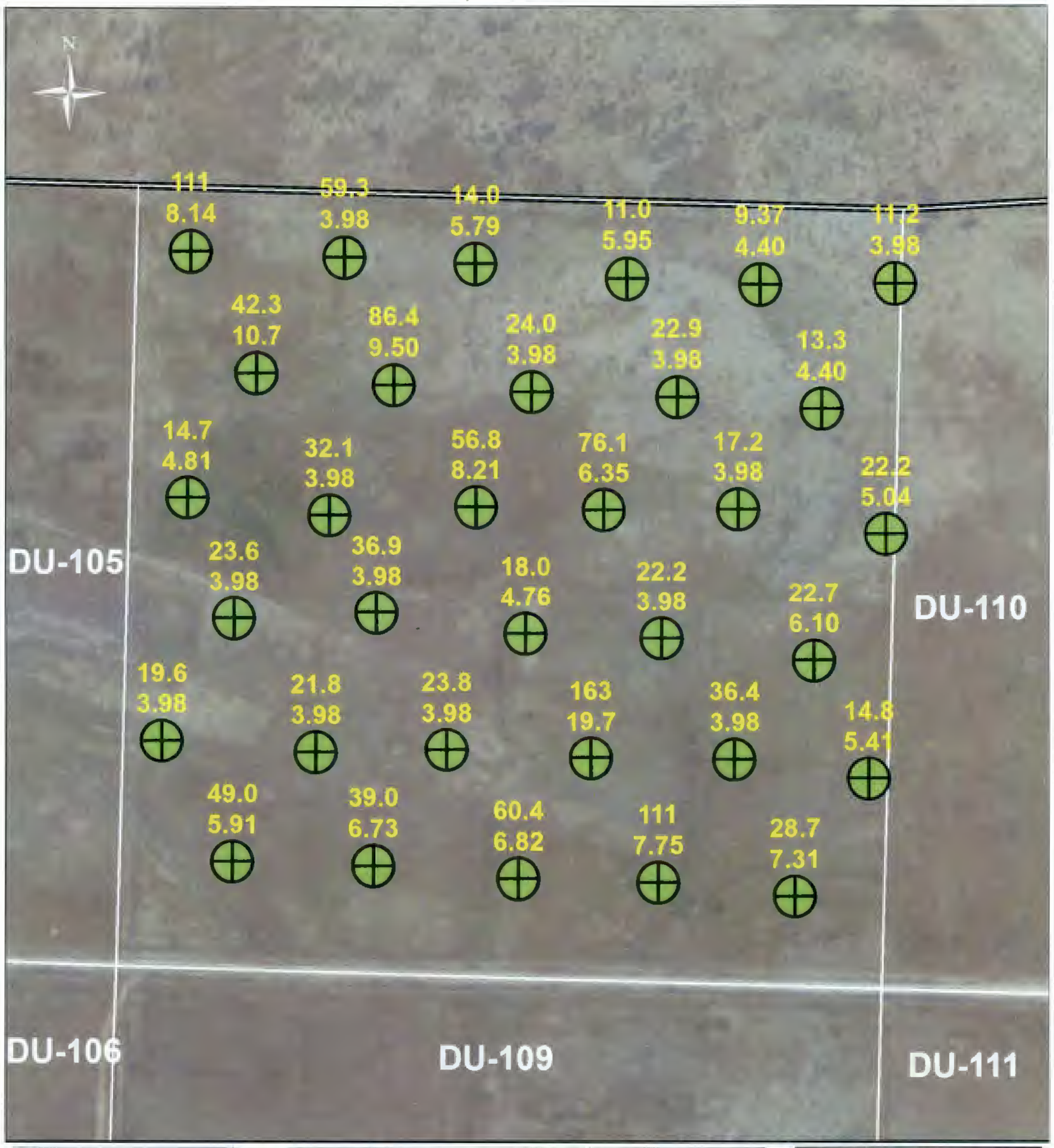




DU-107		
Summary Statistics	Lead	Arsenic
Average	16.9	4.23
Standard Deviation	9.67	0.45
RSD	57.2%	10.6%
95% UCL[1]	20.4	4.40

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

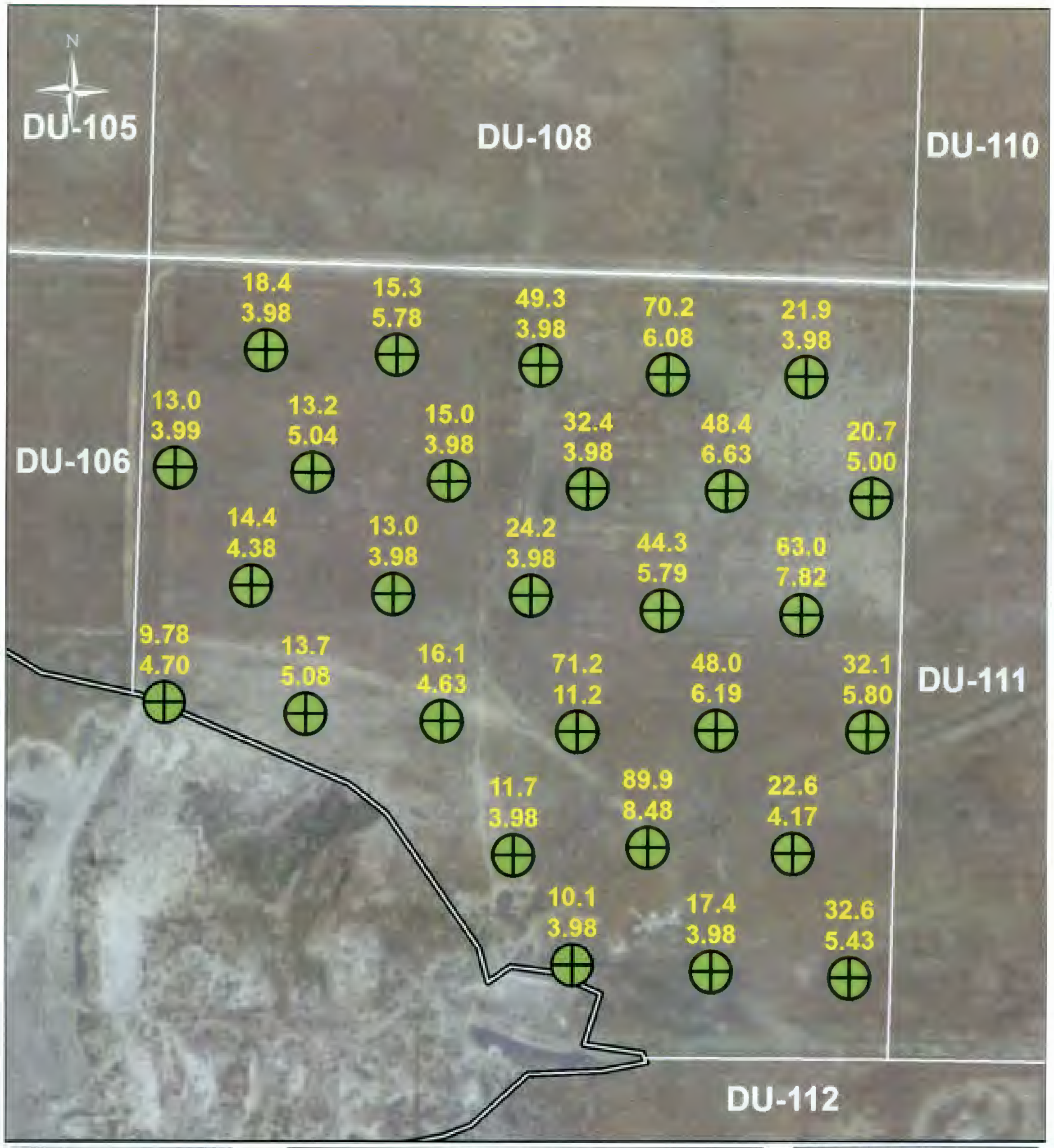
Figure A-110. DU-107 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

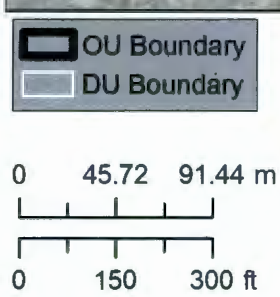


DU-108		
Summary Statistics	Lead	Arsenic
Average	39.9	5.92
Standard Deviation	35.0	3.01
RSD	87.7%	50.8%
95% UCL[1]	51.7	7.31

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-111. DU-108 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

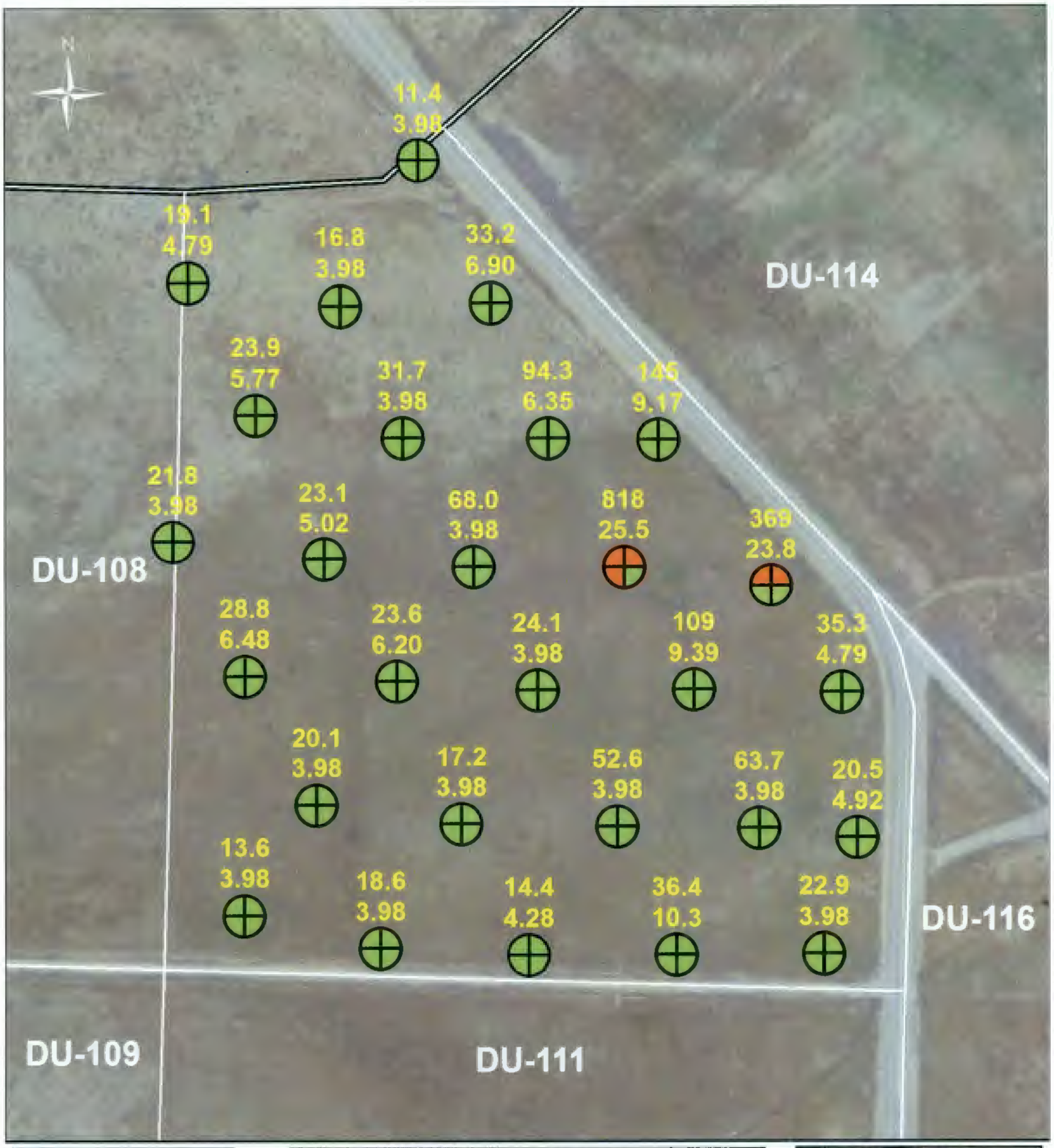


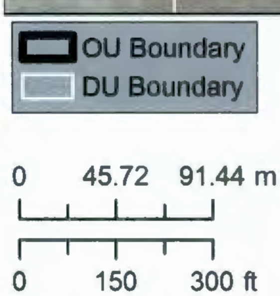


DU-109		
Summary Statistics	**Lead**	**Arsenic**
Average	30.4	5.21
Standard Deviation	21.9	1.66
RSD	71.9%	31.9%
95% UCL[1]	38.6	5.85

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-112. DU-109 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

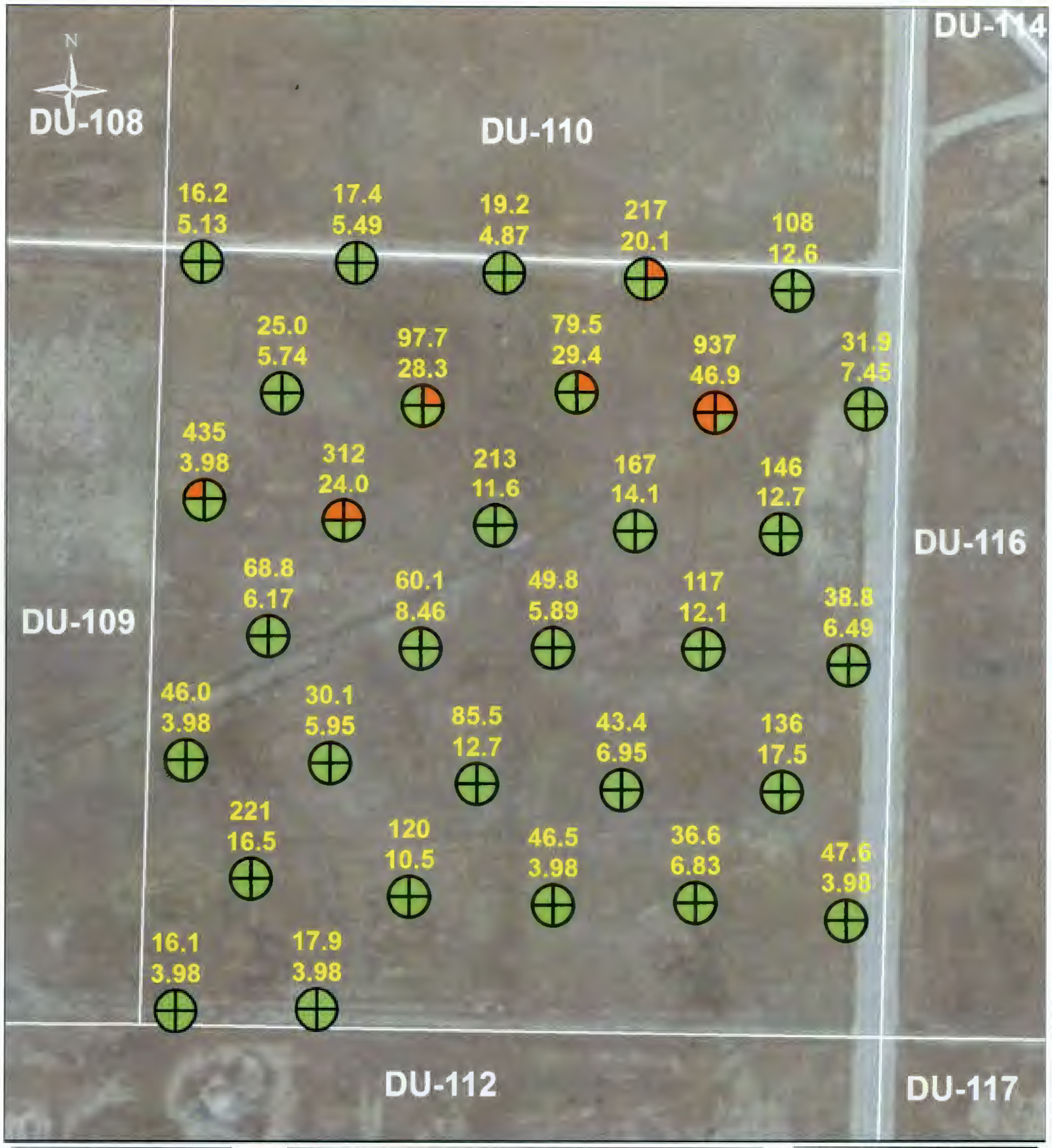




DU-110		
Summary Statistics	**Lead**	**Arsenic**
Average	77.7	6.62
Standard Deviation	161	5.30
RSD	207%	80.1%
95% UCL[1]	210	11.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

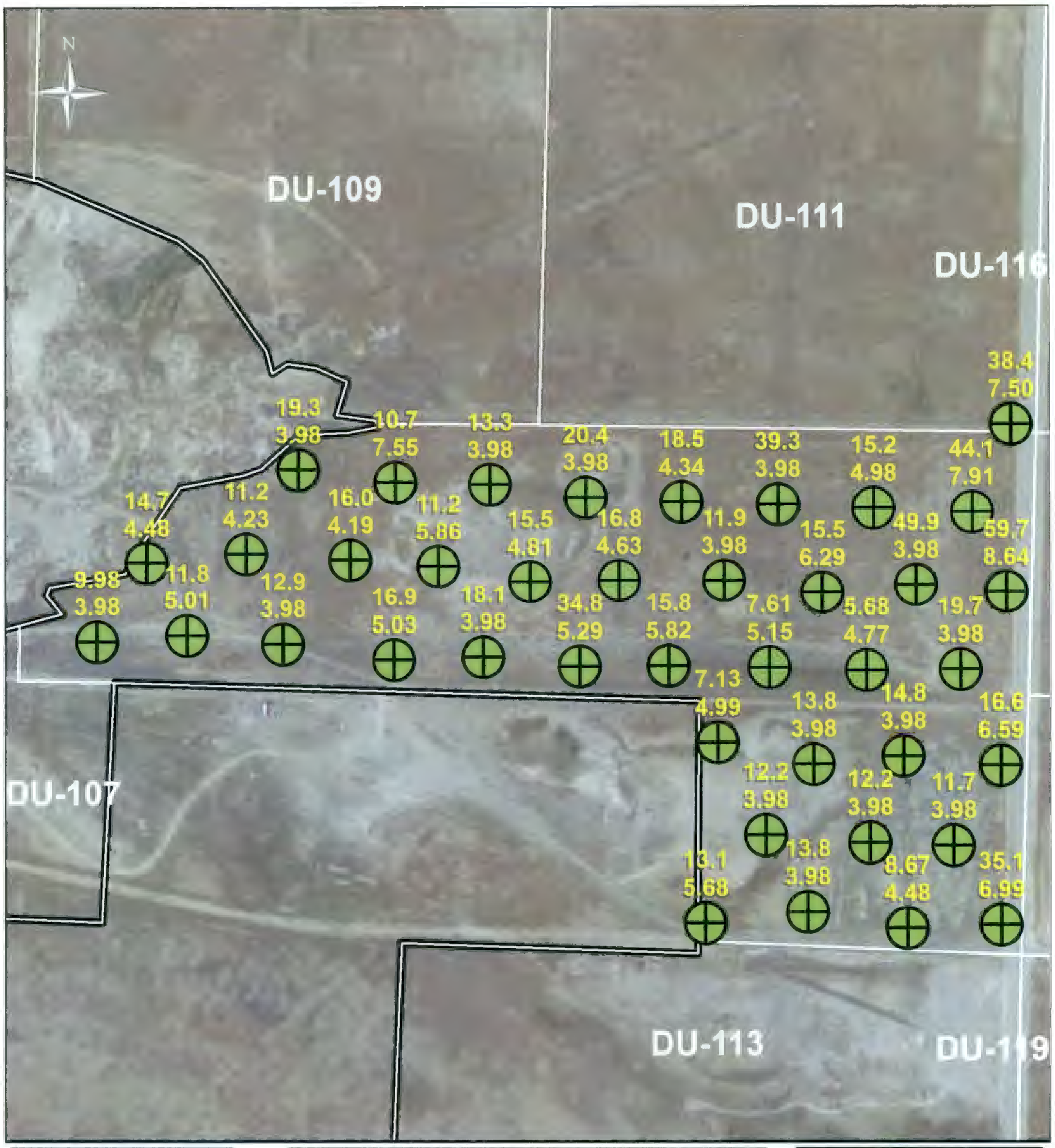
Figure A-113. DU-110 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

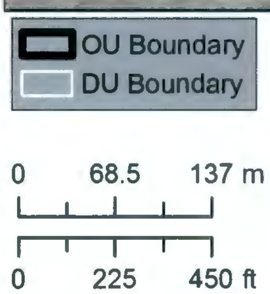


DU-111		
Summary Statistics	Lead	Arsenic
Average	125	11.5
Standard Deviation	176	9.42
RSD	141%	81.8%
95% UCL[1]	176	18.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-114. DU-111 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

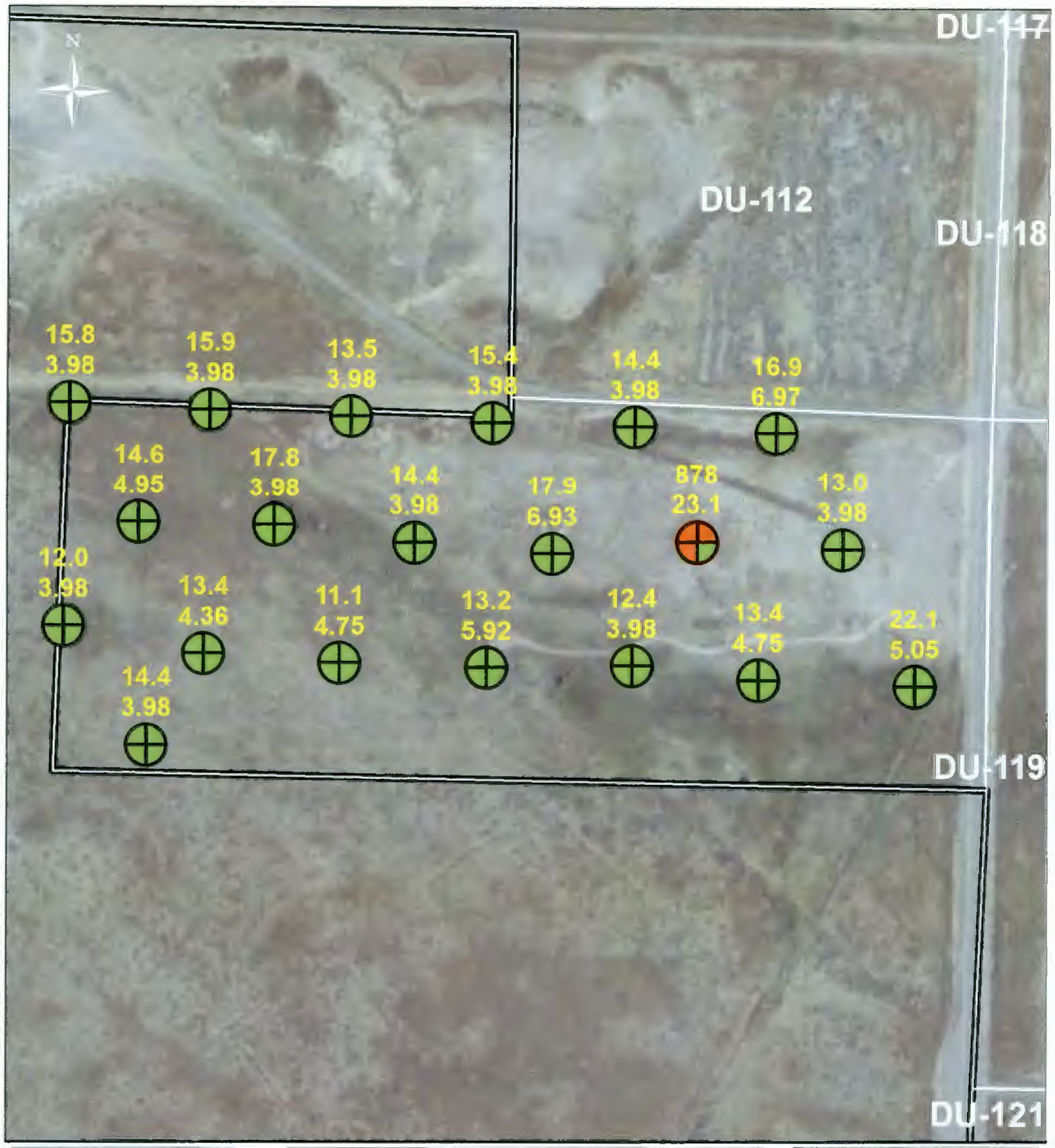


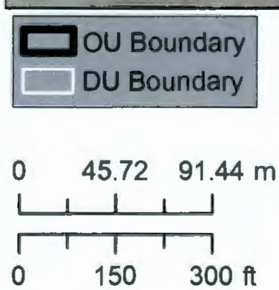


DU-112		
Summary Statistics	Lead	Arsenic
Average	18.9	4.97
Standard Deviation	12.1	1.26
RSD	64.3%	25.4%
95% UCL[1]	27.3	5.35

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-115. DU-112 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

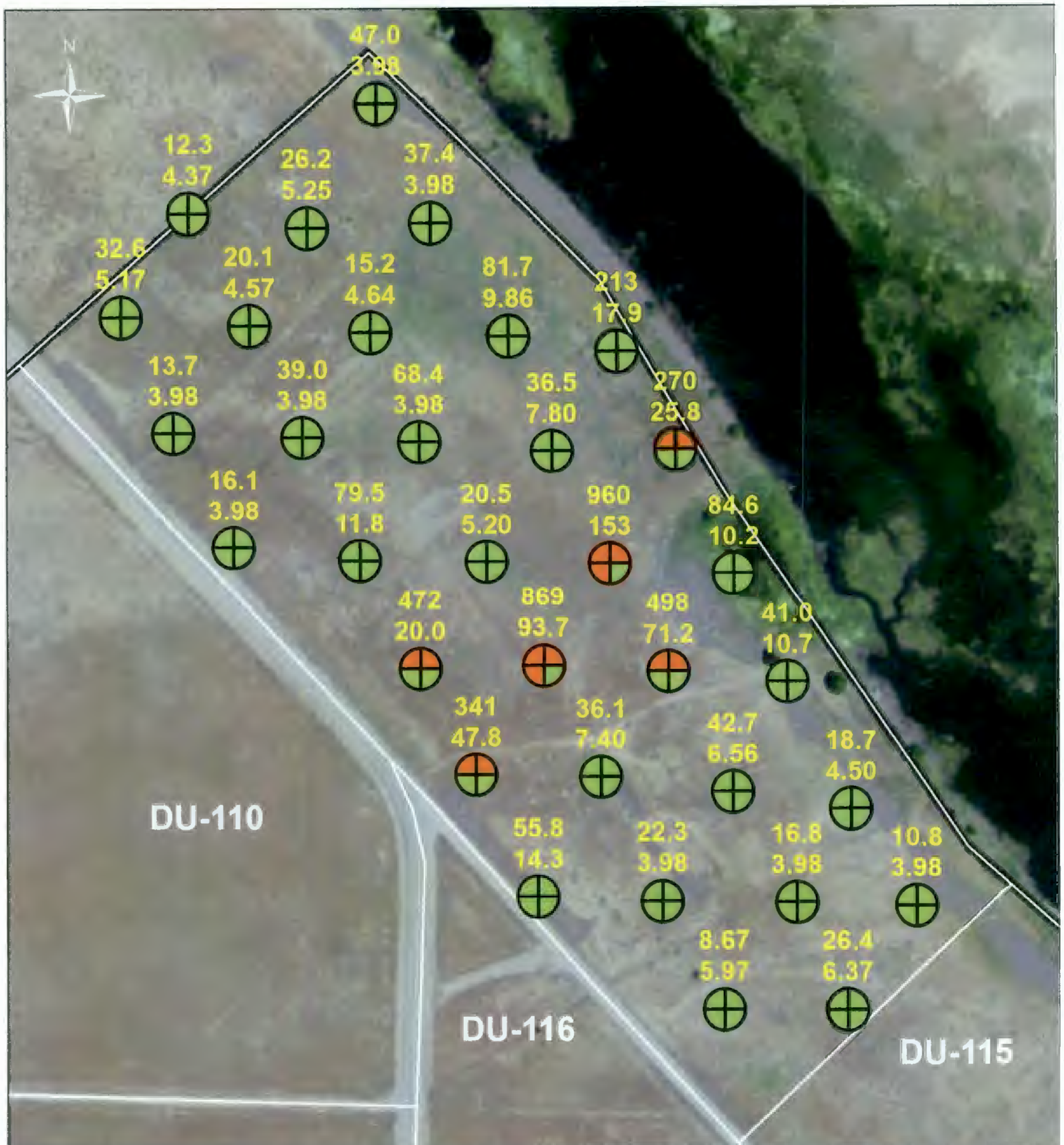




DU-113		
Summary Statistics	**Lead**	**Arsenic**
Average	58.0	5.53
Standard Deviation	193	4.13
RSD	333%	74.7%
95% UCL[1]	246	9.79

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-116. DU-113 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



OU Boundary
DU Boundary

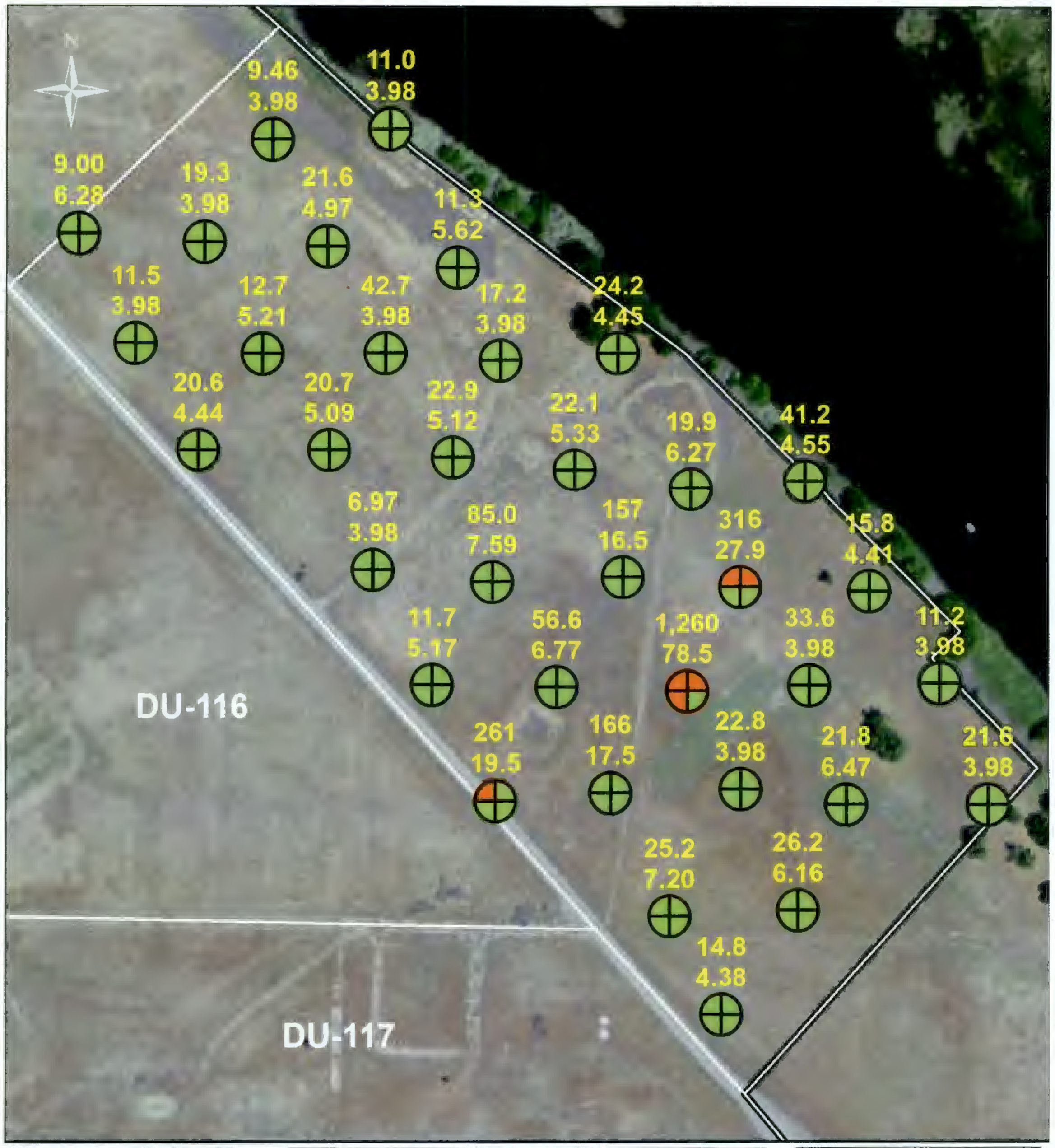
0 53.5 107 m

0 175 350 ft

DU-114		
Summary Statistics	Lead	Arsenic
Average	137	17.9
Standard Deviation	238	31.0
RSD	173%	173%
95% UCL[1]	318	22.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

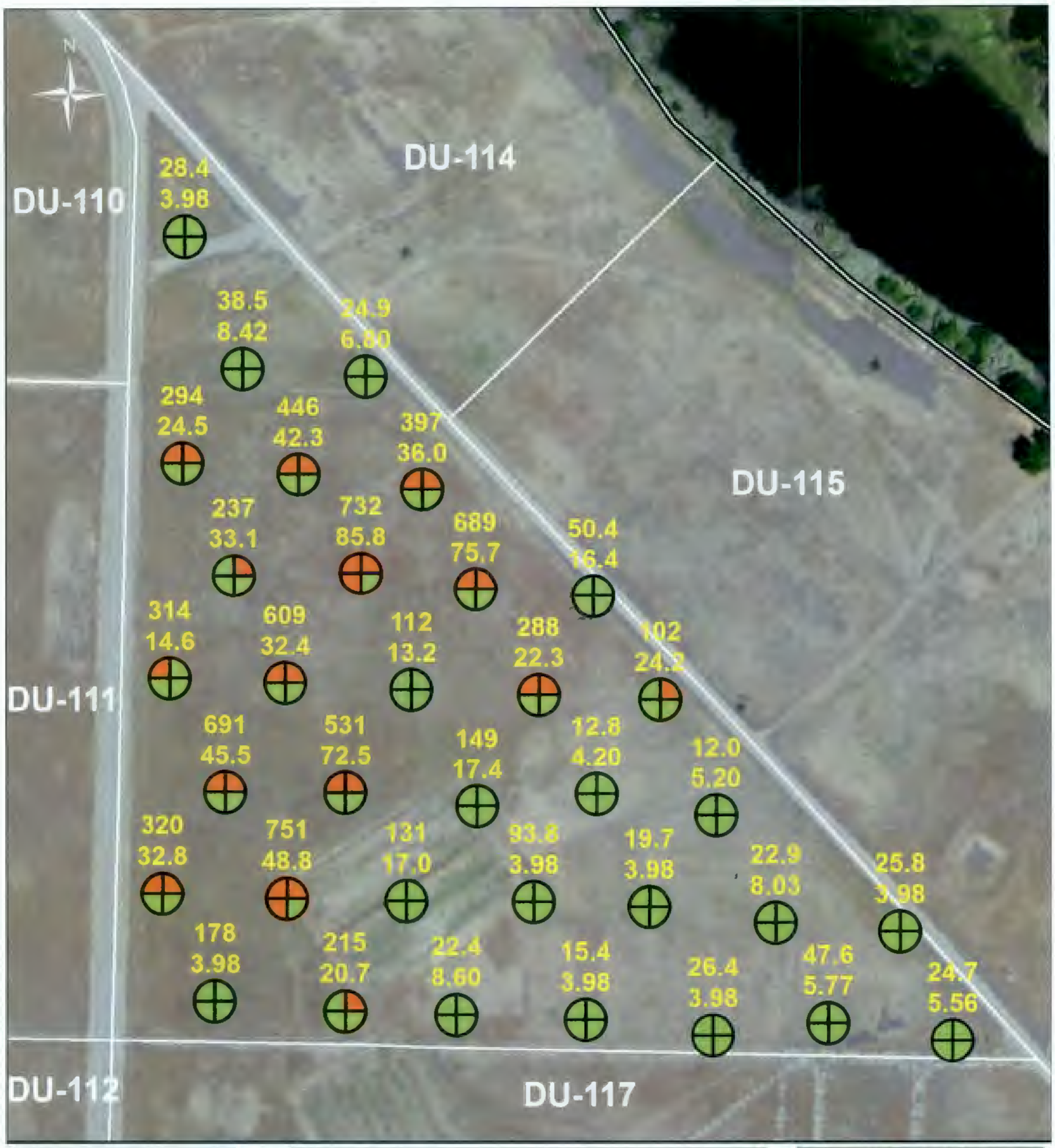
Figure A-117. DU-114 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

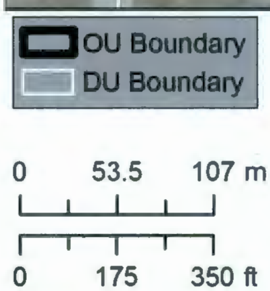


DU-115		
Summary Statistics	Lead	Arsenic
Average	81.6	8.83
Standard Deviation	218	13.0
RSD	267%	148%
95% UCL[1]	242	18.6

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-118. DU-115 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

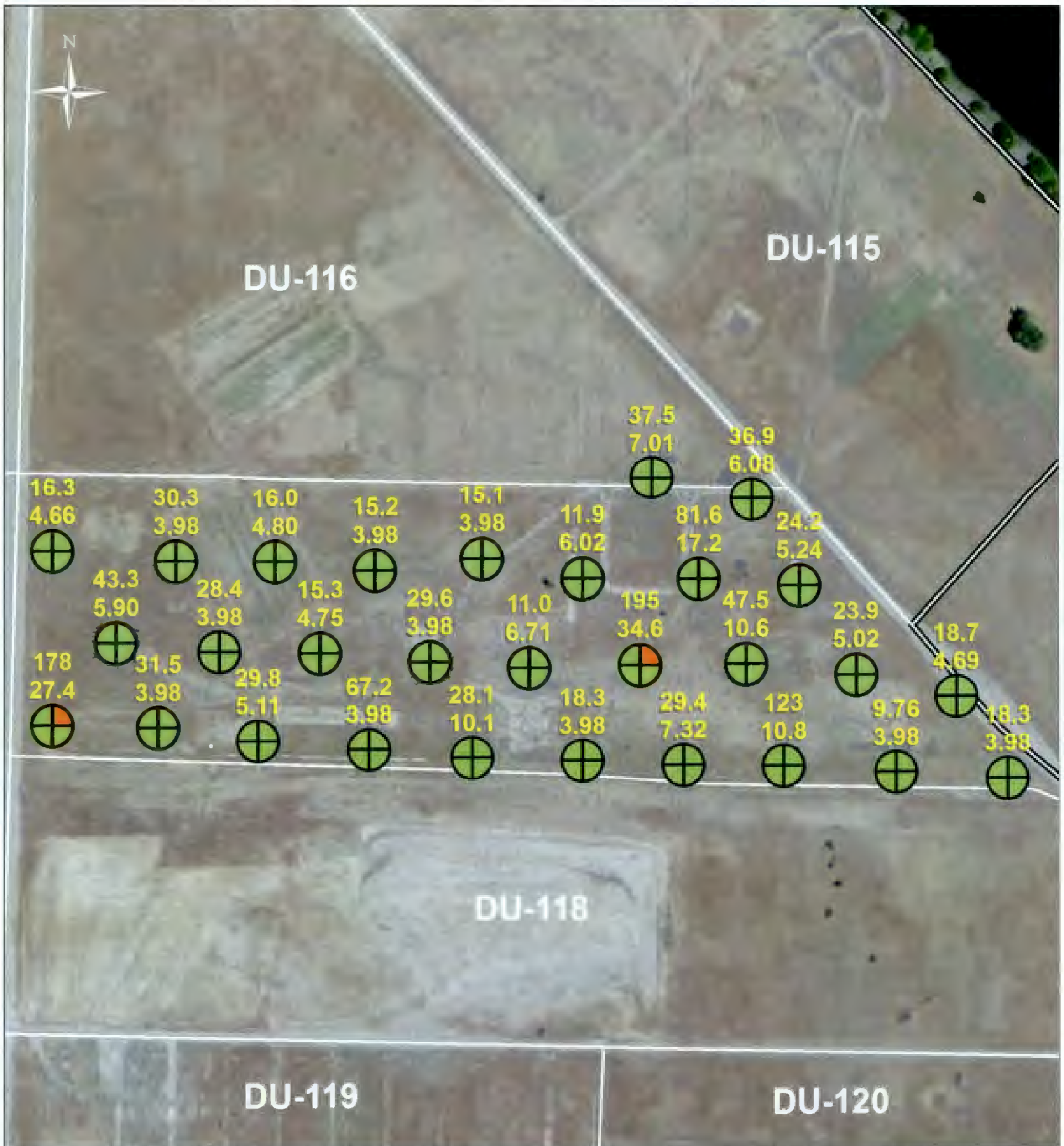




DU-116		
Summary Statistics	Lead	Arsenic
Average	225	22.2
Standard Deviation	242	21.8
RSD	107%	98.1%
95% UCL[1]	330	37.2

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

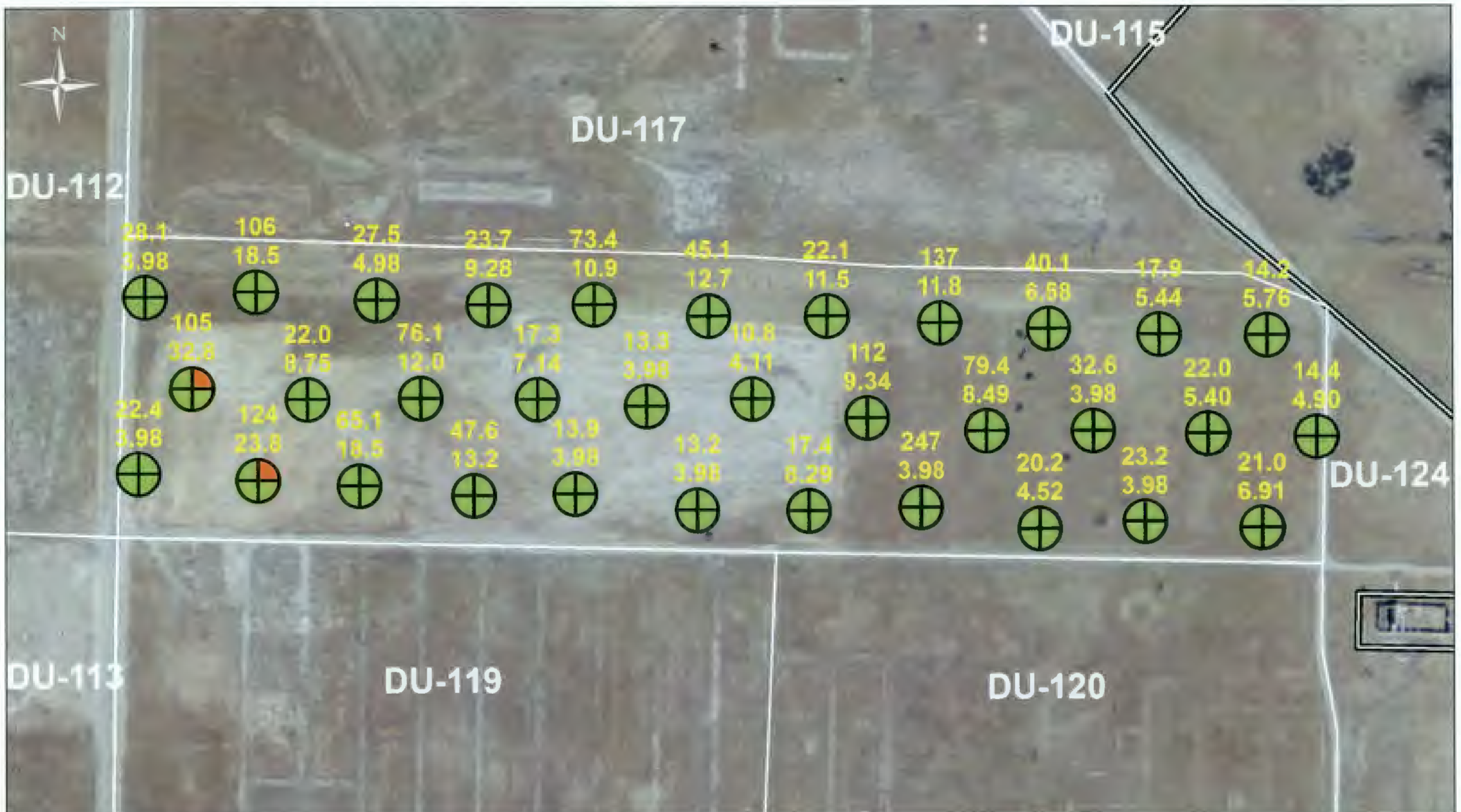
Figure A-119. DU-116 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-117		
Summary Statistics	Lead	Arsenic
Average	42.5	7.71
Standard Deviation	46.5	7.01
RSD	110%	90.9%
95% UCL[1]	55.6	13.5

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

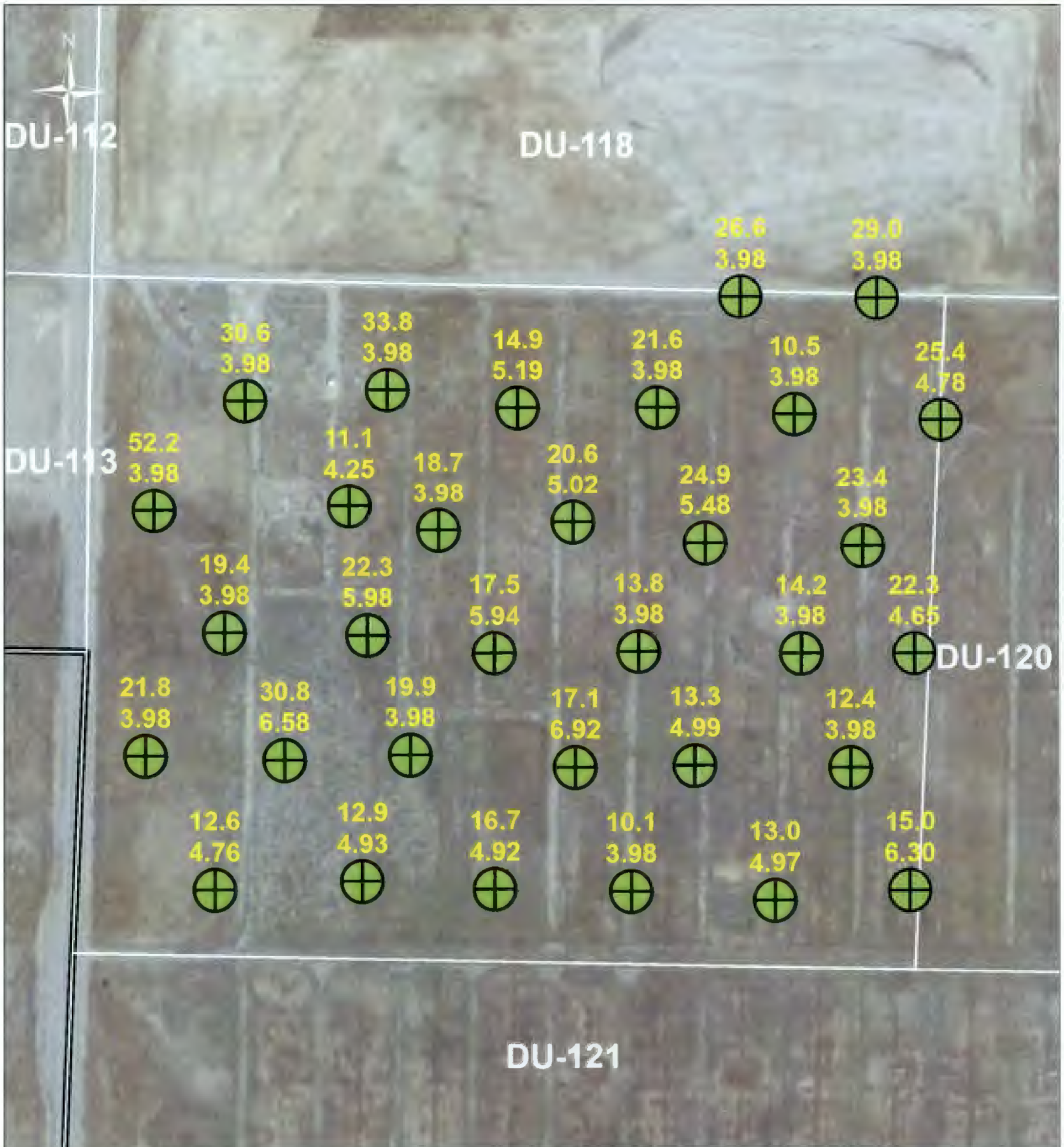
Figure A-120. DU-117 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-118		
Summary Statistics	Lead	Arsenic
Average	50.2	9.01
Standard Deviation	51.0	6.40
RSD	102%	71.1%
95% UCL[1]	88.9	13.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-121. DU-118 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-119		
Summary Statistics	Lead	Arsenic
Average	20.3	4.67
Standard Deviation	8.67	0.86
RSD	42.8%	18.5%
95% UCL[1]	22.9	4.93

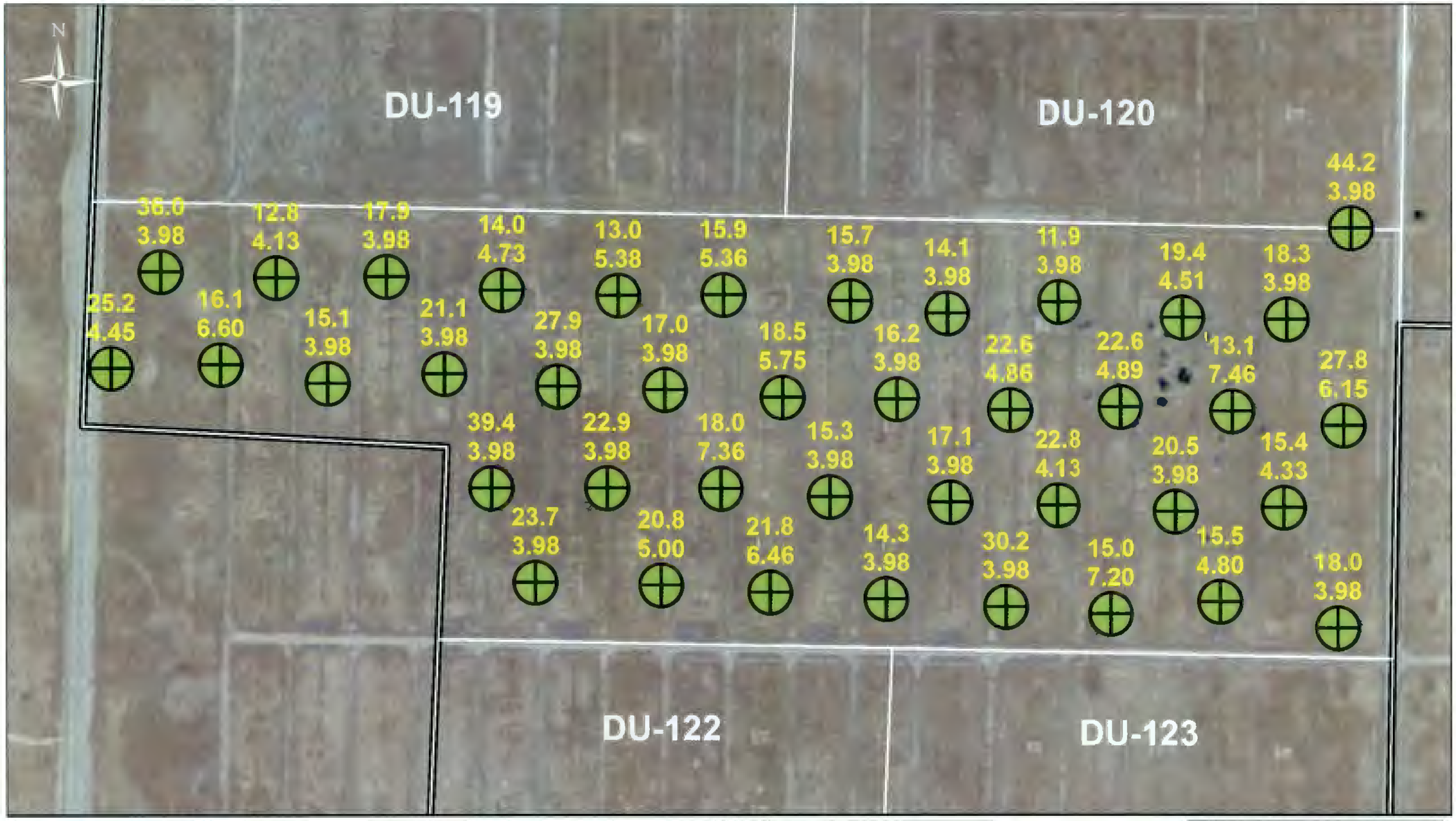
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

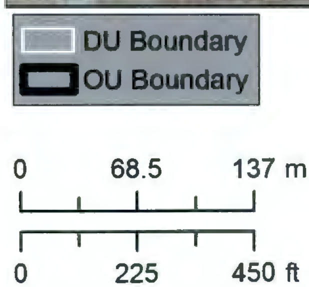
Figure A-122. DU-119 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

DU-120		
Summary Statistics	Lead	Arsenic
Average	34.6	5.03
Standard Deviation	32.4	2.42
RSD	93.7%	48.0%
95% UCL[1]	61.7	5.89

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-123. DU-120 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

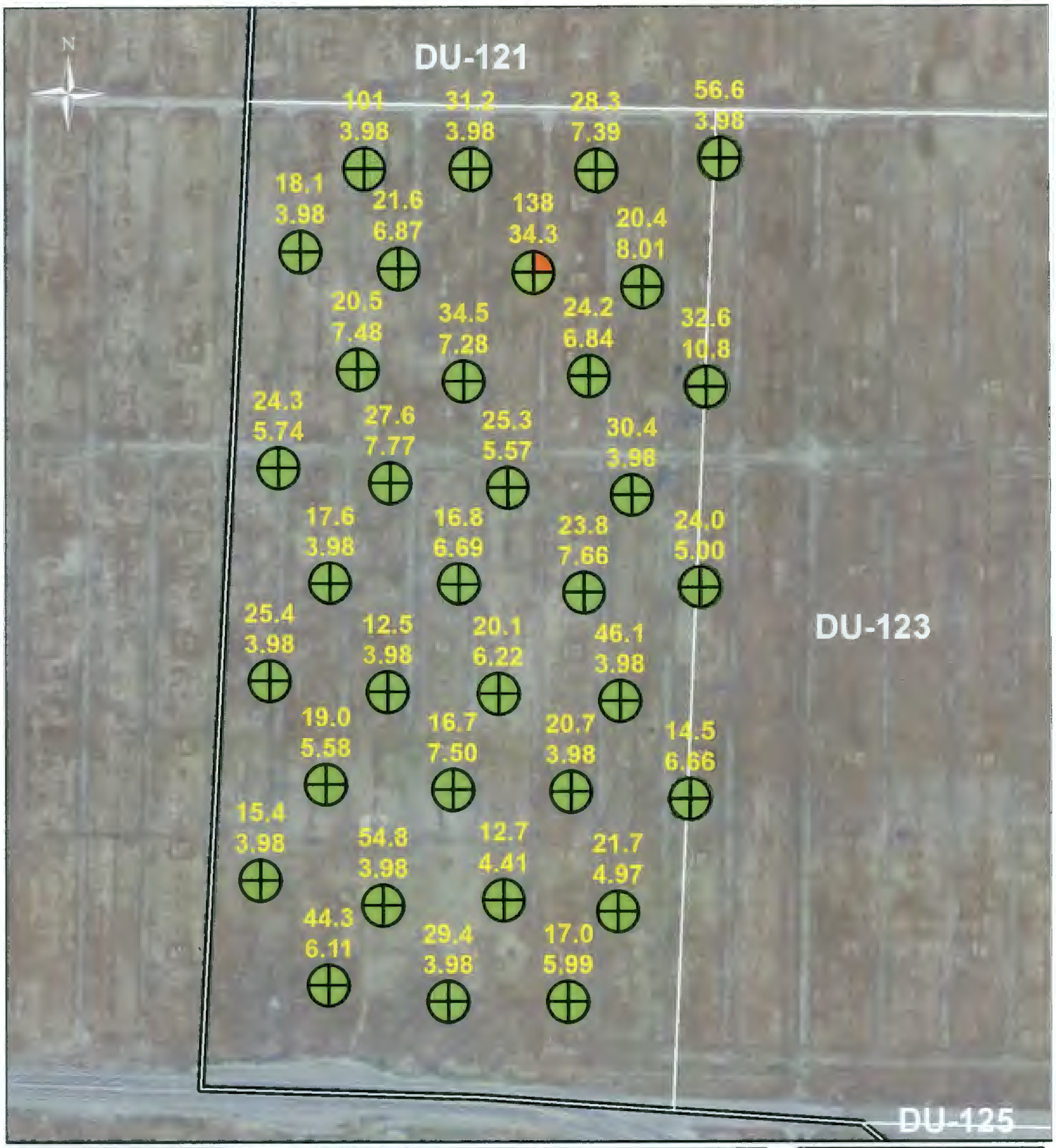


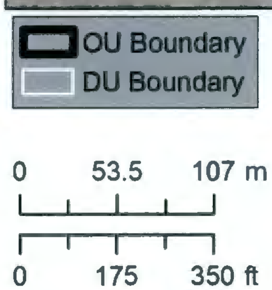


DU-121		
Summary Statistics	Lead	Arsenic
Average	20.2	4.68
Standard Deviation	7.25	1.04
RSD	35.9%	22.3%
95% UCL[1]	22.1	4.96

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-124. DU-121 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

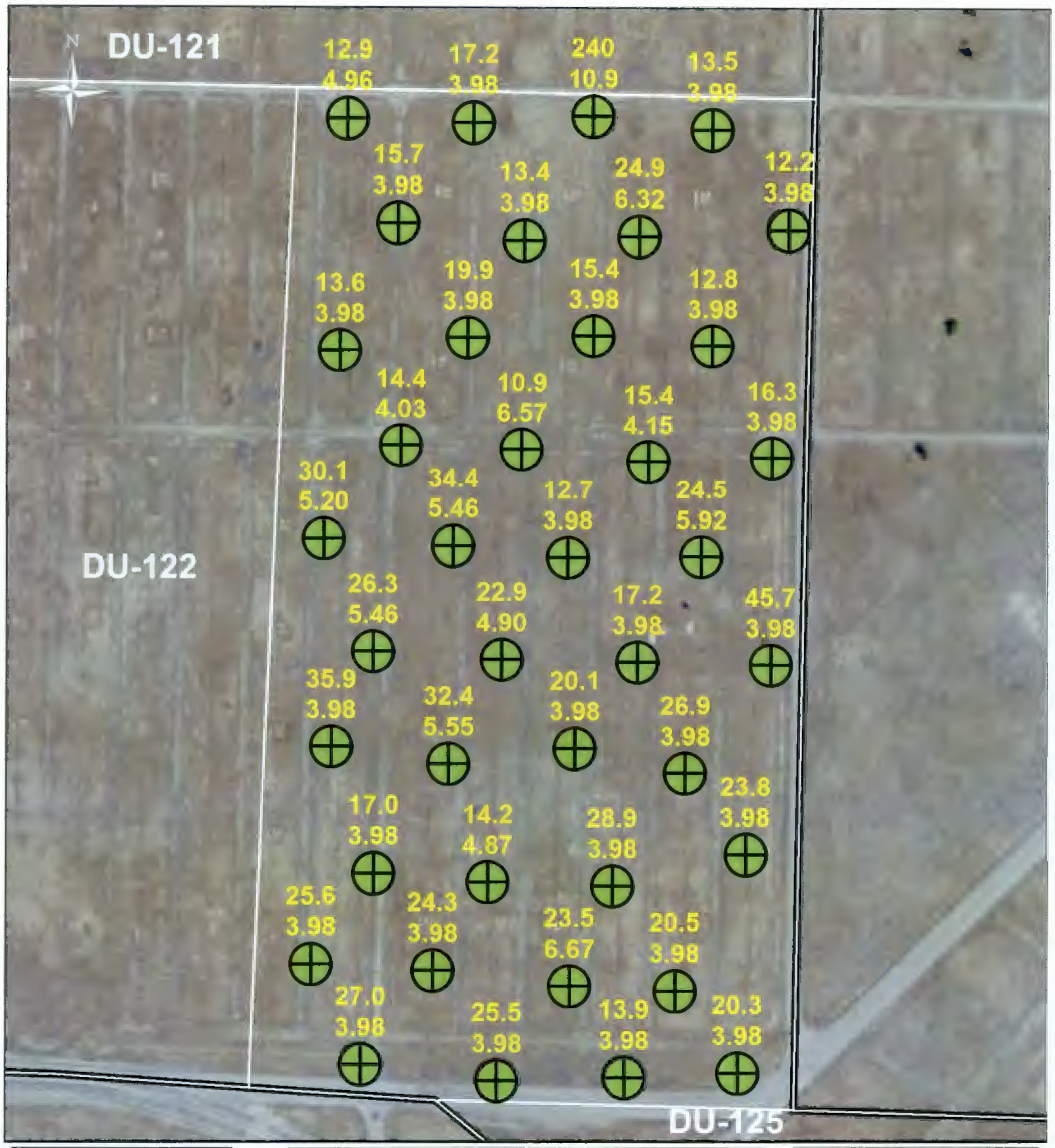




DU-122		
Summary Statistics	Lead	Arsenic
Average	31.1	6.47
Standard Deviation	25.0	5.06
RSD	80.5%	78.1%
95% UCL[1]	49.5	8.10

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

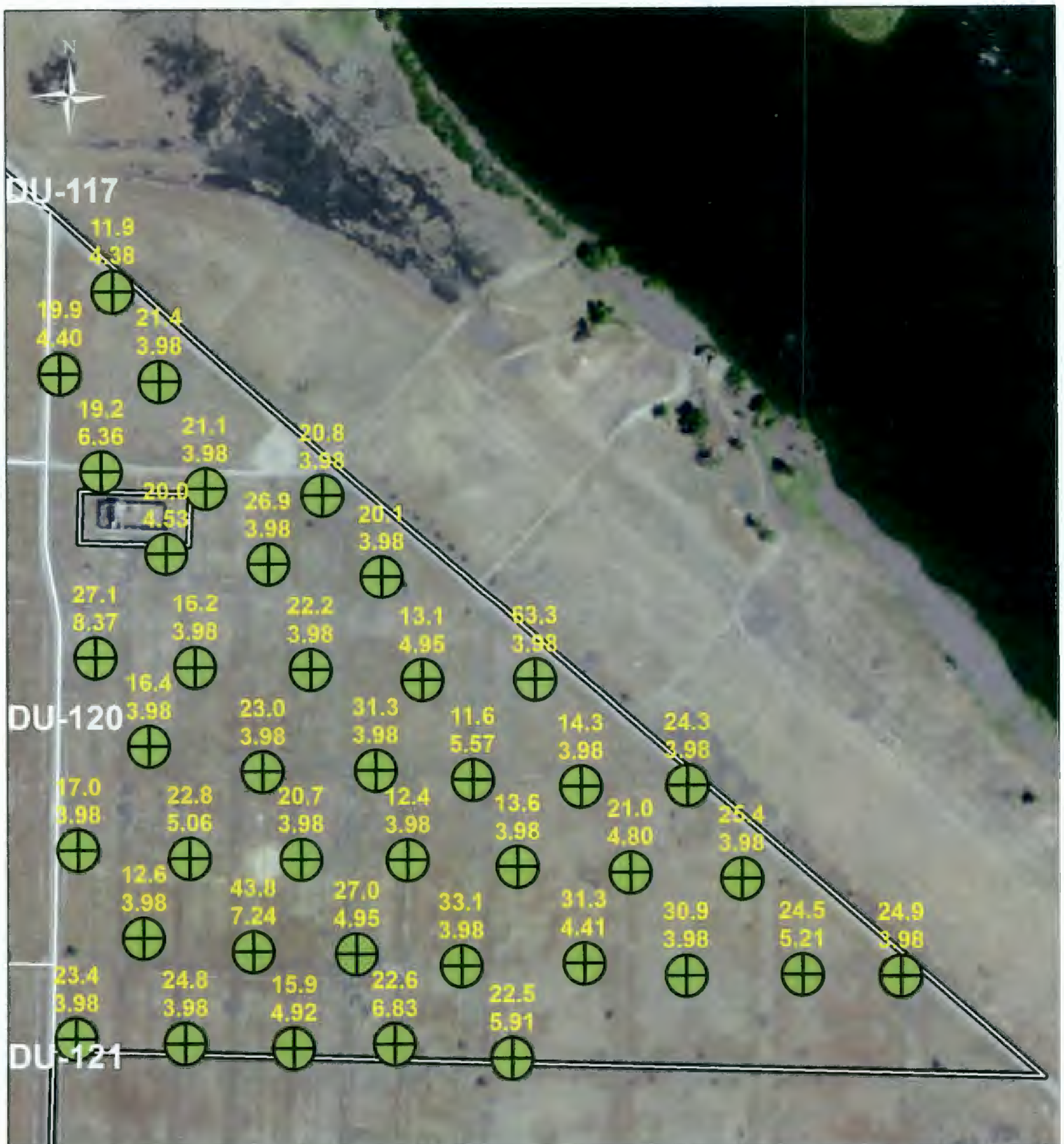
Figure A-125. DU-122 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

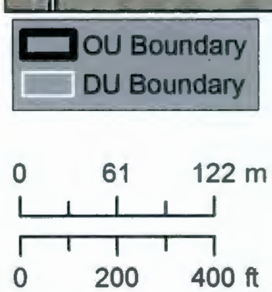


DU-123		
Summary Statistics	Lead	Arsenic
Average	26.6	4.61
Standard Deviation	35.5	1.28
RSD	134%	27.8%
95% UCL[1]	51.1	4.96

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-126. DU-123 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

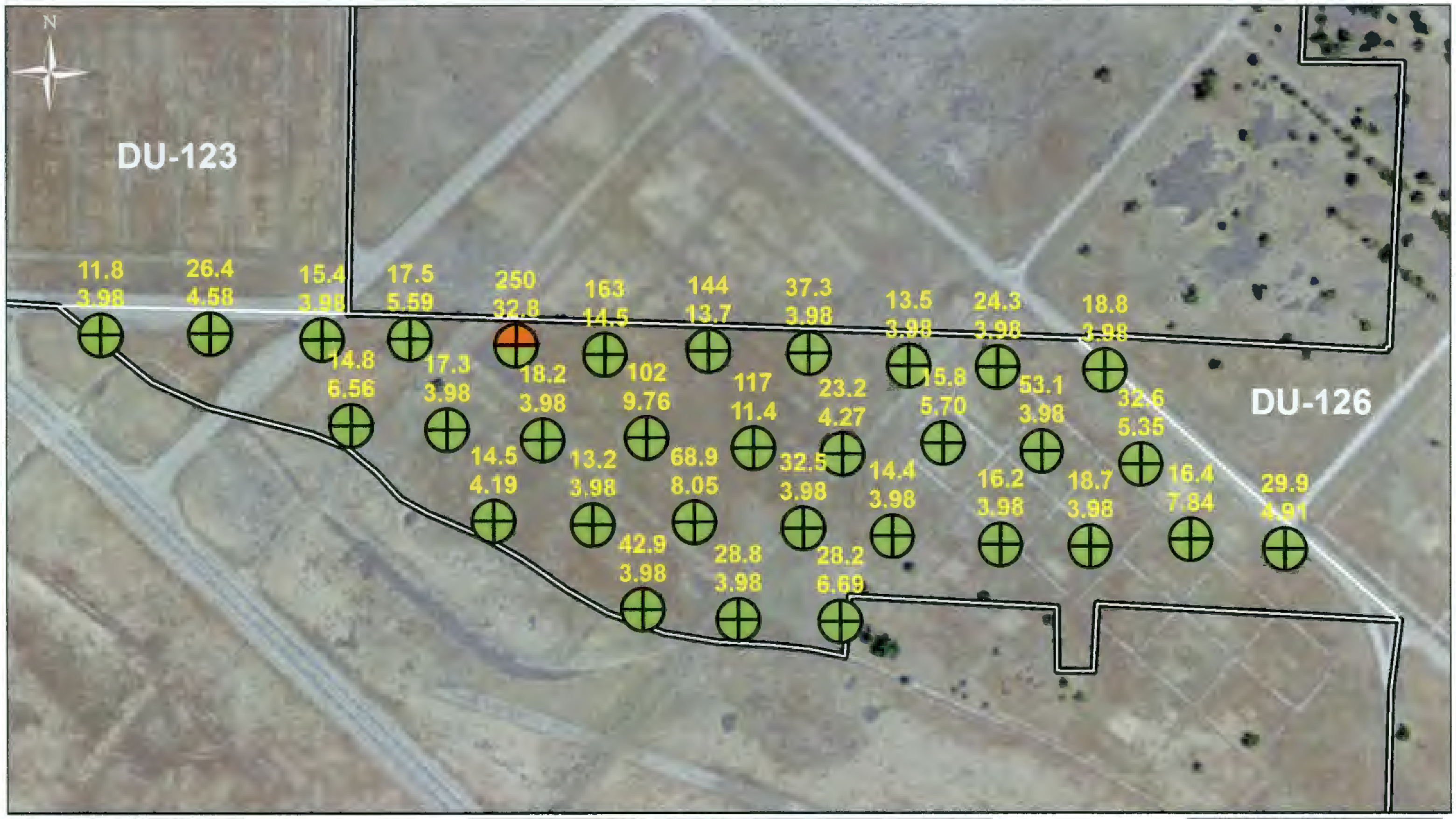


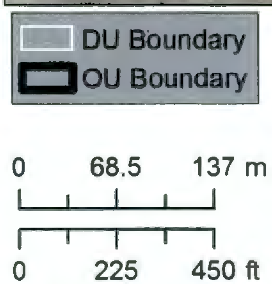


DU-124		
Summary Statistics	Lead	Arsenic
Average	22.9	4.59
Standard Deviation	9.33	1.03
RSD	40.8%	22.4%
95% UCL[1]	25.3	4.89

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-127. DU-124 Field Characterization Results (mg/kg, unless otherwise noted). Hanford High School (square displayed within DU) is not included in the OU. Display of results described in Figure A-2.

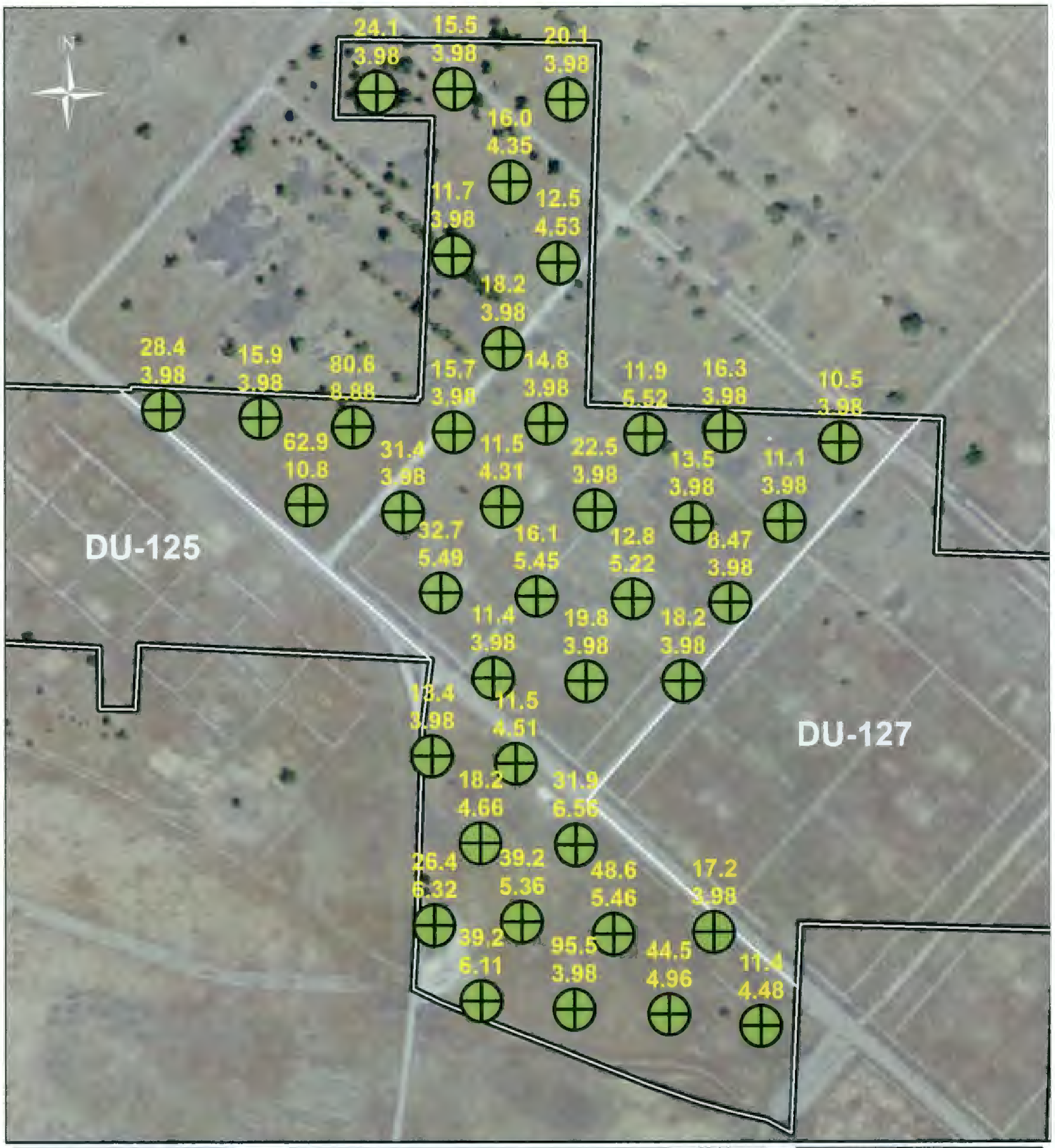


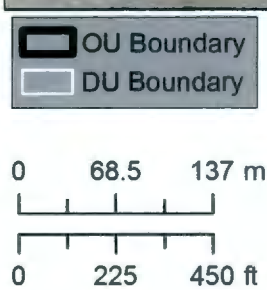


DU-125		
Summary Statistics	Lead	Arsenic
Average	45.0	6.55
Standard Deviation	53.9	5.50
RSD	120%	84.0%
95% UCL[1]	86.6	9.43

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-128. DU-125 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

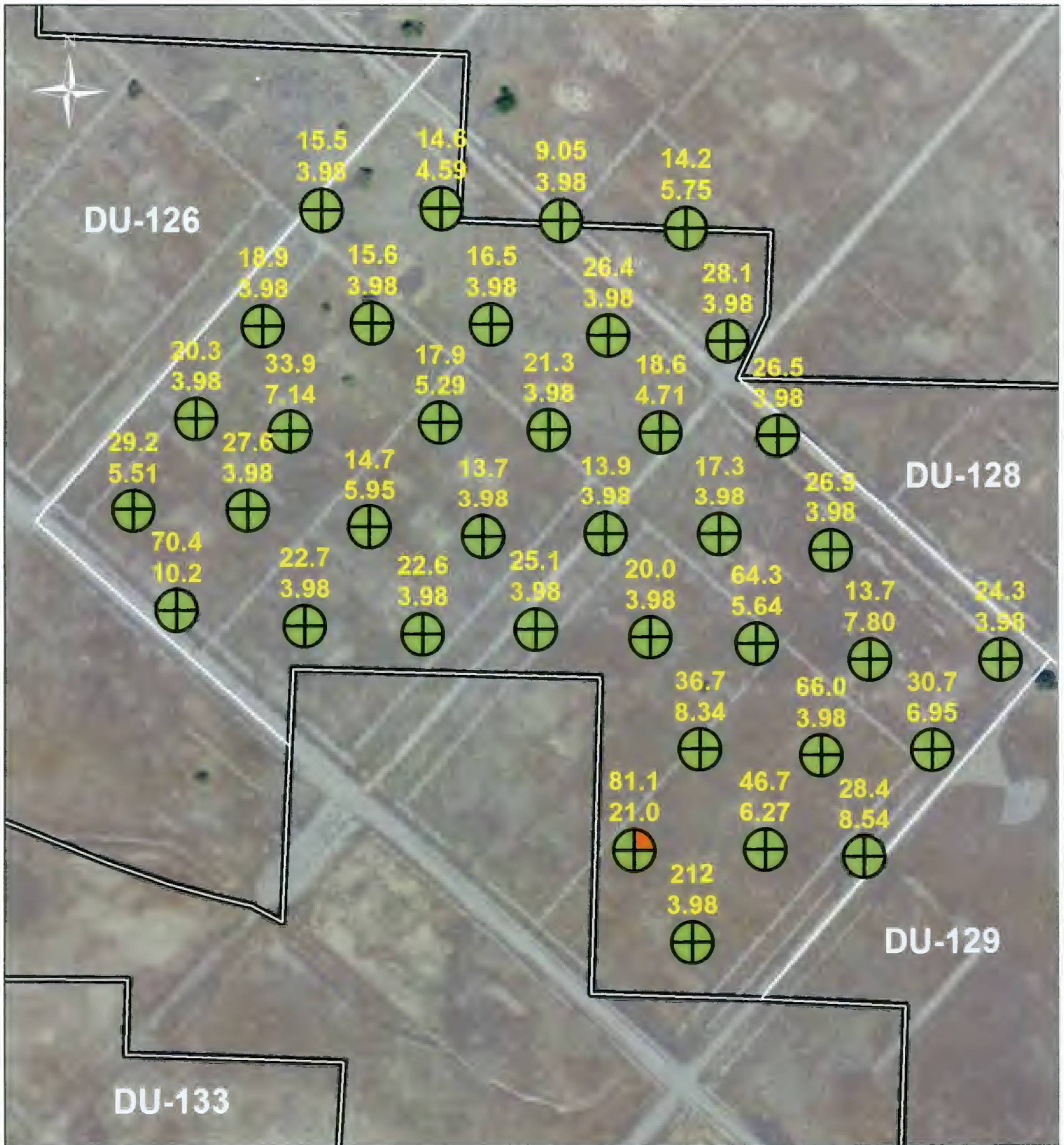




DU-126		
Summary Statistics	Lead	Arsenic
Average	24.5	4.76
Standard Deviation	19.1	1.39
RSD	77.7%	29.2%
95% UCL[1]	37.7	5.16

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

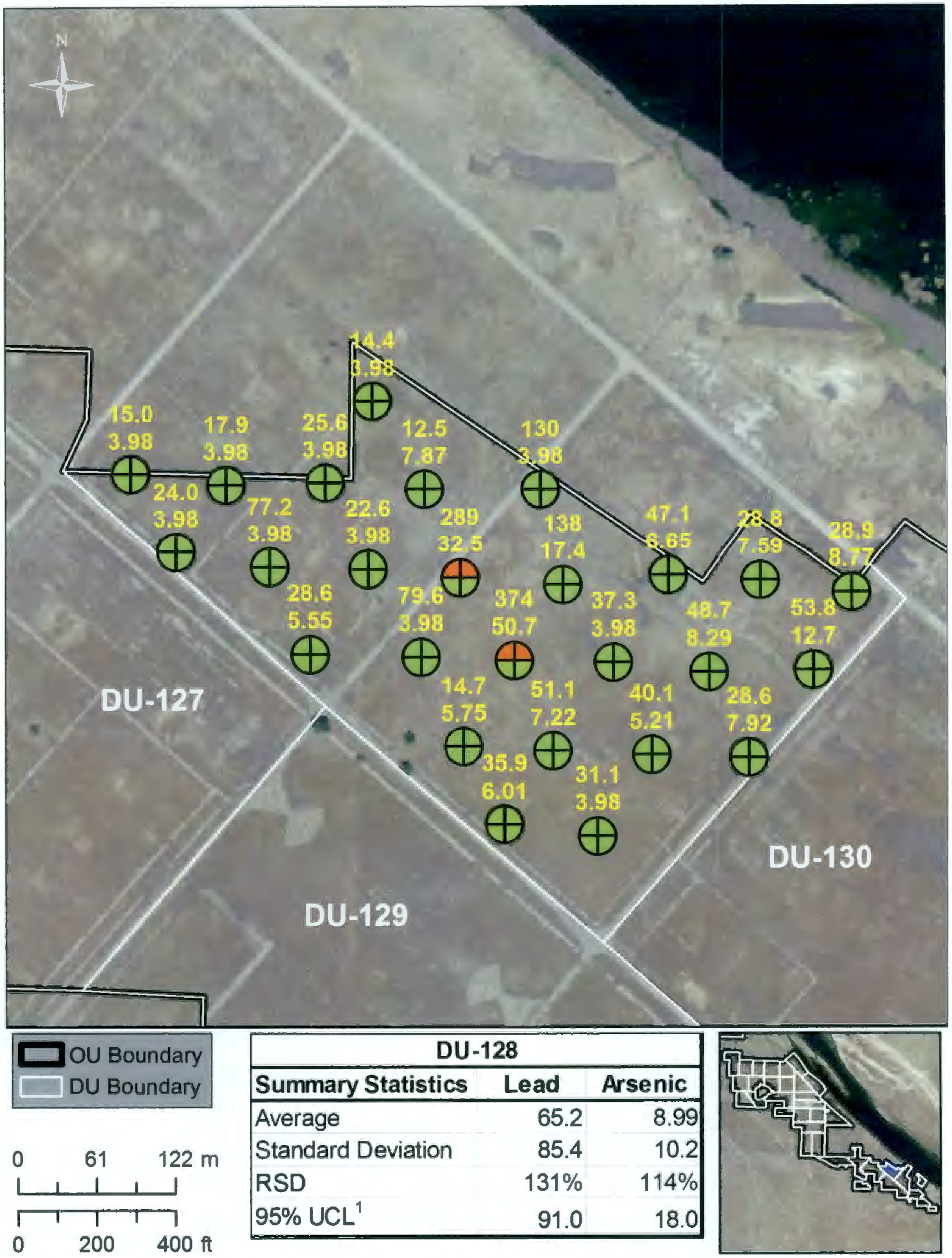
Figure A-129. DU-126 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-127		
Summary Statistics	Lead	Arsenic
Average	32.6	5.44
Standard Deviation	34.8	3.05
RSD	107%	56.1%
95% UCL[1]	57.5	6.46

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

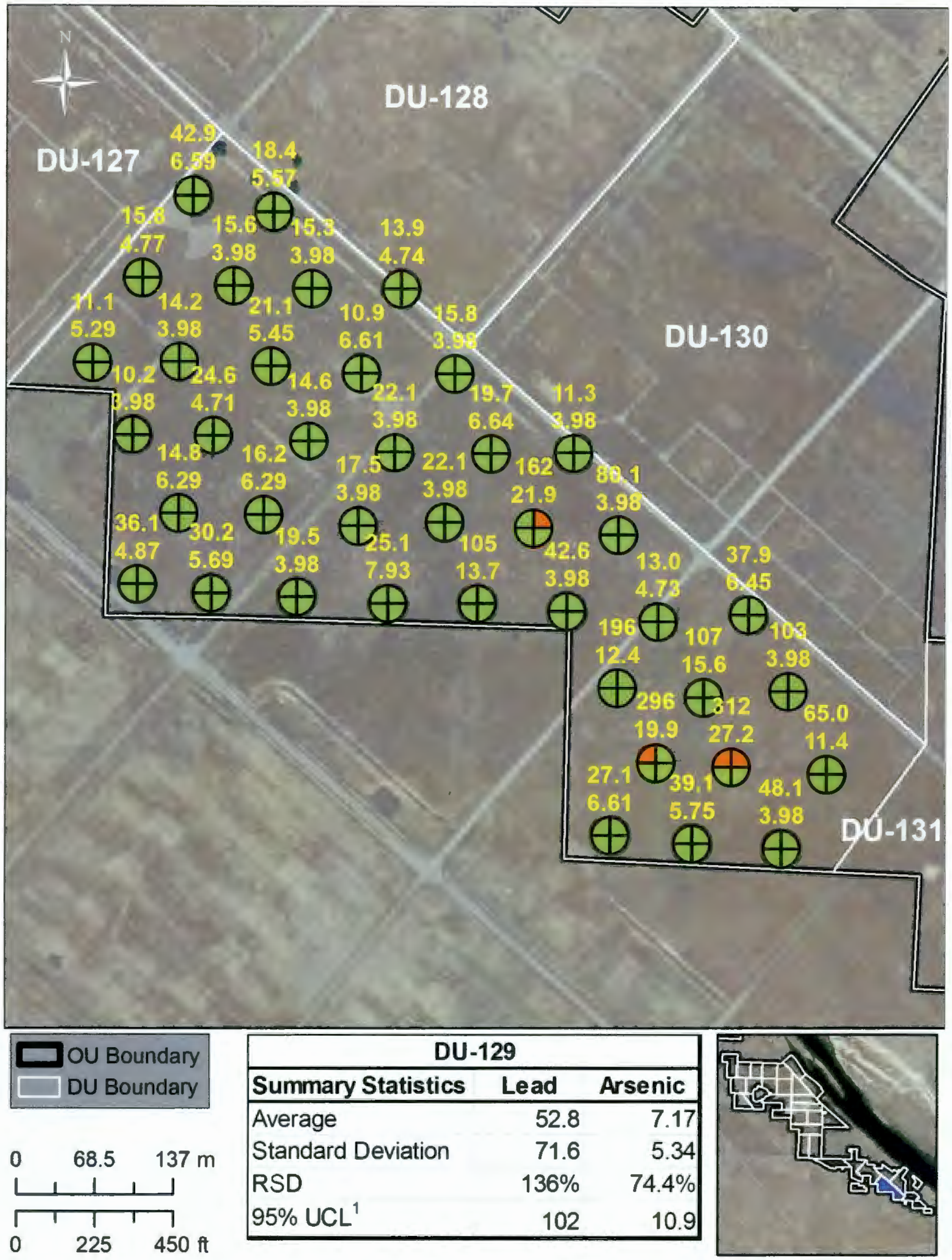
Figure A-130. DU-127 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.



DU-128		
Summary Statistics	Lead	Arsenic
Average	65.2	8.99
Standard Deviation	85.4	10.2
RSD	131%	114%
95% UCL[1]	91.0	18.0

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

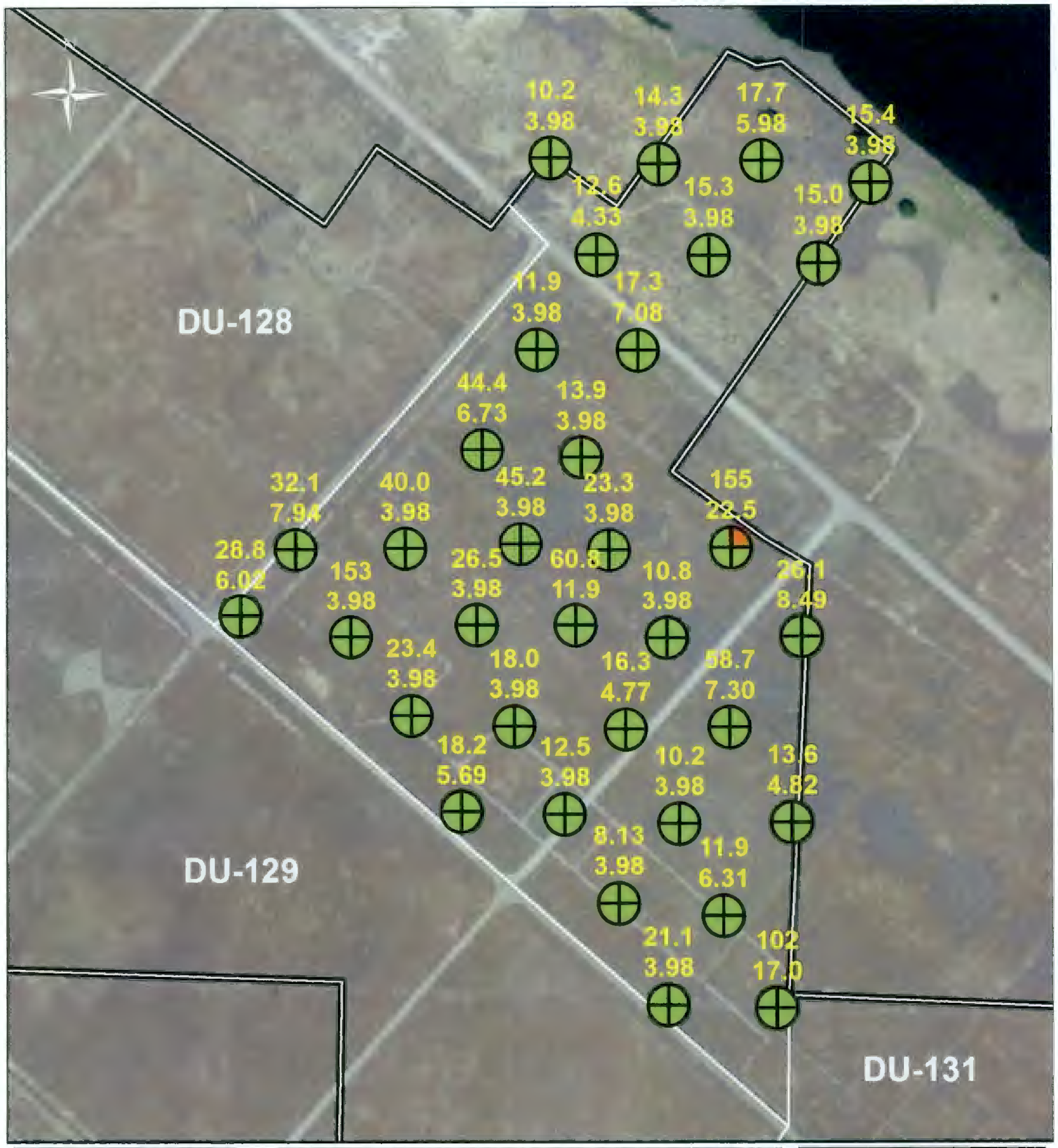
Figure A-131. DU-128 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

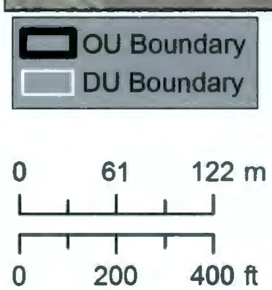


DU-129		
Summary Statistics	Lead	Arsenic
Average	52.8	7.17
Standard Deviation	71.6	5.34
RSD	136%	74.4%
95% UCL[1]	102	10.9

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-132. DU-129 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

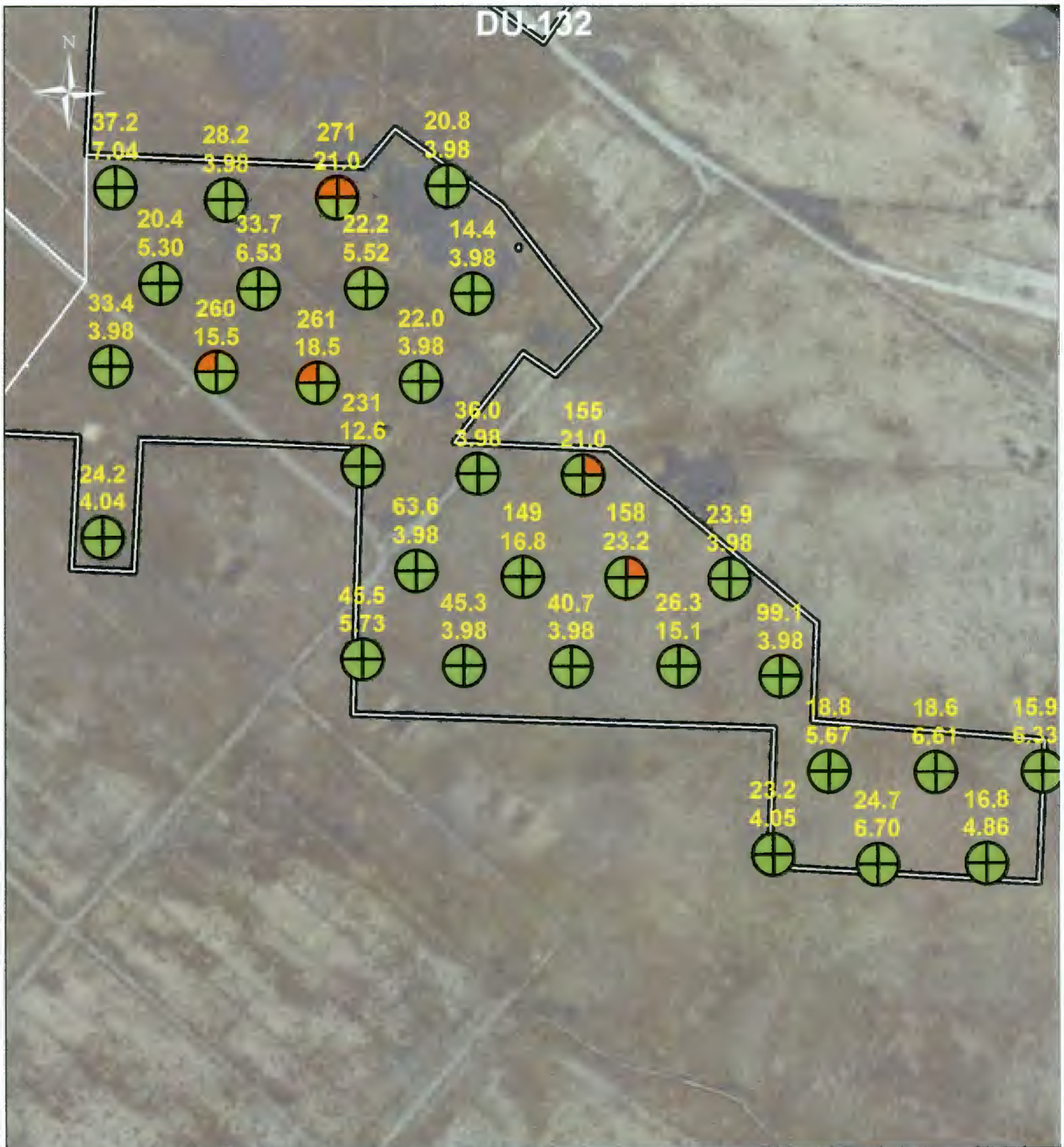


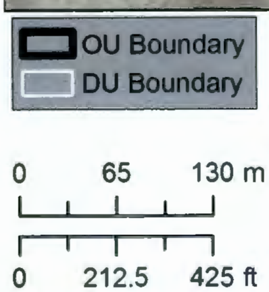


DU-130		
Summary Statistics	Lead	Arsenic
Average	32.5	5.96
Standard Deviation	36.3	3.93
RSD	112%	66.0%
95% UCL[1]	59.6	6.68

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-133. DU-130 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.





DU-131		
Summary Statistics	Lead	Arsenic
Average	72.3	8.26
Standard Deviation	82.4	6.05
RSD	114%	73.3%
95% UCL[1]	137	13.1

[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-134. DU-131 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

OU Boundary
DU Boundary

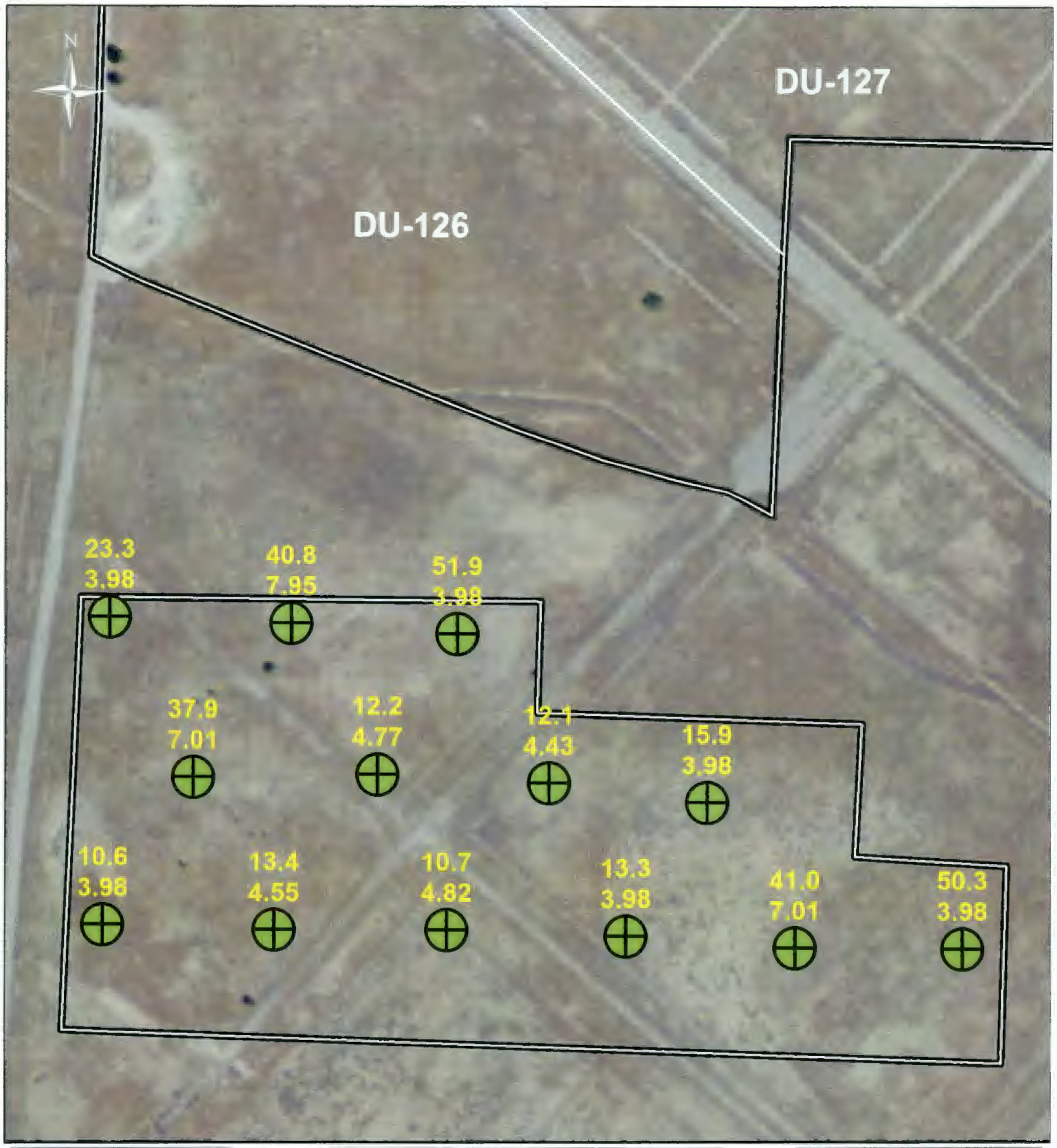
0 38.1 76.2 m

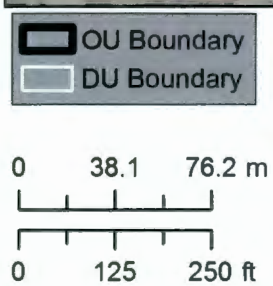
0 125 250 ft

DU-132		
Summary Statistics	**Lead**	**Arsenic**
Average	37.1	6.75
Standard Deviation	73.4	7.92
RSD	198%	117%
95% UCL[1]	126	8.74

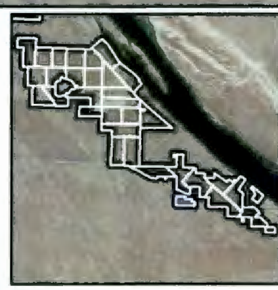
[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-135. DU-132 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.





DU-133		
Summary Statistics	Lead	Arsenic
Average	25.6	4.96
Standard Deviation	16.2	1.35
RSD	63.0%	27.2%
95% UCL[1]	39.5	5.67



[1]Table 4-2 provides a description of the basis for the 95% UCL and other summary results.

Figure A-136. DU-133 Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure A-2.

A.1 References

AWSCTF (Area Wide Soil Contamination Task Force). 2003a. *Area Wide Soil Contamination Task Force Report.* Submitted to Washington State Department of Agriculture, Washington State Department of Ecology, Washington State Department of Health, and Washington State Department of Community, Trade and Economic Development, Olympia, Washington. Available at: http://www.ecy.wa.gov/programs/tcp/area_wide/final-report/PDF/TF-Report-final.pdf

DOE/RL-2012-64. 2016. *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands.* Rev 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076311H

WAC 173-340-740(2). 2007. "Model Toxics Control Act—Cleanup; Unrestricted land use soil cleanup standards." *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-740

Appendix B

100-OL-1 OU Soil Sample Data and Quality Assurance Descriptions

This page intentionally left blank.

Appendix B

100-OL-1 OU Soil Sample Data and Quality Assurance Descriptions

B.1 Overview

This appendix presents the data measured at each sample location within the 100-OL-1 Operable Unit (OU). All the data were peer reviewed, verified, and validated as discussed in Appendix C. To assist the reader, Table B-1 describes the column headings for the sample location data in Table B-3. Any outliers or questionable data identified during the review and/or validation process had data qualifiers applied.

Table B-2 describes the reviewer and validation qualifiers used in Table B-3. Review qualifiers were applied to the data collected within the 100-OL-1 OU. The lead and arsenic concentrations recorded as < LOD (less than the level of detection) received a review qualifier flag of "U". When the XRF analyzer recorded "<LOD", the value was replaced by the method detection limit (MDL)[1], which was 5.68 mg/kg lead and 3.98 mg/kg arsenic for the Remedial Investigation activities (Section 4.3.1 and Appendix C). A validation qualifier was applied only if conditions affected the quality of the data reported; therefore, concentrations flagged with a review qualifier and passing acceptance criteria may not require a validation qualifier.[2] In most cases, a review qualifier of "F", "P", "Q", and "Z" are considered a minor deficiency. If the deficiency was major, then the review qualifier resulted in the validator assigning an "R" validation qualifier, and the corresponding concentrations were removed from the database value fields. Concentrations flagged with a "J" or "UJ" validation qualifier are considered estimated but useable. The "F" review qualifier and the "-" and "+" validation qualifiers were not assigned to the RI data.

Table B-3 includes the 4127 locations of measured lead and arsenic concentrations within the 100-OL-1 OU (by soil sample ID), and the associated data qualifiers. Further details on specific sample information (field comment, count durations, etc.), can be obtained via the project database or upon request.

---

[1] U.S. Department of Energy, Richland Operations Office, Richland, Washington, *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands*, DOE/RL-2012-64, Rev. 0, 2016.

[2] Pacific Northwest National Laboratory (PNNL), DVZ AFRI Project Test Instruction, *Data Entry and Quality Assurance Plan for the Remedial Investigation of the 100-OL-1 Operable Unit Pre-Hanford Orchards Lands*, TI-DVZ-AFRI-002, 2015

Table B-1. Column Heading Description for Table B-3, Lead and Arsenic Concentration Data

Column Heading	Description
Sample ID	The Sample ID (e.g., DU-001-005) is a unique alphanumeric identifier composed of a decision unit (DU) (e.g., DU-001) and a sample point collected within the DU (e.g., -005.). An "s" following the DU number signifies a step-out (i.e., outside of 100-OL-1) sample location (e.g., DU-001s-005).
XRF Reading Number	A number sequentially assigned by the Niton XL3t 950 X-ray fluorescence (XRF) analyzer (Thermo Scientific, Tewksbury, MA); automatically increments with each successive reading until the instrument is reset.
Date/Time	The date and time of the XRF reading.
Latitude	GPS latitude coordinate of current sample location (Decimal Degrees format).
Longitude	GPS longitude coordinate of current sample location (Decimal Degrees format).
Lead Concentration Or Arsenic Concentration	Concentration measured (mg/kg) by XRF during the analysis of the sample.
Lead 2σ Error or Arsenic 2σ Error	The 2-sigma error for the concentration reported; reported in the same units as the concentration value (mg/kg).
Lead Review Qualifiers or Arsenic Review Qualifiers	A set of one or more codes indicating that the data reviewer questioned the quality of the record. Table B-2 defines the review qualifiers.
Lead Validation Qualifiers or Arsenic Validation Qualifiers	A set of one or more codes that are assigned by a qualified individual who validates the results. If no validation qualifier is recorded, the validator agreed with the value reported and Review Qualifier(s), if applied. Table B-2 defines the validation qualifiers.

Table B-2. 100-OL-1 Decision Unit Data Review and Validation Qualifier Descriptions

Review Qualifiers	
F	The result is undergoing further review.
P	Potential problem. Collection/analysis circumstances makes values questionable.
Q	Associated quality control sample is out of limits.
U	Analyzed for but not detected above XRF instrument detection limit. Instrument reports "<LOD". Replace "<LOD" with MDL.
Z	Miscellaneous circumstances exist. Additional information may be found in the database comment field.
Validation Qualifiers	
-	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
+	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
J	Estimated value: The associated result value may not reflect quantitation/detection levels (if assigned with an associated "U" qualifier) or actual concentrations with the precision/accuracy typically associated with results by this methodology. Result precision/accuracy may have been impacted due to minor quality control deficiency/s or sample matrix interferences identified during data validation.
R	Rejected value: The value may not reflect true concentrations. The ability to establish detection/non-detection may be questionable. Validation activities identified major quality control deficiency/s or sample matrix interferences. The data should be considered unusable for most purposes. Any use of this data should be undertaken with great care. The data should not be used for certain regulatory decision-making purposes.
U	Functional non-detect: The constituent was analyzed for and reported by the XRF as "<LOD". The constituent has been assigned a non-detect qualifier and the value has been replaced with the MDL. Note: This qualifier may be assigned along with either, but never both, of the other validation qualifiers. In that case, both definitions apply to the associated result. The data should be considered usable as a non-detect for most decision-making purposes.

Table B-3. Lead and Arsenic Concentration Data and Associated Qualifiers by Soil Sample ID

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-001-001	169	2015-07-09 8:26	46.6386	-119.7263	12.11	3.39	–	–	< LOD	4.11	U	–
DU-001-002	171	2015-07-09 8:30	46.6386	-119.7253	18.20	3.40	–	–	< LOD	4.00	U	–
DU-001-003	172	2015-07-09 8:32	46.6387	-119.7243	18.89	3.34	–	–	< LOD	3.95	U	–
DU-001-004	173	2015-07-09 8:35	46.6386	-119.7234	16.24	3.68	–	–	< LOD	4.31	U	–
DU-001-005	174	2015-07-09 8:39	46.6386	-119.7223	52.16	4.54	–	–	6.41	3.55	–	–
DU-001-006	181	2015-07-09 9:58	46.6393	-119.7267	19.16	3.15	–	–	< LOD	3.72	U	–
DU-001-007	180	2015-07-09 9:55	46.6392	-119.7257	23.03	3.78	–	–	< LOD	4.39	U	–
DU-001-008	179	2015-07-09 9:52	46.6393	-119.7247	13.97	3.24	–	–	< LOD	3.89	U	–
DU-001-009	178	2015-07-09 9:50	46.6392	-119.7238	24.09	4.12	–	–	< LOD	4.86	U	–
DU-001-010	175	2015-07-09 8:43	46.6392	-119.7229	22.25	4.17	–	–	< LOD	4.95	U	–
DU-001-011	182	2015-07-09 10:01	46.6398	-119.7262	22.02	4.97	–	–	< LOD	5.97	U	–
DU-001-012	183	2015-07-09 10:04	46.6398	-119.7252	15.87	3.29	–	–	< LOD	3.91	U	–
DU-001-013	184	2015-07-09 10:07	46.6398	-119.7243	22.09	3.38	–	–	< LOD	3.93	U	–
DU-001-014	185	2015-07-09 10:09	46.6398	-119.7233	11.97	3.88	–	–	< LOD	4.52	U	–
DU-001-015	186	2015-07-09 10:14	46.6398	-119.7223	19.10	3.99	–	–	5.52	3.26	–	–
DU-001-016	191	2015-07-09 10:30	46.6404	-119.7267	26.73	3.78	–	–	< LOD	4.45	U	–
DU-001-017	190	2015-07-09 10:26	46.6404	-119.7257	38.46	4.01	–	–	5.00	3.14	–	–
DU-001-018	189	2015-07-09 10:23	46.6404	-119.7248	13.89	4.03	–	–	5.02	3.34	–	–
DU-001-019	188	2015-07-09 10:20	46.6403	-119.7239	29.65	3.95	–	–	< LOD	4.60	U	–
DU-001-020	187	2015-07-09 10:17	46.6404	-119.7228	16.05	3.55	–	–	< LOD	4.24	U	–
DU-001-021	199	2015-07-09 10:46	46.6410	-119.7262	32.72	3.84	–	–	4.61	3.01	–	–
DU-001-022	200	2015-07-09 10:49	46.6410	-119.7253	23.41	5.67	–	–	< LOD	6.78	U	–
DU-001-023	201	2015-07-09 10:52	46.6409	-119.7243	28.67	3.64	–	–	< LOD	4.19	U	–
DU-001-024	202	2015-07-09 10:55	46.6409	-119.7233	31.74	4.47	–	–	6.88	3.60	–	–
DU-001-025	203	2015-07-09 10:58	46.6410	-119.7224	16.00	3.05	–	–	< LOD	3.59	U	–
DU-001-026	208	2015-07-09 11:13	46.6414	-119.7266	23.99	3.81	–	–	< LOD	4.52	U	–
DU-001-027	207	2015-07-09 11:09	46.6415	-119.7256	25.37	3.39	–	–	4.05	2.68	–	–
DU-001-028	206	2015-07-09 11:06	46.6415	-119.7247	19.07	3.47	–	–	< LOD	4.15	U	–
DU-001-029	205	2015-07-09 11:03	46.6415	-119.7238	17.70	3.33	–	–	< LOD	3.86	U	–
DU-001-030	204	2015-07-09 11:00	46.6415	-119.7229	14.71	3.25	–	–	< LOD	3.89	U	–
DU-001-031	209	2015-07-09 11:18	46.6421	-119.7252	26.84	3.90	–	–	< LOD	4.53	U	–
DU-001-032	212	2015-07-09 11:35	46.6421	-119.7242	22.48	3.56	–	–	< LOD	4.20	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-001-033	213	2015-07-09 11:38	46.6421	-119.7233	14.70	3.51	–	–	< LOD	4.16	U	–
DU-001-034	214	2015-07-09 11:41	46.6421	-119.7223	21.79	3.99	–	–	< LOD	4.73	U	–
DU-001-035	217	2015-07-09 11:50	46.6427	-119.7237	25.59	3.63	–	–	< LOD	4.25	U	–
DU-001-036	216	2015-07-09 11:47	46.6426	-119.7229	19.63	3.40	–	–	5.24	2.72	–	–
DU-001-037	215	2015-07-09 11:45	46.6432	-119.7223	20.22	3.32	–	–	< LOD	3.88	U	–
DU-002-001	218	2015-07-15 8:57	46.6385	-119.7210	23.39	3.58	–	–	< LOD	4.26	U	–
DU-002-002	217	2015-07-15 8:55	46.6385	-119.7201	16.23	3.68	–	–	< LOD	4.39	U	–
DU-002-003	216	2015-07-15 8:52	46.6385	-119.7191	11.18	3.01	–	–	< LOD	3.55	U	–
DU-002-004	214	2015-07-15 8:47	46.6385	-119.7181	15.74	3.52	–	–	< LOD	4.25	U	–
DU-002-005	219	2015-07-15 8:59	46.6391	-119.7216	14.67	3.08	–	–	< LOD	3.68	U	–
DU-002-006	220	2015-07-15 9:02	46.6391	-119.7207	26.94	3.74	–	–	5.62	2.98	–	–
DU-002-007	221	2015-07-15 9:04	46.6391	-119.7197	16.38	3.31	–	–	< LOD	3.78	U	–
DU-002-008	222	2015-07-15 9:07	46.6391	-119.7188	15.53	3.28	–	–	< LOD	3.90	U	–
DU-002-009	226	2015-07-15 9:22	46.6396	-119.7211	41.00	3.99	–	–	4.72	3.11	–	–
DU-002-010	225	2015-07-15 9:19	46.6396	-119.7202	21.65	3.72	–	–	< LOD	4.33	U	–
DU-002-011	224	2015-07-15 9:12	46.6396	-119.7192	15.70	3.33	–	–	< LOD	3.89	U	–
DU-002-012	223	2015-07-15 9:09	46.6397	-119.7183	14.74	3.26	–	–	4.70	2.64	–	–
DU-002-013	227	2015-07-15 9:25	46.6402	-119.7216	34.70	3.99	–	–	6.09	3.16	–	–
DU-002-014	228	2015-07-15 9:27	46.6402	-119.7207	23.29	3.45	–	–	4.65	2.73	–	–
DU-002-015	229	2015-07-15 9:30	46.6403	-119.7197	24.74	3.55	–	–	6.07	2.84	–	–
DU-002-016	230	2015-07-15 9:32	46.6402	-119.7187	19.82	3.35	–	–	4.69	2.67	–	–
DU-002-017	234	2015-07-15 9:41	46.6408	-119.7211	18.76	3.25	–	–	< LOD	3.82	U	–
DU-002-018	233	2015-07-15 9:39	46.6408	-119.7201	15.36	3.29	–	–	< LOD	3.81	U	–
DU-002-019	232	2015-07-15 9:36	46.6408	-119.7192	10.73	2.93	–	–	< LOD	3.47	U	–
DU-002-020	231	2015-07-15 9:34	46.6408	-119.7182	11.84	2.97	–	–	< LOD	3.53	U	–
DU-002-021	246	2015-07-15 9:59	46.6414	-119.7216	7.95	2.85	–	–	< LOD	3.43	U	–
DU-002-022	247	2015-07-15 10:01	46.6414	-119.7207	16.64	3.18	–	–	< LOD	3.67	U	–
DU-002-023	248	2015-07-15 10:03	46.6414	-119.7197	15.43	3.07	–	–	< LOD	3.63	U	–
DU-002-024	249	2015-07-15 10:06	46.6414	-119.7187	7.76	2.88	–	–	< LOD	3.50	U	–
DU-002-025	253	2015-07-15 10:14	46.6419	-119.7212	14.98	3.37	–	–	< LOD	4.06	U	–
DU-002-026	252	2015-07-15 10:12	46.6420	-119.7201	20.00	3.19	–	–	< LOD	3.74	U	–
DU-002-027	251	2015-07-15 10:10	46.6419	-119.7191	12.92	3.07	–	–	< LOD	3.63	U	–
DU-002-028	250	2015-07-15 10:08	46.6419	-119.7183	17.04	3.18	–	–	< LOD	3.74	U	–
DU-002-029	254	2015-07-15 10:17	46.6425	-119.7215	32.52	3.81	–	–	6.02	3.02	–	–
DU-002-030	255	2015-07-15 10:19	46.6425	-119.7207	15.69	3.22	–	–	< LOD	3.84	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-002-031	256	2015-07-15 10:21	46.6426	-119.7198	24.72	3.44	–	–	< LOD	3.98	U	–
DU-002-032	257	2015-07-15 10:23	46.6426	-119.7188	21.98	3.40	–	–	< LOD	3.92	U	–
DU-002-033	261	2015-07-15 10:32	46.6431	-119.7211	13.41	3.19	–	–	4.75	2.57	–	–
DU-002-034	260	2015-07-15 10:29	46.6431	-119.7201	14.38	3.02	–	–	< LOD	3.58	U	–
DU-002-035	259	2015-07-15 10:27	46.6431	-119.7192	14.40	3.33	–	–	< LOD	4.02	U	–
DU-002-036	258	2015-07-15 10:25	46.6431	-119.7183	18.96	3.38	–	–	4.50	2.70	–	–
DU-002-037	262	2015-07-15 10:35	46.6437	-119.7196	17.23	3.52	–	–	6.25	2.86	–	–
DU-002-038	263	2015-07-15 10:37	46.6437	-119.7187	13.91	3.05	–	–	< LOD	3.64	U	–
DU-002-039	264	2015-07-15 10:39	46.6442	-119.7183	30.25	3.88	–	–	< LOD	4.49	U	–
DU-003-001	45	2015-07-13 9:48	46.6403	-119.7174	13.49	3.06	–	–	< LOD	3.63	U	–
DU-003-002	44	2015-07-13 9:45	46.6403	-119.7164	17.34	3.27	–	–	4.92	2.62	–	–
DU-003-003	43	2015-07-13 9:42	46.6403	-119.7154	17.30	3.23	–	–	< LOD	3.83	U	–
DU-003-004	35	2015-07-13 9:28	46.6402	-119.7143	18.08	3.57	–	–	< LOD	4.24	U	–
DU-003-005	46	2015-07-13 9:50	46.6409	-119.7168	13.91	3.38	–	–	< LOD	3.96	U	–
DU-003-006	47	2015-07-13 9:53	46.6408	-119.7158	14.99	3.21	–	–	4.28	2.57	–	–
DU-003-007	48	2015-07-13 9:56	46.6407	-119.7148	16.05	3.35	–	–	< LOD	3.93	U	–
DU-003-008	49	2015-07-13 9:59	46.6408	-119.7139	26.11	3.67	–	–	< LOD	4.33	U	–
DU-003-009	53	2015-07-13 10:10	46.6414	-119.7174	14.36	3.11	–	–	9.18	2.62	–	–
DU-003-010	52	2015-07-13 10:08	46.6415	-119.7164	14.98	3.43	–	–	< LOD	4.12	U	–
DU-003-011	51	2015-07-13 10:05	46.6415	-119.7153	15.55	3.31	–	–	< LOD	3.95	U	–
DU-003-012	50	2015-07-13 10:03	46.6414	-119.7143	12.53	3.57	–	–	< LOD	4.28	U	–
DU-003-013	54	2015-07-13 10:14	46.6421	-119.7178	12.93	3.22	–	–	< LOD	3.78	U	–
DU-003-014	55	2015-07-13 10:16	46.6420	-119.7168	13.13	3.80	–	–	< LOD	4.60	U	–
DU-003-015	56	2015-07-13 10:19	46.6420	-119.7158	10.98	3.10	–	–	4.34	2.51	–	–
DU-003-016	57	2015-07-13 10:22	46.6420	-119.7148	16.12	3.20	–	–	< LOD	3.77	U	–
DU-003-017	62	2015-07-13 10:38	46.6427	-119.7174	18.83	3.66	–	–	< LOD	4.27	U	–
DU-003-018	61	2015-07-13 10:35	46.6426	-119.7164	21.12	3.64	–	–	< LOD	4.23	U	–
DU-003-019	60	2015-07-13 10:33	46.6427	-119.7153	19.67	3.39	–	–	5.24	2.72	–	–
DU-003-020	59	2015-07-13 10:29	46.6426	-119.7143	12.26	3.35	–	–	< LOD	4.04	U	–
DU-003-021	58	2015-07-13 10:27	46.6426	-119.7133	15.07	3.73	–	–	< LOD	4.49	U	–
DU-003-022	72	2015-07-13 10:56	46.6432	-119.7178	21.98	3.64	–	–	6.00	2.94	–	–
DU-003-023	73	2015-07-13 10:59	46.6432	-119.7168	18.43	3.27	–	–	5.22	2.63	–	–
DU-003-024	74	2015-07-13 11:03	46.6433	-119.7157	20.50	3.59	–	–	4.84	2.86	–	–
DU-003-025	75	2015-07-13 11:06	46.6432	-119.7148	19.64	3.52	–	–	< LOD	4.20	U	–
DU-003-026	76	2015-07-13 11:09	46.6432	-119.7138	19.57	3.37	–	–	< LOD	3.93	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-003-027	77	2015-07-13 11:12	46.6432	-119.7129	15.16	3.63	–	–	< LOD	4.35	U	–
DU-003-028	78	2015-07-13 11:15	46.6432	-119.7118	14.75	4.36	–	–	< LOD	5.24	U	–
DU-003-029	84	2015-07-13 11:34	46.6437	-119.7174	52.65	6.94	–	–	96.71	7.47	–	–
DU-003-030	83	2015-07-13 11:31	46.6438	-119.7163	16.89	3.47	–	–	< LOD	4.02	U	–
DU-003-031	82	2015-07-13 11:28	46.6439	-119.7152	13.61	3.74	–	–	< LOD	4.45	U	–
DU-003-032	81	2015-07-13 11:25	46.6438	-119.7143	20.71	3.60	–	–	< LOD	4.21	U	–
DU-003-033	80	2015-07-13 11:22	46.6438	-119.7134	13.65	4.10	–	–	< LOD	4.86	U	–
DU-003-034	79	2015-07-13 11:19	46.6438	-119.7122	11.67	3.00	–	–	< LOD	3.56	U	–
DU-003-035	85	2015-07-13 11:38	46.6444	-119.7176	20.51	3.66	–	–	5.29	2.95	–	–
DU-003-036	86	2015-07-13 11:41	46.6445	-119.7168	25.06	4.03	–	–	5.46	3.23	–	–
DU-003-037	87	2015-07-13 11:45	46.6445	-119.7158	22.32	3.49	–	–	< LOD	4.09	U	–
DU-003-038	88	2015-07-13 11:50	46.6444	-119.7148	21.99	3.60	–	–	< LOD	4.22	U	–
DU-003-039	89	2015-07-13 11:53	46.6444	-119.7138	21.93	3.55	–	–	< LOD	4.19	U	–
DU-003-040	90	2015-07-13 11:57	46.6444	-119.7128	17.05	3.43	–	–	< LOD	3.98	U	–
DU-004-001	246	2015-07-09 14:14	46.6386	-119.7172	14.12	3.45	–	–	< LOD	4.14	U	–
DU-004-002	245	2015-07-09 14:10	46.6386	-119.7163	18.25	3.60	–	–	< LOD	4.30	U	–
DU-004-003	244	2015-07-09 14:07	46.6386	-119.7156	15.81	3.60	–	–	< LOD	4.23	U	–
DU-004-004	243	2015-07-09 14:05	46.6386	-119.7148	11.78	3.50	–	–	< LOD	4.24	U	–
DU-004-005	242	2015-07-09 14:03	46.6386	-119.7139	17.02	4.20	–	–	< LOD	5.02	U	–
DU-004-006	238	2015-07-09 13:51	46.6392	-119.7177	16.43	3.17	–	–	< LOD	3.74	U	–
DU-004-007	239	2015-07-09 13:55	46.6391	-119.7160	17.23	3.24	–	–	< LOD	3.85	U	–
DU-004-008	240	2015-07-09 13:57	46.6391	-119.7152	11.24	3.17	–	–	< LOD	3.79	U	–
DU-004-009	241	2015-07-09 14:00	46.6391	-119.7143	10.35	3.68	–	–	< LOD	4.55	U	–
DU-004-010	237	2015-07-09 13:49	46.6396	-119.7172	17.71	3.78	–	–	< LOD	4.41	U	–
DU-004-011	236	2015-07-09 13:46	46.6396	-119.7165	48.04	4.92	–	–	< LOD	5.52	U	–
DU-004-012	235	2015-07-09 13:44	46.6396	-119.7157	16.23	3.40	–	–	< LOD	4.06	U	–
DU-004-013	234	2015-07-09 13:42	46.6396	-119.7148	22.57	3.97	–	–	< LOD	4.71	U	–
DU-004-014	231	2015-07-09 13:37	46.6396	-119.7140	17.74	3.27	–	–	< LOD	3.80	U	–
DU-005-001	100	2015-08-19 11:56	46.6418	-119.6950	23.19	3.53	–	–	< LOD	4.14	U	–
DU-005-002	99	2015-08-19 11:52	46.6418	-119.6941	12.41	3.08	–	–	< LOD	3.66	U	–
DU-005-003	97	2015-08-19 11:48	46.6418	-119.6932	29.41	4.04	–	–	< LOD	4.78	U	–
DU-005-004	95	2015-08-19 11:43	46.6418	-119.6922	24.09	3.50	–	–	< LOD	4.13	U	–
DU-005-005	93	2015-08-19 11:39	46.6418	-119.6912	28.94	3.56	–	–	< LOD	4.15	U	–
DU-005-006	101	2015-08-19 11:58	46.6424	-119.6946	17.17	3.16	–	–	6.62	2.57	–	–
DU-005-007	98	2015-08-19 11:50	46.6423	-119.6936	16.88	4.57	–	–	< LOD	5.57	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-005-008	96	2015-08-19 11:46	46.6423	-119.6927	14.97	3.09	–	–	< LOD	3.62	U	–
DU-005-009	94	2015-08-19 11:41	46.6423	-119.6917	23.01	3.49	–	–	5.94	2.80	–	–
DU-005-010	92	2015-08-19 11:37	46.6423	-119.6907	29.84	4.16	–	–	< LOD	4.78	U	–
DU-005-011	91	2015-08-19 11:34	46.6423	-119.6897	12.47	2.90	–	–	< LOD	3.47	U	–
DU-005-012	90	2015-08-19 11:32	46.6423	-119.6888	21.84	3.40	–	–	4.27	2.70	–	–
DU-005-013	75	2015-08-19 11:04	46.6430	-119.6950	15.62	3.90	–	–	< LOD	4.57	U	–
DU-005-014	76	2015-08-19 11:06	46.6429	-119.6941	14.93	3.03	–	–	< LOD	3.48	U	–
DU-005-015	77	2015-08-19 11:08	46.6429	-119.6931	13.74	3.02	–	–	< LOD	3.57	U	–
DU-005-016	78	2015-08-19 11:10	46.6429	-119.6922	12.52	3.35	–	–	< LOD	4.01	U	–
DU-005-017	79	2015-08-19 11:13	46.6429	-119.6912	15.18	2.99	–	–	< LOD	3.55	U	–
DU-005-018	80	2015-08-19 11:15	46.6429	-119.6903	17.92	3.39	–	–	< LOD	3.97	U	–
DU-005-019	88	2015-08-19 11:28	46.6429	-119.6893	24.99	3.64	–	–	< LOD	4.27	U	–
DU-005-020	89	2015-08-19 11:30	46.6429	-119.6883	15.28	3.68	–	–	< LOD	4.45	U	–
DU-005-021	74	2015-08-19 11:02	46.6435	-119.6945	12.05	2.98	–	–	< LOD	3.53	U	–
DU-005-022	73	2015-08-19 10:59	46.6435	-119.6936	16.92	3.68	–	–	< LOD	4.38	U	–
DU-005-023	72	2015-08-19 10:57	46.6435	-119.6925	17.90	3.12	–	–	< LOD	3.69	U	–
DU-005-024	71	2015-08-19 10:55	46.6434	-119.6916	26.13	3.59	–	–	< LOD	4.16	U	–
DU-005-025	70	2015-08-19 10:52	46.6434	-119.6907	16.83	3.46	–	–	< LOD	4.12	U	–
DU-005-026	69	2015-08-19 10:50	46.6435	-119.6897	12.42	3.51	–	–	< LOD	4.16	U	–
DU-005-027	68	2015-08-19 10:48	46.6435	-119.6889	17.01	3.25	–	–	< LOD	3.87	U	–
DU-005-028	61	2015-08-19 10:33	46.6441	-119.6950	13.84	3.17	–	–	< LOD	3.82	U	–
DU-005-029	63	2015-08-19 10:36	46.6440	-119.6941	12.22	3.01	–	–	4.87	2.44	–	–
DU-005-030	64	2015-08-19 10:38	46.6441	-119.6931	17.18	3.71	–	–	< LOD	4.35	U	–
DU-005-031	65	2015-08-19 10:40	46.6440	-119.6921	14.67	4.62	–	–	< LOD	5.76	U	–
DU-005-032	66	2015-08-19 10:42	46.6440	-119.6912	30.61	3.78	–	–	< LOD	4.31	U	–
DU-005-033	67	2015-08-19 10:45	46.6440	-119.6902	20.92	3.58	–	–	< LOD	4.22	U	–
DU-006-001	125	2015-07-13 14:23	46.6322	-119.6925	11.05	3.32	Z	–	< LOD	3.99	UZ	–
DU-006-002	124	2015-07-13 14:20	46.6322	-119.6915	13.49	3.29	Z	–	< LOD	3.82	UZ	–
DU-006-003	123	2015-07-13 14:16	46.6322	-119.6905	10.47	3.40	Z	–	< LOD	4.10	UZ	–
DU-006-004	121	2015-07-13 14:11	46.6329	-119.6920	12.64	3.10	Z	–	6.28	2.56	Z	–
DU-006-005	122	2015-07-13 14:13	46.6328	-119.6910	14.53	3.39	Z	–	< LOD	4.03	UZ	–
DU-006-006	120	2015-07-13 14:08	46.6333	-119.6923	13.87	3.74	Z	–	< LOD	4.49	UZ	–
DU-006-007	118	2015-07-13 14:03	46.6334	-119.6914	18.12	3.45	Z	–	< LOD	4.04	UZ	–
DU-006-008	119	2015-07-13 14:05	46.6335	-119.6906	14.17	3.27	Z	–	< LOD	3.88	UZ	–
DU-006-009	116	2015-07-13 13:58	46.6340	-119.6919	13.43	3.04	Z	–	< LOD	3.62	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-006-010	117	2015-07-13 14:00	46.6340	-119.6912	13.20	3.25	Z	–	< LOD	3.90	UZ	–
DU-006-011	115	2015-07-13 13:55	46.6346	-119.6923	13.17	3.43	Z	–	5.13	2.81	Z	–
DU-006-012	114	2015-07-13 13:52	46.6346	-119.6913	22.03	3.92	Z	–	< LOD	4.54	UZ	–
DU-006-013	113	2015-07-13 13:50	46.6347	-119.6904	21.82	3.64	Z	–	< LOD	4.23	UZ	–
DU-006-014	111	2015-07-13 13:45	46.6352	-119.6919	21.22	3.64	Z	–	< LOD	4.32	UZ	–
DU-006-015	112	2015-07-13 13:47	46.6351	-119.6912	15.83	3.63	Z	–	< LOD	4.35	UZ	–
DU-006-016	110	2015-07-13 13:41	46.6357	-119.6922	7.16	2.88	Z	–	< LOD	2.33	UZ	–
DU-006-017	108	2015-07-13 13:38	46.6357	-119.6913	10.12	3.20	Z	–	4.05	2.60	Z	–
DU-006-018	107	2015-07-13 13:36	46.6357	-119.6906	9.42	2.99	Z	–	< LOD	3.57	UZ	–
DU-007-001	298	2015-07-15 12:01	46.6384	-119.6762	11.34	2.96	–	–	< LOD	3.56	U	–
DU-007-002	300	2015-07-15 12:05	46.6385	-119.6751	5.87	3.07	–	–	< LOD	3.78	U	–
DU-007-003	301	2015-07-15 12:08	46.6384	-119.6742	15.25	3.45	–	–	< LOD	4.04	U	–
DU-007-004	302	2015-07-15 12:10	46.6384	-119.6731	17.29	3.27	–	–	< LOD	3.85	U	–
DU-007-005	303	2015-07-15 12:12	46.6384	-119.6723	9.67	3.12	–	–	4.81	2.57	–	–
DU-007-006	311	2015-07-15 12:33	46.6391	-119.6777	14.80	3.29	–	–	< LOD	3.89	U	–
DU-007-007	310	2015-07-15 12:31	46.6391	-119.6766	20.85	3.52	–	–	< LOD	4.17	U	–
DU-007-008	309	2015-07-15 12:28	46.6392	-119.6756	18.40	3.52	–	–	< LOD	4.11	U	–
DU-007-009	308	2015-07-15 12:25	46.6391	-119.6748	23.43	3.49	–	–	< LOD	4.08	U	–
DU-007-010	307	2015-07-15 12:23	46.6391	-119.6739	10.14	3.11	–	–	< LOD	3.68	U	–
DU-007-011	304	2015-07-15 12:14	46.6390	-119.6726	10.03	3.31	–	–	4.12	2.70	–	–
DU-007-012	312	2015-07-15 12:35	46.6396	-119.6782	9.18	2.82	–	–	< LOD	3.39	U	–
DU-007-013	313	2015-07-15 12:37	46.6396	-119.6772	14.97	3.01	–	–	< LOD	3.54	U	–
DU-007-014	314	2015-07-15 12:40	46.6396	-119.6761	12.70	3.19	–	–	< LOD	3.77	U	–
DU-007-015	315	2015-07-15 12:42	46.6396	-119.6751	12.29	3.04	–	–	< LOD	2.44	U	–
DU-007-016	325	2015-07-15 12:55	46.6396	-119.6741	18.34	3.53	–	–	< LOD	4.18	U	–
DU-007-017	326	2015-07-15 12:57	46.6396	-119.6731	15.60	3.20	–	–	< LOD	3.73	U	–
DU-007-018	327	2015-07-15 12:59	46.6396	-119.6721	14.37	3.17	–	–	4.21	2.55	–	–
DU-007-019	333	2015-07-15 13:14	46.6402	-119.6786	20.69	3.38	–	–	< LOD	3.95	U	–
DU-007-020	332	2015-07-15 13:12	46.6402	-119.6776	18.61	3.32	–	–	< LOD	3.86	U	–
DU-007-021	331	2015-07-15 13:09	46.6402	-119.6766	14.46	3.14	–	–	4.27	2.52	–	–
DU-007-022	330	2015-07-15 13:07	46.6402	-119.6756	15.27	3.23	–	–	6.35	2.64	–	–
DU-007-023	329	2015-07-15 13:04	46.6402	-119.6746	14.66	3.20	–	–	< LOD	3.81	U	–
DU-007-024	328	2015-07-15 13:02	46.6402	-119.6736	13.48	3.04	–	–	< LOD	3.62	U	–
DU-007-025	335	2015-07-15 13:20	46.6409	-119.6781	18.14	3.53	–	–	< LOD	4.15	U	–
DU-007-026	336	2015-07-15 13:22	46.6408	-119.6771	12.17	3.06	–	–	6.71	2.53	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-007-027	337	2015-07-15 13:24	46.6408	-119.6761	17.80	3.44	–	–	< LOD	3.97	U	–
DU-007-028	334	2015-07-15 13:17	46.6414	-119.6786	19.07	3.32	–	–	< LOD	3.90	U	–
DU-008-001	103	2015-09-17 11:22	46.6332	-119.6635	13.17	3.44	–	–	< LOD	4.09	U	–
DU-008-002	37	2015-09-17 8:25	46.6332	-119.6624	13.46	3.08	–	–	< LOD	3.55	U	–
DU-008-003	102	2015-09-17 11:18	46.6338	-119.6629	12.88	3.27	–	–	4.44	2.64	–	–
DU-008-004	39	2015-09-17 8:30	46.6338	-119.6619	17.57	3.40	–	–	< LOD	3.91	U	–
DU-008-005	101	2015-09-17 11:16	46.6343	-119.6635	20.77	3.43	–	–	< LOD	4.04	U	–
DU-008-006	99	2015-09-17 11:13	46.6344	-119.6624	23.95	3.93	–	–	5.59	3.16	–	–
DU-008-007	40	2015-09-17 8:33	46.6343	-119.6614	11.25	3.26	–	–	4.01	2.65	–	–
DU-008-008	41	2015-09-17 8:35	46.6344	-119.6603	13.08	2.93	–	–	< LOD	3.50	U	–
DU-008-009	98	2015-09-17 11:11	46.6350	-119.6629	18.94	3.31	–	–	4.36	2.64	–	–
DU-008-010	97	2015-09-17 11:08	46.6350	-119.6619	15.86	3.53	–	–	6.65	2.90	–	–
DU-008-011	96	2015-09-17 11:06	46.6350	-119.6608	22.55	3.47	–	–	< LOD	3.97	U	–
DU-008-012	42	2015-09-17 8:38	46.6349	-119.6599	12.00	2.98	–	–	< LOD	3.53	U	–
DU-008-013	43	2015-09-17 8:41	46.6350	-119.6588	9.66	3.12	–	–	< LOD	3.78	U	–
DU-008-014	84	2015-09-17 10:42	46.6356	-119.6635	21.14	3.70	Z	–	< LOD	4.38	UZ	–
DU-008-015	92	2015-09-17 10:56	46.6355	-119.6624	17.86	3.46	–	–	5.36	2.80	–	–
DU-008-016	93	2015-09-17 10:59	46.6356	-119.6613	17.06	3.32	–	–	4.20	2.65	–	–
DU-008-017	94	2015-09-17 11:01	46.6356	-119.6604	16.69	4.00	–	–	< LOD	4.81	U	–
DU-008-018	95	2015-09-17 11:03	46.6355	-119.6594	15.68	3.56	–	–	< LOD	4.25	U	–
DU-008-019	44	2015-09-17 8:43	46.6355	-119.6583	24.60	3.78	–	–	4.55	3.00	–	–
DU-008-020	45	2015-09-17 8:46	46.6355	-119.6573	10.20	3.30	–	–	5.05	2.72	–	–
DU-008-021	83	2015-09-17 10:39	46.6361	-119.6640	11.26	3.16	Z	–	< LOD	3.74	UZ	–
DU-008-022	82	2015-09-17 10:36	46.6362	-119.6630	11.15	3.11	Z	–	< LOD	3.75	UZ	–
DU-008-023	81	2015-09-17 10:33	46.6360	-119.6619	16.51	4.18	–	–	55.06	4.62	–	–
DU-008-024	80	2015-09-17 10:30	46.6363	-119.6609	8.33	3.62	–	–	7.21	3.08	–	–
DU-008-025	79	2015-09-17 10:28	46.6361	-119.6599	7.97	2.88	–	–	4.18	2.34	–	–
DU-008-026	78	2015-09-17 10:25	46.6361	-119.6588	9.71	3.13	–	–	5.58	2.58	–	–
DU-008-027	77	2015-09-17 10:22	46.6361	-119.6577	18.55	3.37	–	–	6.65	2.75	–	–
DU-008-028	46	2015-09-17 8:50	46.6361	-119.6567	13.54	3.06	–	–	4.11	2.43	–	–
DU-008-029	47	2015-09-17 8:54	46.6363	-119.6557	15.48	3.49	–	–	< LOD	4.17	U	–
DU-008-030	72	2015-09-17 10:10	46.6369	-119.6634	8.92	3.09	–	–	5.15	2.55	–	–
DU-008-031	73	2015-09-17 10:12	46.6368	-119.6623	19.21	3.39	–	–	< LOD	4.02	U	–
DU-008-032	75	2015-09-17 10:15	46.6368	-119.6613	14.66	3.57	–	–	< LOD	4.18	U	–
DU-008-033	76	2015-09-17 10:18	46.6368	-119.6603	22.58	3.67	–	–	< LOD	4.31	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-008-034	63	2015-09-17 9:46	46.6368	-119.6593	53.60	5.17	–	–	7.05	4.07	–	–
DU-008-035	62	2015-09-17 9:43	46.6368	-119.6583	25.66	4.01	–	–	8.63	3.29	–	–
DU-008-036	61	2015-09-17 9:40	46.6368	-119.6572	45.58	5.01	–	–	< LOD	5.90	U	–
DU-008-037	60	2015-09-17 9:37	46.6368	-119.6562	17.80	3.62	–	–	< LOD	4.27	U	–
DU-008-038	48	2015-09-17 8:56	46.6368	-119.6551	20.93	4.16	–	–	< LOD	5.02	U	–
DU-008-039	52	2015-09-17 9:18	46.6367	-119.6543	16.15	3.88	–	–	< LOD	4.53	U	–
DU-008-040	71	2015-09-17 10:07	46.6375	-119.6639	11.19	3.05	–	–	< LOD	2.45	U	–
DU-008-041	67	2015-09-17 9:56	46.6374	-119.6629	14.03	3.34	–	–	< LOD	3.96	U	–
DU-008-042	66	2015-09-17 9:54	46.6374	-119.6618	32.90	4.17	–	–	7.14	3.35	–	–
DU-008-043	65	2015-09-17 9:51	46.6374	-119.6608	22.32	4.26	–	–	< LOD	5.08	U	–
DU-008-044	64	2015-09-17 9:48	46.6374	-119.6598	44.73	4.28	–	–	8.11	3.41	–	–
DU-008-045	69	2015-09-17 10:02	46.6381	-119.6633	34.85	4.82	–	–	< LOD	5.64	U	–
DU-008-046	68	2015-09-17 9:59	46.6380	-119.6624	40.00	4.21	–	–	6.98	3.35	–	–
DU-009-001	43	2015-08-19 9:32	46.6482	-119.6093	18.03	3.40	–	–	< LOD	4.00	U	–
DU-009-002	42	2015-08-19 9:29	46.6483	-119.6080	8.19	2.91	–	–	< LOD	3.47	U	–
DU-009-003	39	2015-08-19 9:23	46.6487	-119.6096	18.88	3.90	–	–	< LOD	4.67	U	–
DU-009-004	40	2015-08-19 9:25	46.6485	-119.6090	18.43	3.83	–	–	< LOD	4.55	U	–
DU-009-005	41	2015-08-19 9:27	46.6485	-119.6084	27.52	3.58	–	–	4.65	2.82	–	–
DU-009-006	38	2015-08-19 9:21	46.6490	-119.6092	26.20	4.08	–	–	< LOD	4.84	U	–
DU-009-007	37	2015-08-19 9:18	46.6489	-119.6087	20.25	3.65	–	–	< LOD	4.32	U	–
DU-009-008	36	2015-08-19 9:16	46.6489	-119.6080	15.79	3.38	–	–	4.12	2.71	–	–
DU-009-009	35	2015-08-19 9:14	46.6489	-119.6075	23.90	3.60	–	–	< LOD	4.23	U	–
DU-009-010	31	2015-08-19 9:05	46.6493	-119.6090	42.03	3.89	–	–	12.35	3.20	–	–
DU-009-011	32	2015-08-19 9:08	46.6493	-119.6084	19.81	3.57	–	–	5.10	2.88	–	–
DU-009-012	33	2015-08-19 9:11	46.6493	-119.6078	20.15	3.53	–	–	4.78	2.83	–	–
DU-009-013	44	2015-08-19 9:41	46.6504	-119.6069	30.76	4.14	–	–	< LOD	4.90	U	–
DU-009-014	45	2015-08-19 9:44	46.6508	-119.6060	16.11	3.58	–	–	< LOD	4.17	U	–
DU-009-015	46	2015-08-19 9:50	46.6518	-119.6038	33.15	3.76	–	–	22.88	3.37	–	–
DU-009-016	47	2015-08-19 9:53	46.6522	-119.6031	27.03	3.15	–	–	5.60	2.52	–	–
DU-010-001	30	2015-07-30 8:20	46.7018	-119.5355	8.46	4.05	Z	–	< LOD	4.92	UZ	–
DU-010-002	31	2015-07-30 8:23	46.7023	-119.5340	137.94	9.80	Z	–	13.22	7.64	Z	–
DU-010-003	32	2015-07-30 8:26	46.7029	-119.5334	31.62	5.35	Z	–	< LOD	6.43	UZ	–
DU-010-004	33	2015-07-30 8:28	46.7029	-119.5325	16.52	4.30	Z	–	< LOD	5.04	UZ	–
DU-010-005	34	2015-07-30 8:31	46.7034	-119.5320	17.55	5.20	Z	–	< LOD	6.24	UZ	–
DU-010-006	35	2015-07-30 8:33	46.7035	-119.5310	21.14	5.57	Z	–	< LOD	6.84	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-010-007	51	2015-07-30 9:22	46.7036	-119.5298	135.00	10.31	Z	–	< LOD	11.61	UZ	–
DU-010-008	36	2015-07-30 8:36	46.7041	-119.5314	179.64	7.63	Z	–	14.18	5.86	Z	–
DU-010-009	50	2015-07-30 9:20	46.7042	-119.5303	60.46	7.20	Z	–	< LOD	8.34	UZ	–
DU-010-010	59	2015-07-30 9:36	46.7040	-119.5294	34.69	5.18	Z	–	< LOD	6.21	UZ	–
DU-010-011	71	2015-07-30 10:09	46.7041	-119.5283	12.10	3.07	Z	–	< LOD	3.70	UZ	–
DU-010-012	70	2015-07-30 10:06	46.7042	-119.5273	21.46	3.59	Z	–	< LOD	4.22	UZ	–
DU-010-013	37	2015-07-30 8:38	46.7047	-119.5308	16.21	3.71	Z	–	< LOD	4.46	UZ	–
DU-010-014	49	2015-07-30 9:14	46.7048	-119.5298	88.25	5.21	Z	–	10.56	4.07	Z	–
DU-010-015	61	2015-07-30 9:41	46.7047	-119.5289	15.00	3.33	Z	–	4.12	2.68	Z	–
DU-010-016	68	2015-07-30 10:01	46.7047	-119.5278	68.54	5.78	Z	–	< LOD	6.72	UZ	–
DU-010-017	69	2015-07-30 10:04	46.7047	-119.5270	13.60	3.42	Z	–	5.51	2.82	Z	–
DU-010-018	38	2015-07-30 8:41	46.7052	-119.5304	43.36	6.32	Z	–	< LOD	7.43	UZ	–
DU-010-019	48	2015-07-30 9:09	46.7054	-119.5293	178.66	7.83	Z	–	10.32	5.96	Z	–
DU-010-020	62	2015-07-30 9:44	46.7052	-119.5284	65.37	5.50	Z	–	< LOD	6.42	UZ	–
DU-010-021	67	2015-07-30 9:58	46.7054	-119.5272	14.97	3.45	Z	–	< LOD	4.06	UZ	–
DU-010-022	39	2015-07-30 8:44	46.7058	-119.5299	50.25	4.16	Z	–	5.93	3.24	Z	–
DU-010-023	47	2015-07-30 9:06	46.7060	-119.5288	17.71	4.86	Z	–	< LOD	5.63	UZ	–
DU-010-024	63	2015-07-30 9:46	46.7058	-119.5279	15.79	3.75	Z	–	< LOD	4.49	UZ	–
DU-010-025	66	2015-07-30 9:55	46.7059	-119.5268	13.24	3.91	Z	–	< LOD	4.74	UZ	–
DU-010-026	40	2015-07-30 8:47	46.7064	-119.5293	47.87	4.80	Z	–	11.77	3.90	Z	–
DU-010-027	46	2015-07-30 9:03	46.7066	-119.5283	10.31	4.34	Z	–	< LOD	5.19	UZ	–
DU-010-028	64	2015-07-30 9:49	46.7065	-119.5273	12.47	3.05	Z	–	6.07	2.50	Z	–
DU-010-029	41	2015-07-30 8:49	46.7071	-119.5288	19.76	4.16	Z	–	< LOD	4.93	UZ	–
DU-010-030	45	2015-07-30 9:01	46.7072	-119.5278	28.88	3.82	Z	–	< LOD	4.50	UZ	–
DU-010-031	65	2015-07-30 9:52	46.7070	-119.5268	17.13	4.28	Z	–	< LOD	5.14	UZ	–
DU-010-032	42	2015-07-30 8:52	46.7076	-119.5283	26.59	5.43	Z	–	< LOD	6.35	UZ	–
DU-010-033	44	2015-07-30 8:58	46.7077	-119.5273	21.82	3.44	Z	–	4.43	2.74	Z	–
DU-010-034	43	2015-07-30 8:55	46.7083	-119.5268	41.67	4.34	Z	–	< LOD	5.02	UZ	–
DU-011-001	118	2015-07-30 12:24	46.7014	-119.5336	14.57	3.41	–	–	< LOD	4.06	U	–
DU-011-002	92	2015-07-30 11:23	46.7019	-119.5340	23.74	3.64	–	–	4.69	2.88	–	–
DU-011-003	117	2015-07-30 12:22	46.7018	-119.5331	23.22	3.72	–	–	6.84	3.02	–	–
DU-011-004	116	2015-07-30 12:19	46.7018	-119.5322	23.90	4.33	–	–	< LOD	5.06	U	–
DU-011-005	115	2015-07-30 12:17	46.7018	-119.5312	69.36	5.67	–	–	8.11	4.44	–	–
DU-011-006	114	2015-07-30 12:14	46.7018	-119.5303	21.33	3.89	–	–	< LOD	4.58	U	–
DU-011-007	113	2015-07-30 12:12	46.7019	-119.5295	11.92	3.30	–	–	< LOD	3.95	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-011-008	112	2015-07-30 12:09	46.7018	-119.5285	17.22	4.04	–	–	< LOD	4.82	U	–
DU-011-009	111	2015-07-30 12:07	46.7018	-119.5276	7.57	2.87	–	–	< LOD	3.44	U	–
DU-011-010	110	2015-07-30 12:04	46.7018	-119.5268	19.11	3.50	–	–	< LOD	4.16	U	–
DU-011-011	93	2015-07-30 11:26	46.7023	-119.5327	22.55	3.73	–	–	5.92	3.00	–	–
DU-011-012	94	2015-07-30 11:28	46.7025	-119.5316	25.85	3.75	–	–	< LOD	4.42	U	–
DU-011-013	95	2015-07-30 11:31	46.7023	-119.5310	30.75	4.31	–	–	< LOD	5.13	U	–
DU-011-014	96	2015-07-30 11:33	46.7024	-119.5300	20.41	4.22	–	–	< LOD	4.98	U	–
DU-011-015	97	2015-07-30 11:36	46.7023	-119.5291	15.21	3.82	–	–	6.00	3.14	–	–
DU-011-016	98	2015-07-30 11:38	46.7025	-119.5282	23.58	3.93	–	–	< LOD	4.61	U	–
DU-011-017	106	2015-07-30 11:53	46.7023	-119.5272	12.15	3.64	–	–	< LOD	4.41	U	–
DU-011-018	91	2015-07-30 10:50	46.7029	-119.5312	14.97	3.80	–	–	< LOD	4.52	U	–
DU-011-019	90	2015-07-30 10:48	46.7029	-119.5303	24.71	4.40	–	–	< LOD	5.24	U	–
DU-011-020	89	2015-07-30 10:45	46.7030	-119.5294	15.06	3.42	–	–	4.96	2.78	–	–
DU-011-021	107	2015-07-30 11:56	46.7030	-119.5285	9.63	3.44	–	–	< LOD	4.20	U	–
DU-011-022	108	2015-07-30 11:59	46.7030	-119.5277	19.82	3.59	–	–	< LOD	4.23	U	–
DU-011-023	109	2015-07-30 12:01	46.7030	-119.5270	20.56	3.84	–	–	5.70	3.10	–	–
DU-011-024	88	2015-07-30 10:43	46.7034	-119.5290	23.91	4.37	–	–	< LOD	5.28	U	–
DU-011-025	87	2015-07-30 10:40	46.7034	-119.5280	29.27	4.18	–	–	< LOD	4.96	U	–
DU-011-026	85	2015-07-30 10:36	46.7034	-119.5273	16.90	4.07	–	–	< LOD	4.92	U	–
DU-012-001	275	2015-08-12 12:13	46.7055	-119.5259	11.62	3.13	–	–	< LOD	3.75	U	–
DU-012-002	274	2015-08-12 12:10	46.7056	-119.5249	14.56	3.29	–	–	4.12	2.64	–	–
DU-012-003	273	2015-08-12 12:08	46.7055	-119.5239	11.44	2.83	–	–	4.19	2.29	–	–
DU-012-004	272	2015-08-12 12:06	46.7055	-119.5229	14.93	3.26	–	–	< LOD	3.78	U	–
DU-012-005	271	2015-08-12 12:04	46.7056	-119.5218	11.64	3.82	–	–	< LOD	4.69	U	–
DU-012-006	265	2015-08-12 11:50	46.7062	-119.5264	13.86	3.09	–	–	4.03	2.49	–	–
DU-012-007	266	2015-08-12 11:52	46.7061	-119.5253	11.32	2.97	–	–	4.36	2.41	–	–
DU-012-008	267	2015-08-12 11:55	46.7061	-119.5243	13.60	2.97	–	–	< LOD	2.37	U	–
DU-012-009	268	2015-08-12 11:57	46.7062	-119.5233	10.38	3.12	–	–	< LOD	3.76	U	–
DU-012-010	269	2015-08-12 11:59	46.7061	-119.5223	11.66	3.33	–	–	< LOD	4.01	U	–
DU-012-011	270	2015-08-12 12:01	46.7061	-119.5212	14.80	3.17	–	–	< LOD	2.54	U	–
DU-012-012	264	2015-08-12 11:48	46.7067	-119.5259	15.82	3.16	–	–	< LOD	3.72	U	–
DU-012-013	263	2015-08-12 11:45	46.7068	-119.5248	11.97	3.09	–	–	< LOD	3.65	U	–
DU-012-014	262	2015-08-12 11:43	46.7067	-119.5238	11.47	3.00	–	–	< LOD	3.60	U	–
DU-012-015	261	2015-08-12 11:41	46.7067	-119.5229	12.76	3.75	–	–	< LOD	4.51	U	–
DU-012-016	260	2015-08-12 11:38	46.7067	-119.5218	16.07	3.51	–	–	4.26	2.82	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-012-017	242	2015-08-12 11:02	46.7074	-119.5263	15.72	5.29	–	–	< LOD	6.32	U	–
DU-012-018	243	2015-08-12 11:05	46.7074	-119.5252	14.85	3.38	–	–	< LOD	4.05	U	–
DU-012-019	244	2015-08-12 11:07	46.7073	-119.5243	15.01	4.17	–	–	< LOD	5.04	U	–
DU-012-020	245	2015-08-12 11:09	46.7074	-119.5233	13.20	3.23	–	–	< LOD	3.80	U	–
DU-012-021	246	2015-08-12 11:11	46.7073	-119.5222	10.70	3.71	–	–	< LOD	4.54	U	–
DU-012-022	247	2015-08-12 11:14	46.7073	-119.5212	15.36	4.01	–	–	< LOD	4.75	U	–
DU-012-023	241	2015-08-12 10:59	46.7080	-119.5258	15.31	3.52	–	–	< LOD	4.17	U	–
DU-012-024	240	2015-08-12 10:56	46.7079	-119.5249	14.61	4.23	–	–	< LOD	5.02	U	–
DU-012-025	239	2015-08-12 10:54	46.7080	-119.5238	32.20	3.65	–	–	7.04	2.92	–	–
DU-012-026	238	2015-08-12 10:51	46.7080	-119.5228	14.72	3.55	–	–	< LOD	4.24	U	–
DU-012-027	237	2015-08-12 10:49	46.7080	-119.5218	15.43	3.42	–	–	< LOD	4.10	U	–
DU-012-028	231	2015-08-12 10:35	46.7085	-119.5253	14.28	3.66	–	–	< LOD	4.28	U	–
DU-012-029	233	2015-08-12 10:39	46.7085	-119.5243	21.39	3.53	–	–	< LOD	4.21	U	–
DU-012-030	234	2015-08-12 10:41	46.7085	-119.5233	22.09	3.55	–	–	< LOD	4.15	U	–
DU-012-031	235	2015-08-12 10:44	46.7086	-119.5223	17.51	3.29	–	–	< LOD	3.80	U	–
DU-012-032	236	2015-08-12 10:46	46.7085	-119.5212	33.92	3.81	–	–	< LOD	4.42	U	–
DU-013-001	171	2015-08-12 8:18	46.7015	-119.5254	25.06	4.25	Z	–	< LOD	5.00	UZ	–
DU-013-002	172	2015-08-12 8:21	46.7016	-119.5245	82.20	5.30	Z	–	10.13	4.15	Z	–
DU-013-003	173	2015-08-12 8:23	46.7016	-119.5234	26.14	3.56	Z	–	< LOD	4.18	UZ	–
DU-013-004	174	2015-08-12 8:25	46.7015	-119.5225	42.96	4.08	Z	–	6.85	3.23	Z	–
DU-013-005	179	2015-08-12 8:37	46.7021	-119.5259	170.32	6.83	Z	–	9.65	5.20	Z	–
DU-013-006	178	2015-08-12 8:34	46.7021	-119.5250	261.75	8.27	Z	–	16.20	6.30	Z	–
DU-013-007	177	2015-08-12 8:32	46.7020	-119.5240	264.18	8.97	Z	–	15.87	6.83	Z	–
DU-013-008	176	2015-08-12 8:30	46.7021	-119.5230	438.29	11.28	Z	–	13.58	8.47	Z	–
DU-013-009	175	2015-08-12 8:27	46.7021	-119.5220	513.82	13.14	Z	–	48.92	10.16	Z	–
DU-013-010	180	2015-08-12 8:39	46.7028	-119.5254	241.86	8.22	Z	–	15.83	6.28	Z	–
DU-013-011	181	2015-08-12 8:41	46.7027	-119.5244	71.02	4.87	Z	–	8.84	3.81	Z	–
DU-013-012	182	2015-08-12 8:43	46.7027	-119.5234	204.76	7.62	Z	–	21.91	5.93	Z	–
DU-013-013	183	2015-08-12 8:46	46.7027	-119.5225	284.50	9.67	Z	–	< LOD	10.90	UZ	–
DU-013-014	184	2015-08-12 8:48	46.7027	-119.5214	1685.99	23.07	Z	–	289.49	18.44	Z	–
DU-013-015	196	2015-08-12 9:09	46.7033	-119.5260	116.69	6.83	–	–	< LOD	7.71	U	–
DU-013-016	188	2015-08-12 8:57	46.7033	-119.5250	36.29	4.26	Z	–	7.25	3.41	Z	–
DU-013-017	187	2015-08-12 8:55	46.7033	-119.5240	194.94	8.15	Z	–	12.95	6.24	Z	–
DU-013-018	186	2015-08-12 8:53	46.7033	-119.5231	98.01	5.74	Z	–	13.88	4.53	Z	–
DU-013-019	185	2015-08-12 8:50	46.7033	-119.5220	128.76	6.76	Z	–	8.96	5.20	Z	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-013-020	197	2015-08-12 9:12	46.7039	-119.5264	30.24	4.98	–	–	< LOD	6.00	U	–
DU-013-021	198	2015-08-12 9:14	46.7039	-119.5254	136.09	7.78	–	–	14.40	6.06	–	–
DU-013-022	199	2015-08-12 9:16	46.7039	-119.5244	14.43	3.05	–	–	< LOD	3.59	U	–
DU-013-023	200	2015-08-12 9:19	46.7039	-119.5234	25.33	3.60	–	–	5.71	2.89	–	–
DU-013-024	201	2015-08-12 9:21	46.7039	-119.5224	169.53	7.04	–	–	< LOD	7.88	U	–
DU-013-025	204	2015-08-12 9:28	46.7038	-119.5215	300.56	10.17	–	–	12.97	7.69	–	–
DU-013-026	214	2015-08-12 9:51	46.7044	-119.5259	19.08	3.27	–	–	4.73	2.62	–	–
DU-013-027	212	2015-08-12 9:46	46.7045	-119.5250	18.30	3.39	–	–	4.70	2.71	–	–
DU-013-028	210	2015-08-12 9:42	46.7044	-119.5239	28.32	3.94	–	–	< LOD	4.63	U	–
DU-013-029	208	2015-08-12 9:38	46.7045	-119.5230	17.40	4.48	–	–	< LOD	5.15	U	–
DU-013-030	205	2015-08-12 9:31	46.7045	-119.5220	17.98	3.62	–	–	< LOD	4.28	U	–
DU-013-031	215	2015-08-12 9:53	46.7051	-119.5263	41.90	4.01	–	–	< LOD	4.66	U	–
DU-013-032	213	2015-08-12 9:49	46.7051	-119.5255	14.17	2.93	–	–	5.46	2.38	–	–
DU-013-033	211	2015-08-12 9:44	46.7051	-119.5244	14.53	3.12	–	–	< LOD	2.49	U	–
DU-013-034	209	2015-08-12 9:40	46.7051	-119.5235	12.85	3.03	–	–	< LOD	3.62	U	–
DU-013-035	207	2015-08-12 9:35	46.7050	-119.5225	18.91	3.32	–	–	5.06	2.66	–	–
DU-013-036	206	2015-08-12 9:33	46.7050	-119.5214	19.66	3.31	–	–	< LOD	3.88	U	–
DU-014-001	94	2015-08-28 10:32	46.7058	-119.5129	14.58	3.09	Z	–	< LOD	3.63	UZ	–
DU-014-002	93	2015-08-28 10:30	46.7058	-119.5119	17.62	3.31	–	–	< LOD	3.88	U	–
DU-014-003	92	2015-08-28 10:28	46.7057	-119.5109	20.66	3.50	–	–	< LOD	4.13	U	–
DU-014-004	91	2015-08-28 10:26	46.7057	-119.5099	16.90	3.40	–	–	< LOD	3.96	U	–
DU-014-005	90	2015-08-28 10:23	46.7057	-119.5089	15.15	3.21	–	–	< LOD	3.78	U	–
DU-014-006	85	2015-08-28 10:13	46.7063	-119.5126	19.49	3.33	–	–	< LOD	3.92	U	–
DU-014-007	86	2015-08-28 10:15	46.7063	-119.5116	14.14	3.41	–	–	< LOD	4.08	U	–
DU-014-008	87	2015-08-28 10:17	46.7063	-119.5105	15.58	3.06	–	–	< LOD	3.64	U	–
DU-014-009	88	2015-08-28 10:19	46.7063	-119.5093	14.58	3.19	–	–	< LOD	3.75	U	–
DU-014-010	89	2015-08-28 10:21	46.7063	-119.5085	16.40	3.35	–	–	< LOD	3.94	U	–
DU-014-011	84	2015-08-28 10:10	46.7071	-119.5149	13.40	3.22	–	–	4.44	2.60	–	–
DU-014-012	83	2015-08-28 10:07	46.7070	-119.5138	15.84	3.68	–	–	< LOD	4.40	U	–
DU-014-013	82	2015-08-28 10:05	46.7069	-119.5129	13.15	3.05	–	–	< LOD	3.63	U	–
DU-014-014	81	2015-08-28 10:02	46.7069	-119.5119	16.41	3.32	–	–	4.25	2.67	–	–
DU-014-015	80	2015-08-28 10:00	46.7069	-119.5109	16.83	3.46	–	–	< LOD	4.13	U	–
DU-014-016	79	2015-08-28 9:58	46.7069	-119.5099	19.67	3.58	–	–	< LOD	4.24	U	–
DU-014-017	78	2015-08-28 9:56	46.7069	-119.5089	13.03	3.75	–	–	< LOD	4.59	U	–
DU-014-018	63	2015-08-28 9:29	46.7076	-119.5154	17.77	3.46	–	–	< LOD	4.14	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-014-019	64	2015-08-28 9:32	46.7076	-119.5144	21.24	3.73	–	–	< LOD	4.43	U	–
DU-014-020	65	2015-08-28 9:34	46.7076	-119.5136	16.79	3.14	–	–	< LOD	3.71	U	–
DU-014-021	66	2015-08-28 9:36	46.7075	-119.5125	18.66	3.28	–	–	< LOD	3.89	U	–
DU-014-022	74	2015-08-28 9:48	46.7075	-119.5113	14.47	3.69	–	–	< LOD	4.39	U	–
DU-014-023	75	2015-08-28 9:50	46.7075	-119.5104	18.43	3.38	–	–	5.04	2.71	–	–
DU-014-024	76	2015-08-28 9:52	46.7075	-119.5094	11.29	3.03	–	–	5.32	2.47	–	–
DU-014-025	77	2015-08-28 9:54	46.7074	-119.5084	11.67	3.13	–	–	4.21	2.54	–	–
DU-014-026	62	2015-08-28 9:27	46.7081	-119.5148	10.72	2.92	–	–	6.06	2.40	–	–
DU-014-027	61	2015-08-28 9:25	46.7081	-119.5141	21.48	3.56	–	–	< LOD	4.18	U	–
DU-014-028	60	2015-08-28 9:23	46.7081	-119.5128	13.65	3.39	–	–	< LOD	4.08	U	–
DU-014-029	59	2015-08-28 9:21	46.7082	-119.5119	15.56	3.14	–	–	4.58	2.52	–	–
DU-014-030	58	2015-08-28 9:18	46.7081	-119.5110	16.31	3.37	–	–	< LOD	3.98	U	–
DU-014-031	57	2015-08-28 9:16	46.7082	-119.5099	13.45	3.44	–	–	< LOD	4.09	U	–
DU-014-032	56	2015-08-28 9:14	46.7082	-119.5089	13.36	3.43	–	–	5.54	2.81	–	–
DU-014-033	47	2015-08-28 8:57	46.7087	-119.5154	13.48	3.17	–	–	< LOD	3.73	U	–
DU-014-034	48	2015-08-28 8:59	46.7087	-119.5145	16.86	3.17	–	–	< LOD	3.67	U	–
DU-014-035	50	2015-08-28 9:02	46.7087	-119.5135	13.59	3.29	–	–	< LOD	3.91	U	–
DU-014-036	51	2015-08-28 9:04	46.7087	-119.5125	17.80	3.53	–	–	< LOD	4.22	U	–
DU-014-037	52	2015-08-28 9:06	46.7087	-119.5115	9.74	3.43	–	–	< LOD	4.18	U	–
DU-014-038	53	2015-08-28 9:08	46.7087	-119.5105	22.79	4.15	–	–	< LOD	4.87	U	–
DU-014-039	54	2015-08-28 9:10	46.7087	-119.5095	20.80	3.99	–	–	< LOD	4.70	U	–
DU-014-040	55	2015-08-28 9:12	46.7087	-119.5085	10.09	2.99	–	–	5.46	2.46	–	–
DU-015-001	201	2015-08-27 9:00	46.7021	-119.5152	41.13	4.31	–	–	< LOD	4.92	U	–
DU-015-002	202	2015-08-27 9:04	46.7021	-119.5142	17.02	3.88	–	–	4.77	3.16	–	–
DU-015-003	203	2015-08-27 9:07	46.7021	-119.5132	31.55	3.97	–	–	6.62	3.19	–	–
DU-015-004	204	2015-08-27 9:09	46.7021	-119.5122	28.72	4.19	–	–	< LOD	4.95	U	–
DU-015-005	205	2015-08-27 9:12	46.7021	-119.5112	39.65	5.69	–	–	< LOD	6.76	U	–
DU-015-006	212	2015-08-27 9:27	46.7027	-119.5157	11.58	2.93	–	–	< LOD	3.51	U	–
DU-015-007	211	2015-08-27 9:24	46.7027	-119.5147	20.01	3.32	–	–	< LOD	3.92	U	–
DU-015-008	210	2015-08-27 9:22	46.7027	-119.5137	16.48	4.54	–	–	< LOD	5.64	U	–
DU-015-009	209	2015-08-27 9:20	46.7027	-119.5127	18.87	3.41	–	–	< LOD	4.06	U	–
DU-015-010	208	2015-08-27 9:18	46.7027	-119.5117	53.75	7.16	–	–	< LOD	8.31	U	–
DU-015-011	206	2015-08-27 9:14	46.7027	-119.5107	24.42	3.57	–	–	6.22	2.87	–	–
DU-015-012	213	2015-08-27 9:29	46.7033	-119.5152	13.61	3.68	–	–	< LOD	4.49	U	–
DU-015-013	214	2015-08-27 9:31	46.7033	-119.5141	9.32	3.19	–	–	4.49	2.61	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-015-014	215	2015-08-27 9:34	46.7033	-119.5132	27.26	3.91	–	–	< LOD	4.65	U	–
DU-015-015	216	2015-08-27 9:36	46.7033	-119.5122	13.53	3.79	–	–	< LOD	4.65	U	–
DU-015-016	217	2015-08-27 9:38	46.7033	-119.5112	34.23	4.56	–	–	< LOD	5.35	U	–
DU-015-017	230	2015-08-27 10:07	46.7039	-119.5157	13.84	3.31	–	–	5.39	2.70	–	–
DU-015-018	229	2015-08-27 10:04	46.7039	-119.5146	12.90	3.18	–	–	< LOD	3.78	U	–
DU-015-019	221	2015-08-27 9:49	46.7039	-119.5137	25.91	4.13	–	–	< LOD	4.87	U	–
DU-015-020	220	2015-08-27 9:46	46.7039	-119.5127	11.29	3.07	–	–	< LOD	3.69	U	–
DU-015-021	219	2015-08-27 9:44	46.7039	-119.5117	22.45	3.44	–	–	< LOD	4.06	U	–
DU-015-022	218	2015-08-27 9:41	46.7039	-119.5107	31.02	3.56	–	–	4.89	2.80	–	–
DU-015-023	231	2015-08-27 10:09	46.7045	-119.5152	14.50	3.16	–	–	4.46	2.54	–	–
DU-015-024	232	2015-08-27 10:12	46.7045	-119.5141	11.75	3.11	–	–	< LOD	3.67	U	–
DU-015-025	233	2015-08-27 10:14	46.7045	-119.5131	14.01	2.97	–	–	7.31	2.47	–	–
DU-015-026	234	2015-08-27 10:16	46.7045	-119.5122	31.85	3.91	–	–	< LOD	4.54	U	–
DU-015-027	235	2015-08-27 10:18	46.7044	-119.5112	24.85	3.92	–	–	5.45	3.15	–	–
DU-015-028	241	2015-08-27 10:33	46.7051	-119.5156	35.28	4.53	–	–	< LOD	5.23	U	–
DU-015-029	240	2015-08-27 10:30	46.7051	-119.5146	21.21	3.53	–	–	< LOD	4.13	U	–
DU-015-030	239	2015-08-27 10:28	46.7051	-119.5136	25.60	3.54	–	–	< LOD	4.07	U	–
DU-015-031	238	2015-08-27 10:26	46.7051	-119.5126	20.40	3.22	–	–	< LOD	3.81	U	–
DU-015-032	237	2015-08-27 10:23	46.7051	-119.5117	19.60	3.69	–	–	5.10	2.97	–	–
DU-015-033	236	2015-08-27 10:21	46.7051	-119.5107	23.22	3.37	–	–	4.44	2.66	–	–
DU-015-034	242	2015-08-27 10:35	46.7057	-119.5151	15.55	3.18	–	–	5.50	2.57	–	–
DU-015-035	243	2015-08-27 10:38	46.7057	-119.5141	15.85	3.46	–	–	< LOD	4.10	U	–
DU-015-036	248	2015-08-27 10:53	46.7063	-119.5156	17.23	3.42	–	–	< LOD	4.03	U	–
DU-015-037	246	2015-08-27 10:48	46.7063	-119.5146	12.51	3.60	–	–	< LOD	4.33	U	–
DU-015-038	244	2015-08-27 10:40	46.7063	-119.5136	17.46	3.23	–	–	4.88	2.59	–	–
DU-015-039	247	2015-08-27 10:50	46.7068	-119.5151	15.55	3.13	–	–	4.32	2.51	–	–
DU-015-040	245	2015-08-27 10:44	46.7068	-119.5141	17.61	3.31	–	–	< LOD	3.91	U	–
DU-016-001	150	2015-07-29 12:40	46.6986	-119.5156	11.21	3.18	–	–	< LOD	3.84	U	–
DU-016-002	149	2015-07-29 12:38	46.6985	-119.5148	24.74	3.98	–	–	< LOD	4.65	U	–
DU-016-003	148	2015-07-29 12:36	46.6985	-119.5138	19.30	3.47	–	–	5.31	2.79	–	–
DU-016-004	147	2015-07-29 12:34	46.6985	-119.5129	32.98	3.94	–	–	< LOD	4.63	U	–
DU-016-005	146	2015-07-29 12:31	46.6984	-119.5119	23.90	3.85	–	–	7.28	3.13	–	–
DU-016-006	145	2015-07-29 12:29	46.6984	-119.5109	20.80	3.68	–	–	< LOD	4.36	U	–
DU-016-007	140	2015-07-29 12:18	46.6991	-119.5151	19.16	3.40	–	–	< LOD	3.98	U	–
DU-016-008	141	2015-07-29 12:20	46.6991	-119.5141	24.51	3.84	–	–	< LOD	4.55	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-016-009	142	2015-07-29 12:23	46.6991	-119.5133	16.85	3.09	–	–	< LOD	3.65	U	–
DU-016-010	143	2015-07-29 12:25	46.6990	-119.5123	15.49	3.12	–	–	< LOD	3.66	U	–
DU-016-011	144	2015-07-29 12:27	46.6991	-119.5114	48.91	4.79	–	–	< LOD	5.58	U	–
DU-016-012	139	2015-07-29 12:16	46.6996	-119.5156	19.91	3.51	–	–	4.41	2.80	–	–
DU-016-013	138	2015-07-29 12:14	46.6996	-119.5147	12.85	3.08	–	–	< LOD	2.46	U	–
DU-016-014	137	2015-07-29 12:12	46.6996	-119.5138	13.88	3.37	–	–	< LOD	4.02	U	–
DU-016-015	136	2015-07-29 12:09	46.6996	-119.5128	17.00	3.09	–	–	4.10	2.45	–	–
DU-016-016	135	2015-07-29 12:07	46.6996	-119.5119	24.44	3.42	–	–	< LOD	3.98	U	–
DU-016-017	134	2015-07-29 12:05	46.6997	-119.5109	16.65	3.03	–	–	4.35	2.43	–	–
DU-016-018	114	2015-07-29 11:30	46.7003	-119.5171	12.20	3.34	–	–	< LOD	4.05	U	–
DU-016-019	115	2015-07-29 11:32	46.7002	-119.5161	11.62	3.17	–	–	6.19	2.60	–	–
DU-016-020	116	2015-07-29 11:35	46.7003	-119.5152	45.91	4.26	–	–	6.95	3.35	–	–
DU-016-021	117	2015-07-29 11:37	46.7002	-119.5142	18.42	3.29	–	–	4.69	2.63	–	–
DU-016-022	118	2015-07-29 11:39	46.7002	-119.5133	18.51	3.22	–	–	4.61	2.57	–	–
DU-016-023	132	2015-07-29 12:01	46.7001	-119.5123	15.54	3.24	–	–	< LOD	3.86	U	–
DU-016-024	133	2015-07-29 12:03	46.7002	-119.5114	37.11	3.96	–	–	4.75	3.10	–	–
DU-016-025	113	2015-07-29 11:28	46.7008	-119.5166	15.50	3.20	–	–	< LOD	3.73	U	–
DU-016-026	112	2015-07-29 11:26	46.7008	-119.5157	25.11	4.32	–	–	< LOD	5.08	U	–
DU-016-027	111	2015-07-29 11:23	46.7008	-119.5147	16.54	3.20	–	–	5.51	2.59	–	–
DU-016-028	110	2015-07-29 11:21	46.7008	-119.5138	34.41	3.80	–	–	< LOD	4.43	U	–
DU-016-029	109	2015-07-29 11:19	46.7008	-119.5128	18.10	3.33	–	–	5.13	2.67	–	–
DU-016-030	108	2015-07-29 11:16	46.7008	-119.5119	20.38	3.96	–	–	6.54	3.23	–	–
DU-016-031	107	2015-07-29 11:14	46.7007	-119.5109	36.57	4.12	–	–	< LOD	4.81	U	–
DU-016-032	87	2015-07-29 10:38	46.7013	-119.5169	14.58	3.09	–	–	< LOD	3.68	U	–
DU-016-033	101	2015-07-29 11:00	46.7013	-119.5160	13.02	3.92	–	–	< LOD	4.75	U	–
DU-016-034	102	2015-07-29 11:03	46.7014	-119.5150	34.76	3.97	–	–	< LOD	4.58	U	–
DU-016-035	103	2015-07-29 11:05	46.7013	-119.5141	42.46	5.67	–	–	6.92	4.53	–	–
DU-016-036	104	2015-07-29 11:07	46.7013	-119.5133	12.31	3.22	–	–	< LOD	3.87	U	–
DU-016-037	105	2015-07-29 11:09	46.7013	-119.5122	19.05	3.23	–	–	< LOD	3.83	U	–
DU-016-038	106	2015-07-29 11:11	46.7013	-119.5114	25.93	3.56	–	–	< LOD	4.19	U	–
DU-017-001	108	2015-08-28 11:22	46.7016	-119.5058	15.34	3.25	–	–	< LOD	3.87	U	–
DU-017-002	111	2015-08-28 11:27	46.7022	-119.5070	13.07	3.34	–	–	6.20	2.76	–	–
DU-017-003	110	2015-08-28 11:25	46.7021	-119.5060	119.18	6.55	–	–	< LOD	7.51	U	–
DU-017-004	112	2015-08-28 11:29	46.7027	-119.5076	16.20	4.55	–	–	< LOD	5.51	U	–
DU-017-005	113	2015-08-28 11:31	46.7028	-119.5067	14.29	3.36	–	–	< LOD	3.93	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-017-006	114	2015-08-28 11:34	46.7028	-119.5057	14.79	3.23	–	–	< LOD	3.86	U	–
DU-017-007	117	2015-08-28 11:39	46.7034	-119.5079	10.67	3.16	–	–	4.60	2.58	–	–
DU-017-008	116	2015-08-28 11:37	46.7034	-119.5069	15.58	3.47	–	–	4.81	2.82	–	–
DU-017-009	115	2015-08-28 11:35	46.7033	-119.5061	17.18	3.74	–	–	< LOD	4.30	U	–
DU-017-010	118	2015-08-28 11:42	46.7040	-119.5096	15.21	3.36	–	–	< LOD	4.00	U	–
DU-017-011	119	2015-08-28 11:45	46.7041	-119.5084	8.88	3.18	–	–	4.01	2.59	–	–
DU-017-012	120	2015-08-28 11:46	46.7040	-119.5078	13.17	3.45	–	–	< LOD	4.09	U	–
DU-017-013	121	2015-08-28 11:49	46.7040	-119.5066	14.28	3.17	–	–	< LOD	3.79	U	–
DU-017-014	124	2015-08-28 11:56	46.7046	-119.5100	22.95	3.64	–	–	< LOD	4.22	U	–
DU-017-015	123	2015-08-28 11:53	46.7046	-119.5090	21.26	3.91	–	–	5.68	3.17	–	–
DU-017-016	122	2015-08-28 11:51	46.7046	-119.5079	18.09	4.67	–	–	< LOD	5.41	U	–
DU-017-017	125	2016-05-11 16:17	46.7052	-119.5105	16.95	7.43	–	–	< LOD	9.26	U	–
DU-017-018	126	2015-08-28 12:01	46.7052	-119.5096	11.17	2.99	–	–	6.98	2.49	–	–
DU-017-019	127	2015-08-28 12:04	46.7052	-119.5086	13.36	3.78	–	–	< LOD	4.53	U	–
DU-018-001	202	2015-08-24 9:05	46.7127	-119.5024	20.13	3.30	–	–	< LOD	3.89	U	–
DU-018-002	201	2015-08-24 9:03	46.7127	-119.5015	16.80	3.14	–	–	< LOD	3.69	U	–
DU-018-003	200	2015-08-24 9:00	46.7127	-119.5005	21.84	3.41	–	–	< LOD	4.04	U	–
DU-018-004	198	2015-08-24 8:56	46.7133	-119.5019	16.03	3.65	–	–	< LOD	4.37	U	–
DU-018-005	199	2015-08-24 8:58	46.7133	-119.5010	21.02	3.58	–	–	< LOD	4.24	U	–
DU-018-006	197	2015-08-24 8:54	46.7139	-119.5024	11.72	2.93	–	–	< LOD	3.50	U	–
DU-018-007	196	2015-08-24 8:52	46.7138	-119.5014	47.24	4.27	–	–	6.33	3.35	–	–
DU-018-008	195	2015-08-24 8:50	46.7138	-119.5005	24.72	3.47	–	–	< LOD	4.00	U	–
DU-018-009	192	2015-08-24 8:42	46.7144	-119.5019	36.29	3.84	–	–	8.39	3.08	–	–
DU-018-010	193	2015-08-24 8:44	46.7144	-119.5009	20.84	3.61	–	–	< LOD	4.26	U	–
DU-018-011	194	2015-08-24 8:47	46.7144	-119.4999	64.76	4.77	–	–	9.80	3.76	–	–
DU-018-012	191	2015-08-24 8:40	46.7150	-119.5024	25.41	3.58	–	–	< LOD	4.24	U	–
DU-018-013	190	2015-08-24 8:38	46.7150	-119.5014	27.68	3.65	–	–	6.52	2.92	–	–
DU-018-014	189	2015-08-24 8:36	46.7150	-119.5004	17.72	3.76	–	–	< LOD	4.43	U	–
DU-018-015	188	2015-08-24 8:33	46.7150	-119.4994	106.13	5.64	–	–	6.51	4.30	–	–
DU-018-016	184	2015-08-24 8:24	46.7156	-119.5019	36.35	3.74	–	–	5.80	2.94	–	–
DU-018-017	185	2015-08-24 8:26	46.7156	-119.5009	13.27	2.87	–	–	< LOD	3.42	U	–
DU-018-018	186	2015-08-24 8:28	46.7156	-119.4999	22.27	3.49	–	–	8.39	2.87	–	–
DU-018-019	187	2015-08-24 8:31	46.7156	-119.4989	54.34	4.64	–	–	< LOD	5.27	U	–
DU-018-020	182	2015-08-24 8:20	46.7162	-119.5004	17.77	3.36	–	–	4.77	2.71	–	–
DU-019-001	232	2015-08-24 10:09	46.7111	-119.5001	14.36	3.63	–	–	< LOD	4.28	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-019-002	231	2015-08-24 10:07	46.7110	-119.4991	16.77	3.23	–	–	< LOD	3.84	U	–
DU-019-003	230	2015-08-24 10:04	46.7110	-119.4981	12.84	3.05	–	–	< LOD	3.63	U	–
DU-019-004	229	2015-08-24 10:02	46.7110	-119.4971	21.61	3.33	–	–	< LOD	3.94	U	–
DU-019-005	228	2015-08-24 10:00	46.7110	-119.4961	9.98	3.07	–	–	< LOD	3.68	U	–
DU-019-006	226	2015-08-24 9:57	46.7110	-119.4951	24.70	3.79	–	–	4.90	3.02	–	–
DU-019-007	233	2015-08-24 10:11	46.7116	-119.4996	20.18	4.03	–	–	< LOD	4.64	U	–
DU-019-008	234	2015-08-24 10:13	46.7116	-119.4986	21.12	3.69	–	–	< LOD	4.40	U	–
DU-019-009	235	2015-08-24 10:15	46.7116	-119.4976	11.78	3.60	–	–	< LOD	4.31	U	–
DU-019-010	236	2015-08-24 10:17	46.7116	-119.4966	13.81	3.07	–	–	< LOD	3.67	U	–
DU-019-011	237	2015-08-24 10:20	46.7116	-119.4956	15.08	3.81	–	–	< LOD	4.58	U	–
DU-019-012	243	2015-08-24 10:33	46.7122	-119.5001	24.32	3.54	–	–	4.65	2.81	–	–
DU-019-013	242	2015-08-24 10:31	46.7122	-119.4991	24.08	3.58	–	–	< LOD	4.16	U	–
DU-019-014	241	2015-08-24 10:29	46.7122	-119.4981	20.90	3.32	–	–	< LOD	3.91	U	–
DU-019-015	240	2015-08-24 10:26	46.7122	-119.4971	13.51	3.77	–	–	< LOD	4.61	U	–
DU-019-016	239	2015-08-24 10:24	46.7122	-119.4961	13.35	4.09	–	–	< LOD	5.08	U	–
DU-019-017	238	2015-08-24 10:22	46.7122	-119.4951	17.62	3.28	–	–	< LOD	3.86	U	–
DU-019-018	255	2015-08-24 10:52	46.7128	-119.4996	102.87	5.61	–	–	7.75	4.31	–	–
DU-019-019	256	2015-08-24 10:54	46.7128	-119.4986	73.99	4.98	–	–	6.42	3.84	–	–
DU-019-020	257	2015-08-24 10:56	46.7128	-119.4976	19.65	3.49	–	–	< LOD	4.12	U	–
DU-019-021	258	2015-08-24 10:58	46.7128	-119.4966	12.10	2.89	–	–	< LOD	2.33	U	–
DU-019-022	259	2015-08-24 11:00	46.7128	-119.4956	20.31	3.27	–	–	< LOD	3.87	U	–
DU-019-023	264	2015-08-24 11:11	46.7134	-119.4990	34.18	3.97	–	–	6.91	3.18	–	–
DU-019-024	263	2015-08-24 11:09	46.7134	-119.4981	21.54	3.32	–	–	< LOD	3.84	U	–
DU-019-025	262	2015-08-24 11:06	46.7134	-119.4971	25.02	3.47	–	–	6.29	2.79	–	–
DU-019-026	261	2015-08-24 11:04	46.7134	-119.4960	13.06	3.07	–	–	< LOD	2.45	U	–
DU-019-027	260	2015-08-24 11:02	46.7135	-119.4951	11.96	3.04	–	–	< LOD	3.62	U	–
DU-019-028	265	2015-08-24 11:13	46.7140	-119.4995	84.64	5.06	–	–	6.41	3.89	–	–
DU-019-029	266	2015-08-24 11:15	46.7140	-119.4985	385.44	10.35	–	–	13.58	7.79	–	–
DU-019-030	267	2015-08-24 11:18	46.7140	-119.4975	25.55	3.49	–	–	< LOD	4.05	U	–
DU-019-031	268	2015-08-24 11:20	46.7140	-119.4965	13.67	3.12	–	–	4.47	2.52	–	–
DU-019-032	270	2015-08-24 11:26	46.7146	-119.4989	198.14	8.33	–	–	< LOD	9.44	U	–
DU-019-033	269	2015-08-24 11:24	46.7146	-119.4980	28.34	3.82	–	–	< LOD	4.47	U	–
DU-019-034	271	2015-08-24 11:28	46.7152	-119.4985	26.19	3.79	–	–	5.25	3.03	–	–
DU-020-001	42	2015-08-26 8:46	46.7076	-119.4916	34.56	3.72	–	–	5.14	2.92	–	–
DU-020-002	40	2015-08-26 8:41	46.7076	-119.4906	19.35	3.44	–	–	< LOD	4.05	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-020-003	47	2015-08-26 9:00	46.7082	-119.4949	11.73	3.13	–	–	< LOD	3.74	U	–
DU-020-004	46	2015-08-26 8:57	46.7082	-119.4940	16.40	3.32	–	–	< LOD	3.94	U	–
DU-020-005	45	2015-08-26 8:54	46.7082	-119.4930	11.81	2.92	–	–	4.90	2.37	–	–
DU-020-006	44	2015-08-26 8:51	46.7082	-119.4921	16.22	3.44	–	–	6.71	2.83	–	–
DU-020-007	43	2015-08-26 8:49	46.7082	-119.4911	17.04	3.54	–	–	< LOD	4.20	U	–
DU-020-008	48	2015-08-26 9:02	46.7088	-119.4944	11.02	2.84	–	–	< LOD	2.28	U	–
DU-020-009	49	2015-08-26 9:05	46.7087	-119.4935	9.66	2.91	–	–	< LOD	3.46	U	–
DU-020-010	50	2015-08-26 9:08	46.7088	-119.4925	24.86	3.42	–	–	< LOD	3.95	U	–
DU-020-011	51	2015-08-26 9:11	46.7087	-119.4915	35.65	4.27	–	–	< LOD	5.03	U	–
DU-020-012	52	2015-08-26 9:14	46.7087	-119.4905	441.34	10.26	–	–	31.08	7.84	–	–
DU-020-013	56	2015-08-26 9:31	46.7093	-119.4940	20.02	3.44	–	–	< LOD	4.06	U	–
DU-020-014	55	2015-08-26 9:27	46.7092	-119.4929	43.61	4.66	–	–	< LOD	5.33	U	–
DU-020-015	54	2015-08-26 9:22	46.7093	-119.4919	128.60	6.84	–	–	11.20	5.29	–	–
DU-020-016	53	2015-08-26 9:19	46.7092	-119.4910	522.56	11.64	–	–	42.56	8.94	–	–
DU-020-017	57	2015-08-26 9:34	46.7099	-119.4943	13.52	3.33	–	–	< LOD	3.97	U	–
DU-020-018	58	2015-08-26 9:37	46.7098	-119.4934	16.86	3.27	–	–	4.93	2.63	–	–
DU-020-019	59	2015-08-26 9:40	46.7098	-119.4924	567.38	12.11	–	–	43.81	9.28	–	–
DU-020-020	68	2015-08-26 9:56	46.7098	-119.4914	1067.75	17.18	–	–	104.57	13.30	–	–
DU-020-021	69	2015-08-26 10:00	46.7099	-119.4905	883.48	16.11	–	–	74.94	12.39	–	–
DU-020-022	73	2015-08-26 10:17	46.7105	-119.4939	15.67	3.11	–	–	4.28	2.48	–	–
DU-020-023	72	2015-08-26 10:14	46.7105	-119.4930	310.94	8.88	–	–	26.23	6.83	–	–
DU-020-024	71	2015-08-26 10:09	46.7105	-119.4920	290.87	9.14	–	–	17.53	6.96	–	–
DU-020-025	70	2015-08-26 10:05	46.7105	-119.4911	2999.18	28.94	–	–	372.11	22.66	–	–
DU-020-026	74	2015-08-26 10:20	46.7110	-119.4944	23.98	3.84	–	–	< LOD	4.40	U	–
DU-020-027	75	2015-08-26 10:24	46.7110	-119.4934	93.46	5.37	–	–	11.60	4.20	–	–
DU-020-028	77	2015-08-26 10:27	46.7111	-119.4924	1080.72	17.52	–	–	73.52	13.37	–	–
DU-020-029	78	2015-08-26 10:33	46.7111	-119.4916	404.88	10.13	–	–	21.19	7.68	–	–
DU-020-030	79	2015-08-26 10:36	46.7111	-119.4905	273.49	8.22	–	–	22.04	6.31	–	–
DU-020-031	83	2015-08-26 10:48	46.7116	-119.4939	26.69	3.46	–	–	4.82	2.73	–	–
DU-020-032	82	2015-08-26 10:45	46.7117	-119.4929	425.82	11.99	–	–	25.78	9.13	–	–
DU-020-033	81	2015-08-26 10:42	46.7117	-119.4920	105.11	5.85	–	–	< LOD	6.59	U	–
DU-020-034	80	2015-08-26 10:39	46.7116	-119.4911	305.16	8.63	–	–	37.16	6.75	–	–
DU-020-035	84	2015-08-26 10:52	46.7122	-119.4944	24.36	3.63	–	–	6.48	2.93	–	–
DU-020-036	87	2015-08-26 11:01	46.7122	-119.4933	403.21	11.59	–	–	37.50	8.96	–	–
DU-020-037	89	2015-08-26 11:07	46.7122	-119.4924	441.05	10.45	–	–	28.35	7.97	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-020-038	85	2015-08-26 10:55	46.7129	-119.4948	12.16	3.10	–	–	< LOD	3.68	U	–
DU-020-039	86	2015-08-26 10:58	46.7128	-119.4939	28.76	3.76	–	–	< LOD	4.39	U	–
DU-021-001	119	2015-08-26 12:31	46.7073	-119.4901	20.20	4.43	–	–	< LOD	5.25	U	–
DU-021-002	118	2015-08-26 12:26	46.7086	-119.4902	126.43	6.17	–	–	26.13	4.97	–	–
DU-021-003	117	2015-08-26 12:22	46.7086	-119.4880	85.30	5.17	–	–	15.27	4.11	–	–
DU-021-004	116	2015-08-26 12:19	46.7085	-119.4871	35.71	4.46	–	–	5.93	3.55	–	–
DU-021-005	115	2015-08-26 12:15	46.7085	-119.4860	26.91	3.45	–	–	5.55	2.74	–	–
DU-021-006	111	2015-08-26 12:03	46.7092	-119.4896	436.52	10.60	–	–	94.04	8.61	–	–
DU-021-007	112	2015-08-26 12:06	46.7091	-119.4885	42.03	4.03	–	–	42.84	3.88	–	–
DU-021-008	113	2015-08-26 12:09	46.7092	-119.4876	144.30	6.45	–	–	19.88	5.07	–	–
DU-021-009	114	2015-08-26 12:13	46.7091	-119.4865	67.24	5.04	–	–	9.32	3.96	–	–
DU-021-010	110	2015-08-26 12:00	46.7098	-119.4901	150.40	7.30	–	–	11.31	5.61	–	–
DU-021-011	109	2015-08-26 11:58	46.7098	-119.4891	158.47	6.72	–	–	36.82	5.48	–	–
DU-021-012	108	2015-08-26 11:55	46.7098	-119.4881	93.91	5.57	–	–	17.15	4.45	–	–
DU-021-013	107	2015-08-26 11:52	46.7098	-119.4870	118.38	6.14	–	–	16.62	4.83	–	–
DU-021-014	105	2015-08-26 11:46	46.7104	-119.4896	89.39	5.33	–	–	18.74	4.30	–	–
DU-021-015	106	2015-08-26 11:49	46.7104	-119.4885	214.40	7.30	–	–	27.40	5.72	–	–
DU-021-016	97	2015-08-26 11:28	46.7110	-119.4900	136.19	7.03	–	–	16.94	5.50	–	–
DU-022-001	37	2015-10-20 10:46	46.7017	-119.4868	22.52	3.79	–	–	6.32	3.07	–	–
DU-022-002	36	2015-10-20 10:44	46.7018	-119.4858	13.97	3.27	–	–	< LOD	3.90	U	–
DU-022-003	35	2015-10-20 10:41	46.7017	-119.4847	27.52	4.07	–	–	9.56	3.35	–	–
DU-022-004	34	2015-10-20 10:38	46.7017	-119.4838	21.82	3.78	–	–	< LOD	4.51	U	–
DU-022-005	33	2015-10-20 10:35	46.7017	-119.4827	16.76	3.86	–	–	< LOD	4.62	U	–
DU-022-006	32	2015-10-20 10:32	46.7017	-119.4817	12.09	3.26	–	–	< LOD	3.92	U	–
DU-022-007	30	2015-10-20 10:28	46.7017	-119.4807	28.91	3.62	–	–	10.80	3.00	–	–
DU-022-008	38	2015-10-20 10:49	46.7024	-119.4873	13.73	3.07	–	–	< LOD	3.58	U	–
DU-022-009	39	2015-10-20 10:52	46.7023	-119.4863	10.24	3.37	–	–	< LOD	4.06	U	–
DU-022-010	40	2015-10-20 10:54	46.7024	-119.4852	16.98	4.76	–	–	< LOD	5.80	U	–
DU-022-011	41	2015-10-20 10:57	46.7023	-119.4842	22.95	3.88	–	–	7.49	3.18	–	–
DU-022-012	42	2015-10-20 11:09	46.7023	-119.4833	13.47	3.19	–	–	< LOD	3.74	U	–
DU-022-013	43	2015-10-20 11:13	46.7023	-119.4821	9.09	3.20	–	–	< LOD	3.84	U	–
DU-022-014	44	2015-10-20 11:17	46.7023	-119.4812	10.45	2.94	–	–	4.22	2.38	–	–
DU-022-015	48	2015-10-20 11:29	46.7029	-119.4836	159.35	8.04	–	–	46.75	6.70	–	–
DU-022-016	47	2015-10-20 11:26	46.7029	-119.4827	< LOD	8.19	U	–	< LOD	6.81	U	–
DU-022-017	46	2015-10-20 11:24	46.7029	-119.4818	29.79	4.72	–	–	8.69	3.88	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-022-018	45	2015-10-20 11:20	46.7029	-119.4807	10.76	5.45	–	–	< LOD	6.86	U	–
DU-022-019	49	2015-10-20 11:31	46.7036	-119.4843	29.86	4.26	–	–	7.78	3.46	–	–
DU-022-020	50	2015-10-20 11:34	46.7035	-119.4832	26.91	3.97	–	–	8.03	3.24	–	–
DU-022-021	63	2015-10-20 12:06	46.7035	-119.4822	24.75	4.39	–	–	5.48	3.55	–	–
DU-022-022	64	2015-10-20 12:09	46.7035	-119.4812	25.57	4.68	–	–	< LOD	5.53	U	–
DU-022-023	68	2015-10-20 12:24	46.7042	-119.4837	26.01	3.61	–	–	10.40	3.01	–	–
DU-022-024	67	2015-10-20 12:20	46.7042	-119.4827	33.83	5.19	–	–	11.67	4.36	–	–
DU-022-025	66	2015-10-20 12:17	46.7042	-119.4817	30.81	4.59	–	–	< LOD	5.37	U	–
DU-022-026	65	2015-10-20 12:13	46.7041	-119.4806	32.76	4.73	–	–	11.81	3.95	–	–
DU-022-027	69	2015-10-20 12:26	46.7048	-119.4842	20.67	3.76	–	–	6.53	3.08	–	–
DU-022-028	70	2015-10-20 12:29	46.7048	-119.4832	20.56	4.34	–	–	< LOD	5.29	U	–
DU-022-029	71	2015-10-20 12:32	46.7048	-119.4821	32.59	4.95	–	–	< LOD	5.93	U	–
DU-022-030	72	2015-10-20 12:36	46.7048	-119.4811	13.53	4.19	–	–	< LOD	4.94	U	–
DU-022-031	76	2015-10-20 12:49	46.7054	-119.4837	10.08	2.96	–	–	< LOD	3.47	U	–
DU-022-032	75	2015-10-20 12:45	46.7054	-119.4826	< LOD	3.24	U	–	5.34	2.62	–	–
DU-022-033	74	2015-10-20 12:42	46.7054	-119.4816	33.86	3.77	–	–	7.20	3.00	–	–
DU-022-034	73	2015-10-20 12:40	46.7053	-119.4807	10.88	3.34	–	–	< LOD	3.97	U	–
DU-022-035	77	2015-10-20 12:51	46.7060	-119.4842	19.44	4.16	–	–	< LOD	5.01	U	–
DU-022-036	78	2015-10-20 12:54	46.7059	-119.4831	45.79	5.69	–	–	8.12	4.58	–	–
DU-022-037	79	2015-10-20 12:57	46.7060	-119.4821	16.98	3.42	–	–	8.33	2.81	–	–
DU-022-038	80	2015-10-20 13:00	46.7058	-119.4811	40.47	5.97	–	–	< LOD	7.12	U	–
DU-022-039	82	2015-10-20 13:08	46.7066	-119.4837	231.40	9.29	–	–	21.22	7.19	–	–
DU-022-040	81	2015-10-20 13:04	46.7066	-119.4826	51.02	6.12	–	–	< LOD	7.19	U	–
DU-023-001	31	2015-10-12 9:32	46.6975	-119.4837	11.27	4.30	–	–	< LOD	5.12	U	–
DU-023-002	33	2015-10-12 9:36	46.6975	-119.4826	< LOD	6.98	U	–	< LOD	5.94	U	–
DU-023-003	34	2015-10-12 9:40	46.6975	-119.4816	24.33	3.77	–	–	5.44	3.00	–	–
DU-023-004	35	2015-10-12 9:42	46.6975	-119.4814	15.17	3.24	–	–	< LOD	3.87	U	–
DU-023-005	41	2015-10-12 10:11	46.6978	-119.4797	29.77	4.08	–	–	7.72	3.31	–	–
DU-023-006	37	2015-10-12 9:56	46.6977	-119.4769	13.67	3.59	–	–	4.84	2.92	–	–
DU-023-007	36	2015-10-12 9:53	46.6977	-119.4769	18.17	3.51	–	–	6.52	2.87	–	–
DU-023-008	46	2015-10-12 10:25	46.6982	-119.4842	18.49	3.61	–	–	8.71	3.01	–	–
DU-023-009	45	2015-10-12 10:23	46.6981	-119.4832	10.66	3.30	–	–	< LOD	3.99	U	–
DU-023-010	44	2015-10-12 10:20	46.6981	-119.4822	12.78	3.50	–	–	< LOD	4.16	U	–
DU-023-011	43	2015-10-12 10:17	46.6982	-119.4813	11.99	3.72	–	–	< LOD	4.48	U	–
DU-023-012	42	2015-10-12 10:14	46.6982	-119.4802	13.17	3.62	–	–	< LOD	4.29	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-023-013	40	2015-10-12 10:09	46.6982	-119.4791	18.08	3.72	–	–	< LOD	4.28	U	–
DU-023-014	39	2016-05-11 15:11	46.6974	-119.4774	22.22	3.55	–	–	5.26	2.83	–	–
DU-023-015	38	2016-05-11 15:15	46.6973	-119.4783	11.68	3.42	–	–	< LOD	4.03	U	–
DU-023-016	47	2015-10-12 10:28	46.6988	-119.4836	60.00	4.64	–	–	7.89	3.64	–	–
DU-023-017	48	2015-10-12 10:31	46.6987	-119.4825	15.06	5.79	–	–	< LOD	6.99	U	–
DU-023-018	49	2015-10-12 10:34	46.6988	-119.4815	13.39	3.60	–	–	5.77	2.97	–	–
DU-023-019	50	2015-10-12 10:37	46.6987	-119.4806	31.58	4.76	–	–	< LOD	5.67	U	–
DU-023-020	51	2015-10-12 10:39	46.6987	-119.4795	35.51	3.84	–	–	6.59	3.05	–	–
DU-023-021	59	2015-10-12 10:55	46.6987	-119.4785	54.54	4.69	–	–	7.38	3.69	–	–
DU-023-022	66	2015-10-12 11:15	46.6994	-119.4842	21.67	3.56	–	–	4.65	2.84	–	–
DU-023-023	65	2015-10-12 11:12	46.6994	-119.4832	9.55	3.58	–	–	4.48	2.96	–	–
DU-023-024	64	2015-10-12 11:08	46.6993	-119.4822	21.88	4.52	–	–	< LOD	5.39	U	–
DU-023-025	61	2015-10-12 11:05	46.6994	-119.4812	11.90	3.66	–	–	< LOD	4.46	U	–
DU-023-026	60	2015-10-12 11:02	46.6994	-119.4801	24.00	3.97	–	–	< LOD	4.73	U	–
DU-023-027	67	2015-10-12 11:19	46.7001	-119.4836	9.08	3.77	–	–	< LOD	4.63	U	–
DU-023-028	68	2015-10-12 11:21	46.7000	-119.4825	7.52	3.64	–	–	< LOD	4.43	U	–
DU-023-029	69	2015-10-12 11:24	46.7000	-119.4816	20.26	5.27	–	–	< LOD	6.42	U	–
DU-023-030	70	2015-10-12 11:27	46.6999	-119.4806	81.32	6.43	–	–	12.61	5.10	–	–
DU-023-031	74	2015-10-12 11:38	46.7006	-119.4842	11.95	4.17	–	–	< LOD	5.14	U	–
DU-023-032	73	2015-10-12 11:35	46.7006	-119.4831	13.93	3.50	–	–	< LOD	4.19	U	–
DU-023-033	72	2015-10-12 11:32	46.7006	-119.4822	10.40	3.06	–	–	5.68	2.51	–	–
DU-023-034	71	2015-10-12 11:30	46.7006	-119.4811	55.46	5.54	–	–	13.24	4.52	–	–
DU-023-035	75	2015-10-12 11:43	46.7012	-119.4867	44.82	5.35	–	–	15.84	4.49	–	–
DU-023-036	76	2015-10-12 11:46	46.7012	-119.4857	33.34	4.16	–	–	5.79	3.31	–	–
DU-023-037	77	2015-10-12 11:49	46.7012	-119.4846	27.58	4.39	–	–	10.21	3.65	–	–
DU-023-038	78	2015-10-12 11:52	46.7012	-119.4835	7.45	3.61	–	–	< LOD	4.50	U	–
DU-023-039	79	2015-10-12 11:56	46.7012	-119.4816	10.91	3.77	–	–	31.36	3.92	–	–
DU-023-040	80	2015-10-12 11:59	46.7011	-119.4807	32.90	4.90	–	–	7.75	3.98	–	–
DU-024-001	144	2015-10-12 15:22	46.6968	-119.4756	148.89	9.06	–	–	< LOD	10.43	U	–
DU-024-002	143	2015-10-12 15:17	46.6967	-119.4734	16.04	3.62	–	–	< LOD	4.23	U	–
DU-024-003	145	2016-05-11 14:55	46.6974	-119.4762	77.08	4.98	–	–	19.61	4.06	–	–
DU-024-004	142	2015-10-12 15:11	46.6974	-119.4740	13.21	4.52	–	–	< LOD	5.56	U	–
DU-024-005	147	2015-10-12 15:29	46.6981	-119.4767	39.90	4.11	–	–	< LOD	4.72	U	–
DU-024-006	146	2015-10-12 15:27	46.6981	-119.4756	36.10	5.08	–	–	6.32	4.07	–	–
DU-024-007	141	2015-10-12 15:08	46.6981	-119.4745	17.28	4.48	–	–	< LOD	5.43	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-024-008	135	2015-10-12 14:34	46.6988	-119.4783	158.93	6.79	–	–	33.59	5.49	–	–
DU-024-009	136	2015-10-12 14:37	46.6988	-119.4771	24.08	4.78	–	–	8.60	3.99	–	–
DU-024-010	137	2015-10-12 14:39	46.6987	-119.4760	27.33	3.81	–	–	< LOD	4.46	U	–
DU-024-011	140	2015-10-12 15:06	46.6987	-119.4750	24.55	4.41	–	–	< LOD	5.24	U	–
DU-024-012	134	2015-10-12 14:31	46.6994	-119.4786	27.84	6.22	–	–	12.90	5.38	–	–
DU-024-013	129	2015-10-12 14:16	46.6994	-119.4778	15.84	4.18	–	–	< LOD	4.94	U	–
DU-024-014	128	2015-10-12 14:12	46.6994	-119.4768	42.31	4.13	–	–	< LOD	4.70	U	–
DU-024-015	127	2015-10-12 14:10	46.6997	-119.4761	21.16	3.81	–	–	< LOD	4.58	U	–
DU-024-016	133	2015-10-12 14:28	46.7000	-119.4805	43.66	4.25	–	–	10.55	3.44	–	–
DU-024-017	132	2015-10-12 14:24	46.7001	-119.4793	95.71	8.32	–	–	18.38	6.72	–	–
DU-024-018	131	2015-10-12 14:22	46.7000	-119.4783	66.91	4.63	–	–	36.60	4.09	–	–
DU-024-019	130	2015-10-12 14:19	46.7001	-119.4773	61.38	5.61	–	–	8.60	4.43	–	–
DU-024-020	126	2015-10-12 14:05	46.7000	-119.4761	23.80	3.56	–	–	< LOD	4.18	U	–
DU-024-021	111	2015-10-12 13:38	46.7007	-119.4799	35.64	4.53	–	–	5.76	3.60	–	–
DU-024-022	112	2015-10-12 13:41	46.7007	-119.4787	25.11	4.78	–	–	< LOD	5.74	U	–
DU-024-023	113	2015-10-12 13:44	46.7007	-119.4777	11.54	4.52	–	–	< LOD	5.68	U	–
DU-024-024	114	2015-10-12 13:46	46.7007	-119.4766	28.49	5.42	–	–	< LOD	6.54	U	–
DU-024-025	110	2015-10-12 13:35	46.7014	-119.4804	15.13	3.71	–	–	< LOD	4.50	U	–
DU-024-026	109	2015-10-12 13:32	46.7014	-119.4793	17.46	3.77	–	–	< LOD	4.49	U	–
DU-024-027	108	2015-10-12 13:30	46.7014	-119.4782	19.80	3.74	–	–	5.73	3.04	–	–
DU-024-028	107	2015-10-12 13:27	46.7013	-119.4772	25.83	4.84	–	–	< LOD	5.85	U	–
DU-024-029	104	2015-10-12 13:18	46.7020	-119.4799	15.79	3.17	–	–	4.45	2.54	–	–
DU-024-030	105	2015-10-12 13:21	46.7020	-119.4789	19.16	3.67	–	–	< LOD	4.39	U	–
DU-024-031	106	2015-10-12 13:23	46.7020	-119.4777	15.47	3.76	–	–	6.70	3.14	–	–
DU-024-032	103	2015-10-12 13:16	46.7026	-119.4802	12.70	4.21	–	–	< LOD	5.10	U	–
DU-024-033	102	2015-10-12 13:13	46.7027	-119.4792	9.78	2.76	–	–	< LOD	3.31	U	–
DU-024-034	101	2015-10-12 13:10	46.7028	-119.4781	17.33	3.24	–	–	< LOD	3.82	U	–
DU-024-035	99	2015-10-12 13:04	46.7034	-119.4798	43.12	4.63	–	–	15.46	3.86	–	–
DU-024-036	100	2015-10-12 13:07	46.7033	-119.4788	13.67	4.98	–	–	< LOD	6.03	U	–
DU-024-037	98	2015-10-12 13:01	46.7040	-119.4803	34.38	6.52	–	–	< LOD	7.82	U	–
DU-024-038	97	2015-10-12 12:58	46.7041	-119.4792	30.59	4.40	–	–	7.03	3.56	–	–
DU-024-039	96	2015-10-12 12:55	46.7047	-119.4799	24.22	6.89	–	–	< LOD	8.34	U	–
DU-024-040	94	2015-10-12 12:51	46.7052	-119.4804	45.56	4.41	–	–	5.59	3.46	–	–
DU-025-001	280	2015-08-27 12:34	46.6964	-119.4891	27.75	3.70	–	–	8.06	3.01	–	–
DU-025-002	279	2015-08-27 12:31	46.6964	-119.4880	25.72	3.57	–	–	< LOD	4.21	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-025-003	281	2015-08-27 12:37	46.6971	-119.4896	16.35	3.13	–	–	< LOD	3.72	U	–
DU-025-004	278	2015-08-27 12:29	46.6970	-119.4885	53.34	4.39	–	–	7.29	3.44	–	–
DU-025-005	277	2015-08-27 12:26	46.6977	-119.4891	19.46	3.29	–	–	< LOD	3.92	U	–
DU-025-006	276	2015-08-27 12:24	46.6977	-119.4880	20.88	3.41	–	–	< LOD	4.04	U	–
DU-025-007	275	2015-08-27 12:21	46.6977	-119.4869	21.63	3.36	Z	–	4.13	2.65	–	–
DU-025-008	272	2015-08-27 12:13	46.6984	-119.4897	14.20	3.19	–	–	< LOD	3.82	U	–
DU-025-009	273	2015-08-27 12:16	46.6984	-119.4885	40.22	3.85	–	–	9.96	3.13	–	–
DU-025-010	274	2015-08-27 12:18	46.6984	-119.4875	23.70	3.75	Z	–	6.19	3.03	–	–
DU-025-011	271	2015-08-27 12:11	46.6991	-119.4892	13.69	2.94	–	–	< LOD	3.46	U	–
DU-025-012	270	2015-08-27 12:08	46.6991	-119.4879	12.58	3.20	–	–	5.00	2.60	–	–
DU-025-013	269	2015-08-27 12:06	46.6991	-119.4868	13.80	3.13	–	–	4.06	2.52	–	–
DU-025-014	268	2015-08-27 12:01	46.7004	-119.4888	79.80	5.64	Z	–	< LOD	6.53	U	–
DU-025-015	267	2015-08-27 11:59	46.7007	-119.4886	21.32	3.43	–	–	< LOD	3.98	U	–
DU-025-016	263	2015-08-27 11:51	46.7009	-119.4887	29.33	3.71	–	–	< LOD	4.37	U	–
DU-026-001	82	2015-08-20 11:51	46.6993	-119.4921	28.61	3.77	–	–	< LOD	4.35	U	–
DU-026-002	90	2015-08-20 12:05	46.6996	-119.4923	92.53	5.36	–	–	16.23	4.26	Q	J
DU-026-003	91	2015-08-20 12:09	46.6996	-119.4917	447.67	11.00	–	–	21.67	8.32	Q	J
DU-026-004	94	2015-08-20 12:20	46.6999	-119.4926	134.95	6.36	–	–	23.79	5.07	Q	J
DU-026-005	93	2015-08-20 12:16	46.7000	-119.4919	93.69	5.28	–	–	9.60	4.10	Q	J
DU-026-006	92	2015-08-20 12:13	46.7000	-119.4915	73.60	5.81	–	–	< LOD	6.68	UQ	UJ
DU-026-007	95	2015-08-20 12:23	46.7003	-119.4923	542.50	13.01	–	–	97.31	10.43	Q	J
DU-026-008	96	2015-08-20 12:28	46.7003	-119.4917	176.47	6.78	–	–	17.48	5.25	Q	J
DU-026-009	100	2015-08-20 12:37	46.7006	-119.4926	150.69	6.29	–	–	18.66	4.92	Q	J
DU-026-010	99	2015-08-20 12:35	46.7006	-119.4920	150.11	6.74	–	–	< LOD	7.66	UQ	UJ
DU-026-011	98	2015-08-20 12:32	46.7006	-119.4915	39.12	3.86	–	–	4.71	3.02	Q	J
DU-026-012	101	2015-08-20 12:40	46.7010	-119.4923	51.08	4.44	–	–	22.53	3.79	Q	J
DU-026-013	102	2015-08-20 12:43	46.7010	-119.4917	393.27	10.31	–	–	20.43	7.82	Q	J
DU-027-001	33	2015-08-20 8:44	46.6907	-119.5262	10.97	2.90	–	–	< LOD	3.49	U	–
DU-027-002	35	2015-08-20 8:50	46.6907	-119.5252	16.55	3.04	–	–	< LOD	3.52	U	–
DU-027-003	36	2015-08-20 8:54	46.6907	-119.5242	12.67	3.25	–	–	< LOD	3.78	U	–
DU-027-004	38	2015-08-20 9:02	46.6913	-119.5257	10.52	3.20	–	–	< LOD	3.89	U	–
DU-027-005	37	2015-08-20 8:58	46.6913	-119.5247	11.78	2.98	–	–	< LOD	3.57	U	–
DU-027-006	39	2015-08-20 9:05	46.6919	-119.5262	12.05	2.89	–	–	< LOD	3.42	U	–
DU-027-007	40	2015-08-20 9:09	46.6919	-119.5252	14.88	3.94	–	–	< LOD	4.75	U	–
DU-027-008	42	2015-08-20 9:13	46.6919	-119.5242	7.92	3.32	–	–	4.20	2.73	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-027-009	44	2015-08-20 9:20	46.6925	-119.5257	12.38	3.10	–	–	< LOD	3.67	U	–
DU-027-010	43	2015-08-20 9:16	46.6925	-119.5247	17.63	3.56	–	–	< LOD	4.19	U	–
DU-027-011	45	2015-08-20 9:24	46.6931	-119.5262	13.70	3.24	–	–	< LOD	3.87	U	–
DU-027-012	46	2015-08-20 9:27	46.6930	-119.5252	11.68	2.99	–	–	< LOD	3.52	U	–
DU-027-013	47	2015-08-20 9:32	46.6931	-119.5241	13.70	3.02	–	–	< LOD	3.54	U	–
DU-027-014	49	2015-08-20 9:40	46.6937	-119.5258	11.36	3.20	–	–	< LOD	3.72	U	–
DU-027-015	48	2015-08-20 9:36	46.6937	-119.5247	10.50	2.79	–	–	< LOD	3.32	U	–
DU-027-016	50	2015-08-20 9:43	46.6942	-119.5262	9.71	2.94	–	–	< LOD	2.36	U	–
DU-027-017	58	2015-08-20 9:58	46.6943	-119.5252	11.60	2.88	–	–	< LOD	2.30	U	–
DU-027-018	59	2015-08-20 10:03	46.6942	-119.5242	12.97	3.04	–	–	< LOD	3.63	U	–
DU-027-019	61	2015-08-20 10:10	46.6948	-119.5257	15.36	3.17	–	–	4.20	2.54	–	–
DU-027-020	60	2015-08-20 10:06	46.6949	-119.5246	13.45	3.27	–	–	< LOD	3.92	U	–
DU-027-021	62	2015-08-20 10:14	46.6955	-119.5261	12.19	3.01	–	–	4.71	2.43	–	–
DU-027-022	63	2015-08-20 10:17	46.6955	-119.5252	9.73	3.08	–	–	4.22	2.49	–	–
DU-027-023	64	2015-08-20 10:21	46.6954	-119.5242	13.35	3.15	–	–	< LOD	3.77	U	–
DU-027-024	66	2015-08-20 10:30	46.6961	-119.5258	7.94	2.99	–	–	< LOD	2.41	U	–
DU-027-025	65	2015-08-20 10:25	46.6960	-119.5246	13.81	3.16	–	–	< LOD	3.72	U	–
DU-027-026	67	2015-08-20 10:33	46.6966	-119.5261	6.42	2.82	–	–	< LOD	2.28	U	–
DU-027-027	68	2015-08-20 10:37	46.6967	-119.5251	12.73	3.47	–	–	< LOD	4.08	U	–
DU-027-028	69	2015-08-20 10:40	46.6966	-119.5241	13.35	3.45	–	–	4.64	2.82	–	–
DU-027-029	71	2015-08-20 10:47	46.6972	-119.5256	9.52	3.14	–	–	< LOD	3.79	U	–
DU-027-030	70	2015-08-20 10:44	46.6972	-119.5246	12.65	3.28	–	–	< LOD	3.87	U	–
DU-027-031	72	2015-08-20 10:50	46.6978	-119.5261	13.63	3.14	–	–	< LOD	3.68	U	–
DU-027-032	73	2015-08-20 10:54	46.6978	-119.5251	9.61	2.78	–	–	< LOD	3.31	U	–
DU-027-033	74	2015-08-20 10:57	46.6978	-119.5241	12.88	3.21	–	–	< LOD	3.75	U	–
DU-028-001	39	2015-07-29 8:24	46.6893	-119.5264	12.84	2.90	–	–	< LOD	3.43	U	–
DU-028-002	38	2015-07-29 8:21	46.6895	-119.5253	11.89	2.84	–	–	< LOD	2.27	U	–
DU-028-003	37	2015-07-29 8:19	46.6894	-119.5243	10.34	2.84	–	–	< LOD	3.33	U	–
DU-028-004	36	2015-07-29 8:17	46.6893	-119.5234	15.98	3.26	–	–	< LOD	3.83	U	–
DU-028-005	35	2015-07-29 8:14	46.6894	-119.5223	12.48	3.02	–	–	< LOD	3.58	U	–
DU-028-006	33	2015-07-29 8:06	46.6894	-119.5214	16.72	3.08	–	–	< LOD	3.62	U	–
DU-028-007	40	2015-07-29 8:26	46.6900	-119.5259	11.00	3.04	–	–	< LOD	3.59	U	–
DU-028-008	41	2015-07-29 8:29	46.6900	-119.5249	9.25	2.80	–	–	4.13	2.28	–	–
DU-028-009	42	2015-07-29 8:31	46.6899	-119.5238	10.69	2.86	–	–	< LOD	2.29	U	–
DU-028-010	43	2015-07-29 8:33	46.6899	-119.5229	9.59	2.82	–	–	< LOD	3.37	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-028-011	44	2015-07-29 8:36	46.6899	-119.5218	12.28	2.98	–	–	6.13	2.45	–	–
DU-028-012	60	2015-07-29 9:06	46.6906	-119.5263	10.66	2.92	–	–	< LOD	2.34	U	–
DU-028-013	49	2015-07-29 8:48	46.6906	-119.5254	11.63	3.03	–	–	< LOD	3.63	U	–
DU-028-014	48	2015-07-29 8:45	46.6906	-119.5243	12.71	3.09	–	–	< LOD	3.60	U	–
DU-028-015	47	2015-07-29 8:43	46.6905	-119.5232	16.96	3.19	–	–	4.48	2.54	–	–
DU-028-016	46	2015-07-29 8:40	46.6905	-119.5223	12.98	2.93	–	–	< LOD	3.48	U	–
DU-028-017	45	2015-07-29 8:38	46.6906	-119.5213	12.76	3.02	–	–	< LOD	3.57	U	–
DU-028-018	61	2015-07-29 9:12	46.6911	-119.5229	12.09	2.98	–	–	< LOD	2.40	U	–
DU-028-019	62	2015-07-29 9:15	46.6912	-119.5218	13.83	3.36	–	–	4.59	2.72	–	–
DU-028-020	65	2015-07-29 9:22	46.6917	-119.5233	16.43	3.35	–	–	< LOD	3.88	U	–
DU-028-021	64	2015-07-29 9:19	46.6918	-119.5222	11.43	3.19	–	–	4.57	2.59	–	–
DU-028-022	63	2015-07-29 9:17	46.6917	-119.5214	13.96	3.35	–	–	4.95	2.73	–	–
DU-028-023	66	2015-07-29 9:24	46.6923	-119.5228	13.18	3.37	–	–	5.14	2.75	–	–
DU-028-024	67	2015-07-29 9:26	46.6923	-119.5218	12.67	2.97	–	–	5.53	2.41	–	–
DU-028-025	72	2015-07-29 9:38	46.6929	-119.5234	14.24	3.05	–	–	< LOD	3.55	U	–
DU-028-026	71	2015-07-29 9:35	46.6929	-119.5223	14.29	3.00	–	–	< LOD	3.49	U	–
DU-028-027	68	2015-07-29 9:29	46.6929	-119.5213	11.29	2.92	–	–	< LOD	3.49	U	–
DU-028-028	73	2015-07-29 9:40	46.6935	-119.5228	14.56	3.09	–	–	4.91	2.50	–	–
DU-028-029	74	2015-07-29 9:43	46.6935	-119.5218	12.03	2.92	–	–	< LOD	3.40	U	–
DU-028-030	77	2015-07-29 9:50	46.6940	-119.5234	15.14	3.03	–	–	< LOD	3.52	U	–
DU-028-031	76	2015-07-29 9:47	46.6941	-119.5222	14.26	2.95	–	–	< LOD	2.34	U	–
DU-028-032	75	2015-07-29 9:45	46.6941	-119.5213	11.89	2.96	–	–	< LOD	3.53	U	–
DU-029-001	117	2015-08-31 10:56	46.6909	-119.5210	13.16	2.90	–	–	< LOD	3.41	U	–
DU-029-002	116	2015-08-31 10:54	46.6909	-119.5201	14.43	3.09	–	–	< LOD	3.67	U	–
DU-029-003	115	2015-08-31 10:52	46.6909	-119.5192	33.02	3.72	–	–	< LOD	4.29	U	–
DU-029-004	114	2015-08-31 10:49	46.6909	-119.5182	34.27	3.88	–	–	< LOD	4.52	U	–
DU-029-005	113	2015-08-31 10:46	46.6908	-119.5171	14.96	2.99	–	–	4.41	2.40	–	–
DU-029-006	111	2015-08-31 10:43	46.6908	-119.5161	15.84	3.09	–	–	5.10	2.49	–	–
DU-029-007	118	2015-08-31 10:58	46.6915	-119.5205	23.60	4.39	–	–	< LOD	5.27	U	–
DU-029-008	119	2015-08-31 11:00	46.6915	-119.5196	26.63	3.51	–	–	7.23	2.82	–	–
DU-029-009	120	2015-08-31 11:03	46.6915	-119.5186	19.02	3.32	–	–	< LOD	3.90	U	–
DU-029-010	121	2015-08-31 11:05	46.6914	-119.5176	14.71	3.20	–	–	4.85	2.60	–	–
DU-029-011	122	2015-08-31 11:07	46.6915	-119.5166	19.25	3.19	–	–	< LOD	3.76	U	–
DU-029-012	128	2015-08-31 11:22	46.6921	-119.5211	15.71	3.15	–	–	< LOD	3.73	U	–
DU-029-013	127	2015-08-31 11:20	46.6920	-119.5201	21.74	3.26	–	–	< LOD	3.81	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-029-014	126	2015-08-31 11:17	46.6921	-119.5191	22.58	3.45	–	–	< LOD	4.05	U	–
DU-029-015	125	2015-08-31 11:14	46.6921	-119.5181	19.56	3.32	–	–	< LOD	3.84	U	–
DU-029-016	124	2015-08-31 11:12	46.6921	-119.5171	24.79	3.82	–	–	< LOD	4.48	U	–
DU-029-017	123	2015-08-31 11:10	46.6920	-119.5161	13.19	3.45	–	–	< LOD	4.13	U	–
DU-029-018	137	2015-08-31 11:36	46.6927	-119.5206	17.46	3.12	–	–	6.65	2.54	–	–
DU-029-019	138	2015-08-31 11:38	46.6927	-119.5196	22.64	3.46	–	–	< LOD	3.97	U	–
DU-029-020	139	2015-08-31 11:41	46.6926	-119.5186	14.71	3.02	–	–	< LOD	3.54	U	–
DU-029-021	140	2015-08-31 11:43	46.6926	-119.5176	16.20	3.42	–	–	< LOD	4.10	U	–
DU-029-022	141	2015-08-31 11:45	46.6926	-119.5166	13.98	3.12	–	–	4.86	2.51	–	–
DU-029-023	147	2015-08-31 11:59	46.6933	-119.5210	13.02	3.03	–	–	< LOD	3.59	U	–
DU-029-024	146	2015-08-31 11:57	46.6933	-119.5201	18.40	3.40	–	–	5.19	2.74	–	–
DU-029-025	145	2015-08-31 11:54	46.6933	-119.5191	239.05	10.24	–	–	< LOD	11.58	U	–
DU-029-026	144	2015-08-31 11:52	46.6932	-119.5181	26.19	3.82	–	–	< LOD	4.51	U	–
DU-029-027	143	2015-08-31 11:50	46.6933	-119.5171	12.82	3.23	–	–	< LOD	3.83	U	–
DU-029-028	142	2015-08-31 11:47	46.6932	-119.5161	10.37	3.03	–	–	< LOD	3.64	U	–
DU-029-029	148	2015-08-31 12:01	46.6938	-119.5206	22.43	3.44	–	–	< LOD	3.89	U	–
DU-029-030	149	2015-08-31 12:03	46.6939	-119.5195	13.19	3.18	–	–	< LOD	3.81	U	–
DU-029-031	150	2015-08-31 12:06	46.6938	-119.5186	21.48	3.61	–	–	< LOD	4.22	U	–
DU-029-032	151	2015-08-31 12:08	46.6938	-119.5175	15.05	3.26	–	–	4.12	2.60	–	–
DU-029-033	154	2015-08-31 12:16	46.6938	-119.5166	13.23	3.17	–	–	< LOD	3.66	U	–
DU-030-001	36	2015-09-08 8:43	46.6873	-119.5205	19.09	3.46	–	–	< LOD	4.06	U	–
DU-030-002	35	2015-09-08 8:41	46.6874	-119.5196	16.28	3.20	–	–	< LOD	3.73	U	–
DU-030-003	34	2015-09-08 8:39	46.6873	-119.5186	12.80	3.12	–	–	< LOD	3.68	U	–
DU-030-004	33	2015-09-08 8:36	46.6873	-119.5175	22.98	3.35	–	–	4.61	2.65	–	–
DU-030-005	31	2015-09-08 8:32	46.6873	-119.5165	24.59	3.63	–	–	< LOD	4.31	U	–
DU-030-006	37	2015-09-08 8:46	46.6880	-119.5210	12.52	2.98	–	–	< LOD	3.56	U	–
DU-030-007	38	2015-09-08 8:49	46.6879	-119.5200	14.26	3.38	–	–	< LOD	4.08	U	–
DU-030-008	39	2015-09-08 8:51	46.6879	-119.5190	10.73	2.79	–	–	4.34	2.26	–	–
DU-030-009	40	2015-09-08 8:53	46.6879	-119.5180	32.47	3.88	–	–	5.90	3.09	–	–
DU-030-010	41	2015-09-08 8:58	46.6879	-119.5170	13.16	3.25	–	–	< LOD	3.89	U	–
DU-030-011	42	2015-09-08 9:00	46.6879	-119.5159	15.28	3.18	–	–	< LOD	3.75	U	–
DU-030-012	47	2015-09-08 9:16	46.6885	-119.5205	12.85	3.00	–	–	4.12	2.41	–	–
DU-030-013	46	2015-09-08 9:13	46.6885	-119.5195	13.02	3.22	–	–	< LOD	3.84	U	–
DU-030-014	45	2015-09-08 9:08	46.6885	-119.5186	13.89	3.29	–	–	< LOD	3.84	U	–
DU-030-015	44	2015-09-08 9:06	46.6885	-119.5175	10.87	3.09	–	–	< LOD	3.67	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-030-016	43	2015-09-08 9:03	46.6885	-119.5165	11.37	2.83	–	–	< LOD	2.27	U	–
DU-030-017	48	2015-09-08 9:20	46.6891	-119.5211	14.87	3.10	–	–	< LOD	3.57	U	–
DU-030-018	56	2015-09-08 9:33	46.6891	-119.5200	17.92	3.30	–	–	4.32	2.63	–	–
DU-030-019	57	2015-09-08 9:36	46.6891	-119.5190	13.83	3.37	–	–	< LOD	3.93	U	–
DU-030-020	58	2015-09-08 9:38	46.6891	-119.5180	11.33	3.05	–	–	< LOD	3.68	U	–
DU-030-021	59	2015-09-08 9:41	46.6891	-119.5170	12.98	2.89	–	–	< LOD	3.36	U	–
DU-030-022	60	2015-09-08 9:43	46.6891	-119.5159	19.06	3.36	–	–	< LOD	3.88	U	–
DU-030-023	65	2015-09-08 9:55	46.6897	-119.5205	15.61	4.42	–	–	< LOD	5.27	U	–
DU-030-024	64	2015-09-08 9:53	46.6896	-119.5195	15.25	3.01	–	–	< LOD	3.50	U	–
DU-030-025	63	2015-09-08 9:50	46.6897	-119.5185	9.17	3.38	–	–	< LOD	4.08	U	–
DU-030-026	62	2015-09-08 9:48	46.6897	-119.5175	17.21	3.30	–	–	< LOD	3.91	U	–
DU-030-027	61	2015-09-08 9:46	46.6897	-119.5165	14.93	3.42	–	–	< LOD	4.03	U	–
DU-030-028	66	2015-09-08 9:58	46.6903	-119.5209	< LOD	2.99	U	–	5.45	2.53	–	–
DU-030-029	67	2015-09-08 10:00	46.6903	-119.5200	15.76	3.22	–	–	< LOD	3.73	U	–
DU-030-030	68	2015-09-08 10:02	46.6903	-119.5189	8.80	2.96	–	–	< LOD	3.56	U	–
DU-030-031	69	2015-09-08 10:05	46.6903	-119.5180	16.95	3.52	–	–	< LOD	4.17	U	–
DU-030-032	70	2015-09-08 10:07	46.6903	-119.5170	21.29	3.36	–	–	< LOD	3.94	U	–
DU-030-033	71	2015-09-08 10:10	46.6903	-119.5159	18.13	3.56	–	–	< LOD	4.21	U	–
DU-031-001	70	2015-07-27 9:07	46.6909	-119.5157	13.57	3.34	–	–	< LOD	3.97	U	–
DU-031-002	69	2015-07-27 9:05	46.6909	-119.5148	12.22	3.36	–	–	4.23	2.72	–	–
DU-031-003	68	2015-07-27 9:03	46.6909	-119.5138	14.75	3.60	–	–	< LOD	4.20	U	–
DU-031-004	67	2015-07-27 9:00	46.6909	-119.5128	15.97	3.35	–	–	< LOD	3.94	U	–
DU-031-005	66	2015-07-27 8:58	46.6909	-119.5118	16.19	3.19	–	–	< LOD	3.69	U	–
DU-031-006	65	2015-07-27 8:56	46.6909	-119.5107	20.35	3.39	–	–	< LOD	3.95	U	–
DU-031-007	60	2015-07-27 8:44	46.6915	-119.5152	18.23	3.45	–	–	< LOD	4.03	U	–
DU-031-008	61	2015-07-27 8:47	46.6915	-119.5142	10.86	3.28	–	–	< LOD	3.86	U	–
DU-031-009	62	2015-07-27 8:49	46.6915	-119.5131	11.75	3.24	–	–	< LOD	3.89	U	–
DU-031-010	63	2015-07-27 8:51	46.6915	-119.5121	17.51	3.82	–	–	< LOD	4.62	U	–
DU-031-011	64	2015-07-27 8:53	46.6915	-119.5112	20.35	3.39	–	–	< LOD	3.98	U	–
DU-031-012	59	2015-07-27 8:42	46.6922	-119.5157	22.10	3.67	–	–	< LOD	4.26	U	–
DU-031-013	58	2015-07-27 8:40	46.6921	-119.5146	16.66	3.41	–	–	4.41	2.72	–	–
DU-031-014	57	2015-07-27 8:37	46.6921	-119.5138	12.08	3.08	–	–	< LOD	3.65	U	–
DU-031-015	56	2015-07-27 8:35	46.6921	-119.5127	16.01	3.27	–	–	4.49	2.61	–	–
DU-031-016	55	2015-07-27 8:33	46.6921	-119.5117	14.29	3.44	–	–	< LOD	4.10	U	–
DU-031-017	47	2015-07-27 8:20	46.6920	-119.5107	20.61	3.47	–	–	7.60	2.84	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-031-018	42	2015-07-27 8:09	46.6927	-119.5152	13.84	3.11	–	–	< LOD	3.69	U	–
DU-031-019	43	2015-07-27 8:11	46.6927	-119.5143	12.91	3.24	–	–	< LOD	3.87	U	–
DU-031-020	44	2015-07-27 8:13	46.6927	-119.5132	14.67	3.13	–	–	< LOD	3.68	U	–
DU-031-021	45	2015-07-27 8:15	46.6927	-119.5122	12.64	3.25	–	–	< LOD	3.78	U	–
DU-031-022	46	2015-07-27 8:18	46.6927	-119.5112	24.72	3.63	–	–	4.97	2.88	–	–
DU-031-023	41	2015-07-27 8:07	46.6933	-119.5157	9.95	3.20	–	–	< LOD	3.86	U	–
DU-031-024	40	2015-07-27 8:04	46.6933	-119.5147	10.44	3.12	–	–	4.14	2.54	–	–
DU-031-025	39	2015-07-27 8:02	46.6933	-119.5137	14.82	3.26	–	–	4.34	2.61	–	–
DU-031-026	38	2015-07-27 8:00	46.6933	-119.5128	13.02	3.06	–	–	< LOD	3.66	U	–
DU-031-027	37	2015-07-27 7:58	46.6932	-119.5117	7.95	3.11	–	–	4.54	2.54	–	–
DU-031-028	36	2015-07-27 7:55	46.6933	-119.5107	10.89	2.86	–	–	< LOD	3.43	U	–
DU-031-029	30	2015-07-27 7:43	46.6939	-119.5152	13.89	3.26	–	–	< LOD	3.92	U	–
DU-031-030	31	2015-07-27 7:45	46.6939	-119.5141	18.06	3.37	–	–	< LOD	4.01	U	–
DU-031-031	32	2015-07-27 7:47	46.6939	-119.5131	14.16	3.20	–	–	< LOD	3.80	U	–
DU-031-032	33	2015-07-27 7:50	46.6939	-119.5121	10.88	3.01	–	–	5.78	2.48	–	–
DU-031-033	34	2015-07-27 7:52	46.6939	-119.5111	11.67	2.97	–	–	< LOD	2.36	U	–
DU-032-001	66	2015-07-31 9:51	46.6875	-119.5157	12.45	3.42	–	–	< LOD	3.99	U	–
DU-032-002	67	2015-07-31 9:53	46.6875	-119.5147	15.74	3.25	–	–	4.09	2.60	–	–
DU-032-003	68	2015-07-31 9:56	46.6875	-119.5138	10.41	3.05	–	–	4.27	2.47	–	–
DU-032-004	69	2015-07-31 9:58	46.6875	-119.5130	45.47	4.15	–	–	< LOD	4.73	U	–
DU-032-005	70	2015-07-31 10:00	46.6875	-119.5119	13.04	3.28	–	–	< LOD	3.93	U	–
DU-032-006	71	2015-07-31 10:03	46.6874	-119.5108	15.97	3.11	–	–	5.89	2.52	–	–
DU-032-007	65	2015-07-31 9:49	46.6880	-119.5154	9.32	2.89	–	–	< LOD	3.46	U	–
DU-032-008	64	2015-07-31 9:47	46.6880	-119.5142	11.24	2.98	–	–	< LOD	3.54	U	–
DU-032-009	63	2015-07-31 9:44	46.6880	-119.5135	13.51	3.03	–	–	< LOD	3.55	U	–
DU-032-010	62	2015-07-31 9:42	46.6880	-119.5124	11.97	3.06	–	–	< LOD	3.64	U	–
DU-032-011	61	2015-07-31 9:39	46.6881	-119.5113	9.80	3.15	–	–	4.04	2.56	–	–
DU-032-012	48	2015-07-31 9:14	46.6887	-119.5157	12.43	2.88	–	–	< LOD	3.43	U	–
DU-032-013	56	2015-07-31 9:26	46.6886	-119.5147	13.95	2.98	–	–	< LOD	3.53	U	–
DU-032-014	57	2015-07-31 9:29	46.6885	-119.5138	9.81	2.89	–	–	5.01	2.36	–	–
DU-032-015	58	2015-07-31 9:32	46.6886	-119.5128	13.05	3.20	–	–	< LOD	3.78	U	–
DU-032-016	59	2015-07-31 9:35	46.6886	-119.5118	12.96	3.33	–	–	< LOD	4.01	U	–
DU-032-017	60	2015-07-31 9:37	46.6886	-119.5108	13.04	3.05	–	–	3.99	2.45	–	–
DU-032-018	47	2015-07-31 9:12	46.6892	-119.5150	11.00	2.88	–	–	4.90	2.33	–	–
DU-032-019	46	2015-07-31 9:09	46.6892	-119.5144	14.41	3.17	–	–	4.14	2.54	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-032-020	45	2015-07-31 9:07	46.6892	-119.5131	10.50	3.29	–	–	< LOD	3.95	U	–
DU-032-021	44	2015-07-31 9:05	46.6892	-119.5121	12.81	2.99	–	–	< LOD	3.55	U	–
DU-032-022	43	2015-07-31 9:03	46.6892	-119.5114	11.86	3.04	–	–	< LOD	3.59	U	–
DU-032-023	37	2015-07-31 8:48	46.6899	-119.5156	14.02	3.25	–	–	< LOD	3.78	U	–
DU-032-024	38	2015-07-31 8:50	46.6898	-119.5148	16.39	3.38	–	–	< LOD	4.04	U	–
DU-032-025	39	2015-07-31 8:53	46.6898	-119.5138	9.57	3.00	–	–	< LOD	3.56	U	–
DU-032-026	40	2015-07-31 8:55	46.6897	-119.5129	12.16	3.10	–	–	< LOD	3.68	U	–
DU-032-027	41	2015-07-31 8:58	46.6897	-119.5119	12.20	3.08	–	–	< LOD	3.64	U	–
DU-032-028	42	2015-07-31 9:00	46.6897	-119.5108	13.58	3.05	–	–	4.47	2.45	–	–
DU-032-029	36	2015-07-31 8:46	46.6904	-119.5151	15.28	3.23	–	–	< LOD	3.74	U	–
DU-032-030	35	2015-07-31 8:44	46.6903	-119.5142	12.19	3.11	–	–	< LOD	3.71	U	–
DU-032-031	34	2015-07-31 8:41	46.6903	-119.5133	14.86	3.37	–	–	< LOD	4.02	U	–
DU-032-032	33	2015-07-31 8:39	46.6903	-119.5124	39.69	4.30	–	–	< LOD	5.05	U	–
DU-032-033	31	2015-07-31 8:35	46.6904	-119.5113	12.41	3.04	–	–	7.09	2.53	–	–
DU-033-001	97	2015-07-31 10:55	46.6855	-119.5153	11.33	2.95	–	–	5.11	2.39	–	–
DU-033-002	98	2015-07-31 10:57	46.6855	-119.5145	14.42	3.05	–	–	< LOD	3.62	U	–
DU-033-003	99	2015-07-31 10:59	46.6856	-119.5137	12.26	3.02	–	–	5.86	2.47	–	–
DU-033-004	100	2015-07-31 11:02	46.6855	-119.5128	17.20	3.16	–	–	< LOD	3.72	U	–
DU-033-005	101	2015-07-31 11:04	46.6855	-119.5118	13.90	3.54	–	–	< LOD	4.27	U	–
DU-033-006	102	2015-07-31 11:06	46.6855	-119.5110	14.11	3.01	–	–	< LOD	3.51	U	–
DU-033-007	96	2015-07-31 10:53	46.6861	-119.5149	10.88	2.96	–	–	4.06	2.40	–	–
DU-033-008	95	2015-07-31 10:50	46.6861	-119.5139	35.50	3.76	–	–	< LOD	4.35	U	–
DU-033-009	94	2015-07-31 10:48	46.6860	-119.5132	13.76	3.17	–	–	5.33	2.58	–	–
DU-033-010	93	2015-07-31 10:46	46.6860	-119.5123	11.50	3.03	–	–	4.09	2.43	–	–
DU-033-011	92	2015-07-31 10:43	46.6861	-119.5114	12.76	3.07	–	–	4.40	2.49	–	–
DU-033-012	85	2015-07-31 10:29	46.6866	-119.5153	10.53	2.87	–	–	< LOD	3.43	U	–
DU-033-013	87	2015-07-31 10:32	46.6865	-119.5146	12.62	2.97	–	–	< LOD	2.38	U	–
DU-033-014	88	2015-07-31 10:35	46.6866	-119.5136	11.32	2.93	–	–	4.49	2.36	–	–
DU-033-015	89	2015-07-31 10:37	46.6866	-119.5127	12.12	3.08	–	–	< LOD	2.45	U	–
DU-033-016	90	2015-07-31 10:39	46.6865	-119.5118	11.49	3.05	–	–	< LOD	2.46	U	–
DU-033-017	91	2015-07-31 10:41	46.6865	-119.5111	11.32	2.90	–	–	< LOD	3.43	U	–
DU-034-001	101	2015-08-10 11:12	46.6912	-119.5106	15.21	3.05	–	–	< LOD	3.60	U	–
DU-034-002	103	2015-08-10 11:16	46.6912	-119.5094	16.14	3.17	–	–	< LOD	3.67	U	–
DU-034-003	104	2015-08-10 11:19	46.6911	-119.5085	13.50	3.20	–	–	< LOD	3.84	U	–
DU-034-004	105	2015-08-10 11:21	46.6912	-119.5076	12.55	3.02	–	–	< LOD	3.61	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-034-005	106	2015-08-10 11:23	46.6912	-119.5065	13.98	3.08	–	–	< LOD	3.64	U	–
DU-034-006	107	2015-08-10 11:26	46.6912	-119.5055	13.75	3.17	–	–	< LOD	3.71	U	–
DU-034-007	112	2015-08-10 11:37	46.6918	-119.5099	15.98	3.15	–	–	< LOD	3.74	U	–
DU-034-008	111	2015-08-10 11:35	46.6918	-119.5089	15.68	3.13	–	–	< LOD	3.70	U	–
DU-034-009	110	2015-08-10 11:32	46.6918	-119.5079	9.00	2.89	–	–	4.76	2.37	–	–
DU-034-010	109	2015-08-10 11:30	46.6918	-119.5069	9.77	2.98	–	–	< LOD	3.58	U	–
DU-034-011	108	2015-08-10 11:28	46.6918	-119.5061	14.08	3.10	–	–	< LOD	3.65	U	–
DU-034-012	113	2015-08-10 11:39	46.6924	-119.5105	12.22	2.98	–	–	4.46	2.40	–	–
DU-034-013	114	2015-08-10 11:41	46.6923	-119.5095	13.93	3.18	–	–	< LOD	3.73	U	–
DU-034-014	115	2015-08-10 11:43	46.6925	-119.5085	11.62	2.99	–	–	< LOD	3.51	U	–
DU-034-015	116	2015-08-10 11:46	46.6924	-119.5075	10.21	2.95	–	–	< LOD	3.48	U	–
DU-034-016	117	2015-08-10 11:48	46.6923	-119.5065	13.07	3.59	–	–	4.38	2.91	–	–
DU-034-017	125	2015-08-10 12:00	46.6924	-119.5056	13.44	3.10	–	–	4.22	2.49	–	–
DU-034-018	130	2015-08-10 12:12	46.6930	-119.5099	12.24	2.92	–	–	< LOD	3.45	U	–
DU-034-019	129	2015-08-10 12:10	46.6929	-119.5090	11.40	3.05	–	–	< LOD	3.65	U	–
DU-034-020	128	2015-08-10 12:07	46.6930	-119.5080	15.52	3.03	–	–	4.13	2.41	–	–
DU-034-021	127	2015-08-10 12:05	46.6930	-119.5069	14.53	3.02	–	–	< LOD	3.56	U	–
DU-034-022	126	2015-08-10 12:03	46.6930	-119.5060	13.54	2.94	–	–	4.13	2.35	–	–
DU-034-023	131	2015-08-10 12:14	46.6935	-119.5104	9.99	2.93	–	–	< LOD	3.49	U	–
DU-034-024	132	2015-08-10 12:16	46.6936	-119.5095	13.13	3.04	–	–	< LOD	2.41	U	–
DU-034-025	133	2015-08-10 12:18	46.6936	-119.5085	15.43	3.24	–	–	< LOD	3.81	U	–
DU-034-026	134	2015-08-10 12:21	46.6935	-119.5075	16.01	3.20	–	–	< LOD	3.79	U	–
DU-034-027	135	2015-08-10 12:24	46.6936	-119.5065	10.86	2.97	–	–	< LOD	2.38	U	–
DU-034-028	136	2015-08-10 12:26	46.6935	-119.5054	11.87	3.10	–	–	< LOD	3.74	U	–
DU-034-029	141	2015-08-10 12:37	46.6942	-119.5099	12.04	2.97	–	–	< LOD	3.54	U	–
DU-034-030	140	2015-08-10 12:35	46.6941	-119.5088	12.76	2.99	–	–	4.47	2.41	–	–
DU-034-031	139	2015-08-10 12:33	46.6941	-119.5079	15.27	3.06	–	–	< LOD	3.63	U	–
DU-034-032	138	2015-08-10 12:30	46.6941	-119.5068	15.34	3.11	–	–	< LOD	3.62	U	–
DU-034-033	137	2015-08-10 12:28	46.6941	-119.5060	12.01	2.96	–	–	4.04	2.38	–	–
DU-035-001	69	2015-09-14 9:28	46.6874	-119.5105	23.23	5.92	–	–	< LOD	7.17	U	–
DU-035-002	70	2015-09-14 9:30	46.6873	-119.5095	14.30	3.17	–	–	< LOD	3.75	U	–
DU-035-003	71	2015-09-14 9:33	46.6873	-119.5085	12.81	3.19	–	–	< LOD	3.74	U	–
DU-035-004	72	2015-09-14 9:35	46.6873	-119.5075	13.08	3.05	–	–	4.19	2.45	–	–
DU-035-005	30	2015-09-14 8:09	46.6873	-119.5064	21.56	3.64	–	–	< LOD	4.29	U	–
DU-035-006	32	2015-09-14 8:12	46.6873	-119.5055	10.39	3.01	–	–	< LOD	2.42	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-035-007	68	2015-09-14 9:26	46.6879	-119.5099	19.29	3.35	–	–	4.71	2.68	–	–
DU-035-008	67	2015-09-14 9:24	46.6879	-119.5090	10.25	3.48	–	–	< LOD	4.25	U	–
DU-035-009	66	2015-09-14 9:21	46.6879	-119.5079	12.90	3.52	–	–	< LOD	4.13	U	–
DU-035-010	65	2015-09-14 9:19	46.6879	-119.5070	12.53	3.41	–	–	< LOD	4.08	U	–
DU-035-011	33	2015-09-14 8:15	46.6879	-119.5060	13.59	3.41	–	–	< LOD	4.11	U	–
DU-035-012	60	2015-09-14 9:08	46.6885	-119.5104	16.57	4.57	–	–	< LOD	5.61	U	–
DU-035-013	61	2015-09-14 9:11	46.6885	-119.5093	14.17	3.03	–	–	5.19	2.45	–	–
DU-035-014	62	2015-09-14 9:13	46.6885	-119.5084	13.02	3.33	–	–	< LOD	3.90	U	–
DU-035-015	63	2015-09-14 9:15	46.6885	-119.5075	10.33	3.32	–	–	< LOD	4.00	U	–
DU-035-016	64	2015-09-14 9:17	46.6885	-119.5064	12.31	3.06	–	–	< LOD	3.60	U	–
DU-035-017	34	2015-09-14 8:17	46.6884	-119.5055	12.23	3.54	–	–	< LOD	4.30	U	–
DU-035-018	59	2015-09-14 9:06	46.6891	-119.5099	11.67	3.34	–	–	< LOD	4.00	U	–
DU-035-019	58	2015-09-14 9:03	46.6891	-119.5090	12.04	3.48	–	–	< LOD	4.16	U	–
DU-035-020	57	2015-09-14 9:01	46.6891	-119.5080	13.13	3.07	–	–	< LOD	3.60	U	–
DU-035-021	47	2015-09-14 8:46	46.6891	-119.5069	11.44	3.31	–	–	< LOD	4.02	U	–
DU-035-022	35	2015-09-14 8:20	46.6891	-119.5060	11.49	3.13	–	–	< LOD	3.74	U	–
DU-035-023	42	2015-09-14 8:35	46.6897	-119.5105	19.39	3.33	–	–	< LOD	3.93	U	–
DU-035-024	43	2015-09-14 8:37	46.6896	-119.5094	12.25	3.40	–	–	< LOD	4.07	U	–
DU-035-025	44	2015-09-14 8:40	46.6897	-119.5085	14.48	3.09	–	–	< LOD	3.66	U	–
DU-035-026	45	2015-09-14 8:42	46.6897	-119.5074	10.47	2.92	–	–	< LOD	3.50	U	–
DU-035-027	46	2015-09-14 8:44	46.6897	-119.5064	14.90	3.46	–	–	< LOD	4.09	U	–
DU-035-028	36	2015-09-14 8:22	46.6896	-119.5055	14.93	3.23	–	–	< LOD	3.81	U	–
DU-035-029	41	2015-09-14 8:33	46.6902	-119.5099	14.11	3.27	–	–	< LOD	3.86	U	–
DU-035-030	40	2015-09-14 8:31	46.6902	-119.5089	15.24	3.40	–	–	< LOD	3.94	U	–
DU-035-031	39	2015-09-14 8:29	46.6902	-119.5079	15.83	3.41	–	–	4.45	2.75	–	–
DU-035-032	38	2015-09-14 8:27	46.6902	-119.5069	13.37	3.18	–	–	< LOD	3.79	U	–
DU-035-033	37	2015-09-14 8:24	46.6902	-119.5060	13.04	3.29	–	–	< LOD	3.92	U	–
DU-036-001	67	2015-08-10 9:47	46.6912	-119.5053	11.83	3.05	–	–	< LOD	3.59	U	–
DU-036-002	68	2015-08-10 9:50	46.6911	-119.5044	13.75	3.15	–	–	< LOD	3.75	U	–
DU-036-003	69	2015-08-10 9:52	46.6911	-119.5033	15.49	3.28	–	–	< LOD	3.83	U	–
DU-036-004	70	2015-08-10 9:54	46.6911	-119.5024	10.20	3.13	–	–	< LOD	3.69	U	–
DU-036-005	71	2015-08-10 9:57	46.6911	-119.5015	15.57	3.14	–	–	< LOD	3.71	U	–
DU-036-006	72	2015-08-10 9:59	46.6911	-119.5005	12.30	3.19	–	–	< LOD	3.71	U	–
DU-036-007	66	2015-08-10 9:45	46.6916	-119.5047	14.01	3.51	–	–	< LOD	4.28	U	–
DU-036-008	65	2015-08-10 9:43	46.6918	-119.5038	6.73	3.34	–	–	4.62	2.77	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-036-009	64	2015-08-10 9:40	46.6917	-119.5028	11.15	3.45	–	–	4.38	2.83	–	–
DU-036-010	63	2015-08-10 9:38	46.6917	-119.5019	12.18	3.02	–	–	< LOD	3.55	U	–
DU-036-011	62	2015-08-10 9:36	46.6918	-119.5008	7.61	3.58	–	–	< LOD	4.42	U	–
DU-036-012	56	2015-08-10 9:23	46.6924	-119.5052	15.78	3.78	–	–	< LOD	4.51	U	–
DU-036-013	57	2015-08-10 9:25	46.6923	-119.5043	14.72	3.32	–	–	5.18	2.71	–	–
DU-036-014	58	2015-08-10 9:27	46.6923	-119.5033	12.13	3.05	–	–	< LOD	3.62	U	–
DU-036-015	59	2015-08-10 9:29	46.6923	-119.5023	15.94	3.38	–	–	< LOD	3.99	U	–
DU-036-016	60	2015-08-10 9:31	46.6923	-119.5014	10.34	3.18	–	–	< LOD	3.75	U	–
DU-036-017	61	2015-08-10 9:34	46.6923	-119.5004	12.04	3.12	–	–	< LOD	3.72	U	–
DU-036-018	48	2015-08-10 9:10	46.6929	-119.5047	13.55	3.41	–	–	< LOD	4.11	U	–
DU-036-019	47	2015-08-10 9:08	46.6929	-119.5037	7.08	3.26	–	–	5.90	2.76	–	–
DU-036-020	46	2015-08-10 9:05	46.6930	-119.5029	13.27	3.11	–	–	< LOD	3.61	U	–
DU-036-021	45	2015-10-16 8:55	46.6929	-119.5018	10.19	3.07	–	–	< LOD	2.49	U	–
DU-036-022	44	2015-08-10 9:01	46.6928	-119.5008	8.28	3.20	–	–	5.38	2.66	–	–
DU-036-023	38	2015-08-10 8:47	46.6935	-119.5052	15.08	3.14	–	–	4.36	2.52	–	–
DU-036-024	39	2015-08-10 8:49	46.6935	-119.5043	13.73	3.00	–	–	< LOD	3.53	U	–
DU-036-025	40	2015-08-10 8:52	46.6935	-119.5034	11.41	2.97	–	–	< LOD	3.54	U	–
DU-036-026	41	2015-08-10 8:54	46.6934	-119.5025	12.97	3.25	–	–	< LOD	3.89	U	–
DU-036-027	42	2015-08-10 8:56	46.6934	-119.5013	12.26	3.36	–	–	< LOD	3.97	U	–
DU-036-028	43	2015-08-10 8:59	46.6934	-119.5004	24.12	3.42	–	–	< LOD	3.95	U	–
DU-036-029	37	2015-08-10 8:45	46.6941	-119.5047	18.99	3.45	–	–	4.29	2.75	–	–
DU-036-030	36	2015-08-10 8:43	46.6940	-119.5038	9.66	3.26	–	–	4.93	2.69	–	–
DU-036-031	35	2015-08-10 8:41	46.6940	-119.5029	11.72	3.24	–	–	< LOD	3.82	U	–
DU-036-032	34	2015-08-10 8:39	46.6940	-119.5018	11.47	2.91	–	–	< LOD	3.47	U	–
DU-036-033	32	2015-08-10 8:35	46.6940	-119.5009	12.40	3.11	–	–	< LOD	3.73	U	–
DU-037-001	78	2015-07-27 9:43	46.6875	-119.5048	15.43	3.19	–	–	5.22	2.58	–	–
DU-037-002	86	2015-07-27 9:54	46.6875	-119.5037	22.14	3.63	–	–	< LOD	4.31	U	–
DU-037-003	87	2015-07-27 9:56	46.6875	-119.5029	11.06	2.88	–	–	< LOD	2.31	U	–
DU-037-004	88	2015-07-27 9:58	46.6875	-119.5019	14.70	3.90	–	–	< LOD	4.70	U	–
DU-037-005	89	2015-07-27 10:01	46.6876	-119.5009	20.74	3.38	–	–	4.32	2.68	–	–
DU-037-006	95	2015-07-27 10:14	46.6882	-119.5051	16.06	3.88	–	–	< LOD	4.61	U	–
DU-037-007	94	2015-07-27 10:12	46.6881	-119.5042	26.91	3.80	–	–	4.97	3.02	–	–
DU-037-008	93	2015-07-27 10:09	46.6881	-119.5033	16.58	3.24	–	–	< LOD	3.75	U	–
DU-037-009	92	2015-07-27 10:07	46.6881	-119.5022	15.85	3.71	–	–	< LOD	4.36	U	–
DU-037-010	91	2015-07-27 10:05	46.6881	-119.5013	15.18	3.55	–	–	4.89	2.87	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-037-011	90	2015-07-27 10:03	46.6880	-119.5003	10.57	2.95	–	–	5.05	2.40	–	–
DU-037-012	96	2015-07-27 10:16	46.6887	-119.5047	24.00	3.64	–	–	< LOD	4.21	U	–
DU-037-013	97	2015-07-27 10:18	46.6887	-119.5039	14.82	3.07	–	–	4.18	2.45	–	–
DU-037-014	98	2015-07-27 10:21	46.6887	-119.5029	15.96	3.12	–	–	< LOD	3.66	U	–
DU-037-015	99	2015-07-27 10:23	46.6887	-119.5018	11.36	3.08	–	–	7.65	2.59	–	–
DU-037-016	100	2015-07-27 10:26	46.6887	-119.5008	13.48	3.05	–	–	< LOD	3.59	U	–
DU-037-017	113	2015-07-27 10:49	46.6894	-119.5052	14.22	3.19	–	–	< LOD	3.80	U	–
DU-037-018	112	2015-07-27 10:46	46.6894	-119.5042	18.78	3.26	–	–	< LOD	2.58	U	–
DU-037-019	111	2015-07-27 10:44	46.6894	-119.5031	16.10	3.09	–	–	< LOD	3.68	U	–
DU-037-020	110	2015-07-27 10:42	46.6893	-119.5022	14.32	3.32	–	–	4.42	2.67	–	–
DU-037-021	109	2015-07-27 10:39	46.6893	-119.5012	16.83	3.17	–	–	5.40	2.55	–	–
DU-037-022	108	2015-07-27 10:37	46.6893	-119.5002	12.69	2.95	–	–	< LOD	3.53	U	–
DU-037-023	114	2015-07-27 10:51	46.6899	-119.5047	13.36	3.02	–	–	4.80	2.43	–	–
DU-037-024	115	2015-07-27 10:53	46.6899	-119.5038	18.03	3.21	–	–	< LOD	3.76	U	–
DU-037-025	116	2015-07-27 10:55	46.6899	-119.5029	14.69	3.09	–	–	4.35	2.46	–	–
DU-037-026	117	2015-07-27 10:57	46.6899	-119.5021	13.97	3.12	–	–	< LOD	3.68	U	–
DU-037-027	118	2015-07-27 11:00	46.6899	-119.5009	16.42	3.17	–	–	< LOD	3.71	U	–
DU-037-028	124	2015-07-27 11:13	46.6906	-119.5052	12.32	3.15	–	–	4.29	2.54	–	–
DU-037-029	123	2015-07-27 11:11	46.6905	-119.5042	9.75	2.91	–	–	5.95	2.40	–	–
DU-037-030	122	2015-07-27 11:09	46.6905	-119.5030	18.59	3.28	–	–	4.71	2.61	–	–
DU-037-031	121	2015-07-27 11:07	46.6905	-119.5021	12.36	3.07	–	–	< LOD	3.62	U	–
DU-037-032	120	2015-07-27 11:04	46.6905	-119.5012	12.05	3.11	–	–	< LOD	3.70	U	–
DU-037-033	119	2015-07-27 11:02	46.6904	-119.5003	13.08	3.15	–	–	< LOD	3.77	U	–
DU-038-001	123	2015-07-20 11:25	46.6911	-119.4998	24.17	3.39	–	–	< LOD	3.98	U	–
DU-038-002	124	2015-07-20 11:27	46.6910	-119.4988	16.77	3.26	–	–	< LOD	3.84	U	–
DU-038-003	125	2015-07-20 11:30	46.6910	-119.4977	16.40	3.20	–	–	4.65	2.57	–	–
DU-038-004	126	2015-07-20 11:32	46.6910	-119.4968	13.47	3.12	–	–	4.65	2.51	–	–
DU-038-005	122	2015-07-20 11:22	46.6916	-119.4993	19.59	3.26	–	–	6.79	2.66	–	–
DU-038-006	121	2015-07-20 11:20	46.6916	-119.4983	17.02	3.11	–	–	< LOD	2.47	U	–
DU-038-007	120	2015-07-20 11:18	46.6917	-119.4973	25.86	3.44	–	–	5.39	2.73	–	–
DU-038-008	116	2015-07-20 11:08	46.6923	-119.4997	23.49	3.36	–	–	< LOD	3.91	U	–
DU-038-009	117	2015-07-20 11:11	46.6922	-119.4987	20.33	3.35	–	–	4.52	2.65	–	–
DU-038-010	118	2015-07-20 11:13	46.6921	-119.4978	28.95	3.58	–	–	6.34	2.86	–	–
DU-038-011	119	2015-07-20 11:15	46.6922	-119.4969	21.08	3.27	–	–	6.73	2.65	–	–
DU-038-012	99	2015-07-20 10:41	46.6928	-119.4993	26.37	3.48	–	–	< LOD	4.05	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-038-013	98	2015-07-20 10:39	46.6928	-119.4983	18.56	3.21	–	–	4.84	2.58	–	–
DU-038-014	97	2015-07-20 10:36	46.6928	-119.4973	22.23	3.41	–	–	< LOD	4.03	U	–
DU-038-015	93	2015-07-20 10:25	46.6935	-119.4998	27.26	3.58	–	–	4.36	2.82	–	–
DU-038-016	94	2015-07-20 10:28	46.6934	-119.4986	21.55	3.33	–	–	5.76	2.67	–	–
DU-038-017	95	2015-07-20 10:30	46.6934	-119.4978	31.28	3.65	–	–	< LOD	4.28	U	–
DU-038-018	96	2015-07-20 10:33	46.6934	-119.4967	16.45	4.23	–	–	< LOD	5.00	U	–
DU-038-019	92	2015-07-20 10:23	46.6940	-119.5002	13.44	3.19	–	–	< LOD	2.55	U	–
DU-038-020	91	2015-07-20 10:20	46.6941	-119.4992	43.98	4.26	–	–	5.91	3.34	–	–
DU-038-021	90	2015-07-20 10:17	46.6941	-119.4980	32.15	4.20	–	–	6.24	3.35	–	–
DU-038-022	88	2015-07-20 10:13	46.6940	-119.4972	49.26	5.35	–	–	< LOD	6.10	U	–
DU-039-001	67	2015-07-20 9:38	46.6947	-119.4996	540.84	11.64	–	–	54.75	9.02	–	–
DU-039-002	68	2015-07-20 9:40	46.6946	-119.4986	45.56	4.89	–	–	< LOD	5.77	U	–
DU-039-003	69	2015-07-20 9:42	46.6946	-119.4976	30.39	3.77	–	–	4.93	2.98	–	–
DU-039-004	70	2015-07-20 9:45	46.6946	-119.4966	21.03	3.84	–	–	< LOD	4.55	U	–
DU-039-005	71	2015-07-20 9:47	46.6946	-119.4957	13.24	3.41	–	–	4.66	2.76	–	–
DU-039-006	66	2015-07-20 9:35	46.6953	-119.5000	16.41	3.16	–	–	< LOD	3.72	U	–
DU-039-007	65	2015-07-20 9:33	46.6953	-119.4990	236.43	8.93	–	–	37.08	7.08	–	–
DU-039-008	64	2015-07-20 9:30	46.6953	-119.4980	245.61	8.16	–	–	32.63	6.41	–	–
DU-039-009	63	2015-07-20 9:28	46.6953	-119.4970	40.32	3.99	–	–	10.37	3.23	–	–
DU-039-010	62	2015-07-20 9:25	46.6952	-119.4960	18.96	3.44	–	–	5.37	2.78	–	–
DU-039-011	61	2015-07-20 9:23	46.6952	-119.4951	19.12	3.85	–	–	< LOD	4.61	U	–
DU-039-012	47	2015-07-20 8:57	46.6959	-119.4995	19.60	3.27	–	–	< LOD	3.86	U	–
DU-039-013	48	2015-07-20 9:00	46.6958	-119.4986	39.11	4.00	–	–	< LOD	4.51	U	–
DU-039-014	49	2015-07-20 9:02	46.6958	-119.4977	30.93	4.33	–	–	< LOD	5.05	U	–
DU-039-015	59	2015-07-20 9:18	46.6958	-119.4965	24.26	4.22	–	–	5.20	3.39	–	–
DU-039-016	60	2015-07-20 9:21	46.6958	-119.4956	16.92	3.50	–	–	< LOD	4.16	U	–
DU-039-017	46	2015-07-20 8:51	46.6964	-119.4999	38.53	3.86	–	–	< LOD	4.36	U	–
DU-039-018	45	2015-07-20 8:48	46.6964	-119.4989	53.72	4.60	–	–	< LOD	5.26	U	–
DU-039-019	44	2015-07-20 8:46	46.6964	-119.4979	19.43	3.28	–	–	< LOD	3.88	U	–
DU-039-020	43	2015-07-20 8:44	46.6964	-119.4971	14.79	3.25	–	–	5.21	2.63	–	–
DU-039-021	42	2015-07-20 8:42	46.6964	-119.4962	15.42	3.11	–	–	4.59	2.49	–	–
DU-039-022	39	2015-07-20 8:33	46.6970	-119.4995	51.94	5.23	–	–	8.08	4.15	–	–
DU-039-023	40	2015-07-20 8:36	46.6969	-119.4985	11.88	3.35	–	–	< LOD	4.04	U	–
DU-039-024	41	2015-07-20 8:39	46.6969	-119.4975	19.39	3.47	–	–	< LOD	4.13	U	–
DU-039-025	38	2015-07-20 8:31	46.6976	-119.4999	44.07	5.01	–	–	6.63	3.97	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-039-026	36	2015-07-20 8:27	46.6975	-119.4990	22.35	4.28	–	–	7.45	3.52	–	–
DU-040-001	99	2015-08-18 10:42	46.6924	-119.4794	15.04	3.18	–	–	< LOD	3.80	U	–
DU-040-002	100	2015-08-18 10:45	46.6924	-119.4784	20.52	3.44	–	–	< LOD	4.01	U	–
DU-040-003	102	2015-08-18 10:49	46.6923	-119.4774	47.21	4.61	–	–	12.64	3.76	–	–
DU-040-004	104	2015-08-18 10:54	46.6923	-119.4763	168.83	7.45	–	–	< LOD	8.46	U	–
DU-040-005	106	2015-08-18 10:59	46.6923	-119.4754	206.76	7.61	–	–	17.86	5.86	–	–
DU-040-006	107	2015-08-18 11:01	46.6923	-119.4744	122.65	6.25	–	–	7.97	4.78	–	–
DU-040-007	98	2015-08-18 10:40	46.6930	-119.4789	18.87	3.36	–	–	< LOD	3.92	U	–
DU-040-008	101	2015-08-18 10:47	46.6929	-119.4779	204.59	7.62	–	–	20.70	5.90	–	–
DU-040-009	103	2015-08-18 10:51	46.6930	-119.4768	88.84	5.32	–	–	9.22	4.12	–	–
DU-040-010	105	2015-08-18 10:56	46.6929	-119.4759	165.86	7.77	–	–	19.97	6.08	–	–
DU-040-011	108	2015-08-18 11:04	46.6929	-119.4749	179.26	7.18	–	–	9.45	5.45	–	–
DU-040-012	97	2015-08-18 10:38	46.6936	-119.4794	15.36	3.10	–	–	4.09	2.46	–	–
DU-040-013	96	2015-08-18 10:36	46.6936	-119.4783	28.58	3.65	–	–	5.91	2.90	–	–
DU-040-014	95	2015-08-18 10:33	46.6936	-119.4774	132.40	6.05	–	–	10.11	4.65	–	–
DU-040-015	94	2015-08-18 10:31	46.6935	-119.4764	77.07	5.28	–	–	9.67	4.14	–	–
DU-040-016	92	2015-08-18 10:27	46.6936	-119.4754	88.03	5.74	–	–	11.00	4.50	–	–
DU-040-017	91	2015-08-18 10:22	46.6936	-119.4744	28.93	3.53	–	–	< LOD	4.11	U	–
DU-041-001	162	2015-07-20 13:28	46.6871	-119.4971	14.83	3.21	–	–	< LOD	2.56	U	–
DU-041-002	163	2015-07-20 13:31	46.6871	-119.4962	15.25	3.16	–	–	< LOD	3.70	U	–
DU-041-003	164	2015-07-20 13:33	46.6870	-119.4951	13.62	4.04	–	–	< LOD	4.91	U	–
DU-041-004	161	2015-07-20 13:26	46.6877	-119.4966	11.40	2.80	–	–	< LOD	3.31	U	–
DU-041-005	160	2015-07-20 13:23	46.6877	-119.4956	22.21	3.66	–	–	< LOD	4.25	U	–
DU-041-006	157	2015-07-20 13:14	46.6883	-119.4971	20.68	3.84	–	–	< LOD	4.60	U	–
DU-041-007	158	2015-07-20 13:17	46.6883	-119.4960	18.19	3.23	–	–	< LOD	3.82	U	–
DU-041-008	159	2015-07-20 13:20	46.6882	-119.4951	15.29	3.21	–	–	< LOD	3.79	U	–
DU-041-009	156	2015-07-20 13:12	46.6888	-119.4964	12.08	3.00	–	–	< LOD	3.56	U	–
DU-041-010	155	2015-07-20 13:09	46.6889	-119.4954	17.19	3.13	–	–	< LOD	3.70	U	–
DU-041-011	152	2015-07-20 13:02	46.6895	-119.4971	14.97	3.12	–	–	< LOD	2.48	U	–
DU-041-012	153	2015-07-20 13:04	46.6894	-119.4960	13.93	3.01	–	–	5.29	2.45	–	–
DU-041-013	154	2015-07-20 13:07	46.6894	-119.4951	15.13	3.14	–	–	5.71	2.54	–	–
DU-041-014	149	2015-07-20 12:53	46.6901	-119.4964	12.14	3.03	–	–	6.55	2.49	–	–
DU-041-015	150	2015-07-20 12:56	46.6901	-119.4955	15.32	3.52	–	–	< LOD	4.22	U	–
DU-041-016	151	2015-07-20 12:59	46.6906	-119.4969	16.10	3.46	–	–	< LOD	4.07	U	–
DU-041-017	148	2015-07-20 12:51	46.6907	-119.4960	14.22	3.08	–	–	4.45	2.46	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-041-018	146	2015-07-20 12:47	46.6906	-119.4950	9.97	2.92	–	–	< LOD	2.35	U	–
DU-042-001	30	2015-07-21 8:54	46.6870	-119.4909	13.86	3.81	–	–	< LOD	4.49	U	–
DU-042-002	32	2015-07-21 8:57	46.6870	-119.4902	12.17	4.35	–	–	< LOD	5.33	U	–
DU-042-003	37	2015-07-21 9:09	46.6876	-119.4941	11.24	3.18	–	–	< LOD	3.74	U	–
DU-042-004	36	2015-07-21 9:07	46.6875	-119.4932	17.52	3.36	–	–	< LOD	3.92	U	–
DU-042-005	35	2015-07-21 9:05	46.6875	-119.4925	24.01	4.11	–	–	< LOD	4.85	U	–
DU-042-006	34	2015-07-21 9:02	46.6875	-119.4914	15.77	3.51	–	–	< LOD	4.19	U	–
DU-042-007	33	2015-07-21 9:00	46.6875	-119.4906	11.71	5.37	–	–	< LOD	6.53	U	–
DU-042-008	38	2015-07-21 9:12	46.6881	-119.4939	13.78	3.58	–	–	< LOD	4.30	U	–
DU-042-009	39	2015-07-21 9:14	46.6881	-119.4929	14.10	3.45	–	–	< LOD	4.15	U	–
DU-042-010	40	2015-07-21 9:17	46.6881	-119.4920	15.98	7.02	–	–	< LOD	9.15	U	–
DU-042-011	41	2015-07-21 9:20	46.6881	-119.4911	13.65	3.64	–	–	< LOD	4.42	U	–
DU-042-012	42	2015-07-21 9:22	46.6880	-119.4901	12.61	3.02	–	–	5.11	2.46	–	–
DU-042-013	47	2015-07-21 9:35	46.6887	-119.4944	14.30	3.95	–	–	< LOD	4.65	U	–
DU-042-014	46	2015-07-21 9:32	46.6887	-119.4934	13.97	5.76	–	–	< LOD	7.32	U	–
DU-042-015	45	2015-07-21 9:30	46.6886	-119.4925	29.06	6.58	–	–	< LOD	7.77	U	–
DU-042-016	44	2015-07-21 9:27	46.6886	-119.4916	15.43	5.71	–	–	< LOD	7.11	U	–
DU-042-017	43	2015-07-21 9:25	46.6886	-119.4906	17.78	4.11	–	–	< LOD	4.87	U	–
DU-042-018	48	2015-07-21 9:37	46.6892	-119.4939	15.97	3.99	–	–	< LOD	4.60	U	–
DU-042-019	49	2015-07-21 9:40	46.6892	-119.4929	14.17	4.89	–	–	< LOD	5.99	U	–
DU-042-020	50	2015-07-21 9:42	46.6892	-119.4921	14.64	3.97	–	–	< LOD	4.82	U	–
DU-042-021	63	2015-07-21 10:15	46.6894	-119.4910	137.05	9.66	Q	J	< LOD	11.08	U	–
DU-042-022	65	2015-07-21 10:19	46.6893	-119.4900	20.07	3.59	Q	J	< LOD	4.19	U	–
DU-042-023	71	2015-07-21 10:37	46.6898	-119.4944	16.86	4.19	Q	J	< LOD	4.99	U	–
DU-042-024	68	2015-07-21 10:28	46.6898	-119.4935	24.46	3.82	Q	J	< LOD	4.48	U	–
DU-042-025	67	2015-07-21 10:25	46.6898	-119.4926	13.94	4.17	Q	J	< LOD	4.98	U	–
DU-042-026	66	2015-07-21 10:22	46.6895	-119.4913	40.88	5.51	Q	J	7.74	4.45	–	–
DU-042-027	62	2015-07-21 10:07	46.6899	-119.4905	31.65	4.57	Q	J	7.20	3.69	–	–
DU-042-028	72	2015-07-21 10:39	46.6904	-119.4939	15.18	3.59	Q	J	< LOD	4.32	U	–
DU-042-029	73	2015-07-21 10:42	46.6904	-119.4928	18.14	4.46	Q	J	< LOD	5.29	U	–
DU-042-030	74	2015-07-21 10:44	46.6904	-119.4920	86.34	6.29	Q	J	10.69	4.94	–	–
DU-042-031	75	2015-07-21 10:47	46.6903	-119.4909	124.28	10.39	Q	J	< LOD	11.87	U	–
DU-042-032	76	2015-07-21 10:51	46.6904	-119.4900	17.62	4.17	–	–	< LOD	4.90	U	–
DU-043-001	79	2015-07-17 9:28	46.6837	-119.4946	19.48	3.51	–	–	< LOD	4.15	U	–
DU-043-002	78	2015-07-17 9:25	46.6837	-119.4936	17.77	3.20	–	–	5.08	2.57	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-043-003	77	2015-07-17 9:23	46.6837	-119.4926	19.03	3.38	–	–	< LOD	3.93	U	–
DU-043-004	74	2015-07-17 9:16	46.6837	-119.4916	39.31	4.40	–	–	9.23	3.56	–	–
DU-043-005	73	2015-07-17 9:13	46.6837	-119.4907	53.56	4.44	–	–	10.58	3.55	–	–
DU-043-006	72	2015-07-17 9:11	46.6837	-119.4897	16.54	3.29	–	–	< LOD	3.94	U	–
DU-043-007	67	2015-07-17 9:00	46.6843	-119.4941	11.84	3.00	–	–	4.16	2.42	–	–
DU-043-008	68	2015-07-17 9:02	46.6843	-119.4931	16.15	3.11	–	–	4.09	2.47	–	–
DU-043-009	69	2015-07-17 9:04	46.6843	-119.4921	26.36	3.66	–	–	5.28	2.91	–	–
DU-043-010	70	2015-07-17 9:07	46.6843	-119.4912	69.31	4.64	–	–	9.48	3.64	–	–
DU-043-011	71	2015-07-17 9:09	46.6843	-119.4902	19.43	3.24	–	–	< LOD	3.80	U	–
DU-043-012	66	2015-07-17 8:57	46.6849	-119.4946	13.02	2.93	–	–	< LOD	3.48	U	–
DU-043-013	65	2015-07-17 8:55	46.6849	-119.4936	14.46	3.04	–	–	< LOD	3.59	U	–
DU-043-014	64	2015-07-17 8:52	46.6849	-119.4926	15.66	3.37	–	–	4.78	2.73	–	–
DU-043-015	63	2015-07-17 8:50	46.6849	-119.4917	18.42	3.37	–	–	< LOD	3.99	U	–
DU-043-016	62	2015-07-17 8:48	46.6848	-119.4906	26.36	3.51	–	–	< LOD	4.13	U	–
DU-043-017	53	2015-07-17 8:35	46.6849	-119.4896	16.92	3.18	–	–	< LOD	3.69	U	–
DU-043-018	48	2015-07-17 8:24	46.6856	-119.4941	15.21	3.17	–	–	< LOD	3.69	U	–
DU-043-019	49	2015-07-17 8:26	46.6855	-119.4932	14.07	2.98	–	–	< LOD	3.47	U	–
DU-043-020	50	2015-07-17 8:28	46.6855	-119.4922	10.34	2.85	–	–	< LOD	3.41	U	–
DU-043-021	51	2015-07-17 8:31	46.6855	-119.4912	20.02	3.26	–	–	4.02	2.57	–	–
DU-043-022	52	2015-07-17 8:33	46.6855	-119.4902	12.03	3.05	–	–	< LOD	3.66	U	–
DU-043-023	47	2015-07-17 8:21	46.6860	-119.4945	12.24	2.99	–	–	7.50	2.49	–	–
DU-043-024	46	2015-07-17 8:19	46.6860	-119.4935	12.51	3.05	–	–	< LOD	2.45	U	–
DU-043-025	45	2015-07-17 8:17	46.6861	-119.4926	16.16	3.15	–	–	< LOD	3.69	U	–
DU-043-026	44	2015-07-17 8:15	46.6860	-119.4917	10.11	2.98	–	–	< LOD	3.59	U	–
DU-043-027	43	2015-07-17 8:13	46.6861	-119.4906	27.73	3.51	–	–	4.53	2.77	–	–
DU-043-028	42	2015-07-17 8:10	46.6860	-119.4895	15.08	3.14	–	–	4.26	2.51	–	–
DU-043-029	36	2015-07-17 7:58	46.6867	-119.4941	12.45	2.93	–	–	< LOD	2.34	U	–
DU-043-030	38	2015-07-17 8:01	46.6868	-119.4928	14.35	3.74	–	–	< LOD	4.38	U	–
DU-043-031	39	2015-07-17 8:04	46.6868	-119.4921	15.57	3.13	–	–	< LOD	2.48	U	–
DU-043-032	40	2015-07-17 8:06	46.6867	-119.4911	16.91	3.49	–	–	4.98	2.82	–	–
DU-043-033	41	2015-07-17 8:08	46.6867	-119.4902	15.46	3.10	–	–	< LOD	3.61	U	–
DU-044-001	147	2015-09-02 14:49	46.6801	-119.4942	16.08	3.17	–	–	< LOD	3.70	U	–
DU-044-002	148	2015-09-02 14:51	46.6801	-119.4932	17.94	3.21	–	–	< LOD	3.79	U	–
DU-044-003	149	2015-09-02 14:53	46.6801	-119.4923	28.68	3.73	–	–	6.30	2.99	–	–
DU-044-004	150	2015-09-02 14:56	46.6800	-119.4913	12.55	3.10	–	–	4.25	2.51	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-044-005	151	2015-09-02 14:59	46.6801	-119.4904	21.83	3.30	–	–	5.29	2.63	–	–
DU-044-006	152	2015-09-02 15:02	46.6800	-119.4894	265.69	9.31	–	–	12.61	7.05	–	–
DU-044-007	146	2015-09-02 14:46	46.6807	-119.4947	11.20	2.94	–	–	< LOD	3.53	U	–
DU-044-008	145	2015-09-02 14:44	46.6807	-119.4938	20.23	3.34	–	–	5.81	2.70	–	–
DU-044-009	144	2015-09-02 14:42	46.6807	-119.4928	10.45	2.85	–	–	5.00	2.31	–	–
DU-044-010	143	2015-09-02 14:39	46.6806	-119.4918	11.01	3.03	–	–	4.59	2.47	–	–
DU-044-011	142	2015-09-02 14:37	46.6807	-119.4908	20.64	3.25	–	–	< LOD	3.84	U	–
DU-044-012	141	2015-09-02 14:34	46.6806	-119.4898	72.80	4.69	–	–	6.53	3.62	–	–
DU-044-013	134	2015-09-02 14:17	46.6813	-119.4942	11.39	2.90	–	–	< LOD	3.45	U	–
DU-044-014	135	2015-09-02 14:19	46.6812	-119.4932	10.35	2.77	–	–	3.99	2.23	–	–
DU-044-015	136	2015-09-02 14:22	46.6812	-119.4922	15.93	3.04	–	–	< LOD	3.58	U	–
DU-044-016	139	2015-09-02 14:29	46.6812	-119.4913	11.39	2.89	–	–	< LOD	2.30	U	–
DU-044-017	140	2015-09-02 14:32	46.6812	-119.4903	12.35	3.10	–	–	< LOD	3.72	U	–
DU-044-018	125	2015-09-02 14:01	46.6818	-119.4947	12.36	2.99	–	–	< LOD	3.53	U	–
DU-044-019	124	2015-09-02 13:58	46.6818	-119.4937	15.59	3.05	–	–	< LOD	3.54	U	–
DU-044-020	123	2015-09-02 13:56	46.6818	-119.4928	12.16	2.93	–	–	4.63	2.37	–	–
DU-044-021	122	2015-09-02 13:53	46.6818	-119.4917	20.71	3.36	–	–	< LOD	3.98	U	–
DU-044-022	121	2015-09-02 13:51	46.6818	-119.4908	13.64	2.97	–	–	< LOD	2.37	U	–
DU-044-023	120	2015-09-02 13:48	46.6817	-119.4899	31.64	3.72	–	–	< LOD	4.34	U	–
DU-044-024	115	2015-09-02 13:36	46.6825	-119.4941	14.75	2.97	–	–	< LOD	3.53	U	–
DU-044-025	116	2015-09-02 13:38	46.6823	-119.4932	16.06	2.97	–	–	< LOD	3.46	U	–
DU-044-026	117	2015-09-02 13:41	46.6824	-119.4922	13.58	2.97	–	–	< LOD	3.50	U	–
DU-044-027	118	2015-09-02 13:43	46.6823	-119.4913	13.63	3.12	–	–	6.46	2.56	–	–
DU-044-028	119	2015-09-02 13:46	46.6823	-119.4903	16.10	3.06	–	–	4.85	2.46	–	–
DU-044-029	114	2015-09-02 13:33	46.6830	-119.4947	23.87	3.34	–	–	< LOD	3.90	U	–
DU-044-030	113	2015-09-02 13:30	46.6830	-119.4937	12.03	3.07	–	–	< LOD	3.67	U	–
DU-044-031	112	2015-09-02 13:28	46.6830	-119.4928	14.87	3.04	–	–	< LOD	2.41	U	–
DU-044-032	111	2015-09-02 13:26	46.6830	-119.4917	29.47	3.62	–	–	< LOD	4.25	U	–
DU-044-033	110	2015-09-02 13:23	46.6830	-119.4908	18.18	3.21	–	–	< LOD	3.78	U	–
DU-044-034	108	2015-09-02 13:18	46.6829	-119.4899	11.83	2.95	–	–	4.49	2.39	–	–
DU-045-001	31	2015-07-01 8:37	46.6764	-119.4947	15.16	3.09	Z	–	< LOD	3.62	UZ	–
DU-045-002	32	2015-07-01 8:43	46.6764	-119.4936	13.37	3.13	Z	–	< LOD	3.70	UZ	–
DU-045-003	33	2015-07-01 8:47	46.6763	-119.4928	12.75	3.06	Z	–	< LOD	3.63	UZ	–
DU-045-004	34	2015-07-01 8:52	46.6762	-119.4917	11.96	3.14	Z	–	4.13	2.54	Z	–
DU-045-005	35	2015-07-01 8:55	46.6763	-119.4908	13.38	3.07	Z	–	< LOD	3.61	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-045-006	36	2015-07-01 8:58	46.6763	-119.4898	9.42	2.93	Z	–	4.62	2.38	Z	–
DU-045-007	42	2015-07-01 9:19	46.6769	-119.4942	13.99	3.01	Z	–	< LOD	3.58	UZ	–
DU-045-008	41	2015-07-01 9:16	46.6769	-119.4933	16.82	3.15	Z	–	< LOD	3.74	UZ	–
DU-045-009	40	2015-07-01 9:12	46.6768	-119.4923	11.90	3.15	Z	–	< LOD	3.74	UZ	–
DU-045-010	39	2015-07-01 9:09	46.6769	-119.4914	15.86	3.58	Z	–	< LOD	4.32	UZ	–
DU-045-011	38	2015-07-01 9:06	46.6769	-119.4903	16.38	3.43	Z	–	< LOD	4.11	UZ	–
DU-045-012	37	2015-07-01 9:02	46.6769	-119.4893	15.92	3.31	Z	–	< LOD	3.91	UZ	–
DU-045-013	43	2015-07-01 9:23	46.6775	-119.4947	20.62	3.70	Z	–	< LOD	4.29	UZ	–
DU-045-014	44	2015-07-01 9:28	46.6775	-119.4938	11.74	3.15	Z	–	< LOD	3.74	UZ	–
DU-045-015	45	2015-07-01 9:32	46.6775	-119.4927	14.32	3.38	Z	–	< LOD	4.02	UZ	–
DU-045-016	46	2015-07-01 9:35	46.6775	-119.4917	14.24	3.06	Z	–	4.78	2.47	Z	–
DU-045-017	47	2015-07-01 9:38	46.6775	-119.4908	19.77	3.27	Z	–	< LOD	3.84	UZ	–
DU-045-018	48	2015-07-01 9:41	46.6775	-119.4898	14.61	3.09	Z	–	4.78	2.49	Z	–
DU-045-019	69	2015-07-01 10:15	46.6781	-119.4940	11.53	3.02	–	–	< LOD	3.55	U	–
DU-045-020	68	2015-07-01 10:12	46.6780	-119.4931	17.49	3.57	–	–	5.38	2.90	–	–
DU-045-021	67	2015-07-01 10:10	46.6781	-119.4919	16.23	3.52	–	–	< LOD	4.25	U	–
DU-045-022	66	2015-07-01 10:07	46.6780	-119.4911	13.17	3.45	–	–	< LOD	4.20	U	–
DU-045-023	65	2015-07-01 10:04	46.6780	-119.4902	14.25	3.65	–	–	< LOD	4.36	U	–
DU-045-024	64	2015-07-01 10:01	46.6780	-119.4894	18.23	3.81	–	–	< LOD	4.44	U	–
DU-045-025	70	2015-07-01 10:17	46.6786	-119.4945	14.71	3.09	–	–	< LOD	3.62	U	–
DU-045-026	71	2015-07-01 10:20	46.6786	-119.4939	11.20	3.16	–	–	< LOD	3.79	U	–
DU-045-027	72	2015-07-01 10:22	46.6785	-119.4929	27.30	3.87	–	–	< LOD	4.61	U	–
DU-045-028	73	2015-07-01 10:25	46.6785	-119.4920	14.01	3.50	–	–	< LOD	4.23	U	–
DU-045-029	74	2015-07-01 10:28	46.6786	-119.4909	15.60	3.34	–	–	< LOD	3.92	U	–
DU-045-030	75	2015-07-01 10:31	46.6786	-119.4901	18.87	3.39	–	–	< LOD	3.97	U	–
DU-045-031	81	2015-07-01 10:47	46.6792	-119.4941	15.43	3.09	–	–	4.20	2.47	–	–
DU-045-032	80	2015-07-01 10:45	46.6792	-119.4931	15.83	3.35	–	–	< LOD	3.92	U	–
DU-045-033	79	2015-07-01 10:42	46.6793	-119.4923	14.45	3.19	–	–	4.84	2.57	–	–
DU-045-034	78	2015-07-01 10:39	46.6792	-119.4911	18.51	3.80	–	–	< LOD	4.51	U	–
DU-045-035	77	2015-07-01 10:35	46.6791	-119.4902	19.05	4.23	–	–	< LOD	5.05	U	–
DU-045-036	76	2015-07-01 10:33	46.6791	-119.4894	15.70	3.21	–	–	5.04	2.59	–	–
DU-046-001	31	2015-08-18 8:00	46.6727	-119.4946	10.24	2.88	–	–	< LOD	3.36	U	–
DU-046-002	33	2015-08-18 8:03	46.6727	-119.4937	12.06	3.01	–	–	< LOD	3.57	U	–
DU-046-003	34	2015-08-18 8:05	46.6728	-119.4927	12.66	2.97	–	–	< LOD	3.55	U	–
DU-046-004	35	2015-08-18 8:07	46.6727	-119.4919	10.38	3.55	–	–	< LOD	4.22	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-046-005	36	2015-08-18 8:09	46.6727	-119.4909	14.62	3.05	–	–	< LOD	3.61	U	–
DU-046-006	37	2015-08-18 8:11	46.6727	-119.4900	11.36	2.99	–	–	< LOD	2.40	U	–
DU-046-007	43	2015-08-18 8:24	46.6733	-119.4942	13.07	3.06	–	–	4.76	2.46	–	–
DU-046-008	42	2015-08-18 8:22	46.6733	-119.4933	11.30	2.92	–	–	5.29	2.38	–	–
DU-046-009	41	2015-08-18 8:20	46.6733	-119.4924	13.66	3.12	–	–	< LOD	2.48	U	–
DU-046-010	40	2015-08-18 8:18	46.6732	-119.4914	10.81	3.01	–	–	4.07	2.43	–	–
DU-046-011	39	2015-08-18 8:15	46.6732	-119.4904	10.48	3.20	–	–	< LOD	3.84	U	–
DU-046-012	38	2015-08-18 8:13	46.6732	-119.4895	10.23	2.87	–	–	4.07	2.32	–	–
DU-046-013	44	2015-08-18 8:26	46.6739	-119.4946	13.15	3.25	–	–	< LOD	3.79	U	–
DU-046-014	45	2015-08-18 8:29	46.6738	-119.4936	11.18	2.97	–	–	< LOD	3.55	U	–
DU-046-015	46	2015-08-18 8:31	46.6738	-119.4927	12.28	2.99	–	–	< LOD	3.54	U	–
DU-046-016	47	2015-08-18 8:33	46.6738	-119.4918	11.05	2.84	–	–	< LOD	2.28	U	–
DU-046-017	48	2015-08-18 8:35	46.6738	-119.4909	13.10	2.98	–	–	< LOD	3.53	U	–
DU-046-018	49	2015-08-18 8:37	46.6738	-119.4899	13.61	3.08	–	–	< LOD	3.59	U	–
DU-046-019	65	2015-08-18 9:07	46.6744	-119.4942	11.84	3.27	–	–	< LOD	3.89	U	–
DU-046-020	64	2015-08-18 9:04	46.6743	-119.4932	10.95	2.92	–	–	4.24	2.37	–	–
DU-046-021	63	2015-08-18 9:02	46.6743	-119.4923	10.29	3.11	–	–	< LOD	3.70	U	–
DU-046-022	62	2015-08-18 9:00	46.6744	-119.4914	12.86	3.77	–	–	< LOD	4.50	U	–
DU-046-023	61	2015-08-18 8:58	46.6743	-119.4904	16.15	3.10	–	–	5.18	2.50	–	–
DU-046-024	60	2015-08-18 8:55	46.6743	-119.4894	10.47	2.99	–	–	< LOD	3.53	U	–
DU-046-025	66	2015-08-18 9:10	46.6749	-119.4946	10.52	2.88	–	–	< LOD	3.37	U	–
DU-046-026	67	2015-08-18 9:12	46.6750	-119.4936	15.21	3.09	–	–	< LOD	3.61	U	–
DU-046-027	68	2015-08-18 9:14	46.6749	-119.4927	11.94	3.58	–	–	< LOD	4.30	U	–
DU-046-028	69	2015-08-18 9:16	46.6749	-119.4917	12.41	3.48	–	–	< LOD	4.21	U	–
DU-046-029	70	2015-08-18 9:18	46.6749	-119.4908	11.37	3.10	–	–	4.67	2.51	–	–
DU-046-030	71	2015-08-18 9:20	46.6748	-119.4899	9.29	2.88	–	–	4.44	2.34	–	–
DU-046-031	77	2015-08-18 9:35	46.6755	-119.4941	10.68	3.15	–	–	< LOD	3.76	U	–
DU-046-032	76	2015-08-18 9:32	46.6755	-119.4932	11.54	3.06	–	–	< LOD	3.66	U	–
DU-046-033	75	2015-08-18 9:30	46.6754	-119.4923	13.53	3.46	–	–	< LOD	4.14	U	–
DU-046-034	74	2015-08-18 9:27	46.6755	-119.4914	11.16	3.25	–	–	< LOD	3.85	U	–
DU-046-035	73	2015-08-18 9:25	46.6754	-119.4904	12.09	2.91	–	–	< LOD	3.48	U	–
DU-046-036	72	2015-08-18 9:23	46.6754	-119.4895	12.16	2.93	–	–	< LOD	3.45	U	–
DU-047-001	134	2015-07-21 13:09	46.6873	-119.4888	14.73	5.10	–	–	< LOD	6.25	U	–
DU-047-002	133	2015-07-21 13:06	46.6872	-119.4877	18.63	3.58	–	–	< LOD	4.23	U	–
DU-047-003	132	2015-07-21 13:04	46.6872	-119.4868	22.73	4.64	–	–	< LOD	5.45	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-047-004	131	2015-07-21 13:01	46.6872	-119.4856	36.17	6.49	–	–	< LOD	7.78	U	–
DU-047-005	130	2015-07-21 12:59	46.6872	-119.4850	57.69	5.87	–	–	< LOD	6.83	U	–
DU-047-006	125	2015-07-21 12:45	46.6879	-119.4893	11.12	3.72	–	–	< LOD	4.52	U	–
DU-047-007	126	2015-07-21 12:48	46.6878	-119.4882	15.71	4.00	–	–	< LOD	4.69	U	–
DU-047-008	127	2015-07-21 12:50	46.6878	-119.4872	35.03	5.01	–	–	< LOD	5.93	U	–
DU-047-009	128	2015-07-21 12:54	46.6878	-119.4861	92.22	9.04	–	–	< LOD	10.42	U	–
DU-047-010	129	2015-07-21 12:56	46.6878	-119.4852	36.67	7.99	–	–	< LOD	9.43	U	–
DU-047-011	124	2015-07-21 12:42	46.6884	-119.4897	13.21	4.81	–	–	< LOD	5.88	U	–
DU-047-012	123	2015-07-21 12:39	46.6884	-119.4887	13.57	3.56	–	–	< LOD	4.28	U	–
DU-047-013	114	2015-07-21 12:24	46.6885	-119.4877	27.06	3.59	–	–	6.62	2.88	–	–
DU-047-014	113	2015-07-21 12:22	46.6884	-119.4866	40.53	5.90	–	–	< LOD	6.98	U	–
DU-047-015	112	2015-07-21 12:19	46.6884	-119.4856	23.40	4.41	–	–	< LOD	5.23	U	–
DU-047-016	111	2015-07-21 12:17	46.6884	-119.4849	21.07	5.45	–	–	< LOD	6.43	U	–
DU-047-017	106	2015-07-21 11:58	46.6891	-119.4892	16.66	4.25	–	–	< LOD	4.94	U	–
DU-047-018	107	2015-07-21 12:01	46.6890	-119.4881	21.01	5.45	–	–	< LOD	6.56	U	–
DU-047-019	108	2015-07-21 12:04	46.6891	-119.4872	83.34	6.66	–	–	13.62	5.30	–	–
DU-047-020	109	2015-07-21 12:12	46.6890	-119.4862	263.80	10.05	–	–	27.18	7.81	–	–
DU-047-021	110	2015-07-21 12:14	46.6890	-119.4852	116.82	9.21	–	–	18.89	7.38	–	–
DU-047-022	105	2015-07-21 11:55	46.6897	-119.4897	23.02	3.97	–	–	< LOD	4.73	U	–
DU-047-023	104	2015-07-21 11:50	46.6895	-119.4878	16.88	5.26	–	–	< LOD	6.21	U	–
DU-047-024	103	2015-07-21 11:46	46.6897	-119.4877	26.59	4.54	–	–	< LOD	5.43	U	–
DU-047-025	102	2015-07-21 11:44	46.6896	-119.4867	281.44	13.32	–	–	24.26	10.30	–	–
DU-047-026	101	2015-07-21 11:41	46.6896	-119.4857	115.95	6.86	–	–	13.99	5.38	–	–
DU-047-027	100	2015-07-21 11:38	46.6897	-119.4848	33.67	5.14	–	–	< LOD	5.95	U	–
DU-047-028	94	2015-07-21 11:23	46.6903	-119.4892	20.40	4.33	–	–	< LOD	5.03	U	–
DU-047-029	96	2015-07-21 11:28	46.6902	-119.4882	12.22	4.82	–	–	< LOD	6.04	U	–
DU-047-030	97	2015-07-21 11:31	46.6902	-119.4871	164.96	8.09	–	–	17.65	6.30	–	–
DU-047-031	98	2015-07-21 11:33	46.6902	-119.4861	299.89	13.51	–	–	< LOD	15.33	U	–
DU-047-032	99	2015-07-21 11:36	46.6902	-119.4851	123.08	8.19	–	–	< LOD	9.48	U	–
DU-048-001	136	2015-07-17 11:43	46.6835	-119.4889	13.17	3.03	–	–	< LOD	3.57	U	–
DU-048-002	135	2015-07-17 11:41	46.6835	-119.4878	21.73	3.39	–	–	< LOD	4.00	U	–
DU-048-003	132	2015-07-17 11:34	46.6836	-119.4868	16.66	3.15	–	–	4.12	2.50	–	–
DU-048-004	131	2015-07-17 11:31	46.6835	-119.4858	14.22	3.32	–	–	< LOD	3.95	U	–
DU-048-005	130	2015-07-17 11:29	46.6836	-119.4849	34.49	3.89	–	–	6.72	3.10	–	–
DU-048-006	124	2015-07-17 11:14	46.6842	-119.4893	20.27	3.41	–	–	< LOD	4.04	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-048-007	125	2015-07-17 11:16	46.6841	-119.4884	9.39	3.22	–	–	< LOD	2.61	U	–
DU-048-008	126	2015-07-17 11:18	46.6841	-119.4873	14.44	3.28	–	–	< LOD	3.90	U	–
DU-048-009	127	2015-07-17 11:21	46.6841	-119.4864	17.86	3.19	–	–	< LOD	2.52	U	–
DU-048-010	128	2015-07-17 11:23	46.6841	-119.4854	68.96	4.97	–	–	13.30	3.97	–	–
DU-048-011	129	2015-07-17 11:26	46.6841	-119.4845	20.00	4.85	–	–	< LOD	5.80	U	–
DU-048-012	123	2015-07-17 11:11	46.6847	-119.4888	13.17	3.46	–	–	< LOD	4.17	U	–
DU-048-013	122	2015-07-17 11:09	46.6847	-119.4879	16.67	3.40	–	–	< LOD	4.03	U	–
DU-048-014	121	2015-07-17 11:07	46.6847	-119.4868	18.43	3.36	–	–	< LOD	3.97	U	–
DU-048-015	120	2015-07-17 11:04	46.6848	-119.4859	17.53	3.19	–	–	4.55	2.54	–	–
DU-048-016	112	2015-07-17 10:53	46.6847	-119.4849	194.94	7.88	–	–	17.88	6.09	–	–
DU-048-017	106	2015-07-17 10:38	46.6853	-119.4894	12.58	3.16	–	–	< LOD	3.76	U	–
DU-048-018	107	2015-07-17 10:40	46.6853	-119.4884	16.18	3.43	–	–	< LOD	4.09	U	–
DU-048-019	108	2015-07-17 10:43	46.6853	-119.4875	17.06	3.20	–	–	< LOD	3.70	U	–
DU-048-020	109	2015-07-17 10:46	46.6854	-119.4864	12.26	3.10	–	–	4.59	2.51	–	–
DU-048-021	110	2015-07-17 10:48	46.6853	-119.4856	337.15	9.47	–	–	25.56	7.25	–	–
DU-048-022	111	2015-07-17 10:50	46.6852	-119.4844	108.29	6.06	–	–	10.97	4.70	–	–
DU-048-023	105	2015-07-17 10:36	46.6859	-119.4887	15.24	3.25	–	–	< LOD	3.88	U	–
DU-048-024	104	2015-07-17 10:33	46.6859	-119.4878	15.49	3.15	–	–	4.21	2.52	–	–
DU-048-025	103	2015-07-17 10:31	46.6859	-119.4868	14.52	3.24	–	–	< LOD	3.88	U	–
DU-048-026	102	2015-07-17 10:28	46.6858	-119.4858	48.73	4.86	–	–	7.00	3.84	–	–
DU-048-027	101	2015-07-17 10:26	46.6859	-119.4849	99.40	6.64	–	–	13.18	5.23	–	–
DU-048-028	94	2015-07-17 10:09	46.6866	-119.4895	12.57	3.50	–	–	4.81	2.86	–	–
DU-048-029	96	2015-07-17 10:13	46.6865	-119.4883	15.12	3.07	–	–	< LOD	2.45	U	–
DU-048-030	97	2015-07-17 10:16	46.6864	-119.4874	17.43	4.13	–	–	< LOD	4.87	U	–
DU-048-031	98	2015-07-17 10:18	46.6865	-119.4864	15.70	3.16	–	–	< LOD	3.71	U	–
DU-048-032	99	2015-07-17 10:21	46.6865	-119.4853	129.66	8.53	–	–	22.90	6.83	–	–
DU-048-033	100	2015-07-17 10:24	46.6865	-119.4843	40.54	4.25	–	–	5.84	3.34	–	–
DU-049-001	127	2015-09-14 11:39	46.6799	-119.4892	799.50	14.21	–	–	51.45	10.83	Q	J
DU-049-002	128	2015-09-14 11:42	46.6799	-119.4883	886.00	16.18	–	–	96.46	12.58	Q	J
DU-049-003	129	2015-09-14 11:44	46.6799	-119.4873	2316.80	24.89	–	–	272.68	19.43	Q	J
DU-049-004	130	2015-09-14 11:46	46.6799	-119.4864	393.49	10.51	–	–	45.53	8.20	Q	J
DU-049-005	87	2015-09-14 10:13	46.6799	-119.4853	146.02	7.59	–	–	< LOD	8.65	U	–
DU-049-006	89	2015-09-14 10:17	46.6799	-119.4844	72.66	5.29	–	–	7.31	4.11	–	–
DU-049-007	126	2015-09-14 11:37	46.6805	-119.4888	1398.23	20.12	–	–	100.06	15.38	Q	J
DU-049-008	125	2015-09-14 11:34	46.6805	-119.4878	1141.38	18.52	–	–	110.15	14.32	Q	J

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-049-009	124	2015-09-14 11:32	46.6805	-119.4868	190.75	7.10	–	–	< LOD	7.95	UQ	UJ
DU-049-010	123	2015-09-14 11:29	46.6805	-119.4859	546.33	13.89	–	–	76.86	10.96	Q	J
DU-049-011	90	2015-09-14 10:19	46.6804	-119.4849	201.35	7.48	–	–	26.01	5.87	–	
DU-049-012	118	2015-09-14 11:17	46.6811	-119.4892	424.62	12.14	–	–	36.20	9.33	Q	J
DU-049-013	119	2015-09-14 11:20	46.6811	-119.4883	415.77	10.43	–	–	29.81	7.98	Q	J
DU-049-014	120	2015-09-14 11:22	46.6810	-119.4873	609.59	13.11	–	–	68.66	10.21	Q	J
DU-049-015	121	2015-09-14 11:25	46.6810	-119.4864	1029.18	17.38	–	–	113.25	13.53	Q	J
DU-049-016	122	2015-09-14 11:27	46.6811	-119.4854	153.17	6.78	–	–	19.66	5.32	Q	J
DU-049-017	91	2015-09-14 10:22	46.6811	-119.4844	300.93	10.35	–	–	18.04	7.89	–	
DU-049-018	117	2015-09-14 11:15	46.6817	-119.4887	100.35	5.69	–	–	< LOD	6.48	UQ	UJ
DU-049-019	116	2015-09-14 11:13	46.6817	-119.4878	133.73	8.70	–	–	20.32	6.92	Q	J
DU-049-020	115	2015-09-14 11:10	46.6816	-119.4868	48.24	4.25	–	–	6.49	3.33	Q	J
DU-049-021	105	2015-09-14 10:53	46.6817	-119.4858	40.19	4.52	–	–	6.88	3.60	–	–
DU-049-022	92	2015-09-14 10:24	46.6817	-119.4849	20.83	3.38	–	–	4.26	2.69	–	–
DU-049-023	99	2015-09-14 10:41	46.6822	-119.4892	98.57	5.72	–	–	22.95	4.65	–	–
DU-049-024	101	2015-09-14 10:44	46.6822	-119.4882	114.68	5.88	–	–	8.18	4.50	–	–
DU-049-025	102	2015-09-14 10:46	46.6823	-119.4873	182.96	8.34	–	–	< LOD	9.51	U	–
DU-049-026	103	2015-09-14 10:48	46.6822	-119.4863	19.88	4.13	–	–	< LOD	5.02	U	–
DU-049-027	104	2015-09-14 10:50	46.6822	-119.4853	18.77	3.93	–	–	< LOD	4.65	U	–
DU-049-028	93	2015-09-14 10:27	46.6822	-119.4844	16.95	3.46	–	–	5.37	2.82	–	–
DU-049-029	98	2015-09-14 10:39	46.6828	-119.4887	104.70	6.33	–	–	14.23	4.98	–	–
DU-049-030	97	2015-09-14 10:37	46.6828	-119.4877	97.35	5.87	–	–	8.61	4.54	–	–
DU-049-031	96	2015-09-14 10:34	46.6827	-119.4868	45.19	4.32	–	–	6.84	3.40	–	–
DU-049-032	95	2015-09-14 10:32	46.6827	-119.4858	16.46	3.21	–	–	4.04	2.56	–	–
DU-049-033	94	2015-09-14 10:30	46.6828	-119.4849	18.39	3.36	–	–	< LOD	3.97	U	–
DU-050-001	74	2015-07-16 10:22	46.6759	-119.4889	17.64	3.39	–	–	< LOD	4.04	U	–
DU-050-002	73	2015-07-16 10:20	46.6759	-119.4879	13.60	3.68	–	–	< LOD	4.38	U	–
DU-050-003	72	2015-07-16 10:17	46.6759	-119.4869	13.29	3.65	–	–	< LOD	4.45	U	–
DU-050-004	71	2015-07-16 10:15	46.6759	-119.4859	21.87	3.78	–	–	< LOD	4.48	U	–
DU-050-005	70	2015-07-16 10:13	46.6760	-119.4850	12.06	4.79	–	–	< LOD	5.95	U	–
DU-050-006	65	2015-07-16 10:00	46.6766	-119.4885	13.55	5.27	–	–	< LOD	6.50	U	–
DU-050-007	66	2015-07-16 10:03	46.6766	-119.4875	8.72	3.25	–	–	< LOD	3.97	U	–
DU-050-008	67	2015-07-16 10:05	46.6765	-119.4866	12.15	4.23	–	–	< LOD	5.16	U	–
DU-050-009	68	2015-07-16 10:08	46.6765	-119.4854	15.36	3.55	–	–	< LOD	4.25	U	–
DU-050-010	69	2015-07-16 10:10	46.6765	-119.4845	13.94	4.73	–	–	6.02	3.95	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-050-011	64	2015-07-16 9:58	46.6772	-119.4887	13.49	3.00	–	–	4.88	2.43	–	–
DU-050-012	63	2015-07-16 9:56	46.6771	-119.4878	12.50	3.12	–	–	4.82	2.53	–	–
DU-050-013	62	2015-07-16 9:53	46.6771	-119.4869	14.92	3.34	–	–	< LOD	3.97	U	–
DU-050-014	61	2015-07-16 9:51	46.6772	-119.4859	19.46	4.83	–	–	< LOD	5.74	U	–
DU-050-015	53	2015-07-16 9:37	46.6772	-119.4850	17.70	4.60	–	–	< LOD	5.43	U	–
DU-050-016	48	2015-07-16 9:23	46.6779	-119.4884	17.27	3.33	–	–	< LOD	3.95	U	–
DU-050-017	49	2015-07-16 9:25	46.6777	-119.4876	12.27	3.98	–	–	< LOD	4.84	U	–
DU-050-018	50	2015-07-16 9:27	46.6776	-119.4865	16.49	3.51	–	–	< LOD	4.13	U	–
DU-050-019	51	2015-07-16 9:30	46.6777	-119.4853	14.04	3.36	–	–	< LOD	3.93	U	–
DU-050-020	52	2015-07-16 9:33	46.6777	-119.4845	12.90	3.06	–	–	< LOD	3.62	U	–
DU-050-021	47	2015-07-16 9:21	46.6783	-119.4887	18.61	3.53	–	–	< LOD	4.18	U	–
DU-050-022	46	2015-07-16 9:18	46.6782	-119.4879	12.54	3.94	–	–	4.98	3.24	–	–
DU-050-023	45	2015-07-16 9:16	46.6783	-119.4868	18.66	3.30	–	–	< LOD	3.91	U	–
DU-050-024	44	2015-07-16 9:14	46.6783	-119.4858	32.03	4.07	–	–	< LOD	4.76	U	–
DU-050-025	43	2015-07-16 9:12	46.6784	-119.4850	18.24	3.30	–	–	4.49	2.64	–	–
DU-050-026	38	2015-07-16 8:59	46.6790	-119.4885	14.52	3.41	–	–	4.31	2.75	–	–
DU-050-027	39	2015-07-16 9:01	46.6789	-119.4875	26.80	3.89	–	–	5.18	3.09	–	–
DU-050-028	40	2015-07-16 9:04	46.6788	-119.4864	24.61	3.85	–	–	< LOD	4.55	U	–
DU-050-029	41	2015-07-16 9:06	46.6788	-119.4855	10.48	3.72	–	–	< LOD	4.55	U	–
DU-050-030	42	2015-07-16 9:09	46.6788	-119.4844	15.33	3.46	–	–	< LOD	4.12	U	–
DU-050-031	37	2015-07-16 8:56	46.6794	-119.4890	17.27	3.97	–	–	6.53	3.28	–	–
DU-050-032	36	2015-07-16 8:53	46.6795	-119.4877	35.66	6.12	–	–	< LOD	7.03	U	–
DU-050-033	34	2015-07-16 8:48	46.6794	-119.4868	28.23	5.11	–	–	< LOD	5.97	U	–
DU-051-001	88	2015-07-16 11:09	46.6726	-119.4890	12.57	3.03	Z	–	< LOD	2.42	UZ	–
DU-051-002	87	2015-07-16 11:07	46.6727	-119.4881	18.87	3.76	Z	–	< LOD	4.51	UZ	–
DU-051-003	86	2015-07-16 11:04	46.6725	-119.4872	13.60	4.05	Z	–	< LOD	4.82	UZ	–
DU-051-004	85	2015-07-16 11:02	46.6725	-119.4862	13.82	3.18	Z	–	< LOD	3.75	UZ	–
DU-051-005	84	2015-07-16 10:57	46.6725	-119.4852	21.04	6.42	Z	–	< LOD	7.39	UZ	–
DU-051-006	82	2015-07-16 10:52	46.6726	-119.4844	18.08	3.75	Z	–	< LOD	4.49	UZ	–
DU-051-007	89	2015-07-16 11:12	46.6731	-119.4887	25.48	4.21	Z	–	< LOD	4.89	UZ	–
DU-051-008	90	2015-07-16 11:14	46.6731	-119.4879	18.53	4.07	Z	–	< LOD	4.79	UZ	–
DU-051-009	91	2015-07-16 11:17	46.6731	-119.4869	21.39	7.64	Z	–	< LOD	9.18	UZ	–
DU-051-010	92	2015-07-16 11:19	46.6731	-119.4859	10.71	2.89	Z	–	< LOD	3.44	UZ	–
DU-051-011	93	2015-07-16 11:23	46.6732	-119.4849	9.55	3.49	Z	–	< LOD	4.24	UZ	–
DU-051-012	99	2015-07-16 11:41	46.6737	-119.4891	11.94	3.17	Z	–	< LOD	3.76	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-051-013	98	2015-07-16 11:38	46.6738	-119.4881	20.80	5.62	Z	–	< LOD	6.69	UZ	–
DU-051-014	97	2015-07-16 11:36	46.6738	-119.4872	18.94	5.02	Z	–	< LOD	6.00	UZ	–
DU-051-015	96	2015-07-16 11:31	46.6737	-119.4862	18.07	4.11	Z	–	< LOD	4.90	UZ	–
DU-051-016	95	2015-07-16 11:28	46.6737	-119.4851	14.94	3.52	Z	–	< LOD	4.16	UZ	–
DU-051-017	94	2015-07-16 11:25	46.6737	-119.4843	11.68	3.29	Z	–	4.00	2.66	Z	–
DU-051-018	100	2015-07-16 11:43	46.6743	-119.4887	13.63	3.20	Z	–	< LOD	3.76	UZ	–
DU-051-019	108	2015-07-16 11:58	46.6744	-119.4877	15.82	6.40	–	–	< LOD	7.94	U	–
DU-051-020	109	2015-07-16 12:01	46.6743	-119.4867	22.31	6.16	–	–	< LOD	7.35	U	–
DU-051-021	110	2015-07-16 12:04	46.6745	-119.4857	17.23	4.77	–	–	< LOD	5.77	U	–
DU-051-022	111	2015-07-16 12:06	46.6743	-119.4849	10.15	3.37	–	–	5.61	2.81	–	–
DU-051-023	117	2015-07-16 12:21	46.6749	-119.4892	14.93	4.28	–	–	< LOD	5.13	U	–
DU-051-024	116	2015-07-16 12:18	46.6750	-119.4881	9.23	3.69	–	–	5.20	3.08	–	–
DU-051-025	115	2015-07-16 12:16	46.6750	-119.4871	14.83	3.27	–	–	< LOD	3.88	U	–
DU-051-026	114	2015-07-16 12:14	46.6750	-119.4861	11.36	3.30	–	–	6.06	2.73	–	–
DU-051-027	113	2015-07-16 12:11	46.6749	-119.4852	14.75	6.94	–	–	< LOD	8.57	U	–
DU-051-028	112	2015-07-16 12:09	46.6749	-119.4843	12.79	3.26	–	–	< LOD	3.81	U	–
DU-051-029	118	2015-07-16 12:24	46.6756	-119.4887	13.19	3.50	–	–	< LOD	4.23	U	–
DU-051-030	119	2015-07-16 12:26	46.6756	-119.4878	11.91	3.03	–	–	5.98	2.49	–	–
DU-051-031	120	2015-07-16 12:29	46.6755	-119.4868	9.86	3.26	–	–	4.45	2.65	–	–
DU-051-032	121	2015-07-16 12:31	46.6756	-119.4858	19.14	3.82	–	–	5.39	3.10		–
DU-051-033	122	2015-07-16 12:34	46.6755	-119.4848	21.28	3.71	–	–	< LOD	4.40	U	–
DU-052-001	31	2015-09-28 8:57	46.6842	-119.4813	13.79	2.95	–	–	< LOD	2.35	U	–
DU-052-002	33	2015-09-28 9:02	46.6842	-119.4802	23.73	3.36	–	–	4.46	2.65		–
DU-052-003	34	2015-09-28 9:05	46.6842	-119.4792	50.92	4.35	–	–	7.23	3.43		–
DU-052-004	36	2015-09-28 9:11	46.6847	-119.4808	14.90	2.99	–	–	< LOD	3.57	U	–
DU-052-005	35	2015-09-28 9:07	46.6848	-119.4797	39.24	3.96	–	–	< LOD	4.45	U	–
DU-052-006	42	2015-09-28 9:32	46.6854	-119.4843	20.68	3.25	–	–	5.28	2.59		–
DU-052-007	41	2015-09-28 9:29	46.6854	-119.4833	47.91	4.50	–	–	8.06	3.57		–
DU-052-008	40	2015-09-28 9:27	46.6854	-119.4822	14.17	3.36	–	–	4.22	2.70		–
DU-052-009	39	2015-09-28 9:24	46.6854	-119.4812	233.18	7.80	–	–	14.03	5.93		–
DU-052-010	38	2015-09-28 9:21	46.6854	-119.4801	28.05	3.55	–	–	4.50	2.79		–
DU-052-011	37	2015-09-28 9:18	46.6854	-119.4791	14.95	3.18	–	–	5.38	2.58		–
DU-052-012	43	2015-09-28 9:34	46.6861	-119.4838	26.16	3.69	–	–	< LOD	4.38	U	–
DU-052-013	44	2015-09-28 9:37	46.6860	-119.4827	19.01	3.40	–	–	4.57	2.72		–
DU-052-014	45	2015-09-28 9:39	46.6860	-119.4817	1481.82	20.69	–	–	166.03	16.12		–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-052-015	46	2015-09-28 9:43	46.6860	-119.4806	87.51	5.67	–	–	< LOD	6.44	U	–
DU-052-016	47	2015-09-28 9:46	46.6860	-119.4796	17.40	3.15	–	–	6.00	2.56	–	–
DU-052-017	63	2015-09-28 10:19	46.6867	-119.4843	28.66	3.96	–	–	< LOD	4.57	U	–
DU-052-018	62	2015-09-28 10:17	46.6867	-119.4832	13.79	3.27	–	–	4.64	2.65	–	–
DU-052-019	61	2015-09-28 10:14	46.6866	-119.4822	17.25	3.29	–	–	< LOD	3.90	U	–
DU-052-020	60	2015-09-28 10:11	46.6866	-119.4811	40.93	4.29	–	–	< LOD	5.02	U	–
DU-052-021	59	2015-09-28 10:09	46.6866	-119.4801	38.41	4.25	–	–	< LOD	4.93	U	–
DU-052-022	58	2015-09-28 10:06	46.6866	-119.4791	26.71	3.92	–	–	< LOD	4.62	U	–
DU-052-023	64	2015-09-28 10:22	46.6873	-119.4837	63.19	5.19	–	–	< LOD	5.97	U	–
DU-052-024	65	2015-09-28 10:25	46.6872	-119.4827	124.47	6.68	–	–	14.85	5.22	–	–
DU-052-025	66	2015-09-28 10:28	46.6872	-119.4817	122.28	6.42	–	–	11.96	4.98	–	–
DU-052-026	70	2015-09-28 10:38	46.6879	-119.4843	173.19	7.28	–	–	11.06	5.56	–	–
DU-052-027	69	2015-09-28 10:35	46.6879	-119.4833	168.20	7.63	–	–	30.52	6.11	–	–
DU-052-028	68	2015-09-28 10:33	46.6879	-119.4822	343.12	9.70	–	–	25.84	7.44	–	–
DU-052-029	67	2015-09-28 10:30	46.6879	-119.4812	13.83	3.33	–	–	< LOD	3.94	U	–
DU-052-030	71	2015-09-28 10:41	46.6885	-119.4837	28.61	4.43	–	–	< LOD	5.33	U	–
DU-052-031	72	2015-09-28 10:43	46.6885	-119.4827	51.80	4.22	–	–	6.57	3.30	–	–
DU-052-032	73	2015-09-28 10:46	46.6885	-119.4816	24.21	4.18	–	–	< LOD	5.01	U	–
DU-053-001	120	2015-08-13 11:06	46.6871	-119.4789	114.77	5.81	–	–	20.97	4.64	–	–
DU-053-002	121	2015-08-13 11:09	46.6870	-119.4781	287.83	8.85	–	–	11.95	6.68	–	–
DU-053-003	122	2015-08-13 11:11	46.6870	-119.4770	15.55	3.14	–	–	7.36	2.59	–	–
DU-053-004	123	2015-08-13 11:14	46.6871	-119.4759	12.77	3.07	–	–	< LOD	3.71	U	–
DU-053-005	124	2015-08-13 11:16	46.6870	-119.4749	16.40	3.90	–	–	< LOD	4.64	U	–
DU-053-006	125	2015-08-13 11:19	46.6870	-119.4740	19.06	3.48	–	–	4.40	2.78	–	–
DU-053-007	119	2015-08-13 11:04	46.6877	-119.4784	31.87	3.98	–	–	6.17	3.18	–	–
DU-053-008	118	2015-08-13 11:02	46.6877	-119.4773	197.43	7.59	–	–	18.48	5.87	–	–
DU-053-009	117	2015-08-13 11:00	46.6877	-119.4764	19.48	3.64	–	–	4.90	2.93	–	–
DU-053-010	116	2015-08-13 10:57	46.6877	-119.4754	12.07	3.03	–	–	< LOD	2.44	U	–
DU-053-011	115	2015-08-13 10:55	46.6877	-119.4745	22.17	3.53	–	–	< LOD	4.20	U	–
DU-053-012	105	2015-08-13 10:37	46.6883	-119.4759	20.17	3.19	–	–	4.74	2.55	–	–
DU-053-013	106	2015-08-13 10:40	46.6882	-119.4749	23.92	3.80	–	–	< LOD	4.46	U	–
DU-053-014	107	2015-08-13 10:42	46.6882	-119.4741	9.23	3.07	–	–	< LOD	2.50	U	–
DU-053-015	104	2015-08-13 10:35	46.6888	-119.4763	2235.01	25.33	–	–	160.76	19.36	–	–
DU-053-016	103	2015-08-13 10:33	46.6888	-119.4754	71.77	4.82	–	–	< LOD	5.51	U	–
DU-053-017	102	2015-08-13 10:30	46.6888	-119.4744	742.10	15.10	–	–	68.43	11.66	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-053-018	100	2015-08-13 10:26	46.6895	-119.4759	39.79	4.13	–	–	9.47	3.34	–	–
DU-053-019	101	2015-08-13 10:28	46.6894	-119.4749	335.73	9.25	–	–	24.39	7.08	–	–
DU-053-020	99	2015-08-13 10:24	46.6900	-119.4764	731.75	17.20	–	–	65.71	13.27	–	–
DU-053-021	98	2015-08-13 10:21	46.6900	-119.4753	73.11	4.98	–	–	< LOD	5.64	U	–
DU-053-022	88	2015-08-13 10:07	46.6900	-119.4744	241.88	10.20	–	–	22.23	7.90	–	–
DU-054-001	99	2015-09-30 11:42	46.6835	-119.4788	29.95	3.65	–	–	4.32	2.87	–	–
DU-054-002	101	2015-09-30 11:46	46.6835	-119.4779	15.28	3.10	–	–	< LOD	3.67	U	–
DU-054-003	102	2015-09-30 11:50	46.6835	-119.4769	211.20	7.35	–	–	33.28	5.83	–	–
DU-054-004	103	2015-09-30 11:52	46.6835	-119.4759	31.20	4.07	–	–	< LOD	4.81	U	–
DU-054-005	104	2015-09-30 11:54	46.6835	-119.4749	31.87	3.68	–	–	7.95	2.97	–	–
DU-054-006	105	2015-09-30 11:56	46.6835	-119.4739	20.10	3.30	–	–	4.19	2.62	–	–
DU-054-007	110	2015-09-30 12:11	46.6841	-119.4783	18.14	4.25	–	–	< LOD	5.14	U	–
DU-054-008	109	2015-09-30 12:09	46.6841	-119.4773	634.18	13.16	–	–	72.32	10.26	–	–
DU-054-009	108	2015-09-30 12:07	46.6841	-119.4763	311.91	9.53	–	–	19.53	7.27	–	–
DU-054-010	107	2015-09-30 12:01	46.6841	-119.4753	21.94	3.26	–	–	< LOD	3.84	U	–
DU-054-011	106	2015-09-30 11:58	46.6841	-119.4744	15.50	3.71	–	–	< LOD	4.39	U	–
DU-054-012	111	2015-09-30 12:14	46.6847	-119.4788	14.19	3.35	–	–	4.61	2.74	–	–
DU-054-013	112	2015-09-30 12:18	46.6847	-119.4778	336.61	9.23	–	–	57.51	7.36	–	–
DU-054-014	113	2015-09-30 12:20	46.6847	-119.4768	783.92	14.42	–	–	90.18	11.24	–	–
DU-054-015	114	2015-09-30 12:22	46.6847	-119.4758	25.08	3.71	–	–	< LOD	4.39	U	–
DU-054-016	115	2015-09-30 12:25	46.6847	-119.4748	27.79	3.67	–	–	4.98	2.90	–	–
DU-054-017	123	2015-09-30 12:39	46.6847	-119.4738	15.96	4.34	–	–	< LOD	5.15	U	–
DU-054-018	128	2015-09-30 12:51	46.6853	-119.4783	15.70	3.00	–	–	< LOD	3.55	U	–
DU-054-019	127	2015-09-30 12:49	46.6853	-119.4773	58.66	5.85	–	–	8.92	4.66	–	–
DU-054-020	126	2015-09-30 12:46	46.6853	-119.4763	108.25	5.56	–	–	15.53	4.38	–	–
DU-054-021	125	2015-09-30 12:43	46.6853	-119.4753	48.92	3.98	–	–	7.24	3.14	–	–
DU-054-022	124	2015-09-30 12:41	46.6853	-119.4743	149.33	6.41	–	–	8.42	4.88	–	–
DU-054-023	129	2015-09-30 12:54	46.6859	-119.4788	24.00	3.57	–	–	7.03	2.89	–	–
DU-054-024	130	2015-09-30 12:56	46.6859	-119.4778	268.13	8.58	–	–	20.91	6.59	–	–
DU-054-025	131	2015-09-30 12:58	46.6859	-119.4768	28.12	3.76	–	–	7.36	3.06	–	–
DU-054-026	132	2015-09-30 13:00	46.6859	-119.4758	22.65	3.57	–	–	< LOD	4.18	U	–
DU-054-027	133	2015-09-30 13:03	46.6859	-119.4748	< LOD	2.48	U	–	< LOD	2.97	U	–
DU-054-028	138	2015-09-30 13:21	46.6865	-119.4783	49.87	4.28	–	–	7.82	3.38	–	–
DU-054-029	137	2015-09-30 13:18	46.6865	-119.4773	27.73	3.84	–	–	10.11	3.18	–	–
DU-054-030	136	2015-09-30 13:15	46.6865	-119.4763	21.81	3.54	–	–	5.36	2.85	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-054-031	135	2015-09-30 13:09	46.6865	-119.4753	15.71	3.04	–	–	< LOD	2.43	U	–
DU-054-032	134	2015-09-30 13:05	46.6864	-119.4743	11.24	3.26	–	–	4.55	2.67	–	–
DU-055-001	33	2015-08-13 7:43	46.6797	-119.4835	42.74	4.07	–	–	< LOD	4.68	U	–
DU-055-002	35	2015-08-13 7:46	46.6796	-119.4827	38.87	3.96	–	–	5.41	3.11	–	–
DU-055-003	36	2015-08-13 7:48	46.6796	-119.4815	13.12	3.01	–	–	4.09	2.42	–	–
DU-055-004	37	2015-08-13 7:50	46.6796	-119.4807	19.85	3.28	–	–	5.62	2.65	–	–
DU-055-005	38	2015-08-13 7:53	46.6796	-119.4796	21.47	3.56	–	–	< LOD	4.21	U	–
DU-055-006	44	2015-08-13 8:05	46.6802	-119.4840	12.96	3.15	–	–	< LOD	3.78	U	–
DU-055-007	43	2015-08-13 8:03	46.6802	-119.4829	25.70	3.57	–	–	< LOD	4.17	U	–
DU-055-008	42	2015-08-13 8:01	46.6802	-119.4819	13.46	3.29	–	–	5.04	2.70	–	–
DU-055-009	41	2015-08-13 7:59	46.6802	-119.4809	18.17	3.24	–	–	< LOD	3.80	U	–
DU-055-010	40	2015-08-13 7:57	46.6802	-119.4799	17.18	3.30	–	–	< LOD	3.80	U	–
DU-055-011	39	2015-08-13 7:55	46.6802	-119.4790	10.44	2.88	–	–	4.19	2.32	–	–
DU-055-012	45	2015-08-13 8:07	46.6809	-119.4834	18.45	3.44	–	–	< LOD	4.07	U	–
DU-055-013	46	2015-08-13 8:09	46.6809	-119.4824	17.67	3.15	–	–	4.05	2.50	–	–
DU-055-014	47	2015-08-13 8:11	46.6808	-119.4814	18.80	3.11	–	–	< LOD	3.57	U	–
DU-055-015	49	2015-08-13 8:15	46.6809	-119.4805	15.96	3.09	–	–	< LOD	3.64	U	–
DU-055-016	51	2015-08-13 8:20	46.6808	-119.4796	11.12	2.98	–	–	< LOD	3.58	U	–
DU-055-017	48	2015-08-13 8:13	46.6815	-119.4809	14.72	3.04	–	–	< LOD	3.64	U	–
DU-055-018	50	2015-08-13 8:17	46.6815	-119.4799	20.57	3.33	–	–	< LOD	3.96	U	–
DU-055-019	52	2015-08-13 8:22	46.6814	-119.4789	19.58	3.20	–	–	< LOD	3.74	U	–
DU-055-020	53	2015-08-13 8:24	46.6814	-119.4780	11.17	3.15	–	–	4.47	2.57	–	–
DU-055-021	61	2015-08-13 8:35	46.6813	-119.4770	76.81	4.91	–	–	9.45	3.83	–	–
DU-055-022	62	2015-08-13 8:37	46.6814	-119.4759	332.95	9.44	–	–	31.13	7.29	–	–
DU-055-023	63	2015-08-13 8:40	46.6813	-119.4750	90.41	5.25	–	–	8.97	4.07	–	–
DU-055-024	64	2015-08-13 8:42	46.6813	-119.4740	120.46	6.08	–	–	12.84	4.73	–	–
DU-055-025	80	2015-08-13 9:17	46.6820	-119.4815	10.42	3.68	–	–	< LOD	4.42	U	–
DU-055-026	78	2015-08-13 9:12	46.6820	-119.4805	16.79	3.29	–	–	< LOD	3.92	U	–
DU-055-027	76	2015-08-13 9:08	46.6820	-119.4795	29.97	3.71	–	–	< LOD	4.34	U	–
DU-055-028	74	2015-08-13 9:04	46.6820	-119.4785	13.57	3.42	–	–	< LOD	4.08	U	–
DU-055-029	72	2015-08-13 8:59	46.6820	-119.4775	15.05	3.78	–	–	5.39	3.09	–	–
DU-055-030	70	2015-08-13 8:55	46.6820	-119.4764	36.90	3.84	–	–	5.92	3.04	–	–
DU-055-031	68	2015-08-13 8:51	46.6820	-119.4754	230.56	8.48	–	–	< LOD	9.45	U	–
DU-055-032	65	2015-08-13 8:44	46.6820	-119.4745	304.74	9.86	–	–	32.02	7.66	–	–
DU-055-033	79	2015-08-13 9:15	46.6825	-119.4810	11.26	3.00	–	–	4.06	2.42	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-055-034	77	2015-08-13 9:10	46.6826	-119.4800	16.52	3.91	–	–	< LOD	4.59	U	–
DU-055-035	75	2015-08-13 9:06	46.6825	-119.4789	16.46	3.33	–	–	< LOD	3.86	U	–
DU-055-036	73	2015-08-13 9:01	46.6826	-119.4780	11.29	3.04	–	–	< LOD	3.64	U	–
DU-055-037	71	2015-08-13 8:57	46.6825	-119.4770	25.26	3.71	–	–	< LOD	4.26	U	–
DU-055-038	69	2015-08-13 8:53	46.6825	-119.4759	355.14	10.40	–	–	22.07	7.92	–	–
DU-055-039	67	2015-08-13 8:49	46.6825	-119.4750	176.33	7.53	–	–	10.13	5.74	–	–
DU-055-040	66	2015-08-13 8:46	46.6826	-119.4739	151.76	6.69	–	–	18.86	5.24	–	–
DU-056-001	69	2015-08-31 8:55	46.6779	-119.4761	31.47	3.55	–	–	4.40	2.79	–	–
DU-056-002	67	2015-08-31 8:52	46.6778	-119.4751	16.31	3.23	–	–	< LOD	3.84	U	–
DU-056-003	65	2015-08-31 8:49	46.6779	-119.4741	13.10	2.94	–	–	4.16	2.37	–	–
DU-056-004	70	2015-08-31 8:57	46.6785	-119.4756	16.12	3.22	–	–	< LOD	3.75	U	–
DU-056-005	71	2015-08-31 9:00	46.6784	-119.4746	17.13	3.11	–	–	5.75	2.51	–	–
DU-056-006	72	2015-08-31 9:03	46.6784	-119.4738	36.71	3.90	–	–	5.60	3.07	–	–
DU-056-007	75	2015-08-31 9:11	46.6790	-119.4762	9.72	2.85	–	–	< LOD	3.40	U	–
DU-056-008	74	2015-08-31 9:09	46.6790	-119.4752	22.54	3.45	–	–	4.37	2.74	–	–
DU-056-009	73	2015-08-31 9:06	46.6791	-119.4742	15.49	3.43	–	–	< LOD	4.12	U	–
DU-056-010	76	2015-08-31 9:14	46.6797	-119.4756	276.24	8.66	–	–	16.65	6.59	–	–
DU-056-011	77	2015-08-31 9:16	46.6796	-119.4745	53.53	4.43	–	–	6.69	3.46	–	–
DU-056-012	78	2015-08-31 9:19	46.6796	-119.4739	28.87	4.21	–	–	< LOD	5.00	U	–
DU-056-013	81	2015-08-31 9:26	46.6802	-119.4761	15.62	3.22	–	–	< LOD	3.79	U	–
DU-056-014	80	2015-08-31 9:23	46.6802	-119.4751	27.90	3.64	–	–	6.84	2.93	–	–
DU-056-015	79	2015-08-31 9:21	46.6802	-119.4741	43.06	5.26	–	–	< LOD	6.18	U	–
DU-056-016	82	2015-08-31 9:28	46.6808	-119.4756	89.54	5.17	–	–	13.82	4.08	–	–
DU-056-017	83	2015-08-31 9:31	46.6808	-119.4746	612.09	12.43	–	–	75.40	9.73	–	–
DU-057-001	142	2015-08-17 13:52	46.6871	-119.4685	12.70	2.83	–	–	4.16	2.27	–	–
DU-057-002	143	2015-08-17 13:54	46.6870	-119.4675	12.37	2.92	–	–	6.25	2.41	–	–
DU-057-003	94	2015-08-17 12:10	46.6871	-119.4667	13.13	4.23	–	–	< LOD	4.93	U	–
DU-057-004	141	2015-08-17 13:49	46.6876	-119.4690	9.09	2.84	–	–	5.65	2.33	–	–
DU-057-005	140	2015-08-17 13:47	46.6876	-119.4680	14.96	3.00	–	–	< LOD	3.55	U	–
DU-057-006	108	2015-08-17 12:33	46.6876	-119.4671	23.66	4.47	–	–	< LOD	5.35	U	–
DU-057-007	138	2015-08-17 13:42	46.6883	-119.4694	184.69	6.91	–	–	8.73	5.23	–	–
DU-057-008	139	2015-08-17 13:45	46.6882	-119.4685	25.39	3.51	–	–	5.58	2.81	–	–
DU-057-009	109	2015-08-17 12:36	46.6882	-119.4675	18.48	4.83	–	–	< LOD	5.78	U	–
DU-057-010	137	2015-08-17 13:39	46.6888	-119.4698	35.03	3.96	–	–	5.24	3.12	–	–
DU-057-011	136	2015-08-17 13:37	46.6887	-119.4690	111.47	5.59	–	–	< LOD	6.38	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-057-012	110	2015-08-17 12:39	46.6887	-119.4679	11.55	2.84	–	–	< LOD	2.28	U	–
DU-057-013	134	2015-08-17 13:31	46.6893	-119.4703	28.44	3.45	–	–	< LOD	3.98	U	–
DU-057-014	135	2015-08-17 13:34	46.6893	-119.4694	17.88	3.10	–	–	< LOD	3.62	U	–
DU-057-015	111	2015-08-17 12:42	46.6893	-119.4684	24.90	3.59	–	–	6.43	2.89	–	–
DU-057-016	133	2015-08-17 13:28	46.6899	-119.4698	15.61	3.02	–	–	4.13	2.40	–	–
DU-057-017	112	2015-08-17 12:45	46.6898	-119.4689	18.39	3.19	–	–	4.54	2.55	–	–
DU-057-018	117	2015-08-17 12:58	46.6904	-119.4703	22.00	3.49	–	–	< LOD	4.11	U	–
DU-057-019	113	2015-08-17 12:47	46.6904	-119.4694	11.65	3.01	–	–	5.37	2.47	–	–
DU-057-020	116	2015-08-17 12:56	46.6910	-119.4707	12.93	2.90	–	–	< LOD	3.45	U	–
DU-057-021	115	2015-08-17 12:53	46.6909	-119.4699	19.32	3.35	–	–	< LOD	3.96	U	–
DU-057-022	114	2015-08-17 12:50	46.6910	-119.4690	29.04	3.53	–	–	< LOD	4.14	U	–
DU-058-001	50	2015-08-17 9:30	46.6833	-119.4728	35.47	3.73	–	–	7.16	2.97	–	–
DU-058-002	49	2015-08-17 9:27	46.6833	-119.4718	75.27	4.98	–	–	< LOD	5.72	U	–
DU-058-003	48	2015-08-17 9:22	46.6833	-119.4707	49.77	5.08	–	–	< LOD	5.76	U	–
DU-058-004	47	2015-08-17 9:19	46.6833	-119.4698	30.45	3.47	–	–	6.12	2.76	–	–
DU-058-005	44	2015-08-17 9:10	46.6832	-119.4689	23.27	3.49	–	–	4.95	2.78	–	–
DU-058-006	43	2015-08-17 9:07	46.6832	-119.4679	10.23	3.29	–	–	22.60	3.23	–	–
DU-058-007	41	2015-08-17 9:03	46.6832	-119.4670	11.69	2.93	–	–	< LOD	3.50	U	–
DU-058-008	40	2015-08-17 8:59	46.6833	-119.4658	25.53	3.77	–	–	< LOD	4.44	U	–
DU-058-009	38	2015-08-17 8:55	46.6833	-119.4649	41.93	4.29	–	–	9.34	3.47	–	–
DU-058-010	51	2015-08-17 9:33	46.6839	-119.4733	34.85	3.70	–	–	< LOD	4.32	U	–
DU-058-011	52	2015-08-17 9:35	46.6839	-119.4722	24.70	3.80	–	–	7.12	3.08	–	–
DU-058-012	53	2015-08-17 9:39	46.6838	-119.4712	29.44	3.62	–	–	7.20	2.91	–	–
DU-058-013	54	2015-08-17 9:41	46.6839	-119.4702	48.73	4.31	–	–	5.79	3.36	–	–
DU-058-014	55	2015-08-17 9:44	46.6839	-119.4694	14.39	3.21	–	–	< LOD	3.85	U	–
DU-058-015	56	2015-08-17 9:47	46.6839	-119.4683	18.05	3.38	–	–	5.30	2.73	–	–
DU-058-016	57	2015-08-17 9:50	46.6838	-119.4674	90.76	5.36	–	–	8.61	4.15	–	–
DU-058-017	58	2015-08-17 9:53	46.6838	-119.4663	33.31	4.04	–	–	6.40	3.22	–	–
DU-058-018	59	2015-08-17 9:56	46.6839	-119.4654	19.95	3.11	–	–	4.44	2.47	–	–
DU-058-019	72	2015-08-17 10:29	46.6844	-119.4707	63.82	5.63	–	–	< LOD	6.48	U	–
DU-058-020	71	2015-08-17 10:27	46.6844	-119.4697	18.12	3.49	–	–	< LOD	4.16	U	–
DU-058-021	70	2015-08-17 10:24	46.6844	-119.4688	11.45	2.98	–	–	< LOD	3.56	U	–
DU-058-022	69	2015-08-17 10:21	46.6845	-119.4678	15.76	3.12	–	–	< LOD	3.61	U	–
DU-058-023	68	2015-08-17 10:18	46.6845	-119.4667	21.51	3.72	–	–	< LOD	4.43	U	–
DU-058-024	60	2015-08-17 9:59	46.6844	-119.4658	29.10	3.48	–	–	< LOD	4.07	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-058-025	73	2015-08-17 10:33	46.6851	-119.4702	20.53	3.19	–	–	4.44	2.54	–	–
DU-058-026	77	2015-08-17 10:47	46.6850	-119.4693	13.18	3.11	–	–	4.49	2.51	–	–
DU-058-027	78	2015-08-17 10:50	46.6850	-119.4683	30.64	3.72	–	–	7.80	2.99	–	–
DU-058-028	79	2015-08-17 10:54	46.6851	-119.4671	17.72	3.50	–	–	4.34	2.82	–	–
DU-058-029	80	2015-08-17 10:56	46.6850	-119.4663	15.35	3.14	–	–	4.19	2.51	–	–
DU-058-030	74	2015-08-17 10:37	46.6856	-119.4708	28.40	3.64	–	–	8.57	2.96	–	–
DU-058-031	76	2015-08-17 10:45	46.6856	-119.4698	30.53	3.84	–	–	4.75	3.02	–	–
DU-058-032	83	2015-08-17 11:06	46.6856	-119.4677	72.01	5.14	–	–	10.23	4.05	–	–
DU-058-033	82	2015-08-17 11:03	46.6856	-119.4668	13.78	3.17	–	–	< LOD	3.76	U	–
DU-058-034	81	2015-08-17 11:00	46.6856	-119.4659	16.21	3.34	–	–	< LOD	3.99	U	–
DU-058-035	75	2015-08-17 10:40	46.6862	-119.4712	17.38	3.61	–	–	5.09	2.94	–	–
DU-058-036	84	2015-08-17 11:10	46.6862	-119.4682	37.08	3.92	–	–	6.44	3.10	–	–
DU-058-037	85	2015-08-17 11:12	46.6862	-119.4673	63.82	5.54	–	–	< LOD	6.36	U	–
DU-058-038	86	2015-08-17 11:16	46.6862	-119.4663	16.33	3.12	–	–	< LOD	3.71	U	–
DU-059-001	70	2015-10-05 10:55	46.6804	-119.4704	11.53	2.92	–	–	5.56	2.39	–	–
DU-059-002	69	2015-10-05 10:53	46.6804	-119.4697	11.31	2.94	–	–	5.60	2.43	–	–
DU-059-003	68	2015-10-05 10:50	46.6804	-119.4685	12.12	2.97	–	–	< LOD	2.37	U	–
DU-059-004	65	2015-10-05 10:42	46.6809	-119.4710	15.28	3.08	–	–	4.49	2.46	–	–
DU-059-005	66	2015-10-05 10:45	46.6810	-119.4699	15.69	3.13	–	–	5.20	2.54	–	–
DU-059-006	67	2015-10-05 10:47	46.6810	-119.4688	11.17	2.79	–	–	< LOD	3.29	U	–
DU-059-007	64	2015-10-05 10:39	46.6816	-119.4715	11.42	3.49	–	–	< LOD	4.20	U	–
DU-059-008	63	2015-10-05 10:35	46.6816	-119.4705	11.78	2.95	–	–	< LOD	3.47	U	–
DU-059-009	62	2015-10-05 10:32	46.6816	-119.4694	21.33	3.59	–	–	< LOD	4.21	U	–
DU-059-010	61	2015-10-05 10:29	46.6815	-119.4682	14.91	3.16	–	–	< LOD	3.76	U	–
DU-059-011	60	2015-10-05 10:27	46.6816	-119.4673	15.33	3.12	–	–	4.59	2.50	–	–
DU-059-012	59	2015-10-05 10:25	46.6815	-119.4662	18.53	3.24	–	–	< LOD	3.80	U	–
DU-059-013	43	2015-10-05 9:49	46.6821	-119.4719	13.29	3.42	–	–	5.12	2.78	–	–
DU-059-014	44	2015-10-05 9:52	46.6822	-119.4709	19.52	3.44	–	–	< LOD	4.10	U	–
DU-059-015	45	2015-10-05 9:56	46.6821	-119.4698	32.87	3.82	–	–	5.18	3.00	–	–
DU-059-016	46	2015-10-05 10:00	46.6822	-119.4686	10.17	2.86	–	–	4.29	2.31	–	–
DU-059-017	47	2015-10-05 10:03	46.6822	-119.4677	13.04	3.10	–	–	< LOD	3.71	U	–
DU-059-018	48	2015-10-05 10:05	46.6822	-119.4668	16.34	3.22	–	–	< LOD	3.82	U	–
DU-059-019	56	2015-10-05 10:17	46.6822	-119.4658	16.22	3.20	–	–	< LOD	3.80	U	–
DU-059-020	42	2015-10-05 9:47	46.6828	-119.4733	46.12	4.39	–	–	< LOD	5.09	U	–
DU-059-021	41	2015-10-05 9:44	46.6827	-119.4724	48.26	4.26	–	–	7.33	3.35	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-059-022	40	2015-10-05 9:42	46.6828	-119.4715	22.04	3.37	–	–	< LOD	3.99	U	–
DU-059-023	39	2015-10-05 9:40	46.6828	-119.4704	15.05	3.08	–	–	5.34	2.52	–	–
DU-059-024	38	2015-10-05 9:38	46.6828	-119.4694	32.11	4.12	–	–	5.90	3.28	–	–
DU-059-025	37	2015-10-05 9:36	46.6828	-119.4683	10.48	3.00	–	–	< LOD	3.51	U	–
DU-059-026	36	2015-10-05 9:33	46.6827	-119.4673	18.51	3.26	–	–	< LOD	3.87	U	–
DU-059-027	35	2015-10-05 9:32	46.6827	-119.4664	16.92	3.22	–	–	5.03	2.60	–	–
DU-059-028	33	2015-10-05 9:28	46.6826	-119.4653	16.73	3.09	–	–	4.45	2.47	–	–
DU-060-001	73	2015-09-15 11:00	46.6843	-119.4612	14.77	2.99	–	–	4.60	2.39	–	–
DU-060-002	72	2015-09-15 10:56	46.6848	-119.4614	16.87	2.88	–	–	4.49	2.30	–	–
DU-060-003	71	2015-09-15 10:53	46.6848	-119.4606	14.10	2.96	–	–	< LOD	3.50	U	–
DU-060-004	70	2015-09-15 10:50	46.6849	-119.4596	23.37	3.28	–	–	< LOD	3.79	U	–
DU-060-005	69	2015-09-15 10:47	46.6848	-119.4586	24.07	3.33	–	–	5.12	2.64	–	–
DU-060-006	64	2015-09-15 10:33	46.6853	-119.4621	21.85	3.34	–	–	< LOD	3.92	U	–
DU-060-007	65	2015-09-15 10:36	46.6854	-119.4611	19.28	3.18	–	–	< LOD	3.68	U	–
DU-060-008	66	2015-09-15 10:39	46.6854	-119.4601	34.80	3.75	–	–	4.50	2.93	–	–
DU-060-009	67	2015-09-15 10:42	46.6853	-119.4591	33.22	3.75	–	–	< LOD	4.34	U	–
DU-060-010	68	2015-09-15 10:44	46.6854	-119.4581	12.93	2.90	–	–	4.87	2.34	–	–
DU-060-011	63	2015-09-15 10:30	46.6859	-119.4616	17.03	3.04	–	–	< LOD	3.56	U	–
DU-060-012	60	2015-09-15 10:23	46.6859	-119.4607	20.82	3.17	–	–	< LOD	3.70	U	–
DU-060-013	59	2015-09-15 10:20	46.6860	-119.4596	16.88	3.09	–	–	< LOD	3.68	U	–
DU-060-014	58	2015-09-15 10:17	46.6860	-119.4586	27.25	3.43	–	–	5.44	2.72	–	–
DU-060-015	41	2015-09-15 9:39	46.6866	-119.4621	20.76	3.25	–	–	< LOD	3.71	U	–
DU-060-016	42	2015-09-15 9:43	46.6865	-119.4611	14.70	3.02	–	–	< LOD	3.56	U	–
DU-060-017	43	2015-09-15 9:46	46.6865	-119.4600	17.19	3.18	–	–	5.06	2.56	–	–
DU-060-018	55	2015-09-15 10:07	46.6866	-119.4591	18.44	6.91	–	–	< LOD	8.56	U	–
DU-060-019	57	2015-09-15 10:14	46.6865	-119.4581	23.53	3.35	–	–	6.84	2.70	–	–
DU-060-020	40	2015-09-15 9:36	46.6871	-119.4626	25.09	3.40	–	–	< LOD	3.97	U	–
DU-060-021	39	2015-09-15 9:34	46.6871	-119.4615	17.62	3.06	–	–	4.38	2.44	–	–
DU-060-022	38	2015-09-15 9:31	46.6871	-119.4606	14.31	2.94	–	–	< LOD	3.48	U	–
DU-060-023	37	2015-09-15 9:28	46.6871	-119.4595	18.44	3.32	–	–	< LOD	3.91	U	–
DU-060-024	36	2015-09-15 9:24	46.6871	-119.4586	26.86	3.39	–	–	5.77	2.70	–	–
DU-060-025	30	2015-09-15 9:05	46.6877	-119.4620	14.06	2.90	–	–	< LOD	3.45	U	–
DU-060-026	32	2015-09-15 9:11	46.6877	-119.4611	13.32	2.94	–	–	< LOD	3.50	U	–
DU-060-027	33	2015-09-15 9:14	46.6877	-119.4600	16.24	3.04	–	–	4.40	2.43	–	–
DU-060-028	35	2015-09-15 9:20	46.6877	-119.4591	17.49	3.24	–	–	< LOD	3.77	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-060-029	34	2015-09-15 9:17	46.6883	-119.4596	16.01	2.93	–	–	< LOD	3.44	U	–
DU-061-001	118	2015-09-15 12:41	46.6814	-119.4603	16.90	3.00	–	–	< LOD	3.50	U	–
DU-061-002	119	2015-09-15 12:44	46.6813	-119.4591	14.45	3.04	–	–	< LOD	3.61	U	–
DU-061-003	120	2015-09-15 12:46	46.6813	-119.4582	19.50	3.21	–	–	4.23	2.54	–	–
DU-061-004	117	2015-09-15 12:38	46.6821	-119.4606	17.21	2.97	–	–	< LOD	3.50	U	–
DU-061-005	115	2015-09-15 12:34	46.6819	-119.4597	15.16	3.03	–	–	< LOD	3.61	U	–
DU-061-006	114	2015-09-15 12:31	46.6820	-119.4587	17.58	3.09	–	–	4.09	2.45	–	–
DU-061-007	113	2015-09-15 12:28	46.6820	-119.4577	19.02	3.22	–	–	< LOD	3.79	U	–
DU-061-008	121	2015-09-15 12:56	46.6826	-119.4610	31.55	3.56	–	–	6.80	2.84	–	–
DU-061-009	111	2015-09-15 12:22	46.6828	-119.4594	26.33	3.53	–	–	4.56	2.79	–	–
DU-061-010	110	2015-09-15 12:20	46.6827	-119.4591	13.53	2.96	–	–	< LOD	3.50	U	–
DU-061-011	112	2015-09-15 12:26	46.6826	-119.4582	16.00	3.30	–	–	< LOD	3.82	U	–
DU-061-012	99	2015-09-15 11:57	46.6832	-119.4615	49.28	4.32	Z	–	5.63	3.36	Z	–
DU-061-013	98	2015-09-15 11:53	46.6833	-119.4605	8.08	2.81	Z	–	< LOD	3.40	UZ	–
DU-061-014	97	2015-09-15 11:49	46.6832	-119.4596	11.62	2.72	Z	–	< LOD	3.15	UZ	–
DU-061-015	96	2015-09-15 11:47	46.6832	-119.4586	17.30	3.28	Z	–	< LOD	3.74	UZ	–
DU-061-016	95	2015-09-15 11:44	46.6831	-119.4577	13.91	2.96	Z	–	5.00	2.39	Z	–
DU-061-017	87	2015-09-15 11:22	46.6838	-119.4611	15.73	3.02	Z	–	4.98	2.43	Z	–
DU-061-018	88	2015-09-15 11:26	46.6838	-119.4601	9.21	3.10	Z	–	< LOD	3.72	UZ	–
DU-061-019	90	2015-09-15 11:31	46.6838	-119.4591	16.59	3.03	Z	–	5.22	2.44	Z	–
DU-061-020	92	2015-09-15 11:36	46.6838	-119.4582	16.15	3.02	Z	–	< LOD	2.40	UZ	–
DU-061-021	94	2015-09-15 11:41	46.6838	-119.4572	14.24	3.14	Z	–	4.62	2.54	Z	–
DU-061-022	89	2015-09-15 11:29	46.6843	-119.4596	13.39	2.98	Z	–	< LOD	3.51	UZ	–
DU-061-023	91	2015-09-15 11:34	46.6843	-119.4586	17.49	3.25	Z	–	4.31	2.61	Z	–
DU-061-024	93	2015-09-15 11:39	46.6843	-119.4576	15.43	3.00	Z	–	< LOD	3.54	UZ	–
DU-062-001	134	2015-10-05 13:10	46.6755	-119.4728	68.86	4.96	–	–	8.86	3.88	–	–
DU-062-002	135	2015-10-05 13:12	46.6756	-119.4718	26.68	3.95	–	–	< LOD	4.61	U	–
DU-062-003	133	2015-10-05 13:07	46.6762	-119.4733	75.01	4.77	–	–	9.36	3.73	–	–
DU-062-004	136	2015-10-05 13:14	46.6762	-119.4724	111.41	5.86	–	–	10.52	4.54	–	–
DU-062-005	137	2015-10-05 13:16	46.6762	-119.4713	177.97	8.25	–	–	11.68	6.31	–	–
DU-062-006	138	2015-10-05 13:19	46.6762	-119.4703	25.46	3.75	–	–	< LOD	4.39	U	–
DU-062-007	139	2015-10-05 13:21	46.6761	-119.4692	23.39	3.68	–	–	< LOD	4.36	U	–
DU-062-008	140	2015-10-05 13:23	46.6761	-119.4683	8.81	3.70	–	–	< LOD	4.48	U	–
DU-062-009	132	2015-10-05 13:04	46.6768	-119.4728	336.46	10.05	–	–	18.15	7.63	–	–
DU-062-010	131	2015-10-05 13:02	46.6767	-119.4719	122.19	5.99	–	–	9.61	4.60	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-062-011	130	2015-10-05 13:00	46.6767	-119.4708	22.11	3.69	–	–	< LOD	4.41	U	–
DU-062-012	129	2015-10-05 12:58	46.6767	-119.4698	23.37	4.33	–	–	< LOD	5.12	U	–
DU-062-013	128	2015-10-05 12:56	46.6767	-119.4688	20.48	3.33	–	–	5.37	2.68	–	–
DU-062-014	106	2015-10-05 12:17	46.6774	-119.4733	15.41	3.09	–	–	< LOD	3.67	U	–
DU-062-015	107	2015-10-05 12:19	46.6774	-119.4723	17.91	3.15	–	–	< LOD	2.52	U	–
DU-062-016	108	2015-10-05 12:22	46.6773	-119.4713	24.16	3.61	–	–	5.21	2.88	–	–
DU-062-017	125	2015-10-05 12:49	46.6773	-119.4703	38.30	4.08	–	–	5.18	3.19	–	–
DU-062-018	126	2015-10-05 12:51	46.6773	-119.4693	19.08	3.51	–	–	< LOD	4.15	U	–
DU-062-019	127	2015-10-05 12:54	46.6773	-119.4682	27.56	3.50	–	–	6.38	2.80	–	–
DU-062-020	105	2015-10-05 12:15	46.6779	-119.4728	101.02	5.46	–	–	9.57	4.22	–	–
DU-062-021	104	2015-10-05 12:13	46.6779	-119.4718	106.08	5.65	–	–	11.21	4.39	–	–
DU-062-022	103	2015-10-05 12:11	46.6779	-119.4708	505.03	11.73	–	–	57.21	9.14	–	–
DU-062-023	102	2015-10-05 12:09	46.6779	-119.4698	121.53	5.78	–	–	15.77	4.54	–	–
DU-062-024	101	2015-10-05 12:07	46.6779	-119.4687	76.46	5.56	–	–	14.72	4.46	–	–
DU-062-025	95	2015-10-05 11:54	46.6786	-119.4733	12.26	3.25	–	–	< LOD	3.88	U	–
DU-062-026	96	2015-10-05 11:56	46.6785	-119.4723	61.14	4.73	–	–	< LOD	5.49	U	–
DU-062-027	97	2015-10-05 11:58	46.6785	-119.4712	67.47	4.62	–	–	8.04	3.60	–	–
DU-062-028	98	2015-10-05 12:01	46.6785	-119.4702	373.91	10.59	–	–	29.03	8.13	–	–
DU-062-029	99	2015-10-05 12:03	46.6785	-119.4693	72.69	4.73	–	–	< LOD	5.46	U	–
DU-062-030	100	2015-10-05 12:05	46.6785	-119.4682	26.16	3.84	–	–	5.94	3.08	–	–
DU-062-031	94	2015-10-05 11:51	46.6791	-119.4728	211.33	8.28	–	–	< LOD	9.30	U	–
DU-062-032	93	2015-10-05 11:49	46.6791	-119.4718	15.97	3.07	–	–	< LOD	3.65	U	–
DU-062-033	92	2015-10-05 11:47	46.6791	-119.4708	137.67	7.05	–	–	21.56	5.59	–	–
DU-062-034	90	2015-10-05 11:45	46.6791	-119.4698	114.44	5.87	–	–	6.93	4.48	–	–
DU-062-035	88	2015-10-05 11:41	46.6790	-119.4688	127.95	8.55	–	–	19.67	6.81	–	–
DU-063-001	66	2015-10-13 10:13	46.6758	-119.4665	12.79	2.91	–	–	< LOD	3.41	U	–
DU-063-002	65	2015-10-13 10:11	46.6760	-119.4656	18.06	3.24	–	–	< LOD	3.85	U	–
DU-063-003	64	2015-10-13 10:09	46.6760	-119.4647	17.61	3.19	–	–	< LOD	3.78	U	–
DU-063-004	63	2015-10-13 10:07	46.6760	-119.4636	14.97	3.04	–	–	< LOD	3.52	U	–
DU-063-005	60	2015-10-13 9:57	46.6767	-119.4660	21.62	3.44	–	–	< LOD	4.06	U	–
DU-063-006	61	2015-10-13 10:02	46.6766	-119.4650	15.00	3.08	–	–	4.37	2.46	–	–
DU-063-007	62	2015-10-13 10:04	46.6766	-119.4641	24.86	3.37	–	–	< LOD	3.94	U	–
DU-063-008	58	2015-10-13 9:50	46.6773	-119.4665	17.73	4.09	–	–	< LOD	4.76	U	–
DU-063-009	57	2015-10-13 9:48	46.6772	-119.4655	19.34	3.19	–	–	< LOD	3.76	U	–
DU-063-010	56	2015-10-13 9:45	46.6771	-119.4645	17.26	3.21	–	–	< LOD	2.56	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-063-011	55	2015-10-13 9:43	46.6772	-119.4635	12.15	2.91	–	–	4.16	2.34	–	–
DU-063-012	59	2015-10-13 9:53	46.6778	-119.4680	156.05	6.48	–	–	13.61	4.99	–	–
DU-063-013	35	2015-10-13 8:59	46.6779	-119.4673	36.22	3.76	–	–	< LOD	4.37	U	–
DU-063-014	43	2015-10-13 9:19	46.6778	-119.4660	18.27	3.13	–	–	4.52	2.51	–	–
DU-063-015	44	2015-10-13 9:22	46.6778	-119.4651	34.06	3.78	–	–	8.35	3.03	–	–
DU-063-016	45	2015-10-13 9:24	46.6778	-119.4641	16.26	3.22	–	–	4.82	2.60	–	–
DU-063-017	53	2015-10-13 9:37	46.6778	-119.4630	6.20	2.66	–	–	< LOD	3.22	U	–
DU-063-018	54	2016-05-11 14:19	46.6776	-119.4623	10.31	2.79	–	–	< LOD	3.34	U	–
DU-063-019	34	2015-10-13 8:55	46.6785	-119.4675	166.57	6.97	–	–	16.50	5.40	–	–
DU-063-020	42	2015-10-13 9:15	46.6783	-119.4666	34.96	3.80	–	–	< LOD	4.44	U	–
DU-063-021	41	2015-10-13 9:13	46.6783	-119.4656	57.48	4.49	–	–	7.64	3.52	–	–
DU-063-022	40	2015-10-13 9:11	46.6783	-119.4647	53.11	4.31	–	–	6.05	3.36	–	–
DU-063-023	39	2015-10-13 9:09	46.6783	-119.4636	54.54	4.16	–	–	7.06	3.26	–	–
DU-063-024	31	2015-10-13 8:48	46.6789	-119.4680	320.34	9.00	–	–	41.02	7.06	–	–
DU-063-025	33	2015-10-13 8:52	46.6788	-119.4670	206.11	7.75	–	–	< LOD	8.76	U	–
DU-063-026	36	2015-10-13 9:02	46.6791	-119.4660	38.59	3.93	–	–	5.53	3.09	–	–
DU-063-027	37	2015-10-13 9:04	46.6790	-119.4651	112.31	5.56	–	–	8.12	4.26	–	–
DU-063-028	38	2015-10-13 9:07	46.6790	-119.4640	23.38	3.34	–	–	< LOD	3.88	U	–
DU-064-001	76	2015-10-14 11:06	46.6726	-119.4731	80.06	5.28	–	–	8.27	4.10	–	–
DU-064-002	77	2015-10-14 11:10	46.6725	-119.4722	521.53	12.11	–	–	36.64	9.26	–	–
DU-064-003	78	2015-10-14 11:13	46.6725	-119.4712	469.67	10.93	–	–	36.40	8.38	–	–
DU-064-004	79	2015-10-14 11:15	46.6725	-119.4702	25.76	3.45	–	–	< LOD	4.08	U	–
DU-064-005	80	2015-10-14 11:17	46.6725	-119.4693	14.53	3.91	–	–	< LOD	4.72	U	–
DU-064-006	81	2015-10-14 11:21	46.6725	-119.4682	15.82	3.40	–	–	< LOD	4.07	U	–
DU-064-007	82	2015-10-14 11:23	46.6725	-119.4674	89.78	5.86	–	–	< LOD	6.74	U	–
DU-064-008	84	2015-10-14 11:26	46.6725	-119.4664	16.00	3.07	–	–	< LOD	3.64	U	–
DU-064-009	75	2015-10-14 11:03	46.6731	-119.4726	316.03	10.14	–	–	33.64	7.88	–	–
DU-064-010	74	2015-10-14 11:00	46.6731	-119.4718	361.24	10.08	–	–	20.21	7.66	–	–
DU-064-011	73	2015-10-14 10:58	46.6731	-119.4708	85.23	5.45	–	–	7.63	4.22	–	–
DU-064-012	72	2015-10-14 10:56	46.6731	-119.4698	29.02	3.69	–	–	5.08	2.92	–	–
DU-064-013	71	2015-10-14 10:53	46.6731	-119.4688	19.14	3.37	–	–	5.39	2.72	–	–
DU-064-014	70	2015-10-14 10:51	46.6731	-119.4678	14.62	4.06	–	–	< LOD	4.89	U	–
DU-064-015	69	2015-10-14 10:48	46.6731	-119.4669	12.03	3.00	–	–	< LOD	3.49	U	–
DU-064-016	49	2015-10-14 9:57	46.6736	-119.4731	21.40	3.40	–	–	4.20	2.69	–	–
DU-064-017	50	2015-10-14 10:00	46.6737	-119.4721	775.67	14.30	–	–	71.11	11.04	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-064-018	51	2015-10-14 10:03	46.6737	-119.4712	627.14	13.70	–	–	51.53	10.53	–	–
DU-064-019	52	2015-10-14 10:06	46.6737	-119.4702	9.58	3.62	–	–	< LOD	4.39	U	–
DU-064-020	53	2015-10-14 10:08	46.6737	-119.4692	21.48	3.34	–	–	4.64	2.66	–	–
DU-064-021	66	2015-10-14 10:39	46.6736	-119.4683	12.05	3.11	–	–	< LOD	3.70	U	–
DU-064-022	67	2015-10-14 10:41	46.6736	-119.4673	15.99	3.62	–	–	< LOD	4.23	U	–
DU-064-023	68	2015-10-14 10:45	46.6736	-119.4664	12.46	3.33	–	–	< LOD	4.01	U	–
DU-064-024	42	2015-10-14 9:37	46.6743	-119.4726	17.71	3.29	–	–	5.00	2.63	–	–
DU-064-025	41	2015-10-14 9:34	46.6743	-119.4717	41.46	4.38	–	–	7.60	3.49	–	–
DU-064-026	40	2015-10-14 9:30	46.6742	-119.4698	27.85	3.83	–	–	< LOD	4.51	U	–
DU-064-027	39	2015-10-14 9:28	46.6743	-119.4689	14.51	3.10	–	–	< LOD	3.70	U	–
DU-064-028	36	2015-10-14 9:21	46.6742	-119.4678	19.86	3.28	–	–	< LOD	3.86	U	–
DU-064-029	35	2015-10-14 9:19	46.6741	-119.4669	26.28	3.57	–	–	< LOD	4.17	U	–
DU-064-030	43	2015-10-14 9:39	46.6749	-119.4731	11.72	3.56	–	–	5.45	2.93	–	–
DU-064-031	48	2015-10-14 9:53	46.6749	-119.4722	11.89	3.21	–	–	< LOD	3.85	U	–
DU-064-032	47	2015-10-14 9:49	46.6748	-119.4712	11.73	3.00	–	–	4.87	2.43	–	–
DU-064-033	34	2015-10-14 9:16	46.6748	-119.4673	76.91	5.16	–	–	6.49	3.98	–	–
DU-064-034	44	2015-10-14 9:42	46.6755	-119.4735	8.25	3.17	–	–	5.50	2.63	–	–
DU-064-035	45	2015-10-14 9:44	46.6754	-119.4726	41.05	3.97	–	–	9.18	3.18	–	–
DU-064-036	46	2015-10-14 9:47	46.6754	-119.4716	20.16	3.53	–	–	7.57	2.90	–	–
DU-064-037	32	2015-10-14 9:11	46.6754	-119.4678	19.01	3.33	–	–	< LOD	3.91	U	–
DU-065-001	125	2015-10-13 12:29	46.6691	-119.4728	17.18	3.12	–	–	< LOD	2.47	U	–
DU-065-002	124	2015-10-13 12:27	46.6690	-119.4719	39.62	4.14	–	–	< LOD	4.85	U	–
DU-065-003	123	2015-10-13 12:25	46.6690	-119.4710	140.61	8.78	–	–	< LOD	9.75	U	–
DU-065-004	122	2015-10-13 12:24	46.6690	-119.4701	13.52	3.17	–	–	< LOD	3.78	U	–
DU-065-005	121	2015-10-13 12:22	46.6690	-119.4691	20.08	3.33	–	–	< LOD	3.90	U	–
DU-065-006	115	2015-10-13 12:10	46.6696	-119.4733	15.90	3.86	–	–	< LOD	4.53	U	–
DU-065-007	116	2015-10-13 12:12	46.6696	-119.4723	18.97	3.31	–	–	< LOD	3.93	U	–
DU-065-008	117	2015-10-13 12:14	46.6696	-119.4714	15.98	3.25	–	–	< LOD	3.89	U	–
DU-065-009	118	2015-10-13 12:16	46.6695	-119.4704	10.99	3.18	–	–	4.31	2.59	–	–
DU-065-010	119	2015-10-13 12:18	46.6695	-119.4695	19.19	3.32	–	–	< LOD	3.90	U	–
DU-065-011	120	2015-10-13 12:20	46.6696	-119.4686	15.53	3.40	–	–	4.44	2.74	–	–
DU-065-012	114	2015-10-13 12:08	46.6701	-119.4728	11.54	3.42	–	–	5.19	2.81	–	–
DU-065-013	113	2015-10-13 12:06	46.6701	-119.4719	14.00	3.90	–	–	< LOD	4.68	U	–
DU-065-014	112	2015-10-13 12:01	46.6701	-119.4710	50.99	4.48	–	–	7.79	3.55	–	–
DU-065-015	111	2015-10-13 11:58	46.6701	-119.4700	18.56	4.36	–	–	< LOD	5.05	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-065-016	101	2015-10-13 11:40	46.6701	-119.4691	20.32	3.27	–	–	< LOD	3.85	U	–
DU-065-017	92	2015-10-13 11:22	46.6707	-119.4733	13.39	3.12	–	–	< LOD	3.74	U	–
DU-065-018	93	2015-10-13 11:24	46.6707	-119.4723	16.93	4.06	–	–	< LOD	4.81	U	–
DU-065-019	94	2015-10-13 11:27	46.6707	-119.4713	18.91	3.23	–	–	4.29	2.57	–	–
DU-065-020	95	2015-10-13 11:29	46.6707	-119.4705	63.01	4.52	–	–	5.46	3.49	–	–
DU-065-021	99	2015-10-13 11:36	46.6706	-119.4695	96.43	5.38	–	–	12.62	4.21	–	–
DU-065-022	100	2015-10-13 11:38	46.6707	-119.4686	198.43	7.66	–	–	16.19	5.89	–	–
DU-065-023	91	2015-10-13 11:20	46.6712	-119.4728	13.12	3.06	–	–	5.68	2.50	–	–
DU-065-024	90	2015-10-13 11:18	46.6712	-119.4719	14.00	4.05	–	–	< LOD	4.98	U	–
DU-065-025	89	2015-10-13 11:16	46.6712	-119.4709	25.33	3.34	–	–	5.13	2.66	–	–
DU-065-026	88	2015-10-13 11:14	46.6712	-119.4700	43.07	4.76	–	–	< LOD	5.56	U	–
DU-065-027	87	2015-10-13 11:12	46.6712	-119.4690	86.11	5.84	–	–	9.03	4.55	–	–
DU-065-028	80	2015-10-13 10:58	46.6718	-119.4732	21.79	3.39	–	–	< LOD	4.03	U	–
DU-065-029	82	2015-10-13 11:01	46.6718	-119.4723	18.89	3.17	–	–	< LOD	2.50	U	–
DU-065-030	83	2015-10-13 11:04	46.6718	-119.4714	15.21	3.10	–	–	< LOD	3.67	U	–
DU-065-031	84	2015-10-13 11:06	46.6718	-119.4704	24.22	4.36	–	–	7.33	3.57	–	–
DU-065-032	85	2015-10-13 11:08	46.6717	-119.4694	12.08	2.99	–	–	5.70	2.44	–	–
DU-065-033	86	2015-10-13 11:10	46.6717	-119.4686	39.75	3.99	–	–	6.66	3.15	–	–
DU-066-001	30	2015-08-11 8:03	46.6649	-119.4726	15.70	3.38	–	–	< LOD	4.02	U	–
DU-066-002	32	2015-08-11 8:07	46.6648	-119.4719	11.49	2.96	–	–	< LOD	3.49	U	–
DU-066-003	33	2015-08-11 8:09	46.6648	-119.4709	14.72	3.31	–	–	< LOD	3.93	U	–
DU-066-004	34	2015-08-11 8:12	46.6648	-119.4698	10.30	2.76	–	–	4.68	2.27	–	–
DU-066-005	35	2015-08-11 8:14	46.6648	-119.4688	17.27	3.39	–	–	< LOD	4.05	U	–
DU-066-006	40	2015-08-11 8:26	46.6654	-119.4730	15.39	3.04	–	–	< LOD	3.58	U	–
DU-066-007	39	2015-08-11 8:23	46.6653	-119.4720	23.22	3.29	–	–	4.86	2.61	–	–
DU-066-008	38	2015-08-11 8:21	46.6654	-119.4711	14.03	3.39	–	–	4.35	2.75	–	–
DU-066-009	37	2015-08-11 8:19	46.6653	-119.4701	14.02	3.14	–	–	< LOD	3.67	U	–
DU-066-010	36	2015-08-11 8:16	46.6653	-119.4692	13.98	3.79	–	–	< LOD	4.45	U	–
DU-066-011	41	2015-08-11 8:28	46.6659	-119.4727	58.46	4.53	–	–	9.93	3.59	–	–
DU-066-012	42	2015-08-11 8:30	46.6660	-119.4718	12.13	3.50	–	–	< LOD	4.26	U	–
DU-066-013	43	2015-08-11 8:33	46.6660	-119.4708	23.80	3.80	–	–	< LOD	4.37	U	–
DU-066-014	44	2015-08-11 8:35	46.6659	-119.4699	14.92	3.20	–	–	< LOD	3.71	U	–
DU-066-015	45	2015-08-11 8:38	46.6659	-119.4688	14.89	3.69	–	–	< LOD	4.30	U	–
DU-066-016	57	2015-08-11 9:00	46.6666	-119.4731	26.91	4.13	–	–	4.99	3.30	–	–
DU-066-017	56	2015-08-11 8:58	46.6665	-119.4721	6.75	3.18	–	–	< LOD	3.97	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-066-018	55	2015-08-11 8:55	46.6665	-119.4712	20.32	3.91	–	–	< LOD	4.43	U	–
DU-066-019	47	2015-08-11 8:42	46.6665	-119.4702	16.85	4.29	–	–	< LOD	5.16	U	–
DU-066-020	46	2015-08-11 8:40	46.6665	-119.4692	11.96	4.09	–	–	< LOD	4.95	U	–
DU-066-021	58	2015-08-11 9:02	46.6672	-119.4726	10.12	2.75	–	–	4.68	2.25	–	–
DU-066-022	59	2015-08-11 9:05	46.6671	-119.4717	21.72	3.63	–	–	< LOD	4.33	U	–
DU-066-023	60	2015-08-11 9:07	46.6672	-119.4707	95.49	6.07	–	–	10.99	4.74	–	–
DU-066-024	61	2015-08-11 9:10	46.6672	-119.4698	70.10	5.08	–	–	13.25	4.06	–	–
DU-066-025	62	2015-08-11 9:12	46.6672	-119.4688	78.08	4.98	–	–	8.84	3.88	–	–
DU-066-026	67	2015-08-11 9:24	46.6678	-119.4730	18.72	3.46	–	–	< LOD	4.02	U	–
DU-066-027	66	2015-08-11 9:22	46.6678	-119.4720	15.69	3.74	–	–	< LOD	4.39	U	–
DU-066-028	65	2015-08-11 9:19	46.6678	-119.4711	21.48	3.57	–	–	< LOD	4.19	U	–
DU-066-029	64	2015-08-11 9:17	46.6678	-119.4701	21.26	3.33	–	–	< LOD	3.91	U	–
DU-066-030	63	2015-08-11 9:14	46.6677	-119.4692	165.76	7.57	–	–	< LOD	8.61	U	–
DU-066-031	68	2015-08-11 9:27	46.6686	-119.4725	16.03	3.02	–	–	< LOD	3.49	U	–
DU-066-032	69	2015-08-11 9:30	46.6684	-119.4717	28.78	3.49	–	–	< LOD	4.09	U	–
DU-066-033	70	2015-08-11 9:32	46.6684	-119.4707	44.93	4.06	–	–	5.50	3.18	–	–
DU-066-034	71	2015-08-11 9:35	46.6683	-119.4697	38.16	3.90	–	–	6.46	3.08	–	–
DU-066-035	72	2015-08-11 9:37	46.6683	-119.4686	106.96	5.65	–	–	7.17	4.32	–	–
DU-067-001	74	2015-07-08 9:32	46.6668	-119.4675	16.29	3.63	–	–	< LOD	4.23	U	–
DU-067-002	75	2015-07-08 9:34	46.6667	-119.4667	13.70	3.07	–	–	< LOD	3.57	U	–
DU-067-003	76	2015-07-08 9:36	46.6667	-119.4657	12.20	3.86	–	–	< LOD	4.52	U	–
DU-067-004	77	2015-07-08 9:39	46.6667	-119.4647	35.85	4.02	–	–	5.06	3.16	–	–
DU-067-005	78	2015-07-08 9:42	46.6667	-119.4637	56.69	5.46	–	–	< LOD	6.36	U	–
DU-067-006	73	2015-07-08 9:30	46.6673	-119.4679	24.24	3.50	–	–	< LOD	4.10	U	–
DU-067-007	72	2015-07-08 9:27	46.6674	-119.4669	13.11	3.04	–	–	< LOD	3.56	U	–
DU-067-008	71	2015-07-08 9:25	46.6673	-119.4658	16.20	3.26	–	–	< LOD	3.82	U	–
DU-067-009	70	2015-07-08 9:22	46.6673	-119.4649	21.23	3.51	–	–	< LOD	4.14	U	–
DU-067-010	69	2015-07-08 9:20	46.6673	-119.4639	121.93	5.80	–	–	8.65	4.45	–	–
DU-067-011	68	2015-07-08 9:17	46.6674	-119.4631	13.66	3.22	–	–	< LOD	3.88	U	–
DU-067-012	61	2015-07-08 9:00	46.6680	-119.4675	21.36	3.41	–	–	< LOD	4.00	U	–
DU-067-013	62	2015-07-08 9:02	46.6680	-119.4666	9.81	3.02	–	–	< LOD	3.65	U	–
DU-067-014	63	2015-07-08 9:04	46.6679	-119.4657	11.11	3.06	–	–	4.01	2.46	–	–
DU-067-015	64	2015-07-08 9:07	46.6679	-119.4647	17.51	4.74	–	–	< LOD	5.64	U	–
DU-067-016	67	2015-07-08 9:15	46.6678	-119.4637	17.93	3.20	–	–	< LOD	3.78	U	–
DU-067-017	60	2015-07-08 8:57	46.6684	-119.4679	11.81	3.33	–	–	< LOD	4.02	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-067-018	59	2015-07-08 8:54	46.6684	-119.4669	10.37	2.89	–	–	5.14	2.36	–	–
DU-067-019	51	2015-07-08 8:41	46.6684	-119.4659	12.97	2.97	–	–	< LOD	2.37	U	–
DU-067-020	50	2015-07-08 8:38	46.6684	-119.4649	17.50	4.19	–	–	< LOD	5.09	U	–
DU-067-021	49	2015-07-08 8:36	46.6684	-119.4639	12.50	3.03	–	–	< LOD	3.61	U	–
DU-067-022	48	2015-07-08 8:33	46.6685	-119.4631	12.78	2.98	–	–	< LOD	3.56	U	–
DU-067-023	43	2015-07-08 8:20	46.6691	-119.4677	11.54	3.78	–	–	< LOD	4.53	U	–
DU-067-024	44	2015-07-08 8:23	46.6691	-119.4667	15.78	3.60	–	–	< LOD	4.34	U	–
DU-067-025	45	2015-07-08 8:26	46.6691	-119.4656	11.82	3.01	–	–	< LOD	3.56	U	–
DU-067-026	46	2015-07-08 8:28	46.6691	-119.4646	11.87	3.01	–	–	< LOD	3.61	U	–
DU-067-027	47	2015-07-08 8:31	46.6691	-119.4636	20.37	3.32	–	–	< LOD	3.91	U	–
DU-067-028	42	2015-07-08 8:18	46.6696	-119.4678	25.74	4.21	–	–	< LOD	4.88	U	–
DU-067-029	41	2015-07-08 8:16	46.6696	-119.4669	13.25	3.19	–	–	4.99	2.60	–	–
DU-067-030	40	2015-07-08 8:13	46.6696	-119.4659	13.80	3.09	–	–	< LOD	3.63	U	–
DU-067-031	39	2015-07-08 8:10	46.6696	-119.4649	23.28	3.73	–	–	< LOD	4.43	U	–
DU-067-032	38	2015-07-08 8:08	46.6696	-119.4640	17.76	3.35	–	–	< LOD	3.91	U	–
DU-067-033	37	2015-07-08 8:05	46.6697	-119.4631	14.33	3.32	–	–	< LOD	3.92	U	–
DU-067-034	31	2015-07-08 7:50	46.6702	-119.4673	11.67	3.22	–	–	< LOD	3.86	U	–
DU-067-035	33	2015-07-08 7:55	46.6703	-119.4664	19.66	3.28	–	–	4.90	2.63	–	–
DU-067-036	34	2015-07-08 7:58	46.6703	-119.4656	21.08	3.71	–	–	< LOD	4.38	U	–
DU-067-037	35	2015-07-08 8:00	46.6703	-119.4646	36.53	3.97	–	–	6.09	3.15	–	–
DU-067-038	36	2015-07-08 8:03	46.6703	-119.4636	24.09	3.44	–	–	< LOD	4.03	U	–
DU-068-001	76	2015-07-06 9:52	46.6627	-119.4675	11.76	3.19	–	–	4.82	2.60	–	–
DU-068-002	77	2015-07-06 9:55	46.6627	-119.4666	13.81	3.67	–	–	< LOD	4.44	U	–
DU-068-003	78	2015-07-06 9:57	46.6627	-119.4655	12.10	3.42	–	–	< LOD	4.00	U	–
DU-068-004	79	2015-07-06 10:00	46.6626	-119.4646	11.61	2.92	–	–	< LOD	3.48	U	–
DU-068-005	80	2015-07-06 10:03	46.6626	-119.4635	15.12	3.02	–	–	< LOD	3.51	U	–
DU-068-006	75	2015-07-06 9:50	46.6633	-119.4678	13.98	3.27	–	–	< LOD	3.91	U	–
DU-068-007	74	2015-07-06 9:47	46.6632	-119.4667	15.84	3.19	–	–	< LOD	3.80	U	–
DU-068-008	73	2015-07-06 9:45	46.6632	-119.4659	11.13	3.07	–	–	< LOD	3.69	U	–
DU-068-009	72	2015-07-06 9:42	46.6632	-119.4649	11.99	3.76	–	–	< LOD	4.44	U	–
DU-068-010	71	2015-07-06 9:39	46.6632	-119.4638	11.21	3.25	–	–	3.99	2.64	–	–
DU-068-011	70	2015-07-06 9:37	46.6632	-119.4630	10.31	3.11	–	–	< LOD	2.52	U	–
DU-068-012	64	2015-07-06 9:23	46.6639	-119.4674	13.28	3.14	–	–	4.08	2.52	–	–
DU-068-013	65	2015-07-06 9:26	46.6639	-119.4666	12.14	3.05	–	–	< LOD	3.61	U	–
DU-068-014	67	2015-07-06 9:29	46.6638	-119.4655	11.90	3.34	–	–	< LOD	3.98	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-068-015	68	2015-07-06 9:32	46.6638	-119.4646	13.91	3.62	–	–	< LOD	4.27	U	–
DU-068-016	69	2015-07-06 9:34	46.6638	-119.4636	27.46	3.77	–	–	< LOD	4.45	U	–
DU-068-017	63	2015-07-06 9:20	46.6644	-119.4678	20.10	3.76	–	–	4.58	3.02	–	–
DU-068-018	53	2015-07-06 9:01	46.6644	-119.4668	8.93	2.85	Z	–	< LOD	3.40	UZ	–
DU-068-019	52	2015-07-06 8:58	46.6644	-119.4658	13.12	3.05	Z	–	< LOD	3.67	UZ	–
DU-068-020	51	2015-10-16 9:36	46.6644	-119.4650	17.41	3.64	–	–	< LOD	4.33	U	–
DU-068-021	50	2015-07-06 8:51	46.6644	-119.4638	17.84	3.25	Z	–	4.74	2.60	Z	–
DU-068-022	49	2015-07-06 8:49	46.6644	-119.4630	17.05	3.25	Z	–	< LOD	3.78	UZ	–
DU-068-023	44	2015-07-06 8:35	46.6651	-119.4674	17.50	3.30	Z	–	< LOD	3.84	UZ	–
DU-068-024	45	2015-07-06 8:39	46.6651	-119.4662	11.39	3.04	Z	–	< LOD	3.64	UZ	–
DU-068-025	46	2015-07-06 8:41	46.6650	-119.4654	11.08	2.81	Z	–	< LOD	3.36	UZ	–
DU-068-026	47	2015-07-06 8:44	46.6650	-119.4645	23.55	3.50	Z	–	< LOD	4.13	UZ	–
DU-068-027	48	2015-07-06 8:46	46.6649	-119.4636	114.83	6.61	Z	–	< LOD	7.42	UZ	–
DU-068-028	43	2015-07-06 8:33	46.6656	-119.4678	64.03	4.76	Z	–	12.08	3.80	Z	–
DU-068-029	42	2015-07-06 8:30	46.6655	-119.4668	22.41	3.89	Z	–	5.58	3.15	Z	–
DU-068-030	41	2015-07-06 8:27	46.6655	-119.4657	17.26	4.24	Z	–	< LOD	5.03	UZ	–
DU-068-031	40	2015-07-06 8:25	46.6656	-119.4647	20.65	3.51	Z	–	4.20	2.80	Z	–
DU-068-032	39	2015-07-06 8:22	46.6657	-119.4638	438.43	11.25	Z	–	44.74	8.73	Z	–
DU-068-033	32	2015-07-06 8:09	46.6662	-119.4672	21.30	3.39	Z	–	5.72	2.72	Z	–
DU-068-034	33	2015-07-06 8:12	46.6662	-119.4665	13.47	3.35	Z	–	< LOD	4.02	UZ	–
DU-068-035	34	2015-07-06 8:14	46.6662	-119.4657	12.78	2.96	Z	–	< LOD	3.48	UZ	–
DU-068-036	35	2015-07-06 8:17	46.6661	-119.4645	34.40	3.83	Z	–	4.94	3.01	Z	–
DU-068-037	36	2015-07-06 8:19	46.6662	-119.4636	2509.05	27.70	Z	–	310.07	21.68	Z	–
DU-069-001	90	2015-07-06 11:00	46.6594	-119.4680	13.69	3.08	Z	–	< LOD	3.64	UZ	–
DU-069-002	89	2015-07-06 10:57	46.6594	-119.4669	19.50	3.39	Z	–	< LOD	3.98	UZ	–
DU-069-003	88	2015-07-06 10:55	46.6593	-119.4659	11.68	2.90	Z	–	< LOD	3.45	UZ	–
DU-069-004	91	2015-07-06 11:03	46.6601	-119.4674	19.49	3.79	Z	–	< LOD	4.39	UZ	–
DU-069-005	92	2015-07-06 11:06	46.6600	-119.4665	22.45	3.54	Z	–	< LOD	4.12	UZ	–
DU-069-006	95	2015-07-06 11:13	46.6606	-119.4679	17.62	3.46	Z	–	5.80	2.81	Z	–
DU-069-007	94	2015-07-06 11:11	46.6606	-119.4669	14.77	3.67	Z	–	< LOD	4.37	UZ	–
DU-069-008	93	2015-07-06 11:08	46.6605	-119.4660	13.35	3.02	Z	–	4.25	2.43	Z	–
DU-069-009	96	2015-07-06 11:16	46.6611	-119.4674	17.60	3.50	Z	–	< LOD	4.15	UZ	–
DU-069-010	97	2015-07-06 11:18	46.6611	-119.4664	16.40	3.18	Z	–	< LOD	3.79	UZ	–
DU-069-011	100	2015-07-06 11:30	46.6617	-119.4678	19.75	3.29	Z	–	< LOD	3.88	UZ	–
DU-069-012	99	2015-07-06 11:28	46.6618	-119.4669	14.59	3.13	Z	–	< LOD	2.51	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-069-013	98	2015-07-06 11:25	46.6617	-119.4659	16.59	3.13	Z	–	< LOD	3.58	UZ	–
DU-069-014	101	2015-07-06 11:32	46.6623	-119.4674	14.75	3.11	Z	–	< LOD	3.70	UZ	–
DU-069-015	102	2015-07-06 11:35	46.6622	-119.4664	12.97	3.06	Z	–	< LOD	3.65	UZ	–
DU-070-001	127	2015-08-11 12:17	46.6710	-119.4625	10.00	3.58	–	–	< LOD	4.32	U	–
DU-070-002	128	2015-08-11 12:20	46.6709	-119.4616	15.43	3.51	–	–	< LOD	4.11	U	–
DU-070-003	129	2015-08-11 12:22	46.6710	-119.4606	12.26	3.83	–	–	< LOD	4.59	U	–
DU-070-004	130	2015-08-11 12:26	46.6709	-119.4597	15.93	3.25	–	–	4.67	2.62	–	–
DU-070-005	126	2015-08-11 12:15	46.6715	-119.4621	10.98	3.66	–	–	< LOD	4.50	U	–
DU-070-006	125	2015-08-11 12:12	46.6716	-119.4611	8.03	2.79	–	–	4.43	2.28	–	–
DU-070-007	124	2015-08-11 12:08	46.6715	-119.4602	11.95	3.09	–	–	< LOD	3.71	U	–
DU-070-008	123	2015-08-11 12:05	46.6716	-119.4592	16.47	3.07	–	–	4.15	2.45	–	–
DU-070-009	119	2015-08-11 11:52	46.6722	-119.4625	28.27	4.59	–	–	< LOD	5.39	U	–
DU-070-010	120	2015-08-11 11:54	46.6721	-119.4616	11.03	3.03	–	–	4.96	2.47	–	–
DU-070-011	121	2015-08-11 11:58	46.6721	-119.4607	10.64	3.27	–	–	< LOD	3.94	U	–
DU-070-012	122	2015-08-11 12:02	46.6721	-119.4596	52.26	4.22	–	–	< LOD	4.89	U	–
DU-070-013	99	2015-08-11 10:54	46.6728	-119.4630	12.49	2.99	–	–	< LOD	3.54	U	–
DU-070-014	100	2015-08-11 10:57	46.6727	-119.4621	14.10	2.90	–	–	< LOD	3.40	U	–
DU-070-015	101	2015-08-11 11:06	46.6726	-119.4611	6.04	2.80	–	–	< LOD	3.26	U	–
DU-070-016	102	2015-08-11 11:11	46.6727	-119.4601	34.37	3.91	–	–	< LOD	4.52	U	–
DU-070-017	98	2015-08-11 10:51	46.6733	-119.4625	16.26	3.72	–	–	< LOD	4.35	U	–
DU-070-018	118	2015-08-11 11:46	46.6732	-119.4616	14.91	6.27	–	–	< LOD	7.80	U	–
DU-070-019	103	2015-08-11 11:14	46.6731	-119.4605	30.80	4.33	–	–	< LOD	5.13	U	–
DU-070-020	97	2015-08-11 10:47	46.6739	-119.4620	15.06	2.64	–	–	< LOD	3.07	U	–
DU-070-021	117	2015-08-11 11:42	46.6738	-119.4612	23.36	5.56	–	–	< LOD	6.60	U	–
DU-070-022	104	2015-08-11 11:17	46.6738	-119.4601	32.98	3.84	–	–	10.50	3.16	–	–
DU-070-023	96	2015-08-11 10:44	46.6745	-119.4625	9.28	2.82	–	–	< LOD	3.33	U	–
DU-070-024	106	2015-08-11 11:25	46.6744	-119.4615	13.00	4.82	–	–	< LOD	5.82	U	–
DU-070-025	105	2015-08-11 11:22	46.6743	-119.4606	9.76	3.28	–	–	< LOD	3.88	U	–
DU-070-026	95	2015-08-11 10:41	46.6750	-119.4629	15.62	4.18	–	–	< LOD	5.07	U	–
DU-070-027	94	2015-08-11 10:33	46.6750	-119.4620	48.87	4.25	–	–	< LOD	4.88	U	–
DU-070-028	92	2015-08-11 10:26	46.6749	-119.4610	19.49	4.00	–	–	< LOD	4.59	U	–
DU-071-001	94	2015-10-07 12:02	46.6669	-119.4625	45.30	4.14	–	–	< LOD	4.78	U	–
DU-071-002	96	2015-10-07 12:05	46.6668	-119.4615	17.84	3.14	–	–	< LOD	3.63	U	–
DU-071-003	97	2015-10-07 12:08	46.6669	-119.4605	18.19	3.37	–	–	5.19	2.71	–	–
DU-071-004	98	2015-10-07 12:10	46.6669	-119.4596	10.71	2.77	–	–	< LOD	2.21	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-071-005	99	2015-10-07 12:13	46.6668	-119.4586	29.97	3.69	–	–	4.87	2.91	–	–
DU-071-006	100	2015-10-07 12:16	46.6669	-119.4576	13.03	3.12	–	–	< LOD	3.71	U	–
DU-071-007	105	2015-10-07 12:27	46.6675	-119.4620	26.02	3.79	–	–	5.62	3.02	–	–
DU-071-008	104	2015-10-07 12:25	46.6674	-119.4611	32.85	3.81	–	–	< LOD	4.48	U	–
DU-071-009	103	2015-10-07 12:23	46.6675	-119.4600	18.05	3.37	–	–	< LOD	3.96	U	–
DU-071-010	102	2015-10-07 12:20	46.6674	-119.4591	26.24	3.55	–	–	5.60	2.82	–	–
DU-071-011	101	2015-10-07 12:18	46.6674	-119.4581	17.81	3.17	–	–	6.34	2.59	–	–
DU-071-012	106	2015-10-07 12:30	46.6680	-119.4625	18.00	3.22	–	–	5.73	2.61	–	–
DU-071-013	107	2015-10-07 12:32	46.6680	-119.4615	23.13	3.41	–	–	< LOD	3.96	U	–
DU-071-014	108	2015-10-07 12:34	46.6680	-119.4605	10.79	2.84	–	–	4.03	2.29	–	–
DU-071-015	109	2015-10-07 12:37	46.6680	-119.4596	17.60	3.30	–	–	< LOD	3.85	U	–
DU-071-016	110	2015-10-07 12:39	46.6680	-119.4585	17.71	3.21	–	–	5.87	2.60	–	–
DU-071-017	111	2015-10-07 12:42	46.6681	-119.4576	20.79	3.30	–	–	< LOD	2.60	U	–
DU-071-018	126	2015-10-07 13:13	46.6687	-119.4620	104.52	5.86	–	–	7.64	4.50	–	–
DU-071-019	125	2015-10-07 13:10	46.6686	-119.4611	22.77	3.47	–	–	< LOD	4.11	U	–
DU-071-020	124	2015-10-07 13:07	46.6686	-119.4600	11.54	3.26	–	–	< LOD	3.95	U	–
DU-071-021	113	2015-10-07 12:47	46.6686	-119.4590	31.11	3.58	–	–	< LOD	4.19	U	–
DU-071-022	112	2015-10-07 12:44	46.6687	-119.4581	11.44	3.05	–	–	< LOD	2.45	U	–
DU-071-023	127	2015-10-07 13:15	46.6693	-119.4625	75.69	4.84	–	–	< LOD	5.54	U	–
DU-071-024	128	2015-10-07 13:17	46.6692	-119.4615	29.51	3.88	–	–	< LOD	4.58	U	–
DU-071-025	132	2015-10-07 13:25	46.6692	-119.4605	19.84	3.79	–	–	< LOD	4.48	U	–
DU-071-026	133	2015-10-07 13:27	46.6692	-119.4595	18.87	3.28	–	–	< LOD	3.84	U	–
DU-071-027	134	2015-10-07 13:30	46.6692	-119.4586	18.75	3.21	–	–	< LOD	3.73	U	–
DU-071-028	139	2015-10-07 13:43	46.6698	-119.4621	115.63	6.81	–	–	12.00	5.31	–	–
DU-071-029	138	2015-10-07 13:41	46.6698	-119.4611	12.36	3.30	–	–	4.73	2.69	–	–
DU-071-030	137	2015-10-07 13:38	46.6697	-119.4601	17.88	3.16	–	–	< LOD	3.70	U	–
DU-071-031	136	2015-10-07 13:36	46.6697	-119.4592	14.94	3.04	–	–	< LOD	3.61	U	–
DU-071-032	135	2015-10-07 13:32	46.6698	-119.4580	26.90	3.75	–	–	5.36	2.99	–	–
DU-071-033	140	2015-10-07 13:46	46.6704	-119.4625	50.12	4.38	–	–	6.84	3.44	–	–
DU-071-034	141	2015-10-07 13:49	46.6704	-119.4615	60.77	4.28	–	–	11.56	3.43	–	–
DU-071-035	143	2015-10-07 13:53	46.6704	-119.4605	16.27	3.17	–	–	< LOD	3.75	U	–
DU-071-036	144	2015-10-07 13:55	46.6704	-119.4595	18.16	3.59	–	–	< LOD	4.23	U	–
DU-071-037	145	2015-10-07 14:01	46.6703	-119.4585	30.42	4.21	–	–	6.52	3.40	–	–
DU-072-001	290	2015-08-06 11:20	46.6631	-119.4622	15.98	3.25	–	–	< LOD	3.88	U	–
DU-072-002	289	2015-08-06 11:17	46.6632	-119.4613	24.98	3.36	–	–	< LOD	3.93	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-072-003	288	2015-08-06 11:15	46.6631	-119.4602	102.34	5.67	–	–	6.97	4.34	–	–
DU-072-004	287	2015-08-06 11:11	46.6631	-119.4590	19.29	3.48	–	–	< LOD	4.15	U	–
DU-072-005	285	2015-08-06 11:07	46.6630	-119.4576	26.24	3.76	–	–	< LOD	4.46	U	–
DU-072-006	291	2015-08-06 11:24	46.6638	-119.4627	14.15	3.05	–	–	< LOD	3.59	U	–
DU-072-007	292	2015-08-06 11:26	46.6638	-119.4616	22.00	3.31	–	–	5.26	2.64	–	–
DU-072-008	293	2015-08-06 11:29	46.6637	-119.4607	59.32	5.00	–	–	< LOD	5.75	U	–
DU-072-009	294	2015-08-06 11:31	46.6638	-119.4597	13.32	4.10	–	–	< LOD	4.95	U	–
DU-072-010	295	2015-08-06 11:33	46.6637	-119.4587	334.65	10.56	–	–	59.44	8.46	–	–
DU-072-011	296	2015-08-06 11:38	46.6637	-119.4576	42.89	4.42	–	–	< LOD	5.15	U	–
DU-072-012	301	2015-08-06 11:51	46.6644	-119.4622	20.83	3.23	–	–	< LOD	2.55	U	–
DU-072-013	300	2015-08-06 11:49	46.6644	-119.4611	13.07	2.98	–	–	< LOD	3.54	U	–
DU-072-014	299	2015-08-06 11:46	46.6643	-119.4601	15.05	4.56	–	–	< LOD	5.47	U	–
DU-072-015	298	2015-08-06 11:44	46.6643	-119.4592	30.17	5.14	–	–	< LOD	6.05	U	–
DU-072-016	297	2015-08-06 11:40	46.6643	-119.4582	116.95	6.93	–	–	10.30	5.37	–	–
DU-072-017	309	2015-08-06 12:04	46.6650	-119.4626	11.88	3.43	–	–	< LOD	4.09	U	–
DU-072-018	310	2015-08-06 12:07	46.6649	-119.4616	35.84	4.46	–	–	< LOD	5.30	U	–
DU-072-019	311	2015-08-06 12:09	46.6649	-119.4606	66.52	5.55	–	–	< LOD	6.45	U	–
DU-072-020	312	2015-08-06 12:12	46.6649	-119.4596	17.33	3.10	–	–	5.76	2.51	–	–
DU-072-021	313	2015-08-06 12:14	46.6650	-119.4586	173.17	7.06	–	–	< LOD	8.03	U	–
DU-072-022	314	2015-08-06 12:17	46.6650	-119.4576	74.21	6.05	–	–	< LOD	6.97	U	–
DU-072-023	319	2015-08-06 12:28	46.6655	-119.4621	25.65	4.01	–	–	< LOD	4.77	U	–
DU-072-024	318	2015-08-06 12:26	46.6655	-119.4611	1047.98	16.98	–	–	121.00	13.24	–	–
DU-072-025	317	2015-08-06 12:23	46.6655	-119.4602	72.39	5.41	–	–	< LOD	6.12	U	–
DU-072-026	316	2015-08-06 12:21	46.6655	-119.4592	214.25	8.10	–	–	10.85	6.15	–	–
DU-072-027	315	2015-08-06 12:19	46.6655	-119.4582	377.45	10.26	–	–	45.87	8.03	–	–
DU-072-028	320	2015-08-06 12:31	46.6661	-119.4626	29.59	3.92	–	–	< LOD	4.60	U	–
DU-072-029	321	2015-08-06 12:33	46.6662	-119.4616	87.55	6.13	–	–	10.08	4.80	–	–
DU-072-030	322	2015-08-06 12:35	46.6661	-119.4606	972.40	20.19	–	–	58.73	15.37	–	–
DU-072-031	323	2015-08-06 12:38	46.6661	-119.4596	21.90	3.45	–	–	< LOD	4.03	U	–
DU-072-032	324	2015-08-06 12:40	46.6661	-119.4586	192.47	8.34	–	–	22.71	6.52	–	–
DU-072-033	325	2015-08-06 12:42	46.6661	-119.4576	98.90	6.32	–	–	7.93	4.88	–	–
DU-073-001	218	2015-08-06 8:20	46.6581	-119.4629	15.34	3.70	–	–	< LOD	4.41	U	–
DU-073-002	220	2015-08-06 8:24	46.6581	-119.4619	661.76	14.01	–	–	51.85	10.75	–	–
DU-073-003	221	2015-08-06 8:26	46.6581	-119.4610	38.57	4.01	–	–	< LOD	4.64	U	–
DU-073-004	222	2015-08-06 8:29	46.6580	-119.4600	15.91	3.77	–	–	< LOD	4.57	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-073-005	223	2015-08-06 8:31	46.6580	-119.4589	15.61	3.47	–	–	4.78	2.81	–	–
DU-073-006	224	2015-08-06 8:34	46.6581	-119.4580	11.69	2.88	–	–	< LOD	3.41	U	–
DU-073-007	231	2015-08-06 8:52	46.6586	-119.4623	348.79	9.92	–	–	25.80	7.60	–	–
DU-073-008	230	2015-08-06 8:50	46.6586	-119.4614	71.31	5.62	–	–	8.75	4.41	–	–
DU-073-009	229	2015-08-06 8:47	46.6586	-119.4604	39.31	4.54	–	–	6.62	3.61	–	–
DU-073-010	228	2015-08-06 8:45	46.6586	-119.4594	12.62	3.06	–	–	< LOD	3.60	U	–
DU-073-011	225	2015-08-06 8:36	46.6585	-119.4584	14.38	3.07	–	–	< LOD	3.65	U	–
DU-073-012	232	2016-05-11 13:42	46.6592	-119.4638	12.17	2.89	–	–	< LOD	3.40	U	–
DU-073-013	233	2015-08-06 8:57	46.6592	-119.4628	18.55	3.57	–	–	< LOD	4.13	U	–
DU-073-014	234	2015-08-06 8:59	46.6592	-119.4619	269.61	9.19	–	–	< LOD	10.41	U	–
DU-073-015	235	2015-08-06 9:02	46.6591	-119.4608	173.63	7.55	–	–	< LOD	8.23	U	–
DU-073-016	246	2015-08-06 9:21	46.6597	-119.4631	18.43	3.31	–	–	6.27	2.69	–	–
DU-073-017	238	2015-08-06 9:08	46.6598	-119.4621	451.49	11.07	–	–	19.03	8.36	–	–
DU-073-018	237	2015-08-06 9:06	46.6597	-119.4612	35.40	4.03	–	–	< LOD	4.68	U	–
DU-073-019	236	2015-08-06 9:04	46.6596	-119.4605	391.99	11.02	–	–	60.63	8.74	–	–
DU-073-020	247	2015-08-06 9:24	46.6603	-119.4638	18.21	3.34	–	–	< LOD	3.96	U	–
DU-073-021	248	2015-08-06 9:26	46.6603	-119.4630	22.46	4.15	–	–	< LOD	4.92	U	–
DU-073-022	249	2015-08-06 9:29	46.6603	-119.4619	631.53	12.87	–	–	52.19	9.89	–	–
DU-073-023	250	2015-08-06 9:31	46.6603	-119.4609	215.75	9.57	–	–	30.19	7.56	–	–
DU-073-024	253	2015-08-06 9:38	46.6609	-119.4621	148.02	7.29	–	–	14.89	5.66	–	–
DU-073-025	252	2015-08-06 9:36	46.6608	-119.4613	725.74	15.54	–	–	42.74	11.82	–	–
DU-073-026	251	2015-08-06 9:34	46.6609	-119.4604	105.75	5.72	–	–	14.87	4.51	–	–
DU-073-027	256	2015-08-06 9:46	46.6614	-119.4627	124.04	6.78	–	–	8.69	5.20	–	–
DU-073-028	257	2015-08-06 9:48	46.6615	-119.4616	64.35	4.57	–	–	5.66	3.52	–	–
DU-073-029	258	2015-08-06 9:51	46.6615	-119.4609	59.11	5.45	–	–	< LOD	6.28	U	–
DU-073-030	261	2015-08-06 9:58	46.6620	-119.4620	34.34	4.06	–	–	5.64	3.21	–	–
DU-073-031	260	2015-08-06 9:56	46.6620	-119.4612	68.41	5.46	–	–	7.05	4.26	–	–
DU-073-032	259	2015-08-06 9:53	46.6620	-119.4603	39.13	4.47	–	–	< LOD	5.22	U	–
DU-073-033	262	2015-08-06 10:00	46.6626	-119.4628	26.79	4.21	–	–	14.37	3.58	–	–
DU-073-034	263	2015-08-06 10:02	46.6626	-119.4619	128.05	7.21	–	–	10.07	5.57	–	–
DU-073-035	264	2015-08-06 10:05	46.6626	-119.4607	36.03	4.68	–	–	6.52	3.77	–	–
DU-074-001	78	2015-10-07 10:50	46.6576	-119.4548	28.18	3.52	–	–	< LOD	4.11	U	–
DU-074-002	75	2015-10-07 10:40	46.6587	-119.4549	44.55	4.00	–	–	8.20	3.17	–	–
DU-074-003	79	2015-10-07 11:00	46.6629	-119.4573	14.16	3.01	–	–	< LOD	2.40	U	–
DU-074-004	73	2015-10-07 10:32	46.6629	-119.4563	16.94	3.79	–	–	< LOD	4.48	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-074-005	72	2015-10-07 10:29	46.6629	-119.4553	20.25	3.32	–	–	< LOD	3.89	U	–
DU-074-006	70	2015-10-07 10:24	46.6634	-119.4568	20.84	3.16	–	–	< LOD	3.67	U	–
DU-074-007	71	2015-10-07 10:26	46.6634	-119.4558	30.88	3.80	–	–	< LOD	4.43	U	–
DU-074-008	69	2015-10-07 10:22	46.6640	-119.4573	35.13	3.85	–	–	5.22	3.03	–	–
DU-074-009	68	2015-10-07 10:19	46.6641	-119.4563	69.60	4.82	–	–	< LOD	5.55	U	–
DU-074-010	67	2015-10-07 10:17	46.6640	-119.4553	184.39	6.87	–	–	14.11	5.27	–	–
DU-074-011	65	2015-10-07 10:11	46.6647	-119.4568	30.35	3.71	–	–	14.33	3.14	–	–
DU-074-012	66	2015-10-07 10:14	46.6646	-119.4557	61.59	4.68	–	–	8.54	3.68	–	–
DU-074-013	64	2015-10-07 10:09	46.6652	-119.4572	58.46	4.69	–	–	8.74	3.70	–	–
DU-074-014	63	2015-10-07 10:06	46.6652	-119.4563	34.44	3.86	–	–	6.32	3.06	–	–
DU-074-015	62	2015-10-07 10:04	46.6652	-119.4553	17.95	3.15	–	–	5.61	2.53	–	–
DU-074-016	53	2015-10-07 9:45	46.6658	-119.4567	41.26	3.92	–	–	4.61	3.05	–	–
DU-074-017	61	2015-10-07 10:01	46.6658	-119.4558	21.21	3.36	–	–	< LOD	4.00	U	–
DU-074-018	52	2015-10-07 9:42	46.6664	-119.4572	21.12	3.36	–	–	< LOD	3.99	U	–
DU-074-019	51	2015-10-07 9:40	46.6664	-119.4562	10.92	3.16	–	–	< LOD	3.82	U	–
DU-074-020	50	2015-10-07 9:36	46.6664	-119.4552	18.59	3.18	–	–	4.90	2.54	–	–
DU-074-021	48	2015-10-07 9:32	46.6670	-119.4567	8.90	2.78	–	–	4.01	2.26	–	–
DU-074-022	49	2015-10-07 9:34	46.6670	-119.4558	18.66	3.18	–	–	< LOD	2.52	U	–
DU-074-023	47	2015-10-07 9:29	46.6676	-119.4572	13.30	3.13	–	–	4.06	2.51	–	–
DU-074-024	44	2015-10-07 9:08	46.6676	-119.4562	16.07	3.17	–	–	< LOD	3.75	U	–
DU-074-025	43	2015-10-07 9:05	46.6676	-119.4552	17.53	3.17	–	–	< LOD	3.76	U	–
DU-074-026	41	2015-10-07 9:00	46.6682	-119.4567	16.09	3.10	–	–	4.92	2.50	–	–
DU-074-027	42	2015-10-07 9:03	46.6682	-119.4557	23.64	3.72	–	–	< LOD	4.33	U	–
DU-074-028	40	2015-10-07 8:58	46.6688	-119.4573	24.45	3.49	–	–	< LOD	4.07	U	–
DU-074-029	39	2015-10-07 8:55	46.6688	-119.4561	20.08	3.18	–	–	< LOD	3.77	U	–
DU-074-030	37	2015-10-07 8:52	46.6692	-119.4568	11.07	3.07	–	–	< LOD	3.68	U	–
DU-074-031	46	2015-10-07 9:22	46.6694	-119.4567	48.28	4.64	–	–	6.78	3.66	–	–
DU-074-032	45	2015-10-07 9:15	46.6695	-119.4575	12.77	3.18	–	–	< LOD	3.78	U	–
DU-075-001	102	2015-10-14 12:17	46.6651	-119.4541	102.42	6.59	–	–	16.48	5.24	–	–
DU-075-002	104	2015-10-14 12:22	46.6651	-119.4531	61.18	4.35	–	–	13.86	3.51	–	–
DU-075-003	105	2015-10-14 12:24	46.6651	-119.4521	26.63	3.45	–	–	4.61	2.72	–	–
DU-075-004	106	2015-10-14 12:27	46.6650	-119.4511	51.80	4.45	–	–	< LOD	5.15	U	–
DU-075-005	107	2015-10-14 12:29	46.6650	-119.4502	113.78	6.19	–	–	8.85	4.76	–	–
DU-075-006	108	2015-10-14 12:33	46.6650	-119.4492	50.61	5.22	–	–	8.13	4.15	–	–
DU-075-007	113	2015-10-14 12:47	46.6657	-119.4546	29.65	3.58	–	–	6.44	2.86	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-075-008	112	2015-10-14 12:44	46.6657	-119.4535	46.66	4.24	–	–	< LOD	4.93	U	–
DU-075-009	111	2015-10-14 12:42	46.6657	-119.4527	20.46	3.32	–	–	4.42	2.64	–	–
DU-075-010	110	2015-10-14 12:39	46.6656	-119.4517	92.38	5.41	–	–	9.12	4.20	–	–
DU-075-011	109	2015-10-14 12:36	46.6656	-119.4507	72.06	5.39	–	–	< LOD	6.17	U	–
DU-075-012	114	2015-10-14 12:49	46.6663	-119.4540	188.88	7.51	–	–	18.13	5.81	–	–
DU-075-013	115	2015-10-14 12:53	46.6662	-119.4531	22.19	3.26	–	–	< LOD	3.80	U	–
DU-075-014	116	2015-10-14 12:55	46.6662	-119.4521	21.09	3.28	–	–	4.18	2.60	–	–
DU-075-015	117	2015-10-14 12:58	46.6661	-119.4512	54.65	4.37	–	–	6.11	3.41	–	–
DU-075-016	122	2015-10-14 13:16	46.6668	-119.4545	33.35	3.81	–	–	< LOD	4.48	U	–
DU-075-017	121	2015-10-14 13:13	46.6668	-119.4535	20.76	3.93	–	–	4.81	3.16	–	–
DU-075-018	118	2015-10-14 13:03	46.6668	-119.4526	21.18	3.31	–	–	< LOD	3.92	U	–
DU-075-019	120	2015-10-14 13:10	46.6674	-119.4541	14.35	3.20	–	–	< LOD	3.85	U	–
DU-075-020	119	2015-10-14 13:07	46.6674	-119.4531	22.91	3.53	–	–	4.36	2.81	–	–
DU-076-001	36	2015-10-23 9:11	46.6578	-119.4536	30.85	3.66	–	–	< LOD	4.25	U	–
DU-076-002	38	2015-10-23 9:16	46.6578	-119.4525	16.29	3.12	–	–	< LOD	3.70	U	–
DU-076-003	40	2015-10-23 9:21	46.6584	-119.4540	62.82	4.39	–	–	5.45	3.39	–	–
DU-076-004	39	2015-10-23 9:18	46.6584	-119.4530	129.17	6.67	–	–	8.00	5.10	–	–
DU-076-005	41	2015-10-23 9:24	46.6591	-119.4545	39.86	3.72	–	–	7.33	2.95	–	–
DU-076-006	42	2015-10-23 9:27	46.6590	-119.4535	36.62	3.65	–	–	< LOD	4.21	U	–
DU-076-007	43	2015-10-23 9:29	46.6596	-119.4541	37.09	3.66	–	–	6.42	2.90	–	–
DU-076-008	44	2015-10-23 9:32	46.6596	-119.4530	134.26	6.08	–	–	61.71	5.33	–	–
DU-076-009	45	2015-10-23 9:35	46.6596	-119.4519	14.92	2.98	–	–	4.19	2.38	–	–
DU-076-010	48	2015-10-23 9:46	46.6602	-119.4545	11.54	3.39	–	–	< LOD	4.10	U	–
DU-076-011	47	2015-10-23 9:42	46.6599	-119.4534	72.75	4.59	–	–	19.10	3.75	–	–
DU-076-012	46	2015-10-23 9:40	46.6599	-119.4525	33.48	3.76	–	–	9.00	3.04	–	–
DU-076-013	49	2015-10-23 9:49	46.6609	-119.4548	19.36	3.38	–	–	13.41	2.92	–	–
DU-076-014	52	2015-10-23 9:56	46.6613	-119.4532	29.02	3.63	–	–	18.45	3.17	–	–
DU-076-015	77	2015-10-23 11:15	46.6614	-119.4520	14.22	3.00	–	–	5.14	2.43	–	–
DU-076-016	50	2015-10-23 9:51	46.6614	-119.4545	14.79	3.11	–	–	6.10	2.53	–	–
DU-076-017	51	2015-10-23 9:54	46.6614	-119.4536	14.73	3.15	–	–	< LOD	3.70	U	–
DU-076-018	53	2015-10-23 9:59	46.6614	-119.4525	17.02	3.64	–	–	5.05	2.94	–	–
DU-076-019	63	2015-10-23 10:23	46.6620	-119.4539	30.51	4.07	–	–	12.41	3.41	–	–
DU-076-020	62	2015-10-23 10:18	46.6619	-119.4530	54.25	4.34	–	–	13.23	3.51	–	–
DU-076-021	54	2015-10-23 10:02	46.6619	-119.4519	32.42	3.82	–	–	8.39	3.08	–	–
DU-076-022	64	2015-10-23 10:32	46.6626	-119.4544	93.21	5.23	–	–	9.61	4.05	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-076-023	65	2015-10-23 10:35	46.6626	-119.4535	35.95	3.81	–	–	8.67	3.07	–	–
DU-076-024	66	2015-10-23 10:39	46.6627	-119.4524	14.23	3.67	–	–	10.03	3.15	–	–
DU-076-025	69	2015-10-23 10:46	46.6632	-119.4539	160.39	6.61	–	–	36.17	5.37	–	–
DU-076-026	68	2015-10-23 10:44	46.6632	-119.4529	127.51	6.01	–	–	17.47	4.72	–	–
DU-076-027	67	2015-10-23 10:42	46.6632	-119.4519	45.28	4.16	–	–	16.64	3.48	–	–
DU-076-028	71	2015-10-23 10:52	46.6638	-119.4544	113.67	5.71	–	–	15.89	4.49	–	–
DU-076-029	72	2015-10-23 10:55	46.6638	-119.4536	54.83	4.80	–	–	14.80	3.92	–	–
DU-076-030	73	2015-10-23 10:57	46.6637	-119.4525	48.97	4.20	–	–	17.87	3.50	–	–
DU-076-031	76	2015-10-23 11:06	46.6645	-119.4539	24.49	3.57	–	–	10.81	2.98	–	–
DU-076-032	75	2015-10-23 11:03	46.6645	-119.4529	106.65	5.61	–	–	20.31	4.49	–	–
DU-076-033	74	2015-10-23 11:01	46.6644	-119.4519	40.95	3.88	–	–	9.14	3.11	–	–
DU-077-001	30	2015-10-19 9:15	46.6664	-119.5116	6.52	3.70	–	–	5.30	3.13	–	–
DU-077-002	32	2015-10-19 9:18	46.6665	-119.5104	15.22	3.71	–	–	< LOD	4.43	U	–
DU-077-003	33	2015-10-19 9:21	46.6665	-119.5094	14.21	2.98	–	–	< LOD	2.37	U	–
DU-077-004	34	2015-10-19 9:23	46.6664	-119.5085	10.79	2.79	–	–	< LOD	3.34	U	–
DU-077-005	39	2015-10-19 9:37	46.6671	-119.5120	18.90	3.37	–	–	< LOD	3.88	U	–
DU-077-006	38	2015-10-19 9:34	46.6671	-119.5109	16.24	3.11	–	–	4.66	2.49	–	–
DU-077-007	37	2015-10-19 9:32	46.6671	-119.5100	34.84	3.64	–	–	6.71	2.89	–	–
DU-077-008	36	2015-10-19 9:29	46.6671	-119.5090	16.73	3.07	–	–	< LOD	3.56	U	–
DU-077-009	35	2015-10-19 9:26	46.6670	-119.5080	17.29	3.09	–	–	< LOD	3.64	U	–
DU-077-010	40	2015-10-19 9:40	46.6677	-119.5115	11.83	3.03	–	–	4.63	2.45	–	–
DU-077-011	41	2015-10-19 9:42	46.6677	-119.5105	13.25	2.91	–	–	< LOD	3.47	U	–
DU-077-012	42	2015-10-19 9:45	46.6677	-119.5094	14.30	3.03	–	–	< LOD	3.52	U	–
DU-077-013	43	2015-10-19 9:48	46.6677	-119.5085	16.87	3.07	–	–	< LOD	3.62	U	–
DU-077-014	49	2015-10-19 10:01	46.6683	-119.5120	13.28	2.92	–	–	< LOD	3.43	U	–
DU-077-015	48	2015-10-19 9:58	46.6682	-119.5110	18.36	3.17	–	–	4.77	2.54	–	–
DU-077-016	47	2015-10-19 9:56	46.6682	-119.5100	18.22	3.28	–	–	< LOD	3.89	U	–
DU-077-017	46	2015-10-19 9:53	46.6683	-119.5090	14.90	3.01	–	–	4.93	2.42	–	–
DU-077-018	44	2015-10-19 9:50	46.6682	-119.5080	14.95	3.20	–	–	< LOD	3.73	U	–
DU-077-019	50	2015-10-19 10:04	46.6689	-119.5104	11.11	2.92	–	–	< LOD	2.35	U	–
DU-077-020	58	2015-10-19 10:19	46.6689	-119.5095	13.92	2.95	–	–	< LOD	3.51	U	–
DU-077-021	59	2015-10-19 10:21	46.6688	-119.5085	14.32	3.05	–	–	< LOD	3.61	U	–
DU-077-022	62	2015-10-19 10:28	46.6694	-119.5100	13.68	2.96	–	–	4.84	2.38	–	–
DU-077-023	61	2015-10-19 10:26	46.6695	-119.5090	12.35	2.97	–	–	< LOD	3.48	U	–
DU-077-024	60	2015-10-19 10:23	46.6694	-119.5079	10.17	2.97	–	–	< LOD	3.55	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-077-025	63	2015-10-19 10:30	46.6701	-119.5105	17.34	3.05	–	–	< LOD	3.51	U	–
DU-077-026	64	2015-10-19 10:33	46.6700	-119.5095	12.87	2.89	–	–	< LOD	3.43	U	–
DU-077-027	65	2015-10-19 10:35	46.6700	-119.5085	13.66	2.90	–	–	< LOD	3.39	U	–
DU-077-028	68	2015-10-19 10:43	46.6707	-119.5099	14.05	3.02	–	–	< LOD	2.41	U	–
DU-077-029	67	2015-10-19 10:40	46.6707	-119.5089	15.40	3.19	–	–	< LOD	3.79	U	–
DU-077-030	66	2015-10-19 10:38	46.6706	-119.5079	13.68	3.23	–	–	5.40	2.61	–	–
DU-077-031	69	2015-10-19 10:45	46.6713	-119.5105	13.00	2.99	–	–	< LOD	3.52	U	–
DU-077-032	70	2015-10-19 10:48	46.6712	-119.5094	14.89	3.12	–	–	< LOD	3.65	U	–
DU-077-033	71	2015-10-19 10:51	46.6712	-119.5085	10.78	2.92	–	–	4.87	2.38	–	–
DU-077-034	73	2015-10-19 10:56	46.6718	-119.5100	14.55	3.03	–	–	< LOD	3.60	U	–
DU-077-035	72	2015-10-19 10:53	46.6718	-119.5090	11.85	2.93	–	–	< LOD	3.49	U	–
DU-077-036	74	2015-10-19 11:00	46.6724	-119.5125	16.97	3.54	–	–	4.49	2.85	–	–
DU-077-037	75	2015-10-19 11:02	46.6724	-119.5114	13.16	3.07	–	–	6.06	2.52	–	–
DU-077-038	76	2015-10-19 11:05	46.6724	-119.5104	15.14	3.07	–	–	< LOD	3.64	U	–
DU-078-001	303	2015-09-03 13:04	46.6653	-119.5104	12.47	4.78	–	–	< LOD	5.84	U	–
DU-078-002	302	2015-09-03 13:01	46.6654	-119.5097	13.19	5.40	–	–	< LOD	6.70	U	–
DU-078-003	301	2015-09-03 12:58	46.6655	-119.5088	27.91	3.40	–	–	< LOD	3.95	U	–
DU-078-004	300	2015-09-03 12:56	46.6654	-119.5080	14.83	4.19	–	–	< LOD	4.99	U	–
DU-078-005	291	2015-09-03 12:41	46.6654	-119.5072	19.55	4.09	–	–	< LOD	4.83	U	–
DU-078-006	290	2015-09-03 12:39	46.6654	-119.5064	33.42	5.68	–	–	< LOD	6.74	U	–
DU-078-007	289	2015-09-03 12:36	46.6653	-119.5057	25.92	3.65	–	–	< LOD	4.31	U	–
DU-078-008	304	2015-09-03 13:06	46.6659	-119.5102	19.52	3.43	–	–	< LOD	3.95	U	–
DU-078-009	305	2015-09-03 13:09	46.6658	-119.5094	11.57	2.97	–	–	4.36	2.41	–	–
DU-078-010	306	2015-09-03 13:11	46.6658	-119.5085	20.58	5.74	–	–	< LOD	6.90	U	–
DU-078-011	307	2015-09-03 13:13	46.6658	-119.5077	13.57	4.44	–	–	< LOD	5.41	U	–
DU-078-012	308	2015-09-03 13:15	46.6658	-119.5069	12.99	3.82	–	–	< LOD	4.60	U	–
DU-078-013	309	2015-09-03 13:18	46.6658	-119.5061	14.66	3.57	–	–	< LOD	4.22	U	–
DU-079-001	239	2015-09-03 10:29	46.6614	-119.5097	373.71	10.17	–	–	25.94	7.77	–	–
DU-079-002	238	2015-09-03 10:27	46.6613	-119.5087	225.81	8.21	–	–	< LOD	9.30	U	–
DU-079-003	237	2015-09-03 10:23	46.6613	-119.5077	333.60	13.99	–	–	< LOD	15.52	U	–
DU-079-004	236	2015-09-03 10:20	46.6613	-119.5068	219.18	11.16	–	–	16.72	8.61	–	–
DU-079-005	234	2015-09-03 10:14	46.6613	-119.5057	764.27	19.23	–	–	50.36	14.69	–	–
DU-079-006	240	2015-09-03 10:32	46.6619	-119.5103	194.70	11.59	–	–	< LOD	13.31	U	–
DU-079-007	241	2015-09-03 10:34	46.6619	-119.5093	312.73	12.71	–	–	< LOD	14.35	U	–
DU-079-008	242	2015-09-03 10:37	46.6619	-119.5083	239.50	10.64	–	–	< LOD	11.98	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-079-009	243	2015-09-03 10:39	46.6619	-119.5073	233.65	13.72	–	–	< LOD	15.42	U	–
DU-079-010	244	2015-09-03 10:42	46.6619	-119.5063	269.94	17.99	–	–	< LOD	20.72	U	–
DU-079-011	245	2015-09-03 10:44	46.6619	-119.5054	1446.88	24.06	–	–	228.51	19.13	–	–
DU-079-012	250	2015-09-03 10:55	46.6625	-119.5097	626.75	21.90	–	–	< LOD	24.56	U	–
DU-079-013	249	2015-09-03 10:53	46.6625	-119.5087	527.00	24.05	–	–	36.21	18.50	–	–
DU-079-014	248	2015-09-03 10:51	46.6624	-119.5077	352.12	12.84	–	–	35.15	9.98	–	–
DU-079-015	247	2015-09-03 10:49	46.6624	-119.5068	103.86	10.68	–	–	< LOD	12.66	U	–
DU-079-016	246	2015-09-03 10:46	46.6625	-119.5059	372.43	12.40	–	–	40.41	9.66	–	–
DU-079-017	251	2015-09-03 10:58	46.6630	-119.5103	529.50	14.81	–	–	35.74	11.32	–	–
DU-079-018	252	2015-09-03 11:00	46.6631	-119.5093	567.51	14.11	–	–	50.15	10.88	–	–
DU-079-019	253	2015-09-03 11:03	46.6632	-119.5083	517.83	21.92	–	–	< LOD	24.93	U	–
DU-079-020	266	2015-09-03 11:33	46.6631	-119.5072	24.09	3.90	–	–	< LOD	4.62	U	–
DU-079-021	267	2015-09-03 11:35	46.6631	-119.5063	198.37	9.47	–	–	25.45	7.46	–	–
DU-079-022	268	2015-09-03 11:38	46.6631	-119.5054	505.87	13.47	–	–	61.32	10.54	–	–
DU-079-023	264	2015-09-03 11:25	46.6636	-119.5096	522.82	13.93	–	–	43.13	10.71	–	–
DU-079-024	263	2015-09-03 11:21	46.6637	-119.5087	1819.01	24.78	–	–	172.78	19.15	–	–
DU-079-025	262	2015-09-03 11:19	46.6636	-119.5078	342.22	13.01	–	–	< LOD	14.74	U	–
DU-079-026	265	2015-09-03 11:30	46.6637	-119.5068	893.37	17.19	–	–	61.30	13.13	–	–
DU-079-027	269	2015-09-03 11:42	46.6636	-119.5058	461.79	11.43	–	–	33.25	8.74	–	–
DU-079-028	275	2015-09-03 11:58	46.6643	-119.5101	225.65	14.85	–	–	< LOD	16.88	U	–
DU-079-029	274	2015-09-03 11:55	46.6643	-119.5092	360.04	17.24	–	–	< LOD	19.50	U	–
DU-079-030	273	2015-09-03 11:52	46.6642	-119.5083	131.59	9.54	–	–	< LOD	10.81	U	–
DU-079-031	272	2015-09-03 11:49	46.6643	-119.5072	651.40	24.93	–	–	42.94	19.11	–	–
DU-079-032	271	2015-09-03 11:46	46.6643	-119.5061	25.30	5.75	–	–	< LOD	7.02	U	–
DU-079-033	270	2015-09-03 11:44	46.6643	-119.5053	78.08	8.61	–	–	< LOD	9.94	U	–
DU-079-034	276	2015-09-03 12:00	46.6648	-119.5097	212.49	7.65	–	–	15.54	5.86	–	–
DU-079-035	277	2015-09-03 12:04	46.6648	-119.5088	58.85	4.78	–	–	6.81	3.74	–	–
DU-079-036	278	2015-09-03 12:13	46.6648	-119.5078	149.67	8.83	–	–	21.29	6.99	–	–
DU-079-037	279	2015-09-03 12:16	46.6649	-119.5068	221.31	16.61	–	–	< LOD	19.22	U	–
DU-079-038	280	2015-09-03 12:19	46.6649	-119.5059	24.33	4.79	–	–	< LOD	5.85	U	–
DU-080-001	203	2015-09-03 9:03	46.6562	-119.5043	15.87	3.64	Z	–	6.26	3.00	Z	–
DU-080-002	202	2015-09-03 9:01	46.6563	-119.5038	18.67	4.90	Z	–	< LOD	5.94	UZ	–
DU-080-003	200	2015-09-03 8:57	46.6563	-119.5031	26.39	4.62	–	–	< LOD	5.38	U	–
DU-080-004	204	2015-09-03 9:05	46.6566	-119.5047	22.13	4.67	Z	–	< LOD	5.53	UZ	–
DU-080-005	205	2015-09-03 9:07	46.6567	-119.5042	30.00	5.66	Z	–	< LOD	6.61	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-080-006	206	2015-09-03 9:09	46.6566	-119.5034	25.55	4.54	Z	–	5.78	3.68	Z	–
DU-080-007	207	2015-09-03 9:11	46.6566	-119.5028	18.11	3.33	Z	–	< LOD	3.85	UZ	–
DU-080-008	211	2015-09-03 9:20	46.6570	-119.5050	15.01	3.46	Z	–	< LOD	4.14	UZ	–
DU-080-009	210	2015-09-03 9:18	46.6571	-119.5043	34.56	4.83	Z	–	< LOD	5.67	UZ	–
DU-080-010	209	2015-09-03 9:16	46.6571	-119.5037	13.81	4.63	Z	–	< LOD	5.75	UZ	–
DU-080-011	208	2015-09-03 9:14	46.6571	-119.5031	14.33	4.43	Z	–	< LOD	5.26	UZ	–
DU-080-012	212	2015-09-03 9:23	46.6575	-119.5047	9.96	4.64	Z	–	< LOD	5.65	UZ	–
DU-080-013	213	2015-09-03 9:25	46.6575	-119.5041	14.07	4.16	Z	–	< LOD	5.06	UZ	–
DU-080-014	214	2015-09-03 9:27	46.6574	-119.5034	20.52	4.44	Z	–	5.72	3.65	Z	–
DU-080-015	218	2015-09-03 9:37	46.6574	-119.5028	8.68	5.61	Z	–	< LOD	7.22	UZ	–
DU-080-016	105	2016-05-11 12:50	46.6555	-119.5038	25.51	4.85	–	–	42.31	4.86	–	–
DU-080-017	106	2016-05-11 12:53	46.6555	-119.5031	13.98	2.98	–	–	3.99	2.38	–	–
DU-080-018	104	2016-05-11 12:48	46.6559	-119.5047	14.63	2.99	–	–	4.72	2.41	–	–
DU-080-019	103	2016-05-11 12:45	46.6559	-119.5040	21.41	3.21	–	–	< LOD	3.78	U	–
DU-080-020	102	2016-05-11 12:43	46.6559	-119.5034	12.70	2.91	–	–	4.58	2.34	–	–
DU-080-021	100	2016-05-11 12:40	46.6559	-119.5028	13.42	2.98	–	–	< LOD	2.37	U	–
DU-081-001	97	2015-09-18 11:37	46.6471	-119.4986	42.09	4.10	–	–	7.80	3.25	–	–
DU-081-002	96	2015-09-18 11:35	46.6470	-119.4977	146.10	7.25	–	–	23.12	5.75	–	–
DU-081-003	95	2015-09-18 11:33	46.6470	-119.4967	88.09	5.36	–	–	6.95	4.13	–	–
DU-081-004	94	2015-09-18 11:31	46.6470	-119.4958	86.33	5.47	–	–	12.12	4.30	–	–
DU-081-005	92	2015-09-18 11:27	46.6470	-119.4949	15.39	3.55	–	–	5.05	2.87	–	–
DU-081-006	98	2015-09-18 11:40	46.6476	-119.4981	147.70	8.56	–	–	12.65	6.62	–	–
DU-081-007	99	2015-09-18 11:43	46.6476	-119.4972	104.50	6.61	–	–	11.55	5.16	–	–
DU-081-008	100	2015-09-18 11:45	46.6476	-119.4962	403.00	10.44	–	–	52.43	8.19	–	–
DU-081-009	101	2015-09-18 11:47	46.6476	-119.4953	32.37	3.72	–	–	4.60	2.91	–	–
DU-081-010	106	2015-09-18 11:59	46.6482	-119.4985	210.33	8.96	–	–	12.41	6.84	–	–
DU-081-011	105	2015-09-18 11:57	46.6482	-119.4977	243.51	8.55	–	–	48.51	6.89	–	–
DU-081-012	104	2015-09-18 11:54	46.6481	-119.4968	642.10	15.36	–	–	69.00	11.94	–	–
DU-081-013	103	2015-09-18 11:52	46.6481	-119.4958	123.63	6.37	–	–	10.88	4.92	–	–
DU-081-014	102	2015-09-18 11:50	46.6482	-119.4949	16.37	3.36	–	–	< LOD	3.98	U	–
DU-081-015	107	2015-09-18 12:01	46.6487	-119.4981	336.56	9.90	–	–	34.71	7.68	–	–
DU-081-016	108	2015-09-18 12:03	46.6487	-119.4971	369.21	10.12	–	–	25.59	7.74	–	–
DU-081-017	109	2015-09-18 12:06	46.6487	-119.4962	440.67	12.81	–	–	31.82	9.82	–	–
DU-081-018	110	2015-09-18 12:09	46.6487	-119.4953	22.78	4.07	–	–	< LOD	4.80	U	–
DU-081-019	118	2015-09-18 12:23	46.6487	-119.4944	338.53	9.70	–	–	29.81	7.47	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-081-020	119	2015-09-18 12:28	46.6487	-119.4935	1117.96	17.68	–	–	185.09	14.09	–	–
DU-081-021	120	2015-09-18 12:31	46.6486	-119.4925	513.63	13.05	–	–	55.23	10.14	–	–
DU-081-022	128	2015-09-18 12:49	46.6492	-119.4986	142.74	6.56	–	–	13.02	5.07	–	–
DU-081-023	127	2015-09-18 12:47	46.6493	-119.4976	358.37	10.02	–	–	32.15	7.73	–	–
DU-081-024	126	2015-09-18 12:45	46.6493	-119.4967	420.24	11.03	–	–	22.04	8.36	–	–
DU-081-025	125	2015-09-18 12:43	46.6492	-119.4958	372.08	10.51	–	–	28.57	8.06	–	–
DU-081-026	124	2015-09-18 12:40	46.6492	-119.4948	95.33	6.02	–	–	< LOD	6.94	U	–
DU-081-027	123	2015-09-18 12:38	46.6493	-119.4939	210.79	8.96	–	–	18.07	6.91	–	–
DU-081-028	122	2015-09-18 12:36	46.6492	-119.4930	381.61	12.68	–	–	29.16	9.73	–	–
DU-081-029	121	2015-09-18 12:33	46.6493	-119.4921	561.15	16.98	–	–	97.36	13.59	–	–
DU-081-030	129	2015-09-18 12:52	46.6498	-119.4981	666.69	15.20	–	–	39.96	11.57	–	–
DU-081-031	130	2015-09-18 12:54	46.6498	-119.4972	335.13	11.30	–	–	32.06	8.75	–	–
DU-081-032	131	2015-09-18 12:56	46.6498	-119.4962	366.86	10.84	–	–	26.47	8.30	–	–
DU-081-033	132	2015-09-18 12:58	46.6497	-119.4952	18.68	3.33	–	–	< LOD	3.92	U	–
DU-081-034	133	2015-09-18 13:00	46.6498	-119.4944	401.25	10.89	–	–	15.27	8.21	–	–
DU-081-035	134	2015-09-18 13:02	46.6498	-119.4935	676.50	14.59	–	–	64.54	11.28	–	–
DU-081-036	135	2015-09-18 13:05	46.6498	-119.4926	73.73	5.97	–	–	13.72	4.79	–	–
DU-082-001	36	2015-09-18 9:14	46.6406	-119.4941	9.59	2.95	–	–	4.18	2.37	–	–
DU-082-002	35	2015-09-18 9:11	46.6406	-119.4931	8.39	4.44	–	–	< LOD	5.45	U	–
DU-082-003	34	2015-09-18 9:09	46.6406	-119.4920	13.79	3.80	–	–	< LOD	4.59	U	–
DU-082-004	32	2015-09-18 9:05	46.6406	-119.4911	9.81	3.44	–	–	< LOD	4.15	U	–
DU-082-005	37	2015-09-18 9:17	46.6412	-119.4946	10.00	3.16	–	–	5.07	2.59	–	–
DU-082-006	38	2015-09-18 9:20	46.6412	-119.4936	10.46	3.22	–	–	4.61	2.63	–	–
DU-082-007	39	2015-09-18 9:22	46.6412	-119.4926	12.30	3.00	–	–	4.86	2.42	–	–
DU-082-008	40	2015-09-18 9:25	46.6412	-119.4916	12.82	3.26	–	–	< LOD	3.88	U	–
DU-082-009	41	2015-09-18 9:27	46.6412	-119.4906	16.01	3.13	–	–	< LOD	3.68	U	–
DU-082-010	46	2015-09-18 9:41	46.6418	-119.4951	12.03	3.00	–	–	< LOD	3.50	U	–
DU-082-011	45	2015-09-18 9:38	46.6417	-119.4942	10.06	3.00	–	–	< LOD	3.55	U	–
DU-082-012	44	2015-09-18 9:36	46.6418	-119.4931	8.55	3.18	–	–	< LOD	3.86	U	–
DU-082-013	43	2015-09-18 9:33	46.6418	-119.4921	15.93	3.14	–	–	< LOD	3.69	U	–
DU-082-014	42	2015-09-18 9:30	46.6418	-119.4911	11.34	3.10	–	–	4.40	2.50	–	–
DU-082-015	47	2015-09-18 9:45	46.6424	-119.4956	21.94	3.42	–	–	4.71	2.72	–	–
DU-082-016	48	2015-09-18 9:47	46.6424	-119.4945	6.71	3.10	–	–	5.10	2.59	–	–
DU-082-017	49	2015-09-18 9:50	46.6424	-119.4935	11.36	3.18	–	–	4.40	2.58	–	–
DU-082-018	50	2015-09-18 9:52	46.6424	-119.4926	14.74	3.37	–	–	< LOD	3.91	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-082-019	51	2015-09-18 9:54	46.6424	-119.4916	14.21	3.10	–	–	< LOD	3.60	U	–
DU-082-020	64	2015-09-18 10:23	46.6430	-119.4970	17.07	3.27	–	–	4.34	2.60	–	–
DU-082-021	63	2015-09-18 10:20	46.6430	-119.4960	12.78	3.52	–	–	< LOD	4.17	U	–
DU-082-022	62	2015-09-18 10:18	46.6429	-119.4951	11.31	3.23	–	–	4.80	2.63	–	–
DU-082-023	60	2015-09-18 10:13	46.6430	-119.4940	14.48	3.60	Z	–	< LOD	4.29	UZ	–
DU-082-024	59	2015-09-18 10:10	46.6429	-119.4931	10.83	3.47	Z	–	4.83	2.84	Z	–
DU-082-025	52	2015-09-18 9:57	46.6430	-119.4922	12.04	3.10	–	–	4.80	2.50	–	–
DU-082-026	65	2015-09-18 10:25	46.6436	-119.4966	12.04	3.28	–	–	4.52	2.67	–	–
DU-082-027	66	2015-09-18 10:28	46.6437	-119.4956	11.82	3.69	–	–	7.09	3.10	–	–
DU-082-028	69	2015-09-18 10:34	46.6442	-119.4970	10.84	3.22	–	–	< LOD	3.89	U	–
DU-082-029	68	2015-09-18 10:32	46.6442	-119.4961	10.70	3.02	–	–	< LOD	2.43	U	–
DU-082-030	67	2015-09-18 10:30	46.6442	-119.4951	15.30	3.20	–	–	4.94	2.58	–	–
DU-082-031	70	2015-09-18 10:37	46.6448	-119.4966	12.92	3.44	–	–	5.36	2.82	–	–
DU-082-032	71	2015-09-18 10:39	46.6448	-119.4956	13.36	3.61	–	–	< LOD	4.39	U	–
DU-082-033	74	2015-09-18 10:46	46.6454	-119.4969	11.76	3.40	–	–	< LOD	4.10	U	–
DU-082-034	73	2015-09-18 10:44	46.6454	-119.4959	16.77	3.23	–	–	< LOD	3.82	U	–
DU-082-035	72	2015-09-18 10:42	46.6453	-119.4951	11.69	3.33	–	–	< LOD	3.99	U	–
DU-082-036	75	2015-09-18 10:49	46.6459	-119.4965	16.11	3.74	–	–	5.44	3.04	–	–
DU-082-037	76	2015-09-18 10:52	46.6460	-119.4956	20.20	3.44	–	–	< LOD	4.04	U	–
DU-082-038	77	2015-09-18 10:54	46.6466	-119.4950	20.93	3.53	–	–	4.63	2.80	–	–
DU-083-001	99	2015-07-01 12:54	46.6545	-119.4674	18.78	4.14	Z	–	< LOD	4.95	UZ	–
DU-083-002	100	2015-07-01 12:56	46.6543	-119.4663	11.15	3.16	Z	–	< LOD	3.72	UZ	–
DU-083-003	103	2015-07-01 13:08	46.6549	-119.4676	6.38	3.18	Z	–	4.42	2.65	Z	–
DU-083-004	102	2015-07-01 13:05	46.6549	-119.4668	19.25	3.88	Z	–	< LOD	4.57	UZ	–
DU-083-005	101	2015-07-01 13:00	46.6548	-119.4659	14.87	3.40	Z	–	< LOD	4.06	UZ	–
DU-083-006	104	2015-07-01 13:10	46.6554	-119.4681	15.90	3.91	Z	–	< LOD	4.60	UZ	–
DU-083-007	105	2015-07-01 13:13	46.6554	-119.4673	19.99	3.55	Z	–	< LOD	4.19	UZ	–
DU-083-008	106	2015-07-01 13:15	46.6555	-119.4664	12.11	3.04	Z	–	< LOD	3.58	UZ	–
DU-083-009	109	2015-07-01 13:23	46.6561	-119.4675	17.29	3.65	Z	–	< LOD	4.20	UZ	–
DU-083-010	108	2015-07-01 13:20	46.6560	-119.4667	9.86	3.05	Z	–	4.08	2.47	Z	–
DU-083-011	107	2015-07-01 13:18	46.6561	-119.4659	14.79	3.76	Z	–	< LOD	4.57	UZ	–
DU-083-012	110	2015-07-01 13:26	46.6566	-119.4681	11.52	3.77	Z	–	< LOD	4.59	UZ	–
DU-083-013	111	2015-07-01 13:28	46.6566	-119.4674	15.96	3.21	Z	–	< LOD	3.81	UZ	–
DU-083-014	112	2015-07-01 13:31	46.6567	-119.4664	10.94	3.12	Z	–	< LOD	3.68	UZ	–
DU-083-015	115	2015-07-01 13:39	46.6572	-119.4676	34.73	4.17	Z	–	< LOD	4.89	UZ	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-083-016	114	2015-07-01 13:36	46.6572	-119.4666	26.07	3.64	Z	–	< LOD	4.19	UZ	–
DU-083-017	113	2015-07-01 13:33	46.6572	-119.4659	11.13	3.15	Z	–	< LOD	2.54	UZ	–
DU-084-001	124	2015-07-08 11:34	46.6507	-119.4701	16.58	3.24	–	–	< LOD	2.58	U	–
DU-084-002	125	2015-07-08 11:37	46.6506	-119.4691	17.60	4.55	–	–	< LOD	5.41	U	–
DU-084-003	126	2015-07-08 11:39	46.6506	-119.4682	22.25	3.59	–	–	5.02	2.85	–	–
DU-084-004	127	2015-07-08 11:41	46.6506	-119.4673	39.90	5.19	–	–	< LOD	6.03	U	–
DU-084-005	128	2015-07-08 11:44	46.6506	-119.4663	57.56	4.57	–	–	9.31	3.61	–	–
DU-084-006	123	2015-07-08 11:32	46.6511	-119.4704	28.48	4.40	–	–	< LOD	5.13	U	–
DU-084-007	122	2015-07-08 11:30	46.6511	-119.4694	25.61	3.54	–	–	4.90	2.80	–	–
DU-084-008	121	2015-07-08 11:28	46.6511	-119.4685	15.25	3.54	–	–	6.36	2.92	–	–
DU-084-009	120	2015-07-08 11:26	46.6512	-119.4676	24.52	4.23	–	–	< LOD	5.03	U	–
DU-084-010	117	2015-07-08 11:18	46.6519	-119.4701	24.87	4.12	–	–	6.30	3.35	–	–
DU-084-011	118	2015-07-08 11:20	46.6518	-119.4692	72.20	5.45	–	–	27.47	4.60	–	–
DU-084-012	119	2015-07-08 11:23	46.6518	-119.4682	11.92	3.11	–	–	< LOD	3.72	U	–
DU-084-013	116	2015-07-08 11:16	46.6523	-119.4703	28.19	3.73	–	–	< LOD	4.38	U	–
DU-084-014	115	2015-07-08 11:14	46.6523	-119.4694	209.48	9.04	–	–	14.91	6.93	–	–
DU-084-015	114	2015-07-08 11:12	46.6524	-119.4687	25.86	3.78	–	–	< LOD	4.46	U	–
DU-084-016	96	2015-07-08 10:43	46.6530	-119.4700	139.49	8.54	–	–	22.77	6.80	–	–
DU-084-017	95	2015-07-08 10:41	46.6534	-119.4704	38.52	4.58	–	–	< LOD	5.30	U	–
DU-085-001	238	2015-10-16 12:20	46.6461	-119.4620	12.71	3.20	–	–	< LOD	3.80	U	–
DU-085-002	237	2015-10-16 12:18	46.6461	-119.4610	19.49	3.40	–	–	5.34	2.73	–	–
DU-085-003	239	2015-10-16 12:23	46.6467	-119.4625	12.58	3.28	–	–	< LOD	3.85	U	–
DU-085-004	240	2015-10-16 12:27	46.6467	-119.4616	15.76	3.58	–	–	< LOD	4.29	U	–
DU-085-005	236	2015-10-16 12:15	46.6466	-119.4607	11.72	3.43	–	–	< LOD	4.09	U	–
DU-085-006	241	2015-10-16 12:29	46.6473	-119.4620	13.33	3.02	–	–	5.41	2.45	–	–
DU-085-007	235	2015-10-16 12:11	46.6472	-119.4611	14.94	3.28	–	–	< LOD	3.84	U	–
DU-085-008	242	2015-10-16 12:32	46.6478	-119.4625	14.59	3.37	–	–	4.23	2.71	–	–
DU-085-009	243	2015-10-16 12:38	46.6478	-119.4617	17.99	4.22	–	–	< LOD	5.13	U	–
DU-085-010	234	2015-10-16 12:07	46.6478	-119.4605	15.84	3.31	–	–	< LOD	3.89	U	–
DU-085-011	232	2015-10-16 12:01	46.6484	-119.4621	42.53	4.54	–	–	< LOD	5.11	U	–
DU-085-012	233	2015-10-16 12:04	46.6484	-119.4611	14.92	3.31	–	–	< LOD	3.90	U	–
DU-085-013	231	2015-10-16 11:58	46.6491	-119.4625	20.53	4.07	–	–	< LOD	4.76	U	–
DU-085-014	221	2015-10-16 11:37	46.6495	-119.4619	12.09	3.12	–	–	< LOD	3.70	U	–
DU-085-015	222	2015-10-16 11:40	46.6496	-119.4610	17.43	3.48	–	–	< LOD	4.04	U	–
DU-085-016	230	2015-10-16 11:54	46.6495	-119.4601	160.80	7.07	–	–	11.26	5.42	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-085-017	220	2015-10-16 11:34	46.6502	-119.4624	22.65	3.67	–	–	< LOD	4.32	U	–
DU-085-018	219	2015-10-16 11:31	46.6501	-119.4615	11.31	3.01	–	–	4.69	2.43	–	–
DU-085-019	218	2015-10-16 11:28	46.6501	-119.4605	34.69	4.16	–	–	7.42	3.34	–	–
DU-085-020	217	2015-10-16 11:26	46.6501	-119.4597	326.53	9.85	–	–	25.04	7.55	–	–
DU-085-021	213	2015-10-16 11:18	46.6507	-119.4620	12.47	3.14	–	–	4.56	2.53	–	–
DU-085-022	214	2015-10-16 11:21	46.6507	-119.4610	11.15	3.00	–	–	< LOD	3.57	U	–
DU-085-023	215	2015-10-16 11:24	46.6507	-119.4600	13.20	3.25	–	–	< LOD	3.86	U	–
DU-085-024	212	2015-10-16 11:15	46.6513	-119.4623	13.08	3.12	–	–	4.22	2.52	–	–
DU-085-025	211	2015-10-16 11:13	46.6512	-119.4614	12.80	3.10	–	–	< LOD	3.71	U	–
DU-085-026	210	2015-10-16 11:11	46.6512	-119.4604	24.16	3.58	–	–	< LOD	4.04	U	–
DU-085-027	209	2015-10-16 11:08	46.6512	-119.4596	12.11	3.71	–	–	< LOD	4.42	U	–
DU-085-028	198	2015-10-16 10:49	46.6519	-119.4619	28.00	3.69	–	–	< LOD	4.28	U	–
DU-085-029	199	2015-10-16 10:52	46.6518	-119.4610	16.74	3.33	–	–	< LOD	3.83	U	–
DU-085-030	200	2015-10-16 10:54	46.6518	-119.4600	14.30	3.57	–	–	< LOD	4.27	U	–
DU-085-031	197	2015-10-16 10:47	46.6524	-119.4624	14.69	3.55	–	–	4.59	2.88	–	–
DU-085-032	196	2015-10-16 10:43	46.6524	-119.4614	25.51	3.74	–	–	< LOD	4.40	U	–
DU-085-033	195	2015-10-16 10:40	46.6524	-119.4604	13.83	3.09	–	–	< LOD	3.59	U	–
DU-085-034	194	2015-10-16 10:37	46.6524	-119.4595	9.70	3.74	–	–	< LOD	4.56	U	–
DU-085-035	191	2015-10-16 10:27	46.6530	-119.4620	12.06	3.37	–	–	< LOD	3.99	U	–
DU-085-036	192	2015-10-16 10:31	46.6530	-119.4610	12.26	3.11	–	–	< LOD	3.65	U	–
DU-085-037	193	2015-10-16 10:33	46.6530	-119.4600	16.03	3.38	–	–	< LOD	3.93	U	–
DU-085-038	190	2015-10-16 10:25	46.6535	-119.4624	6.09	2.92	–	–	< LOD	3.52	U	–
DU-085-039	189	2015-10-16 10:22	46.6535	-119.4613	11.36	3.95	–	–	< LOD	4.80	U	–
DU-085-040	188	2015-10-16 10:18	46.6535	-119.4604	10.14	3.15	–	–	< LOD	3.70	U	–
DU-085-041	186	2015-10-16 10:14	46.6536	-119.4595	15.25	4.10	–	–	< LOD	4.84	U	–
DU-086-001	86	2015-10-09 13:09	46.6468	-119.4588	597.91	12.38	–	–	71.56	9.67	–	–
DU-086-002	92	2015-10-09 13:24	46.6473	-119.4593	577.12	12.47	–	–	34.28	9.48	–	–
DU-086-003	91	2015-10-09 13:20	46.6473	-119.4583	32.50	4.29	–	–	6.95	3.46	–	–
DU-086-004	90	2015-10-09 13:16	46.6473	-119.4574	200.72	7.72	–	–	22.08	6.01	–	–
DU-086-005	93	2015-10-09 13:26	46.6479	-119.4598	260.71	7.89	–	–	21.31	6.07	–	–
DU-086-006	94	2015-10-09 13:29	46.6479	-119.4588	84.68	5.45	–	–	7.08	4.21	–	–
DU-086-007	96	2015-10-09 13:31	46.6479	-119.4578	375.76	10.08	–	–	< LOD	11.26	U	–
DU-086-008	97	2015-10-09 13:34	46.6479	-119.4569	38.50	3.77	–	–	< LOD	4.36	U	–
DU-086-009	98	2015-10-09 13:37	46.6479	-119.4558	488.99	11.88	–	–	38.81	9.12	–	–
DU-086-010	99	2015-10-09 13:39	46.6478	-119.4549	61.87	4.62	–	–	15.04	3.75	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-086-011	108	2015-10-09 14:03	46.6485	-119.4603	48.37	4.15	–	–	< LOD	4.81	U	–
DU-086-012	107	2015-10-09 14:00	46.6485	-119.4593	199.72	7.41	–	–	22.31	5.77	–	–
DU-086-013	106	2015-10-09 13:58	46.6485	-119.4583	62.30	4.85	–	–	7.71	3.82	–	–
DU-086-014	105	2015-10-09 13:55	46.6484	-119.4573	96.86	5.76	–	–	15.90	4.58	–	–
DU-086-015	104	2015-10-09 13:53	46.6484	-119.4564	63.40	4.46	–	–	9.52	3.52	–	–
DU-086-016	103	2015-10-09 13:51	46.6484	-119.4555	67.24	4.50	–	–	< LOD	5.08	U	–
DU-086-017	102	2015-10-09 13:48	46.6484	-119.4545	875.66	14.71	–	–	70.36	11.29	–	–
DU-086-018	101	2015-10-09 13:46	46.6484	-119.4535	44.19	4.32	–	–	< LOD	4.99	U	–
DU-086-019	100	2015-10-09 13:43	46.6484	-119.4524	84.47	5.09	–	–	12.39	4.01	–	–
DU-086-020	116	2015-10-09 14:19	46.6491	-119.4616	22.07	3.40	–	–	< LOD	3.95	U	–
DU-086-021	117	2015-10-09 14:22	46.6491	-119.4607	27.66	3.72	–	–	< LOD	4.39	U	–
DU-086-022	118	2015-10-09 14:25	46.6491	-119.4598	233.96	7.80	–	–	40.02	6.22	–	–
DU-086-023	119	2015-10-09 14:28	46.6491	-119.4587	287.86	8.87	–	–	45.65	7.04	–	–
DU-086-024	120	2015-10-09 14:34	46.6490	-119.4578	108.24	5.66	–	–	9.46	4.37	–	–
DU-086-025	121	2015-10-09 14:38	46.6490	-119.4568	85.99	5.19	–	–	15.26	4.13	–	–
DU-086-026	122	2015-10-09 14:42	46.6490	-119.4559	124.89	6.18	–	–	18.24	4.87	–	–
DU-086-027	123	2015-10-09 14:45	46.6490	-119.4549	30.03	3.71	–	–	5.02	2.94	–	–
DU-086-028	124	2015-10-09 14:47	46.6490	-119.4539	31.67	3.68	–	–	< LOD	4.26	U	–
DU-086-029	125	2015-10-09 14:49	46.6490	-119.4530	35.66	3.89	–	–	7.39	3.11	–	–
DU-086-030	134	2015-10-09 15:18	46.6496	-119.4593	282.27	8.47	Z	–	21.25	6.49	Z	–
DU-086-031	132	2015-10-09 15:13	46.6496	-119.4584	59.22	4.26	–	–	11.71	3.42	–	–
DU-086-032	131	2015-10-09 15:10	46.6496	-119.4574	340.24	10.06	–	–	53.84	7.99	–	–
DU-086-033	130	2015-10-09 15:06	46.6496	-119.4564	417.75	10.66	–	–	44.61	8.28	–	–
DU-086-034	129	2015-10-09 15:03	46.6496	-119.4554	46.84	4.23	–	–	11.20	3.41	–	–
DU-086-035	128	2015-10-09 15:00	46.6496	-119.4544	43.80	4.15	–	–	6.07	3.26	–	–
DU-086-036	127	2015-10-09 14:57	46.6495	-119.4535	291.77	8.86	–	–	42.01	6.98	–	–
DU-086-037	126	2015-10-09 14:53	46.6496	-119.4524	188.44	7.63	–	–	15.84	5.88	–	–
DU-087-001	190	2015-10-02 9:05	46.6500	-119.4586	737.23	13.94	–	–	90.70	10.90	–	–
DU-087-002	189	2015-10-02 9:02	46.6501	-119.4575	352.35	10.91	–	–	36.27	8.47	–	–
DU-087-003	188	2015-10-02 8:58	46.6501	-119.4565	881.92	17.79	–	–	64.71	13.62	–	–
DU-087-004	187	2015-10-02 8:55	46.6500	-119.4554	50.90	4.51	–	–	9.18	3.58	–	–
DU-087-005	186	2015-10-02 8:53	46.6500	-119.4544	38.86	4.19	–	–	7.03	3.33	–	–
DU-087-006	185	2015-10-02 8:50	46.6500	-119.4534	18.24	3.29	–	–	< LOD	3.93	U	–
DU-087-007	183	2015-10-02 8:46	46.6501	-119.4523	51.97	4.57	–	–	< LOD	5.23	U	–
DU-087-008	191	2015-10-02 9:08	46.6507	-119.4591	10.68	3.40	–	–	5.97	2.82	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-087-009	192	2015-10-02 9:11	46.6507	-119.4580	17.79	3.17	–	–	4.53	2.52	–	–
DU-087-010	193	2015-10-02 9:13	46.6507	-119.4570	33.48	4.21	–	–	< LOD	4.95	U	–
DU-087-011	194	2015-10-02 9:16	46.6507	-119.4559	15.12	3.14	–	–	4.89	2.52	–	–
DU-087-012	195	2015-10-02 9:19	46.6507	-119.4549	11.68	3.34	–	–	< LOD	3.92	U	–
DU-087-013	196	2015-10-02 9:21	46.6507	-119.4538	17.86	3.29	–	–	< LOD	3.82	U	–
DU-087-014	197	2015-10-02 9:23	46.6506	-119.4528	17.93	3.21	–	–	< LOD	3.78	U	–
DU-087-015	203	2015-10-02 9:44	46.6513	-119.4586	17.61	3.17	–	–	< LOD	3.69	U	–
DU-087-016	202	2015-10-02 9:42	46.6513	-119.4575	10.14	3.66	–	–	< LOD	4.30	U	–
DU-087-017	201	2015-10-02 9:38	46.6513	-119.4564	16.73	3.20	–	–	< LOD	3.74	U	–
DU-087-018	200	2015-10-02 9:35	46.6513	-119.4554	14.60	3.09	–	–	< LOD	3.66	U	–
DU-087-019	199	2015-10-02 9:31	46.6512	-119.4544	13.87	3.65	–	–	< LOD	4.35	U	–
DU-087-020	198	2015-10-02 9:27	46.6513	-119.4533	9.50	2.91	–	–	< LOD	3.46	U	–
DU-087-021	211	2015-10-02 9:59	46.6520	-119.4590	14.56	3.08	–	–	< LOD	2.45	U	–
DU-087-022	212	2015-10-02 10:02	46.6518	-119.4580	13.30	2.92	–	–	< LOD	2.34	U	–
DU-087-023	213	2015-10-02 10:05	46.6519	-119.4569	23.26	3.73	–	–	< LOD	4.34	U	–
DU-087-024	214	2015-10-02 10:07	46.6517	-119.4559	17.26	3.39	–	–	4.60	2.71	–	–
DU-087-025	215	2015-10-02 10:10	46.6517	-119.4548	29.69	4.09	–	–	10.47	3.37	–	–
DU-087-026	216	2015-10-02 10:13	46.6517	-119.4538	20.84	3.55	–	–	5.08	2.84	–	–
DU-087-027	217	2015-10-02 10:16	46.6516	-119.4526	33.11	4.14	–	–	13.23	3.47	–	–
DU-087-028	223	2015-10-02 10:33	46.6526	-119.4585	19.32	3.38	–	–	< LOD	3.95	U	–
DU-087-029	222	2015-10-02 10:30	46.6525	-119.4574	18.78	3.39	–	–	< LOD	4.00	U	–
DU-087-030	221	2015-10-02 10:28	46.6525	-119.4564	15.06	3.08	–	–	< LOD	3.55	U	–
DU-087-031	220	2015-10-02 10:26	46.6526	-119.4553	12.13	3.08	–	–	< LOD	3.67	U	–
DU-087-032	219	2015-10-02 10:23	46.6525	-119.4543	16.06	4.06	–	–	6.16	3.35	–	–
DU-087-033	218	2015-10-02 10:19	46.6525	-119.4531	13.43	3.28	–	–	< LOD	3.93	U	–
DU-087-034	224	2015-10-02 10:35	46.6532	-119.4590	14.28	3.32	–	–	< LOD	3.90	U	–
DU-087-035	225	2015-10-02 10:39	46.6532	-119.4580	17.06	3.19	–	–	< LOD	3.69	U	–
DU-087-036	226	2015-10-02 10:42	46.6532	-119.4569	20.40	3.25	–	–	< LOD	3.79	U	–
DU-087-037	227	2015-10-02 10:46	46.6532	-119.4559	14.03	3.28	–	–	< LOD	3.88	U	–
DU-087-038	228	2015-10-02 10:49	46.6532	-119.4548	10.94	3.66	–	–	< LOD	4.38	U	–
DU-087-039	229	2015-10-02 10:52	46.6531	-119.4538	26.20	3.96	–	–	9.03	3.18	–	–
DU-087-040	230	2015-10-02 10:56	46.6531	-119.4528	61.16	4.62	–	–	14.79	3.75	–	–
DU-088-001	99	2015-09-10 12:25	46.6265	-119.4779	11.56	3.11	–	–	5.17	2.52	–	–
DU-088-002	103	2015-09-10 12:37	46.6264	-119.4770	15.12	4.28	–	–	< LOD	5.08	U	–
DU-088-003	101	2015-09-10 12:30	46.6270	-119.4785	15.69	3.45	–	–	< LOD	4.13	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-088-004	102	2015-09-10 12:33	46.6270	-119.4775	58.16	4.94	–	–	8.20	3.89	–	–
DU-088-005	104	2015-09-10 12:40	46.6270	-119.4765	23.91	3.74	–	–	< LOD	4.45	U	–
DU-088-006	105	2015-09-10 12:42	46.6270	-119.4754	22.28	6.76	–	–	< LOD	8.27	U	–
DU-088-007	106	2015-09-10 12:44	46.6270	-119.4744	67.08	5.81	–	–	8.39	4.57	–	–
DU-088-008	111	2015-09-10 12:57	46.6276	-119.4790	19.72	5.14	–	–	< LOD	6.17	U	–
DU-088-009	110	2015-09-10 12:54	46.6277	-119.4780	72.56	5.37	–	–	6.51	4.16	–	–
DU-088-010	109	2015-09-10 12:52	46.6276	-119.4770	9.17	3.12	–	–	5.26	2.55	–	–
DU-088-011	108	2015-09-10 12:49	46.6277	-119.4760	13.32	4.01	–	–	< LOD	4.85	U	–
DU-088-012	107	2015-09-10 12:47	46.6277	-119.4750	15.35	4.01	–	–	< LOD	4.82	U	–
DU-088-013	112	2015-09-10 12:59	46.6283	-119.4794	9.27	3.49	–	–	< LOD	4.24	U	–
DU-088-014	113	2015-09-10 13:02	46.6282	-119.4783	9.46	3.12	–	–	< LOD	3.74	U	–
DU-088-015	114	2015-09-10 13:05	46.6282	-119.4774	86.25	5.52	–	–	11.11	4.32	–	–
DU-088-016	118	2015-09-10 13:15	46.6288	-119.4799	10.43	3.02	–	–	< LOD	2.43	U	–
DU-088-017	117	2015-09-10 13:12	46.6288	-119.4790	15.04	4.57	–	–	< LOD	5.68	U	–
DU-088-018	116	2015-09-10 13:10	46.6288	-119.4780	15.96	3.53	–	–	7.34	2.90	–	–
DU-088-019	115	2015-09-10 13:07	46.6288	-119.4770	20.60	3.85	–	–	< LOD	4.46	U	–
DU-088-020	129	2015-09-10 13:34	46.6294	-119.4794	15.64	3.19	–	–	6.37	2.61	–	–
DU-088-021	130	2015-09-10 13:37	46.6294	-119.4784	22.78	4.31	–	–	< LOD	5.06	U	–
DU-088-022	131	2015-09-10 13:39	46.6294	-119.4774	45.75	4.69	–	–	< LOD	5.43	U	–
DU-088-023	132	2015-09-10 13:41	46.6294	-119.4764	21.19	3.83	–	–	< LOD	4.49	U	–
DU-088-024	134	2015-09-10 13:46	46.6299	-119.4780	113.58	6.11	–	–	10.60	4.72	–	–
DU-088-025	133	2015-09-10 13:44	46.6300	-119.4769	33.68	4.32	–	–	7.22	3.47	–	–
DU-088-026	135	2015-09-10 13:49	46.6306	-119.4785	48.72	5.37	–	–	8.14	4.28	–	–
DU-088-027	136	2015-09-10 13:51	46.6312	-119.4778	9.83	3.29	–	–	4.27	2.70	–	–
DU-088-028	137	2015-09-10 13:54	46.6317	-119.4783	6.66	2.99	–	–	4.49	2.43	–	–
DU-088-029	138	2015-09-10 13:57	46.6318	-119.4775	9.54	3.15	–	–	4.36	2.53	–	–
DU-088-030	139	2015-09-10 14:00	46.6323	-119.4779	9.49	3.42	–	–	5.06	2.81	–	–
DU-088-031	145	2015-09-10 14:29	46.6329	-119.4784	15.77	3.20	–	–	< LOD	2.55	U	–
DU-088-032	146	2015-09-10 14:32	46.6329	-119.4774	16.88	3.27	–	–	4.01	2.61	–	–
DU-088-033	147	2015-09-10 14:35	46.6329	-119.4764	13.83	3.39	–	–	< LOD	4.10	U	–
DU-088-034	148	2015-09-10 14:38	46.6330	-119.4753	12.95	3.44	–	–	< LOD	4.05	U	–
DU-088-035	151	2015-09-10 14:44	46.6335	-119.4779	10.01	3.16	–	–	< LOD	3.82	U	–
DU-088-036	150	2015-09-10 14:42	46.6335	-119.4769	16.88	4.23	–	–	< LOD	4.96	U	–
DU-088-037	149	2015-09-10 14:40	46.6336	-119.4759	11.92	4.42	–	–	5.92	3.71	–	–
DU-088-038	152	2015-09-10 14:48	46.6341	-119.4763	12.96	4.84	–	–	< LOD	5.88	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-089-001	35	2015-09-10 8:55	46.6219	-119.4194	303.61	13.05	–	–	< LOD	14.84	U	–
DU-089-002	37	2015-09-10 8:59	46.6217	-119.4185	244.49	9.74	–	–	17.91	7.47	–	–
DU-089-003	38	2015-09-10 9:02	46.6217	-119.4174	211.25	11.79	–	–	13.99	9.07	–	–
DU-089-004	39	2015-09-10 9:05	46.6219	-119.4164	11.39	3.42	–	–	< LOD	4.17	U	–
DU-089-005	40	2015-09-10 9:08	46.6219	-119.4154	75.08	6.82	–	–	< LOD	7.80	U	–
DU-089-006	41	2015-09-10 9:11	46.6220	-119.4144	127.97	9.33	–	–	< LOD	10.42	U	–
DU-089-007	42	2015-09-10 9:15	46.6218	-119.4135	119.26	9.27	–	–	< LOD	10.67	U	–
DU-089-008	49	2015-09-10 9:41	46.6226	-119.4199	353.67	13.62	–	–	25.81	10.46	–	–
DU-089-009	48	2015-09-10 9:38	46.6225	-119.4189	783.70	17.72	–	–	53.62	13.54	–	–
DU-089-010	47	2015-09-10 9:34	46.6225	-119.4179	49.71	6.54	–	–	< LOD	7.80	U	–
DU-089-011	46	2015-09-10 9:30	46.6225	-119.4169	322.72	12.53	–	–	49.34	9.95	–	–
DU-089-012	45	2015-09-10 9:28	46.6225	-119.4159	33.26	3.91	–	–	< LOD	4.60	U	–
DU-089-013	44	2015-09-10 9:24	46.6225	-119.4149	37.53	5.22	–	–	< LOD	6.22	U	–
DU-089-014	43	2015-09-10 9:20	46.6224	-119.4139	17.66	4.57	–	–	< LOD	5.52	U	–
DU-089-015	80	2015-09-10 10:57	46.6231	-119.4245	15.87	3.29	–	–	< LOD	3.93	U	–
DU-089-016	81	2015-09-10 11:00	46.6231	-119.4234	22.13	4.42	–	–	< LOD	5.29	U	–
DU-089-017	82	2015-09-10 11:02	46.6231	-119.4224	19.09	5.10	–	–	< LOD	6.11	U	–
DU-089-018	83	2015-09-10 11:04	46.6231	-119.4214	17.16	4.71	–	–	< LOD	5.58	U	–
DU-089-019	84	2015-09-10 11:07	46.6231	-119.4204	42.71	5.34	–	–	< LOD	6.14	U	–
DU-089-020	50	2015-09-10 9:46	46.6232	-119.4194	208.34	9.51	–	–	16.59	7.33	–	–
DU-089-021	51	2015-09-10 9:49	46.6232	-119.4183	131.46	7.92	–	–	18.53	6.26	–	–
DU-089-022	52	2015-09-10 9:51	46.6231	-119.4174	414.05	12.91	–	–	< LOD	14.57	U	–
DU-089-023	53	2015-09-10 9:54	46.6230	-119.4164	113.37	10.99	–	–	< LOD	12.90	U	–
DU-089-024	54	2015-09-10 9:56	46.6230	-119.4154	30.74	3.89	–	–	9.20	3.16	–	–
DU-089-025	55	2015-09-10 9:59	46.6230	-119.4144	34.98	8.47	–	–	< LOD	10.42	U	–
DU-089-026	56	2015-09-10 10:02	46.6230	-119.4134	157.40	7.61	–	–	10.73	5.84	–	–
DU-089-027	79	2015-09-10 10:55	46.6237	-119.4249	20.17	3.78	–	–	< LOD	4.51	U	–
DU-089-028	77	2015-09-10 10:50	46.6237	-119.4240	19.20	3.55	–	–	6.40	2.90	–	–
DU-089-029	75	2015-09-10 10:46	46.6237	-119.4229	16.19	5.36	–	–	< LOD	6.51	U	–
DU-089-030	73	2015-09-10 10:41	46.6237	-119.4219	16.51	3.81	–	–	< LOD	4.52	U	–
DU-089-031	71	2015-09-10 10:37	46.6237	-119.4209	14.31	3.69	–	–	4.64	3.00	–	–
DU-089-032	69	2015-09-10 10:31	46.6236	-119.4180	30.71	4.39	–	–	< LOD	5.16	U	–
DU-089-033	68	2015-09-10 10:28	46.6237	-119.4169	17.92	3.76	–	–	< LOD	4.52	U	–
DU-089-034	66	2015-09-10 10:26	46.6236	-119.4159	12.67	4.58	–	–	< LOD	5.52	U	–
DU-089-035	65	2015-09-10 10:23	46.6236	-119.4150	40.18	5.39	–	–	< LOD	6.31	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-089-036	64	2015-09-10 10:21	46.6236	-119.4139	289.14	8.57	–	–	30.79	6.66		–
DU-089-037	78	2015-09-10 10:53	46.6243	-119.4245	18.28	5.13	–	–	< LOD	6.25	U	–
DU-089-038	76	2015-09-10 10:48	46.6243	-119.4234	13.87	4.31	–	–	< LOD	5.15	U	–
DU-089-039	74	2015-09-10 10:43	46.6243	-119.4224	16.55	4.47	–	–	< LOD	5.35	U	–
DU-089-040	72	2015-09-10 10:39	46.6243	-119.4214	11.33	4.52	–	–	< LOD	5.54	U	–
DU-089-041	70	2015-09-10 10:34	46.6242	-119.4204	17.26	3.70	–	–	< LOD	4.43	U	–
DU-090-001	31	2015-08-03 8:24	46.6166	-119.4256	13.77	3.94	–	–	6.60	3.28	–	–
DU-090-002	33	2015-08-03 8:28	46.6165	-119.4244	10.00	3.38	–	–	6.06	2.80	–	–
DU-090-003	34	2015-08-03 8:30	46.6166	-119.4234	27.73	3.82	–	–	< LOD	4.52	U	–
DU-090-004	40	2015-08-03 8:47	46.6171	-119.4259	60.31	4.70	–	–	7.53	3.67	–	–
DU-090-005	39	2015-08-03 8:45	46.6170	-119.4252	12.08	3.34	–	–	< LOD	4.00	U	–
DU-090-006	38	2015-08-03 8:42	46.6171	-119.4239	13.05	3.92	–	–	< LOD	4.70	U	–
DU-090-007	37	2015-08-03 8:39	46.6171	-119.4230	16.53	3.35	–	–	< LOD	3.93	U	–
DU-090-008	36	2015-08-03 8:37	46.6171	-119.4220	24.32	3.51	–	–	5.67	2.80	–	–
DU-090-009	35	2015-08-03 8:34	46.6171	-119.4211	24.95	3.79	–	–	< LOD	4.51	U	–
DU-090-010	47	2015-08-03 8:53	46.6177	-119.4275	19.34	3.23	–	–	< LOD	3.79	U	–
DU-090-011	48	2015-08-03 8:55	46.6178	-119.4265	35.49	4.06	–	–	< LOD	4.78	U	–
DU-090-012	49	2015-08-03 8:57	46.6178	-119.4255	28.94	3.88	–	–	< LOD	4.54	U	–
DU-090-013	50	2015-08-03 9:00	46.6177	-119.4246	21.36	3.81	–	–	< LOD	4.43	U	–
DU-090-014	51	2015-08-03 9:02	46.6177	-119.4236	33.98	3.99	–	–	< LOD	4.66	U	–
DU-090-015	52	2015-08-03 9:04	46.6177	-119.4226	12.06	2.95	–	–	4.99	2.41	–	–
DU-090-016	53	2015-08-03 9:07	46.6177	-119.4216	18.93	3.53	–	–	6.31	2.85	–	–
DU-090-017	67	2015-08-03 9:35	46.6183	-119.4288	18.70	3.31	–	–	4.81	2.65	–	–
DU-090-018	66	2015-08-03 9:33	46.6183	-119.4279	21.46	3.57	–	–	4.63	2.83	–	–
DU-090-019	65	2015-08-03 9:30	46.6182	-119.4269	11.32	3.46	–	–	4.86	2.82	–	–
DU-090-020	57	2015-08-03 9:16	46.6183	-119.4259	64.89	5.07	–	–	8.13	3.97	–	–
DU-090-021	56	2015-08-03 9:14	46.6183	-119.4249	266.69	9.55	–	–	42.10	7.58	–	–
DU-090-022	55	2015-08-03 9:12	46.6183	-119.4239	248.58	8.34	–	–	28.88	6.50	–	–
DU-090-023	54	2015-08-03 9:09	46.6183	-119.4229	12.63	3.16	–	–	5.62	2.56	–	–
DU-090-024	68	2015-08-03 9:38	46.6190	-119.4294	27.26	3.70	–	–	4.54	2.92	–	–
DU-090-025	69	2015-08-03 9:40	46.6190	-119.4285	39.77	4.12	–	–	6.51	3.26	–	–
DU-090-026	70	2015-08-03 9:42	46.6190	-119.4274	37.01	4.32	–	–	10.60	3.54	–	–
DU-090-027	71	2015-08-03 9:45	46.6189	-119.4265	32.33	4.22	–	–	5.86	3.34	–	–
DU-090-028	72	2015-08-03 9:47	46.6189	-119.4255	81.47	5.36	–	–	19.13	4.35	–	–
DU-090-029	73	2015-08-03 9:50	46.6189	-119.4246	73.25	5.17	–	–	14.32	4.13	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-090-030	74	2015-08-03 9:52	46.6190	-119.4236	18.83	3.34	–	–	< LOD	3.96	U	–
DU-090-031	78	2015-08-03 10:02	46.6195	-119.4279	307.34	10.16	–	–	18.79	7.75	–	–
DU-090-032	77	2015-08-03 10:00	46.6195	-119.4269	18.12	3.43	–	–	7.11	2.81	–	–
DU-090-033	76	2015-08-03 9:57	46.6195	-119.4259	19.46	3.74	–	–	5.15	3.00	–	–
DU-090-034	75	2015-08-03 9:55	46.6194	-119.4249	43.43	4.32	–	–	10.21	3.47	–	–
DU-090-035	79	2015-08-03 10:05	46.6201	-119.4283	20.66	4.10	–	–	< LOD	4.84	U	–
DU-090-036	80	2015-08-03 10:08	46.6201	-119.4274	122.06	6.32	–	–	15.63	4.95	–	–
DU-090-037	81	2015-08-03 10:11	46.6201	-119.4264	86.48	5.87	–	–	11.88	4.62	–	–
DU-090-038	82	2015-08-03 10:14	46.6201	-119.4254	28.56	3.71	–	–	< LOD	4.32	U	–
DU-090-039	84	2015-08-03 10:19	46.6207	-119.4279	60.48	4.42	–	–	5.21	3.41	–	–
DU-090-040	83	2015-08-03 10:17	46.6207	-119.4269	186.52	7.91	–	–	15.36	6.09	–	–
DU-091-001	168	2015-08-04 7:32	46.6128	-119.4182	16.27	3.62	–	–	< LOD	4.22	U	–
DU-091-002	170	2015-08-04 7:39	46.6134	-119.4188	20.73	3.51	–	–	< LOD	4.07	U	–
DU-091-003	171	2015-08-04 7:42	46.6134	-119.4178	16.27	3.38	–	–	4.33	2.71	–	–
DU-091-004	177	2015-08-04 8:01	46.6140	-119.4214	22.66	3.92	–	–	< LOD	4.60	U	–
DU-091-005	176	2015-08-04 7:57	46.6139	-119.4200	20.46	3.40	–	–	< LOD	3.99	U	–
DU-091-006	175	2015-08-04 7:54	46.6139	-119.4193	17.00	3.79	–	–	5.15	3.07	–	–
DU-091-007	174	2015-08-04 7:51	46.6140	-119.4182	15.85	3.77	–	–	< LOD	4.49	U	–
DU-091-008	173	2015-08-04 7:48	46.6139	-119.4173	10.47	3.26	–	–	4.03	2.62	–	–
DU-091-009	172	2015-08-04 7:46	46.6139	-119.4162	13.87	4.06	–	–	< LOD	4.91	U	–
DU-091-010	178	2015-08-04 8:03	46.6146	-119.4217	41.53	4.24	–	–	< LOD	4.97	U	–
DU-091-011	179	2015-08-04 8:06	46.6146	-119.4208	17.16	3.58	–	–	< LOD	4.30	U	–
DU-091-012	180	2015-08-04 8:09	46.6146	-119.4198	8.44	3.01	–	–	6.26	2.49	–	–
DU-091-013	181	2015-08-04 8:11	46.6146	-119.4188	11.58	3.20	–	–	4.96	2.59	–	–
DU-091-014	182	2015-08-04 8:14	46.6145	-119.4178	12.88	3.23	–	–	5.67	2.63	–	–
DU-091-015	183	2015-08-04 8:16	46.6145	-119.4168	11.32	3.09	–	–	< LOD	3.70	U	–
DU-091-016	200	2015-08-04 8:51	46.6152	-119.4232	16.42	3.29	–	–	< LOD	3.78	U	–
DU-091-017	197	2015-08-04 8:43	46.6151	-119.4224	15.47	3.40	–	–	< LOD	4.08	U	–
DU-091-018	196	2015-08-04 8:40	46.6152	-119.4212	18.09	3.58	–	–	< LOD	4.29	U	–
DU-091-019	195	2015-08-04 8:38	46.6151	-119.4202	8.83	3.03	–	–	4.92	2.47	–	–
DU-091-020	194	2015-08-04 8:35	46.6151	-119.4192	15.53	3.41	–	–	< LOD	4.05	U	–
DU-091-021	193	2015-08-04 8:32	46.6151	-119.4183	15.71	3.28	–	–	< LOD	3.91	U	–
DU-091-022	184	2015-08-04 8:19	46.6152	-119.4172	13.00	3.72	–	–	5.19	3.03	–	–
DU-091-023	201	2015-08-04 8:54	46.6157	-119.4237	15.93	3.04	–	–	< LOD	3.52	U	–
DU-091-024	202	2015-08-04 8:57	46.6158	-119.4226	19.14	4.02	–	–	< LOD	4.66	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-091-025	203	2015-08-04 8:59	46.6158	-119.4217	16.13	3.56	–	–	< LOD	4.17	U	–
DU-091-026	204	2015-08-04 9:02	46.6158	-119.4207	14.83	3.30	–	–	5.23	2.67	–	–
DU-091-027	205	2015-08-04 9:04	46.6157	-119.4199	20.12	3.46	–	–	5.10	2.77	–	–
DU-091-028	206	2015-08-04 9:06	46.6157	-119.4188	17.68	3.62	–	–	< LOD	4.17	U	–
DU-091-029	211	2015-08-04 9:19	46.6163	-119.4232	13.36	3.29	–	–	< LOD	3.95	U	–
DU-091-030	210	2015-08-04 9:16	46.6163	-119.4221	16.95	3.97	–	–	< LOD	4.71	U	–
DU-091-031	209	2015-08-04 9:14	46.6163	-119.4212	12.48	3.21	–	–	< LOD	3.84	U	–
DU-091-032	208	2015-08-04 9:11	46.6163	-119.4201	11.29	3.57	–	–	< LOD	4.28	U	–
DU-091-033	207	2015-08-04 9:09	46.6163	-119.4192	15.81	3.52	–	–	< LOD	4.12	U	–
DU-092-001	91	2015-09-02 11:48	46.6069	-119.4098	19.04	3.26	–	–	< LOD	3.81	U	–
DU-092-002	90	2015-09-02 11:45	46.6075	-119.4104	18.90	3.15	–	–	< LOD	3.69	U	–
DU-092-003	92	2015-09-02 11:51	46.6074	-119.4095	49.23	4.24	–	–	5.83	3.30	–	–
DU-092-004	89	2015-09-02 11:42	46.6080	-119.4110	18.91	3.14	–	–	< LOD	3.72	U	–
DU-092-005	88	2015-09-02 11:37	46.6081	-119.4100	14.62	2.98	–	–	4.67	2.41	–	–
DU-092-006	84	2015-09-02 11:24	46.6087	-119.4123	12.62	3.04	–	–	< LOD	3.63	U	–
DU-092-007	85	2015-09-02 11:29	46.6087	-119.4114	20.50	4.32	–	–	< LOD	5.23	U	–
DU-092-008	86	2015-09-02 11:32	46.6086	-119.4104	14.81	3.01	–	–	4.61	2.42	–	–
DU-092-009	87	2015-09-02 11:35	46.6087	-119.4095	17.89	3.31	–	–	4.40	2.64	–	–
DU-092-010	83	2015-09-02 11:21	46.6092	-119.4129	12.93	3.05	–	–	6.67	2.51	–	–
DU-092-011	82	2015-09-02 11:18	46.6092	-119.4119	8.35	2.97	–	–	< LOD	3.57	U	–
DU-092-012	81	2015-09-02 11:15	46.6092	-119.4109	11.43	3.12	–	–	4.81	2.54	–	–
DU-092-013	80	2015-09-02 11:12	46.6092	-119.4099	14.93	3.04	–	–	< LOD	3.60	U	–
DU-092-014	76	2015-09-02 10:58	46.6099	-119.4141	136.14	7.50	–	–	11.00	5.79	–	–
DU-092-015	77	2015-09-02 11:01	46.6099	-119.4133	25.05	3.75	–	–	< LOD	4.35	U	–
DU-092-016	78	2015-09-02 11:05	46.6098	-119.4123	16.00	3.11	–	–	5.79	2.53	–	–
DU-092-017	79	2015-09-02 11:08	46.6098	-119.4114	10.46	3.14	–	–	< LOD	3.71	U	–
DU-092-018	75	2015-09-02 10:54	46.6104	-119.4148	103.90	5.52	–	–	12.57	4.32	–	–
DU-092-019	74	2015-09-02 10:50	46.6105	-119.4137	230.96	7.50	–	–	20.88	5.78	–	–
DU-092-020	60	2015-09-02 10:21	46.6104	-119.4128	22.93	3.40	–	–	6.60	2.74		–
DU-092-021	59	2015-09-02 10:18	46.6104	-119.4118	15.84	3.22	–	–	< LOD	3.81	U	–
DU-092-022	55	2015-09-02 10:06	46.6110	-119.4152	19.79	3.19	–	–	4.47	2.54	–	–
DU-092-023	56	2015-09-02 10:09	46.6110	-119.4142	107.16	6.09	–	–	< LOD	6.95	U	–
DU-092-024	57	2015-09-02 10:12	46.6110	-119.4133	120.85	6.99	–	–	< LOD	8.03	U	–
DU-092-025	58	2015-09-02 10:15	46.6110	-119.4123	21.40	3.36	–	–	< LOD	3.92	U	–
DU-092-026	54	2015-09-02 10:02	46.6116	-119.4166	16.47	3.07	–	–	4.39	2.45	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-092-027	53	2015-09-02 9:58	46.6116	-119.4157	25.13	3.54	–	–	< LOD	4.08	U	–
DU-092-028	52	2015-09-02 9:55	46.6116	-119.4147	20.30	3.51	–	–	< LOD	4.10	U	–
DU-092-029	48	2015-09-02 9:47	46.6116	-119.4137	15.36	3.06	–	–	6.12	2.50	–	–
DU-092-030	47	2015-09-02 9:42	46.6115	-119.4128	11.96	3.18	–	–	< LOD	3.81	U	–
DU-092-031	41	2015-09-02 9:24	46.6122	-119.4171	11.83	3.00	–	–	5.20	2.43	–	–
DU-092-032	42	2015-09-02 9:28	46.6122	-119.4161	18.81	3.16	–	–	4.95	2.53	–	–
DU-092-033	43	2015-09-02 9:31	46.6121	-119.4152	11.82	2.97	–	–	4.42	2.39	–	–
DU-092-034	46	2015-09-02 9:39	46.6122	-119.4142	16.98	3.11	–	–	< LOD	2.46	U	–
DU-092-035	40	2015-09-02 9:20	46.6128	-119.4176	15.23	3.70	–	–	< LOD	4.37	U	–
DU-092-036	39	2015-09-02 9:17	46.6127	-119.4166	10.47	3.04	–	–	< LOD	3.61	U	–
DU-092-037	38	2015-09-02 9:14	46.6128	-119.4157	9.60	3.08	–	–	4.74	2.50	–	–
DU-092-038	37	2015-09-02 9:11	46.6129	-119.4147	11.30	2.87	–	–	< LOD	3.34	U	–
DU-092-039	34	2015-09-02 9:02	46.6133	-119.4161	12.36	3.12	–	–	< LOD	3.74	U	–
DU-092-040	36	2015-09-02 9:08	46.6133	-119.4152	8.86	3.64	–	–	< LOD	4.33	U	–
DU-093-001	127	2015-08-03 12:10	46.6103	-119.4298	12.55	3.07	–	–	5.44	2.49	–	–
DU-093-002	128	2015-08-03 12:12	46.6103	-119.4290	18.02	3.84	–	–	4.87	3.10	–	–
DU-093-003	129	2015-08-03 12:15	46.6103	-119.4281	1016.01	17.60	–	–	87.75	13.55	–	–
DU-093-004	130	2015-08-03 12:17	46.6103	-119.4272	27.55	4.41	–	–	< LOD	5.25	U	–
DU-093-005	131	2015-08-03 12:20	46.6103	-119.4264	13.29	3.39	–	–	6.26	2.79	–	–
DU-093-006	126	2015-08-03 12:07	46.6108	-119.4303	15.98	3.43	–	–	< LOD	4.03	U	–
DU-093-007	125	2015-08-03 12:05	46.6108	-119.4294	13.70	3.26	–	–	5.43	2.64	–	–
DU-093-008	124	2015-08-03 12:02	46.6107	-119.4285	19.71	4.35	–	–	< LOD	5.16	U	–
DU-093-009	123	2015-10-16 13:41	46.6108	-119.4276	59.95	4.67	–	–	7.29	3.64	–	–
DU-093-010	122	2015-08-03 11:58	46.6108	-119.4267	52.42	4.70	–	–	9.91	3.76	–	–
DU-093-011	121	2015-08-03 11:55	46.6108	-119.4258	41.65	5.22	–	–	< LOD	6.14	U	–
DU-093-012	107	2015-08-03 11:32	46.6114	-119.4299	< LOD	13.90	–	–	< LOD	12.35	U	–
DU-093-013	110	2015-08-03 11:35	46.6114	-119.4290	16.97	3.48	–	–	< LOD	4.12	U	–
DU-093-014	111	2015-08-03 11:37	46.6113	-119.4281	55.58	4.86	–	–	8.93	3.85	–	–
DU-093-015	112	2015-08-03 11:39	46.6113	-119.4272	213.53	8.03	–	–	26.12	6.29	–	–
DU-093-016	120	2015-08-03 11:52	46.6113	-119.4263	464.07	11.46	–	–	85.32	9.20	–	–
DU-093-017	106	2015-08-03 11:30	46.6119	-119.4303	17.42	9.15	–	–	< LOD	11.73	U	–
DU-093-018	105	2015-08-03 11:28	46.6118	-119.4294	16.49	8.47	–	–	< LOD	10.62	U	–
DU-093-019	104	2015-08-03 11:25	46.6118	-119.4284	13.69	8.24	–	–	< LOD	10.77	U	–
DU-093-020	103	2015-08-03 11:23	46.6119	-119.4276	115.15	14.20	–	–	< LOD	16.18	U	–
DU-093-021	102	2015-08-03 11:20	46.6118	-119.4267	294.32	24.30	–	–	< LOD	27.21	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-093-022	101	2015-08-03 11:18	46.6119	-119.4259	212.86	18.22	–	–	< LOD	20.77	U	–
DU-093-023	99	2015-08-03 11:13	46.6129	-119.4258	44.51	10.86	–	–	< LOD	13.87	U	–
DU-094-001	267	2015-08-04 11:23	46.6105	-119.4248	302.91	9.09	–	–	24.86	6.98	–	–
DU-094-002	266	2015-08-04 11:21	46.6105	-119.4239	260.64	8.72	–	–	20.91	6.70	–	–
DU-094-003	265	2015-08-04 11:19	46.6105	-119.4230	33.72	4.09	–	–	16.90	3.49	–	–
DU-094-004	264	2015-08-04 11:16	46.6105	-119.4220	47.42	4.77	–	–	7.40	3.77	–	–
DU-094-005	263	2015-08-04 11:14	46.6105	-119.4210	36.30	5.05	–	–	6.13	4.03	–	–
DU-094-006	262	2015-08-04 11:12	46.6105	-119.4203	22.99	3.65	–	–	< LOD	4.30	U	–
DU-094-007	256	2015-08-04 10:58	46.6111	-119.4253	95.18	5.90	–	–	9.20	4.57	–	–
DU-094-008	257	2015-08-04 11:00	46.6111	-119.4246	302.55	9.75	–	–	43.98	7.70	–	–
DU-094-009	258	2015-08-04 11:02	46.6111	-119.4236	45.00	4.54	–	–	11.28	3.68	–	–
DU-094-010	259	2015-08-04 11:05	46.6110	-119.4227	56.10	5.16	–	–	13.44	4.18	–	–
DU-094-011	260	2015-08-04 11:07	46.6111	-119.4218	40.70	4.67	–	–	< LOD	5.47	U	–
DU-094-012	261	2015-08-04 11:09	46.6110	-119.4207	20.96	4.02	–	–	< LOD	4.74	U	–
DU-094-013	255	2015-08-04 10:55	46.6116	-119.4249	45.00	4.43	–	–	9.54	3.55	–	–
DU-094-014	254	2015-08-04 10:53	46.6116	-119.4241	269.19	8.84	–	–	24.99	6.83	–	–
DU-094-015	253	2015-08-04 10:51	46.6116	-119.4229	148.30	7.42	–	–	< LOD	8.44	U	–
DU-094-016	252	2015-08-04 10:48	46.6116	-119.4220	128.34	7.53	–	–	9.92	5.81	–	–
DU-094-017	251	2015-08-04 10:46	46.6115	-119.4211	23.75	3.61	–	–	< LOD	4.27	U	–
DU-094-018	243	2015-08-04 10:35	46.6117	-119.4202	15.64	3.74	–	–	< LOD	4.54	U	–
DU-094-019	237	2015-08-04 10:21	46.6123	-119.4254	98.00	6.36	–	–	12.93	5.00	–	–
DU-094-020	238	2015-08-04 10:23	46.6121	-119.4245	39.38	4.49	–	–	< LOD	5.12	U	–
DU-094-021	239	2015-08-04 10:26	46.6122	-119.4236	79.00	7.11	–	–	< LOD	8.30	U	–
DU-094-022	240	2015-08-04 10:28	46.6123	-119.4225	17.21	3.91	–	–	< LOD	4.71	U	–
DU-094-023	241	2015-08-04 10:30	46.6122	-119.4216	17.49	3.46	–	–	< LOD	4.10	U	–
DU-094-024	242	2015-08-04 10:32	46.6122	-119.4208	14.39	3.13	–	–	< LOD	3.65	U	–
DU-094-025	236	2015-08-04 10:19	46.6127	-119.4248	107.32	7.74	–	–	12.22	6.06	–	–
DU-094-026	235	2015-08-04 10:16	46.6127	-119.4238	99.03	6.11	–	–	9.10	4.72	–	–
DU-094-027	234	2015-08-04 10:14	46.6127	-119.4231	106.00	8.42	–	–	13.78	6.65	–	–
DU-094-028	233	2015-08-04 10:11	46.6127	-119.4219	15.12	3.26	–	–	< LOD	3.87	U	–
DU-094-029	232	2015-08-04 10:09	46.6129	-119.4210	13.10	3.27	–	–	< LOD	3.87	U	–
DU-094-030	225	2015-08-04 9:54	46.6133	-119.4253	13.20	3.05	–	–	6.01	2.48	–	–
DU-094-031	227	2015-08-04 9:57	46.6133	-119.4244	16.41	3.63	–	–	< LOD	4.26	U	–
DU-094-032	228	2015-08-04 10:00	46.6134	-119.4236	12.56	3.59	–	–	44.22	3.99	–	–
DU-094-033	229	2015-08-04 10:02	46.6134	-119.4225	13.20	3.65	–	–	< LOD	4.38	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-094-034	230	2015-08-04 10:05	46.6133	-119.4215	14.88	3.31	–	–	4.30	2.67	–	–
DU-094-035	231	2015-08-04 10:07	46.6133	-119.4206	16.66	3.67	–	–	< LOD	4.31	U	–
DU-095-001	64	2015-09-09 9:13	46.6068	-119.4246	138.41	6.97	–	–	9.79	5.34	–	–
DU-095-002	62	2015-09-09 9:09	46.6068	-119.4237	193.72	18.34	–	–	< LOD	20.87	U	–
DU-095-003	33	2015-09-09 7:39	46.6068	-119.4228	49.01	5.07	–	–	20.57	4.32	Q	J
DU-095-004	32	2015-09-09 7:36	46.6067	-119.4219	734.72	14.50	–	–	166.14	11.85	Q	J
DU-095-005	30	2015-09-09 7:31	46.6068	-119.4209	402.90	12.24	–	–	30.07	9.39	Q	J
DU-095-006	65	2015-09-09 9:16	46.6073	-119.4251	30.94	3.84	–	–	7.81	3.09	–	–
DU-095-007	66	2015-09-09 9:19	46.6073	-119.4242	788.92	16.71	–	–	58.57	12.80	–	–
DU-095-008	67	2015-09-09 9:21	46.6072	-119.4232	1071.25	21.85	–	–	160.64	17.31	–	–
DU-095-009	68	2015-09-09 9:23	46.6073	-119.4223	919.43	22.65	–	–	71.87	17.40	–	–
DU-095-010	69	2015-09-09 9:26	46.6073	-119.4214	471.82	12.26	–	–	33.08	9.38	–	–
DU-095-011	70	2015-09-09 9:29	46.6073	-119.4205	1617.07	20.98	–	–	186.70	16.36	–	–
DU-095-012	75	2015-09-09 9:41	46.6079	-119.4246	65.41	4.70	–	–	6.94	3.65	–	–
DU-095-013	74	2015-09-09 9:39	46.6079	-119.4237	903.30	20.80	–	–	87.51	16.10	–	–
DU-095-014	73	2015-09-09 9:37	46.6078	-119.4227	569.73	12.77	–	–	82.44	10.08	–	–
DU-095-015	72	2015-09-09 9:34	46.6078	-119.4219	1349.96	20.75	–	–	165.15	16.23	–	–
DU-095-016	71	2015-09-09 9:31	46.6078	-119.4209	902.24	15.02	–	–	207.80	12.30	–	–
DU-095-017	76	2015-09-09 9:44	46.6085	-119.4251	17.27	4.20	–	–	< LOD	4.97	U	–
DU-095-018	77	2015-09-09 9:48	46.6084	-119.4242	413.28	14.80	–	–	65.37	11.78	–	–
DU-095-019	78	2015-09-09 9:50	46.6084	-119.4232	2575.96	36.02	–	–	299.07	28.11	–	–
DU-095-020	85	2015-09-09 10:03	46.6084	-119.4224	31.32	4.35	–	–	5.49	3.46	–	–
DU-095-021	87	2015-09-09 10:07	46.6084	-119.4213	31.15	3.80	–	–	8.20	3.07	–	–
DU-095-022	88	2015-09-09 10:10	46.6084	-119.4205	34.09	3.76	–	–	6.36	2.98	–	–
DU-095-023	93	2015-09-09 10:23	46.6089	-119.4246	453.10	12.00	–	–	148.75	10.19	–	–
DU-095-024	92	2015-09-09 10:20	46.6090	-119.4237	63.12	5.12	–	–	< LOD	5.89	U	–
DU-095-025	91	2015-09-09 10:18	46.6090	-119.4228	110.06	6.26	–	–	14.65	4.92	–	–
DU-095-026	90	2015-09-09 10:15	46.6090	-119.4219	17.21	4.15	–	–	6.48	3.43	–	–
DU-095-027	89	2015-09-09 10:13	46.6089	-119.4209	55.62	4.40	–	–	7.66	3.45	–	–
DU-095-028	94	2015-09-09 10:25	46.6096	-119.4251	2086.22	26.53	–	–	339.08	21.12	–	–
DU-095-029	95	2015-09-09 10:28	46.6095	-119.4241	1585.31	22.50	–	–	166.84	17.47	–	–
DU-095-030	96	2015-09-09 10:30	46.6095	-119.4232	254.62	11.48	–	–	38.65	9.11	–	–
DU-095-031	97	2015-09-09 10:33	46.6095	-119.4223	22.11	3.45	–	–	8.37	2.83	–	–
DU-095-032	98	2015-09-09 10:36	46.6095	-119.4214	20.77	4.08	–	–	< LOD	4.70	U	–
DU-095-033	99	2015-09-09 10:38	46.6095	-119.4204	21.89	4.05	–	–	< LOD	4.80	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-096-001	38	2015-09-21 9:07	46.6049	-119.4246	15.06	3.25	–	–	4.75	2.61	–	–
DU-096-002	37	2015-09-21 9:05	46.6049	-119.4238	43.65	3.95	–	–	< LOD	4.59	U	–
DU-096-003	36	2015-09-21 9:02	46.6048	-119.4228	275.32	8.76	–	–	29.78	6.81	–	–
DU-096-004	35	2015-09-21 9:00	46.6048	-119.4218	400.99	12.87	–	–	25.58	9.82	–	–
DU-096-005	34	2015-09-21 8:58	46.6048	-119.4208	139.28	6.48	–	–	16.36	5.05	–	–
DU-096-006	33	2015-09-21 8:56	46.6048	-119.4200	15.04	3.70	–	–	4.58	3.00	–	–
DU-096-007	32	2015-09-21 8:53	46.6048	-119.4189	16.60	3.64	–	–	< LOD	4.31	U	–
DU-096-008	30	2015-09-21 8:50	46.6048	-119.4179	11.83	3.24	–	–	4.44	2.63	–	–
DU-096-009	39	2015-09-21 9:10	46.6055	-119.4250	11.87	3.27	–	–	< LOD	3.91	U	–
DU-096-010	40	2015-09-21 9:12	46.6054	-119.4241	90.85	5.52	–	–	6.39	4.24	–	–
DU-096-011	41	2015-09-21 9:14	46.6054	-119.4231	735.37	13.78	–	–	66.61	10.63	–	–
DU-096-012	42	2015-09-21 9:17	46.6054	-119.4222	83.80	5.13	–	–	14.17	4.07	–	–
DU-096-013	43	2015-09-21 9:19	46.6054	-119.4212	125.50	5.78	–	–	24.57	4.64	–	–
DU-096-014	52	2015-09-21 9:37	46.6053	-119.4203	206.35	7.96	Z	–	34.17	6.33	Z	–
DU-096-015	53	2015-09-21 9:39	46.6054	-119.4194	28.06	3.60	Z	–	< LOD	4.22	UZ	–
DU-096-016	54	2015-09-21 9:42	46.6054	-119.4184	17.55	3.27	Z	–	4.61	2.62	Z	–
DU-096-017	55	2015-09-21 9:44	46.6054	-119.4175	18.07	3.49	Z	–	< LOD	4.11	UZ	–
DU-096-018	63	2015-09-21 10:04	46.6060	-119.4247	11.96	3.24	Z	–	4.47	2.62	Z	–
DU-096-019	62	2015-09-21 10:01	46.6060	-119.4237	355.29	9.55	Z	–	24.18	7.29	Z	–
DU-096-020	61	2015-09-21 9:59	46.6060	-119.4227	87.79	5.01	Z	–	5.77	3.84	Z	–
DU-096-021	60	2015-09-21 9:56	46.6060	-119.4219	244.99	9.50	Z	–	19.19	7.30	Z	–
DU-096-022	59	2015-09-21 9:54	46.6059	-119.4208	218.62	8.19	Z	–	29.19	6.43	Z	–
DU-096-023	58	2015-09-21 9:51	46.6059	-119.4199	27.46	3.81	Z	–	< LOD	4.47	UZ	–
DU-096-024	57	2015-09-21 9:49	46.6059	-119.4190	50.65	4.34	Z	–	7.45	3.41	Z	–
DU-096-025	56	2015-09-21 9:47	46.6060	-119.4180	18.76	3.37	Z	–	7.08	2.76	Z	–
DU-097-001	34	2015-08-05 8:47	46.6064	-119.4136	27.23	3.56	–	–	< LOD	4.17	U	–
DU-097-002	37	2015-08-05 8:55	46.6071	-119.4142	12.73	3.33	–	–	< LOD	3.97	U	–
DU-097-003	36	2015-08-05 8:52	46.6071	-119.4132	15.33	3.14	–	–	< LOD	3.74	U	–
DU-097-004	33	2015-08-05 8:40	46.6071	-119.4121	23.13	3.73	–	–	< LOD	4.29	U	–
DU-097-005	32	2015-08-05 8:36	46.6071	-119.4112	19.20	3.75	–	–	< LOD	4.43	U	–
DU-097-006	41	2015-08-05 9:07	46.6077	-119.4146	13.69	3.22	–	–	< LOD	3.85	U	–
DU-097-007	42	2015-08-05 9:10	46.6077	-119.4136	11.14	3.40	–	–	4.88	2.78	–	–
DU-097-008	43	2015-08-05 9:12	46.6077	-119.4125	17.64	3.52	–	–	< LOD	4.19	U	–
DU-097-009	44	2015-08-05 9:15	46.6078	-119.4116	18.96	3.87	–	–	6.04	3.16	–	–
DU-097-010	48	2015-08-05 9:26	46.6083	-119.4161	36.60	3.83	–	–	5.11	3.00	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-097-011	47	2015-08-05 9:24	46.6083	-119.4152	84.35	5.32	–	–	8.89	4.13	–	–
DU-097-012	46	2015-08-05 9:21	46.6083	-119.4141	26.16	3.56	–	–	< LOD	4.15	U	–
DU-097-013	45	2015-08-05 9:18	46.6083	-119.4132	22.16	3.47	–	–	< LOD	4.00	U	–
DU-097-014	101	2015-08-05 11:08	46.6084	-119.4125	21.99	3.43	–	–	< LOD	4.04	U	–
DU-097-015	49	2015-08-05 9:29	46.6089	-119.4167	60.45	4.27	–	–	8.42	3.37	–	–
DU-097-016	50	2015-08-05 9:31	46.6089	-119.4156	196.20	8.19	–	–	11.04	6.23	–	–
DU-097-017	51	2015-08-05 9:34	46.6089	-119.4146	36.12	3.87	–	–	< LOD	4.53	U	–
DU-097-018	52	2015-08-05 9:36	46.6089	-119.4136	15.58	3.55	–	–	< LOD	4.27	U	–
DU-097-019	63	2015-08-05 10:00	46.6095	-119.4171	22.00	3.80	–	–	4.70	3.04	–	–
DU-097-020	55	2015-08-05 9:46	46.6095	-119.4161	283.36	8.46	–	–	19.87	6.47	–	–
DU-097-021	54	2015-08-05 9:43	46.6095	-119.4151	273.11	8.87	–	–	15.16	6.74	–	–
DU-097-022	53	2015-08-05 9:40	46.6094	-119.4141	27.88	3.82	–	–	< LOD	4.49	U	–
DU-097-023	89	2015-08-05 10:26	46.6102	-119.4185	18.22	4.02	–	–	< LOD	4.80	U	–
DU-097-024	64	2015-10-16 14:05	46.6102	-119.4176	14.26	3.84	–	–	< LOD	4.63	U	–
DU-097-025	66	2015-08-05 10:07	46.6101	-119.4165	14.58	2.89	–	–	5.85	2.36	–	–
DU-097-026	67	2015-08-05 10:09	46.6101	-119.4155	180.94	7.98	–	–	15.65	6.16	–	–
DU-097-027	90	2015-08-05 10:29	46.6108	-119.4191	166.76	7.36	–	–	22.36	5.78	–	–
DU-097-028	88	2015-08-05 10:23	46.6108	-119.4182	16.35	3.42	–	–	4.64	2.76	–	–
DU-097-029	87	2015-08-05 10:20	46.6107	-119.4171	18.44	3.22	–	–	< LOD	3.75	U	–
DU-097-030	68	2015-08-05 10:12	46.6108	-119.4161	18.93	5.00	–	–	< LOD	6.00	U	–
DU-097-031	91	2015-08-05 10:31	46.6114	-119.4196	52.35	4.75	–	–	6.22	3.72	–	–
DU-097-032	92	2015-08-05 10:34	46.6114	-119.4186	365.21	11.25	–	–	54.80	8.90	–	–
DU-097-033	93	2015-08-05 10:37	46.6113	-119.4176	78.61	4.92	–	–	< LOD	5.64	U	–
DU-097-034	100	2015-08-05 10:58	46.6111	-119.4167	23.69	3.55	–	–	< LOD	4.21	U	–
DU-097-035	96	2015-08-05 10:44	46.6120	-119.4202	15.01	3.37	–	–	< LOD	3.98	U	–
DU-097-036	95	2015-08-05 10:42	46.6122	-119.4192	16.29	3.28	–	–	< LOD	3.85	U	–
DU-097-037	94	2015-08-05 10:39	46.6121	-119.4181	103.04	5.97	–	–	8.14	4.60	–	–
DU-097-038	97	2015-08-05 10:48	46.6126	-119.4196	15.72	3.29	–	–	< LOD	3.89	U	–
DU-097-039	99	2015-08-05 10:54	46.6125	-119.4186	17.68	3.68	–	–	< LOD	4.34	U	–
DU-097-040	98	2015-08-05 10:51	46.6132	-119.4201	13.63	3.17	–	–	< LOD	3.78	U	–
DU-098-001	122	2015-08-05 12:00	46.6066	-119.4200	31.53	4.13	–	–	7.13	3.32	–	–
DU-098-002	121	2015-08-05 11:58	46.6067	-119.4189	22.29	5.91	–	–	< LOD	6.94	U	–
DU-098-003	120	2015-08-05 11:55	46.6067	-119.4181	17.97	3.34	–	–	< LOD	3.97	U	–
DU-098-004	119	2015-08-05 11:52	46.6066	-119.4170	15.15	3.45	–	–	4.23	2.78	–	–
DU-098-005	118	2015-08-05 11:48	46.6066	-119.4162	17.38	3.15	–	–	< LOD	3.73	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-098-006	117	2015-08-05 11:44	46.6067	-119.4151	20.79	3.43	–	–	< LOD	4.06	U	–
DU-098-007	115	2015-08-05 11:40	46.6066	-119.4141	16.20	3.30	–	–	< LOD	3.94	U	–
DU-098-008	123	2015-08-05 12:04	46.6073	-119.4195	41.11	4.76	–	–	< LOD	5.64	U	–
DU-098-009	124	2015-08-05 12:06	46.6072	-119.4185	16.48	3.45	–	–	< LOD	4.04	U	–
DU-098-010	125	2015-08-05 12:09	46.6072	-119.4175	29.46	3.77	–	–	< LOD	4.43	U	–
DU-098-011	126	2015-08-05 12:12	46.6073	-119.4165	16.39	3.25	–	–	< LOD	3.85	U	–
DU-098-012	127	2015-08-05 12:14	46.6072	-119.4155	65.27	4.82	–	–	7.45	3.75	–	–
DU-098-013	142	2016-05-11 11:24	46.6078	-119.4199	55.81	4.62	–	–	< LOD	5.36	U	–
DU-098-014	141	2016-05-11 11:26	46.6078	-119.4190	21.06	3.68	–	–	6.86	3.00	–	–
DU-098-015	133	2015-08-05 12:26	46.6078	-119.4180	36.49	3.78	–	–	< LOD	4.39	U	–
DU-098-016	132	2015-08-05 12:24	46.6078	-119.4170	15.89	3.10	–	–	< LOD	2.46	U	–
DU-098-017	128	2015-08-05 12:16	46.6079	-119.4160	12.73	3.15	–	–	6.70	2.60	–	–
DU-098-018	143	2016-05-11 11:21	46.6084	-119.4195	20.55	3.30	–	–	5.96	2.65	–	–
DU-098-019	144	2016-05-11 11:28	46.6083	-119.4185	20.64	3.46	–	–	5.31	2.78	–	–
DU-098-020	155	2016-05-11 11:31	46.6083	-119.4176	22.13	3.41	–	–	5.84	2.74	–	–
DU-098-021	156	2016-05-11 11:33	46.6083	-119.4165	38.30	3.86	–	–	5.91	3.04	–	–
DU-098-022	171	2016-05-11 11:17	46.6089	-119.4199	24.96	3.35	–	–	4.40	2.64	–	–
DU-098-023	158	2016-05-11 11:14	46.6090	-119.4189	18.61	3.37	–	–	6.20	2.73	–	–
DU-098-024	157	2016-05-11 11:11	46.6089	-119.4180	27.10	3.49	–	–	4.45	2.75	–	–
DU-098-025	172	2016-05-11 11:04	46.6104	-119.4197	22.37	3.50	–	–	4.22	2.77	–	–
DU-098-026	180	2016-05-11 11:08	46.6095	-119.4185	16.89	3.18	–	–	4.31	2.53	–	–
DU-098-027	173	2016-05-11 11:02	46.6101	-119.4199	19.25	3.19	–	–	4.38	2.54	–	–
DU-098-028	179	2016-05-11 10:58	46.6101	-119.4189	17.20	3.20	–	–	6.82	2.62	–	–
DU-099-001	114	2015-09-21 12:40	46.5956	-119.4321	8.41	3.72	–	–	< LOD	4.53	U	–
DU-099-002	113	2015-09-21 12:35	46.5956	-119.4311	13.70	3.20	–	–	4.79	2.58	–	–
DU-099-003	112	2015-09-21 12:31	46.5956	-119.4301	10.31	3.41	–	–	< LOD	4.06	U	–
DU-099-004	111	2015-09-21 12:29	46.5956	-119.4291	15.64	3.26	–	–	< LOD	3.84	U	–
DU-099-005	110	2015-09-21 12:27	46.5956	-119.4281	11.11	3.23	–	–	5.02	2.63	–	–
DU-099-006	106	2015-09-21 12:17	46.5962	-119.4316	14.95	3.11	–	–	< LOD	2.50	U	–
DU-099-007	107	2015-09-21 12:20	46.5962	-119.4306	10.23	3.65	–	–	< LOD	4.35	U	–
DU-099-008	108	2015-09-21 12:22	46.5962	-119.4296	10.03	3.45	–	–	< LOD	4.08	U	–
DU-099-009	109	2015-09-21 12:24	46.5962	-119.4286	6.34	3.61	–	–	5.71	3.07	–	–
DU-099-010	105	2015-09-21 12:14	46.5968	-119.4321	29.46	4.00	–	–	5.11	3.16	–	–
DU-099-011	104	2015-09-21 12:12	46.5968	-119.4311	14.12	3.13	–	–	6.05	2.57	–	–
DU-099-012	103	2015-09-21 12:10	46.5968	-119.4301	9.11	3.13	–	–	6.29	2.61	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-099-013	102	2015-09-21 12:07	46.5968	-119.4291	13.31	2.94	–	–	4.08	2.36	–	–
DU-099-014	93	2015-09-21 11:49	46.5968	-119.4281	9.60	3.15	–	–	< LOD	3.77	U	–
DU-099-015	89	2015-09-21 11:40	46.5974	-119.4315	12.23	3.15	–	–	< LOD	3.76	U	–
DU-099-016	90	2015-09-21 11:42	46.5974	-119.4306	11.61	3.18	–	–	4.21	2.57	–	–
DU-099-017	91	2015-09-21 11:44	46.5974	-119.4296	10.60	3.17	–	–	4.50	2.56	–	–
DU-099-018	92	2015-09-21 11:47	46.5974	-119.4286	14.65	3.18	–	–	< LOD	3.76	U	–
DU-099-019	87	2015-09-21 11:37	46.5980	-119.4320	12.60	3.18	–	–	< LOD	3.78	U	–
DU-099-020	86	2015-09-21 11:34	46.5980	-119.4310	10.66	3.09	–	–	< LOD	3.70	U	–
DU-099-021	85	2015-09-21 11:32	46.5980	-119.4300	11.16	3.95	–	–	< LOD	4.80	U	–
DU-099-022	84	2015-09-21 11:29	46.5980	-119.4290	10.79	2.97	–	–	4.32	2.39	–	–
DU-099-023	83	2015-09-21 11:27	46.5980	-119.4281	11.03	3.18	–	–	4.03	2.55	–	–
DU-099-024	77	2015-09-21 11:14	46.5986	-119.4315	16.76	3.18	–	–	< LOD	3.78	U	–
DU-099-025	80	2015-09-21 11:20	46.5986	-119.4305	12.81	3.12	–	–	4.44	2.52	–	–
DU-099-026	81	2015-09-21 11:22	46.5986	-119.4295	17.33	3.22	–	–	5.13	2.60	–	–
DU-099-027	82	2015-09-21 11:24	46.5986	-119.4285	11.67	3.17	–	–	< LOD	3.76	U	–
DU-100-001	239	2015-09-01 9:36	46.5922	-119.4344	16.36	3.56	–	–	< LOD	4.29	U	–
DU-100-002	240	2015-09-01 9:39	46.5922	-119.4334	10.17	3.02	–	–	< LOD	3.63	U	–
DU-100-003	241	2015-09-01 9:41	46.5921	-119.4324	12.52	3.02	–	–	3.99	2.42	–	–
DU-100-004	242	2015-09-01 9:43	46.5921	-119.4314	11.98	4.89	–	–	< LOD	6.05	U	–
DU-100-005	245	2015-09-01 9:50	46.5921	-119.4304	13.38	4.42	–	–	< LOD	5.32	U	–
DU-100-006	246	2015-09-01 9:53	46.5921	-119.4294	11.28	3.28	–	–	< LOD	3.94	U	–
DU-100-007	247	2015-09-01 9:55	46.5921	-119.4283	16.84	3.37	–	–	< LOD	3.98	U	–
DU-100-008	238	2015-09-01 9:34	46.5928	-119.4339	14.35	3.43	–	–	< LOD	4.02	U	–
DU-100-009	237	2015-09-01 9:32	46.5927	-119.4329	21.70	3.66	–	–	4.65	2.92	–	–
DU-100-010	236	2015-09-01 9:30	46.5927	-119.4319	13.90	3.27	–	–	5.73	2.68	–	–
DU-100-011	235	2015-09-01 9:27	46.5927	-119.4309	18.58	3.26	–	–	4.17	2.59	–	–
DU-100-012	234	2015-09-01 9:25	46.5927	-119.4298	17.21	4.74	–	–	< LOD	5.66	U	–
DU-100-013	233	2015-09-01 9:23	46.5927	-119.4288	19.19	3.79	–	–	< LOD	4.40	U	–
DU-100-014	232	2015-09-01 9:21	46.5927	-119.4278	13.78	4.32	–	–	< LOD	5.23	U	–
DU-100-015	217	2015-09-01 8:54	46.5934	-119.4344	49.24	4.51	–	–	11.29	3.63	–	–
DU-100-016	218	2015-09-01 8:56	46.5934	-119.4334	25.54	3.71	Z	–	6.22	2.98	Z	–
DU-100-017	227	2015-09-01 9:09	46.5933	-119.4324	12.36	3.42	–	–	< LOD	4.08	U	–
DU-100-018	228	2015-09-01 9:12	46.5933	-119.4313	21.66	3.46	–	–	4.75	2.75	–	–
DU-100-019	229	2015-09-01 9:14	46.5933	-119.4303	19.70	3.83	–	–	< LOD	4.53	U	–
DU-100-020	230	2015-09-01 9:16	46.5933	-119.4293	26.20	3.78	–	–	5.53	3.03	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-100-021	231	2015-09-01 9:18	46.5933	-119.4283	16.93	3.39	–	–	< LOD	4.01	U	–
DU-100-022	216	2015-09-01 8:52	46.5940	-119.4339	22.71	3.39	–	–	4.91	2.68	–	–
DU-100-023	215	2015-09-01 8:50	46.5940	-119.4329	32.71	4.00	–	–	< LOD	4.61	U	–
DU-100-024	214	2015-09-01 8:47	46.5939	-119.4318	790.51	14.64	–	–	78.68	11.33	–	–
DU-100-025	213	2015-09-01 8:44	46.5939	-119.4308	570.28	16.33	–	–	39.98	12.50	–	–
DU-100-026	212	2015-09-01 8:42	46.5939	-119.4298	14.26	3.71	–	–	< LOD	4.41	U	–
DU-100-027	211	2015-09-01 8:39	46.5939	-119.4288	11.27	3.34	–	–	4.65	2.72	–	–
DU-100-028	210	2015-09-01 8:37	46.5939	-119.4278	10.09	3.44	–	–	5.26	2.84	–	–
DU-100-029	200	2015-09-01 8:15	46.5946	-119.4343	8.93	3.24	–	–	4.39	2.62	–	–
DU-100-030	203	2015-09-01 8:24	46.5946	-119.4333	13.39	3.42	–	–	< LOD	4.09	U	–
DU-100-031	204	2015-10-16 14:31	46.5946	-119.4324	14.00	3.25	–	–	< LOD	3.81	U	–
DU-100-032	206	2015-09-01 8:28	46.5945	-119.4313	622.91	15.52	–	–	56.74	11.98	–	–
DU-100-033	207	2015-09-01 8:31	46.5945	-119.4303	35.09	4.25	–	–	5.71	3.36	–	–
DU-100-034	208	2015-09-01 8:33	46.5945	-119.4293	16.86	3.68	–	–	< LOD	4.40	U	–
DU-100-035	209	2015-09-01 8:35	46.5945	-119.4283	14.88	3.21	–	–	4.44	2.56	–	–
DU-100-036	199	2015-09-01 8:12	46.5952	-119.4337	8.55	3.39	–	–	5.06	2.80	–	–
DU-100-037	198	2015-09-01 8:09	46.5952	-119.4327	12.20	3.74	–	–	< LOD	4.43	U	–
DU-100-038	197	2015-09-01 8:07	46.5952	-119.4317	936.91	19.68	–	–	81.77	15.17	–	–
DU-100-039	196	2015-09-01 8:05	46.5951	-119.4308	467.16	11.52	–	–	97.76	9.34	–	–
DU-100-040	195	2015-09-01 8:03	46.5951	-119.4297	16.68	4.20	–	–	< LOD	5.04	U	–
DU-100-041	193	2015-09-01 7:59	46.5952	-119.4288	9.61	3.34	–	–	< LOD	4.00	U	–
DU-101-001	314	2015-09-01 12:17	46.5955	-119.4205	8.98	3.54	–	–	4.49	2.92	–	–
DU-101-002	313	2015-09-01 12:15	46.5956	-119.4195	12.11	3.09	–	–	< LOD	3.69	U	–
DU-101-003	312	2015-09-01 12:13	46.5956	-119.4185	11.66	4.36	–	–	< LOD	5.29	U	–
DU-101-004	309	2015-09-01 12:06	46.5962	-119.4210	9.26	3.65	–	–	6.01	3.07	–	–
DU-101-005	310	2015-09-01 12:08	46.5961	-119.4201	10.04	3.24	–	–	6.14	2.69	–	–
DU-101-006	311	2015-09-01 12:10	46.5960	-119.4192	8.49	3.98	–	–	< LOD	4.93	U	–
DU-101-007	308	2015-09-01 12:04	46.5967	-119.4204	18.09	3.97	–	–	< LOD	4.66	U	–
DU-101-008	307	2015-09-01 12:02	46.5967	-119.4194	17.51	3.36	–	–	< LOD	4.01	U	–
DU-101-009	306	2015-09-01 12:00	46.5968	-119.4186	14.34	3.89	–	–	< LOD	4.62	U	–
DU-101-010	303	2015-09-01 11:54	46.5973	-119.4210	15.40	3.29	–	–	4.44	2.63	–	–
DU-101-011	304	2015-09-01 11:56	46.5973	-119.4202	24.00	4.21	–	–	< LOD	4.97	U	–
DU-101-012	305	2015-09-01 11:58	46.5973	-119.4190	30.22	3.78	–	–	< LOD	4.34	U	–
DU-101-013	302	2015-09-01 11:52	46.5979	-119.4213	16.27	3.79	–	–	< LOD	4.52	U	–
DU-101-014	301	2015-09-01 11:50	46.5978	-119.4203	11.77	3.40	–	–	4.39	2.75	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-101-015	300	2015-09-01 11:48	46.5979	-119.4193	16.88	3.93	–	–	6.15	3.23	–	–
DU-101-016	299	2015-09-01 11:46	46.5979	-119.4185	15.02	3.47	–	–	12.09	3.00	–	–
DU-101-017	289	2015-09-01 11:28	46.5985	-119.4211	12.79	3.12	–	–	6.54	2.56	–	–
DU-101-018	297	2015-09-01 11:41	46.5984	-119.4202	11.50	3.12	–	–	4.15	2.52	–	–
DU-101-019	298	2015-09-01 11:44	46.5985	-119.4191	35.85	4.00	–	–	5.52	3.15	–	–
DU-101-020	288	2015-09-01 11:26	46.5990	-119.4216	13.70	3.37	–	–	8.79	2.84	–	–
DU-101-021	287	2015-09-01 11:24	46.5991	-119.4204	8.66	3.35	–	–	< LOD	4.11	U	–
DU-101-022	286	2015-09-01 11:22	46.5991	-119.4193	13.44	3.63	–	–	6.88	3.02	–	–
DU-101-023	283	2015-09-01 11:15	46.5991	-119.4185	10.98	3.38	–	–	4.27	2.75	–	–
DU-101-024	278	2015-09-01 11:05	46.5997	-119.4228	10.69	3.26	–	–	< LOD	3.91	U	–
DU-101-025	279	2015-09-01 11:07	46.5996	-119.4220	10.16	3.33	–	–	5.92	2.76	–	–
DU-101-026	280	2015-09-01 11:09	46.5997	-119.4209	11.64	3.94	–	–	< LOD	4.70	U	–
DU-101-027	281	2015-09-01 11:11	46.5996	-119.4199	10.78	4.36	–	–	< LOD	5.35	U	–
DU-101-028	282	2015-09-01 11:13	46.5997	-119.4190	12.36	4.24	–	–	< LOD	5.10	U	–
DU-101-029	277	2015-09-01 11:03	46.6003	-119.4224	15.24	3.43	–	–	6.66	2.81	–	–
DU-101-030	276	2015-09-01 11:00	46.6003	-119.4213	21.03	3.74	–	–	< LOD	4.39	U	–
DU-101-031	275	2015-09-01 10:58	46.6003	-119.4204	11.83	4.17	–	–	< LOD	5.20	U	–
DU-101-032	274	2015-09-01 10:56	46.6003	-119.4193	26.30	3.94	–	–	4.98	3.14	–	–
DU-101-033	273	2015-09-01 10:54	46.6003	-119.4185	12.30	3.87	–	–	< LOD	4.68	U	–
DU-101-034	265	2015-09-01 10:41	46.6008	-119.4229	9.38	3.12	–	–	< LOD	3.78	U	–
DU-101-035	267	2015-09-01 10:44	46.6008	-119.4221	27.75	3.89	–	–	6.62	3.13	–	–
DU-101-036	270	2015-09-01 10:48	46.6009	-119.4210	26.27	4.47	–	–	< LOD	5.25	U	–
DU-101-037	271	2015-09-01 10:50	46.6008	-119.4200	12.82	4.06	–	–	< LOD	4.77	U	–
DU-101-038	272	2015-09-01 10:52	46.6008	-119.4190	11.11	3.01	–	–	< LOD	3.59	U	–
DU-102-001	263	2015-09-29 12:44	46.5957	-119.4179	12.27	3.37	–	–	< LOD	4.05	U	–
DU-102-002	262	2015-09-29 12:41	46.5957	-119.4171	12.21	3.08	–	–	7.38	2.58	–	–
DU-102-003	261	2015-09-29 12:39	46.5957	-119.4161	13.79	3.61	–	–	< LOD	4.28	U	–
DU-102-004	260	2015-09-29 12:37	46.5957	-119.4151	16.11	3.21	–	–	< LOD	3.81	U	–
DU-102-005	259	2015-09-29 12:35	46.5958	-119.4142	22.15	3.63	–	–	< LOD	4.33	U	–
DU-102-006	254	2015-09-29 12:24	46.5964	-119.4175	16.58	3.88	–	–	< LOD	4.63	U	–
DU-102-007	255	2015-09-29 12:26	46.5963	-119.4165	12.81	3.26	–	–	4.28	2.62	–	–
DU-102-008	256	2015-09-29 12:28	46.5963	-119.4156	12.03	3.56	–	–	5.48	2.93	–	–
DU-102-009	257	2015-09-29 12:30	46.5963	-119.4145	12.81	3.27	–	–	5.07	2.65	–	–
DU-102-010	258	2015-09-29 12:33	46.5963	-119.4135	104.68	6.06	–	–	8.94	4.67	–	–
DU-102-011	253	2015-09-29 12:22	46.5970	-119.4181	15.35	3.19	–	–	< LOD	3.78	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-102-012	252	2015-09-29 12:20	46.5970	-119.4171	9.76	3.16	–	–	< LOD	3.78	U	–
DU-102-013	251	2015-09-29 12:17	46.5970	-119.4161	15.70	3.41	–	–	< LOD	4.08	U	–
DU-102-014	250	2015-09-29 12:14	46.5970	-119.4151	222.99	7.77	–	–	9.53	5.87	–	–
DU-102-015	249	2015-09-29 12:12	46.5970	-119.4140	21.25	3.54	–	–	5.01	2.83	–	–
DU-102-016	235	2015-09-29 11:44	46.5976	-119.4175	12.09	3.08	–	–	< LOD	3.62	U	–
DU-102-017	236	2015-09-29 11:46	46.5975	-119.4165	14.72	3.23	–	–	< LOD	3.82	U	–
DU-102-018	237	2015-09-29 11:48	46.5975	-119.4155	91.63	5.40	–	–	9.86	4.19	–	–
DU-102-019	238	2015-09-29 11:50	46.5975	-119.4145	26.28	3.68	–	–	8.36	3.00	–	–
DU-102-020	239	2015-09-29 11:52	46.5975	-119.4136	33.19	3.89	–	–	< LOD	4.59	U	–
DU-102-021	234	2015-09-29 11:41	46.5981	-119.4179	10.67	2.99	–	–	5.78	2.46	–	–
DU-102-022	233	2015-09-29 11:38	46.5981	-119.4170	15.11	3.31	–	–	4.27	2.65	–	–
DU-102-023	232	2015-09-29 11:36	46.5981	-119.4161	19.02	3.48	–	–	< LOD	4.13	U	–
DU-102-024	231	2015-09-29 11:34	46.5980	-119.4151	16.11	3.40	–	–	< LOD	4.04	U	–
DU-102-025	230	2015-09-29 11:32	46.5982	-119.4142	13.29	3.26	–	–	< LOD	3.87	U	–
DU-102-026	224	2015-09-29 11:19	46.5987	-119.4175	12.02	3.20	–	–	< LOD	3.74	U	–
DU-102-027	226	2015-09-29 11:23	46.5986	-119.4166	12.91	3.25	–	–	5.23	2.63	–	–
DU-102-028	227	2015-09-29 11:25	46.5986	-119.4155	14.62	3.25	–	–	< LOD	3.90	U	–
DU-102-029	228	2015-09-29 11:28	46.5986	-119.4145	17.90	3.24	–	–	< LOD	3.81	U	–
DU-102-030	229	2015-09-29 11:30	46.5986	-119.4135	15.93	3.12	–	–	< LOD	3.71	U	–
DU-103-001	38	2015-09-30 8:57	46.5921	-119.4194	17.43	3.79	–	–	< LOD	4.55	U	–
DU-103-002	37	2015-09-30 8:55	46.5921	-119.4184	12.61	3.02	–	–	< LOD	3.58	U	–
DU-103-003	36	2015-09-30 8:53	46.5921	-119.4174	12.53	3.63	–	–	5.22	2.98	–	–
DU-103-004	35	2015-09-30 8:50	46.5921	-119.4165	10.94	2.97	–	–	< LOD	3.55	U	–
DU-103-005	33	2015-09-30 8:47	46.5921	-119.4155	12.78	3.08	–	–	< LOD	3.59	U	–
DU-103-006	39	2015-09-30 9:00	46.5927	-119.4199	25.24	3.66	–	–	< LOD	4.32	U	–
DU-103-007	40	2015-09-30 9:02	46.5927	-119.4189	17.49	3.60	–	–	4.87	2.90	–	–
DU-103-008	41	2015-09-30 9:04	46.5927	-119.4179	8.34	2.97	–	–	5.11	2.42	–	–
DU-103-009	42	2015-09-30 9:07	46.5927	-119.4169	10.53	2.97	–	–	< LOD	2.37	U	–
DU-103-010	43	2015-09-30 9:09	46.5927	-119.4160	15.07	3.33	–	–	4.80	2.68	–	–
DU-103-011	44	2015-09-30 9:12	46.5927	-119.4150	16.07	3.07	–	–	< LOD	3.59	U	–
DU-103-012	49	2015-09-30 9:24	46.5933	-119.4194	23.72	3.38	–	–	5.38	2.72	–	–
DU-103-013	48	2015-09-30 9:21	46.5933	-119.4184	14.70	3.18	–	–	4.69	2.55	–	–
DU-103-014	47	2015-09-30 9:18	46.5933	-119.4174	10.08	3.04	–	–	4.41	2.45	–	–
DU-103-015	46	2015-09-30 9:16	46.5933	-119.4164	11.34	3.00	–	–	4.51	2.42	–	–
DU-103-016	45	2015-09-30 9:14	46.5933	-119.4154	14.30	3.08	–	–	4.14	2.46	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-103-017	62	2015-09-30 9:44	46.5939	-119.4198	14.83	3.16	–	–	< LOD	3.66	U	–
DU-103-018	63	2015-09-30 9:47	46.5939	-119.4189	12.90	3.10	–	–	< LOD	3.65	U	–
DU-103-019	64	2015-09-30 9:49	46.5939	-119.4179	13.58	3.08	–	–	5.14	2.48	–	–
DU-103-020	65	2015-09-30 9:51	46.5939	-119.4169	12.37	3.04	–	–	< LOD	3.58	U	–
DU-103-021	66	2015-09-30 9:54	46.5939	-119.4159	9.37	3.51	–	–	< LOD	4.27	U	–
DU-103-022	67	2015-09-30 9:56	46.5938	-119.4149	15.38	3.30	–	–	< LOD	3.80	U	–
DU-103-023	72	2015-09-30 10:08	46.5945	-119.4193	19.33	3.53	–	–	< LOD	4.23	U	–
DU-103-024	71	2015-09-30 10:05	46.5945	-119.4184	10.61	3.59	–	–	< LOD	4.35	U	–
DU-103-025	70	2015-09-30 10:03	46.5945	-119.4174	10.58	3.06	–	–	< LOD	3.64	U	–
DU-103-026	69	2015-09-30 10:01	46.5944	-119.4164	11.84	3.13	–	–	4.71	2.53	–	–
DU-103-027	68	2015-09-30 9:59	46.5944	-119.4154	17.38	3.27	–	–	5.17	2.64	–	–
DU-103-028	73	2015-09-30 10:10	46.5951	-119.4198	13.50	4.02	–	–	< LOD	4.85	U	–
DU-103-029	74	2015-09-30 10:13	46.5951	-119.4188	10.86	3.10	–	–	5.15	2.52	–	–
DU-103-030	75	2015-09-30 10:15	46.5950	-119.4179	12.25	3.39	–	–	4.63	2.75	–	–
DU-103-031	76	2015-09-30 10:17	46.5950	-119.4169	15.59	3.71	–	–	< LOD	4.46	U	–
DU-103-032	77	2015-09-30 10:20	46.5950	-119.4159	10.25	2.97	–	–	6.44	2.47	–	–
DU-104-001	179	2015-09-29 9:33	46.5882	-119.4184	9.58	3.14	–	–	4.43	2.57	–	–
DU-104-002	178	2015-09-29 9:31	46.5882	-119.4175	15.02	3.10	–	–	5.04	2.49	–	–
DU-104-003	177	2015-09-29 9:29	46.5882	-119.4164	11.86	2.98	–	–	4.45	2.40	–	–
DU-104-004	176	2015-09-29 9:26	46.5882	-119.4154	15.44	3.22	–	–	< LOD	3.80	U	–
DU-104-005	175	2015-09-29 9:24	46.5882	-119.4144	9.04	3.18	–	–	< LOD	3.82	U	–
DU-104-006	174	2015-09-29 9:22	46.5882	-119.4134	15.00	3.23	–	–	< LOD	3.80	U	–
DU-104-007	172	2015-09-29 9:19	46.5882	-119.4125	9.69	2.88	–	–	5.21	2.37	–	–
DU-104-008	180	2015-09-29 9:38	46.5889	-119.4178	13.79	3.04	–	–	< LOD	2.42	U	–
DU-104-009	181	2015-09-29 9:40	46.5888	-119.4169	13.24	3.10	–	–	< LOD	3.69	U	–
DU-104-010	182	2015-09-29 9:42	46.5887	-119.4159	12.25	3.07	–	–	< LOD	3.66	U	–
DU-104-011	183	2015-09-29 9:44	46.5888	-119.4148	15.84	3.11	–	–	< LOD	3.71	U	–
DU-104-012	184	2015-09-29 9:46	46.5888	-119.4139	11.63	3.08	–	–	< LOD	3.69	U	–
DU-104-013	185	2015-09-29 9:49	46.5888	-119.4129	15.26	3.30	–	–	4.26	2.64	–	–
DU-104-014	198	2015-09-29 10:14	46.5894	-119.4184	7.72	2.97	–	–	< LOD	3.61	U	–
DU-104-015	197	2015-09-29 10:12	46.5894	-119.4173	12.71	3.14	–	–	4.39	2.53	–	–
DU-104-016	196	2015-09-29 10:09	46.5894	-119.4164	15.62	3.22	–	–	< LOD	3.77	U	–
DU-104-017	195	2015-09-29 10:07	46.5893	-119.4154	8.54	2.92	–	–	< LOD	3.50	U	–
DU-104-018	187	2015-09-29 9:53	46.5894	-119.4144	12.49	3.07	–	–	4.10	2.46	–	–
DU-104-019	186	2015-09-29 9:51	46.5893	-119.4134	16.18	3.37	–	–	< LOD	4.01	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-104-020	199	2015-09-29 10:17	46.5900	-119.4179	16.60	3.26	–	–	< LOD	3.83	U	–
DU-104-021	200	2015-09-29 10:19	46.5899	-119.4167	12.24	3.48	–	–	< LOD	4.10	U	–
DU-104-022	201	2015-09-29 10:21	46.5900	-119.4158	8.72	3.30	–	–	< LOD	3.91	U	–
DU-104-023	202	2015-09-29 10:23	46.5900	-119.4148	9.58	3.47	–	–	< LOD	4.16	U	–
DU-104-024	206	2015-09-29 10:32	46.5906	-119.4183	15.05	3.39	–	–	5.17	2.76	–	–
DU-104-025	205	2015-09-29 10:30	46.5905	-119.4174	17.26	3.43	–	–	< LOD	4.07	U	–
DU-104-026	204	2015-09-29 10:27	46.5906	-119.4164	9.58	3.52	–	–	< LOD	4.29	U	–
DU-104-027	203	2015-09-29 10:25	46.5906	-119.4153	9.82	3.12	–	–	< LOD	3.74	U	–
DU-104-028	207	2015-09-29 10:34	46.5911	-119.4177	10.45	2.97	–	–	4.95	2.41	–	–
DU-104-029	208	2015-09-29 10:37	46.5912	-119.4168	12.18	3.30	–	–	< LOD	3.96	U	–
DU-104-030	209	2015-09-29 10:39	46.5910	-119.4157	10.48	3.05	–	–	< LOD	3.65	U	–
DU-105-001	247	2015-10-02 11:57	46.5958	-119.4131	40.32	4.06	–	–	7.23	3.22	–	–
DU-105-002	249	2015-10-02 12:01	46.5958	-119.4120	38.70	4.10	–	–	10.18	3.31	–	–
DU-105-003	250	2015-10-02 12:04	46.5958	-119.4110	15.54	3.26	–	–	< LOD	3.87	U	–
DU-105-004	251	2015-10-02 12:06	46.5958	-119.4100	15.34	3.01	–	–	4.14	2.41	–	–
DU-105-005	255	2015-10-02 12:19	46.5964	-119.4126	57.52	4.76	–	–	16.83	3.90	–	–
DU-105-006	254	2015-10-02 12:15	46.5964	-119.4115	20.62	3.45	–	–	4.38	2.73	–	–
DU-105-007	253	2015-10-02 12:12	46.5964	-119.4106	18.17	4.20	–	–	< LOD	5.10	U	–
DU-105-008	252	2015-10-02 12:09	46.5964	-119.4096	22.07	3.75	–	–	< LOD	4.47	U	–
DU-105-009	256	2015-10-02 12:23	46.5970	-119.4130	17.79	3.83	–	–	11.29	3.30	–	–
DU-105-010	257	2015-10-02 12:27	46.5970	-119.4120	27.18	4.36	–	–	< LOD	5.13	U	–
DU-105-011	258	2015-10-02 12:30	46.5970	-119.4110	10.34	3.86	–	–	< LOD	4.73	U	–
DU-105-012	259	2015-10-02 12:33	46.5969	-119.4101	8.52	3.04	–	–	4.92	2.49	–	–
DU-105-013	274	2015-10-02 13:07	46.5976	-119.4135	31.15	4.46	–	–	< LOD	5.18	U	–
DU-105-014	273	2015-10-02 13:04	46.5976	-119.4126	22.04	3.77	–	–	13.42	3.25	–	–
DU-105-015	272	2015-10-02 13:00	46.5976	-119.4115	49.92	4.49	–	–	11.69	3.62	–	–
DU-105-016	271	2015-10-02 12:56	46.5976	-119.4105	28.97	4.21	–	–	16.75	3.64	–	–
DU-105-017	270	2015-10-02 12:53	46.5976	-119.4096	104.34	6.49	–	–	13.90	5.10	–	–
DU-105-018	275	2015-10-02 13:09	46.5981	-119.4130	27.70	4.00	–	–	7.47	3.24	–	–
DU-105-019	276	2015-10-02 13:12	46.5982	-119.4121	42.23	4.27	–	–	9.40	3.43	–	–
DU-105-020	277	2015-10-02 13:15	46.5982	-119.4110	124.15	5.99	–	–	17.54	4.71	–	–
DU-105-021	278	2015-10-02 13:17	46.5982	-119.4100	53.46	4.77	–	–	< LOD	5.57	U	–
DU-105-022	282	2015-10-02 13:30	46.5987	-119.4135	39.33	4.23	–	–	12.67	3.48	–	–
DU-105-023	281	2015-10-02 13:27	46.5988	-119.4125	25.49	3.56	–	–	17.15	3.11	–	–
DU-105-024	280	2015-10-02 13:24	46.5988	-119.4115	326.90	9.24	–	–	30.53	7.13	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-105-025	279	2015-10-02 13:21	46.5988	-119.4106	251.10	8.16	–	–	25.06	6.32	–	–
DU-106-001	148	2015-09-23 13:57	46.5923	-119.4143	13.23	3.13	–	–	< LOD	3.73	U	–
DU-106-002	147	2015-09-23 13:56	46.5924	-119.4134	13.81	3.16	–	–	< LOD	3.70	U	–
DU-106-003	150	2015-09-23 14:02	46.5930	-119.4148	16.78	3.20	–	–	4.81	2.57	–	–
DU-106-004	151	2015-09-23 14:05	46.5929	-119.4138	14.13	3.11	–	–	< LOD	3.69	U	–
DU-106-005	152	2015-09-23 14:10	46.5929	-119.4128	15.24	3.25	–	–	< LOD	3.92	U	–
DU-106-006	153	2015-09-23 14:13	46.5930	-119.4118	14.38	3.26	–	–	< LOD	3.90	U	–
DU-106-007	157	2015-09-23 14:22	46.5936	-119.4143	11.55	3.06	–	–	< LOD	3.65	U	–
DU-106-008	156	2015-09-23 14:20	46.5935	-119.4133	12.54	3.33	–	–	< LOD	3.94	U	–
DU-106-009	155	2015-09-23 14:18	46.5935	-119.4123	14.61	3.03	–	–	< LOD	3.56	U	–
DU-106-010	154	2015-09-23 14:15	46.5935	-119.4113	20.50	3.46	–	–	4.18	2.74	–	–
DU-106-011	158	2015-09-23 14:25	46.5942	-119.4148	16.13	3.15	–	–	< LOD	3.69	U	–
DU-106-012	159	2015-09-23 14:27	46.5941	-119.4138	30.97	4.60	–	–	27.41	4.20	–	–
DU-106-013	160	2015-09-23 14:30	46.5941	-119.4128	16.52	3.19	–	–	< LOD	3.77	U	–
DU-106-014	161	2015-09-23 14:32	46.5941	-119.4117	142.61	7.26	–	–	15.69	5.66	–	–
DU-106-015	162	2015-09-23 14:35	46.5941	-119.4107	27.19	3.91	–	–	< LOD	4.52	U	–
DU-106-016	170	2015-09-23 14:52	46.5941	-119.4099	14.67	3.20	–	–	5.18	2.59	–	–
DU-106-017	175	2015-09-23 15:06	46.5948	-119.4142	27.12	3.58	–	–	5.22	2.84	–	–
DU-106-018	174	2015-09-23 15:03	46.5947	-119.4133	10.66	3.52	–	–	< LOD	4.30	U	–
DU-106-019	173	2015-09-23 15:01	46.5947	-119.4122	15.60	3.21	–	–	< LOD	3.81	U	–
DU-106-020	172	2015-09-23 14:57	46.5947	-119.4113	136.65	6.47	–	–	14.69	5.02	–	–
DU-106-021	171	2015-09-23 14:55	46.5947	-119.4103	26.98	3.64	–	–	4.52	2.87	–	–
DU-106-022	176	2015-09-23 15:08	46.5954	-119.4148	14.61	3.28	–	–	< LOD	2.62	U	–
DU-106-023	177	2015-09-23 15:12	46.5953	-119.4137	17.20	3.56	–	–	5.17	2.88	–	–
DU-106-024	178	2015-09-23 15:14	46.5953	-119.4128	14.21	3.47	–	–	4.54	2.80	–	–
DU-106-025	179	2016-05-11 10:19	46.5953	-119.4116	13.86	6.81	–	–	< LOD	8.58	U	–
DU-106-026	180	2015-09-23 15:20	46.5953	-119.4107	24.15	3.71	–	–	< LOD	4.39	U	–
DU-106-027	181	2015-09-23 15:22	46.5953	-119.4097	19.40	3.39	–	–	< LOD	3.94	U	–
DU-107-001	93	2015-09-23 11:54	46.5887	-119.4119	18.11	3.46	–	–	< LOD	4.13	U	–
DU-107-002	95	2015-09-23 11:59	46.5885	-119.4108	16.25	3.49	–	–	< LOD	4.17	U	–
DU-107-003	96	2015-09-23 12:01	46.5887	-119.4099	16.29	3.55	–	–	< LOD	4.23	U	–
DU-107-004	97	2015-09-23 12:03	46.5887	-119.4088	24.67	3.49	–	–	< LOD	4.13	U	–
DU-107-005	101	2015-09-23 12:14	46.5894	-119.4124	13.84	3.15	–	–	5.85	2.57	–	–
DU-107-006	100	2015-09-23 12:11	46.5894	-119.4114	15.02	3.18	–	–	< LOD	3.77	U	–
DU-107-007	99	2015-09-23 12:09	46.5894	-119.4104	10.70	3.08	–	–	4.79	2.50	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-107-008	98	2015-09-23 12:06	46.5895	-119.4093	57.89	4.51	–	–	< LOD	5.10	U	–
DU-107-009	104	2015-09-23 12:22	46.5900	-119.4139	11.25	2.98	–	–	4.78	2.41	–	–
DU-107-010	103	2015-09-23 12:20	46.5901	-119.4130	13.92	3.06	–	–	< LOD	2.44	U	–
DU-107-011	102	2015-09-23 12:17	46.5900	-119.4119	13.21	3.10	–	–	4.37	2.49	–	–
DU-107-012	112	2015-09-23 12:42	46.5900	-119.4108	15.91	3.20	–	–	< LOD	3.79	U	–
DU-107-013	113	2015-09-23 12:45	46.5900	-119.4098	19.24	3.46	–	–	< LOD	4.08	U	–
DU-107-014	116	2015-09-23 12:54	46.5906	-119.4144	14.11	3.18	–	–	< LOD	3.78	U	–
DU-107-015	115	2015-09-23 12:52	46.5905	-119.4134	14.46	3.11	–	–	4.55	2.50	–	–
DU-107-016	114	2015-09-23 12:49	46.5905	-119.4124	16.97	3.15	–	–	< LOD	3.73	U	–
DU-107-017	117	2015-09-23 12:57	46.5912	-119.4149	15.66	3.25	–	–	4.01	2.60	–	–
DU-107-018	118	2015-09-23 12:59	46.5912	-119.4138	14.21	3.23	–	–	4.39	2.58	–	–
DU-107-019	119	2015-09-23 13:02	46.5911	-119.4128	14.38	3.04	–	–	< LOD	3.59	U	–
DU-107-020	124	2015-09-23 13:18	46.5917	-119.4154	11.85	3.01	–	–	4.56	2.42	–	–
DU-107-021	123	2015-09-23 13:16	46.5917	-119.4144	13.16	3.08	–	–	< LOD	3.65	U	–
DU-107-022	122	2015-09-23 13:13	46.5917	-119.4134	10.69	2.94	–	–	< LOD	3.48	U	–
DU-108-001	164	2015-09-09 13:09	46.5959	-119.4088	49.03	4.49	–	–	5.91	3.51	–	–
DU-108-002	165	2015-09-09 13:12	46.5959	-119.4078	39.01	4.20	–	–	6.73	3.32	–	–
DU-108-003	166	2015-09-09 13:14	46.5959	-119.4068	60.39	4.60	–	–	6.82	3.58	–	–
DU-108-004	168	2015-09-09 13:16	46.5959	-119.4059	111.08	6.08	–	–	7.75	4.66	–	–
DU-108-005	124	2015-09-09 11:41	46.5959	-119.4049	28.68	5.50	–	–	7.31	4.52		–
DU-108-006	163	2015-09-09 13:07	46.5965	-119.4093	19.62	3.47	–	–	< LOD	4.12	U	–
DU-108-007	162	2015-09-09 13:05	46.5965	-119.4082	21.77	3.65	–	–	< LOD	4.35	U	–
DU-108-008	161	2015-09-09 13:02	46.5965	-119.4073	23.84	3.73	–	–	< LOD	4.36	U	–
DU-108-009	160	2015-09-09 13:00	46.5965	-119.4063	163.02	7.50	–	–	19.65	5.86	–	–
DU-108-010	159	2015-09-09 12:58	46.5965	-119.4054	36.41	3.98	–	–	< LOD	4.60	U	–
DU-108-011	128	2015-09-09 11:51	46.5964	-119.4044	14.82	3.51	–	–	5.41	2.86	–	–
DU-108-012	155	2015-09-09 12:47	46.5971	-119.4088	23.56	4.83	–	–	< LOD	5.79	U	–
DU-108-013	156	2015-09-09 12:51	46.5971	-119.4079	36.93	4.13	–	–	< LOD	4.85	U	–
DU-108-014	157	2015-09-09 12:53	46.5971	-119.4068	18.01	3.52	–	–	4.76	2.82	–	–
DU-108-015	158	2015-09-09 12:55	46.5971	-119.4059	22.16	3.58	–	–	< LOD	4.22	U	–
DU-108-016	129	2015-09-09 11:53	46.5970	-119.4048	22.68	3.42	–	–	6.10	2.74	–	–
DU-108-017	154	2015-09-09 12:45	46.5977	-119.4092	14.70	3.44	–	–	4.81	2.78	–	–
DU-108-018	153	2015-09-09 12:42	46.5976	-119.4082	32.14	4.23	–	–	< LOD	5.03	U	–
DU-108-019	152	2015-09-09 12:40	46.5977	-119.4072	56.75	5.01	–	–	8.21	3.95	–	–
DU-108-020	151	2015-09-09 12:37	46.5977	-119.4063	76.05	5.00	–	–	6.35	3.85	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-108-021	142	2015-09-09 12:23	46.5977	-119.4054	17.21	3.43	–	–	< LOD	4.04	U	–
DU-108-022	130	2015-09-09 11:55	46.5976	-119.4044	22.19	4.10	–	–	5.04	3.30	–	–
DU-108-023	138	2015-09-09 12:13	46.5983	-119.4087	42.31	4.32	–	–	10.66	3.50	–	–
DU-108-024	139	2015-09-09 12:16	46.5982	-119.4078	86.41	5.37	–	–	9.50	4.17	–	–
DU-108-025	140	2015-09-09 12:18	46.5982	-119.4068	23.95	4.36	–	–	< LOD	5.14	U	–
DU-108-026	141	2015-09-09 12:20	46.5982	-119.4058	22.91	5.13	–	–	< LOD	6.11	U	–
DU-108-027	131	2015-09-09 11:58	46.5982	-119.4048	13.34	3.18	–	–	4.40	2.55	–	–
DU-108-028	137	2015-09-09 12:11	46.5988	-119.4092	111.09	6.57	–	–	8.14	5.05	–	–
DU-108-029	136	2015-09-09 12:09	46.5988	-119.4081	59.32	4.90	–	–	< LOD	5.69	U	–
DU-108-030	135	2015-09-09 12:07	46.5988	-119.4072	14.02	3.38	–	–	5.79	2.77	–	–
DU-108-031	134	2015-09-09 12:05	46.5988	-119.4062	10.96	3.11	–	–	5.95	2.55	–	–
DU-108-032	133	2015-09-09 12:02	46.5987	-119.4053	9.37	3.31	–	–	4.40	2.70	–	–
DU-108-033	132	2015-09-09 12:00	46.5988	-119.4044	11.23	3.19	–	–	< LOD	3.79	U	–
DU-109-001	133	2015-09-21 13:41	46.5922	-119.4065	10.08	2.81	–	–	< LOD	3.32	U	–
DU-109-002	132	2015-09-21 13:38	46.5921	-119.4055	17.36	3.82	–	–	< LOD	4.54	U	–
DU-109-003	130	2015-09-21 13:35	46.5921	-119.4046	32.64	3.76	–	–	5.43	2.97	–	–
DU-109-004	134	2015-09-21 13:43	46.5927	-119.4069	11.69	3.32	–	–	< LOD	3.92	U	–
DU-109-005	135	2015-09-21 13:45	46.5927	-119.4060	89.90	5.43	–	–	8.48	4.21	–	–
DU-109-006	136	2015-09-21 13:48	46.5927	-119.4050	22.63	3.23	–	–	4.17	2.56	–	–
DU-109-007	142	2015-09-21 14:02	46.5933	-119.4094	9.78	3.11	–	–	4.70	2.54	–	–
DU-109-008	141	2015-09-21 13:59	46.5933	-119.4084	13.70	3.14	–	–	5.08	2.55	–	–
DU-109-009	140	2015-09-21 13:57	46.5933	-119.4074	16.08	3.44	–	–	4.63	2.77	–	–
DU-109-010	139	2015-09-21 13:54	46.5932	-119.4065	71.16	4.82	–	–	11.22	3.81	–	–
DU-109-011	138	2015-09-21 13:52	46.5933	-119.4056	48.02	4.24	–	–	6.19	3.31	–	–
DU-109-012	137	2015-09-21 13:50	46.5933	-119.4045	32.09	4.44	–	–	5.80	3.55	–	–
DU-109-013	143	2015-09-21 14:05	46.5939	-119.4088	14.40	3.04	–	–	4.38	2.44	–	–
DU-109-014	144	2015-09-21 14:08	46.5939	-119.4078	13.00	3.01	–	–	< LOD	2.39	U	–
DU-109-015	152	2015-09-21 14:21	46.5939	-119.4069	24.20	3.24	–	–	< LOD	3.78	U	–
DU-109-016	153	2015-09-21 14:23	46.5938	-119.4060	44.33	4.73	–	–	5.79	3.72	–	–
DU-109-017	154	2015-09-21 14:25	46.5938	-119.4050	63.02	4.88	–	–	7.82	3.81	–	–
DU-109-018	160	2015-09-21 14:39	46.5944	-119.4093	12.96	3.03	–	–	3.99	2.43	–	–
DU-109-019	159	2015-09-21 14:37	46.5944	-119.4084	13.21	3.05	–	–	5.04	2.48	–	–
DU-109-020	158	2015-09-21 14:35	46.5944	-119.4074	15.03	2.94	–	–	< LOD	3.49	U	–
DU-109-021	157	2015-09-21 14:32	46.5944	-119.4065	32.38	3.75	–	–	< LOD	4.35	U	–
DU-109-022	156	2015-09-21 14:30	46.5944	-119.4055	48.36	4.27	–	–	6.63	3.35	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-109-023	155	2015-09-21 14:28	46.5944	-119.4045	20.71	3.37	–	–	5.00	2.69	–	–
DU-109-024	161	2015-09-21 14:41	46.5950	-119.4087	18.39	3.86	–	–	< LOD	4.60	U	–
DU-109-025	162	2015-09-21 14:43	46.5950	-119.4078	15.33	3.84	–	–	5.78	3.16	–	–
DU-109-026	164	2015-09-21 14:46	46.5950	-119.4068	49.27	4.17	–	–	< LOD	4.82	U	–
DU-109-027	165	2015-09-21 14:48	46.5950	-119.4060	70.22	4.92	–	–	6.08	3.79	–	–
DU-109-028	166	2015-09-21 14:50	46.5950	-119.4050	21.85	3.60	–	–	< LOD	4.27	U	–
DU-110-001	44	2015-09-23 9:05	46.5957	-119.4038	13.55	3.19	–	–	< LOD	2.57	U	–
DU-110-002	43	2015-09-23 9:02	46.5956	-119.4028	18.60	3.35	–	–	< LOD	3.97	U	–
DU-110-003	42	2015-09-23 8:59	46.5956	-119.4018	14.40	3.11	–	–	4.28	2.50	–	–
DU-110-004	39	2015-09-23 8:51	46.5956	-119.4008	36.39	3.96	–	–	10.26	3.22	–	–
DU-110-005	37	2015-09-23 8:46	46.5956	-119.3998	22.89	4.04	–	–	< LOD	4.77	U	–
DU-110-006	45	2015-09-23 9:08	46.5962	-119.4033	20.12	3.53	–	–	< LOD	4.20	U	–
DU-110-007	46	2015-09-23 9:10	46.5962	-119.4023	17.17	3.20	–	–	< LOD	3.71	U	–
DU-110-008	47	2015-09-23 9:13	46.5962	-119.4012	52.60	4.32	–	–	< LOD	4.95	U	–
DU-110-009	48	2015-09-23 9:15	46.5962	-119.4003	63.68	5.10	–	–	< LOD	5.90	U	–
DU-110-010	49	2015-09-23 9:17	46.5961	-119.3996	20.45	3.61	–	–	4.92	2.90	–	–
DU-110-011	54	2015-09-23 9:29	46.5968	-119.4038	28.81	3.65	–	–	6.48	2.93	–	–
DU-110-012	53	2015-09-23 9:27	46.5968	-119.4028	23.61	3.59	–	–	6.20	2.88		–
DU-110-013	52	2015-09-23 9:25	46.5968	-119.4018	24.14	3.45	–	–	< LOD	4.07	U	–
DU-110-014	51	2015-09-23 9:22	46.5968	-119.4007	108.66	6.14	–	–	9.39	4.74	–	–
DU-110-015	50	2015-09-23 9:20	46.5968	-119.3997	35.27	3.99	–	–	4.79	3.14	–	–
DU-110-016	67	2015-09-23 9:53	46.5975	-119.4043	21.82	3.67	–	–	< LOD	4.33	U	–
DU-110-017	68	2015-09-23 9:55	46.5974	-119.4033	23.14	3.44	–	–	5.02	2.73	–	–
DU-110-018	69	2015-09-23 9:58	46.5974	-119.4023	68.04	4.80	–	–	< LOD	5.45	U	–
DU-110-019	70	2015-09-23 10:00	46.5974	-119.4012	818.46	15.31	–	–	25.46	11.49	–	–
DU-110-020	71	2015-09-23 10:04	46.5973	-119.4002	368.93	10.59	–	–	23.80	8.08	–	–
DU-110-021	75	2015-09-23 10:15	46.5981	-119.4038	23.85	3.45	–	–	5.77	2.76	–	–
DU-110-022	74	2015-09-23 10:12	46.5980	-119.4028	31.68	3.78	–	–	< LOD	4.42	U	–
DU-110-023	73	2015-09-23 10:10	46.5980	-119.4018	94.28	5.45	–	–	6.35	4.18	–	–
DU-110-024	72	2015-09-23 10:07	46.5980	-119.4010	144.94	7.10	–	–	9.17	5.43	–	–
DU-110-025	76	2015-09-23 10:20	46.5987	-119.4043	19.07	3.34	–	–	4.79	2.66	–	–
DU-110-026	77	2015-09-23 10:22	46.5986	-119.4032	16.84	3.19	–	–	< LOD	3.76	U	–
DU-110-027	78	2015-09-23 10:26	46.5986	-119.4022	33.23	3.73	–	–	6.90	2.97	–	–
DU-110-028	79	2015-09-23 10:29	46.5993	-119.4027	11.41	3.63	–	–	< LOD	4.42	U	–
DU-111-001	73	2015-10-06 10:15	46.5918	-119.4041	16.09	3.57	–	–	< LOD	4.21	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-111-002	72	2015-10-06 10:11	46.5918	-119.4031	17.89	3.74	–	–	< LOD	4.50	U	–
DU-111-003	67	2015-10-06 9:55	46.5924	-119.4036	220.57	8.21	–	–	16.45	6.29	–	–
DU-111-004	68	2015-10-06 9:58	46.5924	-119.4025	119.73	6.18	–	–	10.48	4.76	–	–
DU-111-005	69	2015-10-06 10:00	46.5924	-119.4015	46.46	4.30	–	–	< LOD	4.94	U	–
DU-111-006	70	2015-10-06 10:03	46.5924	-119.4005	36.59	3.94	–	–	6.83	3.13	–	–
DU-111-007	71	2015-10-06 10:06	46.5923	-119.3995	47.55	4.16	–	–	< LOD	4.81	U	–
DU-111-008	66	2015-10-06 9:52	46.5930	-119.4040	45.96	4.31	–	–	< LOD	5.01	U	–
DU-111-009	65	2015-10-06 9:50	46.5930	-119.4031	30.11	3.92	–	–	5.95	3.11	–	–
DU-111-010	64	2015-10-06 9:47	46.5929	-119.4020	85.48	5.29	–	–	12.70	4.17	–	–
DU-111-011	63	2015-10-06 9:45	46.5929	-119.4010	43.39	4.06	–	–	6.95	3.20	–	–
DU-111-012	62	2015-10-06 9:42	46.5929	-119.3999	136.16	6.84	–	–	17.51	5.36	–	–
DU-111-013	50	2015-10-06 9:16	46.5936	-119.4035	68.83	4.98	–	–	6.17	3.85	–	–
DU-111-014	58	2015-10-06 9:32	46.5936	-119.4025	60.12	5.26	–	–	8.46	4.14	–	–
DU-111-015	59	2015-10-06 9:34	46.5936	-119.4015	49.82	4.25	–	–	5.89	3.31	–	–
DU-111-016	60	2015-10-06 9:37	46.5936	-119.4005	117.02	6.03	–	–	12.12	4.67	–	–
DU-111-017	61	2015-10-06 9:40	46.5935	-119.3995	38.83	3.99	–	–	6.49	3.15	–	–
DU-111-018	49	2015-10-06 9:14	46.5942	-119.4040	435.35	10.92	–	–	< LOD	12.00	U	–
DU-111-019	48	2015-10-06 9:11	46.5942	-119.4030	311.90	10.13	–	–	24.03	7.77	–	–
DU-111-020	47	2015-10-06 9:09	46.5942	-119.4020	212.86	8.15	–	–	11.62	6.19	–	–
DU-111-021	46	2015-10-06 9:06	46.5941	-119.4010	166.57	6.86	–	–	14.12	5.29	–	–
DU-111-022	45	2015-10-06 9:03	46.5942	-119.4000	145.97	6.98	–	–	12.71	5.39	–	–
DU-111-023	40	2015-10-06 8:48	46.5948	-119.4035	25.02	3.45	–	–	5.74	2.74	–	–
DU-111-024	41	2015-10-06 8:51	46.5947	-119.4025	97.68	5.56	–	–	28.28	4.59	–	–
DU-111-025	42	2015-10-06 8:54	46.5948	-119.4014	79.51	5.09	–	–	29.37	4.32	–	–
DU-111-026	43	2015-10-06 8:57	46.5947	-119.4005	936.80	17.81	–	–	46.91	13.48	–	–
DU-111-027	44	2015-10-06 9:00	46.5948	-119.3995	31.90	3.93	–	–	7.45	3.16	–	–
DU-111-028	37	2015-10-06 8:44	46.5954	-119.4040	16.23	3.08	–	–	5.13	2.48	–	–
DU-111-029	36	2015-10-06 8:41	46.5954	-119.4030	17.35	3.34	–	–	5.49	2.69	–	–
DU-111-030	35	2015-10-06 8:39	46.5954	-119.4020	19.17	3.60	–	–	4.87	2.89	–	–
DU-111-031	34	2015-10-06 8:36	46.5954	-119.4010	216.71	8.15	–	–	20.14	6.30	–	–
DU-111-032	32	2015-10-06 8:32	46.5953	-119.4000	107.50	5.66	–	–	12.64	4.41	–	–
DU-112-001	94	2015-10-06 11:19	46.5882	-119.4024	13.12	3.53	–	–	5.68	2.91	–	–
DU-112-002	93	2015-10-06 11:17	46.5883	-119.4014	13.79	3.15	–	–	< LOD	3.70	U	–
DU-112-003	92	2015-10-06 11:14	46.5882	-119.4004	8.67	2.85	–	–	4.48	2.33	–	–
DU-112-004	90	2015-10-06 11:09	46.5883	-119.3994	35.08	3.95	–	–	6.99	3.14	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-112-005	95	2015-10-06 11:23	46.5889	-119.4018	12.20	3.04	–	–	< LOD	3.60	U	–
DU-112-006	96	2015-10-06 11:27	46.5888	-119.4008	12.16	3.32	–	–	< LOD	4.03	U	–
DU-112-007	97	2015-10-06 11:29	46.5888	-119.3999	11.66	3.18	–	–	< LOD	3.77	U	–
DU-112-008	101	2015-10-06 11:44	46.5895	-119.4024	7.13	3.72	–	–	4.99	3.10	–	–
DU-112-009	100	2015-10-06 11:41	46.5894	-119.4014	13.81	3.00	–	–	< LOD	3.48	U	–
DU-112-010	99	2015-10-06 11:37	46.5895	-119.4005	14.84	3.12	–	–	< LOD	3.69	U	–
DU-112-011	98	2015-10-06 11:32	46.5894	-119.3995	16.64	3.46	–	–	6.59	2.84	–	–
DU-112-012	102	2015-10-06 11:53	46.5901	-119.4088	9.98	3.88	–	–	< LOD	4.77	U	–
DU-112-013	103	2015-10-06 11:56	46.5902	-119.4079	11.79	3.97	–	–	5.01	3.28	–	–
DU-112-014	104	2015-10-06 11:59	46.5901	-119.4069	12.91	3.68	–	–	< LOD	4.41	U	–
DU-112-015	105	2015-10-06 12:02	46.5900	-119.4057	16.92	3.12	–	–	5.03	2.51	–	–
DU-112-016	106	2015-10-06 12:04	46.5901	-119.4048	18.10	3.27	–	–	< LOD	3.85	U	–
DU-112-017	107	2015-10-06 12:07	46.5900	-119.4038	34.76	3.84	–	–	5.29	3.04	–	–
DU-112-018	108	2015-10-06 12:10	46.5901	-119.4029	15.78	2.64	–	–	5.82	2.15	–	–
DU-112-019	109	2015-10-06 12:13	46.5901	-119.4019	7.61	2.32	–	–	5.15	1.92	–	–
DU-112-020	110	2015-10-06 12:16	46.5901	-119.4009	< LOD	2.38	U	–	4.77	1.98	–	–
DU-112-021	121	2015-10-06 12:34	46.5901	-119.3999	19.67	3.39	–	–	< LOD	3.97	U	–
DU-112-022	131	2015-10-06 13:05	46.5907	-119.4083	14.65	3.28	–	–	4.48	2.64	–	–
DU-112-023	130	2015-10-06 13:02	46.5908	-119.4073	11.18	3.17	–	–	4.23	2.56	–	–
DU-112-024	129	2015-10-06 13:00	46.5907	-119.4062	16.00	3.13	–	–	4.19	2.49	–	–
DU-112-025	128	2015-10-06 12:56	46.5907	-119.4053	11.15	3.82	–	–	5.86	3.18	–	–
DU-112-026	127	2015-10-06 12:53	46.5906	-119.4044	15.54	3.51	–	–	4.81	2.83	–	–
DU-112-027	126	2015-10-06 12:49	46.5907	-119.4034	16.80	3.17	–	–	4.63	2.54	–	–
DU-112-028	125	2015-10-06 12:46	46.5907	-119.4024	11.94	3.30	–	–	< LOD	3.97	U	–
DU-112-029	124	2015-10-06 12:43	46.5906	-119.4013	15.53	3.17	–	–	6.29	2.58	–	–
DU-112-030	123	2015-10-06 12:40	46.5907	-119.4004	49.91	4.52	–	–	< LOD	5.23	U	–
DU-112-031	122	2015-10-06 12:37	46.5907	-119.3995	59.68	4.75	–	–	8.64	3.74	–	–
DU-112-032	132	2015-10-06 13:10	46.5914	-119.4068	19.29	3.74	–	–	< LOD	4.48	U	–
DU-112-033	133	2015-10-06 13:13	46.5913	-119.4058	10.69	3.00	–	–	7.55	2.51	–	–
DU-112-034	134	2015-10-06 13:16	46.5913	-119.4048	13.33	3.79	–	–	< LOD	4.57	U	–
DU-112-035	135	2015-10-06 13:19	46.5912	-119.4038	20.38	3.22	–	–	< LOD	2.54	U	–
DU-112-036	136	2015-10-06 13:21	46.5912	-119.4028	18.53	3.25	–	–	4.34	2.58	–	–
DU-112-037	137	2015-10-06 13:25	46.5912	-119.4018	39.27	4.08	–	–	< LOD	4.77	U	–
DU-112-038	138	2015-10-06 13:27	46.5912	-119.4008	15.21	3.50	–	–	4.98	2.83	–	–
DU-112-039	140	2015-10-06 13:33	46.5912	-119.3998	44.06	4.10	–	–	7.91	3.25	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-112-040	139	2015-10-06 13:31	46.5919	-119.3995	38.36	4.51	–	–	7.50	3.61	–	–
DU-113-001	101	2015-09-11 10:22	46.5868	-119.4046	13.38	3.00	–	–	4.36	2.41	–	–
DU-113-002	105	2015-09-11 10:34	46.5868	-119.4036	11.09	2.95	–	–	4.75	2.40	–	–
DU-113-003	106	2015-09-11 10:36	46.5868	-119.4026	13.21	3.20	–	–	5.92	2.62	–	–
DU-113-004	107	2015-09-11 10:39	46.5869	-119.4016	12.40	2.97	–	–	< LOD	3.52	U	–
DU-113-005	108	2015-09-11 10:41	46.5868	-119.4008	13.39	3.52	–	–	4.75	2.85	–	–
DU-113-006	109	2015-09-11 10:43	46.5868	-119.3997	22.06	4.09	–	–	5.05	3.31	–	–
DU-113-007	115	2015-09-11 11:00	46.5875	-119.4050	14.57	3.04	–	–	4.95	2.45	–	–
DU-113-008	114	2015-09-11 10:58	46.5875	-119.4041	17.82	3.16	–	–	< LOD	3.68	U	–
DU-113-009	113	2015-09-11 10:55	46.5874	-119.4031	14.36	3.27	–	–	< LOD	3.89	U	–
DU-113-010	112	2015-09-11 10:52	46.5874	-119.4022	17.86	3.56	–	–	6.93	2.92	–	–
DU-113-011	111	2015-09-11 10:49	46.5874	-119.4012	878.15	15.31	–	–	23.05	11.46	–	–
DU-113-012	110	2015-09-11 10:46	46.5874	-119.4002	12.96	4.63	–	–	< LOD	5.54	U	–
DU-113-013	104	2015-09-11 10:30	46.5864	-119.4049	14.36	3.12	–	–	< LOD	2.47	U	–
DU-113-014	122	2015-09-11 11:23	46.5880	-119.4056	15.83	3.27	–	–	< LOD	3.89	U	–
DU-113-015	123	2015-09-11 11:26	46.5880	-119.4046	15.89	3.45	–	–	< LOD	4.15	U	–
DU-113-016	124	2015-09-11 11:28	46.5880	-119.4036	13.52	3.03	–	–	< LOD	2.41	U	–
DU-113-017	125	2015-09-11 11:30	46.5880	-119.4026	15.41	3.11	–	–	< LOD	3.64	U	–
DU-113-018	126	2015-09-11 11:33	46.5880	-119.4017	14.43	3.44	–	–	< LOD	4.09	U	–
DU-113-019	127	2015-09-11 11:35	46.5880	-119.4007	16.85	3.21	–	–	6.97	2.62	–	–
DU-113-020	103	2015-09-11 10:27	46.5870	-119.4055	12.00	3.39	–	–	< LOD	4.08	U	–
DU-114-001	91	2015-09-28 11:50	46.5960	-119.3968	8.67	3.00	Q	–	5.97	2.47	Q	–
DU-114-002	93	2015-09-28 11:53	46.5960	-119.3958	26.44	3.57	Q	–	6.37	2.85	Q	–
DU-114-003	99	2015-09-28 12:10	46.5966	-119.3983	55.82	4.75	Q	–	14.34	3.86	Q	–
DU-114-004	96	2015-09-28 12:02	46.5966	-119.3973	22.29	3.77	Q	–	< LOD	4.35	UQ	–
DU-114-005	95	2015-09-28 11:59	46.5966	-119.3963	16.83	3.34	Q	–	< LOD	3.94	UQ	–
DU-114-006	94	2015-09-28 11:56	46.5966	-119.3953	10.83	3.27	Q	–	< LOD	3.92	UQ	–
DU-114-007	100	2015-09-28 12:13	46.5973	-119.3988	341.06	10.74	Q	–	47.81	8.47	Q	–
DU-114-008	101	2015-09-28 12:15	46.5973	-119.3978	36.06	3.82	Q	–	7.40	3.04	Q	–
DU-114-009	102	2015-09-28 12:18	46.5972	-119.3968	42.68	4.37	Q	–	6.56	3.45	Q	–
DU-114-010	103	2015-09-28 12:21	46.5971	-119.3959	18.74	3.48	Q	–	4.50	2.78	Q	–
DU-114-011	107	2015-09-28 12:33	46.5978	-119.3993	472.32	11.50	Q	–	20.03	8.68	Q	–
DU-114-012	106	2015-09-28 12:30	46.5979	-119.3983	869.41	14.96	Q	–	93.74	11.62	Q	–
DU-114-013	105	2015-09-28 12:27	46.5979	-119.3973	498.05	12.30	Q	–	71.15	9.71	Q	–
DU-114-014	104	2015-09-28 12:24	46.5978	-119.3964	40.96	4.53	Q	–	10.67	3.69	Q	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-114-015	108	2015-09-28 12:37	46.5985	-119.4008	16.09	3.79	Q	–	< LOD	4.57	UQ	–
DU-114-016	109	2015-09-28 12:41	46.5984	-119.3998	79.53	5.39	Q	–	11.79	4.25	Q	–
DU-114-017	117	2015-09-28 12:56	46.5984	-119.3988	20.48	3.55	Q	–	5.20	2.83	Q	–
DU-114-018	118	2015-09-28 12:59	46.5984	-119.3978	960.20	17.45	Q	–	153.40	13.88	Q	–
DU-114-019	119	2015-09-28 13:06	46.5984	-119.3968	84.62	5.02	Q	–	10.24	3.92	Q	–
DU-114-020	124	2015-09-28 13:23	46.5991	-119.4013	13.71	3.23	Q	–	< LOD	3.86	UQ	–
DU-114-021	123	2015-09-28 13:20	46.5991	-119.4003	38.99	3.93	Q	–	< LOD	4.57	UQ	–
DU-114-022	122	2015-09-28 13:17	46.5991	-119.3994	68.40	5.39	Q	–	< LOD	6.26	UQ	–
DU-114-023	121	2015-09-28 13:14	46.5990	-119.3983	36.48	4.17	Q	–	7.80	3.34	Q	–
DU-114-024	120	2015-09-28 13:10	46.5991	-119.3973	270.26	8.26	Q	–	25.84	6.39	Q	–
DU-114-025	125	2015-09-28 13:25	46.5997	-119.4018	32.58	3.97	Q	–	5.17	3.12	Q	–
DU-114-026	126	2015-09-28 13:28	46.5997	-119.4007	20.07	3.58	Q	–	4.57	2.86	Q	–
DU-114-027	127	2015-09-28 13:30	46.5997	-119.3998	15.21	3.53	Q	–	4.64	2.85	Q	–
DU-114-028	128	2015-09-28 13:33	46.5997	-119.3987	81.69	5.38	Q	–	9.86	4.20	Q	–
DU-114-029	129	2015-09-28 13:37	46.5996	-119.3978	212.68	8.14	Q	–	17.90	6.27	Q	–
DU-114-030	133	2015-09-28 13:54	46.6003	-119.4012	12.28	3.01	Q	–	4.37	2.42	Q	–
DU-114-031	132	2015-09-28 13:51	46.6002	-119.4003	26.23	3.84	Q	–	5.25	3.06	Q	–
DU-114-032	130	2015-09-28 13:44	46.6003	-119.3993	37.35	3.84	Q	–	< LOD	4.45	UQ	–
DU-114-033	131	2015-09-28 13:46	46.6009	-119.3998	47.04	4.59	Q	–	< LOD	5.33	UQ	–
DU-115-001	129	2015-09-22 12:22	46.5914	-119.3908	14.79	3.27	–	–	4.38	2.62	–	–
DU-115-002	127	2015-09-22 12:17	46.5919	-119.3912	25.22	4.09	–	–	7.20	3.33	–	–
DU-115-003	128	2015-09-22 12:19	46.5920	-119.3902	26.22	3.84	–	–	6.16	3.07	–	–
DU-115-004	126	2015-09-22 12:13	46.5925	-119.3926	260.68	9.84	–	–	19.47	7.56	–	–
DU-115-005	125	2015-09-22 12:11	46.5926	-119.3917	166.11	7.95	–	–	17.46	6.19	–	–
DU-115-006	124	2015-09-22 12:08	46.5926	-119.3907	22.84	4.51	–	–	< LOD	5.21	U	–
DU-115-007	123	2015-09-22 12:06	46.5926	-119.3898	21.78	3.76	–	–	6.47	3.06	–	–
DU-115-008	122	2015-09-22 12:04	46.5926	-119.3887	21.61	4.22	–	–	< LOD	5.04	U	–
DU-115-009	117	2015-09-22 11:52	46.5931	-119.3932	11.65	3.04	–	–	5.17	2.47	–	–
DU-115-010	118	2015-09-22 11:54	46.5932	-119.3922	56.64	4.93	–	–	6.77	3.86	–	–
DU-115-011	119	2015-09-22 11:56	46.5932	-119.3911	1264.95	18.84	–	–	78.48	14.34	–	–
DU-115-012	120	2015-09-22 11:58	46.5932	-119.3902	33.55	3.82	–	–	< LOD	4.43	U	–
DU-115-013	121	2015-09-22 12:01	46.5932	-119.3891	11.19	3.13	–	–	< LOD	3.74	U	–
DU-115-014	116	2015-09-22 11:49	46.5938	-119.3937	6.97	2.68	–	–	< LOD	2.18	U	–
DU-115-015	115	2015-09-22 11:47	46.5937	-119.3927	85.02	5.90	–	–	7.59	4.57	–	–
DU-115-016	114	2015-09-22 11:45	46.5938	-119.3917	156.61	6.93	–	–	16.50	5.38	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-115-017	113	2015-09-22 11:42	46.5937	-119.3907	315.71	10.77	–	–	27.90	8.31	–	–
DU-115-018	105	2015-09-22 11:29	46.5937	-119.3897	15.76	2.88	–	–	4.41	2.33	–	–
DU-115-019	99	2015-09-22 11:14	46.5944	-119.3951	20.64	3.35	–	–	4.44	2.66	–	–
DU-115-020	100	2015-09-22 11:17	46.5944	-119.3941	20.66	3.54	–	–	5.09	2.85	–	–
DU-115-021	101	2015-09-22 11:19	46.5944	-119.3931	22.92	3.53	–	–	5.12	2.81	–	–
DU-115-022	102	2015-09-22 11:22	46.5944	-119.3921	22.11	3.57	–	–	5.33	2.87	–	–
DU-115-023	103	2015-09-22 11:24	46.5943	-119.3912	19.85	3.30	–	–	6.27	2.68	–	–
DU-115-024	104	2015-09-22 11:27	46.5943	-119.3902	41.20	3.85	–	–	4.55	2.99	–	–
DU-115-025	97	2015-09-22 11:08	46.5950	-119.3956	11.53	3.21	–	–	< LOD	3.81	U	–
DU-115-026	96	2015-09-22 11:05	46.5950	-119.3946	12.74	3.16	–	–	5.21	2.57	–	–
DU-115-027	95	2015-09-22 11:03	46.5950	-119.3936	42.74	4.54	–	–	< LOD	5.28	U	–
DU-115-028	94	2015-09-22 11:00	46.5950	-119.3927	17.23	3.17	–	–	< LOD	3.72	U	–
DU-115-029	93	2015-09-22 10:58	46.5950	-119.3918	24.20	3.67	–	–	4.45	2.91	–	–
DU-115-030	98	2015-09-22 11:10	46.5956	-119.3961	9.00	3.06	–	–	6.28	2.54	–	–
DU-115-031	90	2015-09-22 10:50	46.5956	-119.3951	19.33	3.28	–	–	< LOD	3.86	U	–
DU-115-032	91	2015-09-22 10:52	46.5956	-119.3941	21.58	3.27	–	–	4.97	2.61	–	–
DU-115-033	92	2015-09-22 10:54	46.5955	-119.3931	11.33	3.16	–	–	5.62	2.58	–	–
DU-115-034	89	2015-09-22 10:47	46.5961	-119.3946	9.46	2.76	–	–	< LOD	3.34	U	–
DU-115-035	87	2015-09-22 10:43	46.5962	-119.3937	11.02	4.15	–	–	< LOD	5.03	U	–
DU-116-001	82	2015-09-24 10:26	46.5920	-119.3984	177.90	10.80	–	–	< LOD	12.47	U	–
DU-116-002	80	2015-09-24 10:23	46.5920	-119.3974	215.37	7.90	–	–	20.72	6.11	–	–
DU-116-003	79	2015-09-24 10:20	46.5920	-119.3965	22.41	3.61	–	–	8.60	2.98	–	–
DU-116-004	78	2015-09-24 10:18	46.5920	-119.3954	15.42	3.81	–	–	< LOD	4.58	U	–
DU-116-005	77	2015-09-24 10:16	46.5919	-119.3944	26.43	3.67	–	–	< LOD	4.32	U	–
DU-116-006	76	2015-09-24 10:14	46.5920	-119.3935	47.55	4.48	–	–	5.77	3.50	–	–
DU-116-007	40	2015-09-24 8:47	46.5919	-119.3925	24.72	4.02	–	–	5.56	3.22	–	–
DU-116-008	71	2015-09-24 10:01	46.5926	-119.3988	319.84	10.14	–	–	32.82	7.87	–	–
DU-116-009	72	2015-09-24 10:04	46.5926	-119.3978	750.73	18.11	–	–	48.78	13.82	–	–
DU-116-010	73	2015-09-24 10:06	46.5926	-119.3969	130.87	7.50	–	–	17.01	5.90	–	–
DU-116-011	74	2015-09-24 10:08	46.5926	-119.3959	93.78	6.24	–	–	< LOD	7.20	U	–
DU-116-012	75	2015-09-24 10:11	46.5926	-119.3949	19.69	3.77	–	–	< LOD	4.55	U	–
DU-116-013	43	2015-09-24 8:53	46.5925	-119.3939	22.92	4.23	–	–	8.03	3.49	–	–
DU-116-014	42	2015-09-24 8:51	46.5925	-119.3929	25.80	4.30	–	–	< LOD	5.17	U	–
DU-116-015	70	2015-09-24 9:59	46.5932	-119.3984	691.41	17.80	–	–	45.53	13.60	–	–
DU-116-016	69	2015-09-24 9:57	46.5932	-119.3974	530.92	11.64	–	–	72.54	9.16	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-116-017	68	2015-09-24 9:54	46.5931	-119.3963	149.43	8.18	–	–	17.40	6.39	–	–
DU-116-018	67	2015-09-24 9:51	46.5932	-119.3954	12.84	3.05	–	–	4.20	2.44	–	–
DU-116-019	44	2015-09-24 8:56	46.5931	-119.3944	11.99	3.10	–	–	5.20	2.52	–	–
DU-116-020	56	2015-09-24 9:27	46.5938	-119.3988	314.16	10.98	–	–	14.56	8.32	–	–
DU-116-021	57	2015-09-24 9:30	46.5938	-119.3979	609.46	13.67	–	–	32.44	10.37	–	–
DU-116-022	58	2015-09-24 9:33	46.5938	-119.3969	111.65	7.85	–	–	13.16	6.16	–	–
DU-116-023	59	2015-09-24 9:35	46.5938	-119.3959	288.34	9.21	–	–	22.28	7.06	–	–
DU-116-024	45	2015-09-24 8:58	46.5938	-119.3949	101.70	5.95	–	–	24.21	4.85	–	–
DU-116-025	55	2015-09-24 9:24	46.5944	-119.3983	237.16	8.67	–	–	33.06	6.82	–	–
DU-116-026	54	2015-09-24 9:22	46.5944	-119.3973	731.53	15.27	–	–	85.83	11.92	–	–
DU-116-027	47	2015-09-24 9:03	46.5943	-119.3964	688.72	14.97	–	–	75.69	11.65	–	–
DU-116-028	46	2015-09-24 9:01	46.5943	-119.3955	50.44	4.79	–	–	16.35	3.96	–	–
DU-116-029	52	2015-09-24 9:17	46.5950	-119.3988	293.89	9.75	–	–	24.47	7.51	–	–
DU-116-030	53	2015-09-24 9:19	46.5950	-119.3979	445.74	12.32	–	–	42.33	9.53	–	–
DU-116-031	48	2015-09-24 9:06	46.5949	-119.3969	397.28	11.58	–	–	35.96	8.94	–	–
DU-116-032	50	2015-09-24 9:11	46.5955	-119.3983	38.51	5.86	–	–	8.42	4.78	–	–
DU-116-033	49	2015-09-24 9:08	46.5955	-119.3973	24.85	4.37	–	–	6.80	3.57	–	–
DU-116-034	51	2015-09-24 9:13	46.5962	-119.3988	28.44	3.77	–	–	< LOD	4.45	U	–
DU-117-001	124	2015-09-24 11:52	46.5901	-119.3988	178.27	7.19	–	–	27.35	5.69	–	–
DU-117-002	125	2015-09-24 11:54	46.5901	-119.3978	31.54	3.81	–	–	< LOD	4.47	U	–
DU-117-003	126	2015-09-24 11:57	46.5901	-119.3968	29.84	3.80	–	–	5.11	3.00	–	–
DU-117-004	127	2015-09-24 11:59	46.5900	-119.3958	67.15	4.99	–	–	< LOD	5.75	U	–
DU-117-005	128	2015-09-24 12:02	46.5900	-119.3948	28.13	4.13	–	–	10.09	3.41	–	–
DU-117-006	129	2015-09-24 12:04	46.5900	-119.3937	18.30	3.77	–	–	< LOD	4.41	U	–
DU-117-007	130	2015-09-24 12:06	46.5900	-119.3927	29.37	3.93	–	–	7.32	3.17	–	–
DU-117-008	131	2015-09-24 12:08	46.5900	-119.3918	123.23	8.17	–	–	10.79	6.34	–	–
DU-117-009	132	2015-09-24 12:11	46.5900	-119.3907	9.76	4.25	–	–	< LOD	5.31	U	–
DU-117-010	133	2015-09-24 12:13	46.5900	-119.3896	18.33	3.77	–	–	< LOD	4.51	U	–
DU-117-011	123	2015-09-24 11:49	46.5907	-119.3982	43.29	4.20	–	–	5.90	3.29	–	–
DU-117-012	122	2015-09-24 11:47	46.5906	-119.3972	28.39	3.94	–	–	< LOD	4.59	U	–
DU-117-013	121	2015-09-24 11:45	46.5907	-119.3962	15.33	3.35	–	–	4.75	2.70	–	–
DU-117-014	120	2015-09-24 11:43	46.5906	-119.3952	29.60	4.22	–	–	< LOD	5.01	U	–
DU-117-015	119	2015-09-24 11:40	46.5906	-119.3942	11.04	4.27	–	–	6.71	3.62	–	–
DU-117-016	110	2015-09-24 11:24	46.5906	-119.3932	194.84	7.41	–	–	34.55	5.92	–	–
DU-117-017	109	2015-09-24 11:22	46.5907	-119.3922	47.52	5.39	–	–	10.63	4.37	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-117-018	108	2015-09-24 11:19	46.5906	-119.3911	23.94	3.40	–	–	5.02	2.69	–	–
DU-117-019	107	2015-09-24 11:17	46.5905	-119.3901	18.66	3.72	–	–	4.69	2.99	–	–
DU-117-020	96	2015-09-24 10:50	46.5913	-119.3989	16.25	3.16	–	–	4.66	2.54	–	–
DU-117-021	98	2015-09-24 10:54	46.5912	-119.3977	30.25	4.02	–	–	< LOD	4.76	U	–
DU-117-022	99	2015-09-24 10:56	46.5913	-119.3967	15.98	3.40	–	–	4.80	2.73	–	–
DU-117-023	100	2015-09-24 10:58	46.5912	-119.3957	15.24	3.41	–	–	< LOD	4.09	U	–
DU-117-024	101	2015-09-24 11:01	46.5913	-119.3947	15.11	3.68	–	–	< LOD	4.33	U	–
DU-117-025	102	2015-09-24 11:03	46.5912	-119.3938	11.85	3.20	–	–	6.02	2.63	–	–
DU-117-026	103	2015-09-24 11:05	46.5912	-119.3926	81.60	5.21	–	–	17.20	4.20	–	–
DU-117-027	106	2015-09-24 11:13	46.5912	-119.3917	24.18	3.42	–	–	5.24	2.75	–	–
DU-117-028	104	2016-05-11 9:47	46.5919	-119.3931	37.47	4.06	–	–	7.01	3.23	–	–
DU-117-029	105	2015-09-24 11:10	46.5918	-119.3922	36.89	4.81	–	–	6.08	3.83	–	–
DU-118-001	85	2015-10-19 12:08	46.5885	-119.3990	22.43	3.58	–	–	< LOD	4.18	U	–
DU-118-002	94	2015-10-19 12:27	46.5885	-119.3980	124.42	5.93	–	–	23.76	4.75	–	–
DU-118-003	95	2015-10-19 12:30	46.5884	-119.3971	65.10	4.79	–	–	18.51	3.93	–	–
DU-118-004	96	2015-10-19 12:34	46.5884	-119.3961	47.58	4.34	–	–	13.15	3.54	–	–
DU-118-005	97	2015-10-19 12:37	46.5884	-119.3952	13.93	3.85	–	–	< LOD	4.53	U	–
DU-118-006	98	2015-10-19 12:40	46.5884	-119.3941	13.18	3.58	–	–	< LOD	4.21	U	–
DU-118-007	99	2015-10-19 12:43	46.5884	-119.3931	17.43	3.30	–	–	8.29	2.73	–	–
DU-118-008	100	2015-10-19 12:45	46.5884	-119.3922	246.83	9.08	–	–	< LOD	10.30	U	–
DU-118-009	101	2015-10-19 12:48	46.5883	-119.3911	20.17	3.32	–	–	4.52	2.63	–	–
DU-118-010	102	2015-10-19 12:51	46.5884	-119.3902	23.17	3.39	–	–	< LOD	3.96	U	–
DU-118-011	103	2015-10-19 12:54	46.5883	-119.3891	21.02	3.31	–	–	6.91	2.69	–	–
DU-118-012	124	2015-10-19 13:43	46.5890	-119.3986	105.38	6.08	–	–	32.80	5.07	–	–
DU-118-013	123	2015-10-19 13:40	46.5890	-119.3976	21.95	3.40	–	–	8.75	2.78	–	–
DU-118-014	122	2015-10-19 13:38	46.5890	-119.3966	76.05	5.34	–	–	12.00	4.23	–	–
DU-118-015	121	2015-10-19 13:35	46.5890	-119.3956	17.33	3.70	–	–	7.14	3.07	–	–
DU-118-016	120	2015-10-19 13:32	46.5890	-119.3946	13.30	3.35	–	–	< LOD	3.94	U	–
DU-118-017	119	2015-10-19 13:29	46.5890	-119.3937	10.79	2.91	–	–	4.11	2.35	–	–
DU-118-018	110	2015-10-19 13:13	46.5889	-119.3927	112.42	5.87	–	–	9.34	4.52	–	–
DU-118-019	109	2015-10-19 13:11	46.5889	-119.3916	79.41	5.09	–	–	8.49	3.95	–	–
DU-118-020	108	2015-10-19 13:07	46.5889	-119.3906	32.64	3.68	–	–	< LOD	4.13	U	–
DU-118-021	107	2015-10-19 13:05	46.5889	-119.3896	22.02	3.50	–	–	5.40	2.80	–	–
DU-118-022	104	2015-10-19 12:57	46.5889	-119.3887	14.37	3.19	–	–	4.90	2.57	–	–
DU-118-023	125	2015-10-19 13:46	46.5895	-119.3990	28.07	4.17	–	–	< LOD	4.97	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-118-024	126	2015-10-19 13:49	46.5896	-119.3981	106.25	5.82	–	–	18.53	4.63	–	–
DU-118-025	127	2015-10-19 13:53	46.5896	-119.3970	27.53	3.59	–	–	4.98	2.86	–	–
DU-118-026	128	2015-10-19 13:56	46.5896	-119.3960	23.65	3.73	–	–	9.28	3.08	–	–
DU-118-027	129	2015-10-19 13:59	46.5896	-119.3951	73.42	5.20	–	–	10.90	4.10	–	–
DU-118-028	130	2015-10-19 14:01	46.5895	-119.3941	45.08	4.07	–	–	12.68	3.32	–	–
DU-118-029	131	2015-10-19 14:04	46.5896	-119.3930	22.10	3.47	–	–	11.47	2.92	–	–
DU-118-030	132	2015-10-19 14:06	46.5895	-119.3920	137.01	6.33	–	–	11.76	4.87	–	–
DU-118-031	133	2015-10-19 14:08	46.5895	-119.3911	40.08	3.96	–	–	6.58	3.12	–	–
DU-118-032	134	2015-10-19 14:11	46.5895	-119.3901	17.89	3.21	–	–	5.44	2.58	–	–
DU-118-033	135	2015-10-19 14:14	46.5895	-119.3891	14.22	2.86	–	–	5.76	2.34	–	–
DU-119-001	36	2015-09-22 8:45	46.5852	-119.3982	12.62	3.29	–	–	4.76	2.67	–	–
DU-119-002	35	2015-09-22 8:42	46.5853	-119.3972	12.86	3.19	–	–	4.93	2.60	–	–
DU-119-003	34	2015-09-22 8:40	46.5853	-119.3963	16.73	3.68	–	–	4.92	3.00	–	–
DU-119-004	33	2015-09-22 8:37	46.5853	-119.3954	10.13	3.29	–	–	< LOD	3.98	U	–
DU-119-005	31	2015-09-22 8:33	46.5853	-119.3945	12.97	3.18	–	–	4.97	2.58	–	–
DU-119-006	30	2015-09-22 8:30	46.5853	-119.3935	15.04	3.24	–	–	6.30	2.66	–	–
DU-119-007	37	2015-09-22 8:47	46.5858	-119.3987	21.80	3.36	–	–	< LOD	3.91	U	–
DU-119-008	38	2015-09-22 8:49	46.5858	-119.3978	30.77	4.05	–	–	6.58	3.23	–	–
DU-119-009	39	2015-09-22 8:52	46.5859	-119.3970	19.91	3.52	–	–	< LOD	4.12	U	–
DU-119-010	40	2015-09-22 8:54	46.5858	-119.3958	17.10	3.29	–	–	6.92	2.68	–	–
DU-119-011	41	2015-09-22 8:57	46.5859	-119.3950	13.34	3.72	–	–	4.99	3.05	–	–
DU-119-012	42	2015-09-22 9:00	46.5859	-119.3940	12.43	3.69	–	–	< LOD	4.53	U	–
DU-119-013	56	2015-09-22 9:24	46.5864	-119.3982	19.42	4.02	–	–	< LOD	4.77	U	–
DU-119-014	55	2015-09-22 9:22	46.5864	-119.3973	22.28	3.79	–	–	5.98	3.06	–	–
DU-119-015	46	2015-09-22 9:09	46.5864	-119.3964	17.52	3.31	–	–	5.94	2.68	–	–
DU-119-016	45	2015-09-22 9:07	46.5864	-119.3954	13.77	2.86	–	–	< LOD	3.40	U	–
DU-119-017	44	2015-09-22 9:05	46.5864	-119.3943	14.15	3.11	–	–	< LOD	3.71	U	–
DU-119-018	43	2015-09-22 9:02	46.5864	-119.3936	22.30	3.49	–	–	4.65	2.79	–	–
DU-119-019	57	2015-09-22 9:26	46.5870	-119.3987	52.18	4.89	–	–	< LOD	5.62	U	–
DU-119-020	58	2015-09-22 9:29	46.5870	-119.3974	11.11	3.26	–	–	4.25	2.67	–	–
DU-119-021	59	2015-09-22 9:31	46.5869	-119.3968	18.72	3.71	–	–	< LOD	4.42	U	–
DU-119-022	60	2015-09-22 9:33	46.5870	-119.3959	20.58	3.55	–	–	5.02	2.85	–	–
DU-119-023	61	2015-09-22 9:36	46.5869	-119.3950	24.93	3.59	–	–	5.48	2.88	–	–
DU-119-024	62	2015-09-22 9:38	46.5869	-119.3939	23.35	3.64	–	–	< LOD	4.30	U	–
DU-119-025	68	2015-09-22 9:57	46.5875	-119.3981	30.60	4.62	–	–	< LOD	5.49	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-119-026	67	2015-09-22 9:50	46.5876	-119.3972	33.78	3.87	–	–	< LOD	4.51	U	–
DU-119-027	66	2015-09-22 9:47	46.5875	-119.3963	14.91	3.13	–	–	5.19	2.55	–	–
DU-119-028	65	2015-09-22 9:45	46.5875	-119.3953	21.56	3.56	–	–	< LOD	4.22	U	–
DU-119-029	64	2015-09-22 9:43	46.5875	-119.3944	10.45	2.85	–	–	< LOD	2.31	U	–
DU-119-030	63	2015-09-22 9:41	46.5875	-119.3934	25.38	3.86	–	–	4.78	3.06	–	–
DU-119-031	69	2015-09-22 10:03	46.5881	-119.3948	26.58	3.63	–	–	< LOD	4.31	U	–
DU-119-032	70	2015-09-22 10:05	46.5881	-119.3939	29.02	6.39	–	–	< LOD	7.61	U	–
DU-120-001	135	2015-07-23 14:01	46.5856	-119.3933	20.40	3.46	–	–	< LOD	4.09	U	–
DU-120-002	134	2015-07-23 13:58	46.5855	-119.3925	16.51	3.36	–	–	< LOD	3.96	U	–
DU-120-003	133	2015-07-23 13:55	46.5855	-119.3915	18.16	3.41	–	–	< LOD	4.04	U	–
DU-120-004	132	2015-07-23 13:52	46.5855	-119.3905	19.10	3.49	–	–	5.10	2.81	–	–
DU-120-005	131	2015-07-23 13:49	46.5855	-119.3895	18.37	3.30	–	–	< LOD	3.88	U	–
DU-120-006	130	2015-07-23 13:47	46.5856	-119.3886	26.42	3.84	–	–	5.82	3.08	–	–
DU-120-007	125	2015-07-23 13:34	46.5861	-119.3928	14.68	3.28	–	–	< LOD	3.92	U	–
DU-120-008	126	2015-07-23 13:37	46.5861	-119.3919	21.10	3.46	–	–	< LOD	3.95	U	–
DU-120-009	127	2015-07-23 13:39	46.5861	-119.3909	31.09	3.91	–	–	< LOD	4.49	U	–
DU-120-010	128	2015-07-23 13:42	46.5861	-119.3900	64.42	4.93	–	–	10.14	3.90	–	–
DU-120-011	129	2015-07-23 13:45	46.5861	-119.3889	18.03	4.10	–	–	< LOD	4.94	U	–
DU-120-012	124	2015-07-23 13:31	46.5867	-119.3933	32.79	4.16	–	–	< LOD	4.84	U	–
DU-120-013	123	2015-07-23 13:29	46.5866	-119.3923	21.19	3.36	–	–	< LOD	3.86	U	–
DU-120-014	108	2015-07-23 13:00	46.5867	-119.3914	18.96	3.26	–	–	< LOD	3.77	U	–
DU-120-015	107	2015-07-23 12:57	46.5867	-119.3905	21.82	3.30	–	–	4.26	2.63	–	–
DU-120-016	106	2015-07-23 12:55	46.5866	-119.3895	24.82	3.65	–	–	< LOD	4.29	U	–
DU-120-017	105	2015-07-23 12:51	46.5866	-119.3885	17.73	3.41	–	–	< LOD	4.04	U	–
DU-120-018	100	2015-07-23 12:38	46.5872	-119.3928	54.16	5.33	–	–	< LOD	6.06	U	–
DU-120-019	101	2015-07-23 12:41	46.5873	-119.3918	17.98	4.02	–	–	< LOD	4.85	U	–
DU-120-020	102	2015-07-23 12:44	46.5873	-119.3909	175.00	7.39	–	–	13.13	5.67	–	–
DU-120-021	103	2015-07-23 12:46	46.5873	-119.3900	23.92	3.80	–	–	< LOD	4.52	U	–
DU-120-022	104	2015-07-23 12:49	46.5872	-119.3890	27.32	4.13	–	–	< LOD	4.93	U	–
DU-120-023	99	2015-07-23 12:36	46.5878	-119.3933	43.23	4.58	–	–	6.43	3.63	–	–
DU-120-024	98	2015-07-23 12:33	46.5878	-119.3923	84.21	6.20	–	–	11.41	4.88	–	–
DU-120-025	97	2015-07-23 12:31	46.5878	-119.3914	36.37	4.30	–	–	< LOD	5.01	U	–
DU-120-026	96	2015-07-23 12:28	46.5878	-119.3904	37.34	4.24	–	–	< LOD	4.94	U	–
DU-120-027	94	2015-07-23 12:24	46.5878	-119.3894	27.60	3.78	–	–	< LOD	4.40	U	–
DU-121-001	135	2015-09-08 13:10	46.5828	-119.3955	23.73	3.76	–	–	< LOD	4.34	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-121-002	134	2015-09-08 13:08	46.5828	-119.3944	20.81	3.51	–	–	5.00	2.81	–	–
DU-121-003	133	2015-09-08 13:06	46.5828	-119.3935	21.77	3.37	–	–	6.46	2.71	–	–
DU-121-004	132	2015-09-08 13:03	46.5828	-119.3926	14.29	3.04	–	–	< LOD	3.60	U	–
DU-121-005	131	2015-09-08 13:01	46.5828	-119.3916	30.22	4.08	–	–	< LOD	4.79	U	–
DU-121-006	130	2015-09-08 12:58	46.5827	-119.3907	14.96	3.22	–	–	7.20	2.66	–	–
DU-121-007	129	2015-09-08 12:56	46.5828	-119.3898	15.53	3.63	–	–	4.80	2.94	–	–
DU-121-008	128	2015-09-08 12:53	46.5827	-119.3888	17.98	3.63	–	–	< LOD	4.37	U	–
DU-121-009	120	2015-09-08 12:32	46.5833	-119.3959	39.36	4.39	–	–	< LOD	5.18	U	–
DU-121-010	121	2015-09-08 12:34	46.5834	-119.3949	22.90	3.54	–	–	< LOD	4.15	U	–
DU-121-011	122	2015-09-08 12:37	46.5834	-119.3940	17.97	3.36	–	–	7.36	2.77	–	–
DU-121-012	123	2015-09-08 12:39	46.5834	-119.3931	15.27	3.15	–	–	< LOD	3.75	U	–
DU-121-013	124	2015-09-08 12:41	46.5833	-119.3921	17.09	3.89	–	–	< LOD	4.62	U	–
DU-121-014	125	2015-09-08 12:44	46.5833	-119.3912	22.75	3.46	–	–	4.13	2.73	–	–
DU-121-015	126	2015-09-08 12:47	46.5833	-119.3902	20.52	3.72	–	–	< LOD	4.41	U	–
DU-121-016	127	2015-09-08 12:49	46.5834	-119.3893	15.37	3.17	–	–	4.33	2.53	–	–
DU-121-017	119	2015-09-08 12:25	46.5840	-119.3990	25.16	3.37	–	–	4.45	2.66	–	–
DU-121-018	118	2015-09-08 12:22	46.5840	-119.3981	16.05	4.00	–	–	6.60	3.33	–	–
DU-121-019	117	2015-09-08 12:20	46.5839	-119.3972	15.11	3.32	–	–	< LOD	3.98	U	–
DU-121-020	116	2015-09-08 12:17	46.5840	-119.3963	21.11	3.63	–	–	< LOD	4.24	U	–
DU-121-021	108	2015-09-08 12:03	46.5839	-119.3953	27.92	3.68	–	–	< LOD	4.32	U	–
DU-121-022	107	2015-09-08 12:00	46.5839	-119.3944	16.99	3.49	–	–	< LOD	4.19	U	–
DU-121-023	106	2015-09-08 11:58	46.5839	-119.3935	18.47	3.13	–	–	5.75	2.53	–	–
DU-121-024	105	2015-09-08 11:55	46.5839	-119.3925	16.16	3.72	–	–	< LOD	4.44	U	–
DU-121-025	104	2015-09-08 11:52	46.5839	-119.3916	22.64	3.87	–	–	4.86	3.10	–	–
DU-121-026	103	2015-09-08 11:49	46.5839	-119.3907	22.62	3.58	–	–	4.89	2.85	–	–
DU-121-027	102	2015-09-08 11:47	46.5839	-119.3897	13.10	3.36	–	–	7.46	2.82	–	–
DU-121-028	101	2015-09-08 11:44	46.5838	-119.3888	27.81	3.63	–	–	6.15	2.89	–	–
DU-121-029	79	2015-09-08 10:54	46.5845	-119.3986	35.95	4.15	–	–	< LOD	4.84	U	–
DU-121-030	90	2015-09-08 11:13	46.5845	-119.3977	12.76	3.37	–	–	4.13	2.72	–	–
DU-121-031	91	2015-09-08 11:17	46.5845	-119.3968	17.87	3.15	–	–	< LOD	3.71	U	–
DU-121-032	92	2015-09-08 11:20	46.5845	-119.3958	13.97	3.38	–	–	4.73	2.74	–	–
DU-121-033	93	2015-09-08 11:22	46.5845	-119.3949	12.99	3.52	–	–	5.38	2.91	–	–
DU-121-034	94	2015-09-08 11:25	46.5845	-119.3940	15.89	3.14	–	–	5.36	2.55	–	–
DU-121-035	95	2015-09-08 11:27	46.5845	-119.3929	15.73	3.23	–	–	< LOD	3.84	U	–
DU-121-036	96	2015-09-08 11:30	46.5844	-119.3921	14.11	3.10	–	–	< LOD	3.69	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-121-037	97	2015-09-08 11:33	46.5845	-119.3912	11.87	3.21	–	–	< LOD	3.76	U	–
DU-121-038	98	2015-09-08 11:36	46.5844	-119.3902	19.35	3.20	–	–	4.51	2.55	–	–
DU-121-039	99	2015-09-08 11:38	46.5844	-119.3893	18.32	3.19	–	–	< LOD	3.76	U	–
DU-121-040	100	2015-09-08 11:41	46.5850	-119.3888	44.16	4.24	–	–	< LOD	4.80	U	–
DU-122-001	138	2015-07-22 11:19	46.5776	-119.3954	44.33	4.27	–	–	6.11	3.36	–	–
DU-122-002	137	2015-07-22 11:17	46.5776	-119.3945	29.43	4.06	–	–	< LOD	4.79	U	–
DU-122-003	136	2015-07-22 11:14	46.5776	-119.3935	16.95	3.33	–	–	5.99	2.69	–	–
DU-122-004	132	2015-07-22 11:05	46.5782	-119.3960	15.38	3.32	–	–	< LOD	3.95	U	–
DU-122-005	133	2015-07-22 11:07	46.5781	-119.3950	54.75	5.01	–	–	< LOD	5.86	U	–
DU-122-006	134	2015-07-22 11:10	46.5781	-119.3940	12.74	3.28	–	–	4.41	2.65	–	–
DU-122-007	135	2015-07-22 11:12	46.5781	-119.3931	21.65	3.60	–	–	4.97	2.88	–	–
DU-122-008	131	2015-07-22 11:03	46.5787	-119.3955	19.01	3.52	–	–	5.58	2.84	–	–
DU-122-009	130	2015-07-22 11:00	46.5787	-119.3945	16.71	3.78	–	–	7.50	3.13	–	–
DU-122-010	129	2015-07-22 10:58	46.5787	-119.3935	20.73	3.39	–	–	< LOD	4.00	U	–
DU-122-011	128	2015-07-22 10:56	46.5787	-119.3926	14.54	3.13	–	–	6.66	2.56	–	–
DU-122-012	123	2015-07-22 10:46	46.5793	-119.3960	25.40	4.23	–	–	< LOD	5.00	U	–
DU-122-013	124	2015-07-22 10:49	46.5792	-119.3950	12.48	2.87	–	–	< LOD	2.30	U	–
DU-122-014	126	2015-07-22 10:51	46.5793	-119.3941	20.11	3.46	–	–	6.22	2.80	–	–
DU-122-015	127	2015-07-22 10:53	46.5792	-119.3932	46.14	4.36	–	–	< LOD	5.03	U	–
DU-122-016	122	2015-07-22 10:44	46.5798	-119.3955	17.56	3.78	–	–	< LOD	4.52	U	–
DU-122-017	121	2015-07-22 10:42	46.5799	-119.3945	16.82	4.36	–	–	6.69	3.61	–	–
DU-122-018	120	2015-07-22 10:39	46.5798	-119.3935	23.77	3.63	–	–	7.66	2.97	–	–
DU-122-019	112	2015-07-22 10:27	46.5799	-119.3925	24.01	4.05	–	–	5.00	3.24	–	–
DU-122-020	108	2015-07-22 10:18	46.5805	-119.3959	24.26	3.55	–	–	5.74	2.85	–	–
DU-122-021	109	2015-07-22 10:20	46.5804	-119.3950	27.57	3.88	–	–	7.77	3.15	–	–
DU-122-022	110	2015-07-22 10:23	46.5804	-119.3941	25.25	3.79	–	–	5.57	3.01	–	–
DU-122-023	111	2015-07-22 10:25	46.5804	-119.3931	30.35	4.34	–	–	< LOD	5.14	U	–
DU-122-024	107	2015-07-22 10:15	46.5810	-119.3953	20.52	3.41	–	–	7.48	2.79	–	–
DU-122-025	106	2015-07-22 10:13	46.5810	-119.3945	34.49	3.90	–	–	7.28	3.12	–	–
DU-122-026	105	2015-07-22 10:11	46.5810	-119.3935	24.22	4.06	–	–	6.84	3.29	–	–
DU-122-027	104	2015-07-22 10:08	46.5810	-119.3925	32.59	3.91	–	–	10.79	3.21	–	–
DU-122-028	100	2015-07-22 9:59	46.5817	-119.3958	18.13	3.13	–	–	< LOD	2.47	U	–
DU-122-029	101	2015-07-22 10:01	46.5816	-119.3950	21.59	3.32	–	–	6.87	2.69	–	–
DU-122-030	102	2015-07-22 10:04	46.5816	-119.3939	138.46	6.46	–	–	34.31	5.28	–	–
DU-122-031	103	2015-07-22 10:06	46.5815	-119.3931	20.40	3.58	–	–	8.01	2.94	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-122-032	95	2015-07-22 9:43	46.5821	-119.3953	101.17	6.09	–	–	< LOD	6.76	U	–
DU-122-033	94	2015-07-22 9:41	46.5821	-119.3945	31.23	3.88	–	–	< LOD	4.56	U	–
DU-122-034	93	2015-07-22 9:39	46.5822	-119.3935	28.27	4.22	–	–	7.39	3.43	–	–
DU-122-035	91	2015-07-22 9:35	46.5822	-119.3925	56.63	4.74	–	–	< LOD	5.18	U	–
DU-123-001	34	2015-07-22 7:37	46.5771	-119.3917	26.95	4.25	–	–	< LOD	4.84	U	–
DU-123-002	33	2015-07-22 7:35	46.5771	-119.3906	25.45	3.88	–	–	< LOD	4.59	U	–
DU-123-003	32	2015-07-22 7:32	46.5771	-119.3896	13.92	3.74	–	–	< LOD	4.43	U	–
DU-123-004	30	2015-07-22 7:27	46.5771	-119.3887	20.34	3.99	–	–	< LOD	4.75	U	–
DU-123-005	35	2015-07-22 7:39	46.5777	-119.3922	25.61	3.72	–	–	< LOD	4.35	U	–
DU-123-006	36	2015-07-22 7:41	46.5777	-119.3912	24.30	3.65	–	–	< LOD	4.27	U	–
DU-123-007	37	2015-07-22 7:44	46.5776	-119.3901	23.47	3.47	–	–	6.67	2.80	–	–
DU-123-008	38	2015-07-22 7:46	46.5776	-119.3892	20.54	3.62	–	–	< LOD	4.26	U	–
DU-123-009	42	2015-07-22 7:54	46.5782	-119.3917	16.99	3.31	–	–	< LOD	3.83	U	–
DU-123-010	41	2015-07-22 7:52	46.5782	-119.3908	14.17	2.95	–	–	4.87	2.40	–	–
DU-123-011	40	2015-07-22 7:50	46.5782	-119.3898	28.93	3.93	–	–	< LOD	4.50	U	–
DU-123-012	39	2015-07-22 7:48	46.5783	-119.3887	23.84	3.58	–	–	< LOD	4.19	U	–
DU-123-013	43	2015-07-22 7:57	46.5789	-119.3921	35.93	4.02	–	–	< LOD	4.66	U	–
DU-123-014	44	2015-07-22 7:59	46.5788	-119.3911	32.43	3.78	–	–	5.55	2.99	–	–
DU-123-015	45	2015-07-22 8:02	46.5789	-119.3901	20.11	3.26	–	–	< LOD	3.86	U	–
DU-123-016	46	2015-07-22 8:04	46.5788	-119.3892	26.91	3.63	–	–	< LOD	4.23	U	–
DU-123-017	50	2015-07-22 8:13	46.5794	-119.3917	26.31	4.10	–	–	5.46	3.29	–	–
DU-123-018	49	2015-07-22 8:11	46.5794	-119.3907	22.91	3.40	–	–	4.90	2.71	–	–
DU-123-019	48	2015-07-22 8:08	46.5794	-119.3896	17.21	3.45	–	–	< LOD	4.01	U	–
DU-123-020	47	2015-07-22 8:06	46.5794	-119.3886	45.72	4.22	–	–	< LOD	4.88	U	–
DU-123-021	58	2015-07-22 8:25	46.5800	-119.3922	30.06	3.93	–	–	5.20	3.12	–	–
DU-123-022	59	2015-07-22 8:27	46.5800	-119.3911	34.38	3.84	–	–	5.46	3.04	–	–
DU-123-023	60	2015-07-22 8:29	46.5800	-119.3902	12.71	2.90	–	–	< LOD	2.33	U	–
DU-123-024	61	2015-07-22 8:31	46.5800	-119.3891	24.54	3.52	–	–	5.92	2.83	–	–
DU-123-025	65	2015-07-22 8:40	46.5806	-119.3916	14.41	3.13	–	–	4.03	2.51	–	–
DU-123-026	64	2015-07-22 8:38	46.5806	-119.3906	10.94	2.78	–	–	6.57	2.33	–	–
DU-123-027	63	2015-07-22 8:36	46.5805	-119.3896	15.39	3.31	–	–	4.15	2.66	–	–
DU-123-028	62	2015-07-22 8:34	46.5805	-119.3886	16.27	3.27	–	–	< LOD	3.85	U	–
DU-123-029	66	2015-07-22 8:42	46.5811	-119.3921	13.63	3.15	–	–	< LOD	3.75	U	–
DU-123-030	67	2015-07-22 8:45	46.5812	-119.3911	19.89	3.24	–	–	< LOD	3.79	U	–
DU-123-031	68	2015-07-22 8:47	46.5812	-119.3901	15.42	3.15	–	–	< LOD	3.72	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-123-032	69	2015-07-22 8:49	46.5812	-119.3891	12.76	2.96	–	–	< LOD	3.55	U	–
DU-123-033	73	2015-07-22 8:58	46.5818	-119.3917	15.74	3.11	–	–	< LOD	3.71	U	–
DU-123-034	72	2015-07-22 8:56	46.5817	-119.3906	13.44	3.37	–	–	< LOD	4.01	U	–
DU-123-035	71	2015-07-22 8:54	46.5817	-119.3897	24.89	4.47	–	–	6.32	3.63	–	–
DU-123-036	70	2015-07-22 8:51	46.5818	-119.3885	12.18	2.84	–	–	< LOD	3.34	U	–
DU-123-037	74	2015-07-22 9:00	46.5823	-119.3921	12.85	3.32	–	–	4.96	2.72	–	–
DU-123-038	75	2015-07-22 9:03	46.5823	-119.3911	17.22	3.58	–	–	< LOD	4.24	U	–
DU-123-039	76	2015-07-22 9:06	46.5824	-119.3901	240.39	8.27	–	–	10.86	6.25	–	–
DU-123-040	77	2015-07-22 9:08	46.5823	-119.3892	13.47	2.94	–	–	< LOD	3.51	U	–
DU-124-001	37	2015-09-11 7:49	46.5845	-119.3882	23.37	3.63	–	–	< LOD	4.30	U	–
DU-124-002	36	2015-09-11 7:46	46.5845	-119.3872	24.79	3.75	–	–	< LOD	4.42	U	–
DU-124-003	35	2015-09-11 7:44	46.5845	-119.3862	15.92	3.33	–	–	4.92	2.68	–	–
DU-124-004	34	2015-09-11 7:42	46.5845	-119.3853	22.60	3.98	–	–	6.83	3.24	–	–
DU-124-005	32	2015-09-11 7:35	46.5845	-119.3842	22.54	3.53	–	–	5.91	2.86	–	–
DU-124-006	38	2015-09-11 7:51	46.5851	-119.3876	12.59	4.36	–	–	< LOD	5.26	U	–
DU-124-007	39	2015-09-11 7:53	46.5851	-119.3866	43.78	4.33	–	–	7.24	3.43	–	–
DU-124-008	40	2015-09-11 7:55	46.5851	-119.3857	26.98	3.96	–	–	4.95	3.15	–	–
DU-124-009	41	2015-09-11 7:57	46.5850	-119.3847	33.12	4.11	–	–	< LOD	4.79	U	–
DU-124-010	42	2015-09-11 8:00	46.5851	-119.3836	31.34	3.60	–	–	4.41	2.82	–	–
DU-124-011	43	2015-09-11 8:02	46.5850	-119.3827	30.93	3.77	–	–	< LOD	4.30	U	–
DU-124-012	44	2015-09-11 8:04	46.5850	-119.3816	24.53	3.42	–	–	5.21	2.71	–	–
DU-124-013	45	2015-09-11 8:06	46.5850	-119.3807	24.86	3.60	–	–	< LOD	4.17	U	–
DU-124-014	52	2015-09-11 8:22	46.5857	-119.3882	16.97	3.16	–	–	< LOD	3.69	U	–
DU-124-015	51	2015-09-11 8:20	46.5857	-119.3872	22.75	3.61	–	–	5.06	2.88	–	–
DU-124-016	50	2015-09-11 8:18	46.5857	-119.3862	20.72	4.21	–	–	< LOD	4.85	U	–
DU-124-017	49	2015-09-11 8:16	46.5857	-119.3852	12.41	4.56	–	–	< LOD	5.58	U	–
DU-124-018	48	2015-09-11 8:14	46.5857	-119.3842	13.62	3.27	–	–	< LOD	3.90	U	–
DU-124-019	47	2015-09-11 8:11	46.5856	-119.3832	21.02	3.48	–	–	4.80	2.77	–	–
DU-124-020	46	2015-09-11 8:09	46.5856	-119.3822	25.41	4.19	–	–	< LOD	4.92	U	–
DU-124-021	64	2015-09-11 8:40	46.5864	-119.3876	16.36	3.69	–	–	< LOD	4.33	U	–
DU-124-022	65	2015-09-11 8:43	46.5862	-119.3866	22.98	3.94	–	–	< LOD	4.72	U	–
DU-124-023	66	2015-09-11 8:45	46.5862	-119.3855	31.26	3.70	–	–	< LOD	4.35	U	–
DU-124-024	67	2015-09-11 8:48	46.5862	-119.3847	11.58	3.22	–	–	5.57	2.66	–	–
DU-124-025	68	2015-09-11 8:51	46.5862	-119.3837	14.28	3.49	–	–	< LOD	4.12	U	–
DU-124-026	69	2015-09-11 8:56	46.5862	-119.3827	24.28	3.58	–	–	< LOD	4.19	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-124-027	74	2015-09-11 9:08	46.5869	-119.3881	27.08	4.10	–	–	8.37	3.35	–	–
DU-124-028	73	2015-09-11 9:06	46.5869	-119.3872	16.23	3.17	–	–	< LOD	2.52	U	–
DU-124-029	72	2015-09-11 9:04	46.5869	-119.3861	22.22	4.28	–	–	< LOD	5.17	U	–
DU-124-030	71	2015-09-11 9:02	46.5868	-119.3851	13.09	3.14	–	–	4.95	2.54	–	–
DU-124-031	70	2015-09-11 8:59	46.5868	-119.3841	63.26	5.84	–	–	< LOD	6.74	U	–
DU-124-032	75	2015-09-11 9:11	46.5876	-119.3875	20.04	3.49	–	–	4.53	2.78	–	–
DU-124-033	76	2015-09-11 9:13	46.5875	-119.3866	26.86	3.74	–	–	< LOD	4.38	U	–
DU-124-034	77	2015-09-11 9:15	46.5875	-119.3855	20.11	4.15	–	–	< LOD	4.95	U	–
DU-124-035	80	2015-09-11 9:24	46.5881	-119.3881	19.16	3.63	–	–	6.36	2.95	–	–
DU-124-036	79	2015-09-11 9:20	46.5880	-119.3871	21.06	3.43	–	–	< LOD	4.03	U	–
DU-124-037	78	2015-09-11 9:18	46.5880	-119.3861	20.84	3.97	–	–	< LOD	4.74	U	–
DU-124-038	81	2015-09-11 9:26	46.5887	-119.3885	19.88	3.49	–	–	4.40	2.77	–	–
DU-124-039	82	2015-09-11 9:29	46.5887	-119.3876	21.38	3.50	–	–	< LOD	4.12	U	–
DU-124-040	83	2015-09-11 9:31	46.5892	-119.3880	11.86	2.97	–	–	4.38	2.40	–	–
DU-125-001	40	2015-10-01 9:26	46.5750	-119.3853	42.94	4.10	–	–	< LOD	4.71	U	–
DU-125-002	39	2015-10-01 9:23	46.5749	-119.3843	28.83	3.69	–	–	< LOD	4.32	U	–
DU-125-003	37	2015-10-01 9:20	46.5749	-119.3833	28.18	3.65	–	–	6.69	2.92	–	–
DU-125-004	41	2015-10-01 9:28	46.5756	-119.3868	14.53	3.06	–	–	4.19	2.45	–	–
DU-125-005	42	2015-10-01 9:30	46.5756	-119.3858	13.19	3.21	–	–	< LOD	3.85	U	–
DU-125-006	43	2015-10-01 9:32	46.5756	-119.3848	68.92	4.91	–	–	8.05	3.82	–	–
DU-125-007	44	2015-10-01 9:34	46.5756	-119.3837	32.52	3.69	–	–	< LOD	4.25	U	–
DU-125-008	47	2015-10-01 9:42	46.5755	-119.3828	14.37	3.14	–	–	< LOD	3.73	U	–
DU-125-009	48	2015-10-01 9:44	46.5755	-119.3817	16.15	3.12	–	–	< LOD	3.69	U	–
DU-125-010	49	2015-10-01 9:46	46.5755	-119.3808	18.69	3.72	–	–	< LOD	4.42	U	–
DU-125-011	50	2015-10-01 9:48	46.5756	-119.3798	16.41	3.15	–	–	7.84	2.61	–	–
DU-125-012	51	2015-10-01 9:50	46.5755	-119.3789	29.91	3.70	–	–	4.91	2.92	–	–
DU-125-013	67	2015-10-01 10:28	46.5762	-119.3882	14.76	3.12	–	–	6.56	2.57	–	–
DU-125-014	66	2015-10-01 10:26	46.5762	-119.3873	17.33	3.12	–	–	< LOD	3.73	U	–
DU-125-015	65	2015-10-01 10:24	46.5761	-119.3863	18.17	3.36	–	–	< LOD	4.00	U	–
DU-125-016	64	2015-10-01 10:21	46.5762	-119.3853	102.44	5.41	–	–	9.76	4.20	–	–
DU-125-017	56	2015-10-01 10:02	46.5761	-119.3842	117.40	6.24	–	–	11.41	4.84	–	–
DU-125-018	55	2015-10-01 10:00	46.5761	-119.3833	23.19	3.44	–	–	4.27	2.72	–	–
DU-125-019	54	2015-10-01 9:58	46.5762	-119.3823	15.76	3.38	–	–	5.70	2.76	–	–
DU-125-020	53	2015-10-01 9:56	46.5762	-119.3814	53.09	4.45	–	–	< LOD	5.12	U	–
DU-125-021	52	2015-10-01 9:53	46.5761	-119.3804	32.63	4.25	–	–	5.35	3.37	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-125-022	68	2015-10-01 10:32	46.5768	-119.3907	11.83	3.28	–	–	< LOD	3.98	U	–
DU-125-023	69	2015-10-01 10:34	46.5768	-119.3896	26.36	3.71	–	–	4.58	2.94	–	–
DU-125-024	70	2015-10-01 10:37	46.5768	-119.3885	15.41	3.23	–	–	< LOD	3.85	U	–
DU-125-025	71	2015-10-01 10:39	46.5768	-119.3877	17.49	3.14	–	–	5.59	2.53	–	–
DU-125-026	72	2015-10-01 10:41	46.5768	-119.3866	250.01	8.46	–	–	32.83	6.64	–	–
DU-125-027	73	2015-10-01 10:44	46.5767	-119.3857	163.03	7.07	–	–	14.47	5.45	–	–
DU-125-028	74	2015-10-01 10:46	46.5768	-119.3847	143.57	7.00	–	–	13.71	5.42	–	–
DU-125-029	75	2015-10-01 10:48	46.5768	-119.3837	37.29	3.86	–	–	< LOD	4.42	U	–
DU-125-030	76	2015-10-01 10:50	46.5767	-119.3827	13.50	3.89	–	–	< LOD	4.75	U	–
DU-125-031	77	2015-10-01 10:52	46.5767	-119.3818	24.28	3.61	–	–	< LOD	4.20	U	–
DU-125-032	78	2015-10-01 10:54	46.5767	-119.3807	18.81	3.32	–	–	< LOD	3.93	U	–
DU-126-001	137	2015-10-01 13:45	46.5727	-119.3771	39.22	3.83	–	–	6.11	3.03	–	–
DU-126-002	138	2015-10-01 13:48	46.5726	-119.3762	95.45	5.58	–	–	< LOD	6.23	U	–
DU-126-003	139	2015-10-01 13:50	46.5726	-119.3752	44.50	4.14	–	–	4.96	3.23	–	–
DU-126-004	140	2015-10-01 13:52	46.5725	-119.3742	11.35	2.85	–	–	4.48	2.31	–	–
DU-126-005	136	2016-05-11 9:16	46.5732	-119.3776	26.39	3.48	–	–	6.32	2.79	–	–
DU-126-006	135	2015-10-01 13:39	46.5732	-119.3767	39.17	4.46	–	–	5.36	3.51	–	–
DU-126-007	134	2015-10-01 13:37	46.5732	-119.3758	48.61	4.31	–	–	5.46	3.37	–	–
DU-126-008	133	2015-10-01 13:35	46.5732	-119.3748	17.18	3.10	–	–	< LOD	2.48	U	–
DU-126-009	131	2015-10-01 13:30	46.5738	-119.3772	18.23	3.23	–	–	4.66	2.58	–	–
DU-126-010	132	2015-10-01 13:32	46.5738	-119.3762	31.92	3.55	–	–	6.56	2.83	–	–
DU-126-011	130	2015-10-01 13:28	46.5744	-119.3777	13.42	2.83	–	–	< LOD	3.35	U	–
DU-126-012	129	2015-10-01 13:26	46.5743	-119.3768	11.50	2.94	–	–	4.51	2.39	–	–
DU-126-013	126	2015-10-01 13:19	46.5749	-119.3771	11.38	3.29	–	–	< LOD	3.99	U	–
DU-126-014	127	2015-10-01 13:21	46.5749	-119.3761	19.75	3.72	–	–	< LOD	4.44	U	–
DU-126-015	128	2015-10-01 13:23	46.5750	-119.3752	18.19	3.73	–	–	< LOD	4.48	U	–
DU-126-016	125	2015-10-01 13:16	46.5755	-119.3777	32.71	3.81	–	–	5.49	3.01	–	–
DU-126-017	124	2015-10-01 13:14	46.5755	-119.3767	16.09	3.90	–	–	5.45	3.17	–	–
DU-126-018	123	2015-10-01 13:12	46.5755	-119.3757	12.79	3.15	–	–	5.22	2.56	–	–
DU-126-019	122	2015-10-01 13:10	46.5755	-119.3747	8.47	3.08	–	–	< LOD	3.66	U	–
DU-126-020	109	2015-10-01 12:43	46.5761	-119.3791	62.86	4.90	–	–	10.79	3.89	–	–
DU-126-021	110	2015-10-01 12:45	46.5761	-119.3781	31.38	4.48	–	–	< LOD	5.26	U	–
DU-126-022	111	2015-10-01 12:47	46.5762	-119.3771	11.50	3.13	–	–	4.31	2.56	–	–
DU-126-023	112	2015-10-01 12:50	46.5762	-119.3761	22.50	3.37	–	–	< LOD	3.97	U	–
DU-126-024	113	2015-10-01 12:52	46.5761	-119.3751	13.47	2.99	–	–	< LOD	3.56	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-126-025	114	2015-10-01 12:54	46.5761	-119.3742	11.05	3.86	–	–	< LOD	4.76	U	–
DU-126-026	108	2015-10-01 12:40	46.5768	-119.3806	28.43	4.09	–	–	< LOD	4.78	U	–
DU-126-027	107	2015-10-01 12:37	46.5768	-119.3796	15.87	3.53	–	–	< LOD	4.19	U	–
DU-126-028	106	2015-10-01 12:35	46.5767	-119.3786	80.64	5.89	–	–	8.88	4.60	–	–
DU-126-029	105	2015-10-01 12:32	46.5767	-119.3776	15.66	3.54	–	–	< LOD	4.18	U	–
DU-126-030	104	2015-10-01 12:30	46.5768	-119.3766	14.79	3.33	–	–	< LOD	4.00	U	–
DU-126-031	103	2015-10-01 12:27	46.5767	-119.3756	11.93	3.26	–	–	5.52	2.68	–	–
DU-126-032	102	2015-10-01 12:24	46.5768	-119.3748	16.30	3.10	–	–	< LOD	3.63	U	–
DU-126-033	101	2015-10-01 12:22	46.5767	-119.3736	10.52	2.93	–	–	< LOD	3.51	U	–
DU-126-034	100	2015-10-01 12:16	46.5773	-119.3771	18.22	3.43	–	–	< LOD	4.08	U	–
DU-126-035	99	2015-10-01 12:13	46.5779	-119.3776	11.66	3.00	–	–	< LOD	3.55	U	–
DU-126-036	98	2015-10-01 12:10	46.5779	-119.3765	12.48	2.98	–	–	4.53	2.40	–	–
DU-126-037	97	2015-10-01 12:08	46.5785	-119.3771	15.97	3.22	–	–	4.35	2.58	–	–
DU-126-038	96	2015-10-01 12:04	46.5791	-119.3785	24.11	3.38	–	–	< LOD	3.95	U	–
DU-126-039	95	2015-10-01 12:02	46.5791	-119.3777	15.48	3.17	–	–	< LOD	3.70	U	–
DU-126-040	93	2015-10-01 11:58	46.5791	-119.3765	20.13	3.22	–	–	< LOD	3.75	U	–
DU-127-001	78	2015-07-23 10:42	46.5717	-119.3704	212.39	10.49	–	–	< LOD	11.71	U	–
DU-127-002	75	2015-07-23 10:33	46.5723	-119.3709	81.11	5.47	–	–	21.04	4.47	–	–
DU-127-003	76	2015-07-23 10:35	46.5723	-119.3698	46.68	4.18	–	–	6.27	3.28	–	–
DU-127-004	77	2015-07-23 10:39	46.5723	-119.3690	28.36	3.67	–	–	8.54	2.98	–	–
DU-127-005	74	2015-07-23 10:30	46.5729	-119.3704	36.71	4.11	–	–	8.34	3.32	–	–
DU-127-006	73	2015-07-23 10:27	46.5729	-119.3694	66.02	5.48	–	–	< LOD	6.38	U	–
DU-127-007	72	2015-07-23 10:25	46.5729	-119.3684	30.68	4.67	–	–	6.95	3.76	–	–
DU-127-008	39	2015-07-23 8:38	46.5736	-119.3749	70.35	4.92	–	–	10.23	3.87	–	–
DU-127-009	40	2015-07-23 8:42	46.5735	-119.3738	22.69	4.68	–	–	< LOD	5.59	U	–
DU-127-010	49	2015-07-23 9:10	46.5735	-119.3728	22.59	3.56	–	–	< LOD	4.19	U	–
DU-127-011	50	2015-07-23 9:14	46.5736	-119.3718	25.05	4.00	–	–	< LOD	4.69	U	–
DU-127-012	63	2015-07-23 9:47	46.5735	-119.3709	19.98	3.39	–	–	< LOD	4.02	U	–
DU-127-013	65	2015-07-23 9:56	46.5735	-119.3700	64.32	4.51	–	–	5.64	3.48	–	–
DU-127-014	66	2015-07-23 10:00	46.5734	-119.3690	13.66	3.01	–	–	7.80	2.50	–	–
DU-127-015	67	2015-07-23 10:04	46.5734	-119.3679	24.26	3.52	–	–	< LOD	4.17	U	–
DU-127-016	30	2015-07-23 8:09	46.5742	-119.3753	29.22	4.23	–	–	5.51	3.37	–	–
DU-127-017	38	2015-07-23 8:34	46.5742	-119.3743	27.59	3.94	–	–	< LOD	4.64	U	–
DU-127-018	41	2015-07-23 8:45	46.5741	-119.3733	14.74	3.17	–	–	5.95	2.59	–	–
DU-127-019	48	2015-07-23 9:07	46.5741	-119.3723	13.74	3.64	–	–	< LOD	4.36	U	–

[redacted]

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-127-020	58	2015-07-23 9:30	46.5741	-119.3713	13.90	3.22	–	–	< LOD	3.88	U	–
DU-127-021	62	2015-07-23 9:45	46.5741	-119.3703	17.32	3.72	–	–	< LOD	4.42	U	–
DU-127-022	64	2015-07-23 9:52	46.5741	-119.3694	26.90	3.79	–	–	< LOD	4.42	U	–
DU-127-023	32	2015-07-23 8:13	46.5747	-119.3748	20.32	4.08	–	–	< LOD	4.84	U	–
DU-127-024	37	2015-07-23 8:31	46.5747	-119.3740	33.91	4.33	–	–	7.14	3.48	–	–
DU-127-025	42	2015-07-23 8:48	46.5747	-119.3727	17.94	3.46	–	–	5.29	2.79	–	–
DU-127-026	47	2015-07-23 9:03	46.5747	-119.3718	21.31	3.69	–	–	< LOD	4.29	U	–
DU-127-027	59	2015-07-23 9:33	46.5747	-119.3708	18.57	3.67	–	–	4.71	2.96	–	–
DU-127-028	61	2015-07-23 9:41	46.5747	-119.3698	26.52	3.96	–	–	< LOD	4.69	U	–
DU-127-029	33	2015-07-23 8:16	46.5753	-119.3742	18.85	3.35	–	–	< LOD	4.00	U	–
DU-127-030	36	2015-07-23 8:26	46.5753	-119.3733	15.63	3.99	–	–	< LOD	4.74	U	–
DU-127-031	43	2015-07-23 8:50	46.5753	-119.3723	16.46	3.27	–	–	< LOD	3.86	U	–
DU-127-032	46	2015-07-23 9:00	46.5753	-119.3713	26.35	3.53	–	–	< LOD	4.16	U	–
DU-127-033	60	2015-07-23 9:39	46.5753	-119.3703	28.13	3.85	–	–	< LOD	4.56	U	–
DU-127-034	34	2015-07-23 8:20	46.5760	-119.3738	15.51	3.39	–	–	< LOD	4.01	U	–
DU-127-035	35	2015-07-23 8:23	46.5760	-119.3727	14.64	3.65	–	–	4.59	2.96	–	–
DU-127-036	44	2015-07-23 8:53	46.5760	-119.3717	9.05	2.92	–	–	< LOD	3.55	U	–
DU-127-037	45	2015-07-23 8:57	46.5759	-119.3707	14.23	3.21	–	–	5.75	2.62	–	–
DU-128-001	134	2015-07-27 12:25	46.5727	-119.3656	35.85	4.77	–	–	6.01	3.80	–	–
DU-128-002	142	2015-07-27 12:37	46.5726	-119.3647	31.05	3.92	–	–	< LOD	4.44	U	–
DU-128-003	146	2015-07-27 12:47	46.5732	-119.3660	14.68	3.42	–	–	5.75	2.79	–	–
DU-128-004	145	2015-07-27 12:44	46.5732	-119.3651	51.14	4.86	–	–	7.22	3.82	–	–
DU-128-005	144	2015-07-27 12:42	46.5732	-119.3641	40.07	4.10	–	–	5.21	3.21	–	–
DU-128-006	143	2015-07-27 12:40	46.5732	-119.3632	28.58	4.44	–	–	7.92	3.59	–	–
DU-128-007	147	2015-07-27 12:50	46.5738	-119.3676	28.57	3.92	–	–	5.55	3.12	–	–
DU-128-008	148	2015-07-27 12:52	46.5738	-119.3665	79.61	8.10	–	–	< LOD	9.53	U	–
DU-128-009	149	2015-07-27 12:54	46.5738	-119.3656	373.57	11.01	–	–	50.66	8.67	–	–
DU-128-010	150	2015-07-27 12:57	46.5738	-119.3645	37.26	4.07	–	–	< LOD	4.77	U	–
DU-128-011	151	2015-07-27 12:59	46.5738	-119.3636	48.68	4.86	–	–	8.29	3.86	–	–
DU-128-012	152	2015-07-27 13:02	46.5738	-119.3625	53.79	5.32	–	–	12.66	4.31	–	–
DU-128-013	167	2015-07-27 13:33	46.5745	-119.3690	24.00	4.73	–	–	< LOD	5.74	U	–
DU-128-014	166	2015-07-27 13:30	46.5744	-119.3681	77.23	6.79	–	–	< LOD	7.95	U	–
DU-128-015	165	2015-07-27 13:28	46.5744	-119.3671	22.64	4.40	–	–	< LOD	5.23	U	–
DU-128-016	164	2015-07-27 13:25	46.5744	-119.3661	288.88	10.29	–	–	32.52	8.03	–	–
DU-128-017	163	2015-07-27 13:23	46.5744	-119.3651	137.50	7.56	–	–	17.39	5.93	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-128-018	162	2015-07-27 13:20	46.5745	-119.3640	47.10	4.76	–	–	6.65	3.75	–	–
DU-128-019	161	2015-07-27 13:17	46.5744	-119.3631	28.84	5.74	–	–	7.59	4.74	–	–
DU-128-020	153	2015-07-27 13:04	46.5744	-119.3622	28.86	4.11	–	–	8.77	3.35	–	–
DU-128-021	168	2015-07-27 13:35	46.5751	-119.3695	15.01	3.87	–	–	< LOD	4.67	U	–
DU-128-022	169	2015-07-27 13:38	46.5750	-119.3685	17.92	3.89	–	–	< LOD	4.63	U	–
DU-128-023	170	2015-07-27 13:40	46.5750	-119.3675	25.63	5.18	–	–	< LOD	6.31	U	–
DU-128-024	171	2015-07-27 13:43	46.5750	-119.3665	12.48	3.36	–	–	7.87	2.86	–	–
DU-128-025	172	2015-07-27 13:45	46.5750	-119.3653	130.49	8.78	–	–	< LOD	9.90	U	–
DU-128-026	173	2015-07-27 13:49	46.5756	-119.3671	14.37	3.69	–	–	< LOD	4.47	U	–
DU-129-001	78	2015-09-16 10:59	46.5680	-119.3628	27.13	3.64	–	–	6.61	2.94	–	–
DU-129-002	77	2015-09-16 10:57	46.5680	-119.3618	39.08	3.85	–	–	5.75	3.02	–	–
DU-129-003	76	2015-09-16 10:54	46.5680	-119.3608	48.07	4.07	–	–	< LOD	4.73	U	–
DU-129-004	72	2015-09-16 10:44	46.5686	-119.3623	295.97	8.75	–	–	19.88	6.68	–	–
DU-129-005	73	2015-09-16 10:47	46.5686	-119.3614	311.51	9.58	–	–	27.23	7.38	–	–
DU-129-006	74	2015-09-16 10:49	46.5686	-119.3603	64.96	4.53	–	–	11.40	3.59	–	–
DU-129-007	71	2015-09-16 10:41	46.5692	-119.3628	195.83	8.73	–	–	12.37	6.68	–	–
DU-129-008	70	2015-09-16 10:39	46.5691	-119.3618	107.04	5.53	–	–	15.60	4.35	–	–
DU-129-009	69	2015-09-16 10:37	46.5692	-119.3608	102.86	5.83	–	–	< LOD	6.67	U	–
DU-129-010	61	2015-09-16 10:12	46.5699	-119.3683	36.13	3.90	–	–	4.87	3.06	–	–
DU-129-011	62	2015-09-16 10:15	46.5698	-119.3674	30.18	4.39	–	–	5.69	3.48	–	–
DU-129-012	63	2015-09-16 10:17	46.5698	-119.3664	19.54	3.39	–	–	< LOD	4.03	U	–
DU-129-013	64	2015-09-16 10:20	46.5698	-119.3654	25.09	3.48	–	–	7.93	2.84	–	–
DU-129-014	65	2015-09-16 10:24	46.5698	-119.3644	104.95	5.99	–	–	13.68	4.70	–	–
DU-129-015	66	2015-09-16 10:27	46.5698	-119.3634	42.58	4.07	–	–	< LOD	4.74	U	–
DU-129-016	67	2015-09-16 10:30	46.5697	-119.3623	12.99	3.10	–	–	4.73	2.53	–	–
DU-129-017	68	2015-09-16 10:33	46.5698	-119.3613	37.91	4.13	–	–	6.45	3.26	–	–
DU-129-018	60	2015-09-16 10:09	46.5705	-119.3678	14.75	4.82	–	–	6.29	4.04	–	–
DU-129-019	59	2015-09-16 10:06	46.5705	-119.3668	16.15	3.59	–	–	6.29	2.94	–	–
DU-129-020	51	2015-09-16 9:52	46.5704	-119.3658	17.45	3.28	–	–	< LOD	3.93	U	–
DU-129-021	50	2015-09-16 9:49	46.5705	-119.3648	22.11	3.98	–	–	< LOD	4.69	U	–
DU-129-022	49	2015-09-16 9:46	46.5704	-119.3638	161.83	7.29	–	–	21.94	5.73	–	–
DU-129-023	48	2015-09-16 9:43	46.5704	-119.3628	80.08	5.47	–	–	< LOD	6.24	U	–
DU-129-024	42	2015-09-16 9:27	46.5711	-119.3684	10.17	3.42	–	–	< LOD	4.23	U	–
DU-129-025	43	2015-09-16 9:30	46.5711	-119.3674	24.57	3.79	–	–	4.71	3.02	–	–
DU-129-026	44	2015-09-16 9:32	46.5711	-119.3664	14.61	4.26	–	–	< LOD	5.27	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-129-027	45	2015-09-16 9:35	46.5710	-119.3654	22.06	3.55	–	–	< LOD	4.19	U	–
DU-129-028	46	2015-09-16 9:37	46.5710	-119.3643	19.72	3.47	–	–	6.64	2.83	–	–
DU-129-029	47	2015-09-16 9:40	46.5710	-119.3633	11.33	2.69	–	–	< LOD	3.19	U	–
DU-129-030	41	2015-09-16 9:25	46.5716	-119.3689	11.12	3.09	–	–	5.29	2.55	–	–
DU-129-031	40	2015-09-16 9:22	46.5717	-119.3679	14.21	3.27	–	–	< LOD	3.86	U	–
DU-129-032	39	2015-09-16 9:19	46.5716	-119.3668	21.09	3.45	–	–	5.45	2.77	–	–
DU-129-033	38	2015-09-16 9:16	46.5716	-119.3658	10.91	3.32	–	–	6.61	2.77	–	–
DU-129-034	37	2015-09-16 9:13	46.5716	-119.3647	15.82	3.18	–	–	< LOD	3.81	U	–
DU-129-035	33	2015-09-16 9:01	46.5723	-119.3683	15.84	3.34	–	–	4.77	2.69	–	–
DU-129-036	34	2015-09-16 9:04	46.5723	-119.3673	15.62	3.27	–	–	< LOD	3.80	U	–
DU-129-037	35	2015-09-16 9:07	46.5723	-119.3664	15.25	4.65	–	–	< LOD	5.49	U	–
DU-129-038	36	2015-09-16 9:10	46.5723	-119.3654	13.85	3.29	–	–	4.74	2.70	–	–
DU-129-039	32	2015-09-16 8:58	46.5730	-119.3678	42.93	5.27	–	–	6.59	4.19	–	–
DU-129-040	30	2015-09-16 8:53	46.5729	-119.3668	18.43	3.70	–	–	5.57	3.00	–	–
DU-130-001	137	2015-09-16 13:26	46.5696	-119.3603	21.11	3.77	–	–	< LOD	4.48	U	–
DU-130-002	138	2015-09-16 13:28	46.5696	-119.3593	101.98	5.81	–	–	16.99	4.61	–	–
DU-130-003	136	2015-09-16 13:23	46.5702	-119.3608	8.13	2.67	–	–	< LOD	3.17	U	–
DU-130-004	135	2015-09-16 13:21	46.5701	-119.3599	11.94	3.06	–	–	6.31	2.55	–	–
DU-130-005	131	2015-09-16 13:12	46.5707	-119.3623	18.23	3.17	–	–	5.69	2.54	–	–
DU-130-006	132	2015-09-16 13:14	46.5707	-119.3613	12.52	3.13	–	–	< LOD	2.54	U	–
DU-130-007	133	2015-09-16 13:16	46.5707	-119.3603	10.22	2.87	–	–	< LOD	2.31	U	–
DU-130-008	134	2015-09-16 13:19	46.5707	-119.3593	13.61	3.56	–	–	4.82	2.90	–	–
DU-130-009	130	2015-09-16 13:09	46.5713	-119.3628	23.43	3.71	–	–	< LOD	4.29	U	–
DU-130-010	129	2015-09-16 13:07	46.5713	-119.3618	18.04	3.15	–	–	< LOD	3.74	U	–
DU-130-011	128	2015-09-16 13:05	46.5713	-119.3608	16.30	3.23	–	–	4.77	2.60	–	–
DU-130-012	127	2015-09-16 13:02	46.5713	-119.3598	58.71	4.59	–	–	7.30	3.59	–	–
DU-130-013	114	2015-09-16 12:37	46.5719	-119.3643	28.79	3.53	–	–	6.02	2.81	–	–
DU-130-014	115	2015-09-16 12:39	46.5718	-119.3633	153.38	6.64	–	–	< LOD	7.54	U	–
DU-130-015	123	2015-09-16 12:52	46.5719	-119.3622	26.48	4.02	–	–	< LOD	4.78	U	–
DU-130-016	124	2015-09-16 12:54	46.5719	-119.3613	60.84	4.96	–	–	11.93	3.97	–	–
DU-130-017	125	2015-09-16 12:57	46.5719	-119.3604	10.76	3.90	–	–	< LOD	4.84	U	–
DU-130-018	126	2015-09-16 12:59	46.5719	-119.3592	26.07	3.42	–	–	8.49	2.79	–	–
DU-130-019	113	2015-09-16 12:34	46.5724	-119.3639	32.12	4.12	–	–	7.94	3.33	–	–
DU-130-020	112	2015-09-16 12:32	46.5724	-119.3629	39.98	4.01	–	–	< LOD	4.66	U	–
DU-130-021	111	2015-09-16 12:30	46.5724	-119.3618	45.15	4.88	–	–	< LOD	5.74	U	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-130-022	110	2015-09-16 12:27	46.5724	-119.3610	23.29	4.10	–	–	< LOD	4.87	U	–
DU-130-023	109	2015-09-16 12:25	46.5724	-119.3599	154.79	6.59	–	–	22.50	5.19	–	–
DU-130-024	107	2015-09-16 12:19	46.5730	-119.3622	44.44	4.10	–	–	6.73	3.24	–	–
DU-130-025	108	2015-09-16 12:21	46.5730	-119.3613	13.86	4.68	–	–	< LOD	5.76	U	–
DU-130-026	104	2015-09-16 12:08	46.5737	-119.3617	11.86	2.77	–	–	< LOD	3.32	U	–
DU-130-027	103	2015-09-16 12:05	46.5737	-119.3608	17.34	3.54	–	–	7.08	2.91	–	–
DU-130-028	100	2015-09-16 11:56	46.5743	-119.3612	12.59	2.95	–	–	4.33	2.36	–	–
DU-130-029	101	2015-09-16 11:59	46.5743	-119.3602	15.26	3.04	–	–	< LOD	3.53	U	–
DU-130-030	102	2015-09-16 12:01	46.5742	-119.3592	14.96	3.06	–	–	< LOD	3.61	U	–
DU-130-031	98	2015-09-16 11:52	46.5749	-119.3616	10.23	2.95	–	–	< LOD	3.57	U	–
DU-130-032	97	2015-09-16 11:48	46.5748	-119.3606	14.27	2.96	–	–	< LOD	2.36	U	–
DU-130-033	96	2015-09-16 11:45	46.5749	-119.3597	17.72	3.05	–	–	5.98	2.47	–	–
DU-130-034	95	2015-09-16 11:42	46.5748	-119.3587	15.38	3.19	–	–	< LOD	3.78	U	–
DU-131-001	33	2015-10-09 10:18	46.5651	-119.3525	23.23	3.27	–	–	4.05	2.58	–	–
DU-131-002	35	2015-10-09 10:22	46.5651	-119.3514	24.69	3.51	–	–	6.70	2.83	–	–
DU-131-003	36	2015-10-09 10:24	46.5651	-119.3504	16.77	3.26	–	–	4.86	2.61	–	–
DU-131-004	39	2015-10-09 10:32	46.5657	-119.3519	18.76	3.19	–	–	5.67	2.57	–	–
DU-131-005	38	2015-10-09 10:29	46.5657	-119.3509	18.55	3.17	–	–	6.61	2.57	–	–
DU-131-006	37	2015-10-09 10:27	46.5657	-119.3499	15.92	3.08	–	–	6.33	2.50	–	–
DU-131-007	44	2015-10-09 10:47	46.5663	-119.3564	45.49	4.33	–	–	5.73	3.39	–	–
DU-131-008	43	2015-10-09 10:44	46.5663	-119.3555	45.29	4.08	–	–	< LOD	4.74	U	–
DU-131-009	42	2015-10-09 10:42	46.5663	-119.3544	40.65	3.90	–	–	< LOD	4.53	U	–
DU-131-010	41	2015-10-09 10:39	46.5664	-119.3534	26.29	4.03	–	–	15.08	3.44	–	–
DU-131-011	40	2015-10-09 10:37	46.5663	-119.3524	99.07	6.10	–	–	< LOD	6.88	U	–
DU-131-012	60	2015-10-09 11:28	46.5671	-119.3590	24.23	3.29	–	–	4.04	2.59	–	–
DU-131-013	45	2015-10-09 10:50	46.5669	-119.3560	63.55	4.66	–	–	< LOD	5.32	U	–
DU-131-014	46	2015-10-09 10:53	46.5669	-119.3549	149.37	6.39	–	–	16.83	4.97	–	–
DU-131-015	47	2015-10-09 10:55	46.5669	-119.3539	158.29	6.66	–	–	23.20	5.25	–	–
DU-131-016	48	2015-10-09 10:59	46.5669	-119.3529	23.90	3.43	–	–	< LOD	4.03	U	–
DU-131-017	59	2015-10-09 11:23	46.5676	-119.3565	230.91	8.00	–	–	12.62	6.08	–	–
DU-131-018	58	2015-10-09 11:20	46.5676	-119.3554	36.01	5.23	–	–	< LOD	6.30	U	–
DU-131-019	57	2015-10-09 11:18	46.5676	-119.3544	154.96	6.39	–	–	20.99	5.02	–	–
DU-131-020	61	2015-10-09 11:31	46.5683	-119.3589	33.39	3.75	–	–	< LOD	4.41	U	–
DU-131-021	62	2015-10-09 11:34	46.5682	-119.3579	260.39	8.22	–	–	15.54	6.26	–	–
DU-131-022	63	2015-10-09 11:36	46.5682	-119.3570	260.94	8.23	–	–	18.51	6.29	–	–

Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers
DU-131-023	64	2015-10-09 11:38	46.5682	-119.3560	21.97	3.44	–	–	< LOD	4.06	U	–
DU-131-024	68	2015-10-09 11:48	46.5688	-119.3585	20.40	3.74	–	–	5.30	3.02	–	–
DU-131-025	67	2015-10-09 11:46	46.5688	-119.3575	33.70	3.60	–	–	6.53	2.86	–	–
DU-131-026	66	2015-10-09 11:43	46.5688	-119.3565	22.19	3.53	–	–	5.52	2.83	–	–
DU-131-027	65	2015-10-09 11:41	46.5688	-119.3555	14.39	3.82	–	–	< LOD	4.58	U	–
DU-131-028	69	2015-10-09 11:51	46.5694	-119.3590	37.21	3.76	–	–	7.04	2.98	–	–
DU-131-029	70	2015-10-09 11:53	46.5694	-119.3579	28.18	3.64	–	–	< LOD	4.23	U	–
DU-131-030	71	2015-10-09 11:56	46.5694	-119.3568	271.16	8.63	–	–	21.01	6.62	–	–
DU-131-031	72	2015-10-09 12:01	46.5695	-119.3558	20.76	3.64	–	–	< LOD	4.22	U	–
DU-132-001	136	2015-08-26 13:34	46.5709	-119.3553	14.17	2.96	–	–	< LOD	2.35	U	–
DU-132-002	138	2015-08-26 13:37	46.5710	-119.3544	12.82	3.31	–	–	7.00	2.76	–	–
DU-132-003	141	2015-08-26 13:44	46.5715	-119.3557	280.71	8.74	–	–	33.97	6.83	–	–
DU-132-004	140	2015-08-26 13:42	46.5714	-119.3549	17.43	3.14	–	–	6.36	2.55	–	–
DU-132-005	139	2015-08-26 13:40	46.5714	-119.3541	13.60	3.04	–	–	4.11	2.44	–	–
DU-132-006	142	2015-08-26 13:49	46.5720	-119.3553	17.15	3.23	–	–	< LOD	3.74	U	–
DU-132-007	143	2015-08-26 13:52	46.5719	-119.3545	13.57	2.84	–	–	< LOD	3.32	U	–
DU-132-008	148	2015-08-26 14:09	46.5719	-119.3537	15.35	3.05	–	–	< LOD	3.60	U	–
DU-132-009	150	2015-08-26 14:15	46.5724	-119.3557	16.62	3.25	–	–	< LOD	3.79	U	–
DU-132-010	149	2015-08-26 14:13	46.5723	-119.3549	35.93	3.75	–	–	< LOD	4.36	U	–
DU-132-011	151	2015-08-26 14:19	46.5729	-119.3561	13.77	2.99	–	–	4.44	2.40	–	–
DU-132-012	152	2015-08-26 14:24	46.5729	-119.3553	14.92	4.00	–	–	< LOD	4.90	U	–
DU-132-013	153	2015-08-26 14:28	46.5735	-119.3566	15.94	3.22	–	–	< LOD	3.72	U	–
DU-133-001	123	2015-08-18 12:01	46.5701	-119.3776	10.62	2.83	–	–	< LOD	3.39	U	–
DU-133-002	125	2015-08-18 12:05	46.5701	-119.3767	13.43	3.26	–	–	4.55	2.62	–	–
DU-133-003	126	2015-08-18 12:08	46.5701	-119.3757	10.68	3.66	–	–	4.82	3.03	–	–
DU-133-004	127	2015-08-18 12:10	46.5701	-119.3747	13.27	3.47	–	–	< LOD	4.15	U	–
DU-133-005	128	2015-08-18 12:13	46.5701	-119.3737	41.02	3.98	–	–	7.01	3.15	–	–
DU-133-006	129	2015-08-18 12:15	46.5701	-119.3727	50.29	4.75	–	–	< LOD	5.48	U	–
DU-133-007	135	2015-08-18 12:31	46.5707	-119.3772	37.89	4.31	–	–	7.01	3.43	–	–
DU-133-008	133	2015-08-18 12:25	46.5707	-119.3761	12.16	3.36	–	–	4.77	2.74	–	–
DU-133-009	131	2015-08-18 12:20	46.5707	-119.3751	12.10	2.98	–	–	4.43	2.40	–	–
DU-133-010	130	2015-08-18 12:18	46.5707	-119.3742	15.87	3.31	–	–	< LOD	3.92	U	–
DU-133-011	136	2015-08-18 12:34	46.5713	-119.3777	23.25	4.15	–	–	< LOD	4.96	U	–
DU-133-012	134	2015-08-18 12:29	46.5713	-119.3766	40.79	4.14	–	–	7.95	3.30	–	–
DU-133-013	132	2015-08-18 12:23	46.5713	-119.3757	51.90	4.43	–	–	< LOD	5.10	U	–

37

Appendix C

Quality Assurance for the Remedial Investigation

This page intentionally left blank.

Appendix C

Quality Assurance for the Remedial Investigation

C.1 Introduction

This appendix provides an overview of the data quality evaluation activities in support of the 100-OL-1 Operable Unit (OU) Remedial Investigation (RI).

The principal data quality indicators are precision, accuracy, representativeness, comparability, completeness, and sensitivity, and are discussed in more detail in Table A.4 of the Sampling and Analysis Plan (SAP) (Appendix A) of the *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands* (DOE-RL-2012-64). To ensure reliable data were obtained while using the x-ray fluorescence (XRF) analyzer, field quality control (QC) sampling included a daily instrument check for precision using a site-specific reference material as well as performing duplicate analyses. To monitor for accuracy, instrument blanks and sample reference material (SRM) were collected. The QC sample data were evaluated against the requirements and guidelines provided in DOE-RL-2012-64.

Confirmatory soil samples from locations across the OU were also collected and analyzed with inductively coupled plasma mass spectroscopy (ICP-MS) to meet the quality assurance (QA) criteria established by the U.S. Environmental Protection Agency (EPA) for XRF analysis of soil (EPA 2007).

All data from the files downloaded from the XRF analyzer were used in computations and values reported in three significant figures within error of rounding, unless otherwise observed. For example, "1685.99" has six significant figures; for reporting purposes, the value was reported with three significant figures, or, "1690".

C.2 Scope

DOE/RL-2012-64 requires 100% review of the data. A total of 133 decision units (DUs) and 43 additional (step-out) DUs were characterized for lead and arsenic using the XRF analyzer. The XRF sample data reside in the Deep Vadose Zone Applied Field Research Initiative (DVZ-AFRI) QA-accepted orchards database CORE™ (ver. CoreKernel_orchards2015_ 1.3.0.0)(Adelmund et al. 2014). The 4471 DU field sample locations and 8942 related lead and arsenic measurement concentrations, in addition to 4582 associated QC samples and related lead and arsenic measurement concentrations, were extracted from CORE™ and reviewed for completeness, precision and accuracy.

The purpose of this evaluation is to ensure that the associated QA/QC activities were implemented as prescribed in the *DVZ-AFRI Quality Assurance Plan*[1]. This evaluation is based solely on the QC information associated with the data, not technical interpretation of the data values.

C.2.1 Data Verification

The data verification process included evaluating all collected data for completeness, correctness, and conformance/compliance against the method, procedural, or contractual requirements.

[1] *Deep Vadose Zone-Applied Field Research Initiative Quality Assurance Plan.* QA-DVZ-AFRI-001, Revision 1. 2014. Pacific Northwest National Laboratory, Richland Washington.

C.2.2 Data Validation

The data validation process included evaluation of supporting documentation, whether data met precision and accuracy requirements of an analytical method and whether the data quality goals established during the planning phase were achieved, and effects of quality deficiencies on the analytical sample data. Any outliers or questionable data identified during review and validation had data qualifiers applied (see Table C-3).

C.2.3 XRF Analyzer and Analytical Methods

The Niton XL3t XRF analyzer reports concentrations in parts per million, which is equivalent to milligrams per kilogram (mg/kg), and reports the precision of the measurement, which is two times the standard deviation (2σ). Note: The instrument will report a measured concentration as "<LOD" (less than the level of detection) if the measurement for lead or arsenic was less than 1.5 times the precision of that measurement, and the 2σ value for the "<LOD" measured concentration, which is the 95% confidence interval for the measured concentration (Niton 2015). The lower limit of detection is discussed in Section C.3.2.5.

The analytical methods are controlled in accordance with the requirements of the *Quality Assurance Project Plan* (DOE/RL-2012-64) and the *Marine Sciences Laboratory Quality Assurance Management Plan* (PNNL 2014).[1] EPA Method 6200 (EPA 2007) is the basis for the XRF analyses. Samples analyzed for lead and arsenic using ICP-MS followed EPA Method 3050B (EPA 1996a) for soil digestion and EPA Methods 1638 and 200.8 (EPA 1996b and 1994) for the analyses.

C.3 Quality Control Parameters Discussion

The QC parameters evaluated included the following:

- Operating procedure(s) and statement of work (SOW) compliance
- QC for XRF analyses
- Confirmatory analyses

Each QC parameter was assessed against the lead and arsenic XRF and ICP-MS data quality performance criteria in Table C-1.

---

[1] *Marine Science Laboratory Quality Assurance Management Plan*, Revision: January 2014. Pacific Northwest National Laboratory, Richland Washington.

Table C-1. Quality Performance Requirements for XRF and ICP-MS Soil Analyses

XRF

Analyte	SSRM/ Duplicate Relative Precision	Blank Accuracy	SRM Accuracy	Achieved Method Detection Limits (mg/kg)	Reporting Limit (mg/kg)
Lead	≤20% RSD/RPD[a]	2 of 3 non-detect and 1 of 3 at < 2x MDL	≤20% PD ±20% certified range	5.68[b]	18.06[c]
Arsenic	≤20% RSD/RPD[a]	2 of 3 non-detect and 1 of 3 at < 2x MDL	≤20% PD ±20% certified range	3.98[b]	12.66[c]

ICP-MS

Analyte	Duplicate Relative Precision	Blank Accuracy	SRM / LCS Accuracy	MS/MSD Range of Recovery (Accuracy)	Achieved Method Detection Limits (mg/kg)	Reporting Limit (mg/kg)
Lead	≤25% RPD[d]	Non-detect or < MDL	≤20% PD ±20% certified range	75-125%	0.006[e]	0.02[c]
Arsenic	≤25% RPD[d]	Non-detect or < MDL	≤20% PD ±20% certified range	75-125%	0.3[e]	1[c]

(a) EPA Method 6200 for XRF (EPA 2007).
(b) MDL for XRF, verified annually (EPA 2007), last updated November 13, 2015.
(c) Reporting limit for XRF and ICP-MS defined as 3.18* MDL.
(d) ICP-MS data quality objective.
(e) ICP-MS sediment/soil MDL, annually verified.
LCS is laboratory control sample; MDL is method detection limit; MS is matrix spike; MSD is matrix spike duplicate; PD is percent difference; RSD is relative standard deviation; RPD is relative percent difference; SSRM is site-specific reference material.

The following sections provide a general discussion of the data quality parameters reviewed.

C.3.1 Operating Procedure(s) and SOW Compliance

XRF field sampling activities, data entry, and QA were performed in accordance with the DVZ-AFRI QA program.[1] Analytical services provided by Marine Sciences Laboratory, Sequim, WA, for confirmatory analyses were completed under SOW GD-DVZ-AFRI-003, Rev. 0.[2]

Overall, there were two minor deficiencies associated to procedures. The deficiencies were documented, and the associated data was qualified/commented accordingly.

Non-conformance reports associated to the XRF's internal global positioning system inability to receive satellite signals were documented and associated data was qualified/commented accordingly.

1 *Deep Vadose Zone-Applied Field Research Initiative Quality Assurance Plan.* QA-DVZ-AFRI-001, Revision 1. 2014. Pacific Northwest National Laboratory, Richland Washington.

2 *Marine Science Laboratory Statement of Work*, GD-DVZ-AFRI-003, Rev. 0. 2015. Pacific Northwest National Laboratory, Richland Washington.

C.3.2 Quality Control for XRF Analyses

The standards needed for calibration and instrument QC procedures included SSRM, blank samples, SRM, and duplicate samples.

C.3.2.1 SSRM Results

Site-specific calibration standards were prepared from soil collected during the pilot study, homogenized, and then analyzed by ICP-MS (Bunn et al. 2014). The material confirmed the performance of the XRF analyzer in the field and in the laboratory. The precision check consisted of seven replicate measurements, each of low, medium, and high SSRM soil samples. Per EPA Method 6200, the XRF data is adequately precise if the RSD is less than 20% (EPA 2007). All measured values for the SSRM passed the 20% RSD acceptance criteria.

C.3.2.2 Blank Results

The instrument blank consisted of quartz sand packed into a plastic sample cup covered with a thin polypropylene film, and was used to verify that no contamination existed in the spectrometer or on the probe window.

The procedural deviations associated with blank readings are a minor deficiency. The deficiencies were documented, and the associated data was qualified/commented accordingly. All other measured blank readings passed acceptance criteria with no more than one out of two or three concentration readings being detected above the MDL.

C.3.2.3 SRM Results

The National Research Council Canada "PACS-3" marine sediment certified reference material for trace metals (Lot G 4169010) included certified quantity values for lead (188 ± 7.4 mg/kg) and arsenic (30.3 ± 2.4 mg/kg) and were analyzed in triplicate and used to verify the accuracy and performance of the XRF analyzer.

The procedural deviations associated with SRM readings are a minor deficiency. The deficiency was documented and the data was qualified/commented accordingly. All measured values for the SRM passed acceptance criteria reporting values within 20% of the certified range for the calibration verification check (+20% of the high end of the SRM certified range and -20% of the low end of the certified range).

C.3.2.4 Duplicate Results

Duplicate samples were collected by performing a second XRF reading at a field sample location. If both the sample and its field duplicate were ≥ 20% RPD (with <LOD values substituted with MDL), but concentrations were less than RL, no qualification was required. When the RPD failed the criteria (the samples were ≤20% RPD) and the absolute difference was greater than the RL, the associated data received a "Q" review qualifier; in turn, the associated data received a "J" validation qualifier to indicate the result precision/accuracy may have been impacted due to a minor quality control deficiency.

There were 422 field sample measurements and associated duplicates (referred to as sample pairs) evaluated, of which 32 sample pairs were associated to step-out activities. One sample pair analyzed for lead failed RPD and absolute difference acceptance criteria; associated data received a "J" validation qualifier. Three sample pairs analyzed for arsenic failed RPD and absolute difference acceptance criteria; associated data received a "J" validation qualifier. The remaining sample pairs did not fail both criteria;

therefore, there is no apparent QC issue. The procedural deviations associated with duplicate readings are a minor deficiency. The deficiency was documented, and the associated data were qualified/commented accordingly.

C.3.2.5 Detection Limits

The MDL for the XRF analyzer was determined using site-specific reference material in accordance with 40 CFR 136, Appendix B. The XRF MDL is determined annually, and as of November 2015, the values were 5.68 mg/kg for lead and 3.98 mg/kg for arsenic. Thermo Scientific provided a certificate of analysis with the Niton XL3t 900 analyzer, and the site-specific MDL is within the limits of quantification for the instrument (DOE-RL-2012-64). When performing computations, the MDL was used to replace "<LOD" readings recorded by the XRF. For the Remedial Investigation, the MDL was 5.68 mg/kg lead and 3.98 mg/kg arsenic (Section 4.3.1 and Appendix C). The reporting limit is defined as 3.18 times the MDL (DOE/RL-2012-64).

C.3.3 Confirmatory Analyses

In order to confirm the XRF analyzer performed according to QC guidance (EPA 2007), XRF results were compared to another analytical technique (ICP-MS) for confirmation. Confirmatory analyses using the ICP-MS method for lead and arsenic were performed on 30 collected soil samples from seven DUs; however, two of the sample points were excluded since the XRF readings for arsenic were less than the detectable limits.

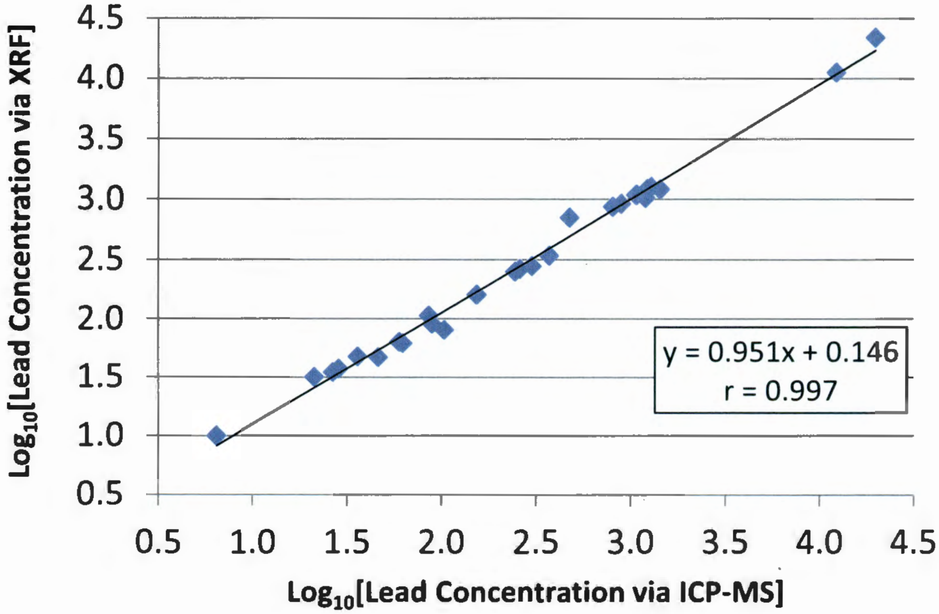
Table C-2 contains the XRF readings and the ICP-MS confirmatory analyses. Samples analyzed for lead and arsenic using ICP-MS followed EPA Method 3050B (EPA 1996a) for soil digestion and EPA Methods 1638 and 200.8 (EPA 1996b and 1994) for the analyses.

Table C-2. Confirmatory Soil Sample Results (units in mg/kg)

	ICP-MS		XRF		
Sample ID	**ICP-MS Lead Result**	**ICP-MS Arsenic Result**	**XRF Reading Number**	**XRF Lead Result**	**XRF Arsenic Result**
Sample 1A, DU-20, 6/4/15	26.70	7.33	37	35.16	5.63
Sample 1B, DU-20, 6/4/15	28.68	7.99	38	37.61	6.54
Sample 2A, DU-20, 6/4/15	154.46	16.65	39	160.55	16.97
Sample 2B, DU-20, 6/4/15	153.80	20.46	40	160.94	19.4
Sample 3A-1, DU-20, 6/4/15	1,068.89	179.84	54	1,094.39	192.72
Sample 3A-2, DU-20, 6/4/15	1,077.12	175.34	53	1,091.06	184.74
Sample 3B, DU-20, 6/4/15	894.56	130.52	56	918.49	135.42
Sample 4A, DU-20, 6/4/15	1,228.28	169.76	46	1,220.74	182.28
Sample 4B, DU-20, 6/4/15	1,438.81	221.96	45	1,212.48	206.54
Sample 5A,-1 DU-95, 6/4/15	85.98	23.65	41	106.93	25.95
Sample 5A-2, DU-95, 6/4/15	89.29	24.08	42	90.92	20.14
Sample 5B, DU-95, 6/4/15	103.63	27.90	43	80.54	18.81
Sample 6A, DU-95, 6/4/15	260.31	52.60	55	265.69	58.58
Sample 6B, DU-95, 6/4/15	245.85	41.93	67	251.58	52.2
Sample 7A, DU-95, 6/4/15	1,201.12	230.27	79	1,033.88	191.93
Sample 7B, DU-95, 6/4/15	1,288.46	231.37	78	1,270.43	280.23
Sample 8A, DU-95, 6/4/15	19,735.59	5,114.91	81	21,844.57	8,744.72
Sample 8B, DU-95, 6/4/15	12,283.29	3,113.86	80	11,185.52	3,465.79
DU-8, 7/28/15 [(a)]	--	--	--	--	--
DU-122, 7/28/15 [(a)]	--	--	--	--	--
DU-123-1, 7/28/15	62.61	7.88	47	61.93	10.34
DU-123-2-1, 7/28/15	60.00	17.05	68	63.37	14.01
DU-123-2-2 7/28/15	36.07	12.19	69	47.6	13.04
DU-123-2-3, 7/28/15	46.42	14.24	70	47.06	14.26
DU-127-S, 7/28/15	21.30	6.44	48	31.87	5.8
DU-127-N, 7/28/15	6.42	5.83	49	10.01	6.26
DU-72-1, 7/28/15	476.16	117.27	74	710.35	212.68
DU-72-2, 7/28/15	807.87	116.87	75	868.78	154.75
DU-72-3, 7/28/15	373.00	85.51	76	342.04	84.07
DU-72-4, 7/28/15	300.94	65.85	77	279.6	59.05

(a) Arsenic XRF readings less than detectable limit; therefore, excluded XRF and ICP-MS values.

The lead and arsenic split sample analyses indicate no difference observed in the correlation between the XRF and ICP-MS. The log-transformed data shown in Figure C-1 show the correlation coefficient measured by the XRF and ICP-MS is greater than 0.9; according to EPA Method 6200, the XRF data "could potentially meet definitive level data criteria" (EPA 2007).



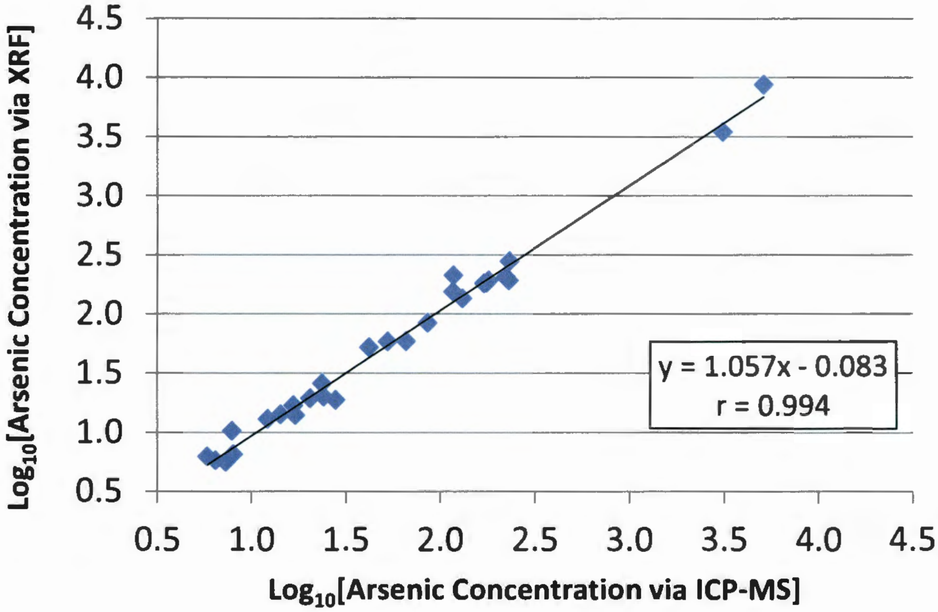


Figure C-1. Log-transformed Data for Confirmatory Soil Samples Analyzed for Lead (top) and Arsenic (bottom) by XRF and ICP-MS.

C.4 Data Qualifiers

Any outliers or questionable data identified during the review and/or validation process had data qualifiers applied; Table C-3 describes the reviewer and validation qualifiers. Review qualifiers were applied to the data collected within the 100-OL-1 OU. The lead and arsenic concentrations recorded as < LOD received a review qualifier flag of "U". A validation qualifier was applied only if conditions affected the quality of the data reported; therefore, concentrations flagged with a review qualifier and passing acceptance criteria may not require a validation qualifier.[1] In most cases, a review qualifier of "F", "P", "Q", and "Z" are considered a minor deficiency. If the deficiency was major, then the review qualifier resulted in the validator assigning an "R" validation qualifier, and the corresponding concentrations were removed from the database value fields. Concentrations flagged with a "J" or "UJ" validation qualifier are considered estimated but useable. The "F" review qualifier and the "-" and "+" validation qualifiers were not assigned to the RI data.

Table C-3. 100-OL-1 Decision Unit Data Review and Validation Qualifier Descriptions

Review Qualifiers	
F	The result is undergoing further review.
P	Potential problem. Collection/analysis circumstances makes values questionable.
Q	Associated quality control sample is out of limits.
U	Analyzed for but not detected above XRF instrument detection limit. Instrument reports "<LOD". Replace "<LOD" with MDL.
Z	Miscellaneous circumstances exist. Additional information may be found in the database comment field.
Validation Qualifiers	
-	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a QC deficiency identified during data validation. The data should be considered usable for decision-making purposes.
+	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a QC deficiency identified during data validation. The data should be considered usable for decision-making purposes.
J	Estimated value: The associated result value may not reflect quantitation/detection levels (if assigned with an associated "U" qualifier) or actual concentrations with the precision/accuracy typically associated with results by this methodology. Result precision/accuracy may have been affected due to minor QC deficiency/s or sample matrix interferences identified during data validation.
R	Rejected value: The value may not reflect true concentrations. The ability to establish detection/non-detection may be questionable. Validation activities identified major QC deficiency/s or sample matrix interferences. The data should be considered unusable for most purposes. Any use of this data should be undertaken with great care. The data should not be used for certain regulatory decision-making purposes.
U	Functional non-detect: The constituent was analyzed for and reported by the XRF as "<LOD". The constituent has been assigned a non-detect qualifier and the value has been replaced with the MDL. Note: This qualifier may be assigned along with either, but never both, of the other validation qualifiers. In that case, both definitions apply to the associated result. The data should be considered usable as a non-detect for most decision-making purposes.

On the occasion when data collected resulted in a deficiency report, nonconformance report, and/or technical observation report, the report was captured in the comment field of CORE™; however, data qualifiers were only applied when conditions affected the quality of the data reported. In most cases, the deficiency/nonconformance reports and technical observation reports issued were considered minor,

[1] Pacific Northwest National Laboratory (PNNL), DVZ AFRI Project Test Instruction, *Data Entry and Quality Assurance Plan for the Remedial Investigation of the 100-OL-1 Operable Unit Pre-Hanford Orchards Lands,* TI-DVZ-AFRI-002, 2015

unless it resulted in the validator assigning an "R" validation qualifier, with corresponding concentrations removed from the database value fields. Concentrations flagged with a "J" or "UJ" validation qualifier are considered estimated but useable. Due to the large volume of data that was reviewed/validated, it is not possible to discuss in detail each of the qualifiers that were applied to the individual results. Deficiency reports, nonconformance reports, and technical observation reports issued as a result of 100-OL-1 sample data are summarized in Table C-4 and maintained in the project files.

Table C-4. Summary of Deficiency Reports, Nonconformance Reports, and Technical Observation Reports

Report Number	Title	Brief Description
DR-DVZ-AFRI-007, Rev. 0	*Sample Collection and Analysis without Test Instruction*	Sample collection started in June 2015 in accordance to the work plan, test instruction not signed until July 2015.
DR-DVZ-AFRI-011, Rev. 0	*Deviation from Procedure During Sample Collection*	Sample frequency exceeded and QC measures not performed.
DR-DVZ-AFRI-012, Rev. 0	*Deviation from Procedure During Step-Out Sample Collection*	End blank readings sampled two instead of three times.
DR-DVZ-AFRI-013, Rev. 0	*Precision Test Deviation from Procedure During Step-Out Sample Collection*	SRM reading less than 60 seconds.
NCR-DVZ-AFRI-001_Rev. 0	*100-OL-1 Operable Unit XRF Analyzer Issues with Duplicate Readings*	DU-086 anomalous reading; DU-080-015 reading overwritten by XRF, replacing with duplicate.
NCR-DVZ-AFRI-002_Rev. 0	*100-OL-1 Operable Unit XRF Analyzer Issues with Latitude and Longitude*	Differences between the XRF download file and predetermined coordinates.
NCR-DVZ-AFRI-003_Rev. 1	*100-OL-1 Operable Unit Step-Out XRF Analyzer Issues with Latitude and Longitude Coordinates*	XRF recorded coordinate anomalies and marked waypoints.
TOR 174	*DU-080 09/03/2015 Missing Valid XRF Reading #*	DU-080-015 reading overwritten by XRF, replacing with duplicate.
TOR 183	*Decision Unit Sample Locations with Reading Time Less than 60 Seconds*	XRF readings less than the 60 seconds for DU-36-21 (8/10/2015), DU-68-20 (7/6/2016), DU-93-9 (8/3/2015), DU-97-24 (8/5/2015), and DU-100-31 (9/1/2015); locations were resampled 10/16/2015.
TOR 184	*DU-113-13 and DU-113-20 discrepancy with coordinates between field data sheet and XRF download*	Clarify DU-113 XRF downloaded coordinates versus coordinates hand-written on the field data sheet.
TOR 185	*DU-114 XRF #113 blank count < 60 seconds, data point unusable*	Blank reading less than the 60 seconds (DU-114 XRF #113); blank reading was only 58.44 seconds; results qualified as unusable "R".
TOR 186	*DU-025 XRF download file concentration(s) differ from field data sheet*	Differences between DU-025 XRF download file and concentrations written on the field data sheet.
TOR 187	*DU-017, -023, -063, -073, -106, -117, -126 had points collected outside of DU, resampled 5/11/16*	Sample locations originally collected outside of the DU being sampled; resampled 05/11/16.
TOR 188	*DU-080 collection points missing in southern portion of DU*	Southern portion of DU-080 data points not collected 09/03/2015; missing points sampled 05/11/2016.

Report Number	Title	Brief Description
TOR 189	*DU-095 Procedural Deviation due to Soil Sampling and High Pb Concentration*	On 09/09/2015 soil collection occurred during DU-095 characterization. Field crew performed additional QC sampling, deviating from procedure, to ensure no cross-contamination existed.
TOR 190	*DU-035-25 XRF download file concentration(s) differ from field data sheet*	Clarify DU-035-21 XRF downloaded concentration values versus values hand-written on the field data sheet.
TOR 191	*DU-24 -03 Reading Time Less than 60 Seconds*	XRF reading less than the 60 seconds for DU-024-003 (10/12/2015); location resampled 05/11/2016.
TOR 192	*DU-098 Invalid 3rd Blank Reading, resampled 5/11/16*	The final blank check for DU-098 (08/05/2015) only had two valid readings (XRF #182 and 183), both were non-detects. The second half of the DU-098 (locations 13, 14, and 18-28) was resampled 05/11/2016.
TOR 193	*DU-084S-3 Issue with sample location*	DU-084S-003 (05/24/16) collected inside DU-084 instead of outside the OU; resampled 06/30/2016.
TOR 194	*DU-09S and DU-079S Discontinued Step-Out Activities*	Due to safety concerns related to obstructions in the terrain, step-out activities for DU-079S (southwest corner) and DU-009S (northwest edge along river) were discontinued.
TOR 195	*Additional Step-Out Needed*	Additional step-out sampling for DU-021S, DU-026S, DU-080S, DU-081S, DU-086S, DU-093S, DU-130S, and DU-131S occurred on a different day(s) than the original step-out sampling date.
TOR 196	*DU-020S, DU-021S, and DU-114S Discontinued Step-Out Sampling*	Due to obstructions in terrain, step-out activities for DU-020S, DU-021S, and DU-114S were discontinued.

The XRF analyzer collected 8942 individual DU and step-out lead and arsenic sample concentrations (not including QC samples and confirmatory analyses). Table C-5 lists by qualifier type the percentage of XRF sample data that were qualified.

Table C-5. Percentage of Sample Results Qualified for 100-OL-1 Operable Unit[a]

Qualifier Type[b]	Lead		Arsenic	
Review Qualifier	Q	1%	Q	1%
	U	< 1%	U	52%
	Z	5%	Z	2%
	--	--	UZ	3%
	--	--	UQ	<1%
Validation Qualifier	J	<1%	J	<1%
	R	<1%	R	<1%
	--	--	UJ	<1%

(a) Includes step-out activities; excludes QC results and XRF/ICP-MS confirmatory analyses.
(b) Qualifiers are defined in Table C-3.

C.5 Data Usability

All verification sampling data have undergone validation and data quality assessment to determine that data meet data quality goals established in DOE/RL-2012-64. The field XRF sample data that were not qualified as rejected are considered useable for their intended purpose.

C.6 References

40 CFR 136, Appendix B, *Definition and Procedure for the Determination of the Method Detection Limit*. U.S. Code of Federal Regulations.

Adelrnund MN, BH Browne, GM Gelston, BW Gerber, HM Orr, AW Piatt, AJ Pospical, KS Rohlfing, JE Smith, and DG Tixier. 2014. *Common Operating and Response Environment (CORE™) Technology Architecture: Software Quality Assurance Plan*. Revision 3, Pacific Northwest National Laboratory, Richland, Washington.

Bunn AL, BG Fritz, BA Pulsipher, AM Gorton, LE Bisping, JM Brandenberger, C Pino, DM Martinez, K Rana, and DM Wellman. 2014. *100-OL-1 Operable Unit Pilot Study: XRF Evaluation of Select Pre-Hanford Orchards*. PNNL-23868, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23868.pdf

DOE/RL-2012-64. 2012. *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands*. Revision 0, U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076311H

EPA. 1994. *Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry*. EPA Method 200.8, Revision 5.4, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-08/documents/method_200-8_rev_5-4_1994.pdf

EPA. 1996a. *Acid Digestion of Sediments, Sludges, and Soils*. EPA Method 3050B, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-06/documents/epa-3050b.pdf

EPA. 1996b. *Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma — Mass Spectrometry*. EPA Method 1638, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-10/documents/method_1638_1996.pdf

EPA. 2007. *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*. EPA Method 6200, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/sites/production/files/2015-12/documents/6200.pdf

Niton. 2015. *Niton XL3t 900 Analyzer with GOLDD Technology: User Guide*. Version 6.5, Thermo Scientific, Tewksbury, Massachusetts.

Appendix D

Step-Out Sampling Results of Field Characterization Outside of the 100-OL-1 Operable Unit

This page intentionally left blank.

Appendix D

Step-Out Sampling Results of Field Characterization Outside of the 100-OL-1 Operable Unit

As discussed in Section 2.2.2, additional field samples were collected outside the 100-OL-1 Operable Unit (OU) when the concentration at the boundary of the OU was equal to or greater than 150 mg/kg lead or 15 mg/kg arsenic (DOE/RL-2012-64). Prior to sampling, regions outside the OU were evaluated for ecological and cultural resources and received Mission Support Alliance clearance, similar to work performed inside the OU. The design for additional sampling beyond the OU boundary was to provide sufficient information for the Tri-Party agencies to evaluate the nature and extent of lead arsenate pesticide residues in the soil. A random-start, systematic-grid-sampling design was created along the border of the OU where there were elevated concentrations of lead and/or arsenic at the edge of the decision unit (DU). The design identified sampling locations equidistant to the locations within the nearest DU. In some cases, e.g., DU-020 and DU-114, the distance between sampling locations was closer because of the terrain or the proximity of the river.

The field characterization team reviewed the results of the X-ray fluorescence (XRF) measurements at the pre-selected locations to determine whether to continue sampling outside the OU. The criteria for continuing to sample was if the previous location was greater than or equal to 51 mg/kg lead and/or 15 mg/kg arsenic (DOE/RL-2012-64). If the concentration was less than the criteria, then the field characterization team did not continue sampling at the pre-selected locations. In one case, at DU-093, sampling of pre-selected locations did continue because the field characterization team noticed the presence of tree stumps.

This appendix includes the step-out and field characterization results for 46 of the 133 DUs in the 100-OL-1 OU (Figure D-1). Similar to Appendix A, the figures in this appendix convey the field characterization results within the DU as well as outside the OU and an interpretation of the sample results to human health screening levels. The human health screening levels are the MTCA Method A levels for unrestricted use of the soil (WAC 173-340-740(2)): 250 mg/kg lead and 20 mg/kg arsenic (Section 6.1.2). The Washington State Area-Wide Soil Contamination Task Force's screening levels for properties where exposure of children is infrequent (AWSCTF 2003) are: 700 mg/kg lead and 200 mg/kg arsenic. All units for measured concentrations are in mg/kg, unless otherwise noted. Figure D-2 is the legend for the field characterization results. The legend applies to all the figures of field characterization results within each DU (yellow concentrations) as well as step-out sampling (white concentrations). The centroid for each pie chart is geographically located over the sample location for the XRF analysis of the surface soil. Figure D-3 provides the criteria for step-out sampling (as discussed above) and an example of the decision process by the field characterization team for continuing sampling based on field results. Figure D-4 provides the logic for evaluating potential boundary modifications.

Figure D-5 through Figure D-68 display the results for the 46 DUs with step-out sampling. In some figures, the sample locations appear to be very close to one another due to the perspective of the figure, and in these cases, there is a box around the locations and a close up of those sample locations to assist the reader (e.g., Figure D-5, DU-009). Some step-out sample locations appear to be inside of the OU boundary, but these locations are outside of the OU boundary (e.g., Figure D-30, DU-064). The GPS for the Niton XL3t XRF analyzer has a resolution of ±9 m (30 ft).

The tables in this appendix provide more specific information about the results of step-out sampling and the summary statistics for further consideration. Results from each step-out sampling location are included in Table D-2, and column descriptions are in Table D-1. Summary statistics for all of the step-out sampling by DU is included in Table D-3. The "<LOD" (less than the level of detection) value recorded by the XRF was replaced by the method detection limit (MDL) (DOE/RL-2012-64), which was 5.68 mg/kg lead and 3.98 mg/kg arsenic for the Remedial Investigation activities (Section 4.3.1 and Appendix C). There were several instances where the 95% upper confidence limit (UCL) for the adjusted combined results was greater than the 95% UCL for the original DU results, including DU-090 for lead, DU-093 and DU-095 for arsenic, and DU-022 and DU-114 for lead and arsenic.

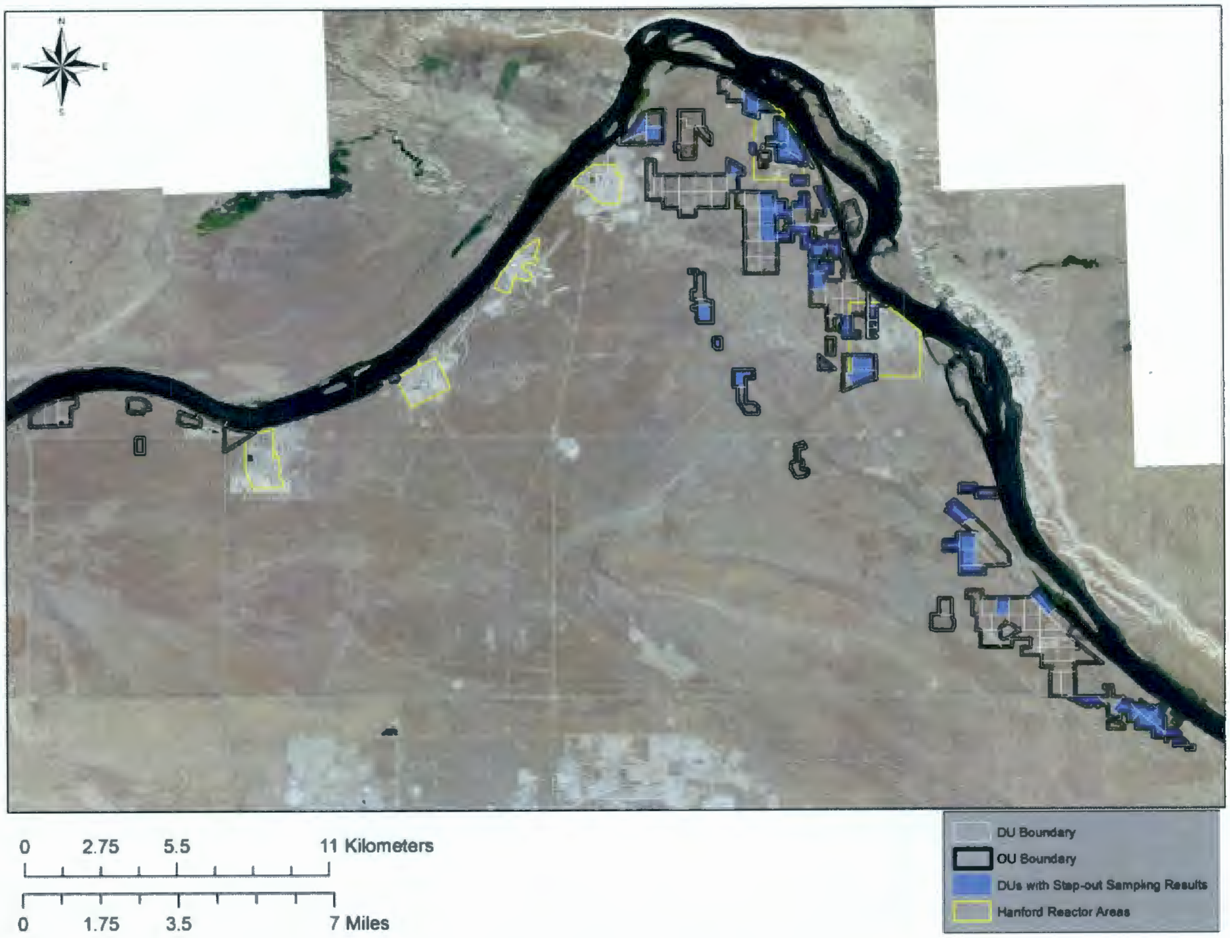


Figure D-1. Map of 100-OL-1 OU and DUs with Step-Out Sampling (highlighted in blue).

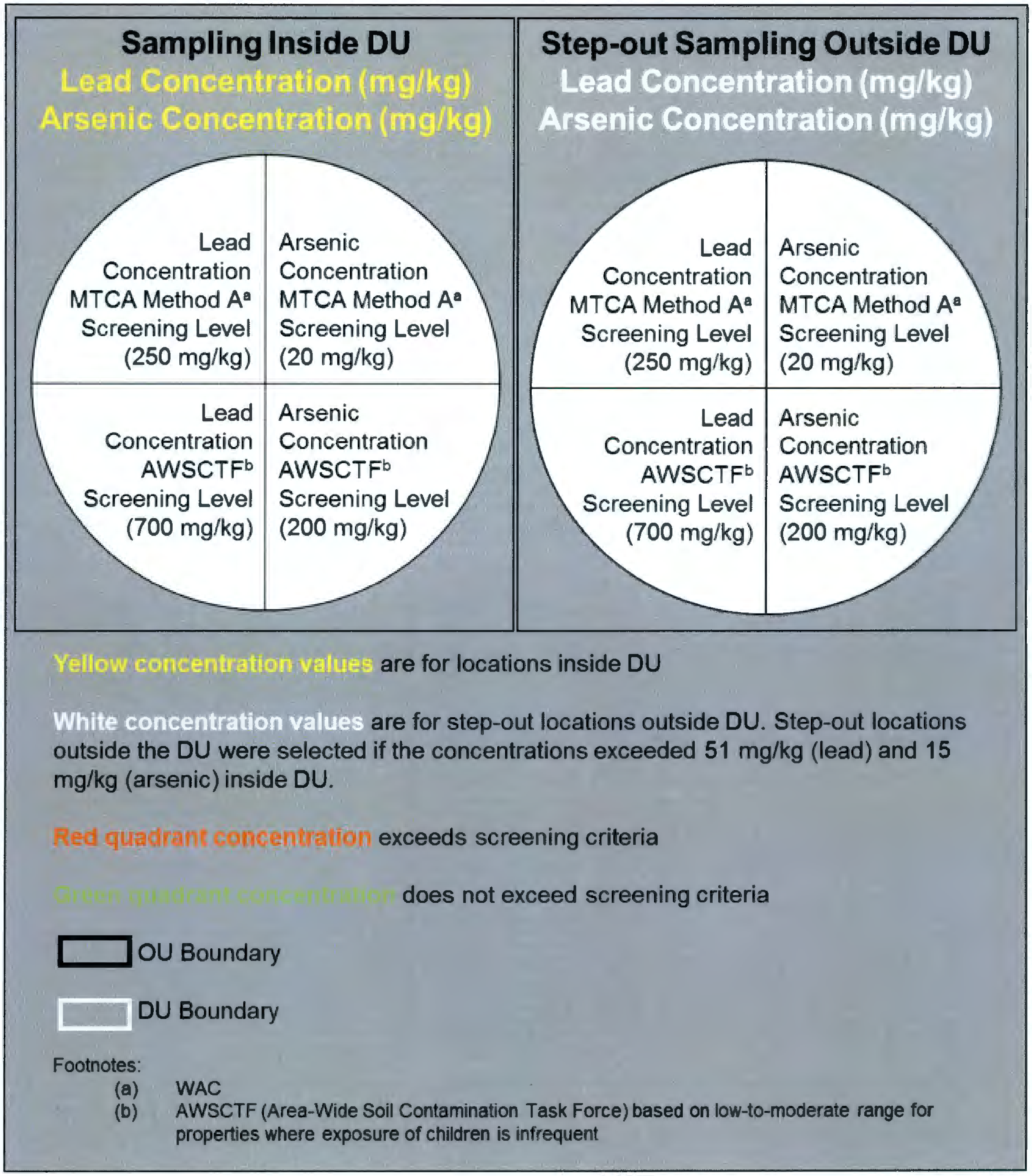


Figure D-2. Legend for the Figures in Appendix D, Showing the Sample Concentrations for inside the DU and Step-Out Sample Concentrations outside the OU.

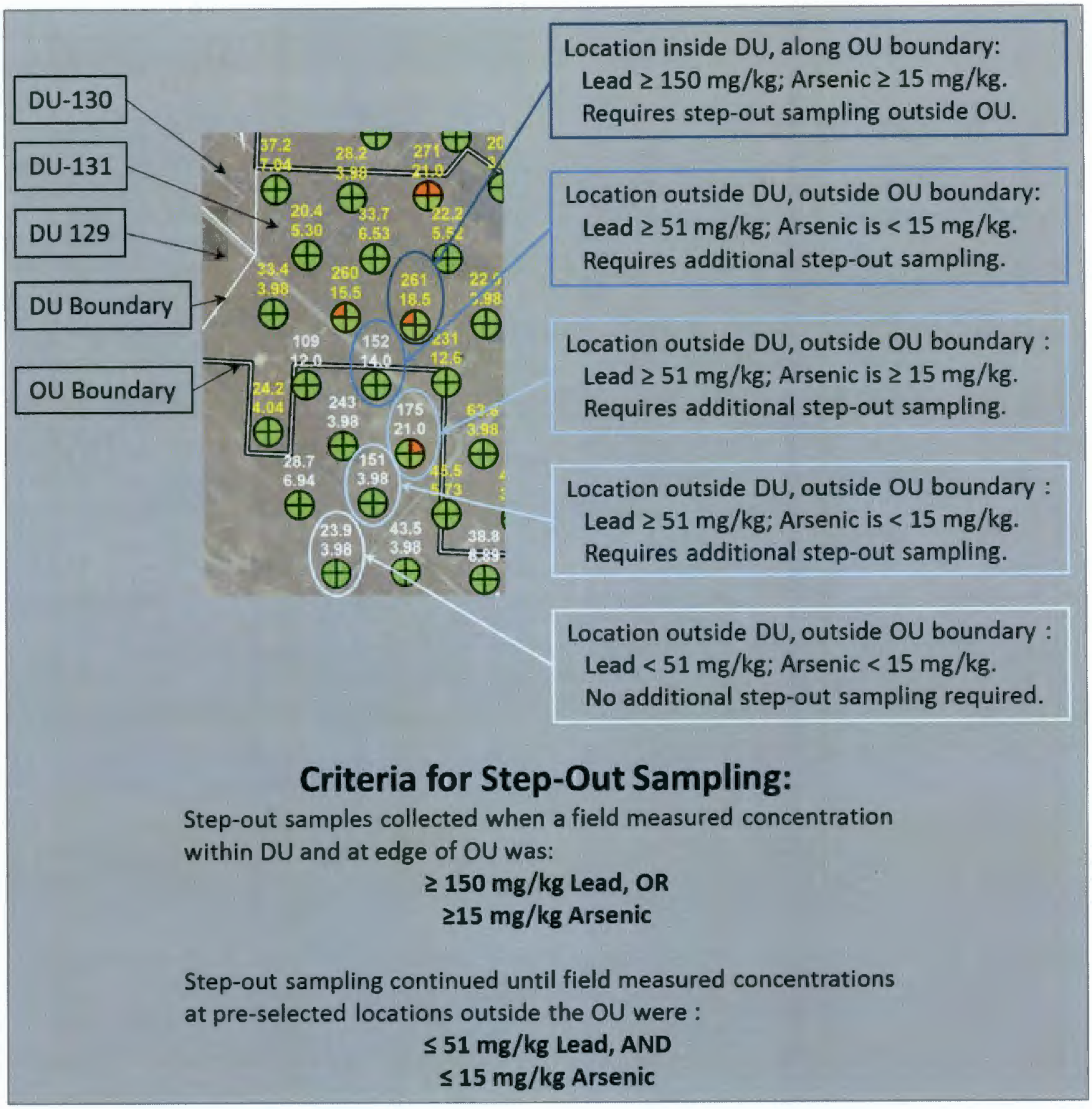


Figure D-3. Interpreting the Criteria for Step-Out Sampling for the DU Figures in Appendix D, Using an Example from DU-131.

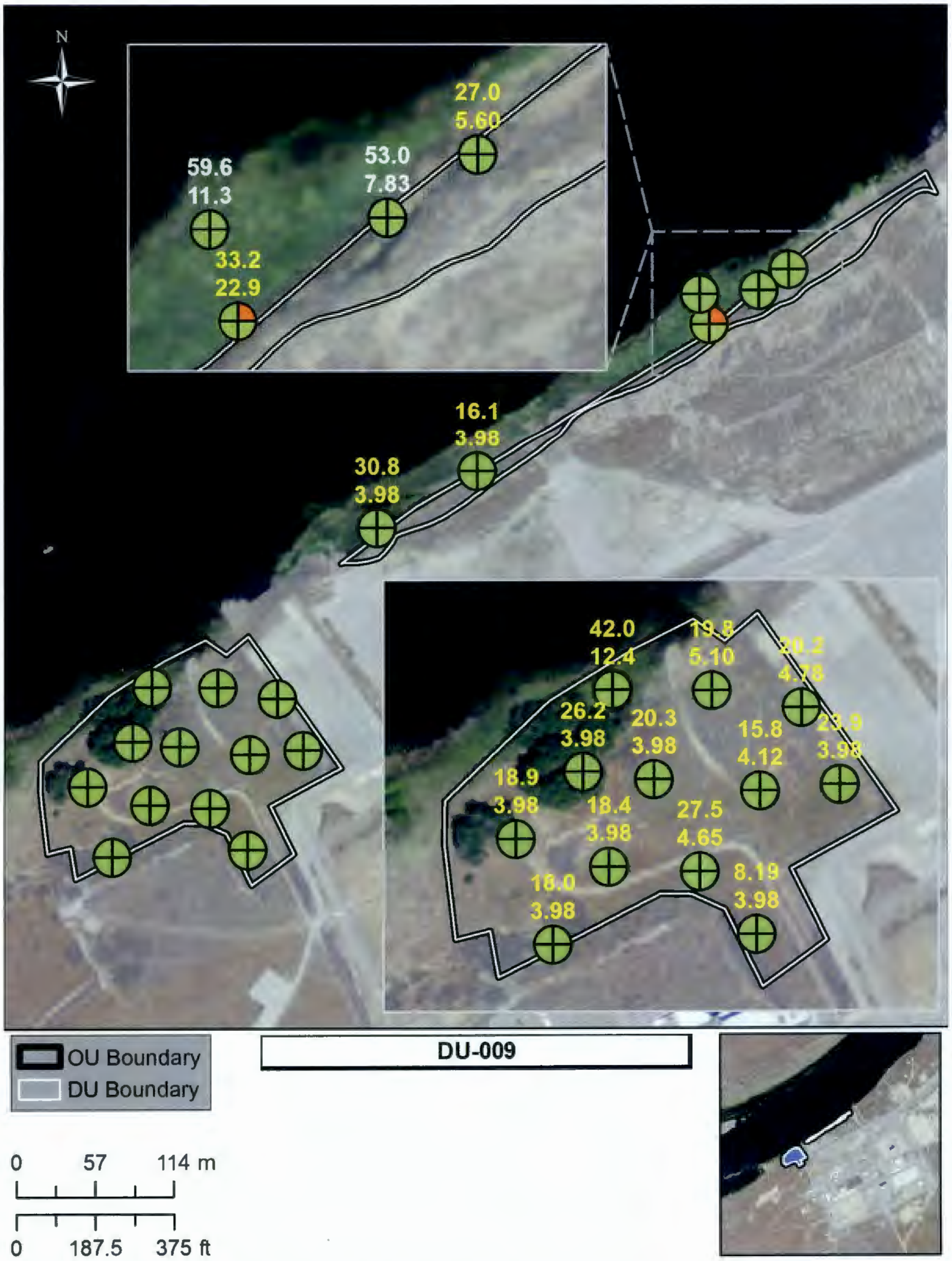


Figure D-4. **DU-009 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

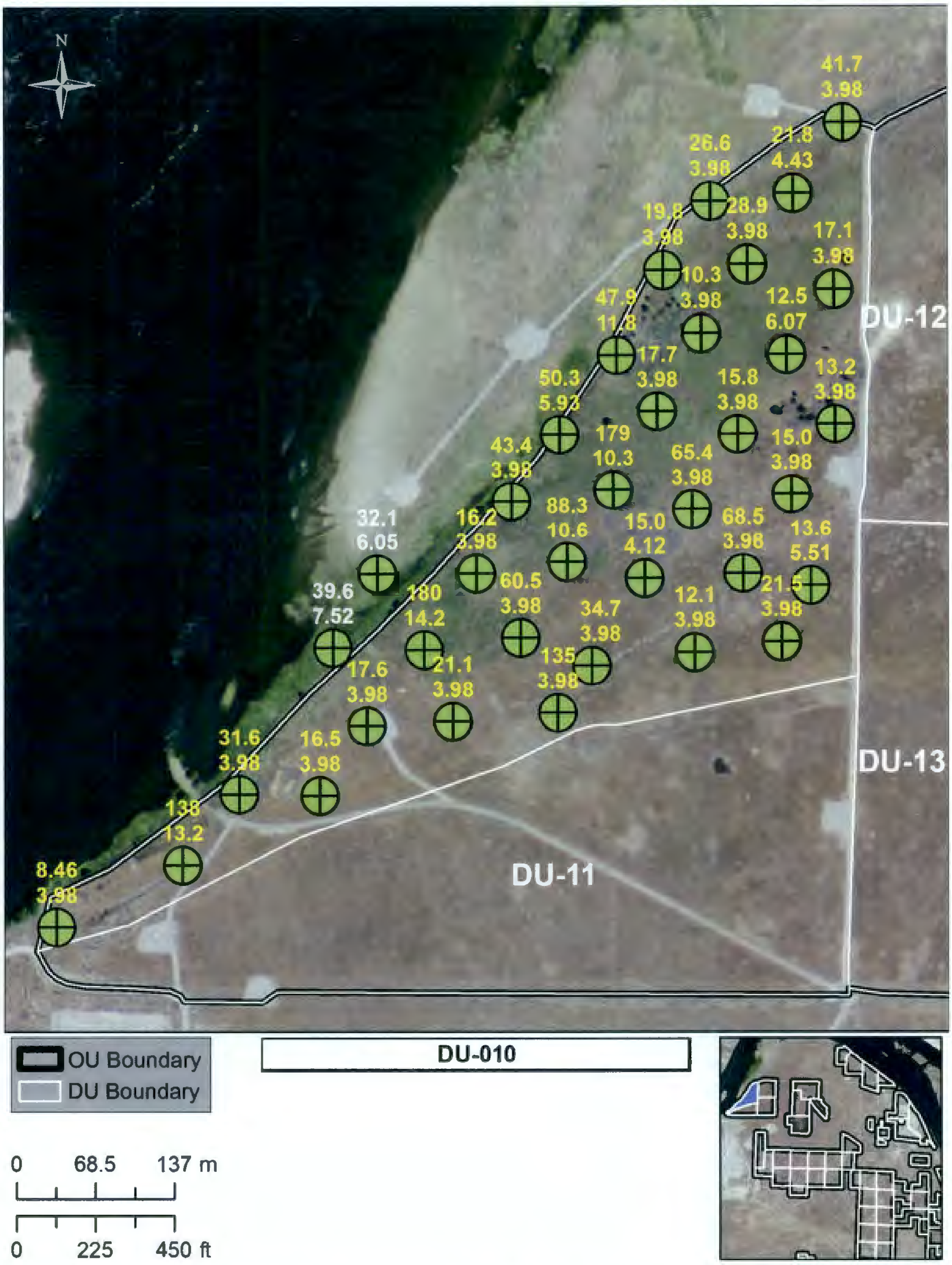


Figure D-5. DU-010 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

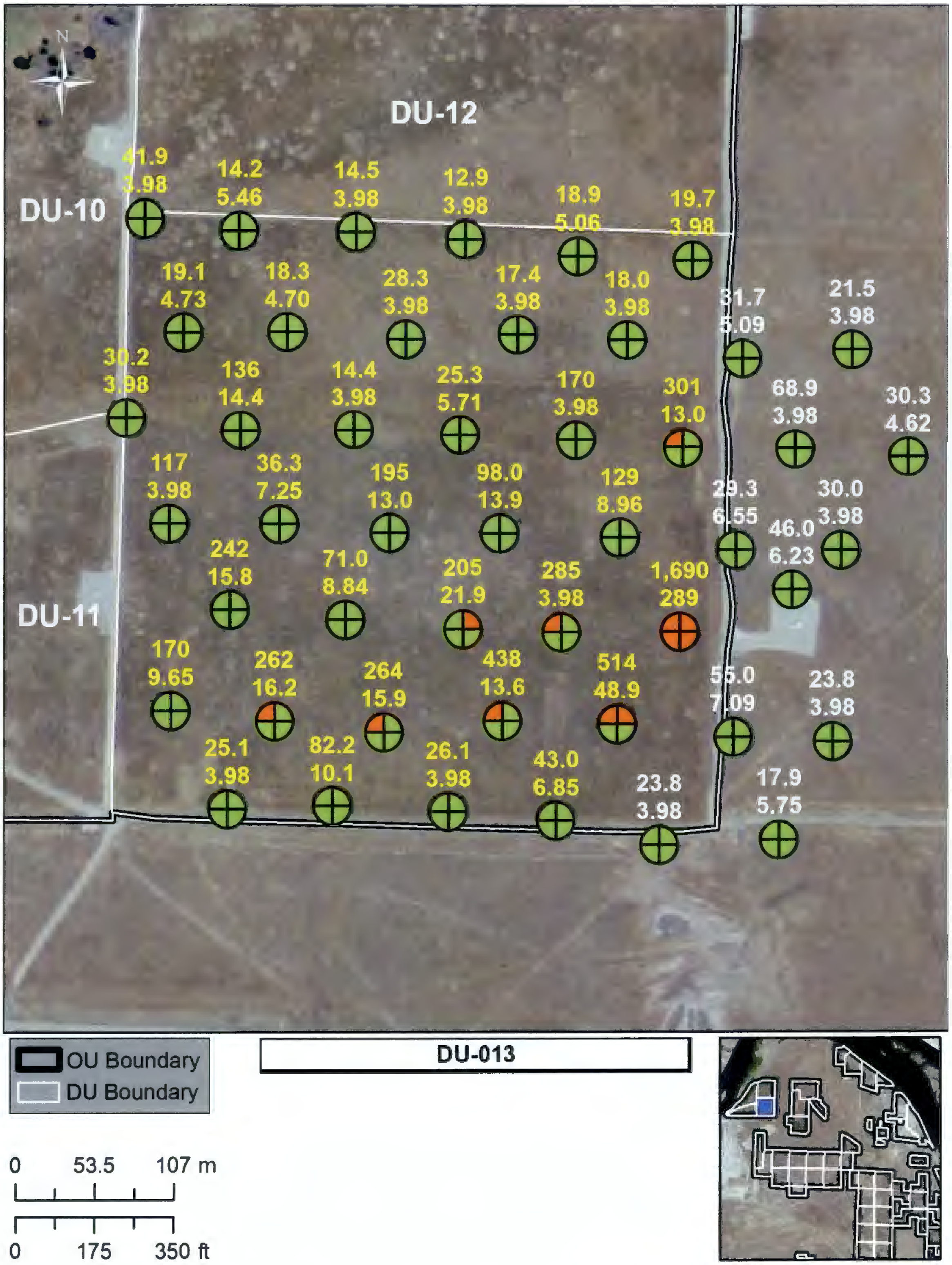


Figure D-6. DU-013 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

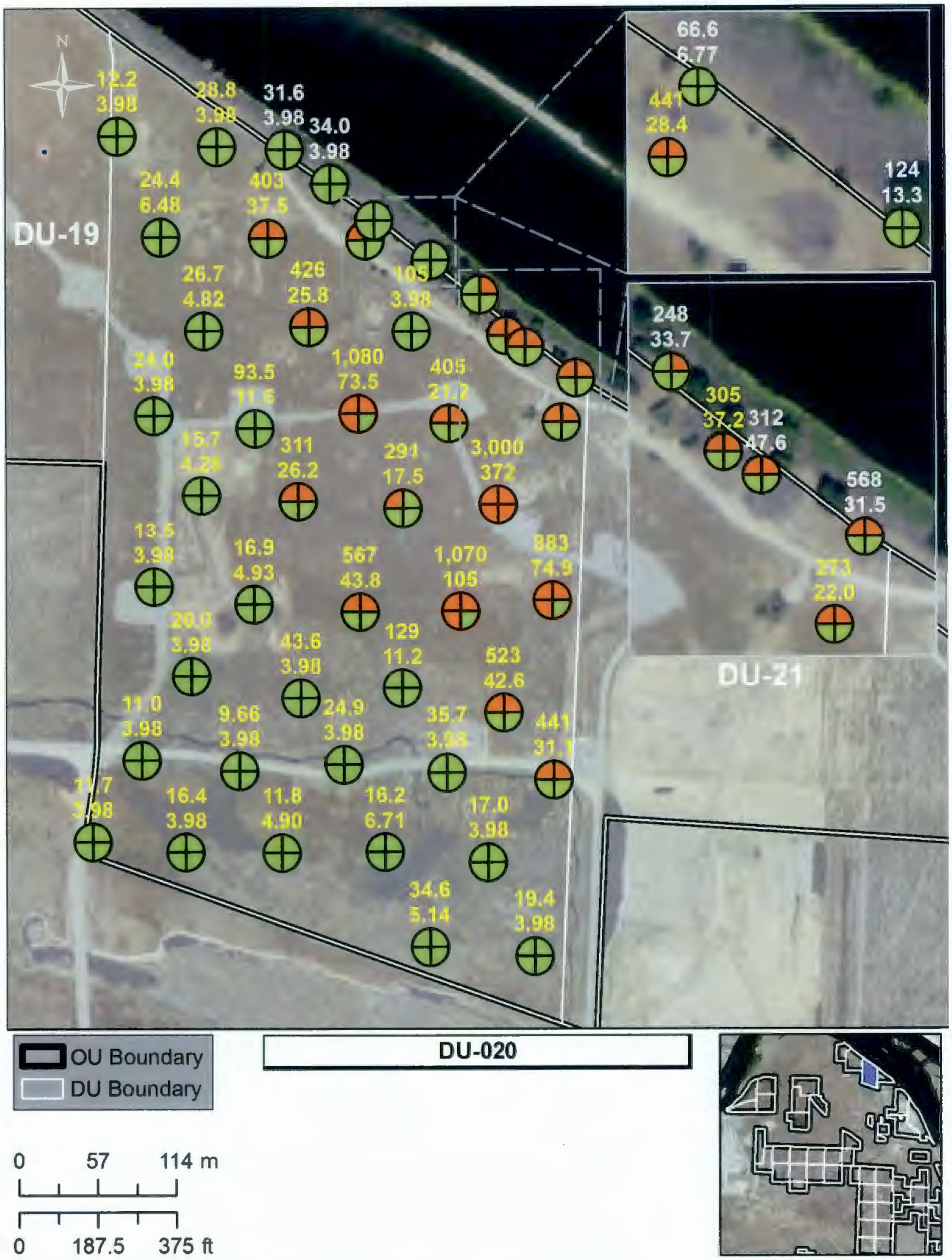


Figure D-7. **DU-020 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

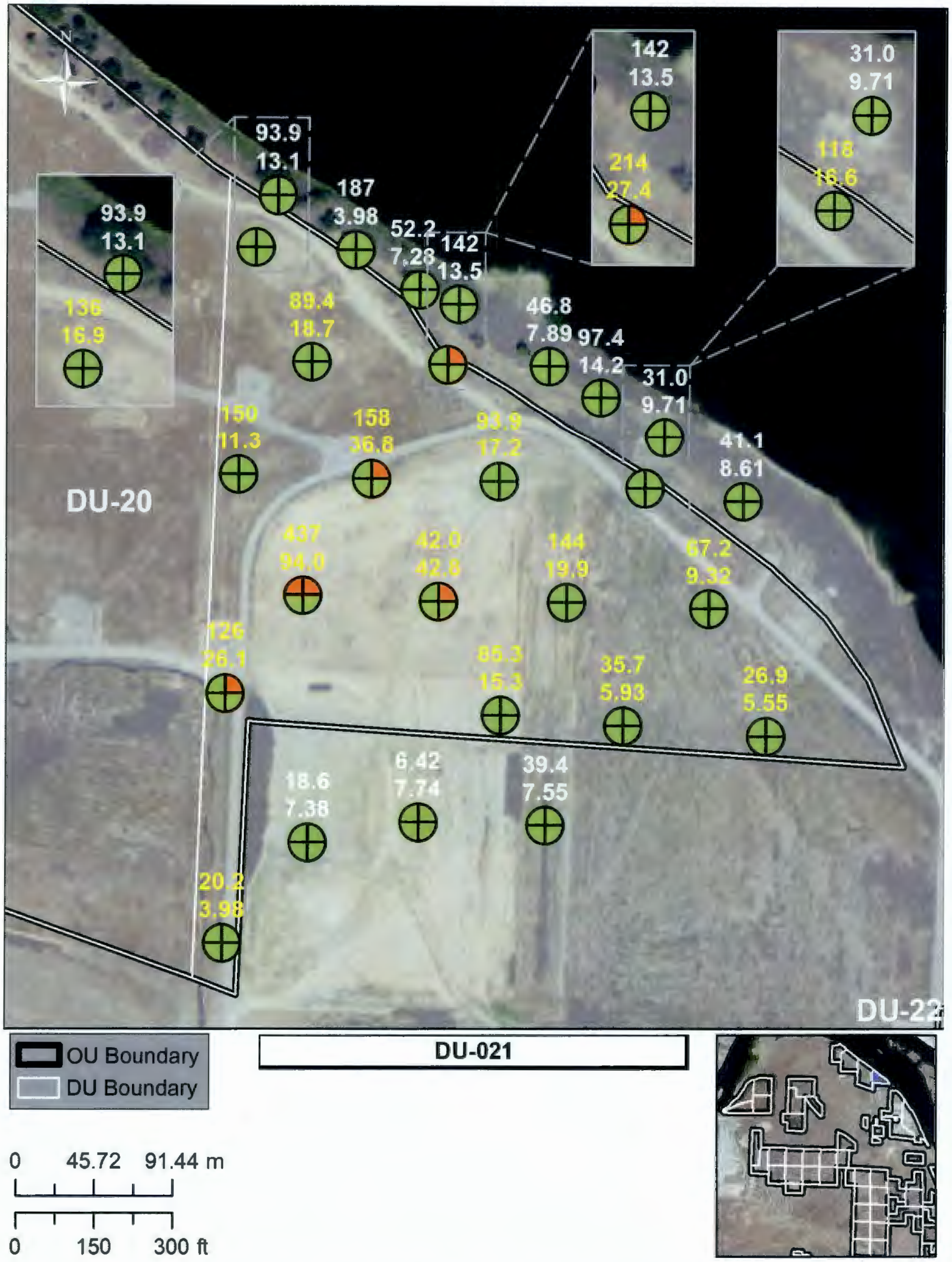


Figure D-8. **DU-021 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

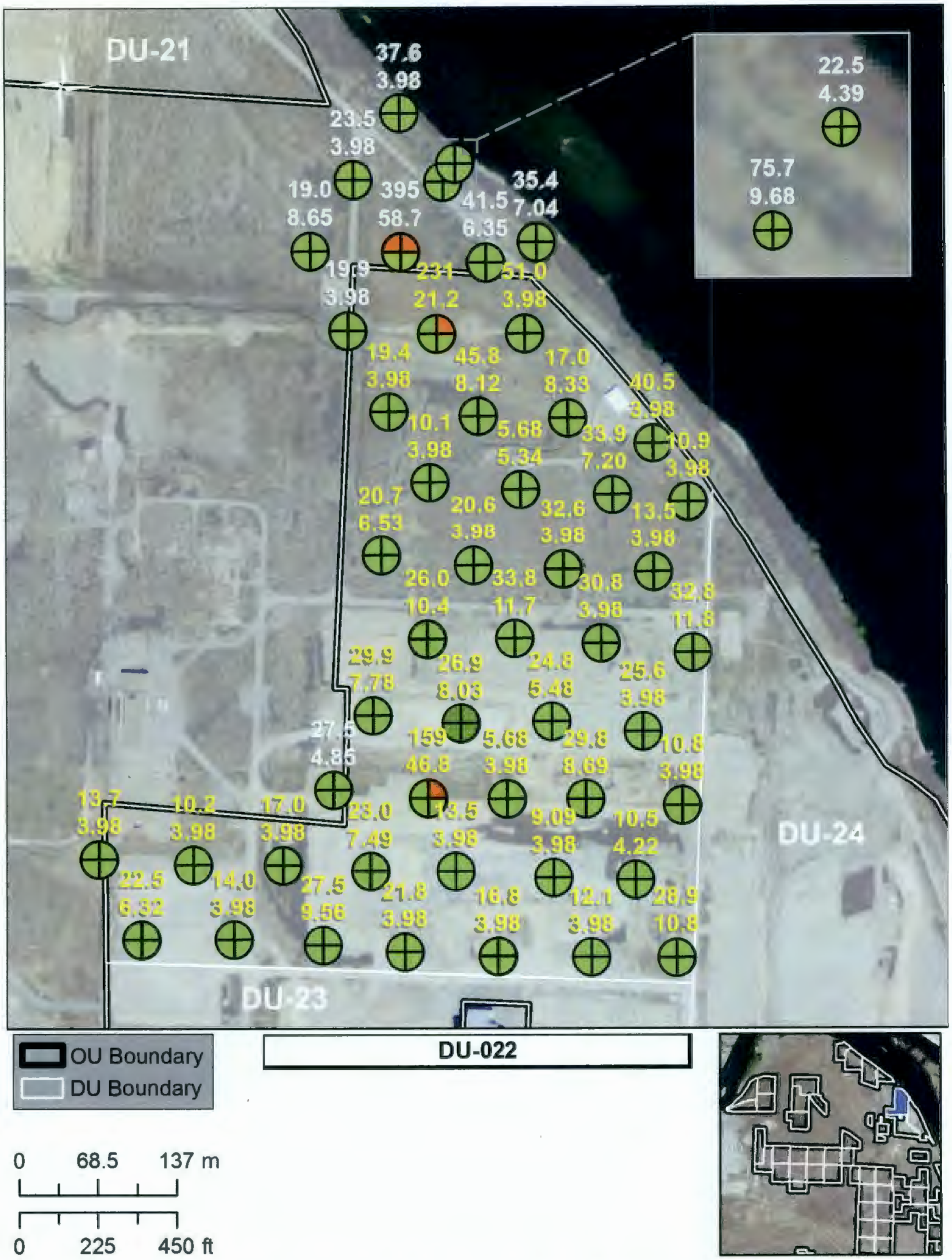


Figure D-9. DU-022 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

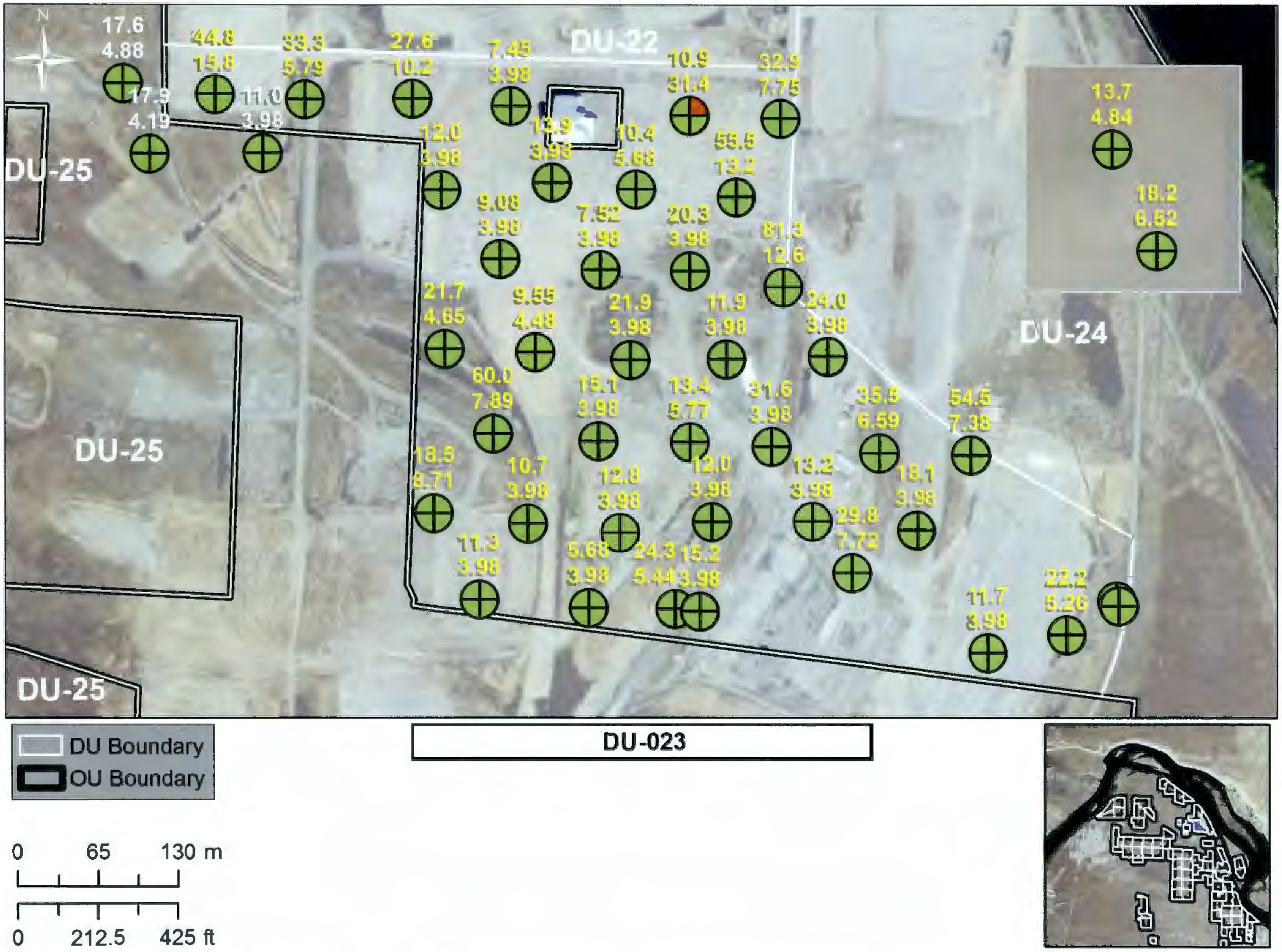


Figure D-10. DU-023 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

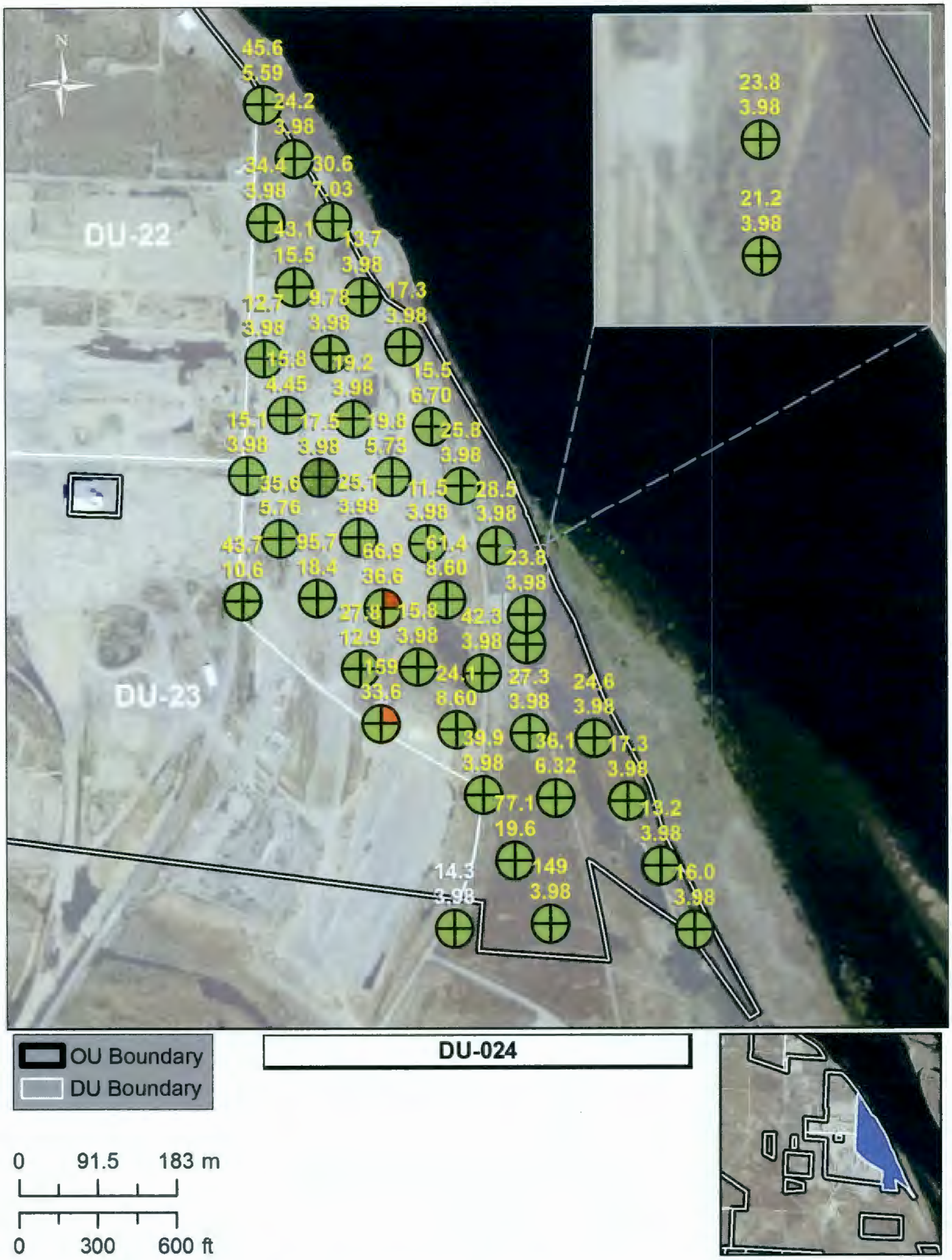


Figure D-11. **DU-024 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

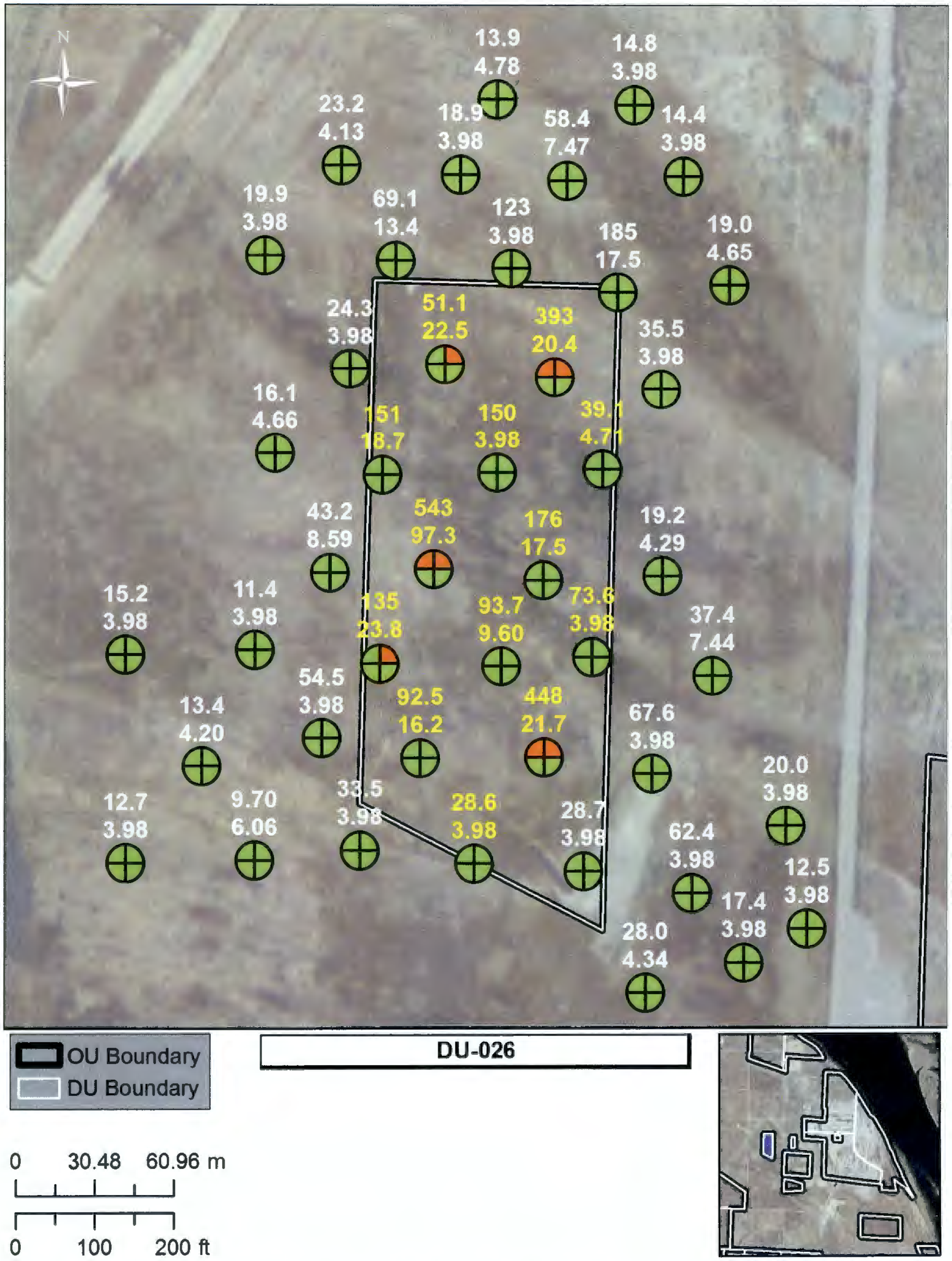


Figure D-12. **DU-026 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

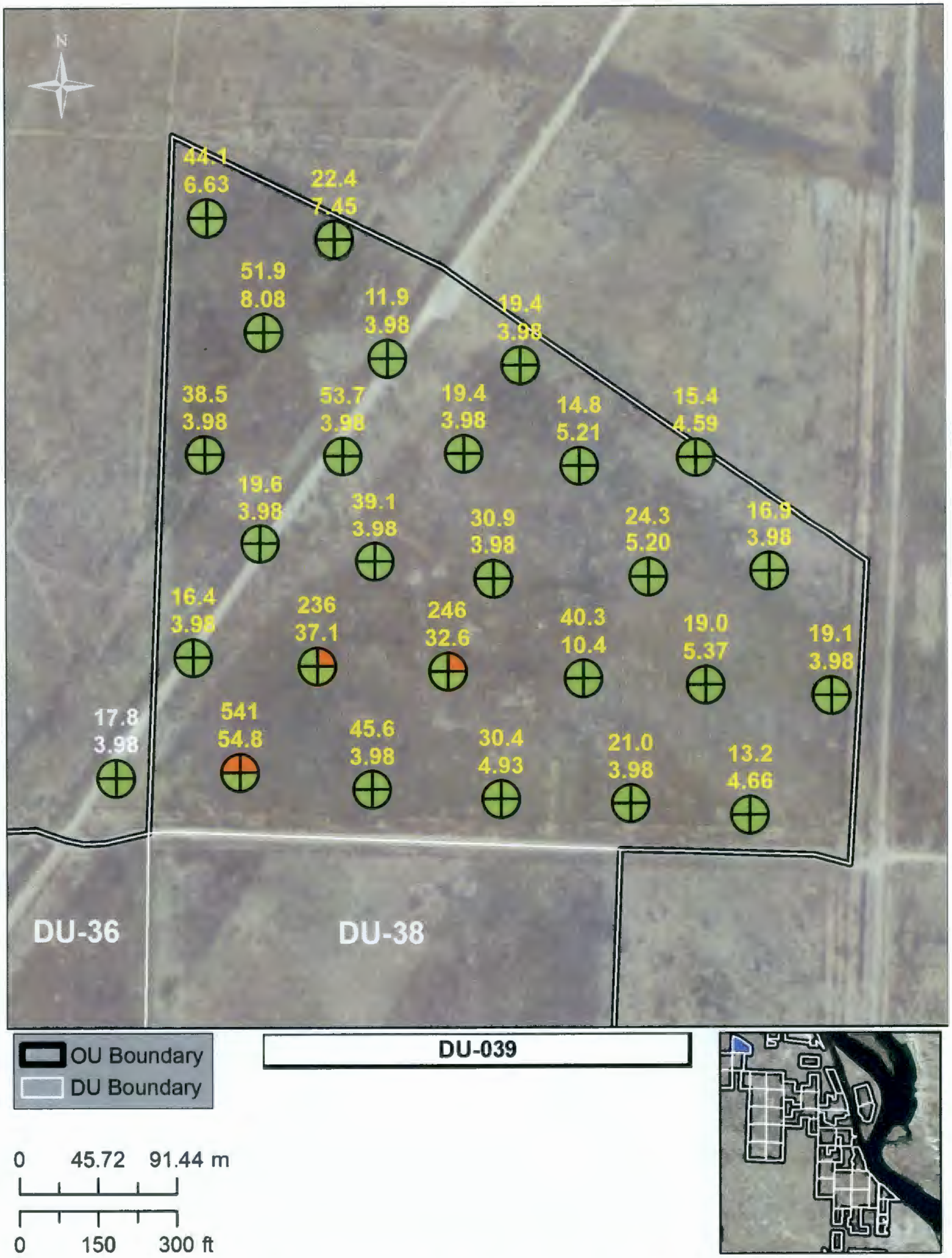


Figure D-13. DU-039 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

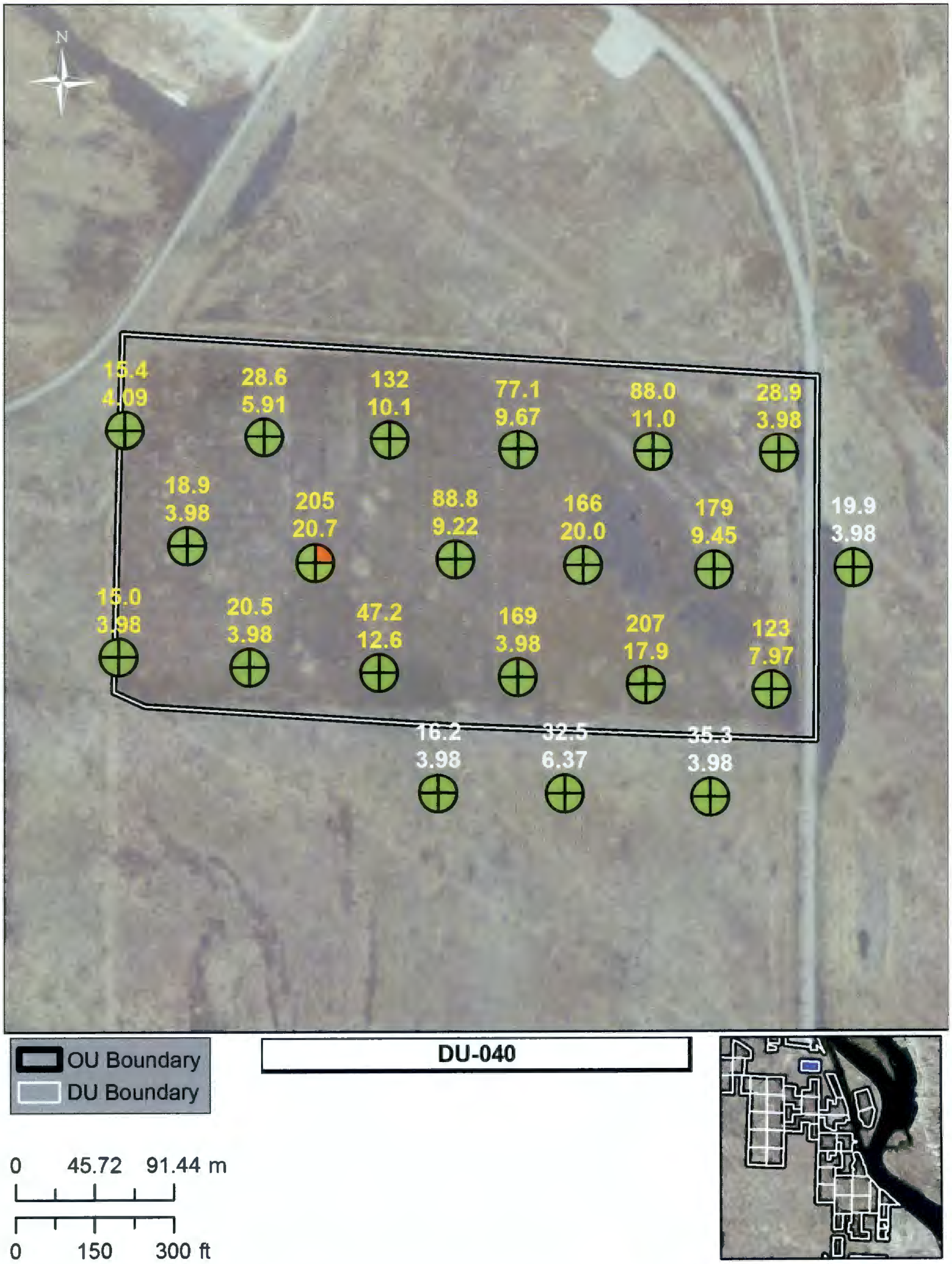


Figure D-14. DU-040 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

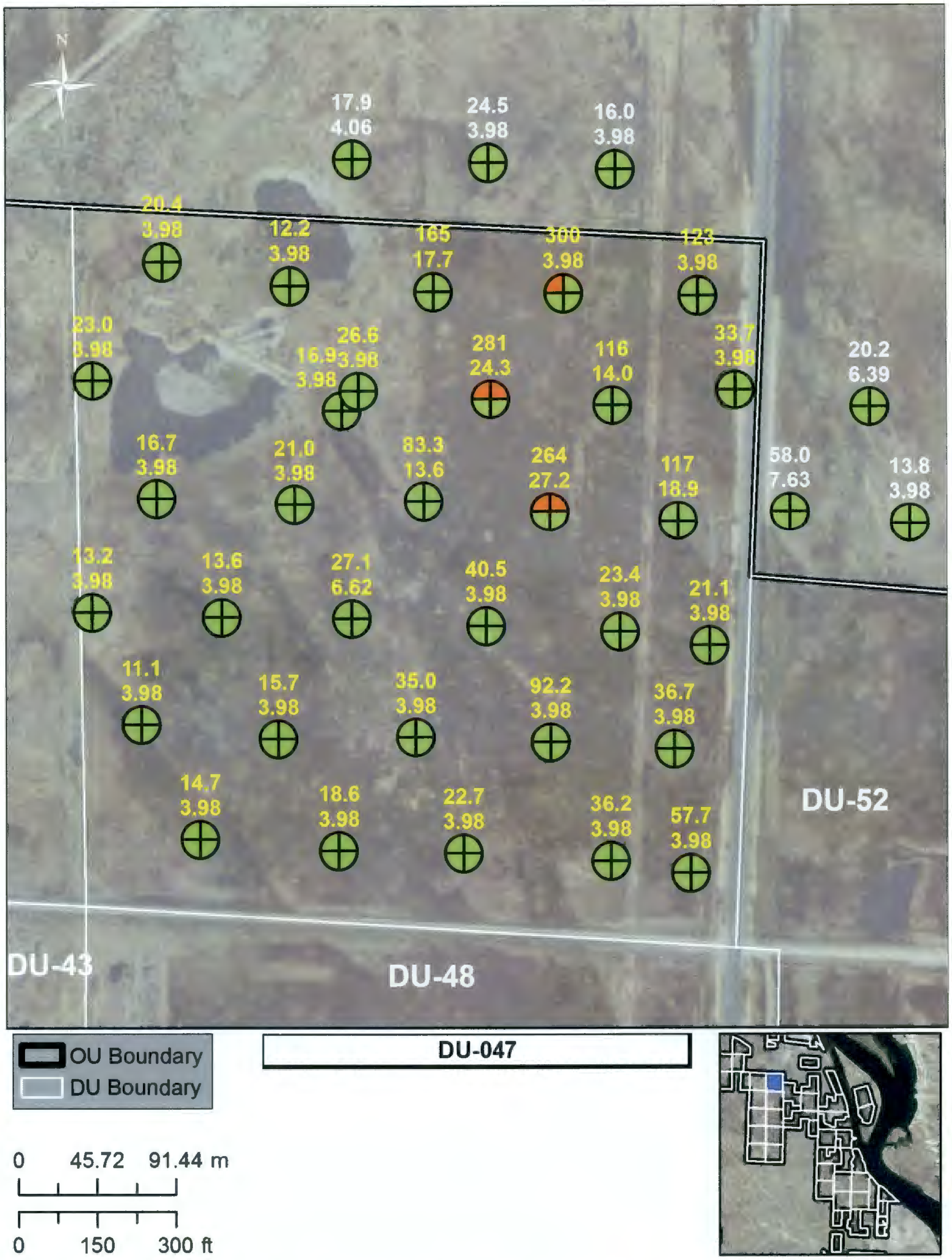


Figure D-15. **DU-047 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

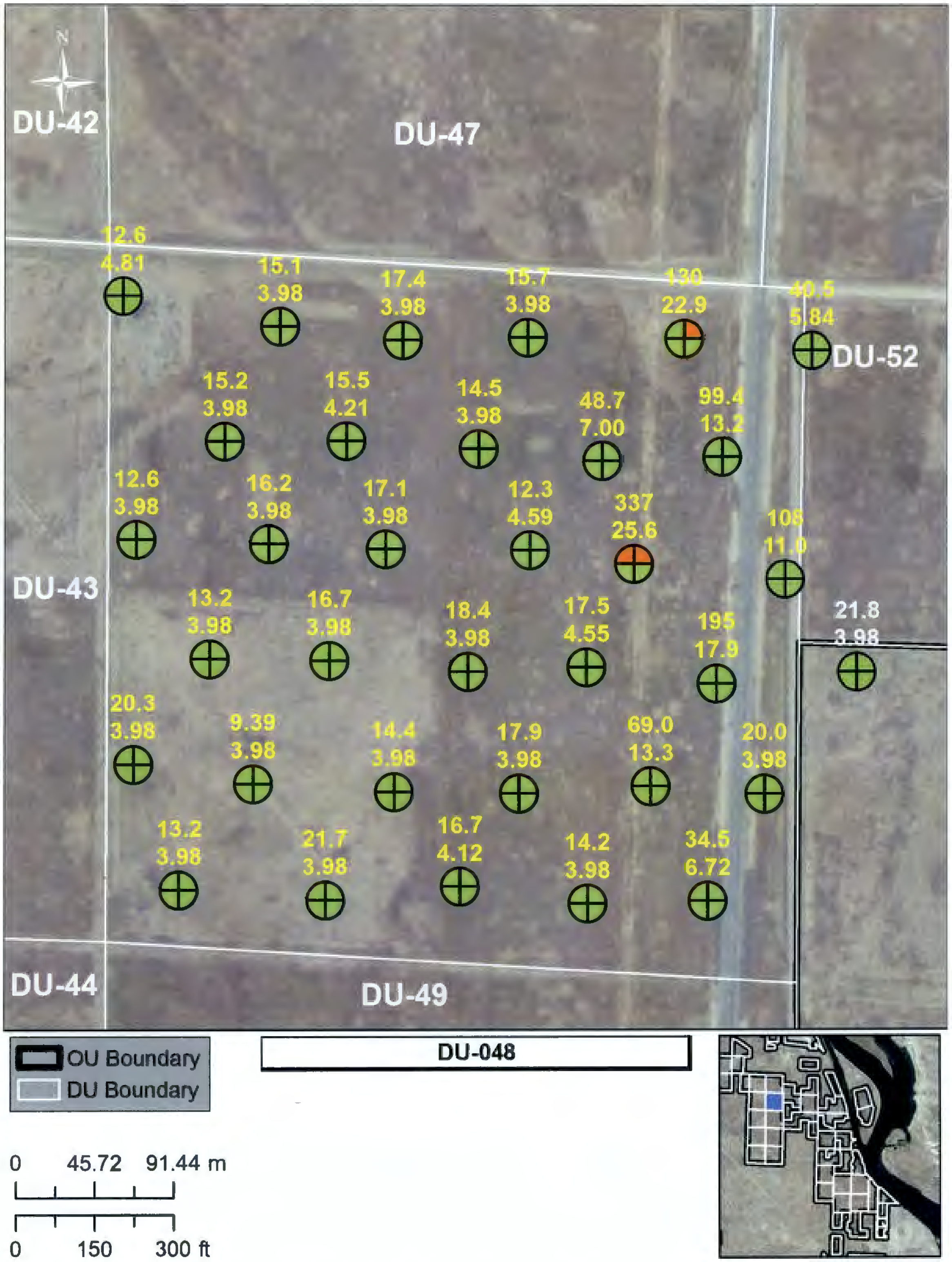


Figure D-16. DU-048 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

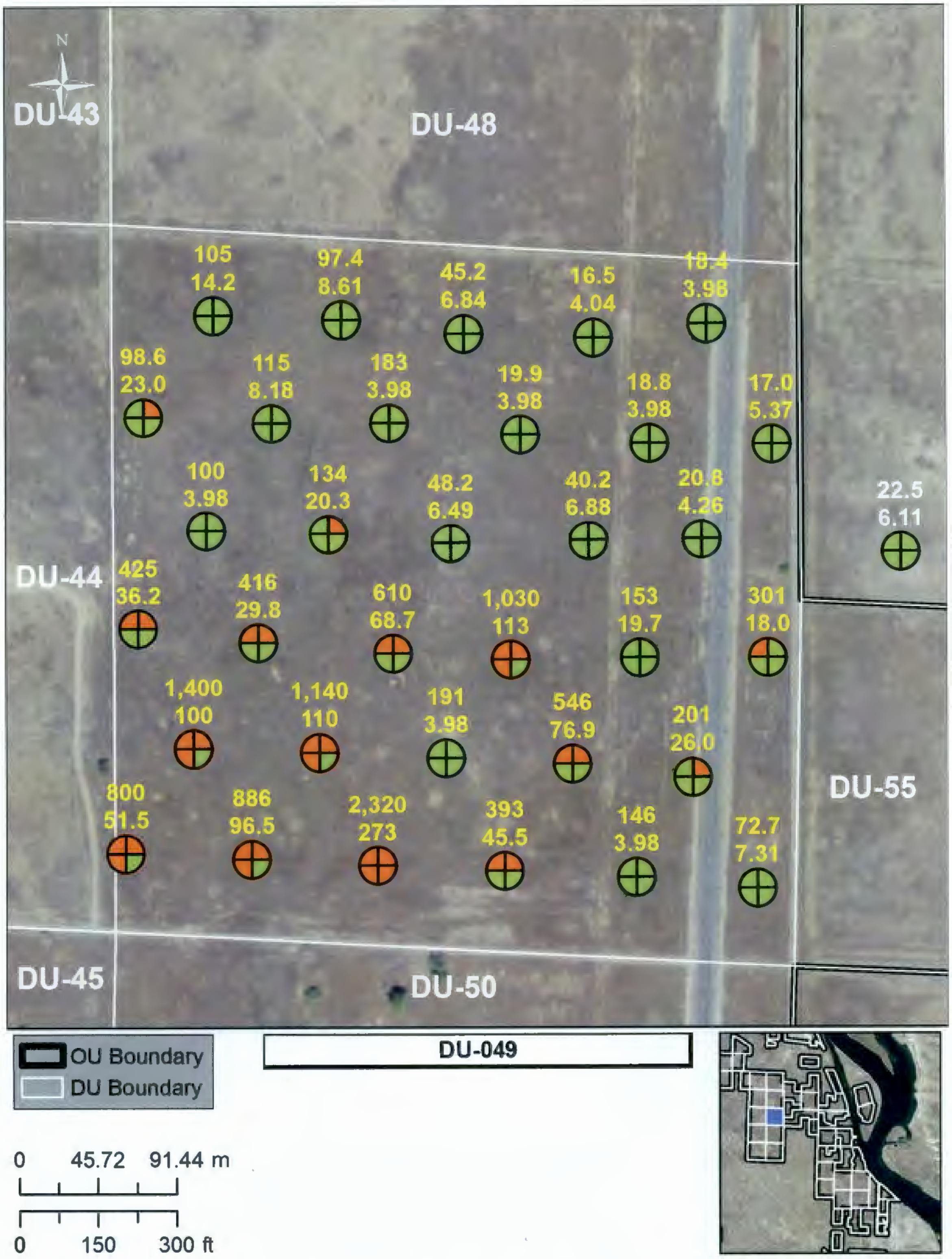


Figure D-17. DU-049 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

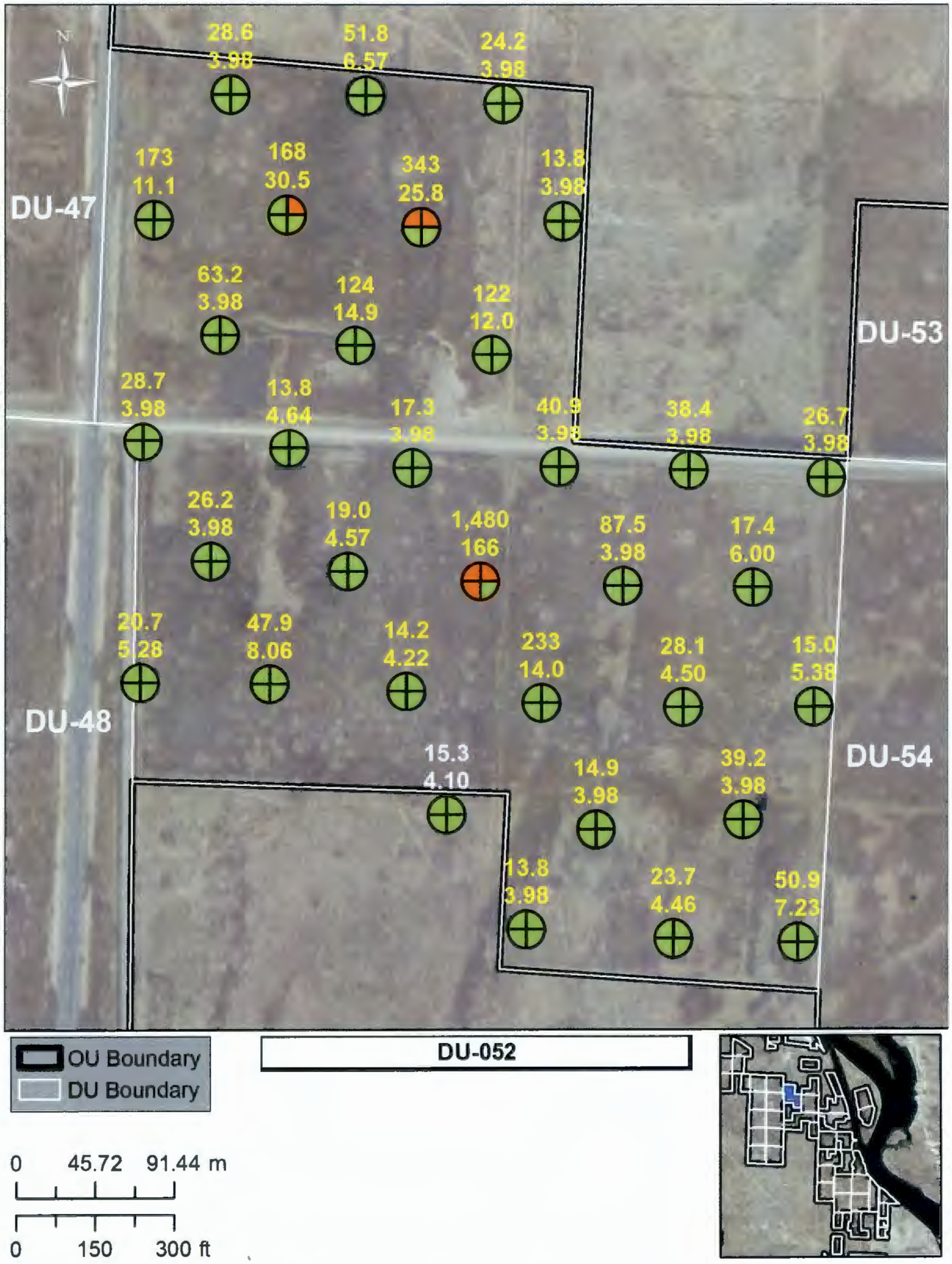


Figure D-18. **DU-052 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

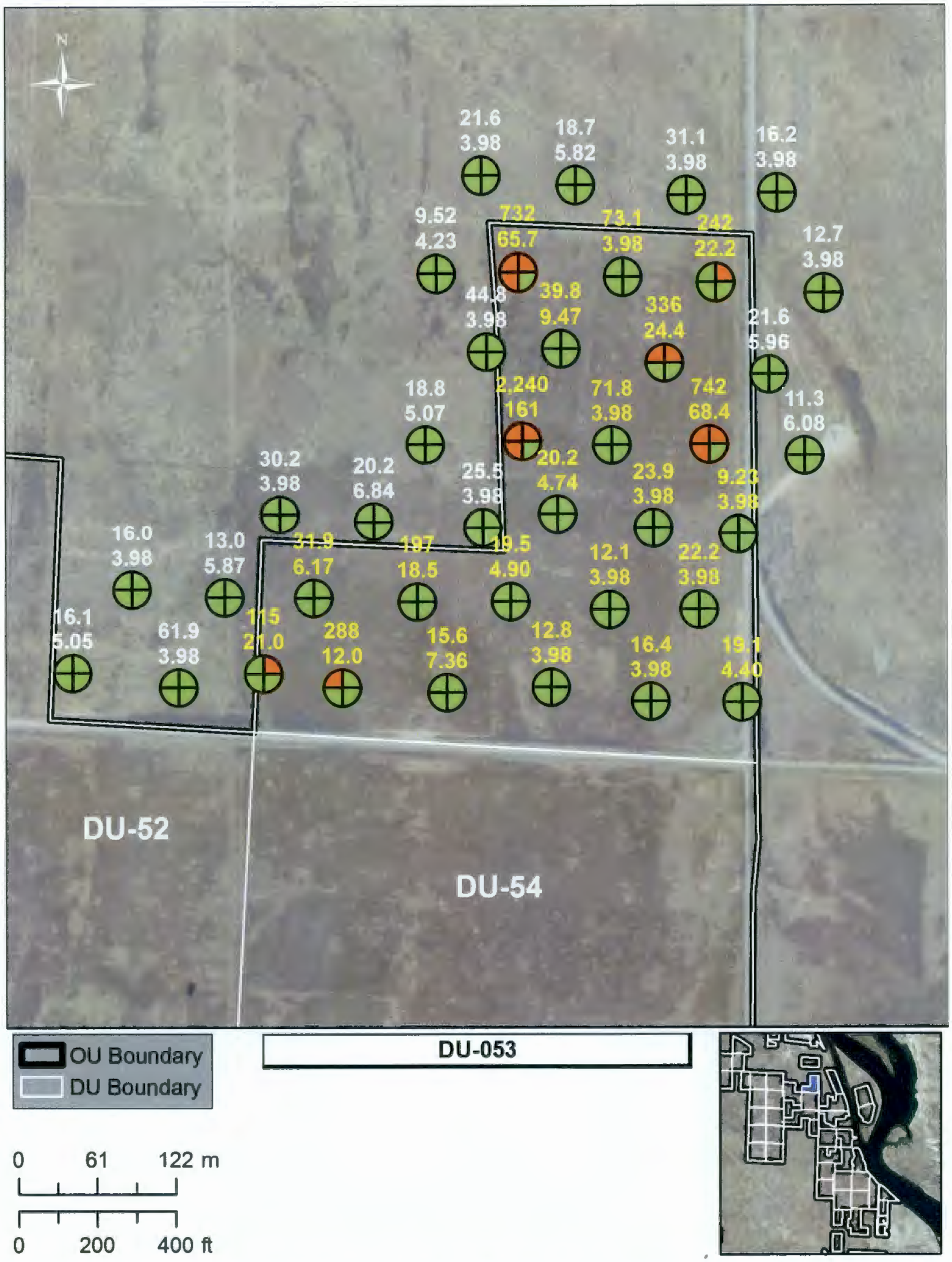


Figure D-19. DU-053 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

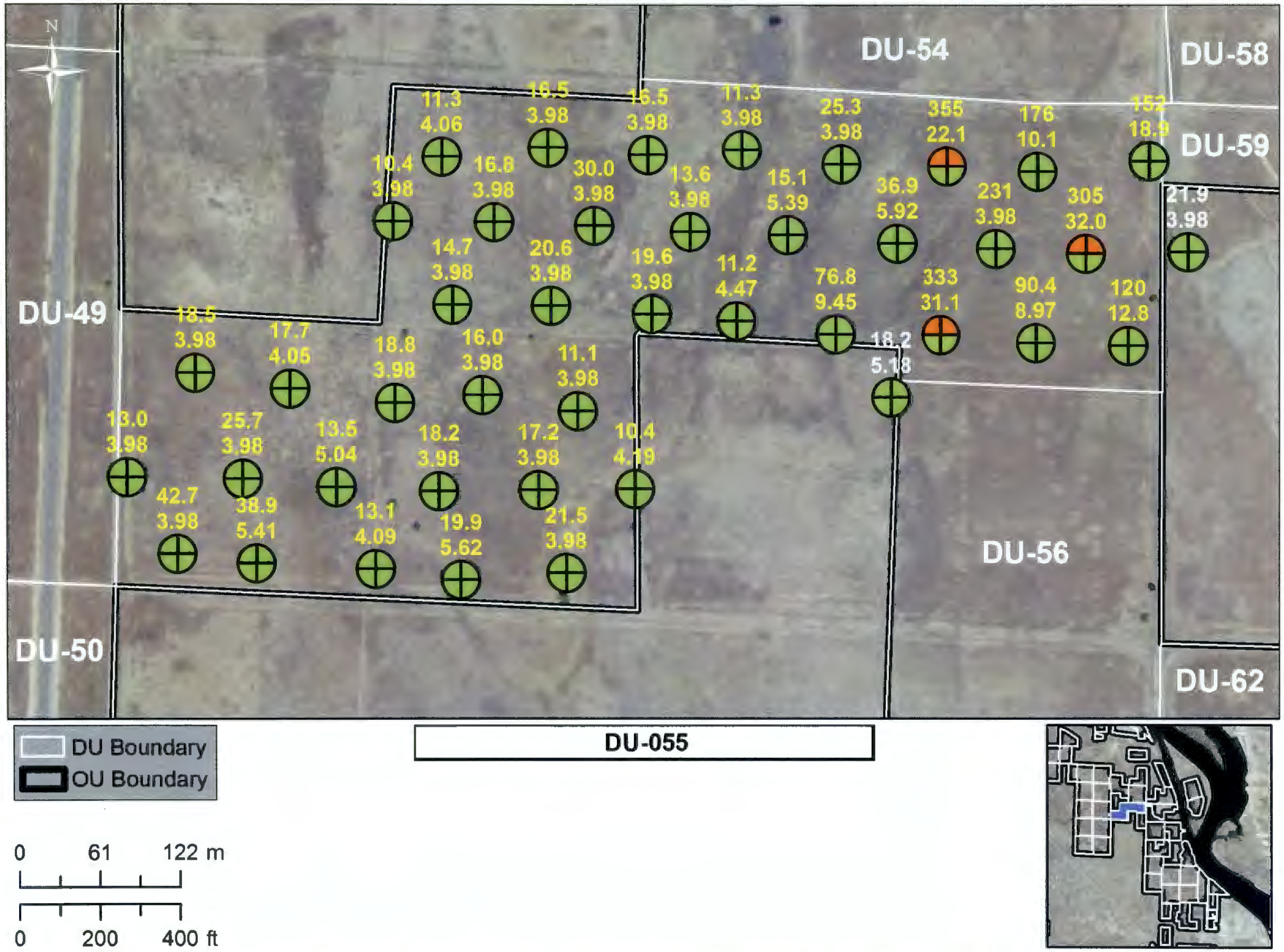


Figure D-20. DU-055 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

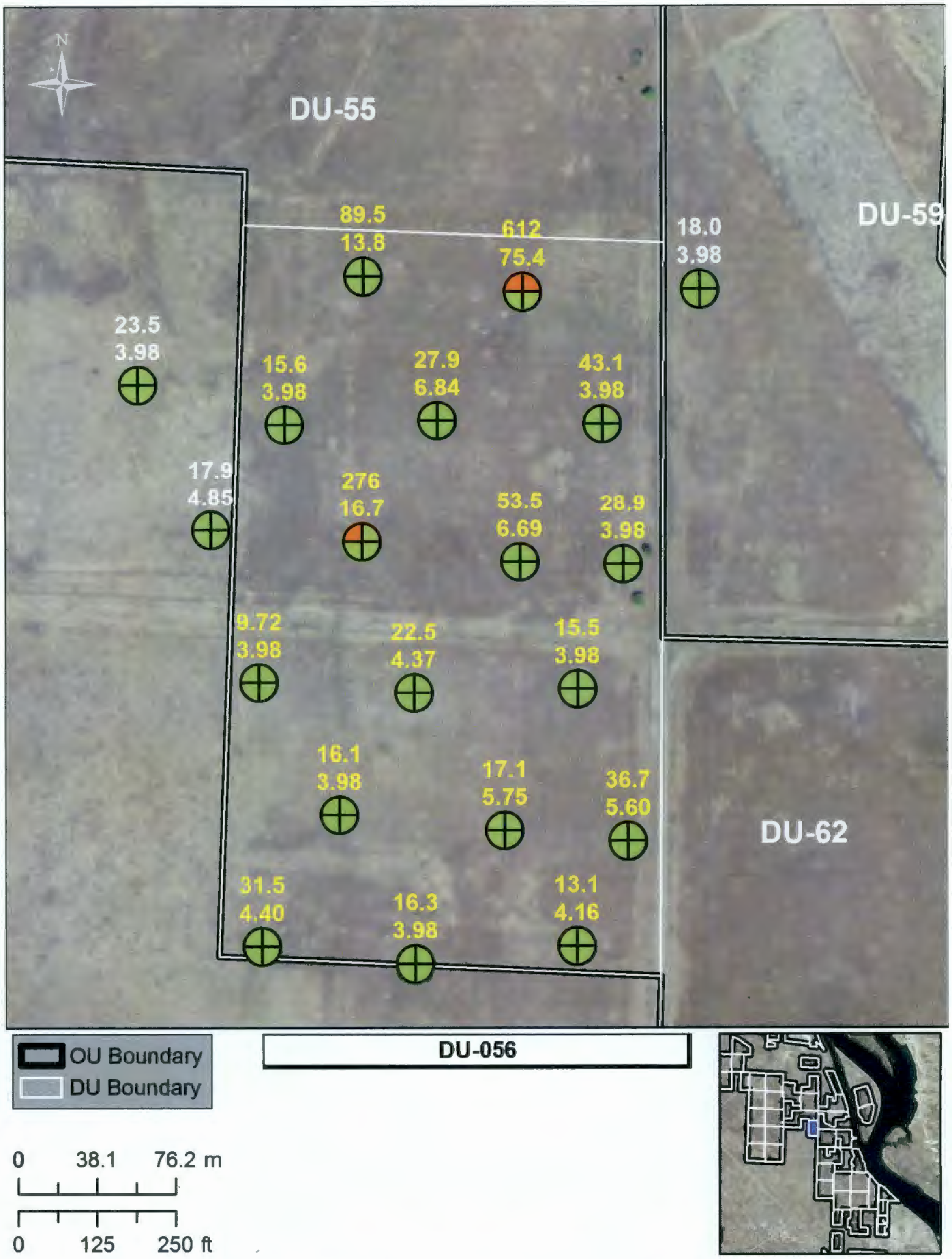


Figure D-21. DU-056 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

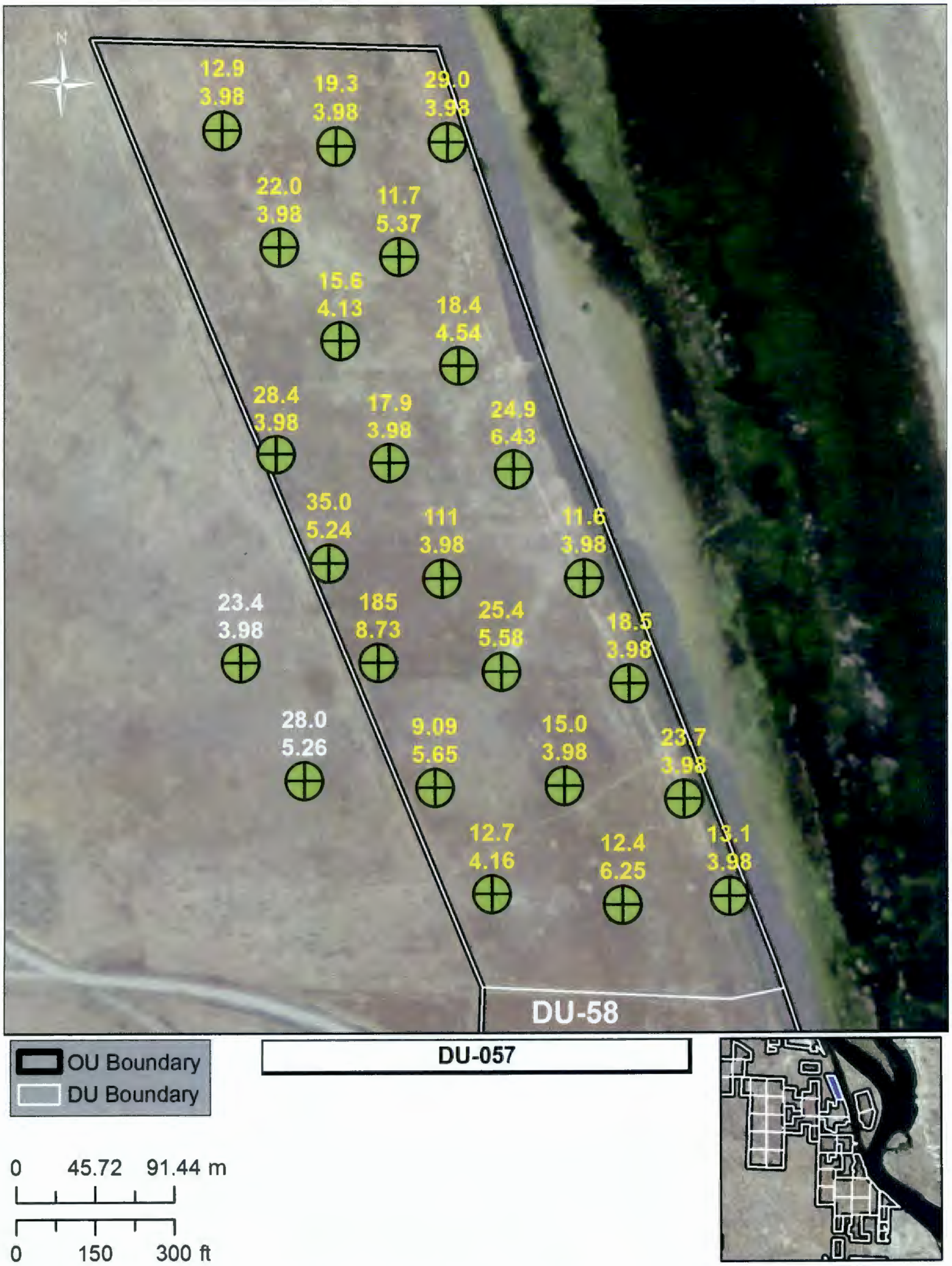


Figure D-22. DU-057 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

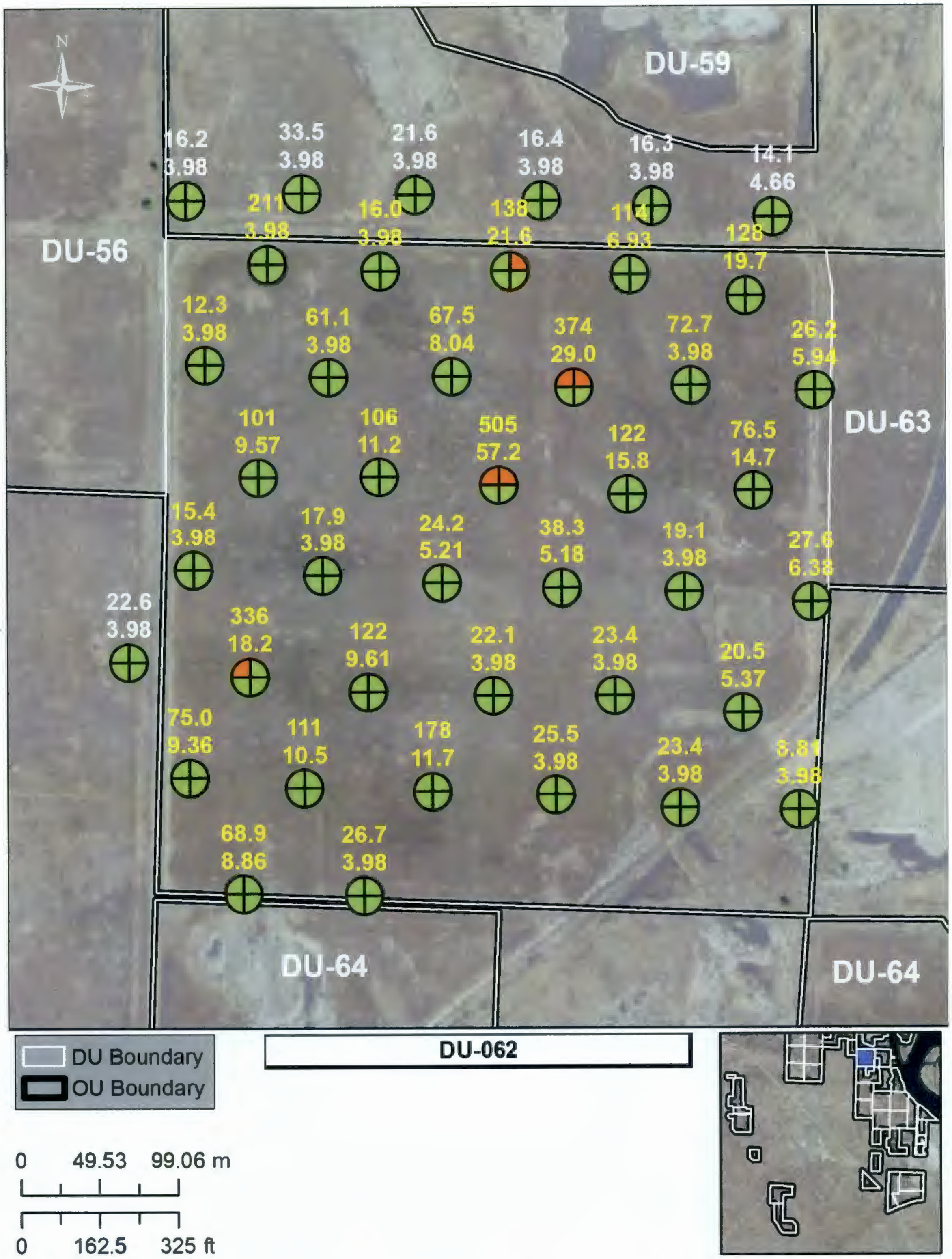


Figure D-23. **DU-062 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

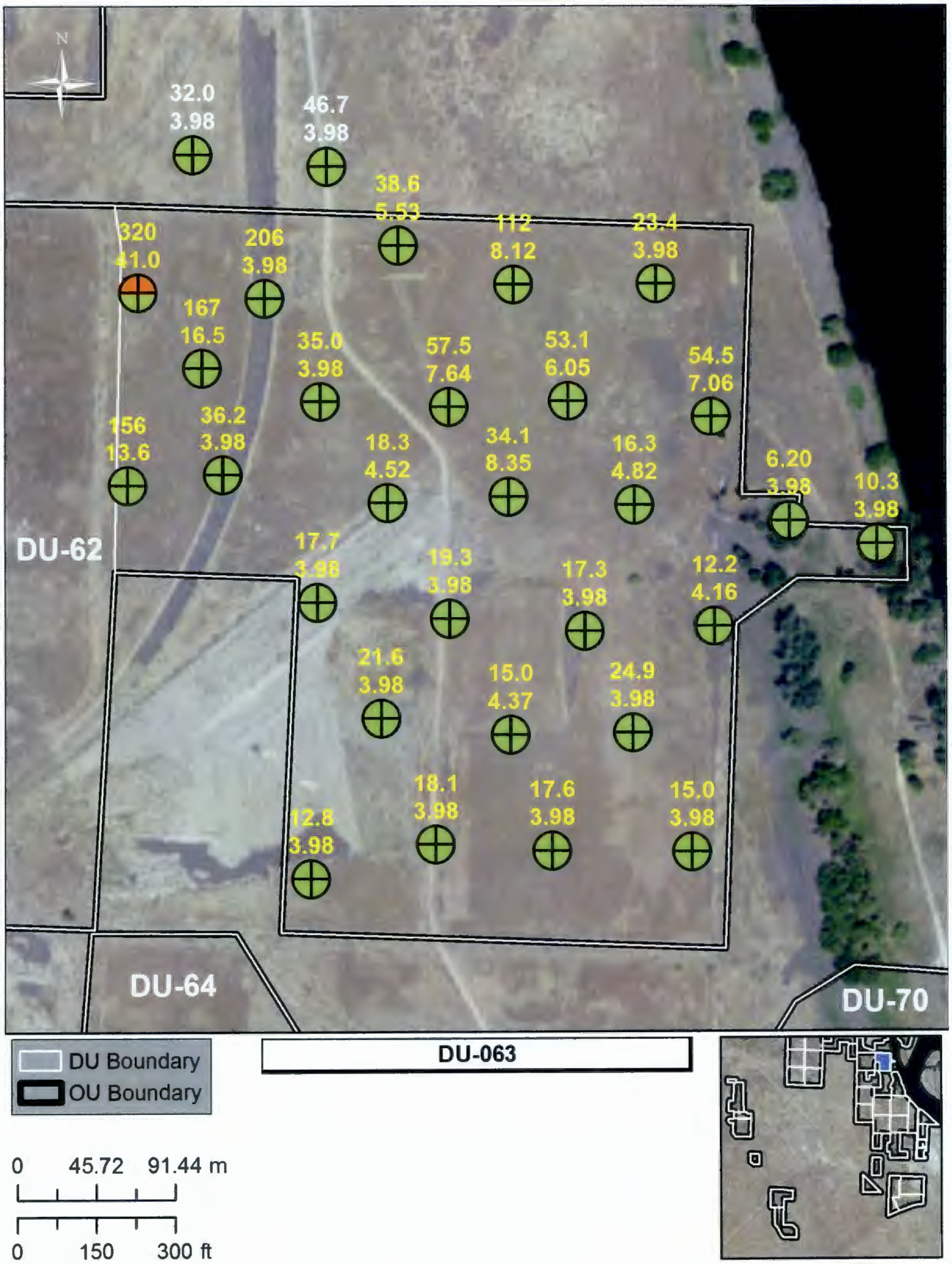


Figure D-24. DU-063 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

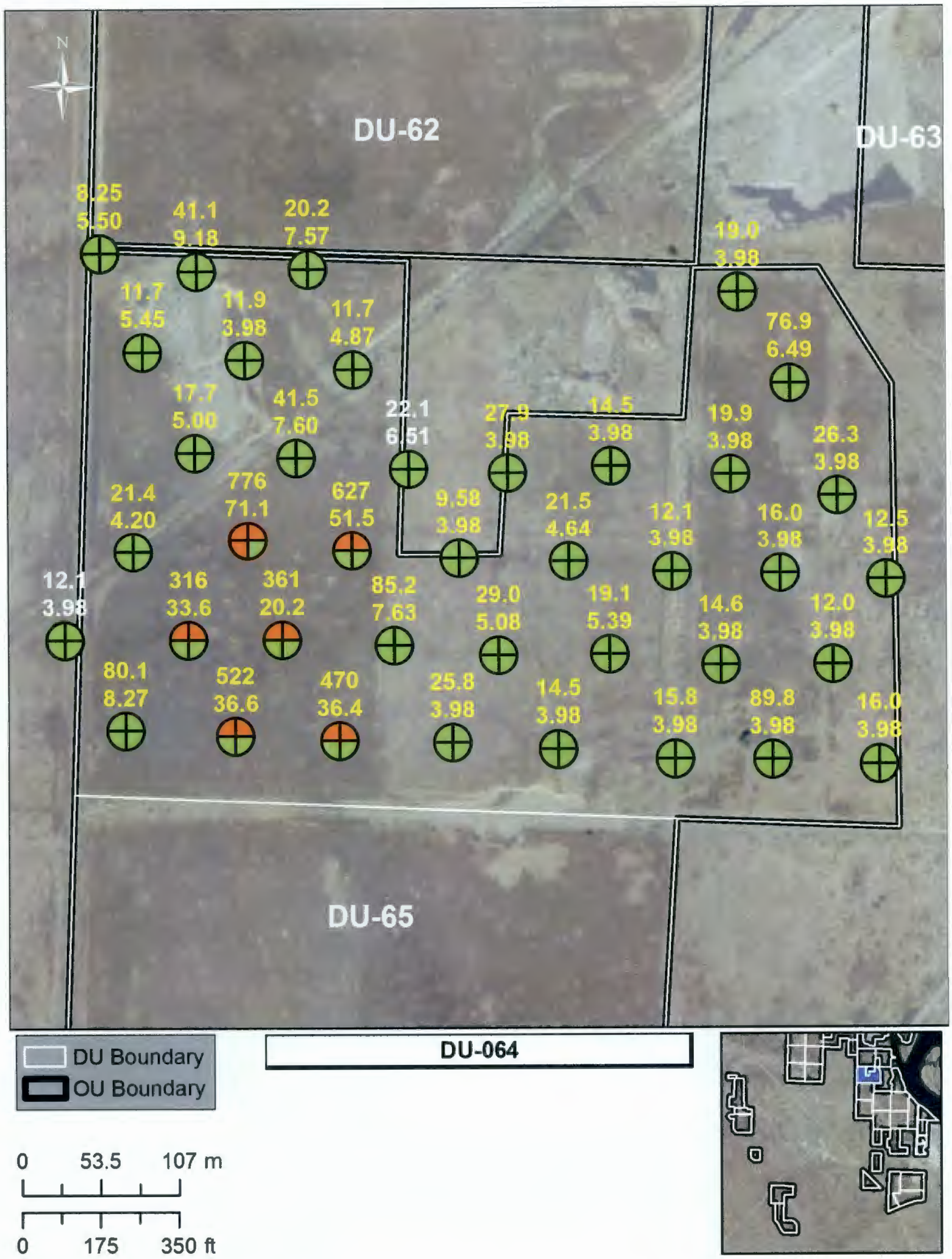


Figure D-25. DU-064 Step-Out Field Characterization Results. Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

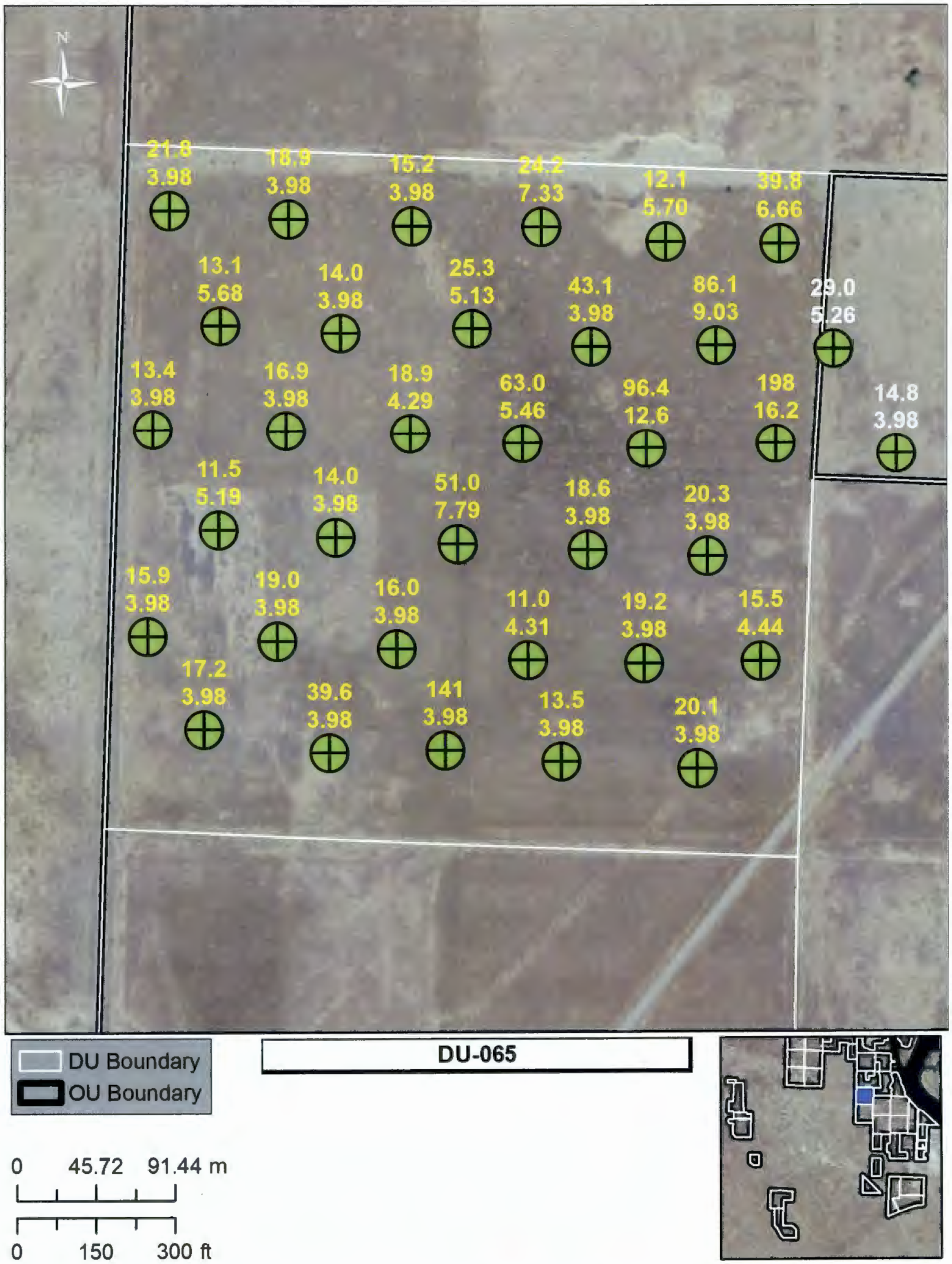


Figure D-26. DU-065 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

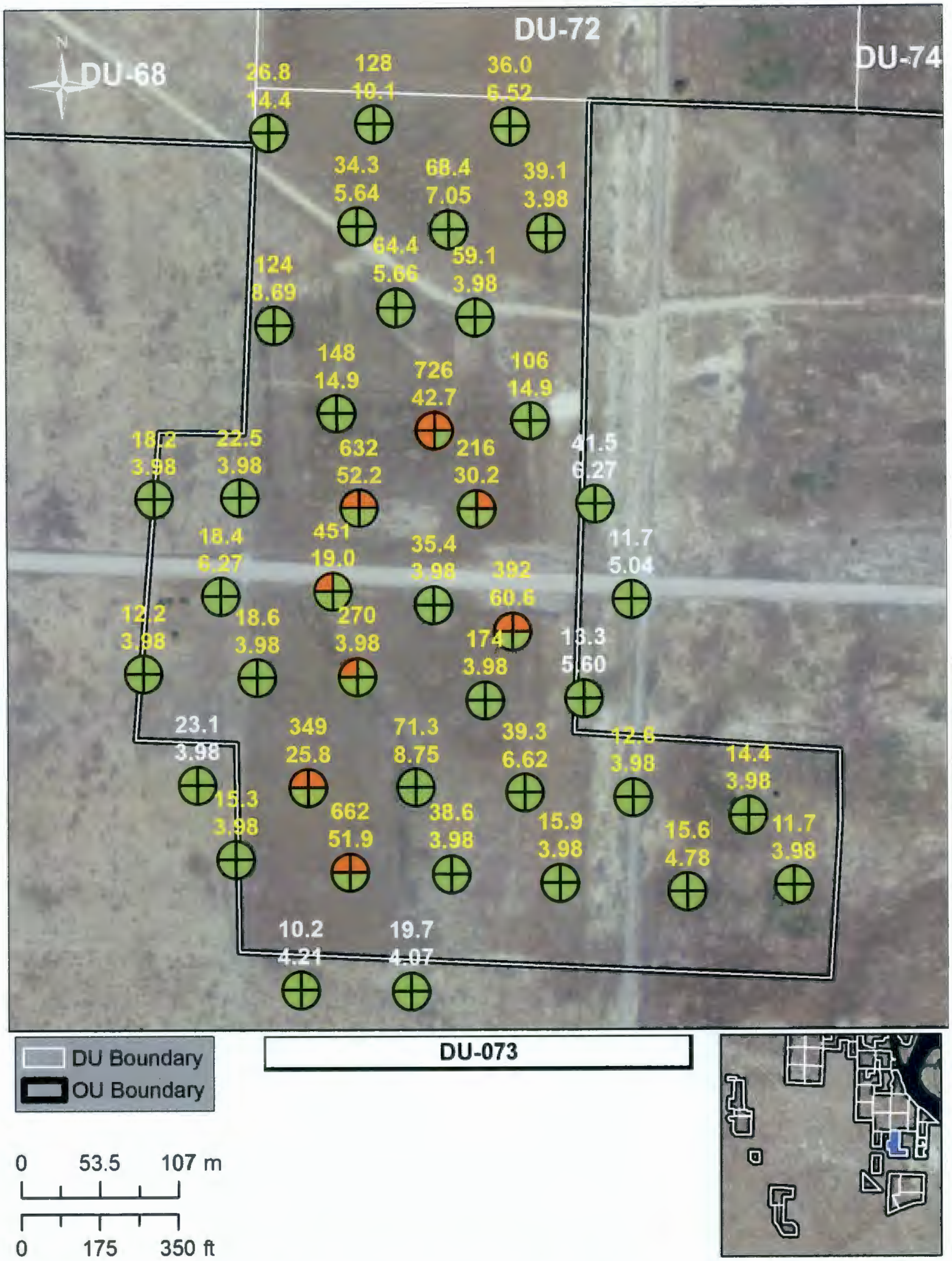


Figure D-27. DU-073 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

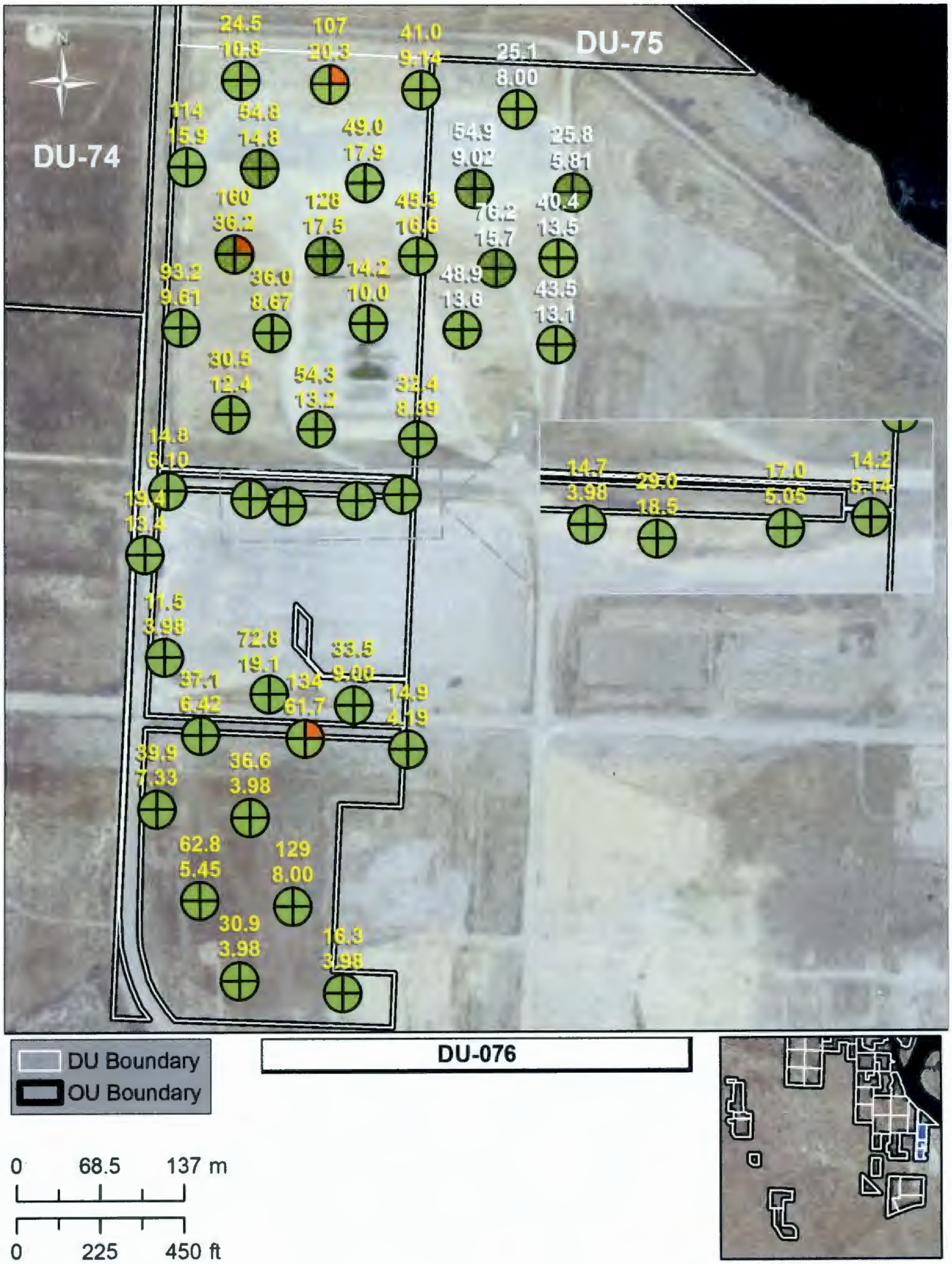


Figure D-28. DU-076 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

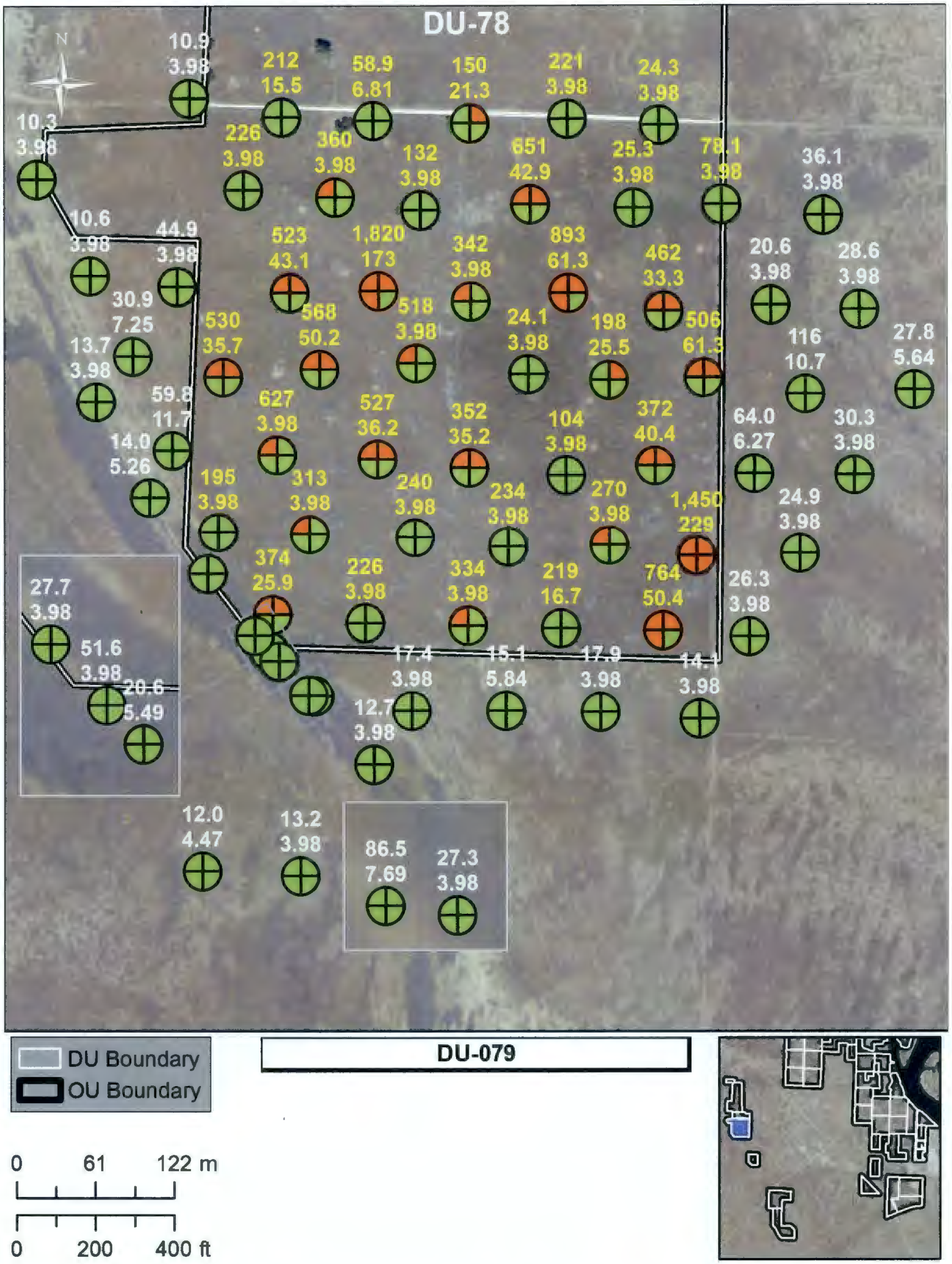


Figure D-29. **DU-079 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

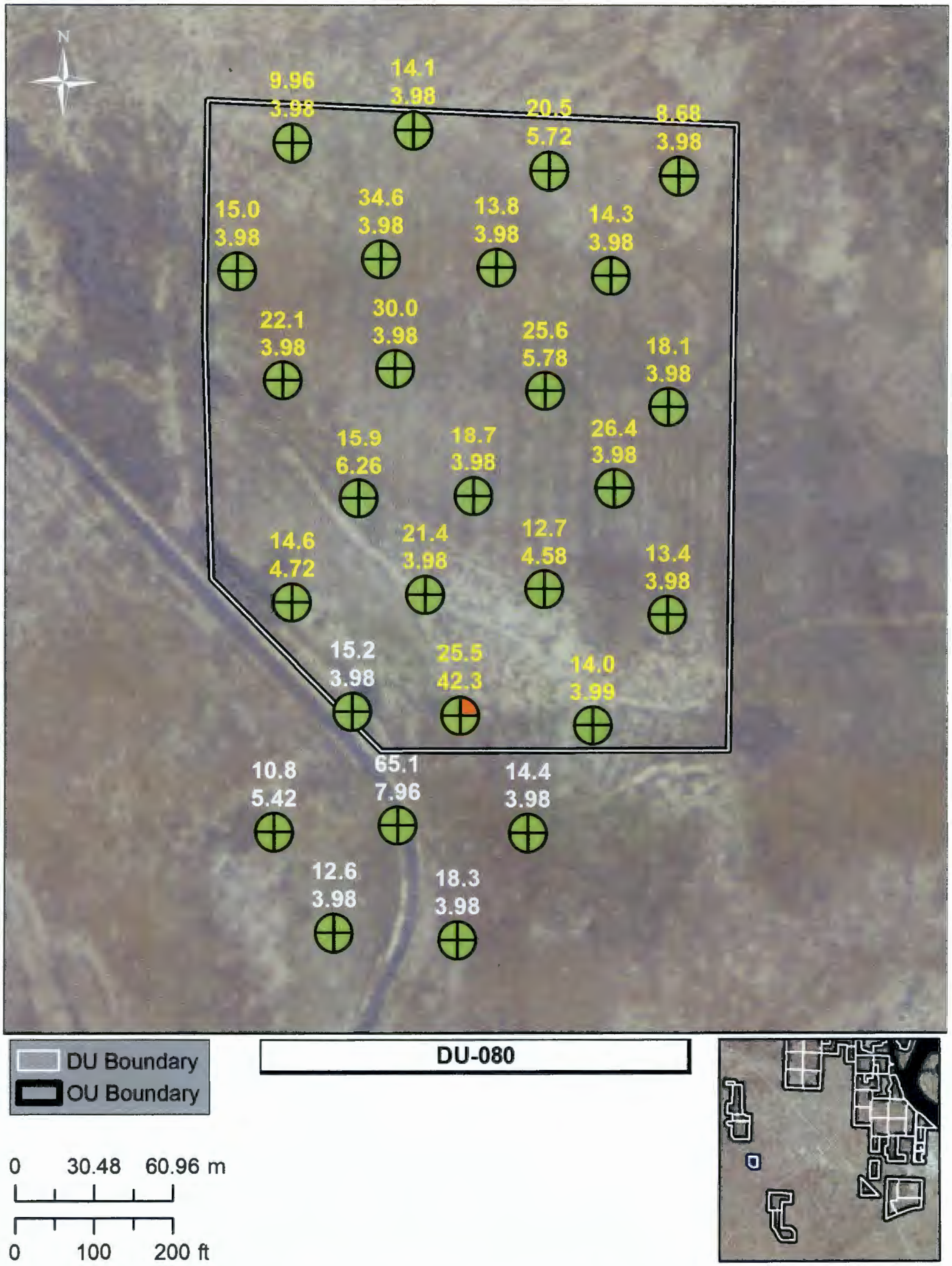


Figure D-30. DU-080 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

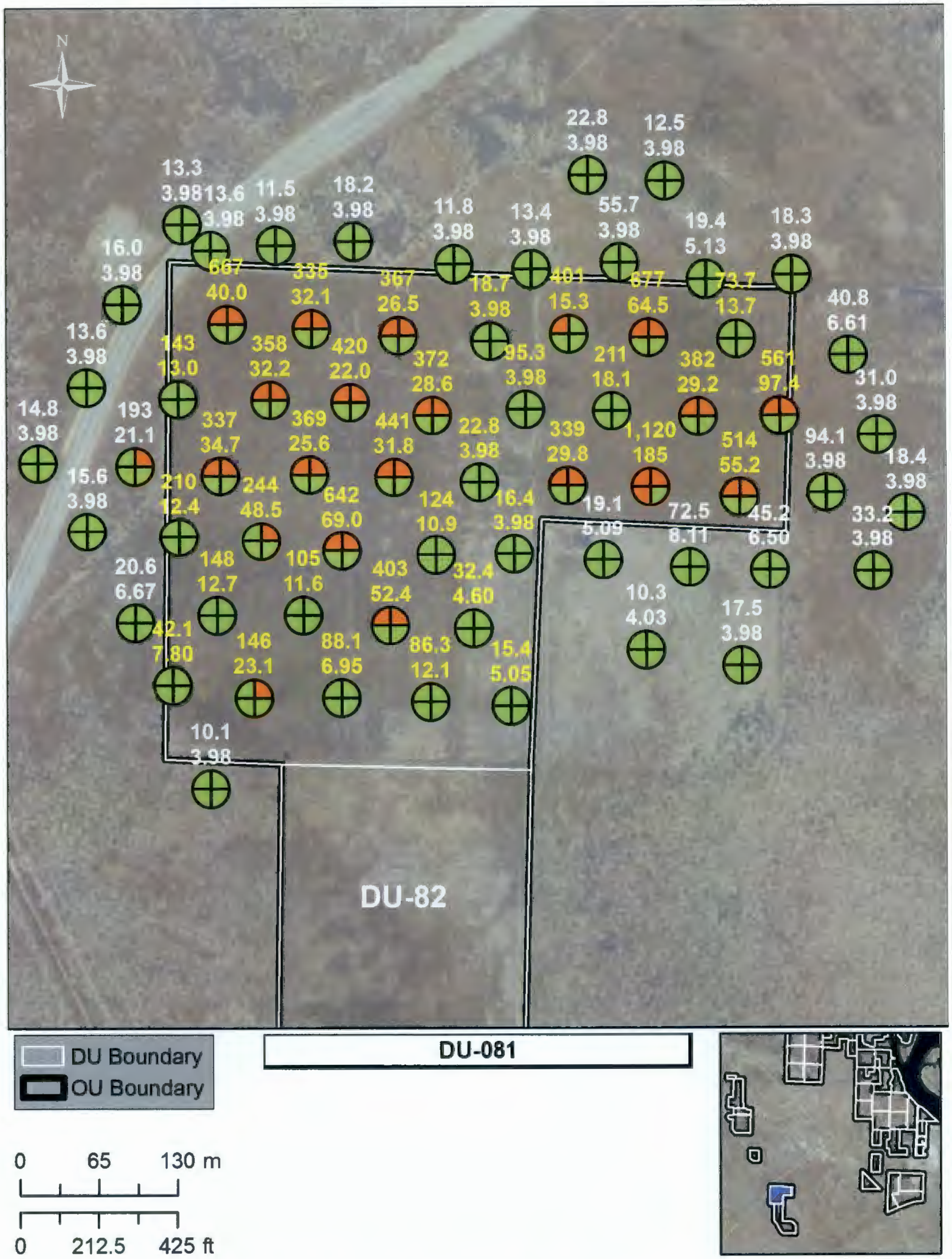


Figure D-31. DU-081 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

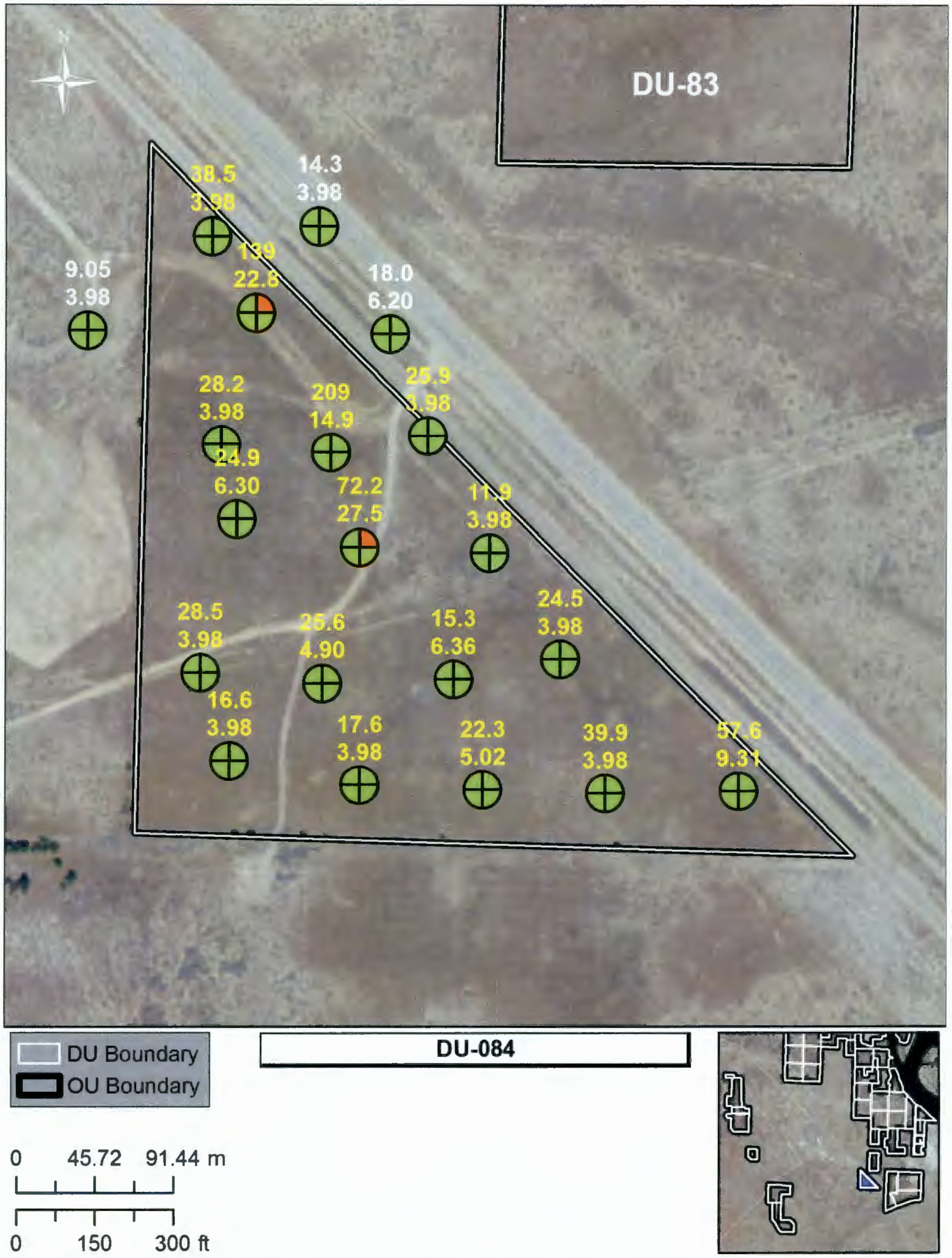


Figure D-32. DU-084 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

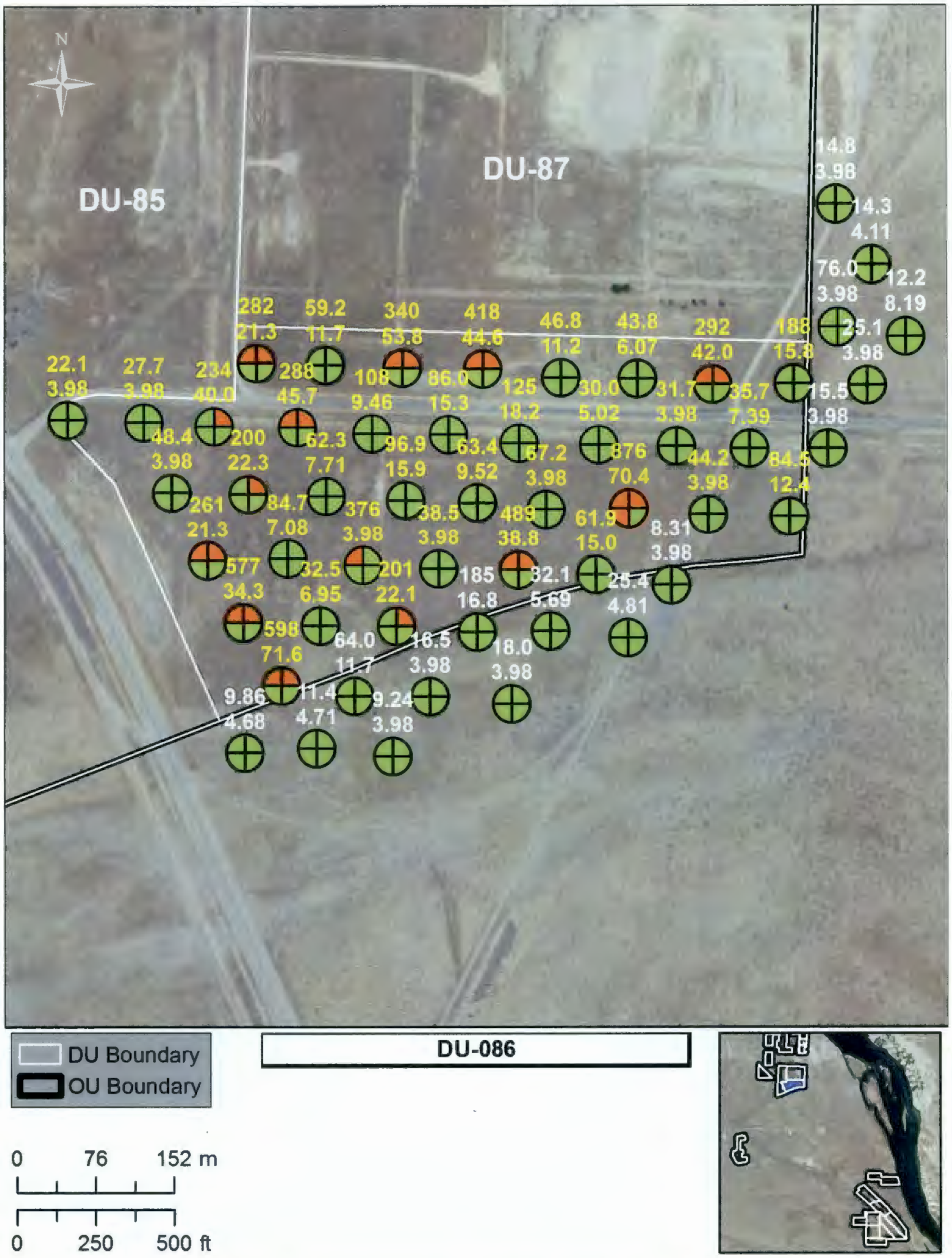


Figure D-33. DU-086 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

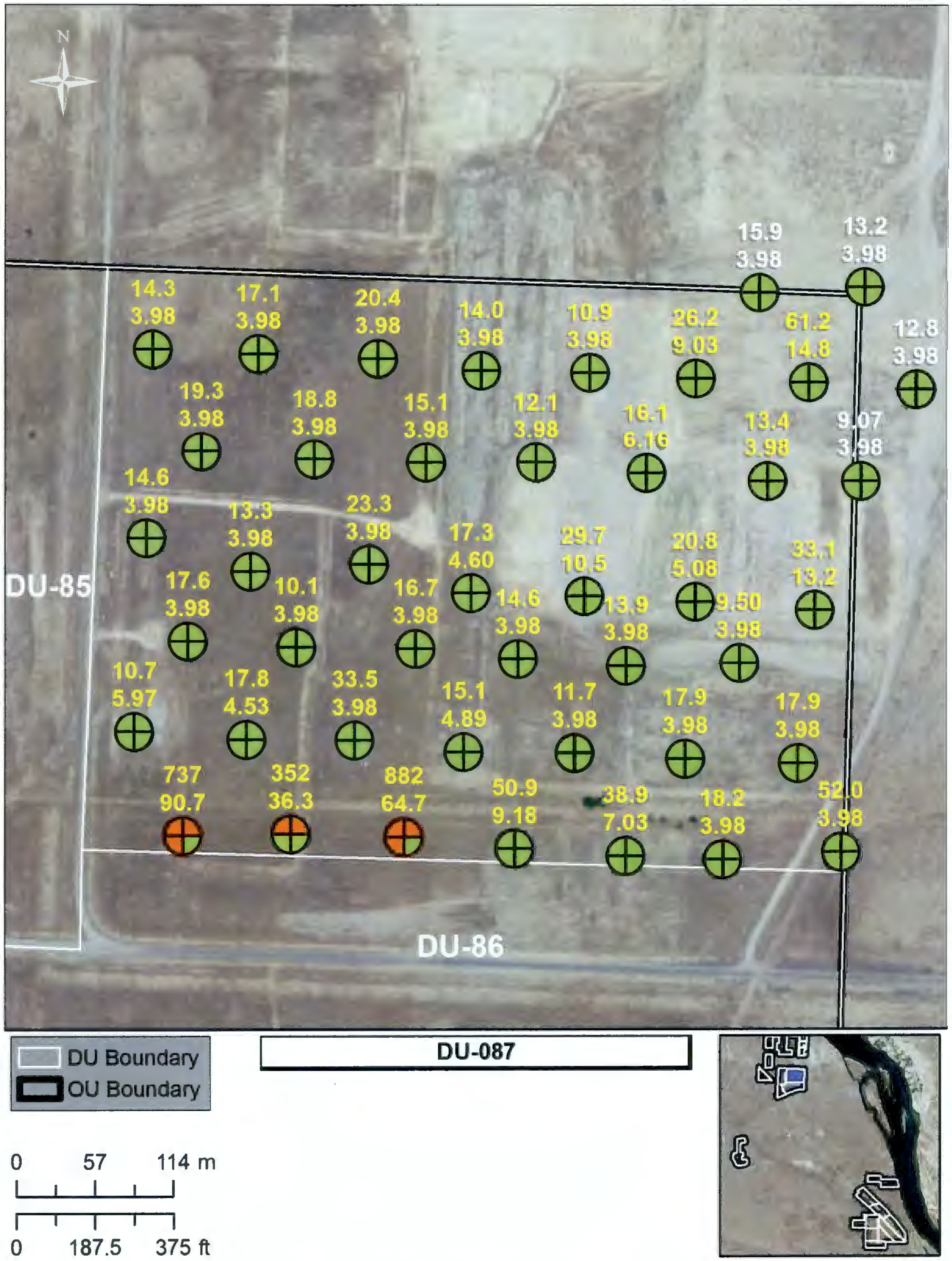


Figure D-34. **DU-087 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

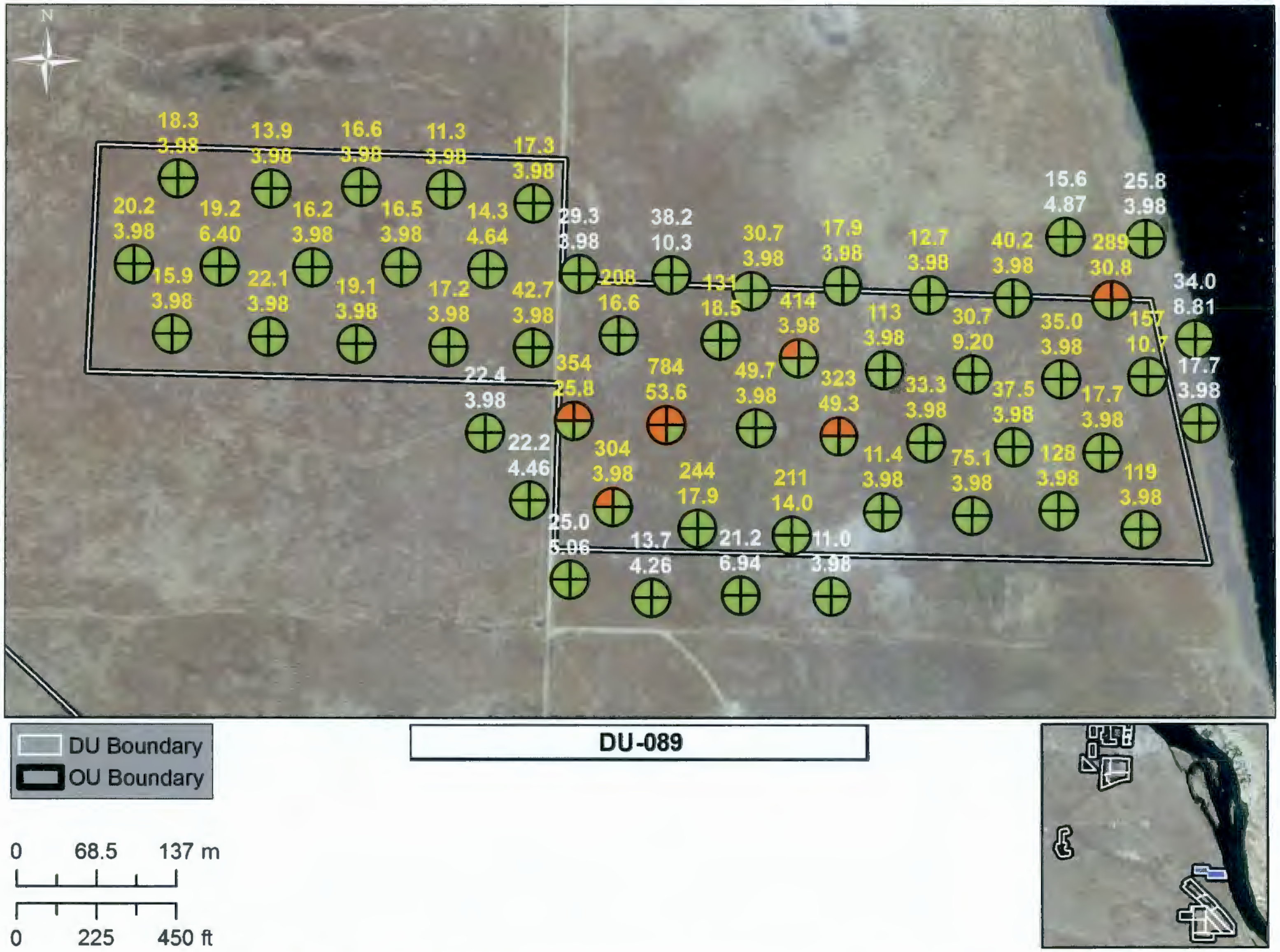


Figure D-35. DU-089 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

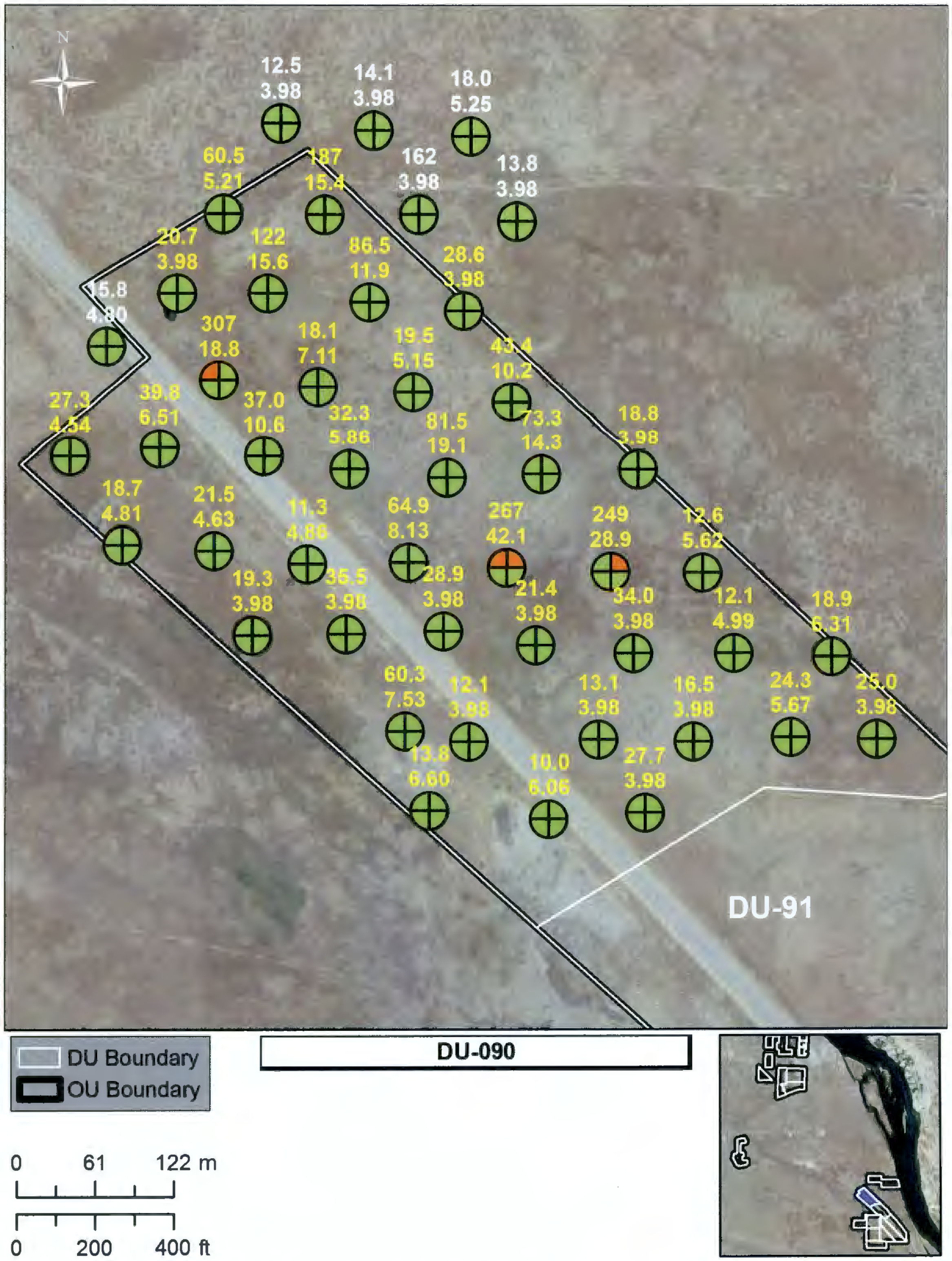


Figure D-36. **DU-090 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

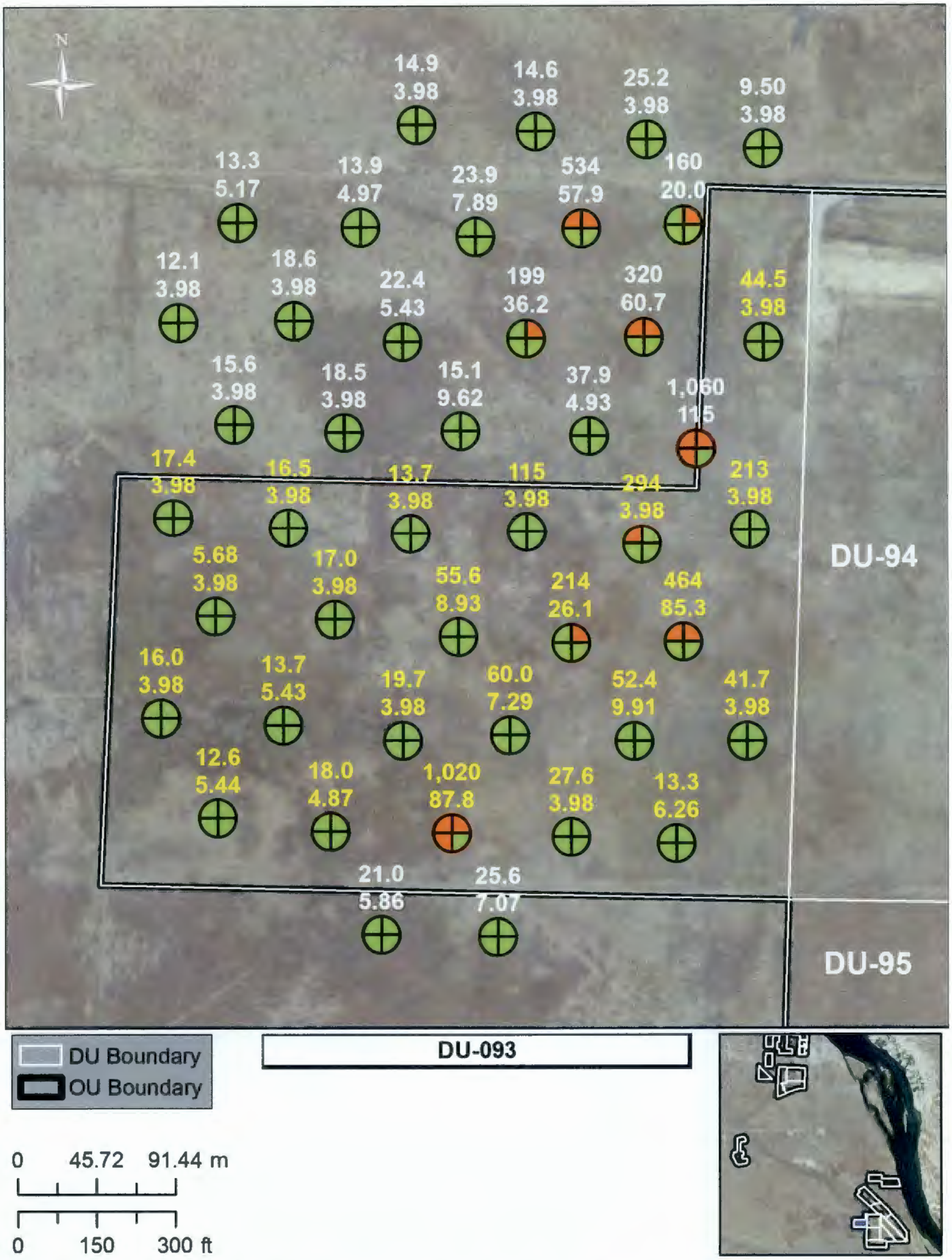


Figure D-37. DU-093 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

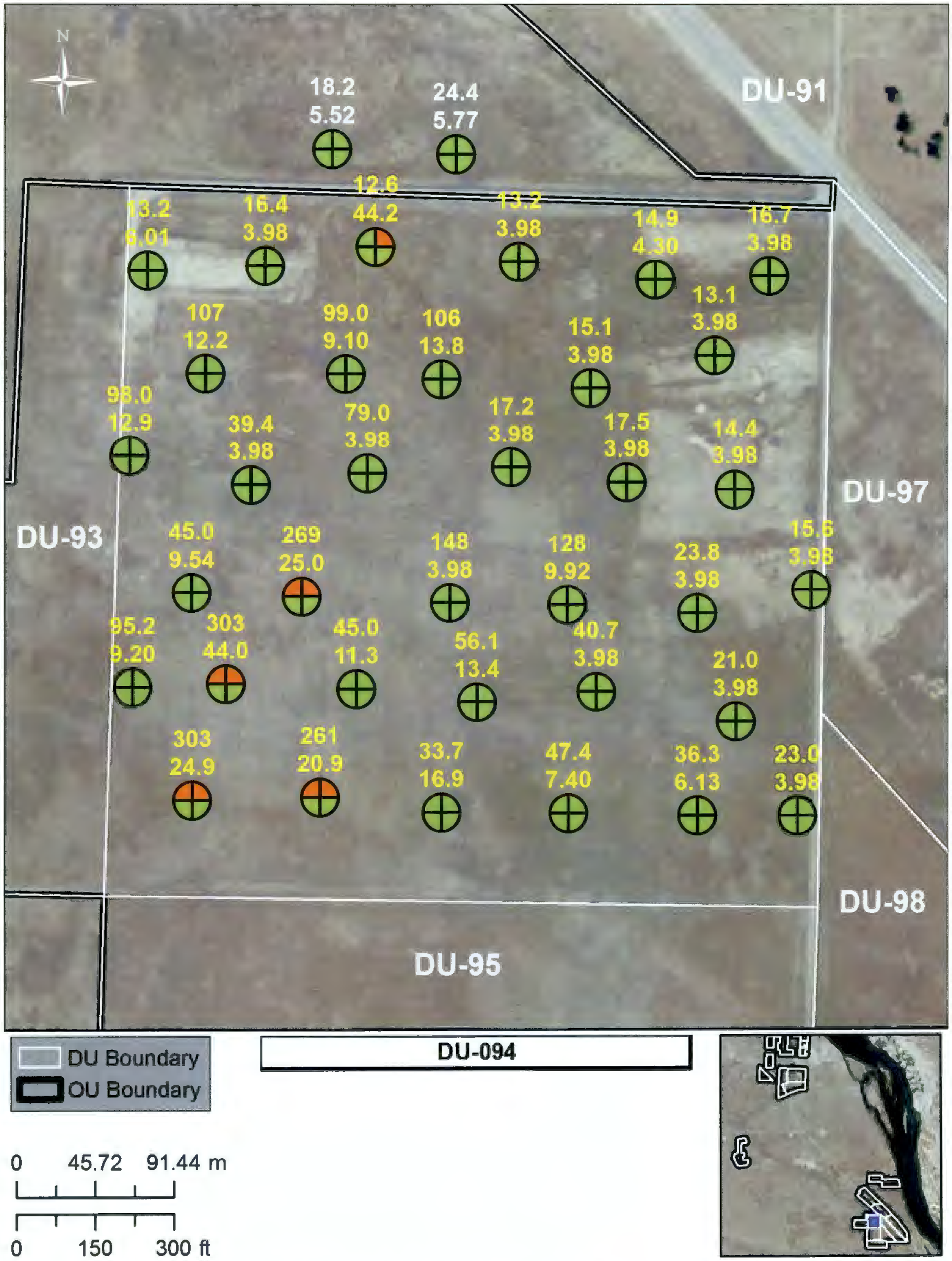


Figure D-38. **DU-094 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

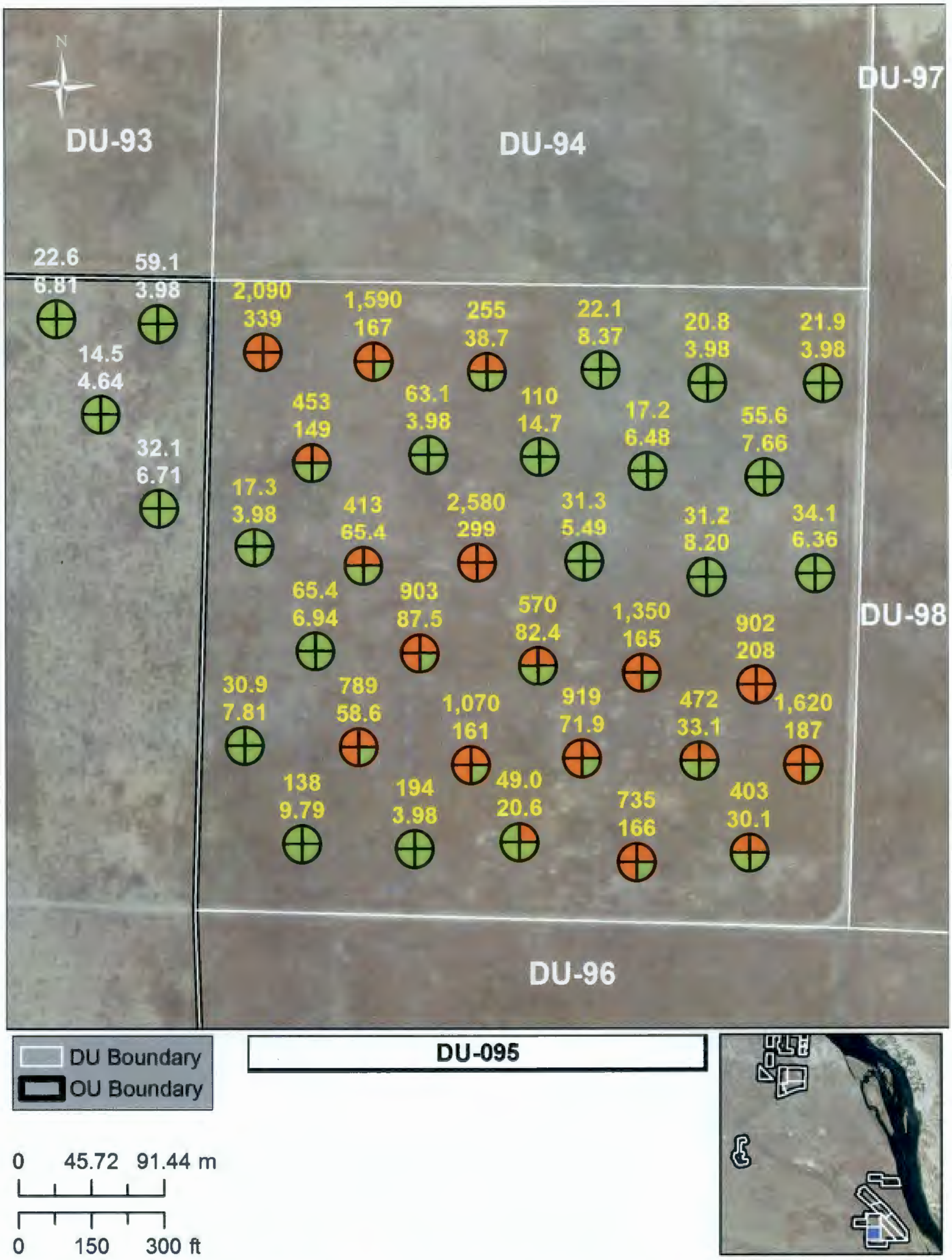


Figure D-39. DU-095 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

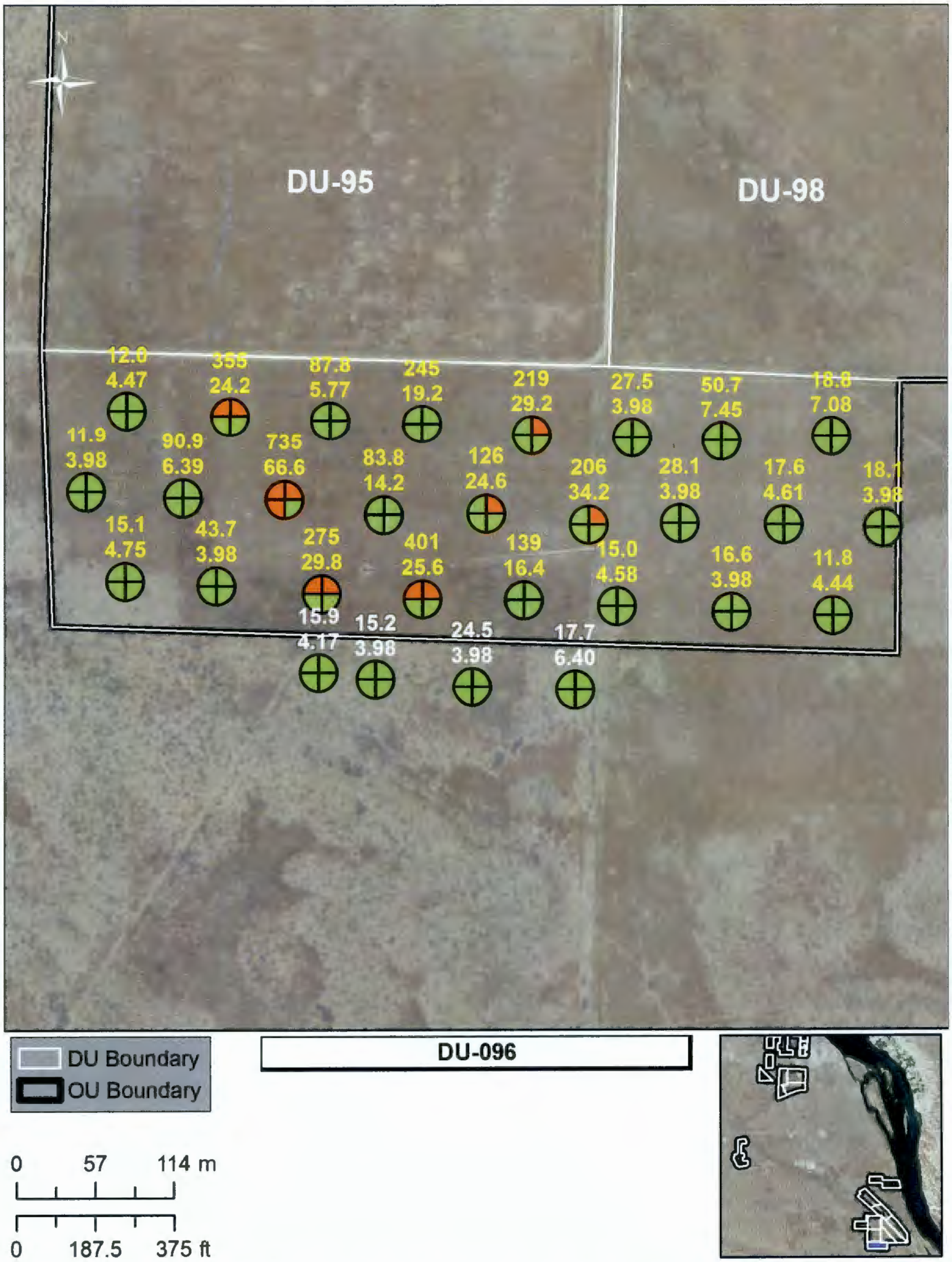


Figure D-40. **DU-096 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

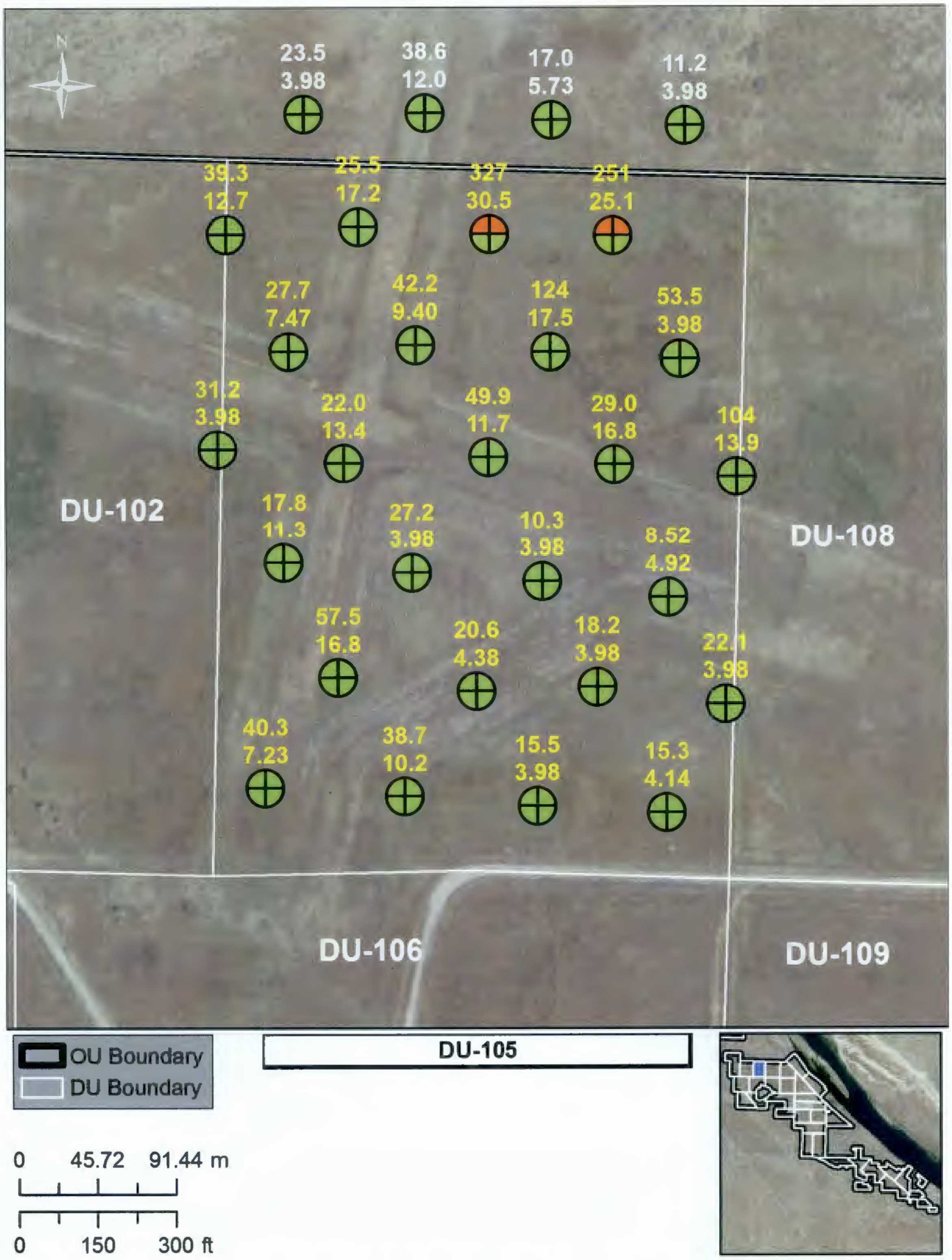


Figure D-41. DU-105 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

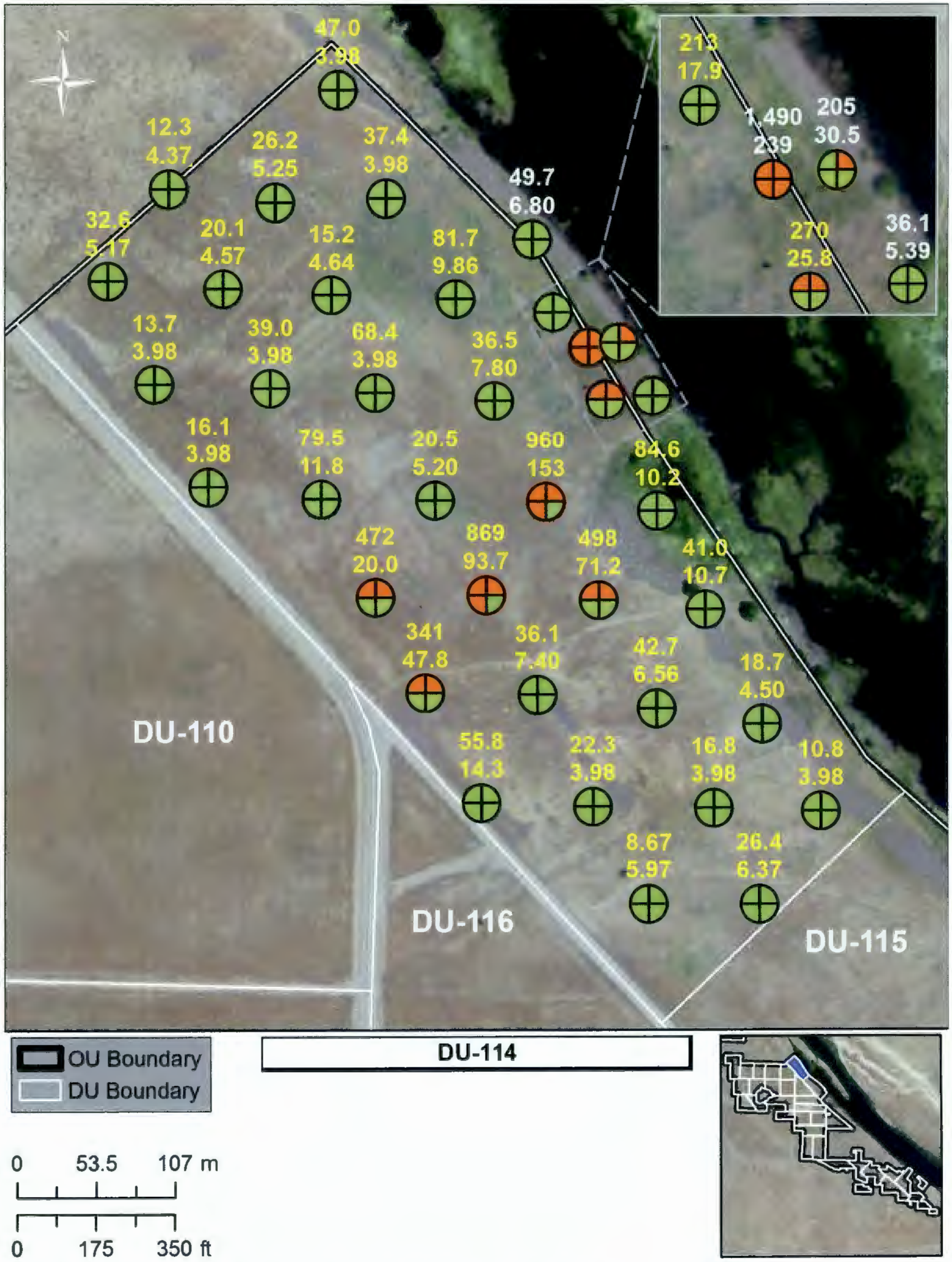


Figure D-42. DU-114 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

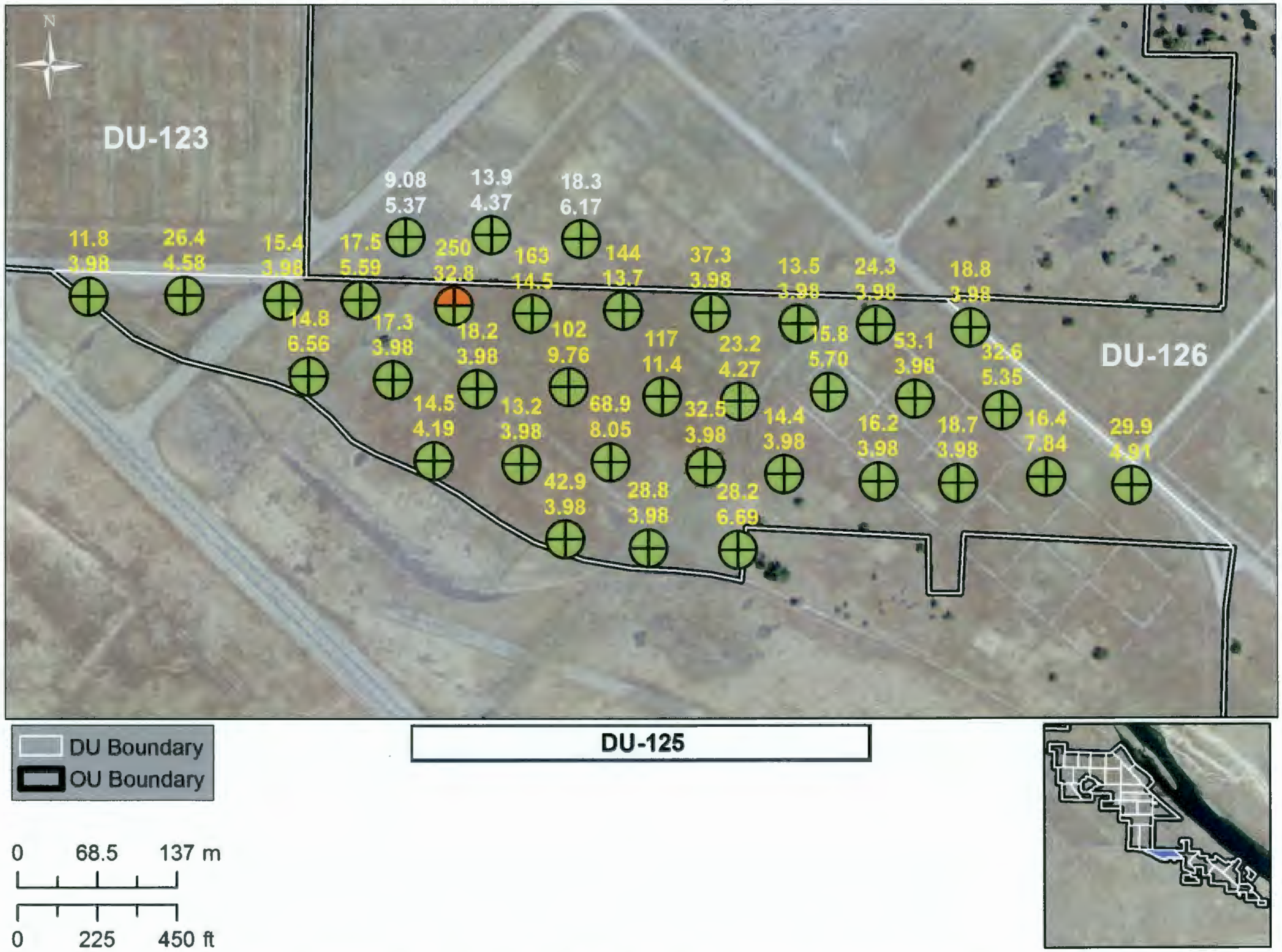


Figure D-43. DU-125 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

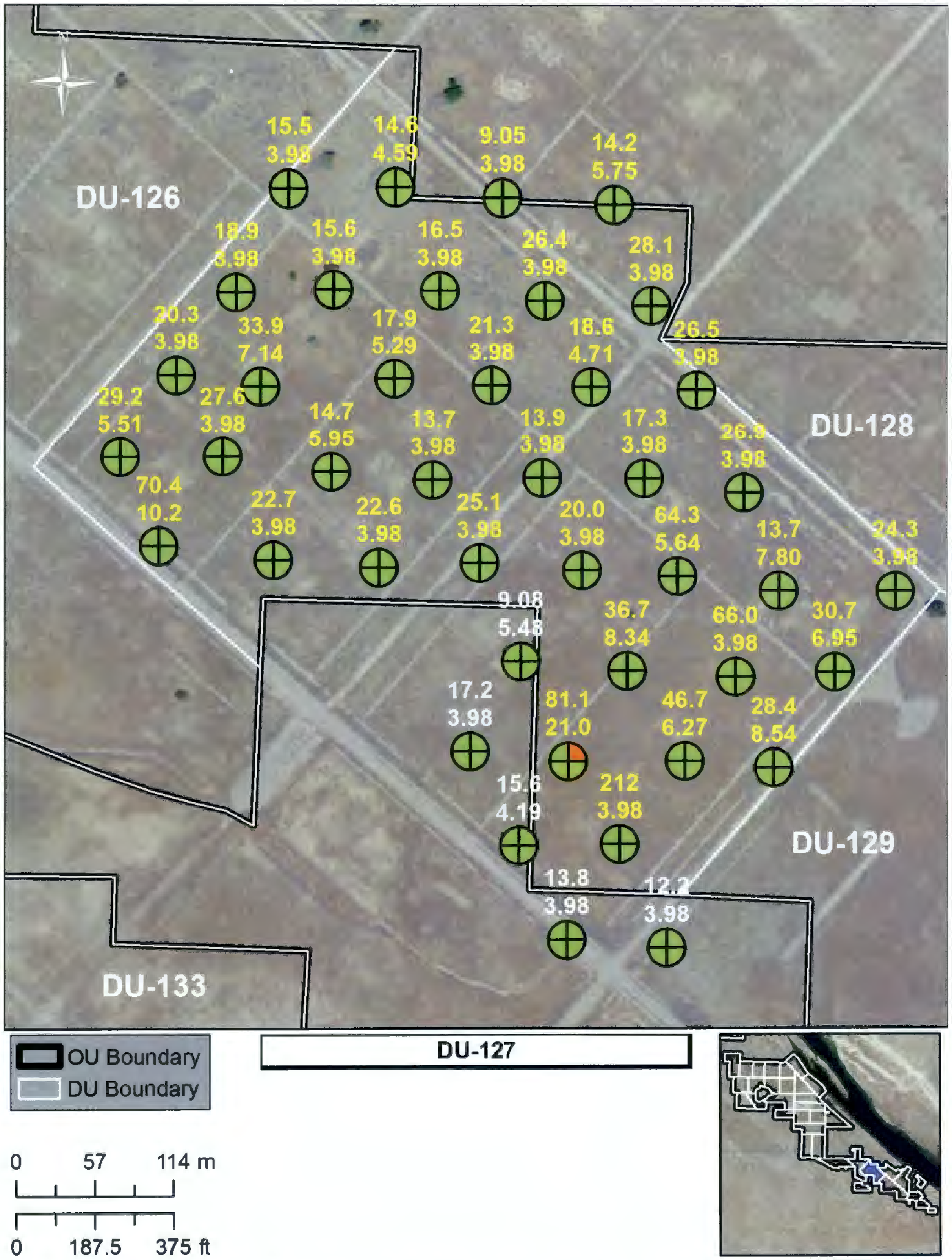


Figure D-44. DU-127 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

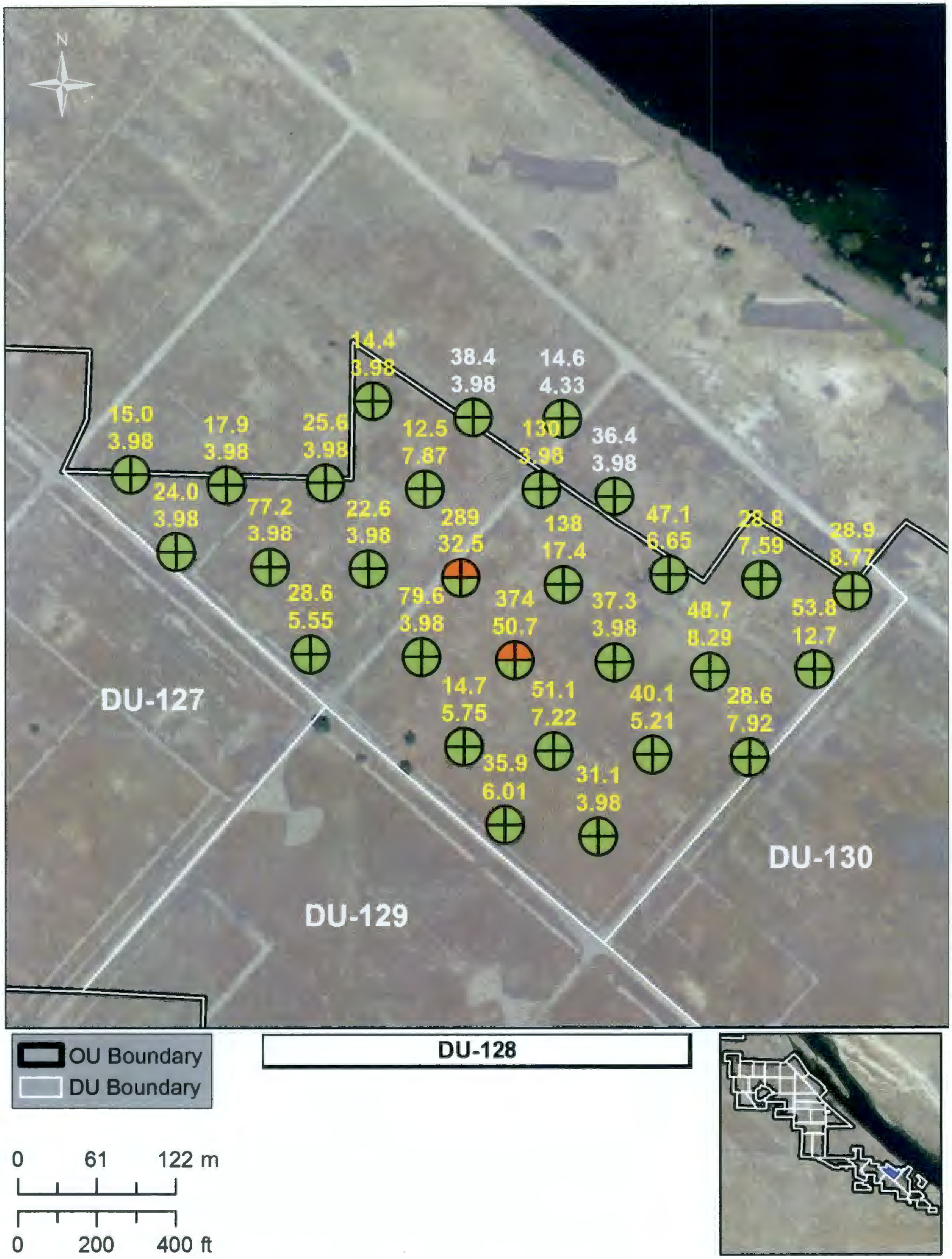


Figure D-45. **DU-128 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

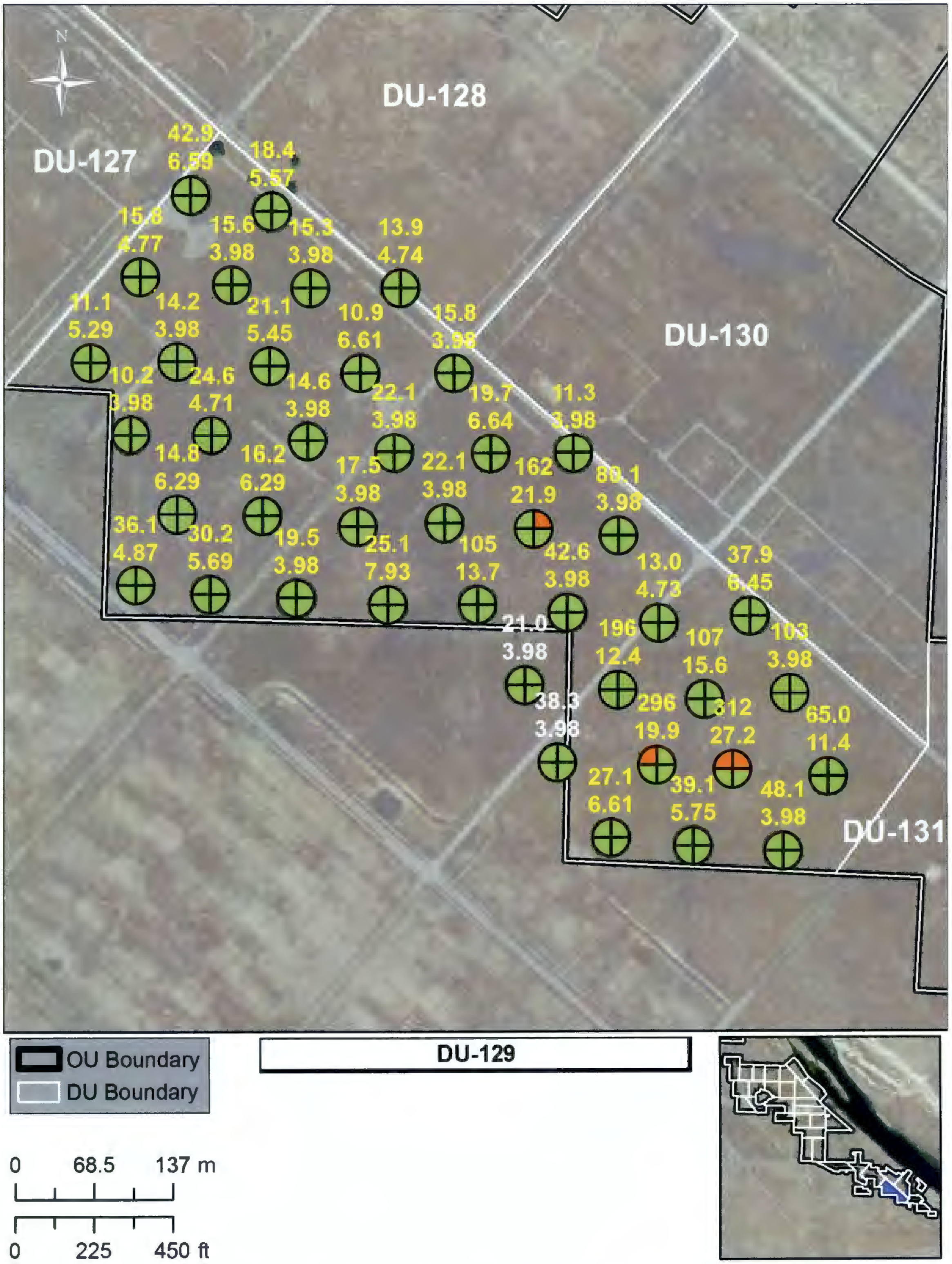


Figure D-46. DU-129 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

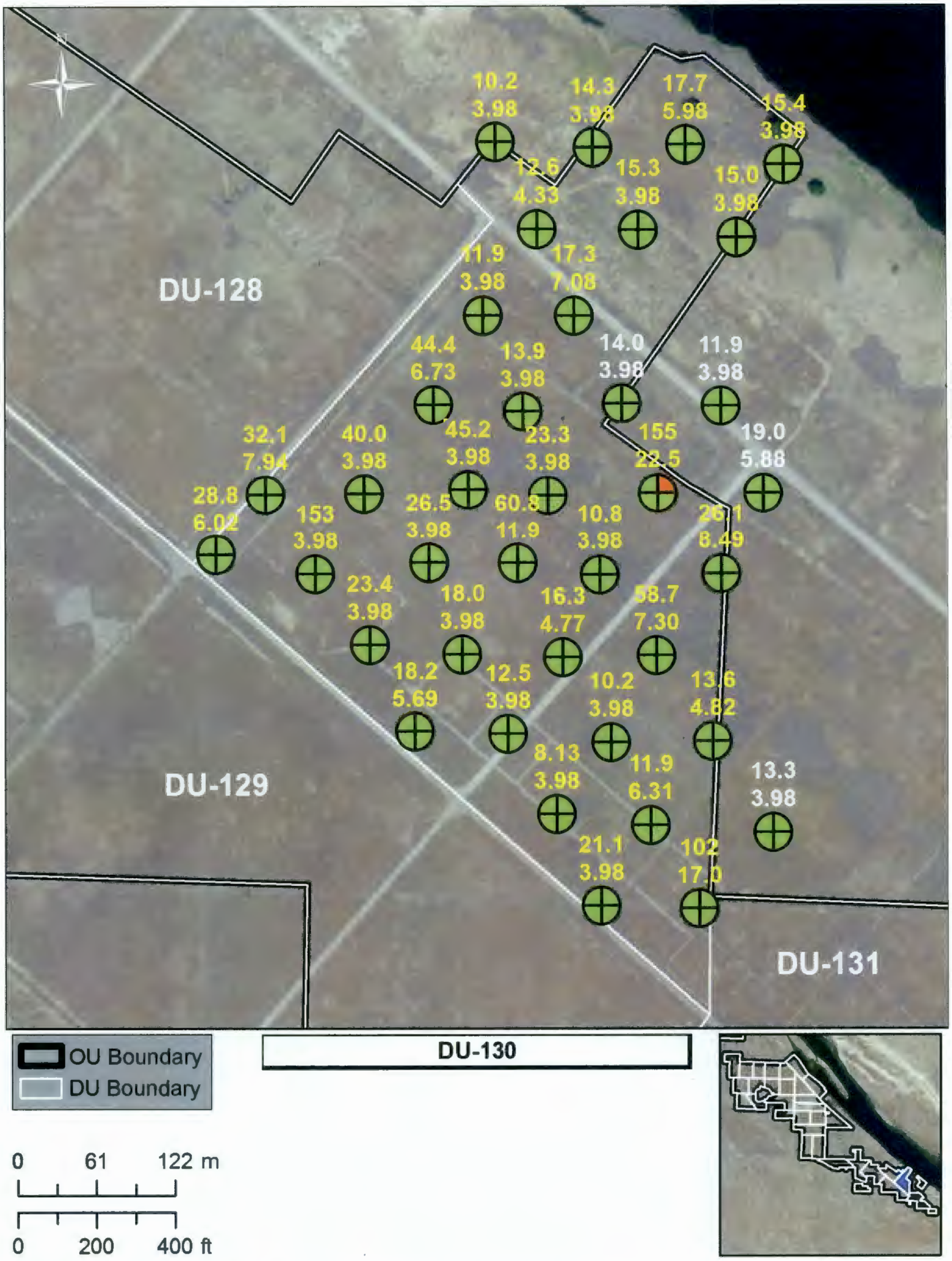


Figure D-47. **DU-130 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

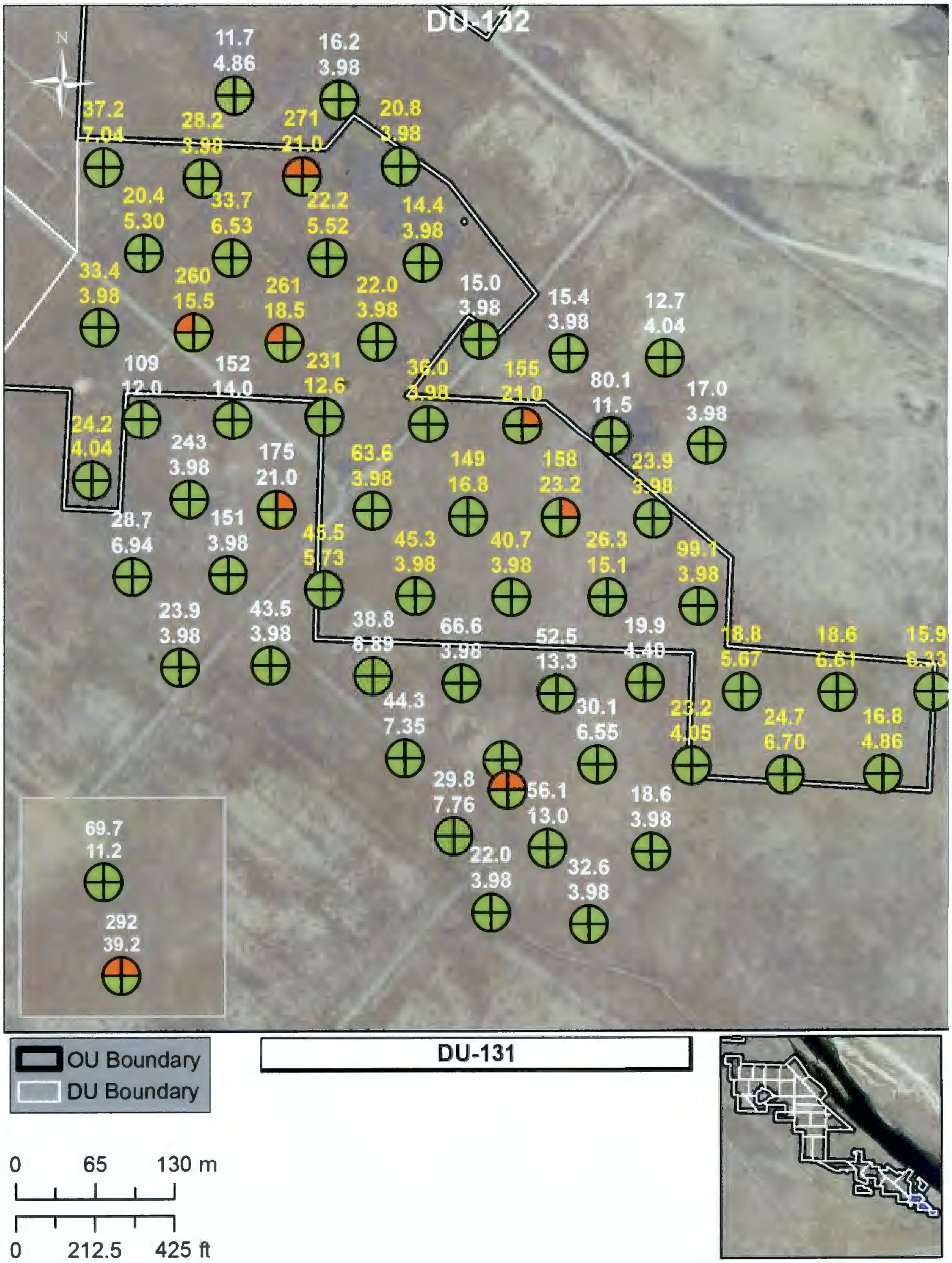


Figure D-48. **DU-131 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.**

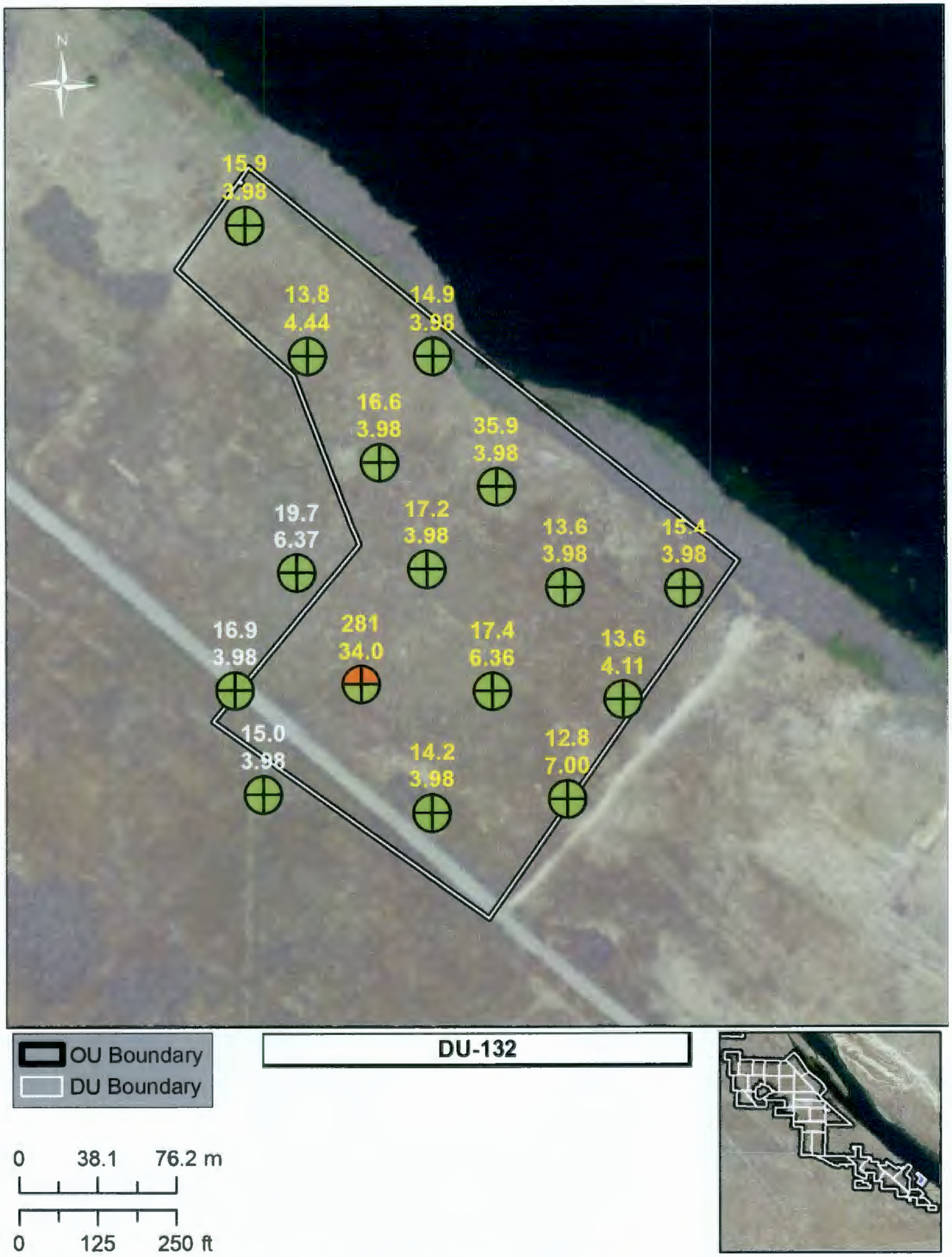


Figure D-49. DU-132 Step-Out Field Characterization Results (mg/kg, unless otherwise noted). Display of results described in Figure D-2. Concentrations along the OU boundary exceeded criteria for step-out sampling. See combined results in Table D-3.

1 **Table D-1. Step-Out Column Heading Description for Table D-2, 100-OL-1 OU Raw Step-Out Data.**

Column Heading	Description
Original DU	The original DU is the decision unit that had lead and/or arsenic values that exceed step-out criteria, thus warrants step-out sampling.
Sample ID	The sample ID (e.g., DU-001-005) is a unique alphanumeric identifier comprised of a decision unit (DU) (e.g., DU-001) and a sample point collected within the DU (e.g., -005.). An "s" following the DU number signifies a step-out (i.e., outside of 100-OL-1) sample location (e.g., DU-001s-005).
XRF Reading Number	A number sequentially assigned by the XRF analyzer; automatically increments with each successive reading until the instrument is reset.
Date/Time	The date and time when the sample was collected.
Latitude	GPS latitude coordinate of current sample location (decimal degrees format).
Longitude	GPS longitude coordinate of current sample location (decimal degrees format).
Lead Concentration or Arsenic Concentration	Concentration measured (mg/kg) during the analysis of the sample.
Lead 2σ Error or Arsenic 2σ Error	The 2-sigma error for the concentration reported; reported in the same units as the concentration value (mg/kg).
Lead Review Qualifiers or Arsenic Review Qualifiers	A set of one or more codes indicating that the quality of the record has been questioned by a reviewer. Appendix B, Table B-2 provides descriptions of review qualifiers.
Lead Validation Qualifiers or Arsenic Validation Qualifiers	A set of one or more codes that are assigned by a qualified individual who validates the results. If no validation qualifier is recorded, the validator agreed with the value reported and review qualifier(s), if applied. Appendix B, Table B-2 provides descriptions of validation qualifiers.
Include Step-Out Sample ID (Y/N)	Clarifies whether the step-out sample ID was included in potential boundary modifications.

2

Table D-2. 100-OL-1 OU Raw Step-Out Data. See Table D-1 for an explanation of column headings.

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
DU-009	DU-009s-001	309	2016-06-17 12:02	46.6520	-119.6034	53.02	4.22			7.83	3.32			N
	DU-009s-002	311	2016-06-17 12:07	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-003	312	2016-06-17 12:10	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-004	313	2016-06-17 12:14	46.6520	-119.6039	59.58	4.29	–	–	11.32	3.42			N
	DU-009s-005	314	2016-06-17 12:18	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-006	315	2016-06-17 12:20	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-007	316	2016-06-17 12:26	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-008	317	2016-06-17 12:29	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-009	318	2016-06-17 12:33	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-010	319	2016-06-17 12:36	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-011	320	2016-06-17 12:39	–	–	–	–	Z	R	–	–	Z	R	N
	DU-009s-012	321	2016-06-17 12:43	–	–	–	–	Z	R	–	–	Z	R	N
DU-010	DU-010s-001	32	2016-07-15 9:54	46.7040	-119.5324	39.62	4.22	–	–	7.52	3.37	–	–	N
	DU-010s-002	34	2016-07-15 9:59	46.7046	-119.5319	32.13	3.83	–	–	6.05	3.05	–	–	N
DU-013	DU-013s-001	35	2016-07-15 10:13	46.7014	-119.5216	23.81	4.75	–	–	< LOD	5.82	U	–	N
	DU-013s-002	47	2016-07-15 10:43	46.7015	-119.5205	17.86	3.40	–	–	5.75	2.76	–	–	N
	DU-013s-004	36	2016-07-15 10:15	46.7021	-119.5209	54.98	4.60	–	–	7.09	3.61	–	–	N
	DU-013s-005	46	2016-07-15 10:40	46.7021	-119.5201	23.83	3.88	–	–	< LOD	4.44	U	–	N
	DU-013s-007	37	2016-07-15 10:18	46.7030	-119.5205	46.02	4.26	–	–	6.23	3.34	–	–	N
	DU-013s-010	38	2016-07-15 10:21	46.7032	-119.5210	29.32	3.77	–	–	6.55	3.02	–	–	N
	DU-013s-011	45	2016-07-15 10:37	46.7032	-119.5200	30.01	3.73	–	–	< LOD	4.31	U	–	N
	DU-013s-013	41	2016-07-15 10:28	46.7038	-119.5205	68.88	4.86	–	–	< LOD	5.59	U	–	N
	DU-013s-014	44	2016-07-15 10:35	46.7038	-119.5195	30.26	3.62	–	–	4.62	2.84	–	–	N
	DU-013s-016	42	2016-07-15 10:30	46.7044	-119.5210	31.66	4.08	–	–	5.09	3.23	–	–	N
	DU-013s-017	43	2016-07-15 10:33	46.7045	-119.5200	21.45	3.27	–	–	< LOD	3.82	U	–	N
DU-020	DU-020s-003	105	2016-07-20 9:15	46.7128	-119.4932	31.59	5.35	–	–	< LOD	6.24	U	–	Y
	DU-020s-004	107	2016-07-20 9:18	46.7126	-119.4928	34.04	4.69	–	–	< LOD	5.58	U	–	Y
	DU-020s-005	108	2016-07-20 9:20	46.7124	-119.4923	66.60	5.11	–	–	6.77	3.98	–	–	Y
	DU-020s-006	109	2016-07-20 9:23	46.7121	-119.4918	123.74	6.14	–	–	13.31	4.77	–	–	Y

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-020s-007	110	2016-07-20 9:25	46.7119	-119.4913	248.13	9.01	–	–	33.72	7.10	–	–	Y
	DU-020s-008	111	2016-07-20 9:27	46.7116	-119.4909	311.91	8.87	–	–	47.64	7.03	–	–	Y
	DU-020s-009	112	2016-07-20 9:29	46.7114	-119.4904	567.74	12.41	–	–	31.53	9.42	–	–	Y
DU-021	DU-021s-002	158	2016-05-24 12:45	46.7079	-119.4895	18.57	3.76	–	–	7.38	3.08	–	–	Y
	DU-021s-003	159	2016-05-24 12:48	46.7080	-119.4886	6.42	3.32	–	–	7.74	2.84	–	–	Y
	DU-021s-004	160	2016-05-24 12:51	46.7080	-119.4877	39.41	3.97	–	–	7.55	3.15	–	–	Y
	DU-021s-014	113	2016-07-20 9:32	46.7113	-119.4899	93.88	5.28	–	–	13.14	4.15	–	–	Y
	DU-021s-015	114	2016-07-20 9:35	46.7110	-119.4893	186.82	8.42	–	–	< LOD	9.58	U	–	Y
	DU-021s-016	116	2016-07-20 9:39	46.7107	-119.4885	141.72	6.31	–	–	13.45	4.88	–	–	Y
	DU-021s-017	117	2016-07-20 9:41	46.7104	-119.4878	46.78	4.38	–	–	7.89	3.48	–	–	Y
	DU-021s-018	119	2016-07-20 9:45	46.7100	-119.4869	31.01	3.56	–	–	9.71	2.94	–	–	Y
	DU-021s-019	120	2016-07-20 9:48	46.7097	-119.4863	41.12	5.11	–	–	8.61	4.14	–	–	Y
	DU-021s-021	115	2016-07-20 9:37	46.7108	-119.4888	52.16	4.59	–	–	7.28	3.62	–	–	Y
	DU-021s-022	118	2016-07-20 9:43	46.7102	-119.4874	97.38	5.59	–	–	14.17	4.40	–	–	Y
DU-022	DU-022s-001	152	2016-05-24 12:05	46.7078	-119.4836	75.74	4.90	–	–	9.68	3.83	–	–	Y
	DU-022s-002	156	2016-05-24 12:28	46.7078	-119.4847	23.45	3.12	–	–	< LOD	3.66	U	–	Y
	DU-022s-003	142	2016-05-24 11:41	46.7072	-119.4841	394.98	9.98	–	–	58.71	7.89	–	–	Y
	DU-022s-004	151	2016-05-24 12:01	46.7072	-119.4831	41.48	4.10	–	–	6.35	3.22	–	–	Y
	DU-022s-005	157	2016-05-24 12:30	46.7072	-119.4851	19.02	4.13	–	–	8.65	3.43	–	–	Y
	DU-022s-006	141	2016-05-24 11:36	46.7066	-119.4847	19.89	3.26	–	–	< LOD	3.81	U	–	Y
	DU-022s-013	140	2016-05-24 11:29	46.7030	-119.4847	27.53	3.48	–	–	4.85	2.75	–	–	N
	DU-022s-014	155	2016-05-24 12:25	46.7083	-119.4841	37.63	3.81	–	–	< LOD	4.45	U	–	Y
	DU-022s-015	153	2016-05-24 12:15	46.7079	-119.4835	22.51	3.47	–	–	4.39	2.76	–	–	Y
	DU-022s-016	154	2016-05-24 12:20	46.7073	-119.4825	35.35	3.80	–	–	7.04	3.04	–	–	Y
DU-023	DU-023s-001	121	2016-07-20 10:05	46.7008	-119.4862	11.02	3.18	–	–	< LOD	3.79	U	–	N
	DU-023s-002	122	2016-07-20 10:08	46.7007	-119.4874	17.86	3.45	–	–	4.19	2.77	–	–	N
	DU-023s-003	123	2016-07-20 10:10	46.7013	-119.4877	17.60	3.42	–	–	4.88	2.75	–	–	N
DU-024	DU-024s-004	124	2016-07-20 10:20	46.6967	-119.4771	14.27	3.07	–	–	< LOD	3.63	U	–	N
DU-026	DU-026s-005	187	2016-06-15 9:14	46.6992	-119.4938	12.73	3.14	–	–	< LOD	3.73	U	–	N
	DU-026s-006	186	2016-06-15 9:12	46.6996	-119.4934	13.38	2.99	–	–	4.20	2.39	–	–	N
	DU-026s-007	184	2016-06-15 9:09	46.7000	-119.4939	15.15	3.01	–	–	< LOD	3.55	U	–	N
	DU-026s-009	188	2016-06-15 9:18	46.6988	-119.4912	27.99	3.50	–	–	4.34	2.75	–	–	Y

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-026s-010	56	2016-06-09 9:47	46.6993	-119.4926	33.51	3.75	–	–	< LOD	4.37	U	–	Y
	DU-026s-011	87	2016-06-09 11:07	46.6992	-119.4915	28.72	3.71	–	–	< LOD	4.34	U	–	Y
	DU-026s-012	59	2016-06-09 9:56	46.6992	-119.4932	9.70	3.42	–	–	6.06	2.85	–	–	N
	DU-026s-013	86	2016-06-09 11:03	46.6992	-119.4909	62.37	4.57	–	–	< LOD	5.25	U	–	Y
	DU-026s-014	58	2016-06-09 9:51	46.6997	-119.4928	54.53	4.37	–	–	< LOD	5.03	U	–	Y
	DU-026s-015	84	2016-06-09 10:56	46.6996	-119.4912	67.62	4.99	–	–	< LOD	5.79	U	–	Y
	DU-026s-016	60	2016-06-09 9:59	46.7000	-119.4932	11.37	2.83	–	–	< LOD	3.34	U	–	N
	DU-026s-017	85	2016-06-09 11:00	46.6999	-119.4909	37.44	4.55	–	–	7.44	3.66	–	–	Y
	DU-026s-018	61	2016-06-09 10:02	46.7003	-119.4928	43.20	4.24	–	–	8.59	3.38	–	–	Y
	DU-026s-019	76	2016-06-09 10:41	46.7003	-119.4911	19.17	3.25	–	–	4.29	2.60	–	–	Y
	DU-026s-020	62	2016-06-09 10:04	46.7007	-119.4931	16.06	3.24	–	–	4.66	2.60	–	–	N
	DU-026s-022	63	2016-06-09 10:06	46.7010	-119.4928	24.27	3.40	–	–	< LOD	3.96	U	–	Y
	DU-026s-023	75	2016-06-09 10:38	46.7009	-119.4912	35.50	4.32	–	–	< LOD	5.08	U	–	Y
	DU-026s-024	65	2016-06-09 10:12	46.7014	-119.4932	19.86	3.83	–	–	< LOD	4.52	U	–	N
	DU-026s-025	64	2016-06-09 10:09	46.7014	-119.4925	69.10	5.83	–	–	13.37	4.69	–	–	Y
	DU-026s-026	68	2016-06-09 10:20	46.7013	-119.4920	123.28	6.11	–	–	< LOD	6.84	U	–	Y
	DU-026s-027	73	2016-06-09 10:32	46.7013	-119.4914	184.73	7.30	–	–	17.49	5.64	–	–	Y
	DU-026s-028	74	2016-06-09 10:35	46.7013	-119.4909	19.01	3.21	–	–	4.65	2.57	–	–	Y
	DU-026s-029	66	2016-06-09 10:15	46.7017	-119.4928	23.22	3.43	–	–	4.13	2.70	–	–	Y
	DU-026s-030	67	2016-06-09 10:17	46.7017	-119.4922	18.87	3.35	–	–	< LOD	3.99	U	–	Y
	DU-026s-031	69	2016-06-09 10:23	46.7017	-119.4917	58.38	5.12	–	–	7.47	4.02	–	–	Y
	DU-026s-032	72	2016-06-09 10:30	46.7017	-119.4911	14.36	3.42	–	–	< LOD	4.10	U	–	Y
	DU-026s-034	70	2016-06-09 10:26	46.7019	-119.4921	13.93	3.20	–	–	4.78	2.60	–	–	N
	DU-026s-035	71	2016-06-09 10:28	46.7019	-119.4914	14.81	3.72	–	–	< LOD	4.42	U	–	N
	DU-026s-036	88	2016-06-09 11:18	46.6989	-119.4907	17.40	3.25	–	–	< LOD	3.85	U	–	N
	DU-026s-037	89	2016-06-09 11:21	46.6991	-119.4904	12.49	3.10	–	–	< LOD	3.73	U	–	N
	DU-026s-038	90	2016-06-09 11:24	46.6994	-119.4905	19.95	3.59	–	–	< LOD	4.17	U	–	N
DU-039	DU-039s-001	170	2016-05-24 13:57	46.6947	-119.5005	17.84	3.18	–	–	< LOD	2.52	U	–	N
DU-040	DU-040s-007	138	2016-05-24 11:04	46.6917	-119.4769	16.17	3.54	–	–	< LOD	4.20	U	–	N
	DU-040s-008	137	2016-05-24 11:01	46.6918	-119.4759	32.52	3.79	–	–	6.37	3.01	–	–	N
	DU-040s-009	136	2016-05-24 10:59	46.6918	-119.4748	35.30	3.73	–	–	< LOD	4.33	U	–	N
	DU-040s-014	139	2016-05-24 11:11	46.6930	-119.4738	19.94	3.18	–	–	< LOD	3.73	U	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
DU-047	DU-047s-001	78	2016-05-20 12:43	46.6891	-119.4844	57.99	4.36	–	–	7.63	3.41	–	–	N
	DU-047s-002	79	2016-05-20 12:47	46.6890	-119.4835	13.79	3.37	–	–	< LOD	4.06	U	–	N
	DU-047s-003	80	2016-05-20 12:49	46.6897	-119.4838	20.24	3.21	–	–	6.39	2.60	–	–	N
	DU-047s-007	83	2016-05-20 13:04	46.6909	-119.4878	17.92	3.18	–	–	4.06	2.53	–	–	N
	DU-047s-008	82	2016-05-20 13:00	46.6909	-119.4867	24.53	3.75	–	–	< LOD	4.45	U	–	N
	DU-047s-009	81	2016-05-20 12:58	46.6908	-119.4858	16.04	3.58	–	–	< LOD	4.28	U	–	N
DU-048	DU-048s-001	47	2016-05-20 10:34	46.6848	-119.4839	21.78	3.25	–	–	< LOD	2.56	U	–	N
DU-049	DU-048s-020	46	2016-05-20 10:28	46.6816	-119.4834	22.45	3.25	–	–	6.11	2.61	–	–	N
DU-052	DU-048s-003	48	2016-05-20 10:38	46.6848	-119.4819	15.27	3.16	–	–	4.10	2.53	–	–	N
DU-053	DU-053s-001	52	2016-05-20 11:14	46.6871	-119.4808	16.10	3.18	–	–	5.05	2.55	–	–	N
	DU-053s-002	51	2016-05-20 11:09	46.6870	-119.4797	61.92	4.66	–	–	< LOD	5.38	U	–	N
	DU-053s-003	53	2016-05-20 11:16	46.6877	-119.4802	16.04	3.46	–	–	< LOD	4.10	U	–	N
	DU-053s-004	64	2016-05-20 11:35	46.6877	-119.4793	12.96	3.15	–	–	5.87	2.58	–	–	N
	DU-053s-007	65	2016-05-20 11:37	46.6882	-119.4787	30.17	3.54	–	–	< LOD	4.15	U	–	N
	DU-053s-008	66	2016-05-20 11:40	46.6882	-119.4778	20.24	3.37	–	–	6.84	2.74	–	–	N
	DU-053s-009	67	2016-05-20 11:44	46.6882	-119.4767	25.49	3.39	–	–	< LOD	3.98	U	–	N
	DU-053s-012	68	2016-05-20 11:47	46.6888	-119.4773	18.82	3.12	–	–	5.07	2.51	–	–	N
	DU-053s-013	77	2016-05-20 12:12	46.6888	-119.4734	11.32	3.06	–	–	6.08	2.53	–	–	N
	DU-053s-017	69	2016-05-20 11:52	46.6894	-119.4767	44.83	3.90	–	–	< LOD	4.54	U	–	N
	DU-053s-018	76	2016-05-20 12:09	46.6893	-119.4738	21.64	3.53	–	–	5.96	2.85	–	–	N
	DU-053s-022	70	2016-05-20 11:54	46.6900	-119.4772	9.52	2.82	–	–	4.23	2.28	–	–	N
	DU-053s-023	75	2016-05-20 12:07	46.6899	-119.4733	12.74	3.28	–	–	< LOD	3.86	U	–	N
	DU-053s-027	71	2016-05-20 11:57	46.6907	-119.4768	21.63	3.26	–	–	< LOD	3.84	U	–	N
	DU-053s-028	72	2016-05-20 12:00	46.6906	-119.4758	18.72	3.31	–	–	5.82	2.68	–	–	N
	DU-053s-029	73	2016-05-20 12:02	46.6906	-119.4747	31.07	3.72	–	–	< LOD	4.33	U	–	N
	DU-053s-030	74	2016-05-20 12:04	46.6906	-119.4738	16.19	3.06	–	–	< LOD	2.44	U	–	N
DU-055	DU-055s-006	43	2016-05-20 9:54	46.6809	-119.4764	18.22	3.59	–	–	5.18	2.91	–	–	N
	DU-056s-002	35	2016-05-20 9:13	46.6820	-119.4735	21.93	3.53	–	–	< LOD	4.07	U	–	N
DU-056	DU-055s-004	44	2016-05-20 9:56	46.6803	-119.4770	23.54	3.37	–	–	< LOD	3.96	U	–	N
	DU-055s-005	45	2016-05-20 9:59	46.6797	-119.4765	17.87	3.12	–	–	4.85	2.49	–	–	N
	DU-056s-001	36	2016-05-20 9:17	46.6808	-119.4735	18.02	3.70	–	–	< LOD	4.45	U	–	N
DU-057	DU-057s-001	49	2016-05-20 10:54	46.6882	-119.4705	23.38	3.40	–	–	< LOD	3.97	U	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-057s-002	50	2016-05-20 10:57	46.6876	-119.4700	27.96	4.22	–	–	5.26	3.37	–	–	N
DU-062	DU-056s-007	38	2016-05-20 9:24	46.6795	-119.4725	33.48	3.90	–	–	< LOD	4.59	U	–	N
	DU-056s-008	37	2016-05-20 9:20	46.6795	-119.4735	16.21	2.97	–	–	< LOD	3.53	U	–	N
	DU-056s-010	39	2016-05-20 9:27	46.6796	-119.4716	21.58	3.43	–	–	< LOD	4.01	U	–	N
	DU-056s-011	40	2016-05-20 9:29	46.6795	-119.4705	16.38	3.16	–	–	< LOD	3.74	U	–	N
	DU-056s-012	41	2016-05-20 9:31	46.6795	-119.4696	16.33	3.57	–	–	< LOD	4.17	U	–	N
	DU-056s-013	42	2016-05-20 9:34	46.6795	-119.4686	14.12	2.95	–	–	4.66	2.38	–	–	N
	DU-062s-001	33	2016-05-20 8:54	46.6768	-119.4738	22.62	3.28	–	–	< LOD	3.85	U	–	N
DU-063	DU-063s-001	135	2016-05-24 10:29	46.6796	-119.4676	31.99	3.75	–	–	< LOD	4.32	U	–	N
	DU-063s-002	134	2016-05-24 10:24	46.6795	-119.4666	46.70	4.32	–	–	< LOD	5.04	U	–	N
DU-064	DU-064s-001	131	2016-05-24 10:02	46.6742	-119.4707	22.13	3.39	–	–	6.51	2.73	–	–	N
	DU-064s-002	132	2016-05-24 10:08	46.6731	-119.4737	12.13	3.04	–	–	< LOD	3.59	U	–	N
DU-065	DU-065s-001	48	2016-07-15 11:07	46.6707	-119.4676	14.80	3.25	–	–	< LOD	3.90	U	–	N
	DU-065s-002	49	2016-07-15 11:09	46.6712	-119.4681	28.95	3.52	–	–	5.26	2.79	–	–	N
DU-073	DU-073s-001	123	2016-05-24 9:05	46.6573	-119.4623	10.20	2.98	–	–	4.21	2.40	–	–	N
	DU-073s-002	124	2016-05-24 9:08	46.6573	-119.4613	19.72	3.34	–	–	4.07	2.65	–	–	N
	DU-073s-003	121	2016-05-24 9:01	46.6586	-119.4633	23.12	3.58	–	–	< LOD	4.21	U	–	N
	DU-073s-004	127	2016-05-24 9:18	46.6604	-119.4598	41.50	4.09	–	–	6.27	3.22	–	–	N
	DU-073s-005	126	2016-05-24 9:16	46.6598	-119.4595	11.67	2.77	–	–	5.04	2.26	–	–	N
	DU-073s-006	125	2016-05-24 9:13	46.6592	-119.4599	13.25	3.26	–	–	5.60	2.68	–	–	N
DU-076	DU-076s-001	125	2016-07-20 10:44	46.6627	-119.4514	48.92	4.43	–	–	13.59	3.63	–	–	Y
	DU-076s-002	135	2016-07-20 11:03	46.6637	-119.4513	54.94	5.57	–	–	9.02	4.45	–	–	Y
	DU-076s-003	134	2016-07-20 10:59	46.6631	-119.4511	76.21	5.13	–	–	15.74	4.13	–	–	Y
	DU-076s-005	139	2016-07-20 11:14	46.6626	-119.4504	43.45	4.06	–	–	13.13	3.33	–	–	Y
	DU-076s-006	138	2016-07-20 11:11	46.6632	-119.4504	40.41	3.82	–	–	13.51	3.15	–	–	Y
	DU-076s-007	137	2016-07-20 11:09	46.6637	-119.4503	25.79	3.43	–	–	5.81	2.75	–	–	Y
	DU-076s-009	136	2016-07-20 11:06	46.6643	-119.4509	25.11	3.73	–	–	8.00	3.05	–	–	Y
DU-079	DU-079s-001	190	2016-06-15 9:51	46.6610	-119.5096	20.61	3.20	–	–	5.49	2.57	–	–	N
	DU-079s-002	191	2016-06-15 9:53	46.6608	-119.5093	86.53	5.35	–	–	7.69	4.14	–	–	N
	DU-079s-003	192	2016-06-15 9:57	46.6604	-119.5086	12.74	2.79	–	–	< LOD	3.33	U	–	N
	DU-079s-008	189	2016-06-15 9:48	46.6612	-119.5099	27.69	3.67	–	–	< LOD	4.21	U	–	N
	DU-079s-009	100	2016-06-09 12:39	46.6611	-119.5097	51.61	4.68	–	–	< LOD	5.44	U	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-079s-010	101	2016-06-09 12:43	46.6608	-119.5092	27.26	4.11	–	–	< LOD	4.86	U	–	N
	DU-079s-011	102	2016-06-09 12:46	46.6607	-119.5082	17.37	3.26	–	–	< LOD	3.82	U	–	N
	DU-079s-012	103	2016-06-09 12:49	46.6608	-119.5073	15.06	3.28	–	–	5.84	2.68	–	–	N
	DU-079s-013	112	2016-06-09 13:03	46.6608	-119.5063	17.87	3.42	–	–	< LOD	4.07	U	–	N
	DU-079s-014	113	2016-06-09 13:06	46.6607	-119.5053	14.09	3.10	–	–	< LOD	3.73	U	–	N
	DU-079s-017	99	2016-06-09 12:36	46.6616	-119.5104	9.42	3.03	–	–	< LOD	3.69	U	–	N
	DU-079s-018	114	2016-06-09 13:09	46.6613	-119.5048	26.34	4.10	–	–	< LOD	4.82	U	–	N
	DU-079s-021	98	2016-06-09 12:31	46.6622	-119.5110	14.04	3.04	–	–	5.26	2.47	–	–	N
	DU-079s-022	117	2016-06-09 13:11	46.6619	-119.5044	24.89	3.46	–	–	< LOD	4.01	U	–	N
	DU-079s-024	97	2016-06-09 12:24	46.6628	-119.5115	13.73	3.04	–	–	< LOD	3.58	U	–	N
	DU-079s-025	96	2016-06-09 12:20	46.6625	-119.5108	59.76	4.33	–	–	11.65	3.46	–	–	N
	DU-079s-026	118	2016-06-09 13:14	46.6625	-119.5048	63.98	4.62	–	–	6.27	3.59	–	–	N
	DU-079s-027	119	2016-06-09 13:17	46.6625	-119.5038	30.26	4.13	–	–	< LOD	4.85	U	–	N
	DU-079s-029	95	2016-06-09 12:18	46.6632	-119.5112	30.93	3.62	–	–	7.25	2.90	–	–	N
	DU-079s-030	120	2016-06-09 13:19	46.6630	-119.5044	115.65	5.67	–	–	10.71	4.38	–	–	N
	DU-079s-031	121	2016-06-09 13:22	46.6631	-119.5033	27.75	3.83	–	–	5.64	3.06	–	–	N
	DU-079s-032	93	2016-06-09 12:13	46.6637	-119.5116	10.58	2.84	–	–	< LOD	2.28	U	–	N
	DU-079s-033	94	2016-06-09 12:15	46.6637	-119.5108	44.89	4.54	–	–	< LOD	5.28	U	–	N
	DU-079s-034	123	2016-06-09 13:27	46.6637	-119.5047	20.63	3.31	–	–	< LOD	3.93	U	–	N
	DU-079s-035	122	2016-06-09 13:25	46.6636	-119.5038	28.57	3.65	–	–	< LOD	4.24	U	–	N
	DU-079s-036	92	2016-06-09 12:11	46.6644	-119.5122	10.33	3.12	–	–	< LOD	2.52	U	–	N
	DU-079s-037	124	2016-06-09 13:29	46.6643	-119.5042	36.06	3.86	–	–	< LOD	4.48	U	–	N
	DU-079s-039	91	2016-06-09 12:07	46.6649	-119.5107	10.90	3.27	–	–	< LOD	3.89	U	–	N
	DU-079s-043	322	2016-06-17 13:37	46.6596	-119.5103	11.95	2.98	–	–	4.47	2.41	–	–	N
	DU-079s-044	323	2016-06-17 13:40	46.6596	-119.5093	13.17	3.07	–	–	< LOD	3.64	U	–	N
DU-080	DU-080s-001	127	2016-06-09 13:58	46.6551	-119.5034	14.35	3.16	–	–	< LOD	3.78	U	–	N
	DU-080s-002	128	2016-06-09 14:01	46.6551	-119.5041	65.05	5.05	–	–	7.96	3.95	–	–	N
	DU-080s-003	129	2016-06-09 14:04	46.6555	-119.5043	15.22	3.30	–	–	< LOD	3.92	U	–	N
	DU-080s-004	130	2016-06-09 14:07	46.6547	-119.5038	18.30	3.50	–	–	< LOD	4.12	U	–	N
	DU-080s-006	194	2016-06-15 10:15	46.6551	-119.5047	10.79	2.98	–	–	5.42	2.43	–	–	N
	DU-080s-008	193	2016-06-15 10:12	46.6547	-119.5044	12.61	3.07	–	–	< LOD	3.64	U	–	N
DU-081	DU-081s-004	227	2016-06-15 12:15	46.6476	-119.4990	20.63	3.67	–	–	6.67	2.98	–	–	Y

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-081s-006	224	2016-06-15 12:03	46.6475	-119.4935	10.26	3.28	–	–	4.03	2.66	–	–	N
	DU-081s-007	223	2016-06-15 12:00	46.6474	-119.4924	17.46	3.40	–	–	< LOD	4.03	U	–	N
	DU-081s-011	226	2016-06-15 12:12	46.6482	-119.4995	15.57	3.60	–	–	< LOD	4.36	U	–	Y
	DU-081s-012	225	2016-06-15 12:05	46.6481	-119.4940	19.12	3.68	–	–	5.09	2.95	–	–	Y
	DU-081s-013	222	2016-06-15 11:57	46.6481	-119.4930	72.46	5.68	–	–	8.11	4.43	–	–	Y
	DU-081s-014	221	2016-06-15 11:55	46.6481	-119.4921	45.17	4.34	–	–	6.50	3.40	–	–	Y
	DU-081s-015	220	2016-06-15 11:52	46.6481	-119.4910	33.24	4.31	–	–	< LOD	5.11	U	–	Y
	DU-081s-017	229	2016-06-15 12:21	46.6487	-119.5001	14.82	3.90	–	–	< LOD	4.61	U	–	N
	DU-081s-018	228	2016-06-15 12:18	46.6487	-119.4990	193.18	8.09	–	–	21.10	6.31	–	–	Y
	DU-081s-019	218	2016-06-15 11:48	46.6487	-119.4916	94.10	6.47	–	–	< LOD	7.39	U	–	Y
	DU-081s-020	219	2016-06-15 11:50	46.6485	-119.4907	18.38	3.56	–	–	< LOD	4.27	U	–	N
	DU-081s-022	230	2016-06-15 12:23	46.6493	-119.4996	13.58	3.79	–	–	< LOD	4.52	U	–	N
	DU-081s-023	217	2016-06-15 11:46	46.6491	-119.4910	31.02	3.81	–	–	< LOD	4.37	U	–	Y
	DU-081s-026	363	2016-06-30 10:03	46.6499	-119.4992	15.97	3.25	–	–	< LOD	2.60	U	–	N
	DU-081s-027	216	2016-06-15 11:43	46.6497	-119.4914	40.81	3.99	–	–	6.61	3.14	–	–	Y
	DU-081s-028	196	2016-06-15 11:01	46.6504	-119.4983	13.61	3.61	–	–	< LOD	4.26	U	–	N
	DU-081s-030	195	2016-06-15 10:58	46.6505	-119.4986	13.31	3.10	–	–	< LOD	3.67	U	–	N
	DU-081s-031	197	2016-06-15 11:04	46.6504	-119.4976	11.48	3.56	–	–	< LOD	4.32	U	–	N
	DU-081s-032	198	2016-06-15 11:06	46.6504	-119.4967	18.18	3.36	–	–	< LOD	3.97	U	–	N
	DU-081s-033	199	2016-06-15 11:09	46.6503	-119.4956	11.78	3.38	–	–	< LOD	4.04	U	–	N
	DU-081s-034	200	2016-06-15 11:11	46.6503	-119.4948	13.42	3.80	–	–	< LOD	4.62	U	–	N
	DU-081s-035	201	2016-06-15 11:13	46.6504	-119.4939	55.67	4.70	–	–	< LOD	5.43	U	–	N
	DU-081s-036	204	2016-06-15 11:21	46.6502	-119.4929	19.35	3.26	–	–	5.13	2.62	–	–	N
	DU-081s-037	215	2016-06-15 11:41	46.6503	-119.4920	18.33	3.25	–	–	< LOD	3.83	U	–	N
	DU-081s-043	202	2016-06-15 11:16	46.6510	-119.4942	22.79	4.31	–	–	< LOD	5.18	U	–	N
	DU-081s-044	203	2016-06-15 11:19	46.6510	-119.4934	12.47	3.77	–	–	< LOD	4.46	U	–	N
	DU-081s-054	140	2016-07-20 11:32	46.6463	-119.4981	10.11	3.13	–	–	< LOD	3.69	U	–	N
DU-084	DU-084s-001	129	2016-05-24 9:39	46.6535	-119.4696	14.31	3.15	–	–	< LOD	3.71	U	–	N
	DU-084s-002	128	2016-05-24 9:36	46.6529	-119.4690	18.04	3.24	–	–	6.20	2.62	–	–	N
	DU-084s-003	365	2016-06-30 10:15	46.6529	-119.4713	9.05	3.13	–	–	< LOD	3.69	U	–	N
DU-086	DU-086s-001	241	2016-06-15 13:05	46.6462	-119.4593	9.86	3.12	–	–	4.68	2.53	–	–	N
	DU-086s-002	242	2016-06-15 13:08	46.6462	-119.4583	11.35	3.16	–	–	4.71	2.57	–	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-086s-003	244	2016-06-15 13:12	46.6462	-119.4574	9.24	3.02	–	–	< LOD	2.44	U	–	N
	DU-086s-004	243	2016-06-15 13:10	46.6467	-119.4579	63.95	4.71	–	–	11.69	3.75	–	–	Y
	DU-086s-008	245	2016-06-15 13:14	46.6467	-119.4569	16.49	3.36	–	–	< LOD	3.96	U	–	Y
	DU-086s-010	246	2016-06-15 13:16	46.6473	-119.4564	184.95	7.76	–	–	16.76	5.99	–	–	Y
	DU-086s-011	247	2016-06-15 13:19	46.6467	-119.4559	18.01	3.58	–	–	< LOD	4.24	U	–	Y
	DU-086s-013	248	2016-06-15 13:21	46.6473	-119.4554	32.14	3.90	–	–	5.69	3.07	–	–	Y
	DU-086s-014	249	2016-06-15 13:23	46.6473	-119.4544	25.43	3.69	–	–	4.81	2.91	–	–	Y
	DU-086s-015	252	2016-06-15 13:33	46.6496	-119.4515	25.05	3.52	–	–	< LOD	4.13	U	–	N
	DU-086s-016	251	2016-06-15 13:30	46.6490	-119.4520	15.47	3.18	–	–	< LOD	3.72	U	–	N
	DU-086s-017	253	2016-06-15 13:35	46.6501	-119.4519	75.99	4.96	–	–	< LOD	5.71	U	–	N
	DU-086s-020	254	2016-06-15 13:37	46.6500	-119.4511	12.17	3.63	–	–	8.19	3.07	–	–	N
	DU-086s-023	250	2016-06-15 13:26	46.6478	-119.4539	8.31	3.08	–	–	< LOD	3.66	U	–	Y
	DU-086s-024	324	2016-06-17 14:10	46.6511	-119.4520	14.84	3.21	–	–	< LOD	3.78	U	–	N
	DU-086s-025	325	2016-06-17 14:13	46.6506	-119.4515	14.34	3.12	–	–	4.11	2.51	–	–	N
DU-087	DU-087s-001	255	2016-06-15 13:42	46.6525	-119.4522	9.07	3.43	–	–	< LOD	4.12	U	–	N
	DU-087s-003	256	2016-06-15 13:45	46.6531	-119.4517	12.83	3.16	–	–	< LOD	3.71	U	–	N
	DU-087s-006	258	2016-06-15 13:50	46.6537	-119.4533	15.86	3.25	–	–	< LOD	3.78	U	–	N
	DU-087s-007	257	2016-06-15 13:47	46.6538	-119.4523	13.18	3.49	–	–	< LOD	4.05	U	–	N
DU-089	DU-089s-007	44	2016-05-27 9:32	46.6213	-119.4199	24.95	3.49	–	–	5.06	2.77	–	–	N
	DU-089s-009	43	2016-05-27 9:30	46.6212	-119.4190	13.72	3.02	–	–	4.26	2.44	–	–	N
	DU-089s-010	42	2016-05-27 9:28	46.6212	-119.4180	21.19	3.73	–	–	6.94	3.03	–	–	N
	DU-089s-011	41	2016-05-27 9:25	46.6212	-119.4169	10.98	3.11	–	–	< LOD	2.50	U	–	N
	DU-089s-013	45	2016-05-27 9:35	46.6219	-119.4204	22.18	3.44	–	–	4.46	2.75	–	–	N
	DU-089s-015	46	2016-05-27 9:37	46.6224	-119.4209	22.38	3.28	–	–	< LOD	3.86	U	–	N
	DU-089s-016	40	2016-05-27 9:19	46.6227	-119.4129	17.65	3.27	–	–	< LOD	3.87	U	–	N
	DU-089s-017	39	2016-05-27 9:16	46.6233	-119.4129	34.01	3.78	–	–	8.81	3.06	–	–	N
	DU-089s-018	34	2016-05-27 9:01	46.6237	-119.4199	29.32	4.06	–	–	< LOD	4.73	U	–	N
	DU-089s-019	36	2016-05-27 9:05	46.6237	-119.4189	38.22	4.13	–	–	10.27	3.35	–	–	N
	DU-089s-020	37	2016-05-27 9:11	46.6241	-119.4144	15.56	3.02	–	–	4.87	2.42	–	–	N
	DU-089s-021	38	2016-05-27 9:13	46.6241	-119.4135	25.79	3.44	–	–	< LOD	4.03	U	–	N
DU-090	DU-090s-003	70	2016-05-18 13:10	46.6197	-119.4290	15.84	3.24	Z	–	4.80	2.60	Z	–	N
	DU-090s-007	71	2016-05-18 13:20	46.6213	-119.4273	12.49	3.16	Z	–	< LOD	3.66	UZ	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-090s-009	72	2016-05-18 13:22	46.6213	-119.4264	14.12	3.09	Z	–	< LOD	2.46	UZ	–	N
	DU-090s-010	73	2016-05-18 13:24	46.6207	-119.4259	161.56	6.58	Z	–	< LOD	7.25	UZ	–	Y
	DU-090s-011	74	2016-05-18 13:27	46.6213	-119.4254	17.95	3.31	Z	–	5.25	2.66	Z	–	N
	DU-090s-012	75	2016-05-18 13:29	46.6207	-119.4249	13.83	3.09	Z	–	< LOD	2.46	UZ	–	N
DU-093	DU-093s-002	52	2016-05-18 11:35	46.6097	-119.4286	21.04	3.59	–	–	5.86	2.89	–	–	N
	DU-093s-003	53	2016-05-18 11:38	46.6097	-119.4277	25.58	3.42	–	–	7.07	2.76	–	–	N
	DU-093s-019	47	2016-05-18 11:03	46.6124	-119.4298	15.60	3.32	–	–	< LOD	3.96	U	–	Y
	DU-093s-020	48	2016-05-18 11:06	46.6124	-119.4290	18.54	3.35	–	–	< LOD	3.99	U	–	Y
	DU-093s-021	49	2016-05-18 11:09	46.6124	-119.4281	15.09	3.58	–	–	9.62	3.03	–	–	Y
	DU-093s-022	50	2016-05-18 11:12	46.6124	-119.4271	37.88	3.91	–	–	4.93	3.05	–	–	Y
	DU-093s-023	51	2016-05-18 11:15	46.6123	-119.4263	1063.02	17.52	–	–	115.27	13.62	–	–	Y
	DU-093s-024	46	2016-05-18 11:01	46.6129	-119.4303	12.05	3.09	–	–	< LOD	2.46	U	–	Y
	DU-093s-025	45	2016-05-18 10:58	46.6129	-119.4294	18.64	3.26	–	–	< LOD	3.81	U	–	Y
	DU-093s-026	44	2016-05-18 10:55	46.6129	-119.4285	22.41	3.32	–	–	5.43	2.66	–	–	Y
	DU-093s-027	43	2016-05-18 10:51	46.6129	-119.4276	198.80	8.29	–	–	36.24	6.65	–	–	Y
	DU-093s-028	42	2016-05-18 10:48	46.6129	-119.4267	319.92	9.56	–	–	60.74	7.68	–	–	Y
	DU-093s-029	39	2016-05-18 10:37	46.6134	-119.4298	13.34	3.22	–	–	5.17	2.59	–	–	Y
	DU-093s-030	38	2016-05-18 10:34	46.6134	-119.4289	13.90	3.27	–	–	4.97	2.66	–	–	Y
	DU-093s-031	37	2016-05-18 10:31	46.6134	-119.4280	23.85	3.49	–	–	7.89	2.83	–	–	Y
	DU-093s-032	36	2016-05-18 10:27	46.6135	-119.4272	533.80	12.06	–	–	57.91	9.37	–	–	Y
	DU-093s-033	32	2016-05-18 10:17	46.6135	-119.4264	159.77	7.06	–	–	20.04	5.54	–	–	Y
	DU-093s-034	40	2016-05-18 10:41	46.6140	-119.4285	14.86	3.12	–	–	< LOD	3.68	U	–	N
	DU-093s-035	41	2016-05-18 10:45	46.6140	-119.4276	14.60	3.07	–	–	< LOD	2.44	U	–	N
	DU-093s-036	35	2016-05-18 10:24	46.6139	-119.4267	25.19	3.56	–	–	< LOD	4.15	U	–	N
	DU-093s-037	34	2016-05-18 10:21	46.6139	-119.4258	9.50	3.34	–	–	< LOD	3.98	U	–	N
DU-094	DU-094s-002	68	2016-05-18 12:56	46.6139	-119.4239	18.16	3.25	Z	–	5.52	2.62	Z	–	N
	DU-094s-003	69	2016-05-18 12:59	46.6139	-119.4230	24.41	3.46	Z	–	5.77	2.76	Z	–	N
DU-095	DU-093s-004	147	2016-05-27 9:55	46.6097	-119.4268	22.60	3.53	–	–	6.81	2.86	–	–	N
	DU-093s-005	61	2016-05-18 11:53	46.6097	-119.4259	59.13	4.45	Z	–	< LOD	5.13	UZ	–	Y
	DU-093s-009	62	2016-05-18 11:56	46.6092	-119.4264	14.50	3.16	Z	–	4.64	2.54	Z	–	N
	DU-093s-014	63	2016-05-18 11:58	46.6087	-119.4259	32.10	3.72	Z	–	6.71	2.96	Z	–	Y
DU-096	DU-096s-002	67	2016-05-18 12:38	46.6043	-119.4228	15.92	3.26	Z	–	4.17	2.61	Z	–	N

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-096s-003	66	2016-05-18 12:34	46.6043	-119.4222	15.23	3.37	Z	–	< LOD	4.03	UZ	–	N
	DU-096s-004	65	2016-05-18 12:31	46.6043	-119.4213	24.51	3.63	Z	–	< LOD	4.28	UZ	–	N
	DU-096s-005	64	2016-05-18 12:29	46.6043	-119.4203	17.68	3.30	Z	–	6.40	2.68	Z	–	N
DU-105	DU-105s-001	48	2016-05-27 10:27	46.5994	-119.4130	23.54	3.53	–	–	< LOD	4.19	U	–	N
	DU-105s-002	49	2016-05-27 10:29	46.5994	-119.4120	38.60	4.36	–	–	11.97	3.58	–	–	N
	DU-105s-003	50	2016-05-27 10:32	46.5994	-119.4111	16.97	3.26	–	–	5.73	2.63	–	–	N
	DU-105s-004	51	2016-05-27 10:34	46.5994	-119.4101	11.19	4.41	–	–	< LOD	5.47	U	–	N
DU-114	DU-114s-001	141	2016-07-20 11:55	46.6000	-119.3980	49.68	4.06	–	–	6.80	3.20	–	–	Y
	DU-114s-002	142	2016-07-20 11:59	46.5994	-119.3975	1489.49	19.65	–	–	239.11	15.63	–	–	Y
	DU-114s-003	144	2016-07-20 12:05	46.5991	-119.3969	36.13	3.47	–	–	5.39	2.75	–	–	Y
	DU-114s-006	143	2016-07-20 12:01	46.5994	-119.3972	204.95	7.50	–	–	30.45	5.93	–	–	Y
DU-125	DU-125s-006	50	2016-07-15 11:29	46.5773	-119.3872	9.08	3.85	–	–	5.37	3.20	–	–	N
	DU-125s-007	51	2016-07-15 11:31	46.5773	-119.3862	13.89	3.29	–	–	4.37	2.65	–	–	N
	DU-125s-008	52	2016-07-15 11:34	46.5773	-119.3852	18.31	3.37	–	–	6.17	2.75	–	–	N
DU-127	DU-127s-002	67	2016-05-27 11:39	46.5711	-119.3709	13.82	3.06	–	–	< LOD	3.66	U	–	N
	DU-127s-003	66	2016-05-27 11:36	46.5711	-119.3700	12.20	3.83	–	–	< LOD	4.67	U	–	N
	DU-127s-004	65	2016-05-27 11:33	46.5717	-119.3714	15.59	3.05	–	–	4.19	2.43	–	–	N
	DU-127s-005	64	2016-05-27 11:30	46.5723	-119.3719	17.18	3.32	–	–	< LOD	3.94	U	–	N
	DU-127s-014	62	2016-05-27 11:24	46.5729	-119.3714	9.08	3.28	–	–	5.48	2.73	–	–	N
DU-128	DU-128s-001	70	2016-05-27 12:14	46.5750	-119.3646	36.37	3.86	–	–	< LOD	4.51	U	–	N
	DU-128s-003	68	2016-05-27 12:07	46.5755	-119.3651	14.59	3.28	–	–	4.33	2.63	–	–	N
	DU-128s-005	69	2016-05-27 12:09	46.5755	-119.3660	38.38	3.98	–	–	< LOD	4.62	U	–	N
DU-129	DU-129s-014	72	2016-05-27 12:26	46.5692	-119.3638	21.03	3.75	–	–	< LOD	4.41	U	–	N
	DU-129s-018	71	2016-05-27 12:24	46.5686	-119.3634	38.27	4.06	–	–	< LOD	4.69	U	–	N
DU-130	DU-130s-002	73	2016-05-27 12:34	46.5725	-119.3588	19.02	4.20	–	–	5.88	3.43	–	–	N
	DU-130s-004	74	2016-05-27 12:38	46.5731	-119.3593	11.88	2.99	–	–	< LOD	3.57	U	–	N
	DU-130s-006	75	2016-05-27 12:41	46.5731	-119.3603	13.96	4.32	–	–	< LOD	5.19	U	–	N
	DU-130s-007	145	2016-07-20 12:22	46.5701	-119.3586	13.30	3.79	–	–	< LOD	4.45	U	–	N
DU-131	DU-131s-004	112	2016-05-27 14:45	46.5651	-119.3555	44.26	4.17	–	–	7.35	3.30	–	–	Y
	DU-131s-005	109	2016-05-27 14:38	46.5651	-119.3545	69.69	4.64	–	–	11.15	3.67	–	–	Y
	DU-131s-006	108	2016-05-27 14:36	46.5651	-119.3535	30.14	3.69	–	–	6.55	2.94	–	–	Y
	DU-131s-007	101	2016-05-27 14:11	46.5657	-119.3580	23.89	3.59	–	–	< LOD	4.25	U	–	Y

Original DU	Sample ID	XRF Reading Number	Date/Time	Latitude	Longitude	Lead Concentration (mg/kg)	Lead 2σ Error (mg/kg)	Lead Review Qualifiers	Lead Validation Qualifiers	Arsenic Concentration (mg/kg)	Arsenic 2σ Error (mg/kg)	Arsenic Review Qualifiers	Arsenic Validation Qualifiers	Include Step-Out Sample ID (Y/N)
	DU-131s-008	100	2016-05-27 14:08	46.5658	-119.3570	43.49	4.84	–	–	< LOD	5.54	U	–	Y
	DU-131s-009	111	2016-05-27 14:43	46.5657	-119.3559	38.77	3.96	–	–	6.89	3.14	–	–	Y
	DU-131s-010	110	2016-05-27 14:41	46.5657	-119.3550	66.56	4.73	–	–	< LOD	5.44	U	–	Y
	DU-131s-011	106	2016-05-27 14:30	46.5656	-119.3539	52.52	4.53	–	–	13.31	3.69	–	–	Y
	DU-131s-012	107	2016-05-27 14:33	46.5657	-119.3530	19.94	3.34	–	–	4.40	2.65	–	–	Y
	DU-131s-013	102	2016-05-27 14:14	46.5664	-119.3585	28.67	3.83	–	–	6.94	3.10	–	–	Y
	DU-131s-014	99	2016-05-27 14:05	46.5664	-119.3575	150.79	8.32	–	–	< LOD	9.54	U	–	Y
	DU-131s-015	103	2016-05-27 14:16	46.5670	-119.3579	243.08	8.21	–	–	< LOD	9.23	U	–	Y
	DU-131s-016	98	2016-05-27 14:03	46.5669	-119.3570	174.90	7.55	–	–	20.98	5.91	–	–	Y
	DU-131s-017	104	2016-05-27 14:19	46.5676	-119.3585	109.01	6.80	–	–	12.04	5.32	–	–	Y
	DU-131s-018	105	2016-05-27 14:21	46.5676	-119.3575	152.08	6.88	–	–	13.98	5.32	–	–	Y
	DU-131s-020	95	2016-05-27 13:48	46.5676	-119.3534	80.07	5.13	–	–	11.52	4.04	–	–	Y
	DU-131s-021	96	2016-05-27 13:52	46.5675	-119.3524	16.95	3.22	–	–	< LOD	3.80	U	–	Y
	DU-131s-022	85	2016-05-27 13:30	46.5682	-119.3549	14.96	3.20	–	–	< LOD	3.84	U	–	N
	DU-131s-023	93	2016-05-27 13:45	46.5682	-119.3539	15.44	3.42	–	–	< LOD	4.11	U	–	N
	DU-131s-024	97	2016-05-27 13:54	46.5682	-119.3529	12.72	2.98	–	–	4.04	2.39	–	–	N
	DU-131s-027	81	2016-05-27 13:14	46.5700	-119.3576	11.73	3.56	–	–	4.86	2.92	–	–	N
	DU-131s-028	82	2016-05-27 13:17	46.5700	-119.3564	16.15	3.07	–	–	< LOD	3.65	U	–	N
	DU-131s-033	133	2016-06-09 15:25	46.5645	-119.3529	18.64	3.62	–	–	< LOD	4.28	U	–	Y
	DU-131s-036	135	2016-06-09 15:30	46.5640	-119.3546	22.03	3.43	–	–	< LOD	4.03	U	–	Y
	DU-131s-037	134	2016-06-09 15:28	46.5639	-119.3535	32.59	3.74	–	–	< LOD	4.36	U	–	Y
	DU-131s-040	136	2016-06-09 15:33	46.5646	-119.3550	29.75	3.40	–	–	7.76	2.74	–	–	Y
	DU-131s-041	132	2016-06-09 15:22	46.5645	-119.3540	56.05	4.80	–	–	13.01	3.88	–	–	Y
	DU-131s-042	131	2016-06-09 15:19	46.5649	-119.3544	292.14	8.79	–	–	39.16	6.91	–	–	Y
DU-132	DU-132s-006	78	2016-05-27 12:55	46.5710	-119.3563	15.00	3.39	–	–	< LOD	4.05	U	–	N
	DU-132s-008	77	2016-05-27 12:52	46.5714	-119.3565	16.89	3.27	–	–	< LOD	3.79	U	–	N
	DU-132s-010	76	2016-05-27 12:50	46.5719	-119.3562	19.71	3.31	–	–	6.37	2.68	–	–	N

Table D-3. All Step-Out Field Characterization Summary Statistics.

Decision Unit	Analyte	Total Samples	Total Non-Detects	% Non-Detects	Total Above Screening Levels[b]	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Average Result (mg/kg)	Standard Deviation(mg/kg)[c]	Relative Standard Deviation (%)[c]
DU-009s	Lead	2	0	83.3%[a]	0	59.6	53.0	56.3	4.64	8.24%
	Arsenic	2	0	83.3%[a]	0	11.3	7.83	9.58	2.47	25.8%
DU-010s	Lead	2	0	0.00%	0	39.6	32.1	35.9	5.30	14.8%
	Arsenic	2	0	0.00%	0	7.52	6.05	6.79	1.04	15.3%
DU-013s	Lead	11	0	0.00%	0	68.9	17.9	34.4	15.8	45.8%
	Arsenic	11	5	45.5%	0	7.09	3.98 (MDL)	5.02	1.14	22.6%
DU-020s	Lead	7	0	0.00%	2	568	31.6	198	196	99.0%
	Arsenic	7	2	28.6%	3	47.6	3.98 (MDL)	20.1	16.1	80.1%
DU-021s	Lead	11	0	0.00%	0	187	6.42	68.7	55.6	81.0%
	Arsenic	11	1	9.09%	0	14.2	3.98 (MDL)	9.17	3.01	32.8%
DU-022s	Lead	10	0	0.00%	1	395	19.0	69.8	115	166%
	Arsenic	10	3	30.0%	1	58.7	3.98 (MDL)	11.2	16.0	143%
DU-023s	Lead	3	0	0.00%	0	17.9	11.0	15.5	3.88	25.0%
	Arsenic	3	1	33.3%	0	4.88	3.98 (MDL)	4.35	0.38	8.84%
DU-024s	Lead	1	0	0.00%	0	14.3	14.3	14.3	0.00	0.00
	Arsenic	1	1	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-026s	Lead	31	0	0.00%	0	185	9.70	36.2	36.8	102%
	Arsenic	31	18	58.1%	0	17.5	3.98 (MDL)	5.26	2.96	56.2%
DU-039s	Lead	1	0	0.00%	0	17.8	17.8	17.8	0.00	0.00
	Arsenic	1	1	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-040s	Lead	4	0	0.00%	0	35.3	16.2	26.0	9.35	36.0%
	Arsenic	4	3	75.0%	0	6.37	3.98 (MDL)	4.58	1.03	22.6%
DU-047s	Lead	6	0	0.00%	0	58.0	13.8	25.1	16.5	65.9%
	Arsenic	6	3	50.0%	0	7.63	3.98 (MDL)	5.00	1.46	29.3%
DU-048s	Lead	1	0	0.00%	0	21.8	21.8	21.8	0.00	0.00%
	Arsenic	1	1	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-049s	Lead	1	0	0.00%	0	22.5	22.5	22.5	0.00	0.00%
	Arsenic	1	0	0.00%	0	6.11	6.11	6.11	0.00	0.00%
DU-052s	Lead	1	0	0.00%	0	15.3	15.3	15.3	0.00	0.00%
	Arsenic	1	0	0.00%	0	4.10	4.10	4.10	0.00	0.00%
DU-053s	Lead	17	0	0.00%	0	61.9	9.52	22.9	13.3	58.0%
	Arsenic	17	9	52.9%	0	6.84	3.98 (MDL)	4.75	0.96	20.3%
DU-055s	Lead	2	0	0.00%	0	21.9	18.2	20.1	2.62	13.1%
	Arsenic	2	1	50.0%	0	5.18	3.98 (MDL)	4.58	0.60	13.1%
DU-056s	Lead	3	0	0.00%	0	23.5	17.9	19.8	3.23	16.3%
	Arsenic	3	2	66.7%	0	4.85	3.98 (MDL)	4.27	0.41	9.60%
DU-057s	Lead	2	0	0.00%	0	28.0	23.4	25.7	3.24	12.6%
	Arsenic	2	1	50.0%	0	5.26	3.98 (MDL)	4.62	0.64	13.9%
DU-062s	Lead	7	0	0.00%	0	33.5	14.1	20.1	6.66	33.2%
	Arsenic	7	6	85.7%	0	4.66	3.98 (MDL)	4.08	0.24	5.84%
DU-063s	Lead	2	0	0.00%	0	46.7	32.0	39.4	10.4	26.4%
	Arsenic	2	2	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-064s	Lead	2	0	0.00%	0	22.1	12.1	17.1	7.07	41.3%
	Arsenic	2	1	50.0%	0	6.51	3.98 (MDL)	5.25	1.27	24.1%
DU-065s	Lead	2	0	0.00%	0	29.0	14.8	21.9	10.0	45.7%
	Arsenic	2	1	50.0%	0	5.26	3.98 (MDL)	4.62	0.64	13.9%
DU-073s	Lead	6	0	0.00%	0	41.5	10.2	19.9	11.7	58.7%
	Arsenic	6	1	16.7%	0	6.27	3.98 (MDL)	4.86	0.86	17.6%

Decision Unit	Analyte	Total Samples	Total Non-Detects	% Non-Detects	Total Above Screening Levels[(b)]	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Average Result (mg/kg)	Standard Deviation(mg/kg) [(c)]	Relative Standard Deviation (%) [(c)]
DU-076s	Lead	7	0	0.00%	0	76.2	25.1	45.0	17.7	39.3%
	Arsenic	7	0	0.00%	0	15.7	5.81	11.3	3.64	32.3%
DU-079s	Lead	30	0	0.00%	0	116	9.42	29.8	24.4	81.9%
	Arsenic	30	20	66.7%	0	11.7	3.98 (MDL)	5.00	1.94	38.9%
DU-080s	Lead	6	0	0.00%	0	65.1	10.8	22.7	20.9	92.0%
	Arsenic	6	4	66.7%	0	7.96	3.98 (MDL)	4.88	1.47	30.2%
DU-081s	Lead	28	0	0.00%	0	193	10.1	31.3	37.5	120%
	Arsenic	28	20	71.4%	1	21.1	3.98 (MDL)	5.10	3.26	64.0%
DU-084s	Lead	3	0	0.00%	0	18.0	9.05	13.8	4.52	32.7%
	Arsenic	3	2	66.7%	0	6.20	3.98 (MDL)	4.72	1.05	22.2%
DU-086s	Lead	16	0	0.00%	0	185	8.31	33.6	44.8	133%
	Arsenic	16	8	50.0%	0	16.8	3.98 (MDL)	5.78	3.48	60.1%
DU-087s	Lead	4	0	0.00%	0	15.9	9.07	12.7	2.79	21.9%
	Arsenic	4	4	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-089s	Lead	12	0	0.00%	0	38.2	11.0	23.0	8.11	35.3%
	Arsenic	12	5	41.7%	0	10.3	3.98 (MDL)	5.38	2.05	38.1%
DU-090s	Lead	6	0	0.00%	0	162	12.5	39.3	59.9	152%
	Arsenic	6	4	66.7%	0	5.25	3.98 (MDL)	4.33	0.51	11.8%
DU-093s	Lead	21	0	0.00%	3	1063	9.50	123	252	206%
	Arsenic	21	8	38.1%	5	115	3.98 (MDL)	17.8	27.5	155%
DU-094s	Lead	2	0	0.00%	0	24.4	18.2	21.3	4.42	20.8%
	Arsenic	2	0	0.00%	0	5.77	5.52	5.65	0.18	3.13%
DU-095s	Lead	4	0	0.00%	0	59.1	14.5	32.1	19.4	60.5%
	Arsenic	4	1	25.0%	0	6.81	3.98 (MDL)	5.54	1.25	22.5%
DU-096s	Lead	4	0	0.00%	0	24.5	15.2	18.3	4.24	23.2%
	Arsenic	4	2	50.0%	0	6.40	3.98 (MDL)	4.63	1.02	22.1%
DU-105s	Lead	4	0	0.00%	0	38.6	11.2	22.6	11.8	52.3%
	Arsenic	4	2	50.0%	0	12.0	3.98 (MDL)	6.42	3.29	51.2%
DU-114s	Lead	4	0	0.00%	1	1490	36.1	445	700	157%
	Arsenic	4	0	0.00%	2	239	5.39	70.4	113	160%
DU-125s	Lead	3	0	0.00%	0	18.3	9.08	13.8	4.62	33.6%
	Arsenic	3	0	0.00%	0	6.17	4.37	5.30	0.90	17.0%
DU-127s	Lead	5	0	0.00%	0	17.2	9.08	13.6	3.13	23.1%
	Arsenic	5	3	60.0%	0	5.48	3.98 (MDL)	4.32	0.58	13.5%
DU-128s	Lead	3	0	0.00%	0	38.4	14.6	29.8	13.2	44.3%
	Arsenic	3	2	66.7%	0	4.33	3.98 (MDL)	4.10	0.16	4.03%
DU-129s	Lead	2	0	0.00%	0	38.3	21.0	29.7	12.2	41.1%
	Arsenic	2	2	100%	0	3.98 (MDL)	3.98 (MDL)	3.98 (MDL)	0.00	0.00%
DU-130s	Lead	4	0	0.00%	0	19.0	11.9	14.5	3.11	21.4%
	Arsenic	4	3	75.0%	0	5.88	3.98 (MDL)	4.46	0.82	18.5%
DU-131s	Lead	28	0	0.00%	1	292	11.7	66.7	72.5	109%
	Arsenic	28	12	42.9%	2	39.2	3.98 (MDL)	8.28	7.33	88.5%
DU-132s	Lead	3	0	0.00%	0	19.7	15.0	17.2	2.37	13.8%
	Arsenic	3	2	66.7%	0	6.37	3.98 (MDL)	4.78	1.13	23.6%

(a) CORE™ calculated %non-detects based off of 12 total samples, 10 of which were rejected from further consideration. See Appendix C for further information.

(b) The screening levels are the MTCA Method A unrestricted land use soil cleanup standards (WAC 173-340-740(2)): 250 mg/kg lead and 20 mg/kg arsenic.

(c) The standard deviation and relative standard deviation are reported as 0.00 or 0.00%, respectively, when there is only 1 sample location or when all samples are reported as <LOD for a decision unit.

D.1 References

DOE/RL-2012-64. 2012. *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands.* Revision 0, U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076311H

WAC 173-340-740(2). 2007. "Model Toxics Control Act—Cleanup; Unrestricted land use soil cleanup standards." *Washington Administrative Code,* Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-740

Appendix E

Historical Information Review of the 100-OL-1 Operable Unit

This page intentionally left blank.

Appendix E

Historical Information Review of the 100-OL-1 Operable Unit

E.1 Historical Information Review

To complement the historical and cultural resources information in the remedial investigation (RI), this appendix provides an overview of the early settler/farming history of the Hanford Site and summarizes the history of the regions in the 100-OL-1 operable unit (OU). It describes the early farming strategies employed in the area, including a discussion on pest management and pesticide use.

E.1.1 Early Exploration and Settlement of the Priest Rapids Valley

The first Euro-Americans to visit the Hanford Region were Lewis and Clark in 1805. Fur trappers, military units, and miners followed them, passing through the area on their way to the lands across and beyond the Columbia Basin. In the mid-1800s, the town of White Bluffs was an established trading post for trappers and gold miners passing through on their way to British Columbia and was also an important transportation junction (White Bluffs ferry). The importance of White Bluffs slowly declined in the mid-1800s with the waning of the British Columbia mining boom and the development of more convenient roadways and passages in the region (DOE/RL-97-02).

The influx of people through the area during the gold rush attracted Chinese miners to the area. "Chinese miners were reported to be working gravel bars along much of the upper Columbia River and one author noted that there were over 1000 Chinese miners between Priest Rapids and Colville, especially along the east bank of the river below Wanapum Dam" (DOE/RL-97-02).

Ranching (both cattle and sheep) began to spread across the area in the mid to late 1800s. Ranchers took advantage of the large open grasslands and the meat shortages in the British Columbia gold-mining district (DOE/RL-97-02). "Ranching declined in the early 1880s in the Hanford vicinity and across the Columbia Plain due to the coming of the railroad, extensive farming and fencing, and overgrazing and subsequent range depletion" (DOE/RL-97-02). The slow shift from ranching to agriculture in the Hanford area began in the late 1800s, but was not a great success until the introduction of large-scale irrigation projects at the turn of the century.

E.1.2 Farming and Irrigation

Agriculture in the Hanford vicinity started in the mid to late 1800s. Early farmers in the area utilized wells and direct withdrawal techniques from the river for irrigation. Direct withdrawal techniques included equipment such as water elevators (powered by horse), windmills, water wheels, makeshift dams, gravity-fed wooden ditches/flumes, and small steam-powered vacuum pumps (DOE/RL-97-02; Sharpe 1999). Direct withdrawal techniques were mostly limited to farms and orchards that bordered the Columbia River, but were highly dependent on the natural grade of the river and gravity.

Wells were excavated with some success in the area starting in the late 1800s. According to Jenkins (1922), approximately 36 irrigation wells were being utilized within the 100-OL-1 OU boundary in 1921 (Figure E-1). Water from irrigation wells was extracted using stationary pumps that were powered initially by gasoline, and later by electricity. While water supplied from these wells proved adequate for irrigation, the "price of electricity was so high that it was not profitable for many of the growers to use the wells" (interview with Lawrence and Marilyn Tomson, White Bluffs-Hanford Pioneer Association 1982) (Sharpe 1999). While some of these wells may have been excavated and in use prior to the creation and utilization of large-scale irrigation projects in the area, the wells probably were used in combination with water supplied through the irrigation canals, especially in times of low water output. Wells and direct withdrawal techniques were adequate for small-scale agricultural production, but presented challenges due to the river's natural grade and limited the potential for irrigable land further away from the Columbia River and/or other water sources. As detailed in DOE/RL-97-02, "as settlement pressures increased and colonization began to push inward toward the more arid center of the Columbia Basin, domestic water supply became a more serious difficulty and impediment to agricultural development."

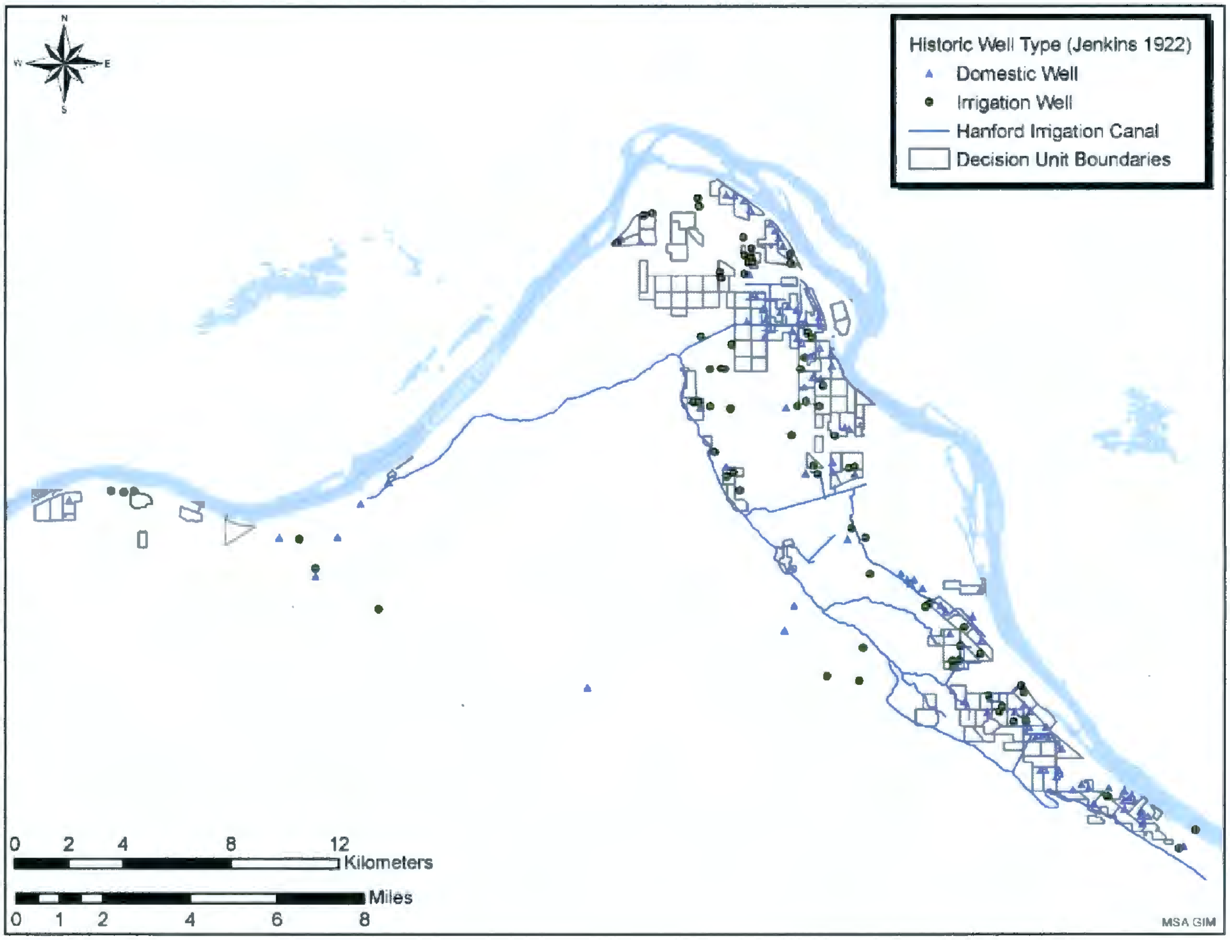


Figure E-1. Domestic and Irrigation Well (from Jenkins 1922).

The wide-scale agricultural development seen on the Hanford Site and greater Priest Rapids Valley would not have been possible or successful without artificial irrigation techniques. While irrigation projects were in development during the late 1800s in portions of the Priest Rapids Valley, large-scale irrigation on the Hanford Site was not successfully undertaken until the turn of the century (DOE/RL-97-02). The Priest Rapids Irrigation and Power Company (the forerunner of the Hanford Irrigation and Power Company) was organized in 1905 to reclaim 32,000 acres of arid land on what is now the Hanford Site (as part of the *Newland Reclamation Act of 1902*). Soon after its formation, disputes began over the location and development of the project, specifically the location of the townsite. According to Sharpe (1999), "Two groups of individuals purchased land in the area and each wanted the new town to be near its holdings. One group had land holdings near the future townsite of Hanford and the other group controlled land north of White Bluffs." Following the resolution of the dispute, the company split and the White Bluffs Land and Irrigation Company was created in 1907. A gas-powered pumping plant was constructed north of the White Bluffs ferry landing and the company began supplying water in the vicinity of White Bluffs in 1907 (Sharpe 1999).

Meanwhile, the Hanford Irrigation and Power Company focused on their own large-scale irrigation development project. Construction on the Hanford Irrigation Canal (also referred to as the "low line ditch") and pumping plant at Coyote Rapids commenced in 1906 and was initially completed in 1908. The Coyote Rapids Pumping Plant, also referred to as the Allard Pumphouse, received electricity from the Priest Rapids generating plant (via pole lines), located approximately 16 miles upstream. The pumping plant contained equipment used to deliver water from the Columbia River to the main irrigation canal. The irrigation system contained the main irrigation channel or canal and several laterals (large and small E-Laterals, F-Lateral, G-Lateral, H-Lateral) and various pipelines (Figure E-2).

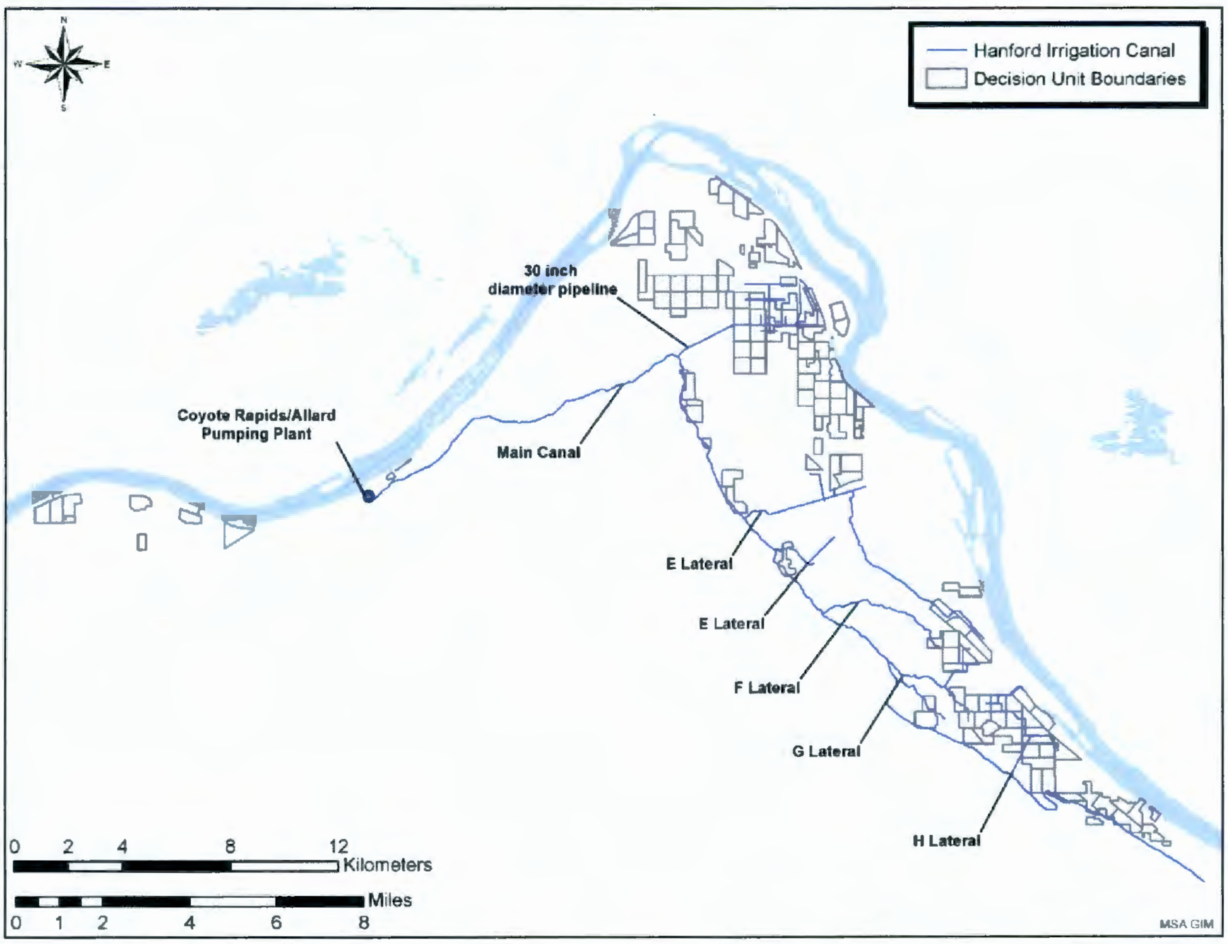


Figure E-2. Hanford Irrigation Canal System.

Property owners built small, privately owned irrigation systems. These irrigation systems fed into the main canal, laterals, and system pipelines to deliver water to orchards and agricultural fields. Irrigation water was withdrawn from either the canal or the irrigation well, and then delivered to a nearby weir box for diversion into the farms' irrigation system. These small-scale irrigation systems often consisted of a main line, rill ditches, and return lines (Sharpe 1999). Several different types of main lines were used to transport water from the weir box to the farms' irrigation system. The earliest mainlines were often constructed of wire-wrapped wooden pipe (flume). It appears that cement pipe (or tile) replaced earlier wooden pipes in approximately 1915 due to its superior water loss prevention qualities. Water was usually diverted from the weir box into a small pipeline and/or open ditch to deliver water to agricultural fields and/or orchards, called flood irrigation. The pipes "usually contained small holes about 1-inch diameter, spaced at random intervals along the length of the line. Irrigation water for fields was on a rotation system. Plugs were removed and reinstalled in the 1-inch-diameter holes for the rotation system." (Sharpe 1999) (Figure E-3). Water would flow through the pipes and out of the holes to provide water to surrounding agricultural fields/areas. Plugs provided the farmers control over the areas that were being watered in the rotation. Lastly, rill ditches were a gravity-operated system that utilized mechanically installed rills (or ditches) to deliver water from the higher elevations of the field to the lower portions. Water ultimately drained into a return line (Sharpe 1999).

Figure E-3. Cement (Tile) Pipeline Running from a Cement Weir Box (in DU-002), with Perforations to Allow Water Overflow into Adjacent Agricultural Areas.

While the Hanford irrigation canal was designed to deliver irrigation water to 18,000 acres, there were problems initially with delivery due to water seepage, which resulted in several sections of the canal being cemented over (as opposed to being left as open earthen ditches) to reduce water loss. It was not until 1909 that water flowed through the entire length of the canal (Sharpe 1999).

The full potential of the Priest Rapids Valley for agricultural production was not fully realized until the development of these pumping and canal systems by private irrigation consortiums in the early 1900s. This vastly increased the amount of irrigated land and potential for agricultural growth across the Valley (and the Hanford Site). With the irrigation projects during the early 1900s, lavish promotions and advertisements of the region were created to promote the areas of Richland, White Bluffs, and Hanford, and their potential for economic gain from agricultural production (DOE/RL-97-02). The advertisements were widely distributed to draw people to the area. With the newly built irrigation systems, the towns of White Bluffs and Hanford began to expand and grow as land previously seen as barren and unproductive was transformed to fertile and fruitful areas, full of agricultural potential. As detailed in DOE/RL-97-02:

> "As the irrigation projects were being built in the middles years of the first decade of the 20th century, farmers in the White Bluffs and Hanford areas were making major investments in their lands. With the promise of ample water, large orchards of apples, pears and plums were planted. Since these young trees would require several years to grow into mature fruit-bearing production, the farmers often planted other cash crops (such as strawberries or alfalfa) between the rows of tree saplings."

E.1.3 Soldier Settlements

In response to the *1919 Land Settlement Act*, enacted by the Legislature of Washington State, a "soldier settlement" project was initiated in the early 1920s. The act was intended to provide World War I veterans with approximately 20 acres of land for agricultural development. The White Bluffs-Hanford area was one of 20 areas considered for the project, and ultimately was selected by the State for the location of the "soldier settlement." In 1922, the State purchased a total of 1,160 acres (or fifty-eight 20-acre tracts), which was then expanded in 1924, when the Act was extended, to 840 additional acres (or forty-two 20-acre tracts) for a total of 100 tracts (Cooper 1925) (Figure E-4).

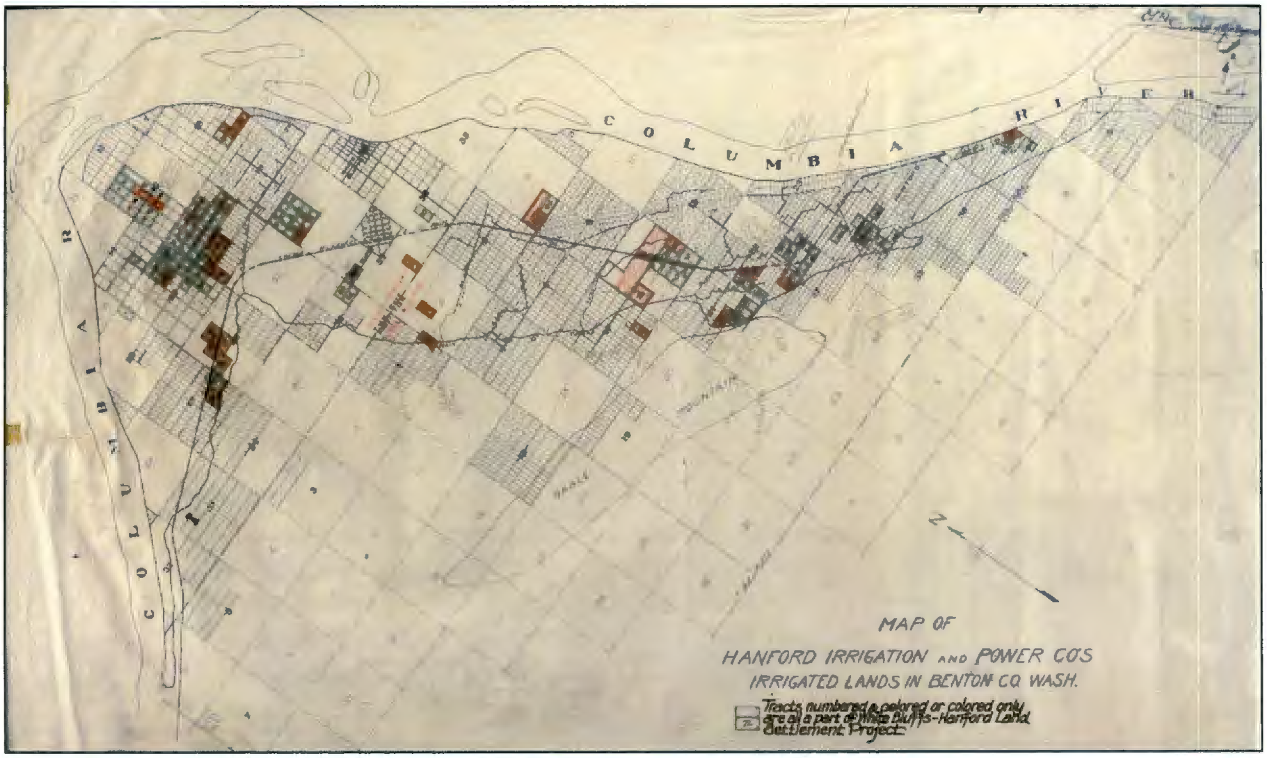


Figure E-4. Map of Hanford Irrigation and Power Company's Irrigated Lands in Benton County, Washington, with White Bluffs-Hanford Land Settlement Tracts Highlighted.

The tracts purchased as part of the project were set up in a similar fashion, with a small house, an outhouse, a barn, a poultry house, and a well with an irrigation pump. The houses were of similar construction, consisting of a rectangular, wood-framed building, with a one bedroom/living room, a small kitchen, and front and back porches (Sharpe 1999) (Figure E-5). The promotional package developed to lure soldiers to the program boasts of the agricultural benefits of the area (Parker 1986):

> "Farming is confined mostly to fruit and alfalfa growing, dairying, hogs, sheep, chicken and turkey raising. Of these, fruit growing has taken the lead, it having been found that this section will produce fruit ready for market 10 days to two weeks ahead of other sections of the state. For this reason, our efforts have been to grow the early varieties of the different fruit and in this way capture the fancy prices obtained on an open market."

Figure E-5. Photograph of a Soldier Settlement (Lempke), Located Half a Mile North of White Bluffs (ca. 1930).

According to Cooper (1925): "In order to make the project economically successful, each applicant was required to have certain qualifications: first, that he be an ex-service man; second, that he be experience in farming to some degree; and third that he have at least $1500 or its equivalent." An initial $612.50 down payment was required within the first 6 months, with a 4% interest payment on the unpaid balance over the first 3 years. At the end of the 3-year period, the remaining balance was to be paid in 20 equal annual payments (Cooper 1925; Sharpe 1999). The State provided financial assistance for certain improvements to the parcels such as clearing, leveling, seeding fencing, irrigation system improvements, and electric bill for pumping for the first 3 years (Cooper 1925).

A large influx of settlers came into the area as a result of the program (Sharpe 1999); however, challenges with drought, difficulty farming in the Hanford area, and low crop prices ultimately led to the failure of the project in 1926 (DOE/RL-97-02). According to Sharpe (1999), "Sixty-nine ex-soldiers settled on the tracts. Soldier settlers were generally inexperienced farmers; however, several successfully produced alfalfa, soy beans, asparagus, rhubarb, corn, rye, onions, pears, peaches, apples, plums, and numerous varieties of grapes." After the State declared the project a failure in 1926, deeds were provided to 50 veterans who had made partial payments on their property, while the remaining parcels were sold at auction (DOE/RL-97-02; Sharpe 1999).

E.1.4 Private and Major Production Areas

With the successful implementation of the large-scale irrigation projects throughout the valley at the turn of the century, the towns of White Bluffs and Hanford saw a dramatic influx of people between 1900 and 1920. Along with farmland, orchards (both private and commercial) became more prevalent in the area. Irrigation companies (such as the White Bluffs Irrigation Company), along with land development/real estate companies (El Dorado Orchard Tract Company, Riverview Orchard Tract Company, and others) began buying up and setting aside tracts of land for orchard development and resale (Figure E-6). It should be noted that while some of these lands were platted for use as orchards, not all of them were developed as such. A good example are the Riverview Orchard tracts, northeast of what is now the 100-N Area (U.S. War Department 1943). These tracts appear to have been in the initial stages of development in the early 1940s (the area was bladed with 20 earthen mounds spaced 50 feet apart), but was never actually developed as an orchard. It is likely that this area was bought by the Riverview Orchard

Company for land development and resale as orchards, but due to the acquisition of the land by the government in 1943, never reached the final stages of development. Similarly, the area in and around the present day 300 Area were also platted for use as orchard lands. The area was named Fruitvale, and while some historical development did take place in the area (Fruitvale school, Fruitvale grange, a few historical residences), the area was never developed for fruit production (as evidenced by 1943 aerial imagery of the area).

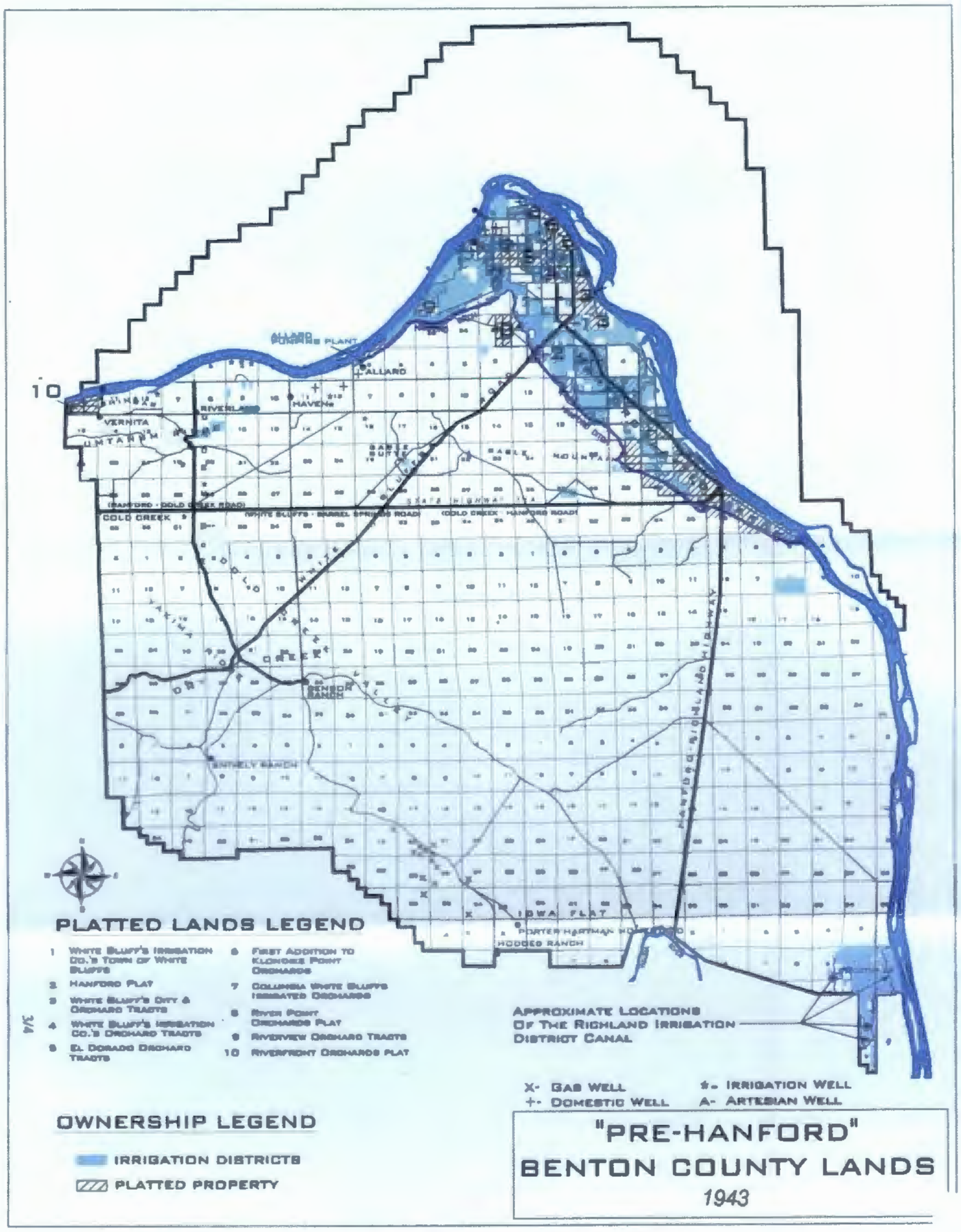


Figure E-6. "Pre-Hanford" Benton County Lands, 1943 (Sharpe 1999).

The Priest Rapids Valley was quickly recognized as a prime fruit-producing area due to its ability to produce fruit crops between 2 to 3 weeks earlier than other fruit-producing areas (Sharpe 1999). Some of the commercial fruit companies that owned lands on the Hanford Site included Perham Fruit Company (Hanford vicinity), Zerwick Fruit Company (Hanford vicinity), Columbia Valley Fruit Company (White Bluffs vicinity), and Balleygreen Orchard Company (Hanford vicinity) (Metsker Maps 1934). In addition, local commercial farms operating on the Hanford Site included the Hanford Ranch, Red Apple Ranch, Bruggemann Ranch, and the Sunnybank Ranch. Oral histories from former residents of White Bluffs and Hanford also detail the stories of small, family-owned farms that grew produce for profit as well (White Bluffs-Hanford Pioneer Association 1982). While crop selection relied heavily on commodity prices, the most common fruits were apples, apricots, cherries, peaches, pears, plums, and prunes. Figure E-7 shows photos of fruit box labels from orchards/vineyards located in the White Bluffs area of the Hanford Site (available on the Hanford Gallery, http://www.hanford.gov/c.cfm/photogallery).

Figure E-7. Fruit Box Labels from Orchards/Vineyards Located in the White Bluffs Area of the Hanford Site (ca. 1935).

With the rapid growth of the area and the economic potential for fruit producing, the Milwaukee Railroad keenly saw the need for freight transportation in and out of the flourishing area. The establishment of the year round Chicago-Milwaukee-St. Pail Railroad spur line (Priest Rapids-Hanford Line) from Beverly to Hanford in 1913 greatly increased the speed of produce delivery, getting fruit to market quicker, and also provided a means of refrigeration for local produce (Sharpe 1999). According to DOE/RL-97-02: "With the arrival of the Priest Rapids Line into the White Bluffs and Hanford area, the farmers were better able to ship large quantities of fruit from their maturing orchards. Not only were produce prices up as a result of war-time demand, but with the arrival of this rail link, transportation costs to ship produce were eased."

The ability to handle and process large quantities of produce along with getting fruit to market faster proved fruitful and provided for profitable gains for the local growers of the area.

While some farms provided their own packing houses (Hanford Ranch, Bruggemann Warehouse, and others) (Figure E-8 and Figure E-9), large processing facilities (such as the White Bluffs Fruit Packing Warehouse, White Bluffs Warehouse Company, Perham Warehouse, the Priest Rapids Ice and Cold Storage Company, and Richland Cold Storage) began providing services to aid in the processing of bulk fruit/produce and provided packing and cold storage services (Sharpe 1999) (Figure E-10 and Figure E-11). According to an interview with MS Borden (White Bluffs-Hanford Pioneer Association 1982), "In 1922, the need for another ice making plant rose for the purpose of refrigerating freight cars hauling fruit by the Milwaukie Railroad. The location chosen was White Bluffs, adjoining the fruit packing house. The building of the Priest Rapids Ice and Cold Storage Co. quickly got under way."

Figure E-8. John Erickson's Fruit Packing Shed, Richland, Washington (January 1, 1943).

Figure E-9. Paul Bruggemann's Warehouse, Bruggemann Ranch, Vernita, Washington (ca. 1930s-1940s).

Figure E-10. Priest Rapids Ice and Cold Storage Company, outside of the town of White Bluffs, Washington (March 23, 1954).

Figure E-11. Richland Cold Storage, Richland, Washington (July 18, 1944).

E.2 Pest Management

An extensive review of historical documents produced by the State of Washington Agricultural Extension Service served as the basis for a literature survey of lead arsenate insecticide application in the orchards of central and eastern Washington State from 1903 to 1950. The literature reveals that the codling moth was the most significant factor orchardists had to overcome in the vibrant Washington apple industry in 1900 to 1920, leading to significant research into lead arsenate application. However, as trees aged, the apple economy waned, and profit/loss ratio inverted and widened, orchards turned into fields, and the awareness of the effects of decades of heavy use of lead arsenate became present. The necessity for better farming methods to increase profit and reclaim toxic land transformed the apple industry by the late 1940s and the era of DDT (dichlorodiphenyltrichloroethane) pesticide.

E.2.1 Lead Arsenate Discovery and Manufacture

F.C. Moulton, a chemist employed by the Massachusetts State Board of Agriculture, discovered lead arsenate as an insecticide in 1892. He was charged with investigating insecticides that would kill the gypsy moth. His discovery was part of a set of insecticides under investigation that included Paris green, Paris green and lime, sodium arsenate, and "Oriental Fertilizer" (a propriety blend from an unnamed company in Chicago). A report of the investigation concluded that, except for lead arsenate, all caused damage to foliage at concentrations that killed gypsy caterpillars. (Massachusetts Agricultural College 1894; Fernald 1898). The Gypsy Moth by E.H. Forbush and C.H. Fernald (1896) and Smith (1898) provide more information on early experimentation and use of lead arsenate.

Early literature described a method of lead arsenate production as a carefully calculated mixture of lead nitrate or lead acetate and sodium arsenate in hot water. In the right combination, a white precipitate formed that did not easily settle because its specific gravity was very close to the specific gravity of water. This characteristic benefitted the spray application technique. When sprayed onto foliage, the water evaporated and a dry film appeared. However, combinations of other chemicals would cause the precipitate to out, resulting in non-uniform application and mechanical issues. (Smith 1898)

The Insecticide Act of 1910 prohibited homemade mixtures of insecticides, so chemical manufacturers took over the market and produced more standardized forms (Figure E-12). Two forms of lead arsenate were derived for pesticide use: an acidic form ($PbHAsO_4$) and a basic form ($Pb_5OH(AsO_4)_3$. The acidic form of lead arsenate was preferred because it killed test insects about 30% to 50% faster than the basic form. The theoretical composition of acid lead arsenate was 33.13% As_2O_5, 64.29% PbO, and 2.58% H_2O, and analysis of the leading brands produced in 1916 confirmed that their composition was close to the theoretical composition. A couple of methods were used to manufacture acid lead arsenate, but the most common was to "mix arsenic acid (H_2AsO_4) and litharge (PbO) in the presence of a small amount of nitric acid." (Cook and McIndoo 1923).

Figure E-12. Container of Swift's Arsenate of Lead.

E.2.2 Early State of Washington Research into the Codling Moth

The codling moth (*Cydia pomonella*) was first introduced to Washington State through Walla Walla in about 1881, and was creating an annual loss to the local apple industry of about $250,000. Consequently, research efforts towards combating the pest were needed. Until this time, early research about the codling moth had been focused on the East Coast of the United States, where it was well established. Not until about 1903 would the first research about the codling moth occur in Washington State (Melander and Jenne 1906).

In 1905, Paris Green (a compound composed of copper acetate and arsenic trioxide) was the most commonplace insecticide advised by the Washington Extension Service to spray orchards against the codling moth (Melander 1905; Cook and McIndoo 1923). However, a 1906 document describing extensive field research performed in the Yakima Valley from 1903 to 1905 concluded that lead arsenate showed more improvement of codling moth control despite a higher cost to the farmer. Another important conclusion was that the codling moth lifecycle included two, if not three, broods. This life cycle study coupled with experimentation on spray applications concluded that four or five sprayings had the best effect and conserved the most insecticide (Melander and Jenne 1906).

The following year research was published that focused on lead arsenate spray tests conducted on a total of 125 acres of neglected orchards in Eastern Washington: two northeast of Spokane and one in Whitman County. Researchers looked at several parameters, including timing of spray applications, quality of lead arsenate product, machinery used to apply the spray, and number of healthy and unhealthy apples. They found that sprayed orchards yielded 90% or more healthy apples versus 41% to 58% in unsprayed orchards (Melander and Jenne 1907).

E.2.3 Research Turns into Applied Science

Research in the decade starting with 1910 built on known facts from earlier research about the codling moth. The literature shows best practices being developed over the years as theoretical methods were employed in orchards, results could be seen, and applied methods adjusted. However, there was conflict between orchardists and the research community during this time. For example, it was theory that killing the worms early in the season (during the calyx phase) would save the fruit at harvest time. However, the author (an extension service researcher) states that "farmers say that theories have little place for consideration when the fruit crop is at stake." Losses the Washington apple industry was experiencing (1917 saw an unexpected amount of codling worms) during a time of rising prices for apples, and lack of education, were probably limiting factors in changing the habits of these farmers. The author expressed some frustration near the end of the document, saying that farmers should "own up" if they have worms in their apples, and "[i]t is not so much that we need government and experiment station entomologists to discover more facts about the codling moth as it is to put into practice what we already know" (Melander 1919). (Note: The literature of the day used the term "worm" when referring to the larval phase of the codling moth lifecycle.)

It would not be until about 1927 that an annual bulletin providing guidance to the orchardist was produced by the Extension Service. This bulletin, titled "Spray Recommendations for Codling Moth Control in Washington" (Johnson et al. 1927), changed names and included other pests over the years, but was produced at least through 1960. The recommendations frequently commented on timing of seasonal spray, availability, composition and application of sprays, tree banding and bark removal, parameters of spray equipment, the impact of spray residue on harvested fruit, and removal of the residue from the harvested fruit.

The method of spraying had its parameters. The orchardist needed the right type of spray gun (certain diameter holes and precise pressure to hold), and had to use a device (called a tower in the literature) to elevate the person spraying above the treetops. Research showed that the codling moths lay their eggs in the upper part of the tree, where ground spray techniques would likely not reach. Very thorough spraying was reinforced in all the bulletins. Figure E-13 shows photos of spraying on the Hanford Site (available on the Hanford Gallery, http://www.hanford.gov/c.cfm/photogallery).

Figure E-13. Orchard Sprayer Equipment, ca. 1920-1930.

Regarding the composition of a lead arsenate spray mixture, a 1918 document says that 1 pound of lead arsenate paste or 1/2 pound of lead arsenate powder was mixed with 40 gallons of water (Melander

1918a). The spray recommendation bulletins usually recommended 2 pounds of paste per 100 gallons of water, with 3 pounds of paste per 100 gallons of water if the infestation was severe.

Further investigation into the codling moth and alternatives to lead arsenate is seen in the late 1920s. The 1927 Washington Agriculture Sub-Committee on Spray Residue and Processing recommended putting jars of fermented apple juice in the tops of trees, as well as using oil sprays on orchards. The Extension Service produced the "hootch trap" in 1926 and deployed it for the following 2 years to help determine the timing of codling moth development and spraying time. The traps were said to save money because of more accurate timing about when to spray, and they were also an auxiliary means of capturing the moths (Parks 1927; State College of Washington 1928).

In the 1930s, the literature shows the first serious progression of treatment practices for codling moth infestations. Issues of how well lead arsenate spray was covering the fruit were handled by mixing lead arsenate with lime, soaps, fish oil, or mineral oil. They also found that multiple sprayings of lead arsenate beyond usual application practices were necessary because the coverage of the pesticide grew smaller as the surface area of the fruit increased with maturity. At the calyx phase, the suggestion for dosing a tree with a heavy infestation of larvae was 80 micrograms of lead arsenate per square inch of fruit. To reach that level, it took 25 to 30 gallons of lead arsenate spray for an average 18-year old Jonathan apple tree. Several cover sprays were advised at the sign of moths (Webster et al. 1932, 1936). By 1936, the arsenic concentration on the fruit was set to a minimum of 120 micrograms per square inch of fruit for the most infested orchards. Webster et al. (1936) added that obtaining this concentration would require "at least one gallon of spray liquid for each box of fruit which the tree is capable of bearing."

E.2.4 Life Cycle of the Codling Moth

Figure E-14 depicts the life cycle of the codling moth (Zeck date unknown). In the early spring, worms that overwintered in the bark of the fruit tree pupate (Figure E-14 (3)) and emerge as moths. They are about 3/4 inch long with brownish gray wings and a bronze band at the tip (Figure E-14 (4)). When the dusk time temperatures are above 15°C (60°F) (usually mid-May to June), they crawl up into the treetops to lay eggs on the leaves (Figure E-14 (1)).

The incubation time of the eggs is between 5 and 21 days, depending on the ambient temperature during the season. After hatching (called the first brood), the worms (Figure E-14 (2)) enter the calyx end of the fruit, or pierce the skin and burrow if the calyx has closed, and dig a tunnel (eating along the way) towards the center of the fruit (Figure E-14 (8)). Within 5 weeks (usually by the first part of July), they will have fed, spun a cocoon, and emerge as moths; the emergence is called the second brood (Zeck date unknown).

The second brood moths will lay eggs on the leaves of the tree (Figure E-14(5)), and the warm weather of summer allows them to hatch in about a week (Figure E-14(6)). These worms will burrow into the fruit. If the temperatures continue to be warm into fall, a third brood may emerge. However, if the temperatures cool, some worms will stay in their larval stage and overwinter in the bark of the tree. They then will emerge the following spring to start the cycle again (Zeck date unknown). Similar information about the life cycle of the codling moth is presented in Figure E-15 (Melander and Jenne 1906).

Figure E-14. Codling Moth Life Cycle (Zeck, date unknown; reproduced with publisher's permission).

This outline of the course of development during the season may be represented in the following tabular form:

1 Wintering larva 2 Spring pupa 3 Moth of 1st brood		Second or third generation
4 Egg of 1st brood 5 Larva of 1st brood 6 Pupa of 2d brood 7 Moth of 2d brood		First generation
Second generation	8 Egg of 2d brood 9 Larva of 2d brood, if wintering return to 1 10 Pupa of 3d brood 11 Moth of 3d brood	
Partial third generation	12 Egg of 3d brood 13 Larva of 3d brood	

May June July August September October

Figure E-15. Codling Moth Life Cycle over the Spring and Summer (Melander and Jenne 1906).

E.2.5 Timeline of Lead Arsenate Application Development

Based on several oral histories by past residents of the Priest Rapids Valley or their descendants, the orchardists referred to recommendations by extension agencies and other expertise on how to control codling moths. Practices for pest management changed over time as new pesticides became available and as the pests became more resistant to the pesticides. Below is a timeline of the major developments and practices for addressing codling moths and lead arsenate pesticide.

1881 Codling moth brought to Washington State through Walla Walla (Melander and Jenne 1906).

1892 Lead arsenate discovered as an insecticide for gypsy moth by F.C. Moulton (Massachusetts Agricultural College 1894).

1903 First study by the State College of Washington Extension Service on the codling moth lifecycle. The results of the study were published as Bulletin 69, "Preliminary Study of the Codling Moth in the Yakima Valley." The result was the finding of two distinct broods separated by a period of several weeks (Jenne 1905).

1905 Study of pesticides and spraying methods to determine the most effective combination for combating the codling moth. The results of the study were published in Bulletin 77, "The Codling Moth in the Yakima Valley." The most effective pesticide was lead arsenate. The most effective application of lead arsenate was four or five spray applications over a season. Banding is mentioned as a preventative measure to inhibit the worms in the early spring from moving up the trunk of the tree, but the bulletin did not mention adding poisons to the bands (Melander and Jenne 1906).

1907 Bulletin 81, "The Codling Moth in Eastern Washington," included the effectiveness of different brands of lead arsenate on the market. One of the differences noted in the bulletin was, "Finally, it is not the kind of materials used, or, with the exception of the first spraying, the exact time of spaying, that counts as much as the kind of man who is doing the pumping or holding the nozzle." The emphasis was that coverage of the tree was the most important factor for effectiveness of lead arsenate (Melander and Jenne 1907).

1918 A four-application spray schedule for lead arsenate continues to generally follow the suggestion in 1907. Figure E-16 shows recommendations from Melander (1918b) for spray applications over the season with the onset of spring. 1903 had a late spring and 1905 had an early spring. Melander also noted there was no reason to apply any pesticide between broods in mid-summer.

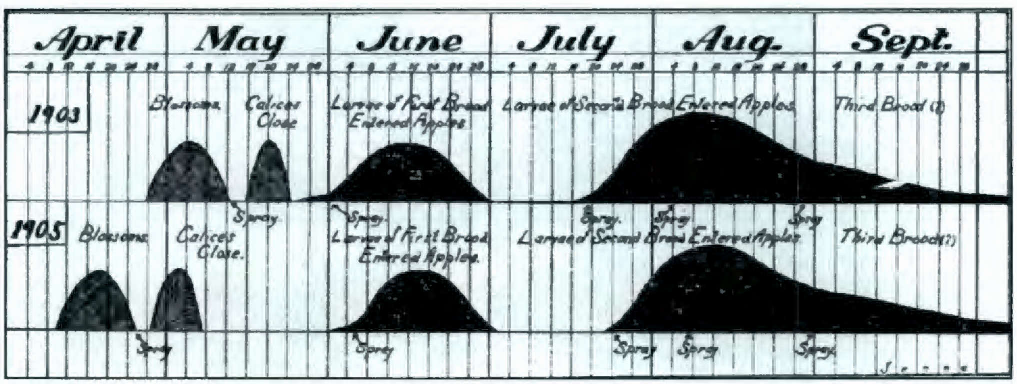


Figure E-16. Changes in the Lead Arsenate Spray Schedule Based on the Onset of Spring Each Year (Melander 1918b).

1927	Recommending tree bark scraping 1 to 2 inches below the soil (State College of Washington 1927).
1927	Recommending tree banding (State College of Washington 1928).
1936	Tree bark scraping increased from 1 to 2 inches to 3 to 5 inches below the soil level (Webster et al. 1936).
1943	Tree bark scraping decreased from 3 to 5 inches to 2 to 3 inches below soil level (Clemens et al. 1943).
1945	As an alternative to scraping/banding of the tree trunks, spreading dinitro-o-cresol/stove oil emulsion onto the tree trucks is recommended (Carver et al. 1945).
1946	It is recommended that tree bark scraping should span from 2 to 3 inches below soil level to as high as there is rough bark on the tree trunk (State College of Washington 1946).
1946	First mention by agricultural extension service of DDT as pesticide for codling moth control, though not recommended on apple and pear trees (Allmendinger et al. 1946)
1947	Spraying dinitro-o-cresol/stove oil emulsion on tree trunks rather than scraping and banding trees is recommended. No further information provided about scraping/banding trees (Allmendinger et al. 1947).
1947	DDT recommended for apple orchards (not pear orchards) and while the guidance for lead arsenate application did not change from 1946 (Allmendinger et al. 1947). The guidance to the orchardists for use of DDT on apples includes: "1st application – 1 lb DDT applied just prior to first hatching of eggs (the date of application should be from 4 to 7 days after first moths are caught in bait traps) 2nd application – 1/2 to 1 lb DDT applied in approximately 20 days, depending upon development of brood 3. 3rd application – 1/2 to 1 lb DDT applied immediately prior to second brood"
1988	August 1, the U.S. Environmental Protection Agency officially bans the use of lead arsenate in the U.S. (53 Federal Register 24787). Peryea (1998) reported that by 1988 all registrations for insecticidal use of lead arsenate had lapsed before that date.

E.2.6 Tree Scraping and Banding

Farmers were encouraged to employ prevention practices in addition to a spraying schedule. A widely practiced method was tree scraping (Figure E-17) and banding. This method was employed in the Pacific Northwest from the 1920s to 1943, when trunk sprays (commonly an emulsion of dinitro-o-cresol and stove oil that was effective at killing overwintering worms on tree trunks and stumps) and DDT applications reduced costs and labor to the farmer (Carver et al. 1945).

The goal of this practice was to reduce the places where larvae could cocoon after leaving the fruit (the larvae of the first brood), and hibernate during the winter (the larvae of the second brood). Codling moth larvae prefer to cocoon in the rough bark of a fruit tree, but also are found in broken limbs, knots, crotches, and the surrounding detritus of the tree. Removing the tree bark forced the larvae to find other refuge, usually lower on the tree or in the soil; those larvae that encountered the band during their movement would be killed.

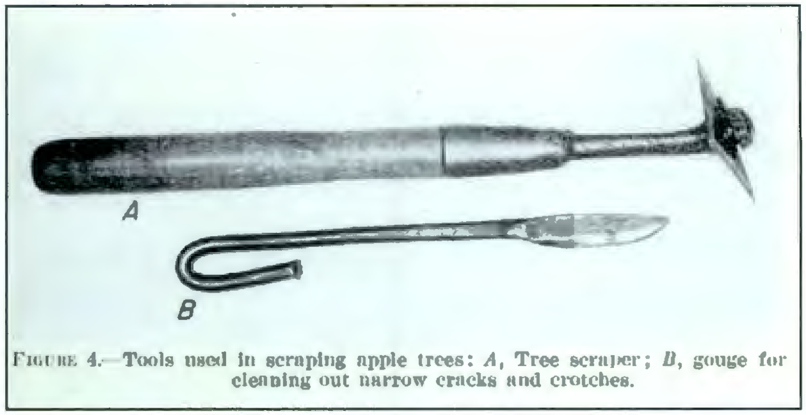


Figure E-17. Rough Bark of Apple Trees Was Scraped with Tools to Inhibit Codling Moth Larvae from Going up the Tree Trunk (Yothers and Carlson 1949).

The extent of bark scraping varied throughout the years, presumably based on the extent of the previous year's infestation. Initial general recommendations were to scrape the tree to 1 to 2 inches below soil level. By 1936, the recommendation increased to 3 to 5 inches below soil level. Removing bark from a tree was laborious; the image on the right of Figure E-17 shows the tools laborers would use. In early practice, it was acceptable to bury scrapings and thinnings underneath the soil. This disposal method changed to burning all waste tree material when it was found that the larvae survived in the detritus.

Banding a tree involved placing a band of corrugated paper containing beta-naphthol dissolved in oil around each tree trunk. The bands contained at least 2 pounds of beta-naphthol per 100 feet of 2-inch material. They were applied around June, before the first larvae leave the fruit. Older generation bands used burlap, or other material that had to be replaced every 10 to 14 days. Newer generation corrugated paper bands were commercially available and could be left on through the following spring (Webster et al. 1932, 1933, 1934, 1935, 1936; Clemens et al. 1941).

E.2.7 Orchard Mites

Starting in 1937, the extension service bulletin started reporting controls for mites as well as codling moths (State College of Washington 1937). Common mites in Washington State include the spider mite (*Tetranychus mcdanieli*), European red mite, and apple rust mite (*Aculus schlechtendali*). There is no supporting evidence that an epidemic of mites in tree fruits was happening in Washington. However, control recommendations stated some coordination practices between sprays for codling moth and mites. An assumption then is that wherever codling moths were present, mites may be as well. The bulletin cautioned that treatment for a mite-infested tree or orchard required careful considerations for lead arsenate application so as to not damage fruit or foliage.

Three types of mite were of interest: the Pacific or spider mite (*Tetranychus mcdanieli*), European red mite (*Panonychus ulmi*), and brown mite (*Bryobia rubrioculus*). The Pacific mite was the most difficult to treat because it was the only mite that created a heavy webbing in the tree that shielded its eggs from pesticide spray.

Arsenical compounds were not effective on mites because they were not a "chewing" insect; these compounds are only effective if ingested. Instead, sulfur and mineral oil were the most effective pesticides for mite control because mites were considered a "sucking" insect. When mites infested an apple or pear tree, they consumed the cells of the leaf, including any chlorophyll and water. The tree could produce enough nutrients, so its fruit did not mature well.

The issue for a farmer who was dealing with codling moth and mite infestations was the timing of pesticide spray applications. The combination of lead arsenate cover spray early in the season for codling moths, then a sulfur spray cover for mites later in the season, and a mineral oil cover spray for mites (again) further in the season would harm to the fruit and foliage. It was at the grower's discretion to determine the how much collateral damage to crop was acceptable with respect to the level of infestation and spray applications. Another element to spray applications was the ease of their removal at harvest time. Some combinations of pesticides and the time of the season in which they were sprayed would make their removal very difficult (Webster et al. 1937, 1938; Clemens et al. 1939, 1940, 1941; Breakey et al. 1942).

E.2.8 Other Insecticides

Lead arsenate was not the only spray that was applied during the growing season. What spray to use and when to apply the spray was a function of the temperature and growth cycle of fruit. Some of the sprays that were included in the seasonal spray schedule, in addition to lead arsenate, were mineral oil, fish oil, kerosene, nicotine sulfate, soaps and spreaders, homemade formulas, phenothiazine, fluorine compounds, and DDT.

Despite the increasing knowledge on the application of lead arsenate to combat codling moth in orchards, growers continued to have difficulties keeping a heavy enough arsenic deposit on the fruit as it matured. Reasons for this included inadequate equipment, underestimation of moth infestation, spray applications that were not thorough enough, ineffective spray mixtures, concern about residue removal at harvest, and warm temperatures in lower valleys where eight or more sprays were often applied. In response, the Washington Extension Service created a pesticide formula in 1937 they called W.S.C. Dynamite (Marshall and Groves 1937).

W.S.C. Dynamite was an inverted mixture, meaning that the solvent base was oil, not water. The grower could mix it from stock materials: lead arsenate, mineral oil, oleic acid, and either triethanolamine or ammonia. A heavy application of 75 gallons per tree was advised. Unlike a water-based lead arsenate mixture, Dynamite was not supposed to be applied after June 30 because it was too difficult to remove from fruit after harvest if applied later in the growing season. The recipe for application in July and August was the Modified W.S.C. Dynamite (depending on previous sulfur spray applications). This modified recipe used a mixture of kerosene and herring oil instead of mineral oil. The tradeoff for extending application of the Dynamite base was that—like its cousin—its residue was difficult to remove from the fruit if used later than intended (Marshall and Groves 1937).

The use of fluorine compounds as pesticides was advised for a brief period in the 1930s. The main disadvantage of these was that their residue was more difficult to remove from the fruit than arsenical compounds. By 1936, the U.S. Food and Drug Administration would not grant shipping clearance to any fruit sprayed with fluorine compounds, even if accompanied by chemical analysis of the residual. However, fluorine continued to be mentioned in bulletins published after this date.

E.2.9 Awareness of Lead Arsenate Toxicity in Soil

In the mid-1930s, the agricultural community started understanding the effects of years of lead arsenate spraying in orchards. The number of producing trees had been declining for the last 10 to 15 years due to aging orchards and rough economic factors, so farmers were seeking other ways to use their land and continue profitability. As trees were removed and replaced with other crops, farmers realized that some crops grew poorly, if at all, in the orchard soils.

Several studies were performed during this period on orchard soils in the Yakima and Wenatchee agricultural areas related to the quantity and observable effects of arsenic contamination (Vandecaneye et al. 1936; Vincent 1939, 1941). The 1936 study by Vandecaveye, Horner, and Keaton in Yakima, Washington, reported arsenic concentrations in test soils between 4.5 and 12.5 parts per million.

A 1939 study on test soils in the Wenatchee area found between 8.5 and 33 parts per million arsenic. The study also concluded that rye green-manure (that is, planting rye then tilling it under), cow manure, or a combination of the two, reduced arsenic concentrations to an amount that small vegetables and fruits could grow normally. The most tolerant crops to arsenic were asparagus, Irish potato, tomato, carrot, tobacco, dewberry, grape, and red raspberry. Sweet corn, beets, summer and winter squash, and strawberries were moderately tolerant to arsenic. Snap beans, Lima beans, onions, peas, and cucumber had little to no tolerance to arsenic. No mention or study was made in the experiment about the bioaccumlative effect of arsenic in the target produce (Vincent 1944).

E.2.10 Transition from Lead Arsenate to DDT

The transition from lead arsenate spray applications to DDT happened in the mid-1940s. Sometime around 1947, the Washington Extension Service changed its recommendation for combating codling moth infestation from lead arsenate to DDT. DDT was popular because it was effective against more than just the codling moth, and only one or two applications were needed for the entire season. However, it did have complications; one of the main ones was that DDT reduced the predators of mites and aphids, causing the population to increase. This predicament forced growers to compromise spray control methods towards whatever pest (codling moth, or aphids and mites) was more damaging to the harvest result (Allmendinger et al. 1946, 1947, 1948, 1949).

Lead arsenate would continue to be used for peach twig borers, cherry fruit fly, stone fly, and pear or cherry slug in the early 1950s (Anthon et al. 1950; State College of Washington 1952 and 1954; Peryea 1998).

E.3 The Great Depression

The farmers and orchardists fell under hard times during the Depression of the 1930s. In addition to decreased land values, fluctuating commodity prices were posing serious economic problems for the growers in the area. Many farmers were forced to relocate or abandon their farms, and the towns of White Bluffs and Hanford were declining in population (Sharpe 1999). With the decrease in population, the irrigation systems were no longer economically viable with decreased farmlands in production, and many were forced to shut off water and close. Then, in February 1943, the U.S. Department of War, acting under the *Second War Powers Act*, acquired the land that is now the Hanford Site to support the war effort and Manhattan Project operations.

E.4 Post-1943 Orchards

The expedient evacuation process of the Hanford Site in 1943 left many well-maintained orchards abandoned and vacant prior to the annual harvest. At the time, Colonel Franklin T. Matthias of the Army Corps of Engineers (Corps) was responsible for directing construction work on the Hanford Site, and the Corps was the agency responsible for carrying out Manhattan Project construction activities. According to the diaries of Colonel Matthias, he was approached by the McNeil Island Federal Penitentiary in Tacoma, Washington, with an offer to harvest the fruit in the White Bluffs and Hanford areas. The labor force from McNeil Federal Penitentiary would be housed at a local prison camp and prison labor would be used to pick the fruit (Matthias 1943).

An agreement was reached and a contract was forged between the Corps and Federal Prison Industries. The contract included the responsibility and maintenance for the orchards and other agricultural property on the Hanford Site, including "irrigation, pruning, spraying, picking and all other activities, incident to this work" (Matthias 1943). DuPont, the leading contractor for the Corps in the construction of the Hanford Site, advertised employment opportunities for farming work in the area. This was likely needed until Federal Prison Industries was able to create sufficient infrastructure to support the agricultural efforts (Interview with Jerome Clark, White Bluffs-Hanford Pioneer Association 1982). In addition, DuPont offered former Hanford Site residents who came to work for them the ability to continue living in their residences for an extended period (what appears to have been up to 1 year) (Interview with Jerome Clark, White Bluffs-Hanford Pioneer Association 1982).

In September of 1943, the Corps began building a temporary prison camp, named Columbia Camp, on the horn of the Yakima River to house the prisoners who would be working the agricultural areas and orchards of Hanford. Manhattan District of the Corps constructed Columbia Camp by moving and using existing buildings from a Civilian Conservation Corps camp in Winifred, Montana (Davis 1993a) (Figure E-18).

Figure E-18. Columbia Prison Camp, Located on the Horn of the Yakima River (February 12, 1944).

Columbia Camp received its first prisoners from McNeil Island Federal Penitentiary on February 1, 1944 (Davis 1993a). Special care was taken in selecting inmates due to the camp's proximity to Manhattan Project operations. According to Davis (1993b), the population of Columbia Camp consisted of:

> "...minimum-custody-type improvable male offenders who had no more than one year to serve. They were violators of national defense, wartime and military laws and included conscientious objectors, violators of rationing and price support laws and those convicted of espionage, sabotage and sedition by military courts martial."

Prisoners and guards were transported onto the site by vehicles provided by the Army, and later the Atomic Energy Commission (AEC), to work the orchards and fields. According to Colonel Matthias's diaries, the prisoners were responsible for harvesting and maintaining the orchards and agricultural lands located in and around Vernita, White Bluffs, Hanford, Richland, and on the north and east sides of the Columbia River (Matthias 1943; Matthias 1944). The fruit was harvested and sent by truck to the cannery at McNeil Island Federal Penitentiary for processing and packaging before being sold to the Army, Navy, and other government agencies.

By 1944, Columbia Camp was harvesting enough fruit that Federal Prison Industries requested additional equipment from the Corps to increase the water supply at the cannery in Tacoma to keep up with the large quantities of fruit that were being processed from the Hanford area (Matthias 1944). The journal entries following the 1944 harvest indicate that the harvest season was not viewed as a success. It seems that there was a considerable amount of theft of the harvested fruit coupled with an inability to access all orchard areas within the site.

In the winter of 1944, discussions were underway about restricting access to some interior portions of the Hanford Site "Area A" and abandoning orchard maintenance and harvesting by prisoners in these areas

(Matthias 1944). As a result, the orchards in and around the White Bluffs and Hanford town sites were abandoned after the 1944 harvest. Additionally, as detailed above, Federal Prison Industries requested to be "relieved of any responsibility for the orchards north and east of the river as the area was so inaccessible to them that it made it very difficult to operate" (Matthias 1944). This left the orchards in Richland (referred to as the "Village," and not part of the 100-OL-1 OU) and the Vernita area (e.g., around DU-001 through -004) under the responsibility of Federal Prison Industries for the following year.

There were many discussions between the Corps and Federal Prison Industries about using prison labor for salvage work on site to support project operations during the following harvest season, when there was a dramatic decrease in the amount of orchard/agricultural work for the Columbia Camp prisoners (Matthias 1945). This concept was ultimately abandoned, with the thought that another program to keep the prisoners busy during the agricultural offseason would be organized later (Matthias 1945).

The contract with Federal Prison Industries was terminated on November 1, 1947 (Davis 1993a). With the end of the contract, there was no longer a need for prison labor, and as such, Columbia Camp closed its doors in the fall of 1947. By the end of the contract, an estimated 5,669 tons of fruit had been processed from the Hanford Site, with a total of $500,000 in sales (Walla Walla Union Bulletin 1950). There is little available information related to the contract between AEC (which took over for the Corps after World War II) and Federal Prison Industries between 1946 and 1947; however, it is assumed that the prisoners of Columbia Camp continued maintenance and operations at the remaining orchards in the Vernita and Richland areas of the Hanford Site during this time.

After 1947, the AEC transferred the contract for orchard operations to two private companies: the Webber Brothers of Mesa and the Vernita Orchard Company. Vernita Orchard Company was responsible for orchard operations at Vernita, which included the former Bruggemann warehouse area and associated agricultural complex (DU-001 through -004). Figure E-19 shows the Bruggeman property in 1943 and 1948, demonstrating the continued prosperous growth of orchards at that location. Additionally, Figure E-20 shows a cement weir box located on the Bruggemann property with a 1947 date inscribed using small pebbles, indicating that upgrades to the irrigation system continued through the acquisition of the land by the government in 1943. Evidence of a wire-wrapped wooden irrigation pipe extends from the opposite end of the diversion box. The existing wooden irrigation pipe may have been replaced in 1947 with the ceramic pipe along with the installation of the diversion box.

Figure E-19. Arial Imagery of the Orchards and Other Agricultural Products at the Bruggemann Property in 1943 and 1948.

Figure E-20. "3-19-47" Date Created from Pressed Pebbles into Wet Concrete on a Diversion Box at the Bruggemann Property.

The Walla Walla Union Bulletin (1950) reported about the orchard products from Hanford in 1949:

> "Under operation by two private contractors, more than 300 acres of orchards last year [1949] produced 1,230 tons of fruit, which brought a gross return of $90,000. In 1948, the production was 790 tons bringing gross returns of $80,000. When the fruit was marketed, the private contractors paid a specified percentage of the cash returns to the atomic energy commission."

Review of construction photographs of several of the Hanford reactor and support areas (Hanford Construction Camp, 100-H Area and 100-K Area) shows the orchards on the Hanford Site (Figure E-21). These images, while capturing construction progress on the reactors and support buildings, also depict orchard areas thriving in the background through the early 1950s. While not all orchard areas were maintained, it is clear from these images that selected orchards were kept for continued use and operations well after 1947.

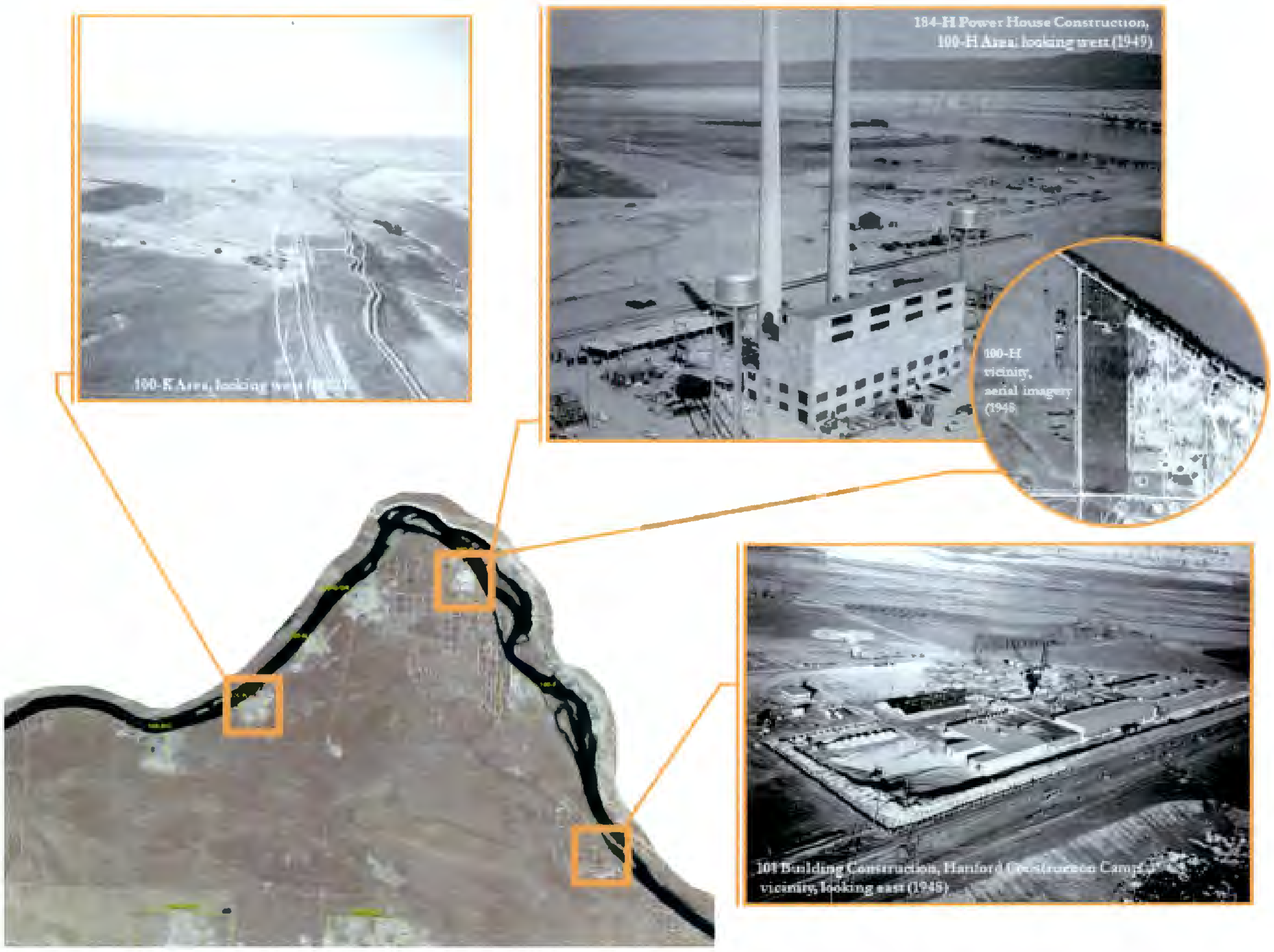


Figure E-21. Hanford Orchards Continued after the Manhattan Project around 100-K, 100-H and around the Hanford Construction Camp.

The Webber Brothers of Mesa and the Vernita Orchard Company held the contract with AEC until 1954, when it was cancelled due to concern over the proximity of the orchards to Hanford Site plutonium operations and a lack of justification for continued orchard operations on the Hanford Site. While not much information is available to date on these private contracts, it is assumed that these contractors continued operations at all of the remaining orchard areas until the termination of their contracts. Following the conclusion of these two contracts, orchards were abandoned on the Hanford Site.

E.4.1 Orchard Selection Post-1943

While more information needs to be gathered, it appears that the areas selected for continued orchard activities were properties that had easy access to irrigation water without using the Hanford Irrigation canal (and associated laterals). Additional research into this area is currently being conducted; however, many properties along the Columbia River shoreline had autonomous systems, which pumped water directly from the river without a need for a connection to the larger irrigation district. In addition, irrigation wells are known to exist in several areas throughout the Hanford Site, with a concentration of these properties in and around the Horn of the Columbia River. Several journal entries from Matthias support this fact. In an early journal entry, from May 4, 1943, Matthias (1943) discusses the general poor condition of the irrigation canal and the large expense expected to repair it:

> "Checked progress of work on Priest Rapids irrigation district with Mr. Grogan and found that they were experiencing considerable difficulty in getting the main trunk irrigation ditch and some of the laterals in working condition. The entire district has been sadly neglected for a number of years, and the main trunk irrigation ditch is in such bad shape as to be completely unsafe with respect to possible break throughs. It is estimated that it may cost in the neighborhood of $20,000 to put the ditch in condition to receive water. Mr. Grogan was instructed to spend as little as possible to make the ditch carry water, as there would be no cash return from this operation. DuPont have hired an agricultural graduate, and will be consulted when the representative of the State Department of Agriculture comes in to inspect the orchards, and to decide which ones will be kept."

There is no discussion of this subject again in subsequent journal entries. It is possible that the damage was too extensive and too expensive to repair and that the irrigation canal would have been abandoned for other forms of irrigation (such as those mentioned above). A later journal entry from August 10, 1944 (Matthias 1944) seems to suggest this may have been true:

> "Some discussion has arisen on the electrical irrigation pump care and Major Newcomb will take up with the IBBW the question of taking this entirely under the jurisdiction or DuPont and handling it by Government personnel. On this basis the electricians would have no objection. Their present claim is that they feel they should do the oiling and servicing of all of the isolated irrigation pumps that are serving the orchards not connected to the irrigation district as part of the electrical work contract."

This point suggests that at least some of the orchards being maintained were not connected to the irrigation district and used autonomous pumps (likely from the river directly, or irrigation wells). Additional information is needed to more fully understand this topic.

E.4.2 Manhattan Project Operations

For a summary of Manhattan Project operations, please see the following documents:

- DOE/RL-2008-46. 2008. *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2010-95. 2014. *Remedial Investigation/Feasibility Study for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-2010-98. 2014. *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU6 Operable Units.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.

E.5 References

53 Federal Register 24787. 1988. "Final notice of intent to cancel; lead arsenate." U.S. Environmental Protection Agency, Washington, D.C.

Allmendinger DF, DH Brannon, LR Bryant, FE Carver, RB Clemens, B Day, WN Grubb, HA Himmelsbach, PJ Moody, WJ O'Neill, FL Overley, WH Shaw, JC Snyder, and RL Webster. 1946. "Control of Codling Moth, Orchard Mite, Aphis, and Scale in Eastern Washington, 1946." Extension Bulletin No. 279 (revised), Agricultural Extension Service, The State College of Washington, Pullman, Washington.

Allmendinger DF, DH Brannon, LR Bryant, RM Bullock, FE Carver, RB Clemens, B Day, KA Haines, WA Luce, RC McCue, PJ Moody, TA Merrill, WJ O'Neill, FL Overley, CW Schisler, WH Shaw, JC Snyder, K Walker, RL Webster, and JS Woodward. 1947. "Control of Codling Moth, Orchard Mite, Aphid, and Scale in Eastern Washington, 1947." Extension Bulletin No. 279 (revised), Extension Service, Institute of Agricultural Sciences, The State College of Washington, Pullman, Washington.

Allmendinger DF, EW Anthon, DH Brannon, FE Carver, F Charles, RB Clemens, B Day, HA Himmelsbach, WA Luce, RC McCue, PJ Moody, WJ O'Neill, FL Overley, CW Schisler, WH Shaw, JC Snyder, HS Telford, K Walker, and RL Webster. 1948. "Spray Programs for Apples and Pears in Eastern Washington." Extension Bulletin No. 374, Institute of Agricultural Sciences, The State College of Washington, Pullman, Washington.

Allmendinger DF, EW Anthon, RD Bartram, DH Brannon, FE Carver, RB Clements, B Day, MR Harris, HA Himmelsbach, WA Luce, RV McCue, PJ Moody, WJ O'Neill, FL Overley, HS Telford, K Walker, RL Webster, and H Wolfe. 1949. "Spray Programs for Apples and Pears in Eastern Washington." Extension Bulletin No. 374, Extension Service, Institute of Agricultural Sciences, The State College of Washington, Pullman, Washington.

Anthon EW, RD Bartram, DH Brannon, FE Carver, RB Clemens, B Day, K Frick, MR Harris, CH Koppang, WA Luce, PJ Moddy, WJ O'Neill, FL Overley, JL St. John, WH Shaw, JC Snyder, R Sprague, HS Telford, K Walker, RL Webster, H Wolfe, and MA Yothers. 1950. "Spray Programs for Insects and Diseases of Tree Fruits in Eastern Washington." Extension Bulletin No. 419, Extension Service, Institute of Agricultural Sciences, The State College of Washington, Pullman, Washington.

Breakey EP, RB Clemens, FE DeSellem, H Fallscheer, CA Mills, WJ O'Neill, EL Overholser, FL Overley, AC Rich, LG Smith, RL Webster, and HL Wood. 1942. "Recommendations for Codling Moth, Orchard Mite and Scale Control in Washington for 1942." Extension Bulletin No. 279, Extension Service, State College of Washington.

Carver FE, EB Clemens, G Day, L Harman, JD Menzies, MC Midley, WJ O'Neill, DL Overholser, FL Overley, JL St. John, CW Schisler, WH Shaw, LG Smith, KC Walker, and RL Webster. 1945. "Control of Codling Moth, Orchard Mite, Aphis and Scale in Eastern Washington, 1945." Extension Bulletin No. 279, Agricultural Extension Service, State College of Washington, Pullman, Washington.

Clemens RB, H Fallscheer, JI Griner, TL Kirkpatrick, WJ O'Neill, EL Overholser, FL Overley, AC Rich, LG Smith, JC Snyder, and RL Webster. 1941. "Recommendations for Codling Moth, Orchard Mite and Scale Control in Washington for 1941." Extension Bulletin No. 266, Extension Service, State College of Washington.

Clemens RB, SR Kelso, TL Kirkpatrick, JB Moore, EL Overholser, RL Overley, AC Rich, LG Smith, JC Snyder, B Tucker, and RL Webster. 1939. "Recommendation for Codling Moth Control in Washington for 1939." Extension Bulletin No. 248, Extension Service, State College of Washington.

Clemens RB, EV Ellington, H Fallscheer, JI Griner, K Groves, SR Kelson, TL Kirkpatrick, PJ Moody, JB Moore, WJ O'Neill, EL Overholser, FL Overley, AC Rich, LG Smith, JC Snyder, B Tucker, and RL Webster. 1940. "Recommendation for Codling Moth and Orchard Mite Control in Washington for 1940." Extension Bulletin No. 252, Extension Service, State College of Washington.

Clemens RB, Day G, FE DeSellem, WA Luce, PJ Moody, WJ O'Neill, EL Overholser, FL Overley, AC Rich, LG Smith, and DL Webster. 1943. "Recommendations for Codling Moth, Orchard Mite, Aphis and Scale Control in Washington, 1943." Extension Bulletin No. 279 (revised), Agricultural Extension Service, State College of Washington, Pullman, Washington.

Cook FC and NE McIndoo. 1923. "Chemical, Physical, and Insecticidal Properties of Arsenicals." Department Bulletin No. 1147, U.S. Department of Agriculture, Washington, D.C.

Cooper HW. 1925. "The White Bluffs-Hanford Land Settlement Experiment." *Journal of Electricity* 54(9):313-315.

Davis JC. 1993a. "Columbia Camp: Prison Camp in Our Midst, 1944-1947." *The Courier, East Benton County Historic Society* 15(1):1-3.

Davis JC. 1993b. "Columbia Camp Held Violators of Wartime Laws," August 22, 1993. *Tri-City Herald*, Kennewick, Washington.

DOE/RL-97-02. 1997. *National Register of Historic Places Multiple Property Documentation Form – Historic Archaeological and Traditional Cultural Properties of the Hanford Site, Washington.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington. http://pdw.hanford.gov/arpir/pdf.cfm?accession=0084900.

DOE/RL-2008-46. 2008. *Integrated 100 Area Remedial Investigation/Feasibility Study Work Plan.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2010-95. 2014. *Remedial Investigation/Feasibility Study for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units*, Rev 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2010-98. 2014. *Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU6 Operable Units.* Revision 0. U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Fernald CH. 1898. "Arsenate of Lead as an Insecticide." In *Forty-Fifth Annual Report of the Secretary of the Massachusetts State Board of Agriculture Together with the Tenth Annual Report of the Hatch Experiment Station of the Massachusetts Agricultural College.* Wright and Potter Printing Co., Boston, Massachusetts. pp. 353-356

Forbush EH and CH Fernald. 1896. *The Gypsy Moth.* Wright and Porter Printing Co., Boston, Massachusetts.

Jenkins OP. 1922. "Underground Water Supply of the Region About White Bluffs and Hanford." Bulletin No. 26, State of Washington, Department of Conservation and Development, Division of Geology. http://file.dnr.wa.gov/publications/ger_b26_underground_water_whitebluffs_hanford.pdf.

Jenne EL. 1905. "Preliminary Report On the Codling Moth in the Yakima Valley." Bulletin No. 69, Experiment Station, Washington State Agricultural College and School of Science, Pullman, Washington.

Johnson DC, JI Griner, GE Harter, EJ Newcomer, FC Nielsen, A Spuler, and EL Webster. 1927. "Spray Recommendation for Codling Moth Control for Washington 1927." *Journal of Economic Entomology* 20:546-547.

Marshall J and K Groves. 1937. "WSC 'Dynamite' Spray: How to Mix and Use It." Extension Bulletin No. 232, Extension Service, State College of Washington, Pullman, Washington.

Massachusetts Agricultural College. 1894. *Thirty-First Annual Report of the Massachusetts Agricultural College, October 1893*. Public Document No. 31, Wright and Potter Printing Co., State Printers, Boston, Massachusetts. https://archive.org/details/annualreport8494mass.

Matthias FT. 1943. *Colonel Matthias's Diary*. Manuscript available at the Department of Energy Reading Room, Richland, Washington.

Matthias FT. 1944. *Colonel Matthias's Diary*. Manuscript available at the Department of Energy Reading Room, Richland, Washington.

Matthias FT. 1945. *Colonel Matthias's Diary*. Manuscript available at the Department of Energy Reading Room, Richland, Washington.

Melander AL. 1905. "The Wormy Apple." Bulletin 68, Experiment Station, Washington State Agricultural College and School of Science, Pullman, Washington.

Melander AL. 1918a. "Codling Moth Spraying." Entomology Extension Circular No. 4. Extension Service, State College of Washington.

Melander AL. 1918b. "Spraying Formulas for Orchard Insects." Series I, No. 39, Extension Service, State College of Washington, Pullman, Washington.

Melander AL. 1919. "Spraying for the Codling Moth." Series I, No. 54, Extension Service, The State College of Washington, Pullman, Washington.

Melander AL and EL Jenne. 1906. "The Codling Moth in the Yakima Valley." Bulletin No. 77, Department of Botany and Zoology, The Agricultural Experiment Station, The State College of Washington, Pullman, Washington.

Melander AL and EL Jenne. 1907. "The Codling Moth in Eastern Washington: With an Account of the User of Arsenate of Lead for the Codling Moth." Bulletin No. 81, Department of Zoology, The Agricultural Experiment Station, The State College of Washington, Pullman, Washington.

Metsker Maps. 1934. *Metsker Atlas of Benton County* [map]. Metsker Maps, Tacoma, Washington.

Newland Reclamation Act of 1902. 1902. Public Law 57-161, 32 Stat. 388.

Parker MB. 1986. *Tales of Richland, White Bluffs & Hanford 1805-1943, Before the Atomic Reserve*. YE Galleon Press, Fairfield, Washington.

Parks PR. 1927. "Report of Sub-committee on Spray Residue and Processing." In *Washington Agriculture*, Part 10 Recommendations and Resolutions. No. 134, Extension Service, State College of Washington. pp. 14-15.

Sharpe JJ. 1999. *Pre-Hanford Agricultural History: 1900-1943*. BHI-01326, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

Peryea FJ. 1998. "Historical Use of Lead Arsenate Insecticides, Resulting Soil Contamination and Implications for Soil Remediation." In *Proceedings of the 16th World Congress of Soil Science*, Montpellier, France. http://soils.tfrec.wsu.edu/leadhistory.htm.

Smith FJ. 1898. "Arsenate of Lead: Its Manufacture and Chemical Composition." In *Forty-Fifth Annual Report of the Secretary of the Massachusetts State Board of Agriculture Together with the Tenth Annual Report of the Hatch Experiment Station of the Massachusetts Agricultural College*. Wright and Potter Printing Co., Boston, Massachusetts. pp. 357-369

State College of Washington. 1927. *Washington Agriculture*, Part 10, Recommendations and Resolutions. No. 134, State College of Washington, Pullman, Washington.

State College of Washington. 1928. *Fourteenth Annual Report of the Extension Service*. No. 150, Extension Service, State College of Washington, Pullman, Washington.

State College of Washington. 1937. "Recommendations for codling moth and orchard mite in Washington for 1937." State College of Washington, Pullman, Washington.

State College of Washington. 1946. *Control of codling moth, orchard mite, aphis, and scale in Eastern Washington, 1946*. State College of Washington, Pullman, Washington.

State College of Washington. 1952. "Spray Recommendations for Tree Fruits in Eastern Washington." Extension Bulletin No. 419 (revised), State College of Washington, Pullman, Washington.

State College of Washington. 1954. "1954 Spray Recommendations for Tree Fruits in Eastern Washington." Extension Bulletin No. 419 (revised), State College of Washington, Pullman, Washington.

U.S. War Department. 1943. *Hanford Engineer Works (HEW) Real Estate Maps*. https://docs.google.com/file/d/0B4JiRk754kBFS25HSUVRY1NvZEk/edit?pref=2&pli=1.

Vandecaneye SC, GM Horner, and CM Keaton. 1936. "Unproductiveness of certain orchard soils as related to lead arsenate accumulations." *Soil Science* 42(3):203-215.

Vincent CL. 1944. "Vegetable and Small Fruit Growing in Toxic Ex-Orchard Soils of Central Washington." Bulletin No. 437, Agricultural Experiment Station, The State College of Washington, Pullman, Washington.

Vincent CL. 1939. "Problems in vegetable and small fruit production on toxic orchard soils of central Washington." In *Proceedings of the American Society for Horticulture Science*, Volume 37.

Vincent CL, OM Morris, and EL Overholser. 1941. "Possibilities of vegetables, small fruits, and tree fruits on toxic orchard soils." Washington Agricultural Experiment Station.

Walla Walla Union Bulletin. 1950. "Richland Orchard Remnants Continue to Produce for Gain." April 23, 1950. Walla Walla, Washington.

Webster RL, A Spuler, GE Harter, AC Rich, EJ Newcomer, FL Overley, AR Chase, EL Harms, and R Clemens. 1932. "Spray Recommendations for Codling Moth Control in Washington for 1932." Extension Bulletin No. 167, State College of Washington, Agricultural Experiment Station, Pullman, Washington.

Webster RL, J Marshall, W Brown, D Starcher, EL Overholser, EJ Newcomer, FL Overley, AR Chase, and CL Vincent. 1933. "Spray Recommendations for Codling Moth Control in Washington for 1933." Extension Bulletin No. 177, State College of Washington, Agricultural Experiment Station, Pullman, Washington.

Webster RL, J Marshall, EL Overholser, FL Overley, W Brown, D Starcher, EJ Newcomer, AR Chase, AC Rich, RB Clemens, SR Kelso, and H Wood. 1934. "Recommendations for Codling Moth Control in Washington for 1934." Extension Bulletin No. 185, Extension Service, State College of Washington.

Webster RL, J Marshall, EL Overholder, FL Overley, EJ Newcomer, AC Rich, RB Clemens, H Wood, JC Snyder, PA Combelic, and CD Dolman. 1935. "Recommendations for Codling Moth Control in Washington for 1935." Extension Bulletin No. 201, Extension Service, State College of Washington.

Webster RL, EJ Newcomer, JI Griner, J Marshall, RE Marshall, TL Overley, RH Sargent, K Groves, CD Dolman, AC Rich, RF Clemens, TL Kirkpatrick, H Wood, FE Balmer, and JC Snyder. 1936. "Recommendations for Codling Moth Control in Washington for 1936." Extension Bulletin No. 219, Extension Service, State College of Washington.

Webster RL, EJ Newcomer, JI Griner, J Marshall, EL Overholser, HR Defabaugh, FL Overley, AC Rich, RF Clemens, TL Kirkpatrick, H Wood, SR Kelson, and JC Snyder. 1937. "Recommendations for Codling Moth and Orchard Mite Control in Washington for 1937." Extension Bulletin No. 233, Extension Service, State College of Washington.

Webster RL, JI Griner, J Marshall, EL Overholser, FL Overley, AC Rich, EJ Newcomer, RB Clemens, TL Kirkpatrick, H Wood, HJ Reynolds, HR Defabaugh, and JC Snyder. 1938. "Recommendations for Codling Moth and Orchard Mite Control in Washington for 1938." Extension Bulletin No. 240, Extension Service, State College of Washington.

White Bluffs-Hanford Pioneer Association. 1982. *Family Histories from Hanford and White Bluffs, W.A.* Richland, Washington.

Yothers MA and FW Carlson. 1949. "Scraping and Banding Apple Trees as a Supplementary Codling Moth Control Measure in the Pacific Northwest." Circular No. 828, U.S. Department of Agriculture.

Zeck EH Date unknown. "Illustration of Codling moth *Cydia pomonella* (Linnaeus) (Lepidoptera: Tortricidae)." New South Wales Government, Dangar, New Zealand.

Appendix F

Lead and Arsenic in Waste Sites Co-Located Within 100-OL-1 Operable Unit

This page intentionally left blank.

Appendix F

Lead and Arsenic in Waste Sites Co-Located Within 100-OL-1 Operable Unit

During the development of the *Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands* (DOE/RL-2012-64) questions arose about lead and arsenic concentrations in the waste sites that are co-located with the 100-OL-1 Operable Unit (OU). This appendix summarizes the closeout verification packages and similar documents for the co-located waste sites within the 100-OL-1 OU. This is provided for information only, and there has been limited verification of the summarized materials.

F.1 Lead and Arsenic Contamination in the River Corridor

The 100 BC RI/FS (DOE/RL-2010-96) discussed several sites with lead and arsenic contamination in the soil that are all outside the 100-OL-1 OU.

- 116-B-14 Trench is located near the Columbia River, upstream of DU-008. The unlined trench was used for disposal of sludge from the 107-B Retention Basin (116-B-11) during maintenance operations in 1948. Lead was detected with a maximum concentration of 18.7 mg/kg in the shallow zone and 5.0 mg/kg in the deep zone. There was no report of arsenic at 116-B-14 Trench.
- 118-C-3:2 Fuel Storage Basin next to 105 B reactor, which is outside of the 100-OL-1 OU, had elevated lead and arsenic levels. Soil samples indicated lead had a maximum concentration 120 mg/kg. Arsenic was detected only once in the soil, 19.8 mg/kg at about 6.7 m (22 ft) below ground surface (bgs).
- 116-C-5 Retention Basin next to 105 B reactor had elevated lead levels, but arsenic was not reported. Soil contamination of the undesignated waste site was a result of multiple leaks of reactor cooling water effluent from a vent pipe associated with effluent sewers. Lead was detected above background concentrations until the area was excavated into the deep vadose zone.
- Lead was above background in soil concentrations during initial characterization efforts, but was not detected after remediation at 116-B-6B Crib, 118-B-8:3 Process Sewer, and 116-C-1 Process Effluent Trench.

The 100 K RI/FS stated that there were lead and arsenic measurements above background in the soil above the water table when new wells were drilled in the region near the 105-KE and -KW reactors (DOE/RL-2010-97). Lead was detected in all the boreholes. 100-K-6 was notable in that samples collected from 18.5 to 23.2 m (61 to 76 ft) bgs ranged from just above background to 229 mg/kg and then decreased just above the water table. Arsenic was detected only twice in all the boreholes, with a maximum concentration of 14.3 mg/kg. The RI/FS stated that the "source of the deep vadose lead detections is unknown but there is no evidence that they are related to Hanford Site operations." DU-009 is an orchard area that was mostly covered by fill between the 100-KE and 100-KW intake structures, and it is possible that some of these boreholes are located in soil that was contaminated by lead arsenate residues from past orchard operations.

The 100 D/H RI/FS stated that there was one site outside of 100-OL-1 OU that had elevated concentration of arsenic, but not lead. The 116-D-1A Trench received 200,000 L (52,834 gal) of fuel storage basin effluent and sludge from 1947 to 1952. This material contained 1000 kg (2200 lb) sodium dichromate. The highest concentration of arsenic was 167 mg/kg at the groundwater-vadose zone interface, while other arsenic measurements were below background values. The arsenic measurement was considered an outlier that is not representative of arsenic concentrations at 116-D-1A. There was no detection of arsenic in the nearby well and the soil concentrations were below the levels for concern of groundwater and surface water protection (DOE/RL-2010-95).

There were also measurements of lead contamination with no corresponding report of arsenic at waste sites and boreholes within 100 D/H (DOE/RL-2010-95). The waste sites included 116-H-1 Trench, 116-H-6 and 100-H-33 Solar Evaporation Basins, 1607-H4 Septic System Characterization. Remedial Process Optimization Wells in 100 D/H had two detections of lead: 15.5 mg/kg lead at 31.09 m (102 ft) in 199-D4-96; and 10.6 mg/kg lead at 19.35 m (63.5 ft) in 199-D7-95. As a result, lead was retained as a preliminary contaminant of potential concern in the vadose zone.

The 100-F/IU RI/FS included a discussion of lead and arsenic contamination in waste sites and in boreholes within its OU boundary (DOE/RL-2010-98). Three of the sites (600-351, 600-109 and 118-F-1) are within 100-OL-1 OU boundary. Waste site 600-351is in DU-086, and the maximum concentrations were 805 mg/kg lead and 250 mg/kg arsenic. Waste site 600-109 is in DU-118, and the concentrations range from 24.7 to 141 mg/kg lead and 6.07 to 27.20 mg/kg arsenic. 118-F-1 Burial Ground is in DU-087, and the burial ground received radioactive equipment and other miscellaneous solid waste from F Reactor operations, including dummy elements and irradiated process tubing, gun barrel tips, steel sleeves, and metal chips removed from the reactor. Lead and arsenic were detected above background at 9.6 m (31.5 ft) bgs with a maximum concentration of 12.6 mg/kg and 7.06 mg/kg, respectively.

The other four waste sites with lead and/or arsenic contamination located inside 100-F/IU, but are outside of the 100-OL-1 OU, are summarized below (DOE/RL-2010-98):

- Site 600-3 is located halfway between DU-088 and -090, and contained elevated levels of lead but not corresponding elevated arsenic concentrations. While this site does share part of its boundary with a former farmstead site, the neighboring location was not an orchard and it is outside of 100-OL-1 OU. Since the presence of lead contamination is not matched by the corresponding presence of arsenic contamination, the lead contamination is not attributed to the use of lead arsenate. The soil contamination is likely from lead sheeting at the site that was removed under the interim remedial action, as documented in *Remaining Sites Verification Package for the 600-3, Hanford Townsite Excess Material Storage Yard/Paint Pit* (RSVP-2011-072). The presence of residual elevated lead concentrations (maximum focused sample concentration of 259 mg/kg, 34.4 mg/kg 95% UCL in the east excavation area, and of 22.2 mg/kg 95% UCL in the staging pile area) is most likely attributed to residual contamination resulting from the historical use of the site (DOE/RL-2010-98).

- Site 600-176 is located halfway between DU-080 and -069, outside the 100-OL-1 OU. The site was a paint disposal area. The historical use of lead paint and subsequent disposal in this area is the likely contributor to elevated lead concentrations (119 mg/kg, 95% UCL) in the soil. The site has been remediated as documented in *Remaining Sites Verification Package for the 600-176, White Bluffs Paint Disposal Area* (RSVP-2011-029) (DOE/RL-2010-98).

- Site 600-202 is located between DU-131 and the Columbia River shoreline, outside the 100-OL-1 OU. The site was the location of four burn and burial pits within the Hanford Construction Camp municipal dump area. Since the presence of elevated lead concentrations is not matched by the presence of arsenic, the lead contamination is not attributed to the use of lead arsenate. The site was remediated as documented in *Remaining Sites Verification Package for the 600-202, Hanford Townsite Four Burn and Burial Pits* (RSVP-2011-030). The residual elevated lead concentration (maximum focused sample concentration of 278 mg/kg and 38.3 mg/kg 95% UCL in the staging pile area) is most likely attributed to the historical disposal and burning activities that took place in the pits (DOE/RL-2010-98).

- Site 100-F-59 is located to the west of DU-076. This waste site is a riparian area with contamination originating from 128-F-2, includes the section of the former 128-F-2 Burn Pit (that is below the Columbia River ordinary high water mark) and a portion of the adjoining slough. Lead concentrations ranged from 160 mg/kg (within 128-F-2) to 54.4 mg/kg (in the slough area). Arsenic concentrations ranged from 37.1 mg/kg (within 128-F-2) to 7.5 mg/kg (in the slough area).

F.2 Explanation of Table F-1, Summary of Lead and Arsenic Concentrations in Waste Sites Co-located within 100-OL-1 Operable Unit

Table F-1 lists 97 Waste Information Data Systems (WIDS) cleanup and/or remaining site verification packages that are co-located with the 100-OL-1 OU. The table provides lead and arsenic results from closeout samples from WIDS sites within the boundaries of the OU. This is provided for information only, and there has been limited verification of the summarized materials.

DU-ID – Identification of the decision unit (DU) in which the waste site is co-located within 100-OL-1 OU.

WIDS Site Name – Unique waste site identification number.

Lead (mg/kg) in WIDS Site – Reported concentration of lead in the WIDS closeout package, in milligrams per kilogram. Multiple results are reported for a waste site if multiple locations within the waste site were sampled. For example, as identified in the column "Type of Result Reported for WIDS Site," there were three results at 100-H-10 in DU-023 for the Fuel Storage Basin (FSB) side-slope deep zone, upper deep zone beneath FSB floor, and lower deep zone beneath FSB floor. Undetected sample concentrations are included, and are noted with a "U" validation qualifier. The background value of lead for the Hanford Site using the 90^{th} percentile value is 10.2 mg/kg (DOE/RL-92-24).

Arsenic (mg/kg) in WIDS Site – Reported concentration of arsenic in the WIDS closeout package, in milligrams per kilogram. Multiple results are reported for a waste site if multiple locations within the waste site were sampled. For example, as identified in the column "Type of Result Reported for WIDS Site," there were three results at 100-H-21 in DU-023 for the shallow zone, deep zone, and overburden. Undetected sample concentrations are included, and are noted with a "U" validation qualifier. The background value of arsenic for the Hanford Site using the 90^{th} percentile value is 6.47 mg/kg (DOE/RL-92-24). The Washington State Department of Ecology uses 20 mg/kg arsenic as "natural background" (Ecology 2001), and this value has been recorded as "background" for older documents in this review of waste sites. The background value of 20 mg/kg arsenic is elevated compared to more recent work (San Juan 1994; DOE/RL-92-24) because the estimation included "data from areas impacted by the former Tacoma smelter" (Ecology 2001).

Type of Result Reported for WIDS Site – Identifies the type of value reported in the cited reference, e.g., maximum value or a statistical value. The location within the waste site is described if multiple results are provided.

Reference for WIDS Site – Citation to support documented findings.

Table Number and Name for Concentration Information in Reference – Table number and the name of the table from which the reported lead and arsenic concentrations were recorded from the cited reference.

Comments on Reference and Results – Identifies additional supporting information from the referenced table regarding the reported lead and arsenic concentration values (e.g., footnotes).

Maximum Value of Lead (mg/kg) Recorded in DU – Maximum value of lead measured in 100-OL-1 OU DU (see Table 4-2).

Maximum Value of Arsenic (mg/kg) Recorded in DU – Maximum value of arsenic measured in 100-OL-1 OU DU (see Table 4-2).

Table F-1. Summary of Lead and Arsenic Concentrations in Waste Sites Co-located within 100-OL-1 Operable Unit (For Information Only)

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-005	600-344	6.41 (<BG)	3.05 (<BG)	Maximum Value	DOE-RL 2010j	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-344 Verification Sampling Data	–	30.6	6.62
DU-008	100-B-23	73.80	4.4 (<BG)	Maximum Value	DOE-RL 2008a	Table 3. Comparison of Maximum Contaminant Concentrations to Action Levels for the 100-B-23, 100-B/C Surface Debris	–	53.6	55.1
DU-016	600-384	80.70	5.71 (<BG)	Maximum Value	DOE-RL 2014g	Table 6. Comparison of Contaminant Concentrations to Action Levels for the 600-384 Excavation Verification Samples	Located in DU-16, DU-32, and DU-35. Maximum value as described in the *600-384 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations.*	48.9	7.28
DU-020	100-H-56	84.00	11.50	Maximum Value	DOE-RL 2014h	Table 3. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-56 Confirmatory Samples	Located in DU-20, DU-23, and DU-24. 95% upper confidence level or maximum value, depending on data censorship.	3000	372
DU-020	600-151	133.00	20.20	Statistical or Maximum Value	DOE-RL 2011t	Table 4. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-151 Verification Samples - Area A	95% upper confidence level or maximum value, depending on data censorship.	3000	372

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-020	600-151	679.00	83.40	Statistical or Maximum Value	DOE-RL 2011t	Table 5. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-151 Verification Samples - Area B	95% upper confidence level or maximum value, depending on data censorship.	3000	372
DU-020	600-151	712.00	67.40	Statistical or Maximum Value	DOE-RL 2011t	Table 6. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-151 Verification Samples - Area C	95% upper confidence level or maximum value, depending on data censorship.	3000	372
DU-020	600-152	26.50	6.27	Statistical Value	DOE-RL 2010d	Table 2. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-152 Excavation Verification Sampling Event	95% upper confidence level or maximum value, depending on data censorship.	3000	372
DU-020	600-152	10.20	4.42	Statistical Value	DOE-RL 2010d	Table 3. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-152 Overburden Verification Sampling Event	95% upper confidence level or maximum value, depending on data censorship.	3000	372
DU-021	128-H-1	304.00	45.00	Statistical Value	DOE-RL 2012a	Table 5. Comparison of Statistical Values to Action Levels for the 128-H-1 Surface Soil Stockpile Verification Samples	95% upper confidence level or maximum value, depending on data censorship.	437	94
DU-021	128-H-1	207.00	65.30	Statistical Value	DOE-RL 2012a	Table 6. Comparison of Statistical Values to Action Levels for the 128-H-1 Original Waste Staging	95% upper confidence level or maximum value, depending on data censorship.	437	94

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Area Footprint Verification Samples			
DU-022	100-H-24	NR	NR	–	DOE-RL 2001f	–	Located in DU-22 and DU-23. Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2). Lead not mentioned.	231	46.8
DU-022	100-H-28	28.20	8.47	Statistical Value	DOE-RL 2015f	Table 8. Comparison of Contaminant Concentrations to Action Levels for the North Overburden Stockpile Verification Samples	100-H-28 located in DU-22, DU-23, and DU-24. 100-H-44 only located in DU-22. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Certification 95% UCL Calculations.	231	46.8
DU-022	100-H-28	24.20	8.52	Statistical Value	DOE-RL 2015f	Table 9. Comparison of Contaminant Concentrations to Action Levels for the South Overburden Stockpile Verification Samples	100-H-28 located in DU-22, DU-23, and DU-24. 100-H-44 only located in DU-22. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Certification 95% UCL Calculations.	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-022	100-H-28	9.70 (<BG)	7.80	Maximum Value	DOE-RL 2015f	Table 10. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3, 100-H-28:5, and 100-H-44 Focused Verification Samples	100-H-28 located in DU-22, DU-23, and DU-24. 100-H-44 only located in DU-22. Maximum result as described in the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Certification 95% UCL Calculations.	231	46.8
DU-022	100-H-28-3	27.20	6.16 (<BG)	Statistical Value	DOE-RL 2015f	Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:3 and 100-H-44 Excavation (EXC 1-12) Verification Samples	100-H-28 located in DU-22, DU-23, and DU-24. 100-H-44 only located in DU-22. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Certification 95% UCL Calculations.	231	46.8
DU-022	100-H-28-5	24.00	8.16	Statistical Value	DOE-RL 2015f	Table 7. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:5 Excavation (EXC 13-24) Verification Samples	100-H-28 located in DU-22, DU-23, and DU-24. 100-H-44 only located in DU-22. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites Cleanup Certification 95% UCL Calculations.	231	46.8
DU-022	100-H-33	NR	NR	–	DOE-RL 2011w	–	Arsenic and lead not mentioned.	231	46.8
DU-022	100-H-37	54.00	13.00	Maximum Value	DOE-RL 2010h	Comparison of Maximum Values from the 100-H-37 In-Process Samples to Action Levels	Located in DU-22, DU-23, DU-24, and DU-25.	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-022	100-H-41	7.69 (<BG)	8.02	Maximum Value	DOE-RL 2011h	Table 3. Comparison of Maximum Values to Action Levels for the 100-H-41 Test Pit Confirmation Samples	–	231	46.8
DU-022	100-H-46	8.2 (<BG)	5.5 (<BG)	Statistical or Maximum Value	DOE-RL 2014e	Table 6. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Decision Unit 1 Statistical Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	100-H-46	9.0 (<BG)	3.3 (<BG)	Statistical or Maximum Value	DOE-RL 2014e	Table 7. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Decision Unit 2 Statistical Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	100-H-46	3.2 (<BG)	2.4 (<BG)	Statistical or Maximum Value	DOE-RL 2014e	Table 8. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Overburden (Decision Unit 3) Statistical Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	100-H-46	8.20	5.50	Statistical or Maximum Value	DOE-RL 2014d	Table 6. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Decision Unit 1 Statistical Verification Samples	95% upper confidence level or maximum value, depending on data censorship.	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-022	100-H-46	9.00	3.30	Statistical or Maximum Value	DOE-RL 2014d	Table 7. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Decision Unit 2 Statistical Verification Samples	95% upper confidence level or maximum value, depending on data censorship.	231	46.8
DU-022	100-H-46	3.20	2.40	Statistical or Maximum Value	DOE-RL 2014d	Table 8. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-46 Overburden (Decision Unit 3) Statistical Verification Samples	95% upper confidence level or maximum value, depending on data censorship.	231	46.8
DU-022	100-H-48	36.10	9.10	Statistical or Maximum Value	DOE-RL 2014b	Table 9. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-48 and 100-H-52 Excavation Area Verification Samples	Maximum or 95% UCL, depending on data censorship, as described in the 100-H-48 and 100-H-52 Waste Sites Cleanup Verification 95% UCL Calculations.	231	46.8
DU-022	100-H-50	12.60	4.86 (<BG)	Maximum Value	DOE-RL 2011a	Table 2. Comparison of the Maximum Contaminant Concentrations to the Remedial Action Goals for the 100-H-50 Confirmatory Sampling Data	Located in DU-22 and DU-23.	231	46.8
DU-022	100-H-51-2	6.6 (<BG)	4.1 (<BG)	Statistical Value	DOE-RL 2015e	Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-H-51:2 Excavation Verification Samples	Located in DU-21, DU-22, and DU-23. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-51:2 Subsite Cleanup Verification 95% UCL Calculation.	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-022	100-H-51-3	10.90	9.30	Statistical or Maximum Value	DOE-RL 2015c	Table 5. Comparison of Contaminant Concentrations to Action Levels for the 100-H-51:3 and 100-H-51:6 Subsites Statistical Verification Samples	Located in DU-21, DU-22, and DU-23. Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-51:3 and 100-H-51:6 Subsite Cleanup Verification 95% UCL Calculation.	231	46.8
DU-022	100-H-51-4	6.47 (<BG)	5.94 (<BG)	Maximum Value	DOE-RL 2011d	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 100-H-51:4 Confirmatory Sampling Underlying Soil Data	Located in DU-21, DU-22, and DU-23.	231	46.8
DU-022	100-H-51-4	32.80	4.09 (<BG)	Maximum Value	DOE-RL 2011d	Table 4. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 100-H-51:4 Confirmatory Sampling Pipeline Contents Other Solid Data	Located in DU-21, DU-22, and DU-23.	231	46.8
DU-022	100-H-51-6	7.6 (<BG)	4.3 (<BG)	Maximum Value	DOE-RL 2015c	Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-H-51:6 Focused Verification Sample	Located in DU-21, DU-22, and DU-23. Maximum result as described in the 100-H-51:3 and 100-H-51:6 Subsites Cleanup Verification 95% UCL Calculations.	231	46.8
DU-022	116-H-6	NR	NR	–	DOE/RL-2010-95	Table 1-7.	116-H-6 (183-H Solar Evaporation Basins) is a Resource Conservation and Recovery Act Temporary Storage and Disposal unit that has been closed under RCRA	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							but is in modified post-closure care.		
DU-022	126-H-2 (June 2011)	11.90	30.50	Statistical or Maximum Value	DOE-RL 2011l	Table 3. Comparison of Statistical Values to Action Levels for the 126-H-2 East Clearwell Floor Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	126-H-2 (June 2011)	25.70	56.00	Statistical or Maximum Value	DOE-RL 2011l	Table 4. Comparison of Statistical Values to Action Levels for the 126-H-2 Pump Room Floor Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	126-H-2 (Oct 2012)	11.90	NR	Statistical or Maximum Value	DOE-RL 2012c	Table 4. Comparison of Statistical Values to Action Levels for the 126-H-2 East Clearwell Floor Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	126-H-2 (Oct 2012)	25.70	NR	Statistical or Maximum Value	DOE-RL 2012c	Table 5. Comparison of Statistical Values to Action Levels for the 126-H-2 Pump Room Floor Verification Samples	95% UCL or maximum value, depending on data censorship.	231	46.8
DU-022	126-H-2 (Oct 2012)	59.70	18.9 (<BG)	Maximum Value	DOE-RL 2012c	Table 6. Comparison of Maximum Value to Action Levels for Soil Samples Collected Below the 126-H-2 East Clearwell and Pump Room Floors	–	231	46.8
DU-022	1607-H2	36.0; 44.1; 3.3	NR	Cleanup Verification Data Set (Site Excavation [Shallow Zone; Deep Zone]; Overburden)	DOE-RL 2001a	Table 2. Cleanup Verification Data	Lead based on deep zone values from test pit to provide more information to demonstrate groundwater and river protection RAG attainment. Arsenic was not input into Residual	231	46.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							Radioactivity (RESRAD), because the concentration is < RAGs or Hanford BG (pp. C-150). Arsenic not discussed.		
DU-023	100-H-10	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document.	81.3	31.4
DU-023	100-H-10	20.10; 18.90; 2.60 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic was not discussed.	81.3	31.4
DU-023	100-H-10	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of *Guidance for Radiological Release of DOE Real Property at Hanford*, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-10	34.8; Undetected; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	100-H-11	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	100-H-11	20.10; 18.90; 2.60 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-11	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-11	34.80	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	100-H-12	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	100-H-12	20.10; 18.90; 2.60 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
				Floor			as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.		
DU-023	100-H-12	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-12	34.80	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	100-H-13	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-13	20.10; 18.90; 2.60 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	100-H-13	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-13	34.80	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-14	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% Upper Confidence Limit	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	100-H-14	20.10; 18.90; 2.60 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	100-H-14	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-14	34.8; Undetected; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
				Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)					
DU-023	100-H-17	NR	NR	–	DOE-RL 2001c	Table 2. Cleanup Verification Data	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2). Lead was not input into RESRAD, because the concertation is below RAGs or background values (pp. C-47).	81.3	31.4
DU-023	100-H-2	NR	NR	–	DOE-RL 2001c	Table 2. Cleanup Verification Data	Arsenic not discussed.	81.3	31.4
DU-023	100-H-21	42; 16; 38	14; 6.0; 11	95% UCL Statistical Values (Shallow Zone; Deep Zone; Overburden)	DOE-RL 2001b	Table 2. Cleanup Verification Data	Located in DU-23 and DU-24. Laboratory data including the minimum detectable activity or practical quantitation limit for individual cleanup verification samples are included in the 95% UCL calculation brief.	81.3	31.4
DU-023	100-H-21	95; 32; 61	26; 11; 25	Maximum Detected (Shallow Zone; Deep Zone; Overburden)	DOE-RL 2001b	Table 6. Application of the MTCA Three-Part Test	Located in DU-23 and DU-24. Criterion is no single detection can exceed two times the cleanup criteria.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-30	NR	NR	–	DOE-RL 2001c	Table 2. Cleanup Verification Data	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2). Lead was not input into RESRAD, because the concertation is below RAGs or background values (pp. C-47).	81.3	31.4
DU-023	100-H-31	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	100-H-31	20.1; 18.9; 2.6 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-31	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-31	34.8; U; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	100-H-7	130.00	4.0 (<BG)	Maximum Detected Value	DOE-RL 2009b	Table 2. Comparison of Maximum Detected Values with Action Levels for the 100-H-7 Waste Site	–	81.3	31.4
DU-023	100-H-8	46.80	7.30	Maximum Detected Value	DOE-RL 2009d	Table 2. Comparison of Maximum Detected Values with Action Levels for the 100-H-8 Waste Site	–	81.3	31.4
DU-023	100-H-9	15.00	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	100-H-9	20.1; 18.9; 2.6 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	100-H-9	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	100-H-9	34.8; U; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	116-H-1	11.7; 16.0; 0.98	NR	95% UCL Statistical Values (Shallow Zone; Deep Zone [Level I; Level II])	DOE-RL 2001d	Table 2. Cleanup Verification Data	Located in DU-23 and DU-24. The 95% UCL statistical value above background is used as the input value for RESRAD. Laboratory data including the minimum detectable activity or practical quantitation limit for individual cleanup verification samples are included in the 95% UCL calculation brief. Because a more detailed analysis of lead was required to demonstrate groundwater and river protection RAG attainment, the lead deep zone was divided into two levels (Level I and Level II). The Level II value is based on the site-specific cleanup verification model derived from the 116-H-1 borehole data (see Section 5.3). Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	116-H-1	18.0; 23.0	NR	Maximum Detected (Shallow Zone; Deep Zone)	DOE-RL 2001d	Table 6. Application of the MTCA Three-Part Test to the Shallow Zone	Located in DU-23 and DU-24. Criterion is no single detection can exceed two times the cleanup criteria. Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).	81.3	31.4
DU-023	116-H-2	NR	NR	–	DOE-RL 2001c	Table 2. Cleanup Verification Data	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2). Lead was not input into RESRAD, because the concertation is below RAGs or background values (pp. C-47).	81.3	31.4
DU-023	116-H-3	NR	NR	–	DOE-RL 2001e	Table 2. Cleanup Verification Data	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2). Lead was not input into RESRAD because the concertation is below RAGs or background values (pp. C-	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							47).		
DU-023	116-H-4	NR	NR	–	DOE-RL 2007d	–	Arsenic and lead not mentioned.	81.3	31.4
DU-023	118-H-3	7.75 (<BG)	4.85 (<BG)	Statistical Value	DOE-RL 2011f	Table 2. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-H-3 Excavation Trenches B and C (Decision Unit 1) Verification Sampling	118-H-3 Waste Site Cleanup Verification 95% UCL Calculations.	81.3	31.4
DU-023	118-H-3	7.21 (<BG)	3.12 (<BG)	Statistical Value	DOE-RL 2011f	Table 3. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-H-3 Excavation Trench A and Waste Staging Area Footprint (Decision Unit 2) Verification Sampling	118-H-3 Waste Site Cleanup Verification 95% UCL Calculations.	81.3	31.4
DU-023	118-H-3	11.60	4.8 (<BG)	Maximum Value	DOE-RL 2011f	Table 4. Comparison of Maximum Contaminant Concentrations to Action Levels for the 118-H-3 Focused Verification Sampling Verification Sampling	–	81.3	31.4
DU-023	118-H-4	10.40	3.43 (<BG)	Statistical Value	DOE-RL 2010i	Table 2. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 118-H-4 Excavation Verification	Maximum or 95% UCL, depending on data censorship, as described in the 118-H-4, 105-DR Gas Loop Burial Ground Cleanup Certification	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Sampling	95% UCL Calculation.		
DU-023	118-H-4	33.20	4.07 (<BG)	Statistical Value	DOE-RL 2010i	Table 3. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 118-H-4 Staging Area Footprint Verification Sampling	Maximum or 95% UCL, depending on data censorship, as described in the 118-H-4, 105-DR Gas Loop Burial Ground Cleanup Certification 95% UCL Calculation.	81.3	31.4
DU-023	118-H-4	4.33 [<BG])	2.10 (<BG)	Maximum Value	DOE-RL 2010i	Table 4. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 118-H-4 Focused Verification Sampling	Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340 750[3]) (Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).	81.3	31.4
DU-023	118-H-5	11.20	4.64 (<BG)	Statistical Value	DOE-RL 2009c	Table 2. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-H-5 Excavation Verification Sampling	118-H-5, 105-H Thimble Pit Cleanup Verification 95% UCL Calculations.	81.3	31.4
DU-023	118-H-5	9.24 (<BG)	4.49 (<BG)	Maximum Value	DOE-RL 2009c	Table 3. Comparison of Maximum Contaminant Concentrations to Action Levels for the 118-H-5 Focuses Verification Sampling Verification	–	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	118-H-6-2	11.50	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-2	20.1; 18.9; 2.6 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-2	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-2	34.8; U; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
				Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)					
DU-023	118-H-6-3	11.50	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-3	20.1; 18.9; 2.6 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-3	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	118-H-6-3	34.8; U; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-4	9.06 (<BG)	4.13 (<BG)	Statistical Value	DOE-RL 2010g	Table 2. Comparison of Statistical Values to Action Levels for the 118-H-6:4 Excavation Verification Samples	–	81.3	31.4
DU-023	118-H-6-4	4.20 (<BG)	3.13 (<BG)	Statistical Value	DOE-RL 2010g	Table 3. Comparison of Statistical Values to Action Levels for the 118-H-6:4 Overburden Soil Stockpile Verification Samples	–	81.3	31.4
DU-023	118-H-6-5	425.00	70.80	Statistical Value	DOE-RL 2011r	Table 2. Comparison of Statistical Values to Action Levels for the 118-H-6:5 East Decon Pad Verification Samples	–	81.3	31.4
DU-023	118-H-6-5	21.20	7.82 (<BG)	Statistical Value	DOE-RL 2011r	Table 3. Comparison of Statistical Values to Action Levels for the 118-H-6:5 Center Decon Pad Verification Samples	–	81.3	31.4
DU-023	118-H-6-5	10.90	4.57 (<BG)	Statistical Value	DOE-RL 2011r	Table 4. Comparison of Statistical Values to Action Levels for the 118--6:5 West Decon Pad Verification Samples	–	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	118-H-6-5	114.00	27.00	Maximum Value	DOE-RL 2011r	Table 5. Comparison of Maximum Values to Action Levels for the 118-H-6:5 Focused Verification Samples	–	81.3	31.4
DU-023	118-H-6-6	11.50	NR	FSB Side-Slope Shallow Zone	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Soil in the FSB side-slope shallow zone has been deferred to the Field Remediation Closure Project for remedial action and is not evaluated further in this document. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-6	20.1; 18.9; 2.6 U	NR	FSB Side-Slope Deep Zone; Upper Deep Zone Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	Results also pertain to the remaining waste sites 100-H-11, 100-H-12, and 100-H-14, which were located within the remediation footprint of the fuel storage basin and were removed in their entirety as a result of the deep excavations required for the 105-H Reactor Fuel Storage Basin Remediation. Arsenic not discussed.	81.3	31.4
DU-023	118-H-6-6	0.13	NR	Post-Drilling Scenario	DOE-RL 2006a	Table 3. Cleanup Verification Data Set Using the 95% UCL	The post-drilling resident scenario concentrations are calculated as described on page 4-22 of Guidance for Radiological Release of DOE Real Property at Hanford, DOE/RL-97-93, Rev. 1 (DOE-RL 1999). Arsenic not discussed.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	118-H-6-6	34.8; Undetected; 22.4	NR	Maximum Detected (Upper Deep Zone Solid Beneath FSB Floor; Lower Deep Zone Beneath FSB Floor; FSB Deep Zone Side-Slope Soils)	DOE-RL 2006a	Table 7. Application of the WAC 173-340 Three-Part Test	Arsenic not discussed.	81.3	31.4
DU-023	132-H-1	NR	NR	–	DOE-RL 2007a	–	Arsenic and lead not mentioned.	81.3	31.4
DU-023	132-H-2	NR	NR	–	DOE-RL 2006b	–	Arsenic and lead not mentioned.	81.3	31.4
DU-023	132-H-3	8.2 (<BG)	3.7 (<BG)	Statistical Value	DOE-RL 2012b	Table 2. Comparison of Statistical or Maximum Values to Action Levels for the 132-H-3 Overburden/ Layback Soil Stockpile Verification Samples - Area A	95% UCL or maximum value, depending on data censorship.	81.3	31.4
DU-023	132-H-3	25.10	6.0 (<BG)	Statistical Value	DOE-RL 2012b	Table 3. Comparison of Statistical or Maximum Values to Action Levels for the 132-H-3 Waste Staging Area Footprint Verification Samples - Area B	95% UCL or maximum value, depending on data censorship.	81.3	31.4
DU-023	132-H-3	10.80	4.2 (<BG)	Statistical Value	DOE-RL 2012b	Table 4. Comparison of Statistical or Maximum Values to Action Levels for the 132-H-3 Overburden/Layback Soil Stockpile Verification Samples - Area C	95% UCL or maximum value, depending on data censorship.	81.3	31.4

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-023	132-H-3	7.9 (<BG)	3.6 (<BG)	Statistical Value	DOE-RL 2012b	Table 5. Comparison of Statistical or Maximum Values to Action Levels for the 132-H-3 Overburden/Layback Soil Stockpile Verification Samples - Area D	95% UCL or maximum value, depending on data censorship.	81.3	31.4
DU-023	132-H-3	3.5 (<BG)	2.4 (<BG)	Statistical Value	DOE-RL 2012b	Table 6. Comparison of Statistical or Maximum Values to Action Levels for the 132-H-3 Waste Site Excavation	95% UCL or maximum value, depending on data censorship.	81.3	31.4
DU-024	100-H-22	42; 16; 38	14; 6.0; 11	95% UCL Statistical Values (Shallow Zone; Deep Zone; Overburden)	DOE-RL 2001b	Table 2. Cleanup Verification Data	Laboratory data including the minimum detectable activity or practical quantitation limit for individual cleanup verification samples are included in the 95% UCL calculation brief.	159	36.6
DU-024	100-H-22	95; 32; 61	26; 11; 25	Maximum Detected (Shallow Zone; Deep Zone; Overburden)	DOE-RL 2001b	Table 6. Application of the MTCA Three-Part Test to the Shallow Zone	Criterion is no single detection can exceed two times the cleanup criteria.	159	36.6
DU-024	100-H-3	67.80	12.90	Statistical Value	DOE-RL 2011b	Table 3. Comparison of Statistical Values to Action Levels for the 100-H-3 Shallow Zone Verification Samples	95% upper confidence level or maximum value, depending on data censorship.	159	36.6
DU-024	100-H-4	18.40	8.36	Maximum Value	DOE-RL 2011e	Table 5. Comparison of Maximum Values to Action Levels for the 100-H-4 Focused Verification Sampling	–	159	36.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-024	100-H-4	16.80	7.17	Statistical Value	DOE-RL 2011e	Table 4. Comparison of Statistical or Maximum Values to Action Levels for the 100-H-4 Excavation Verification Samples	95% UCL or maximum value, depending on data censorship.	159	36.6
DU-024	100-H-42	17.30	6.70	Statistical Value	DOE-RL 2015g	Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:2 Excavation 1 Verification Samples	Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:2, and 100-H-42 Waste Sites Cleanup Certification 95% UCL Calculations.	159	36.6
DU-024	100-H-42	12.00	4.1 (<BG)	Statistical Value	DOE-RL 2015g	Table 4. Comparison of Contaminant Concentrations to Action Levels for the 100-H-42 Excavation 2 Verification Samples	Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:2, and 100-H-42 Waste Sites Cleanup Certification 95% UCL Calculations.	159	36.6
DU-024	100-H-42	65.00	15.20	Statistical Value	DOE-RL 2015g	Table 5. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:2 and 100-H-42 Staging Pile Area Verification Samples	Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:2, and 100-H-42 Waste Sites Cleanup Certification 95% UCL Calculations.	159	36.6
DU-024	100-H-42	29.10	8.60	Statistical Value	DOE-RL 2015g	Table 6. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:2 and 100-H-42 Overburden Verification Samples	Maximum or 95% UCL result, depending on data censorship, as described in the 100-H-28:2, and 100-H-42 Waste Sites Cleanup Certification 95% UCL Calculations.	159	36.6
DU-024	100-H-42	21.10	7.30	Maximum Value	DOE-RL 2015g	Table 7. Comparison of Contaminant Concentrations to Action Levels for the 100-H-28:2	Maximum result, as described in the *100-H-28:2 and 100-H-42 Waste Sites Cleanup Verification*	159	36.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						and 100-H-42 Focused Verification Samples	*95% UCL Calculations* (Attachment C).		
DU-024	100-H-43	55.40	11.80	Statistical or Maximum Value	DOE-RL 2015a	Table 3. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-43 Excavation Statistical Verification Samples	95% UCL or maximum value, depending on data censorship, as described in the 100-H-43 Waste Site Cleanup Verification 95% UCL Calculations.	159	36.6
DU-024	100-H-43	18.50	5.7 (<BG)	Statistical or Maximum Value	DOE-RL 2015a	Table 4. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-43 Staging Pile Area Statistical Verification Samples	95% UCL or maximum value, depending on data censorship, as described in the 100-H-43 Waste Site Cleanup Verification 95% UCL Calculations.	159	36.6
DU-024	100-H-43	37.70	13.00	Maximum Value	DOE-RL 2015a	Table 5. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-43 Focused Verification Samples	Maximum value as described in the 100-H-43 Waste Cleanup Verification 95% UCL Calculations.	159	36.6
DU-024	100-H-45	1.87 (<BG)	1.43 (<BG)	Maximum Value	DOE-RL 2010f	Table 3. Comparison of Maximum Values to Action Levels for the 100-H-45 Test Pit Confirmation Samples	--	159	36.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-024	100-H-49-1	27.50	7.80	Maximum Value	DOE-RL 2015b	Table 4. Comparison of Contaminant Concentrations to Remedial Action Goals for the 100-H-49:1 Excavation Focused Verification Samples	Located in DU-22, DU-23, and DU-24. Maximum value as described in the 100-H-49:1 Subsite Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations.	159	36.6
DU-024	100-H-49-2	46.20	8.91	Maximum Value	DOE-RL 2011k	Table 3. Comparison of the Maximum Contaminant Concentrations to the Remedial Action Goals for the 100-H-49:2 Confirmatory Sampling Data	Located in DU-22, DU-23, and DU-24.	159	36.6
DU-024	100-H-5	8.3; 4.3	NR	Statistical Values (Shallow Zone; Deep Zone)	DOE-RL 2000	Table 2. Cleanup Verification Data	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).	159	36.6
DU-024	100-H-5	17.00	NR	Maximum Detected	DOE-RL 2000	Table 6. Application of the MTCA Three-Part Test to the Shallow Zone	Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).	159	36.6
DU-024	100-H-5	4.20	NR	Maximum Detected	DOE-RL 2000	Table 7. Application of the MTCA Three-Part Test to the Deep Zone	Arsenic not discussed because it "was not detected in cleanup verification samples at	159	36.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							concentrations above Washington State background of 20 mg/kg" (pp. ES-2).		
DU-024	116-H-5	18.80	6.53	Statistical Value	DOE-RL 2011m	Table 4. Comparison of Statistical Contaminant Concentrations to Action Levels for the 116-H-5 Shallow-Zone Excavation Verification Samples	95% UCL or maximum value, depending on data censorship.	159	36.6
DU-024	116-H-5	18.70	6.3 (<BG)	Statistical Value	DOE-RL 2011m	Table 5. Comparison of Statistical Contaminant Concentrations to Action Levels for the 116-H-5 Deep-Zone Excavation Verification Samples	95% UCL or maximum value, depending on data censorship.	159	36.6
DU-024	116-H-5	17.00	0.41 (<BG)	Statistical Value	DOE-RL 2011m	Table 6. Comparison of Statistical Contaminant Concentrations to Action Levels for the 116-H-5 Overburden Verification Samples	95% UCL or maximum value, depending on data censorship.	159	36.6
DU-024	116-H-5	33.40	14.00	Statistical Value	DOE-RL 2011m	Table 7. Comparison of Statistical Contaminant Concentrations to Action Levels for the 116-H-5 Staging Pile Area Verification Samples	95% UCL or maximum value, depending on data censorship.	159	36.6
DU-024	116-H-7	19.3; 9.17; 9.47	NR	95% UCL Statistical Values (Shallow Zone; Deep Zone; Overburden)	DOE-RL 2001g	Table 2. Cleanup Verification Data	Laboratory data including the minimum detectable activity or practical quantitation limit for individual cleanup verification samples are included the 95% UCL calculation brief. Arsenic not discussed because it	159	36.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							"was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).		
DU-024	116-H-7	12.9; 30.5; 15.6	NR	Maximum Detected (Overburden; Shallow Zone; Deep Zone)	DOE-RL 2001g	Table 6. Application of the MTCA Three-Part Test to the Excavation Cleanup Verification Sample Data Set	Criterion is no single detection can exceed two times the cleanup criteria. Arsenic not discussed because it "was not detected in cleanup verification samples at concentrations above Washington State background of 20 mg/kg" (pp. ES-2).	159	36.6
DU-025	100-H-38	4.9 (<BG)	3.5 (<BG)	Maximum Value	DOE-RL 2013a	Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-H-38 Waste Site	-	79.8	9.96
DU-025	118-H-1-1	7.13 (<BG)	3.46 (<BG)	Statistical or Maximum Value	DOE-RL 2011n	Table 3. Comparison of Statistical Values to Action Levels for the 118-H-1:1 Sample Area A (Trenches A, B, C, E, and F) Verification Samples	Located in DU-23 and DU-25. Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-1:1 Waste Cleanup Site Verification 95% UCL Calculations.	79.8	9.96
DU-025	118-H-1-1	3.76 (<BG)	2.99 (<BG)	Statistical or Maximum Value	DOE-RL 2011n	Table 4. Comparison of Statistical Values to Action Levels for the 118-H-1:1 Sample Area B (Trench D) Verification Samples	Located in DU-23 and DU-25. Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-	79.8	9.96

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							1:1 Waste Cleanup Site Verification 95% UCL Calculations.		
DU-025	118-H-1-1	21.00	5.93 (<BG)	Statistical or Maximum Value	DOE-RL 2011n	Table 5. Comparison of Statistical Values to Action Levels for the 118-H-1:1 Overburden Verification Samples	Located in DU-23 and DU-25. Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-1:1 Waste Cleanup Site Verification 95% UCL Calculations.	79.8	9.96
DU-025	118-H-1-1	6.06 (<BG)	3.34 (<BG)	Statistical or Maximum Value	DOE-RL 2011n	Table 6. Comparison of Statistical Values to Action Levels for the 118-H-1:1 Sorting Cell Verification Samples	Located in DU-23 and DU-25. Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-1:1 Waste Cleanup Site Verification 95% UCL Calculations.	79.8	9.96
DU-025	118-H-1-1	10.90	4.11 (<BG)	Maximum Value	DOE-RL 2011n	Table 7. Comparison of Maximum Values to Action Levels for the 118-H-1:1 Focused Verification Samples	Located in DU-23 and DU-25.	79.8	9.96
DU-025	118-H-1-2	11.20	4.5 (<BG)	Statistical Value	DOE-RL 2011q	Table 2. Comparison of Contaminant Concentrations to Action Levels for the 118-H-1:2 Anomaly Staging and Characterization Areas Statistical Verification Samples	Located in DU-23 and DU-25. Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-1:2, Waste Site Cleanup Verification 95% UCL Calculations.	79.8	9.96
DU-025	118-H-1-2	11.70	3.7 (<BG)	Maximum Value	DOE-RL 2011q	Table 3. Comparison of Maximum Contaminant Concentrations to Action Levels for the 118-H-1:2	Located in DU-23 and DU-25.	79.8	9.96

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						SSNF Bunker Area Focused Verification Samples			
DU-025	118-H-2	18.20	5.31 (<BG)	Statistical Value	DOE-RL 2010k	Table 2. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-H-2 Excavation Verification Sampling	Maximum or 95% UCL result, depending on data censorship, as described in the 118-H-2 Cleanup Verification 95% Calculations.	79.8	79.8
DU-026	128-H-3	4.9 (<BG)	3.5 (<BG)	Maximum Value	DOE-RL 2009a	Table 3. Comparison of Maximum Values to Action Levels for the 128-H-2 Confirmatory Samples	–	543	97.3
DU-026	128-H-3	94.10	11.00	Maximum Value	DOE-RL 2009a	Table 4. Comparison of Maximum Values to Action Levels for the 128-H-3 Confirmatory Samples	–	543	97.3
DU-027	100-D-7	3.3 (<BG)	1.6 (<BG)	Statistical or Maximum Value	DOE-RL 2011u	Table 2. Comparison of Contaminant Concentrations to Action Levels for the 100-D-7 Excavation Statistical Verification Samples	–	17.6	4.71
DU-027	100-D-7	4.1 (<BG)	2.1 (<BG)	Statistical or Maximum Value	DOE-RL 2011u	Table 3. Comparison of Contaminant Concentrations to Action Levels for the 100-D-7 Nonremediated Area Statistical Verification Samples	–	17.6	4.71
DU-027	100-D-7	5.8 (<BG)	1.6 (<BG)	Statistical or Maximum Value	DOE-RL 2011u	Table 4. Comparison of Contaminant Concentrations to Action Levels for the 128-D-2 and 100-D-7 Staging Area Statistical Verification	–	17.6	4.71

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Samples			
DU-027	100-D-7	3.3 (<BG)	1.9 (<BG)	Maximum Value	DOE-RL 2011u	Table 5. Comparison of Contaminant Concentrations to Remedial Action Levels for the 100-D-7 Focused Samples within the Nonremediated Area Verification Samples	-	17.6	4.71
DU-031	600-383	181.00	10.20	Maximum Value	DOE-RL 2014f	Table 4. Comparison of Contaminant Concentrations to Action Levels for the 600-383 Waste Site Focused Verification Soil Samples	Located in DU-14, DU-31, and DU-36. Maximum result of all subsites as described in the 600-383 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations.	24.7	7.6
DU-032	600-384	80.70	5.71 (<BG)	Maximum Value	DOE-RL 2014g	Table 6. Comparison of Contaminant Concentrations to Action Levels for the 600-384 Excavation Verification Samples	Located in DU-32 and DU-35. Maximum value as described in the 600-384 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations.	45.5	7.09
DU-035	600-105	NR	NR	-	DOE/RL-2010-95; EPA/ROD/ R10-96/151	-	This is the Sodium Dichromate Barrel Landfill, remediated as an expedited response action in 1993 (identified as 100-IU-4). Lead and arsenic were not COC, and were	23.2	5.19

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							not analyzed.		
DU-052	600-235	2.4 to 34.2	1.7 to 6.9 (<BG)	Range of Values	DOE-RL 2005	-	Located in DU-52, DU-55, DU-85, DU-86, DU-103, DU-104, DU-107, DU-113, and DU-119. Reported values found in the text (pp. 16).	1480	166
DU-055	600-372	10.0 (<BG)	5.36 (<BG)	Maximum Value	DOE-RL 2013d	Table 5. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-372 Excavation Verification Sampling Data	Located in DU-55 and DU-59.	355	32
DU-055	600-373	322.00	65.70	Maximum Value	DOE-RL 2014a	Table 5. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-373 Excavation Verification Sampling Data	-	355	32
DU-070	600-98	NR	NR	-	DOE-RL 2004b	-	A reclassification status of no action [was determined] for the 600-98 site […]. […] The results of [Remedial Design Report/Remedial Action Work Plan for the 100 Area [DOE-RL 2004b] and the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-	52.3	10.5

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							3 Operable Units, Hanford Site, Benton County, Washington [EPA 1999]) show that the site was a pre-Hanford dumping area and borrow pit (pp. ES-1).		
DU-072	600-300	203.00	28.60	Maximum Value	DOE-RL 2013c	Table 12. Comparison of Maximum Verification Sample Contaminant Concentrations to Remedial Action Goals for the 600-300 Waste Site Verification Sampling Data	–	1050	121
DU-073	600-279	28.30	13.90	Statistical or Maximum Value	DOE-RL 2014c	Table 4. Comparison of Contaminant Concentrations to Action Levels for the 600-279 Excavation Statistical Verification Samples	Maximum or 95% UCL, depending on data censorship, as described in the 600-279 Waste Site Cleanup Verification 95% UCL Calculations.	726	60.6
DU-073	600-279	4.04 (<BG)	3.96 (<BG)	Maximum Value	DOE-RL 2014c	Table 5. Comparison of Contaminant Concentrations to Action Levels for the 600-279 Excavation Focused Verification Samples	–	726	60.6
DU-074	116-F-1	NR	6.0; 11.0	95% UCL Statistical Values (Shallow Zone; Overburden)	DOE-RL 2003	Table 2. Cleanup Verification Data	Located in DU-74, DU-75, and DU-76. Lead was not recorded because it was not listed as a contaminant of concern according to the 100 Area	184	14.3

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
							Remedial Action Sampling and Analysis Plan (SAP) (DOE/RL-92-24) (pp. 2).		
DU-074	116-F-1	NR	16.0; 16.0	Maximum Detected (Overburden; Site Excavation [Shallow Zone])	DOE-RL 2003	Table 6. Application of the WAC 173-340 Three-Part Test	Located in DU-74, DU-75, and DU-76. Lead was not recorded because it was not listed as a contaminant of concern according to the 100 Area Remedial Action Sampling and Analysis Plan (SAP) (DOE/RL-92-24) (pp. 2).	184	14.3
DU-076	1607-F3	29.00	8.20	Maximum or Statistical Value	DOE-RL 2007c	Table 4a. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 1607-F3 Excavation Area Verification Sampling Event	Result based on Phase II verification sampling.	160	61.7
DU-076	1607-F3	54.90	12.10	Maximum Value	DOE-RL 2007c	Table 4b. Comparison of Maximum Contaminant Concentrations to Action Levels for the 1607-F3 Staging Pile Footprint Verification Sampling Event	–	160	61.7
DU-086	600-351	805.00	250.00	Maximum Value	DOE-RL 2011v	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-351, North and South Excavations Verifications Sampling Data	–	876	71.6

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-087	100-F-2	NR	NR	–	DOE-RL 2002	–	Arsenic and lead not mentioned.	882	90.7
DU-087	100-F-58	NR	NR	–	DOE-RL 2011j	–	Arsenic and lead not discussed because locations containing asbestos-containing material were remediated (pp. 1).	882	90.7
DU-087	118-F-1	5.40	NR	Statistical Value	DOE-RL 2007f	Table 3. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-1 Excavation Shallow Zone Verification Sampling	Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 5).	882	90.7
DU-087	118-F-1	18.00	NR	Statistical Value	DOE-RL 2007f	Table 4. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-1 Waste Sorting Trench Shallow Zone Verification Sampling	Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 5).	882	90.7

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-087	118-F-1	12.00	NR	Statistical Value	DOE-RL 2007f	Table 5. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-1 Waste Sorting Trench Shallow Zone Verification Sampling	Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 5).	882	90.7
DU-087	118-F-1	32.0; 22.8	NR	Maximum Detected Cleanup Verification Value (Waste Sorting Trenches; Overburden/BCL Piles)	DOE-RL 2007f	Table 8. Summary of the WAC 173-340 Three-Part Test for the 118-F-1 Burial Ground	Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 5).	882	90.7
DU-087	118-F-2	5.7 (<BG)	NR	Statistical Value	DOE-RL 2007e	Table 2. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-2 Shallow Zone Excavation Verification Sampling	Located outside of DU-87, and is not within any other DU's. Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 6).	882	90.7

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-087	118-F-2	4.5 (<BG)	NR	Statistical Value	DOE-RL 2007e	Table 3. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-2 Overburden Stockpiles Verification Sampling	Located outside of DU-87, and is not within any other DU's. Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 6).	882	90.7
DU-087	118-F-2	4.5 (<BG)	NR	Statistical Value	DOE-RL 2007e	Table 4. Comparison of Statistical Contaminant Concentrations to Action Levels for the 118-F-2 Staging Pile (ACL) Footprint Verification Sampling	Located outside of DU-87, and is not within any other DUs. Arsenic was not recorded because it was not listed as a contaminant of concern for the 118-F-1 Burial Ground according to the *100 Area Burial Grounds Remedial Action Sampling and Analysis Plan* (SAP) (DOE/RL-92-24) (pp. 6).	882	90.7
DU-087	118-F-2	3.8 (<BG)	1.5 (<BG)	Maximum Value	DOE-RL 2007e	Table 5. Comparison of Maximum Contaminant Concentrations to Action Levels for the 118-F-2 Focused Sampling	Located outside of DU-87, and is not within any other DUs.	882	90.7
DU-087	118-F-6	NR	NR	–	DOE-RL 2008b	–	Arsenic and lead were not identified as contaminants of concern according to the Burial Ground SAP (DOE/RL-92-24) (pp. 7).	882	90.7
DU-094	600-111	11.30	7.50	Maximum Value	DOE-RL 2008c	Table 2. Comparison of 120 Experimental Building (Area 1) Sample Results to	–	303	44.2

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Action Levels			
DU-094	600-111	18.60	8.70	Maximum Value	DOE-RL 2008c	Table 3. Comparison of Crib (Area 2) Sample Results to Action Levels	–	303	44.2
DU-094	600-111	142.00	19.70	Maximum Value	DOE-RL 2008c	Table 4. Comparison of 123 Control Building (Area 3) Sample Results to Action Levels	–	303	44.2
DU-094	600-111	1100.00	43.80	Maximum Value	DOE-RL 2008c	Table 5. Comparison of Septic Drain Field (Area 5) Sample Results to Action Levels	–	303	44.2
DU-094	600-111	81.10	15.70	Maximum Value	DOE-RL 2008c	Table 6. Comparison of Septic Tank (Area 6) Sample Results to Action Levels	–	303	44.2
DU-094	600-111	12.70	5.6 (<BG)	Maximum or Statistical Value	DOE-RL 2008c	Table 8. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-111 Septic System Verification Sampling	–	303	44.2
DU-094	UPR-600-16	11.30	7.50	Maximum Value	DOE-RL 2008c	Table 2. Comparison of 120 Experimental Building (Area 1) Sample Results to Action Levels	–	303	44.2
DU-094	UPR-600-16	18.60	8.70	Maximum Value	DOE-RL 2008c	Table 3. Comparison of Crib (Area 2) Sample Results to Action Levels	–	303	44.2
DU-094	UPR-600-16	142.00	19.70	Maximum Value	DOE-RL 2008c	Table 4. Comparison of 123 Control Building (Area 3) Sample Results to Action Levels	–	303	44.2

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-094	UPR-600-16	1100.00	43.80	Maximum Value	DOE-RL 2008c	Table 5. Comparison of Septic Drain Field (Area 5) Sample Results to Action Levels	–	303	44.2
DU-094	UPR-600-16	81.10	15.70	Maximum Value	DOE-RL 2008c	Table 6. Comparison of Septic Tank (Area 6) Sample Results to Action Levels	–	303	44.2
DU-094	UPR-600-16	12.70	5.6 (<BG)	Maximum or Statistical Value	DOE-RL 2008c	Table 8. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 600-111 Septic System Verification Sampling	–	303	44.2
DU-095	600-331	354.00	123.00	Maximum Value	DOE-RL 2015d	Table 3. Comparison of Maximum Contaminant Concentrations to Action Levels for the 600-331 Waste Site Verification Soil Samples	Maximum result of all subsites as described in the 600-331 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations. This site includes UPR-600-19, as discussed in DOE/RL-2010-98.	2580	339
DU-096	600-316	26.90	6.60	Maximum Value	DOE-RL 2015h	Table 29. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-316 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted.	735	66.6
DU-104	600-320	4.0 (<BG)	1.7 (<BG)	Maximum Value	DOE-RL 2015h	Table 37. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:1	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values	17.3	5.21

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Excavation Focused Verification Samples	obtained from DOE-RL (2001).		
DU-104	600-320	4.0 (<BG)	2.9 (<BG)	Maximum Value	DOE-RL 2015h	Table 39. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:2 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001).	17.3	5.21
DU-104	600-320	4.9 (<BG)	4.6 (<BG)	Statistical Value	DOE-RL 2015h	Table 40. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:3 Excavation Statistical Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001).	17.3	5.21
DU-104	600-320	5.6 (<BG)	5.0 (<BG)	Maximum Value	DOE-RL 2015h	Table 41. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:3 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001).	17.3	5.21
DU-104	600-320	4.9 (<BG)	2.5 (<BG)	Maximum Value	DOE-RL 2015h	Table 43. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:4 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001)	17.3	5.21
DU-104	600-320	4.1 (<BG)	1.9 (<BG)	Maximum Value	DOE-RL 2015h	Table 44. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:5 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001)	17.3	5.21
DU-104	600-320	3.9 (<BG)	2.0 (<BG)	Maximum Value	DOE-RL 2015h	Table 45. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:6	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values	17.3	5.21

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
						Excavation Focused Verification Samples	obtained from DOE-RL (2001)		
DU-104	600-320	62.90	18.20	Maximum Value	DOE-RL 2015h	Table 46. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:7 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted.	17.3	5.21
DU-104	600-320	142.00	57.50	Maximum Value	DOE-RL 2015h	Table 48. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:8 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted.	17.3	5.21
DU-104	600-320	6.1 (<BG)	1.6 (<BG)	Maximum Value	DOE-RL 2015h	Table 50. Comparison of Contaminant Concentrations to Cleanup Levels for the 600-320:9 Excavation Focused Verification Samples	Values obtained from DOE-RL (2015h), unless otherwise noted. Background values obtained from DOE-RL (2001).	17.3	5.21
DU-104	600-322	72.20	1.1 (<BG)	Maximum Value	DOE-RL 2011c	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-322 Confirmatory Sampling Data	–	17.3	5.21
DU-112	600-323	5.2 (<BG)	4.3 (<BG)	Maximum Value	DOE-RL 2011g	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-323 Waste Site Confirmatory Sampling Data	–	59.7	8.64

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-116	600-350	NR	NR	–	DOE-RL 2011p	–	Located in DU-116 and DU-117. Arsenic and lead were excluded from verification sampling (pp. 5).	751	85.8
DU-117	600-186	93.50	5.64 (<BG)	Maximum Value	DOE-RL 2011o	Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-186 Confirmatory Sampling Data	Located in DU-117, DU-119, DU-120, DU-121, DU-122, DU-123, DU-124, DU-125, DU-126, DU-127, DU-128 DU-129, DU-130, and DU-131.	195	34.6
DU-118	600-109	141.00	27.20	Statistical Value	DOE-RL 2010l	Table 5. Comparison of Statistical Contaminant Concentrations to Remedial Action Goals for the 600-109 Staging Pile Area Footprint Verification Sampling Data	95% UCL or maximum value, depending on data censorship.	247	32.8
DU-118	600-109	71.90	15.30	Maximum Value	DOE-RL 2010l	Table 6. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-109 Overburden Verification Sampling Data	–	247	32.8
DU-118	600-109	24.70	6.07 (<BG)	Maximum Value	DOE-RL 2010l	Table 7. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-109 Boulder Soil Verification Sampling Data	–	247	32.8

DU-ID	WIDS Site Name	Lead (mg/kg) in WIDS Site	Arsenic (mg/kg) in WIDS Site	Type of Result Reported for WIDS Site	Reference for WIDS Site	Table Number and Name for Concentration Information in Reference	Comment on Reference and Results	Maximum Value of Lead (mg/kg) Recorded in DU	Maximum Value of Arsenic (mg/kg) Recorded in DU
DU-126	600-208	NR	NR	–	DOE-RL 2004a	–	Located in DU-126, DU-129, DU-130, and DU-133. Arsenic and lead not discussed, and no other hazardous chemicals present a risk to human health or the environment (pp. ES-1).	95.5	10.8
DU-133	600-321	16.20	2.7 (<BG)	Maximum Value	DOE-RL 2013b	Table 11. Comparison of Maximum Verification Sample Contaminant Concentrations to Remedial Action Goals for the 600-303 Waste Site Verification Sampling Data	Located outside of a few DUs, but only inside of DU-133.	51.9	7.95

BG = background; FSB = fuel storage basin; NR = not recorded; RAGs = remedial action goals; RESRAD = RESidual RADioactive dose assessment model; U = undetected validation qualifier; UCL = upper confidence limit.

F.3 Explanation of Table F-2, Summary of Waste Sites Co-located within 100-OL-1 Operable Unit That Were Rejected, No Action, or No Evidence to Support the Existence of Dangerous Waste

Table F-2 lists 15 WIDS co-located with the 100-OL-1 OU that were rejected, had no action, or did not have evidence to support the existence of dangerous waste, as defined by Washington Administrative Code (WAC) 173-303. This is provided for information only, and there has been limited verification of the summarized materials.

DU-ID – Identification of the Decision Unit (DU) in which the waste site is located.

WIDS Site Name – Unique waste site identification number.

Reference – Citation to support documented findings.

Comments – Additional supporting information.

Table F-2. Summary of Waste Sites Co-located within 100-OL-1 Operable Unit that were Rejected, No Action, or No Evidence to Support the Existence of Dangerous Waste (Data Provided for Information Only)

DU-ID	Waste Information Data System Site Name	Reference	Comment on Reference and Results	PNNL Maximum Value of Lead (mg/kg)	PNNL Maximum Value of Arsenic (mg/kg)
DU-008	600-253; Gravel Pit #24; Pit 24	WCH 2011	No evidence to indicate hazardous, dangerous, or radioactive waste at this site.	53.6	55.1
DU-008	600-34	BHI 1997a	Waste site rejected.	53.6	55.1
DU-020	100-H-55	DOE-RL 2010b	Waste site rejected.	3000	372
DU-023	100-H-1	BHI 2001	Waste site rejected.	231	46.8
DU-023	100-H-39	DOE-RL 2010e	Waste site rejected.	81.3	31.4
DU-023	118-H-6-1	WCH 2015	Waste site rejected.	81.3	31.4
DU-024	100-H-47	DOE-RL 2010a	Waste site rejected.	81.3	31.4
DU-024	100-H-49-3	DOE-RL 2011s	Located in DU-22, DU-23, and DU-24. Waste site rejected.	159	36.6
DU-076	100-F-41	DOE-RL 2007b	Located in DU-76 and DU-87. Waste site rejected.	159	36.6
DU-105	600-213	DOE-RL 2010c	Waste site rejected.	160	61.7
DU-112	600-239	WCH 2016	No action for the waste site.	327	30.5
DU-113	600-26	BHI 1997b	No evidence to indicate hazardous, dangerous, or radioactive waste at this site.	59.7	8.64
DU-117	600-206	BHI 1997c	No evidence to indicate hazardous, dangerous, or radioactive waste at this site.	878	23.1
DU-117	600-333	DOE-RL 2011i	Waste site rejected.	195	34.6
DU-119	600-27	BHI 1997d	Waste site rejected.	195	34.6

F.4 References

BHI. 1997a. Waste Site Reclassification Form, 100-BC-1 Operable Unit, 600-34, Baled Tumbleweed Disposal Site. Control Number 97-010. Bechtel Hanford, Inc., Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06723805

BHI. 1997b. Waste Site Reclassification Form, 100-IU-6 Operable Unit, 600-26, Hanford Townsite Burn Pile. Control Number 97-032. Bechtel Hanford, Inc., Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06723746

BHI. 1997c. Waste Site Reclassification Form, 100-IU-6 Operable Unit, 600-206, 101 Building Graphite Dump Site. Control Number 97-035. Bechtel Hanford, Inc., Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06723761

BHI. 1997d. Waste Site Reclassification Form, 100-IU-6 Operable Unit, 600-27, Abandoned Monitoring well, Well DC-6, Well 699-50-18C. Control Number 97-041. Bechtel Hanford, Inc., Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06723778

BHI. 2001. Waste Site Reclassification Form, 100-HR-1 Operable Unit, 100-H-1 Rod Cave Waste Site. Control Number 2001-07. CVP-2000-00029. Bechtel Hanford, Inc., Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8683212

DOE/RL-92-24. 2001. Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, Revision 4, 2 volumes, January 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096062 and http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096061

DOE/RL-2010-97. 2011. *Remedial Investigation/ Feasibility Study for the 100-KR-1, 100-KR-2, and 100-KR-4 Operable Units*. Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093615

DOE/RL-2010-96. 2013. *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units*. Working Draft A, U.S, Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0089052

DOE/RL-2010-95. 2014. Remedial Investigation/Feasibility Study for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units. Revision 0, 4 volumes, September 2014. U.S. Department of Energy, CH2MHill, Richland, WA. Available at:
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083383H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083382H
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083381H and
http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083380H

DOE/RL-2010-98. 2014. Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units. Revision 0, June 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085352

DOE/RL-2012-64. 2016. Remedial Investigation Work Plan to Evaluate the 100-OL-1 Operable Unit Pre-Hanford Orchard Lands. Revision 0, June 2016. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076311H

DOE-RL. 2000. Cleanup Verification Package for the 100-H-5 Sludge Disposal Trench. CVP-2000-00028, Revision 0, December 2000. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5624426

DOE-RL. 2002. Cleanup Verification Package for the 100-F-2 Strontium Garden. CVP-2001-0001, Revision 0, July 2002. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D9147680

DOE-RL. 2003. Cleanup Verification Package for the 116-F-1 Lewis Canal. CVP-2002-00009, Revision 0, November 2003. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084373

DOE-RL. 2005. Report for the 600-235, Lead-Sheathed Telecommunications Cable Sampling, Attachment to Waste Site Reclassification Form 2001-091. Control Number 2001-091, Revision 0, January 2005. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D7852260

DOE-RL. 2001a. Cleanup Verification Package for the 1607-H2 Septic System. CVP-2000-00024, Revision 0, February 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8650014

DOE-RL. 2001b. Cleanup Verification Package for the 100-H-21 Reactor Effluent Pipelines, 100-H-22 Effluent Pipeline Leakage, and 100-H-1 Rod Cave. CVP-2000-00029, Revision 0, March 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5626735

DOE-RL. 2001c. Cleanup Verification Package for the 100-H-17 Overflow, 116-H-2 Liquid Waste Disposal Trench, 100-H-2 Buried Thimble Site, and the 100-H-30 Sanitary Sewer Trench. CVP-2000-00031, Revision 0, March 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5626958

DOE-RL. 2001d. Cleanup Verification Package for the 116-H-1 Process Effluent Trench. CVP-2000-00026, Revision 0, April 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5623911

DOE-RL. 2001e. Cleanup Verification Package for the 116-H-3 Process Effluent Trench. CVP-2000-00032, Revision 0, April 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5627056

DOE-RL. 2001f. Cleanup Verification Package for the 100-H-24 Substation. CVP-2000-00030, Revision 0, May 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D8836772

DOE-RL. 2001g. Cleanup Verification Package for the 116-H-7 Retention Basin. CVP-2000-00027, Revision 0, July 2001. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D5624133

DOE-RL. 2004a. Remaining Sites Verification Package for 600-208 Hanford Construction Camp Boiler House Ponds, Attachment to Waste Site Reclassification Form 2004-096. Control Number 2004-096, Revision 0, July 2004. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6054273

DOE-RL. 2004b. Remaining Sites Verification Package for 600-98 East White Bluffs City Landfill, Attachment to Waste Site Reclassification Form 2004-098. Control Number 2004-098, Revision 0, August 2004. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D6054247

DOE-RL. 2006a. Cleanup Verification Package for the 118-H-6:2, 105-H Reactor Ancillary Support Areas, Below-Grade Structures, and Underlying Soils; the 118-H-6:3, 105-H Reactor Fuel Storage Basin and Underlying Soils; the 118-H-6:6 Fuel Storage Basin Deep Zone Side-Slope Soils; the 100-H-9, 100-H-10, and 100-H-13 French Drains; the 100-H-11 and 100-H-12 Expansion Box French Drains; and the 100-H-14 and 100-H-31 Surface Contamination Zones. CVP-2006-00003, Revision 0, June 2006. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03226404

DOE-RL. 2006b. Remaining Sites Verification Package for 132-H-2, 117-H Filter Building, Attachment to Waste Site Reclassification Form 2006-049. Control Number 2006-049, Revision 0, August 2006. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA03467720

DOE-RL. 2007a. Remaining Sites Verification Package for 132-H-1, 116-H Reactor Stack Burial Site, Attachment to Waste Site Reclassification Form 2006-053. Control Number 2006-053, Revision 0, January 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA05392567

DOE-RL. 2007b. Attachment to Waste Site Reclassification Form 2006-064, Description of 100-F-41 Subsites 1 through 4. Control Number 2006-064, February 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA04508712

DOE-RL. 2007c. Remaining Sites Verification Package for the 1607-F3 Sanitary Sewer System, Attachment to Waste Site Reclassification Form 2006-047. Control Number 2006-047, Revision 0, April 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA05001340

DOE-RL. 2007d. Remaining Sites Verification Package for the 116-H-4, 105-H Pluto Crib, Attachment to Waste Site Reclassification Form 2006-044, Attachment to Waste Site Reclassification Form 2006-044. Control Number 2006-044, Revision 0, April 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA05001813

DOE-RL. 2007e. Cleanup Verification Package for the 118-F-2 Burial Ground. CVP-2007-00002, Revision 0, October 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06834544

DOE-RL. 2007f. Cleanup Verification Package for the 118-F-1 Burial Ground. CVP-2007-00001, Revision 0, November 2007. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA06587512

DOE-RL. 2008a. Remaining Sites Verification Package for the 100-B-23, 100-B/C Area Surface Debris, Waste Site, Attachment to Waste Site Reclassification Form 2008-027. Control Number 2008-027, Revision 0, June 2008. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0808180169

DOE-RL. 2008b. Cleanup Verification Package for the 118-F-6 Burial Ground. CVP-2008-00001, Revision 0, June 2008. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0810230114

DOE-RL. 2008c. Remaining Sites Verification Package for the 600-11, P-11 Critical Mass Laboratory Crib, and UPR-600-16, Fire and Contamination Spread Waste Sites, Attachment to Waste Site Reclassification Form 2004-065. Control Number 2004-065, Revision 0, November 2008. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0812030146

DOE-RL. 2009a. Remaining Sites Verification Package for 128-H-2, 100-H Burning Ground #2, and 128-H-3, 100-H Burning Ground #3, Attachment to Waste Site Reclassification Forms 2007-08 and 2007-09. Control Numbers 2007-08 and 2007-09, Revision 0, February 2009. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084725

DOE-RL. 2009b. Remaining Sites Verification Package for 100-H-7 French Drain A, Attachment to Waste Site Reclassification Form 2008-056. Control Number 2008-056, Revision 0, August 2009. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0096030

DOE-RL. 2009c. Cleanup Verification Package for the 118-H-5, 105-H Thimble Pit. CVP-2009-00009, Revision 0, September 2009. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0094894

DOE-RL. 2009d. Remaining Sites Verification Package for 100-H-8 French Drain B, Attachment to Waste Site Reclassification Form 2006-031. Control Number 2006-031, Revision 0, December 2009. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0095054

DOE-RL. 2010a. 100-H-47, 1717-H Geophysical Anomaly, Attachment to Waste Site Reclassification Form 2009-058. Control Number 2009-058, Revision 0, January 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084530

DOE-RL. 2010b. 100-H-55, Cast Iron Pipe, Attachment to Waste Site Reclassification Form 2009-056. Control Number 2009-056, Revision 0, January 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084531

DOE-RL. 2010c. Attachment 1 Figures and Photos 600-213 Hanford Airport Underground Fuel Storage Tanks, Attachment to Waste Site Reclassification Form 2010-001. Control Number 2010-001, Revision 0, January 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084401

DOE-RL. 2010d. Remaining Sites Verification Package for the 600-152 Military Septic Tanks, Attachment to Waste Site Reclassification Form 2009-019. Control Number 2009-019, Revision 0, March 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084413v

DOE-RL. 2010e. 100-H-39, 100-H Possible Thimble Pit Locations Site, Attachment to Waste Site Reclassification Form 2010-002. Control Number 2010-002, Revision 0, April 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084325

DOE-RL. 2010f. Remaining Sites Verification Package for the 100-H-45, 1717-H Underground Propane Tank, Attachment to Waste Site Reclassification Form 2009-064. Control Number 2009-064, Revision 0, June 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084306

DOE-RL. 2010g. Cleanup Verification Package for the 118-H-6:4, 105-H Fuel Storage Basin Shallow Zone Side Slope Soils. CVP-2010-00005, Revision 0, June 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084150

DOE-RL. 2010h. 100-H-37 Mud Daubers Waste Site, Attachments to Waste Site Reclassification Form 2010-007. Control Number 2010-007, Revision 0, August 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084248

DOE-RL. 2010i. Cleanup Verification Package for the 118-H-4, Ball 3X Burial Ground. CVP-2010-00003, Revision 0, August 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084105

DOE-RL. 2010j. Remaining Sites Verification Package for the 600-344, Inter Areas Stain Site #1, Attachment to Waste Site Reclassification Form 2010-067. Control Number 2010-067, Revision 0, September 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084158

DOE-RL. 2010k. Cleanup Verification Package for 118-H-2, H-1 Loop Burial Ground. CVP-2010-00002, Revision 0, November 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1012280971

DOE-RL. 2010l. Remaining Sites Verification Package for the 600-109, Hanford Trailer Camp Landfill, Attachment to Waste Site Reclassification Form 2010-075. Control Number 2010-075, Revision 0, November 2010. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084022

DOE-RL. 2011a. Remaining Sites Verification Package for the 100-H-50, 100-H Stem Condensate French Drains, Attachment to Waste Site Reclassification Form 2009-009. Control Number 2009-009, Revision 0, January 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093777

DOE-RL. 2011b. Remaining Sites Verification Package for the 100-H-3, 1716-H Garage Fuel Tank Site, Attachment to Waste Site Reclassification Form 2010-103. Control Number 2010-103, Revision 0, January 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093820

DOE-RL. 2011c. Remaining Sites Verification Package for the 600-322, Rail Spur Pipe, Attachment to Waste Site Reclassification Form 2011-011. Control Number 2011-011, Revision 0, February 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093899

DOE-RL. 2011d. Remaining Sites Verification Package for the 100-H-51:4, 100-H Main Gate Storm Drain, Attachment to Waste Site Reclassification Form 2009-026. Control Number 2009-026, Revision 0, February 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093855

DOE-RL. 2011e. Remaining Sites Verification Package for the 100-H-4, 1717 Hot Shop, French Drain, and Contaminated Storage Unit, Attachment to Waste Site Reclassification Form 2011-001. Control Number 2011-001, Revision 0, February 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093821

DOE-RL. 2011f. Cleanup Verification Package for the 118-H-3, Construction Burial Ground. CVP-2010-00006, Revision 0, February 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093771

DOE-RL. 2011g. Remaining Sites Verification Package for the 600-323, Bermed Area, Attachment to Waste Site Reclassification Form 2011-009. Control Number 2011-009, Revision 0, March 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1105200938

DOE-RL. 2011h. Remaining Sites Verification Package for the 100-H-41, 100-H Contaminated Area Waste Site, Attachment to Waste Site Reclassification Form 2010-003. Control Number 2010-003, Revision 0, March 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093981

DOE-RL. 2011i. Supporting Information for Reclassification of the 600-333, Underground Storage Structure, Attachment to Waste Site Reclassification Form 2011-008. Control Number 2011-008, Revision 0, March 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1104050150

DOE-RL. 2011j. Supporting Information for Reclassification of the 100-F-58, 100-F Surface Debris Potentially Containing Asbestos, Attachment to Waste Site Reclassification Form 2011-033. Control Number 2011-033, Revision 0, April 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093825

DOE-RL. 2011k. Remaining Sites Verification Package for the 100-H-49:2, 119-H, 181-H, 184-H, and 183-H French Drains, Attachment to Waste Site Reclassification Form 2010-096. Control Number 2010-096, Revision 0, May 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093562

DOE-RL. 2011l. Remaining Sites Verification Package for the 126-H-2, 183-H Clearwells/Disposal Pit Waste Site, Attachment to Waste Site Reclassification Form 2006-006. Control Number 2006-006, Revision 0, June 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093519

DOE-RL. 2011m. Remaining Sites Verification Package for the 116-H-5, 1904-H Outfall Structure, Attachment to Waste Site Reclassification Form 2011-012. Control Number 2011-012, Revision 0, June 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0092736

DOE-RL. 2011n. Cleanup Verification Package for the 118-H-1:1, 100-H Burial Ground Trenches and Sorting Cells. CVP-2011-00001, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093728

DOE-RL. 2011o. Remaining Sites Verification Package for the 600-186, Hanford Construction Camp Septic Tanks and Sewage Treatment Plants, Attachment to Waste Site Reclassification Form 2011-069. Control Number 2011-069, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093628

DOE-RL. 2011p. Remaining Sites Verification Package for the 600-350, PNL Water Catchment Experiment, Attachment to Waste Site Reclassification Form 2011-073. Control Number 2011-073, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093630

DOE-RL. 2011q. Cleanup Verification Package for 118-H-1:2, Burial Ground Anomaly Staging Area and Suspect Spent Nuclear Fuel Bunker Area. CVP-2011-0003, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093600

DOE-RL. 2011r. Cleanup Verification Package for 118-H-6:5, 105-H Decontamination Pads. CVP-2011-00002, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093560

DOE-RL. 2011s. 100-H-49:3, 183-H and 1717-H French Drains, Attachment to Waste Site Reclassification Form 2011-065. Control Number 2011-065, Revision 0, July 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093354

DOE-RL. 2011t. Remaining Sites Verification Package for the 600-151, Dumping Areas 50 Yards and 200 Yards Downstream of River Mile 14 Waste Site, Attachment to Waste Site Reclassification Form 2011-053. Control Number 2011-053, Revision 0, August 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093558

DOE-RL. 2011u. Remaining Sites Verification Package for the 100-D-7 Undocumented Solid Waste Site, Attachment to Waste Site Reclassification Form 2011-005. Control Number 2011-005, Revision 0, September 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093594

DOE-RL. 2011v. Remaining Sites Verification Package for the 600-351, Stained Areas Outside of the 100-F Area, Attachment to Waste Site Reclassification Form 2011-087. Control Number 2011-087, Revision 0, September 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1202020267

DOE-RL. 2011w. 100-H-33, 183-H Solar Evaporation Basins Radionuclide Component Waste Site, Attachment to Waste Site Reclassification Form 2011-099. Control Number 2011-099, Revision 0, October 2011. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0093025

DOE-RL. 2012a. Remaining Sites Verification Package for the 128-H-1, 100-H Burning Pit Waste Site, Attachment to Waste Site Reclassification Form 2010-062. Control Number 2010-062, Revision 0, May 2012. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0092549

DOE-RL. 2012b. Remaining Sites Verification Package for the 132-H-3, 1608-H Effluent Pumping Station Waste Site, Attachment to Waste Site Reclassification Form 2006-050. Control Number 2006-050, U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1208100087

DOE-RL. 2012c. Remaining Sites Verification Package for the 126-H-2, 183-H Clearwells/Disposal Pit Waste Site, Attachment to Waste Site Reclassification Form 2006-006. Control Number 2006-006, Revision 0, October 2012. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0091167

DOE-RL. 2013a. Remaining Sites Verification Package for the 100-H-38, Possible Trenches and Pit Southwest of 105-H Waste Site, Attachment to Waste Site Reclassification Form 2013-095. Control Number 2013-095, Revision 0, November 2013. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087182

DOE-RL. 2013b. Remaining Sites Verification Package for the 600-303, Vertical Pipes; and 600-321, Suspect Asbestos Containing Material and Debris, Attachment to Waste Site Reclassification Forms 2013-046 and 2013-047. Control Numbers 2013-046 and 2013-047, Revision 0, August 2013. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1309180462

DOE-RL. 2013c. Remaining Sites Verification Package for the 600-298, Stained Soil/Surface Debris; 600-299, Surface Debris/Batteries; and 600-300, Miscellaneous Surface Debris Waste Sites, Attachment to Waste Site Reclassification Forms 2013-040, 2013-041, and 2013-042. Control Numbers 2013-040, 2013-041, and 2013-042, Revision 0, December 2013. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087073

DOE-RL. 2013d. Remaining Sites Verification Package for the 600-372, Segment 4 Oil Stains and Filter Areas Waste Site, Attachment to Waste Site Reclassification Form 2013-091. Control Number 2013-091, Revision 0, December 2013. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083711

DOE-RL. 2014a. Remaining Sites Verification Package for the 600-373, Segment 4 Bare Ground and White Stain Area; and 600-374, Segment 4 Drum Remnant Area Waste Sites, Attachment to Waste Site Reclassification Forms 2013-086 and 2013-087. Control Numbers 2013-086 and 2013-087, Revision 0, January 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0086593

DOE-RL. 2014b. Remaining Sites Verification Package for the 100-H-48, 184-HA Underground Fuel Oil Tanks Associated Piping and 100-H-52, 184-HA Septic Drain Field and Associated Piping, Attachment to

Waste Site Reclassification Forms 2013-126 and 2013-127. Control Numbers 2013-126 and 2013-127, Revision 0, April 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085675

DOE-RL. 2014c. Remaining Sites Verification Package for the 600-279, Vegetation Free Area Between White Bluffs and 100F, Attachment to Waste Site Reclassification Form 2013-134. Control Number 2013-134, Revision 0, April 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085619

DOE-RL. 2014d. Remaining Sites Verification Package for the 100-H-46, 190-H Potential Contaminated Soil Waste Site, Attachment to Waste Site Reclassification Form 2014-003. Control Number 2014-003, Revision 0, May 2014. . U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085431

DOE-RL. 2014e. Remaining Sites Verification Package for the 100-H-46, 190-H Potential Contaminated Soil Waste Site, Attachment to Waste Site Reclassification Form 2014-033. Control Number 2014-003, Revision 0, May 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085431

DOE-RL. 2014f. Remaining Sites Verification Package for the 600-383, Segment 4 Battery Remnant Area #2 Waste Site, Attachment to Waste Site Reclassification Form 2014-023. Control Number 2014-023, Revision 0, July 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084949

DOE-RL. 2014g. Remaining Sites Verification Package for the 600-384, Segment 4 Stained Soil Area #3 Waste Site, Attachment to the Waste Site Reclassification Form 2014-008. Control Number 2014-008, Revision 0, August 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083711

DOE-RL. 2014h. Remaining Sites Verification Package for the 100-H-56; H-Area Miscellaneous Pipelines Waste Site, Attachment to Waste Site Reclassification Form 2014-063. Control Number 2014-063, Revision 0, September 2014. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0083604

DOE-RL. 2015a. Remaining Sites Verification Package for the 100-H-43, 1716-H Maintenance Garage, Repair Shop Waste Site, Attachment to Waste Site Reclassification Form 2014-110. Control Number 2014-110, Revision 0, March 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081603H

DOE-RL. 2015b. Remaining Sites Verification Package for the 100-H-49:1, 184-H Boiler House and 1717-H Hot Shop French Drains Subsite, Attachment to Waste Site Reclassification Form 2014-111. Control Number 2014-111, Revision 0, April 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081455H

DOE-RL. 2015c. Remaining Sites Verification Package for the 100-H-51:3, 184-H Brine Discharge Line and 100-H-51:6, Carbon Steel Pipe Subsites, Attachment to Waste Site Reclassification Forms 2014-097 and 2014-098. Control Numbers 2014-097 and 2014-098, Revision 0, April 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0081457H

DOE-RL. 2015d. Cleanup Verification Package for the 600-331, Lime Sulfur Barrel Waste Site. CVP-2014-00003, Revision 0, May 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=1506100321

DOE-RL. 2015e. Remaining Sites Verification Package for the 100-H-51:2, 117-H Seal Pit Crib Feedline Subsite, Attachment to Waste Site Reclassification Form 2015-025. Control Number 2015-025, Revision 0, July 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080456H

DOE-RL. 2015f. Remaining Sites Verification Package for the 100-H-28:3, 100-H-28:5, and 100-H-44 Waste Sites, and the 100-H-28:2, 100-H-28:3, 100-H-28:4, and 100-H-28:5 Overburden Piles, Attachment to Waste Site Reclassification Forms 2015-027, 2015-028, and 2015-029. Control Numbers 2015-027, 2015-028, and 2015-029, Revision 0, July 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080460H

DOE-RL. 2015g. Remaining Sites Verification Package for the 100-H-28:2 and 100-H-42 Waste Sites, Attachment to Waste Site Reclassification Forms 2015-052 and 2015-053. Control Numbers 2015-052 and 2015-053, Revision 0, October 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0079686H

DOE-RL. 2015h. Final Action Evaluation of Additional 100-IU-2 & 100-IU-6 Waste Sites, Attachment to Waste Site Reclassification Form 2015-073. Control Number 2015-073, Revision 0, December 2015. U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0079132H

EPA/ROD/R10-96/151. 1996. EPA Superfund Record of Decision: USDOE Hanford 100 Area 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 Operable Units. February 1996. U.S. Environmental Protection Agency, Washington, DC.

Ecology. 2001. Notes of the Development of Method A Cleanup Levels, WAC 173-340-720, 740, and 745. Washington State Department of Ecology, Olympia, Washington.

San Juan C. 1994. Natural Background Soil Metals Concentrations in Washington State. Publication No. 94-115, Washington State Department of Ecology, Olympia, Washington.

WAC 173-303. "Dangerous Waste Regulations." Washington Administrative Code, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303

WCH. 2011. Waste Information Data System General Summary Report, 100-BC-1 Operable Unit, 600-253, Gravel Pit #24, Pit 24. Washington Closure Hanford, Richland, WA.

WCH. 2015. Waste Site Reclassification Form, 118-H-6:1, Cocooned 105-H Reactor Core. Control Number 2014-086. Washington Closure Hanford, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080068H

WCH. 2015. Waste Site Reclassification Form, 118-H-6:1, Cocooned 105-H Reactor Core. Control Number 2014-086. Washington Closure Hanford, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0080068H

WCH. 2016. Waste Site Reclassification Form, 100-IU-6 Operable Unit, 600-107, 2013-J and 213-K Cribs, 600-110, Hanford Townsite Landfill, 600-186, Hanford Construction Camp Septic Tanks and Sewage Treatment Plants, 600-208, Hanford Construction Camp Boiler House Ponds, 600-239, Debris in Pit 16, 600-315, Black Granular Stain, 600-322, Rail Spur Pipe, 600-323, Bermed Area, 600-327, Suspect Dichromate Facility, and 600-334:1, CMX Building and Surface Anomalies. Control Number 2015-038. Washington Closure Hanford, Richland, WA. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0078661H