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**Final Data Quality Objectives Report for RVAAP-05 Winklepeck Burning Grounds
Version 1.0**

**Ravenna Army Ammunition Plant
Ravenna, Ohio**

**Contract No. W912QR-08-D-0013
Delivery Order 0002**

Prepared for:



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of Engineers** ®
Louisville District

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June 8, 2011

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CONTRACTOR'S STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Shaw Environmental & Infrastructure, Inc. has completed the *Final Data Quality Objectives Report for RVAAP-05 Winklepeck Burning Grounds* at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that Shaw has conducted an independent technical review that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy, principles, and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets customer's needs consistent with law and existing USACE policy.

Reviewed/Approved by:



David Cobb
Project/Program Manager

Date: 6/8/2011

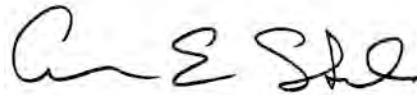
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Table of Contents

List of Exhibits	iii
List of Figures	iii
List of Tables	iv
List of Appendices	iv
Acronyms and Abbreviations	v
1.0 Introduction	1-1
1.1 Purpose and Scope	1-1
1.2 RVAAP Description and Background	1-1
1.3 Historical Use of Winklepeck Burning Grounds	1-2
1.3.1 Summary of Investigations at Winklepeck Burning Grounds	1-2
1.3.2 Summary of Removal Actions at Winklepeck Burning Grounds	1-3
1.4 Planned Future Use of Winklepeck Burning Grounds	1-5
2.0 Data Quality Objectives	2-1
2.1 Conceptual Site Model	2-1
2.2 State the Problem	2-2
2.3 Identify Decisions to be Made	2-2
2.4 Define Study Boundaries	2-3
2.5 Identify Decision Rules	2-3
2.6 Identify Inputs to the Decision	2-4
2.7 Specify Limits on Decision Error	2-4
2.8 Optimize the Sample Design	2-4
3.0 Data Evaluation	3-1
3.1 Definition of Investigation and Confirmation Data Sets	3-1
3.2 Data Reduction and Screening	3-2
3.2.1 Determination of the Chemicals of Potential Concern	3-3
3.2.2 Determination of the Chemicals of Concern	3-4
3.2.3 Data Presentation	3-5
3.3 Data Evaluation for COPCs	3-6
3.3.1 Surface Soil and Deep Surface Soil Investigation Data	3-6
3.3.1.1 Inorganics	3-7
3.3.1.2 Explosives and Propellants	3-9
3.3.1.3 SVOCs	3-11
3.3.1.4 VOCs	3-13
3.3.1.5 Pesticides and PCBs	3-14
3.3.2 Dry Sediment Investigation Data	3-15
3.3.2.1 Inorganics	3-16
3.3.2.2 Explosives and Propellants	3-16
3.3.2.3 SVOCs	3-17
3.3.2.4 Pesticides and PCBs	3-17
3.3.2.5 VOCs	3-17
3.3.3 Subsurface Soil Investigation Data	3-18
3.3.3.1 Inorganics	3-18

Table of Contents (continued)

3.3.3.2	Explosives and Propellants	3-20
3.3.3.3	SVOCs	3-21
3.3.3.4	VOCs	3-23
3.3.3.5	Pesticides and PCBs.....	3-23
3.4	Data Evaluation for COCs	3-24
3.4.1	Surface and Deep Surface Soil Confirmation Data.....	3-24
3.4.1.1	Explosives and Propellants	3-25
3.4.1.2	SVOCs	3-27
3.4.2	Subsurface Soil Confirmation Data.....	3-29
3.4.2.1	Explosives and Propellants	3-29
3.4.2.2	SVOCs	3-30
3.5	Summary of Results	3-31
3.5.1	Surface and Deep Surface Soils	3-31
3.5.2	Dry Sediment.....	3-34
3.5.3	Subsurface Soil	3-36
4.0	Sample Design.....	4-1
4.1	Geophysical Investigation.....	4-1
4.2	Residential Farmer (adult)	4-1
4.2.1	Surface Soil	4-1
4.2.2	Dry Sediment.....	4-2
4.2.3	Subsurface Soil	4-2
4.3	Residential Farmer (Child).....	4-2
4.3.1	Surface Soil	4-3
4.3.2	Dry Sediment.....	4-3
4.3.3	Subsurface Soil	4-3
4.4	National Guard Dust/Fire Control Worker	4-3
4.4.1	Deep Surface Soil	4-4
4.4.2	Dry Sediment.....	4-4
4.5	National Guard Range Maintenance Soldier	4-4
4.5.1	Deep Surface Soil	4-4
4.5.2	Dry Sediment.....	4-5
4.6	National Guard Trainee	4-5
4.6.1	Deep Surface Soil	4-5
4.6.2	Dry Sediment.....	4-5
4.6.3	Subsurface Soil	4-5
5.0	Summary of Conclusions	5-1
6.0	References	6-1

List of Exhibits

Exhibit 3-1	Chemicals of Potential Concern Identified in Surface Soil	3-31
Exhibit 3-2	Chemicals of Concern Identified in Surface Soil	3-34
Exhibit 3-3	Chemicals of Potential Concern Identified in Dry Sediment	3-35
Exhibit 3-4	Chemicals of Potential Concern Identified in Subsurface Soil.....	3-36
Exhibit 3-5	Chemicals of Concern Identified in Subsurface Soil	3-38

List of Figures

Figure 1-1	Site Location Map
Figure 1-2	RVAAP Facility Map
Figure 1-3	RVAAP-05 Winklepeck Burning Grounds
Figure 1-4	RVAAP-05 Winklepeck Burning Grounds with Mark 19 Grenade Machinegun Range and Grenade Launcher Range
Figure 3-1a	Surface Soil, Subsurface Soil, and Sediment Sample Locations: Investigation Data, NW Quad
Figure 3-1b	Surface Soil, Subsurface Soil, and Sediment Sample Locations: Investigation Data, SW Quad
Figure 3-1c	Surface Soil, Subsurface Soil, and Sediment Sample Locations: Investigation Data, NE Quad
Figure 3-1d	Surface Soil, Subsurface Soil, and Sediment Sample Locations: Investigation Data, SE Quad
Figure 3-2	Cadmium in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-3	Lead in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-4	Antimony in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-5	Copper in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-6	Lead in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-7	Barium in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-8	Cadmium in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-9	Hexavalent Chromium in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-10	Explosives in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-11	Explosives in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-12	SVOCs in Surface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-13	SVOCs in Deep Surface Soil, Investigation Data for National Guard Land Use
Figure 3-14	Inorganics in Subsurface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-15	Inorganics in Subsurface Soil, Investigation Data for National Guard Land Use
Figure 3-16	Explosives in Subsurface Soil, Investigation Data for Residential Farmer Land Use
Figure 3-17	SVOCs in Subsurface Soil, Investigation Data for Residential Farmer Land Use

List of Tables

Table 3-1	Identification of COPCs in Surface Soil, Investigation Data for Residential Farmer Land Use
Table 3-2	Identification of COPCs in Deep Surface Soil, Investigation Data for National Guard Land Use
Table 3-3	Identification of COPCs in Dry Sediment, Investigation Data for Residential Farmer Land Use
Table 3-4	Identification of COPCs in Dry Sediment, Investigation Data for National Guard Land Use
Table 3-5	Identification of COPCs in Subsurface Soil, Investigation Data for Residential Farmer Land Use
Table 3-6	Identification of COPCs in Subsurface Soil, Investigation Data for National Guard Land Use
Table 3-7a	Detected Analytes in Surface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-7b	Identification of Carcinogenic COCs in Surface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-7c	Identification of Non-Carcinogenic COCs in Surface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-8a	Detected Analytes in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-8b	Identification of Carcinogenic COCs in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-8c	Identification of Non-Carcinogenic COCs in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
Table 3-9a	Detected Analytes in Deep Surface Soil, Confirmation Data for National Guard Land Use
Table 3-9b	Identification of Carcinogenic COCs in Deep Surface Soil, Confirmation Data for National Guard Land Use
Table 3-9c	Identification of Non-Carcinogenic COCs in Deep Surface Soil, Confirmation Data for National Guard Land Use

List of Appendices

Appendix A	ProUCL Software Program Output
Appendix B	Comment Response Table
Appendix C	Ohio EPA Approval Letter

Acronyms and Abbreviations

AOC	Area of Concern
bgs	below ground surface
BRAC	Base Realignment and Closure
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
CSM	conceptual site model
CUG	cleanup goal
DFFO	Director's Final Findings and Orders
DO	Delivery Order
DoD	Department of Defense
DQO	data quality objective
DQO Report	<i>Final Data Quality Objectives Report for RVAAP-05 Winklepeck Burning Grounds</i>
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
FSAP	<i>Facility-Wide Sampling and Analysis Plan</i>
ft	foot, feet
FWCUG	facility-wide cleanup goals
GLR	Grenade Launcher Range
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
km	kilometer
mg/kg	milligram per kilogram
MEC	munitions and explosives of concern
MI	multi-increment
MKM	MKM Engineers, Inc.
MPMG	Multi Purpose Machinegun
NGB	National Guard Bureau
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PCB	polychlorinated biphenyl
QC	quality control
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	<i>Final Record of Decision for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio</i>
RSL	Regional Screening Levels
RVAAP	Ravenna Army Ammunition Plant

Acronyms and Abbreviations (continued)

SAIC	Science Applications International Corporation
Shaw	Shaw Environmental & Infrastructure, Inc.
SOW	Scope of Work
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TNT	2,4,6-trinitrotoluene
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
USPFO	U.S. Property & Fiscal Office
VOC	volatile organic compound
WBG	Winklepeck Burning Grounds

1.0 Introduction

1.1 Purpose and Scope

This *Final Data Quality Objectives Report for RVAAP-05 Winklepeck Burning Grounds (DQO Report)* provides a systematic approach for evaluating data requirements to support the decision making process associated with possible future actions for Ravenna Army Ammunition Plant (RVAAP) Area of Concern (AOC) RVAAP-05, Winklepeck Burning Grounds (WBG), located at RVAAP in Ravenna, Ohio (Figure 1-1). This *DQO Report* is being prepared by Shaw Environmental & Infrastructure, Inc. (Shaw) under Delivery Order (DO) 0002 for Architectural/Engineering Environmental Services at RVAAP under the Indefinite Delivery/Indefinite Quantity Contract No. W912QR-08-D-0013. The task order was issued by the U.S. Army Corps of Engineers, Louisville District (USACE) on September 22, 2008.

The purpose of this *DQO Report* is to review the previous reports to determine if there are areas at the WBG AOC that need additional investigation in relation to the proposed future use of the site as a Multi Purpose Machinegun (MPMG) Range and a Grenade Launcher Range (GLR). Areas within the proposed range construction with identified data gaps will then be evaluated by others to determine if additional investigation or remediation is needed to facilitate construction of the MPMG Range and GLR. The evaluation processes presented in this document and performed under this DO were conducted in accordance with the Facility-Wide data quality objectives (DQOs) described in the *Facility-Wide Sampling and Analysis Plan (FSAP)* (Science Applications International Corporation [SAIC], 2001a) and the revised Scope of Work (SOW), dated August 26, 2008, included as an attachment to the DO contract.

1.2 RVAAP Description and Background

The RVAAP is located in northeastern Ohio within Portage and Trumbull counties, approximately 1.6 kilometer (km) (1 mile) northwest of the city of Newton Falls and 4.8 km (3 miles) east-northeast of the city of Ravenna (Figure 1-1). The facility is a parcel of property approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (Figure 1-2).

As of February 2006, administrative control of 20,403 acres of the former 21,683-acre RVAAP have been transferred to the U.S. Property and Fiscal Officer for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a training site. Currently, RVAAP consists of 1,280 acres in several distinct parcels scattered throughout the confines of the Camp Ravenna Joint Military Training Center (Camp Ravenna). These 1,280 acres consist of former

industrial facilities that are being remediated and managed by the Base Realignment and Closure (BRAC) Division that has, among other responsibilities, the task of overseeing inactive status installations.

During the operational years, prior to Camp Ravenna, the entire 21,683- acre property was a government-owned, contractor-operated industrial facility. The RVAAP Installation Restoration Program (IRP) encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP; therefore, references to the RVAAP in this document are considered to be inclusive of the historical extent of the RVAAP, which is inclusive of the combined acreages of the current Camp Ravenna and RVAAP, unless otherwise specifically stated.

The Ohio Environmental Protection Agency (Ohio EPA) is the lead regulatory agency for the investigation and remediation conducted by USACE under the U.S. Department of Defense (DoD) IRP. It is important to note that RVAAP is bound to the Director's Final Findings and Orders (DFFO) issued June 10, 2004 by the Ohio EPA pursuant to the authority vested under Chapters 3734, 3745, and 6111 of the Ohio Revised Code. The objective of the DFFO is to ensure that the public health, safety, and welfare, as well as the environment, is protected from the disposal, discharge, or release of contaminants.

1.3 Historical Use of Winklepeck Burning Grounds

WBG is located in the center of RVAAP and encompasses approximately 200 acres (Figure 1-3). Historical activities at WBG included destruction of explosives in munitions, bulk explosives, propellants, and explosive-contaminated combustible material using open burning. The topography at WBG is gently undulating with a general elevation decrease from west to east. Surface water drainage during storm events generally flows from west to east to southeast across WBG. Storm run-off ditches ultimately flow into Sand Creek. Former burn pads (a total of 70) are located on one side of each of the east/west trending gravel or dirt roads. The former burn pads range in appearance from distinct areas of soil and slag that are partially vegetated to non-descript (no visible slag and heavily vegetated).

1.3.1 Summary of Investigations at Winklepeck Burning Grounds

WBG was the subject of a Phase I Remedial Investigation (RI) (SAIC, 1998), a Phase II RI (SAIC, 2001b), a Phase III RI (SAIC, 2005a), and a Biological Field-Truthing Effort (SAIC, 2006). The purpose of the investigations was to confirm whether or not contamination was present at the AOC, to determine the nature and extent of chemicals of potential concern, and to evaluate chemical risks and hazards to human and ecological receptors.

During the Phase I, II, and III RIs, 273 surface soil samples encompassing the 70 former burn pads were collected and analyzed for explosives, propellants, metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and pesticides. Not all samples were subject to all analyses. Surface soil samples were collected from either 0 to 1 or 0 to 2 ft below ground surface (ft bgs) during the RIs. The Phase III RI surface soil sampling strategy was biased towards areas known or suspected to have the greatest soil contamination based on data from the Phase I and II RIs. Areas thought to be uncontaminated outside of the former burn pads were characterized using random-grid sampling.

Ninety-five subsurface soil samples were collected during the Phase II and Phase III RIs at 14 different former burn pads. No subsurface soil samples were collected during the Phase I RI. Subsurface soil samples were collected below 2 ft bgs during the RIs. Subsurface sampling was biased towards areas that were known or suspected to have the greatest surface soil contamination. The subsurface soil samples were analyzed for explosives, propellants, metals, SVOCs, VOCs, PCBs, and pesticides. Not all samples were subject to all analyses. A minimum of one 2- to 4-foot (ft) depth sample was collected from each of the 14 targeted former burn pads for determination of the vertical extent of contamination. Based on these results, further sampling was conducted to depths up to 10 ft.

Nineteen dry sediment samples were collected during the Phase I, II, and III RIs from drainage ditches at WBG. Dry sediment samples were collected from 0 to 0.5 ft bgs during the RIs. Dry sediment samples were analyzed for explosives, propellants, metals, SVOCs, VOCs, PCBs, and pesticides. Not all samples were subject to all analyses.

1.3.2 Summary of Removal Actions at Winklepeck Burning Grounds

Based on the results of the historical environmental investigations (1996 to 2003) and a 2004 MEC density survey, and in preparation for the proposed future land use as a Mark 19 Grenade Machinegun Range (Figure 1-4), a target practice range for use in firing non-explosive practice rounds, a MEC removal action was performed between March and August 2005 (MKM Engineers, Inc. [MKM], 2005a, 2005b, 2005c). The MEC removal action completed in August 2005 included the removal of soil contaminated with MEC and chemical contaminants and soil containing transite and off-site disposal as asbestos-containing material (MKM, 2008a). The areas of MEC removal are shaded in Figure 1-4. The 2005 action included the following activities:

- Excavation, MEC removal, and backfill re-use in 10 ft by 10 ft areas centered on previous soil sampling stations WBG-243 located west of Pad 66 and WBGss-070 located west of Pad 67 to a depth of 1 ft below ground surface (bgs).
- Excavation halted and not backfilled in 10 ft by 10 ft area centered on previous soil sampling station WBG-217 located south of Pad 61 to a depth of 4 ft bgs. Removal of

the soil berm associated with Pad 61 halted pending further environmental investigation.

- Excavation and MEC removal in 13.5 ft by 13.5 ft area surrounding previous soil sampling stations WBGss-401 and WBGss-071, both located at Pad 67, to a depth of 1 ft bgs. Excavated soil was staged on site and the excavation was not backfilled pending further environmental investigation.
- Excavation, MEC removal, and backfill re-use at Pads 7, 18, 26, 35, 48, and 70 to a depth of 1 ft bgs where a proposed target array overlapped the pad.
- Excavation, MEC removal, and backfill re-use at Pads 37, 38, 45, 58, 60, 61, 66, and 67 to a depth of 1 ft bgs.
- Removal of soil berms associated with Pad 58 to a depth of 1 ft bgs and with Pad 60 to ground level and off-site disposal of material.
- Performed test pits in the area of Pads 61 and 61A, which were backfilled with their respective excavated soil.
- Surface clearance of MEC in MEC clearance support areas, Firing Point Area, select former burn pads, and target arrays as identified in the Phase I MEC density survey (MKM, 2005a).

Approximately 180 acres of WBG was transferred to the National Guard Bureau (NGB) for construction following the removal of MEC from designated areas and remediation of contaminated soil and dry sediment from the target array construction areas and firing points. Construction of three of the four planned firing lanes (Lanes 2, 3, and 4) of the Mark 19 Grenade Machinegun Range was completed in 2006.

At the conclusion of 2005 MEC removal actions, confirmation sampling indicated that additional soil contamination remained on-site. Portions of the soil at Pads 61/61A and 67 were contaminated with hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) or SVOCs at concentrations greater than levels that are considered safe for range construction workers and range maintenance personnel. In addition, transite and friable asbestos was observed at Pad 70.

Additional soil removal began in August 2008 in accordance with the *Final Record of Decision for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio (ROD)* (SAIC, 2008). The objective for remediation presented in the 2008 *ROD* was to prevent exposure of the National Guard Range Maintenance Soldier to contaminants in soil at concentrations greater than risk-based cleanup levels extending to a maximum depth of 4 ft below ground surface (SAIC, 2008). Chemicals of concern (COCs) and cleanup goals (CUGs) for this removal action were defined in the *Final Remedial Action Work Plan, Winklepeck Burning Grounds, Ravenna Army Ammunition Plant, Ravenna, Ohio, Amendment 1* (MKM, 2008b). The scope of work included soil removal in the areas of Pads 61/61A, 67, and 70. At the completion of work, concentrations of COCs were less than WBG

cleanup goals in confirmatory soil and dry sediment samples (MKM, 2009). The specific activities included the following:

- Excavation and grading of an area including Pads 61 and 61A to achieve design grades for Firing Lane 1 to varied depths of up to approximately 6.5 ft bgs.
- Excavation and grading of soil berms associated with Pad 61 and the area of previous soil sampling station WBG-217 located south of Pad 61 to a depth of 4.5 ft bgs.
- Excavation of limited area overlapping Pad 61A to a depth of 1 ft below design grade, backfilled with clean soil to design grade.
- Excavation and backfill of limited area overlapping Pad 67 to a depth of 2 ft bgs.
- Excavation and grading of soil stockpile overlapping Pad 70 to ground level.

Following the removal action, the area of the final firing lane (Lane 1) of the Mark 19 Grenade Machinegun Range was transferred.

1.4 Planned Future Use of Winklepeck Burning Grounds

The OHARNG is proposing to construct a MPMG Range and GLR on the footprint of the existing Mark 19 Grenade Machinegun Range and other undeveloped portions of the WBG AOC. The current construction plan depicted in Figure 1-4 includes a total of 15 target arrays in the combined Mark 19 Grenade Machinegun and MPMG Range, a GLR, and a parking lot for the GLR. The planned future land use of WBG for a combined Mark 19 Grenade Machinegun Range, MPMG Range, and GLR will herein after be referred to as ‘National Guard Land Use,’ including in tables and figures.

A total of four firing lanes will be constructed for the MPMG Range overlapping Lanes 1 through 3 of the Mark 19 Grenade Machinegun Range. The firing point area for the MPMG Range is the same as for the Mark 19 Grenade Machinegun Range. The MPMG Range will include 15 target arrays ranging from 100 to 1,500 meters in distance and containing a combination of stationary infantry targets, moving infantry targets emplacements, and stationary armor targets. The target array bands are 10 meters (approximately 33 ft) wide. Targets are fully automated, and the event specific target scenario is computer driven and scored from the range operations center. Targets beyond 800 meters in distance will be battery powered/radio controlled. The range operating system is fully capable of providing immediate performance feedback to the using participants. Natural vegetation is required in parts of the target area to provide realistic natural obstacles for the using participants to negotiate.

2.0 Data Quality Objectives

As part of the facility-wide approach to environmental investigation activities at RVAAP, facility-wide DQOs have been developed per the requirements outlined in the *FSAP* (SAIC, 2001a). As stated in the *FSAP*, the DQO process is a tool to guide investigations at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites and will be incorporated to identify data gaps at WBG. The DQOs serve two major purposes: (1) to present the facility-wide approach to sampling at the installation, and (2) to present the process that will be used to develop AOC-specific sampling and analysis plans. The DQO process culminates in the reduction of uncertainty associated with decisions related to remedial design and response actions. Shaw will utilize the following steps to implement the DQO process:

1. Develop the conceptual site model (CSM)
2. State the problem
3. Identify decisions to be made
4. Define the study boundaries
5. Develop the decision rule (if/then)
6. Identify inputs to the decision (data uses and data needs)
7. Specify limits on uncertainty
8. Optimize the sample design

2.1 Conceptual Site Model

A CSM is the cornerstone for planning a field sampling effort. It reflects an understanding of the known or expected site conditions and serves as the basis for making decisions about sample locations, frequencies, and required analytes. A good CSM is inclusive of available information, incorporating the hydrogeologic features and other characteristics of the site that combine to define the problem to be addressed (e.g., location of buried waste, primary contaminants and their properties, contaminant transport pathways, and potential human exposure scenarios, etc.).

The CSM presented in the *FSAP* is applicable for use at WBG for this *DQO Report*. Site information that adds to the CSM for WBG is discussed in Sections 1.2.1 and 1.2.2 of this *DQO Report*. Operational information and analytical data collected during historical environmental investigations and removal actions at the site are further discussed in Section 3.0 of this *DQO Report*. This information has been used to refine the previously presented CSM as follows:

Soil: The exact source of some inorganics in soil at WBG are unknown (i.e., natural or anthropogenic). Contaminated soils within and adjacent to the former burning pads are potential

secondary sources of contamination to sediment, surface water, and groundwater. Contaminants may be released from soil and migrate in storm runoff either in dissolved phase or adsorbed to particulates and/or colloids. Contaminants may also leach from soils throughout the vadose zone to groundwater and, subsequently, migrate along flowpaths until discharging to surface streams near the AOC.

Sediment: Sediment within ditches and tributaries represents a receptor medium for contaminants eroded or leached from soils in source areas and transported by storm runoff. In addition, sediment may function as a transport mechanism considering that contaminants adsorbed to particulates may be mobilized by surface water flow. Operational data suggest that the ditches in the vicinity of former burn areas represent likely locations where contaminants may have accumulated through erosion and redeposition.

Surface Water: Surface water conveyances within WBG are intermittent. Modeling of potential surface water transport conducted in the Phase II RI using the Environmental Protection Agency (EPA) Storm Water Management Model indicated that potential contaminant migration off of the AOC is not expected to be a future problem. Biased sampling of sediment in the ditch flowing north out of WBG indicates that the drainage is not an exit point for contaminants.

2.2 *State the Problem*

A MPMG Range and GLR with associated parking areas are proposed to be constructed on the WBG AOC. Therefore, the AOC must be assessed to identify any sampling data gaps and address, as necessary, to facilitate the new proposed range construction. This document reviewed previous sampling activities at the WBG AOC and identified any additional areas that might require additional investigation as related to the future proposed ranges. There are no wet sediments at the WBG AOC. Surface water is not evaluated in this DQO Report. Groundwater is being evaluated separately as part of a facility-wide study and is removed from further consideration in this *DQO Report*.

2.3 *Identify Decisions to be Made*

The key decisions for investigations at RVAAP have been identified in Section 3.2.4 and in Table 3-1 of the *FSAP*. Additional investigation data, if necessary to finalize the decision process and determine whether additional response action is needed, would be required to satisfy the following data needs:

- The data are to be of sufficient quality to be legally defensible.
- The data are to be of sufficient quality and quantity to support screening assessments for human health and the environment.

- The data are to be of sufficient quality and quantity to support evaluation of the proposed future land use scenario.

2.4 Define Study Boundaries

The investigation area boundary for the WBG is the footprint of the proposed MPMG Range and GLR shown in Figure 1-4. This includes the firing point area, target array construction areas, GLR, and GLR parking.

2.5 Identify Decision Rules

Decision rules used to guide remediation decisions are provided in Section 3.2.6 of the *FSAP*. Application of the decision rules will result in the determination of the extent of releases at WBG. As stated in the *FSAP*, the purposes of assessing sampling data are to determine the type of contamination, to compare these data to the risk-based facility-wide CUGs for unrestricted land use or OHARNG use and to determine if further investigation is needed. The Phase I, II, and III RI reports characterized the nature of environmental impact at WBG. Two removal actions addressed the more contaminated surface and subsurface soils based on historical sampling results and collected and removed MEC debris in Mark 19 construction areas.

The historical sampling data, including removal action confirmation sample data, are now to be compared to more current CUGs for multiple receptors as identified in Section 3.0 to determine if the site has been adequately characterized for new uses. The current CUGs are the final risk-based CUGs identified for facility-wide application in the March 2010 Final *Facility-Wide Human Health Remediation Goals at the RVAAP* (SAIC, 2010), and are hereafter referred to as the Final FWCUGs. The Final FWCUGs to be used for comparison at WBG are the values for cancer and non-cancer effects for the Residential Farmer (Adult and Child) receptors and the three National Guard receptors – Dust/Fire Control Worker, Range Maintenance Soldier, and Trainee. The Residential Farmer (Adult and Child) receptors are required to be evaluated for the unrestricted land use scenario. The National Guard Trainee receptor is required to be included in the chemical of potential concern (COPC) evaluation. The National Guard Range Maintenance Soldier is required to be evaluated as the primary receptor for the planned future land use at WBG. Although the National Guard Range Maintenance Soldier receptor represents a more conservative exposure scenario, the National Guard Dust/Fire Control Worker receptor is included in the evaluation as an occasional receptor at WBG. The National Guard Range Maintenance Soldier receptor presented in the March 2010 Final FWCUGs document incorporates revised exposure assumptions (i.e., inhalation) from those used in prior evaluations of an equivalent receptor at WBG. The exposure assumptions used specifically for the risk assessment that was the basis for the 2008 ROD for WBG were different from those used in developing the facility-wide risk assessment. The resulting Final FWCUGs for the National Guard Range Maintenance Soldier are more conservative for select constituents and less

conservative for others compared to those used in prior evaluations of an equivalent receptor specifically at WBG.

Although the National Guard Range Maintenance Soldier is the primary receptor for the planned future land use at WBG, there are no Final FWCUGs for subsurface soil for this receptor. Therefore, the National Guard Trainee receptor is evaluated for subsurface soil as there are Final FWCUGs for subsurface soil for this receptor. However, the National Guard Trainee receptor may still be limited to the firing point area only during range operation because the basis for remediation design of previous removal actions did not account for the National Guard Trainee being present in the firing range itself. Decisions on the need for additional sampling to fill data gaps for subsurface soil or receptor evaluations in this media can be eliminated during development of a sampling plan and/or remedial action plan.

2.6 Identify Inputs to the Decision

Inputs to the decision process are the analytical results of historic environmental investigations and remedial actions and the revised CSM developed from field observations.

2.7 Specify Limits on Decision Error

Limits on decision errors are specified in Section 3.2.8 of the FSAP.

2.8 Optimize the Sample Design

The sample design and rationale for additional investigation at WBG is described in detail in Section 4.0 of this *DQO Report*. The intent of additional sampling and analysis at the site is to focus on the criteria identified in Section 3.2.9.1 of the *FSAP*. Areas proposed for future construction of the MPMG and GLR ranges represent specific focus areas for additional surface and subsurface sampling.

In order to accomplish the purposes of sampling for evaluation of proposed land use, biased sampling will be used. That is, areas where construction is proposed to occur (e.g., target arrays) or where land use activities would result in disturbance of contaminated media (e.g., GLR). At these locations, grid areas will be established and sample analysis will be conducted for the identified COPCs or COCs. Biased sampling will be most applicable to the surface soil areas where COPCs and COCs were previously identified at concentrations greater than the current RVAAP risk-based Final FWCUGs, where future construction will occur, and at subsurface soils beneath these surface soil areas.

3.0 *Data Evaluation*

This section presents the data evaluation methods and screening criteria used to identify COPCs and COCs for the media of concern at WBG. Identifying whether a contaminant is a COPC or COC depends upon what phase of the CERCLA process is being investigated and what decisions will be made using the Final FWCUGs. If the data is being evaluated to determine the presence or absence of contamination, nature and extent of contamination, characterization of contamination, sampling locations, or for other reasons where the data identifies potential contamination, then the initial evaluation step should be completed. The end result of the initial data screening process is a list of COPCs. The COPCs are typically identified during the RI phase. Once the COPCs are established and sampling has been completed so that the nature and extent of the contamination is known, the next step is to determine which of the COPCs are COCs. This is typically established in the feasibility study phase. The determination of the COCs consists of a screening of the chemical concentration to specific Final FWCUGs. However, unlike the COPC comparison, the COCs are determined by comparing the chemical concentration to different risk levels and potentially, for different receptors. Following any removal action, assurance that the media has been cleaned to the established Final FWCUGs for the COCs is verified through confirmation sampling (USACE, 2009).

Surface water is not considered as modeling indicated that erosional transport mechanisms are not expected to contribute substantial flux of contaminants to Sand Creek. There are no wet sediments at WBG. Groundwater is not considered since any wells in this area will ultimately be addressed on a facility-wide basis.

3.1 *Definition of Investigation and Confirmation Data Sets*

The surface soil, subsurface soil, and dry sediment data for WBG are divided into multiple data sets for use in this evaluation based on if the data are investigation or confirmation data. The division will determine which data are subject to COPC evaluation and which are subject to COC evaluation.

Data collected during the RIs as described in Section 1.3.1 are investigation data. Select areas at WBG were subject to removal actions in 2005 and 2008 that involved the removal of soils to address environmental contamination and grading in preparation for construction of target arrays. The analytical results for RI samples collected from areas of excavated or graded soil that was disposed offsite were removed from the data evaluation. Data points were only removed from the investigation data set if the entire sample interval depth was excavated and removed. The resulting investigation data set better represents current conditions at WBG. The approximate overlay of the RI sample locations, MEC removal areas, and soil removal areas are shown in

Figures 3-1a through d. The RI data set, less the results for samples collected during the RIs in areas of soil physically removed during the subsequent removal actions, is considered the investigation data set for use in determining COPCs at WBG. Thus, references to ‘investigation data’ used in this evaluation consist of the remaining RI investigation data.

Samples collected in excavations during and after the removal actions described in Section 1.3.2 are confirmation data. The confirmation data is used in determining COCs at WBG. References to ‘confirmation data’ used in this evaluation consist only of removal action data.

Further divisions of the investigation data and confirmation data sets are the result of the evaluations specific to future land use. Surface soil and subsurface soil are defined differently for the different receptors. Soil classifications for the Residential Farmer (adult and child) in the unrestricted land use scenario are 0 to 1 ft bgs for surface soil and 1 to 13 ft bgs for subsurface soil. Soil classifications for the National Guard Trainee (with digging) are 0 to 4 ft bgs for surface soil, also referred to as deep surface soil, and 4 to 7 ft bgs for subsurface soil. Therefore, the resulting data sets used in this evaluation consist of the following:

- For COPCs:
 - Surface Soil Investigation Data for Residential Farmer Land Use
 - Dry Sediment Investigation Data for Residential Farmer Land Use
 - Subsurface Soil Investigation Data for Residential Farmer Land Use
 - Deep Surface Soil Investigation Data for National Guard Land Use
 - Dry Sediment Investigation Data for National Guard Land Use
 - Subsurface Soil Investigation Data for National Guard Land Use
- For COCs:
 - Surface Soil Confirmation Data for Residential Farmer Land Use
 - Subsurface Soil Confirmation Data for Residential Farmer Land Use
 - Deep Surface Soil Confirmation Data for National Guard Land Use

Table summaries of the analytical results for detected constituents for surface, deep surface, and subsurface soil and dry sediment samples in the investigation and confirmation sample data sets are presented in tables at the end of the report.

3.2 Data Reduction and Screening

The general decision rules as identified in the *USACE RVAAP Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals* (USACE, 2009); hereafter, referred to as the *Position Paper*, and discussed further in this section, were applied to the data collected for

WBG. Quality control (QC) samples (e.g., blanks and field duplicates) were excluded from the screening data sets. Samples rejected in the validation process are also excluded from the screening data sets. Analytes having at least one detected value were included in the data reduction process.

3.2.1 Determination of the Chemicals of Potential Concern

Investigation data at WBG was evaluated to determine the presence or absence of contamination, nature and extent of contamination, characterization of contamination, and need for additional sample locations (if any). This data was evaluated in accordance with the initial evaluation step presented in the *Position Paper* to establish COPCs and characterize areas of contamination. This evaluation process for the investigation data consists of the following guidance:

1. The concentrations of inorganics were compared to the soil background values in the March 2010 *Final Facility-Wide Human Health Cleanup Goals at the RVAAP* (SAIC, 2010). If no background value was identified for a constituent in that document, a background value was obtained from the *Winklepeck Burning Grounds Phase II RI* (SAIC, 2001b). Concentrations of an inorganic constituent greater than its respective background value required it to be retained as a COPC for further evaluation. In the event an inorganic constituent did not have an established background value, any detected result for that constituent was considered to be greater than background.
2. Chemicals identified as essential nutrients (e.g., calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium) were screened out as long as they were: 1) present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and 2) toxic at very high doses (i.e., much higher than those that could be associated with contact at an AOC).
3. Chemicals meeting the less than 5 percent detected rule (i.e., frequency of detection) were eliminated from further consideration as a COPC; however, in order for this to occur, the chemical must have a statistically valid data set with a sample size of at least 20. The frequency of detection screening does not apply to site-related contaminants such as propellants and explosives that were retained as COPCs through the evaluation process.
4. To establish COPCs, chemicals that had not been eliminated to this point were evaluated using the following process:
 - The Final FWCUGs developed for the Residential Farmer Adult and Child and the OHARNG human health receptors for each chemical were used. The OHARNG receptors include the National Guard Dust/Fire Control Worker, National Guard Range Maintenance Soldier, and the National Guard Trainee for deep surface soil (0 to 4 ft bgs) and dry sediment and only the National Guard Trainee for subsurface soil (4 to 7 ft bgs). The Final FWCUGs are currently presented in the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP, Ravenna, Ohio* (SAIC, 2010). If there was no Final FWCUGs developed for a particular chemical, then the EPA Regional Screening Levels (RSLs) for the Region 9 Residential Receptor developed in December 2009 was used. Where the RSL was based on a

non-cancer endpoint, the RSL was divided by 10 for a resulting Hazard Quotient (HQ) of 0.1. If neither the Final FWCUG nor the RSL was available, then the contaminant was retained as a COPC for further evaluation. COPCs that were retained because they lack Final FWCUGs or RSLs will be further assessed in the Feasibility Study (FS) stage of the CERCLA process.

- The Final FWCUGs at the 1×10^{-6} cancer risk level and non-carcinogenic risk value termed HQ using the 0.1 risk value for each of the receptors were selected for the investigation data.
- Carcinogenic and non-carcinogenic risk values for each chemical for each receptor were reported.
- A comparison of the selected Final FWCUG to the Exposure Point Concentration (EPC) was completed. The EPC was either the 95 percent upper confidence limit (UCL) of the mean for each chemical concentration or the maximum value detected, depending upon whichever value was the lowest. In comparisons where the 95 percent UCL could not be determined, the maximum concentration of the chemical was compared to the appropriate Final FWCUGs. The 95 percent UCL was calculated using the most recent version of the software program ProUCL (version 4.00.04) released May 2009. The raw output from this program is included in Appendix A.
- The chemical was retained as a COPC for the investigation data if the EPC exceeded the most stringent risk value for the Residential Farmer Adult and Child and/or the OHARNG receptors for either one of the 1×10^{-6} carcinogenic value and the non-carcinogenic risk value termed HQ using the 0.1 risk value. Detected concentrations were compared to the larger of the Final FWCUGs or background values for inorganics in cases where the background value was greater than the Final FWCUGs.

3.2.2 Determination of the Chemicals of Concern

The identification of COCs was performed for contaminants detected in confirmation samples collected following removal actions previously conducted at the WBG. The COCs were evaluated to different risk levels than were evaluated for the COPCs and for the actual intended OHARNG human health receptors in addition to the Residential Farmer Adult and Child (USACE, 2009). The determination of COCs for WBG confirmation data was performed as follows:

1. The Final FWCUGs for the Residential Farmer Adult and Child receptors and the receptor for the planned future land use by the OHARNG were selected using the 1×10^{-5} carcinogenic value and non-carcinogenic risk value termed HQ using the 1.0 risk value.
2. Carcinogenic and non-carcinogenic risk values for all receptors and critical effect and target organ for each of the non-carcinogenic risk values were reported.

3. A comparison of the Final FWCUG to the EPC was completed similarly as discussed for COPC evaluation in Section 3.1.1.
4. For carcinogens and non-carcinogens, the chemical-specific concentrations were compared to the target risk Final FWCUG using the Sum of Ratios method presented in the *Position Paper*.
5. The chemical was retained as a COC if (1) the EPC exceeded the most stringent risk value for either the Adult Residential Farmer, Child Residential Farmer, and/or the OHARNG planned future use receptor, for either one of the 1×10^{-5} carcinogenic value and the non-carcinogenic risk value termed HQ using the 1.0 risk value; and/or (2) the Sum of Ratios for all carcinogens and all non-carcinogens that may affect the same organ were greater than 1 and the chemical contributes at least 10 percent to the sum. COCs that were retained because they lack Final FWCUGs will be further assessed in the FS stage of the CERCLA process.

The Final FWCUGs for each of the COCs identified through the aforementioned process are the actual remediation levels unless there are additive effects. In some instances, there may be a risk management analysis such as a “Weight of Evidence” approach that may allow for a COC to be reassessed; however, any re-evaluation of a COC and the proposed approach will require approval from USACE and Ohio EPA. The use of the Sum of Ratios approach is intended to account for additive effects from exposure to multiple chemicals that can cause the same effect (e.g., cancer) or affect the same target organ. The Sum of Ratios approach compares the chemical concentration (e.g., mean concentration or concentration in confirmation samples, the EPC) of the COC to the individual Final FWCUG to determine a ratio of acceptable risk (USACE, 2009).

3.2.3 Data Presentation

In addition to screening the data to the Final FWCUGs to identify COPCs and COCs, the sample locations for the detections at concentrations greater than the Final FWCUGs are reviewed with the areas specifically targeted for future land use. Final FWCUGs were not developed for certain chemicals. These chemicals that lack either Final FWCUGs or RSLs were identified as COPCs and COCs because there is no value for comparison. In the discussion of data gaps in the summary of this DQO Report, chemicals identified as COPCs for which neither Final FWCUGs, RSLs, nor background values have been developed are evaluated qualitatively in terms of their distribution, frequency of detection, or other chemical characteristics. Chemicals lacking Final FWCUGs are evaluated using RSLs or background values for the purposes of refining the data gap analysis. Such COPCs or COCs will require further quantitative evaluation prior to finalization of a sampling or remediation plan in subsequent phases of the CERCLA process that will follow this DQO report. This may occur as part of the FS or another risk evaluation step as agreed upon by stakeholders.

Data summary statistics and screening results for the COPCs and COCs in surface soil, deep surface soil, dry sediment, and subsurface soils at WBG are presented in the following sections. Screened constituents and identified COPCs and COCs are addressed in the text of this section. For each media, screening results are presented in data summary tables at the end of the report. Output from the software program used to calculate the 95 percent UCLs used in the tables are presented in Appendix A.

3.3 Data Evaluation for COPCs

As identified in Section 3.1, the investigation data set used for determining COPCs includes surface soils, deep surface soils, dry sediment, and subsurface soils. The COPCs identified through the screening process presented in Section 3.1.1 will be evaluated against the human health receptors as required per the Position Paper (USACE, 2009) and as directed by USACE. These human health receptors include the unrestricted use scenarios for the Residential Farmer (adult and child) and the OHARNG use scenarios for the Dust/Fire Control Worker, Range Maintenance Soldier, and the Trainee.

In addition to identifying the COPCs, this evaluation also identifies the locations where COPCs were detected. However, in the case of areas subject to the 2005 MEC removal action, the locations are not necessarily where the station is on the site plan. The 2005 MEC removal action resulted in a mixing of soil within a given area as the soil was excavated, sifted for MEC removal, and returned to the excavation. Analytical results of samples collected during the RIs from the areas of future excavations prior to the actual MEC removal action are still applicable in the investigation data set for characterizing potential environmental contamination in the soil. However, the original sample locations are no longer valid as single physical points within a given excavation area. Therefore, the analytical results from RI samples collected from MEC removal action soils are included in the investigation data set and this data gap analysis for identifying COPCs but are applied to larger areas when discussing physical locations of detections and data gaps. Results for soil samples collected from locations that overlap 2005 MEC removal action areas as depicted on the figures, do not apply to the top 1 foot of soil (i.e., up to 1 ft bgs) at that specific sample location as a result of the soil mixing.

Contaminants identified as COPCs are presented in Tables 3-1 through 3-6 for surface soils, deep surface soils, dry sediment, and subsurface soils. Output from the software program used to calculate the 95 percent UCLs used in the tables are presented Appendix A.

3.3.1 Surface Soil and Deep Surface Soil Investigation Data

The following paragraphs provide a narrative summary of the surface soil and deep surface soil investigation data where concentrations are greater than the Final FWCUGs (and background values for inorganics). Data summary statistics and screening results to identify COPCs in the

surface and deep surface soil investigation data sets are presented in Table 3-1 for the Residential Farmer receptors and Table 3-2 for the OHARNG receptors, respectively. A comparison of the COPCs retained to the unrestricted land use facility-wide cancer and non-cancer risk Final FWCUGs for the Residential Farmer (adult and child) and OHARNG receptors, or RSLs where applicable, is also presented in Tables 3-1 and 3-2. These tables are provided at the end of the report. Output from the software program used to calculate the 95 percent UCLs used in Tables 3-1 and 3-2 are presented in Appendix A.

3.3.1.1 Inorganics

A total of 25 inorganic analytes were detected in multiple surface and deep surface soil samples collected at WBG in the investigation data set. Five of these inorganic analytes (calcium, iron, magnesium, potassium, and sodium) are considered to be essential nutrients and, thus, were not retained in the COPC evaluation. Background values have not been developed for cadmium, hexavalent chromium, cyanide, silver, or thallium; therefore, these constituents were retained as COPCs for comparison to Final FWCUGs. The maximum detections of the other 15 inorganic analytes were greater than the established background values. The frequency of detection screening does not result in data reduction for the investigation data set.

The retained inorganic COPCs with developed Final FWCUGs in surface and deep surface soils were screened against the Final FWCUGs for the Residential Farmer (adult and child) and OHARNG Land Use Scenarios, respectively. The inorganic constituent was retained as a COPC for further evaluation at the site if the EPC was greater than the Final FWCUGs. No Final FWCUGs have been developed for beryllium, cyanide, lead, or selenium. The background values or RSLs were used as alternate screening criteria where no Final FWCUGs have been developed.

The discussion below contains a brief summary of the nature and extent for each of the inorganic COPCs where the EPCs were greater than the screening criteria for the Residential Farmer or OHARNG receptors. A summary of the accumulated COPCs per sample location that were retained following comparison to the screening criteria for surface and deep surface soils is presented in Tables 3-1 and 3-2 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, inorganic COPCs identified for the Residential Farmer (adult) consist of cadmium and lead. Cadmium was detected at concentrations greater than the background value and the Final FWCUGs in 8 of 246 surface soil samples. Four of the detections of cadmium in surface soil at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) occurred at sampling stations located at Pad 38 with 2 in the 0 to 1 ft bgs and 2 in the 0 to 2 ft bgs sample interval and the other four occurred in the 0 to 1 ft bgs sample interval at Pads 37, 58, 60, and north of Pad 45 as shown in Figure 3-2. Lead was the

most frequently detected of the inorganic COPCs for the Residential Farmer (adult) with concentrations greater than the RSL (no Final FWCUGs for lead) and the background value in 90 of the 247 surface soil samples analyzed from both the 0 to 1 ft bgs and 0 to 2 ft bgs sample intervals. The locations of surface soil samples analyzed for lead and the relative detected concentration is shown in Figure 3-3.

Residential Farmer (Child)

In addition to the inorganic COPCs identified for the Residential Farmer (adult), antimony and copper were identified as inorganic COPCs for the Residential Farmer (child). The distributions of cadmium and lead in surface soil are consistent with that reported for the Residential Farmer (adult) with the addition of 21 surface soil samples where cadmium was detected at concentrations greater than Final FWCUGs for Residential Farmer (child). Three of those 21 were from the 0 to 2 ft bgs sample interval and the remainder were from the 0 to 1 ft bgs sample interval. The locations of surface soil samples analyzed for antimony (0 to 1 ft bgs) and copper (0 to 1 ft bgs) and the relative detected concentrations are shown in Figures 3-4 and 3-5, respectively.

National Guard Dust/Fire Control Worker

The only inorganic COPC in deep surface soil (0 to 4 ft bgs) identified for the National Guard Dust/Fire Control Worker is lead. The distribution of lead in deep surface soil is consistent with that reported for the Residential Farmer (adult) for the 0 to 1 and 0 to 2 ft bgs sample intervals with an additional 7 samples from the 2 to 4 ft bgs sample interval. There is no Final FWCUG for lead; therefore, lead was evaluated against the Region 9 RSL. The construction footprints for the proposed firing range components do overlap the locations of deep surface soil samples where lead was detected at concentrations greater than the RSL and the background value in the areas of Pads 58 and 59 for the 0 to 1 and 0 to 2 ft bgs sample intervals and in the area of Pad 59 for the 2 to 4 ft bgs sample interval as shown in Figure 3-6. Locations of deep surface soil samples where lead was detected at concentrations greater than the RSL and background value are located adjacent to the construction footprints in the areas of Pads 45, 58, 59, and 60 for the 0 to 1 and 0 to 2 ft bgs sample intervals and in the areas of Pads 58, 60 and south of Pad 61 for the 2 to 4 ft bgs sample interval as shown in Figure 3-6.

National Guard Range Maintenance Soldier

The only inorganic COPC in deep surface soil (0 to 4 ft bgs) identified for the National Guard Range Maintenance Soldier is lead. The distribution of lead in deep surface soil is consistent with that reported for the National Guard Dust/Fire Control Worker.

National Guard Trainee

In addition to the inorganic COPC in deep surface soil (0 to 4 ft bgs) identified for the National Guard Range Maintenance Soldier, barium, cadmium, and hexavalent chromium were identified

as inorganic COPCs for the National Guard Trainee. The distribution of lead in deep surface soil is consistent with that reported for the National Guard Dust/Fire Control Worker and National Guard Range Maintenance Soldier.

- Based on the distribution of barium in deep surface soil shown in Figure 3-7, the construction footprints for the proposed firing range components do not overlap the locations of deep surface soil samples where barium was detected at concentrations greater than the Final FWCUGs for the National Guard Trainee. Locations of deep surface soil samples where barium was detected at concentrations greater than the Final FWCUGs for the National Guard Trainee are located adjacent to the construction footprints in the areas of WBG-199 (0 to 1 ft bgs) at Pad 58 and WBG-218 (2 to 4 ft bgs) south of Pad 61.
- Based on the distribution of cadmium in deep surface soil shown in Figure 3-8, the construction footprints for the proposed firing range components do not overlap the locations of deep surface soil samples where cadmium was detected at concentrations greater than the Final FWCUGs for the National Guard Trainee.
- Hexavalent chromium was detected at concentrations greater than the Final FWCUGs for the National Guard Trainee in 14 of the 40 deep surface soil samples collected at WBG. Each of the detections occurred in samples collected from the 0 to 1 ft bgs sample interval. Based on the distribution of hexavalent chromium in deep surface soil shown in Figure 3-9, the construction footprints for the proposed firing range components overlap the locations of deep surface soil samples where hexavalent chromium was detected at concentrations greater than the Final FWCUGs for the National Guard Trainee in the areas of Pad 58 (WBG-200 at 0 to 1 ft bgs).

3.3.1.2 Explosives and Propellants

Seventeen explosive or propellant analytes were detected in multiple surface and deep surface soil samples collected at WBG in the investigation data set. The explosive and propellant COPCs with developed Final FWCUGs in surface and deep surface soils were screened against the Final FWCUGs for the Residential Farmer (adult and child) and OHARNG Land Use Scenarios, respectively. The explosive or propellant constituent was retained as a COPC for further evaluation at the site if the EPC was greater than the Final FWCUGs, or where no Final FWCUGs have been developed, the Region 9 Residential RSLs. Final FWCUGs for the Residential Farmer (adult) have not been developed for the explosive and propellant constituents 3-nitrotoluene, nitrobenzene, nitrocellulose, nitroguanidine, and tetryl.

The discussion below contains a brief summary of the nature and extent for each of the explosive or propellant COPCs where the EPCs were greater than the screening criteria for the Residential Farmer or OHARNG receptors. A summary of the accumulated COPCs per sample location that were retained following comparison to the screening criteria for surface and deep surface soils is presented in Tables 3-1 and 3-2 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, explosive COPCs identified because EPCs were greater than the Final FWCUGs for the Residential Farmer (adult) consist of 2,4,6-trinitrotoluene (TNT) and RDX. TNT was detected at concentrations greater than the most restrictive Final FWCUG for the Residential Farmer (adult) of 21.1 milligrams per kilogram (mg/kg) in 9 of 130 surface soil samples collected in the vicinity of Pads 38, 59, 62, 66, and 67. Four of the 9 samples were collected from the 0 to 2 ft bgs sample interval and the remainder were collected from the 0 to 1 ft bgs sample interval. RDX was detected at concentrations greater than the most restrictive Final FWCUG for the Residential Farmer (adult) of 11.5 mg/kg in 5 of 130 surface soil samples collected in the vicinity of Pads 62, 66, and 67. The three samples at Pad 66 were collected from the 0 to 1 ft bgs sample interval and the two at Pad 62 and in the vicinity of Pad 67 were collected from the 0 to 2 ft bgs sample interval. For the unrestricted land use scenario, explosive COPCs identified because EPCs were greater than the Residential RSLs consist of 3-nitrotoluene. 3-Nitrotoluene was detected in 3 surface soil samples from the 0 to 1 ft bgs sample interval out of 130 samples analyzed but only one occurrence was greater than the Residential RSL of 0.61 mg/kg in the surface soil sample collected from station WBGss-168 at Pad 66. The sample locations and the relative concentrations of explosives in surface soil samples are depicted in Figure 3-10.

Residential Farmer (Child)

Explosive and propellant COPCs identified for the Residential Farmer (child) are the same as those for the Residential Farmer (adult). The distributions of TNT, 3-nitrotoluene, and RDX in surface soil for this receptor are consistent with that reported for the Residential Farmer (adult) with the addition of three other samples collected from Pads 38 and 68 where the concentrations of TNT were greater than the most restrictive Final FWCUG for the Residential Farmer (child) of 3.65 mg/kg. The 3 additional samples were collected from the 0 to 1 ft bgs sample interval. The sample locations and the relative concentrations of explosives in surface soil samples are depicted in Figure 3-10.

National Guard Dust/Fire Control Worker

3-Nitrotoluene was the only explosive or propellant COPC identified in deep surface soil for the National Guard Dust/Fire Control Worker and the distribution of 3-nitrotoluene is consistent with that reported for the Residential Farmer (adult and child). The eastern edge of Pad 66, where the one detection of 3-nitrotoluene at a concentration greater than the Residential RSL occurred at the 0 to 1 ft bgs sample interval, does not overlap proposed target arrays. No additional explosive or propellant COPCs were identified for the National Guard Dust/Fire Control Worker because EPCs were less than the Final FWCUGs. The sample locations and the relative concentrations of explosives in deep surface soil samples are depicted in Figure 3-11.

National Guard Range Maintenance Soldier

Explosive and propellant COPCs in deep surface soil identified for the National Guard Range Maintenance Soldier are the same as those for the National Guard Dust/Fire Control Worker with the addition of RDX. The distribution of 3-nitrotoluene is consistent with that reported for the National Guard Dust/Fire Control Worker.

RDX was detected at concentrations greater than the most restrictive Final FWCUG for the National Guard Range Maintenance Soldier of 1,376 mg/kg in 4 of 162 deep surface soil samples collected in the vicinity of Pads 62, 66, and 67. RDX was detected in the deep surface soil samples collected from WBGss-070 (0 to 2 ft bgs) west of Pad 67 and from two locations at Pad 66 (WBGss-389 and WBGss-390, both 0 to 1 ft bgs). These three stations were located within areas that were previously cleared of MEC to 1 ft bgs. However, these data points were retained in this evaluation as, during the 2005 MEC clearance activities, the soil was returned to the excavation after sifting for MEC. The fourth detection of RDX occurred in a surface soil sample collected from WBGss-062 (0 to 2 ft bgs) at Pad 62. The construction footprints for the proposed firing range components do not overlap these four sample locations at Pads 62, 66, and 67. The sample locations and the relative concentrations of RDX in deep surface soil samples are depicted in Figure 3-11.

National Guard Trainee

Explosive and propellant COPCs in deep surface soil identified for the National Guard Trainee, and the distributions thereof, are the same as those for the National Guard Range Maintenance Soldier with the addition of TNT.

TNT was detected at concentrations greater than the most restrictive Final FWCUG for the National Guard Trainee of 249 mg/kg in 5 of 162 deep surface soil samples collected in the vicinity of Pads 38, 66, and 67. Each of the five detections were in deep surface soil samples collected from stations located within areas that were previously cleared of MEC to 1 ft bgs (WBGss-326 [0 to 1 ft bgs] at Pad 38, WBGss-069 [0 to 2 ft bgs] and WBGss-168 [0 to 1 ft bgs] at Pad 66, WBGss-070 [0 to 2 ft bgs] west of Pad 67, and WBG-252 [2 to 4 ft bgs] at Pad 67). However, these data points were retained in this evaluation as, during the 2005 MEC clearance activities, the soil was returned to the excavation after sifting for MEC. The four sampling locations do not overlap the construction footprint of any proposed firing range component. The sample locations and the relative concentrations of TNT in deep surface soil samples are depicted in Figure 3-11.

3.3.1.3 SVOCs

Twenty-three SVOC analytes were detected in multiple surface and deep surface soil samples collected at WBG in the investigation data and 22 were initially retained as COPCs. The

frequency of detection screening resulted in data reduction for the investigation data set through the elimination of N-nitrosodiphenylamine. N-nitrosodiphenylamine was detected in 2 of 42 samples both at Pad 38, and as this is less than 5 percent frequency, this constituent was not retained as a COPC.

The SVOC COPCs with developed Final FWCUGs in surface and deep surface soils were screened against the Final FWCUGs for the Residential Farmer (adult and child) and OHARNG Land Use Scenarios, respectively. The SVOC constituent was retained as a COPC for further evaluation at the site if the EPC was greater than the Final FWCUGs, or where no Final FWCUGs have been developed, the Region 9 Residential RSLs. Final FWCUGs for the Residential Farmer (adult) have not been developed for the SVOCs acenaphthene, anthracene, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, and N-nitrosodiphenylamine. Where no Final FWCUGs or Residential RSLs have been developed (e.g., benzo(ghi)perylene and phenanthrene), the constituent is automatically retained as a COPC for further evaluation. Development of CUGs for retained COPCs for which Final FWCUGs have not previously been identified would take place in the Feasibility Study (FS) stage of the CERCLA process.

The discussion below contains a brief summary of the nature and extent for each of the SVOC COPCs where the EPCs were greater than the screening criteria for the Residential Farmer or OHARNG receptors. A summary of the accumulated COPCs per sample location that were retained following comparison to the screening criteria for surface and deep surface soils is presented in Tables 3-1 and 3-2 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, SVOC COPCs identified because EPCs were greater than the Final FWCUGs for the Residential Farmer (adult) consist of 2,4-dinitrotoluene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. SVOC COPCs identified because neither Final FWCUGs for the Residential Farmer (adult) nor Residential RSLs have been developed consist of benzo(ghi)perylene and phenanthrene. SVOC COPCs were detected at concentrations greater than the screening criteria in surface soil samples (0 to 1 and 0 to 2 ft bgs) in the area of Pads 8, 37, 38, 58, 59, 60, 66, and 70 and Building 4301. The distribution of SVOC COPCs in surface soil where concentrations are greater than the screening criteria (i.e., Final FWCUGs or RSL) is shown in Figure 3-12.

Residential Farmer (Child)

SVOC COPCs identified for the Residential Farmer (child) are the same as those for the Residential Farmer (adult) less benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. The distributions of SVOC COPCs in surface soil for this receptor are consistent with that reported for the Residential Farmer (adult) as shown in Figure 3-12.

National Guard Dust/Fire Control Worker

SVOC COPCs in deep surface soil for the National Guard Dust/Fire Control Worker consist of benzo(ghi)perylene and phenanthrene. No Final FWCUGs or RSLs are identified for these compounds; therefore, they are retained as COPCs. The distributions of benzo(ghi)perylene and phenanthrene in deep surface soil are consistent with those reported for surface soil for the Residential Farmer (adult and child) with the addition of one sample station for benzo(ghi)perylene at WBGso-190 (2 to 4 ft bgs) at Pad 70 and three for phenanthrene at WBGso-055 (2 to 4 ft bgs) and WBG-210 (2 to 4 ft bgs) at Pad 59 and WBGso-190 (2 to 4 ft bgs) at Pad 70. As shown in Figure 3-13, only sample locations WBGso-055 (2 to 4 ft bgs) and WBG-210 (2 to 4 ft bgs) at Pad 59 overlap the construction footprint of target arrays. No other sample locations where SVOC COPC concentrations were greater than the comparison criteria (i.e., Final FWCUGs or RSL) overlap the construction footprint of target arrays or GLR components.

National Guard Range Maintenance Soldier

In addition to the SVOC COPCs identified for the National Guard Dust/Fire Control Worker, benzo(a)pyrene was identified as a COPC for the National Guard Range Maintenance Soldier because the EPC was greater than the Final FWCUG. The distributions of benzo(ghi)perylene and phenanthrene in deep surface soil for this receptor are consistent with that reported for the National Guard Dust/Fire Control Worker. Benzo(a)pyrene was detected at concentrations greater than the Final FWCUG for the National Guard Range Maintenance Soldier in deep surface soil samples collected from stations WBGss-388 (0 to 1 ft bgs) and WBGss-131 (0 to 1 ft bgs) at Pad 66, WBGss-191 (0 to 1 ft bgs) at Pad 70, WBG-261 (0 to 1 ft bgs) at Building 4301, and WBGso-190 (2 to 4 ft bgs) at Pad 70. None of these stations overlap the construction footprint of the proposed firing range or GLR components. The distribution of SVOC COPCs in deep surface soil where concentrations are greater than the comparison criteria (i.e., Final FWCUGs or RSL) is shown in Figure 3-13.

National Guard Trainee

SVOC COPCs identified for the National Guard Trainee receptor, and the distributions thereof, are the same as those for the National Guard Dust/Fire Control Worker.

3.3.1.4 VOCs

Nine VOC analytes were detected in multiple surface and deep surface soil samples collected at WBG in the investigation data including 1,2-dimethylbenzene, benzene, chloroform, dimethylbenzene, ethylbenzene, methylene chloride, styrene, toluene, and trichloroethene. Acetone was also detected in 2 deep surface soil samples from the 2 to 4 ft bgs sample interval. The frequency of detection screening resulted in data reduction for the surface soil investigation data set for the Residential Farmer land use as benzene, dimethylbenzene, ethylbenzene,

methylene chloride, styrene, and trichloroethene were detected at 5 percent frequency and were not retained for further evaluation. The frequency of detection screening resulted in data reduction for the deep surface soil investigation data set as benzene, styrene, and trichloroethene were detected at 5 percent frequency and were not retained for further evaluation. Final FWCUGs have not been developed for VOCs so the EPCs are compared to the RSLs. The EPCs for each of the VOCs detected are less than their respective RSLs, thus, there are no VOC COPCs for WBG.

3.3.1.5 Pesticides and PCBs

The discussion below contains a brief summary of the nature and extent of pesticide and PCB COPCs for the Residential Farmer or OHARNG receptors. A summary of the accumulated COPCs per sample location that were retained following comparison to the screening criteria for surface and deep surface soil is presented in Tables 3-1 and 3-2 at the end of the report.

Residential Farmer Receptors

Two pesticide analytes (dieldrin and heptachlor epoxide) and one PCB analyte (PCB-1254) were detected in surface soil samples (0 to 1 and 0 to 2 ft bgs) collected at WBG in the investigation data set. The frequency of detection screening does not apply for data reduction as only 14 surface soil samples were subject to pesticide and PCB analyses. Dieldrin was detected in two samples and heptachlor epoxide and PCB-1254 were detected in one sample each.

The concentrations of dieldrin and heptachlor epoxide detected in surface soil were less than the Final FWCUGs for the Residential Farmer receptors, and, thus, neither dieldrin nor heptachlor epoxide are not retained for further evaluation as COPCs.

The concentration of PCB-1254 detected in surface soil was greater than the Final FWCUGs for the Residential Farmer (child) and less than the Final FWCUGs for the Residential Farmer (adult). Thus, PCB-1254 is identified as a COPC for the Residential Farmer (child) scenario. PCB-1254 was detected in one surface soil sample collected from WBG-261 at 0.14 mg/kg. The non-carcinogenic Final FWCUG for the Residential Farmer (child) is 0.12 mg/kg. This sample station is located on the eastern perimeter of the WBG on the north side of Building 4301 shown on Figure 3-1d.

OHARNG Receptors

Three pesticide analytes (dieldrin, endrin ketone, and heptachlor epoxide) and one PCB analyte (PCB-1254) were detected in deep surface soil samples (0 to 4 ft bgs) collected at WBG in the investigation data. The frequency of detection screening does not apply for data reduction as only 16 deep surface soil samples were subject to pesticide and PCB analyses. Dieldrin was detected in two samples and endrin ketone, heptachlor epoxide, and PCB-1254 were detected in one sample each.

The concentrations of dieldrin, heptachlor epoxide, and PCB-1254 detected in deep surface soil were less than the Final FWCUGs for the OHARNG receptors, and, thus, neither dieldrin, heptachlor epoxide, nor PCB-1254 are not retained for further evaluation as COPCs.

Endrin ketone was detected in the deep surface soil sample collected from WBG-210 (2 to 4 ft bgs) at Pad 59 shown in Figure 3-1a. There are no Final FWCUGs or an RSL for endrin ketone. Thus, endrin ketone is retained as a COPC for further evaluation in deep surface soil. WBG-210 at Pad 59 is located within the construction footprint for the proposed firing range components.

3.3.2 Dry Sediment Investigation Data

Based on the conceptual model, sediment is both a receptor for contaminants in surface soil runoff and as a transporter of contaminants within drainage ditches. The 2008 removal action addressed select areas of contamination in surface soil for the planned future land use as a Mark 19 firing range thereby reducing the potential future contribution of contaminants to sediment in the drainage ditches. However, sediment within the drainage ditches was not addressed by these remedial activities and surface soil transport will continue to occur.

A total of 19 dry sediment samples (0 to 0.5 ft bgs) were collected from separate locations within ditches and tributaries within the AOC as shown in Figures 3-1a through d. Dry sediment samples were collected to characterize potential impact associated with site run-off, if any. Dry sediment samples were collected for analysis of explosives, propellants, target analyte list (TAL) metals, hexavalent chromium, cyanide, and organic compounds including VOCs, SVOCs, PCBs, and pesticides. Not all samples were subject to all analyses. Five (5) dry sediment samples were analyzed for SVOCs, 17 for explosives and propellants, and 4 for pesticides and PCBs. The following paragraphs provide a narrative summary of the dry sediment sample results where concentrations are greater than the Final FWCUG screening levels for surface soil. The locations where the dry sediment samples were collected were not subject to either the 2005 or 2008 removal actions conducted at WBG.

Data summary statistics and screening results to identify COPCs in the dry sediment investigation data set are presented in Tables 3-3 and 3-4. A comparison of the COPCs retained to the unrestricted land use facility-wide cancer and non-cancer risk Final FWCUGs for dry sediment for the Residential Farmer (adult and child) and OHARNG receptors, or RSLs where applicable, is also presented in Tables 3-3 and 3-4. These tables are provided at the end of the report. Output from the software program used to calculate the 95 percent UCLs used in Tables 3-3 and 3-4 are presented in Appendix A.

3.3.2.1 Inorganics

Residential Farmer (Adult)

There are no inorganic COPCs identified in dry sediment for the Residential Farmer (adult).

Residential Farmer (Child)

The only inorganic COPC identified in dry sediment for the Residential Farmer (child) is thallium. Thallium was detected at concentrations greater than the background value and the most restrictive Final FWCUG for the Residential Farmer (child) in dry sediment samples collected from WBGsd-080 (0 to 0.5 ft bgs) and WBGsd-083 (0 to 0.5 ft bgs). The sediment sampling locations are shown on Figure 3-1c. WBGsd-080 is located in the drainage channel south of Pad 52. WBGsd-083 is located in the drainage channel north of Pallet Road E East between Pads 67 and 68.

National Guard Dust/Fire Control Worker

There are no inorganic COPCs identified in dry sediment for the National Guard Dust/Fire Control Worker.

National Guard Range Maintenance Soldier

There are no inorganic COPCs identified in dry sediment for the National Guard Range Maintenance Soldier.

National Guard Trainee

The only inorganic COPC identified in dry sediment for the National Guard Trainee is hexavalent chromium. Hexavalent chromium was detected at a concentration greater than the Final FWCUG for the National Guard Trainee (no background for hexavalent chromium) in the dry sediment sample collected from WBG-294 (0 to 0.5 ft bgs). WBG-294 is located in the drainage channel north of Pad 60 and Pallet Road E West as shown on Figure 3-1a.

The construction footprint of the proposed target arrays, GLR, and GLR parking do not overlap locations where sediment samples were collected. However, the drainage channels do receive runoff from the surface soils within WBG.

3.3.2.2 Explosives and Propellants

There are no explosive or propellant COPCs identified in dry sediment for the Residential Farmer or OHARNG receptors.

3.3.2.3 SVOCs

Residential Farmer (Adult)

The concentrations of SVOCs detected in dry sediment samples were less than the applicable screening criteria with the exception of one detection each of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, and phenanthrene. Neither Final FWCUGs nor RSLs have been defined for benzo(ghi)perylene and phenanthrene. The five SVOCs were detected in one sediment sample collected at station WBGsd-156(d) (0 to 0.5 ft bgs). WBGsd-156(d) is located in the drainage channel southeast of Pad 70 and northwest of Pad 56 as shown on Figure 3-1c.

Residential Farmer (Child)

SVOC COPCs in dry sediment for the Residential Farmer (child) consist of benz(a)anthracene, benzo(ghi)perylene, and phenanthrene. The distribution of these SVOC COPCs is as described for the Residential Farmer (adult).

National Guard Dust/Fire Control Worker

SVOC COPCs in dry sediment for the National Guard Dust/Fire Control Worker consist of benzo(ghi)perylene and phenanthrene. The distribution of these SVOC COPCs is as described for the Residential Farmer (adult).

National Guard Range Maintenance Soldier

SVOC COPCs in dry sediment for the National Guard Range Maintenance Soldier are consistent with those described for the Residential Farmer (child).

National Guard Trainee

SVOC COPCs in dry sediment for the National Guard Trainee are consistent with those described for the National Guard Dust/Fire Control Worker.

3.3.2.4 Pesticides and PCBs

No pesticides were detected in dry sediment. There are no PCB COPCs identified in dry sediment for the Residential Farmer or OHARNG receptors.

3.3.2.5 VOCs

No VOCs were detected at concentrations greater than the RSLs (no Final FWCUGs for VOCs) in dry sediment samples for either the Residential Farmer or OHARNG receptors.

3.3.3 Subsurface Soil Investigation Data

Prior investigations of subsurface soils focused on the areas of the burn pads. A total of 95 subsurface soil samples were collected for analysis of explosives, TAL metals, hexavalent chromium, cyanide, and organic compounds including VOCs, SVOCs, PCBs, and pesticides. Not all samples were subject to all analyses. Subsurface soil samples were collected at up to 2-ft depth intervals to a maximum depth of 10 ft bgs. The following paragraphs provide a narrative summary of the subsurface soil sample results in comparison to the screening criteria for COPCs.

Select areas at WBG were subject to removal action in 2005 and 2008 involving the removal of soils to address environmental contamination and grading in preparation for construction of target arrays. The analytical results for samples collected from areas of excavated soil were removed from the data gap analysis. The resulting data set better represents current conditions at WBG. The approximate overlay of the RI subsurface soil sample locations and soil removal areas are shown in Figures 3-1a through d.

The planned future reuse of WBG by OHARNG is as a multi-purpose machinegun firing range and GLR and the intended future use receptor at WBG will be the National Guard Range Maintenance Soldier. At the direction of USACE, the National Guard Trainee will be evaluated as a human receptor for subsurface soils at the WBG (4 to 7 ft bgs) since subsurface soil Final FWCUGs have not been developed for Range Maintenance Soldier at this time.

Data summary statistics and screening results to identify COPCs in the subsurface soil investigation data set are presented in Tables 3-5 and 3-6. A comparison of the COPCs retained to the unrestricted land use facility-wide cancer and non-cancer risk Final FWCUGs for subsurface soil for the Residential Farmer (adult and child) and OHARNG receptors, or RSLs where applicable, is also presented in Tables 3-5 and 3-6. These tables are provided at the end of the report. Output from the software program used to calculate the 95 percent UCLs used in Tables 3-5 and 3-6 are presented in Appendix A.

3.3.3.1 Inorganics

A total of 24 inorganic analytes were detected in multiple subsurface soil samples collected at WBG in the investigation data set. Five of these inorganic analytes (calcium, iron, magnesium, potassium, and sodium) are considered to be essential nutrients and, thus, were not retained in the COPC evaluation. Background values have not been developed for cadmium, hexavalent chromium, and silver; therefore, these constituents were retained as COPCs for comparison to Final FWCUGs. The maximum detections of the other 16 inorganic analytes were greater than the background values. The frequency of detection screening does not result in data reduction for the surface soil investigation data set.

The discussion below contains a brief summary of the nature and extent for each of the inorganic COPCs where the EPCs were greater than the Final FWCUGs for the Residential Farmer or OHARNG receptor. No Final FWCUGs have been developed for beryllium, lead, or selenium in subsurface soils. A summary of the accumulated COPCs per sample location that were retained following comparison to the screening criteria for subsurface soil is presented in Tables 3-5 and 3-6 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, inorganic COPCs identified for the Residential Farmer (adult) in subsurface soil includes lead only. Lead was detected at concentrations greater than the RSL (no Final FWCUGs for lead) and the background value in 13 of the 88 subsurface soil samples analyzed collected in 2-ft sample intervals from 2 to 8 ft bgs at 9 stations in the areas of Pads 38 (2 to 6 ft bgs), 58 (2 to 8 ft bgs), 59 (2 to 4 ft bgs), 60 (2 to 4 ft bgs), 61 (2 to 6 ft bgs), 66 (2 to 4 ft bgs), and 67 (4 to 8 ft bgs). Lead was detected at concentrations below the RSL in deeper intervals at Pads 38, 59, 60, and 67. Inorganics were not analyzed in deeper intervals at Pads 58, 61, and 66. The locations of subsurface soil samples analyzed for lead and the relative detected concentration is shown in Figure 3-14.

Residential Farmer (Child)

In addition to the inorganic COPC identified for the Residential Farmer (adult), cadmium was identified as an inorganic COPC for the Residential Farmer (child). The distribution of lead in subsurface soil is consistent with that reported for the Residential Farmer (adult). Cadmium was detected at concentrations greater than the background value and the Final FWCUGs in 4 subsurface soil samples collected from sample stations WBG-232 (2 to 4, 4 to 6, and 6 to 8 ft bgs) at Pad 38 and WBGso-196 (2 to 4 ft bgs) at Pad 61. Cadmium was detected at a concentration below the screening criteria in the deeper interval (8 to 10 ft bgs) at Pad 38. Inorganics were not analyzed in the deeper interval (4 to 6 ft bgs) at Pad 61. The locations of the sample stations are shown in Figure 3-14.

National Guard Trainee

Three inorganics were identified as COPCs for the National Guard Trainee receptor scenario including cadmium, hexavalent chromium, and lead. Cadmium was detected at concentrations greater than the background value and the Final FWCUGs in 2 subsurface soil samples collected from sample station WBG-232 (4 to 6 and 6 to 8 ft bgs) at Pad 38. Hexavalent chromium was detected at a concentration greater than the Final FWCUGs in one subsurface soil sample collected from sample station WBG-237 (4 to 6 ft bgs) north of Pad 45. Hexavalent chromium and cadmium were detected at concentrations greater than the Final FWCUGs for the National Guard Trainee in subsurface soil samples collected from stations that do not overlap the construction footprint of the firing range or GLR components.

Lead was detected at concentrations greater than the RSL (no Final FWCUGs for lead) and the background value in 6 of 31 subsurface soil samples including WBG-199 (4 to 6 and 6 to 8 ft bgs) at Pad 58, WBG-219 (4 to 6 ft bgs) at Pad 61, WBG-232 (4 to 6 ft bgs) at Pad 38, and WBG-252 (4 to 6 and 6 to 8 ft bgs) at Pad 67 as shown in Figure 3-15. Lead was detected at concentrations below the RSL in deeper intervals at Pads 38 and 67. Inorganics were not analyzed in deeper intervals at Pads 58 and 61. The construction footprint of the firing range and GLR components does overlap the stations where subsurface soil samples were collected and where lead was detected at concentrations greater than the RSL (no Final FWCUGs for lead) and the background value but is adjacent near Pads 58 and 67 as shown in Figure 3-15.

3.3.3.2 Explosives and Propellants

Sixteen explosive or propellant analytes were detected in multiple subsurface soil samples collected at WBG in the investigation data set. The discussion below contains a brief summary of the nature and extent for each of the explosive or propellant COPCs where the EPCs were greater than the Final FWCUGs for the Residential Farmer or the OHARNG receptor. A summary of the accumulated COPCs per sample location that were retained following comparison to the Final FWCUGs for subsurface soil is presented in Tables 3-5 and 3-6 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, explosive COPCs identified because EPCs were greater than the Final FWCUGs for the Residential Farmer (adult) consist of TNT and RDX.

- TNT was detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in 7 of 68 subsurface soil samples analyzed including WBGso-186 (2 to 4 ft bgs) and WBG-252 (2 to 4, 4 to 6, 6 to 8, and 8 to 10 ft bgs) at Pad 67, WBG-199 (2 to 4 ft bgs) at Pad 58, and WBGso-168 (2 to 4 ft bgs) at Pad 66. TNT was not detected at concentrations greater than the Final FWCUGs in the 4 to 6 ft bgs sample intervals at WBG-199 or WBGso-186. Explosives were not analyzed below 4 ft bgs at WBGso-168 or below 10 ft bgs at WBG-252.
- RDX was detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) including WBGso-186 (2 to 4 ft bgs) and WBG-252 (2 to 4 ft bgs) at Pad 67 and WBGso-168 (2 to 4 ft bgs) at Pad 66. RDX was not detected at concentrations greater than the Final FWCUGs in the 4 to 6 ft bgs sample interval at WBGso-186 or below 4 ft bgs at WBG-252. Explosives were not analyzed in the 4 to 6 ft bgs sample interval at WBGso-168.

The 2005 and 2008 removal actions occurred in the vicinity of the subsurface samples stations identified above; however, neither of those actions impacted the subsurface soil data set. WBGso-186 at Pad 67 is located in an area where MEC was cleared to a depth of 1 ft bgs during the 2005 MEC Removal Action. During the 2008 Remedial Action, soil was removed in the area of WBG-252 and WBGso-186 at Pad 67 to a depth of 2 ft bgs. WBG-199 at Pad 58 is located

outside the limits of the soil berm removed during the 2008 Remedial Action. The subsurface soil sample locations are shown on Figure 3-16.

Residential Farmer (Child)

In addition to the explosive and propellant COPCs identified for the Residential Farmer (adult), 2-amino-4,6-dinitrotoluene was identified as a COPC in subsurface soil for the Residential Farmer (child). 2-amino-4,6-dinitrotoluene was detected at concentrations greater than the Final FWCUG for the Residential Farmer (child) in one subsurface soil sample collected from WBG-199 (2 to 4 ft bgs) at Pad 58. The concentration of 2-amino-4,6-dinitrotoluene was less than the Final FWCUG for the Residential Farmer (child) in the 4 to 6 ft bgs sampling interval at this station and samples were not collected deeper than 6 ft bgs at this sampling station.

The distribution of RDX in subsurface soil for this receptor is consistent with that reported for the Residential Farmer (adult). TNT was detected at concentrations greater than the Final FWCUGs for the Residential Farmer (child) in the subsurface soil samples identified for the Residential Farmer (adult) with the addition of WBG-199 (4 to 6 ft bgs) at Pad 58, WBGso-186 (4 to 6 ft bgs) at Pad 67, WBG-205 (4 to 6 ft bgs) at Pad 59, and WBGso-069 (2 to 4 ft bgs) and WBG-243 (2 to 4 ft bgs) at Pad 66. TNT was not analyzed in samples below 6 ft bgs at WBG-199, WBGso-186, and WBG-205 or below 4 ft bgs at WBG-243. TNT was not detected at a concentration greater than the Final FWCUGs at WBGso-069 (4 to 5 ft bgs).

The 2005 and 2008 removal actions occurred in the vicinity of the subsurface samples stations listed above with the exception of Pad 59; however, neither of those actions impacted the subsurface soil investigation data set. In addition to the locations identified in the Residential Farmer (adult) distribution, soil was cleared of MEC to a depth of 1 ft bgs in the area of WBGso-069 and WBG-243 at Pad 66. The subsurface soil sample locations are shown on Figure 3-16.

National Guard Trainee

Explosive COPCs identified because EPCs were greater than the Final FWCUGs for the National Guard Trainee includes TNT and RDX. TNT and RDX were both detected at concentrations greater than the Final FWCUGs for the National Guard Trainee in two subsurface soil samples collected at station WBG-252 (4 to 6 and 6 to 8 ft bgs) located at Pad 67. The 1,100m target array overlaps Pad 67. As stated previously, soil was removed in the area of WBG-252 at Pad 67 to a depth of 2 ft bgs during the 2008 removal action. The subsurface soil sample location is shown relative to the pad on Figure 3-1c.

3.3.3.3 SVOCs

Seven SVOC analytes were detected in multiple subsurface soil samples collected at WBG in the investigation data set. The frequency of detection screening does not result in data reduction for the subsurface soil investigation data set. The discussion below contains a brief summary of the

nature and extent for each of the SVOC COPCs where the EPCs were greater than the Final FWCUGs for the Residential Farmer or OHARNG receptor. A summary of the accumulated COPCs per sample location that were retained following comparison to the Final FWCUGs for subsurface soil is presented in Tables 3-5 and 3-6 at the end of the report.

Residential Farmer (Adult)

For the unrestricted land use scenario, SVOC COPCs identified because EPCs were greater than the Final FWCUGs for the Residential Farmer (adult) consist of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The distribution of SVOC COPCs in subsurface soil is shown on Figure 3-17. Each of the five SVOCs were detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in the subsurface soil sample collected from station WBGso-190 (2 to 4 ft bgs) at Pad 70. Concentrations of these SVOCs in the deeper interval subsurface soil sample collected at station WBGso-190 (4 to 6 ft bgs) were less than the Final FWCUGs for the Residential Farmer (adult). Benzo(b)fluoranthene was also detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in the subsurface soil sample collected from station WBG-199 (4 to 6 ft bgs) at Pad 58. No other deeper samples were analyzed for SVOCs at this location. Benzo(a)pyrene was also detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in the subsurface soil samples collected from stations WBG-199 (4 to 6 ft bgs) at Pad 58 and WBGso-191 (2 to 4 ft bgs) at Pad 70. No other deeper samples were analyzed for SVOCs at these locations.

Neither Final FWCUGs nor RSLs have been developed for benzo(ghi)perylene or phenanthrene. Thus, these compounds are retained as COPCs for the Residential Farmer (adult).

- Benzo(ghi)perylene was detected in two subsurface soil samples collected from stations WBGso-190 (2 to 4 ft bgs) at Pad 70 and WBG-199 (4 to 6 ft bgs) at Pad 58. Both detections were at estimated concentrations less than the laboratory reporting limit. This compound was not detected in the subsurface soil sample collected from the next deeper sampling interval at station WBGso-190 and there was no deeper interval sample collected at station WBG-199.
- Phenanthrene was detected in four subsurface soil samples collected from stations WBGso-190 (2 to 4 ft bgs) at Pad 70, WBG-199 (4 to 6 ft bgs) at Pad 58, and WBG-210 (2 to 4 ft bgs) and WBGso-055 (2 to 4 ft bgs) at Pad 59. This compound was not detected in the subsurface soil sample collected from the next deeper sampling interval at station WBGso-190 and there were no deeper interval samples collected at stations WBG-199, WBG-210, and WBGso-055.

Residential Farmer (Child)

SVOC COPCs identified because EPCs were greater than the Final FWCUGs for the Residential Farmer (child) consist of benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.

Benzo(ghi)perylene and phenanthrene are also identified as COPCs for the Residential Farmer (child) as no Final FWCUGs or RSLs have been developed for these compounds. The distribution of the SVOC COPCs for the Residential farmer (child) is similar to that identified for the Residential Farmer (adult) but with a reduction in the number of data points. Benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were detected at concentrations greater than the Final FWCUGs for the Residential Farmer (child) in the subsurface soil sample collected from station WBGso-190 (2 to 4 ft bgs) at Pad 70. Benzo(a)pyrene was also detected at a concentration greater than the Final FWCUGs for the Residential Farmer (adult) in the subsurface soil sample collected from station WBG-199 (4 to 6 ft bgs) at Pad 58. The distribution of SVOC COPCs in subsurface soil is shown on Figure 3-17.

National Guard Trainee

Benzo(ghi)perylene and phenanthrene are the SVOC COPCs identified for the National Guard Trainee receptor. Benzo(ghi)perylene and phenanthrene were both detected in one subsurface soil sample collected from station WBG-199 (4 to 6 ft bgs) at Pad 58. SVOCs were not analyzed in samples below 6 ft bgs at WBG-199. This station does not overlap the construction footprint for the target arrays or GLR. The location of WBG-199 is shown in Figure 3-1a.

3.3.3.4 VOCs

Five VOCs were detected in multiple subsurface soil samples collected at WBG in the investigation data for the Residential Farmer (adult and child) receptors including acetone, dimethylbenzene, ethylbenzene, methylene chloride, and toluene. Toluene was the only VOC detected in one subsurface soil sample in the investigation data set for the National Guard Trainee receptor. The frequency of detection screening does not apply to either of the small subsurface soil investigation data sets. No background values or Final FWCUGs have been developed for VOCs, thus the Region 9 Residential RSLs were used for screening. The EPCs were less than the RSLs for each of the five compounds, thus, these constituents are not retained as COPCs in subsurface soil.

3.3.3.5 Pesticides and PCBs

No PCBs were detected in the subsurface soil investigation data sets. Two pesticide analytes (endrin ketone and heptachlor epoxide) were detected in the subsurface soil samples collected at WBG in the investigation data for the Residential Farmer (adult and child) receptors and one pesticide analyte (heptachlor epoxide) was detected in the subsurface soil samples collected at WBG in the investigation data for the National Guard Trainee. The frequency of detection screening does not apply to either of the small data sets.

Endrin ketone was detected in the subsurface soil sample collected from station WBG-210 (2 to 4 ft bgs) at Pad 59. No Final FWCUGs or RSLs have been developed for endrin ketone; thus,

this compound was retained as a COPC in subsurface soil for the Residential Farmer (adult and child) receptors. Pesticides were not analyzed in deeper intervals at this station.

Heptachlor epoxide was detected in the subsurface soil sample collected from station WBG-199 (4 to 6 ft bgs) at Pad 58. The concentrations of heptachlor epoxide detected in subsurface soil were less than the Final FWCUGs for the Residential Farmer (adult and child) and National Guard Trainee receptors, and, thus, heptachlor epoxide is not retained for further evaluation as a COPC.

3.4 Data Evaluation for COCs

Following completion of the excavation of soil during the 2008 removal action, multi-increment (MI) confirmatory samples were collected from the base and sides of each excavated area and analyzed for explosives and SVOCs. This data set consists of samples collected from the excavations at Pads 61, 67, and 70, and two limited excavations at stations WBGss-070 (west of Pad 67) and WBG-243 (west of Pad 66). As this data set is confirmation data, the purpose of this evaluation is to identify COCs remaining in soil following the excavation activities. A total of 15 MI soil samples, excluding QC samples and field duplicates, were collected during the removal action. The 2008 excavation areas are shown in Figures 3-1a and c.

Surface grading in support of the future land use as a firing range was also conducted during the 2008 removal action. The classification of the confirmatory soil samples as either surface or subsurface used in this section, are in reference to the current existing post-grading conditions at WBG and not necessarily in reference to the depth of the sample interval at the time of sample collection pre-grading. For the Residential Farmer land use, the 15 samples consist of 7 surface soil (0 to 1 ft bgs) and 8 subsurface soil samples. For the OHARNG land use, each of the 15 samples are deep surface soil (0 to 4 ft bgs) samples.

Detected analytes in the surface and subsurface soil confirmation data sets are presented in Tables 3-7a and 3-8a, respectively, for the Residential Farmer land use scenarios and in Table 3-9a for deep surface soil for the OHARNG land use scenario. Output from the software program used to calculate the 95 percent UCLs used in these tables are presented in Appendix A.

3.4.1 Surface and Deep Surface Soil Confirmation Data

The following sections summarize the COC data evaluation process for confirmation surface and deep surface soil data for the Residential Farmer or OHARNG receptors, respectively. A comparison of the detected concentrations to the unrestricted land use facility-wide cancer and non-cancer risk Final FWCUGs for the Residential Farmer (adult and child) and OHARNG receptors (Dust/Fire Control Worker, Range Maintenance Soldier, and Trainee) and identification of COCs in surface and deep surface soil confirmation data is presented in Tables 3-7a-c and 3-9a-c.

3.4.1.1 Explosives and Propellants

Nine explosive and propellant compounds were detected in confirmatory surface and deep surface soil samples and screened against the Final FWCUGs for the Residential Farmer (adult and child) and OHARNG Land Use Scenarios. The maximum detected concentrations of explosives and propellants were less than both cancer-risk and hazard index Final FWCUGs for each constituent for each receptor. The constituent was retained as a COC if the EPC was greater than the Final FWCUGs and based on the Sum of Ratios analysis. There are no RVAAP background values for explosives or propellants.

Residential Farmer (Adult)

Carcinogenic explosive and propellant COCs identified for the Residential Farmer (adult) for surface soils consist of nitrobenzene. Non-carcinogenic explosive and propellant COCs identified for the Residential Farmer (adult) for surface soils consist of nitrobenzene.

- Cancer-risk Final FWCUGs for the Residential Farmer (adult) have not been developed for nitrobenzene; therefore, nitrobenzene is automatically retained as a carcinogenic COC for the Residential Farmer (adult).
- The EPCs for TNT; 2,4-dinitrotoluene; nitroglycerin; and RDX were less than the cancer-risk Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was greater than 1. However, the contributions to the Sum of Ratios from each of the explosive and propellant constituents were less than 10 percent. Therefore, TNT; 2,4-dinitrotoluene; nitroglycerin; and RDX are not retained as carcinogenic COCs for the Residential Farmer (adult).
- Hazard-index Final FWCUGs for the Residential Farmer (adult) have not been developed for nitrobenzene so this constituent is automatically retained as a non-carcinogenic COC for the Residential Farmer (adult).
- The EPCs for 1,3,5-trinitrobenzene; TNT; 2,4-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; HMX; and RDX were less than the hazard-index Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the hazard-index evaluations including those ratios for the detected SVOCs was less than 1. Therefore, 1,3,5-trinitrobenzene; TNT; 2,4-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; HMX; and RDX were not retained as non-carcinogenic COCs for the Residential Farmer (adult).

Explosives and propellants were not detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in any of the surface soil confirmation data. Final FWCUGs have not been developed for nitrobenzene. The only COC, nitrobenzene, was detected in one confirmation sample collected at the bottom of the Pad 61 excavation.

Residential Farmer (Child)

The carcinogenic and non-carcinogenic explosive and propellant COCs for the Residential Farmer (child) for surface soils are the same as identified for the Residential Farmer (adult).

National Guard Dust/Fire Control Worker

Carcinogenic explosive and propellant COCs identified for the National Guard Dust/Fire Control Worker for deep surface soils consist of nitrobenzene. Non-carcinogenic explosive and propellant COCs identified for the National Guard Dust/Fire Control Worker for deep surface soils consist of nitrobenzene.

- Cancer-risk Final FWCUGs for the National Guard Dust/Fire Control Worker have not been developed for nitrobenzene; therefore, nitrobenzene is automatically retained as a carcinogenic COC for the National Guard Dust/Fire Control Worker.
- The EPC for nitroglycerin was less than the cancer-risk Final FWCUG for the National Guard Dust/Fire Control Worker. The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was less than 1. Therefore, nitroglycerin is not retained as a carcinogenic COC for the National Guard Dust/Fire Control Worker.
- Hazard-index Final FWCUGs for the National Guard Dust/Fire Control Worker have not been developed for nitrobenzene so this constituent is automatically retained as a non-carcinogenic COC for the National Guard Dust/Fire Control Worker.
- The EPCs for 1,3,5-trinitrobenzene; 2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; and HMX were less than the hazard-index Final FWCUGs for the National Guard Dust/Fire Control Worker. The Sum of Ratios for the hazard-index evaluations including those ratios for the detected SVOCs was less than 1. Therefore, TNT; 2,4-dinitrotoluene; and RDX were not retained as COCs for the National Guard Dust/Fire Control Worker.
- The EPCs for TNT; 2,4-dinitrotoluene; and RDX were less than both the cancer-risk and hazard-index Final FWCUGs for the National Guard Dust/Fire Control Worker. The Sums of Ratios for both the cancer-risk and hazard-index evaluations including those ratios for the detected SVOCs were less than 1. Therefore, TNT; 2,4-dinitrotoluene; and RDX were not retained as COCs for the National Guard Dust/Fire Control Worker.

Explosives and propellants were not detected at concentrations greater than the Final FWCUGs for the National Guard Dust/Fire Control Worker in any of the deep surface soil confirmation data. Final FWCUGs have not been developed for nitrobenzene. The COC, nitrobenzene, was detected in the confirmation sample collected at the bottom of the Pad 61 excavation.

National Guard Range Maintenance Soldier

The carcinogenic and non-carcinogenic explosive and propellant COCs for the National Guard Range Maintenance Soldier for deep surface soils are the same as identified for the National

Guard Dust/Fire Control Worker. The only difference in the data evaluation is that the Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was greater than 1. However, the contributions to the Sum of Ratios for explosive and propellant constituents were each less than 10 percent. Thus, there is no resulting change to the list of explosive and propellant COCs from the National Guard Dust/Fire Control Worker for the National Guard Range Maintenance Soldier.

National Guard Trainee

The carcinogenic and non-carcinogenic explosive and propellant COCs for the National Guard Trainee for deep surface soils are the same as identified for the National Guard Range Maintenance Soldier with the addition of TNT as a carcinogenic COC. The EPC for TNT was less than the cancer-risk Final FWCUG for the National Guard Trainee. However, the Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was greater than 1 and the contribution to the Sum of Ratios for TNT was greater than 10 percent. Therefore, TNT was retained as a carcinogenic COC for the National Guard Trainee.

TNT was not detected at concentrations greater than the Final FWCUGs for the National Guard Trainee in any of the deep surface soil confirmation data. TNT was detected in each of the samples that were analyzed for explosives in the confirmation data set.

3.4.1.2 SVOCs

Five SVOCs were detected in confirmatory surface and deep surface soil samples and screened against the Final FWCUGs for the Residential Farmer (adult and child) and OHARNG receptors, respectively. The constituent was retained as a COC if the EPC was greater than the Final FWCUGs and based on the Sum of Ratios analysis. There are no RVAAP background values for SVOCs.

Residential Farmer (Adult)

Carcinogenic SVOC COCs identified for the Residential Farmer (adult) for surface soils consist of benzo(a)pyrene and dibenz(a,h)anthracene. There are no non-carcinogenic SVOC COCs identified for the Residential Farmer (adult) for surface soils.

- The EPCs for detected SVOCs were greater than the cancer-risk Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected explosives and propellants was greater than 1. However, the contributions to the Sum of Ratios from benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were less than 10 percent while those of benzo(a)pyrene and dibenz(a,h)anthracene were greater than 10 percent. Therefore, benzo(a)pyrene and dibenz(a,h)anthracene were retained as carcinogenic COCs for the Residential Farmer (adult).

SVOC COCs were detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in confirmation samples collected at the surface of Pad 70, sidewalls of the Pad 61 excavation, bottom of the Pad 61 excavation, and the bottom of the eastern Pad 61A excavation.

Residential Farmer (Child)

The carcinogenic and non-carcinogenic SVOC COCs for the Residential Farmer (child) for surface soils are the same as identified for the Residential Farmer (adult). The only difference in the data evaluation is that the EPCs for benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were less than the cancer-risk Final FWCUGs for the Residential Farmer (child).

National Guard Dust/Fire Control Worker

There are no carcinogenic or non-carcinogenic SVOC COCs identified for the National Guard Dust/Fire Control Worker for deep surface soils.

- The EPC for detected SVOCs were less than the cancer-risk Final FWCUGs for the National Guard Dust/Fire Control Worker. The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected explosives and propellants were less than 1. Therefore, detected SVOCs were not retained as carcinogenic COCs for the National Guard Dust/Fire Control Worker.

SVOCs were not detected at concentrations greater than the Final FWCUGs for the National Guard Dust/Fire Control Worker in any of the deep surface soil confirmation data. Multiple SVOC COCs were detected in each of the confirmation samples analyzed for SVOCs.

National Guard Range Maintenance Soldier

The only carcinogenic SVOC COC identified for the National Guard Range Maintenance Soldier for deep surface soils is benzo(a)pyrene. There are no non-carcinogenic SVOC COCs for the National Guard Range Maintenance Soldier.

The EPC for benzo(a)pyrene was greater than the cancer-risk Final FWCUG for the National Guard Range Maintenance Soldier. The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected explosives and propellants was greater than 1. The contribution to the Sum of Ratios was greater than 10 percent for benzo(a)pyrene. Therefore, benzo(a)pyrene was retained as a carcinogenic COC for the National Guard Dust/Fire Control Worker.

Benzo(a)pyrene was detected at concentrations greater than the Final FWCUGs for the National Guard Range Maintenance Soldier in confirmation samples collected from the bottoms of the Pad 61 and eastern 61A excavations.

National Guard Range Maintenance Soldier

Carcinogenic and non-carcinogenic SVOC COCs for the National Guard Trainee are the same as those identified for the National Guard Range Maintenance Soldier.

3.4.2 Subsurface Soil Confirmation Data

The following sections summarize the COC data evaluation process for confirmation subsurface soil data for the Residential Farmer. There are no confirmation subsurface soil samples for the OHARNG receptors. A comparison of the detected concentrations to the unrestricted land use facility-wide cancer and non-cancer risk Final FWCUGs for the Residential Farmer (adult and child) receptors and identification of COCs in subsurface soil is presented in Tables 3-8a-c.

3.4.2.1 Explosives and Propellants

Seven explosive compounds were detected in confirmatory subsurface soil samples and screened against the Final FWCUGs for the Residential Farmer (adult and child) Land Use Scenarios. The constituent was retained as a COC if the EPC was greater than the Final FWCUGs and based on the Sum of Ratios analysis. There are no RVAAP background values for explosives. No propellants were detected in confirmatory subsurface soil samples.

Residential Farmer (Adult)

Carcinogenic explosive COCs identified for the Residential Farmer (adult) for subsurface soils consist of TNT and RDX. The only non-carcinogenic explosive COC identified for the Residential Farmer (adult) for subsurface soils is TNT.

- The EPCs for TNT and RDX were greater than the cancer-risk Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was greater than 1. The contributions to the Sum of Ratios from TNT and RDX were greater than 10 percent. Therefore, TNT and RDX are retained as carcinogenic COCs for the Residential Farmer (adult).
- The EPC for 2,4-dinitrotoluene was less than the cancer-risk Final FWCUG for the Residential Farmer (adult). The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected SVOCs was greater than 1. However, the contribution to the Sum of Ratios from 2,4-dinitrotoluene was less than 10 percent. Therefore, 2,4-dinitrotoluene is not retained as a carcinogenic COC for the Residential Farmer (adult).
- The EPCs for 1,3,5-trinitrobenzene; 2,4-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; HMX; and RDX were less than the hazard-index Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the hazard-index evaluations including those ratios for detected SVOCs was greater than 1. However, the contribution to the Sum of Ratios from 1,3,5-trinitrobenzene; 2,4-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene; HMX; and RDX were each less than 10 percent. Therefore, 1,3,5-trinitrobenzene; 2,4-dinitrotoluene; 2-amino-4,6-

dinitrotoluene; 4-amino-2,6-dinitrotoluene; HMX; and RDX were not retained as non-carcinogenic COCs for the Residential Farmer (adult).

- The EPC for TNT was greater than the hazard-index Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the hazard-index evaluation including those ratios for the detected SVOCs was greater than 1. The contribution to the Sum of Ratios from TNT was greater than 10 percent. Therefore, TNT is retained as non-carcinogenic COC for the Residential Farmer (adult).

TNT and RDX were detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in confirmation samples collected on the sidewalls of the Pad 67 excavation.

Residential Farmer (Child)

The carcinogenic and non-carcinogenic explosive COCs for the Residential Farmer (child) for subsurface soils are the same as identified for the Residential Farmer (adult). The only difference in the data evaluation is that the EPC for RDX was greater than the cancer-risk Final FWCUG for the Residential Farmer (child).

3.4.2.2 SVOCs

Five SVOCs were detected in confirmatory subsurface soil samples and screened against the Final FWCUGs for the Residential Farmer (adult and child) receptors. The constituent was retained as a COC if the EPC was greater than the Final FWCUGs and based on the Sum of Ratios analysis. There are no RVAAP background values for SVOCs.

Residential Farmer (Adult)

The carcinogenic SVOC COCs identified for the Residential Farmer (adult) for subsurface soils are benzo(a)pyrene and dibenz(a,h)anthracene. There are no non-carcinogenic SVOC COCs identified for the Residential Farmer (adult) for subsurface soils.

- The EPCs for benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were less than the cancer-risk Final FWCUGs for the Residential Farmer (adult). The EPCs for benzo(a)pyrene and dibenz(a,h)anthracene were greater than the cancer-risk Final FWCUGs for the Residential Farmer (adult). The Sum of Ratios for the cancer-risk evaluation including those ratios for the detected explosives was greater than 1. The contributions to the Sum of Ratios from benz(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were less than 10 percent while that of benzo(a)pyrene was greater than 10 percent. Therefore, benzo(a)pyrene and dibenz(a,h)pyrene were retained as carcinogenic COCs for the Residential Farmer (adult).

SVOC COCs were detected at concentrations greater than the Final FWCUGs for the Residential Farmer (adult) in confirmation samples collected at the sidewalls of the Pad 67 excavation and the bottom of the western Pad 61A excavation.

Residential Farmer (Child)

The only carcinogenic SVOC COC for the Residential Farmer (child) for subsurface soils is benzo(a)pyrene. The EPC for dibenz(a,h)anthracene was less than the cancer-risk Final FWCUG for the Residential Farmer (child). As for the Residential Farmer (adult), there are no non-carcinogenic SVOC COCs for the Residential Farmer (child) for subsurface soils.

3.5 Summary of Results

The summary of results discussion is organized by sample medium including surface soils, deep surface soils, dry sediment, and subsurface soils. Within each media category, summaries are provided for Residential Farmer and National Guard land use scenarios based on COPCs identified from investigation data and COCs identified from confirmation data.

3.5.1 Surface and Deep Surface Soils

The COPCs identified in *surface soil* in 0 to 1 ft bgs for Residential Farmer receptors and in *deep surface soil* in 0 to 4 ft bgs for the National Guard receptors based on the data evaluation process presented in Section 3.2 include the following:

Exhibit 3-1

Chemicals of Potential Concern Identified in Surface and Deep Surface Soil

Analyte	Residential Farmer (adult)	Residential Farmer (child)	National Guard Dust/Fire Control Worker	National Guard Range Maintenance Worker	National Guard Trainee
<i>Explosives/Propellants</i>					
TNT	X	X			X
3-Nitrotoluene	X	X	X	X	X
RDX	X	X		X	X
<i>Inorganics</i>					
Antimony		X			
Barium					X
Cadmium	X	X			X
Chromium, hexavalent					X
Copper		X			

Exhibit 3-1**Chemicals of Potential Concern Identified in Surface and Deep Surface Soil (continued)**

Analyte	Residential Farmer (adult)	Residential Farmer (child)	National Guard Dust/Fire Control Worker	National Guard Range Maintenance Worker	National Guard Trainee
Lead	X	X	X	X	X
Pesticides/PCBs					
PCB-1254		X			
SVOCs					
2,4-Dinitrotoluene	X	X			
Benz(a)anthracene	X				
Benzo(a)pyrene	X	X		X	
Benzo(b)fluoranthene	X				
Benzo(ghi)perylene	X	X	X	X	X
Dibenz(a,h)anthracene	X	X			
Indeno(1,2,3-cd)pyrene	X				
Phenanthrene	X	X	X	X	X

Results of *surface soil* (0 to 1 and 0 to 2 ft bgs) investigation sampling and identification of COPCs in terms of the unrestricted land use for the Residential Farmer (adult and child) show the following patterns:

- Inorganic COPCs for the Residential Farmer (adult and child) receptors including antimony, cadmium, copper, and lead were identified at concentrations greater than the screening criteria in surface soil samples collected from stations located in, adjacent to, and surrounding the pads as shown in Figures 3-2 through 3-5. The distributions are primarily centered on Pads 32, 37, 38, 45, 58, 59, 60, 62, 66, 67, 68 and Building 4301. Individual inorganic COPCs were identified at Pads 40, 53, and 63.
- Explosive and propellant COPCs for the Residential Farmer (adult and child) receptors including TNT, 3-nitrotoluene, and RDX were identified at concentrations greater than the screening criteria in surface soil samples collected from stations located in the areas of Pads 38, 59, 62, 66, 67, and 68.
- SVOC COPCs for the Residential Farmer (adult and child) receptors including 2,4-dinitrotoluene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene were identified at concentrations greater than their respective Final FWCUGs or RSLs

in surface soil samples collected from stations located in the areas of Pads 8, 37, 38, 58, 59, 60, 66, and 70 and Building 4301.

- There are no VOC COPCs for the Residential Farmer (adult and child) receptors in surface soil identified at WBG.
- There are no pesticide COPCs in surface soil identified for the Residential Farmer (adult and child) receptors at WBG.
- The PCB COPC for the Residential Farmer (adult and child) receptors, PCB-1254, was identified at a concentration greater than the non-carcinogenic Final FWCUG for the Residential Farmer (child) in one surface soil sample collected from a sample station on the north side of Building 4301.

Results of *deep surface soil* (0 to 4 ft bgs) investigation sampling and identification of COPCs in terms of the planned future land use as a firing range and GLR show the following patterns:

- Inorganic COPCs for OHARNG receptors including lead and hexavalent chromium were identified at concentrations greater than their respective Final FWCUGs or background values in deep surface soil samples collected from stations located within the construction footprint of the proposed firing range components in the areas of Pads 58 (0 to 1, 0 to 2 ft bgs), 59 (0 to 1, 0 to 2, 2 to 4 ft bgs). Those for barium and cadmium do not overlap the construction footprint.
- Explosive and propellant COPCs for OHARNG receptors including TNT, 3-nitrotoluene, and RDX were identified at concentrations greater than their respective Final FWCUGs in deep surface soil samples collected from stations located outside the construction footprint of the firing range components.
- SVOC COPCs for OHARNG receptors consisting of benzo(ghi)perylene and phenanthrene were identified at concentrations greater than their respective Final FWCUGs or RSLs in deep surface soil samples collected from stations located within the construction footprint of the firing range components in the area of Pad 59 (2 to 4 ft bgs). Those for benzo(a)pyrene do not overlap the construction footprint.
- There are no VOC COPCs for OHARNG receptors in deep surface soil identified at WBG.
- The pesticide COPC for OHARNG receptors, endrin ketone, was identified at a concentration greater than the screening criteria in a deep surface soil sample collected from stations located within the construction footprint of the firing range components in the area of Pad 59 (2 to 4 ft bgs).
- There are no PCB COPCs in deep surface soil identified for the OHARNG receptors at WBG.

The COCs identified in *surface soil* in 0 to 1 ft bgs for Residential Farmer receptors and in *deep surface soil* in 0 to 4 ft bgs for the National Guard receptors based on the data evaluation process presented in Section 3.2 include the following:

Exhibit 3-2**Chemicals of Concern Identified in Surface and Deep Surface Soil**

Analyte	Residential Farmer (adult)	Residential Farmer (child)	National Guard Dust/Fire Control Worker	National Guard Range Maintenance Worker	National Guard Trainee
<i>Explosives</i>					
TNT					X
Nitrobenzene	X	X	X	X	X
<i>SVOCs</i>					
Benzo(a)pyrene	X	X		X	X
Dibenz(a,h)anthracene	X	X			

At the areas where removal actions have been performed based on previously identified COCs, results of *surface soil* (0 to 1 ft bgs) confirmation sampling and identification of COCs for the Residential Farmer receptors show the following patterns:

- COCs in surface soil based on limited confirmation data in the area of Pads 61 (0 to 0.25 ft bgs), 61A (0 to 0.25 ft bgs), and 70 (0 to 0.25 ft bgs) include explosives/propellants (nitrobenzene) and SVOCs (benzo[a]pyrene and dibenz[a,h]anthracene).

At the areas where removal actions have been performed based on previously identified COCs, results of *deep surface soil* (0 to 4 ft bgs) confirmation sampling and identification of COCs for the OHARNG receptors in terms of the planned future land use as a firing range and GLR show the following patterns:

- COCs in deep surface soil based on limited confirmation data in the area of Pads 61 (0 to 0.25 ft bgs) and 61A (0 to 0.25 ft bgs) include explosives/propellants (TNT, and nitrobenzene) and SVOCs (benzo[a]pyrene).

3.5.2 Dry Sediment

The COPCs identified in *dry sediment* in 0 to 0.5 ft bgs for the Residential Farmer and National Guard receptors based on the data evaluation process presented in Section 3.2 include the following:

Exhibit 3-3
Chemicals of Potential Concern Identified in Dry Sediment

Analyte	Residential Farmer (adult)	Residential Farmer (child)	National Guard Dust/Fire Control Worker	National Guard Range Maintenance Worker	National Guard Trainee
<i>Inorganics</i>					
Hexavalent Chromium					X
Thallium		X			
<i>SVOCs</i>					
Benz(a)anthracene	X	X		X	
Benzo(a)pyrene	X				
Benzo(b)fluoranthene	X				
Benzo(ghi)perylene	X	X	X	X	X
Phenanthrene	X	X	X	X	X

Results of *dry sediment* (0 to 0.5 ft bgs) investigation sampling and identification of COPCs in terms of the unrestricted land use for the Residential Farmer (adult and child) show the following patterns:

- There are no inorganic COPCs identified for the Residential Farmer (adult). The only inorganic COPC for the Residential Farmer (child) is thallium detected in the drainage channels south of Pad 52 and between Pads 67 and 68.
- SVOC COPCs for the Residential farmer (adult) in dry sediment consisting of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, and phenanthrene and SVOC COPCs for the Residential farmer (child) in dry sediment consisting of benz(a)anthracene, benzo(ghi)perylene, and phenanthrene were detected in one sample collected from the drainage channel southeast of Pad 70.
- No explosives, propellants, pesticides, PCBs, or VOCs COPCs were identified in dry sediment for Residential Farmer receptors.

Results of *dry sediment* (0 to 0.5 ft bgs) investigation sampling and identification of COPCs in terms of the planned future land use as a firing range and GLR show the following patterns although no dry sediment sampling locations overlap the construction footprint:

- There are no inorganic COPCs identified for the National Guard Dust/Fire Control Worker or National Guard Range Maintenance Soldier. The only inorganic COPC for the National Guard Trainee is hexavalent chromium detected in the drainage channel north of Pad 60.

- SVOC COPCs for the National Guard Dust/Fire Control Worker and National Guard Trainee in dry sediment consisting of benzo(ghi)perylene and phenanthrene and SVOC COPCs for the National Guard Range Maintenance Soldier in dry sediment consisting of benz(a)anthracene, benzo(ghi)perylene, and phenanthrene were detected in one sample collected from the drainage channel southeast of Pad 70.
- No explosives, propellants, pesticides, PCBs, or VOCs COPCs were identified in dry sediment for OHARNG receptors.

3.5.3 Subsurface Soil

The COPCs identified in *subsurface soil* in 1 to 13 ft bgs for Residential Farmer receptors and 4 to 7 ft bgs for the National Guard Trainee receptor based on the data evaluation process presented in Section 3.2 can be summarized as follows:

Exhibit 3-4

Chemicals of Potential Concern Identified in Subsurface Soil

Analyte	Residential Farmer (adult)	Residential Farmer (child)	National Guard Trainee
<i>Explosives/Propellants</i>			
TNT	X	X	X
2-Amino-4,6-dinitrotoluene		X	
RDX	X	X	X
<i>Inorganics</i>			
Cadmium		X	X
Chromium, hexavalent			X
Lead	X	X	X
<i>Pesticides/PCBs</i>			
Endrin ketone	X	X	
<i>SVOCs</i>			
Benz(a)anthracene	X		
Benzo(a)pyrene	X	X	
Benzo(b)fluoranthene	X	X	
Benzo(ghi)perylene	X	X	X
Dibenz(a,h)anthracene	X	X	
Indeno(1,2,3-cd)pyrene	X		
Phenanthrene	X	X	X

Results of *subsurface soil* (1 to 13 ft bgs) investigation samples for COPCs for the unrestricted land use for the Residential Farmer (adult and child) show the following patterns:

- Inorganic COPCs for the Residential Farmer (adult and child) receptors include cadmium and lead. Lead was identified at concentrations greater than the screening criteria in subsurface soil samples collected from stations located in the areas of Pads 38, 58, 59, 60, 61, 66, and 67 between 2 and 8 ft bgs. Lead was detected at concentrations below the RSL in deeper intervals at Pads 38, 59, 60, and 67. Cadmium was identified at concentrations greater than the screening criteria in subsurface soil samples collected from stations located in the areas of Pads 38 (2 to 4 ft bgs) and 61 (2 to 8 ft bgs). Cadmium was detected at a concentration below the screening criteria in the deeper interval (8 to 10 ft bgs) at Pad 38. Inorganics were not analyzed in deeper intervals at Pads 58, 61, and 66.
- Explosive COPCs for the Residential Farmer (adult and child) receptors including TNT, 2-amino-4,6-dinitrotoluene, and RDX were identified at concentrations greater than screening criteria in subsurface soil samples collected from stations located in the areas of Pads 58 (2 to 6 ft bgs), 59 (4 to 6 ft bgs), 66 (2 to 4 ft bgs), and 67 (2 to 10 ft bgs). TNT concentrations were less than screening criteria in the samples below 4 ft bgs at Pad 67. The 2-amino-4,6-dinitrotoluene concentration was less than screening criteria in the sample below 4 ft bgs at Pad 58. RDX concentrations were less than screening criteria in the samples below 4 ft bgs at Pad 67. Explosives were not analyzed below 6 ft at Pads 58 and 59, 4 ft bgs at Pad 66, and 10 ft bgs at Pad 67.
- SVOC COPCs for the Residential Farmer (adult and child) receptors including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene were identified at concentrations greater than their respective Final FWCUGs or RSLs in subsurface soil samples collected from stations located at Pads 58 (4 to 6 ft bgs), 59 (2 to 4 ft bgs), and 70 (2 to 4 ft bgs). SVOC COPCs were not detected below 4 ft bgs in one station at Pad 70 and not analyzed below 6 ft bgs at Pad 58, below 4 ft bgs at Pad 59, and below 4 ft bgs in one station at Pad 70.
- There are no VOC COPCs for the Residential Farmer (adult and child) receptors in subsurface soil identified at WBG.
- There are no PCB COPCs in subsurface soil identified for the Residential Farmer (adult and child) receptors at WBG.
- The pesticide COPC for the Residential Farmer (adult and child) receptors including endrin ketone was identified in one subsurface soil sample collected from a sample station located at Pad 59 (2 to 4 ft bgs). Pesticides were not analyzed in samples from deeper intervals at this station.

Results of *subsurface soil* (4 to 7 ft bgs) investigation samples for COPCs for the National Guard Trainee receptor in terms of the planned future land use as a firing range and GLR show the following patterns:

- The inorganic COPC lead for the National Guard Trainee receptor was identified at concentrations greater than the background value in subsurface soil samples collected from stations located within the construction footprint of the proposed target arrays in the areas of Pads 58 (4 to 8 ft bgs) and 67 (4 to 8 ft bgs). The detections of the inorganic COPC for the National Guard Trainee of cadmium and hexavalent chromium do not overlap the construction footprint.
- The explosive COPCs TNT and RDX were identified at concentrations greater than the Final FWCUGs for the National Guard Trainee receptor in subsurface soil samples collected from one station located within the construction footprint of the proposed target arrays in the area of Pad 67 (4 to 8 ft bgs).
- SVOC COPCs for the National Guard Trainee including benzo(ghi)perylene and phenanthrene were identified in one subsurface soil sample collected from a station near Pad 58 (4 to 6 ft bgs) that is not located within the construction footprint of the proposed firing range components. SVOCs were not analyzed in samples below 6 ft bgs at this station.
- There are no VOC COPCs for the National Guard Trainee receptor in subsurface soil identified at WBG.
- There are no pesticide COPCs in subsurface soil identified for the National Guard Trainee receptor.
- There are no PCB COPCs in subsurface soil identified for the National Guard Trainee receptor.

The COCs identified in *subsurface soil* in 1 to 13 ft bgs for Residential Farmer receptors based on the data evaluation process presented in Section 3.2 can be summarized as follows:

Exhibit 3-5
Chemicals of Concern Identified in Subsurface Soil

Analyte	Residential Farmer (adult)	Residential Farmer (child)
<i>Explosives</i>		
TNT	X	X
RDX	X	X
<i>SVOCs</i>		
Benzo(a)pyrene	X	X
Dibenz(a,h)anthracene	X	

At the areas where removal actions have been performed based on previously identified COCs, results of *subsurface soil* (1 to 13 ft bgs) confirmation sampling and identification of COCs for Residential Farmer receptors show the following patterns:

- COCs for the Residential Farmer (adult and child) in subsurface soil based on limited confirmation data in the area of Pads 61A (1 to 1.25 ft bgs) and 67 (1.5 to 1.75 and 2 to 2.5 ft bgs) include explosives/propellants (TNT and RDX) and SVOCs (benzo[a]pyrene and dibenz[a,h]anthracene).

4.0 *Sample Design*

This section summarizes the data gaps identified during the data evaluation in Section 3.0 and presents the rationale for additional investigation. The analysis is applicable for the current layout of target arrays and siting of the GLR as presented in Figure 1-4. The selection for the areas for biased or random sampling is based on the project DQOs and the conceptual site model described in Section 2.0, the data evaluation results and identification of COPCs and COCs in Section 3.0, discussions with Ohio EPA and the direction as provided in the SOW.

4.1 *Geophysical Investigation*

Geophysical investigations were performed prior to the implementation of the 2008 *ROD* remedy including the firing point area and construction footprints of the 400, 600, 800, 1,100, and 1,500 meter target arrays followed by MEC removal actions as necessary to support firing range construction. Prior to performing any additional intrusive sampling activities as suggested by this DQO report, an instrument assisted MEC survey is recommended to identify potential buried MEC in the areas of proposed sampling.

4.2 *Residential Farmer (adult)*

Results of the surface soil (0 to 1 ft bgs), dry sediment (0 to 0.5 ft bgs), and subsurface soil (1 to 13 ft bgs) samples in terms of the unrestricted land use scenario for the Residential Farmer (adult) receptor results in a distribution of COPCs primarily across the northeastern, central, and northwestern portions of WBG. While the data collected during previous investigations is comprehensive to identify a complete list of COPCs in surface and subsurface soil at WBG, the extent of each contaminant is not adequately defined for the unrestricted use of WBG including the area of Building 4301 to the east.

4.2.1 *Surface Soil*

The horizontal extent of lead in surface soil is currently not defined in the area north of Pad 32; south of Pad 37; south of Pad 38; south of Pad 40; each direction at Building 4301; each direction at Pad 56; south of Pad 58; south of Pad 59; north, west, and south of Pad 65; and west of Pad 68.

The horizontal extents of TNT, 3-nitrotoluene, and RDX in surface soil are not currently defined south of Pad 59, northeast of Pad 38, east of Pad 68, and west of Pad 67.

The horizontal extents of 2,4-dinitrotoluene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and

phenanthrene are not currently defined in each direction at Pad 8, south and east at Pad 58, each direction at Pad 59, each direction at Pad 60, west of Pad 66, and south and west of Pad 70.

4.2.2 Dry Sediment

The horizontal extent of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, and phenanthrene within the drainage ditch is not defined upstream and downstream of WBGsd-156(d) located southeast of Pad 70.

4.2.3 Subsurface Soil

No subsurface soil samples were collected at WBG below 10 ft bgs. The horizontal extent of lead is not currently defined in subsurface soil in each direction at Pad 58 (2 to 8 ft bgs); south of Pad 59 (2 to 4 ft bgs); south of Pad 60 (2 to 4 ft bgs); west of Pad 67 (4 to 8 ft bgs); and west and north of Pad 38 (2 to 6 ft bgs). The vertical extent of lead to 13 ft bgs in subsurface soil is not defined for each of the corresponding subsurface sample intervals to the shallow data gaps identified in Sections 4.2.1 above.

The horizontal extents of TNT and RDX in subsurface soil are not defined south of Pad 58 (2 to 6 ft bgs) and east of Pad 67 (2 to 10 ft bgs). The vertical extents of TNT and RDX are not defined below 4 ft bgs at Pad 66 and below 10 ft bgs at Pad 67.

The horizontal extents of benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene are not defined south of Pad 70 (2 to 4 ft bgs), west of Pad 70 (2 to 4 ft bgs), west and south of Pad 58 (4 to 6 ft bgs), and east and south of Pad 59 (2 to 4 ft bgs). The vertical extents of these SVOCs are not defined below 4 ft bgs at Pad 70, below 4 ft bgs at Pad 59, and below 6 ft bgs at Pad 58.

The horizontal extent of endrin ketone in subsurface soil is not defined to the east, south, or west at Pad 59 and the vertical extent is not defined below 4 ft bgs.

4.3 Residential Farmer (Child)

Results of the surface soil (0 to 1 ft bgs), dry sediment (0 to 0.5 ft bgs), and subsurface soil (1 to 13 ft bgs) samples in terms of the unrestricted land use scenario for the Residential Farmer (adult) receptor results in a distribution of COPCs primarily across the northeastern, central, and northwestern portions of WBG. While the data collected during previous investigations is comprehensive to identify a complete list of COPCs in surface and subsurface soil at WBG, the extent of each contaminant is not adequately defined for the unrestricted use of WBG including the area of Building 4301 to the east.

4.3.1 Surface Soil

The data gaps identified for the horizontal extents of lead, TNT, 3-nitrotoluene, RDX, 2,4-dinitrotoluene, benzo(a)pyrene, benzo(ghi)perylene, dibenz(a,h)anthracene, and phenanthrene are as described for the Residential Farmer (adult).

The horizontal extent of PCB-1254 is not currently defined in each direction of WBG-261 at Building 4301.

The horizontal extent of antimony in surface soil is not currently defined south of Pads 58 and 59, west of Pad 60, west of Pad 66, and in each direction around Building 4301. The horizontal extent of copper in surface soil is not currently defined south of Pad 59 or south of Pad 45.

4.3.2 Dry Sediment

The horizontal extent of thallium in dry sediment is not currently defined upstream and downstream of WBGsd-083 located north of Pads 67 and 68 and WBGsd-080 located south of Pad 52. The horizontal extent of benz(a)anthracene, benzo(ghi)perylene, and phenanthrene within the drainage ditches is not defined upstream and downstream of WBGsd-156(d) located southeast of Pad 70.

4.3.3 Subsurface Soil

No subsurface soil samples were collected at WBG below 10 ft bgs. The data gaps in subsurface soil identified for the horizontal extents of lead, TNT, RDX, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and endrin ketone are as described for the Residential Farmer (adult) with the exception of data gaps for SVOCs only at Pads 58 and 70. In addition to the data gaps identified for the Residential Farmer (adult) for TNT, the horizontal extent is not defined south of Pad 59 (4 to 6 ft bgs) and the vertical extent is not defined below 6 ft bgs at Pad 59. The horizontal extent of 2-amino-4,6-dinitrotoluene is not defined to the south of Pad 58 (2 to 4 ft bgs). The horizontal extent of cadmium in subsurface soil is not defined north and west of Pad 38. The vertical extent of cadmium in subsurface soil is not defined below 4 ft bgs at Pad 61.

4.4 National Guard Dust/Fire Control Worker

Based on the detection of COPCs at concentrations greater than screening criteria for the National Guard Dust/Fire Control Worker in deep surface (0 to 4 ft bgs) and subsurface soil (4 to 7 ft bgs) collected in areas that overlap the target arrays and the GLR, additional data is necessary to define the extent of these compounds in deep surface soil and dry sediment along the proposed target arrays.

4.4.1 Deep Surface Soil

The horizontal extent of lead in deep surface soil in areas overlapping the construction footprint is not defined in the areas of Pad 58 (0 to 4 ft bgs) to the south along the 100-meter target array; in the area of Pad 59 (0 to 4 ft bgs) to the south along the 175-meter target array and east to the 200-meter target array; in the area of Pads 45 and 60 along the 250- and 300-meter target arrays; in the area of Pad 62 to the west to the 500-meter target array; and in the area of Pad 65 to the south along the 900-meter target array.

The horizontal extent of benzo(ghi)perylene and phenanthrene is not defined in the area of Pad 59 (2 to 4 ft bgs) to the south along the 100-meter target array, in the area between Pads 37 and 38 along the 1,100-meter target array, in the area between Pads 37 and 66 along the 1,000-meter target array, or in the area of Pad 70 to the south along the 1,500-meter target array.

The horizontal extent of endrin ketone is not defined in the area of Pad 59 to the south along the 175-meter target array.

Deep surface soil samples collected within the GLR area were not analyzed for SVOCs, PCBs or pesticides. Additional analysis of deep surface soil samples within the GLR area for SVOCs, PCBs, and pesticides is recommended in order to evaluate the distribution of COPCs for the National Guard Dust/Fire Control Worker in the GLR area.

4.4.2 Dry Sediment

The horizontal extent of benzo(ghi)perylene and phenanthrene within the drainage ditches is not defined upstream and downstream of WBGsd-156(d) located southeast of Pad 70.

4.5 National Guard Range Maintenance Soldier

Based on the detection of COPCs at concentrations greater than screening criteria for the National Guard Range Maintenance Soldier in deep surface (0 to 4 ft bgs) and subsurface soil (4 to 7 ft bgs) collected in areas that overlap the target arrays and the GLR, additional data is necessary to define the extent of these compounds in deep surface soil and dry sediment along the proposed target arrays.

4.5.1 Deep Surface Soil

The data gaps identified for the horizontal extents of lead, benzo(ghi)perylene, phenanthrene, and endrin ketone are as described for the National Guard Dust/Fire Control Worker. The data gap identified for organics in the GLR area is as described for the National Guard Dust/Fire Control Worker.

4.5.2 Dry Sediment

The horizontal extent of benz(a)pyrene, benzo(ghi)perylene, and phenanthrene within the drainage ditches is not defined upstream and downstream of WBGsd-156(d) located southeast of Pad 70.

4.6 National Guard Trainee

Based on the detection of COPCs at concentrations greater than screening criteria for the National Guard Trainee in deep surface (0 to 4 ft bgs) and subsurface soil (4 to 7 ft bgs) collected in areas that overlap the target arrays and the GLR, additional data is necessary to define the extent of these compounds in deep surface and subsurface soils and dry sediment along the proposed target arrays.

4.6.1 Deep Surface Soil

The data gaps identified for the horizontal extents of lead, benzo(ghi)perylene, phenanthrene, and endrin ketone are as described for the National Guard Dust/Fire Control Worker. The data gap identified for organics in the GLR area is as described for the National Guard Dust/Fire Control Worker.

The horizontal extent of hexavalent chromium in deep surface soil is not currently defined in the area of Pad 58 (0 to 4 ft bgs) to the south along the 100-meter target array, in the area of Pad 59 (0 to 4 ft bgs) to the south along the 175-meter target array, in the area of Pad 37 (0 to 4 ft bgs) to the north and south along the 1,000-meter target array, and in the area of Pad 67 (0 to 4 ft bgs) to the south along the 1,100-meter target array.

Deep surface soil samples collected within the GLR area were not analyzed for SVOCs, PCBs or pesticides. Additional analysis of deep surface soil samples within the GLR area for SVOCs, PCBs, and pesticides is recommended in order to evaluate the distribution of COPCs for the National Guard Trainee in the GLR area.

4.6.2 Dry Sediment

The horizontal extent of hexavalent chromium is not defined upstream and downstream of WBG-294 located north of Pad 60. The horizontal extent of benzo(ghi)perylene and phenanthrene within the drainage ditches is not defined upstream and downstream of WBGsd-156(d) located southeast of Pad 70.

4.6.3 Subsurface Soil

The horizontal extent of lead in subsurface soil is not defined in the area of Pad 58 (4 to 7 ft bgs) south along the 100-meter target array and between Pads 37, 38, and 67 along the 1,100-meter

target array. The vertical extent of lead in subsurface soil is not defined for each of the corresponding subsurface sample intervals to the shallow data gaps identified in Sections 4.4.1 and 4.6.1 above.

The horizontal extent of TNT and RDX in subsurface soil is not defined in the area of Pad 67 (4 to 7 ft bgs) south along the 1,100-meter target array.

No subsurface soil samples were collected previously within the GLR area. No inorganic or explosive/propellant COPCs were identified in the deep surface soil samples collected in this area; however, additional deep surface soil samples have been recommended to evaluate the distribution of organic COPCs. Thus, either concurrent with the collection of deep surface soil samples or dependent upon the deep surface soil sampling results, subsurface soil samples would be necessary to evaluate data gaps in the GLR area.

5.0 Summary of Conclusions

This *DQO Report* has utilized the DQO process provided in the *FSAP* to identify data gaps from the past remedial investigations at WBG where the extent of contamination was not adequately characterized for use as a MPMG Range and GLR or to evaluate if any additional efforts were necessary for the proposed land use scenario. Data results from the remedial investigations have been compared to the Final FWCUGs (or RSLs where applicable and background values for inorganics) for unrestricted land use and the proposed future land use of a MPMG Range and GLR. Based on the elevated concentrations of COPCs that are greater than the Final FWCUGs (or RSLs) and background values in surface soil, deep surface soil, dry sediment, and subsurface soil samples, it is recommended that additional sampling be performed to determine the extent of these compounds in surface soil, deep surface soil, dry sediment, and subsurface soil for the proposed land use.

It is also recommended that further risk evaluation be performed in subsequent phases of the CERCLA process to quantify potential risk associated with chemicals identified as COPCs and COCs solely because they lack Final FWCUGs. Chemicals identified herein as COPCs because they lack Final FWCUGs include endrin ketone, benzo(ghi)perylene, and phenanthrene. One chemical was identified herein as a COC, nitrobenzene, because no Final FWCUGs have been developed. One of the screening criteria for the determination of COPCs and COCs is the 5 percent detection per 20 samples rule. Endrin ketone was detected at a concentration of 0.0043 mg/kg in 1 out of 17 investigation soil samples collected at WBG, and therefore could not be eliminated using the 5 percent detection rule. The endrin ketone concentration of 0.0043 mg/kg is similar to the detection limit of 0.004 mg/kg. In addition, the detected concentration of endrin ketone is much less than the RSL of 1.8 mg/kg for related compound endrin. In the *Focused Feasibility Study (FFS)* (SAIC, 2005) for WBG, endrin ketone, benzo(ghi)perylene, and phenanthrene were eliminated as COPCs based on results of a quantitative evaluation of their toxicity profiles. The 2005 *FFS* was used to prepare the 2008 ROD for WBG. Nitrobenzene was detected at a concentration of 0.26 mg/kg in 1 out of 15 confirmation soil samples collected at WBG. This nitrobenzene concentration of 0.26 mg/kg is similar to the detection limit of 0.25 mg/kg. In addition, the detected concentration of nitrobenzene is much less than the RSL of 4.8 mg/kg. Therefore, based on the results of this risk evaluation and a consideration of the detection limits, additional sampling to address potential data gaps for these four chemicals is not recommended. These four chemicals have limited occurrence or are detected at low concentrations, and therefore do not appear to be true COCs.

The recommended sampling actions include the following organized by receptor (refer to the end of this section for the same information organized by construction area):

- Instrument assisted MEC survey in the area of the proposed sampling.
- For the National Guard Dust/Fire Control Worker receptor:
 - Deep surface soil (0 to 4 ft bgs) sampling for inorganics in the areas of the construction footprint near Pads 45, 58, 59, 60, 62, and 65.
 - Deep surface soil (0 to 4 ft bgs) sampling for SVOCs, PCBs, and pesticides in the GLR area.
- For the National Guard Range Maintenance Soldier receptor:
 - Deep surface soil (0 to 4 ft bgs) sampling for inorganics in the areas of the construction footprint near Pads 45, 58, 59, 60, 62, and 65.
 - Deep surface soil (0 to 4 ft bgs) sampling for SVOCs, PCBs, and pesticides in the GLR area.
 - Dry sediment (0 to 0.5 ft bgs) sampling for SVOCs in the area of WBGsd-156(d) located southeast of Pad 70.
- For the National Guard Trainee receptor:
 - Deep surface soil (0 to 4 ft bgs) sampling for inorganics in the areas of the construction footprint near Pads 37, 45, 58, 59, 60, 62, 65, and 67.
 - Deep surface soil (0 to 4 ft bgs) sampling for SVOCs, PCBs, and pesticides in the GLR area.
 - Dry sediment (0 to 0.5 ft bgs) sampling for inorganics in the area of WBG-294 located north of Pad 60.
 - Subsurface soil (4 to 7 ft bgs) sampling for inorganics in the area of the construction footprint near Pads 37, 38, 45, 58, 59, 60, 62, 65, and 67.
 - Subsurface soil (4 to 7 ft bgs) sampling for explosives in the area of the construction footprint near Pad 67.
 - Subsurface soil (4 to 7 ft bgs) sampling within the GLR for SVOCs, PCBs, and pesticides as necessary based on the results of the surface soil sampling in this area.
- For the Residential Farmer (adult) receptor:
 - Surface soil (0 to 1 ft bgs) sampling for inorganics in the areas of Pad 32, 37, 38, 40, Building 4301, 56, 58, 59, 65, and 68.
 - Surface soil (0 to 1 ft bgs) sampling for explosives in the areas of Pad 59, 38, 68, and 67.
 - Surface soil (0 to 1 ft bgs) sampling for SVOCs in the areas of Pad 59, 60, 66, and 70.
 - Dry sediment (0 to 0.5 ft bgs) sampling for SVOCs in the area of WBGsd-156(d) located southeast of Pad 70.

- Subsurface soil (1 to 13 ft bgs) sampling for inorganics in the areas of Pad 58, 59, 60, 67, and 38.
- Subsurface soil (1 to 13 ft bgs) sampling for explosives in the areas of Pads 58 and 67.
- Subsurface soil (1 to 13 ft bgs) sampling for SVOCs in the areas of Pads 58 and 70.
- For the Residential Farmer (child) receptor:
 - Surface soil (0 to 1 ft bgs) sampling for inorganics in the areas of Pad 32, 37, 38, 40, 45, Building 4301, 56, 58, 59, 60, 65, 66, and 68.
 - Surface soil (0 to 1 ft bgs) sampling for explosives in the areas of Pad 59, 38, 68, and 67.
 - Surface soil (0 to 1 ft bgs) sampling for SVOCs in the areas of Pad 59, 60, 66, and 70.
 - Surface soil (0 to 1 ft bgs) sampling for PCBs in the area of Building 4301.
 - Dry sediment (0 to 0.5 ft bgs) sampling for inorganics in the area of WBGsd-083 located north of Pad 67 and WBGsd-080 located south of Pad 52.
 - Dry sediment (0 to 0.5 ft bgs) sampling for SVOCs in the area of WBGsd-156(d) located southeast of Pad 70.
 - Subsurface soil (1 to 13 ft bgs) sampling for inorganics in the areas of Pad 38, 58, 59, 60, 61, 67, and 38.
 - Subsurface soil (1 to 13 ft bgs) sampling for explosives in the areas of Pads 58, 59, and 67.
 - Subsurface soil (1 to 13 ft bgs) sampling for SVOCs in the areas of Pads 58 and 70.

The following presents the same information as above but organized by construction area in the MPMG Range and GLR as detailed in Section 4.

MPMG Range:

- 100 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area south of Pad 58.
- 175 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area south of Pad 59.
- 200 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area east of Pad 59.
- 250 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the areas of Pads 45 and 60 and dry sediment (0-0.5 ft bgs) sampling for inorganics in the drainage ditch.

- 300 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area of Pad 60 and dry sediment (0-0.5 ft bgs) sampling for inorganics in the drainage ditch.
- 400 Meter Target Array – No sampling.
- 475 Meter Target Array – No sampling.
- 500 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area west of Pad 62.
- 600 Meter Target Array – No sampling.
- 700 Meter Target Array – No sampling.
- 800 Meter Target Array – No sampling.
- 900 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area south of Pad 65.
- 1,000 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the areas north and south of Pad 37.
- 1,100 Meter Target Array – Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for inorganics in the area of Pad 67 and between Pads 37 and 38 and subsurface soil (4-7 ft bgs) sampling for explosives in the area south of Pad 67.
- 1,500 Meter Target Array – Dry sediment sampling (0-0.5 ft bgs) for SVOCs in drainage ditch.

GLR:

- Deep surface soil (0-4 ft bgs) and subsurface soil (4-7 ft bgs) sampling for SVOCs, PCBs, and pesticides.

6.0 References

Environmental Protection Agency (EPA), 2009, *Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites*, December, <<http://www.epa.gov/region09/superfund/prg/index.html>>.

MKM Engineers, Inc. (MKM), 2005a, *Final Phase I MEC Density Survey After Action Report at RVAAP-05 Winklepeck Burning Grounds*, March.

MKM, 2005b, *Final Work Plan for Phase II MEC Clearance and Munitions Response at RVAAP-05 Winklepeck Burning Grounds*, March.

MKM, 2005c, *Final Phase II MEC Clearance and Munitions Response at Winklepeck Burning Grounds*, December 16.

MKM, 2008a, *Final Field Sampling and Analysis Plan MEC Clearance and Munitions Response Amendment 1 for RVAAP-05 Winklepeck Burning Grounds at Ravenna Army Ammunition Plant*, October.

MKM, 2008b, *Final Remedial Action Work Plan, Winklepeck Burning Grounds, Ravenna Army Ammunition Plant, Ravenna, Ohio, Amendment 1*, September.

MKM, 2009, *Final Remedial Action Completion Report for RVAAP-05 Winklepeck Burning Grounds Pads 61/671A, 67, and 70*, November 19.

Science Applications International Corporation (SAIC), 1998, *Final Phase I Remedial Investigation Report for High Priority Areas of Concern at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. February.

SAIC, 2001a, *Final Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, March.

SAIC, 2001b, *Final Phase II Remedial Investigation Report for the Winklepeck Burning Grounds at RVAAP, Ravenna, Ohio*, April.

SAIC, 2005a, *Final Phase III Remedial Investigation Report for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, March.

SAIC, 2005b, *Revised Final Focused Feasibility Study for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, March.

SAIC, 2006, *Revised Final Report On The Biological Field-Truthing Effort At Winklepeck Burning Grounds At Ravenna Army Ammunition Plant, Ravenna, Ohio*, August.

SAIC, 2008, *Final Record of Decision for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. August.

SAIC, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio*, March 23.

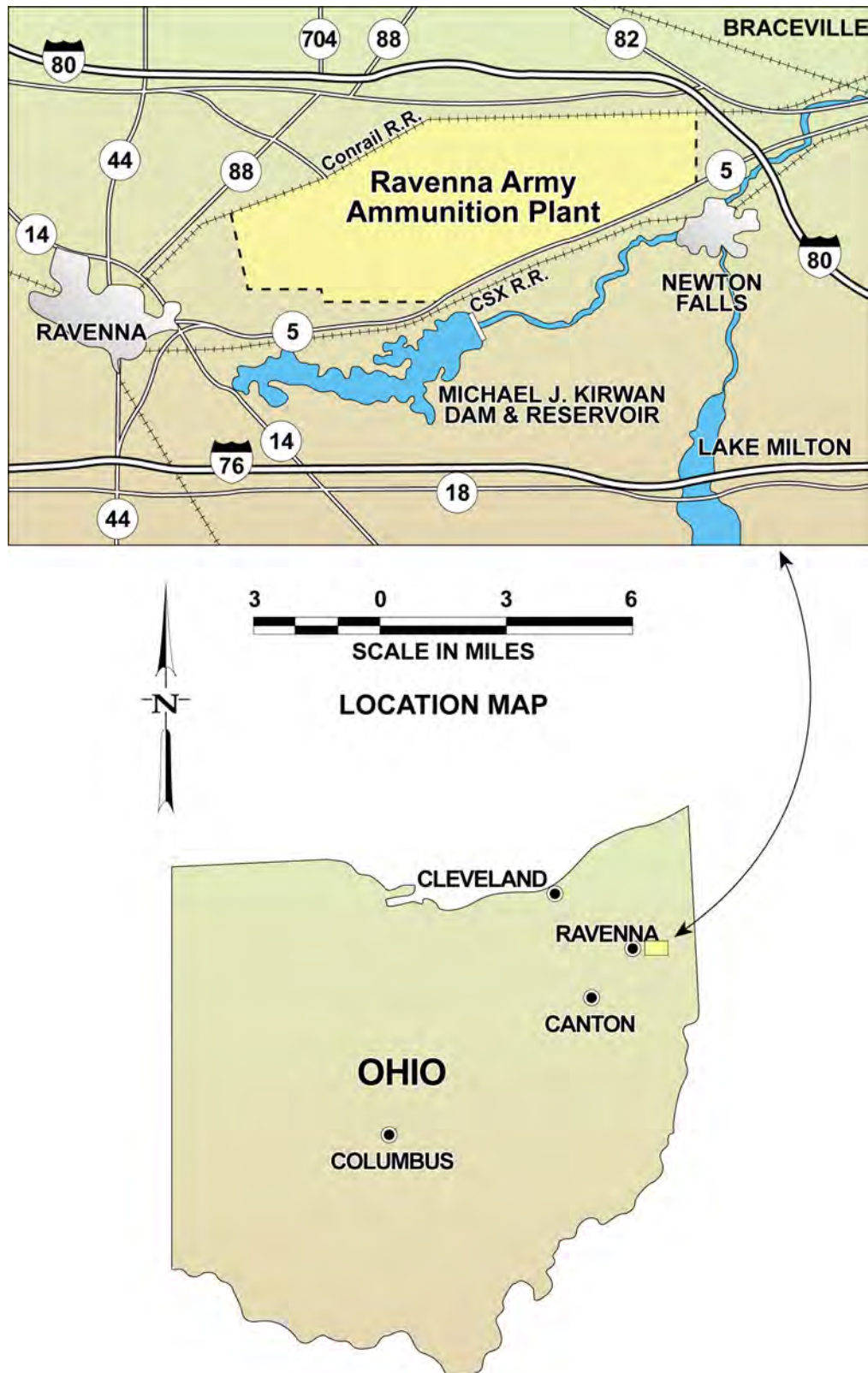
United States Army Corps of Engineers (USACE), 2005, *Ravenna Army Ammunition Plant Facility-Wide Human Health Risk Assessor Manual, Amendment 1*.

USACE, 2009, *Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals*, June.

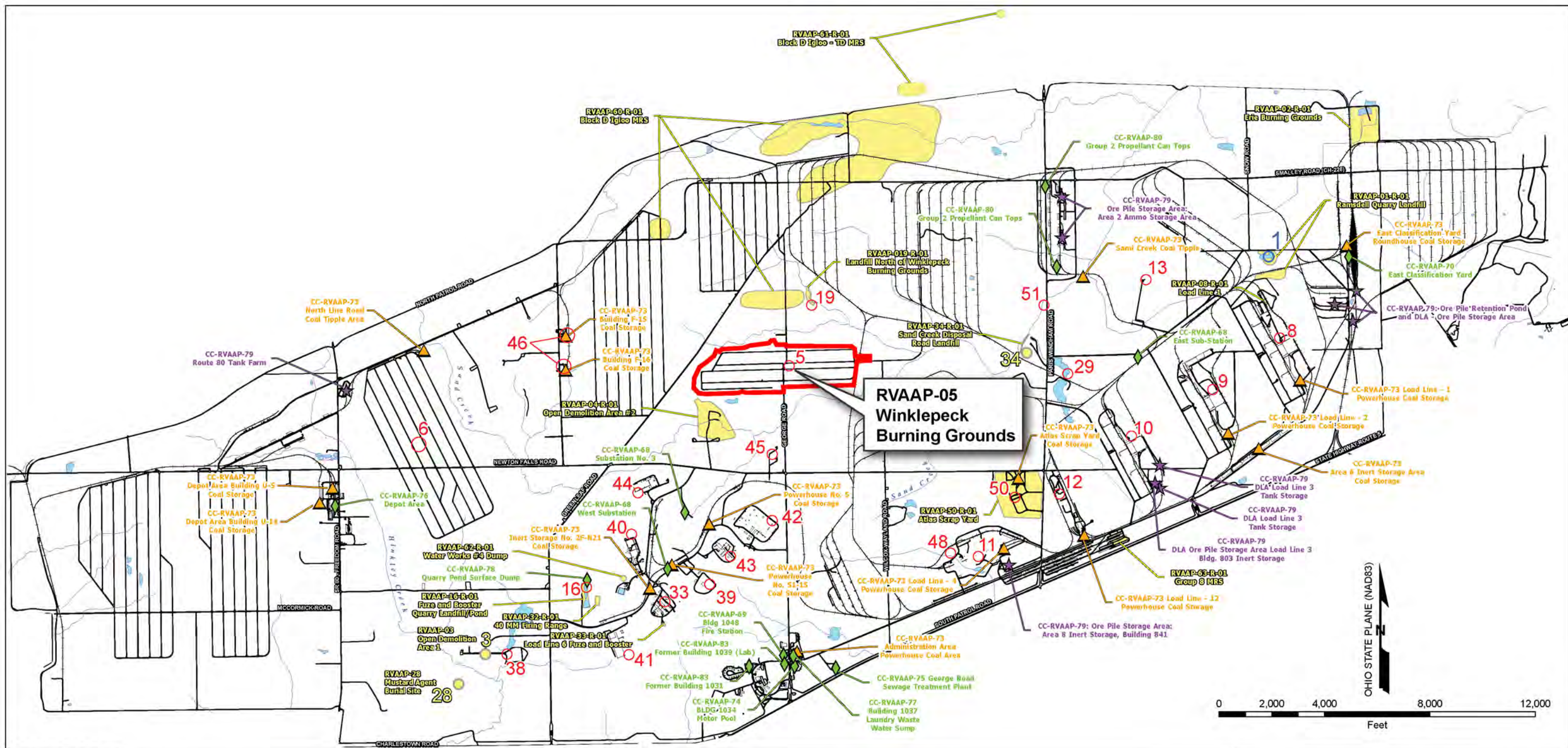
Shaw, 2006, *Final Sampling and Analysis Plan Addendum No. 1 for the Remediation of Soils at LLs 1, 2, 3 and 4, Ravenna Army Ammunition Plant*, November.

Figures

Figure 1-1
Site Location Map



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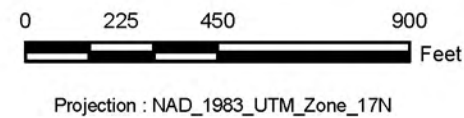
LEGEND OF SITES									
IRP SITES (29 SITES)									
RVAAP-01	RAMSDELL QUARRY LANDFILL	RVAAP-33	LOAD LINE 6	RVAAP-67	FACILITY-WIDE SEWERS	MMRP SITES (14 SITES)			
RVAAP-03	OPEN DEMOLITION AREA 1	RVAAP-34	SAND CREEK DISPOSAL ROAD LANDFILL	COMPLIANCE RESTORATION SITES (13 SITES)		RVAAP-001-R-01	RAMSDELL QUARRY LANDFILL MRS	○	CERCLA
RVAAP-05	WINKLEPECK BURNING GROUNDS	RVAAP-38	NACA TEST AREA	CC-RVAAP-68	ELECTRIC SUBSTATIONS (E.W.N.3)	RVAAP-002-R-01	ERIE BURNING GROUNDS MRS	○	RCRA
RVAAP-06	C BLOCK QUARRY	RVAAP-39	LOAD LINE 5	CC-RVAAP-69	BUILDING 1048 - FIRE STATION	RVAAP-004-R-01	OPEN DEMOLITION AREA #2 MRS	◇	MMRP SITES
RVAAP-08	LOAD LINE 1	RVAAP-40	LOAD LINE 7	CC-RVAAP-70	EAST CLASSIFICATION YARD	RVAAP-008-R-01	LOAD LINE 1 MRS	★	COMPLIANCE RESTORATION SITES - APPROVED
RVAAP-09	LOAD LINE 2	RVAAP-41	LOAD LINE 8	CC-RVAAP-72	FACILITY-WIDE USTS (4 SITES)	RVAAP-010-R-01	FUZE AND BOOSTER QUARRY MRS	▲	DLA ORE STORAGE AREAS (7 SITES)
RVAAP-10	LOAD LINE 3	RVAAP-42	LOAD LINE 9	CC-RVAAP-73	FACILITY-WIDE COAL STORAGE	RVAAP-012-R-01	LANDFILL NORTH OF WINKLEPECK MRS	●	COAL STORAGE AREAS (17 SITES)
RVAAP-11	LOAD LINE 4	RVAAP-43	LOAD LINE 10	CC-RVAAP-74	BUILDING 1034 MOTOR POOL HYDRAULIC LIFT	RVAAP-016-R-01	40MM FIRING RANGE MRS	○	AOC UNDER A/E SERVICES CONTRACT
RVAAP-12	LOAD LINE 12	RVAAP-44	LOAD LINE 11	CC-RVAAP-75	GEORGE ROAD SEWAGE TREATMENT PLANT	RVAAP-022-R-01	FIRESTONE TEST FACILITY MRS		
RVAAP-13	BLDG 1200 AND DILLUTION/SETTLING POND	RVAAP-45	WET STORAGE AREA	CC-RVAAP-76	DEPOT AREA	RVAAP-028-R-01	SAND CREEK DUMP MRS		
RVAAP-16	FUZE AND BOOSTER QUARRY LANDFILL/PONDS	RVAAP-46	BUILDINGS F-15 AND F-16	CC-RVAAP-77	BUILDING 1037 LAUNDRY WASTE WATER SUMP	RVAAP-030-R-01	ATLAS SCRAP YARD MRS		
RVAAP-19	LANDFILL NORTH OF WINKLEPECK BURNING GROUND	RVAAP-48	ANCHOR TEST AREA	CC-RVAAP-78	QUARRY POND SURFACE DUMP	RVAAP-032-R-01	BLOCK D IGLOO MRS		
RVAAP-23	MUSTARD AGENT BURIAL SITE	RVAAP-50	ATLAS SCRAP YARD	CC-RVAAP-79	DLA ORE STORAGE SITES	RVAAP-034-R-01	BLOCK D IGLOO -TD MRS		
RVAAP-29	UPPER AND LOWER COBBS POND	RVAAP-51	DUMP ALONG PARIS-WINDHAM ROAD	CC-RVAAP-80	GROUP 2 PROPELLANT CAN TOPS	RVAAP-036-R-01	WATER WORKS #4 DUMP MRS		
		RVAAP-66	FACILITY-WIDE GROUNDWATER	CC-RVAAP-83	FORMER BUILDINGS 1031 AND 1039	RVAAP-038-R-01	GROUP 8 MRS		

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- Winklepeck Burning Grounds AOC
- Former Burning Pad
- Former Rail Bed, Tracks Removed
- Perennial Stream

Notes:
1) Aerial photograph (Portage County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2009.



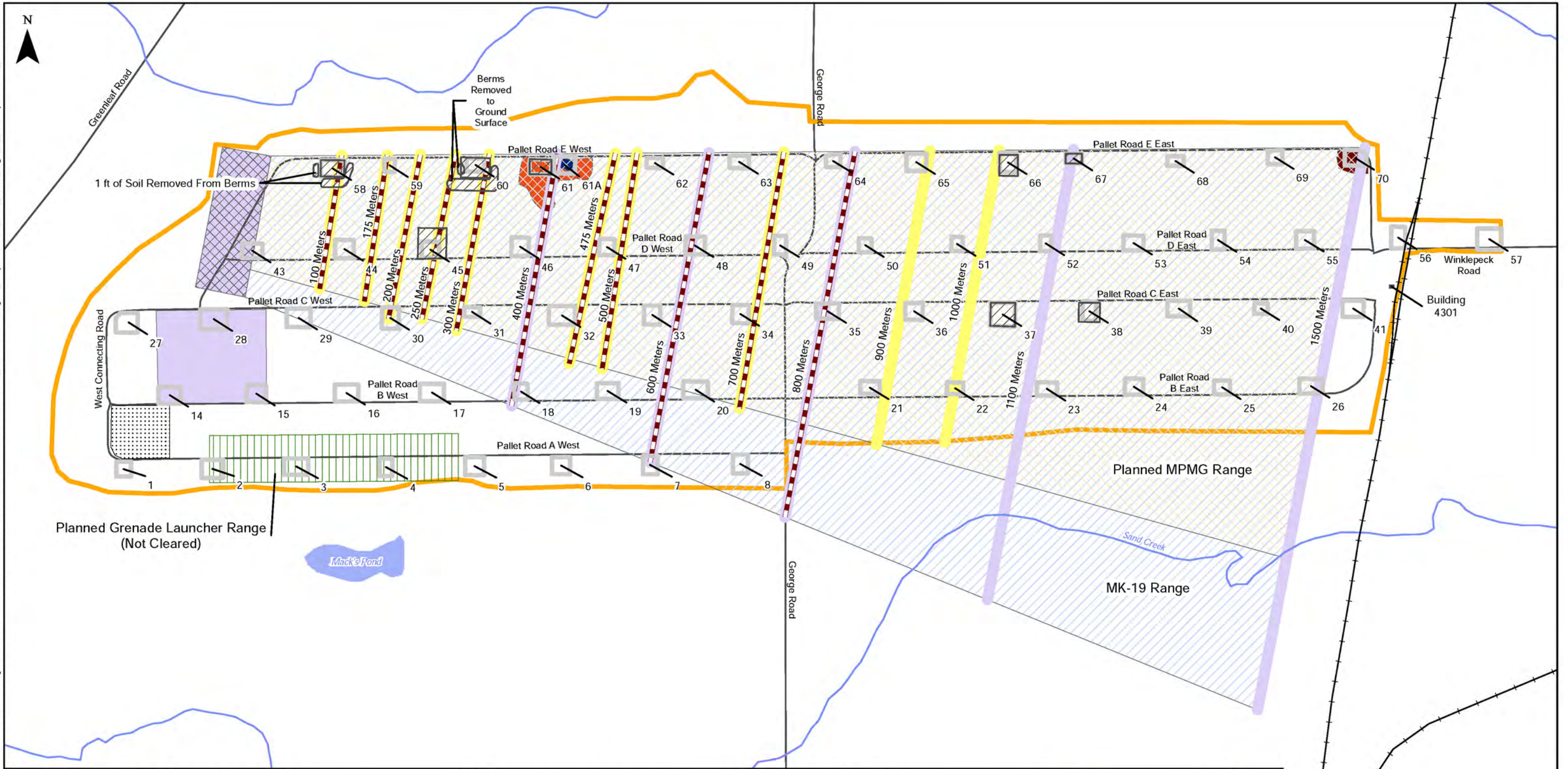
U.S. ARMY
CORPS OF ENGINEERS
LOUISVILLE DISTRICT

FIGURE
NUMBER
1-3

SITE LAYOUT
WINKLEPECK BURNING GROUNDS AOC
RAVENNA ARMY AMMUNITION PLANT



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Winklepeck Burning Grounds AOC

Firing Point Area

MK-19 Range

Planned MPMG Range

Planned Grenade Launcher Range (Not Cleared)

Planned Grenade Launcher Range Parking (Not Cleared)

Former Burning Pad

2005 MEC Removal to 1 ft bgs
(Unless Otherwise Noted)

2005 MEC Surface Clearance

2008 Excavation and Grading

Excavation to 1 ft
Below Design Depth

Excavation to 2 ft
Below Ground Surface

Excavation/Grading to Design
Depth (up to 6.5 ft bgs)

Soil Stockpile Removed
to Ground Surface

Mark 19 Range Target Arrays

Planned Target Array (Not Cleared)

Planned 2ft Buried Electrical
Wire in Conduit

Former Rail Bed, Tracks Removed

Perennial Stream

Note:
1) No subsurface clearance was performed in the area of
the Mark 19 Range except as noted.



0 225 450 900 Feet

Projection : NAD_1983_UTM_Zone_17N



U.S. ARMY
CORPS OF ENGINEERS
LOUISVILLE DISTRICT

FIGURE
NUMBER
1-4

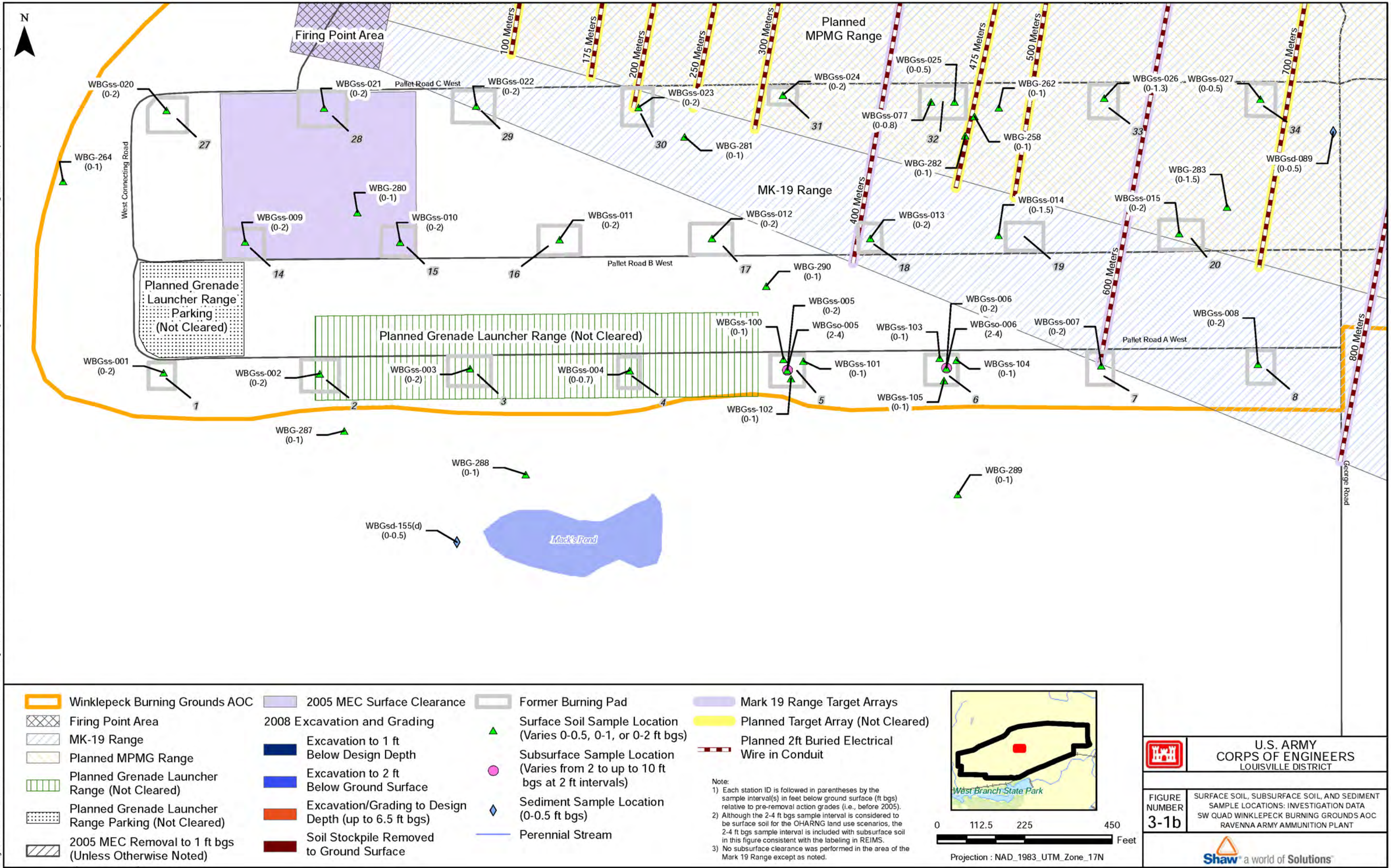
RVAAP-05 WINKLEPECK BURNING GROUNDS
WITH MARK 19 RANGE, MULTIPURPOSE MACHINE
GUN RANGE, AND GRENADE LAUNCHER RANGE
RAVENNA ARMY AMMUNITION PLANT

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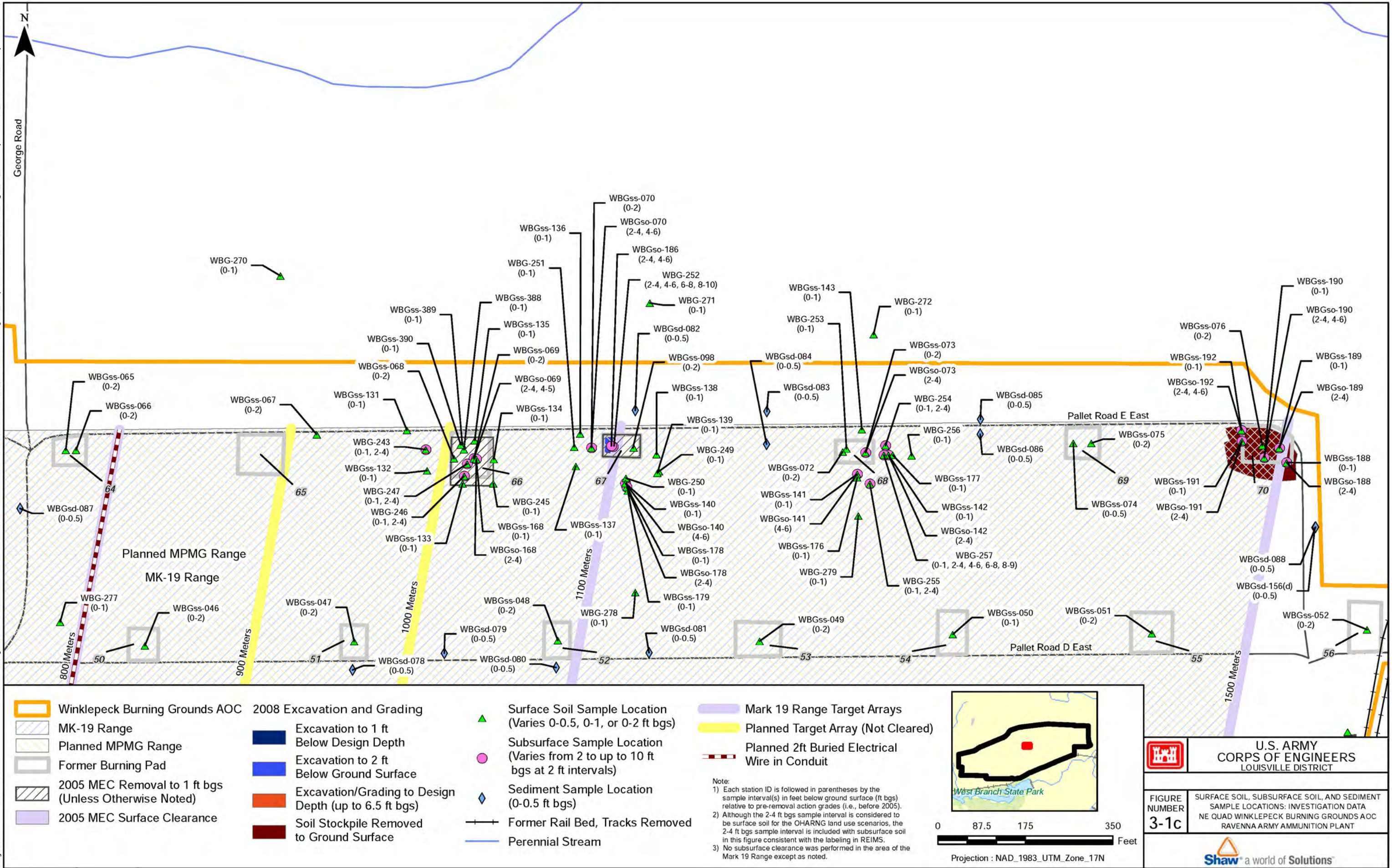
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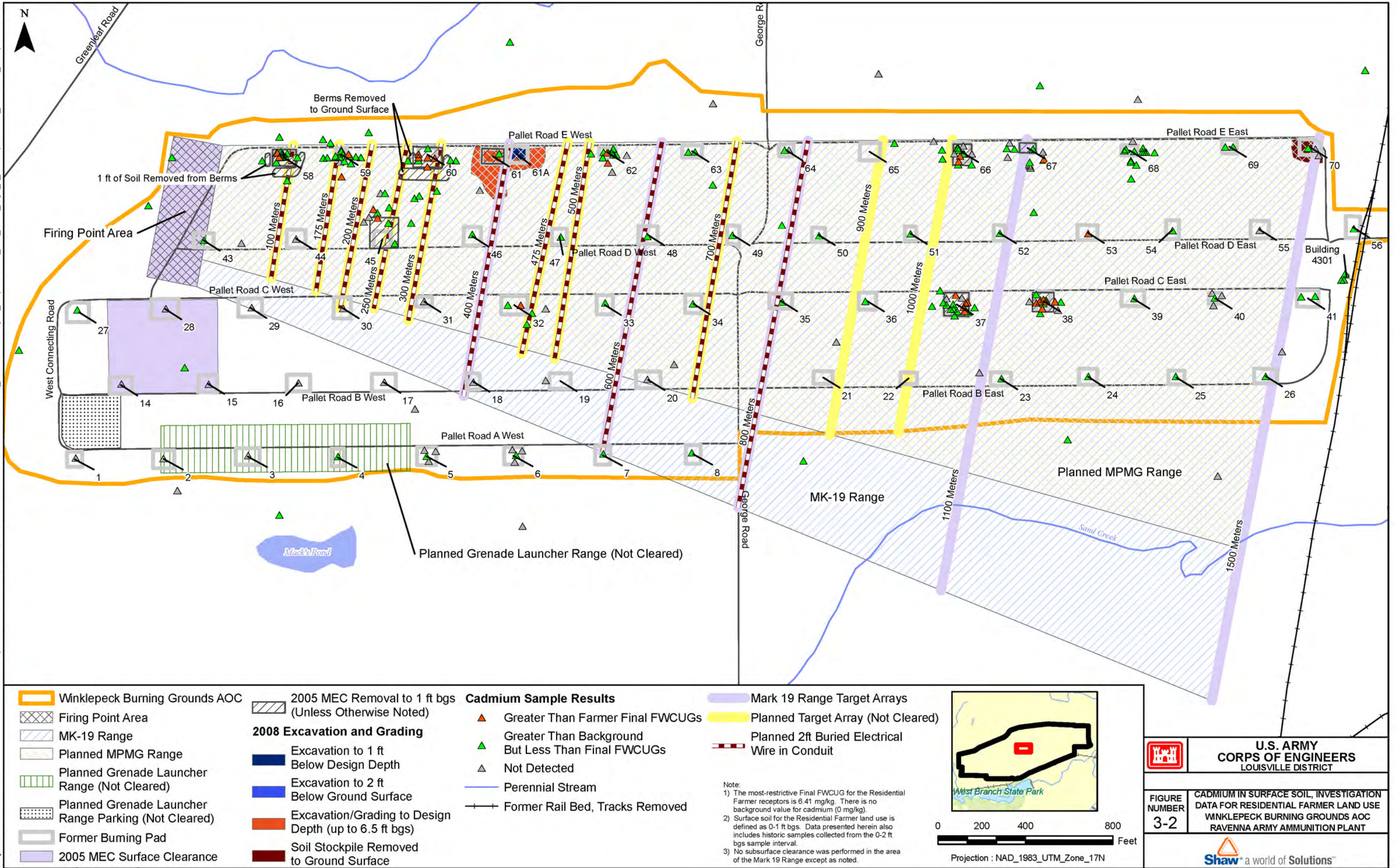
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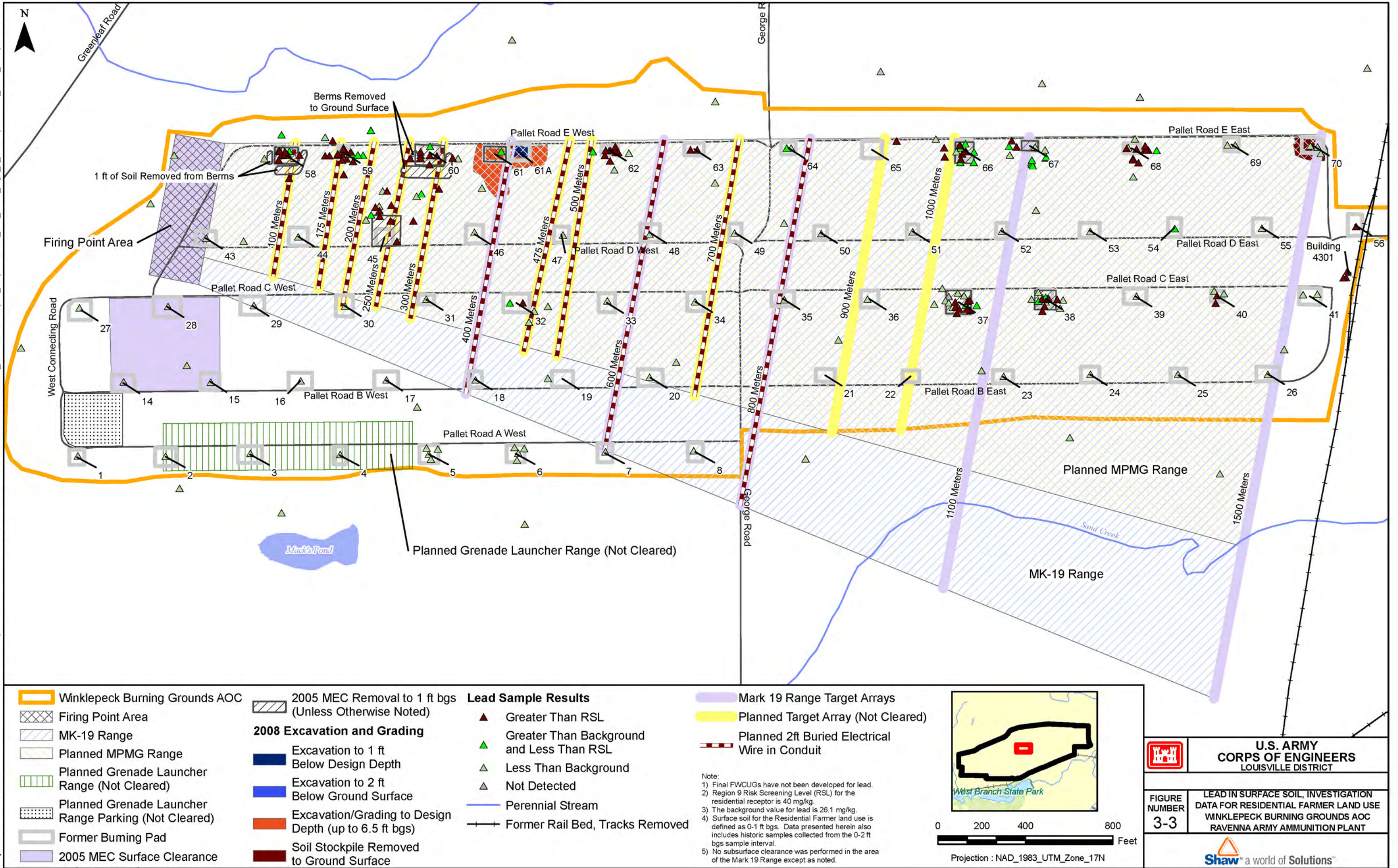
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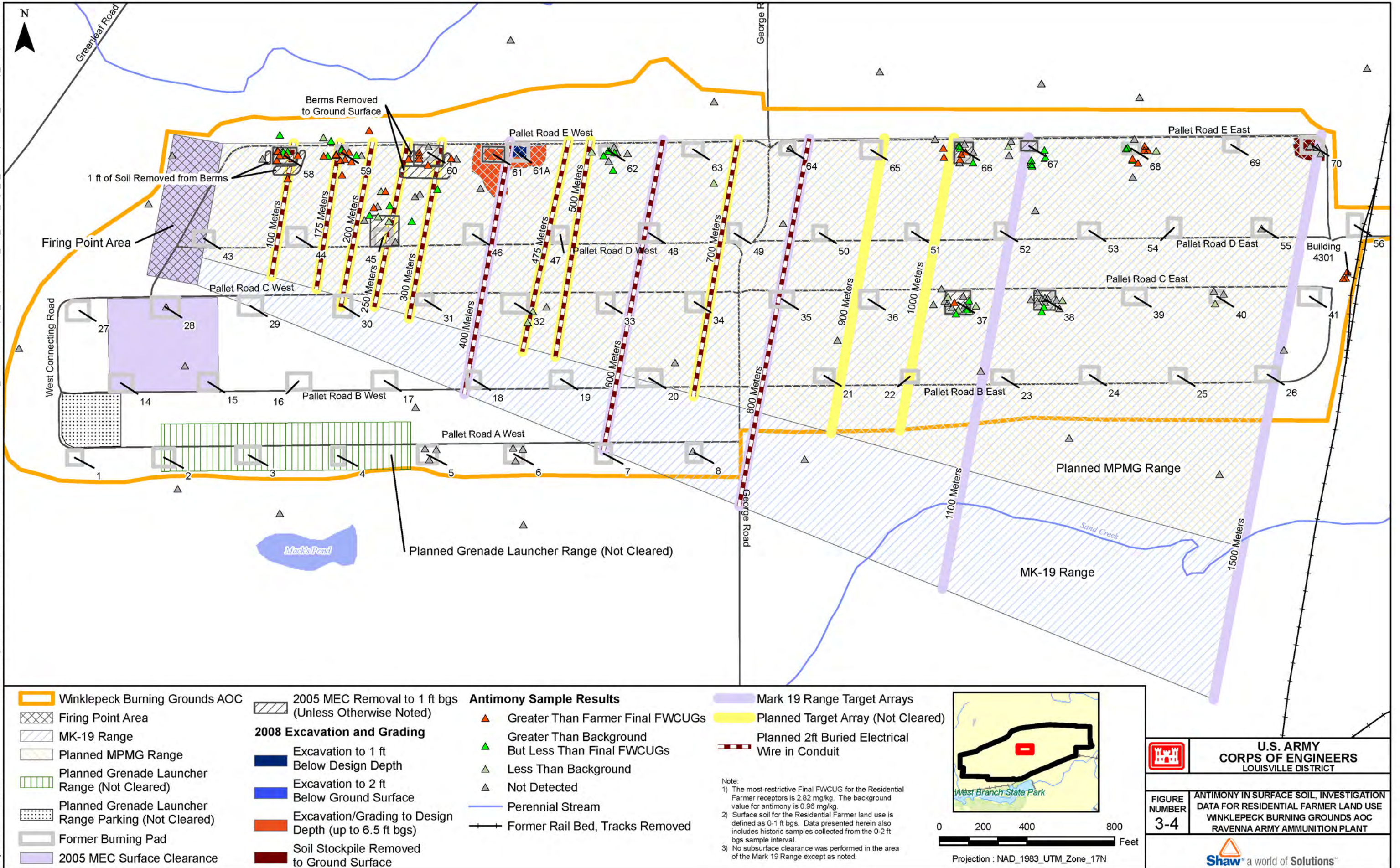
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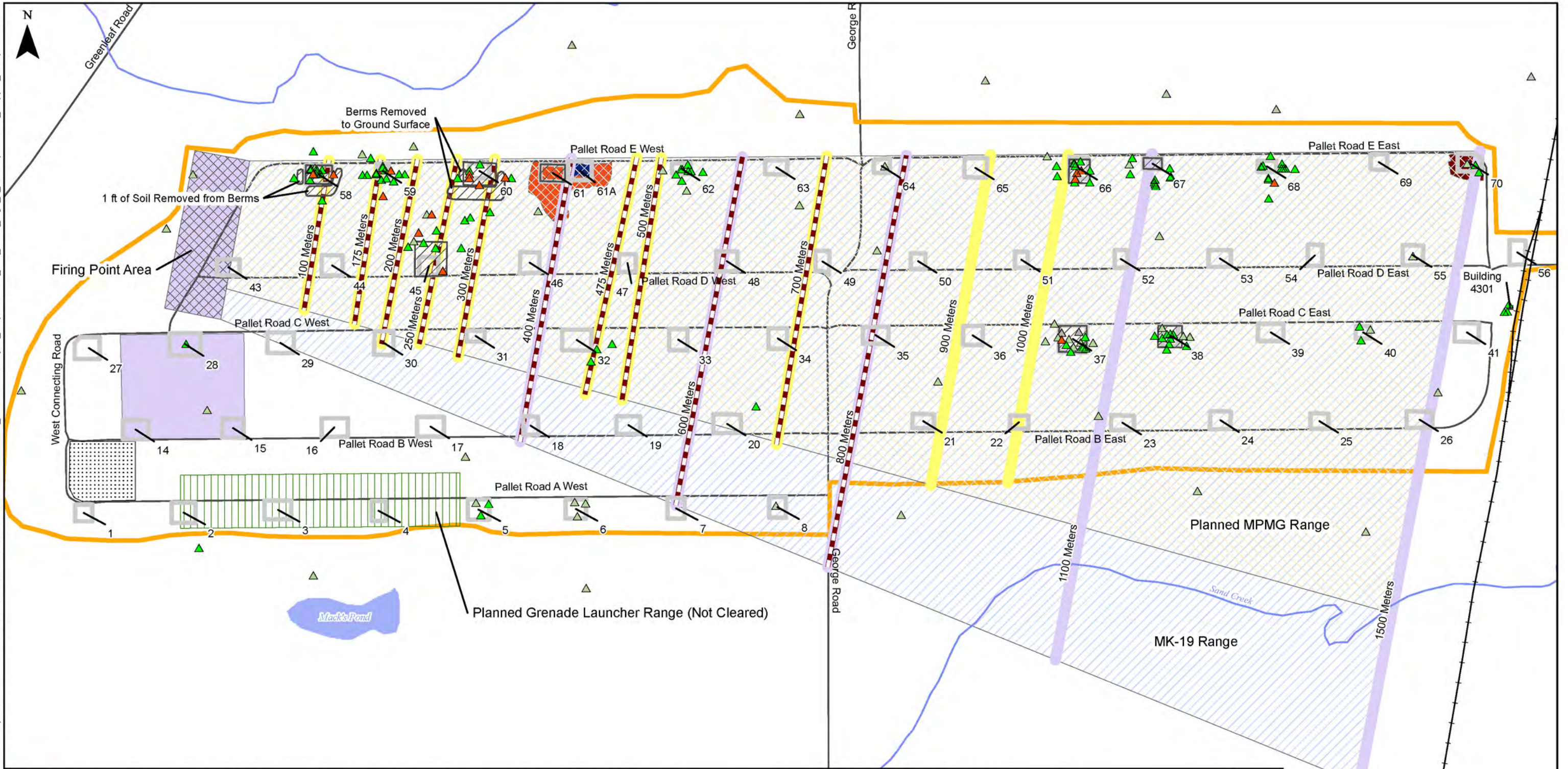
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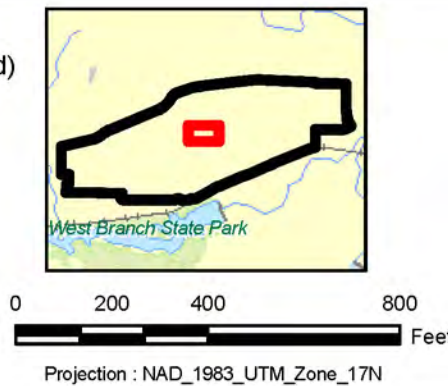
- Winklepeck Burning Grounds AOC
- Firing Point Area
- MK-19 Range
- Planned MPMG Range
- Planned Grenade Launcher Range (Not Cleared)
- Planned Grenade Launcher Range Parking (Not Cleared)
- Former Burning Pad
- 2005 MEC Surface Clearance


- 2005 MEC Removal to 1 ft bgs (Unless Otherwise Noted)
- 2008 Excavation and Grading**
- Excavation to 1 ft Below Design Depth
- Excavation to 2 ft Below Ground Surface
- Excavation/Grading to Design Depth (up to 6.5 ft bgs)
- Soil Stockpile Removed to Ground Surface

- Copper Sample Results**
- Greater Than Farmer Final FWCUGs
- Greater Than Background But Less Than Final FWCUGs
- Less Than Background
- Not Detected
- Perennial Stream
- Former Rail Bed, Tracks Removed

- Mark 19 Range Target Arrays
- Planned Target Array (Not Cleared)
- Planned 2ft Buried Electrical Wire in Conduit

Note:
1) The most-restrictive Final FWCUG for the Residential Farmer receptors is 311 mg/kg. The background value for copper is 17.7 mg/kg.
2) Surface soil for the Residential Farmer land use is defined as 0-1 ft bgs. Data presented herein also includes historic samples collected from the 0-2 ft bgs sample interval.
3) No subsurface clearance was performed in the area of the Mark 19 Range except as noted.






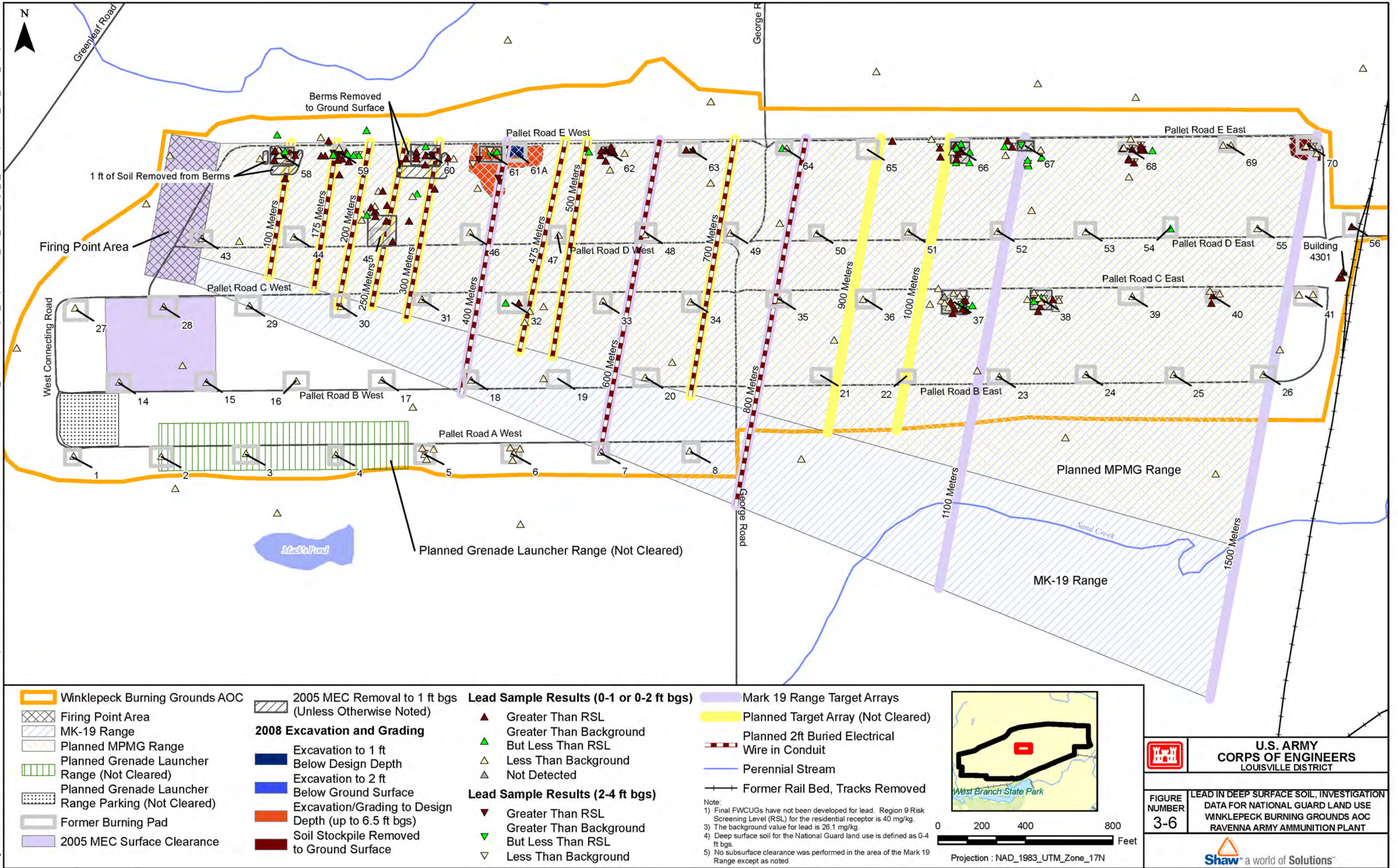
**U.S. ARMY
CORPS OF ENGINEERS**
LOUISVILLE DISTRICT

FIGURE
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3-5

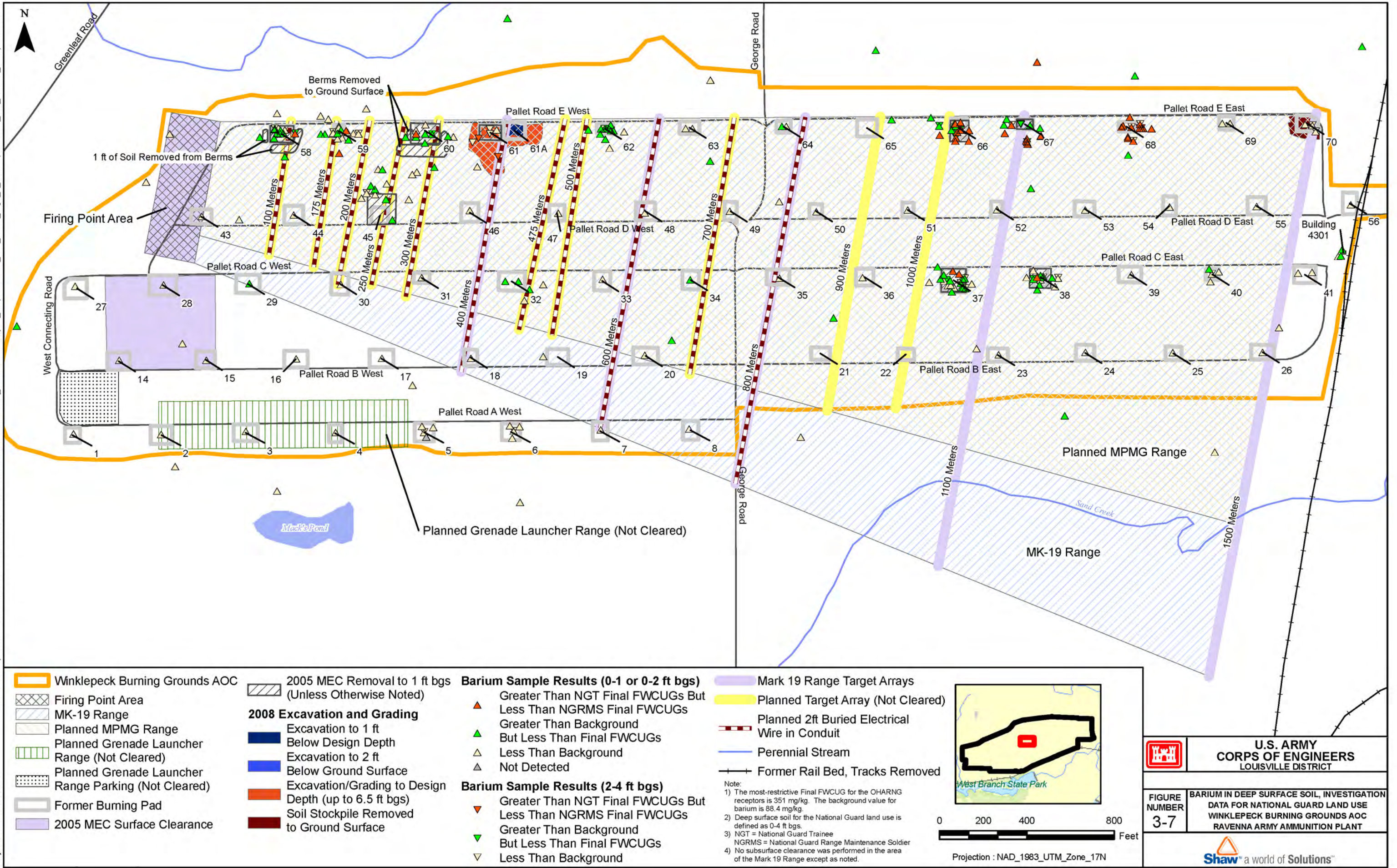
**COPPER IN SURFACE SOIL, INVESTIGATION
DATA FOR RESIDENTIAL FARMER LAND USE
WINKLEPECK BURNING GROUNDS AOC
RAVENNA ARMY AMMUNITION PLANT**

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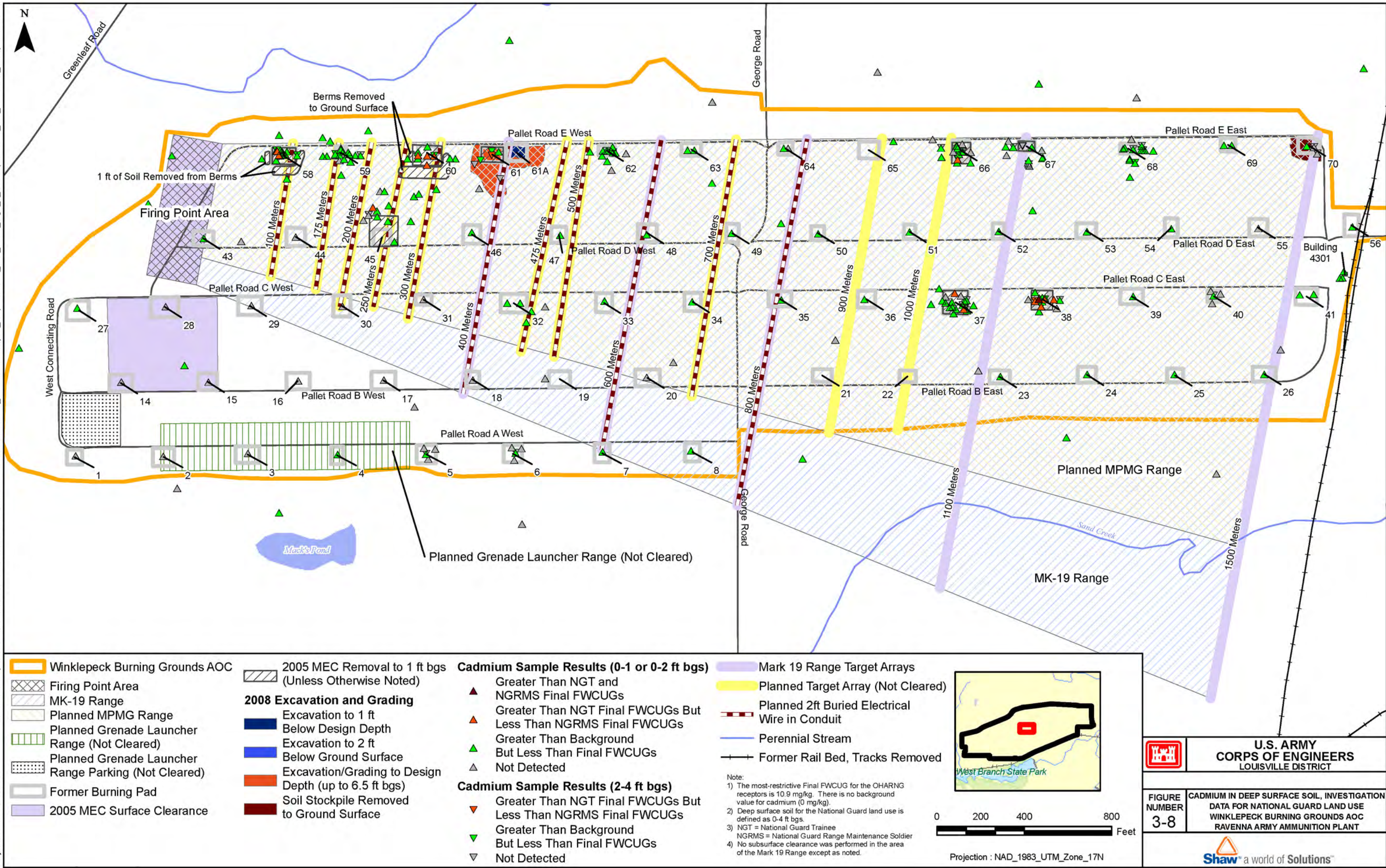
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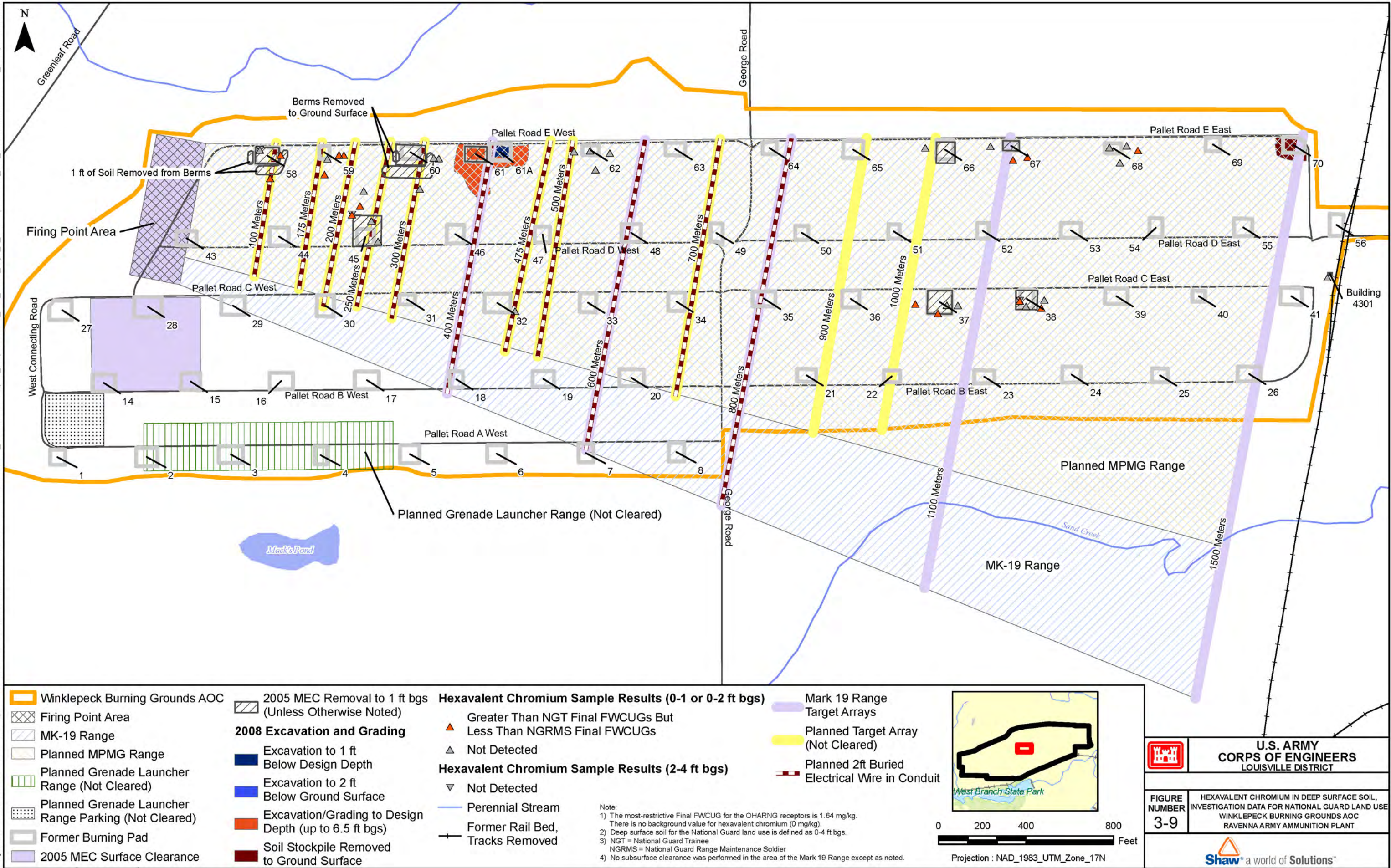
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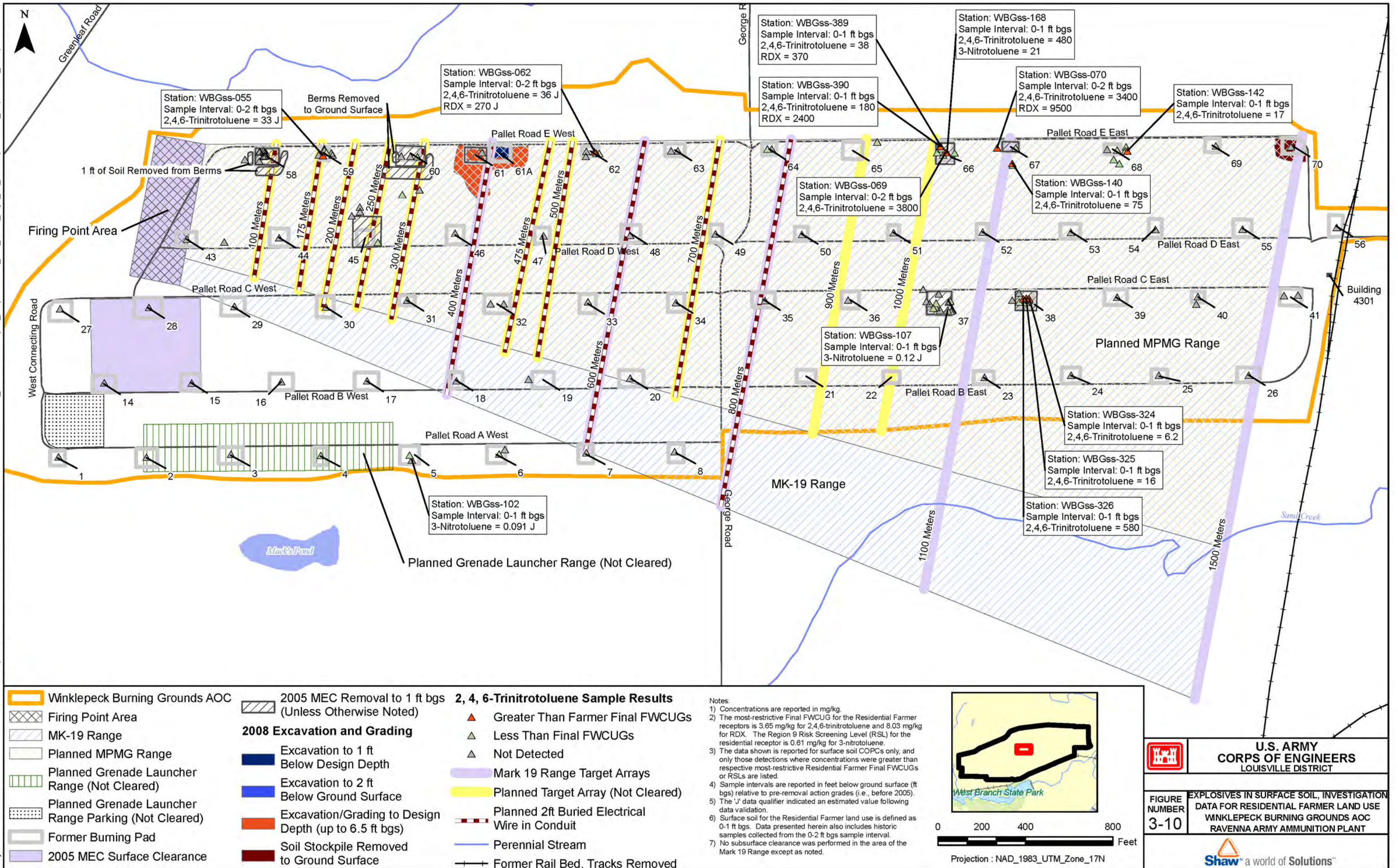
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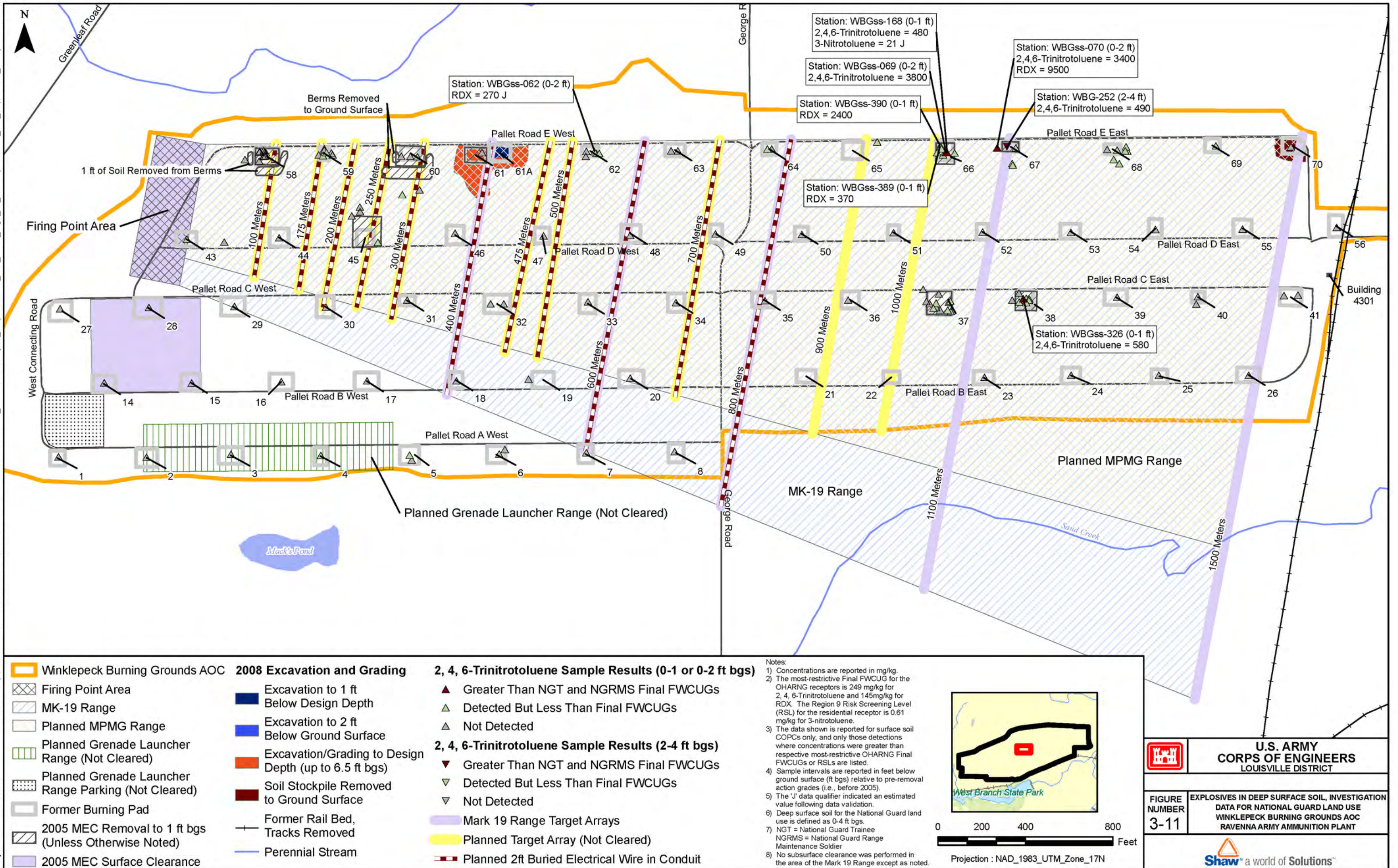
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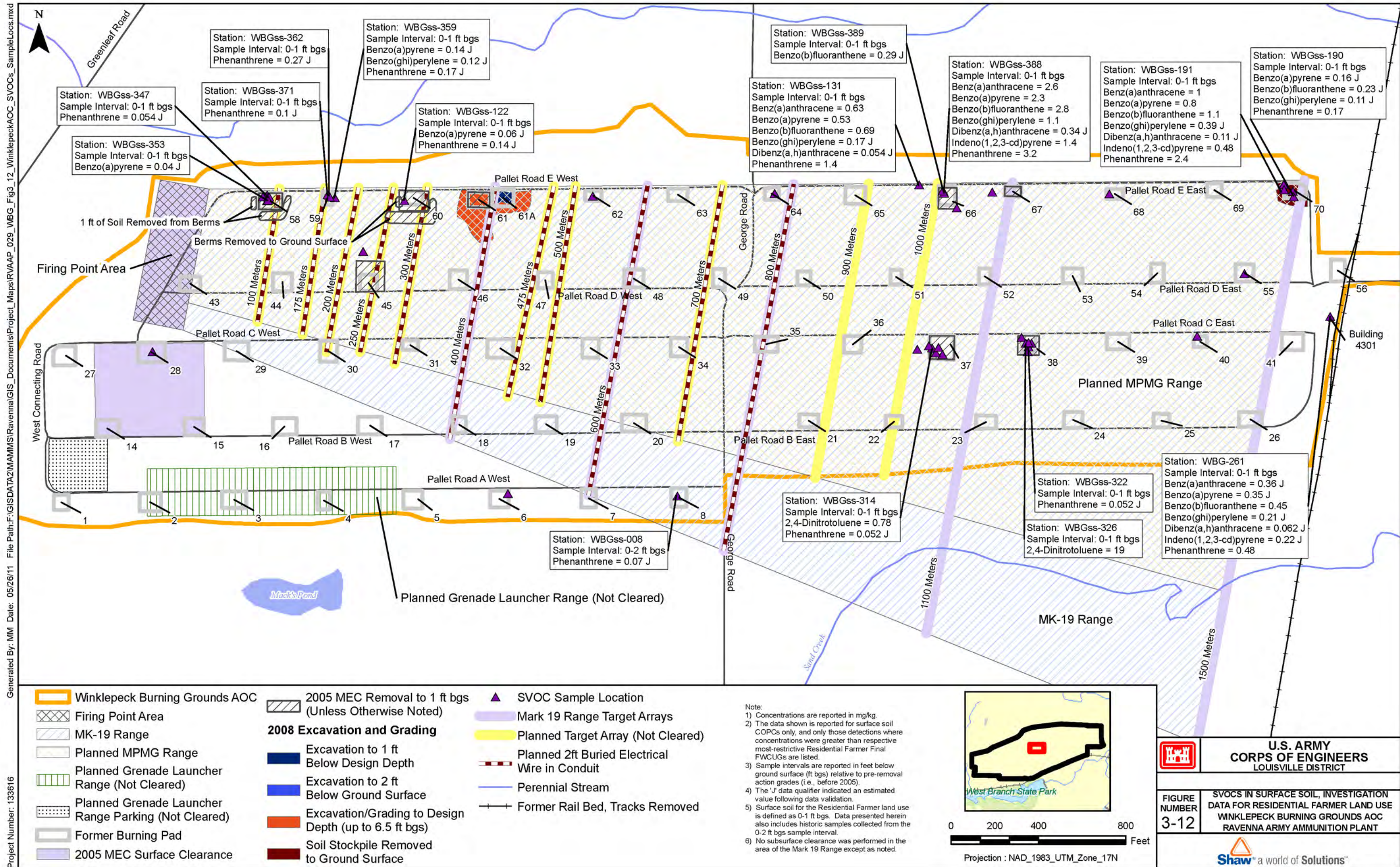
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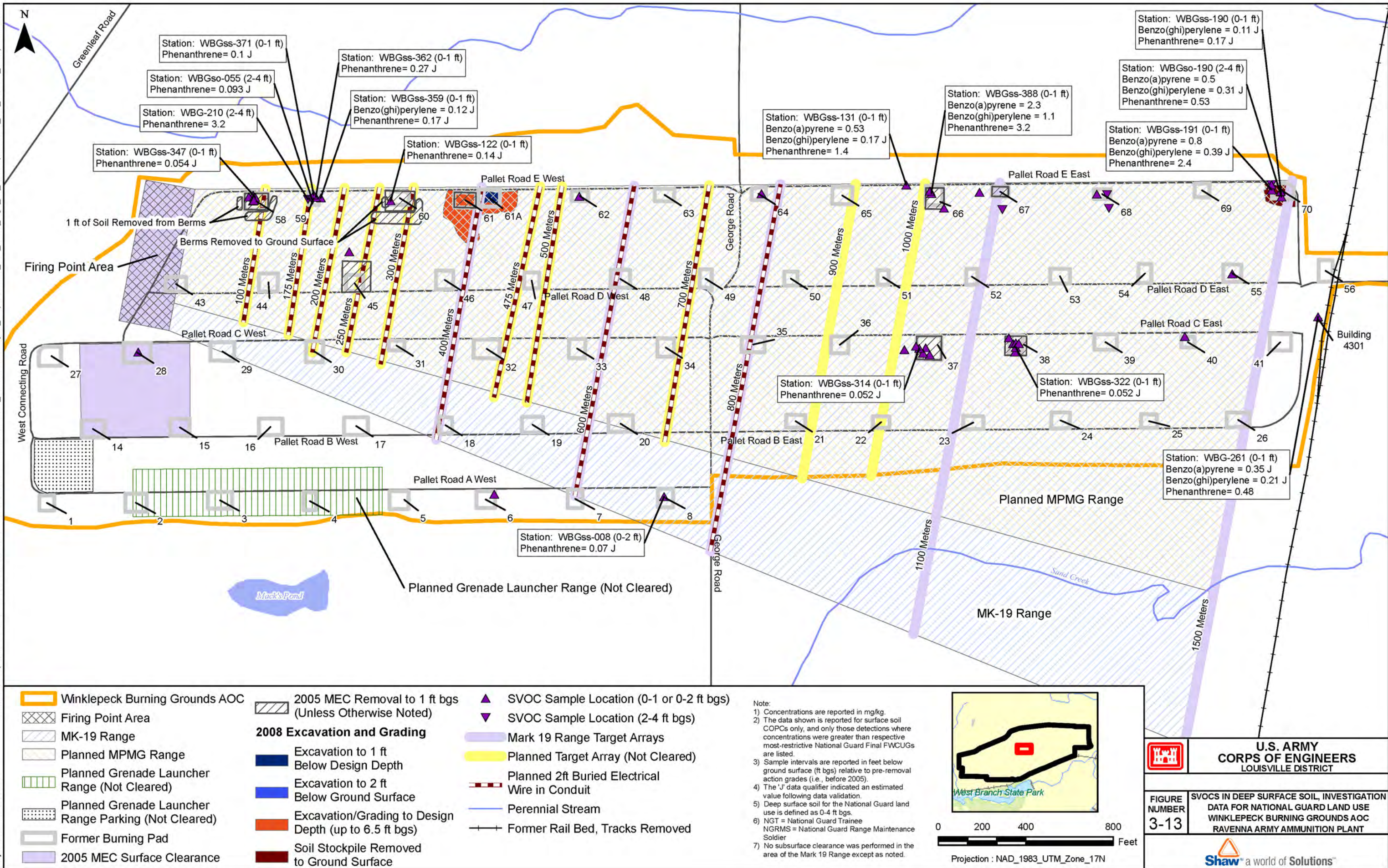
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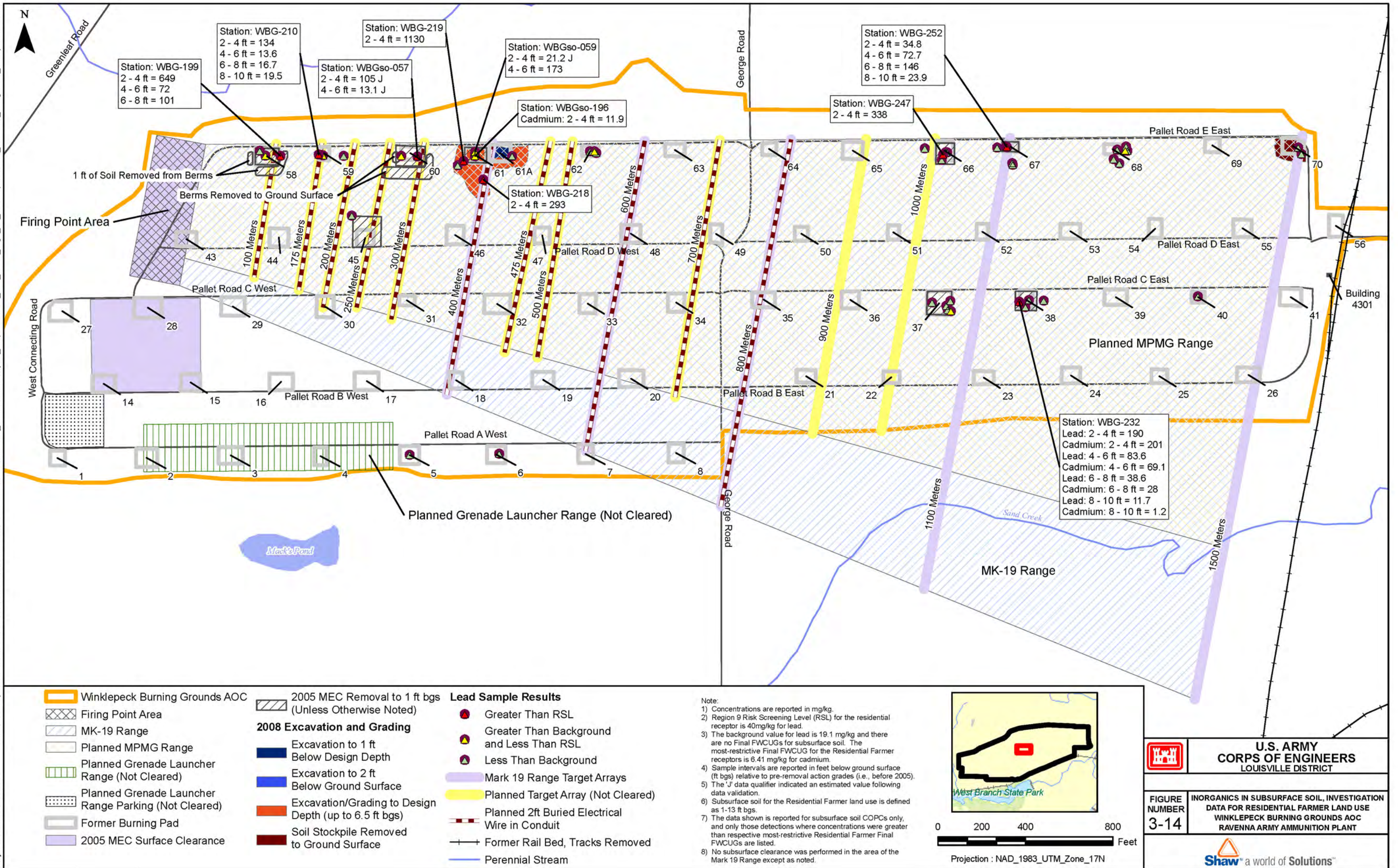
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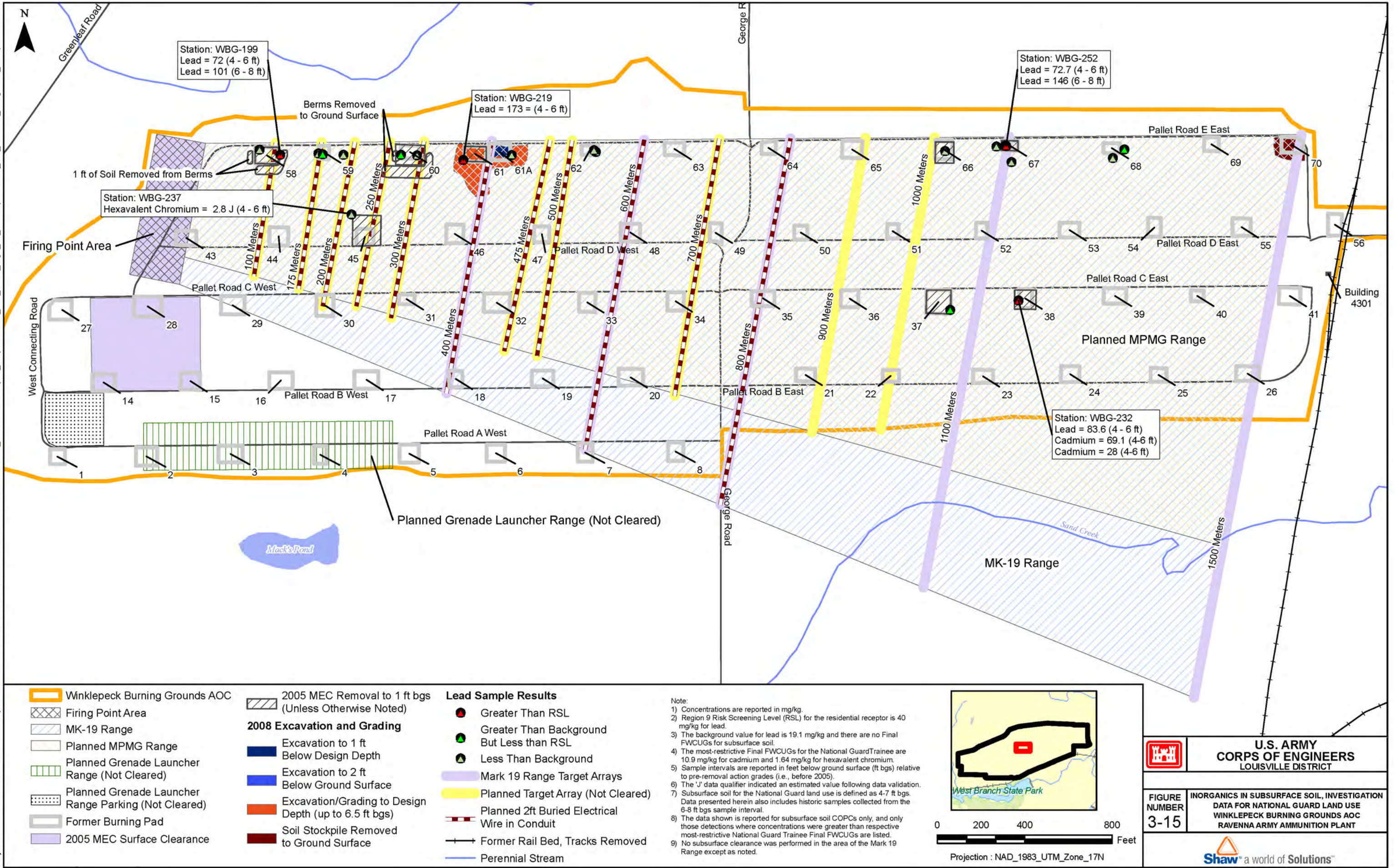
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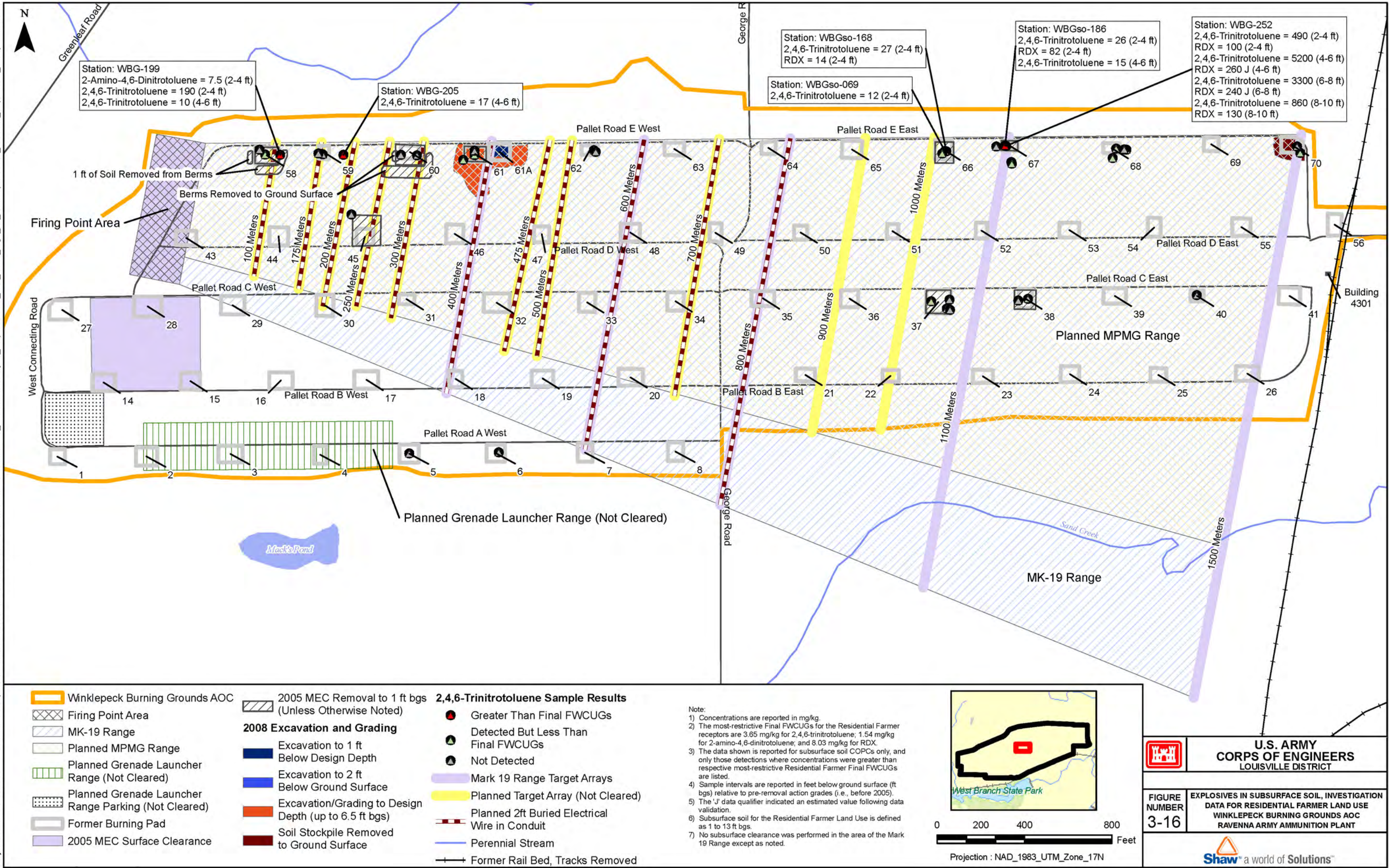
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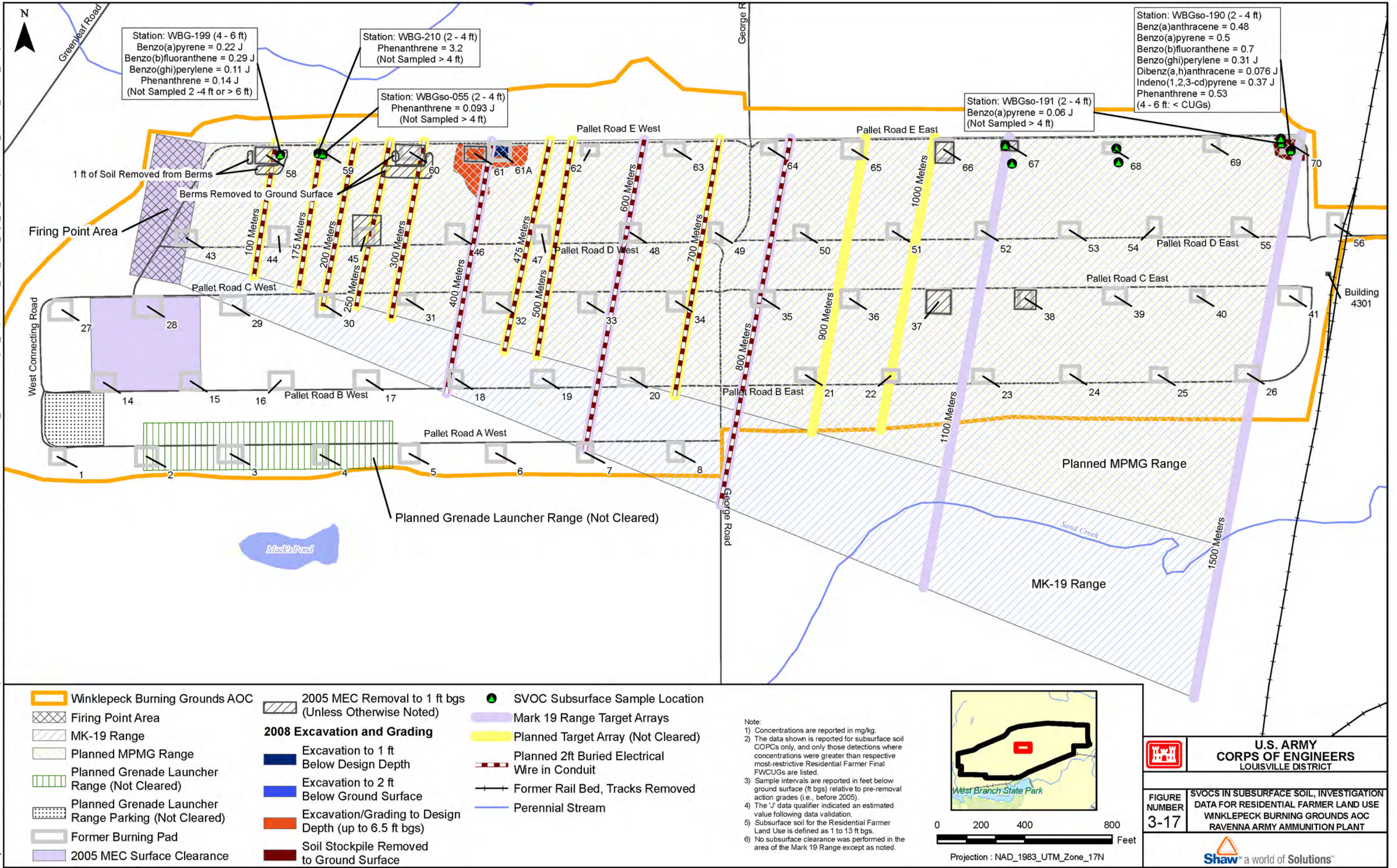
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Tables

TABLE 3-1
Identification of COPCs in Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria (0-1 ft bgs) ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Surface Soil (0-1 feet bgs) ^d									
											Residential Farmer									
											Adult					Child				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
Explosives and Propellants																				
1,3,5-Trinitrobenzene	mg/kg	130	18	490	NA	NA	Yes	29.11	29.11	NA	--	1,528	NA	No	No	--	225	NA	No	No
1,3-Dinitrobenzene	mg/kg	130	3	0.088	NA	NA	Yes	0.097	0.088	NA	--	5.94	NA	No	No	--	0.765	NA	No	No
2,4,6-Trinitrotoluene	mg/kg	130	44	3,800	NA	NA	Yes	314.8	314.8	NA	32.8	21.1	9	Yes	Yes	28.4	3.65	12	Yes	Yes
2,4-Dinitrotoluene	mg/kg	130	15	0.55	NA	NA	Yes	0.179	0.179	NA	0.753	43.9	NA	No	No	1.1	12.8	NA	No	No
2,6-Dinitrotoluene	mg/kg	130	4	0.62	NA	NA	Yes	0.106	0.106	NA	0.769	22.4	NA	No	No	1.1	6.42	NA	No	No
2-Amino-4,6-Dinitrotoluene	mg/kg	14	4	0.97	NA	NA	Yes	0.333	0.333	NA	--	12.8	NA	No	No	--	1.54	NA	No	No
2-Nitrotoluene	mg/kg	130	2	0.17	NA	NA	Yes	0.202	0.17	NA	6.03	594	NA	No	No	3.88	76.5	NA	No	No
3-Nitrotoluene	mg/kg	130	3	21	NA	NA	Yes	1.504	1.504	0.61	NC	NC	1	Yes ^f	Yes	NC	NC	1	Yes ^f	Yes
4-Amino-2,6-Dinitrotoluene	mg/kg	14	6	0.93	NA	NA	Yes	0.324	0.324	NA	--	12.8	NA	No	No	--	1.54	NA	No	No
4-Nitrotoluene	mg/kg	130	4	0.19	NA	NA	Yes	0.193	0.190	NA	81.6	594	NA	No	No	52.5	76.5	NA	No	No
HMX	mg/kg	130	18	1,700	NA	NA	Yes	102.8	102.8	NA	--	1,909	NA	No	No	--	359	NA	No	No
Nitrobenzene	mg/kg	130	2	0.05	NA	NA	Yes	0.060	0.05	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Nitrocellulose	mg/kg	23	7	315	NA	NA	Yes	53.08	53.08	2.30E+07	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Nitroglycerin	mg/kg	54	2	12	NA	NA	Yes	12.00	12.00	NA	81.6	--	NA	No	No	52.5	--	NA	No	No
Nitroguanidine	mg/kg	23	1	0.091	NA	NA	Yes	NA	0.091	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
RDX	mg/kg	130	18	9,500	NA	NA	Yes	579.2	579.2	NA	11.5	163	5	Yes	Yes	8.03	22.7	5	Yes	Yes
Tetryl	mg/kg	130	5	0.48	NA	NA	Yes	0.349	0.349	24	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Inorganics																				
Aluminum	mg/kg	246	246	50,100	17,700	Yes	Yes	13,378	13,378	NA	--	52,923	NA	No	No	--	7,380	NA	No ^e	No
Antimony	mg/kg	177	93	157	0.96	Yes	Yes	9.00	9.00	NA	--	13.6	NA	No	No	--	2.82	38	Yes	Yes
Arsenic	mg/kg	247	247	35.8	15.4	Yes	Yes	13.06	13.06	NA	0.425	8.21	NA	No ^e	No	0.524	2.02	NA	No ^e	No
Barium	mg/kg	246	245	10,400	88.4	Yes	Yes	675.9	675.9	NA	--	8,966	NA	No	No	--	1,413	NA	No	No
Beryllium	mg/kg	176	110	10.9	0.88	Yes	Yes	0.75	0.75	NA	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No
Cadmium	mg/kg	246	179	877	0	Yes	Yes	30.48	30.48	NA	1,249	22.3	8	Yes	Yes	2,677	6.41	29	Yes	Yes
Calcium	mg/kg	176	170	247,000	15,800	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	No
Chromium, total	mg/kg	246	246	189	17.4	Yes	Yes	20.43	20.43	NA	--	19,694	NA	No	No	--	8,147	NA	No	No
Chromium, hexavalent	mg/kg	37	14	10.1	NA	NA	Yes	4.02	4.02	NA	187	90.4	NA	No	No	401.5	19.9	NA	No	No
Cobalt	mg/kg	176	174	21.7	10.4	Yes	Yes	8.86	8.86	NA	803	820	NA	No	No	1,721	131	NA	No	No
Copper	mg/kg	176	174	16,800	17.7	Yes	Yes	662.3	662.3	NA	--	2,714	NA	No	No	--	311	16	Yes	Yes
Cyanide	mg/kg	99	12	2.8	0	Yes	Yes	0.29	0.29	160	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Iron	mg/kg	176	176	57,100	23,100	Yes	No ^g	NA	NA	NA	--	19,010	NA	NA	No	--	2,313	NA	NA	No
Lead	mg/kg	247	246	2,800	26.1	Yes	Yes	235.5	235.5	40	NC	NC	90	Yes ^f	Yes ^f	NC	NC	90	Yes ^f	Yes ^f
Magnesium	mg/kg	176	176	53,700	3,030	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	No
Manganese	mg/kg	246	246	4,270	1,450	Yes	Yes	703.9	703.9	NA	--	1,482	NA	No	No	--	293	NA	No ^e	No
Mercury	mg/kg	247	171	1.2	0.036	Yes	Yes	0.090	0.090	NA	--	16.5	NA	No	No	--	2.3	NA	No	No
Nickel	mg/kg	176	174	50.7	21.1	Yes	Yes	19.47	19.47	NA	--	1,346	NA	No	No	--	155	NA	No	No
Potassium	mg/kg	176	176	3,710	927	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	No
Selenium	mg/kg	247	179	5.0	1.4	Yes	Yes	0.99	0.99	NA	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No
Silver	mg/kg	246	40	33.2	0	Yes	Yes	1.09	1.09	NA	--	324	NA	No	No	--	38.6	NA	No	No
Sodium	mg/kg	175	79	2,320	123	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	No
Thallium	mg/kg	177	112	3.1	0	Yes	Yes	0.57	0.57	NA	--	4.76	NA	No	No	--	0.612	NA	No	No
Vanadium	mg/kg	176	176	35.6	31.1	Yes	Yes	22.59	22.59	NA	--	156	NA	No	No	--	44.9	NA	No	No
Zinc	mg/kg	246	244	24,900	61.8	Yes	Yes	804.2	804.2	NA	--	19,659	NA	No	No	--	2,321	NA	No	No
Pesticides and PCBs																				
Dieldrin	mg/kg	14	2	0.0054	NA	NA	Yes	0.0054	0.0054	NA	0.087	2.97	NA	No	No	0.056	0.383	NA	No	No
Heptachlor Epoxide	mg/kg	14	1	0.081	NA	NA	Yes	NA	0.081	NA	0.152	0.773	NA	No	No	0.098	0.099	NA	No	No
PCB-1254	mg/kg	14	1	0.14	NA	NA	Yes	NA	0.14	NA	0.203	0.348	NA	No	No	0.349	0.12	1	Yes	Yes

TABLE 3-1
Identification of COPCs in Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria (0-1 ft bgs) ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Surface Soil (0-1 feet bgs) ^d										
											Residential Farmer										
											Adult					Child					
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	
SVOCs																					
2,4-Dinitrotoluene	mg/kg	35	5	19	NA	NA	Yes	1.75	1.75	NA	0.753	43.9	2	Yes	Yes	1.1	12.8	1	Yes	Yes	
2,6-Dinitrotoluene	mg/kg	35	2	1.3	NA	NA	Yes	0.463	0.463	NA	0.769	22.4	NA	No	No	1.1	6.42	NA	No	No	
2-Methylnaphthalene	mg/kg	42	10	0.67	NA	NA	Yes	0.178	0.178	NA	--	238	NA	No	No	--	30.6	NA	No	No	
Acenaphthene	mg/kg	42	3	0.22	NA	NA	Yes	0.22	0.22	340	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Anthracene	mg/kg	42	4	0.87	NA	NA	Yes	0.513	0.513	1,700	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Benz(a)anthracene	mg/kg	42	8	2.6	NA	NA	Yes	0.373	0.373	NA	0.221	--	4	Yes	Yes	0.65	--	NA	No	No	
Benzo(a)pyrene	mg/kg	42	8	2.3	NA	NA	Yes	0.321	0.321	NA	0.022	--	8	Yes	Yes	0.065	--	6	Yes	Yes	
Benzo(b)fluoranthene	mg/kg	42	9	2.8	NA	NA	Yes	0.42	0.42	NA	0.221	--	6	Yes	Yes	0.65	--	NA	No	No	
Benzo(ghi)perylene	mg/kg	42	6	1.1	NA	NA	Yes	0.245	0.245	NC	NC	NC	NA	NA	Yes ^h	NC	NC	NA	NA	Yes ^h	
Benzo(k)fluoranthene	mg/kg	42	6	1.1	NA	NA	Yes	0.298	0.298	NA	2.21	--	NA	No	No	6.5	--	NA	No	No	
Bis(2-ethylhexyl)phthalate	mg/kg	42	3	0.14	NA	NA	Yes	0.158	0.140	35	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Carbazole	mg/kg	42	3	0.41	NA	NA	Yes	0.41	0.41	NA	69.4	--	NA	No	No	44.6	--	NA	No	No	
Chrysene	mg/kg	42	7	2.3	NA	NA	Yes	0.333	0.333	NA	22.1	--	NA	No	No	65.0	--	NA	No	No	
Dibenz(a,h)anthracene	mg/kg	42	4	0.34	NA	NA	Yes	0.173	0.173	NA	0.022	--	4	Yes	Yes	0.065	--	2	Yes	Yes	
Dibenzofuran	mg/kg	42	4	0.19	NA	NA	Yes	0.18	0.18	NA	--	119	NA	No	No	--	15.3	NA	No	No	
Di-n-butyl phthalate	mg/kg	42	6	26	NA	NA	Yes	1.940	1.940	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Fluoranthene	mg/kg	42	12	5.3	NA	NA	Yes	0.615	0.615	NA	--	276	NA	No	No	--	163	NA	No	No	
Fluorene	mg/kg	42	3	0.29	NA	NA	Yes	0.29	0.29	NA	--	737	NA	No	No	--	243	NA	No	No	
Indeno(1,2,3-cd)pyrene	mg/kg	42	6	1.4	NA	NA	Yes	0.285	0.285	NA	0.221	--	2	Yes	Yes	0.65	--	NA	No	No	
Naphthalene	mg/kg	42	7	0.18	NA	NA	Yes	0.134	0.134	NA	--	368	NA	No	No	--	122	NA	No	No	
N-Nitrosodiphenylamine	mg/kg	42	2	1.5	NA	NA	No ⁱ	1.5	1.5	99	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Phenanthrene	mg/kg	42	13	3.2	NA	NA	Yes	0.501	0.501	NC	NC	NC	NA	NA	Yes ^h	NC	NC	NA	NA	Yes ^h	
Pyrene	mg/kg	42	10	4.7	NA	NA	Yes	0.578	0.578	NA	--	207	NA	No	No	--	122	NA	No	No	
VOCs																					
1,2-Dimethylbenzene	mg/kg	10	1	0.02	NA	NA	Yes	NA	0.02	380	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Benzene	mg/kg	20	1	0.032	NA	NA	No ⁱ	NA	0.032	1.1	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Chloroform	mg/kg	20	4	0.023	NA	NA	Yes	0.007	0.007	0.29	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Dimethylbenzene	mg/kg	20	1	0.02	NA	NA	No ⁱ	NA	0.02	63	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Ethylbenzene	mg/kg	20	1	0.16	NA	NA	No ⁱ	NA	0.16	5.4	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Methylene Chloride	mg/kg	20	1	0.012	NA	NA	No ⁱ	NA	0.012	11	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Styrene	mg/kg	20	1	0.036	NA	NA	No ⁱ	NA	0.036	630	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Toluene	mg/kg	20	9	0.19	NA	NA	Yes	0.0492	0.0492	500	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Trichloroethene	mg/kg	20	1	0.0012	NA	NA	No ⁱ	NA	0.0012	2.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

Bkgd = Background

COPC - chemical of potential concern

CR = Cumulative Risk

CUG = Cleanup Goal

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSL = Risk Screening Level

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.

^b Background values are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010. Background values for potassium and sodium are from the WBG Phase II RI prepared by SAIC for USACE in 2001.

^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.

^d Cleanup Goals (CUGs) are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010.

^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.

^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.

^g Eliminated as a COPC based on the essential nutrient screen.

^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs have been developed if the maximum detection is greater than the RVAAP background value (and RSLs if applicable).

ⁱ Eliminated as a COPC based on the frequency of detection screen.

TABLE 3-2
Identification of COPCs in Deep Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Deep Surface Soil Background Criteria (0-4 ft bgs) ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 feet bgs) ^d															
											National Guard															
											Dust/Fire Control Worker					Range Maintenance Soldier					Trainee					
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	
Explosives and Propellants																										
1,3,5-Trinitrobenzene	mg/kg	162	32	490	NA	NA	Yes	23.24	23.24	NA	--	144,038	NA	No	No	--	20,584	NA	No	No	--	16,542	NA	No	No	
1,3-Dinitrobenzene	mg/kg	162	4	0.26	NA	NA	Yes	0.0964	0.0964	NA	--	641	NA	No	No	--	86.1	NA	No	No	--	59.6	NA	No	No	
2,4,6-Trinitrotoluene	mg/kg	162	66	3,800	NA	NA	Yes	257.7	257.7	NA	3,288	1,762	NA	No	No	495	265	NA	No	No	464	249	5	Yes	Yes	
2,4-Dinitrotoluene	mg/kg	162	26	0.56	NA	NA	Yes	0.146	0.146	NA	59.6	2,896	NA	No	No	9.82	477	NA	No	No	13.4	652	NA	No	No	
2,6-Dinitrotoluene	mg/kg	162	7	0.62	NA	NA	Yes	0.182	0.182	NA	61.2	1,485	NA	No	No	10.1	244	NA	No	No	13.6	331	NA	No	No	
2-Amino-4,6-Dinitrotoluene	mg/kg	24	6	7.5	NA	NA	Yes	1.053	1.053	NA	--	1,507	NA	No	No	--	194	NA	No	No	--	124	NA	No	No	
2-Nitrotoluene	mg/kg	162	3	4.8	NA	NA	Yes	0.496	0.496	NA	781	64,115	NA	No	No	105	8,613	NA	No	No	72.6	5,961	NA	No	No	
3-Nitrotoluene	mg/kg	162	6	21.0	NA	NA	Yes	1.123	1.123	0.61	NC	NC	1	Yes ^f	Yes	NC	NC	1	Yes ^f	No	NC	NC	1	Yes ^f	Yes	
4-Amino-2,6-Dinitrotoluene	mg/kg	24	8	0.93	NA	NA	Yes	0.254	0.254	NA	--	1,507	NA	No	No	--	194	NA	No	No	--	124	NA	No	No	
4-Nitrotoluene	mg/kg	162	7	0.19	NA	NA	Yes	0.173	0.173	NA	10,560	64,115	NA	No	No	1,419	8,613	NA	No	No	982	5,961	NA	No	No	
HMX	mg/kg	162	33	1,700	NA	NA	Yes	82	82	NA	--	151,363	NA	No	No	--	23,265	NA	No	No	--	23,464	NA	No	No	
Nitrobenzene	mg/kg	162	7	0.36	NA	NA	Yes	0.0753	0.0753	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Nitrocellulose	mg/kg	27	9	315	NA	NA	Yes	48.86	48.86	2.30E+07	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Nitroglycerin	mg/kg	86	3	12.0	NA	NA	Yes	12	12	NA	10,560	--	NA	No	No	1,419	--	NA	No	No	982	--	NA	No	No	
Nitroguanidine	mg/kg	27	1	0.091	NA	NA	Yes	0.091	0.091	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
RDX	mg/kg	162	26	9,500	NA	NA	Yes	463.1	463.1	NA	1,376	16,214	NA	No	No	192	2,263	4	Yes	Yes	145	1,711	4	Yes	Yes	
Tetryl	mg/kg	162	8	0.48	NA	NA	Yes	0.241	0.241	24	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Inorganics																										
Aluminum	mg/kg	290	290	50,100	17,700	Yes	Yes	13,247	13,247	NA	--	1.0E+06	NA	No	No	--	775,289	NA	No	No	--	3,496	NA	No ^g	No	
Antimony	mg/kg	221	117	157	0.96	Yes	Yes	7.767	7.767	NA	--	1,030	NA	No	No	--	161	NA	No	No	--	175	NA	No	No	
Arsenic	mg/kg	291	291	38.4	15.4	Yes	Yes	13.42	13.42	NA	35.7	573	NA	No	No	5.76	92.5	NA	No ^g	No	2.78	114	NA	No ^g	No	
Barium	mg/kg	290	289	10,400	88.4	Yes	Yes	595.5	595.5	NA	--	810,909	NA	No	No	--	128,223	NA	No	No	--	351	41	Yes	Yes	
Beryllium	mg/kg	220	132	10.9	0.88	Yes	Yes	0.669	0.669	16	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	
Cadmium	mg/kg	290	193	877	0	Yes	Yes	27.14	27.14	NA	94,527	1,473	NA	No	No	24,133	242	NA	No	No	10.9	329	17	Yes	Yes	
Calcium	mg/kg	220	213	247,000	15,800	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	
Chromium, total	mg/kg	290	290	189	17.4	Yes	Yes	20.33	20.33	NA	--	1.0E+06	NA	No	No	--	202,189	NA	No	No	--	329,763	NA	No	No	
Chromium, hexavalent	mg/kg	40	14	10.1	NA	NA	Yes	3.885	3.885	NA	14,179	6,666	NA	No	No	3,620	1,103	NA	No	No	1.64	5.61	14	Yes	Yes	
Cobalt	mg/kg	220	218	25.4	10.4	Yes	Yes	9.26	9.26	NA	60,768	74,531	NA	No	No	15,514	13,248	NA	No	No	7.03	14.0	NA	No ^g	No	
Copper	mg/kg	220	218	16,800	17.7	Yes	Yes	539.9	539.9	NA	--	341,235	NA	No	No	--	42,486	NA	No	No	--	25,368	NA	No	No	
Cyanide	mg/kg	122	12	2.8	0	Yes	Yes	0.255	0.255	160	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Iron	mg/kg	220	220	163,000	23,100	Yes	No ^g	NA	NA	NA	--	1.0E+06	NA	NA	NA	--	285,369	NA	NA	NA	--	184,370	NA	NA	NA	
Lead	mg/kg	291	290	2,800	26.1	Yes	Yes	214.3	214.3	40	NC	NC	97	Yes ^f	Yes	NC	NC	97	Yes ^f	Yes	NC	NC	97	Yes ^f	Yes	
Magnesium	mg/kg	220	220	53,700	3,030	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	
Manganese	mg/kg	290	290	4,270	1,450	Yes	Yes	675.6	675.6	NA	--	116,634	NA	No	No	--	20,467	NA	No	No	--	35.1	NA	No ^g	No	
Mercury	mg/kg	291	194	1.2	0.036	Yes	Yes	0.079	0.079	NA	--	1,659	NA	No	No	--	230	NA	No	No	--	172	NA	No	No	
Nickel	mg/kg	220	218	92.7	21.1	Yes	Yes	20.89	20.89	NA	--	167,541	NA	No	No	--	20,971	NA	No	No	--	12,639	NA	No	No	
Potassium	mg/kg	220	220	3,710	927	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	
Selenium	mg/kg	291	191	5.0	1.4	Yes	Yes	0.966	0.966	39	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	
Silver	mg/kg	290	44	33.2	0	Yes	Yes	1.026	1.026	NA	--	38,421	NA	No	No	--	4,928	NA	No	No	--	3,105	NA	No	No	
Sodium	mg/kg	213	91	2,320	123	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	
Thallium	mg/kg	221	132	3.1	0	Yes	Yes	0.553	0.553	NA	--	513	NA	No	No	--	68.9	NA	No	No	--	47.7	NA	No	No	
Vanadium	mg/kg	220	220	44.8	31.1	Yes	Yes	22.58	22.58	NA	--	10,308	NA	No	No	--	1,697	NA	No	No	--	2,304	NA	No	No	
Zinc	mg/kg	290	288	24,900	61.8	Yes	Yes	714.6	714.6	NA	--	1.0E+06	NA	No	No	--	301,090	NA	No	No	--	187,269	NA	No	No	
Pesticides and PCBs																										
Dieldrin	mg/kg	16	2	0.0054	NA	NA	Yes	0.0032	0.0032	NA	11.2	321	NA	No	No	1.51	43.1	NA	No	No	0.839	29.8	NA	No	No	
Endrin Ketone	mg/kg	16	1	0.0043	NA	NA	Yes	0.0043	0.0043	NC	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	
Heptachlor Epoxide	mg/kg	16	1	0.081	NA	NA	Yes	0.081	0.081	NA	19.7	83.4	NA	No	No	2.65	11.2	NA	No	No	1.48	7.75	NA	No	No	
PCB-1254	mg/kg	16	1	0.14	NA	NA	Yes	0.14	0.14	NA	15.4	21.9	NA	No	No	2.57	3.67	NA	No	No	3.46	5.49	NA	No	No	

TABLE 3-2
Identification of COPCs in Deep Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Deep Surface Soil Background Criteria (0-4 ft bgs) ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 feet bgs) ^d														
											National Guard														
											Dust/Fire Control Worker					Range Maintenance Soldier					Trainee				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
SVOCs																									
2,4-Dinitrotoluene	mg/kg	43	5	19	NA	NA	Yes	1.46	1.46	NA	59.6	2,896	NA	No	No	9.82	477	NA	No	No	13.4	652	NA	No	No
2,6-Dinitrotoluene	mg/kg	43	2	1.3	NA	NA	Yes	0.313	0.313	NA	61.2	1,485	NA	No	No	10.1	244	NA	No	No	13.6	331	NA	No	No
2-Methylnaphthalene	mg/kg	50	12	17	NA	NA	Yes	1.981	1.981	NA	--	25,646	NA	No	No	--	3,445	NA	No	No	--	2,384	NA	No	No
Acenaphthene	mg/kg	50	4	0.44	NA	NA	Yes	0.44	0.44	340	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Anthracene	mg/kg	50	6	0.87	NA	NA	Yes	0.238	0.238	1,700	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Benz(a)anthracene	mg/kg	50	10	2.6	NA	NA	Yes	0.33	0.33	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
Benzo(a)pyrene	mg/kg	50	10	2.3	NA	NA	Yes	0.289	0.289	NA	1.51	--	NA	No	No	0.262	--	5	Yes	Yes	0.477	--	NA	No	No
Benzo(b)fluoranthene	mg/kg	50	11	2.8	NA	NA	Yes	0.38	0.38	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
Benzo(ghi)perylene	mg/kg	50	7	1.1	NA	NA	Yes	0.277	0.277	NC	NC	NC	7	Yes ^h	Yes	NC	NC	7	Yes ^h	Yes	NC	NC	7	Yes ^h	Yes
Benzo(k)fluoranthene	mg/kg	50	7	1.1	NA	NA	Yes	0.292	0.292	NA	151	--	NA	No	No	26.2	--	NA	No	No	47.7	--	NA	No	No
Bis(2-ethylhexyl)phthalate	mg/kg	50	3	0.14	NA	NA	Yes	0.158	0.14	35	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Carbazole	mg/kg	50	4	0.41	NA	NA	Yes	0.277	0.277	NA	8,976	--	NA	No	No	1,206	--	NA	No	No	835	--	NA	No	No
Chrysene	mg/kg	50	9	2.3	NA	NA	Yes	0.294	0.294	NA	1,513	--	NA	No	No	262	--	NA	No	No	477	--	NA	No	No
Dibenz(a,h)anthracene	mg/kg	50	5	0.34	NA	NA	Yes	0.146	0.146	NA	1.51	--	NA	No	No	0.262	--	NA	No	No	0.477	--	NA	No	No
Dibenzofuran	mg/kg	50	4	0.19	NA	NA	Yes	0.184	0.184	NA	--	12,823	NA	No	No	--	1,723	NA	No	No	--	1,192	NA	No	No
Di-n-butyl phthalate	mg/kg	50	6	26	NA	NA	Yes	1.645	1.645	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Fluoranthene	mg/kg	50	15	5.3	NA	NA	Yes	0.555	0.555	NA	--	15,778	NA	No	No	--	2,732	NA	No	No	--	5,087	NA	No	No
Fluorene	mg/kg	50	4	0.93	NA	NA	Yes	0.332	0.332	NA	--	46,870	NA	No	No	--	7,823	NA	No	No	--	11,458	NA	No	No
Indeno(1,2,3-cd)pyrene	mg/kg	50	7	1.4	NA	NA	Yes	0.288	0.288	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
Naphthalene	mg/kg	50	8	1.6	NA	NA	Yes	0.205	0.205	NA	--	23,405	NA	No	No	--	3,908	NA	No	No	--	1,541	NA	No	No
N-Nitrosodiphenylamine	mg/kg	50	2	1.5	NA	NA	No ⁱ	0.719	0.719	99	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Phenanthrene	mg/kg	50	16	3.2	NA	NA	Yes	0.534	0.534	NC	NC	NC	16	Yes ^h	Yes	NC	NC	16	Yes ^h	Yes	NC	NC	16	Yes ^h	Yes
Pyrene	mg/kg	50	13	4.7	NA	NA	Yes	0.514	0.514	NA	--	11,833	NA	No	No	--	2,049	NA	No	No	--	3,815	NA	No	No
VOCs																									
1,2-Dimethylbenzene	mg/kg	10	1	0.02	NA	NA	Yes	0.02	0.02	380	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Acetone	mg/kg	21	2	0.052	NA	NA	Yes	0.027	0.027	1.1	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Benzene	mg/kg	25	1	0.032	NA	NA	No ⁱ	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Chloroform	mg/kg	25	4	0.023	NA	NA	Yes	0.0062	0.0062	0.29	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Dimethylbenzene	mg/kg	25	2	0.026	NA	NA	Yes	0.0208	0.0208	63	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Ethylbenzene	mg/kg	25	2	0.16	NA	NA	Yes	0.16	0.16	5.4	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Methylene Chloride	mg/kg	25	2	0.012	NA	NA	Yes	0.00743	0.00743	11	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Styrene	mg/kg	25	1	0.036	NA	NA	No ⁱ	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Toluene	mg/kg	25	13	0.19	NA	NA	Yes	0.0385	0.0385	500	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Trichloroethene	mg/kg	25	1	0.0012	NA	NA	No ⁱ	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

Bkgd = Background

COPC - chemical of potential concern

CR = Cumulative Risk

CUG = Cleanup Goal

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSL = Risk Screening Level

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.

^b Background values are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010. Background values for potassium and sodium are from the WBG Phase II RI prepared by SAIC for USACE in 2001.

^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.

^d Cleanup Goals (CUGs) are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010.

^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.

^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.

^g Eliminated as a COPC based on the essential nutrient screen.

^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs have been developed if the maximum detection is greater than the RVAAP background value (and RSLs if applicable).

ⁱ Eliminated as a COPC based on the frequency of detection screen.

TABLE 3-3
Identification of COPCs in Dry Sediment, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Surface Soil and Dry Sediment (0-1 feet bgs) ^d									
											Residential Farmer									
											Adult					Child				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
Explosives and Propellants																				
1,3,5-Trinitrobenzene	mg/kg	17	4	0.15	NA	NA	Yes	0.131	0.131	NA	--	1,528	NA	No	No	--	225	NA	No	No
1,3-Dinitrobenzene	mg/kg	17	1	0.044	NA	NA	Yes	0.044	0.044	NA	--	5.94	NA	No	No	--	0.765	NA	No	No
2,4,6-Trinitrotoluene	mg/kg	17	4	0.97	NA	NA	Yes	0.485	0.485	NA	32.8	21.1	NA	No	No	28.4	3.65	NA	No	No
2,4-Dinitrotoluene	mg/kg	17	1	0.037	NA	NA	Yes	0.037	0.037	NA	0.753	43.9	NA	No	No	1.1	12.8	NA	No	No
HMX	mg/kg	17	1	0.12	NA	NA	Yes	0.12	0.12	NA	--	1,909	NA	No	No	--	359	NA	No	No
Nitrobenzene	mg/kg	17	1	0.071	NA	NA	Yes	0.071	0.071	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Nitroguanidine	mg/kg	2	1	0.035	NA	NA	Yes	0.035	0.035	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Inorganics																				
Aluminum	mg/kg	19	19	17,900	17,700	Yes	Yes	12,514	12,514	NA	--	52,923	NA	No	No	--	7,380	NA	No ^e	No
Antimony	mg/kg	8	3	2	0.96	Yes	Yes	2.00	2	NA	--	13.6	NA	No	No	--	2.82	NA	No	No
Arsenic	mg/kg	19	19	18.1	15.4	Yes	Yes	13.42	13.42	NA	0.425	8.21	NA	No ^e	No	0.524	2.02	NA	No ^e	No
Barium	mg/kg	19	19	528	88.4	Yes	Yes	174.8	174.8	NA	--	8,966	NA	No	No	--	1,413	NA	No	No
Beryllium	mg/kg	8	4	0.6	0.88	No	No	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Cadmium	mg/kg	19	8	0.73	0	Yes	Yes	0.332	0.332	NA	1,249	22.3	NA	No	No	2,677	6.41	NA	No	No
Calcium	mg/kg	8	8	3,910	15,800	No	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Chromium, total	mg/kg	19	19	21.3	17.4	Yes	Yes	15	15	NA	--	19,694	NA	No	No	--	8,147	NA	No	No
Chromium, hexavalent	mg/kg	1	1	5	NA	NA	Yes	5	5	NA	187	90.4	NA	No	No	401.5	19.9	NA	No	No
Cobalt	mg/kg	8	8	10.4	10.4	No	No	NA	NA	NA	803	820	NA	NA	NA	1,721	131	NA	NA	NA
Copper	mg/kg	8	8	49.1	17.7	Yes	Yes	29.96	29.96	NA	--	2,714	NA	No	No	--	311	NA	No	No
Cyanide	mg/kg	8	1	0.11	0	Yes	Yes	0.11	0.11	160	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Iron	mg/kg	8	8	25,400	23,100	Yes	No ^g	NA	NA	NA	--	19,010	NA	NA	NA	--	2,313	NA	NA	NA
Lead	mg/kg	19	19	44.6	26.1	Yes	Yes	24.58	24.58	40	NC	NC	NA	No ^e	No	NC	NC	NA	No ^e	No
Magnesium	mg/kg	8	8	3,280	3,030	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Manganese	mg/kg	19	19	1,050	1,450	No	No	NA	NA	NA	--	1,482	NA	NA	NA	--	293	NA	NA	NA
Mercury	mg/kg	19	5	0.16	0.036	Yes	Yes	0.0503	0.0503	NA	--	16.5	NA	No	No	--	2.3	NA	No	No
Nickel	mg/kg	8	8	28.3	21.1	Yes	Yes	21.7	21.7	NA	--	1,346	NA	No	No	--	155	NA	No	No
Potassium	mg/kg	8	8	1,970	927	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Selenium	mg/kg	19	8	3.6	1.4	Yes	Yes	0.997	0.997	39	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Sodium	mg/kg	8	6	161	123	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Thallium	mg/kg	8	4	1.8	0	Yes	Yes	1.586	1.586	NA	--	4.76	NA	No	No	--	0.612	2	Yes	Yes
Vanadium	mg/kg	8	8	29.2	31.1	No	No	NA	NA	NA	--	156	NA	NA	NA	--	44.9	NA	NA	NA
Zinc	mg/kg	19	19	328	61.8	Yes	Yes	163.8	163.8	NA	--	19,659	NA	No	No	--	2,321	NA	No	No
Pesticides and PCBs																				
PCB-1260	mg/kg	4	1	0.032	NA	NA	Yes	0.032	0.032	NA	0.203	--	NA	No	No	0.349	--	NA	No	No

TABLE 3-3
Identification of COPCs in Dry Sediment, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Surface Soil and Dry Sediment (0-1 feet bgs) ^d										
											Residential Farmer										
											Adult					Child					
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	
SVOCs																					
Anthracene	mg/kg	5	1	0.15	NA	NA	Yes	0.15	0.15	1,700	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Benz(a)anthracene	mg/kg	5	1	0.56	NA	NA	Yes	0.56	0.56	NA	0.221	--	1	Yes	Yes	0.65	--	NA	No	No	
Benzo(a)pyrene	mg/kg	5	1	0.39	NA	NA	Yes	0.39	0.39	NA	0.022	--	1	Yes	Yes	0.065	--	1	Yes	Yes	
Benzo(b)fluoranthene	mg/kg	5	1	0.56	NA	NA	Yes	0.56	0.56	NA	0.221	--	1	Yes	Yes	0.65	--	NA	No	No	
Benzo(ghi)perylene	mg/kg	5	1	0.13	NA	NA	Yes	0.13	0.13	NC	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	
Benzo(k)fluoranthene	mg/kg	5	1	0.19	NA	NA	Yes	0.19	0.19	NA	2.21	--	NA	No	No	6.5	--	NA	No	No	
Chrysene	mg/kg	5	1	0.51	NA	NA	Yes	0.51	0.51	NA	22.1	--	NA	No	No	65.0	--	NA	No	No	
Di-n-butyl phthalate	mg/kg	5	1	0.87	NA	NA	Yes	0.87	0.87	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Fluoranthene	mg/kg	5	1	1.5	NA	NA	Yes	1.5	1.5	NA	--	276	NA	No	No	--	163	NA	No	No	
Indeno(1,2,3-cd)pyrene	mg/kg	5	1	0.17	NA	NA	Yes	0.17	0.17	NA	0.221	--	NA	No	No	0.65	--	NA	No	No	
N-Nitrosodiphenylamine	mg/kg	5	1	0.085	NA	NA	Yes	0.085	0.085	99	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Phenanthrene	mg/kg	5	1	0.64	NA	NA	Yes	0.64	0.64	NC	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	
Pyrene	mg/kg	5	1	0.94	NA	NA	Yes	0.94	0.94	NA	--	207	NA	No	No	--	122	NA	No	No	
VOCs																					
Acetone	mg/kg	4	1	0.021	NA	NA	Yes	0.021	0.021	1.1	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Chloroform	mg/kg	5	1	0.002	NA	NA	Yes	0.002	0.002	0.29	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Toluene	mg/kg	5	1	0.025	NA	NA	Yes	0.025	0.025	500	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Trichloroethene	mg/kg	5	1	0.0012	NA	NA	Yes	0.0012	0.0012	2.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

Bkgd = Background

COPC - chemical of potential concern

CR = Cumulative Risk

CUG = Cleanup Goal

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSL = Risk Screening Level

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.

^b Background values are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010 or, if not available, from the WBG Phase II RI prepared by SAIC for USACE in 2001.

^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.

^d Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.

^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.

^g Eliminated as a COPC based on the essential nutrient screen.

^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs (or RSLs) have been developed if the maximum detection is greater than the RVAAP background value.

ⁱ Eliminated as a COPC based on the frequency of detection screen.

TABLE 3-4
Identification of COPCs in Dry Sediment, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 feet bgs) and Dry Sediment ^d														
											National Guard														
											Dust/Fire Control Worker					Range Maintenance Soldier					Trainee				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
Explosives and Propellants																									
1,3,5-Trinitrobenzene	mg/kg	17	4	0.15	NA	NA	Yes	0.131	0.131	NA	--	144,038	NA	No	No	--	20,584	NA	No	No	--	16,542	NA	No	No
1,3-Dinitrobenzene	mg/kg	17	1	0.044	NA	NA	Yes	0.044	0.044	NA	--	641	NA	No	No	--	86.1	NA	No	No	--	59.6	NA	No	No
2,4,6-Trinitrotoluene	mg/kg	17	4	0.97	NA	NA	Yes	0.485	0.485	NA	3,288	1,762	NA	No	No	495	265	NA	No	No	464	249	NA	No	No
2,4-Dinitrotoluene	mg/kg	17	1	0.037	NA	NA	Yes	0.037	0.037	NA	59.6	2,896	NA	No	No	9.82	477	NA	No	No	13.4	652	NA	No	No
HMX	mg/kg	17	1	0.12	NA	NA	Yes	0.12	0.12	NA	--	151,363	NA	No	No	--	23,265	NA	No	No	--	23,464	NA	No	No
Nitrobenzene	mg/kg	17	1	0.071	NA	NA	Yes	0.071	0.071	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Nitroguanidine	mg/kg	2	1	0.035	NA	NA	Yes	0.035	0.035	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Inorganics																									
Aluminum	mg/kg	19	19	17,900	17,700	Yes	Yes	12,514	12,514	NA	--	1.0E+06	NA	No	No	--	775,289	NA	No	No	--	3,496	NA	No ^e	No
Antimony	mg/kg	8	3	2	0.96	Yes	Yes	2.00	2	NA	--	1,030	NA	No	No	--	161	NA	No	No	--	175	NA	No	No
Arsenic	mg/kg	19	19	18.1	15.4	Yes	Yes	13.42	13.42	NA	35.7	573	NA	No	No	5.76	92.5	NA	No ^e	No	2.78	114	NA	No ^e	No
Barium	mg/kg	19	19	528	88.4	Yes	Yes	174.8	174.8	NA	--	810,909	NA	No	No	--	128,223	NA	No	No	--	351	NA	No	No
Beryllium	mg/kg	8	4	0.6	0.88	No	No	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Cadmium	mg/kg	19	8	0.73	0	Yes	Yes	0.332	0.332	NA	94,527	1,473	NA	No	No	24,133	242	NA	No	No	10.9	329	NA	No	No
Calcium	mg/kg	8	8	3,910	15,800	No	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Chromium, total	mg/kg	19	19	21.3	17.4	Yes	Yes	15	15	NA	--	1.0E+06	NA	No	No	--	202,189	NA	No	No	--	329,763	NA	No	No
Chromium, hexavalent	mg/kg	1	1	5	NA	NA	Yes	5	5	NA	14,179	6,666	NA	No	No	3,620	1,103	NA	No	No	1.64	5.61	1	Yes	Yes
Cobalt	mg/kg	8	8	10.4	10.4	No	No	NA	NA	NA	60,768	74,531	NA	NA	NA	15,514	13,248	NA	NA	NA	7.03	14.0	NA	NA	NA
Copper	mg/kg	8	8	49.1	17.7	Yes	Yes	29.96	29.96	NA	--	341,235	NA	No	No	--	42,486	NA	No	No	--	25,368	NA	No	No
Cyanide	mg/kg	8	1	0.11	0	Yes	Yes	0.11	0.11	160	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Iron	mg/kg	8	8	25,400	23,100	Yes	No ^g	NA	NA	NA	--	1.0E+06	NA	NA	NA	--	285,369	NA	NA	NA	--	184,370	NA	NA	NA
Lead	mg/kg	19	19	44.6	26.1	Yes	Yes	24.58	24.58	40	NC	NC	NA	No ^e	No	NC	NC	NA	No ^e	No	NC	NC	NA	No ^e	No
Magnesium	mg/kg	8	8	3,280	3,030	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Manganese	mg/kg	19	19	1,050	1,450	No	No	NA	NA	NA	--	116,634	NA	NA	NA	--	20,467	NA	NA	NA	--	35.1	NA	NA	NA
Mercury	mg/kg	19	5	0.16	0.036	Yes	Yes	0.0503	0.0503	NA	--	1,659	NA	No	No	--	230	NA	No	No	--	172	NA	No	No
Nickel	mg/kg	8	8	28.3	21.1	Yes	Yes	21.7	21.7	NA	--	167,541	NA	No	No	--	20,971	NA	No	No	--	12,639	NA	No	No
Potassium	mg/kg	8	8	1,970	927	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Selenium	mg/kg	19	8	3.6	1.4	Yes	Yes	0.997	0.997	39	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Sodium	mg/kg	8	6	161	123	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA	NC	NC	NA	NA	NA
Thallium	mg/kg	8	4	1.8	0	Yes	Yes	1.586	1.586	NA	--	513	NA	No	No	--	68.9	NA	No	No	--	47.7	NA	No	No
Vanadium	mg/kg	8	8	29.2	31.1	No	No	NA	NA	NA	--	10,308	NA	NA	NA	--	1,697	NA	NA	NA	--	2,304	NA	NA	NA
Zinc	mg/kg	19	19	328	61.8	Yes	Yes	163.8	163.8	NA	--	1.0E+06	NA	No	No	--	301,090	NA	No	No	--	187,269	NA	No	No
Pesticides and PCBs																									
PCB-1260	mg/kg	4	1	0.032	NA	NA	Yes	0.032	0.032	NA	15.4	--	NA	No	No	2.57	--	NA	No	No	3.46	--	NA	No	No

TABLE 3-4
Identification of COPCs in Dry Sediment, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Surface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 feet bgs) and Dry Sediment ^d														
											National Guard														
											Dust/Fire Control Worker					Range Maintenance Soldier					Trainee				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
SVOCs																									
Anthracene	mg/kg	5	1	0.15	NA	NA	Yes	0.15	0.15	1,700	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Benz(a)anthracene	mg/kg	5	1	0.56	NA	NA	Yes	0.56	0.56	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
Benzo(a)pyrene	mg/kg	5	1	0.39	NA	NA	Yes	0.39	0.39	NA	1.51	--	NA	No	No	0.262	--	1	Yes	Yes	0.477	--	NA	No	No
Benzo(b)fluoranthene	mg/kg	5	1	0.56	NA	NA	Yes	0.56	0.56	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
Benzo(ghi)perylene	mg/kg	5	1	0.13	NA	NA	Yes	0.13	0.13	NC	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes
Benzo(k)fluoranthene	mg/kg	5	1	0.19	NA	NA	Yes	0.19	0.19	NA	151	--	NA	No	No	26.2	--	NA	No	No	47.7	--	NA	No	No
Chrysene	mg/kg	5	1	0.51	NA	NA	Yes	0.51	0.51	NA	1,513	--	NA	No	No	262	--	NA	No	No	477	--	NA	No	No
Di-n-butyl phthalate	mg/kg	5	1	0.87	NA	NA	Yes	0.87	0.87	610	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Fluoranthene	mg/kg	5	1	1.5	NA	NA	Yes	1.5	1.5	NA	--	15,778	NA	No	No	--	2,732	NA	No	No	--	5,087	NA	No	No
Indeno(1,2,3-cd)pyrene	mg/kg	5	1	0.17	NA	NA	Yes	0.17	0.17	NA	15.1	--	NA	No	No	2.62	--	NA	No	No	4.77	--	NA	No	No
N-Nitrosodiphenylamine	mg/kg	5	1	0.085	NA	NA	Yes	0.085	0.085	99	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Phenanthrene	mg/kg	5	1	0.64	NA	NA	Yes	0.64	0.64	NC	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes	NC	NC	1	Yes ^h	Yes
Pyrene	mg/kg	5	1	0.94	NA	NA	Yes	0.94	0.94	NA	--	11,833	NA	No	No	--	2,049	NA	No	No	--	3,815	NA	No	No
VOCs																									
Acetone	mg/kg	4	1	0.021	NA	NA	Yes	0.021	0.021	1.1	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Chloroform	mg/kg	5	1	0.002	NA	NA	Yes	0.002	0.002	0.29	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Toluene	mg/kg	5	1	0.025	NA	NA	Yes	0.025	0.025	500	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Trichloroethene	mg/kg	5	1	0.0012	NA	NA	Yes	0.0012	0.0012	2.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

Bkgd = Background

COPC - chemical of potential concern

CR = Cumulative Risk

CUG = Cleanup Goal

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSL = Risk Screening Level

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.

^b Background values are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010. Background values for potassium and sodium are from the WBG Phase II RI prepared by SAIC for USACE in 2001.

^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.

^d Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.

^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.

^g Eliminated as a COPC based on the essential nutrient screen.

^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs have been developed if the maximum detection is greater than the RVAAP background value (and RSLs if applicable).

ⁱ Eliminated as a COPC based on the frequency of detection screen.

TABLE 3-5
Identification of COPCs in Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Subsurface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Subsurface Soil (1-13 ft bgs) ^d										
											Residential Farmer										
											Adult					Child					
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	
Explosives and Propellants																					
1,3,5-Trinitrobenzene	mg/kg	68	21	8.7	NA	NA	Yes	1.310	1.310	NA	--	1,528	NA	No	No	--	225	NA	No	No	
1,3-Dinitrobenzene	mg/kg	68	2	0.26	NA	NA	Yes	NA	0.26	NA	--	5.94	NA	No	No	--	0.765	NA	No	No	
2,4,6-Trinitrotoluene	mg/kg	68	36	5,200	NA	NA	Yes	719.3	719.3	NA	32.8	21.1	7	Yes	Yes	28.4	3.65	11	Yes	Yes	
2,4-Dinitrotoluene	mg/kg	68	13	2.8	NA	NA	Yes	0.232	0.232	NA	0.753	43.9	NA	No	No	1.1	12.8	NA	No	No	
2,6-Dinitrotoluene	mg/kg	68	4	0.22	NA	NA	Yes	0.216	0.216	NA	0.769	22.4	NA	No	No	1.1	6.42	NA	No	No	
2-Amino-4,6-Dinitrotoluene	mg/kg	37	4	7.5	NA	NA	Yes	1.908	1.908	NA	--	12.8	NA	No	No	--	1.54	1	Yes	Yes	
2-Nitrotoluene	mg/kg	68	2	4.8	NA	NA	Yes	0.770	0.770	NA	6.03	594	NA	No	No	3.88	76.5	NA	No	No	
3-Nitrotoluene	mg/kg	68	4	0.12	NA	NA	Yes	0.120	0.120	0.61	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
4-Amino-2,6-Dinitrotoluene	mg/kg	37	3	0.24	NA	NA	Yes	0.240	0.240	NA	--	12.8	NA	No	No	--	1.54	NA	No	No	
4-Nitrotoluene	mg/kg	68	4	0.16	NA	NA	Yes	0.148	0.148	NA	81.6	594	NA	No	No	52.5	76.5	NA	No	No	
HMX	mg/kg	68	23	27	NA	NA	Yes	3.044	3.044	NA	--	1,909	NA	No	No	--	359	NA	No	No	
Nitrobenzene	mg/kg	68	6	0.36	NA	NA	Yes	0.083	0.083	4.8	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Nitrocellulose	mg/kg	6	3	88.4	NA	NA	Yes	88.4	88.4	2.30E+07	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Nitroglycerin	mg/kg	68	1	7.4	NA	NA	Yes	NA	7.4	NA	81.6	--	NA	No	No	52.5	--	NA	No	No	
RDX	mg/kg	68	19	260	NA	NA	Yes	48.96	48.96	NA	11.5	163	6	Yes	Yes	8.03	22.7	6	Yes	Yes	
Tetryl	mg/kg	68	7	0.24	NA	NA	Yes	0.161	0.161	24	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No	
Inorganics																					
Aluminum	mg/kg	83	83	20,000	19,500	Yes	Yes	12,259	12,259	NA	--	52,923	NA	No	No	--	7,380	NA	No ^e	No	
Antimony	mg/kg	83	44	27.6	0.96	Yes	Yes	4.068	4.068	NA	--	13.6	NA	No	No	--	2.82	8	Yes	Yes	
Arsenic	mg/kg	83	83	38.4	19.8	Yes	Yes	16.04	16.04	NA	0.425	8.21	NA	No ^e	No	0.524	2.02	NA	No ^e	No	
Barium	mg/kg	83	83	1,040	124	Yes	Yes	181.2	181.2	NA	--	8,966	NA	No	No	--	1,413	NA	No	No	
Beryllium	mg/kg	83	51	1.3	0.88	Yes	Yes	0.481	0.481	NA	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	
Cadmium	mg/kg	83	34	201	0	Yes	Yes	15.45	15.45	NA	1,249	22.3	NA	No	No	2,677	6.41	4	Yes	Yes	
Calcium	mg/kg	83	82	35,700	35,500	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	NA	
Chromium, total	mg/kg	83	83	80.9	27.2	Yes	Yes	20.28	20.28	NA	--	19,694	NA	No	No	--	8,147	NA	No	No	
Chromium, hexavalent	mg/kg	12	2	2.8	NA	NA	Yes	2.8	2.8	NA	187	90.4	NA	No	No	401.5	19.9	NA	No	No	
Cobalt	mg/kg	83	83	25.4	23.2	Yes	Yes	11.43	11.43	NA	803	820	NA	No	No	1,721	131	NA	No	No	
Copper	mg/kg	83	83	428	32.3	Yes	Yes	71.20	71.20	NA	--	2,714	NA	No	No	--	311	NA	No	No	
Iron	mg/kg	83	83	163,000	35,200	Yes	No ^g	NA	NA	NA	--	19,010	NA	NA	No	--	2,313	NA	NA	NA	
Lead	mg/kg	83	83	1,130	19.1	Yes	Yes	157.6	157.6	40	NC	NC	13	Yes ^f	Yes	NC	NC	13	Yes ^f	Yes	
Magnesium	mg/kg	83	83	11,100	8,790	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	NA	
Manganese	mg/kg	83	83	3,470	3,030	Yes	Yes	570.6	570.6	NA	--	1,482	NA	No ^e	No	--	293	NA	No ^e	No	
Mercury	mg/kg	83	48	0.065	0.044	Yes	Yes	0.026	0.026	NA	--	16.5	NA	No	No	--	2.27	NA	No	No	
Nickel	mg/kg	83	83	92.7	60.7	Yes	Yes	27.00	27.00	NA	--	1,346	NA	No	No	--	155	NA	No	No	
Potassium	mg/kg	83	83	3,490	3,350	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	NA	
Selenium	mg/kg	83	23	4.6	1.5	Yes	Yes	0.821	0.821	NA	NC	NC	NA	No ^h	No	NC	NC	NA	No ^h	No	
Silver	mg/kg	83	7	5.7	0	Yes	Yes	1.062	1.062	NA	--	324	NA	No	No	--	38.6	NA	No	No	
Sodium	mg/kg	76	25	1,780	145	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	No	NC	NC	NA	NA	NA	
Thallium	mg/kg	83	49	1.1	0.91	Yes	Yes	0.506	0.506	NA	--	4.76	NA	No	No	--	0.612	NA	No	No	
Vanadium	mg/kg	83	83	44.8	37.6	Yes	Yes	21.73	21.73	NA	--	156.00	NA	No	No	--	44.9	NA	No	No	
Zinc	mg/kg	83	82	2,390	93.3	Yes	Yes	230.2	230.2	NA	--	19,659	NA	No	No	--	2,321	NA	No	No	
Pesticides and PCBs																					
Endrin Ketone	mg/kg	3	1	0.0043	NA	NA	Yes	NA	0.0043	NC	NC	NC	NA	NA	Yes ^h	NC	NC	NA	NA	Yes ^h	
Heptachlor Epoxide	mg/kg	3	1	0.05	NA	NA	Yes	NA	0.05	NA	0.152	0.773	NA	No	No	0.098	0.099	NA	No	No	

TABLE 3-5
Identification of COPCs in Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Subsurface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final Facility-Wide Cleanup Goals for Subsurface Soil (1-13 ft bgs) ^d									
											Residential Farmer									
											Adult					Child				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?	CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
SVOCs																				
Acenaphthene	mg/kg	12	1	0.44	NA	NA	Yes	0.185	0.185	340	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Anthracene	mg/kg	12	2	0.16	NA	NA	Yes	0.160	0.16	1,700	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Benz(a)anthracene	mg/kg	12	3	0.48	NA	NA	Yes	0.480	0.48	NA	0.221	--	1	Yes	Yes	0.65	--	NA	No	No
Benzo(a)pyrene	mg/kg	12	3	0.5	NA	NA	Yes	0.300	0.3	NA	0.022	--	3	Yes	Yes	0.065	--	2	Yes	Yes
Benzo(b)fluoranthene	mg/kg	12	3	0.7	NA	NA	Yes	0.403	0.403	NA	0.221	--	2	Yes	Yes	0.65	--	NA	No	No
Benzo(ghi)perylene	mg/kg	12	2	0.31	NA	NA	Yes	0.390	0.31	NC	NC	NC	2	Yes ^h	Yes	NC	NC	2	Yes ^h	Yes
Benzo(k)fluoranthene	mg/kg	12	2	0.29	NA	NA	Yes	0.354	0.29	NA	2.21	--	NA	No	No	6.5	--	NA	No	No
Carbazole	mg/kg	12	1	0.086	NA	NA	Yes	0.086	0.086	NA	69.4	--	NA	No	No	44.6	--	NA	No	No
Chrysene	mg/kg	12	3	0.56	NA	NA	Yes	0.291	0.291	NA	22.1	--	NA	No	No	65.0	--	NA	No	No
Dibenz(a,h)anthracene	mg/kg	12	1	0.076	NA	NA	Yes	0.076	0.076	NA	0.022	--	1	Yes	Yes	0.065	--	1	Yes	Yes
Fluoranthene	mg/kg	12	4	1.2	NA	NA	Yes	0.542	0.542	NA	--	276	NA	No	No	--	163	NA	No	No
Fluorene	mg/kg	12	1	0.93	NA	NA	Yes	0.930	0.93	NA	--	737	NA	No	No	--	243	NA	No	No
Indeno(1,2,3-cd)pyrene	mg/kg	12	2	0.37	NA	NA	Yes	0.466	0.37	NA	0.221	--	1	Yes	Yes	0.65	--	NA	No	No
Naphthalene	mg/kg	12	1	1.6	NA	NA	Yes	1.6	1.6	NA	--	368	NA	No	No	--	122	NA	No	No
Phenanthrene	mg/kg	12	4	3.2	NA	NA	Yes	0.917	0.917	NC	NC	NC	4	Yes ^h	Yes	NC	NC	4	Yes ^h	Yes
Pyrene	mg/kg	12	4	0.91	NA	NA	Yes	0.543	0.543	NA	--	207	NA	No	No	--	122	NA	No	No
VOCs																				
Acetone	mg/kg	8	2	0.052	NA	NA	Yes	0.059	0.052	6,100	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Dimethylbenzene	mg/kg	8	1	0.026	NA	NA	Yes	0.026	0.026	63	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Ethylbenzene	mg/kg	8	1	0.021	NA	NA	Yes	0.021	0.021	5.4	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Methylene Chloride	mg/kg	8	1	0.0066	NA	NA	Yes	0.0066	0.0066	11	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No
Toluene	mg/kg	8	5	0.011	NA	NA	Yes	0.0053	0.00534	500	NC	NC	NA	No ^f	No	NC	NC	NA	No ^f	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

Bkgd = Background

COPC - chemical of potential concern

CR = Cumulative Risk

CUG = Cleanup Goal

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

RSL = Risk Screening Level

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.

^b Background values are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010. Background values for potassium and sodium are from the WBG Phase II RI prepared by SAIC for USACE in 2001.

^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.

^d Cleanup Goals (CUGs) are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010.

^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.

^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.

^g Eliminated as a COPC based on the essential nutrient screen.

^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs have been developed if the maximum detection is greater than the RVAAP background value (and RSLs if applicable).

TABLE 3-6
Identification of COPCs in Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Subsurface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final FWCUGs for Subsurface Soil (4-7 ft bgs) ^d				
											National Guard				
											Trainee				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
Explosives and Propellants															
1,3,5-Trinitrobenzene	mg/kg	28	6	1.6	NA	NA	Yes	0.275	0.275	NA	--	16,542	NA	No	No
1,3-Dinitrobenzene	mg/kg	28	1	0.045	NA	NA	Yes	0.045	0.045	NA	--	59.6	NA	No	No
2,4,6-Trinitrotoluene	mg/kg	28	13	5,200	NA	NA	Yes	2,503	2,503	NA	464	249	2	Yes	Yes
2,4-Dinitrotoluene	mg/kg	28	1	2.8	NA	NA	Yes	2.8	2.8	NA	652	13.4	NA	No	No
2,6-Dinitrotoluene	mg/kg	28	1	0.065	NA	NA	Yes	0.065	0.065	NA	13.6	331	NA	No	No
2-Amino-4,6-Dinitrotoluene	mg/kg	19	2	1.4	NA	NA	Yes	0.639	0.639	NA	--	124	NA	No	No
2-Nitrotoluene	mg/kg	28	1	0.082	NA	NA	Yes	0.082	0.082	NA	72.6	5,961	NA	No	No
3-Nitrotoluene	mg/kg	28	1	0.065	NA	NA	Yes	0.065	0.065	0.61	NC	NC	NA	No ^f	No
4-Amino-2,6-Dinitrotoluene	mg/kg	19	1	0.24	NA	NA	Yes	0.24	0.24	NA	--	124	NA	No	No
4-Nitrotoluene	mg/kg	28	1	0.093	NA	NA	Yes	0.093	0.093	NA	982	5,961	NA	No	No
HMX	mg/kg	28	7	0.41	NA	NA	Yes	0.343	0.343	NA	--	23,464	NA	No	No
Nitrobenzene	mg/kg	28	1	0.039	NA	NA	Yes	0.039	0.039	4.8	NC	NC	NA	No ^f	No
Nitrocellulose	mg/kg	2	1	3.2	NA	NA	Yes	3.2	3.2	2.30E+07	NC	NC	NA	No ^f	No
RDX	mg/kg	28	10	260	NA	NA	Yes	145.8	145.8	NA	145	1,711	2	Yes	Yes
Tetryl	mg/kg	28	4	0.24	NA	NA	Yes	0.213	0.213	24	NC	NC	NA	No ^f	No
Inorganics															
Aluminum	mg/kg	31	31	16,400	19,500	No	No	NA	NA	NA	--	3,496	NA	NA	NA
Antimony	mg/kg	31	18	9.4	0.96	Yes	Yes	1.987	1.987	NA	--	175	NA	No	No
Arsenic	mg/kg	31	31	28.8	19.8	Yes	Yes	16.93	16.93	NA	2.78	114	NA	No ^e	No
Barium	mg/kg	31	31	367	124	Yes	Yes	164.9	164.9	NA	--	351	NA	No	No
Beryllium	mg/kg	31	23	0.88	0.88	No	No	NA	NA	NA	NC	NC	NA	NA	NA
Cadmium	mg/kg	31	15	69.1	0	Yes	Yes	18.43	18.43	NA	10.9	329	2	Yes	Yes
Calcium	mg/kg	31	31	32,800	35,500	No	No ^g	NA	NA	NA	NC	NC	NA	NA	NA
Chromium, total	mg/kg	31	31	28.8	27.2	Yes	Yes	18.58	18.58	NA	--	329,763	NA	No	No
Chromium, hexavalent	mg/kg	6	1	2.8	NA	NA	Yes	2.8	2.8	NA	1.64	5.61	1	Yes	Yes
Cobalt	mg/kg	31	31	18.2	23.2	No	No	NA	NA	NA	7.03	14.0	NA	NA	NA
Copper	mg/kg	31	31	220	32.3	Yes	Yes	63.11	63.11	NA	--	25,368	NA	No	No
Iron	mg/kg	31	31	41,400	35,200	Yes	No ^g	NA	NA	NA	--	184,370	NA	NA	NA
Lead	mg/kg	31	31	173	19.1	Yes	Yes	66.26	66.26	40	NC	NC	6	Yes ^f	Yes
Magnesium	mg/kg	31	31	7,250	8,790	No	No ^g	NA	NA	NA	NC	NC	NA	NA	NA
Manganese	mg/kg	31	31	1,270	3,030	No	No	NA	NA	NA	--	35.1	NA	NA	NA
Mercury	mg/kg	31	20	0.065	0.044	Yes	Yes	0.0273	0.0273	NA	--	172	NA	No	No
Nickel	mg/kg	31	31	46.8	60.7	No	No	NA	NA	NA	--	12,639	NA	NA	NA
Potassium	mg/kg	31	31	3,490	3,350	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA
Selenium	mg/kg	31	10	1.9	1.5	Yes	Yes	0.66	0.66	39	NC	NC	NA	No ^f	No
Silver	mg/kg	31	3	0.78	0	Yes	Yes	0.78	0.78	NA	--	3,105	NA	No	No
Sodium	mg/kg	30	11	389	145	Yes	No ^g	NA	NA	NA	NC	NC	NA	NA	NA
Thallium	mg/kg	31	21	0.76	0.91	No	No	NA	NA	NA	--	47.7	NA	NA	NA
Vanadium	mg/kg	31	31	28	37.6	No	No	NA	NA	NA	--	2,304	NA	NA	NA
Zinc	mg/kg	31	31	890	93.3	Yes	Yes	256.8	256.8	NA	--	187,269	NA	No	No

TABLE 3-6
Identification of COPCs in Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte ^a	Units	Total Samples	Results > Detection Limit	Maximum Detect	Subsurface Soil Background Criteria ^b	Maximum Detect > Background	Data Reduction and Screening - Retained as COPC?	95% UCL	EPC	Region 9 Residential RSL ^c	Final FWCUGs for Subsurface Soil (4-7 ft bgs) ^d				
											National Guard				
											Trainee				
											CR=10 ⁻⁶	HI=0.1	# Detect > CUG and Bkgd ^e	EPC > CUG?	COPC?
Pesticides and PCBs															
Heptachlor Epoxide	mg/kg	1	1	0.05	NA	NA	Yes	0.05	0.05	NA	1.48	7.75	NA	No	No
SVOCs															
Benz(a)anthracene	mg/kg	4	1	0.2	NA	NA	Yes	0.2	0.2	NA	4.77	--	NA	No	No
Benzo(a)pyrene	mg/kg	4	1	0.22	NA	NA	Yes	0.22	0.22	NA	0.477	--	NA	No	No
Benzo(b)fluoranthene	mg/kg	4	1	0.29	NA	NA	Yes	0.29	0.29	NA	4.77	--	NA	No	No
Benzo(ghi)perylene	mg/kg	4	1	0.11	NA	NA	Yes	0.11	0.11	NC	NC	NC	1	Yes ^h	Yes
Benzo(k)fluoranthene	mg/kg	4	1	0.13	NA	NA	Yes	0.13	0.13	NA	47.7	--	NA	No	No
Chrysene	mg/kg	4	1	0.2	NA	NA	Yes	0.2	0.2	NA	477	--	NA	No	No
Fluoranthene	mg/kg	4	1	0.41	NA	NA	Yes	0.41	0.41	NA	--	5,087	NA	No	No
Indeno(1,2,3-cd)pyrene	mg/kg	4	1	0.13	NA	NA	Yes	0.13	0.13	NA	4.77	--	NA	No	No
Phenanthrene	mg/kg	4	1	0.14	NA	NA	Yes	0.14	0.14	NC	NC	NC	1	Yes ^h	Yes
Pyrene	mg/kg	4	1	0.47	NA	NA	Yes	0.47	0.47	NA	--	3,815	NA	No	No
VOCs															
Toluene	mg/kg	3	1	0.0012	NA	NA	Yes	0.0012	0.0012	500	NC	NC	NA	No ^f	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.
Bkgd = Background
COPC - chemical of potential concern
CR = Cumulative Risk
CUG = Cleanup Goal
EPC = exposure point concentration

ft bgs = feet below ground surface
HI = Hazard Index
mg/kg = milligrams/kilograms
NA = Not applicable
NC = Not calculated
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

PCBs = polychlorinated biphenyls
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
RSL = Risk Screening Level
SVOCs = Semivolatile Organic Compounds
UCL = upper confidence limit
VOCs = Volatile Organic Compounds

^a Table only lists detected compounds.
^b Background values are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010 or, if not available, from the WBG Phase II RI prepared by SAIC for USACE in 2001.
^c Region 9 Risk Screening Levels (RSLs) for Residential Receptor from December 2009 document.
^d Cleanup Goals (CUGs) are from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP prepared by SAIC in March 2010.
^e The RVAAP background value is the default action level for inorganic COPCs with CUGs less than background.
^f Retained or eliminated as a COPC based on comparison of EPC to RSL where CUGs have not been developed.
^g Eliminated as a COPC based on the essential nutrient screen.
^h Detected organics are automatically retained as COPCs where no CUGs (or RSLs) have been developed. Inorganics are automatically retained where no CUGs (or RSLs) have been developed if the maximum detection is greater than the RVAAP background value.

TABLE 3-7a
Detected Analytes in Surface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Final Facility-Wide CUGs for Surface Soil (0-1 ft bgs)				WBGcs-070M-SDW-SO	WBGcs-243M-SDW-SO	WBGcs-P70m-SFC-SO	WBGcs-P61m-SDW-SO	WBGcs-P61m-BOT-SO	WBGcs-P61Am-BOT(E)-SO	WBGcs-P61m-BERM2-SO
	Residential Farmer										
	Adult		Child								
	CR=10 ⁻⁵	HI=1	CR=10 ⁻⁵	HI=1							
Station					WBGcs-070M-SDW	WBGcs-243M-SDW	WBGcs-P70m-SFC	WBGcs-P61m-SDW	WBGcs-P61m-BOT	WBGcs-P61Am-BOT(E)	WBGcs-P61m-BERM2
Sample Date					4/21/2005	4/21/2005	11/24/2008	11/24/2008	11/24/2008	11/6/2008	12/4/2008
Surface Elevation (ft bgs) Relative to Historical Grade					1	1	0	Varies >1	Varies >1	Varies >1	Varies >1
Sample Interval (ft)					0.5	0.5	0.25	0.25	0.25	0.25	0.25
Surface Elevation (ft bgs) Relative to Design/Constructed Grade					1	1	0	0	0	0	0
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Explosives											
1,3,5-Trinitrobenzene	--	15,280	--	2,252	NT	NT	0.24 U	0.036 J	0.56	NR	0.25 U
2,4,6-Trinitrotoluene	328	211	284	36.5	NT	NT	12	0.38	5.2	12	0.078 J
2,4-Dinitrotoluene	7.53	439	11.0	128	NT	NT	0.24 U	0.027 J	0.13 J	NR	0.25 U
2-Amino-4,6-Dinitrotoluene	--	128	--	15.4	NT	NT	0.36	0.26 J	0.7	NR	0.3 U
4-Amino-2,6-Dinitrotoluene	--	128	--	15.4	NT	NT	0.77	0.17 J	0.7	NR	0.25 U
HMX	--	19,090	--	3,594	NT	NT	4.3	0.16 J	1	NR	0.24 J
Nitrobenzene	NC	NC	NC	NC	NT	NT	0.24 U	0.24 U	0.26	NR	0.25 U
Nitroglycerin	816	--	525	--	NT	NT	0.49 U	0.49 U	7.8	NR	0.5 U
RDX	115	1,632	80.3	227	0.28	7.2	18	0.20 J	1.8	0.25 U	0.3
SVOCs											
Benz(a)anthracene	2.21	--	6.5	--	NT	NT	0.31	1.5	7.8	4.3	0.096
Benzo(a)pyrene	0.221	--	0.65	--	NT	NT	0.31	1.3	6.7	3.9	0.086
Benzo(b)fluoranthene	2.21	--	6.5	--	NT	NT	0.48	1.6	7.8	5.4	0.12
Dibenz(a,h)anthracene	0.221	--	0.65	--	NT	NT	0.028 U	0.21	1.4	0.8	0.0068 U
Indeno(1,2,3-cd)pyrene	2.21	--	6.5	--	NT	NT	0.18	0.74	3.4	2.3	0.064

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

CR = Cumulative Risk

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NC = Not calculated

NR = Not reported

NT = Not tested

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

J = estimated value below reporting limit

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

SVOCs = Semivolatile Organic Compounds

U = Result not detected at indicated laboratory reporting limit.

1. Table only lists detected compounds.

2. Shaded cell indicates exceedance of most restrictive risk-based cleanup goal for surface soil from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP*, SAIC, March 2010.

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TABLE 3-7b
Identification of Carcinogenic COCs in Surface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Final Facility-Wide Cleanup Goals for Surface Soil (0-1 ft bgs) ^a											
						Residential Farmer											
						Adult						Child					
						CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?	CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?
Explosives																	
1,3,5-Trinitrobenzene	mg/kg	2 / 4	0.56	0.56	0.56	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	mg/kg	5 / 5	12	11.56	11.56	328	0	0.04	No	0.10	No	284	0	0.04	No	0.32	No
2,4-Dinitrotoluene	mg/kg	2 / 4	0.13	0.13	0.13	7.53	0	0.02	No	0.05	No	11.0	0	0.01	No	0.09	No
2-Amino-4,6-Dinitrotoluene	mg/kg	3 / 4	0.7	0.7	0.7	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	mg/kg	3 / 4	0.77	0.77	0.77	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
HMX	mg/kg	4 / 4	4.3	4.3	4.3	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
Nitrobenzene	mg/kg	1 / 4	0.26	0.26	0.26	NC	NA	NA	Yes ^b	NA	Yes ^b	NC	NA	NA	Yes ^b	NA	Yes ^b
Nitroglycerin	mg/kg	1 / 4	7.8	7.8	7.8	816	0	0.01	No	0.03	No	525	0	0.01	No	0.12	No
RDX	mg/kg	6 / 7	18	15.15	15.15	115	0	0.13	No	0.36	No	80.3	0	0.19	No	1.50	No
SVOCs																	
Benz(a)anthracene	mg/kg	5 / 5	7.8	5.907	5.907	2.21	2	2.67	Yes	7.31	No	6.5	1	0.91	No	7.20	No
Benzo(a)pyrene	mg/kg	5 / 5	6.7	5.141	5.141	0.221	4	23.3	Yes	63.66	Yes	0.65	3	7.9	Yes	62.70	Yes
Benzo(b)fluoranthene	mg/kg	5 / 5	7.8	6.291	6.291	2.21	2	2.85	Yes	7.79	No	6.5	1	0.97	No	7.67	No
Dibenz(a,h)anthracene	mg/kg	3 / 5	1.4	1.4	1.4	0.221	2	6.33	Yes	17.33	Yes	0.65	2	2.15	Yes	17.07	Yes
Indeno(1,2,3-cd)pyrene	mg/kg	5 / 5	3.4	2.727	2.727	2.21	2	1.23	Yes	3.38	No	6.5	0	0.42	No	3.33	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

COC = chemical of concern

COPC = chemical of potential concern

CR = Cumulative Risk

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

UCL = upper confidence limit

Sum of Ratios 36.54

Sum of Ratios 12.62

^a Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^b Detected organics are automatically retained as COCs where no CUGs have been developed.

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TABLE 3-7c
Identification of Non-Carcinogenic COCs in Surface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Final Facility-Wide Cleanup Goals for Surface Soil (0-1 ft bgs) ^a							
						Residential Farmer							
						Adult				Child			
						HI=1	# Detect > HI	Ratio of EPC to HI	COC?	HI=1	# Detect > HI	Ratio of EPC to HI	COC?
Explosives													
1,3,5-Trinitrobenzene	mg/kg	2 / 4	0.56	0.56	0.56	15,280	0	0.00	No	2,252	0	0.00	No
2,4,6-Trinitrotoluene	mg/kg	5 / 5	12	11.56	11.56	211	0	0.05	No	36.5	0	0.32	No
2,4-Dinitrotoluene	mg/kg	2 / 4	0.13	0.13	0.13	439	0	0.00	No	128	0	0.00	No
2-Amino-4,6-Dinitrotoluene	mg/kg	3 / 4	0.7	0.7	0.7	128	0	0.01	No	15.4	0	0.05	No
4-Amino-2,6-Dinitrotoluene	mg/kg	3 / 4	0.77	0.77	0.77	128	0	0.01	No	15.4	0	0.05	No
HMX	mg/kg	4 / 4	4.3	4.3	4.3	19,090	0	0.00	No	3,594	0	0.00	No
Nitrobenzene	mg/kg	1 / 4	0.26	0.26	0.26	NC	NA	NA	Yes ^b	NC	NA	NA	Yes ^b
Nitroglycerin	mg/kg	1 / 4	7.8	7.8	7.8	--	NA	NA	NA	--	NA	NA	NA
RDX	mg/kg	6 / 7	18	15.15	15.15	1,632	0	0.01	No	227	0	0.07	No
SVOCs													
Benz(a)anthracene	mg/kg	5 / 5	7.8	5.907	5.907	--	NA	NA	NA	--	NA	NA	NA
Benzo(a)pyrene	mg/kg	5 / 5	6.7	5.141	5.141	--	NA	NA	NA	--	NA	NA	NA
Benzo(b)fluoranthene	mg/kg	5 / 5	7.8	6.291	6.291	--	NA	NA	NA	--	NA	NA	NA
Dibenz(a,h)anthracene	mg/kg	3 / 5	1.4	1.4	1.4	--	NA	NA	NA	--	NA	NA	NA
Indeno(1,2,3-cd)pyrene	mg/kg	5 / 5	3.4	2.727	2.727	--	NA	NA	NA	--	NA	NA	NA

Sum of Ratios0.08

Sum of Ratios0.48

Notes:
-- = No CUG could be quantified based on lack of approved toxicity value.
COC = chemical of concern
COPC = chemical of potential concern
EPC = Exposure Point Concentration
ft bgs = feet below ground surface
HI = Hazard Index
mg/kg = milligrams/kilograms
NA = Not applicable
NC = Not calculated
UCL = Upper Confidence Limit
SVOCs = Semivolatile organics

^a Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.
^b Detected organics are automatically retained as COCs where no CUGs have been developed.

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TABLE 3-8a
Detected Analytes in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Final FWCUGs for Subsurface Soil (1-13 ft bgs)				WBGcs-070M-FLR-SO	WBGcs-243M-FLR-SO	WBGcs-071/401m-SDW-SO	WBGcs-071/401m-FLR2-SO	WBGcs-071/401m-SDW2-SO	WBGcs-071/401m-FLR2b-SO	WBGcs-071/401m-SDW2b-SO	WBGcs-P61Am-BOT(W)-SO
	Residential Farmer											
	Adult		Child									
	CR=10 ⁻⁵	HI=1	CR=10 ⁻⁵	HI=1								
Station					WBGcs-070M-FLR	WBGcs-243M-FLR	WBGcs-071/401m-SDW	WBGcs-071/401m-FLR	WBGcs-071/401m-SDW	WBGcs-071/401m-FLR	WBGcs-071/401m-SDW	WBGcs-P61Am-BOT(W)
Sample Date					4/21/2005	4/21/2005	11/6/2008	12/15/2008	12/15/2008	1/12/2009	1/12/2009	11/6/2008
Surface Elevation (ft bgs) Relative to Historical Grade					1	1	1.5	2	2	2	2	Varies >1
Sample Interval (ft)					0.5	0.5	0.25	0.25	0.25	0.5	0.50	0.25
Surface Elevation (ft bgs) Relative to Design/Constructed Grade					1	1	1.5	2	2	2	2	1
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Explosives												
1,3,5-Trinitrobenzene	--	15,280	--	2,252	NT	NT	NR	0.69 J	0.49 J	NT	NT	NR
2,4,6-Trinitrotoluene	328	211	284	36.5	NT	NT	1600	44	110	NT	NT	2.7
2,4-Dinitrotoluene	7.53	439	11.0	128	NT	NT	NR	1.2 U	0.54 J	NT	NT	NR
2-Amino-4,6-Dinitrotoluene	--	128	--	15.4	NT	NT	NR	0.72 J	3 U	NT	NT	NR
4-Amino-2,6-Dinitrotoluene	--	128	--	15.4	NT	NT	NR	0.87 J	1.2 J	NT	NT	NR
HMX	--	19,090	--	3,594	NT	NT	NR	11	6.3	NT	NT	NR
RDX	115	1,632	80.3	227	0.17 J	0.20 U	570	43	15	NT	NT	0.089 J
SVOCs												
Benz(a)anthracene	2.21	--	6.5	--	NT	NT	NT	NT	NT	0.031	0.9	1.4
Benzo(a)pyrene	0.221	--	0.65	--	NT	NT	NT	NT	NT	0.033	1.0	1.2
Benzo(b)fluoranthene	2.21	--	6.5	--	NT	NT	NT	NT	NT	0.04	1.6	1.5
Dibenz(a,h)anthracene	0.221	--	0.65	--	NT	NT	NT	NT	NT	0.0068 U	0.24	0.25
Indeno(1,2,3-cd)pyrene	2.21	--	6.5	--	NT	NT	NT	NT	NT	0.022	0.75	0.66

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

CR = Cumulative Risk

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NR = Not reported

NT = Not tested

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

J = estimated value below reporting limit

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

SVOCs = Semivolatile Organic Compounds

U = Result not detected at indicated laboratory reporting limit.

1. Table only lists detected compounds.

2. Shaded cell indicates exceedance of most restrictive risk-based cleanup goal for subsurface soil from the Final Facility-Wide Human Health Cleanup Goals for the RVAAP, SAIC, March 2010.

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TABLE 3-8b
Identification of Carcinogenic COCs in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Final Facility-Wide Cleanup Goals for Subsurface Soil (1-13 ft bgs) ^a											
						Residential Farmer											
						Adult						Child					
						CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?	CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?
Explosives																	
1,3,5-Trinitrobenzene	mg/kg	2 / 2	0.69	NA	0.69	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	mg/kg	4 / 4	1,600	NA	1,600	328	1	4.88	Yes	28	Yes	284	1	5.63	Yes	38	Yes
2,4-Dinitrotoluene	mg/kg	1 / 2	0.54	NA	0.54	7.53	0	0.07	No	0	No	11.0	0	0.05	No	0	No
2-Amino-4,6-Dinitrotoluene	mg/kg	1 / 2	0.72	NA	0.72	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	mg/kg	2 / 2	1.2	NA	1.2	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
HMX	mg/kg	2 / 2	11	NA	11	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
RDX	mg/kg	5 / 6	570	519.8	519.8	115	1	4.52	Yes	25	Yes	80.3	1	6.47	Yes	43	Yes
SVOCs																	
Benz(a)anthracene	mg/kg	3 / 3	1.4	NA	1.4	2.21	0	0.63	No	4	No	6.5	0	0.22	No	1	No
Benzo(a)pyrene	mg/kg	3 / 3	1.2	NA	1.2	0.221	2	5.43	Yes	31	Yes	0.65	2	1.85	Yes	12	Yes
Benzo(b)fluoranthene	mg/kg	3 / 3	1.6	NA	1.6	2.21	0	0.72	No	4	No	6.5	0	0.25	No	2	No
Dibenz(a,h)anthracene	mg/kg	2 / 3	0.25	NA	0.25	0.221	2	1.13	Yes	6	No	0.65	0	0.38	No	3	No
Indeno(1,2,3-cd)pyrene	mg/kg	3 / 3	0.75	NA	0.75	2.21	0	0.34	No	2	No	6.5	0	0.12	No	1	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

COC = chemical of concern

COPC = chemical of potential concern

CR = Cumulative Risk

EPC = exposure point concentration

ft bgs = feet below ground surface

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

mg/kg = milligrams/kilograms

NA = Not applicable

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

UCL = upper confidence limit

Sum of Ratios 17.73

Sum of Ratios 14.96

^a Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

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TABLE 3-8c
Identification of Non-Carcinogenic COCs in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Critical Effect ^a	Target Organ(s) ^b	Final Facility-Wide Cleanup Goals for Subsurface Soil (1-13 ft bgs) ^c																							
								Residential Farmer																							
								Adult								Child															
								HI=1	# Detect > HI	Ratio of EPC to HI	COC?	% of Sum ^d Eyes, Skin, or CNS	COC?	% of Sum ^d Resp.Sys. or Kidneys	COC?	% of Sum ^d Blood, Liver, or CVS	COC?	HI=1	# Detect > HI	Ratio of EPC to HI	COC?	% of Sum ^d Eyes, Skin, or CNS	COC?	% of Sum ^d Resp.Sys. or Kidneys	COC?	% of Sum ^d Blood, Liver, or CVS	COC?				
Explosives																															
1,3,5-Trinitrobenzene	mg/kg	2 / 2	0.69	NA	0.69	NL	NL	15,280	0	0.00	No	0.0	No	0.0	No	0.0	No	2,252	0	0.00	No	0.0	No	0.0	No	0.0	No				
2,4,6-Trinitrotoluene	mg/kg	4 / 4	1,600	NA	1,600	liver effects	eyes, skin, respiratory system, blood, liver, CVS, CNS, kidneys	211	1	7.58	Yes	95.8	Yes	99.8	Yes	99.8	Yes	36.5	3	43.8	Yes	94.8	Yes	99.7	Yes	99.7	Yes				
2,4-Dinitrotoluene	mg/kg	1 / 2	0.54	NA	0.54	neurotoxicity, heinz bodies, biliary tract hyperplasia, ischemic heart disease, hematological effects, cyanosis, anemia, leukocytosis, neurological dizziness, insomnia, nausea, blood, liver, nervous system, reproductive system	blood, liver, CVS, reproductive system	439	0	0.00	No	NA	NA	NA	0.0	No	128	0	0.00	No	NA	NA	NA	0.0	No						
2-Amino-4,6-Dinitrotoluene	mg/kg	1 / 2	0.72	NA	0.72	NL	NL	128	0	0.01	No	0.1	No	0.1	No	0.1	No	15.4	0	0.05	No	0.1	No	0.1	No	0.1	No				
4-Amino-2,6-Dinitrotoluene	mg/kg	2 / 2	1.2	NA	1.2	NL	NL	128	0	0.01	No	0.1	No	0.1	No	0.1	No	15.4	0	0.08	No	0.2	No	0.2	No	0.2	No				
HMX	mg/kg	2 / 2	11	NA	11	NL	NL	19,090	0	0.00	No	0.0	No	0.0	No	0.0	No	3,594	0	0.00	No	0.0	No	0.0	No	0.0	No				
RDX	mg/kg	5 / 6	570	519.8	519.8	NL	eyes, skin, CNS	1,632	0	0.32	No	4.0	No	NA	NA	NA	NA	227	1	2.29	Yes	5.0	No	NA	NA	NA	NA				
SVOCs																															
Benz(a)anthracene	mg/kg	3 / 3	1.4	NA	1.4	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Benzo(a)pyrene	mg/kg	3 / 3	1.2	NA	1.2	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Benzo(b)fluoranthene	mg/kg	3 / 3	1.6	NA	1.6	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Dibenz(a,h)anthracene	mg/kg	2 / 3	0.25	NA	0.25	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Indeno(1,2,3-cd)pyrene	mg/kg	3 / 3	0.75	NA	0.75	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA	NA	NA	NA	NA				

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

COC = chemical of concern

COPC = chemical of potential concern

CNS = Central Nervous System

CVS = Cardiovascular System

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

mg/kg = milligrams/kilograms

NA = Not applicable

NL = Not listed

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

SVOCs = Semivolatile Organic Compounds

UCL = upper confidence limit

Sum of Ratios	7.92	eyes
Sum of Ratios	7.92	skin
Sum of Ratios	7.60	respiratory system
Sum of Ratios	7.60	blood
Sum of Ratios	7.60	liver
Sum of Ratios	7.60	CVS
Sum of Ratios	7.92	CNS
Sum of Ratios	7.60	kidneys
Sum of Ratios	0.02	reproductive system

Sum of Ratios	46.25	eyes
Sum of Ratios	46.25	skin
Sum of Ratios	43.96	respiratory system
Sum of Ratios	43.97	blood
Sum of Ratios	43.97	liver
Sum of Ratios	43.97	CVS
Sum of Ratios	46.25	CNS
Sum of Ratios	43.96	kidneys
Sum of Ratios	0.13	reproductive system

^a Critical Effect data are from Table 4-2 of the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^b Target organ data are from the Pocket Guide to Chemical Hazards, National Institute for Occupational Safety and Health, June 1997.

^c Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^d Sum of Ratios for each target organ includes ratios for COCs where target organs are not listed.

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TABLE 3-9a
Detected Analytes in Deep Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Deep Surface Soil Background Criteria (0-4 feet bgs)	Fianl FWCUGs for Deep Surface Soil (0-4 ft bgs)						WBGcs-070M-FLR-SO	WBGcs-070M-SDW-SO	WBGcs-243M-FLR-SO	WBGcs-243M-SDW-SO	WBGcs-071/401m-SDW-SO	WBGcs-071/401m-FLR2-SO	WBGcs-071/401m-SDW2-SO	WBGcs-071/401m-FLR2b-SO	WBGcs-071/401m-SDW2b-SO	WBGcs-P70m-SFC-SO	WBGcs-P61m-SDW-SO	WBGcs-P61m-BOT-SO	WBGcs-P61Am-BOT(W)-SO	WBGcs-P61Am-BOT(E)-SO	WBGcs-P61m-BERM2-SO
		National Guard																				
		Dust/Fire Control Worker		Range Maintenance Soldier		Trainee																
		CR=10 ⁻⁵	HI=1	CR=10 ⁻⁵	HI=1	CR=10 ⁻⁵	HI=1															
Station								WBGcs-070M-FLR	WBGcs-070M-SDW	WBGcs-243M-FLR	WBGcs-243M-SDW	WBGcs-071/401m-SDW	WBGcs-071/401m-FLR	WBGcs-071/401m-SDW	WBGcs-071/401m-FLR	WBGcs-071/401m-SDW	WBGcs-P70m-SFC	WBGcs-P61m-SDW	WBGcs-P61m-BOT	WBGcs-P61Am-BOT(W)	WBGcs-P61Am-BOT(E)	WBGcs-P61m-BERM2
Sample Date								4/21/2005	4/21/2005	4/21/2005	4/21/2005	11/6/2008	12/15/2008	12/15/2008	1/12/2009	1/12/2009	11/24/2008	11/24/2008	11/24/2008	11/6/2008	11/6/2008	12/4/2008
Surface Elevation (ft bgs) Relative to Historical Grade								1	1	1	1	1.5	2	2	2	2	0	Varies >1	Varies >1	Varies >1	Varies >1	Varies >1
Sample Interval (ft)								0.5	0.5	0.5	0.5	0.25	0.25	0.25	0.5	0.50	0.25	0.25	0.25	0.25	0.25	0.25
Surface Elevation (ft bgs) Relative to Design/Constructed Grade								1	1	1	1	1.5	2	2	2	2	0	0	0	1	0	0
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Explosives																						
1,3,5-Trinitrobenzene	NA	--	1.0E+06	--	205,835	--	165,422	NT	NT	NT	NT	NR	0.69 J	0.49 J	NT	NT	0.24 U	0.036 J	0.56	NR	NR	0.25 U
2,4,6-Trinitrotoluene	NA	32,883	17,616	4,950	2,652	4,643	2,488	NT	NT	NT	NT	1600	44	110	NT	NT	12	0.38	5.2	2.7	12	0.078 J
2,4-Dinitrotoluene	NA	596	28,957	98.2	4,772	134	6,519	NT	NT	NT	NT	NR	1.2 U	0.54 J	NT	NT	0.24 U	0.027 J	0.13 J	NR	NR	0.25 U
2-Amino-4,6-Dinitrotoluene	NA	--	15,069	--	1,943	--	1,237	NT	NT	NT	NT	NR	0.72 J	3 U	NT	NT	0.36	0.26 J	0.7	NR	NR	0.3 U
4-Amino-2,6-Dinitrotoluene	NA	--	15,069	--	1,943	--	1,237	NT	NT	NT	NT	NR	0.87 J	1.2 J	NT	NT	0.77	0.17 J	0.7	NR	NR	0.25 U
HMX	NA	--	1.0E+06	--	232,653	--	234,645	NT	NT	NT	NT	NR	11	6.3	NT	NT	4.3	0.16 J	1	NR	NR	0.24 J
Nitrobenzene	NA	NC	NC	NC	NC	NC	NC	NT	NT	NT	NT	NR	1.2 U	2.5 U	NT	NT	0.24 U	0.24 U	0.26	NR	NR	0.25 U
Nitroglycerin	NA	105,602	--	14,186	--	9,818	--	NT	NT	NT	NT	NR	2.5 U	5 U	NT	NT	0.49 U	0.49 U	7.8	NR	NR	0.5 U
RDX	NA	13,757	162,136	1,920	22,629	1,452	17,113	0.17 J	0.28	0.20 U	7.2	570	43	15	NT	NT	18	0.20 J	1.8	0.089 J	0.25 U	0.3
SVOCs																						
Benz(a)anthracene	NA	151	--	26.2	--	47.7	--	NT	NT	NT	NT	NT	NT	NT	0.031	0.9	0.31	1.5	7.8	1.4	4.3	0.096
Benzo(a)pyrene	NA	15.1	--	2.62	--	4.77	--	NT	NT	NT	NT	NT	NT	NT	0.033	1.0	0.31	1.3	6.7	1.2	3.9	0.086
Benzo(b)fluoranthene	NA	151	--	26.2	--	47.7	--	NT	NT	NT	NT	NT	NT	NT	0.04	1.6	0.48	1.6	7.8	1.5	5.4	0.12
Dibenz(a,h)anthracene	NA	15.1	--	2.62	--	4.77	--	NT	NT	NT	NT	NT	NT	NT	0.0068 U	0.24	0.028 U	0.21	1.4	0.25	0.8	0.0068 U
Indeno(1,2,3-cd)pyrene	NA	151	--	26.2	--	47.7	--	NT	NT	NT	NT	NT	NT	NT	0.022	0.75	0.18	0.74	3.4	0.66	2.3	0.064

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

CR = Cumulative Risk

ft bgs = feet below ground surface

HI = Hazard Index

mg/kg = milligrams/kilograms

NC = Not calculated

NR = Not reported

NT = Not tested

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

J = estimated value below reporting limit

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

SVOCs = Semivolatile Organic Compounds

U = Result not detected at indicated laboratory reporting limit.

1. Table only lists detected compounds.

1. Shaded cells indicate exceedance of most restrictive risk-based cleanup goal for surface soil from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP*, SAIC, March 2010.

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TABLE 3-9b
Identification of Carcinogenic COCs in Deep Surface Soil for National Guard Land Use, Confirmation Data
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 ft bgs) ^a															
						National Guard															
						Dust/Fire Control Worker				Range Maintenance Soldier						Trainee					
						CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?	CR=10 ⁻⁵	# Detect > CR	Ratio of EPC to CR	COC?	% of Sum	COC?
Explosives																					
1,3,5-Trinitrobenzene	mg/kg	4 / 6	0.69	0.602	0.602	--	NA	NA	NA	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	mg/kg	9 / 9	1,600	963.8	963.8	32,883	0	0.0293	No	4,950	0	0.195	No	5.95	No	4,643	0	0.208	No	10.40	Yes
2,4-Dinitrotoluene	mg/kg	3 / 6	0.54	0.387	0.387	596	0	0.0006	No	98.2	0	0.004	No	0.12	No	134	0	0.003	No	0.14	No
2-Amino-4,6-Dinitrotoluene	mg/kg	4 / 6	0.72	0.705	0.705	--	NA	NA	NA	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
4-Amino-2,6-Dinitrotoluene	mg/kg	5 / 6	1.2	0.988	0.988	--	NA	NA	NA	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
HMX	mg/kg	6 / 6	11	7.364	7.364	--	NA	NA	NA	--	NA	NA	NA	NA	NA	--	NA	NA	NA	NA	NA
Nitrobenzene	mg/kg	1 / 6	0.26	0.26	0.26	NC	NA	NA	Yes ^b	NC	NA	NA	Yes ^b	NA	Yes ^b	NC	NA	NA	Yes ^b	NA	Yes ^b
Nitroglycerin	mg/kg	1 / 6	7.8	7.8	7.8	105,602	0	0.0001	No	14,186	0	0.001	No	0.02	No	9,818	0	0.001	No	0.04	No
RDX	mg/kg	11 / 13	570	241.2	241.2	13,757	0	0.018	No	1,920	0	0.13	No	3.84	No	1,452	0	0.17	No	8.32	No
SVOCs																					
Benz(a)anthracene	mg/kg	8 / 8	7.8	6.206	6.206	151	0	0.04	No	26.2	0	0.24	No	7.24	No	47.7	0	0.13	No	6.52	No
Benzo(a)pyrene	mg/kg	8 / 8	6.7	5.404	5.404	15.1	0	0.4	No	2.62	2	2.1	Yes	63.03	Yes	4.77	1	1.1	Yes	56.75	Yes
Benzo(b)fluoranthene	mg/kg	8 / 8	7.8	6.624	6.624	151	0	0.04	No	26.2	0	0.25	No	7.73	No	47.7	0	0.14	No	6.96	No
Dibenz(a,h)anthracene	mg/kg	6 / 8	1.4	0.748	0.748	15.1	0	0.05	No	2.62	0	0.29	No	8.72	No	4.77	0	0.16	No	7.85	No
Indeno(1,2,3-cd)pyrene	mg/kg	8 / 8	3.4	2.875	2.875	151	0	0.02	No	26.2	0	0.11	No	3.35	No	47.7	0	0.06	No	3.02	No

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.

COC = chemical of concern

COPC = chemical of potential concern

CR = Cumulative Risk

EPC = exposure point concentration

ft bgs = feet below ground surface

HI = Hazard Index

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

mg/kg = milligrams/kilograms

NA = Not applicable

NC = Not calculated

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

UCL = upper confidence limit

Sum of Ratios 0.56

Sum of Ratios 3.27

Sum of Ratios 2.00

^a Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^b Detected organics are automatically retained as COCs where no CUGs have been developed.

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TABLE 3-9c
Identification of Non-Carcinogenic COCs in Deep Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

COPCs	Units	Results > Detection Limit	Maximum Detect	95% UCL	EPC	Final Facility-Wide Cleanup Goals for Deep Surface Soil (0-4 ft bgs) ^a											
						National Guard											
						Dust/Fire Control Worker				Range Maintenance Soldier				Trainee			
						HI=1	# Detect > HI	Ratio of EPC to HI	COC?	HI=1	# Detect > HI	Ratio of EPC to HI	COC?	HI=1	# Detect > HI	Ratio of EPC to HI	COC?
Explosives																	
1,3,5-Trinitrobenzene	mg/kg	4 / 6	0.69	0.602	0.602	1.0E+06	0	0.00	No	205,835	0	0.00	No	165,422	0	0.00	No
2,4,6-Trinitrotoluene	mg/kg	9 / 9	1,600	963.8	963.8	17,616	0	0.05	No	2,652	0	0.36	No	2,488	0	0.39	No
2,4-Dinitrotoluene	mg/kg	3 / 6	0.54	0.387	0.387	28,957	0	0.00	No	4,772	0	0.00	No	6,519	0	0.00	No
2-Amino-4,6-Dinitrotoluene	mg/kg	4 / 6	0.72	0.705	0.705	15,069	0	0.00	No	1,943	0	0.00	No	1,237	0	0.00	No
4-Amino-2,6-Dinitrotoluene	mg/kg	5 / 6	1.2	0.988	0.988	15,069	0	0.00	No	1,943	0	0.00	No	1,237	0	0.00	No
HMX	mg/kg	6 / 6	11	7.364	7.364	1.0E+06	0	0.00	No	232,653	0	0.00	No	234,645	0	0.00	No
Nitrobenzene	mg/kg	1 / 6	0.26	0.26	0.26	NC	NA	NA	Yes ^b	NC	NA	NA	Yes ^b	NC	NA	NA	Yes ^b
Nitroglycerin	mg/kg	1 / 6	7.8	7.8	7.8	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA
RDX	mg/kg	11 / 13	570	241.2	241.2	162,136	0	0.00	No	22,629	0	0.01	No	17,113	0	0.01	No
SVOCs																	
Benz(a)anthracene	mg/kg	8 / 8	7.8	6.206	6.206	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA
Benzo(a)pyrene	mg/kg	8 / 8	6.7	5.404	5.404	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA
Benzo(b)fluoranthene	mg/kg	8 / 8	7.8	6.624	6.624	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA
Dibenz(a,h)anthracene	mg/kg	6 / 8	1.4	0.748	0.748	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA
Indeno(1,2,3-cd)pyrene	mg/kg	8 / 8	3.4	2.875	2.875	--	NA	NA	NA	--	NA	NA	NA	--	NA	NA	NA

Sum of Ratios0.06Sum of Ratios0.38Sum of Ratios0.40

Notes:

-- = No CUG could be quantified based on lack of approved toxicity value.
COC = chemical of concern
COPC = chemical of potential concern
EPC = Exposure Point Concentration
ft bgs = feet below ground surface
HI = Hazard Index
mg/kg = milligrams/kilograms
NA = Not applicable
NC = Not calculated
UCL = Upper Confidence Limit
SVOCs = Semivolatile organics

^a Cleanup Goals (CUGs) are from the *Final Facility-Wide Human Health Cleanup Goals for the RVAAP* prepared by SAIC in March 2010.

^b Detected organics are automatically retained as COCs where no CUGs have been developed.

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Appendix A

ProUCL Software Program Output

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil Samples, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended EPC mg/kg	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg						
Explosives									
1,3,5-Trinitrobenzene	18/130	5.70E-02	4.90E+02	3.33E+01	2.91E+01	NP	97.5% KM (Chebyshev)	2.91E+01	UCL
1,3-Dinitrobenzene	3/130	3.70E-02	8.80E-02	6.97E-02	9.68E-02	Normal	KM-t	8.80E-02	MDC
2,4,6-Trinitrotoluene	44/130	3.00E-02	3.80E+03	1.97E+02	3.15E+02	NP	97.5% KM (Chebyshev)	3.15E+02	UCL
2,4-Dinitrotoluene	15/130	6.30E-02	5.50E-01	2.07E-01	1.79E-01	Normal	KM (Percentile Bootstrap)	1.79E-01	UCL
2,6-Dinitrotoluene	4/130	7.50E-02	6.20E-01	2.19E-01	1.06E-01	NP	KM (Percentile Bootstrap)	1.06E-01	UCL
2-Amino-4,6-Dinitrotoluene	4/14	9.90E-02	9.70E-01	3.50E-01	3.33E-01	Gamma	KM-t	3.33E-01	UCL
2-Nitrotoluene	2/130	7.40E-02	1.70E-01	1.22E-01	2.02E-01	NP	KM-t	1.70E-01	MDC
3-Nitrotoluene	3/130	9.10E-02	2.10E+01	7.07E+00	1.50E+00	Lognormal	97.5% KM (Chebyshev)	1.50E+00	UCL
4-Amino-2,6-Dinitrotoluene	6/14	9.70E-02	9.30E-01	3.18E-01	3.24E-01	Gamma	KM-t	3.24E-01	UCL
4-Nitrotoluene	4/130	1.30E-01	1.90E-01	1.70E-01	1.93E-01	Normal	KM-t	1.90E-01	MDC
HMX	18/130	1.20E-01	1.70E+03	1.23E+02	1.03E+02	NP	97.5% KM (Chebyshev)	1.03E+02	UCL
Nitrobenzene	2/130	3.50E-02	5.40E-02	4.45E-02	6.02E-02	NP	KM-t	5.40E-02	MDC
Nitrocellulose	7/23	2.50E+00	3.15E+02	7.81E+01	5.31E+01	Gamma	KM-t	5.31E+01	UCL
Nitroglycerin	2/54	5.50E+00	1.20E+01	8.75E+00	1.20E+01	NP	KM (Percentile Bootstrap)	1.20E+01	MDC
RDX	18/130	1.80E-01	9.50E+03	7.02E+02	5.79E+02	NP	97.5% KM (Chebyshev)	5.79E+02	UCL
Tetryl	5/130	8.80E-02	4.80E-01	2.10E-01	3.49E-01	Normal	KM (Percentile Bootstrap)	3.49E-01	UCL
Inorganics									
Aluminum	246/246	1.41E+03	5.01E+04	1.29E+04	1.34E+04	NP	KM (BCA)	1.34E+04	UCL
Antimony	93/177	4.00E-01	1.57E+02	7.83E+00	9.00E+00	NP	KM (Chebyshev)	9.00E+00	UCL
Arsenic	247/247	3.10E-01	3.58E+01	1.27E+01	1.31E+01	NP	Student's-t	1.31E+01	UCL
Barium	245/246	1.17E+01	1.04E+04	3.74E+02	6.76E+02	NP	KM (Chebyshev)	6.76E+02	UCL
Beryllium	110/176	1.40E-01	1.09E+01	7.80E-01	7.52E-01	NP	KM (BCA)	7.52E-01	UCL
Cadmium	179/246	6.00E-02	8.77E+02	9.96E+00	3.05E+01	NP	97.5% KM (Chebyshev)	3.05E+01	UCL
Chromium (total)	246/246	3.40E+00	1.89E+02	1.87E+01	2.04E+01	NP	KM (BCA)	2.04E+01	UCL
Chromium, hexavalent	14/37	2.00E+00	1.01E+01	5.03E+00	4.02E+00	Normal	KM (Percentile Bootstrap)	4.02E+00	UCL
Cobalt	174/176	9.20E-01	2.17E+01	8.49E+00	8.86E+00	NP	KM (BCA)	8.86E+00	UCL
Copper	174/176	5.80E+00	1.68E+04	2.31E+02	6.62E+02	NP	KM (Chebyshev)	6.62E+02	UCL
Cyanide	12/99	6.40E-02	2.80E+00	9.40E-01	2.90E-01	Gamma	KM-t	2.90E-01	UCL
Lead	246/247	5.60E+00	2.80E+03	1.39E+02	2.36E+02	NP	KM (Chebyshev)	2.36E+02	UCL
Manganese	246/246	6.54E+01	4.27E+03	6.39E+02	7.04E+02	NP	KM (BCA)	7.04E+02	UCL
Mercury	171/247	1.50E-02	1.20E+00	9.34E-02	8.95E-02	NP	KM (BCA)	8.95E-02	UCL
Nickel	174/176	7.00E+00	5.07E+01	1.87E+01	1.95E+01	Lognormal	KM (BCA)	1.95E+01	UCL
Selenium	179/247	3.40E-01	5.00E+00	1.11E+00	9.88E-01	NP	KM (BCA)	9.88E-01	UCL
Silver	40/246	2.00E-01	3.32E+01	3.41E+00	1.09E+00	Lognormal	KM (BCA)	1.09E+00	UCL
Thallium	112/177	1.70E-01	3.10E+00	5.70E-01	5.69E-01	NP	KM (BCA)	5.69E-01	UCL
Vanadium	176/176	4.80E+00	3.56E+01	2.19E+01	2.26E+01	Normal	KM-t	2.26E+01	UCL
Zinc	244/246	2.86E+01	2.49E+04	3.49E+02	8.04E+02	NP	KM (Chebyshev)	8.04E+02	UCL
Pesticides and PCBs									
Dieldrin	2/14	2.40E-03	5.40E-03	3.90E-03	5.40E-03	NP	KM (Percentile Bootstrap)	5.40E-03	MDC

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil Samples, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg					EPC mg/kg	
SVOCs									
2,4-Dinitrotoluene	5/35	9.00E-02	1.90E+01	4.07E+00	1.75E+00	Gamma	KM-t	1.75E+00	UCL
2,6-Dinitrotoluene	2/35	1.00E-01	1.30E+00	7.00E-01	4.63E-01	NP	97.5% KM (Chebyshev)	4.63E-01	UCL
2-Methylnaphthalene	10/42	4.70E-02	6.70E-01	1.95E-01	1.78E-01	Lognormal	KM (Percentile Bootstrap)	1.78E-01	UCL
Acenaphthene	3/42	1.40E-01	2.20E-01	1.70E-01	2.20E-01	Normal	KM (Percentile Bootstrap)	2.20E-01	MDC
Anthracene	4/42	5.70E-02	8.70E-01	4.62E-01	5.13E-01	Normal	KM (Percentile Bootstrap)	5.13E-01	UCL
Benz(a)anthracene	8/42	4.30E-02	2.60E+00	6.37E-01	3.73E-01	Gamma	KM-t	3.73E-01	UCL
Benzo(a)pyrene	8/42	4.00E-02	2.30E+00	5.48E-01	3.21E-01	Gamma	KM-t	3.21E-01	UCL
Benzo(b)fluoranthene	9/42	5.40E-02	2.80E+00	6.56E-01	4.22E-01	Gamma	KM-t	4.22E-01	UCL
Benzo(ghi)perylene	6/42	1.10E-01	1.10E+00	3.50E-01	2.45E-01	Gamma	KM-t	2.45E-01	UCL
Benzo(k)fluoranthene	6/42	6.50E-02	1.10E+00	3.71E-01	2.98E-01	Normal	KM (Percentile Bootstrap)	2.98E-01	UCL
Bis(2-ethylhexyl)phthalate	3/42	3.40E-02	1.40E-01	1.01E-01	1.58E-01	Normal	KM-t	1.40E-01	MDC
Carbazole	3/42	2.00E-01	4.10E-01	2.93E-01	4.10E-01	Normal	KM (Percentile Bootstrap)	4.10E-01	MDC
Chrysene	7/42	5.00E-02	2.30E+00	6.70E-01	3.33E-01	Gamma	KM-t	3.33E-01	UCL
Dibenz(a,h)anthracene	4/42	5.40E-02	3.40E-01	1.42E-01	1.73E-01	Normal	KM (Percentile Bootstrap)	1.73E-01	UCL
Dibenzofuran	4/42	4.50E-02	1.90E-01	1.26E-01	1.83E-01	Normal	KM (Percentile Bootstrap)	1.83E-01	UCL
Di-n-butyl phthalate	6/42	5.30E-02	2.60E+01	5.10E+00	1.94E+00	Gamma	KM-t	1.94E+00	UCL
Fluoranthene	12/42	4.00E-02	5.30E+00	1.02E+00	6.15E-01	Gamma	KM-t	6.15E-01	UCL
Fluorene	3/42	1.80E-01	2.90E-01	2.37E-01	2.90E-01	Normal	KM-t	2.90E-01	MDC
Indeno(1,2,3-cd)pyrene	6/42	1.30E-01	1.40E+00	4.30E-01	2.85E-01	Gamma	KM-t	2.85E-01	UCL
Naphthalene	7/42	4.10E-02	1.80E-01	9.99E-02	1.34E-01	Normal	KM (Percentile Bootstrap)	1.34E-01	UCL
N-Nitrosodiphenylamine	2/42	6.60E-01	1.50E+00	1.08E+00	1.50E+00	Normal	KM (Percentile Bootstrap)	1.50E+00	MDC
Phenanthrene	13/42	5.20E-02	3.20E+00	6.58E-01	5.01E-01	Lognormal	KM (BCA)	5.01E-01	UCL
Pyrene	10/42	3.60E-02	4.70E+00	9.85E-01	5.78E-01	Gamma	KM-t	5.78E-01	UCL
VOCs									
Chloroform	4/20	2.00E-03	2.30E-02	7.75E-03	7.00E-03	Lognormal	KM (BCA)	7.00E-03	UCL
Toluene	9/20	7.90E-04	1.90E-01	5.79E-02	4.92E-02	Gamma	KM-t	4.92E-02	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.)
The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG ss_NGT RA and MEC UC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	18
Number of Distinct Detected Data	15	Number of Non-Detect Data	112
Number of Missing Values	4	Percent Non-Detects	86.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.057	Minimum Detected	-2.865
Maximum Detected	490	Maximum Detected	6.194
Mean of Detected	33.28	Mean of Detected	-0.603
SD of Detected	115.5	SD of Detected	2.621
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	25	Maximum Non-Detect	3.219
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	127
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.69%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.326	Shapiro Wilk Test Statistic	0.772
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.842	Mean	-1.798
SD	43.47	SD	1.188
95% DL/2 (t) UCL	11.16	95% H-Stat (DL/2) UCL	0.406
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.994
		SD in Log Scale	1.762
		Mean in Original Scale	4.835
		SD in Original Scale	43.46
		95% Percentile Bootstrap UCL	12.14
		95% BCA Bootstrap UCL	19.12
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.189	Data do not follow a Discernable Distribution (0.05)	
Theta Star	176.5		
nu star	6.788		
A-D Test Statistic	3.288	Nonparametric Statistics	
5% A-D Critical Value	0.891	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.891	Mean	4.704
5% K-S Critical Value	0.226	SD	43.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.908
		95% KM (t) UCL	11.18
Assuming Gamma Distribution		95% KM (z) UCL	11.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.02
Minimum	1E-09	95% KM (bootstrap t) UCL	81.99
Maximum	490	95% KM (BCA) UCL	11.44
Mean	29.56	95% KM (Percentile Bootstrap) UCL	12.24
Median	36.16	95% KM (Chebyshev) UCL	21.74
SD	44.23	97.5% KM (Chebyshev) UCL	29.11
k star	0.208	99% KM (Chebyshev) UCL	43.59
Theta star	141.8		
Nu star	54.19	Potential UCLs to Use	
AppChi2	38.27	97.5% KM (Chebyshev) UCL	29.11
95% Gamma Approximate UCL	41.85		
95% Adjusted Gamma UCL	42.01		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3-Dinitrobenzene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	127
Number of Missing Values	4	Percent Non-Detects	97.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.037	Minimum Detected	-3.297
Maximum Detected	0.088	Maximum Detected	-2.43
Mean of Detected	0.0697	Mean of Detected	-2.735
SD of Detected	0.0284	SD of Detected	0.487
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.808	Shapiro Wilk Test Statistic	0.79
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.526	Mean	-1.962
SD	2.962	SD	0.774
95% DL/2 (t) UCL	0.957	95% H-Stat (DL/2) UCL	0.224
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.735
		SD in Log Scale	0.609
		Mean in Original Scale	0.0779
		SD in Original Scale	0.0505
		95% Percentile Bootstrap UCL	0.0853
		95% BCA Bootstrap UCL	0.0859
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0697
5% K-S Critical Value	N/A	SD	0.0232
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0164
		95% KM (t) UCL	0.0968
Assuming Gamma Distribution		95% KM (z) UCL	0.0966
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.103
Minimum	N/A	95% KM (bootstrap t) UCL	0.0988
Maximum	N/A	95% KM (BCA) UCL	0.088
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.088
Median	N/A	95% KM (Chebyshev) UCL	0.141
SD	N/A	97.5% KM (Chebyshev) UCL	0.172
k star	N/A	99% KM (Chebyshev) UCL	0.233
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	95% KM (t) UCL	0.0968
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.088
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	44
Number of Distinct Detected Data	40	Number of Non-Detect Data	86
Number of Missing Values	4	Percent Non-Detects	66.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	3800	Maximum Detected	8.243
Mean of Detected	197.4	Mean of Detected	0.575
SD of Detected	760.9	SD of Detected	2.959
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.45	Maximum Non-Detect	-0.799
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	103
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	27
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	79.23%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.288	Shapiro Wilk Test Statistic	0.885
5% Shapiro Wilk Critical Value	0.944	5% Shapiro Wilk Critical Value	0.944
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	66.88	Mean	-1.176
SD	449.2	SD	2.122
95% DL/2 (t) UCL	132.1	95% H-Stat (DL/2) UCL	4.29
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.857
		SD in Log Scale	2.958
		Mean in Original Scale	66.91
		SD in Original Scale	449.2
		95% Percentile Bootstrap UCL	133.3
		95% BCA Bootstrap UCL	182.4
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.166	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1192		
nu star	14.57		
A-D Test Statistic	6.393	Nonparametric Statistics	
5% A-D Critical Value	0.929	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.929	Mean	66.88
5% K-S Critical Value	0.149	SD	447.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	39.7
		95% KM (t) UCL	132.6
Assuming Gamma Distribution		95% KM (z) UCL	132.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	132.1
Minimum	1E-09	95% KM (bootstrap t) UCL	568.7
Maximum	3800	95% KM (BCA) UCL	130.4
Mean	172	95% KM (Percentile Bootstrap) UCL	141.9
Median	158.6	95% KM (Chebyshev) UCL	239.9
SD	444	97.5% KM (Chebyshev) UCL	314.8
k star	0.198	99% KM (Chebyshev) UCL	461.9
Theta star	870.3		
Nu star	51.37	Potential UCLs to Use	
AppChi2	35.91	97.5% KM (Chebyshev) UCL	314.8
95% Gamma Approximate UCL	246		
95% Adjusted Gamma UCL	247		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	115
Number of Missing Values	4	Percent Non-Detects	88.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.063	Minimum Detected	-2.765
Maximum Detected	0.55	Maximum Detected	-0.598
Mean of Detected	0.207	Mean of Detected	-1.748
SD of Detected	0.129	SD of Detected	0.615
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12.5	Maximum Non-Detect	2.526
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.882	Shapiro Wilk Test Statistic	0.972
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.182	Mean	-2.011
SD	0.539	SD	0.41
95% DL/2 (t) UCL	0.26	95% H-Stat (DL/2) UCL	0.162
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.01
		SD in Log Scale	0.465
		Mean in Original Scale	0.149
		SD in Original Scale	0.0738
		95% Percentile Bootstrap UCL	0.16
		95% BCA Bootstrap UCL	0.161
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.493	Data appear Normal at 5% Significance Level	
Theta Star	0.083		
nu star	74.79		
A-D Test Statistic	0.211	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.151
5% K-S Critical Value	0.223	SD	0.0683
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0164
		95% KM (t) UCL	0.178
Assuming Gamma Distribution		95% KM (z) UCL	0.178
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.18
Minimum	0.063	95% KM (bootstrap t) UCL	0.18
Maximum	0.55	95% KM (BCA) UCL	0.178
Mean	0.184	95% KM (Percentile Bootstrap) UCL	0.179
Median	0.173	95% KM (Chebyshev) UCL	0.223
SD	0.0595	97.5% KM (Chebyshev) UCL	0.254
k star	11.06	99% KM (Chebyshev) UCL	0.314
Theta star	0.0166		
Nu star	2875	Potential UCLs to Use	
AppChi2	2752	95% KM (t) UCL	0.178
95% Gamma Approximate UCL	0.192	95% KM (Percentile Bootstrap) UCL	0.179
95% Adjusted Gamma UCL	0.192		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	126
Number of Missing Values	4	Percent Non-Detects	96.92%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.075	Minimum Detected	-2.59
Maximum Detected	0.62	Maximum Detected	-0.478
Mean of Detected	0.219	Mean of Detected	-1.969
SD of Detected	0.267	SD of Detected	0.998
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	75	Maximum Non-Detect	4.317
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.658	Shapiro Wilk Test Statistic	0.718
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.467	Mean	-1.979
SD	3.321	SD	0.623
95% DL/2 (t) UCL	0.95	95% H-Stat (DL/2) UCL	0.189
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.401
		SD in Log Scale	0.624
		Mean in Original Scale	0.11
		SD in Original Scale	0.0796
		95% Percentile Bootstrap UCL	0.122
		95% BCA Bootstrap UCL	0.125
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.48	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.457		
nu star	3.836		
A-D Test Statistic	0.815	Nonparametric Statistics	
5% A-D Critical Value	0.664	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.664	Mean	0.0895
5% K-S Critical Value	0.401	SD	0.0477
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00707
Assuming Gamma Distribution		95% KM (t) UCL	0.101
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.101
Minimum	1E-09	95% KM (jackknife) UCL	0.103
Maximum	0.62	95% KM (bootstrap t) UCL	0.104
Mean	0.18	95% KM (BCA) UCL	0.107
Median	0.202	95% KM (Percentile Bootstrap) UCL	0.106
SD	0.135	95% KM (Chebyshev) UCL	0.12
k star	0.185	97.5% KM (Chebyshev) UCL	0.134
Theta star	0.977	99% KM (Chebyshev) UCL	0.16
Nu star	48.02	Potential UCLs to Use	
AppChi2	33.12	95% KM (t) UCL	0.101
95% Gamma Approximate UCL	0.262	95% KM (% Bootstrap) UCL	0.106
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Amino-4,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	14	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	10
Number of Missing Values	2	Percent Non-Detects	71.43%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.099	Minimum Detected	-2.313
Maximum Detected	0.97	Maximum Detected	-0.0305
Mean of Detected	0.35	Mean of Detected	-1.516
SD of Detected	0.417	SD of Detected	1.052
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.855
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.189	Mean	-1.918
SD	0.226	SD	0.57
95% DL/2 (t) UCL	0.296	95% H-Stat (DL/2) UCL	0.229
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.851
		SD in Log Scale	0.811
		Mean in Original Scale	0.222
		SD in Original Scale	0.237
		95% Percentile Bootstrap UCL	0.329
		95% BCA Bootstrap UCL	0.39
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.47	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.744		
nu star	3.76		
A-D Test Statistic	0.529	Nonparametric Statistics	
5% A-D Critical Value	0.665	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.665	Mean	0.202
5% K-S Critical Value	0.401	SD	0.219
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0739
Assuming Gamma Distribution		95% KM (t) UCL	0.333
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.324
Minimum	1E-09	95% KM (jackknife) UCL	0.331
Maximum	0.97	95% KM (bootstrap t) UCL	0.439
Mean	0.306	95% KM (BCA) UCL	0.356
Median	0.259	95% KM (Percentile Bootstrap) UCL	0.335
SD	0.258	95% KM (Chebyshev) UCL	0.524
k star	0.356	97.5% KM (Chebyshev) UCL	0.664
Theta star	0.859	99% KM (Chebyshev) UCL	0.938
Nu star	9.961	Potential UCLs to Use	
AppChi2	3.917	95% KM (t) UCL	0.333
95% Gamma Approximate UCL	0.777		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Nitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	128
Number of Missing Values	4	Percent Non-Detects	98.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	0.17	Maximum Detected	-1.772
Mean of Detected	0.122	Mean of Detected	-2.188
SD of Detected	0.0679	SD of Detected	0.588
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.53	Mean	-1.939
SD	2.962	SD	0.77
95% DL/2 (t) UCL	0.96	95% H-Stat (DL/2) UCL	0.224
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.122
5% K-S Critical Value	N/A	SD	0.048
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.048
Assuming Gamma Distribution		95% KM (t) UCL	0.202
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.201
Minimum	N/A	95% KM (jackknife) UCL	0.234
Maximum	N/A	95% KM (bootstrap t) UCL	0.242
Mean	N/A	95% KM (BCA) UCL	N/A
Median	N/A	95% KM (Percentile Bootstrap) UCL	0.17
SD	N/A	95% KM (Chebyshev) UCL	0.331
k star	N/A	97.5% KM (Chebyshev) UCL	0.422
Theta star	N/A	99% KM (Chebyshev) UCL	0.6
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.202
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.17
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

3-Nitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	127
Number of Missing Values	4	Percent Non-Detects	97.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.091	Minimum Detected	-2.397
Maximum Detected	21	Maximum Detected	3.045
Mean of Detected	7.07	Mean of Detected	-0.491
SD of Detected	12.06	SD of Detected	3.065
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	25	Maximum Non-Detect	3.219
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.751	Shapiro Wilk Test Statistic	0.788
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.45	Mean	-1.953
SD	2.195	SD	0.742
95% DL/2 (t) UCL	0.769	95% H-Stat (DL/2) UCL	0.209
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.13
		SD in Log Scale	1.791
		Mean in Original Scale	0.593
		SD in Original Scale	2.019
		95% Percentile Bootstrap UCL	0.908
		95% BCA Bootstrap UCL	1.092
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Lognormal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.267
5% K-S Critical Value	N/A	SD	1.833
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.198
		95% KM (t) UCL	0.596
Assuming Gamma Distribution		95% KM (z) UCL	0.593
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.538
Minimum	N/A	95% KM (bootstrap t) UCL	4.889
Maximum	N/A	95% KM (BCA) UCL	21
Mean	N/A	95% KM (Percentile Bootstrap) UCL	21
Median	N/A	95% KM (Chebyshev) UCL	1.131
SD	N/A	97.5% KM (Chebyshev) UCL	1.504
k star	N/A	99% KM (Chebyshev) UCL	2.238
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	97.5% KM (Chebyshev) UCL	1.504
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	14	Number of Detected Data	6
Number of Distinct Detected Data	5	Number of Non-Detect Data	8
Number of Missing Values	2	Percent Non-Detects	57.14%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.097	Minimum Detected	-2.333
Maximum Detected	0.93	Maximum Detected	-0.0726
Mean of Detected	0.318	Mean of Detected	-1.529
SD of Detected	0.331	SD of Detected	0.908
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.745	Shapiro Wilk Test Statistic	0.845
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.208	Mean	-1.843
SD	0.228	SD	0.63
95% DL/2 (t) UCL	0.315	95% H-Stat (DL/2) UCL	0.359
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.813
		SD in Log Scale	0.751
		Mean in Original Scale	0.223
		SD in Original Scale	0.23
		95% Percentile Bootstrap UCL	0.325
		95% BCA Bootstrap UCL	0.382
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.837	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.38		
nu star	10.04		
A-D Test Statistic	0.642	Nonparametric Statistics	
5% A-D Critical Value	0.709	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.709	Mean	0.209
5% K-S Critical Value	0.338	SD	0.22
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0652
Assuming Gamma Distribution		95% KM (t) UCL	0.324
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.316
Minimum	0.0141	95% KM (jackknife) UCL	0.319
Maximum	0.93	95% KM (bootstrap t) UCL	0.644
Mean	0.281	95% KM (BCA) UCL	0.328
Median	0.199	95% KM (Percentile Bootstrap) UCL	0.318
SD	0.239	95% KM (Chebyshev) UCL	0.493
k star	1.2	97.5% KM (Chebyshev) UCL	0.616
Theta star	0.234	99% KM (Chebyshev) UCL	0.858
Nu star	33.61	Potential UCLs to Use	
AppChi2	21.35	95% KM (t) UCL	0.324
95% Gamma Approximate UCL	0.442		
95% Adjusted Gamma UCL	0.471		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Nitrotoluene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	4
Number of Distinct Detected Data	3	Number of Non-Detect Data	126
Number of Missing Values	4	Percent Non-Detects	96.92%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.13	Minimum Detected	-2.04
Maximum Detected	0.19	Maximum Detected	-1.661
Mean of Detected	0.17	Mean of Detected	-1.783
SD of Detected	0.0283	SD of Detected	0.179
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.828	Shapiro Wilk Test Statistic	0.812
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.53	Mean	-1.934
SD	2.962	SD	0.763
95% DL/2 (t) UCL	0.96	95% H-Stat (DL/2) UCL	0.23
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.783
		SD in Log Scale	0.212
		Mean in Original Scale	0.172
		SD in Original Scale	0.0367
		95% Percentile Bootstrap UCL	0.177
		95% BCA Bootstrap UCL	0.178
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	11.12	Data appear Normal at 5% Significance Level	
Theta Star	0.0153		
nu star	88.98		
A-D Test Statistic	0.514	Nonparametric Statistics	
5% A-D Critical Value	0.656	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.656	Mean	0.17
5% K-S Critical Value	0.394	SD	0.0245
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0141
		95% KM (t) UCL	0.193
Assuming Gamma Distribution		95% KM (z) UCL	0.193
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.197
Minimum	0.036	95% KM (bootstrap t) UCL	0.192
Maximum	0.209	95% KM (BCA) UCL	N/A
Mean	0.165	95% KM (Percentile Bootstrap) UCL	0.19
Median	0.174	95% KM (Chebyshev) UCL	0.232
SD	0.0367	97.5% KM (Chebyshev) UCL	0.258
k star	14.58	99% KM (Chebyshev) UCL	0.311
Theta star	0.0113		
Nu star	3790	Potential UCLs to Use	
AppCh2	3648	95% KM (t) UCL	0.193
95% Gamma Approximate UCL	0.172	95% KM (Percentile Bootstrap) UCL	0.19
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

HMX			
General Statistics			
Number of Valid Data	130	Number of Detected Data	18
Number of Distinct Detected Data	15	Number of Non-Detect Data	112
Number of Missing Values	4	Percent Non-Detects	86.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.12	Minimum Detected	-2.12
Maximum Detected	1700	Maximum Detected	7.438
Mean of Detected	123.1	Mean of Detected	0.561
SD of Detected	403	SD of Detected	3.017
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	128
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.46%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.349	Shapiro Wilk Test Statistic	0.816
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.3	Mean	-0.248
SD	152.3	SD	1.399
95% DL/2 (t) UCL	40.43	95% H-Stat (DL/2) UCL	3.166
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.214
		SD in Log Scale	2.149
		Mean in Original Scale	17.79
		SD in Original Scale	152.3
		95% Percentile Bootstrap UCL	43.73
		95% BCA Bootstrap UCL	69.36
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.184	Data do not follow a Discernable Distribution (0.05)	
Theta Star	668.9		
nu star	6.627		
A-D Test Statistic	2.522	Nonparametric Statistics	
5% A-D Critical Value	0.893	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.893	Mean	17.29
5% K-S Critical Value	0.226	SD	151.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	13.7
		95% KM (t) UCL	39.98
Assuming Gamma Distribution		95% KM (z) UCL	39.82
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	39.43
Minimum	1E-09	95% KM (bootstrap t) UCL	399.3
Maximum	1700	95% KM (BCA) UCL	43.41
Mean	102.8	95% KM (Percentile Bootstrap) UCL	43.39
Median	126.6	95% KM (Chebyshev) UCL	77
SD	156.1	97.5% KM (Chebyshev) UCL	102.8
k star	0.165	99% KM (Chebyshev) UCL	153.6
Theta star	621.3		
Nu star	43.03	Potential UCLs to Use	
AppChi2	28.99	97.5% KM (Chebyshev) UCL	102.8
95% Gamma Approximate UCL	152.6		
95% Adjusted Gamma UCL	153.3		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrobenzene			
General Statistics			
Number of Valid Data	130	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	128
Number of Missing Values	4	Percent Non-Detects	98.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.035	Minimum Detected	-3.352
Maximum Detected	0.054	Maximum Detected	-2.919
Mean of Detected	0.0445	Mean of Detected	-3.136
SD of Detected	0.0134	SD of Detected	0.307
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.531	Mean	-1.94
SD	2.966	SD	0.775
95% DL/2 (t) UCL	0.962	95% H-Stat (DL/2) UCL	0.228
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0445
5% K-S Critical Value	N/A	SD	0.0095
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0095
		95% KM (t) UCL	0.0602
Assuming Gamma Distribution		95% KM (z) UCL	0.0601
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0667
Minimum	N/A	95% KM (bootstrap t) UCL	0.059
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.054
Median	N/A	95% KM (Chebyshev) UCL	0.0859
SD	N/A	97.5% KM (Chebyshev) UCL	0.104
k star	N/A	99% KM (Chebyshev) UCL	0.139
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.0602
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.054
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrocellulose			
General Statistics			
Number of Valid Data	23	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	16
Number of Missing Values	90	Percent Non-Detects	69.57%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	315	Maximum Detected	5.753
Mean of Detected	78.07	Mean of Detected	2.939
SD of Detected	121.9	SD of Detected	1.931
Minimum Non-Detect	2	Minimum Non-Detect	0.693
Maximum Non-Detect	5.9	Maximum Non-Detect	1.775
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.61%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.708	Shapiro Wilk Test Statistic	0.901
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	24.54	Mean	0.941
SD	73.22	SD	1.7
95% DL/2 (t) UCL	50.76	95% H-Stat (DL/2) UCL	29.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.735
		SD in Log Scale	3.936
		Mean in Original Scale	23.86
		SD in Original Scale	73.44
		95% Percentile Bootstrap UCL	50.93
		95% BCA Bootstrap UCL	70.91
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.355	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	220		
nu star	4.969		
A-D Test Statistic	0.541	Nonparametric Statistics	
5% A-D Critical Value	0.759	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.759	Mean	25.51
5% K-S Critical Value	0.329	SD	71.29
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	16.06
		95% KM (t) UCL	53.08
Assuming Gamma Distribution		95% KM (z) UCL	51.92
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	51.31
Minimum	1E-09	95% KM (bootstrap t) UCL	260.2
Maximum	2684	95% KM (BCA) UCL	59.66
Mean	563.5	95% KM (Percentile Bootstrap) UCL	52.95
Median	177	95% KM (Chebyshev) UCL	95.5
SD	775.9	97.5% KM (Chebyshev) UCL	125.8
k star	0.197	99% KM (Chebyshev) UCL	185.3
Theta star	2861		
Nu star	9.06	Potential UCLs to Use	
AppChi2	3.363	95% KM (t) UCL	53.08
95% Gamma Approximate UCL	1518		
95% Adjusted Gamma UCL	1639		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitroglycerin			
General Statistics			
Number of Valid Data	54	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	52
Number of Missing Values	80	Percent Non-Detects	96.30%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.5	Minimum Detected	1.705
Maximum Detected	12	Maximum Detected	2.485
Mean of Detected	8.75	Mean of Detected	2.095
SD of Detected	4.596	SD of Detected	0.552
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	6.8	Maximum Non-Detect	1.917
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	52
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.15%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.627	Mean	0.342
SD	1.599	SD	0.409
95% DL/2 (t) UCL	1.991	95% H-Stat (DL/2) UCL	1.603
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	5.62
5% K-S Critical Value	N/A	SD	0.876
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.169
		95% KM (t) UCL	5.903
Assuming Gamma Distribution		95% KM (z) UCL	5.898
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.846
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	12
Median	N/A	95% KM (Chebyshev) UCL	6.355
SD	N/A	97.5% KM (Chebyshev) UCL	6.674
k star	N/A	99% KM (Chebyshev) UCL	7.298
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	5.903
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	12
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitroguanidine			
General Statistics			
Number of Valid Data	23	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	22
Number of Missing Values	89	Percent Non-Detects	95.65%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable Nitroguanidine was not processed!			
RDX			
General Statistics			
Number of Valid Data	130	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	112
Number of Missing Values	4	Percent Non-Detects	86.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.18	Minimum Detected	-1.715
Maximum Detected	9500	Maximum Detected	9.159
Mean of Detected	701.9	Mean of Detected	1.373
SD of Detected	2267	SD of Detected	3.572
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	50	Maximum Non-Detect	3.912
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	125
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.15%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.357	Shapiro Wilk Test Statistic	0.811
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	97.97	Mean	-0.525
SD	858.1	SD	1.635
95% DL/2 (t) UCL	222.7	95% H-Stat (DL/2) UCL	3.461
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.978
		SD in Log Scale	2.502
		Mean in Original Scale	98.26
		SD in Original Scale	858
		95% Percentile Bootstrap UCL	243.6
		95% BCA Bootstrap UCL	372.7
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.161	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4364		
nu star	5.79		
A-D Test Statistic	2.461	Nonparametric Statistics	
5% A-D Critical Value	0.904	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.904	Mean	97.43
5% K-S Critical Value	0.227	SD	854.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	77.15
		95% KM (t) UCL	225.2
Assuming Gamma Distribution		95% KM (z) UCL	224.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	222.1
Minimum	1E-09	95% KM (bootstrap t) UCL	2450
Maximum	9500	95% KM (BCA) UCL	242.8
Mean	593	95% KM (Percentile Bootstrap) UCL	232.9
Median	730.3	95% KM (Chebyshev) UCL	433.7
SD	873.2	97.5% KM (Chebyshev) UCL	579.2
k star	0.172	99% KM (Chebyshev) UCL	865
Theta star	3457		
Nu star	44.6	Potential UCLs to Use	
AppChi2	30.28	97.5% KM (Chebyshev) UCL	579.2
95% Gamma Approximate UCL	873.3		
95% Adjusted Gamma UCL	877.1		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Tetryl			
General Statistics			
Number of Valid Data	130	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	125
Number of Missing Values	4	Percent Non-Detects	96.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.088	Minimum Detected	-2.43
Maximum Detected	0.48	Maximum Detected	-0.734
Mean of Detected	0.21	Mean of Detected	-1.768
SD of Detected	0.162	SD of Detected	0.702
Minimum Non-Detect	0.65	Minimum Non-Detect	-0.431
Maximum Non-Detect	160	Maximum Non-Detect	5.075
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	130
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.826	Shapiro Wilk Test Statistic	0.92
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.363	Mean	-1.016
SD	7.653	SD	0.786
95% DL/2 (t) UCL	2.475	95% H-Stat (DL/2) UCL	0.593
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.768
		SD in Log Scale	0.856
		Mean in Original Scale	0.244
		SD in Original Scale	0.235
		95% Percentile Bootstrap UCL	0.279
		95% BCA Bootstrap UCL	0.282
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.154	Data appear Normal at 5% Significance Level	
Theta Star	0.182		
nu star	11.54		
A-D Test Statistic	0.352	Nonparametric Statistics	
5% A-D Critical Value	0.683	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.683	Mean	0.21
5% K-S Critical Value	0.36	SD	0.144
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0722
		95% KM (t) UCL	0.33
Assuming Gamma Distribution		95% KM (z) UCL	0.329
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.343
Minimum	1E-09	95% KM (bootstrap t) UCL	0.593
Maximum	0.48	95% KM (BCA) UCL	0.349
Mean	0.213	95% KM (Percentile Bootstrap) UCL	0.349
Median	0.214	95% KM (Chebyshev) UCL	0.525
SD	0.148	97.5% KM (Chebyshev) UCL	0.661
k star	0.293	99% KM (Chebyshev) UCL	0.929
Theta star	0.728		
Nu star	76.1	Potential UCLs to Use	
AppChi2	57	95% KM (t) UCL	0.33
95% Gamma Approximate UCL	0.284	95% KM (Percentile Bootstrap) UCL	0.349
95% Adjusted Gamma UCL	0.285		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

	General UCL Statistics for Data Sets with Non-Detects
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG ss_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Aluminum			
General Statistics			
Number of Valid Data	246	Number of Detected Data	246
Number of Distinct Detected Data	129	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1410	Minimum Detected	7.251
Maximum Detected	50100	Maximum Detected	10.82
Mean of Detected	12890	Mean of Detected	9.415
SD of Detected	4466	SD of Detected	0.317
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.125	Lilliefors Test Statistic	0.0891
5% Lilliefors Critical Value	0.0565	5% Lilliefors Critical Value	0.0565
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12890	Mean	9.415
SD	4466	SD	0.317
95% DL/2 (t) UCL	13360	95% H-Stat (DL/2) UCL	13366
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	10.29	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1253		
nu star	5062		
A-D Test Statistic	3.607	Nonparametric Statistics	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	12890
5% K-S Critical Value	0.0583	SD	4457
Data not Gamma Distributed at 5% Significance Level		SE of Mean	284.7
		95% KM (t) UCL	13360
Assuming Gamma Distribution		95% KM (z) UCL	13359
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	13360
Minimum	1410	95% KM (bootstrap t) UCL	13437
Maximum	50100	95% KM (BCA) UCL	13378
Mean	12890	95% KM (Percentile Bootstrap) UCL	13393
Median	12500	95% KM (Chebyshev) UCL	14131
SD	4466	97.5% KM (Chebyshev) UCL	14668
k star	10.29	99% KM (Chebyshev) UCL	15723
Theta star	1253		
Nu star	5062	Potential UCLs to Use	
AppChi2	4897	95% KM (BCA) UCL	13378
95% Gamma Approximate UCL	13323		
95% Adjusted Gamma UCL	13326		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Antimony			
General Statistics			
Number of Valid Data	177	Number of Detected Data	93
Number of Distinct Detected Data	68	Number of Non-Detect Data	84
Number of Missing Values	67	Percent Non-Detects	47.46%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.4	Minimum Detected	-0.916
Maximum Detected	157	Maximum Detected	5.056
Mean of Detected	7.83	Mean of Detected	1.074
SD of Detected	18.88	SD of Detected	1.227
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	1.6	Maximum Non-Detect	0.47
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	66.10%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.347	Lilliefors Test Statistic	0.116
5% Lilliefors Critical Value	0.0919	5% Lilliefors Critical Value	0.0919
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.351	Mean	0.197
SD	14.14	SD	1.316
95% DL/2 (t) UCL	6.108	95% H-Stat (DL/2) UCL	2.77
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.206
		SD in Log Scale	1.739
		Mean in Original Scale	4.254
		SD in Original Scale	14.17
		95% Percentile Bootstrap UCL	6.175
		95% BCA Bootstrap UCL	7.191
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.611	Data do not follow a Discernable Distribution (0.05)	
Theta Star	12.81		
nu star	113.7		
A-D Test Statistic	6.487	Nonparametric Statistics	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	4.359
5% K-S Critical Value	0.0973	SD	14.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.065
		95% KM (t) UCL	6.12
Assuming Gamma Distribution		95% KM (z) UCL	6.111
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.043
Minimum	0.4	95% KM (bootstrap t) UCL	7.671
Maximum	157	95% KM (BCA) UCL	6.481
Mean	7.93	95% KM (Percentile Bootstrap) UCL	6.287
Median	7.1	95% KM (Chebyshev) UCL	9.002
SD	13.67	97.5% KM (Chebyshev) UCL	11.01
k star	1.083	99% KM (Chebyshev) UCL	14.96
Theta star	7.323		
Nu star	383.3	Potential UCLs to Use	
AppChi2	339	95% KM (Chebyshev) UCL	9.002
95% Gamma Approximate UCL	8.968		
95% Adjusted Gamma UCL	8.977		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Arsenic			
General Statistics			
Number of Valid Observations	247	Number of Distinct Observations	108
Raw Statistics		Log-transformed Statistics	
Minimum	0.31	Minimum of Log Data	-1.171
Maximum	35.8	Maximum of Log Data	3.578
Mean	12.67	Mean of log Data	2.482
Median	12.5	SD of log Data	0.411
SD	3.728		
Coefficient of Variation	0.294		
Skewness	1.078		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.0708	Lilliefors Test Statistic	0.135
Lilliefors Critical Value	0.0564	Lilliefors Critical Value	0.0564
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13.06	95% H-UCL	13.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14.56
95% Adjusted-CLT UCL	13.08	97.5% Chebyshev (MVUE) UCL	15.23
95% Modified-t UCL	13.06	99% Chebyshev (MVUE) UCL	16.54
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.862	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.429		
MLE of Mean	12.67		
MLE of Standard Deviation	4.255		
nu star	4378		
Approximate Chi Square Value (.05)	4225	Nonparametric Statistics	
Adjusted Level of Significance	0.049	95% CLT UCL	13.06
Adjusted Chi Square Value	4224	95% Jackknife UCL	13.06
		95% Standard Bootstrap UCL	13.05
Anderson-Darling Test Statistic	4.906	95% Bootstrap-t UCL	13.08
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	13.1
Kolmogorov-Smirnov Test Statistic	0.0885	95% Percentile Bootstrap UCL	13.05
Kolmogorov-Smirnov 5% Critical Value	0.0582	95% BCA Bootstrap UCL	13.04
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13.7
		97.5% Chebyshev(Mean, Sd) UCL	14.15
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15.03
95% Approximate Gamma UCL	13.13		
95% Adjusted Gamma UCL	13.13		
Potential UCL to Use		Use 95% Student's-t UCL	13.06
		or 95% Modified-t UCL	13.06

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Barium			
General Statistics			
Number of Valid Data	246	Number of Detected Data	245
Number of Distinct Detected Data	218	Number of Non-Detect Data	1
Number of Missing Values	1	Percent Non-Detects	0.41%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	11.7	Minimum Detected	2.46
Maximum Detected	10400	Maximum Detected	9.25
Mean of Detected	374	Mean of Detected	4.825
SD of Detected	1094	SD of Detected	1.154
Minimum Non-Detect	26.7	Minimum Non-Detect	3.285
Maximum Non-Detect	26.7	Maximum Non-Detect	3.285
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.37	Lilliefors Test Statistic	0.158
5% Lilliefors Critical Value	0.0566	5% Lilliefors Critical Value	0.0566
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	372.5	Mean	4.816
SD	1092	SD	1.16
95% DL/2 (t) UCL	487.4	95% H-Stat (DL/2) UCL	285.9
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	363.3	Mean in Log Scale	4.813
SD	1098	SD in Log Scale	1.165
95% MLE (t) UCL	478.9	Mean in Original Scale	372.5
95% MLE (Tiku) UCL	465.2	SD in Original Scale	1092
		95% Percentile Bootstrap UCL	493
		95% BCA Bootstrap UCL	523.3
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.562	Data do not follow a Discernable Distribution (0.05)	
Theta Star	664.9		
nu star	275.6		
A-D Test Statistic	30.3	Nonparametric Statistics	
5% A-D Critical Value	0.815	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.815	Mean	372.5
5% K-S Critical Value	0.0615	SD	1089
Data not Gamma Distributed at 5% Significance Level		SE of Mean	69.6
Assuming Gamma Distribution		95% KM (t) UCL	487.5
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	487
Minimum	1E-09	95% KM (jackknife) UCL	487.5
Maximum	10400	95% KM (bootstrap t) UCL	539.7
Mean	372.5	95% KM (BCA) UCL	492.2
Median	88.1	95% KM (Percentile Bootstrap) UCL	494
SD	1092	95% KM (Chebyshev) UCL	675.9
k star	0.522	97.5% KM (Chebyshev) UCL	807.2
Theta star	713.8	99% KM (Chebyshev) UCL	1065
Nu star	256.7	Potential UCLs to Use	
AppChi2	220.6	95% KM (Chebyshev) UCL	675.9
95% Gamma Approximate UCL	433.4		
95% Adjusted Gamma UCL	433.8		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Beryllium			
General Statistics			
Number of Valid Data	176	Number of Detected Data	110
Number of Distinct Detected Data	54	Number of Non-Detect Data	66
Number of Missing Values	68	Percent Non-Detects	37.50%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	10.9	Maximum Detected	2.389
Mean of Detected	0.78	Mean of Detected	-0.582
SD of Detected	1.278	SD of Detected	0.631
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	0.81	Maximum Non-Detect	-0.211
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	158
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	18
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.349	Lilliefors Test Statistic	0.198
5% Lilliefors Critical Value	0.0845	5% Lilliefors Critical Value	0.0845
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.566	Mean	-0.965
SD	1.047	SD	0.729
95% DL/2 (t) UCL	0.697	95% H-Stat (DL/2) UCL	0.501
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.929
		SD in Log Scale	0.707
		Mean in Original Scale	0.576
		SD in Original Scale	1.044
		95% Percentile Bootstrap UCL	0.723
		95% BCA Bootstrap UCL	0.766
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.609	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.485		
nu star	354		
A-D Test Statistic	12.03	Nonparametric Statistics	
5% A-D Critical Value	0.769	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.769	Mean	0.585
5% K-S Critical Value	0.0883	SD	1.039
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.079
Assuming Gamma Distribution		95% KM (t) UCL	0.715
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.715
Minimum	1E-09	95% KM (jackknife) UCL	0.703
Maximum	10.9	95% KM (bootstrap t) UCL	0.842
Mean	0.681	95% KM (BCA) UCL	0.752
Median	0.488	95% KM (Percentile Bootstrap) UCL	0.739
SD	1.046	95% KM (Chebyshev) UCL	0.929
k star	0.428	97.5% KM (Chebyshev) UCL	1.078
Theta star	1.591	99% KM (Chebyshev) UCL	1.37
Nu star	150.5	Potential UCLs to Use	
AppChi2	123.2	95% KM (BCA) UCL	0.752
95% Gamma Approximate UCL	0.832		
95% Adjusted Gamma UCL	0.833		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Cadmium			
General Statistics			
Number of Valid Data	246	Number of Detected Data	179
Number of Distinct Detected Data	115	Number of Non-Detect Data	67
Number of Missing Values	1	Percent Non-Detects	27.24%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	877	Maximum Detected	6.777
Mean of Detected	9.963	Mean of Detected	0.0209
SD of Detected	68.07	SD of Detected	1.724
Minimum Non-Detect	0.04	Minimum Non-Detect	-3.219
Maximum Non-Detect	0.7	Maximum Non-Detect	-0.357
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	147
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	99
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	59.76%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.442	Lilliefors Test Statistic	0.075
5% Lilliefors Critical Value	0.0662	5% Lilliefors Critical Value	0.0662
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.313	Mean	-0.476
SD	58.18	SD	1.768
95% DL/2 (t) UCL	13.44	95% H-Stat (DL/2) UCL	3.524
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.655
		SD in Log Scale	1.947
		Mean in Original Scale	7.292
		SD in Original Scale	58.19
		95% Percentile Bootstrap UCL	14.14
		95% BCA Bootstrap UCL	20.88
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.301	Data do not follow a Discernable Distribution (0.05)	
Theta Star	33.1		
nu star	107.8		
A-D Test Statistic	19.22	Nonparametric Statistics	
5% A-D Critical Value	0.868	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.868	Mean	7.299
5% K-S Critical Value	0.075	SD	58.07
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.713
Assuming Gamma Distribution		95% KM (t) UCL	13.43
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	13.41
Minimum	1E-09	95% KM (jackknife) UCL	13.42
Maximum	877	95% KM (bootstrap t) UCL	44.3
Mean	7.786	95% KM (BCA) UCL	14.65
Median	0.515	95% KM (Percentile Bootstrap) UCL	14.36
SD	58.19	95% KM (Chebyshev) UCL	23.48
k star	0.126	97.5% KM (Chebyshev) UCL	30.48
Theta star	61.72	99% KM (Chebyshev) UCL	44.24
Nu star	62.06	Potential UCLs to Use	
AppChi2	44.94	97.5% KM (Chebyshev) UCL	30.48
95% Gamma Approximate UCL	10.75		
95% Adjusted Gamma UCL	10.77		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium			
General Statistics			
Number of Valid Data	246	Number of Detected Data	246
Number of Distinct Detected Data	149	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.4	Minimum Detected	1.224
Maximum Detected	189	Maximum Detected	5.242
Mean of Detected	18.7	Mean of Detected	2.816
SD of Detected	14.57	SD of Detected	0.417
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.25	Lilliefors Test Statistic	0.114
5% Lilliefors Critical Value	0.0565	5% Lilliefors Critical Value	0.0565
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.7	Mean	2.816
SD	14.57	SD	0.417
95% DL/2 (t) UCL	20.24	95% H-Stat (DL/2) UCL	19.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.537	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4.122		
nu star	2232		
A-D Test Statistic	9.202	Nonparametric Statistics	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	18.7
5% K-S Critical Value	0.0585	SD	14.54
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.929
		95% KM (t) UCL	20.24
Assuming Gamma Distribution		95% KM (z) UCL	20.23
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	20.24
Minimum	3.4	95% KM (bootstrap t) UCL	21.41
Maximum	189	95% KM (BCA) UCL	20.43
Mean	18.7	95% KM (Percentile Bootstrap) UCL	20.29
Median	16.15	95% KM (Chebyshev) UCL	22.75
SD	14.57	97.5% KM (Chebyshev) UCL	24.5
k star	4.537	99% KM (Chebyshev) UCL	27.94
Theta star	4.122		
Nu star	2232	Potential UCLs to Use	
AppChi2	2124	95% KM (BCA) UCL	20.43
95% Gamma Approximate UCL	19.66		
95% Adjusted Gamma UCL	19.66		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium, hexavalent			
General Statistics			
Number of Valid Data	37	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	23
Number of Missing Values	12	Percent Non-Detects	62.16%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	10.1	Maximum Detected	2.313
Mean of Detected	5.029	Mean of Detected	1.504
SD of Detected	2.478	SD of Detected	0.491
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	62.16%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.874	5% Shapiro Wilk Critical Value	0.874
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.284	Mean	0.264
SD	2.633	SD	1.025
95% DL/2 (t) UCL	3.015	95% H-Stat (DL/2) UCL	2.149
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.529
		SD in Log Scale	0.932
		Mean in Original Scale	2.568
		SD in Original Scale	2.484
		95% Percentile Bootstrap UCL	3.219
		95% BCA Bootstrap UCL	3.332
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.707	Data appear Normal at 5% Significance Level	
Theta Star	1.356		
nu star	103.8		
A-D Test Statistic	0.209	Nonparametric Statistics	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	3.146
5% K-S Critical Value	0.229	SD	2.077
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.354
Assuming Gamma Distribution		95% KM (t) UCL	3.744
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	3.729
Minimum	0.892	95% KM (jackknife) UCL	3.656
Maximum	10.1	95% KM (bootstrap t) UCL	3.871
Mean	5.268	95% KM (BCA) UCL	4.354
Median	5.353	95% KM (Percentile Bootstrap) UCL	4.024
SD	2.18	95% KM (Chebyshev) UCL	4.691
k star	4.465	97.5% KM (Chebyshev) UCL	5.359
Theta star	1.18	99% KM (Chebyshev) UCL	6.672
Nu star	330.4	Potential UCLs to Use	
AppChi2	289.3	95% KM (t) UCL	3.744
95% Gamma Approximate UCL	6.017	95% KM (Percentile Bootstrap) UCL	4.024
95% Adjusted Gamma UCL	6.052		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Cobalt			
General Statistics			
Number of Valid Data	176	Number of Detected Data	174
Number of Distinct Detected Data	82	Number of Non-Detect Data	2
Number of Missing Values	68	Percent Non-Detects	1.14%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.92	Minimum Detected	-0.0834
Maximum Detected	21.7	Maximum Detected	3.077
Mean of Detected	8.492	Mean of Detected	2.066
SD of Detected	2.889	SD of Detected	0.428
Minimum Non-Detect	15	Minimum Non-Detect	2.708
Maximum Non-Detect	19.1	Maximum Non-Detect	2.95
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	174
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.43%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.0703	Lilliefors Test Statistic	0.135
5% Lilliefors Critical Value	0.0672	5% Lilliefors Critical Value	0.0672
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.492	Mean	2.067
SD	2.875	SD	0.426
95% DL/2 (t) UCL	8.851	95% H-Stat (DL/2) UCL	9.214
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.066
		SD in Log Scale	0.426
		Mean in Original Scale	8.484
		SD in Original Scale	2.874
		95% Percentile Bootstrap UCL	8.847
		95% BCA Bootstrap UCL	8.837
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	6.906	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.23		
nu star	2403		
A-D Test Statistic	3.28	Nonparametric Statistics	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	8.49
5% K-S Critical Value	0.0704	SD	2.878
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.219
		95% KM (t) UCL	8.852
Assuming Gamma Distribution		95% KM (z) UCL	8.85
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8.852
Minimum	0.92	95% KM (bootstrap t) UCL	8.864
Maximum	21.7	95% KM (BCA) UCL	8.855
Mean	8.499	95% KM (Percentile Bootstrap) UCL	8.832
Median	8.5	95% KM (Chebyshev) UCL	9.443
SD	2.873	97.5% KM (Chebyshev) UCL	9.855
k star	6.982	99% KM (Chebyshev) UCL	10.66
Theta star	1.217		
Nu star	2458	Potential UCLs to Use	
AppChi2	2343	95% KM (BCA) UCL	8.855
95% Gamma Approximate UCL	8.913		
95% Adjusted Gamma UCL	8.917		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Copper			
General Statistics			
Number of Valid Data	176	Number of Detected Data	174
Number of Distinct Detected Data	156	Number of Non-Detect Data	2
Number of Missing Values	68	Percent Non-Detects	1.14%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.8	Minimum Detected	1.758
Maximum Detected	16800	Maximum Detected	9.729
Mean of Detected	230.7	Mean of Detected	3.721
SD of Detected	1329	SD of Detected	1.351
Minimum Non-Detect	0.63	Minimum Non-Detect	-0.462
Maximum Non-Detect	3.4	Maximum Non-Detect	1.224
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	174
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	1.14%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.433	Lilliefors Test Statistic	0.13
5% Lilliefors Critical Value	0.0672	5% Lilliefors Critical Value	0.0672
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	228.1	Mean	3.675
SD	1321	SD	1.412
95% DL/2 (t) UCL	392.8	95% H-Stat (DL/2) UCL	135.6
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	217	Mean in Log Scale	3.682
SD	1326	SD in Log Scale	1.392
95% MLE (t) UCL	382.2	Mean in Original Scale	228.1
95% MLE (Tiku) UCL	361.7	SD in Original Scale	1321
		95% Percentile Bootstrap UCL	411.2
		95% BCA Bootstrap UCL	521.5
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.382	Data do not follow a Discernable Distribution (0.05)	
Theta Star	603.9		
nu star	133		
A-D Test Statistic	23.72	Nonparametric Statistics	
5% A-D Critical Value	0.848	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.848	Mean	228.2
5% K-S Critical Value	0.0756	SD	1317
Data not Gamma Distributed at 5% Significance Level		SE of Mean	99.6
Assuming Gamma Distribution		95% KM (t) UCL	392.9
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	392
Minimum	1E-09	95% KM (jackknife) UCL	392.9
Maximum	16800	95% KM (bootstrap t) UCL	869.3
Mean	228.1	95% KM (BCA) UCL	433.3
Median	27.5	95% KM (Percentile Bootstrap) UCL	414.1
SD	1321	95% KM (Chebyshev) UCL	662.3
k star	0.338	97.5% KM (Chebyshev) UCL	850.2
Theta star	674.8	99% KM (Chebyshev) UCL	1219
Nu star	119	Potential UCLs to Use	
AppChi2	94.81	95% KM (Chebyshev) UCL	662.3
95% Gamma Approximate UCL	286.3		
95% Adjusted Gamma UCL	286.8		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Cyanide			
General Statistics			
Number of Valid Data	99	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	87
Number of Missing Values	145	Percent Non-Detects	87.88%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.064	Minimum Detected	-2.749
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	0.94	Mean of Detected	-0.388
SD of Detected	0.738	SD of Detected	0.969
Minimum Non-Detect	0.1	Minimum Non-Detect	-2.303
Maximum Non-Detect	0.76	Maximum Non-Detect	-0.274
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	94
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.95%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.847	Shapiro Wilk Test Statistic	0.889
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.376	Mean	-1.149
SD	0.329	SD	0.558
95% DL/2 (t) UCL	0.431	95% H-Stat (DL/2) UCL	0.406
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.306
		SD in Log Scale	1.106
		Mean in Original Scale	0.206
		SD in Original Scale	0.377
		95% Percentile Bootstrap UCL	0.269
		95% BCA Bootstrap UCL	0.289
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.315	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.715		
nu star	31.57		
A-D Test Statistic	0.414	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.21
5% K-S Critical Value	0.249	SD	0.381
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0481
Assuming Gamma Distribution		95% KM (t) UCL	0.29
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.289
Minimum	0.064	95% KM (jackknife) UCL	0.311
Maximum	2.8	95% KM (bootstrap t) UCL	0.306
Mean	0.938	95% KM (BCA) UCL	0.702
Median	0.937	95% KM (Percentile Bootstrap) UCL	0.656
SD	0.247	95% KM (Chebyshev) UCL	0.42
k star	12.42	97.5% KM (Chebyshev) UCL	0.511
Theta star	0.0756	99% KM (Chebyshev) UCL	0.689
Nu star	2459	Potential UCLs to Use	
AppChi2	2345	95% KM (t) UCL	0.29
95% Gamma Approximate UCL	0.984		
95% Adjusted Gamma UCL	0.985		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Lead			
General Statistics			
Number of Valid Data	247	Number of Detected Data	246
Number of Distinct Detected Data	200	Number of Non-Detect Data	1
		Percent Non-Detects	0.40%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.6	Minimum Detected	1.723
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	139.1	Mean of Detected	3.751
SD of Detected	350.1	SD of Detected	1.284
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	0.3	Maximum Non-Detect	-1.204
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.351	Lilliefors Test Statistic	0.163
5% Lilliefors Critical Value	0.0565	5% Lilliefors Critical Value	0.0565
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	138.6	Mean	3.728
SD	349.5	SD	1.331
95% DL/2 (t) UCL	175.3	95% H-Stat (DL/2) UCL	122.4
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	137.6	Mean in Log Scale	3.737
SD	349.6	SD in Log Scale	1.301
95% MLE (t) UCL	174.3	Mean in Original Scale	138.6
95% MLE (Tiku) UCL	170.1	SD in Original Scale	349.5
		95% Percentile Bootstrap UCL	178.1
		95% BCA Bootstrap UCL	183.9
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.528	Data do not follow a Discernable Distribution (0.05)	
Theta Star	263.6		
nu star	259.6		
A-D Test Statistic	26.86	Nonparametric Statistics	
5% A-D Critical Value	0.818	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.818	Mean	138.6
5% K-S Critical Value	0.0616	SD	348.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	22.24
Assuming Gamma Distribution		95% KM (t) UCL	175.3
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	175.1
Minimum	1E-09	95% KM (jackknife) UCL	175.3
Maximum	2800	95% KM (bootstrap t) UCL	185.9
Mean	138.6	95% KM (BCA) UCL	179
Median	25.5	95% KM (Percentile Bootstrap) UCL	178.1
SD	349.5	95% KM (Chebyshev) UCL	235.5
k star	0.494	97.5% KM (Chebyshev) UCL	277.4
Theta star	280.6	99% KM (Chebyshev) UCL	359.8
Nu star	243.9	Potential UCLs to Use	
AppChi2	208.7	95% KM (Chebyshev) UCL	235.5
95% Gamma Approximate UCL	161.9		
95% Adjusted Gamma UCL	162		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Manganese			
General Statistics			
Number of Valid Data	246	Number of Detected Data	246
Number of Distinct Detected Data	210	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	65.4	Minimum Detected	4.181
Maximum Detected	4270	Maximum Detected	8.359
Mean of Detected	638.8	Mean of Detected	6.219
SD of Detected	565.7	SD of Detected	0.659
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.189	Lilliefors Test Statistic	0.06
5% Lilliefors Critical Value	0.0565	5% Lilliefors Critical Value	0.0565
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	638.8	Mean	6.219
SD	565.7	SD	0.659
95% DL/2 (t) UCL	698.3	95% H-Stat (DL/2) UCL	675.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.204	Data do not follow a Discernable Distribution (0.05)	
Theta Star	289.9		
nu star	1084		
A-D Test Statistic	5.112	Nonparametric Statistics	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	638.8
5% K-S Critical Value	0.059	SD	564.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	36.06
Assuming Gamma Distribution		95% KM (t) UCL	698.3
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	698.1
Minimum	65.4	95% KM (jackknife) UCL	698.3
Maximum	4270	95% KM (bootstrap t) UCL	709.3
Mean	638.8	95% KM (BCA) UCL	703.9
Median	463.5	95% KM (Percentile Bootstrap) UCL	701.2
SD	565.7	95% KM (Chebyshev) UCL	796
k star	2.204	97.5% KM (Chebyshev) UCL	864
Theta star	289.9	99% KM (Chebyshev) UCL	997.6
Nu star	1084	Potential UCLs to Use	
AppChi2	1009	95% KM (BCA) UCL	703.9
95% Gamma Approximate UCL	686.6		
95% Adjusted Gamma UCL	686.8		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Mercury			
General Statistics			
Number of Valid Data	247	Number of Detected Data	171
Number of Distinct Detected Data	82	Number of Non-Detect Data	76
		Percent Non-Detects	30.77%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.015	Minimum Detected	-4.2
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.0934	Mean of Detected	-2.822
SD of Detected	0.156	SD of Detected	0.785
Minimum Non-Detect	0.03	Minimum Non-Detect	-3.507
Maximum Non-Detect	0.13	Maximum Non-Detect	-2.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	225
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	22
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.09%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.31	Lilliefors Test Statistic	0.129
5% Lilliefors Critical Value	0.0678	5% Lilliefors Critical Value	0.0678
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.073	Mean	-3.098
SD	0.133	SD	0.811
95% DL/2 (t) UCL	0.087	95% H-Stat (DL/2) UCL	0.0612
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.093
		SD in Log Scale	0.814
		Mean in Original Scale	0.0732
		SD in Original Scale	0.133
		95% Percentile Bootstrap UCL	0.0882
		95% BCA Bootstrap UCL	0.0908
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.23	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0759		
nu star	420.7		
A-D Test Statistic	13.5	Nonparametric Statistics	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	0.0741
5% K-S Critical Value	0.0728	SD	0.132
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00847
Assuming Gamma Distribution		95% KM (t) UCL	0.088
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.088
Minimum	1E-09	95% KM (jackknife) UCL	0.088
Maximum	1.2	95% KM (bootstrap t) UCL	0.094
Mean	0.0838	95% KM (BCA) UCL	0.0895
Median	0.0502	95% KM (Percentile Bootstrap) UCL	0.0898
SD	0.133	95% KM (Chebyshev) UCL	0.111
k star	0.528	97.5% KM (Chebyshev) UCL	0.127
Theta star	0.159	99% KM (Chebyshev) UCL	0.158
Nu star	260.9	Potential UCLs to Use	
AppChi2	224.5	95% KM (BCA) UCL	0.0895
95% Gamma Approximate UCL	0.0974		
95% Adjusted Gamma UCL	0.0975		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nickel			
General Statistics			
Number of Valid Data	176	Number of Detected Data	174
Number of Distinct Detected Data	121	Number of Non-Detect Data	2
Number of Missing Values	68	Percent Non-Detects	1.14%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	7	Minimum Detected	1.946
Maximum Detected	50.7	Maximum Detected	3.926
Mean of Detected	18.72	Mean of Detected	2.865
SD of Detected	7.279	SD of Detected	0.353
Minimum Non-Detect	4	Minimum Non-Detect	1.386
Maximum Non-Detect	4	Maximum Non-Detect	1.386
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.133	Lilliefors Test Statistic	0.0614
5% Lilliefors Critical Value	0.0672	5% Lilliefors Critical Value	0.0672
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.53	Mean	2.84
SD	7.452	SD	0.42
95% DL/2 (t) UCL	19.46	95% H-Stat (DL/2) UCL	19.43
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	18.52	Mean in Log Scale	2.854
SD	7.457	SD in Log Scale	0.365
95% MLE (t) UCL	19.45	Mean in Original Scale	18.59
95% MLE (Tiku) UCL	19.45	SD in Original Scale	7.348
		95% Percentile Bootstrap UCL	19.5
		95% BCA Bootstrap UCL	19.49
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	7.77	Data appear Lognormal at 5% Significance Level	
Theta Star	2.409		
nu star	2704		
A-D Test Statistic	1.609	Nonparametric Statistics	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	18.59
5% K-S Critical Value	0.0704	SD	7.323
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.554
Assuming Gamma Distribution		95% KM (t) UCL	19.5
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	19.5
Minimum	1E-09	95% KM (jackknife) UCL	19.5
Maximum	50.7	95% KM (bootstrap t) UCL	19.59
Mean	18.51	95% KM (BCA) UCL	19.47
Median	17.05	95% KM (Percentile Bootstrap) UCL	19.53
SD	7.506	95% KM (Chebyshev) UCL	21
k star	1.679	97.5% KM (Chebyshev) UCL	22.05
Theta star	11.02	99% KM (Chebyshev) UCL	24.1
Nu star	591	Potential UCLs to Use	
AppChi2	535.6	95% KM (BCA) UCL	19.47
95% Gamma Approximate UCL	20.42		
95% Adjusted Gamma UCL	20.44		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Selenium			
General Statistics			
Number of Valid Data	247	Number of Detected Data	179
Number of Distinct Detected Data	61	Number of Non-Detect Data	68
		Percent Non-Detects	27.53%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.34	Minimum Detected	-1.079
Maximum Detected	5	Maximum Detected	1.609
Mean of Detected	1.106	Mean of Detected	0.0148
SD of Detected	0.515	SD of Detected	0.41
Minimum Non-Detect	0.31	Minimum Non-Detect	-1.171
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	179
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	70
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	71.66%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.141	Lilliefors Test Statistic	0.0708
5% Lilliefors Critical Value	0.0662	5% Lilliefors Critical Value	0.0662
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.884	Mean	-0.327
SD	0.568	SD	0.669
95% DL/2 (t) UCL	0.944	95% H-Stat (DL/2) UCL	0.918
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.707	Mean in Log Scale	-0.209
SD	0.764	SD in Log Scale	0.516
95% MLE (t) UCL	0.787	Mean in Original Scale	0.928
95% MLE (Tiku) UCL	0.856	SD in Original Scale	0.527
		95% Percentile Bootstrap UCL	0.981
		95% BCA Bootstrap UCL	0.994
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	5.891	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.188		
nu star	2109		
A-D Test Statistic	0.876	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	0.919
5% K-S Critical Value	0.0692	SD	0.536
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0346
		95% KM (t) UCL	0.976
Assuming Gamma Distribution		95% KM (z) UCL	0.976
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.974
Minimum	0.215	95% KM (bootstrap t) UCL	0.983
Maximum	5	95% KM (BCA) UCL	0.988
Mean	1.008	95% KM (Percentile Bootstrap) UCL	0.978
Median	0.96	95% KM (Chebyshev) UCL	1.07
SD	0.486	97.5% KM (Chebyshev) UCL	1.135
k star	5.222	99% KM (Chebyshev) UCL	1.263
Theta star	0.193		
Nu star	2580	Potential UCLs to Use	
AppChi2	2463	95% KM (BCA) UCL	0.988
95% Gamma Approximate UCL	1.056		
95% Adjusted Gamma UCL	1.056		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Silver			
General Statistics			
Number of Valid Data	246	Number of Detected Data	40
Number of Distinct Detected Data	36	Number of Non-Detect Data	206
Number of Missing Values	1	Percent Non-Detects	83.74%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	33.2	Maximum Detected	3.503
Mean of Detected	3.409	Mean of Detected	0.255
SD of Detected	6.273	SD of Detected	1.362
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	1.4	Maximum Non-Detect	0.336
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	22
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.28%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.533	Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.94	5% Shapiro Wilk Critical Value	0.94
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.93	Mean	-0.85
SD	2.741	SD	1.056
95% DL/2 (t) UCL	1.219	95% H-Stat (DL/2) UCL	0.799
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.065
		SD in Log Scale	2.307
		Mean in Original Scale	0.637
		SD in Original Scale	2.791
		95% Percentile Bootstrap UCL	0.96
		95% BCA Bootstrap UCL	1.069
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.601	Data appear Lognormal at 5% Significance Level	
Theta Star	5.672		
nu star	48.07		
A-D Test Statistic	1.693	Nonparametric Statistics	
5% A-D Critical Value	0.8	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.8	Mean	0.76
5% K-S Critical Value	0.146	SD	2.76
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.179
Assuming Gamma Distribution		95% KM (t) UCL	1.055
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.054
Minimum	1E-09	95% KM (jackknife) UCL	1.045
Maximum	33.2	95% KM (bootstrap t) UCL	1.398
Mean	4.811	95% KM (BCA) UCL	1.085
Median	3.486	95% KM (Percentile Bootstrap) UCL	1.074
SD	4.655	95% KM (Chebyshev) UCL	1.539
k star	0.517	97.5% KM (Chebyshev) UCL	1.876
Theta star	9.302	99% KM (Chebyshev) UCL	2.538
Nu star	254.5	Potential UCLs to Use	
AppChi2	218.6	95% KM (BCA) UCL	1.085
95% Gamma Approximate UCL	5.603		
95% Adjusted Gamma UCL	5.608		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Thallium			
General Statistics			
Number of Valid Data	177	Number of Detected Data	112
Number of Distinct Detected Data	49	Number of Non-Detect Data	65
Number of Missing Values	67	Percent Non-Detects	36.72%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	3.1	Maximum Detected	1.131
Mean of Detected	0.57	Mean of Detected	-0.711
SD of Detected	0.44	SD of Detected	0.483
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	170
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.05%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.295	Lilliefors Test Statistic	0.142
5% Lilliefors Critical Value	0.0837	5% Lilliefors Critical Value	0.0837
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.481	Mean	-0.864
SD	0.37	SD	0.441
95% DL/2 (t) UCL	0.527	95% H-Stat (DL/2) UCL	0.499
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.767
		SD in Log Scale	0.415
		Mean in Original Scale	0.52
		SD in Original Scale	0.361
		95% Percentile Bootstrap UCL	0.567
		95% BCA Bootstrap UCL	0.574
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.428	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.166		
nu star	768		
A-D Test Statistic	6.937	Nonparametric Statistics	
5% A-D Critical Value	0.758	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.758	Mean	0.517
5% K-S Critical Value	0.0868	SD	0.361
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.028
Assuming Gamma Distribution		95% KM (t) UCL	0.563
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.563
Minimum	0.17	95% KM (jackknife) UCL	0.563
Maximum	3.1	95% KM (bootstrap t) UCL	0.574
Mean	0.577	95% KM (BCA) UCL	0.569
Median	0.52	95% KM (Percentile Bootstrap) UCL	0.566
SD	0.355	95% KM (Chebyshev) UCL	0.639
k star	5.048	97.5% KM (Chebyshev) UCL	0.692
Theta star	0.114	99% KM (Chebyshev) UCL	0.795
Nu star	1787	Potential UCLs to Use	
AppChi2	1690	95% KM (BCA) UCL	0.569
95% Gamma Approximate UCL	0.61		
95% Adjusted Gamma UCL	0.611		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Vanadium			
General Statistics			
Number of Valid Data	176	Number of Detected Data	176
Number of Distinct Detected Data	120	Number of Non-Detect Data	0
Number of Missing Values	68	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.8	Minimum Detected	1.569
Maximum Detected	35.6	Maximum Detected	3.572
Mean of Detected	21.88	Mean of Detected	3.046
SD of Detected	5.629	SD of Detected	0.301
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.0472	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.0668	5% Lilliefors Critical Value	0.0668
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	21.88	Mean	3.046
SD	5.629	SD	0.301
95% DL/2 (t) UCL	22.59	95% H-Stat (DL/2) UCL	22.89
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	12.57	Data appear Normal at 5% Significance Level	
Theta Star	1.741		
nu star	4425		
A-D Test Statistic	1.706	Nonparametric Statistics	
5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	21.88
5% K-S Critical Value	0.0697	SD	5.613
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.424
		95% KM (t) UCL	22.59
		95% KM (z) UCL	22.58
Assuming Gamma Distribution		95% KM (jackknife) UCL	22.59
Gamma ROS Statistics using Extrapolated Data		95% KM (bootstrap t) UCL	22.59
Minimum	4.8	95% KM (BCA) UCL	22.59
Maximum	35.6	95% KM (Percentile Bootstrap) UCL	22.57
Mean	21.88	95% KM (Chebyshev) UCL	23.73
Median	21.75	97.5% KM (Chebyshev) UCL	24.53
SD	5.629	99% KM (Chebyshev) UCL	26.11
k star	12.57		
Theta star	1.741		
Nu star	4425	Potential UCLs to Use	
AppChi2	4272	95% KM (t) UCL	22.59
95% Gamma Approximate UCL	22.67	95% KM (Percentile Bootstrap) UCL	22.57
95% Adjusted Gamma UCL	22.68		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Zinc			
General Statistics			
Number of Valid Data	246	Number of Detected Data	244
Number of Distinct Detected Data	215	Number of Non-Detect Data	2
Number of Missing Values	1	Percent Non-Detects	0.81%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	28.6	Minimum Detected	3.353
Maximum Detected	24900	Maximum Detected	10.12
Mean of Detected	348.8	Mean of Detected	4.827
SD of Detected	1654	SD of Detected	1.065
Minimum Non-Detect	2	Minimum Non-Detect	0.693
Maximum Non-Detect	9.3	Maximum Non-Detect	2.23
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	244
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	0.81%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.423	Lilliefors Test Statistic	0.176
5% Lilliefors Critical Value	0.0567	5% Lilliefors Critical Value	0.0567
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	346	Mean	4.794
SD	1648	SD	1.123
95% DL/2 (t) UCL	519.4	95% H-Stat (DL/2) UCL	261.7
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	336.2	Mean in Log Scale	4.804
SD	1652	SD in Log Scale	1.089
95% MLE (t) UCL	510.1	Mean in Original Scale	346
95% MLE (Tiku) UCL	488.4	SD in Original Scale	1648
		95% Percentile Bootstrap UCL	544.6
		95% BCA Bootstrap UCL	676.1
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.596	Data do not follow a Discernable Distribution (0.05)	
Theta Star	584.7		
nu star	291.1		
A-D Test Statistic	4.098E+28	Nonparametric Statistics	
5% A-D Critical Value	0.811	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.811	Mean	346.2
5% K-S Critical Value	0.0615	SD	1645
Data not Gamma Distributed at 5% Significance Level		SE of Mean	105.1
		95% KM (t) UCL	519.7
Assuming Gamma Distribution		95% KM (z) UCL	519
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	519.6
Minimum	1E-09	95% KM (bootstrap t) UCL	951.7
Maximum	24900	95% KM (BCA) UCL	566.3
Mean	345.9	95% KM (Percentile Bootstrap) UCL	549.5
Median	82.95	95% KM (Chebyshev) UCL	804.2
SD	1648	97.5% KM (Chebyshev) UCL	1002
k star	0.512	99% KM (Chebyshev) UCL	1392
Theta star	676.1		
Nu star	251.7	Potential UCLs to Use	
AppChi2	216	95% KM (Chebyshev) UCL	804.2
95% Gamma Approximate UCL	403.2		
95% Adjusted Gamma UCL	403.5		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG ss_NGT RA and MEC UC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Diieldrin			
General Statistics			
Number of Valid Data	14	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	12
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0024	Minimum Detected	-6.032
Maximum Detected	0.0054	Maximum Detected	-5.221
Mean of Detected	0.0039	Mean of Detected	-5.627
SD of Detected	0.00212	SD of Detected	0.573
Minimum Non-Detect	0.0025	Minimum Non-Detect	-5.991
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	14
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0108	Mean	-5.757
SD	0.0273	SD	1.297
95% DL/2 (t) UCL	0.0237	95% H-Stat (DL/2) UCL	0.0221
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0027
5% K-S Critical Value	N/A	SD	0.0009
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0004025
		95% KM (t) UCL	0.00341
Assuming Gamma Distribution		95% KM (z) UCL	0.00336
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0047
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.0054
Median	N/A	95% KM (Chebyshev) UCL	0.00445
SD	N/A	97.5% KM (Chebyshev) UCL	0.00521
k star	N/A	99% KM (Chebyshev) UCL	0.0067
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	95% KM (t) UCL	0.00341
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.0054
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG ss_NGT RA and MEC UC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	35	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	30
Number of Missing Values	7	Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.09	Minimum Detected	-2.408
Maximum Detected	19	Maximum Detected	2.944
Mean of Detected	4.07	Mean of Detected	-0.531
SD of Detected	8.35	SD of Detected	2.099
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.14%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.58	Shapiro Wilk Test Statistic	0.874
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.823	Mean	-1.352
SD	3.18	SD	0.92
95% DL/2 (t) UCL	1.732	95% H-Stat (DL/2) UCL	0.537
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.624
		SD in Log Scale	1.203
		Mean in Original Scale	0.787
		SD in Original Scale	3.177
		95% Percentile Bootstrap UCL	1.848
		95% BCA Bootstrap UCL	2.423
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.272	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	14.94		
nu star	2.725		
A-D Test Statistic	0.722	Nonparametric Statistics	
5% A-D Critical Value	0.732	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.732	Mean	0.745
5% K-S Critical Value	0.378	SD	3.134
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.595
Assuming Gamma Distribution		95% KM (t) UCL	1.751
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.723
Minimum	1E-09	95% KM (jackknife) UCL	1.662
Maximum	19	95% KM (bootstrap t) UCL	11.07
Mean	3.842	95% KM (BCA) UCL	2.342
Median	4.624	95% KM (Percentile Bootstrap) UCL	1.829
SD	3.644	95% KM (Chebyshev) UCL	3.337
k star	0.19	97.5% KM (Chebyshev) UCL	4.458
Theta star	20.19	99% KM (Chebyshev) UCL	6.661
Nu star	13.32	Potential UCLs to Use	
AppChi2	6.11	95% KM (t) UCL	1.751
95% Gamma Approximate UCL	8.377		
95% Adjusted Gamma UCL	8.706		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	35	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	33
Number of Missing Values	7	Percent Non-Detects	94.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.1	Minimum Detected	-2.303
Maximum Detected	1.3	Maximum Detected	0.262
Mean of Detected	0.7	Mean of Detected	-1.02
SD of Detected	0.849	SD of Detected	1.814
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	35
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.314	Mean	-1.436
SD	0.372	SD	0.603
95% DL/2 (t) UCL	0.42	95% H-Stat (DL/2) UCL	0.354
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.138
5% K-S Critical Value	N/A	SD	0.209
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0522
		95% KM (t) UCL	0.226
Assuming Gamma Distribution		95% KM (z) UCL	0.223
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.92
Minimum	N/A	95% KM (bootstrap t) UCL	0.142
Maximum	N/A	95% KM (BCA) UCL	1.3
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.3
Median	N/A	95% KM (Chebyshev) UCL	0.365
SD	N/A	97.5% KM (Chebyshev) UCL	0.463
k star	N/A	99% KM (Chebyshev) UCL	0.657
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.463
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Methylnaphthalene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	32
		Percent Non-Detects	76.19%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.047	Minimum Detected	-3.058
Maximum Detected	0.67	Maximum Detected	-0.4
Mean of Detected	0.195	Mean of Detected	-2.084
SD of Detected	0.213	SD of Detected	0.944
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.732	Shapiro Wilk Test Statistic	0.87
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.318	Mean	-1.571
SD	0.458	SD	0.796
95% DL/2 (t) UCL	0.437	95% H-Stat (DL/2) UCL	0.534
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.334
		SD in Log Scale	0.606
		Mean in Original Scale	0.121
		SD in Original Scale	0.114
		95% Percentile Bootstrap UCL	0.152
		95% BCA Bootstrap UCL	0.161
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.948	Data appear Lognormal at 5% Significance Level	
Theta Star	0.205		
nu star	18.97		
A-D Test Statistic	0.821	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.125
5% K-S Critical Value	0.272	SD	0.126
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.03
		95% KM (t) UCL	0.176
Assuming Gamma Distribution		95% KM (z) UCL	0.175
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.177
Minimum	0.047	95% KM (bootstrap t) UCL	0.214
Maximum	0.67	95% KM (BCA) UCL	0.185
Mean	0.196	95% KM (Percentile Bootstrap) UCL	0.178
Median	0.196	95% KM (Chebyshev) UCL	0.256
SD	0.101	97.5% KM (Chebyshev) UCL	0.313
k star	4.439	99% KM (Chebyshev) UCL	0.424
Theta star	0.0442		
Nu star	372.9	Potential UCLs to Use	
AppChi2	329.1	95% KM (t) UCL	0.176
95% Gamma Approximate UCL	0.222	95% KM (% Bootstrap) UCL	0.178
95% Adjusted Gamma UCL	0.223		
Note: DL/2 is not a recommended method.			

Acenaphthene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	39
		Percent Non-Detects	92.86%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	0.22	Maximum Detected	-1.514
Mean of Detected	0.17	Mean of Detected	-1.792
SD of Detected	0.0436	SD of Detected	0.243
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.842	Shapiro Wilk Test Statistic	0.861
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.32	Mean	-1.461
SD	0.447	SD	0.612
95% DL/2 (t) UCL	0.436	95% H-Stat (DL/2) UCL	0.378
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.792
		SD in Log Scale	0.202
		Mean in Original Scale	0.17
		SD in Original Scale	0.0346
		95% Percentile Bootstrap UCL	0.178
		95% BCA Bootstrap UCL	0.179
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.17
5% K-S Critical Value	N/A	SD	0.0356
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0252
		95% KM (t) UCL	0.212
Assuming Gamma Distribution		95% KM (z) UCL	0.211
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.221
Minimum	N/A	95% KM (bootstrap t) UCL	0.447
Maximum	N/A	95% KM (BCA) UCL	0.22
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.22
Median	N/A	95% KM (Chebyshev) UCL	0.28
SD	N/A	97.5% KM (Chebyshev) UCL	0.327
k star	N/A	99% KM (Chebyshev) UCL	0.42
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.212
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.22
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A

Anthracene

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benz(a)anthracene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	34
		Percent Non-Detects	80.95%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.043	Minimum Detected	-3.147
Maximum Detected	2.6	Maximum Detected	0.956
Mean of Detected	0.637	Mean of Detected	-1.186
SD of Detected	0.856	SD of Detected	1.335
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.724	Shapiro Wilk Test Statistic	0.992
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.388	Mean	-1.405
SD	0.572	SD	0.793
95% DL/2 (t) UCL	0.536	95% H-Stat (DL/2) UCL	0.52
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.982
		SD in Log Scale	0.878
		Mean in Original Scale	0.232
		SD in Original Scale	0.413
		95% Percentile Bootstrap UCL	0.349
		95% BCA Bootstrap UCL	0.421
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.588	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.082		
nu star	9.408		
A-D Test Statistic	0.262	Nonparametric Statistics	
5% A-D Critical Value	0.743	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.743	Mean	0.243
5% K-S Critical Value	0.303	SD	0.417
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0774
		95% KM (t) UCL	0.373
Assuming Gamma Distribution		95% KM (z) UCL	0.37
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.372
Minimum	0.043	95% KM (bootstrap t) UCL	0.485
Maximum	2.6	95% KM (BCA) UCL	0.407
Mean	0.593	95% KM (Percentile Bootstrap) UCL	0.394
Median	0.598	95% KM (Chebyshev) UCL	0.58
SD	0.384	97.5% KM (Chebyshev) UCL	0.726
k star	2.75	99% KM (Chebyshev) UCL	1.013
Theta star	0.216		
Nu star	231	Potential UCLs to Use	
AppChi2	196.8	95% KM (t) UCL	0.373
95% Gamma Approximate UCL	0.696		
95% Adjusted Gamma UCL	0.7		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(a)pyrene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	34
		Percent Non-Detects	80.95%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.04	Minimum Detected	-3.219
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.548	Mean of Detected	-1.363
SD of Detected	0.755	SD of Detected	1.357
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.709	Shapiro Wilk Test Statistic	0.977
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.389	Mean	-1.4
SD	0.547	SD	0.82
95% DL/2 (t) UCL	0.531	95% H-Stat (DL/2) UCL	0.537
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.169
		SD in Log Scale	0.88
		Mean in Original Scale	0.195
		SD in Original Scale	0.362
		95% Percentile Bootstrap UCL	0.297
		95% BCA Bootstrap UCL	0.361
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.572	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.957		
nu star	9.157		
A-D Test Statistic	0.289	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.206
5% K-S Critical Value	0.304	SD	0.368
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0683
		95% KM (t) UCL	0.321
Assuming Gamma Distribution		95% KM (z) UCL	0.318
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.32
Minimum	0.04	95% KM (bootstrap t) UCL	0.409
Maximum	2.3	95% KM (BCA) UCL	0.339
Mean	0.503	95% KM (Percentile Bootstrap) UCL	0.334
Median	0.509	95% KM (Chebyshev) UCL	0.504
SD	0.346	97.5% KM (Chebyshev) UCL	0.633
k star	2.39	99% KM (Chebyshev) UCL	0.886
Theta star	0.211		
Nu star	200.7	Potential UCLs to Use	
AppChi2	168.9	95% KM (t) UCL	0.321
95% Gamma Approximate UCL	0.598		
95% Adjusted Gamma UCL	0.602		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(b)fluoranthene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	33
		Percent Non-Detects	78.57%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	0.656	Mean of Detected	-1.073
SD of Detected	0.869	SD of Detected	1.221
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 9 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.703	Shapiro Wilk Test Statistic	0.989
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.402	Mean	-1.369
SD	0.593	SD	0.792
95% DL/2 (t) UCL	0.556	95% H-Stat (DL/2) UCL	0.537
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.755
		SD in Log Scale	0.813
		Mean in Original Scale	0.271
		SD in Original Scale	0.442
		95% Percentile Bootstrap UCL	0.391
		95% BCA Bootstrap UCL	0.453
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.672	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.976		
nu star	12.1		
A-D Test Statistic	0.308	Nonparametric Statistics	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	0.283
5% K-S Critical Value	0.288	SD	0.445
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0824
Assuming Gamma Distribution		95% KM (t) UCL	0.422
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.419
Minimum	0.054	95% KM (jackknife) UCL	0.422
Maximum	2.8	95% KM (bootstrap t) UCL	0.517
Mean	0.643	95% KM (BCA) UCL	0.434
Median	0.651	95% KM (Percentile Bootstrap) UCL	0.426
SD	0.398	95% KM (Chebyshev) UCL	0.643
k star	3.17	97.5% KM (Chebyshev) UCL	0.798
Theta star	0.203	99% KM (Chebyshev) UCL	1.103
Nu star	266.3	Potential UCLs to Use	
AppChi2	229.5	95% KM (t) UCL	0.422
95% Gamma Approximate UCL	0.747		
95% Adjusted Gamma UCL	0.751		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(ghi)perylene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	36
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	1.1	Maximum Detected	0.0953
Mean of Detected	0.35	Mean of Detected	-1.418
SD of Detected	0.381	SD of Detected	0.869
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.705	Shapiro Wilk Test Statistic	0.886
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.344	Mean	-1.42
SD	0.463	SD	0.673
95% DL/2 (t) UCL	0.464	95% H-Stat (DL/2) UCL	0.427
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.812
		SD in Log Scale	0.49
		Mean in Original Scale	0.19
		SD in Original Scale	0.159
		95% Percentile Bootstrap UCL	0.236
		95% BCA Bootstrap UCL	0.263
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.863	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.406		
nu star	10.36		
A-D Test Statistic	0.553	Nonparametric Statistics	
5% A-D Critical Value	0.708	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.708	Mean	0.186
5% K-S Critical Value	0.337	SD	0.161
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.035
		95% KM (t) UCL	0.245
Assuming Gamma Distribution		95% KM (z) UCL	0.244
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.247
Minimum	0.11	95% KM (bootstrap t) UCL	0.284
Maximum	1.1	95% KM (BCA) UCL	0.251
Mean	0.353	95% KM (Percentile Bootstrap) UCL	0.25
Median	0.354	95% KM (Chebyshev) UCL	0.339
SD	0.134	97.5% KM (Chebyshev) UCL	0.405
k star	8.871	99% KM (Chebyshev) UCL	0.534
Theta star	0.0398		
Nu star	745.2	Potential UCLs to Use	
AppChi2	682.8	95% KM (t) UCL	0.245
95% Gamma Approximate UCL	0.385		
95% Adjusted Gamma UCL	0.387		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(k)fluoranthene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	36
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.065	Minimum Detected	-2.733
Maximum Detected	1.1	Maximum Detected	0.0953
Mean of Detected	0.371	Mean of Detected	-1.483
SD of Detected	0.396	SD of Detected	1.105
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.818	Shapiro Wilk Test Statistic	0.936
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.347	Mean	-1.429
SD	0.465	SD	0.714
95% DL/2 (t) UCL	0.468	95% H-Stat (DL/2) UCL	0.447
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.17
		SD in Log Scale	0.666
		Mean in Original Scale	0.151
		SD in Original Scale	0.174
		95% Percentile Bootstrap UCL	0.201
		95% BCA Bootstrap UCL	0.223
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.689	Data appear Normal at 5% Significance Level	
Theta Star	0.539		
nu star	8.266		
A-D Test Statistic	0.334	Nonparametric Statistics	
5% A-D Critical Value	0.713	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.713	Mean	0.154
5% K-S Critical Value	0.34	SD	0.185
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.041
		95% KM (t) UCL	0.223
Assuming Gamma Distribution		95% KM (z) UCL	0.221
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.223
Minimum	0.065	95% KM (bootstrap t) UCL	0.259
Maximum	1.1	95% KM (BCA) UCL	0.272
Mean	0.409	95% KM (Percentile Bootstrap) UCL	0.298
Median	0.402	95% KM (Chebyshev) UCL	0.333
SD	0.224	97.5% KM (Chebyshev) UCL	0.41
k star	2.837	99% KM (Chebyshev) UCL	0.562
Theta star	0.144		
Nu star	238.3	Potential UCLs to Use	
AppChi2	203.5	95% KM (t) UCL	0.223
95% Gamma Approximate UCL	0.479	95% KM (Percentile Bootstrap) UCL	0.298
95% Adjusted Gamma UCL	0.482		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Bis(2-ethylhexyl)phthalate			
General Statistics			
Number of Valid Data	42	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	39
		Percent Non-Detects	92.86%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.034	Minimum Detected	-3.381
Maximum Detected	0.14	Maximum Detected	-1.966
Mean of Detected	0.101	Mean of Detected	-2.463
SD of Detected	0.0585	SD of Detected	0.797
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.82	Shapiro Wilk Test Statistic	0.789
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.317	Mean	-1.502
SD	0.449	SD	0.681
95% DL/2 (t) UCL	0.433	95% H-Stat (DL/2) UCL	0.401
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.463
		SD in Log Scale	0.633
		Mean in Original Scale	0.103
		SD in Original Scale	0.0666
		95% Percentile Bootstrap UCL	0.121
		95% BCA Bootstrap UCL	0.123
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.101
5% K-S Critical Value	N/A	SD	0.0478
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0338
		95% KM (t) UCL	0.158
Assuming Gamma Distribution		95% KM (z) UCL	0.157
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.17
Minimum	N/A	95% KM (bootstrap t) UCL	0.162
Maximum	N/A	95% KM (BCA) UCL	0.14
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.249
SD	N/A	97.5% KM (Chebyshev) UCL	0.312
k star	N/A	99% KM (Chebyshev) UCL	0.438
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	95% KM (t) UCL	0.158
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

CarbezoLe			
General Statistics			
Number of Valid Data	42	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	39
		Percent Non-Detects	92.86%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	0.41	Maximum Detected	-0.892
Mean of Detected	0.293	Mean of Detected	-1.27
SD of Detected	0.107	SD of Detected	0.361
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Test Statistic	0.991
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.329	Mean	-1.423
SD	0.446	SD	0.61
95% DL/2 (t) UCL	0.445	95% H-Stat (DL/2) UCL	0.376
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.451
		SD in Log Scale	0.176
		Mean in Original Scale	0.238
		SD in Original Scale	0.0447
		95% Percentile Bootstrap UCL	0.25
		95% BCA Bootstrap UCL	0.25
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.24
5% K-S Critical Value	N/A	SD	0.0457
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0301
		95% KM (t) UCL	0.291
Assuming Gamma Distribution		95% KM (z) UCL	0.29
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.321
Minimum	N/A	95% KM (bootstrap t) UCL	0.336
Maximum	N/A	95% KM (BCA) UCL	0.41
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.41
Median	N/A	95% KM (Chebyshev) UCL	0.371
SD	N/A	97.5% KM (Chebyshev) UCL	0.428
k star	N/A	99% KM (Chebyshev) UCL	0.54
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.291
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.41
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chrysene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	35
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.05	Minimum Detected	-2.996
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.67	Mean of Detected	-1.058
SD of Detected	0.792	SD of Detected	1.328
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.799	Shapiro Wilk Test Statistic	0.985
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.401	Mean	-1.356
SD	0.55	SD	0.798
95% DL/2 (t) UCL	0.544	95% H-Stat (DL/2) UCL	0.506
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.114
		SD in Log Scale	0.901
		Mean in Original Scale	0.209
		SD in Original Scale	0.373
		95% Percentile Bootstrap UCL	0.317
		95% BCA Bootstrap UCL	0.364
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.604	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.109		
nu star	8.455		
A-D Test Statistic	0.19	Nonparametric Statistics	
5% A-D Critical Value	0.731	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.731	Mean	0.214
5% K-S Critical Value	0.321	SD	0.377
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0708
		95% KM (t) UCL	0.333
Assuming Gamma Distribution		95% KM (z) UCL	0.33
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.336
Minimum	0.05	95% KM (bootstrap t) UCL	0.432
Maximum	2.3	95% KM (BCA) UCL	0.461
Mean	0.646	95% KM (Percentile Bootstrap) UCL	0.398
Median	0.639	95% KM (Chebyshev) UCL	0.523
SD	0.33	97.5% KM (Chebyshev) UCL	0.656
k star	3.669	99% KM (Chebyshev) UCL	0.918
Theta star	0.176		
Nu star	308.2	Potential UCLs to Use	
AppChi2	268.5	95% KM (t) UCL	0.333
95% Gamma Approximate UCL	0.742		
95% Adjusted Gamma UCL	0.745		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Dibenz(a,h)anthracene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	38
		Percent Non-Detects	90.48%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	0.34	Maximum Detected	-1.079
Mean of Detected	0.142	Mean of Detected	-2.246
SD of Detected	0.135	SD of Detected	0.837
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.77	Shapiro Wilk Test Statistic	0.881
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.317	Mean	-1.509
SD	0.45	SD	0.688
95% DL/2 (t) UCL	0.433	95% H-Stat (DL/2) UCL	0.416
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.484
		SD in Log Scale	0.51
		Mean in Original Scale	0.0956
		SD in Original Scale	0.0582
		95% Percentile Bootstrap UCL	0.111
		95% BCA Bootstrap UCL	0.116
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.634	Data appear Normal at 5% Significance Level	
Theta Star	0.223		
nu star	5.07		
A-D Test Statistic	0.466	Nonparametric Statistics	
5% A-D Critical Value	0.661	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.661	Mean	0.102
5% K-S Critical Value	0.398	SD	0.0828
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0326
		95% KM (t) UCL	0.157
Assuming Gamma Distribution		95% KM (z) UCL	0.155
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.158
Minimum	0.0112	95% KM (bootstrap t) UCL	0.219
Maximum	0.34	95% KM (BCA) UCL	0.196
Mean	0.122	95% KM (Percentile Bootstrap) UCL	0.173
Median	0.124	95% KM (Chebyshev) UCL	0.244
SD	0.0579	97.5% KM (Chebyshev) UCL	0.305
k star	3.428	99% KM (Chebyshev) UCL	0.426
Theta star	0.0355		
Nu star	287.9	Potential UCLs to Use	
AppChi2	249.6	95% KM (t) UCL	0.157
95% Gamma Approximate UCL	0.14	95% KM (Percentile Bootstrap) UCL	0.173
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A

ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Dibenzofuran				
General Statistics				
Number of Valid Data		42	Number of Detected Data	
Number of Distinct Detected Data		4	Number of Non-Detect Data	
			Percent Non-Detects	
			90.48%	
Raw Statistics		Log-transformed Statistics		
Minimum Detected		0.045	Minimum Detected	
Maximum Detected		0.19	Maximum Detected	
Mean of Detected		0.126	Mean of Detected	
SD of Detected		0.0634	SD of Detected	
Minimum Non-Detect		0.33	Minimum Non-Detect	
Maximum Non-Detect		4.8	Maximum Non-Detect	
Note: Data have multiple DLs - Use of KM Method is recommended			Number treated as Non-Detect	
For all methods (except KM, DL/2, and ROS Methods),			Number treated as Detected	
Observations < Largest ND are treated as NDs			Single DL Non-Detect Percentage	
			100.00%	
Warning: There are only 4 Distinct Detected Values in this data				
Note: It should be noted that even though bootstrap may be performed on this data set				
the resulting calculations may not be reliable enough to draw conclusions				
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.				
UCL Statistics				
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic		0.967	Shapiro Wilk Test Statistic	
5% Shapiro Wilk Critical Value		0.748	5% Shapiro Wilk Critical Value	
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
DL/2 Substitution Method			DL/2 Substitution Method	
Mean		0.315	Mean	
SD		0.449	SD	
95% DL/2 (t) UCL		0.432	95% H-Stat (DL/2) UCL	
Maximum Likelihood Estimate(MLE) Method		N/A	Log ROS Method	
MLE method failed to converge properly			Mean in Log Scale	
			SD in Log Scale	
			Mean in Original Scale	
			SD in Original Scale	
			95% Percentile Bootstrap UCL	
			95% BCA Bootstrap UCL	
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only		
k star (bias corrected)		1.161	Data appear Normal at 5% Significance Level	
Theta Star		0.109		
nu star		9.289		
A-D Test Statistic		0.322	Nonparametric Statistics	
5% A-D Critical Value		0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic		0.659	Mean	
5% K-S Critical Value		0.396	SD	
Data appear Gamma Distributed at 5% Significance Level			SE of Mean	
			95% KM (t) UCL	
Assuming Gamma Distribution			95% KM (z) UCL	
Gamma ROS Statistics using Extrapolated Data			95% KM (jackknife) UCL	
Minimum		0.0238	95% KM (bootstrap t) UCL	
Maximum		0.221	95% KM (BCA) UCL	
Mean		0.126	95% KM (Percentile Bootstrap) UCL	
Median		0.128	95% KM (Chebyshev) UCL	
SD		0.051	97.5% KM (Chebyshev) UCL	
k star		4.56	99% KM (Chebyshev) UCL	
Theta star		0.0277		
Nu star		383.1	Potential UCLs to Use	
AppChi2		338.7	95% KM (t) UCL	
95% Gamma Approximate UCL		0.143	95% KM (Percentile Bootstrap) UCL	
95% Adjusted Gamma UCL		N/A		
Note: DL/2 is not a recommended method.				

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Di-n-butyl phthalate			
General Statistics			
Number of Valid Data	42	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	36
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.053	Minimum Detected	-2.937
Maximum Detected	26	Maximum Detected	3.258
Mean of Detected	5.1	Mean of Detected	-0.338
SD of Detected	10.3	SD of Detected	2.335
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	41
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.62%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.582	Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.958	Mean	-1.349
SD	3.993	SD	1.015
95% DL/2 (t) UCL	1.995	95% H-Stat (DL/2) UCL	0.578
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.388
		SD in Log Scale	1.569
		Mean in Original Scale	0.827
		SD in Original Scale	4.008
		95% Percentile Bootstrap UCL	2.052
		95% BCA Bootstrap UCL	3.236
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.283	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	18.05		
nu star	3.391		
A-D Test Statistic	0.438	Nonparametric Statistics	
5% A-D Critical Value	0.76	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.76	Mean	0.812
5% K-S Critical Value	0.355	SD	3.963
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.671
Assuming Gamma Distribution		95% KM (t) UCL	1.94
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.915
Minimum	1E-09	95% KM (jackknife) UCL	1.855
Maximum	26	95% KM (bootstrap t) UCL	11.4
Mean	4.271	95% KM (BCA) UCL	2.784
Median	4.827	95% KM (Percentile Bootstrap) UCL	2.155
SD	4.068	95% KM (Chebyshev) UCL	3.735
k star	0.287	97.5% KM (Chebyshev) UCL	5
Theta star	14.86	99% KM (Chebyshev) UCL	7.484
Nu star	24.15	Potential UCLs to Use	
AppChi2	13.96	95% KM (t) UCL	1.94
95% Gamma Approximate UCL	7.388		
95% Adjusted Gamma UCL	7.537		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Fluoranthene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	30
		Percent Non-Detects	71.43%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.04	Minimum Detected	-3.219
Maximum Detected	5.3	Maximum Detected	1.668
Mean of Detected	1.02	Mean of Detected	-1.129
SD of Detected	1.592	SD of Detected	1.662
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	41
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.62%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.676	Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.498	Mean	-1.397
SD	0.955	SD	0.984
95% DL/2 (t) UCL	0.746	95% H-Stat (DL/2) UCL	0.772
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.135
		SD in Log Scale	1.246
		Mean in Original Scale	0.364
		SD in Original Scale	0.927
		95% Percentile Bootstrap UCL	0.615
		95% BCA Bootstrap UCL	0.748
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.465	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	2.193		
nu star	11.16		
A-D Test Statistic	0.571	Nonparametric Statistics	
5% A-D Critical Value	0.781	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.781	Mean	0.362
5% K-S Critical Value	0.258	SD	0.921
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.15
		95% KM (t) UCL	0.615
Assuming Gamma Distribution		95% KM (z) UCL	0.61
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.608
Minimum	0.04	95% KM (bootstrap t) UCL	0.935
Maximum	5.3	95% KM (BCA) UCL	0.655
Mean	1.01	95% KM (Percentile Bootstrap) UCL	0.607
Median	0.876	95% KM (Chebyshev) UCL	1.018
SD	0.885	97.5% KM (Chebyshev) UCL	1.302
k star	1.383	99% KM (Chebyshev) UCL	1.859
Theta star	0.73		
Nu star	116.2	Potential UCLs to Use	
AppChi2	92.3	95% KM (t) UCL	0.615
95% Gamma Approximate UCL	1.271		
95% Adjusted Gamma UCL	1.282		
Note: DL/2 is not a recommended method.			

APPENDIX A

ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Fluorene				
General Statistics				
Number of Valid Data	42	Number of Detected Data	3	
Number of Distinct Detected Data	3	Number of Non-Detect Data	39	
		Percent Non-Detects	92.86%	
Raw Statistics		Log-transformed Statistics		
Minimum Detected	0.18	Minimum Detected	-1.715	
Maximum Detected	0.29	Maximum Detected	-1.238	
Mean of Detected	0.237	Mean of Detected	-1.46	
SD of Detected	0.0551	SD of Detected	0.24	
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109	
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569	
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42	
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0	
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%	
Warning: There are only 3 Distinct Detected Values in this data set				
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.				
Those methods will return a 'N/A' value on your output display!				
It is necessary to have 4 or more Distinct Values for bootstrap methods.				
However, results obtained using 4 to 9 distinct values may not be reliable.				
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.				
UCL Statistics				
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic	0.997	Shapiro Wilk Test Statistic	0.986	
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767	
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
DL/2 Substitution Method		DL/2 Substitution Method		
Mean	0.325	Mean	-1.437	
SD	0.446	SD	0.605	
95% DL/2 (t) UCL	0.441	95% H-Stat (DL/2) UCL	0.375	
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method		
MLE method failed to converge properly		Mean in Log Scale	-1.46	
		SD in Log Scale	0.212	
		Mean in Original Scale	0.237	
		SD in Original Scale	0.0505	
		95% Percentile Bootstrap UCL	0.251	
		95% BCA Bootstrap UCL	0.251	
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only		
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level		
Theta Star	N/A			
nu star	N/A			
A-D Test Statistic	N/A	Nonparametric Statistics		
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method		
K-S Test Statistic	N/A	Mean	0.237	
5% K-S Critical Value	N/A	SD	0.045	
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0318	
		95% KM (t) UCL	0.29	
Assuming Gamma Distribution		95% KM (z) UCL	0.289	
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.301	
Minimum	N/A	95% KM (bootstrap t) UCL	0.325	
Maximum	N/A	95% KM (BCA) UCL	0.29	
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.29	
Median	N/A	95% KM (Chebyshev) UCL	0.375	
SD	N/A	97.5% KM (Chebyshev) UCL	0.435	
k star	N/A	99% KM (Chebyshev) UCL	0.553	
Theta star	N/A			
Nu star	N/A	Potential UCLs to Use		
AppChi2	N/A	95% KM (t) UCL	0.29	
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.29	
95% Adjusted Gamma UCL	N/A			
Warning: Recommended UCL exceeds the maximum observation				
Note: DL/2 is not a recommended method.				

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Indeno(1,2,3-cd)pyrene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	36
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.13	Minimum Detected	-2.04
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.43	Mean of Detected	-1.246
SD of Detected	0.492	SD of Detected	0.904
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.689	Shapiro Wilk Test Statistic	0.863
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.355	Mean	-1.395
SD	0.477	SD	0.681
95% DL/2 (t) UCL	0.479	95% H-Stat (DL/2) UCL	0.43
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.66
		SD in Log Scale	0.506
		Mean in Original Scale	0.225
		SD in Original Scale	0.203
		95% Percentile Bootstrap UCL	0.281
		95% BCA Bootstrap UCL	0.312
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.804	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.535		
nu star	9.645		
A-D Test Statistic	0.628	Nonparametric Statistics	
5% A-D Critical Value	0.709	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.709	Mean	0.215
5% K-S Critical Value	0.338	SD	0.205
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0414
Assuming Gamma Distribution		95% KM (t) UCL	0.285
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.284
Minimum	0.13	95% KM (jackknife) UCL	0.285
Maximum	1.4	95% KM (bootstrap t) UCL	0.337
Mean	0.431	95% KM (BCA) UCL	0.301
Median	0.431	95% KM (Percentile Bootstrap) UCL	0.289
SD	0.172	95% KM (Chebyshev) UCL	0.396
k star	8.226	97.5% KM (Chebyshev) UCL	0.474
Theta star	0.0524	99% KM (Chebyshev) UCL	0.627
Nu star	691	Potential UCLs to Use	
AppChi2	631	95% KM (t) UCL	0.285
95% Gamma Approximate UCL	0.472		
95% Adjusted Gamma UCL	0.474		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Naphthalene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	35
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.041	Minimum Detected	-3.194
Maximum Detected	0.18	Maximum Detected	-1.715
Mean of Detected	0.0999	Mean of Detected	-2.427
SD of Detected	0.0541	SD of Detected	0.536
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.86	Shapiro Wilk Test Statistic	0.936
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.303	Mean	-1.593
SD	0.453	SD	0.735
95% DL/2 (t) UCL	0.421	95% H-Stat (DL/2) UCL	0.473
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.427
		SD in Log Scale	0.402
		Mean in Original Scale	0.0955
		SD in Original Scale	0.039
		95% Percentile Bootstrap UCL	0.105
		95% BCA Bootstrap UCL	0.105
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.503	Data appear Normal at 5% Significance Level	
Theta Star	0.0399		
nu star	35.04		
A-D Test Statistic	0.38	Nonparametric Statistics	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.0999
5% K-S Critical Value	0.313	SD	0.0501
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0204
		95% KM (t) UCL	0.134
Assuming Gamma Distribution		95% KM (z) UCL	0.133
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.137
Minimum	0.0222	95% KM (bootstrap t) UCL	0.184
Maximum	0.18	95% KM (BCA) UCL	0.133
Mean	0.102	95% KM (Percentile Bootstrap) UCL	0.134
Median	0.106	95% KM (Chebyshev) UCL	0.189
SD	0.0388	97.5% KM (Chebyshev) UCL	0.228
k star	5.344	99% KM (Chebyshev) UCL	0.303
Theta star	0.0191		
Nu star	448.9	Potential UCLs to Use	
AppChi2	400.8	95% KM (t) UCL	0.134
95% Gamma Approximate UCL	0.114	95% KM (Percentile Bootstrap) UCL	0.134
95% Adjusted Gamma UCL	0.115		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Phenanthrene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	13
Number of Distinct Detected Data	11	Number of Non-Detect Data	29
		Percent Non-Detects	69.05%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.052	Minimum Detected	-2.957
Maximum Detected	3.2	Maximum Detected	1.163
Mean of Detected	0.658	Mean of Detected	-1.459
SD of Detected	1.03	SD of Detected	1.453
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.653	Shapiro Wilk Test Statistic	0.878
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.462	Mean	-1.411
SD	0.722	SD	0.984
95% DL/2 (t) UCL	0.649	95% H-Stat (DL/2) UCL	0.773
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.938
		SD in Log Scale	0.989
		Mean in Original Scale	0.299
		SD in Original Scale	0.612
		95% Percentile Bootstrap UCL	0.465
		95% BCA Bootstrap UCL	0.521
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.508	Data appear Lognormal at 5% Significance Level	
Theta Star	1.295		
nu star	13.22		
A-D Test Statistic	1.076	Nonparametric Statistics	
5% A-D Critical Value	0.783	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.783	Mean	0.297
5% K-S Critical Value	0.248	SD	0.622
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.104
		95% KM (t) UCL	0.473
Assuming Gamma Distribution		95% KM (z) UCL	0.469
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.469
Minimum	0.052	95% KM (bootstrap t) UCL	0.707
Maximum	3.2	95% KM (BCA) UCL	0.501
Mean	0.658	95% KM (Percentile Bootstrap) UCL	0.49
Median	0.657	95% KM (Chebyshev) UCL	0.752
SD	0.557	97.5% KM (Chebyshev) UCL	0.949
k star	1.593	99% KM (Chebyshev) UCL	1.336
Theta star	0.413		
Nu star	133.8	Potential UCLs to Use	
AppChi2	108.1	95% KM (BCA) UCL	0.501
95% Gamma Approximate UCL	0.815		
95% Adjusted Gamma UCL	0.821		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Pyrene			
General Statistics			
Number of Valid Data	42	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	32
		Percent Non-Detects	76.19%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.036	Minimum Detected	-3.324
Maximum Detected	4.7	Maximum Detected	1.548
Mean of Detected	0.985	Mean of Detected	-1.029
SD of Detected	1.465	SD of Detected	1.583
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.701	Shapiro Wilk Test Statistic	0.966
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.492	Mean	-1.343
SD	0.857	SD	0.944
95% DL/2 (t) UCL	0.715	95% H-Stat (DL/2) UCL	0.703
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.905
		SD in Log Scale	1.09
		Mean in Original Scale	0.344
		SD in Original Scale	0.782
		95% Percentile Bootstrap UCL	0.553
		95% BCA Bootstrap UCL	0.668
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.492	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	2.001		
nu star	9.846		
A-D Test Statistic	0.377	Nonparametric Statistics	
5% A-D Critical Value	0.768	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.768	Mean	0.352
5% K-S Critical Value	0.279	SD	0.783
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.134
		95% KM (t) UCL	0.578
Assuming Gamma Distribution		95% KM (z) UCL	0.573
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.573
Minimum	0.036	95% KM (bootstrap t) UCL	0.799
Maximum	4.7	95% KM (BCA) UCL	0.591
Mean	1.038	95% KM (Percentile Bootstrap) UCL	0.594
Median	0.992	95% KM (Chebyshev) UCL	0.938
SD	0.748	97.5% KM (Chebyshev) UCL	1.191
k star	1.823	99% KM (Chebyshev) UCL	1.688
Theta star	0.57		
Nu star	153.1	Potential UCLs to Use	
AppChi2	125.5	95% KM (t) UCL	0.578
95% Gamma Approximate UCL	1.267		
95% Adjusted Gamma UCL	1.276		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

N-Nitrosodiphenylamine			
General Statistics			
Number of Valid Data	42	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	40
		Percent Non-Detects	95.24%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.66	Minimum Detected	-0.416
Maximum Detected	1.5	Maximum Detected	0.405
Mean of Detected	1.08	Mean of Detected	-0.00503
SD of Detected	0.594	SD of Detected	0.581
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.299	Mean	-1.462
SD	0.354	SD	0.557
95% DL/2 (t) UCL	0.391	95% H-Stat (DL/2) UCL	0.305
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.681
5% K-S Critical Value	N/A	SD	0.131
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0293
		95% KM (t) UCL	0.73
Assuming Gamma Distribution		95% KM (z) UCL	0.729
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.228
Minimum	N/A	95% KM (bootstrap t) UCL	0.682
Maximum	N/A	95% KM (BCA) UCL	1.5
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.5
Median	N/A	95% KM (Chebyshev) UCL	0.809
SD	N/A	97.5% KM (Chebyshev) UCL	0.864
k star	N/A	99% KM (Chebyshev) UCL	0.973
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.73
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	1.5
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\March 2010 redos\WBG ss_NGT RA and MEC UC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chloroform			
General Statistics			
Number of Valid Data	20	Number of Detected Data	4
Number of Distinct Detected Data	3	Number of Non-Detect Data	16
		Percent Non-Detects	80.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.002	Minimum Detected	-6.215
Maximum Detected	0.023	Maximum Detected	-3.772
Mean of Detected	0.00775	Mean of Detected	-5.401
SD of Detected	0.0102	SD of Detected	1.103
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.67	Shapiro Wilk Test Statistic	0.772
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00385	Mean	-5.766
SD	0.00452	SD	0.487
95% DL/2 (t) UCL	0.0056	95% H-Stat (DL/2) UCL	0.00538
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.772
		SD in Log Scale	0.639
		Mean in Original Scale	0.00407
		SD in Original Scale	0.00466
		95% Percentile Bootstrap UCL	0.00601
		95% BCA Bootstrap UCL	0.00736
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.432	Data appear Lognormal at 5% Significance Level	
Theta Star	0.018		
nu star	3.452		
A-D Test Statistic	0.74	Nonparametric Statistics	
5% A-D Critical Value	0.666	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.666	Mean	0.00368
5% K-S Critical Value	0.402	SD	0.00446
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00118
Assuming Gamma Distribution		95% KM (t) UCL	0.00573
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.00563
Minimum	1E-09	95% KM (jackknife) UCL	0.00556
Maximum	0.023	95% KM (bootstrap t) UCL	0.0113
Mean	0.00697	95% KM (BCA) UCL	0.007
Median	0.00755	95% KM (Percentile Bootstrap) UCL	0.006
SD	0.00528	95% KM (Chebyshev) UCL	0.00884
k star	0.56	97.5% KM (Chebyshev) UCL	0.0111
Theta star	0.0124	99% KM (Chebyshev) UCL	0.0154
Nu star	22.41	Potential UCLs to Use	
AppChi2	12.64	95% KM (BCA) UCL	0.007
95% Gamma Approximate UCL	0.0123		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Toluene			
General Statistics			
Number of Valid Data	20	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	11
		Percent Non-Detects	55.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00079	Minimum Detected	-7.143
Maximum Detected	0.19	Maximum Detected	-1.661
Mean of Detected	0.0579	Mean of Detected	-4.123
SD of Detected	0.0739	SD of Detected	2.072
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	14
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	70.00%
Warning: There are only 9 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.775	Shapiro Wilk Test Statistic	0.905
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0277	Mean	-5.051
SD	0.0555	SD	1.598
95% DL/2 (t) UCL	0.0492	95% H-Stat (DL/2) UCL	0.0797
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.416
		SD in Log Scale	1.89
		Mean in Original Scale	0.0272
		SD in Original Scale	0.0558
		95% Percentile Bootstrap UCL	0.0507
		95% BCA Bootstrap UCL	0.0558
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.407	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.142		
nu star	7.319		
A-D Test Statistic	0.338	Nonparametric Statistics	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	0.0268
5% K-S Critical Value	0.294	SD	0.0545
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0129
		95% KM (t) UCL	0.0492
Assuming Gamma Distribution		95% KM (z) UCL	0.0481
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0485
Minimum	0.00079	95% KM (bootstrap t) UCL	0.0813
Maximum	0.19	95% KM (BCA) UCL	0.0507
Mean	0.0574	95% KM (Percentile Bootstrap) UCL	0.0504
Median	0.0481	95% KM (Chebyshev) UCL	0.0832
SD	0.0492	97.5% KM (Chebyshev) UCL	0.108
k star	0.866	99% KM (Chebyshev) UCL	0.155
Theta star	0.0663		
Nu star	34.62	Potential UCLs to Use	
AppChi2	22.16	95% KM (t) UCL	0.0492
95% Gamma Approximate UCL	0.0897		
95% Adjusted Gamma UCL	0.093		
Note: DL/2 is not a recommended method.			

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended EPC mg/kg	UCL or MDC?
Detected Analyte		Minimum mg/kg	Maximum mg/kg						
Explosives									
1,3,5-Trinitrobenzene	32/162	2.70E-02	4.90E+02	1.93E+01	2.32E+01	NP	97.5% KM (Chebyshev)	2.32E+01	UCL
1,3-Dinitrobenzene	4/162	3.70E-02	2.60E-01	1.17E-01	9.64E-02	Normal	KM-t	9.64E-02	UCL
2,4,6-Trinitrotoluene	66/162	3.00E-02	3.80E+03	1.43E+02	2.58E+02	NP	97.5% KM (Chebyshev)	2.58E+02	UCL
2,4-Dinitrotoluene	26/162	3.20E-02	5.60E-01	1.87E-01	1.46E-01	Gamma	KM-t	1.46E-01	UCL
2,6-Dinitrotoluene	7/162	7.50E-02	6.20E-01	2.07E-01	1.82E-01	Gamma	KM-t	1.82E-01	UCL
2-Amino-4,6-Dinitrotoluene	6/24	9.90E-02	7.50E+00	1.51E+00	1.05E+00	Approx Gamma	KM-t	1.05E+00	UCL
2-Nitrotoluene	3/162	7.40E-02	4.80E+00	1.68E+00	4.96E-01	Lognormal	97.5% KM (Chebyshev)	4.96E-01	UCL
3-Nitrotoluene	6/162	8.60E-02	2.10E+01	3.59E+00	1.12E+00	NP	97.5% KM (Chebyshev)	1.12E+00	UCL
4-Amino-2,6-Dinitrotoluene	8/24	9.20E-02	9.30E-01	2.67E-01	2.54E-01	NP	KM (Percentile Bootstrap)	2.54E-01	UCL
4-Nitrotoluene	7/162	8.40E-02	1.90E-01	1.48E-01	1.73E-01	Normal	KM-t	1.73E-01	UCL
HMX	33/162	1.00E-01	1.70E+03	6.86E+01	8.20E+01	NP	97.5% KM (Chebyshev)	8.20E+01	UCL
Nitrobenzene	7/162	3.30E-02	3.60E-01	1.01E-01	7.53E-02	Lognormal	KM (Percentile Bootstrap)	7.53E-02	UCL
Nitrocellulose	9/27	2.50E+00	3.15E+02	7.13E+01	4.89E+01	Gamma	KM-t	4.89E+01	UCL
Nitroglycerin	3/86	5.50E+00	1.20E+01	8.30E+00	1.20E+01	Normal	KM (Percentile Bootstrap)	1.20E+01	MDC
RDX	26/162	1.40E-01	9.50E+03	4.94E+02	4.63E+02	NP	97.5% KM (Chebyshev)	4.63E+02	UCL
Tetryl	8/162	5.40E-02	4.80E-01	1.57E-01	2.41E-01	Gamma	KM-t	2.41E-01	UCL
Inorganics									
Aluminum	290/290	1.41E+03	5.01E+04	1.28E+04	1.32E+04	NP	KM (BCA)	1.32E+04	UCL
Antimony	117/221	3.40E-01	1.57E+02	7.05E+00	7.77E+00	NP	KM (Chebyshev)	7.77E+00	UCL
Arsenic	291/291	3.10E-01	3.84E+01	1.30E+01	1.34E+01	NP	Student's-t	1.34E+01	UCL
Barium	289/290	1.17E+01	1.04E+04	3.38E+02	5.96E+02	NP	KM (Chebyshev)	5.96E+02	UCL
Beryllium	132/220	1.40E-01	1.09E+01	7.38E-01	6.69E-01	NP	KM (Percentile Bootstrap)	6.69E-01	UCL
Cadmium	193/290	6.00E-02	8.77E+02	1.04E+01	2.71E+01	NP	97.5% KM (Chebyshev)	2.71E+01	UCL
Chromium (total)	290/290	3.40E+00	1.89E+02	1.89E+01	2.03E+01	NP	KM (BCA)	2.03E+01	UCL
Chromium, hexavalent	14/40	2.00E+00	1.01E+01	5.03E+00	3.89E+00	Normal	KM (Percentile Bootstrap)	3.89E+00	UCL
Cobalt	218/220	9.20E-01	2.54E+01	8.91E+00	9.26E+00	NP	KM (BCA)	9.26E+00	UCL
Copper	218/220	5.80E+00	1.68E+04	1.94E+02	5.40E+02	NP	KM (Chebyshev)	5.40E+02	UCL
Cyanide	12/122	6.40E-02	2.80E+00	9.40E-01	2.55E-01	Gamma	KM-t	2.55E-01	UCL
Lead	290/291	5.60E+00	2.80E+03	1.30E+02	2.14E+02	NP	KM (Chebyshev)	2.14E+02	UCL
Manganese	290/290	6.54E+01	4.27E+03	6.21E+02	6.76E+02	NP	KM (BCA)	6.76E+02	UCL
Mercury	194/291	1.30E-02	1.20E+00	8.55E-02	7.90E-02	NP	KM (BCA)	7.90E-02	UCL
Nickel	218/220	7.00E+00	9.27E+01	1.99E+01	2.09E+01	NP	KM (BCA)	2.09E+01	UCL
Selenium	191/291	3.40E-01	5.00E+00	1.14E+00	9.66E-01	NP	KM (BCA)	9.66E-01	UCL
Silver	44/290	2.00E-01	3.32E+01	3.38E+00	1.03E+00	Lognormal	KM (BCA)	1.03E+00	UCL
Thallium	132/221	1.70E-01	3.10E+00	5.68E-01	5.53E-01	NP	KM (Percentile Bootstrap)	5.53E-01	UCL
Vanadium	220/220	4.80E+00	4.48E+01	2.19E+01	2.26E+01	Normal	KM-t	2.26E+01	UCL
Zinc	288/290	2.86E+01	2.49E+04	3.25E+02	7.15E+02	NP	KM (Chebyshev)	7.15E+02	UCL
Pesticides and PCBs									
Dieldrin	2/16	2.40E-03	5.40E-03	3.90E-03	3.24E-03	NP	KM-t	3.24E-03	UCL

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg					EPC mg/kg	
SVOCs									
2,4-Dinitrotoluene	5/43	9.00E-02	1.90E+01	4.07E+00	1.46E+00	Gamma	KM-t	1.46E+00	UCL
2,6-Dinitrotoluene	2/43	1.00E-01	1.30E+00	7.00E-01	3.13E-01	NP	KM (Chebyshev)	3.13E-01	UCL
2-Methylnaphthalene	12/50	4.70E-02	1.70E+01	1.58E+00	1.98E+00	NP	KM (Chebyshev)	1.98E+00	UCL
Acenaphthene	4/50	1.40E-01	4.40E-01	2.38E-01	4.40E-01	Normal	KM (Percentile Bootstrap)	4.40E-01	MDC
Anthracene	6/50	5.70E-02	8.70E-01	3.51E-01	2.38E-01	Normal	KM (Percentile Bootstrap)	2.38E-01	UCL
Benz(a)anthracene	10/50	4.30E-02	2.60E+00	5.62E-01	3.30E-01	Gamma	KM-t	3.30E-01	UCL
Benzo(a)pyrene	10/50	4.00E-02	2.30E+00	4.94E-01	2.89E-01	Gamma	KM-t	2.89E-01	UCL
Benzo(b)fluoranthene	11/50	5.40E-02	2.80E+00	6.08E-01	3.80E-01	Gamma	KM-t	3.80E-01	UCL
Benzo(ghi)perylene	7/50	1.10E-01	1.10E+00	3.44E-01	2.77E-01	Gamma	KM-t	2.77E-01	UCL
Benzo(k)fluoranthene	7/50	6.50E-02	1.10E+00	3.59E-01	2.92E-01	Normal	KM (Percentile Bootstrap)	2.92E-01	UCL
Bis(2-ethylhexyl)phthalate	3/50	3.40E-02	1.40E-01	1.01E-01	1.58E-01	Normal	KM-t	1.40E-01	MDC
Carbazole	4/50	8.60E-02	4.10E-01	2.42E-01	2.77E-01	Normal	KM (Percentile Bootstrap)	2.77E-01	UCL
Chrysene	9/50	5.00E-02	2.30E+00	5.90E-01	2.94E-01	Gamma	KM-t	2.94E-01	UCL
Dibenz(a,h)anthracene	5/50	5.40E-02	3.40E-01	1.28E-01	1.46E-01	Gamma	KM-t	1.46E-01	UCL
Dibenzofuran	4/50	4.50E-02	1.90E-01	1.26E-01	1.84E-01	Normal	KM (Percentile Bootstrap)	1.84E-01	UCL
Di-n-butyl phthalate	6/50	5.30E-02	2.60E+01	5.10E+00	1.65E+00	Gamma	KM-t	1.65E+00	UCL
Fluoranthene	15/50	4.00E-02	5.30E+00	9.06E-01	5.55E-01	Gamma	KM-t	5.55E-01	UCL
Fluorene	4/50	1.80E-01	9.30E-01	4.10E-01	3.32E-01	Normal	KM (Percentile Bootstrap)	3.32E-01	UCL
Indeno(1,2,3-cd)pyrene	7/50	1.30E-01	1.40E+00	4.21E-01	2.88E-01	Gamma	KM-t	2.88E-01	UCL
Naphthalene	8/50	4.10E-02	1.60E+00	2.87E-01	2.05E-01	NP	KM (BCA)	2.05E-01	UCL
N-Nitrosodiphenylamine	2/50	6.60E-01	1.50E+00	1.08E+00	7.19E-01	NP	KM-t	7.19E-01	UCL
Phenanthrene	16/50	5.20E-02	3.20E+00	7.74E-01	5.34E-01	NP	KM (BCA)	5.34E-01	UCL
Pyrene	13/50	3.60E-02	4.70E+00	8.44E-01	5.14E-01	Gamma	KM-t	5.14E-01	UCL
VOCs									
Acetone	2/21	4.90E-03	5.20E-02	2.85E-02	2.65E-02	NP	97.5% KM (Chebyshev)	2.65E-02	UCL
Chloroform	4/25	2.00E-03	2.30E-02	7.75E-03	6.20E-03	Lognormal	KM (BCA)	6.20E-03	UCL
Dimethylbenzene	2/25	2.00E-02	2.60E-02	2.30E-02	2.08E-02	NP	KM-t	2.08E-02	UCL
Ethylbenzene	2/25	2.10E-02	1.60E-01	9.05E-02	1.60E-01	NP	KM (BCA)	1.60E-01	MDC
Methylene Chloride	2/25	6.60E-03	1.20E-02	9.30E-03	7.43E-03	NP	KM-t	7.43E-03	UCL
Toluene	13/25	4.30E-04	1.90E-01	4.14E-02	3.85E-02	Gamma	KM (BCA)	3.85E-02	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.)

The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG ss_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	32
Number of Distinct Detected Data	27	Number of Non-Detect Data	130
Number of Missing Values	4	Percent Non-Detects	80.25%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.027	Minimum Detected	-3.612
Maximum Detected	490	Maximum Detected	6.194
Mean of Detected	19.26	Mean of Detected	-1.056
SD of Detected	87.04	SD of Detected	2.389
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	25	Maximum Non-Detect	3.219
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	159
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.15%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.24	Shapiro Wilk Test Statistic	0.829
5% Shapiro Wilk Critical Value	0.93	5% Shapiro Wilk Critical Value	0.93
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.021	Mean	-1.793
SD	38.95	SD	1.228
95% DL/2 (t) UCL	9.085	95% H-Stat (DL/2) UCL	0.441
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.122
		SD in Log Scale	1.753
		Mean in Original Scale	3.977
		SD in Original Scale	38.95
		95% Percentile Bootstrap UCL	9.874
		95% BCA Bootstrap UCL	16.37
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.189	Data do not follow a Discernable Distribution (0.05)	
Theta Star	102		
nu star	12.09		
A-D Test Statistic	5.656	Nonparametric Statistics	
5% A-D Critical Value	0.906	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.906	Mean	3.878
5% K-S Critical Value	0.173	SD	38.83
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.1
Assuming Gamme Distribution		95% KM (t) UCL	9.006
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	8.977
Minimum	1E-09	95% KM (jackknife) UCL	8.941
Maximum	490	95% KM (bootstrap t) UCL	143.7
Mean	17.89	95% KM (BCA) UCL	10.36
Median	20.83	95% KM (Percentile Bootstrap) UCL	9.78
SD	38.96	95% KM (Chebyshev) UCL	17.39
k star	0.232	97.5% KM (Chebyshev) UCL	23.24
Theta star	77.15	99% KM (Chebyshev) UCL	34.72
Nu star	75.16	Potential UCLs to Use	
AppChi2	56.19	97.5% KM (Chebyshev) UCL	23.24
95% Gamma Approximate UCL	23.94		
95% Adjusted Gamma UCL	24		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3-Dinitrobenzene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	158
Number of Missing Values	4	Percent Non-Detects	97.53%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.037	Minimum Detected	-3.297
Maximum Detected	0.26	Maximum Detected	-1.347
Mean of Detected	0.117	Mean of Detected	-2.388
SD of Detected	0.0979	SD of Detected	0.8
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.823	Shapiro Wilk Test Statistic	0.946
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.5	Mean	-1.934
SD	2.696	SD	0.79
95% DL/2 (t) UCL	0.85	95% H-Stat (DL/2) UCL	0.229
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.742
		SD in Log Scale	0.502
		Mean in Original Scale	0.073
		SD in Original Scale	0.0389
		95% Percentile Bootstrap UCL	0.0781
		95% BCA Bootstrap UCL	0.0788
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.716	Data appear Normal at 5% Significance Level	
Theta Star	0.164		
nu star	5.73		
A-D Test Statistic	0.373	Nonparametric Statistics	
5% A-D Critical Value	0.66	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.66	Mean	0.0709
5% K-S Critical Value	0.398	SD	0.0277
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0154
		95% KM (t) UCL	0.0964
Assuming Gamma Distribution		95% KM (z) UCL	0.0962
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.104
Minimum	1E-09	95% KM (bootstrap t) UCL	0.107
Maximum	0.26	95% KM (BCA) UCL	0.26
Mean	0.0979	95% KM (Percentile Bootstrap) UCL	0.0925
Median	0.103	95% KM (Chebyshev) UCL	0.138
SD	0.0509	97.5% KM (Chebyshev) UCL	0.167
k star	1.554	99% KM (Chebyshev) UCL	0.224
Theta star	0.063		
Nu star	503.5	Potential UCLs to Use	
AppChi2	452.5	95% KM (t) UCL	0.0964
95% Gamma Approximate UCL	0.109	95% KM (Percentile Bootstrap) UCL	0.0925
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	66
Number of Distinct Detected Data	59	Number of Non-Detect Data	96
Number of Missing Values	4	Percent Non-Detects	59.26%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	3800	Maximum Detected	8.243
Mean of Detected	143	Mean of Detected	0.266
SD of Detected	626.8	SD of Detected	2.919
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.45	Maximum Non-Detect	-0.799
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	126
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	36
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	77.78%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.445	Lilliefors Test Statistic	0.167
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	58.33	Mean	-1.12
SD	404.4	SD	2.185
95% DL/2 (t) UCL	110.9	95% H-Stat (DL/2) UCL	5.428
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.517
		SD in Log Scale	2.781
		Mean in Original Scale	58.37
		SD in Original Scale	404.4
		95% Percentile Bootstrap UCL	116.2
		95% BCA Bootstrap UCL	145.5
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.165	Data do not follow a Discernable Distribution (0.05)	
Theta Star	868.7		
nu star	21.73		
A-D Test Statistic	9.36	Nonparametric Statistics	
5% A-D Critical Value	0.94	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.94	Mean	58.32
5% K-S Critical Value	0.123	SD	403.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	31.92
Assuming Gamme Distribution		95% KM (t) UCL	111.1
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	110.8
Minimum	1E-09	95% KM (jackknife) UCL	110.9
Maximum	3800	95% KM (bootstrap t) UCL	333.2
Mean	130.1	95% KM (BCA) UCL	121
Median	98.87	95% KM (Percentile Bootstrap) UCL	118
SD	400.4	95% KM (Chebyshev) UCL	197.5
k star	0.219	97.5% KM (Chebyshev) UCL	257.7
Theta star	595.4	99% KM (Chebyshev) UCL	375.9
Nu star	70.82	Potential UCLs to Use	
AppChi2	52.44	97.5% KM (Chebyshev) UCL	257.7
95% Gamma Approximate UCL	175.7		
95% Adjusted Gamma UCL	176.2		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	26
Number of Distinct Detected Data	23	Number of Non-Detect Data	136
Number of Missing Values	4	Percent Non-Detects	83.95%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.032	Minimum Detected	-3.442
Maximum Detected	0.56	Maximum Detected	-0.58
Mean of Detected	0.187	Mean of Detected	-1.987
SD of Detected	0.159	SD of Detected	0.798
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12.5	Maximum Non-Detect	2.526
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.799	Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.173	Mean	-2.04
SD	0.485	SD	0.44
95% DL/2 (t) UCL	0.236	95% H-Stat (DL/2) UCL	0.165
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.274
		SD in Log Scale	0.636
		Mean in Original Scale	0.126
		SD in Original Scale	0.0903
		95% Percentile Bootstrap UCL	0.138
		95% BCA Bootstrap UCL	0.139
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.586	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.118		
nu star	82.46		
A-D Test Statistic	0.605	Nonparametric Statistics	
5% A-D Critical Value	0.759	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.759	Mean	0.124
5% K-S Critical Value	0.174	SD	0.0851
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0133
Assuming Gamme Distribution		95% KM (t) UCL	0.146
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.146
Minimum	0.032	95% KM (jackknife) UCL	0.146
Maximum	0.56	95% KM (bootstrap t) UCL	0.148
Mean	0.166	95% KM (BCA) UCL	0.147
Median	0.154	95% KM (Percentile Bootstrap) UCL	0.146
SD	0.0796	95% KM (Chebyshev) UCL	0.182
k star	5.257	97.5% KM (Chebyshev) UCL	0.207
Theta star	0.0316	99% KM (Chebyshev) UCL	0.256
Nu star	1703	Potential UCLs to Use	
AppChi2	1608	95% KM (t) UCL	0.146
95% Gamma Approximate UCL	0.176		
95% Adjusted Gamma UCL	0.176		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	155
Number of Missing Values	4	Percent Non-Detects	95.68%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.075	Minimum Detected	-2.59
Maximum Detected	0.62	Maximum Detected	-0.478
Mean of Detected	0.207	Mean of Detected	-1.842
SD of Detected	0.191	SD of Detected	0.732
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	75	Maximum Non-Detect	4.317
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.713	Shapiro Wilk Test Statistic	0.902
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.408	Mean	-1.97
SD	2.976	SD	0.59
95% DL/2 (t) UCL	0.795	95% H-Stat (DL/2) UCL	0.186
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.061
		SD in Log Scale	0.546
		Mean in Original Scale	0.148
		SD in Original Scale	0.0869
		95% Percentile Bootstrap UCL	0.159
		95% BCA Bootstrap UCL	0.16
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.259	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.164		
nu star	17.63		
A-D Test Statistic	0.521	Nonparametric Statistics	
5% A-D Critical Value	0.715	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.715	Mean	0.141
5% K-S Critical Value	0.315	SD	0.0682
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.025
		95% KM (t) UCL	0.182
Assuming Gamma Distribution		95% KM (z) UCL	0.182
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.186
Minimum	0.0749	95% KM (bootstrap t) UCL	0.22
Maximum	0.62	95% KM (BCA) UCL	0.186
Mean	0.189	95% KM (Percentile Bootstrap) UCL	0.184
Median	0.183	95% KM (Chebyshev) UCL	0.25
SD	0.0781	97.5% KM (Chebyshev) UCL	0.297
k star	5.966	99% KM (Chebyshev) UCL	0.39
Theta star	0.0317		
Nu star	1933	Potential UCLs to Use	
AppChi2	1832	95% KM (t) UCL	0.182
95% Gamma Approximate UCL	0.199		
95% Adjusted Gamma UCL	0.199		
Note: DL/2 is not a recommended method.			
2-Amino-4,6-Dinitrotoluene			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General Statistics			
Number of Valid Data	24	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	18
Number of Missing Values	142	Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.099	Minimum Detected	-2.313
Maximum Detected	7.5	Maximum Detected	2.015
Mean of Detected	1.508	Mean of Detected	-0.991
SD of Detected	2.954	SD of Detected	1.69
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	2.7	Maximum Non-Detect	0.993
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.83%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.575	Shapiro Wilk Test Statistic	0.823
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.522	Mean	-1.708
SD	1.516	SD	1.016
95% DL/2 (t) UCL	1.052	95% H-Stat (DL/2) UCL	0.436
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.678
		SD in Log Scale	1.269
		Mean in Original Scale	0.554
		SD in Original Scale	1.501
		95% Percentile Bootstrap UCL	1.147
		95% BCA Bootstrap UCL	1.483
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.341	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	4.427		
nu star	4.088		
A-D Test Statistic	0.833	Nonparametric Statistics	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	0.487
5% K-S Critical Value	0.35	SD	1.473
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.33
Assuming Gamma Distribution		95% KM (t) UCL	1.053
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.03
Minimum	1E-09	95% KM (jackknife) UCL	1.016
Maximum	7.5	95% KM (bootstrap t) UCL	5.588
Mean	1.319	95% KM (BCA) UCL	1.339
Median	1.155	95% KM (Percentile Bootstrap) UCL	1.083
SD	1.574	95% KM (Chebyshev) UCL	1.926
k star	0.199	97.5% KM (Chebyshev) UCL	2.549
Theta star	6.623	99% KM (Chebyshev) UCL	3.771
Nu star	9.559	Potential UCLs to Use	
AppChi2	3.668	95% KM (t) UCL	1.053
95% Gamma Approximate UCL	3.437		
95% Adjusted Gamma UCL	3.692		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Nitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	159
Number of Missing Values	4	Percent Non-Detects	98.15%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.074	Minimum Detected	-2.604
Maximum Detected	4.8	Maximum Detected	1.569
Mean of Detected	1.681	Mean of Detected	-0.936
SD of Detected	2.701	SD of Detected	2.208
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.765	Shapiro Wilk Test Statistic	0.892
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.505	Mean	-1.893
SD	2.682	SD	0.804
95% DL/2 (t) UCL	0.853	95% H-Stat (DL/2) UCL	0.235
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.149
		SD in Log Scale	1.265
		Mean in Original Scale	0.262
		SD in Original Scale	0.494
		95% Percentile Bootstrap UCL	0.332
		95% BCA Bootstrap UCL	0.352
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Lognormal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.152
5% K-S Critical Value	N/A	SD	0.375
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.055
		95% KM (t) UCL	0.243
Assuming Gamma Distribution		95% KM (z) UCL	0.242
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.273
Minimum	N/A	95% KM (bootstrap t) UCL	0.256
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.392
SD	N/A	97.5% KM (Chebyshev) UCL	0.496
k star	N/A	99% KM (Chebyshev) UCL	0.699
Theta star	N/A	Potential UCLs to Use	
Nu star	N/A	97.5% KM (Chebyshev) UCL	0.496
AppChi2	N/A		
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

3-Nitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	6
Number of Distinct Detected Data	4	Number of Non-Detect Data	156
Number of Missing Values	4	Percent Non-Detects	96.30%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.086	Minimum Detected	-2.453
Maximum Detected	21	Maximum Detected	3.045
Mean of Detected	3.59	Mean of Detected	-1.361
SD of Detected	8.529	SD of Detected	2.164
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	25	Maximum Non-Detect	3.219
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.498	Shapiro Wilk Test Statistic	0.558
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.445	Mean	-1.92
SD	2.025	SD	0.784
95% DL/2 (t) UCL	0.708	95% H-Stat (DL/2) UCL	0.225
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.019
		SD in Log Scale	1.414
		Mean in Original Scale	0.434
		SD in Original Scale	1.702
		95% Percentile Bootstrap UCL	0.689
		95% BCA Bootstrap UCL	0.867
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.244	Data do not follow a Discernable Distribution (0.05)	
Theta Star	14.69		
nu star	2.932		
A-D Test Statistic	1.587	Nonparametric Statistics	
5% A-D Critical Value	0.779	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.779	Mean	0.237
5% K-S Critical Value	0.359	SD	1.642
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.142
Assuming Gamma Distribution		95% KM (t) UCL	0.472
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.471
Minimum	1E-09	95% KM (jackknife) UCL	0.452
Maximum	21	95% KM (bootstrap t) UCL	3.779
Mean	3.447	95% KM (BCA) UCL	0.514
Median	4.522	95% KM (Percentile Bootstrap) UCL	0.501
SD	2.589	95% KM (Chebyshev) UCL	0.856
k star	0.174	97.5% KM (Chebyshev) UCL	1.123
Theta star	19.81	99% KM (Chebyshev) UCL	1.649
Nu star	56.37	Potential UCLs to Use	
AppChi2	40.12	97.5% KM (Chebyshev) UCL	1.123
95% Gamma Approximate UCL	4.844		
95% Adjusted Gamma UCL	4.858		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	24	Number of Detected Data	8
Number of Distinct Detected Data	7	Number of Non-Detect Data	16
Number of Missing Values	142	Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.092	Minimum Detected	-2.386
Maximum Detected	0.93	Maximum Detected	-0.0726
Mean of Detected	0.267	Mean of Detected	-1.691
SD of Detected	0.295	SD of Detected	0.832
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	110	Maximum Non-Detect	4.7
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.662	Shapiro Wilk Test Statistic	0.801
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.516	Mean	-1.475
SD	12.12	SD	1.65
95% DL/2 (t) UCL	7.757	95% H-Stat (DL/2) UCL	3.227
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.916
		SD in Log Scale	0.645
		Mean in Original Scale	0.188
		SD in Original Scale	0.182
		95% Percentile Bootstrap UCL	0.256
		95% BCA Bootstrap UCL	0.277
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.015	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.263		
nu star	16.24		
A-D Test Statistic	0.999	Nonparametric Statistics	
5% A-D Critical Value	0.729	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.729	Mean	0.176
5% K-S Critical Value	0.299	SD	0.181
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0423
		95% KM (t) UCL	0.248
Assuming Gamma Distribution		95% KM (z) UCL	0.245
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.246
Minimum	0.0057	95% KM (bootstrap t) UCL	0.432
Maximum	0.93	95% KM (BCA) UCL	0.254
Mean	0.233	95% KM (Percentile Bootstrap) UCL	0.254
Median	0.182	95% KM (Chebyshev) UCL	0.36
SD	0.194	97.5% KM (Chebyshev) UCL	0.44
k star	1.414	99% KM (Chebyshev) UCL	0.596
Theta star	0.164		
Nu star	67.89	Potential UCLs to Use	
AppChi2	49.93	95% KM (t) UCL	0.248
95% Gamma Approximate UCL	0.316	95% KM (% Bootstrap) UCL	0.254
95% Adjusted Gamma UCL	0.323		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Nitrotoluene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	155
Number of Missing Values	4	Percent Non-Detects	95.68%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.084	Minimum Detected	-2.477
Maximum Detected	0.19	Maximum Detected	-1.661
Mean of Detected	0.148	Mean of Detected	-1.95
SD of Detected	0.0409	SD of Detected	0.307
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.918	Shapiro Wilk Test Statistic	0.897
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.513	Mean	-1.892
SD	2.696	SD	0.811
95% DL/2 (t) UCL	0.863	95% H-Stat (DL/2) UCL	0.249
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.95
		SD in Log Scale	0.346
		Mean in Original Scale	0.151
		SD in Original Scale	0.0535
		95% Percentile Bootstrap UCL	0.158
		95% BCA Bootstrap UCL	0.158
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	7.791	Data appear Normal at 5% Significance Level	
Theta Star	0.019		
nu star	109.1		
A-D Test Statistic	0.36	Nonparametric Statistics	
5% A-D Critical Value	0.708	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.708	Mean	0.148
5% K-S Critical Value	0.312	SD	0.0378
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0154
		95% KM (t) UCL	0.173
Assuming Gamma Distribution		95% KM (z) UCL	0.173
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.175
Minimum	1E-09	95% KM (bootstrap t) UCL	0.173
Maximum	0.203	95% KM (BCA) UCL	0.174
Mean	0.144	95% KM (Percentile Bootstrap) UCL	0.173
Median	0.156	95% KM (Chebyshev) UCL	0.215
SD	0.0475	97.5% KM (Chebyshev) UCL	0.244
k star	1.79	99% KM (Chebyshev) UCL	0.301
Theta star	0.0805		
Nu star	579.8	Potential UCLs to Use	
AppChi2	525	95% KM (t) UCL	0.173
95% Gamma Approximate UCL	0.159	95% KM (Percentile Bootstrap) UCL	0.173
95% Adjusted Gamma UCL	0.159		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

HMX			
General Statistics			
Number of Valid Data	162	Number of Detected Data	33
Number of Distinct Detected Data	25	Number of Non-Detect Data	129
Number of Missing Values	4	Percent Non-Detects	79.63%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.1	Minimum Detected	-2.303
Maximum Detected	1700	Maximum Detected	7.438
Mean of Detected	68.58	Mean of Detected	-0.0745
SD of Detected	300	SD of Detected	2.603
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	160
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.251	Shapiro Wilk Test Statistic	0.789
5% Shapiro Wilk Critical Value	0.931	5% Shapiro Wilk Critical Value	0.931
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	15.03	Mean	-0.401
SD	136.5	SD	1.417
95% DL/2 (t) UCL	32.78	95% H-Stat (DL/2) UCL	2.881
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.182
		SD in Log Scale	1.897
		Mean in Original Scale	14.46
		SD in Original Scale	136.5
		95% Percentile Bootstrap UCL	35.4
		95% BCA Bootstrap UCL	53.77
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.179	Data do not follow a Discernable Distribution (0.05)	
Theta Star	383.2		
nu star	11.81		
A-D Test Statistic	5.737	Nonparametric Statistics	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	14.17
5% K-S Critical Value	0.171	SD	136.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	10.86
		95% KM (t) UCL	32.14
Assuming Gamme Distribution		95% KM (z) UCL	32.04
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	31.92
Minimum	1E-09	95% KM (bootstrap t) UCL	293.8
Maximum	1700	95% KM (BCA) UCL	34.86
Mean	61.95	95% KM (Percentile Bootstrap) UCL	34.74
Median	70.99	95% KM (Chebyshev) UCL	61.52
SD	136.6	97.5% KM (Chebyshev) UCL	82
k star	0.198	99% KM (Chebyshev) UCL	122.2
Theta star	313.4		
Nu star	64.04	Potential UCLs to Use	
AppChi2	46.63	97.5% KM (Chebyshev) UCL	82
95% Gamma Approximate UCL	85.09		
95% Adjusted Gamma UCL	85.33		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrobenzene			
General Statistics			
Number of Valid Data	162	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	155
Number of Missing Values	4	Percent Non-Detects	95.68%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.033	Minimum Detected	-3.411
Maximum Detected	0.36	Maximum Detected	-1.022
Mean of Detected	0.101	Mean of Detected	-2.637
SD of Detected	0.116	SD of Detected	0.798
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	62	Maximum Non-Detect	4.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.609	Shapiro Wilk Test Statistic	0.843
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.503	Mean	-1.932
SD	2.699	SD	0.806
95% DL/2 (t) UCL	0.854	95% H-Stat (DL/2) UCL	0.245
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.873
		SD in Log Scale	0.585
		Mean in Original Scale	0.0672
		SD in Original Scale	0.0446
		95% Percentile Bootstrap UCL	0.073
		95% BCA Bootstrap UCL	0.0739
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.002	Data appear Lognormal at 5% Significance Level	
Theta Star	0.101		
nu star	14.03		
A-D Test Statistic	0.822	Nonparametric Statistics	
5% A-D Critical Value	0.72	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.72	Mean	0.0601
5% K-S Critical Value	0.317	SD	0.0308
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00865
		95% KM (t) UCL	0.0744
Assuming Gamma Distribution		95% KM (z) UCL	0.0743
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0758
Minimum	0.00336	95% KM (bootstrap t) UCL	0.0768
Maximum	0.36	95% KM (BCA) UCL	0.0752
Mean	0.0896	95% KM (Percentile Bootstrap) UCL	0.0753
Median	0.0885	95% KM (Chebyshev) UCL	0.0978
SD	0.053	97.5% KM (Chebyshev) UCL	0.114
k star	2.074	99% KM (Chebyshev) UCL	0.146
Theta star	0.0432		
Nu star	671.8	Potential UCLs to Use	
AppChi2	612.7	95% KM (t) UCL	0.0744
95% Gamma Approximate UCL	0.0982	95% KM (% Bootstrap) UCL	0.0753
95% Adjusted Gamma UCL	0.0983		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrocellulose			
General Statistics			
Number of Valid Data	27	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	18
Number of Missing Values	125	Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	315	Maximum Detected	5.753
Mean of Detected	71.28	Mean of Detected	2.993
SD of Detected	108.3	SD of Detected	1.797
Minimum Non-Detect	2	Minimum Non-Detect	0.693
Maximum Non-Detect	5.9	Maximum Non-Detect	1.775
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	77.78%
Warning: There are only 9 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.715	Shapiro Wilk Test Statistic	0.914
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	24.5	Mean	1.038
SD	68.9	SD	1.738
95% DL/2 (t) UCL	47.12	95% H-Stat (DL/2) UCL	29.17
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.046
		SD in Log Scale	3.596
		Mean in Original Scale	23.9
		SD in Original Scale	69.11
		95% Percentile Bootstrap UCL	46.62
		95% BCA Bootstrap UCL	60.38
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.407	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	175.2		
nu star	7.322		
A-D Test Statistic	0.543	Nonparametric Statistics	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	25.43
5% K-S Critical Value	0.294	SD	67.29
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	13.74
		95% KM (t) UCL	48.86
Assuming Gamma Distribution		95% KM (z) UCL	48.03
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	47.66
Minimum	1E-09	95% KM (bootstrap t) UCL	102.6
Maximum	1372	95% KM (BCA) UCL	53.4
Mean	303.9	95% KM (Percentile Bootstrap) UCL	48.87
Median	127.6	95% KM (Chebyshev) UCL	85.31
SD	394.4	97.5% KM (Chebyshev) UCL	111.2
k star	0.194	99% KM (Chebyshev) UCL	162.1
Theta star	1564		
Nu star	10.49	Potential UCLs to Use	
AppChi2	4.252	95% KM (t) UCL	48.86
95% Gamma Approximate UCL	749.8		
95% Adjusted Gamma UCL	797.1		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitroglycerin			
General Statistics			
Number of Valid Data	86	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	83
Number of Missing Values	80	Percent Non-Detects	96.51%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.5	Minimum Detected	1.705
Maximum Detected	12	Maximum Detected	2.485
Mean of Detected	8.3	Mean of Detected	2.064
SD of Detected	3.342	SD of Detected	0.394
Minimum Non-Detect	2.5	Minimum Non-Detect	0.916
Maximum Non-Detect	6.8	Maximum Non-Detect	1.917
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.67%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Test Statistic	0.981
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.558	Mean	0.319
SD	1.426	SD	0.376
95% DL/2 (t) UCL	1.814	95% H-Stat (DL/2) UCL	1.516
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.115
		SD in Log Scale	1.404
		Mean in Original Scale	0.866
		SD in Original Scale	1.686
		95% Percentile Bootstrap UCL	1.179
		95% BCA Bootstrap UCL	1.299
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	5.598
5% K-S Critical Value	N/A	SD	0.724
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0956
		95% KM (t) UCL	5.757
Assuming Gamma Distribution		95% KM (z) UCL	5.755
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.818
Minimum	N/A	95% KM (bootstrap t) UCL	5.746
Maximum	N/A	95% KM (BCA) UCL	12
Mean	N/A	95% KM (Percentile Bootstrap) UCL	12
Median	N/A	95% KM (Chebyshev) UCL	6.014
SD	N/A	97.5% KM (Chebyshev) UCL	6.195
k star	N/A	99% KM (Chebyshev) UCL	6.549
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	5.757
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	12
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitroguanidine			
General Statistics			
Number of Valid Data	27	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	26
Number of Missing Values	125	Percent Non-Detects	96.30%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable Nitroguanidine was not processed!			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

RDX			
General Statistics			
Number of Valid Data	162	Number of Detected Data	26
Number of Distinct Detected Data	24	Number of Non-Detect Data	136
Number of Missing Values	4	Percent Non-Detects	83.95%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	9500	Maximum Detected	9.159
Mean of Detected	493.9	Mean of Detected	1.357
SD of Detected	1896	SD of Detected	3.226
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	50	Maximum Non-Detect	3.912
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	155
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.68%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.291	Shapiro Wilk Test Statistic	0.865
5% Shapiro Wilk Critical Value	0.92	5% Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	79.95	Mean	-0.542
SD	769	SD	1.646
95% DL/2 (t) UCL	179.9	95% H-Stat (DL/2) UCL	2.862
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.051
		SD in Log Scale	2.444
		Mean in Original Scale	80.01
		SD in Original Scale	769
		95% Percentile Bootstrap UCL	195.4
		95% BCA Bootstrap UCL	290
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.165	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2994		
nu star	8.578		
A-D Test Statistic	3.376	Nonparametric Statistics	
5% A-D Critical Value	0.913	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.913	Mean	79.49
5% K-S Critical Value	0.191	SD	766.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	61.43
		95% KM (t) UCL	181.1
Assuming Gamme Distribution		95% KM (z) UCL	180.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	179.5
Minimum	1E-09	95% KM (bootstrap t) UCL	1928
Maximum	9500	95% KM (BCA) UCL	194.3
Mean	418	95% KM (Percentile Bootstrap) UCL	195.3
Median	499.4	95% KM (Chebyshev) UCL	347.2
SD	772.2	97.5% KM (Chebyshev) UCL	463.1
k star	0.18	99% KM (Chebyshev) UCL	690.7
Theta star	2323		
Nu star	58.29	Potential UCLs to Use	
AppChi2	41.73	97.5% KM (Chebyshev) UCL	463.1
95% Gamma Approximate UCL	583.7		
95% Adjusted Gamma UCL	585.5		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Tetryl			
General Statistics			
Number of Valid Data	162	Number of Detected Data	8
Number of Distinct Detected Data	7	Number of Non-Detect Data	154
Number of Missing Values	4	Percent Non-Detects	95.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	0.48	Maximum Detected	-0.734
Mean of Detected	0.157	Mean of Detected	-2.119
SD of Detected	0.143	SD of Detected	0.734
Minimum Non-Detect	0.65	Minimum Non-Detect	-0.431
Maximum Non-Detect	160	Maximum Non-Detect	5.075
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	162
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.737	Shapiro Wilk Test Statistic	0.909
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.308	Mean	-1.006
SD	6.975	SD	0.85
95% DL/2 (t) UCL	2.214	95% H-Stat (DL/2) UCL	0.647
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.119
		SD in Log Scale	0.816
		Mean in Original Scale	0.167
		SD in Original Scale	0.154
		95% Percentile Bootstrap UCL	0.189
		95% BCA Bootstrap UCL	0.191
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.34	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.117		
nu star	21.45		
A-D Test Statistic	0.558	Nonparametric Statistics	
5% A-D Critical Value	0.724	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.724	Mean	0.157
5% K-S Critical Value	0.297	SD	0.134
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0505
		95% KM (t) UCL	0.241
Assuming Gamma Distribution		95% KM (z) UCL	0.24
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.246
Minimum	1E-09	95% KM (bootstrap t) UCL	0.424
Maximum	0.48	95% KM (BCA) UCL	0.249
Mean	0.161	95% KM (Percentile Bootstrap) UCL	0.254
Median	0.165	95% KM (Chebyshev) UCL	0.377
SD	0.111	97.5% KM (Chebyshev) UCL	0.472
k star	0.283	99% KM (Chebyshev) UCL	0.659
Theta star	0.567		
Nu star	91.7	Potential UCLs to Use	
AppChi2	70.62	95% KM (t) UCL	0.241
95% Gamma Approximate UCL	0.209		
95% Adjusted Gamma UCL	0.209		
Note: DL/2 is not a recommended method.			

APPENDIX A
 ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
 RVAAP-05 Winklepeck Burning Grounds

	General UCL Statistics for Data Sets with Non-Detects
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG ss_NGT RA and MEC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Aluminum			
General Statistics			
Number of Valid Data	290	Number of Detected Data	290
Number of Distinct Detected Data	142	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1410	Minimum Detected	7.251
Maximum Detected	50100	Maximum Detected	10.82
Mean of Detected	12824	Mean of Detected	9.414
SD of Detected	4256	SD of Detected	0.305
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.12	Lilliefors Test Statistic	0.0768
5% Lilliefors Critical Value	0.052	5% Lilliefors Critical Value	0.052
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12824	Mean	9.414
SD	4256	SD	0.305
95% DL/2 (t) UCL	13237	95% H-Stat (DL/2) UCL	13242
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	11.05	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1161		
nu star	6409		
A-D Test Statistic	3.628	Nonparametric Statistics	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	12824
5% K-S Critical Value	0.0532	SD	4249
Data not Gamma Distributed at 5% Significance Level		SE of Mean	249.9
Assuming Gamma Distribution		95% KM (t) UCL	13237
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	13236
Minimum	1410	95% KM (jackknife) UCL	13237
Maximum	50100	95% KM (bootstrap t) UCL	13304
Mean	12824	95% KM (BCA) UCL	13247
Median	12500	95% KM (Percentile Bootstrap) UCL	13223
SD	4256	95% KM (Chebyshev) UCL	13914
k star	11.05	97.5% KM (Chebyshev) UCL	14385
Theta star	1161	99% KM (Chebyshev) UCL	15311
Nu star	6409	Potential UCLs to Use	
AppChi2	6224	95% KM (BCA) UCL	13247
95% Gamma Approximate UCL	13206		
95% Adjusted Gamma UCL	13208		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Antimony			
General Statistics			
Number of Valid Data	221	Number of Detected Data	117
Number of Distinct Detected Data	81	Number of Non-Detect Data	104
Number of Missing Values	70	Percent Non-Detects	47.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.34	Minimum Detected	-1.079
Maximum Detected	157	Maximum Detected	5.056
Mean of Detected	7.049	Mean of Detected	0.919
SD of Detected	17.25	SD of Detected	1.265
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	1.6	Maximum Non-Detect	0.47
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	155
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	66
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	70.14%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.349	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.0819	5% Lilliefors Critical Value	0.0819
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.958	Mean	0.106
SD	12.95	SD	1.294
95% DL/2 (t) UCL	5.397	95% H-Stat (DL/2) UCL	2.476
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.286
		SD in Log Scale	1.713
		Mean in Original Scale	3.874
		SD in Original Scale	12.97
		95% Percentile Bootstrap UCL	5.506
		95% BCA Bootstrap UCL	6.115
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.588	Data do not follow a Discernable Distribution (0.05)	
Theta Star	11.98		
nu star	137.7		
A-D Test Statistic	8.454	Nonparametric Statistics	
5% A-D Critical Value	0.81	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.81	Mean	3.963
5% K-S Critical Value	0.0894	SD	12.92
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.873
Assuming Gamma Distribution		95% KM (t) UCL	5.405
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	5.399
Minimum	1E-09	95% KM (jackknife) UCL	5.389
Maximum	157	95% KM (bootstrap t) UCL	6.822
Mean	6.121	95% KM (BCA) UCL	5.742
Median	2.5	95% KM (Percentile Bootstrap) UCL	5.566
SD	13.02	95% KM (Chebyshev) UCL	7.767
k star	0.546	97.5% KM (Chebyshev) UCL	9.413
Theta star	11.22	99% KM (Chebyshev) UCL	12.65
Nu star	241.2	Potential UCLs to Use	
AppChi2	206.2	95% KM (Chebyshev) UCL	7.767
95% Gamma Approximate UCL	7.159		
95% Adjusted Gamma UCL	7.166		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Arsenic			
General Statistics			
Number of Valid Observations	291	Number of Distinct Observations	120
Raw Statistics		Log-transformed Statistics	
Minimum	0.31	Minimum of Log Data	-1.171
Maximum	38.4	Maximum of Log Data	3.648
Mean	13.02	Mean of log Data	2.508
Median	12.6	SD of log Data	0.404
SD	4.141		
Coefficient of Variation	0.318		
Skewness	1.65		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.101	Lilliefors Test Statistic	0.121
Lilliefors Critical Value	0.0519	Lilliefors Critical Value	0.0519
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13.42	95% H-UCL	13.89
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14.74
95% Adjusted-CLT UCL	13.44	97.5% Chebyshev (MVUE) UCL	15.36
95% Modified-t UCL	13.42	99% Chebyshev (MVUE) UCL	16.58
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.607	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.512		
MLE of Mean	13.02		
MLE of Standard Deviation	4.436		
nu star	5009		
Approximate Chi Square Value (.05)	4846	Nonparametric Statistics	
Adjusted Level of Significance	0.0492	95% CLT UCL	13.41
Adjusted Chi Square Value	4845	95% Jackknife UCL	13.42
		95% Standard Bootstrap UCL	13.43
Anderson-Darling Test Statistic	5.612	95% Bootstrap-t UCL	13.44
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	13.45
Kolmogorov-Smirnov Test Statistic	0.0872	95% Percentile Bootstrap UCL	13.44
Kolmogorov-Smirnov 5% Critical Value	0.0532	95% BCA Bootstrap UCL	13.43
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14.07
		97.5% Chebyshev(Mean, Sd) UCL	14.53
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15.43
95% Approximate Gamma UCL	13.45		
95% Adjusted Gamma UCL	13.46		
Potential UCL to Use		Use 95% Student's-t UCL	13.42
		or 95% Modified-t UCL	13.42

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Barium			
General Statistics			
Number of Valid Data	290	Number of Detected Data	289
Number of Distinct Detected Data	255	Number of Non-Detect Data	1
Number of Missing Values	1	Percent Non-Detects	0.34%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	11.7	Minimum Detected	2.46
Maximum Detected	10400	Maximum Detected	9.25
Mean of Detected	337.9	Mean of Detected	4.785
SD of Detected	1012	SD of Detected	1.105
Minimum Non-Detect	26.7	Minimum Non-Detect	3.285
Maximum Non-Detect	26.7	Maximum Non-Detect	3.285
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.375	Lilliefors Test Statistic	0.155
5% Lilliefors Critical Value	0.0521	5% Lilliefors Critical Value	0.0521
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	336.8	Mean	4.777
SD	1011	SD	1.111
95% DL/2 (t) UCL	434.7	95% H-Stat (DL/2) UCL	254
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	329.6	Mean in Log Scale	4.775
SD	1015	SD in Log Scale	1.115
95% MLE (t) UCL	427.9	Mean in Original Scale	336.8
95% MLE (Tiku) UCL	416.2	SD in Original Scale	1011
		95% Percentile Bootstrap UCL	447.8
		95% BCA Bootstrap UCL	457.7
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.592	Data do not follow a Discernable Distribution (0.05)	
Theta Star	570.9		
nu star	342.1		
A-D Test Statistic	35.58	Nonparametric Statistics	
5% A-D Critical Value	0.812	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.812	Mean	336.8
5% K-S Critical Value	0.0561	SD	1009
Data not Gamma Distributed at 5% Significance Level		SE of Mean	59.35
Assuming Gamma Distribution		95% KM (t) UCL	434.7
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	434.4
Minimum	1E-09	95% KM (jackknife) UCL	434.7
Maximum	10400	95% KM (bootstrap t) UCL	478.3
Mean	336.7	95% KM (BCA) UCL	437.1
Median	85.65	95% KM (Percentile Bootstrap) UCL	446.2
SD	1011	95% KM (Chebyshev) UCL	595.5
k star	0.553	97.5% KM (Chebyshev) UCL	707.5
Theta star	608.9	99% KM (Chebyshev) UCL	927.3
Nu star	320.8	Potential UCLs to Use	
AppChi2	280.3	95% KM (Chebyshev) UCL	595.5
95% Gamma Approximate UCL	385.4		
95% Adjusted Gamma UCL	385.7		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Beryllium			
General Statistics			
Number of Valid Data	220	Number of Detected Data	132
Number of Distinct Detected Data	59	Number of Non-Detect Data	88
Number of Missing Values	71	Percent Non-Detects	40.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	10.9	Maximum Detected	2.389
Mean of Detected	0.738	Mean of Detected	-0.602
SD of Detected	1.173	SD of Detected	0.595
Minimum Non-Detect	0.11	Minimum Non-Detect	-2.207
Maximum Non-Detect	0.81	Maximum Non-Detect	-0.211
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	199
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	21
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.45%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.343	Lilliefors Test Statistic	0.19
5% Lilliefors Critical Value	0.0771	5% Lilliefors Critical Value	0.0771
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.529	Mean	-0.999
SD	0.944	SD	0.707
95% DL/2 (t) UCL	0.634	95% H-Stat (DL/2) UCL	0.459
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.955
		SD in Log Scale	0.675
		Mean in Original Scale	0.54
		SD in Original Scale	0.941
		95% Percentile Bootstrap UCL	0.655
		95% BCA Bootstrap UCL	0.711
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.79	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.412		
nu star	472.6		
A-D Test Statistic	13.93	Nonparametric Statistics	
5% A-D Critical Value	0.767	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.767	Mean	0.547
5% K-S Critical Value	0.0824	SD	0.938
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0638
Assuming Gamma Distribution		95% KM (t) UCL	0.652
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.652
Minimum	0.0954	95% KM (jackknife) UCL	0.639
Maximum	10.9	95% KM (bootstrap t) UCL	0.757
Mean	0.679	95% KM (BCA) UCL	0.701
Median	0.51	95% KM (Percentile Bootstrap) UCL	0.669
SD	0.928	95% KM (Chebyshev) UCL	0.825
k star	2.179	97.5% KM (Chebyshev) UCL	0.945
Theta star	0.311	99% KM (Chebyshev) UCL	1.181
Nu star	958.8	Potential UCLs to Use	
AppChi2	888	95% KM (t) UCL	0.652
95% Gamma Approximate UCL	0.733	95% KM (% Bootstrap) UCL	0.669
95% Adjusted Gamma UCL	0.733		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Cadmium			
General Statistics			
Number of Valid Data	290	Number of Detected Data	193
Number of Distinct Detected Data	122	Number of Non-Detect Data	97
Number of Missing Values	1	Percent Non-Detects	33.45%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	877	Maximum Detected	6.777
Mean of Detected	10.44	Mean of Detected	0.0468
SD of Detected	67.01	SD of Detected	1.742
Minimum Non-Detect	0.04	Minimum Non-Detect	-3.219
Maximum Non-Detect	3	Maximum Non-Detect	1.099
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	239
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	51
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.41%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.438	Lilliefors Test Statistic	0.0796
5% Lilliefors Critical Value	0.0638	5% Lilliefors Critical Value	0.0638
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.039	Mean	-0.504
SD	54.83	SD	1.709
95% DL/2 (t) UCL	12.35	95% H-Stat (DL/2) UCL	2.477
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.749
		SD in Log Scale	1.949
		Mean in Original Scale	7.009
		SD in Original Scale	54.83
		95% Percentile Bootstrap UCL	13.02
		95% BCA Bootstrap UCL	17.32
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.299	Data do not follow a Discernable Distribution (0.05)	
Theta Star	34.95		
nu star	115.3		
A-D Test Statistic	20.99	Nonparametric Statistics	
5% A-D Critical Value	0.869	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.869	Mean	7.016
5% K-S Critical Value	0.0711	SD	54.74
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.223
Assuming Gamma Distribution		95% KM (t) UCL	12.33
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	12.32
Minimum	1E-09	95% KM (jackknife) UCL	12.33
Maximum	877	95% KM (bootstrap t) UCL	26.45
Mean	8.958	95% KM (BCA) UCL	14.1
Median	0.58	95% KM (Percentile Bootstrap) UCL	13.18
SD	55.03	95% KM (Chebyshev) UCL	21.06
k star	0.122	97.5% KM (Chebyshev) UCL	27.14
Theta star	73.12	99% KM (Chebyshev) UCL	39.08
Nu star	71.05	Potential UCLs to Use	
AppChi2	52.64	97.5% KM (Chebyshev) UCL	27.14
95% Gamma Approximate UCL	12.09		
95% Adjusted Gamma UCL	12.11		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium			
General Statistics			
Number of Valid Data	290	Number of Detected Data	290
Number of Distinct Detected Data	161	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.4	Minimum Detected	1.224
Maximum Detected	189	Maximum Detected	5.242
Mean of Detected	18.87	Mean of Detected	2.824
SD of Detected	14.36	SD of Detected	0.418
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.249	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.052	5% Lilliefors Critical Value	0.052
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.87	Mean	2.824
SD	14.36	SD	0.418
95% DL/2 (t) UCL	20.26	95% H-Stat (DL/2) UCL	19.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.525	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4.169		
nu star	2625		
A-D Test Statistic	11.91	Nonparametric Statistics	
5% A-D Critical Value	0.758	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.758	Mean	18.87
5% K-S Critical Value	0.0534	SD	14.33
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.843
Assuming Gamma Distribution		95% KM (t) UCL	20.26
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	20.25
Minimum	3.4	95% KM (jackknife) UCL	20.26
Maximum	189	95% KM (bootstrap t) UCL	21.13
Mean	18.87	95% KM (BCA) UCL	20.33
Median	16.5	95% KM (Percentile Bootstrap) UCL	20.34
SD	14.36	95% KM (Chebyshev) UCL	22.54
k star	4.525	97.5% KM (Chebyshev) UCL	24.13
Theta star	4.169	99% KM (Chebyshev) UCL	27.26
Nu star	2625	Potential UCLs to Use	
AppChi2	2507	95% KM (BCA) UCL	20.33
95% Gamma Approximate UCL	19.75		
95% Adjusted Gamma UCL	19.76		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium, hexavalent			
General Statistics			
Number of Valid Data	40	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	26
Number of Missing Values	220	Percent Non-Detects	65.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	10.1	Maximum Detected	2.313
Mean of Detected	5.029	Mean of Detected	1.504
SD of Detected	2.478	SD of Detected	0.491
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	65.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.874	5% Shapiro Wilk Critical Value	0.874
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.156	Mean	0.204
SD	2.57	SD	1.008
95% DL/2 (t) UCL	2.841	95% H-Stat (DL/2) UCL	1.949
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.45
		SD in Log Scale	0.955
		Mean in Original Scale	2.43
		SD in Original Scale	2.44
		95% Percentile Bootstrap UCL	3.088
		95% BCA Bootstrap UCL	3.115
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.707	Data appear Normal at 5% Significance Level	
Theta Star	1.356		
nu star	103.8		
A-D Test Statistic	0.209	Nonparametric Statistics	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	3.06
5% K-S Critical Value	0.229	SD	2.021
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.332
		95% KM (t) UCL	3.619
Assuming Gamma Distribution		95% KM (z) UCL	3.605
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.539
Minimum	1.696	95% KM (bootstrap t) UCL	3.762
Maximum	10.1	95% KM (BCA) UCL	4.073
Mean	5.481	95% KM (Percentile Bootstrap) UCL	3.885
Median	5.544	95% KM (Chebyshev) UCL	4.505
SD	2.025	97.5% KM (Chebyshev) UCL	5.131
k star	6.014	99% KM (Chebyshev) UCL	6.359
Theta star	0.911		
Nu star	481.1	Potential UCLs to Use	
AppChi2	431.2	95% KM (t) UCL	3.619
95% Gamma Approximate UCL	6.114	95% KM (Percentile Bootstrap) UCL	3.885
95% Adjusted Gamma UCL	6.139		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Cobalt			
General Statistics			
Number of Valid Data	220	Number of Detected Data	218
Number of Distinct Detected Data	94	Number of Non-Detect Data	2
Number of Missing Values	71	Percent Non-Detects	0.91%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.92	Minimum Detected	-0.0834
Maximum Detected	25.4	Maximum Detected	3.235
Mean of Detected	8.907	Mean of Detected	2.112
SD of Detected	3.247	SD of Detected	0.425
Minimum Non-Detect	15	Minimum Non-Detect	2.708
Maximum Non-Detect	19.1	Maximum Non-Detect	2.95
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	218
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.09%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.0999	Lilliefors Test Statistic	0.115
5% Lilliefors Critical Value	0.06	5% Lilliefors Critical Value	0.06
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.903	Mean	2.112
SD	3.233	SD	0.423
95% DL/2 (t) UCL	9.263	95% H-Stat (DL/2) UCL	9.553
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.111
		SD in Log Scale	0.423
		Mean in Original Scale	8.9
		SD in Original Scale	3.233
		95% Percentile Bootstrap UCL	9.26
		95% BCA Bootstrap UCL	9.274
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	6.723	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.325		
nu star	2931		
A-D Test Statistic	2.688	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	8.904
5% K-S Critical Value	0.0616	SD	3.235
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.219
		95% KM (t) UCL	9.266
Assuming Gamma Distribution		95% KM (z) UCL	9.265
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.266
Minimum	0.92	95% KM (bootstrap t) UCL	9.309
Maximum	25.4	95% KM (BCA) UCL	9.26
Mean	8.912	95% KM (Percentile Bootstrap) UCL	9.279
Median	8.65	95% KM (Chebyshev) UCL	9.86
SD	3.232	97.5% KM (Chebyshev) UCL	10.27
k star	6.782	99% KM (Chebyshev) UCL	11.09
Theta star	1.314		
Nu star	2984	Potential UCLs to Use	
AppChi2	2858	95% KM (BCA) UCL	9.26
95% Gamma Approximate UCL	9.305		
95% Adjusted Gamma UCL	9.308		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Copper			
General Statistics			
Number of Valid Data	220	Number of Detected Data	218
Number of Distinct Detected Data	184	Number of Non-Detect Data	2
Number of Missing Values	71	Percent Non-Detects	0.91%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.8	Minimum Detected	1.758
Maximum Detected	16800	Maximum Detected	9.729
Mean of Detected	193.7	Mean of Detected	3.631
SD of Detected	1189	SD of Detected	1.277
Minimum Non-Detect	0.63	Minimum Non-Detect	-0.462
Maximum Non-Detect	3.4	Maximum Non-Detect	1.224
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	218
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	0.91%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.437	Lilliefors Test Statistic	0.153
5% Lilliefors Critical Value	0.06	5% Lilliefors Critical Value	0.06
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	192	Mean	3.596
SD	1184	SD	1.327
95% DL/2 (t) UCL	323.8	95% H-Stat (DL/2) UCL	107
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	183.9	Mean in Log Scale	3.602
SD	1187	SD in Log Scale	1.309
95% MLE (t) UCL	316.2	Mean in Original Scale	192
95% MLE (Tiku) UCL	299.6	SD in Original Scale	1184
		95% Percentile Bootstrap UCL	337.2
		95% BCA Bootstrap UCL	435.1
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.4	Data do not follow a Discernable Distribution (0.05)	
Theta Star	484.7		
nu star	174.2		
A-D Test Statistic	4.587E+28	Nonparametric Statistics	
5% A-D Critical Value	0.845	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.845	Mean	192
5% K-S Critical Value	0.066	SD	1181
Data not Gamma Distributed at 5% Significance Level		SE of Mean	79.82
Assuming Gamma Distribution		95% KM (t) UCL	323.9
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	323.3
Minimum	1E-09	95% KM (jackknife) UCL	323.8
Maximum	16800	95% KM (bootstrap t) UCL	723.8
Mean	192	95% KM (BCA) UCL	354.9
Median	23.3	95% KM (Percentile Bootstrap) UCL	344.9
SD	1184	95% KM (Chebyshev) UCL	539.9
k star	0.36	97.5% KM (Chebyshev) UCL	690.5
Theta star	533	99% KM (Chebyshev) UCL	986.2
Nu star	158.5	Potential UCLs to Use	
AppChi2	130.3	95% KM (Chebyshev) UCL	539.9
95% Gamma Approximate UCL	233.3		
95% Adjusted Gamma UCL	233.6		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Cyanide			
General Statistics			
Number of Valid Data	122	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	110
Number of Missing Values	168	Percent Non-Detects	90.16%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.064	Minimum Detected	-2.749
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	0.94	Mean of Detected	-0.388
SD of Detected	0.738	SD of Detected	0.969
Minimum Non-Detect	0.1	Minimum Non-Detect	-2.303
Maximum Non-Detect	0.76	Maximum Non-Detect	-0.274
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	117
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.90%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.847	Shapiro Wilk Test Statistic	0.889
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.362	Mean	-1.158
SD	0.298	SD	0.503
95% DL/2 (t) UCL	0.407	95% H-Stat (DL/2) UCL	0.381
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.411
		SD in Log Scale	1.113
		Mean in Original Scale	0.185
		SD in Original Scale	0.345
		95% Percentile Bootstrap UCL	0.24
		95% BCA Bootstrap UCL	0.252
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.315	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.715		
nu star	31.57		
A-D Test Statistic	0.414	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.186
5% K-S Critical Value	0.249	SD	0.347
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0416
Assuming Gamma Distribution		95% KM (t) UCL	0.255
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.255
Minimum	0.064	95% KM (jackknife) UCL	0.285
Maximum	2.8	95% KM (bootstrap t) UCL	0.267
Mean	0.9	95% KM (BCA) UCL	0.663
Median	0.875	95% KM (Percentile Bootstrap) UCL	0.648
SD	0.273	95% KM (Chebyshev) UCL	0.368
k star	10.37	97.5% KM (Chebyshev) UCL	0.446
Theta star	0.0868	99% KM (Chebyshev) UCL	0.6
Nu star	2530	Potential UCLs to Use	
AppChi2	2414	95% KM (t) UCL	0.255
95% Gamma Approximate UCL	0.944		
95% Adjusted Gamma UCL	0.944		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Lead			
General Statistics			
Number of Valid Data	291	Number of Detected Data	290
Number of Distinct Detected Data	227	Number of Non-Detect Data	1
		Percent Non-Detects	0.34%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	5.6	Minimum Detected	1.723
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	130	Mean of Detected	3.673
SD of Detected	332	SD of Detected	1.28
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	0.3	Maximum Non-Detect	-1.204
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.354	Lilliefors Test Statistic	0.173
5% Lilliefors Critical Value	0.052	5% Lilliefors Critical Value	0.052
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	129.6	Mean	3.654
SD	331.5	SD	1.319
95% DL/2 (t) UCL	161.6	95% H-Stat (DL/2) UCL	109.9
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	128.8	Mean in Log Scale	3.66
SD	331.7	SD in Log Scale	1.295
95% MLE (t) UCL	160.9	Mean in Original Scale	129.6
95% MLE (Tiku) UCL	157.1	SD in Original Scale	331.5
		95% Percentile Bootstrap UCL	162.2
		95% BCA Bootstrap UCL	169.5
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.524	Data do not follow a Discernable Distribution (0.05)	
Theta Star	248		
nu star	304		
A-D Test Statistic	33.12	Nonparametric Statistics	
5% A-D Critical Value	0.819	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.819	Mean	129.6
5% K-S Critical Value	0.0562	SD	331
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19.43
		95% KM (t) UCL	161.6
Assuming Gamma Distribution		95% KM (z) UCL	161.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	161.6
Minimum	1E-09	95% KM (bootstrap t) UCL	171.1
Maximum	2800	95% KM (BCA) UCL	166.6
Mean	129.6	95% KM (Percentile Bootstrap) UCL	164.3
Median	24.1	95% KM (Chebyshev) UCL	214.3
SD	331.5	97.5% KM (Chebyshev) UCL	250.9
k star	0.496	99% KM (Chebyshev) UCL	322.9
Theta star	261.5		
Nu star	288.4	Potential UCLs to Use	
AppChi2	250.1	95% KM (Chebyshev) UCL	214.3
95% Gamma Approximate UCL	149.4		
95% Adjusted Gamma UCL	149.5		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Manganese			
General Statistics			
Number of Valid Data	290	Number of Detected Data	290
Number of Distinct Detected Data	238	Number of Non-Detect Data	0
Number of Missing Values	1	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	65.4	Minimum Detected	4.181
Maximum Detected	4270	Maximum Detected	8.359
Mean of Detected	620.7	Mean of Detected	6.193
SD of Detected	558.5	SD of Detected	0.647
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.201	Lilliefors Test Statistic	0.0593
5% Lilliefors Critical Value	0.052	5% Lilliefors Critical Value	0.052
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	620.7	Mean	6.193
SD	558.5	SD	0.647
95% DL/2 (t) UCL	674.8	95% H-Stat (DL/2) UCL	648.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.238	Data do not follow a Discernable Distribution (0.05)	
Theta Star	277.4		
nu star	1298		
A-D Test Statistic	6.932	Nonparametric Statistics	
5% A-D Critical Value	0.764	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764	Mean	620.7
5% K-S Critical Value	0.0538	SD	557.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	32.8
Assuming Gamma Distribution		95% KM (t) UCL	674.8
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	674.7
Minimum	65.4	95% KM (jackknife) UCL	674.8
Maximum	4270	95% KM (bootstrap t) UCL	685
Mean	620.7	95% KM (BCA) UCL	675.6
Median	456	95% KM (Percentile Bootstrap) UCL	675.6
SD	558.5	95% KM (Chebyshev) UCL	763.7
k star	2.238	97.5% KM (Chebyshev) UCL	825.5
Theta star	277.4	99% KM (Chebyshev) UCL	947.1
Nu star	1298	Potential UCLs to Use	
AppChi2	1215	95% KM (BCA) UCL	675.6
95% Gamma Approximate UCL	662.9		
95% Adjusted Gamma UCL	663.1		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Mercury			
General Statistics			
Number of Valid Data	291	Number of Detected Data	194
Number of Distinct Detected Data	86	Number of Non-Detect Data	97
		Percent Non-Detects	33.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.013	Minimum Detected	-4.343
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.0855	Mean of Detected	-2.925
SD of Detected	0.148	SD of Detected	0.799
Minimum Non-Detect	0.03	Minimum Non-Detect	-3.507
Maximum Non-Detect	0.13	Maximum Non-Detect	-2.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	269
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	22
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.44%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.313	Lilliefors Test Statistic	0.129
5% Lilliefors Critical Value	0.0636	5% Lilliefors Critical Value	0.0636
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0671	Mean	-3.157
SD	0.124	SD	0.781
95% DL/2 (t) UCL	0.0791	95% H-Stat (DL/2) UCL	0.0568
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.161
		SD in Log Scale	0.784
		Mean in Original Scale	0.0668
		SD in Original Scale	0.124
		95% Percentile Bootstrap UCL	0.0796
		95% BCA Bootstrap UCL	0.0827
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.198	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.0714		
nu star	464.9		
A-D Test Statistic	14.5	Nonparametric Statistics	
5% A-D Critical Value	0.778	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.778	Mean	0.0673
5% K-S Critical Value	0.0668	SD	0.123
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00726
		95% KM (t) UCL	0.0792
Assuming Gamma Distribution		95% KM (z) UCL	0.0792
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0792
Minimum	1E-09	95% KM (bootstrap t) UCL	0.0846
Maximum	1.2	95% KM (BCA) UCL	0.079
Mean	0.0794	95% KM (Percentile Bootstrap) UCL	0.0803
Median	0.0486	95% KM (Chebyshev) UCL	0.0989
SD	0.124	97.5% KM (Chebyshev) UCL	0.113
k star	0.538	99% KM (Chebyshev) UCL	0.139
Theta star	0.148		
Nu star	313.2	Potential UCLs to Use	
AppChi2	273.2	95% KM (BCA) UCL	0.079
95% Gamma Approximate UCL	0.0911		
95% Adjusted Gamma UCL	0.0911		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nickel			
General Statistics			
Number of Valid Data	220	Number of Detected Data	218
Number of Distinct Detected Data	142	Number of Non-Detect Data	2
Number of Missing Values	71	Percent Non-Detects	0.91%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	7	Minimum Detected	1.946
Maximum Detected	92.7	Maximum Detected	4.529
Mean of Detected	19.86	Mean of Detected	2.907
SD of Detected	9.715	SD of Detected	0.386
Minimum Non-Detect	4	Minimum Non-Detect	1.386
Maximum Non-Detect	4	Maximum Non-Detect	1.386
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.15	Lilliefors Test Statistic	0.0709
5% Lilliefors Critical Value	0.06	5% Lilliefors Critical Value	0.06
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.7	Mean	2.886
SD	9.818	SD	0.438
95% DL/2 (t) UCL	20.79	95% H-Stat (DL/2) UCL	20.53
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	19.68	Mean in Log Scale	2.897
SD	9.84	SD in Log Scale	0.397
95% MLE (t) UCL	20.78	Mean in Original Scale	19.74
95% MLE (Tiku) UCL	20.76	SD in Original Scale	9.755
		95% Percentile Bootstrap UCL	20.82
		95% BCA Bootstrap UCL	21.05
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	6.148	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.231		
nu star	2681		
A-D Test Statistic	3.13	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	19.75
5% K-S Critical Value	0.0617	SD	9.725
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.657
Assuming Gamma Distribution		95% KM (t) UCL	20.83
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	20.83
Minimum	1E-09	95% KM (jackknife) UCL	20.83
Maximum	92.7	95% KM (bootstrap t) UCL	21.02
Mean	19.68	95% KM (BCA) UCL	20.89
Median	17.5	95% KM (Percentile Bootstrap) UCL	20.78
SD	9.853	95% KM (Chebyshev) UCL	22.61
k star	1.863	97.5% KM (Chebyshev) UCL	23.85
Theta star	10.57	99% KM (Chebyshev) UCL	26.29
Nu star	819.5	Potential UCLs to Use	
AppChi2	754.1	95% KM (BCA) UCL	20.89
95% Gamma Approximate UCL	21.39		
95% Adjusted Gamma UCL	21.4		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Selenium			
General Statistics			
Number of Valid Data	291	Number of Detected Data	191
Number of Distinct Detected Data	64	Number of Non-Detect Data	100
		Percent Non-Detects	34.36%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.34	Minimum Detected	-1.079
Maximum Detected	5	Maximum Detected	1.609
Mean of Detected	1.144	Mean of Detected	0.0332
SD of Detected	0.611	SD of Detected	0.434
Minimum Non-Detect	0.31	Minimum Non-Detect	-1.171
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	215
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	76
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	73.88%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.175	Lilliefors Test Statistic	0.0803
5% Lilliefors Critical Value	0.0641	5% Lilliefors Critical Value	0.0641
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.857	Mean	-0.39
SD	0.636	SD	0.697
95% DL/2 (t) UCL	0.918	95% H-Stat (DL/2) UCL	0.82
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.501	Mean in Log Scale	-0.271
SD	0.983	SD in Log Scale	0.57
95% MLE (t) UCL	0.596	Mean in Original Scale	0.902
95% MLE (Tiku) UCL	0.69	SD in Original Scale	0.601
		95% Percentile Bootstrap UCL	0.961
		95% BCA Bootstrap UCL	0.971
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	5.035	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.227		
nu star	1923		
A-D Test Statistic	1.927	Nonparametric Statistics	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	0.898
5% K-S Critical Value	0.0661	SD	0.603
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0359
Assuming Gamma Distribution		95% KM (t) UCL	0.957
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.957
Minimum	0.228	95% KM (jackknife) UCL	0.955
Maximum	5	95% KM (bootstrap t) UCL	0.962
Mean	1.056	95% KM (BCA) UCL	0.966
Median	0.995	95% KM (Percentile Bootstrap) UCL	0.958
SD	0.538	95% KM (Chebyshev) UCL	1.054
k star	5.217	97.5% KM (Chebyshev) UCL	1.122
Theta star	0.202	99% KM (Chebyshev) UCL	1.255
Nu star	3036	Potential UCLs to Use	
AppChi2	2909	95% KM (BCA) UCL	0.966
95% Gamma Approximate UCL	1.102		
95% Adjusted Gamma UCL	1.102		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Silver			
General Statistics			
Number of Valid Data	290	Number of Detected Data	44
Number of Distinct Detected Data	39	Number of Non-Detect Data	246
Number of Missing Values	1	Percent Non-Detects	84.83%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	33.2	Maximum Detected	3.503
Mean of Detected	3.383	Mean of Detected	0.325
SD of Detected	5.994	SD of Detected	1.324
Minimum Non-Detect	0.19	Minimum Non-Detect	-1.661
Maximum Non-Detect	1.4	Maximum Non-Detect	0.336
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	267
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	23
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.07%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.538	Shapiro Wilk Test Statistic	0.95
5% Shapiro Wilk Critical Value	0.944	5% Shapiro Wilk Critical Value	0.944
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.917	Mean	-0.775
SD	2.546	SD	1.005
95% DL/2 (t) UCL	1.163	95% H-Stat (DL/2) UCL	0.797
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.986
		SD in Log Scale	2.255
		Mean in Original Scale	0.604
		SD in Original Scale	2.6
		95% Percentile Bootstrap UCL	0.876
		95% BCA Bootstrap UCL	1.012
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.648	Data appear Lognormal at 5% Significance Level	
Theta Star	5.22		
nu star	57.03		
A-D Test Statistic	1.435	Nonparametric Statistics	
5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.796	Mean	0.724
5% K-S Critical Value	0.139	SD	2.571
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.153
		95% KM (t) UCL	0.977
Assuming Gamma Distribution		95% KM (z) UCL	0.976
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.968
Minimum	0.2	95% KM (bootstrap t) UCL	1.206
Maximum	33.2	95% KM (BCA) UCL	1.026
Mean	3.864	95% KM (Percentile Bootstrap) UCL	1
Median	3.428	95% KM (Chebyshev) UCL	1.393
SD	2.807	97.5% KM (Chebyshev) UCL	1.682
k star	2.428	99% KM (Chebyshev) UCL	2.25
Theta star	1.591		
Nu star	1408	Potential UCLs to Use	
AppChi2	1322	95% KM (BCA) UCL	1.026
95% Gamma Approximate UCL	4.116		
95% Adjusted Gamma UCL	4.117		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Thallium			
General Statistics			
Number of Valid Data	221	Number of Detected Data	132
Number of Distinct Detected Data	55	Number of Non-Detect Data	89
Number of Missing Values	70	Percent Non-Detects	40.27%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	3.1	Maximum Detected	1.131
Mean of Detected	0.568	Mean of Detected	-0.699
SD of Detected	0.412	SD of Detected	0.462
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	214
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.83%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.267	Lilliefors Test Statistic	0.122
5% Lilliefors Critical Value	0.0771	5% Lilliefors Critical Value	0.0771
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.47	Mean	-0.874
SD	0.341	SD	0.423
95% DL/2 (t) UCL	0.508	95% H-Stat (DL/2) UCL	0.471
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.763
		SD in Log Scale	0.394
		Mean in Original Scale	0.515
		SD in Original Scale	0.33
		95% Percentile Bootstrap UCL	0.553
		95% BCA Bootstrap UCL	0.561
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.804	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.149		
nu star	1004		
A-D Test Statistic	6.886	Nonparametric Statistics	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	0.512
5% K-S Critical Value	0.0815	SD	0.331
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0231
Assuming Gamma Distribution		95% KM (t) UCL	0.551
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.55
Minimum	0.17	95% KM (jackknife) UCL	0.551
Maximum	3.1	95% KM (bootstrap t) UCL	0.558
Mean	0.575	95% KM (BCA) UCL	0.555
Median	0.53	95% KM (Percentile Bootstrap) UCL	0.553
SD	0.323	95% KM (Chebyshev) UCL	0.613
k star	5.936	97.5% KM (Chebyshev) UCL	0.657
Theta star	0.0969	99% KM (Chebyshev) UCL	0.742
Nu star	2624	Potential UCLs to Use	
AppChi2	2506	95% KM (t) UCL	0.551
95% Gamma Approximate UCL	0.602	95% KM (% Bootstrap) UCL	0.553
95% Adjusted Gamma UCL	0.602		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Vanadium			
General Statistics			
Number of Valid Data	220	Number of Detected Data	220
Number of Distinct Detected Data	135	Number of Non-Detect Data	0
Number of Missing Values	71	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.8	Minimum Detected	1.569
Maximum Detected	44.8	Maximum Detected	3.802
Mean of Detected	21.94	Mean of Detected	3.049
SD of Detected	5.777	SD of Detected	0.294
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.0543	Lilliefors Test Statistic	0.0964
5% Lilliefors Critical Value	0.0597	5% Lilliefors Critical Value	0.0597
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	21.94	Mean	3.049
SD	5.777	SD	0.294
95% DL/2 (t) UCL	22.58	95% H-Stat (DL/2) UCL	22.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	12.83	Data appear Normal at 5% Significance Level	
Theta Star	1.71		
nu star	5645		
A-D Test Statistic	1.553	Nonparametric Statistics	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	21.94
5% K-S Critical Value	0.0612	SD	5.764
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.389
Assuming Gamma Distribution		95% KM (t) UCL	22.58
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	22.58
Minimum	4.8	95% KM (jackknife) UCL	22.58
Maximum	44.8	95% KM (bootstrap t) UCL	22.58
Mean	21.94	95% KM (BCA) UCL	22.57
Median	21.6	95% KM (Percentile Bootstrap) UCL	22.58
SD	5.777	95% KM (Chebyshev) UCL	23.64
k star	12.83	97.5% KM (Chebyshev) UCL	24.37
Theta star	1.71	99% KM (Chebyshev) UCL	25.82
Nu star	5645	Potential UCLs to Use	
AppChi2	5471	95% KM (t) UCL	22.58
95% Gamma Approximate UCL	22.64	95% KM (Percentile Bootstrap) UCL	22.58
95% Adjusted Gamma UCL	22.64		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Zinc			
General Statistics			
Number of Valid Data	290	Number of Detected Data	288
Number of Distinct Detected Data	243	Number of Non-Detect Data	2
Number of Missing Values	1	Percent Non-Detects	0.69%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	28.6	Minimum Detected	3.353
Maximum Detected	24900	Maximum Detected	10.12
Mean of Detected	325.3	Mean of Detected	4.777
SD of Detected	1534	SD of Detected	1.046
Minimum Non-Detect	2	Minimum Non-Detect	0.693
Maximum Non-Detect	9.3	Maximum Non-Detect	2.23
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	288
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	0.69%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.423	Lilliefors Test Statistic	0.192
5% Lilliefors Critical Value	0.0522	5% Lilliefors Critical Value	0.0522
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	323.1	Mean	4.749
SD	1529	SD	1.096
95% DL/2 (t) UCL	471.2	95% H-Stat (DL/2) UCL	239.3
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	315.4	Mean in Log Scale	4.758
SD	1532	SD in Log Scale	1.067
95% MLE (t) UCL	463.9	Mean in Original Scale	323.1
95% MLE (Tiku) UCL	445.3	SD in Original Scale	1529
		95% Percentile Bootstrap UCL	486.2
		95% BCA Bootstrap UCL	606.6
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.607	Data do not follow a Discernable Distribution (0.05)	
Theta Star	535.6		
nu star	349.9		
A-D Test Statistic	3.472E+28	Nonparametric Statistics	
5% A-D Critical Value	0.811	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.811	Mean	323.3
5% K-S Critical Value	0.0561	SD	1526
Data not Gamma Distributed at 5% Significance Level		SE of Mean	89.78
Assuming Gamma Distribution		95% KM (t) UCL	471.4
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	470.9
Minimum	1E-09	95% KM (jackknife) UCL	471.4
Maximum	24900	95% KM (bootstrap t) UCL	755.8
Mean	323.1	95% KM (BCA) UCL	506.6
Median	79.1	95% KM (Percentile Bootstrap) UCL	484.5
SD	1529	95% KM (Chebyshev) UCL	714.6
k star	0.531	97.5% KM (Chebyshev) UCL	883.9
Theta star	608.3	99% KM (Chebyshev) UCL	1217
Nu star	308	Potential UCLs to Use	
AppChi2	268.4	95% KM (Chebyshev) UCL	714.6
95% Gamma Approximate UCL	370.8		
95% Adjusted Gamma UCL	371		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG ss_NGT RA and ME0
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Dieldrin			
General Statistics			
Number of Valid Data	16	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	14
		Percent Non-Detects	87.50%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0024	Minimum Detected	-6.032
Maximum Detected	0.0054	Maximum Detected	-5.221
Mean of Detected	0.0039	Mean of Detected	-5.627
SD of Detected	0.00212	SD of Detected	0.573
Minimum Non-Detect	0.002	Minimum Non-Detect	-6.215
Maximum Non-Detect	0.21	Maximum Non-Detect	-1.561
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	16
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00961	Mean	-5.858
SD	0.0256	SD	1.245
95% DL/2 (t) UCL	0.0209	95% H-Stat (DL/2) UCL	0.0153
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.00265
5% K-S Critical Value	N/A	SD	0.0008292
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0003385
		95% KM (t) UCL	0.00324
Assuming Gamma Distribution		95% KM (z) UCL	0.00321
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00464
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	0.0054
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.00413
SD	N/A	97.5% KM (Chebyshev) UCL	0.00476
k star	N/A	99% KM (Chebyshev) UCL	0.00602
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.00324
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\April 2010 rev data set\WBG ss_NGT RA and ME
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	43	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	38
Number of Missing Values	7	Percent Non-Detects	88.37%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.09	Minimum Detected	-2.408
Maximum Detected	19	Maximum Detected	2.944
Mean of Detected	4.07	Mean of Detected	-0.531
SD of Detected	8.35	SD of Detected	2.099
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	42
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.67%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.58	Shapiro Wilk Test Statistic	0.874
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.707	Mean	-1.404
SD	2.872	SD	0.835
95% DL/2 (t) UCL	1.443	95% H-Stat (DL/2) UCL	0.438
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.664
		SD in Log Scale	1.204
		Mean in Original Scale	0.696
		SD in Original Scale	2.868
		95% Percentile Bootstrap UCL	1.55
		95% BCA Bootstrap UCL	2.04
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.272	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	14.94		
nu star	2.725		
A-D Test Statistic	0.722	Nonparametric Statistics	
5% A-D Critical Value	0.732	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.732	Mean	0.642
5% K-S Critical Value	0.378	SD	2.836
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.486
Assuming Gamma Distribution		95% KM (t) UCL	1.46
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.442
Minimum	1E-09	95% KM (jackknife) UCL	1.388
Maximum	19	95% KM (bootstrap t) UCL	8.536
Mean	3.765	95% KM (BCA) UCL	1.885
Median	4.445	95% KM (Percentile Bootstrap) UCL	1.549
SD	3.526	95% KM (Chebyshev) UCL	2.762
k star	0.164	97.5% KM (Chebyshev) UCL	3.68
Theta star	22.89	99% KM (Chebyshev) UCL	5.482
Nu star	14.15	Potential UCLs to Use	
AppChi2	6.671	95% KM (t) UCL	1.46
95% Gamma Approximate UCL	7.983		
95% Adjusted Gamma UCL	8.203		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	43	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	41
Number of Missing Values	7	Percent Non-Detects	95.35%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.1	Minimum Detected	-2.303
Maximum Detected	1.3	Maximum Detected	0.262
Mean of Detected	0.7	Mean of Detected	-1.02
SD of Detected	0.849	SD of Detected	1.814
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.292	Mean	-1.473
SD	0.338	SD	0.548
95% DL/2 (t) UCL	0.379	95% H-Stat (DL/2) UCL	0.315
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.13
5% K-S Critical Value	N/A	SD	0.187
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0419
		95% KM (t) UCL	0.2
Assuming Gamma Distribution		95% KM (z) UCL	0.199
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.911
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	1.3
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.3
Median	N/A	95% KM (Chebyshev) UCL	0.313
SD	N/A	97.5% KM (Chebyshev) UCL	0.392
k star	N/A	99% KM (Chebyshev) UCL	0.547
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (Chebyshev) UCL	0.313
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Methylnaphthalene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	38
		Percent Non-Detects	76.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.047	Minimum Detected	-3.058
Maximum Detected	17	Maximum Detected	2.833
Mean of Detected	1.584	Mean of Detected	-1.732
SD of Detected	4.859	SD of Detected	1.684
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.356	Shapiro Wilk Test Statistic	0.752
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.632	Mean	-1.514
SD	2.399	SD	0.976
95% DL/2 (t) UCL	1.201	95% H-Stat (DL/2) UCL	0.577
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.219
		SD in Log Scale	1.065
		Mean in Original Scale	0.472
		SD in Original Scale	2.388
		95% Percentile Bootstrap UCL	1.14
		95% BCA Bootstrap UCL	1.494
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.29	Data do not follow a Discernable Distribution (0.05)	
Theta Star	5.463		
nu star	6.958		
A-D Test Statistic	2.354	Nonparametric Statistics	
5% A-D Critical Value	0.821	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.821	Mean	0.455
5% K-S Critical Value	0.265	SD	2.366
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.35
Assuming Gamma Distribution		95% KM (t) UCL	1.042
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.031
Minimum	0.047	95% KM (jackknife) UCL	1.023
Maximum	17	95% KM (bootstrap t) UCL	7.752
Mean	1.491	95% KM (BCA) UCL	1.164
Median	0.935	95% KM (Percentile Bootstrap) UCL	1.125
SD	2.476	95% KM (Chebyshev) UCL	1.981
k star	0.815	97.5% KM (Chebyshev) UCL	2.641
Theta star	1.828	99% KM (Chebyshev) UCL	3.938
Nu star	81.55	Potential UCLs to Use	
AppChi2	61.74	95% KM (Chebyshev) UCL	1.981
95% Gamma Approximate UCL	1.969		
95% Adjusted Gamma UCL	1.985		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Acenaphthene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	46
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	0.44	Maximum Detected	-0.821
Mean of Detected	0.238	Mean of Detected	-1.55
SD of Detected	0.14	SD of Detected	0.525
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Test Statistic	0.877
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.305	Mean	-1.471
SD	0.412	SD	0.571
95% DL/2 (t) UCL	0.403	95% H-Stat (DL/2) UCL	0.335
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.766
		SD in Log Scale	0.285
		Mean in Original Scale	0.178
		SD in Original Scale	0.0575
		95% Percentile Bootstrap UCL	0.193
		95% BCA Bootstrap UCL	0.194
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.323	Data appear Normal at 5% Significance Level	
Theta Star	0.18		
nu star	10.58		
A-D Test Statistic	0.442	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.176
5% K-S Critical Value	0.396	SD	0.0531
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0242
		95% KM (t) UCL	0.217
Assuming Gamma Distribution		95% KM (z) UCL	0.216
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.227
Minimum	0.14	95% KM (bootstrap t) UCL	0.264
Maximum	0.44	95% KM (BCA) UCL	0.44
Mean	0.227	95% KM (Percentile Bootstrap) UCL	0.44
Median	0.224	95% KM (Chebyshev) UCL	0.281
SD	0.0527	97.5% KM (Chebyshev) UCL	0.327
k star	19.5	99% KM (Chebyshev) UCL	0.417
Theta star	0.0116	Potential UCLs to Use	
Nu star	1950	95% KM (t) UCL	0.217
AppChi2	1849	95% KM (Percentile Bootstrap) UCL	0.44
95% Gamma Approximate UCL	0.239		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

Anthracene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	44
		Percent Non-Detects	88.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.057	Minimum Detected	-2.865
Maximum Detected	0.87	Maximum Detected	-0.139
Mean of Detected	0.351	Mean of Detected	-1.452
SD of Detected	0.31	SD of Detected	1.052
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.945
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.32	Mean	-1.457
SD	0.421	SD	0.649
95% DL/2 (t) UCL	0.42	95% H-Stat (DL/2) UCL	0.383
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.23
		SD in Log Scale	0.66
		Mean in Original Scale	0.139
		SD in Original Scale	0.137
		95% Percentile Bootstrap UCL	0.174
		95% BCA Bootstrap UCL	0.184
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.8	Data appear Normal at 5% Significance Level	
Theta Star	0.439		
nu star	9.599		
A-D Test Statistic	0.286	Nonparametric Statistics	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.137
5% K-S Critical Value	0.338	SD	0.138
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0329
		95% KM (t) UCL	0.193
Assuming Gamma Distribution		95% KM (z) UCL	0.191
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.203
Minimum	0.057	95% KM (bootstrap t) UCL	0.211
Maximum	0.87	95% KM (BCA) UCL	0.44
Mean	0.353	95% KM (Percentile Bootstrap) UCL	0.238
Median	0.345	95% KM (Chebyshev) UCL	0.281
SD	0.148	97.5% KM (Chebyshev) UCL	0.343
k star	4.821	99% KM (Chebyshev) UCL	0.464
Theta star	0.0733	Potential UCLs to Use	
Nu star	482.1	95% KM (t) UCL	0.193
AppChi2	432.2	95% KM (Percentile Bootstrap) UCL	0.238
95% Gamma Approximate UCL	0.394		
95% Adjusted Gamma UCL	0.396		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benz(a)anthracene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	40
		Percent Non-Detects	80.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.043	Minimum Detected	-3.147
Maximum Detected	2.6	Maximum Detected	0.956
Mean of Detected	0.562	Mean of Detected	-1.32
SD of Detected	0.777	SD of Detected	1.321
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.693	Shapiro Wilk Test Statistic	0.973
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.359	Mean	-1.451
SD	0.529	SD	0.768
95% DL/2 (t) UCL	0.485	95% H-Stat (DL/2) UCL	0.471
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.107
		SD in Log Scale	0.911
		Mean in Original Scale	0.21
		SD in Original Scale	0.384
		95% Percentile Bootstrap UCL	0.306
		95% BCA Bootstrap UCL	0.361
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.625	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.899		
nu star	12.51		
A-D Test Statistic	0.288	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	0.22
5% K-S Critical Value	0.276	SD	0.389
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.066
Assuming Gamma Distribution		95% KM (t) UCL	0.33
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.328
Minimum	0.043	95% KM (jackknife) UCL	0.33
Maximum	2.6	95% KM (bootstrap t) UCL	0.413
Mean	0.558	95% KM (BCA) UCL	0.345
Median	0.557	95% KM (Percentile Bootstrap) UCL	0.338
SD	0.333	95% KM (Chebyshev) UCL	0.507
k star	3.312	97.5% KM (Chebyshev) UCL	0.632
Theta star	0.169	99% KM (Chebyshev) UCL	0.876
Nu star	331.2	Potential UCLs to Use	
AppChi2	290	95% KM (t) UCL	0.33
95% Gamma Approximate UCL	0.637		
95% Adjusted Gamma UCL	0.64		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(a)pyrene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	40
		Percent Non-Detects	80.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.04	Minimum Detected	-3.219
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.494	Mean of Detected	-1.441
SD of Detected	0.683	SD of Detected	1.307
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.683	Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.361	Mean	-1.443
SD	0.506	SD	0.787
95% DL/2 (t) UCL	0.481	95% H-Stat (DL/2) UCL	0.496
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.215
		SD in Log Scale	0.89
		Mean in Original Scale	0.186
		SD in Original Scale	0.337
		95% Percentile Bootstrap UCL	0.275
		95% BCA Bootstrap UCL	0.325
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.631	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.783		
nu star	12.61		
A-D Test Statistic	0.369	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	0.192
5% K-S Critical Value	0.275	SD	0.343
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0578
Assuming Gamma Distribution		95% KM (t) UCL	0.289
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.287
Minimum	0.04	95% KM (jackknife) UCL	0.288
Maximum	2.3	95% KM (bootstrap t) UCL	0.373
Mean	0.489	95% KM (BCA) UCL	0.304
Median	0.487	95% KM (Percentile Bootstrap) UCL	0.296
SD	0.293	95% KM (Chebyshev) UCL	0.444
k star	3.34	97.5% KM (Chebyshev) UCL	0.553
Theta star	0.146	99% KM (Chebyshev) UCL	0.767
Nu star	334	Potential UCLs to Use	
AppChi2	292.7	95% KM (t) UCL	0.289
95% Gamma Approximate UCL	0.558		
95% Adjusted Gamma UCL	0.56		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(b)fluoranthene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	39
		Percent Non-Detects	78.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	0.608	Mean of Detected	-1.142
SD of Detected	0.797	SD of Detected	1.207
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.694	Shapiro Wilk Test Statistic	0.974
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.377	Mean	-1.405
SD	0.55	SD	0.763
95% DL/2 (t) UCL	0.507	95% H-Stat (DL/2) UCL	0.475
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.834
		SD in Log Scale	0.844
		Mean in Original Scale	0.254
		SD in Original Scale	0.414
		95% Percentile Bootstrap UCL	0.365
		95% BCA Bootstrap UCL	0.412
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.72	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.844		
nu star	15.84		
A-D Test Statistic	0.318	Nonparametric Statistics	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	0.262
5% K-S Critical Value	0.263	SD	0.418
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0705
Assuming Gamma Distribution		95% KM (t) UCL	0.38
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.378
Minimum	0.054	95% KM (jackknife) UCL	0.381
Maximum	2.8	95% KM (bootstrap t) UCL	0.46
Mean	0.608	95% KM (BCA) UCL	0.397
Median	0.608	95% KM (Percentile Bootstrap) UCL	0.383
SD	0.36	95% KM (Chebyshev) UCL	0.569
k star	3.479	97.5% KM (Chebyshev) UCL	0.702
Theta star	0.175	99% KM (Chebyshev) UCL	0.964
Nu star	347.9	Potential UCLs to Use	
AppChi2	305.7	95% KM (t) UCL	0.38
95% Gamma Approximate UCL	0.692		
95% Adjusted Gamma UCL	0.695		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(ghi)perylene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	43
		Percent Non-Detects	86.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	1.1	Maximum Detected	0.0953
Mean of Detected	0.344	Mean of Detected	-1.383
SD of Detected	0.348	SD of Detected	0.799
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.709	Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.323	Mean	-1.444
SD	0.427	SD	0.621
95% DL/2 (t) UCL	0.424	95% H-Stat (DL/2) UCL	0.376
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.707
		SD in Log Scale	0.472
		Mean in Original Scale	0.207
		SD in Original Scale	0.149
		95% Percentile Bootstrap UCL	0.244
		95% BCA Bootstrap UCL	0.261
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.083	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.318		
nu star	15.17		
A-D Test Statistic	0.483	Nonparametric Statistics	
5% A-D Critical Value	0.718	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.718	Mean	0.21
5% K-S Critical Value	0.316	SD	0.154
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0399
Assuming Gamma Distribution		95% KM (t) UCL	0.277
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.276
Minimum	0.11	95% KM (jackknife) UCL	0.283
Maximum	1.1	95% KM (bootstrap t) UCL	0.319
Mean	0.352	95% KM (BCA) UCL	0.285
Median	0.355	95% KM (Percentile Bootstrap) UCL	0.277
SD	0.13	95% KM (Chebyshev) UCL	0.384
k star	9.141	97.5% KM (Chebyshev) UCL	0.46
Theta star	0.0386	99% KM (Chebyshev) UCL	0.607
Nu star	914.1	Potential UCLs to Use	
AppChi2	845	95% KM (t) UCL	0.277
95% Gamma Approximate UCL	0.381		
95% Adjusted Gamma UCL	0.382		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(k)fluoranthene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	43
		Percent Non-Detects	86.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.065	Minimum Detected	-2.733
Maximum Detected	1.1	Maximum Detected	0.0953
Mean of Detected	0.359	Mean of Detected	-1.448
SD of Detected	0.363	SD of Detected	1.013
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.814	Shapiro Wilk Test Statistic	0.958
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.325	Mean	-1.454
SD	0.428	SD	0.658
95% DL/2 (t) UCL	0.426	95% H-Stat (DL/2) UCL	0.391
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.985
		SD in Log Scale	0.617
		Mean in Original Scale	0.172
		SD in Original Scale	0.162
		95% Percentile Bootstrap UCL	0.213
		95% BCA Bootstrap UCL	0.224
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.849	Data appear Normal at 5% Significance Level	
Theta Star	0.423		
nu star	11.88		
A-D Test Statistic	0.274	Nonparametric Statistics	
5% A-D Critical Value	0.724	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.724	Mean	0.188
5% K-S Critical Value	0.318	SD	0.176
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0508
		95% KM (t) UCL	0.274
Assuming Gamma Distribution		95% KM (z) UCL	0.272
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.285
Minimum	0.0579	95% KM (bootstrap t) UCL	0.327
Maximum	1.1	95% KM (BCA) UCL	0.303
Mean	0.392	95% KM (Percentile Bootstrap) UCL	0.292
Median	0.393	95% KM (Chebyshev) UCL	0.41
SD	0.219	97.5% KM (Chebyshev) UCL	0.506
k star	2.621	99% KM (Chebyshev) UCL	0.694
Theta star	0.15	Potential UCLs to Use	
Nu star	262.1	95% KM (t) UCL	0.274
AppChi2	225.6	95% KM (Percentile Bootstrap) UCL	0.292
95% Gamma Approximate UCL	0.455		
95% Adjusted Gamma UCL	0.458		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Bis(2-ethylhexyl)phthalate			
General Statistics			
Number of Valid Data	50	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	47
		Percent Non-Detects	94.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.034	Minimum Detected	-3.381
Maximum Detected	0.14	Maximum Detected	-1.966
Mean of Detected	0.101	Mean of Detected	-2.463
SD of Detected	0.0585	SD of Detected	0.797
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.82	Shapiro Wilk Test Statistic	0.789
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.297	Mean	-1.523
SD	0.413	SD	0.625
95% DL/2 (t) UCL	0.395	95% H-Stat (DL/2) UCL	0.35
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.463
		SD in Log Scale	0.69
		Mean in Original Scale	0.107
		SD in Original Scale	0.0768
		95% Percentile Bootstrap UCL	0.125
		95% BCA Bootstrap UCL	0.128
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.101
5% K-S Critical Value	N/A	SD	0.0478
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0338
Assuming Gamma Distribution		95% KM (t) UCL	0.158
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.157
Minimum	N/A	95% KM (jackknife) UCL	0.17
Maximum	N/A	95% KM (bootstrap t) UCL	0.162
Mean	N/A	95% KM (BCA) UCL	N/A
Median	N/A	95% KM (Percentile Bootstrap) UCL	N/A
SD	N/A	95% KM (Chebyshev) UCL	0.249
k star	N/A	97.5% KM (Chebyshev) UCL	0.312
Theta star	N/A	99% KM (Chebyshev) UCL	0.438
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.158
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Carbazole			
General Statistics			
Number of Valid Data	50	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	46
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.086	Minimum Detected	-2.453
Maximum Detected	0.41	Maximum Detected	-0.892
Mean of Detected	0.242	Mean of Detected	-1.566
SD of Detected	0.136	SD of Detected	0.661
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.997	Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.306	Mean	-1.473
SD	0.412	SD	0.58
95% DL/2 (t) UCL	0.403	95% H-Stat (DL/2) UCL	0.349
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.817
		SD in Log Scale	0.341
		Mean in Original Scale	0.172
		SD in Original Scale	0.0621
		95% Percentile Bootstrap UCL	0.187
		95% BCA Bootstrap UCL	0.188
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.068	Data appear Normal at 5% Significance Level	
Theta Star	0.226		
nu star	8.543		
A-D Test Statistic	0.217	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.191
5% K-S Critical Value	0.396	SD	0.0825
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0497
		95% KM (t) UCL	0.274
Assuming Gamma Distribution		95% KM (z) UCL	0.273
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.297
Minimum	0.086	95% KM (bootstrap t) UCL	0.324
Maximum	0.41	95% KM (BCA) UCL	0.277
Mean	0.243	95% KM (Percentile Bootstrap) UCL	0.277
Median	0.243	95% KM (Chebyshev) UCL	0.408
SD	0.0339	97.5% KM (Chebyshev) UCL	0.501
k star	40.05	99% KM (Chebyshev) UCL	0.685
Theta star	0.00606		
Nu star	4005	Potential UCLs to Use	
AppChi2	3859	95% KM (t) UCL	0.274
95% Gamma Approximate UCL	0.252	95% KM (Percentile Bootstrap) UCL	0.277
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Chrysene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	41
		Percent Non-Detects	82.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.05	Minimum Detected	-2.996
Maximum Detected	2.3	Maximum Detected	0.833
Mean of Detected	0.59	Mean of Detected	-1.196
SD of Detected	0.715	SD of Detected	1.304
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 9 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.763	Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.372	Mean	-1.403
SD	0.511	SD	0.771
95% DL/2 (t) UCL	0.493	95% H-Stat (DL/2) UCL	0.477
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.185
		SD in Log Scale	0.924
		Mean in Original Scale	0.197
		SD in Original Scale	0.349
		95% Percentile Bootstrap UCL	0.288
		95% BCA Bootstrap UCL	0.327
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.658	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.896		
nu star	11.85		
A-D Test Statistic	0.263	Nonparametric Statistics	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	0.195
5% K-S Critical Value	0.288	SD	0.353
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0591
Assuming Gamma Distribution		95% KM (t) UCL	0.294
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.292
Minimum	0.05	95% KM (jackknife) UCL	0.295
Maximum	2.3	95% KM (bootstrap t) UCL	0.381
Mean	0.586	95% KM (BCA) UCL	0.327
Median	0.583	95% KM (Percentile Bootstrap) UCL	0.301
SD	0.29	95% KM (Chebyshev) UCL	0.453
k star	4.029	97.5% KM (Chebyshev) UCL	0.564
Theta star	0.145	99% KM (Chebyshev) UCL	0.783
Nu star	402.9	Potential UCLs to Use	
AppChi2	357.4	95% KM (t) UCL	0.294
95% Gamma Approximate UCL	0.661		
95% Adjusted Gamma UCL	0.663		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Dibenz(a,h)anthracene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	45
		Percent Non-Detects	90.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	0.34	Maximum Detected	-1.079
Mean of Detected	0.128	Mean of Detected	-2.312
SD of Detected	0.12	SD of Detected	0.74
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.704	Shapiro Wilk Test Statistic	0.846
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.295	Mean	-1.547
SD	0.415	SD	0.648
95% DL/2 (t) UCL	0.393	95% H-Stat (DL/2) UCL	0.378
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.474
		SD in Log Scale	0.492
		Mean in Original Scale	0.0956
		SD in Original Scale	0.0555
		95% Percentile Bootstrap UCL	0.11
		95% BCA Bootstrap UCL	0.112
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.963	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.133		
nu star	9.634		
A-D Test Statistic	0.608	Nonparametric Statistics	
5% A-D Critical Value	0.684	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.684	Mean	0.0995
5% K-S Critical Value	0.36	SD	0.0787
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0278
Assuming Gamma Distribution		95% KM (t) UCL	0.146
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.145
Minimum	0.049	95% KM (jackknife) UCL	0.147
Maximum	0.34	95% KM (bootstrap t) UCL	0.304
Mean	0.117	95% KM (BCA) UCL	0.164
Median	0.115	95% KM (Percentile Bootstrap) UCL	0.151
SD	0.0469	95% KM (Chebyshev) UCL	0.221
k star	7.058	97.5% KM (Chebyshev) UCL	0.273
Theta star	0.0165	99% KM (Chebyshev) UCL	0.377
Nu star	705.8	Potential UCLs to Use	
AppChi2	645.2	95% KM (t) UCL	0.146
95% Gamma Approximate UCL	0.128		
95% Adjusted Gamma UCL	0.128		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Dibenzofuran			
General Statistics			
Number of Valid Data	50	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	46
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.045	Minimum Detected	-3.101
Maximum Detected	0.19	Maximum Detected	-1.661
Mean of Detected	0.126	Mean of Detected	-2.2
SD of Detected	0.0634	SD of Detected	0.642
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.895
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.296	Mean	-1.524
SD	0.413	SD	0.612
95% DL/2 (t) UCL	0.394	95% H-Stat (DL/2) UCL	0.349
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.2
		SD in Log Scale	0.552
		Mean in Original Scale	0.128
		SD in Original Scale	0.0722
		95% Percentile Bootstrap UCL	0.145
		95% BCA Bootstrap UCL	0.146
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.161	Data appear Normal at 5% Significance Level	
Theta Star	0.109		
nu star	9.289		
A-D Test Statistic	0.322	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.126
5% K-S Critical Value	0.396	SD	0.0549
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0317
		95% KM (t) UCL	0.179
		95% KM (z) UCL	0.178
Assuming Gamma Distribution		95% KM (jackknife) UCL	0.187
Gamma ROS Statistics using Extrapolated Data		95% KM (bootstrap t) UCL	0.188
Minimum	0.0167	95% KM (BCA) UCL	0.175
Maximum	0.226	95% KM (Percentile Bootstrap) UCL	0.184
Mean	0.126	95% KM (Chebyshev) UCL	0.264
Median	0.128	97.5% KM (Chebyshev) UCL	0.324
SD	0.0544	99% KM (Chebyshev) UCL	0.442
k star	3.833		
Theta star	0.0329	Potential UCLs to Use	
Nu star	383.3	95% KM (t) UCL	0.179
AppChi2	338.9	95% KM (Percentile Bootstrap) UCL	0.184
95% Gamma Approximate UCL	0.143		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Di-n-butyl phthalate			
General Statistics			
Number of Valid Data	50	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	44
		Percent Non-Detects	88.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.053	Minimum Detected	-2.937
Maximum Detected	26	Maximum Detected	3.258
Mean of Detected	5.1	Mean of Detected	-0.338
SD of Detected	10.3	SD of Detected	2.335
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.582	Shapiro Wilk Test Statistic	0.955
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.836	Mean	-1.394
SD	3.664	SD	0.934
95% DL/2 (t) UCL	1.705	95% H-Stat (DL/2) UCL	0.481
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.446
		SD in Log Scale	1.57
		Mean in Original Scale	0.722
		SD in Original Scale	3.676
		95% Percentile Bootstrap UCL	1.728
		95% BCA Bootstrap UCL	2.423
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.283	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	18.05		
nu star	3.391		
A-D Test Statistic	0.438	Nonparametric Statistics	
5% A-D Critical Value	0.76	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.76	Mean	0.697
5% K-S Critical Value	0.355	SD	3.642
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.565
Assuming Gamma Distribution		95% KM (t) UCL	1.645
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.627
Minimum	1E-09	95% KM (jackknife) UCL	1.572
Maximum	26	95% KM (bootstrap t) UCL	8.131
Mean	4.19	95% KM (BCA) UCL	2.194
Median	4.777	95% KM (Percentile Bootstrap) UCL	1.767
SD	3.847	95% KM (Chebyshev) UCL	3.16
k star	0.249	97.5% KM (Chebyshev) UCL	4.226
Theta star	16.83	99% KM (Chebyshev) UCL	6.32
Nu star	24.9	Potential UCLs to Use	
AppChi2	14.54	95% KM (t) UCL	1.645
95% Gamma Approximate UCL	7.178		
95% Adjusted Gamma UCL	7.297		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Fluoranthene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	35
		Percent Non-Detects	70.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.04	Minimum Detected	-3.219
Maximum Detected	5.3	Maximum Detected	1.668
Mean of Detected	0.906	Mean of Detected	-1.238
SD of Detected	1.451	SD of Detected	1.616
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	49
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.659	Shapiro Wilk Test Statistic	0.923
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.465	Mean	-1.437
SD	0.888	SD	0.965
95% DL/2 (t) UCL	0.676	95% H-Stat (DL/2) UCL	0.622
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.104
		SD in Log Scale	1.219
		Mean in Original Scale	0.348
		SD in Original Scale	0.861
		95% Percentile Bootstrap UCL	0.577
		95% BCA Bootstrap UCL	0.648
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.484	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.873		
nu star	14.52		
A-D Test Statistic	0.699	Nonparametric Statistics	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	0.341
5% K-S Critical Value	0.233	SD	0.859
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.127
Assuming Gamma Distribution		95% KM (t) UCL	0.555
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.551
Minimum	0.04	95% KM (jackknife) UCL	0.55
Maximum	5.3	95% KM (bootstrap t) UCL	0.797
Mean	0.904	95% KM (BCA) UCL	0.564
Median	0.899	95% KM (Percentile Bootstrap) UCL	0.547
SD	0.777	95% KM (Chebyshev) UCL	0.896
k star	1.522	97.5% KM (Chebyshev) UCL	1.136
Theta star	0.594	99% KM (Chebyshev) UCL	1.608
Nu star	152.2	Potential UCLs to Use	
AppChi2	124.7	95% KM (t) UCL	0.555
95% Gamma Approximate UCL	1.104		
95% Adjusted Gamma UCL	1.11		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Fluorene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	46
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.18	Minimum Detected	-1.715
Maximum Detected	0.93	Maximum Detected	-0.0726
Mean of Detected	0.41	Mean of Detected	-1.113
SD of Detected	0.35	SD of Detected	0.721
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.748	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.319	Mean	-1.436
SD	0.42	SD	0.591
95% DL/2 (t) UCL	0.419	95% H-Stat (DL/2) UCL	0.34
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.41
		SD in Log Scale	0.391
		Mean in Original Scale	0.265
		SD in Original Scale	0.129
		95% Percentile Bootstrap UCL	0.297
		95% BCA Bootstrap UCL	0.306
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.769	Data appear Normal at 5% Significance Level	
Theta Star	0.533		
nu star	6.155		
A-D Test Statistic	0.533	Nonparametric Statistics	
5% A-D Critical Value	0.66	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.66	Mean	0.252
5% K-S Critical Value	0.397	SD	0.11
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.034
Assuming Gamma Distribution		95% KM (t) UCL	0.309
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.308
Minimum	0.11	95% KM (jackknife) UCL	0.32
Maximum	0.93	95% KM (bootstrap t) UCL	0.312
Mean	0.375	95% KM (BCA) UCL	0.322
Median	0.382	95% KM (Percentile Bootstrap) UCL	0.332
SD	0.151	95% KM (Chebyshev) UCL	0.4
k star	5.618	97.5% KM (Chebyshev) UCL	0.464
Theta star	0.0668	99% KM (Chebyshev) UCL	0.59
Nu star	561.8	Potential UCLs to Use	
AppChi2	507.9	95% KM (t) UCL	0.309
95% Gamma Approximate UCL	0.415	95% KM (Percentile Bootstrap) UCL	0.332
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Indeno(1,2,3-cd)pyrene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	43
		Percent Non-Detects	86.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.13	Minimum Detected	-2.04
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.421	Mean of Detected	-1.21
SD of Detected	0.45	SD of Detected	0.831
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.693	Shapiro Wilk Test Statistic	0.903
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.333	Mean	-1.42
SD	0.44	SD	0.632
95% DL/2 (t) UCL	0.438	95% H-Stat (DL/2) UCL	0.38
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.64
		SD in Log Scale	0.494
		Mean in Original Scale	0.226
		SD in Original Scale	0.19
		95% Percentile Bootstrap UCL	0.274
		95% BCA Bootstrap UCL	0.31
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.004	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.42		
nu star	14.05		
A-D Test Statistic	0.546	Nonparametric Statistics	
5% A-D Critical Value	0.72	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.72	Mean	0.224
5% K-S Critical Value	0.317	SD	0.192
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0381
Assuming Gamma Distribution		95% KM (t) UCL	0.288
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.287
Minimum	0.0548	95% KM (jackknife) UCL	0.289
Maximum	1.4	95% KM (bootstrap t) UCL	0.319
Mean	0.453	95% KM (BCA) UCL	0.299
Median	0.462	95% KM (Percentile Bootstrap) UCL	0.293
SD	0.252	95% KM (Chebyshev) UCL	0.39
k star	2.835	97.5% KM (Chebyshev) UCL	0.462
Theta star	0.16	99% KM (Chebyshev) UCL	0.603
Nu star	283.5	Potential UCLs to Use	
AppChi2	245.5	95% KM (t) UCL	0.288
95% Gamma Approximate UCL	0.523		
95% Adjusted Gamma UCL	0.525		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Naphthalene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	42
		Percent Non-Detects	84.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.041	Minimum Detected	-3.194
Maximum Detected	1.6	Maximum Detected	0.47
Mean of Detected	0.287	Mean of Detected	-2.065
SD of Detected	0.533	SD of Detected	1.138
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.502	Shapiro Wilk Test Statistic	0.815
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.314	Mean	-1.557
SD	0.456	SD	0.734
95% DL/2 (t) UCL	0.422	95% H-Stat (DL/2) UCL	0.411
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.307
		SD in Log Scale	0.718
		Mean in Original Scale	0.142
		SD in Original Scale	0.221
		95% Percentile Bootstrap UCL	0.2
		95% BCA Bootstrap UCL	0.235
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.542	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.53		
nu star	8.671		
A-D Test Statistic	1.213	Nonparametric Statistics	
5% A-D Critical Value	0.746	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.746	Mean	0.132
5% K-S Critical Value	0.304	SD	0.222
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0391
Assuming Gamma Distribution		95% KM (t) UCL	0.197
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.196
Minimum	0.0408	95% KM (jackknife) UCL	0.196
Maximum	1.6	95% KM (bootstrap t) UCL	0.281
Mean	0.28	95% KM (BCA) UCL	0.205
Median	0.295	95% KM (Percentile Bootstrap) UCL	0.196
SD	0.224	95% KM (Chebyshev) UCL	0.302
k star	2.229	97.5% KM (Chebyshev) UCL	0.376
Theta star	0.126	99% KM (Chebyshev) UCL	0.521
Nu star	222.9	Potential UCLs to Use	
AppChi2	189.3	95% KM (BCA) UCL	0.205
95% Gamma Approximate UCL	0.329		
95% Adjusted Gamma UCL	0.331		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

N-Nitrosodiphenylamine			
General Statistics			
Number of Valid Data	50	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	48
		Percent Non-Detects	96.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.66	Minimum Detected	-0.416
Maximum Detected	1.5	Maximum Detected	0.405
Mean of Detected	1.08	Mean of Detected	-0.00503
SD of Detected	0.594	SD of Detected	0.581
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	3.9	Maximum Non-Detect	1.361
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.282	Mean	-1.489
SD	0.326	SD	0.514
95% DL/2 (t) UCL	0.36	95% H-Stat (DL/2) UCL	0.283
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.678
5% K-S Critical Value	N/A	SD	0.12
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0245
		95% KM (t) UCL	0.719
Assuming Gamma Distribution		95% KM (z) UCL	0.718
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.224
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	1.5
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.784
SD	N/A	97.5% KM (Chebyshev) UCL	0.83
k star	N/A	99% KM (Chebyshev) UCL	0.921
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.719
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Phenanthrene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	16
Number of Distinct Detected Data	13	Number of Non-Detect Data	34
		Percent Non-Detects	68.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.052	Minimum Detected	-2.957
Maximum Detected	3.2	Maximum Detected	1.163
Mean of Detected	0.774	Mean of Detected	-1.301
SD of Detected	1.135	SD of Detected	1.49
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.666	Shapiro Wilk Test Statistic	0.883
5% Shapiro Wilk Critical Value	0.887	5% Shapiro Wilk Critical Value	0.887
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.484	Mean	-1.385
SD	0.774	SD	0.991
95% DL/2 (t) UCL	0.667	95% H-Stat (DL/2) UCL	0.689
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.879
		SD in Log Scale	1.07
		Mean in Original Scale	0.345
		SD in Original Scale	0.699
		95% Percentile Bootstrap UCL	0.53
		95% BCA Bootstrap UCL	0.572
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.523	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.479		
nu star	16.74		
A-D Test Statistic	1.159	Nonparametric Statistics	
5% A-D Critical Value	0.788	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.788	Mean	0.338
5% K-S Critical Value	0.226	SD	0.709
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.107
		95% KM (t) UCL	0.518
Assuming Gamma Distribution		95% KM (z) UCL	0.514
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.514
Minimum	0.052	95% KM (bootstrap t) UCL	0.636
Maximum	3.2	95% KM (BCA) UCL	0.534
Mean	0.771	95% KM (Percentile Bootstrap) UCL	0.523
Median	0.749	95% KM (Chebyshev) UCL	0.805
SD	0.633	97.5% KM (Chebyshev) UCL	1.007
k star	1.536	99% KM (Chebyshev) UCL	1.404
Theta star	0.502		
Nu star	153.6	Potential UCLs to Use	
AppChi2	125.9	95% KM (BCA) UCL	0.534
95% Gamma Approximate UCL	0.941		
95% Adjusted Gamma UCL	0.946		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Pyrene			
General Statistics			
Number of Valid Data	50	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	37
		Percent Non-Detects	74.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.036	Minimum Detected	-3.324
Maximum Detected	4.7	Maximum Detected	1.548
Mean of Detected	0.844	Mean of Detected	-1.147
SD of Detected	1.311	SD of Detected	1.483
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	4.8	Maximum Non-Detect	1.569
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.66	Shapiro Wilk Test Statistic	0.951
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.455	Mean	-1.384
SD	0.795	SD	0.906
95% DL/2 (t) UCL	0.644	95% H-Stat (DL/2) UCL	0.598
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.88
		SD in Log Scale	1.053
		Mean in Original Scale	0.33
		SD in Original Scale	0.724
		95% Percentile Bootstrap UCL	0.508
		95% BCA Bootstrap UCL	0.611
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.534	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.581		
nu star	13.89		
A-D Test Statistic	0.574	Nonparametric Statistics	
5% A-D Critical Value	0.78	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.78	Mean	0.327
5% K-S Critical Value	0.248	SD	0.726
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.112
		95% KM (t) UCL	0.514
Assuming Gamma Distribution		95% KM (z) UCL	0.51
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.51
Minimum	1E-09	95% KM (bootstrap t) UCL	0.718
Maximum	4.7	95% KM (BCA) UCL	0.524
Mean	0.821	95% KM (Percentile Bootstrap) UCL	0.508
Median	0.679	95% KM (Chebyshev) UCL	0.813
SD	0.877	97.5% KM (Chebyshev) UCL	1.024
k star	0.317	99% KM (Chebyshev) UCL	1.438
Theta star	2.589		
Nu star	31.71	Potential UCLs to Use	
AppChi2	19.84	95% KM (t) UCL	0.514
95% Gamma Approximate UCL	1.312		
95% Adjusted Gamma UCL	1.331		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\April 2010 rev data set\WBG ss_NGT RA and ME
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Acetone			
General Statistics			
Number of Valid Data	21	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	19
Number of Missing Values	4	Percent Non-Detects	90.48%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0049	Minimum Detected	-5.319
Maximum Detected	0.052	Maximum Detected	-2.957
Mean of Detected	0.0285	Mean of Detected	-4.138
SD of Detected	0.0333	SD of Detected	1.67
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.031	Maximum Non-Detect	-3.474
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	20
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.24%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00804	Mean	-5.137
SD	0.0105	SD	0.676
95% DL/2 (t) UCL	0.012	95% H-Stat (DL/2) UCL	0.0109
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.00714
5% K-S Critical Value	N/A	SD	0.01
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0031
		95% KM (t) UCL	0.0125
Assuming Gamma Distribution		95% KM (z) UCL	0.0122
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0383
Minimum	N/A	95% KM (bootstrap t) UCL	0.00714
Maximum	N/A	95% KM (BCA) UCL	0.052
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.052
Median	N/A	95% KM (Chebyshev) UCL	0.0206
SD	N/A	97.5% KM (Chebyshev) UCL	0.0265
k star	N/A	99% KM (Chebyshev) UCL	0.0379
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.0265
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

Chloroform			
General Statistics			
Number of Valid Data	25	Number of Detected Data	4
Number of Distinct Detected Data	3	Number of Non-Detect Data	21
		Percent Non-Detects	84.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.002	Minimum Detected	-6.215
Maximum Detected	0.023	Maximum Detected	-3.772
Mean of Detected	0.00775	Mean of Detected	-5.401
SD of Detected	0.0102	SD of Detected	1.103
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
These methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.67	Shapiro Wilk Test Statistic	0.772
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00368	Mean	-5.776
SD	0.00404	SD	0.434
95% DL/2 (t) UCL	0.00506	95% H-Stat (DL/2) UCL	0.00426
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.795
		SD in Log Scale	0.601
		Mean in Original Scale	0.00386
		SD in Original Scale	0.0042
		95% Percentile Bootstrap UCL	0.00531
		95% BCA Bootstrap UCL	0.00618
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.432	Data appear Lognormal at 5% Significance Level	
Theta Star	0.018		
nu star	3.452		
A-D Test Statistic	0.74	Nonparametric Statistics	
5% A-D Critical Value	0.666	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.666	Mean	0.00348
5% K-S Critical Value	0.402	SD	0.00401
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0009684
		95% KM (t) UCL	0.00514
Assuming Gamma Distribution		95% KM (z) UCL	0.00507
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00502
Minimum	1E-09	95% KM (bootstrap t) UCL	0.00875
Maximum	0.023	95% KM (BCA) UCL	0.0062
Mean	0.00693	95% KM (Percentile Bootstrap) UCL	0.00578
Median	0.00755	95% KM (Chebyshev) UCL	0.0077
SD	0.00499	97.5% KM (Chebyshev) UCL	0.00953
k star	0.442	99% KM (Chebyshev) UCL	0.0131
Theta star	0.0157	Potential UCLs to Use	
Nu star	22.11	95% KM (BCA) UCL	0.0062
AppChi2	12.42		
95% Gamma Approximate UCL	0.0123		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Dimethylbenzene			
General Statistics			
Number of Valid Data	25	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	23
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.02	Minimum Detected	-3.912
Maximum Detected	0.026	Maximum Detected	-3.65
Mean of Detected	0.023	Mean of Detected	-3.781
SD of Detected	0.00424	SD of Detected	0.186
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0045	Mean	-5.685
SD	0.00564	SD	0.583
95% DL/2 (t) UCL	0.00643	95% H-Stat (DL/2) UCL	0.00442
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0202
5% K-S Critical Value	N/A	SD	0.00118
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0003326
		95% KM (t) UCL	0.0208
Assuming Gamma Distribution		95% KM (z) UCL	0.0208
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0242
Minimum	N/A	95% KM (bootstrap t) UCL	0.0202
Maximum	N/A	95% KM (BCA) UCL	0.026
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0217
SD	N/A	97.5% KM (Chebyshev) UCL	0.0223
k star	N/A	99% KM (Chebyshev) UCL	0.0235
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.0208
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Ethylbenzene			
General Statistics			
Number of Valid Data	25	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	23
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.021	Minimum Detected	-3.863
Maximum Detected	0.16	Maximum Detected	-1.833
Mean of Detected	0.0905	Mean of Detected	-2.848
SD of Detected	0.0983	SD of Detected	1.436
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0099	Mean	-5.611
SD	0.0315	SD	0.887
95% DL/2 (t) UCL	0.0207	95% H-Stat (DL/2) UCL	0.00658
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0266
5% K-S Critical Value	N/A	SD	0.0272
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0077
		95% KM (t) UCL	0.0397
Assuming Gamma Distribution		95% KM (z) UCL	0.0392
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.118
Minimum	N/A	95% KM (bootstrap t) UCL	0.0266
Maximum	N/A	95% KM (BCA) UCL	0.16
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0601
SD	N/A	97.5% KM (Chebyshev) UCL	0.0747
k star	N/A	99% KM (Chebyshev) UCL	0.103
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (BCA) UCL	0.16
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Methylene chloride			
General Statistics			
Number of Valid Data	25	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	23
		Percent Non-Detects	92.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0066	Minimum Detected	-5.021
Maximum Detected	0.012	Maximum Detected	-4.423
Mean of Detected	0.0093	Mean of Detected	-4.722
SD of Detected	0.00382	SD of Detected	0.423
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.068	Maximum Non-Detect	-2.688
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00548	Mean	-5.478
SD	0.00643	SD	0.621
95% DL/2 (t) UCL	0.00768	95% H-Stat (DL/2) UCL	0.00656
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.00685
5% K-S Critical Value	N/A	SD	0.00112
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0003391
		95% KM (t) UCL	0.00743
Assuming Gamma Distribution		95% KM (z) UCL	0.0074
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0104
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	0.012
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.00832
SD	N/A	97.5% KM (Chebyshev) UCL	0.00896
k star	N/A	99% KM (Chebyshev) UCL	0.0102
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.00743
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Toluene			
General Statistics			
Number of Valid Data	25	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	12
		Percent Non-Detects	48.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00043	Minimum Detected	-7.752
Maximum Detected	0.19	Maximum Detected	-1.661
Mean of Detected	0.0414	Mean of Detected	-4.713
SD of Detected	0.0656	SD of Detected	2.038
Minimum Non-Detect	0.005	Minimum Non-Detect	-5.298
Maximum Non-Detect	0.0066	Maximum Non-Detect	-5.021
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	72.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.67	Shapiro Wilk Test Statistic	0.941
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.023	Mean	-5.241
SD	0.0504	SD	1.547
95% DL/2 (t) UCL	0.0402	95% H-Stat (DL/2) UCL	0.071
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.535
		SD in Log Scale	1.748
		Mean in Original Scale	0.0225
		SD in Original Scale	0.0506
		95% Percentile Bootstrap UCL	0.0403
		95% BCA Bootstrap UCL	0.0462
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.379	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.109		
nu star	9.859		
A-D Test Statistic	0.564	Nonparametric Statistics	
5% A-D Critical Value	0.805	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.805	Mean	0.0223
5% K-S Critical Value	0.252	SD	0.0496
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0103
Assuming Gamma Distribution		95% KM (t) UCL	0.04
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.0393
Minimum	0.00043	95% KM (jackknife) UCL	0.0396
Maximum	0.19	95% KM (bootstrap t) UCL	0.0675
Mean	0.0409	95% KM (BCA) UCL	0.0385
Median	0.0346	95% KM (Percentile Bootstrap) UCL	0.04
SD	0.0466	95% KM (Chebyshev) UCL	0.0673
k star	0.686	97.5% KM (Chebyshev) UCL	0.0868
Theta star	0.0596	99% KM (Chebyshev) UCL	0.125
Nu star	34.29	Potential UCLs to Use	
AppChi2	21.89	95% KM (BCA) UCL	0.0385
95% Gamma Approximate UCL	0.0641		
95% Adjusted Gamma UCL	0.0661		
Note: DL/2 is not a recommended method.			

APPENDIX A
Statistical Summary of Detected Analytes in Dry Sediment
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended	
		Minimum mg/kg	Maximum mg/kg					EPC mg/kg	UCL or MDC?
Explosives									
1,3,5-Trinitrobenzene	4/17	7.10E-02	1.50E-01	1.00E-01	1.31E-01	Normal	KM-t	1.31E-01	UCL
2,4,6-Trinitrotoluene	4/17	9.40E-02	9.70E-01	4.61E-01	4.85E-01	Normal	KM (Percentile Bootstrap)	4.85E-01	UCL
Inorganics									
Aluminum	19/19	4.74E+03	1.79E+04	1.10E+04	1.25E+04	Normal	Student's-t	1.25E+04	UCL
Antimony	3/8	3.20E-01	2.00E+00	1.34E+00	2.00E+00	Normal	KM (Percentile Bootstrap)	2.00E+00	MDC
Arsenic	19/19	7.70E+00	1.81E+01	1.23E+01	1.34E+01	Normal	Student's-t	1.34E+01	UCL
Barium	19/19	3.68E+01	5.28E+02	1.26E+02	1.75E+02	Lognormal	H-UCL	1.75E+02	UCL
Cadmium	8/19	6.00E-02	7.30E-01	3.29E-01	3.32E-01	Normal	KM (Percentile Bootstrap)	3.32E-01	UCL
Chromium, total	19/19	7.20E+00	2.13E+01	1.35E+01	1.50E+01	Normal	Student's-t	1.50E+01	UCL
Copper	8/8	7.80E+00	4.91E+01	2.10E+01	3.00E+01	Normal	KM-t	3.00E+01	UCL
Lead	19/19	1.02E+01	4.46E+01	1.99E+01	2.46E+01	Lognormal	H-UCL	2.46E+01	UCL
Mercury	5/19	2.40E-02	1.60E-01	6.28E-02	5.03E-02	Gamma	KM-t	5.03E-02	UCL
Nickel	8/8	1.01E+01	2.83E+01	1.74E+01	2.17E+01	Normal	KM-t	2.17E+01	UCL
Selenium	8/19	3.70E-01	3.60E+00	1.05E+00	9.97E-01	Approx. Gamma	KM-t	9.97E-01	UCL
Thallium	4/8	4.70E-01	1.80E+00	1.08E+00	1.59E+00	Normal	KM (Percentile Bootstrap)	1.59E+00	UCL
Zinc	19/19	3.83E+01	3.28E+02	9.49E+01	1.64E+02	NP	Chebyshev (Mean, Sd)	1.64E+02	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.
The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

	General UCL Statistics for Data Sets with Non-Detects
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG dry sediment_10-6 CC
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	17	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	13
		Percent Non-Detects	76.47%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.071	Minimum Detected	-2.645
Maximum Detected	0.15	Maximum Detected	-1.897
Mean of Detected	0.1	Mean of Detected	-2.342
SD of Detected	0.035	SD of Detected	0.324
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.938
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.119	Mean	-2.141
SD	0.0186	SD	0.181
95% DL/2 (t) UCL	0.127	95% H-Stat (DL/2) UCL	0.13
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.342
		SD in Log Scale	0.353
		Mean in Original Scale	0.102
		SD in Original Scale	0.0365
		95% Percentile Bootstrap UCL	0.116
		95% BCA Bootstrap UCL	0.117
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.226	Data appear Normal at 5% Significance Level	
Theta Star	0.0311		
nu star	25.81		
A-D Test Statistic	0.329	Nonparametric Statistics	
5% A-D Critical Value	0.657	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.657	Mean	0.1
5% K-S Critical Value	0.395	SD	0.0303
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0175
		95% KM (t) UCL	0.131
Assuming Gamma Distribution		95% KM (z) UCL	0.129
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.134
Minimum	0.0285	95% KM (bootstrap t) UCL	0.185
Maximum	0.15	95% KM (BCA) UCL	0.127
Mean	0.0985	95% KM (Percentile Bootstrap) UCL	0.127
Median	0.098	95% KM (Chebyshev) UCL	0.176
SD	0.0346	97.5% KM (Chebyshev) UCL	0.209
k star	5.673	99% KM (Chebyshev) UCL	0.274
Theta star	0.0174		
Nu star	192.9	Potential UCLs to Use	
AppChi2	161.8	95% KM (t) UCL	0.131
95% Gamma Approximate UCL	0.117	95% KM (Percentile Bootstrap) UCL	0.127
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	17	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	13
		Percent Non-Detects	76.47%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.094	Minimum Detected	-2.364
Maximum Detected	0.97	Maximum Detected	-0.0305
Mean of Detected	0.461	Mean of Detected	-1.071
SD of Detected	0.368	SD of Detected	0.966
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.949
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.204	Mean	-1.842
SD	0.217	SD	0.608
95% DL/2 (t) UCL	0.296	95% H-Stat (DL/2) UCL	0.212
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.661	Mean in Log Scale	-2.163
SD	0.275	SD in Log Scale	1.007
95% MLE (t) UCL	0.777	Mean in Original Scale	0.189
95% MLE (Tiku) UCL	0.93	SD in Original Scale	0.231
		95% Percentile Bootstrap UCL	0.288
		95% BCA Bootstrap UCL	0.323
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.625	Data appear Normal at 5% Significance Level	
Theta Star	0.737		
nu star	5.002		
A-D Test Statistic	0.265	Nonparametric Statistics	
5% A-D Critical Value	0.661	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.661	Mean	0.18
5% K-S Critical Value	0.398	SD	0.219
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0614
Assuming Gamma Distribution		95% KM (t) UCL	0.288
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.281
Minimum	1E-09	95% KM (jackknife) UCL	0.354
Maximum	0.97	95% KM (bootstrap t) UCL	0.298
Mean	0.285	95% KM (BCA) UCL	0.517
Median	0.279	95% KM (Percentile Bootstrap) UCL	0.485
SD	0.278	95% KM (Chebyshev) UCL	0.448
k star	0.153	97.5% KM (Chebyshev) UCL	0.564
Theta star	1.866	99% KM (Chebyshev) UCL	0.791
Nu star	5.203	Potential UCLs to Use	
AppChi2	1.247	95% KM (t) UCL	0.288
95% Gamma Approximate UCL	1.191	95% KM (Percentile Bootstrap) UCL	0.485
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG dry sediment_10-6 COP
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Aluminum			
General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	18
Raw Statistics		Log-transformed Statistics	
Minimum	4740	Minimum of Log Data	8.464
Maximum	17900	Maximum of Log Data	9.793
Mean	11044	Mean of log Data	9.252
Median	10600	SD of log Data	0.359
SD	3693		
Coefficient of Variation	0.334		
Skewness	0.157		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12514	95% H-UCL	13044
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15131
95% Adjusted-CLT UCL	12470	97.5% Chebyshev (MVUE) UCL	16884
95% Modified-t UCL	12519	99% Chebyshev (MVUE) UCL	20328
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.471	Data appear Normal at 5% Significance Level	
Theta Star	1478		
MLE of Mean	11044		
MLE of Standard Deviation	4041		
nu star	283.9		
Approximate Chi Square Value (.05)	245.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	12438
Adjusted Chi Square Value	242.8	95% Jackknife UCL	12514
		95% Standard Bootstrap UCL	12395
Anderson-Darling Test Statistic	0.293	95% Bootstrap-t UCL	12592
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	12449
Kolmogorov-Smirnov Test Statistic	0.123	95% Percentile Bootstrap UCL	12479
Kolmogorov-Smirnov 5% Critical Value	0.199	95% BCA Bootstrap UCL	12447
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14738
		97.5% Chebyshev(Mean, Sd) UCL	16336
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19475
95% Approximate Gamma UCL	12752		
95% Adjusted Gamma UCL	12915		
Potential UCL to Use		Use 95% Student's-t UCL	12514

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Arsenic			
General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	19
Raw Statistics		Log-transformed Statistics	
Minimum	7.7	Minimum of Log Data	2.041
Maximum	18.1	Maximum of Log Data	2.896
Mean	12.3	Mean of log Data	2.484
Median	12.6	SD of log Data	0.238
SD	2.812		
Coefficient of Variation	0.229		
Skewness	0.0752		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.976	Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13.42	95% H-UCL	13.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15.26
95% Adjusted-CLT UCL	13.37	97.5% Chebyshev (MVUE) UCL	16.54
95% Modified-t UCL	13.42	99% Chebyshev (MVUE) UCL	19.05
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	16.38	Data appear Normal at 5% Significance Level	
Theta Star	0.751		
MLE of Mean	12.3		
MLE of Standard Deviation	3.039		
nu star	622.5		
Approximate Chi Square Value (.05)	565.6	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	13.36
Adjusted Chi Square Value	560.9	95% Jackknife UCL	13.42
		95% Standard Bootstrap UCL	13.33
Anderson-Darling Test Statistic	0.255	95% Bootstrap-t UCL	13.49
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL	13.39
Kolmogorov-Smirnov Test Statistic	0.113	95% Percentile Bootstrap UCL	13.36
Kolmogorov-Smirnov 5% Critical Value	0.198	95% BCA Bootstrap UCL	13.34
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.11
		97.5% Chebyshev(Mean, Sd) UCL	16.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	18.72
95% Approximate Gamma UCL	13.54		
95% Adjusted Gamma UCL	13.65		
Potential UCL to Use		Use 95% Student's-t UCL	13.42

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Berium			
General Statistics			
Number of Valid Observations		19	Number of Distinct Observations 19
Raw Statistics		Log-transformed Statistics	
Minimum	36.8	Minimum of Log Data	3.605
Maximum	528	Maximum of Log Data	6.269
Mean	126.2	Mean of log Data	4.586
Median	78.9	SD of log Data	0.676
SD	114.4		
Coefficient of Variation	0.906		
Skewness	2.668		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic		0.684	Shapiro Wilk Test Statistic 0.931
Shapiro Wilk Critical Value		0.901	Shapiro Wilk Critical Value 0.901
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL		171.7	95% H-UCL 174.8
95% UCLs (Adjusted for Skewness)			95% Chebyshev (MVUE) UCL 208.7
95% Adjusted-CLT UCL		186.5	97.5% Chebyshev (MVUE) UCL 246.4
95% Modified-t UCL		174.4	99% Chebyshev (MVUE) UCL 320.5
Gamma Distribution Test		Data Distribution	
k star (bias corrected)		1.834	Data appear Lognormal at 5% Significance Level
Theta Star		68.83	
MLE of Mean		126.2	
MLE of Standard Deviation		93.2	
nu star		69.68	
Approximate Chi Square Value (.05)		51.46	Nonparametric Statistics
Adjusted Level of Significance		0.0369	95% CLT UCL 169.4
Adjusted Chi Square Value		50.09	95% Jackknife UCL 171.7
Anderson-Darling Test Statistic		0.927	95% Standard Bootstrap UCL 167.9
Anderson-Darling 5% Critical Value		0.751	95% Bootstrap-t UCL 205.2
Kolmogorov-Smirnov Test Statistic		0.25	95% Hall's Bootstrap UCL 338.6
Kolmogorov-Smirnov 5% Critical Value		0.201	95% Percentile Bootstrap UCL 171.2
Data not Gamma Distributed at 5% Significance Level			95% BCA Bootstrap UCL 186.2
			95% Chebyshev(Mean, Sd) UCL 240.6
Assuming Gamma Distribution			97.5% Chebyshev(Mean, Sd) UCL 290.1
95% Approximate Gamma UCL		170.9	99% Chebyshev(Mean, Sd) UCL 387.3
95% Adjusted Gamma UCL		175.5	
Potential UCL to Use			Use 95% H-UCL 174.8

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Cadmium			
General Statistics			
Number of Valid Data	19	Number of Detected Data	8
Number of Distinct Detected Data	7	Number of Non-Detect Data	11
		Percent Non-Detects	57.89%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	0.73	Maximum Detected	-0.315
Mean of Detected	0.329	Mean of Detected	-1.409
SD of Detected	0.254	SD of Detected	0.856
Minimum Non-Detect	0.04	Minimum Non-Detect	-3.219
Maximum Non-Detect	1.9	Maximum Non-Detect	0.642
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.82	Shapiro Wilk Test Statistic	0.886
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.264	Mean	-2.115
SD	0.283	SD	1.433
95% DL/2 (t) UCL	0.377	95% H-Stat (DL/2) UCL	0.74
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.488
		SD in Log Scale	1.231
		Mean in Original Scale	0.166
		SD in Original Scale	0.214
		95% Percentile Bootstrap UCL	0.249
		95% BCA Bootstrap UCL	0.262
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.231	Data appear Normal at 5% Significance Level	
Theta Star	0.267		
nu star	19.7		
A-D Test Statistic	0.646	Nonparametric Statistics	
5% A-D Critical Value	0.725	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.725	Mean	0.203
5% K-S Critical Value	0.298	SD	0.219
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0606
		95% KM (t) UCL	0.308
Assuming Gamma Distribution		95% KM (z) UCL	0.303
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.298
Minimum	0.0296	95% KM (bootstrap t) UCL	0.332
Maximum	0.73	95% KM (BCA) UCL	0.358
Mean	0.379	95% KM (Percentile Bootstrap) UCL	0.332
Median	0.397	95% KM (Chebyshev) UCL	0.467
SD	0.239	97.5% KM (Chebyshev) UCL	0.582
k star	1.627	99% KM (Chebyshev) UCL	0.806
Theta star	0.233		
Nu star	61.82	Potential UCLs to Use	
AppChi2	44.74	95% KM (t) UCL	0.308
95% Gamma Approximate UCL	0.524	95% KM (Percentile Bootstrap) UCL	0.332
95% Adjusted Gamma UCL	0.539		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Chromium			
General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	17
Raw Statistics		Log-transformed Statistics	
Minimum	7.2	Minimum of Log Data	1.974
Maximum	21.3	Maximum of Log Data	3.059
Mean	13.51	Mean of log Data	2.565
Median	14	SD of log Data	0.286
SD	3.758		
Coefficient of Variation	0.278		
Skewness	0.366		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.968	Shapiro Wilk Test Statistic	0.973
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	15	95% H-UCL	15.33
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17.43
95% Adjusted-CLT UCL	15	97.5% Chebyshev (MVUE) UCL	19.12
95% Modified-t UCL	15.01	99% Chebyshev (MVUE) UCL	22.44
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.34	Data appear Normal at 5% Significance Level	
Theta Star	1.191		
MLE of Mean	13.51		
MLE of Standard Deviation	4.011		
nu star	430.8		
Approximate Chi Square Value (.05)	383.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	14.92
Adjusted Chi Square Value	379.8	95% Jackknife UCL	15
		95% Standard Bootstrap UCL	14.91
Anderson-Darling Test Statistic	0.246	95% Bootstrap-t UCL	15
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	15.15
Kolmogorov-Smirnov Test Statistic	0.115	95% Percentile Bootstrap UCL	14.93
Kolmogorov-Smirnov 5% Critical Value	0.198	95% BCA Bootstrap UCL	14.94
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.26
		97.5% Chebyshev(Mean, Sd) UCL	18.89
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.08
95% Approximate Gamma UCL	15.16		
95% Adjusted Gamma UCL	15.32		
Potential UCL to Use		Use 95% Student's-t UCL	15

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Antimony			
General Statistics			
Number of Valid Data	8	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	5
Number of Missing Values	11	Percent Non-Detects	62.50%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.32	Minimum Detected	-1.139
Maximum Detected	2	Maximum Detected	0.693
Mean of Detected	1.34	Mean of Detected	0.0281
SD of Detected	0.896	SD of Detected	1.014
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	1.9	Maximum Non-Detect	0.642
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.879	Shapiro Wilk Test Statistic	0.816
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.799	Mean	-0.557
SD	0.693	SD	0.883
95% DL/2 (t) UCL	1.263	95% H-Stat (DL/2) UCL	1.024
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.995
		SD in Log Scale	1.044
		Mean in Original Scale	0.634
		SD in Original Scale	0.757
		95% Percentile Bootstrap UCL	1.08
		95% BCA Bootstrap UCL	1.11
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.731
5% K-S Critical Value	N/A	SD	0.679
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.306
		95% KM (t) UCL	1.311
Assuming Gamma Distribution		95% KM (z) UCL	1.235
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.668
Minimum	N/A	95% KM (bootstrap t) UCL	1.003
Maximum	N/A	95% KM (BCA) UCL	2
Mean	N/A	95% KM (Percentile Bootstrap) UCL	2
Median	N/A	95% KM (Chebyshev) UCL	2.066
SD	N/A	97.5% KM (Chebyshev) UCL	2.643
k star	N/A	99% KM (Chebyshev) UCL	3.778
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	1.311
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	2
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Copper			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	11	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	7.8	Minimum Detected	2.054
Maximum Detected	49.1	Maximum Detected	3.894
Mean of Detected	21.01	Mean of Detected	2.89
SD of Detected	13.36	SD of Detected	0.586
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.849	Shapiro Wilk Test Statistic	0.967
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	21.01	Mean	2.89
SD	13.36	SD	0.586
95% DL/2 (t) UCL	29.96	95% H-Stat (DL/2) UCL	37.21
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.193	Data appear Normal at 5% Significance Level	
Theta Star	9.582		
nu star	35.09		
A-D Test Statistic	0.311	Nonparametric Statistics	
5% A-D Critical Value	0.72	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.72	Mean	21.01
5% K-S Critical Value	0.296	SD	12.49
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.722
		95% KM (t) UCL	29.96
Assuming Gamma Distribution		95% KM (z) UCL	28.78
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	29.96
Minimum	7.8	95% KM (bootstrap t) UCL	40.09
Maximum	49.1	95% KM (BCA) UCL	28.74
Mean	21.01	95% KM (Percentile Bootstrap) UCL	28.7
Median	18.7	95% KM (Chebyshev) UCL	41.59
SD	13.36	97.5% KM (Chebyshev) UCL	50.5
k star	2.193	99% KM (Chebyshev) UCL	67.99
Theta star	9.582	Potential UCLs to Use	
Nu star	35.09	95% KM (t) UCL	29.96
AppChi2	22.54	95% KM (Percentile Bootstrap) UCL	28.7
95% Gamma Approximate UCL	32.72		
95% Adjusted Gamma UCL	36.81		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Lead			
General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	19
Raw Statistics		Log-transformed Statistics	
Minimum	10.2	Minimum of Log Data	2.322
Maximum	44.6	Maximum of Log Data	3.798
Mean	19.94	Mean of log Data	2.886
Median	15.2	SD of log Data	0.457
SD	10.31		
Coefficient of Variation	0.517		
Skewness	1.287		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.823	Shapiro Wilk Test Statistic	0.902
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	24.05	95% H-UCL	24.58
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.07
95% Adjusted-CLT UCL	24.58	97.5% Chebyshev (MVUE) UCL	33.09
95% Modified-t UCL	24.16	99% Chebyshev (MVUE) UCL	41
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.107	Data appear Lognormal at 5% Significance Level	
Theta Star	4.856		
MLE of Mean	19.94		
MLE of Standard Deviation	9.841		
nu star	156.1		
Approximate Chi Square Value (.05)	128.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	23.83
Adjusted Chi Square Value	126	95% Jackknife UCL	24.05
		95% Standard Bootstrap UCL	23.65
Anderson-Darling Test Statistic	0.941	95% Bootstrap-t UCL	25.38
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	24.34
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	24.21
Kolmogorov-Smirnov 5% Critical Value	0.199	95% BCA Bootstrap UCL	24.65
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30.26
		97.5% Chebyshev(Mean, Sd) UCL	34.72
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	43.49
95% Approximate Gamma UCL	24.28		
95% Adjusted Gamma UCL	24.7		
Potential UCL to Use		Use 95% Student's-t UCL	24.05
		or 95% Modified-t UCL	24.16
		or 95% H-UCL	24.58

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Mercury			
General Statistics			
Number of Valid Data	19	Number of Detected Data	5
Number of Distinct Detected Data	4	Number of Non-Detect Data	14
		Percent Non-Detects	73.68%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.024	Minimum Detected	-3.73
Maximum Detected	0.16	Maximum Detected	-1.833
Mean of Detected	0.0628	Mean of Detected	-2.999
SD of Detected	0.0551	SD of Detected	0.706
Minimum Non-Detect	0.03	Minimum Non-Detect	-3.507
Maximum Non-Detect	0.19	Maximum Non-Detect	-1.661
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.708	Shapiro Wilk Test Statistic	0.868
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0421	Mean	-3.425
SD	0.037	SD	0.68
95% DL/2 (t) UCL	0.0568	95% H-Stat (DL/2) UCL	0.0568
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.655
		SD in Log Scale	0.593
		Mean in Original Scale	0.0323
		SD in Original Scale	0.0325
		95% Percentile Bootstrap UCL	0.0463
		95% BCA Bootstrap UCL	0.0545
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.059	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.0593		
nu star	10.59		
A-D Test Statistic	0.618	Nonparametric Statistics	
5% A-D Critical Value	0.684	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.684	Mean	0.0359
5% K-S Critical Value	0.36	SD	0.0312
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00831
		95% KM (t) UCL	0.0503
Assuming Gamma Distribution		95% KM (z) UCL	0.0495
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.049
Minimum	0.0169	95% KM (bootstrap t) UCL	0.0651
Maximum	0.16	95% KM (BCA) UCL	0.0623
Mean	0.05	95% KM (Percentile Bootstrap) UCL	0.0589
Median	0.04	95% KM (Chebyshev) UCL	0.0721
SD	0.0323	97.5% KM (Chebyshev) UCL	0.0878
k star	3.081	99% KM (Chebyshev) UCL	0.119
Theta star	0.0162		
Nu star	117.1	Potential UCLs to Use	
AppChi2	93.11	95% KM (t) UCL	0.0503
95% Gamma Approximate UCL	0.0628		
95% Adjusted Gamma UCL	0.0641		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Nickel			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	11	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	10.1	Minimum Detected	2.313
Maximum Detected	28.3	Maximum Detected	3.343
Mean of Detected	17.38	Mean of Detected	2.796
SD of Detected	6.457	SD of Detected	0.364
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk Test Statistic	0.953
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	17.38	Mean	2.796
SD	6.457	SD	0.364
95% DL/2 (t) UCL	21.7	95% H-Stat (DL/2) UCL	23.52
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	5.514	Data appear Normal at 5% Significance Level	
Theta Star	3.151		
nu star	88.22		
A-D Test Statistic	0.273	Nonparametric Statistics	
5% A-D Critical Value	0.716	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.716	Mean	17.38
5% K-S Critical Value	0.295	SD	6.04
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.283
		95% KM (t) UCL	21.7
Assuming Gamma Distribution		95% KM (z) UCL	21.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	21.7
Minimum	10.1	95% KM (bootstrap t) UCL	22.98
Maximum	28.3	95% KM (BCA) UCL	20.89
Mean	17.38	95% KM (Percentile Bootstrap) UCL	21.1
Median	16.15	95% KM (Chebyshev) UCL	27.33
SD	6.457	97.5% KM (Chebyshev) UCL	31.63
k star	5.514	99% KM (Chebyshev) UCL	40.09
Theta star	3.151		
Nu star	88.22	Potential UCLs to Use	
AppChi2	67.57	95% KM (t) UCL	21.7
95% Gamma Approximate UCL	22.69	95% KM (Percentile Bootstrap) UCL	21.1
95% Adjusted Gamma UCL	24.33		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Selenium			
General Statistics			
Number of Valid Data	19	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	11
		Percent Non-Detects	57.89%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.37	Minimum Detected	-0.994
Maximum Detected	3.6	Maximum Detected	1.281
Mean of Detected	1.045	Mean of Detected	-0.306
SD of Detected	1.121	SD of Detected	0.812
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	1.9	Maximum Non-Detect	0.642
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.74%
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.676	Shapiro Wilk Test Statistic	0.835
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.635	Mean	-0.852
SD	0.805	SD	0.812
95% DL/2 (t) UCL	0.955	95% H-Stat (DL/2) UCL	0.707
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.11
		SD in Log Scale	0.92
		Mean in Original Scale	0.555
		SD in Original Scale	0.823
		95% Percentile Bootstrap UCL	0.895
		95% BCA Bootstrap UCL	1.066
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.067	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.979		
nu star	17.08		
A-D Test Statistic	0.83	Nonparametric Statistics	
5% A-D Critical Value	0.728	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.728	Mean	0.673
5% K-S Critical Value	0.299	SD	0.756
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.187
		95% KM (t) UCL	0.997
Assuming Gamma Distribution		95% KM (z) UCL	0.98
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.981
Minimum	0.37	95% KM (bootstrap t) UCL	2.154
Maximum	3.6	95% KM (BCA) UCL	1.051
Mean	1.021	95% KM (Percentile Bootstrap) UCL	0.998
Median	0.665	95% KM (Chebyshev) UCL	1.487
SD	0.82	97.5% KM (Chebyshev) UCL	1.84
k star	1.857	99% KM (Chebyshev) UCL	2.532
Theta star	0.55		
Nu star	70.55	Potential UCLs to Use	
AppChi2	52.22	95% KM (t) UCL	0.997
95% Gamma Approximate UCL	1.379		
95% Adjusted Gamma UCL	1.417		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Thallium			
General Statistics			
Number of Valid Data	8	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	4
Number of Missing Values	11	Percent Non-Detects	50.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.47	Minimum Detected	-0.755
Maximum Detected	1.8	Maximum Detected	0.588
Mean of Detected	1.075	Mean of Detected	-0.0992
SD of Detected	0.676	SD of Detected	0.694
Minimum Non-Detect	0.76	Minimum Non-Detect	-0.274
Maximum Non-Detect	1.9	Maximum Non-Detect	0.642
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	8
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.847	Shapiro Wilk Test Statistic	0.834
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.815	Mean	-0.38
SD	0.551	SD	0.61
95% DL/2 (t) UCL	1.184	95% H-Stat (DL/2) UCL	0.883
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.331
		SD in Log Scale	0.525
		Mean in Original Scale	0.824
		SD in Original Scale	0.52
		95% Percentile Bootstrap UCL	1.128
		95% BCA Bootstrap UCL	1.171
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.935	Data appear Normal at 5% Significance Level	
Theta Star	1.15		
nu star	7.478		
A-D Test Statistic	0.503	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.829
5% K-S Critical Value	0.397	SD	0.526
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.23
		95% KM (t) UCL	1.264
Assuming Gamma Distribution		95% KM (z) UCL	1.207
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.242
Minimum	0.47	95% KM (bootstrap t) UCL	1.185
Maximum	1.8	95% KM (BCA) UCL	1.6
Mean	1.078	95% KM (Percentile Bootstrap) UCL	1.586
Median	1.075	95% KM (Chebyshev) UCL	1.831
SD	0.442	97.5% KM (Chebyshev) UCL	2.265
k star	3.828	99% KM (Chebyshev) UCL	3.118
Theta star	0.282		
Nu star	61.25	Potential UCLs to Use	
AppChi2	44.25	95% KM (t) UCL	1.264
95% Gamma Approximate UCL	1.492	95% KM (Percentile Bootstrap) UCL	1.586
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Dry Sediment, Investigation Data
RVAAP-05 Winklepeck Burning Grounds

Zinc			
General Statistics			
Number of Valid Observations	19	Number of Distinct Observations	17
Raw Statistics		Log-transformed Statistics	
Minimum	38.3	Minimum of Log Data	3.645
Maximum	328	Maximum of Log Data	5.793
Mean	94.93	Mean of log Data	4.384
Median	64.8	SD of log Data	0.553
SD	68.89		
Coefficient of Variation	0.726		
Skewness	2.403		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.712	Shapiro Wilk Test Statistic	0.896
Shapiro Wilk Critical Value	0.901	Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	122.3	95% H-UCL	122.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	145.9
95% Adjusted-CLT UCL	130.2	97.5% Chebyshev (MVUE) UCL	168.9
95% Modified-t UCL	123.8	99% Chebyshev (MVUE) UCL	214.3
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.652	Data do not follow a Discernable Distribution (0.05)	
Theta Star	35.79		
MLE of Mean	94.93		
MLE of Standard Deviation	58.29		
nu star	100.8		
Approximate Chi Square Value (.05)	78.63	Nonparametric Statistics	
Adjusted Level of Significance	0.0369	95% CLT UCL	120.9
Adjusted Chi Square Value	76.92	95% Jackknife UCL	122.3
		95% Standard Bootstrap UCL	120.5
Anderson-Darling Test Statistic	1.112	95% Bootstrap-t UCL	141
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	216.6
Kolmogorov-Smirnov Test Statistic	0.248	95% Percentile Bootstrap UCL	121.9
Kolmogorov-Smirnov 5% Critical Value	0.2	95% BCA Bootstrap UCL	131.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	163.8
		97.5% Chebyshev(Mean, Sd) UCL	193.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	252.2
95% Approximate Gamma UCL	121.7		
95% Adjusted Gamma UCL	124.4		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	163.8

APPENDIX A
Statistical Summary of Detected Analytes in Subsurface Soil Samples, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended EPC mg/kg	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg						
Explosives									
1,3,5-Trinitrobenzene	21/68	2.70E-02	8.70E+00	1.35E+00	1.31E+00	NP	KM (Chebyshev)	1.31E+00	UCL
1,3-Dinitrobenzene	2/68	4.50E-02	2.60E-01	1.53E-01	NA	NP	KM (BCA)	2.60E-01	MDC
2,4,6-Trinitrotoluene	36/68	3.70E-02	5.20E+03	2.82E+02	7.19E+02	NP	97.5% KM (Chebyshev)	7.19E+02	UCL
2,4-Dinitrotoluene	13/68	3.20E-02	2.80E+00	3.95E-01	2.32E-01	NP	KM (BCA)	2.32E-01	UCL
2,6-Dinitrotoluene	4/68	6.50E-02	2.20E-01	1.59E-01	2.16E-01	Normal	KM-t	2.16E-01	UCL
2-Amino-4,6-Dinitrotoluene	4/37	1.50E-01	7.50E+00	2.38E+00	1.91E+00	Normal	KM (Percentile Bootstrap)	1.91E+00	UCL
2-Nitrotoluene	2/68	8.20E-02	4.80E+00	2.44E+00	7.70E-01	NP	97.5% KM (Chebyshev)	7.70E-01	UCL
3-Nitrotoluene	4/68	6.50E-02	1.20E-01	9.78E-02	1.20E-01	Normal	KM-t	1.20E-01	MDC
4-Amino-2,6-Dinitrotoluene	3/37	9.20E-02	2.40E-01	1.57E-01	2.40E-01	Normal	KM (Percentile Bootstrap)	2.40E-01	MDC
4-Nitrotoluene	4/68	8.40E-02	1.60E-01	1.12E-01	1.48E-01	Normal	KM (Percentile Bootstrap)	1.48E-01	UCL
HMX	23/68	1.00E-01	2.70E+01	2.43E+00	3.04E+00	NP	KM (Chebyshev)	3.04E+00	UCL
Nitrobenzene	6/68	3.30E-02	3.60E-01	1.10E-01	8.28E-02	Approx. Gamma	KM-t	8.28E-02	UCL
Nitrocellulose	3/6	3.20E+00	8.84E+01	3.27E+01	8.84E+01		Normal	KM (Percentile Bootstrap)	8.84E+01
RDX	19/68	1.40E-01	2.60E+02	4.45E+01	4.90E+01	NP	97.5% KM (Chebyshev)	4.90E+01	UCL
Tetryl	7/68	5.40E-02	2.40E-01	1.15E-01	1.61E-01	Normal	KM (Percentile Bootstrap)	1.61E-01	UCL
Inorganics									
Aluminum	83/83	3.58E+03	2.00E+04	1.17E+04	1.23E+04	Normal	Student's-t	1.23E+04	UCL
Antimony	44/83	3.40E-01	2.76E+01	3.05E+00	4.07E+00	NP	KM (Chebyshev)	4.07E+00	UCL
Arsenic	83/83	5.80E+00	3.84E+01	1.51E+01	1.60E+01	NP	Modified-t	1.60E+01	UCL
Barium	83/83	2.02E+01	1.04E+03	1.17E+02	1.81E+02	NP	Chebyshev (Mean, Sd)	1.81E+02	UCL
Beryllium	51/83	2.30E-01	1.30E+00	5.14E-01	4.81E-01	Lognormal	KM (BCA)	4.81E-01	UCL
Cadmium	34/83	8.10E-02	2.01E+02	9.85E+00	1.55E+01	NP	KM (Chebyshev)	1.55E+01	UCL
Chromium (total)	83/83	7.60E+00	8.09E+01	1.83E+01	2.03E+01	NP	Modified-t	2.03E+01	UCL
Chromium, hexavalent	2/12	1.40E+00	2.80E+00	2.10E+00	2.80E+00	NP	KM (Percentile Bootstrap)	2.80E+00	MDC
Cobalt	83/83	3.70E+00	2.54E+01	1.08E+01	1.14E+01	Normal	Student's-t	1.14E+01	UCL
Copper	83/83	8.30E+00	4.28E+02	3.93E+01	7.12E+01	NP	Chebyshev (Mean, Sd)	7.12E+01	UCL
Lead	83/83	7.20E+00	1.13E+03	5.59E+01	1.58E+02	NP	97.5% KM (Chebyshev)	1.58E+02	UCL
Manganese	83/83	1.54E+02	3.47E+03	4.93E+02	5.71E+02	NP	Modified-t	5.71E+02	UCL
Mercury	48/83	9.70E-03	6.50E-02	2.41E-02	2.64E-02	Approx Gamma	KM-t	2.64E-02	UCL
Nickel	83/83	8.80E+00	9.27E+01	2.47E+01	2.70E+01		Lognormal	Modified-t	2.70E+01
Selenium	23/83	4.20E-01	4.60E+00	1.28E+00	8.21E-01	Lognormal	KM (Percentile Bootstrap)	8.21E-01	UCL
Silver	7/83	2.50E-01	5.70E+00	1.97E+00	1.06E+00	Normal	KM (Percentile Bootstrap)	1.06E+00	UCL
Thallium	49/83	2.70E-01	1.10E+00	5.04E-01	5.06E-01	Gamma	KM-t	5.06E-01	UCL
Vanadium	83/83	7.40E+00	4.48E+01	2.06E+01	2.17E+01	Normal	Student's-t	2.17E+01	UCL
Zinc	82/83	3.12E+01	2.39E+03	1.57E+02	2.30E+02	NP	KM (BCA)	2.30E+02	UCL

APPENDIX A
Statistical Summary of Detected Analytes in Subsurface Soil Samples, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended	
		Minimum mg/kg	Maximum mg/kg					EPC mg/kg	UCL or MDC?
SVOCs									
Anthracene	2/12	9.80E-02	1.60E-01	1.29E-01	1.85E-01	NP	KM-t	1.60E-01	MDC
Benzo(a)anthracene	3/12	5.10E-02	4.80E-01	2.44E-01	4.80E-01	Normal	KM (Percentile Bootstrap)	4.80E-01	MDC
Benzo(a)pyrene	3/12	6.00E-02	5.00E-01	2.60E-01	3.00E-01	Normal	KM-t	3.00E-01	UCL
Benzo(b)fluoranthene	3/12	7.80E-02	7.00E-01	3.56E-01	4.03E-01	Normal	KM-t	4.03E-01	UCL
Benzo(ghi)perylene	2/12	1.10E-01	3.10E-01	2.10E-01	3.90E-01	NP	KM-t	3.10E-01	MDC
Benzo(k)fluoranthene	2/12	1.30E-01	2.90E-01	2.10E-01	3.54E-01	NP	KM-t	2.90E-01	MDC
Chrysene	3/12	6.20E-02	5.60E-01	2.74E-01	2.91E-01	Normal	KM-t	2.91E-01	UCL
Fluoranthene	4/12	5.00E-02	1.20E+00	4.43E-01	5.42E-01	Normal	KM (Percentile Bootstrap)	5.42E-01	UCL
Indeno(1,2,3-cd)pyrene	2/12	1.30E-01	3.70E-01	2.50E-01	4.66E-01	NP	KM-t	3.70E-01	MDC
Phenanthrene	4/12	9.30E-02	3.20E+00	9.91E-01	9.17E-01	Gamma	KM-t	9.17E-01	UCL
Pyrene	4/12	8.30E-02	9.10E-01	3.98E-01	5.43E-01	Normal	KM (Percentile Bootstrap)	5.43E-01	UCL
VOCs									
Acetone	2/8	4.90E-03	5.20E-02	2.85E-02	5.94E-02	NP	97.5% KM (Chebyshev)	5.20E-02	MDC
Toluene	5/8	4.30E-04	1.10E-02	3.57E-03	5.34E-03	Gamma	KM (BCA)	5.34E-03	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.
The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG sbs_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	21
Number of Distinct Detected Data	20	Number of Non-Detect Data	47
		Percent Non-Detects	69.12%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.027	Minimum Detected	-3.612
Maximum Detected	8.7	Maximum Detected	2.163
Mean of Detected	1.354	Mean of Detected	-1.447
SD of Detected	2.506	SD of Detected	1.913
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.599	Shapiro Wilk Test Statistic	0.856
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.26	Mean	-1.627
SD	16.69	SD	1.562
95% DL/2 (t) UCL	6.637	95% H-Stat (DL/2) UCL	1.046
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.224
		SD in Log Scale	1.533
		Mean in Original Scale	0.512
		SD in Original Scale	1.486
		95% Percentile Bootstrap UCL	0.832
		95% BCA Bootstrap UCL	0.946
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.357	Data do not follow a Discernable Distribution (0.05)	
Theta Star	3.793		
nu star	14.99		
A-D Test Statistic	2.037	Nonparametric Statistics	
5% A-D Critical Value	0.83	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.83	Mean	0.482
5% K-S Critical Value	0.203	SD	1.504
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.19
Assuming Gamma Distribution		95% KM (t) UCL	0.799
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.794
Minimum	1E-09	95% KM (jackknife) UCL	0.794
Maximum	8.7	95% KM (bootstrap t) UCL	1.017
Mean	1.199	95% KM (BCA) UCL	0.861
Median	1.154	95% KM (Percentile Bootstrap) UCL	0.825
SD	1.488	95% KM (Chebyshev) UCL	1.31
k star	0.241	97.5% KM (Chebyshev) UCL	1.668
Theta star	4.979	99% KM (Chebyshev) UCL	2.372
Nu star	32.74	Potential UCLs to Use	
AppChi2	20.66	95% KM (Chebyshev) UCL	1.31
95% Gamma Approximate UCL	1.9		
95% Adjusted Gamma UCL	1.919		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3-Dinitrobenzene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	66
		Percent Non-Detects	97.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.045	Minimum Detected	-3.101
Maximum Detected	0.26	Maximum Detected	-1.347
Mean of Detected	0.153	Mean of Detected	-2.224
SD of Detected	0.152	SD of Detected	1.24
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12	Maximum Non-Detect	2.485
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.254	Mean	-1.946
SD	0.764	SD	0.629
95% DL/2 (t) UCL	0.409	95% H-Stat (DL/2) UCL	0.208
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0484
5% K-S Critical Value	N/A	SD	0.0269
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00479
		95% KM (t) UCL	0.0564
Assuming Gamma Distribution		95% KM (z) UCL	0.0563
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.188
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0693
SD	N/A	97.5% KM (Chebyshev) UCL	0.0783
k star	N/A	99% KM (Chebyshev) UCL	0.0961
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (BCA) UCL	N/A
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	36
Number of Distinct Detected Data	35	Number of Non-Detect Data	32
		Percent Non-Detects	47.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.037	Minimum Detected	-3.297
Maximum Detected	5200	Maximum Detected	8.556
Mean of Detected	282.3	Mean of Detected	0.41
SD of Detected	1015	SD of Detected	3.353
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.322	Shapiro Wilk Test Statistic	0.876
5% Shapiro Wilk Critical Value	0.935	5% Shapiro Wilk Critical Value	0.935
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	149.5	Mean	-0.761
SD	747.4	SD	2.727
95% DL/2 (t) UCL	300.7	95% H-Stat (DL/2) UCL	26.16
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.988
		SD in Log Scale	3.17
		Mean in Original Scale	149.6
		SD in Original Scale	747.4
		95% Percentile Bootstrap UCL	313.1
		95% BCA Bootstrap UCL	397.8
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.154	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1839		
nu star	11.05		
A-D Test Statistic	4.813	Nonparametric Statistics	
5% A-D Critical Value	0.93	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.93	Mean	149.5
5% K-S Critical Value	0.165	SD	741.9
Data not Gamme Distributed at 5% Significance Level		SE of Mean	91.24
		95% KM (t) UCL	301.7
Assuming Gamma Distribution		95% KM (z) UCL	299.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	300.7
Minimum	0.037	95% KM (bootstrap t) UCL	1081
Maximum	5200	95% KM (BCA) UCL	335
Mean	277.8	95% KM (Percentile Bootstrap) UCL	315
Median	209.2	95% KM (Chebyshev) UCL	547.2
SD	734.1	97.5% KM (Chebyshev) UCL	719.3
k star	0.254	99% KM (Chebyshev) UCL	1057
Theta star	1095		
Nu star	34.52	Potential UCLs to Use	
AppChi2	22.08	97.5% KM (Chebyshev) UCL	719.3
95% Gamma Approximate UCL	434.4		
95% Adjusted Gamma UCL	438.7		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	55
		Percent Non-Detects	80.88%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.032	Minimum Detected	-3.442
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	0.395	Mean of Detected	-1.921
SD of Detected	0.753	SD of Detected	1.319
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	4.9	Maximum Non-Detect	1.589
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.514	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.216	Mean	-1.979
SD	0.435	SD	0.681
95% DL/2 (t) UCL	0.304	95% H-Stat (DL/2) UCL	0.221
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.473
		SD in Log Scale	1.001
		Mean in Original Scale	0.16
		SD in Original Scale	0.348
		95% Percentile Bootstrap UCL	0.234
		95% BCA Bootstrap UCL	0.28
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.528	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.747		
nu star	13.74		
A-D Test Statistic	1.337	Nonparametric Statistics	
5% A-D Critical Value	0.781	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.781	Mean	0.135
5% K-S Critical Value	0.248	SD	0.344
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0445
		95% KM (t) UCL	0.21
Assuming Gamma Distribution		95% KM (z) UCL	0.209
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.208
Minimum	1E-09	95% KM (bootstrap t) UCL	0.338
Maximum	2.8	95% KM (BCA) UCL	0.232
Mean	0.334	95% KM (Percentile Bootstrap) UCL	0.213
Median	0.328	95% KM (Chebyshev) UCL	0.329
SD	0.378	97.5% KM (Chebyshev) UCL	0.413
k star	0.232	99% KM (Chebyshev) UCL	0.578
Theta star	1.438		
Nu star	31.59	Potential UCLs to Use	
AppChi2	19.75	95% KM (BCA) UCL	0.232
95% Gamma Approximate UCL	0.534		
95% Adjusted Gamma UCL	0.54		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	64
		Percent Non-Detects	94.12%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.065	Minimum Detected	-2.733
Maximum Detected	0.22	Maximum Detected	-1.514
Mean of Detected	0.159	Mean of Detected	-1.939
SD of Detected	0.0691	SD of Detected	0.554
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk Test Statistic	0.852
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.044	Mean	-1.815
SD	15.14	SD	0.994
95% DL/2 (t) UCL	5.106	95% H-Stat (DL/2) UCL	0.361
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.939
		SD in Log Scale	0.627
		Mean in Original Scale	0.174
		SD in Original Scale	0.117
		95% Percentile Bootstrap UCL	0.199
		95% BCA Bootstrap UCL	0.201
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.481	Data appear Normal at 5% Significance Level	
Theta Star	0.107		
nu star	11.85		
A-D Test Statistic	0.408	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.159
5% K-S Critical Value	0.396	SD	0.0598
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0345
		95% KM (t) UCL	0.216
Assuming Gamma Distribution		95% KM (z) UCL	0.216
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.225
Minimum	1E-09	95% KM (bootstrap t) UCL	0.22
Maximum	0.273	95% KM (BCA) UCL	0.21
Mean	0.156	95% KM (Percentile Bootstrap) UCL	0.213
Median	0.163	95% KM (Chebyshev) UCL	0.309
SD	0.0724	97.5% KM (Chebyshev) UCL	0.374
k star	1.277	99% KM (Chebyshev) UCL	0.502
Theta star	0.122	Potential UCLs to Use	
Nu star	173.6	95% KM (t) UCL	0.216
AppChi2	144.1	95% KM (Percentile Bootstrap) UCL	0.213
95% Gamma Approximate UCL	0.188		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Amino-4,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	37	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	33
Number of Missing Values	31	Percent Non-Detects	89.19%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.15	Minimum Detected	-1.897
Maximum Detected	7.5	Maximum Detected	2.015
Mean of Detected	2.375	Mean of Detected	-0.0861
SD of Detected	3.458	SD of Detected	1.671
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	37
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.757	Shapiro Wilk Test Statistic	0.989
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.445	Mean	-1.371
SD	22.48	SD	1.707
95% DL/2 (t) UCL	11.68	95% H-Stat (DL/2) UCL	2.351
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.036
		SD in Log Scale	1.357
		Mean in Original Scale	0.413
		SD in Original Scale	1.227
		95% Percentile Bootstrap UCL	0.802
		95% BCA Bootstrap UCL	1.079
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.327	Data appear Normal at 5% Significance Level	
Theta Star	7.253		
nu star	2.62		
A-D Test Statistic	0.299	Nonparametric Statistics	
5% A-D Critical Value	0.675	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.675	Mean	0.407
5% K-S Critical Value	0.407	SD	1.236
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.241
Assuming Gamma Distribution		95% KM (t) UCL	0.815
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.804
Minimum	1E-09	95% KM (jackknife) UCL	0.725
Maximum	7.5	95% KM (bootstrap t) UCL	1.644
Mean	1.185	95% KM (BCA) UCL	7.5
Median	0.15	95% KM (Percentile Bootstrap) UCL	1.908
SD	1.648	95% KM (Chebyshev) UCL	1.46
k star	0.0944	97.5% KM (Chebyshev) UCL	1.915
Theta star	12.56	99% KM (Chebyshev) UCL	2.81
Nu star	6.983	Potential UCLs to Use	
AppChi2	2.161	95% KM (t) UCL	0.815
95% Gamma Approximate UCL	3.83	95% KM (Percentile Bootstrap) UCL	1.908
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Nitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	66
		Percent Non-Detects	97.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.082	Minimum Detected	-2.501
Maximum Detected	4.8	Maximum Detected	1.569
Mean of Detected	2.441	Mean of Detected	-0.466
SD of Detected	3.336	SD of Detected	2.878
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	5	Maximum Non-Detect	1.609
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.26	Mean	-1.883
SD	0.644	SD	0.669
95% DL/2 (t) UCL	0.391	95% H-Stat (DL/2) UCL	0.218
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.152
5% K-S Critical Value	N/A	SD	0.572
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0988
		95% KM (t) UCL	0.317
Assuming Gamma Distribution		95% KM (z) UCL	0.315
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.213
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	4.8
Mean	N/A	95% KM (Percentile Bootstrap) UCL	4.8
Median	N/A	95% KM (Chebyshev) UCL	0.583
SD	N/A	97.5% KM (Chebyshev) UCL	0.77
k star	N/A	99% KM (Chebyshev) UCL	1.136
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.77
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

3-Nitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	4
Number of Distinct Detected Data	3	Number of Non-Detect Data	64
		Percent Non-Detects	94.12%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.065	Minimum Detected	-2.733
Maximum Detected	0.12	Maximum Detected	-2.12
Mean of Detected	0.0978	Mean of Detected	-2.357
SD of Detected	0.0271	SD of Detected	0.296
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12	Maximum Non-Detect	2.485
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.86	Shapiro Wilk Test Statistic	0.866
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.269	Mean	-1.924
SD	0.774	SD	0.673
95% DL/2 (t) UCL	0.425	95% H-Stat (DL/2) UCL	0.226
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.357
		SD in Log Scale	0.347
		Mean in Original Scale	0.1
		SD in Original Scale	0.0355
		95% Percentile Bootstrap UCL	0.108
		95% BCA Bootstrap UCL	0.108
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.178	Data appear Normal at 5% Significance Level	
Theta Star	0.0234		
nu star	33.43		
A-D Test Statistic	0.433	Nonparametric Statistics	
5% A-D Critical Value	0.657	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.657	Mean	0.0978
5% K-S Critical Value	0.395	SD	0.0235
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0135
Assuming Gamma Distribution		95% KM (t) UCL	0.12
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.12
Minimum	0.00362	95% KM (jackknife) UCL	0.124
Maximum	0.137	95% KM (bootstrap t) UCL	0.123
Mean	0.0948	95% KM (BCA) UCL	0.12
Median	0.101	95% KM (Percentile Bootstrap) UCL	0.12
SD	0.0315	95% KM (Chebyshev) UCL	0.157
k star	4.901	97.5% KM (Chebyshev) UCL	0.182
Theta star	0.0194	99% KM (Chebyshev) UCL	0.232
Nu star	666.6	Potential UCLs to Use	
AppChi2	607.7	95% KM (t) UCL	0.12
95% Gamma Approximate UCL	0.104	95% KM (Percentile Bootstrap) UCL	0.12
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	37	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	34
Number of Missing Values	31	Percent Non-Detects	91.89%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.092	Minimum Detected	-2.386
Maximum Detected	0.24	Maximum Detected	-1.427
Mean of Detected	0.157	Mean of Detected	-1.926
SD of Detected	0.0755	SD of Detected	0.481
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	600	Maximum Non-Detect	6.397
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	37
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.995
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.3	Mean	-1.011
SD	64.12	SD	2.359
95% DL/2 (t) UCL	37.1	95% H-Stat (DL/2) UCL	32.98
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.926
		SD in Log Scale	0.562
		Mean in Original Scale	0.17
		SD in Original Scale	0.102
		95% Percentile Bootstrap UCL	0.199
		95% BCA Bootstrap UCL	0.203
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.157
5% K-S Critical Value	N/A	SD	0.0617
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0436
Assuming Gamma Distribution		95% KM (t) UCL	0.231
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.229
Minimum	N/A	95% KM (jackknife) UCL	0.246
Maximum	N/A	95% KM (bootstrap t) UCL	0.351
Mean	N/A	95% KM (BCA) UCL	0.24
Median	N/A	95% KM (Percentile Bootstrap) UCL	0.24
SD	N/A	95% KM (Chebyshev) UCL	0.347
k star	N/A	97.5% KM (Chebyshev) UCL	0.43
Theta star	N/A	99% KM (Chebyshev) UCL	0.591
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.231
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.24
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Nitrotoluene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	64
		Percent Non-Detects	94.12%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.084	Minimum Detected	-2.477
Maximum Detected	0.16	Maximum Detected	-1.833
Mean of Detected	0.112	Mean of Detected	-2.223
SD of Detected	0.0339	SD of Detected	0.283
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12	Maximum Non-Detect	2.485
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.879	Shapiro Wilk Test Statistic	0.923
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.28	Mean	-1.888
SD	0.777	SD	0.701
95% DL/2 (t) UCL	0.437	95% H-Stat (DL/2) UCL	0.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.223
		SD in Log Scale	0.335
		Mean in Original Scale	0.114
		SD in Original Scale	0.0392
		95% Percentile Bootstrap UCL	0.122
		95% BCA Bootstrap UCL	0.123
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.177	Data appear Normal at 5% Significance Level	
Theta Star	0.0268		
nu star	33.41		
A-D Test Statistic	0.349	Nonparametric Statistics	
5% A-D Critical Value	0.657	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.657	Mean	0.112
5% K-S Critical Value	0.395	SD	0.0294
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.017
		95% KM (t) UCL	0.14
Assuming Gamma Distribution		95% KM (z) UCL	0.14
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.144
Minimum	0.00453	95% KM (bootstrap t) UCL	0.182
Maximum	0.16	95% KM (BCA) UCL	0.143
Mean	0.109	95% KM (Percentile Bootstrap) UCL	0.148
Median	0.116	95% KM (Chebyshev) UCL	0.186
SD	0.0358	97.5% KM (Chebyshev) UCL	0.218
k star	5.043	99% KM (Chebyshev) UCL	0.281
Theta star	0.0215	Potential UCLs to Use	
Nu star	685.8	95% KM (t) UCL	0.14
AppChi2	626	95% KM (Percentile Bootstrap) UCL	0.148
95% Gamma Approximate UCL	0.119		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

HMX			
General Statistics			
Number of Valid Data	68	Number of Detected Data	23
Number of Distinct Detected Data	16	Number of Non-Detect Data	45
		Percent Non-Detects	66.18%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.1	Minimum Detected	-2.303
Maximum Detected	27	Maximum Detected	3.296
Mean of Detected	2.425	Mean of Detected	-0.919
SD of Detected	6.212	SD of Detected	1.636
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.434	Shapiro Wilk Test Statistic	0.775
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.576	Mean	-0.957
SD	33.72	SD	1.489
95% DL/2 (t) UCL	13.4	95% H-Stat (DL/2) UCL	1.911
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.297
		SD in Log Scale	1.275
		Mean in Original Scale	1.052
		SD in Original Scale	3.705
		95% Percentile Bootstrap UCL	1.882
		95% BCA Bootstrap UCL	2.246
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.35	Data do not follow a Discernable Distribution (0.05)	
Theta Star	6.927		
nu star	16.11		
A-D Test Statistic	3.539	Nonparametric Statistics	
5% A-D Critical Value	0.834	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.834	Mean	0.988
5% K-S Critical Value	0.195	SD	3.74
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.472
Assuming Gamma Distribution		95% KM (t) UCL	1.775
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.764
Minimum	1E-09	95% KM (jackknife) UCL	1.764
Maximum	27	95% KM (bootstrap t) UCL	3.955
Mean	2.343	95% KM (BCA) UCL	1.928
Median	2.167	95% KM (Percentile Bootstrap) UCL	1.837
SD	3.706	95% KM (Chebyshev) UCL	3.044
k star	0.276	97.5% KM (Chebyshev) UCL	3.933
Theta star	8.491	99% KM (Chebyshev) UCL	5.68
Nu star	37.53	Potential UCLs to Use	
AppChi2	24.5	95% KM (Chebyshev) UCL	3.044
95% Gamma Approximate UCL	3.589		
95% Adjusted Gamma UCL	3.622		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrobenzene			
General Statistics			
Number of Valid Data	68	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	62
		Percent Non-Detects	91.18%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.033	Minimum Detected	-3.411
Maximum Detected	0.36	Maximum Detected	-1.022
Mean of Detected	0.11	Mean of Detected	-2.572
SD of Detected	0.124	SD of Detected	0.846
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	12	Maximum Non-Detect	2.485
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.645	Shapiro Wilk Test Statistic	0.86
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.252	Mean	-1.985
SD	0.765	SD	0.675
95% DL/2 (t) UCL	0.407	95% H-Stat (DL/2) UCL	0.226
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.833
		SD in Log Scale	0.632
		Mean in Original Scale	0.0721
		SD in Original Scale	0.054
		95% Percentile Bootstrap UCL	0.083
		95% BCA Bootstrap UCL	0.0852
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.873	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.126		
nu star	10.47		
A-D Test Statistic	0.706	Nonparametric Statistics	
5% A-D Critical Value	0.708	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.708	Mean	0.0646
5% K-S Critical Value	0.337	SD	0.0424
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0109
Assuming Gamma Distribution		95% KM (t) UCL	0.0828
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.0826
Minimum	1E-09	95% KM (jackknife) UCL	0.0844
Maximum	0.36	95% KM (bootstrap t) UCL	0.0846
Mean	0.0959	95% KM (BCA) UCL	0.0852
Median	0.0945	95% KM (Percentile Bootstrap) UCL	0.0839
SD	0.0622	95% KM (Chebyshev) UCL	0.112
k star	0.747	97.5% KM (Chebyshev) UCL	0.133
Theta star	0.128	99% KM (Chebyshev) UCL	0.173
Nu star	101.6	Potential UCLs to Use	
AppChi2	79.31	95% KM (t) UCL	0.0828
95% Gamma Approximate UCL	0.123		
95% Adjusted Gamma UCL	0.123		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrocellulose			
General Statistics			
Number of Valid Data	6	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	3
Number of Missing Values	35	Percent Non-Detects	50.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.2	Minimum Detected	1.163
Maximum Detected	88.4	Maximum Detected	4.482
Mean of Detected	32.73	Mean of Detected	2.511
SD of Detected	48.24	SD of Detected	1.745
Minimum Non-Detect	2	Minimum Non-Detect	0.693
Maximum Non-Detect	2	Maximum Non-Detect	0.693
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.78	Shapiro Wilk Test Statistic	0.904
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	16.87	Mean	1.255
SD	35.11	SD	1.763
95% DL/2 (t) UCL	45.75	95% H-Stat (DL/2) UCL	1329
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.397
		SD in Log Scale	3.538
		Mean in Original Scale	16.41
		SD in Original Scale	35.37
		95% Percentile Bootstrap UCL	44.74
		95% BCA Bootstrap UCL	46.4
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	17.97
5% K-S Critical Value	N/A	SD	31.52
Data not Gamma Distributed at 5% Significance Level		SE of Mean	15.76
		95% KM (t) UCL	49.73
Assuming Gamma Distribution		95% KM (z) UCL	43.89
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	45.58
Minimum	N/A	95% KM (bootstrap t) UCL	392.7
Maximum	N/A	95% KM (BCA) UCL	88.4
Mean	N/A	95% KM (Percentile Bootstrap) UCL	88.4
Median	N/A	95% KM (Chebyshev) UCL	86.67
SD	N/A	97.5% KM (Chebyshev) UCL	116.4
k star	N/A	99% KM (Chebyshev) UCL	174.8
Theta star	N/A	Potential UCLs to Use	
Nu star	N/A	95% KM (t) UCL	49.73
AppChi2	N/A	95% KM (Percentile Bootstrap) UCL	88.4
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitroglycerin			
General Statistics			
Number of Valid Data	68	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	67
		Percent Non-Detects	98.53%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable Nitroglycerin was not processed!			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

RDX			
General Statistics			
Number of Valid Data	68	Number of Detected Data	19
Number of Distinct Detected Data	19	Number of Non-Detect Data	49
		Percent Non-Detects	72.06%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.14	Minimum Detected	-1.966
Maximum Detected	260	Maximum Detected	5.561
Mean of Detected	44.47	Mean of Detected	1.217
SD of Detected	82.16	SD of Detected	2.62
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	10	Maximum Non-Detect	2.303
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	62
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.18%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.61	Shapiro Wilk Test Statistic	0.889
5% Shapiro Wilk Critical Value	0.901	5% Shapiro Wilk Critical Value	0.901
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.69	Mean	-0.585
SD	47.03	SD	1.81
95% DL/2 (t) UCL	22.2	95% H-Stat (DL/2) UCL	3.451
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.88
		SD in Log Scale	2.389
		Mean in Original Scale	12.8
		SD in Original Scale	47
		95% Percentile Bootstrap UCL	22.59
		95% BCA Bootstrap UCL	26.23
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.264	Data do not follow a Discernable Distribution (0.05)	
Theta Star	168.5		
nu star	10.03		
A-D Test Statistic	1.472	Nonparametric Statistics	
5% A-D Critical Value	0.855	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.855	Mean	12.63
5% K-S Critical Value	0.216	SD	46.69
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.818
		95% KM (t) UCL	22.33
Assuming Gamma Distribution		95% KM (z) UCL	22.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	22.14
Minimum	1E-09	95% KM (bootstrap t) UCL	34.04
Maximum	260	95% KM (BCA) UCL	23.28
Mean	36.24	95% KM (Percentile Bootstrap) UCL	23.41
Median	37.33	95% KM (Chebyshev) UCL	37.99
SD	45.97	97.5% KM (Chebyshev) UCL	48.96
k star	0.193	99% KM (Chebyshev) UCL	70.51
Theta star	187.9		
Nu star	26.23	Potential UCLs to Use	
AppChi2	15.56	97.5% KM (Chebyshev) UCL	48.96
95% Gamma Approximate UCL	61.11		
95% Adjusted Gamma UCL	61.82		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Tetryl			
General Statistics			
Number of Valid Data	68	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	61
		Percent Non-Detects	89.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.054	Minimum Detected	-2.919
Maximum Detected	0.24	Maximum Detected	-1.427
Mean of Detected	0.115	Mean of Detected	-2.291
SD of Detected	0.0655	SD of Detected	0.534
Minimum Non-Detect	0.65	Minimum Non-Detect	-0.431
Maximum Non-Detect	32	Maximum Non-Detect	3.466
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	68
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Test Statistic	0.958
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.687	Mean	-1.072
SD	2.061	SD	0.799
95% DL/2 (t) UCL	1.104	95% H-Stat (DL/2) UCL	0.678
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.291
		SD in Log Scale	0.589
		Mean in Original Scale	0.12
		SD in Original Scale	0.075
		95% Percentile Bootstrap UCL	0.135
		95% BCA Bootstrap UCL	0.137
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.44	Data appear Normal at 5% Significance Level	
Theta Star	0.0471		
nu star	34.16		
A-D Test Statistic	0.259	Nonparametric Statistics	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.115
5% K-S Critical Value	0.313	SD	0.0606
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0248
Assuming Gamma Distribution		95% KM (t) UCL	0.156
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.156
Minimum	1E-09	95% KM (jackknife) UCL	0.159
Maximum	0.24	95% KM (bootstrap t) UCL	0.198
Mean	0.114	95% KM (BCA) UCL	0.159
Median	0.123	95% KM (Percentile Bootstrap) UCL	0.161
SD	0.059	95% KM (Chebyshev) UCL	0.223
k star	0.52	97.5% KM (Chebyshev) UCL	0.269
Theta star	0.219	99% KM (Chebyshev) UCL	0.361
Nu star	70.76	Potential UCLs to Use	
AppChi2	52.39	95% KM (t) UCL	0.156
95% Gamma Approximate UCL	0.154	95% KM (Percentile Bootstrap) UCL	0.161
95% Adjusted Gamma UCL	0.155		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

User Selected Options	General UCL Statistics for Data Sets with Non-Detects
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\March 2010 redos\WBG sbs_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Aluminum			
General Statistics			
Number of Valid Observations	83	Number of Distinct Observations	63
Raw Statistics		Log-transformed Statistics	
Minimum	3580	Minimum of Log Data	8.183
Maximum	20000	Maximum of Log Data	9.903
Mean	11713	Mean of log Data	9.331
Median	12000	SD of log Data	0.293
SD	2986		
Coefficient of Variation	0.255		
Skewness	-0.107		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.0601	Lilliefors Test Statistic	0.104
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12259	95% H-UCL	12453
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13446
95% Adjusted-CLT UCL	12249	97.5% Chebyshev (MVUE) UCL	14172
95% Modified-t UCL	12258	99% Chebyshev (MVUE) UCL	15598
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	12.96	Data appear Normal at 5% Significance Level	
Theta Star	904		
MLE of Mean	11713		
MLE of Standard Deviation	3254		
nu star	2151		
Approximate Chi Square Value (.05)	2044	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	12253
Adjusted Chi Square Value	2042	95% Jackknife UCL	12259
		95% Standard Bootstrap UCL	12257
Anderson-Darling Test Statistic	0.814	95% Bootstrap-t UCL	12273
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	12236
Kolmogorov-Smirnov Test Statistic	0.0851	95% Percentile Bootstrap UCL	12254
Kolmogorov-Smirnov 5% Critical Value	0.0979	95% BCA Bootstrap UCL	12252
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13142
		97.5% Chebyshev(Mean, Sd) UCL	13760
		99% Chebyshev(Mean, Sd) UCL	14975
Assuming Gamma Distribution			
95% Approximate Gamma UCL	12325		
95% Adjusted Gamma UCL	12336		
Potential UCL to Use		Use 95% Student's-t UCL	12259

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Antimony			
General Statistics			
Number of Valid Data	83	Number of Detected Data	44
Number of Distinct Detected Data	37	Number of Non-Detect Data	39
		Percent Non-Detects	46.99%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.34	Minimum Detected	-1.079
Maximum Detected	27.6	Maximum Detected	3.318
Mean of Detected	3.045	Mean of Detected	0.216
SD of Detected	6.065	SD of Detected	1.122
Minimum Non-Detect	0.56	Minimum Non-Detect	-0.58
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	70
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.34%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.47	Shapiro Wilk Test Statistic	0.785
5% Shapiro Wilk Critical Value	0.944	5% Shapiro Wilk Critical Value	0.944
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.831	Mean	-0.275
SD	4.581	SD	0.996
95% DL/2 (t) UCL	2.668	95% H-Stat (DL/2) UCL	1.535
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.342
		SD in Log Scale	1.107
		Mean in Original Scale	1.839
		SD in Original Scale	4.584
		95% Percentile Bootstrap UCL	2.748
		95% BCA Bootstrap UCL	2.937
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.646	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4.717		
nu star	56.8		
A-D Test Statistic	5.947	Nonparametric Statistics	
5% A-D Critical Value	0.797	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.797	Mean	1.869
5% K-S Critical Value	0.139	SD	4.542
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.505
		95% KM (t) UCL	2.708
Assuming Gamma Distribution		95% KM (z) UCL	2.699
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.704
Minimum	1E-09	95% KM (bootstrap t) UCL	3.66
Maximum	27.6	95% KM (BCA) UCL	2.866
Mean	2.713	95% KM (Percentile Bootstrap) UCL	2.774
Median	0.72	95% KM (Chebyshev) UCL	4.068
SD	4.982	97.5% KM (Chebyshev) UCL	5.02
k star	0.173	99% KM (Chebyshev) UCL	6.889
Theta star	15.7		
Nu star	28.68	Potential UCLs to Use	
AppChi2	17.46	95% KM (Chebyshev) UCL	4.068
95% Gamma Approximate UCL	4.457		
95% Adjusted Gamma UCL	4.497		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Arsenic			
General Statistics			
Number of Valid Observations	83	Number of Distinct Observations	60
Raw Statistics		Log-transformed Statistics	
Minimum	5.8	Minimum of Log Data	1.758
Maximum	38.4	Maximum of Log Data	3.648
Mean	15.12	Mean of log Data	2.67
Median	14.4	SD of log Data	0.298
SD	4.936		
Coefficient of Variation	0.327		
Skewness	1.838		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.16	Lilliefors Test Statistic	0.0974
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	16.02	95% H-UCL	15.99
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17.29
95% Adjusted-CLT UCL	16.12	97.5% Chebyshev (MVUE) UCL	18.24
95% Modified-t UCL	16.04	99% Chebyshev (MVUE) UCL	20.11
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	10.78	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1.402		
MLE of Mean	15.12		
MLE of Standard Deviation	4.604		
nu star	1789		
Approximate Chi Square Value (.05)	1692	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	16.01
Adjusted Chi Square Value	1690	95% Jackknife UCL	16.02
		95% Standard Bootstrap UCL	15.98
Anderson-Darling Test Statistic	1.039	95% Bootstrap-t UCL	16.12
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	16.2
Kolmogorov-Smirnov Test Statistic	0.116	95% Percentile Bootstrap UCL	15.99
Kolmogorov-Smirnov 5% Critical Value	0.098	95% BCA Bootstrap UCL	16.12
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.48
		97.5% Chebyshev(Mean, Sd) UCL	18.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	20.51
95% Approximate Gamma UCL	15.98		
95% Adjusted Gamma UCL	16		
Potential UCL to Use		Use 95% Student's-t UCL	16.02
		or 95% Modified-t UCL	16.04

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Barium			
General Statistics			
Number of Valid Observations	83	Number of Distinct Observations	78
Raw Statistics		Log-transformed Statistics	
Minimum	20.2	Minimum of Log Data	3.006
Maximum	1040	Maximum of Log Data	6.947
Mean	116.8	Mean of log Data	4.444
Median	73.4	SD of log Data	0.718
SD	134.6		
Coefficient of Variation	1.153		
Skewness	4.46		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.283	Lilliefors Test Statistic	0.166
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	141.4	95% H-UCL	129.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	151.4
95% Adjusted-CLT UCL	148.8	97.5% Chebyshev (MVUE) UCL	169.4
95% Modified-t UCL	142.6	99% Chebyshev (MVUE) UCL	204.9
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.673	Data do not follow a Discernable Distribution (0.05)	
Theta Star	69.83		
MLE of Mean	116.8		
MLE of Standard Deviation	90.31		
nu star	277.7		
Approximate Chi Square Value (.05)	240.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	141.1
Adjusted Chi Square Value	239.5	95% Jackknife UCL	141.4
		95% Standard Bootstrap UCL	141.1
Anderson-Darling Test Statistic	4.074	95% Bootstrap-t UCL	155.6
Anderson-Darling 5% Critical Value	0.768	95% Hall's Bootstrap UCL	222.9
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	142.2
Kolmogorov-Smirnov 5% Critical Value	0.0996	95% BCA Bootstrap UCL	149.9
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	181.2
		97.5% Chebyshev(Mean, Sd) UCL	209.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	263.8
95% Approximate Gamma UCL	135.1		
95% Adjusted Gamma UCL	135.4		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	181.2

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Beryllium			
General Statistics			
Number of Valid Data	83	Number of Detected Data	51
Number of Distinct Detected Data	37	Number of Non-Detect Data	32
		Percent Non-Detects	38.55%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.23	Minimum Detected	-1.47
Maximum Detected	1.3	Maximum Detected	0.262
Mean of Detected	0.514	Mean of Detected	-0.723
SD of Detected	0.189	SD of Detected	0.331
Minimum Non-Detect	0.11	Minimum Non-Detect	-2.207
Maximum Non-Detect	0.78	Maximum Non-Detect	-0.248
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.161	Lilliefors Test Statistic	0.12
5% Lilliefors Critical Value	0.124	5% Lilliefors Critical Value	0.124
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.4	Mean	-1.075
SD	0.215	SD	0.611
95% DL/2 (t) UCL	0.439	95% H-Stat (DL/2) UCL	0.489
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.294	Mean in Log Scale	-0.913
SD	0.33	SD in Log Scale	0.379
95% MLE (t) UCL	0.354	Mean in Original Scale	0.433
95% MLE (Tiku) UCL	0.624	SD in Original Scale	0.185
		95% Percentile Bootstrap UCL	0.466
		95% BCA Bootstrap UCL	0.472
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	8.505	Data appear Lognormal at 5% Significance Level	
Theta Star	0.0604		
nu star	867.5		
A-D Test Statistic	0.787	Nonparametric Statistics	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.75	Mean	0.433
5% K-S Critical Value	0.124	SD	0.19
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.022
Assuming Gamma Distribution		95% KM (t) UCL	0.47
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.47
Minimum	0.224	95% KM (jackknife) UCL	0.467
Maximum	1.3	95% KM (bootstrap t) UCL	0.47
Mean	0.489	95% KM (BCA) UCL	0.481
Median	0.45	95% KM (Percentile Bootstrap) UCL	0.475
SD	0.17	95% KM (Chebyshev) UCL	0.529
k star	9.339	97.5% KM (Chebyshev) UCL	0.571
Theta star	0.0524	99% KM (Chebyshev) UCL	0.652
Nu star	1550	Potential UCLs to Use	
AppChi2	1460	95% KM (BCA) UCL	0.481
95% Gamma Approximate UCL	0.52		
95% Adjusted Gamma UCL	0.52		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Cadmium			
General Statistics			
Number of Valid Data	83	Number of Detected Data	34
Number of Distinct Detected Data	30	Number of Non-Detect Data	49
		Percent Non-Detects	59.04%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.081	Minimum Detected	-2.513
Maximum Detected	201	Maximum Detected	5.303
Mean of Detected	9.845	Mean of Detected	-0.331
SD of Detected	36.04	SD of Detected	1.89
Minimum Non-Detect	0.56	Minimum Non-Detect	-0.58
Maximum Non-Detect	3	Maximum Non-Detect	1.099
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	76
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.57%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.306	Shapiro Wilk Test Statistic	0.842
5% Shapiro Wilk Critical Value	0.933	5% Shapiro Wilk Critical Value	0.933
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.224	Mean	-0.828
SD	23.35	SD	1.282
95% DL/2 (t) UCL	8.488	95% H-Stat (DL/2) UCL	1.705
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.965
		SD in Log Scale	1.476
		Mean in Original Scale	4.236
		SD in Original Scale	23.34
		95% Percentile Bootstrap UCL	8.975
		95% BCA Bootstrap UCL	13.57
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.264	Data do not follow a Discernable Distribution (0.05)	
Theta Star	37.27		
nu star	17.96		
A-D Test Statistic	5.351	Nonparametric Statistics	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	4.174
5% K-S Critical Value	0.165	SD	23.21
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.586
		95% KM (t) UCL	8.477
Assuming Gamma Distribution		95% KM (z) UCL	8.428
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8.439
Minimum	0.081	95% KM (bootstrap t) UCL	33.94
Maximum	201	95% KM (BCA) UCL	8.529
Mean	9.916	95% KM (Percentile Bootstrap) UCL	9.076
Median	8.302	95% KM (Chebyshev) UCL	15.45
SD	22.92	97.5% KM (Chebyshev) UCL	20.33
k star	0.561	99% KM (Chebyshev) UCL	29.91
Theta star	17.67		
Nu star	93.16	Potential UCLs to Use	
AppChi2	71.91	95% KM (Chebyshev) UCL	15.45
95% Gamma Approximate UCL	12.85		
95% Adjusted Gamma UCL	12.91		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium			
General Statistics			
Number of Valid Observations	83	Number of Distinct Observations	60
Raw Statistics		Log-transformed Statistics	
Minimum	7.6	Minimum of Log Data	2.028
Maximum	80.9	Maximum of Log Data	4.393
Mean	18.34	Mean of log Data	2.829
Median	16.4	SD of log Data	0.36
SD	10.12		
Coefficient of Variation	0.552		
Skewness	4.461		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.252	Lilliefors Test Statistic	0.127
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.19	95% H-UCL	19.38
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.25
95% Adjusted-CLT UCL	20.75	97.5% Chebyshev (MVUE) UCL	22.63
95% Modified-t UCL	20.28	99% Chebyshev (MVUE) UCL	25.35
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.206	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.955		
MLE of Mean	18.34		
MLE of Standard Deviation	7.363		
nu star	1030		
Approximate Chi Square Value (.05)	956.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	20.17
Adjusted Chi Square Value	955.5	95% Jackknife UCL	20.19
		95% Standard Bootstrap UCL	20.14
Anderson-Darling Test Statistic	3.91	95% Bootstrap-t UCL	21.68
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	30.25
Kolmogorov-Smirnov Test Statistic	0.163	95% Percentile Bootstrap UCL	20.33
Kolmogorov-Smirnov 5% Critical Value	0.0982	95% BCA Bootstrap UCL	20.83
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.18
		97.5% Chebyshev(Mean, Sd) UCL	25.28
		99% Chebyshev(Mean, Sd) UCL	29.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL	19.75		
95% Adjusted Gamma UCL	19.78		
Potential UCL to Use		Use 95% Student's-t UCL	20.19
		or 95% Modified-t UCL	20.28

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium, hexavalent			
General Statistics			
Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
Number of Missing Values	51	Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	2.8	Maximum Detected	1.03
Mean of Detected	2.1	Mean of Detected	0.683
SD of Detected	0.99	SD of Detected	0.49
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.33%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.829	Mean	-0.348
SD	0.665	SD	0.506
95% DL/2 (t) UCL	1.174	95% H-Stat (DL/2) UCL	1.085
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	1.517
5% K-S Critical Value	N/A	SD	0.387
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.158
		95% KM (t) UCL	1.8
Assuming Gamma Distribution		95% KM (z) UCL	1.776
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.475
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	2.8
Median	N/A	95% KM (Chebyshev) UCL	2.205
SD	N/A	97.5% KM (Chebyshev) UCL	2.503
k star	N/A	99% KM (Chebyshev) UCL	3.088
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	1.8
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	2.8
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Cobalt				
General Statistics				
Number of Valid Observations		83	Number of Distinct Observations	66
Raw Statistics		Log-transformed Statistics		
Minimum	3.7	Minimum of Log Data	1.308	
Maximum	25.4	Maximum of Log Data	3.235	
Mean	10.76	Mean of log Data	2.318	
Median	10.8	SD of log Data	0.352	
SD	3.668			
Coefficient of Variation	0.341			
Skewness	0.852			
Relevant UCL Statistics				
Normal Distribution Test		Lognormal Distribution Test		
Lilliefors Test Statistic	0.0788	Lilliefors Test Statistic	0.0883	
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973	
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
95% Student's-t UCL	11.43	95% H-UCL	11.57	
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12.66	
95% Adjusted-CLT UCL	11.47	97.5% Chebyshev (MVUE) UCL	13.47	
95% Modified-t UCL	11.44	99% Chebyshev (MVUE) UCL	15.05	
Gamma Distribution Test		Data Distribution		
k star (bias corrected)	8.425	Data appear Normal at 5% Significance Level		
Theta Star	1.278			
MLE of Mean	10.76			
MLE of Standard Deviation	3.708			
nu star	1398			
Approximate Chi Square Value (.05)	1313	Nonparametric Statistics		
Adjusted Level of Significance	0.0471	95% CLT UCL	11.42	
Adjusted Chi Square Value	1311	95% Jackknife UCL	11.43	
		95% Standard Bootstrap UCL	11.41	
Anderson-Darling Test Statistic	0.285	95% Bootstrap-t UCL	11.5	
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	11.52	
Kolmogorov-Smirnov Test Statistic	0.0662	95% Percentile Bootstrap UCL	11.42	
Kolmogorov-Smirnov 5% Critical Value	0.0981	95% BCA Bootstrap UCL	11.48	
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	12.52	
		97.5% Chebyshev(Mean, Sd) UCL	13.28	
		99% Chebyshev(Mean, Sd) UCL	14.77	
Assuming Gamma Distribution				
95% Approximate Gamma UCL	11.47			
95% Adjusted Gamma UCL	11.48			
Potential UCL to Use		Use 95% Student's-t UCL	11.43	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Copper			
General Statistics			
Number of Valid Observations		83	Number of Distinct Observations
			70
Raw Statistics		Log-transformed Statistics	
Minimum	8.3	Minimum of Log Data	2.116
Maximum	428	Maximum of Log Data	6.059
Mean	39.32	Mean of log Data	3.236
Median	21.7	SD of log Data	0.719
SD	66.63		
Coefficient of Variation	1.694		
Skewness	4.457		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.38	Lilliefors Test Statistic	0.235
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	51.49	95% H-UCL	38.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	45.34
95% Adjusted-CLT UCL	55.18	97.5% Chebyshev (MVUE) UCL	50.76
95% Modified-t UCL	52.09	99% Chebyshev (MVUE) UCL	61.39
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.251	Data do not follow a Discernable Distribution (0.05)	
Theta Star	31.43		
MLE of Mean	39.32		
MLE of Standard Deviation	35.16		
nu star	207.7		
Approximate Chi Square Value (.05)	175.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	51.35
Adjusted Chi Square Value	174.8	95% Jackknife UCL	51.49
		95% Standard Bootstrap UCL	51.01
Anderson-Darling Test Statistic	11.75	95% Bootstrap-t UCL	62.58
Anderson-Darling 5% Critical Value	0.776	95% Hall's Bootstrap UCL	58.21
Kolmogorov-Smirnov Test Statistic	0.293	95% Percentile Bootstrap UCL	52.21
Kolmogorov-Smirnov 5% Critical Value	0.1	95% BCA Bootstrap UCL	54.79
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	71.2
		97.5% Chebyshev(Mean, Sd) UCL	85
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	112.1
95% Approximate Gamma UCL	46.58		
95% Adjusted Gamma UCL	46.72		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	71.2

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Lead			
General Statistics			
Number of Valid Observations		83	Number of Distinct Observations
			78
Raw Statistics		Log-transformed Statistics	
Minimum	7.2	Minimum of Log Data	1.974
Maximum	1130	Maximum of Log Data	7.03
Mean	55.9	Mean of log Data	3.11
Median	15.8	SD of log Data	1.024
SD	148.4		
Coefficient of Variation	2.655		
Skewness	5.678		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.39	Lilliefors Test Statistic	0.233
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	82.99	95% H-UCL	48.88
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	59.61
95% Adjusted-CLT UCL	93.53	97.5% Chebyshev (MVUE) UCL	69.17
95% Modified-t UCL	84.68	99% Chebyshev (MVUE) UCL	87.95
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.65	Data do not follow a Discernable Distribution (0.05)	
Theta Star	85.95		
MLE of Mean	55.9		
MLE of Standard Deviation	69.31		
nu star	108		
Approximate Chi Square Value (.05)	84.97	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	82.69
Adjusted Chi Square Value	84.61	95% Jackknife UCL	82.99
		95% Standard Bootstrap UCL	82.46
Anderson-Darling Test Statistic	12.54	95% Bootstrap-t UCL	129.6
Anderson-Darling 5% Critical Value	0.802	95% Hall's Bootstrap UCL	186.9
Kolmogorov-Smirnov Test Statistic	0.312	95% Percentile Bootstrap UCL	87.8
Kolmogorov-Smirnov 5% Critical Value	0.103	95% BCA Bootstrap UCL	99.73
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	126.9
		97.5% Chebyshev(Mean, Sd) UCL	157.6
		99% Chebyshev(Mean, Sd) UCL	217.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL	71.01		
95% Adjusted Gamma UCL	71.31		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	
		157.6	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Manganese			
General Statistics			
Number of Valid Observations		83	Number of Distinct Observations
			76
Raw Statistics		Log-transformed Statistics	
Minimum	154	Minimum of Log Data	5.037
Maximum	3470	Maximum of Log Data	8.152
Mean	492.7	Mean of log Data	6.049
Median	404	SD of log Data	0.494
SD	402.4		
Coefficient of Variation	0.817		
Skewness	5.347		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.257	Lilliefors Test Statistic	0.116
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	566.2	95% H-UCL	529.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	596.8
95% Adjusted-CLT UCL	593.1	97.5% Chebyshev (MVUE) UCL	648.3
95% Modified-t UCL	570.6	99% Chebyshev (MVUE) UCL	749.3
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.356	Data do not follow a Discernable Distribution (0.05)	
Theta Star	146.8		
MLE of Mean	492.7		
MLE of Standard Deviation	269		
nu star	557.1		
Approximate Chi Square Value (.05)	503.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	565.4
Adjusted Chi Square Value	502.4	95% Jackknife UCL	566.2
		95% Standard Bootstrap UCL	565.1
Anderson-Darling Test Statistic	3.241	95% Bootstrap-t UCL	632.8
Anderson-Darling 5% Critical Value	0.758	95% Hall's Bootstrap UCL	885.9
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	569.7
Kolmogorov-Smirnov 5% Critical Value	0.0987	95% BCA Bootstrap UCL	595.5
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	685.3
		97.5% Chebyshev(Mean, Sd) UCL	768.6
		99% Chebyshev(Mean, Sd) UCL	932.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL	545.4		
95% Adjusted Gamma UCL	546.3		
Potential UCL to Use		Use 95% Student's-t UCL	566.2
		or 95% Modified-t UCL	570.6

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Mercury			
General Statistics			
Number of Valid Data	83	Number of Detected Data	48
Number of Distinct Detected Data	26	Number of Non-Detect Data	35
		Percent Non-Detects	42.17%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0097	Minimum Detected	-4.636
Maximum Detected	0.065	Maximum Detected	-2.733
Mean of Detected	0.0241	Mean of Detected	-3.826
SD of Detected	0.0115	SD of Detected	0.446
Minimum Non-Detect	0.039	Minimum Non-Detect	-3.244
Maximum Non-Detect	0.13	Maximum Non-Detect	-2.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	83
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.89	Shapiro Wilk Test Statistic	0.959
5% Shapiro Wilk Critical Value	0.947	5% Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0329	Mean	-3.556
SD	0.0175	SD	0.544
95% DL/2 (t) UCL	0.0361	95% H-Stat (DL/2) UCL	0.0636
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.836
		SD in Log Scale	0.381
		Mean in Original Scale	0.0233
		SD in Original Scale	0.00963
		95% Percentile Bootstrap UCL	0.0249
		95% BCA Bootstrap UCL	0.0251
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.831	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.00499		
nu star	463.7		
A-D Test Statistic	0.859	Nonparametric Statistics	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	0.0238
5% K-S Critical Value	0.128	SD	0.011
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.00155
		95% KM (t) UCL	0.0264
Assuming Gamma Distribution		95% KM (z) UCL	0.0263
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0264
Minimum	0.0097	95% KM (bootstrap t) UCL	0.0267
Maximum	0.065	95% KM (BCA) UCL	0.0265
Mean	0.0247	95% KM (Percentile Bootstrap) UCL	0.0263
Median	0.025	95% KM (Chebyshev) UCL	0.0305
SD	0.00939	97.5% KM (Chebyshev) UCL	0.0335
k star	7.062	99% KM (Chebyshev) UCL	0.0392
Theta star	0.0035		
Nu star	1172	Potential UCLs to Use	
AppChi2	1094	95% KM (t) UCL	0.0264
95% Gamma Approximate UCL	0.0265		
95% Adjusted Gamma UCL	0.0265		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Nickel			
General Statistics			
Number of Valid Observations	83	Number of Distinct Observations	69
Raw Statistics		Log-transformed Statistics	
Minimum	8.8	Minimum of Log Data	2.175
Maximum	92.7	Maximum of Log Data	4.529
Mean	24.7	Mean of log Data	3.119
Median	24.2	SD of log Data	0.407
SD	12.2		
Coefficient of Variation	0.494		
Skewness	3.04		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.164	Lilliefors Test Statistic	0.0912
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	26.93	95% H-UCL	26.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.51
95% Adjusted-CLT UCL	27.38	97.5% Chebyshev (MVUE) UCL	31.65
95% Modified-t UCL	27	99% Chebyshev (MVUE) UCL	35.86
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.658	Data appear Lognormal at 5% Significance Level	
Theta Star	4.366		
MLE of Mean	24.7		
MLE of Standard Deviation	10.39		
nu star	939.2		
Approximate Chi Square Value (.05)	869	Nonparametric Statistics	
Adjusted Level of Significance	0.0471	95% CLT UCL	26.9
Adjusted Chi Square Value	867.9	95% Jackknife UCL	26.93
		95% Standard Bootstrap UCL	26.88
Anderson-Darling Test Statistic	1.257	95% Bootstrap-t UCL	27.67
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	28.89
Kolmogorov-Smirnov Test Statistic	0.102	95% Percentile Bootstrap UCL	27.13
Kolmogorov-Smirnov 5% Critical Value	0.0982	95% BCA Bootstrap UCL	27.21
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30.54
		97.5% Chebyshev(Mean, Sd) UCL	33.06
		99% Chebyshev(Mean, Sd) UCL	38.03
Assuming Gamma Distribution			
95% Approximate Gamma UCL	26.7		
95% Adjusted Gamma UCL	26.73		
Potential UCL to Use		Use 95% Student's-t UCL	26.93
		or 95% Modified-t UCL	27
		or 95% H-UCL	26.64

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Selenium			
General Statistics			
Number of Valid Data	83	Number of Detected Data	23
Number of Distinct Detected Data	22	Number of Non-Detect Data	60
		Percent Non-Detects	72.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.42	Minimum Detected	-0.868
Maximum Detected	4.6	Maximum Detected	1.526
Mean of Detected	1.275	Mean of Detected	0.0143
SD of Detected	1.086	SD of Detected	0.637
Minimum Non-Detect	0.41	Minimum Non-Detect	-0.892
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	76
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.57%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.687	Shapiro Wilk Test Statistic	0.924
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.58	Mean	-0.845
SD	0.712	SD	0.645
95% DL/2 (t) UCL	0.71	95% H-Stat (DL/2) UCL	0.544
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.987
		SD in Log Scale	0.803
		Mean in Original Scale	0.555
		SD in Original Scale	0.726
		95% Percentile Bootstrap UCL	0.688
		95% BCA Bootstrap UCL	0.738
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.063	Data appear Lognormal at 5% Significance Level	
Theta Star	0.618		
nu star	94.88		
A-D Test Statistic	1.116	Nonparametric Statistics	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	0.676
5% K-S Critical Value	0.183	SD	0.673
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0761
Assuming Gamma Distribution		95% KM (t) UCL	0.802
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.801
Minimum	0.42	95% KM (jackknife) UCL	0.795
Maximum	4.6	95% KM (bootstrap t) UCL	0.89
Mean	1.292	95% KM (BCA) UCL	0.847
Median	1.292	95% KM (Percentile Bootstrap) UCL	0.821
SD	0.573	95% KM (Chebyshev) UCL	1.007
k star	7.369	97.5% KM (Chebyshev) UCL	1.151
Theta star	0.175	99% KM (Chebyshev) UCL	1.433
Nu star	1223	Potential UCLs to Use	
AppChi2	1143	95% KM (t) UCL	0.802
95% Gamma Approximate UCL	1.382	95% KM (% Bootstrap) UCL	0.821
95% Adjusted Gamma UCL	1.384		
Note: DL/2 is not a recommended method.			

Silver			
General Statistics			
Number of Valid Data	83	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	76
		Percent Non-Detects	91.57%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	5.7	Maximum Detected	1.74
Mean of Detected	1.973	Mean of Detected	0.17
SD of Detected	1.928	SD of Detected	1.19
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	79
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.18%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.863	Shapiro Wilk Test Statistic	0.926
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.718	Mean	-0.451
SD	0.648	SD	0.376
95% DL/2 (t) UCL	0.836	95% H-Stat (DL/2) UCL	0.751
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.915
		SD in Log Scale	0.902
		Mean in Original Scale	0.614
		SD in Original Scale	0.757
		95% Percentile Bootstrap UCL	0.759
		95% BCA Bootstrap UCL	0.8
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.734	Data appear Normal at 5% Significance Level	
Theta Star	2.688		
nu star	10.28		
A-D Test Statistic	0.268	Nonparametric Statistics	
5% A-D Critical Value	0.726	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.726	Mean	0.566
5% K-S Critical Value	0.319	SD	0.711
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.165
		95% KM (t) UCL	0.84
Assuming Gamma Distribution		95% KM (z) UCL	0.919
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.917
Minimum	0.25	95% KM (bootstrap t) UCL	1.283
Maximum	5.7	95% KM (BCA) UCL	1.125
Mean	1.64	95% KM (Percentile Bootstrap) UCL	1.062
Median	1.679	95% KM (Chebyshev) UCL	1.284
SD	0.804	97.5% KM (Chebyshev) UCL	1.595
k star	3.74	99% KM (Chebyshev) UCL	2.205
Theta star	0.439		
Nu star	620.8	Potential UCLs to Use	
AppChi2	564	95% KM (t) UCL	0.84
95% Gamma Approximate UCL	1.806	95% KM (Percentile Bootstrap) UCL	1.062
95% Adjusted Gamma UCL	1.809		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Thallium			
General Statistics			
Number of Valid Data	83	Number of Detected Data	49
Number of Distinct Detected Data	32	Number of Non-Detect Data	34
		Percent Non-Detects	40.96%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.27	Minimum Detected	-1.309
Maximum Detected	1.1	Maximum Detected	0.0953
Mean of Detected	0.504	Mean of Detected	-0.727
SD of Detected	0.156	SD of Detected	0.283
Minimum Non-Detect	0.56	Minimum Non-Detect	-0.58
Maximum Non-Detect	0.82	Maximum Non-Detect	-0.198
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	82
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.80%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.98
5% Shapiro Wilk Critical Value	0.947	5% Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.428	Mean	-0.9
SD	0.152	SD	0.308
95% DL/2 (t) UCL	0.456	95% H-Stat (DL/2) UCL	0.535
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.766
		SD in Log Scale	0.236
		Mean in Original Scale	0.479
		SD in Original Scale	0.128
		95% Percentile Bootstrap UCL	0.501
		95% BCA Bootstrap UCL	0.505
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	11.62	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.0433		
nu star	1139		
A-D Test Statistic	0.504	Nonparametric Statistics	
5% A-D Critical Value	0.749	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.749	Mean	0.478
5% K-S Critical Value	0.126	SD	0.134
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0167
Assuming Gamma Distribution		95% KM (t) UCL	0.506
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.505
Minimum	0.27	95% KM (jackknife) UCL	0.506
Maximum	1.1	95% KM (bootstrap t) UCL	0.51
Mean	0.51	95% KM (BCA) UCL	0.505
Median	0.5	95% KM (Percentile Bootstrap) UCL	0.505
SD	0.124	95% KM (Chebyshev) UCL	0.551
k star	18.47	97.5% KM (Chebyshev) UCL	0.582
Theta star	0.0276	99% KM (Chebyshev) UCL	0.644
Nu star	3065	Potential UCLs to Use	
AppChi2	2938	95% KM (t) UCL	0.506
95% Gamma Approximate UCL	0.532		
95% Adjusted Gamma UCL	0.533		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Vanadium				
General Statistics				
Number of Valid Observations		83	Number of Distinct Observations	69
Raw Statistics		Log-transformed Statistics		
Minimum	7.4	Minimum of Log Data	2.001	
Maximum	44.8	Maximum of Log Data	3.802	
Mean	20.63	Mean of log Data	2.986	
Median	20.2	SD of log Data	0.294	
SD	6.004			
Coefficient of Variation	0.291			
Skewness	1.042			
Relevant UCL Statistics				
Normal Distribution Test		Lognormal Distribution Test		
Lilliefors Test Statistic	0.091	Lilliefors Test Statistic	0.096	
Lilliefors Critical Value	0.0973	Lilliefors Critical Value	0.0973	
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
95% Student's-t UCL	21.73	95% H-UCL	21.88	
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	23.63	
95% Adjusted-CLT UCL	21.8	97.5% Chebyshev (MVUE) UCL	24.91	
95% Modified-t UCL	21.74	99% Chebyshev (MVUE) UCL	27.43	
Gamma Distribution Test		Data Distribution		
k star (bias corrected)	11.82	Data appear Normal at 5% Significance Level		
Theta Star	1.746			
MLE of Mean	20.63			
MLE of Standard Deviation	6.003			
nu star	1962			
Approximate Chi Square Value (.05)	1860	Nonparametric Statistics		
Adjusted Level of Significance	0.0471	95% CLT UCL	21.72	
Adjusted Chi Square Value	1858	95% Jackknife UCL	21.73	
		95% Standard Bootstrap UCL	21.72	
Anderson-Darling Test Statistic	0.528	95% Bootstrap-t UCL	21.82	
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	21.86	
Kolmogorov-Smirnov Test Statistic	0.0782	95% Percentile Bootstrap UCL	21.75	
Kolmogorov-Smirnov 5% Critical Value	0.098	95% BCA Bootstrap UCL	21.87	
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.51	
		97.5% Chebyshev(Mean, Sd) UCL	24.75	
		99% Chebyshev(Mean, Sd) UCL	27.19	
Assuming Gamma Distribution				
95% Approximate Gamma UCL	21.77			
95% Adjusted Gamma UCL	21.79			
Potential UCL to Use		Use 95% Student's-t UCL	21.73	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Zinc			
General Statistics			
Number of Valid Data	83	Number of Detected Data	82
Number of Distinct Detected Data	75	Number of Non-Detect Data	1
		Percent Non-Detects	1.20%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	31.2	Minimum Detected	3.44
Maximum Detected	2390	Maximum Detected	7.779
Mean of Detected	156.5	Mean of Detected	4.45
SD of Detected	357.2	SD of Detected	0.786
Minimum Non-Detect	66.9	Minimum Non-Detect	4.203
Maximum Non-Detect	66.9	Maximum Non-Detect	4.203
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.418	Lilliefors Test Statistic	0.28
5% Lilliefors Critical Value	0.0978	5% Lilliefors Critical Value	0.0978
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	155	Mean	4.439
SD	355.3	SD	0.788
95% DL/2 (t) UCL	219.9	95% H-Stat (DL/2) UCL	137.8
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	5.776	Mean in Log Scale	4.443
SD	474.1	SD in Log Scale	0.784
95% MLE (t) UCL	92.34	Mean in Original Scale	155.2
95% MLE (Tiku) UCL	102.8	SD in Original Scale	355.2
		95% Percentile Bootstrap UCL	223.2
		95% BCA Bootstrap UCL	256
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.934	Data do not follow a Discernable Distribution (0.05)	
Theta Star	167.6		
nu star	153.2		
A-D Test Statistic	14.87	Nonparametric Statistics	
5% A-D Critical Value	0.784	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.784	Mean	155.3
5% K-S Critical Value	0.102	SD	353.1
Data not Gamme Distributed at 5% Significance Level		SE of Mean	38.99
		95% KM (t) UCL	220.2
Assuming Gamma Distribution		95% KM (z) UCL	219.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	220.2
Minimum	1E-09	95% KM (bootstrap t) UCL	325.9
Maximum	2390	95% KM (BCA) UCL	230.2
Mean	154.6	95% KM (Percentile Bootstrap) UCL	225.7
Median	70.8	95% KM (Chebyshev) UCL	325.3
SD	355.5	97.5% KM (Chebyshev) UCL	398.8
k star	0.662	99% KM (Chebyshev) UCL	543.3
Theta star	233.6		
Nu star	109.9	Potential UCLs to Use	
AppChi2	86.71	95% KM (BCA) UCL	230.2
95% Gamma Approximate UCL	196		
95% Adjusted Gamma UCL	196.8		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debby.freer\My Documents\Ravenna\March 2010 redos\WBG sbs_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Anthracene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.098	Minimum Detected	-2.323
Maximum Detected	0.16	Maximum Detected	-1.833
Mean of Detected	0.129	Mean of Detected	-2.078
SD of Detected	0.0438	SD of Detected	0.347
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	0.41	Maximum Non-Detect	-0.892
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.184	Mean	-1.707
SD	0.0296	SD	0.204
95% DL/2 (t) UCL	0.2	95% H-Stat (DL/2) UCL	0.313
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.129
5% K-S Critical Value	N/A	SD	0.031
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.031
		95% KM (t) UCL	0.185
Assuming Gamma Distribution		95% KM (z) UCL	0.18
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.204
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	0.16
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.16
Median	N/A	95% KM (Chebyshev) UCL	0.264
SD	N/A	97.5% KM (Chebyshev) UCL	0.323
k star	N/A	99% KM (Chebyshev) UCL	0.437
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.185
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.16
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benz(a)anthracene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.051	Minimum Detected	-2.976
Maximum Detected	0.48	Maximum Detected	-0.734
Mean of Detected	0.244	Mean of Detected	-1.773
SD of Detected	0.218	SD of Detected	1.13
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.97	Shapiro Wilk Test Statistic	0.984
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.207	Mean	-1.67
SD	0.0955	SD	0.486
95% DL/2 (t) UCL	0.257	95% H-Stat (DL/2) UCL	0.43
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.216
		SD in Log Scale	0.701
		Mean in Original Scale	0.14
		SD in Original Scale	0.12
		95% Percentile Bootstrap UCL	0.202
		95% BCA Bootstrap UCL	0.216
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.155
5% K-S Critical Value	N/A	SD	0.121
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0685
		95% KM (t) UCL	0.278
Assuming Gamma Distribution		95% KM (z) UCL	0.268
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.328
Minimum	N/A	95% KM (bootstrap t) UCL	0.273
Maximum	N/A	95% KM (BCA) UCL	0.48
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.48
Median	N/A	95% KM (Chebyshev) UCL	0.454
SD	N/A	97.5% KM (Chebyshev) UCL	0.583
k star	N/A	99% KM (Chebyshev) UCL	0.837
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	95% KM (t) UCL	0.278
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.48
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

Benzo(a)pyrene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.06	Minimum Detected	-2.813
Maximum Detected	0.5	Maximum Detected	-0.693
Mean of Detected	0.26	Mean of Detected	-1.674
SD of Detected	0.223	SD of Detected	1.069
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.976	Shapiro Wilk Test Statistic	0.983
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.211	Mean	-1.645
SD	0.0995	SD	0.457
95% DL/2 (t) UCL	0.263	95% H-Stat (DL/2) UCL	0.406
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.093
		SD in Log Scale	0.662
		Mean in Original Scale	0.154
		SD in Original Scale	0.124
		95% Percentile Bootstrap UCL	0.211
		95% BCA Bootstrap UCL	0.234
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.17
5% K-S Critical Value	N/A	SD	0.126
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0726
		95% KM (t) UCL	0.3
Assuming Gamma Distribution		95% KM (z) UCL	0.289
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.355
Minimum	N/A	95% KM (bootstrap t) UCL	0.301
Maximum	N/A	95% KM (BCA) UCL	0.5
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.486
SD	N/A	97.5% KM (Chebyshev) UCL	0.623
k star	N/A	99% KM (Chebyshev) UCL	0.892
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.3
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(b)fluoranthene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.078	Minimum Detected	-2.551
Maximum Detected	0.7	Maximum Detected	-0.357
Mean of Detected	0.356	Mean of Detected	-1.382
SD of Detected	0.316	SD of Detected	1.104
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.987
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.235	Mean	-1.572
SD	0.153	SD	0.485
95% DL/2 (t) UCL	0.315	95% H-Stat (DL/2) UCL	0.394
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.817
		SD in Log Scale	0.686
		Mean in Original Scale	0.206
		SD in Original Scale	0.174
		95% Percentile Bootstrap UCL	0.296
		95% BCA Bootstrap UCL	0.32
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.227
5% K-S Critical Value	N/A	SD	0.175
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0981
		95% KM (t) UCL	0.403
Assuming Gamma Distribution		95% KM (z) UCL	0.388
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.474
Minimum	N/A	95% KM (bootstrap t) UCL	0.393
Maximum	N/A	95% KM (BCA) UCL	0.7
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.655
SD	N/A	97.5% KM (Chebyshev) UCL	0.84
k star	N/A	99% KM (Chebyshev) UCL	1.203
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppCh2	N/A	95% KM (t) UCL	0.403
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(ghi)perylene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.11	Minimum Detected	-2.207
Maximum Detected	0.31	Maximum Detected	-1.171
Mean of Detected	0.21	Mean of Detected	-1.689
SD of Detected	0.141	SD of Detected	0.733
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.41	Maximum Non-Detect	-0.892
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.198	Mean	-1.64
SD	0.0432	SD	0.223
95% DL/2 (t) UCL	0.221	95% H-Stat (DL/2) UCL	0.299
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.21
5% K-S Critical Value	N/A	SD	0.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.1
		95% KM (t) UCL	0.39
Assuming Gamma Distribution		95% KM (z) UCL	0.374
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.453
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	0.31
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.31
Median	N/A	95% KM (Chebyshev) UCL	0.646
SD	N/A	97.5% KM (Chebyshev) UCL	0.834
k star	N/A	99% KM (Chebyshev) UCL	1.205
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.39
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.31
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(k)fluoranthene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.13	Minimum Detected	-2.04
Maximum Detected	0.29	Maximum Detected	-1.238
Mean of Detected	0.21	Mean of Detected	-1.639
SD of Detected	0.113	SD of Detected	0.567
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.41	Maximum Non-Detect	-0.892
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.198	Mean	-1.631
SD	0.0349	SD	0.173
95% DL/2 (t) UCL	0.216	95% H-Stat (DL/2) UCL	0.288
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.21
5% K-S Critical Value	N/A	SD	0.08
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.08
		95% KM (t) UCL	0.354
Assuming Gamma Distribution		95% KM (z) UCL	0.342
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.405
Minimum	N/A	95% KM (bootstrap t) UCL	N/A
Maximum	N/A	95% KM (BCA) UCL	N/A
Mean	N/A	95% KM (Percentile Bootstrap) UCL	0.29
Median	N/A	95% KM (Chebyshev) UCL	0.559
SD	N/A	97.5% KM (Chebyshev) UCL	0.71
k star	N/A	99% KM (Chebyshev) UCL	1.006
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.354
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.29
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

Chrysene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	9
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.062	Minimum Detected	-2.781
Maximum Detected	0.56	Maximum Detected	-0.58
Mean of Detected	0.274	Mean of Detected	-1.657
SD of Detected	0.257	SD of Detected	1.101
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	11
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.67%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.938	Shapiro Wilk Test Statistic	0.999
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.215	Mean	-1.64
SD	0.115	SD	0.47
95% DL/2 (t) UCL	0.275	95% H-Stat (DL/2) UCL	0.411
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.099
		SD in Log Scale	0.691
		Mean in Original Scale	0.157
		SD in Original Scale	0.139
		95% Percentile Bootstrap UCL	0.226
		95% BCA Bootstrap UCL	0.244
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.167
5% K-S Critical Value	N/A	SD	0.136
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.069
		95% KM (t) UCL	0.291
Assuming Gamma Distribution		95% KM (z) UCL	0.28
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.332
Minimum	N/A	95% KM (bootstrap t) UCL	0.268
Maximum	N/A	95% KM (BCA) UCL	0.56
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.467
SD	N/A	97.5% KM (Chebyshev) UCL	0.598
k star	N/A	99% KM (Chebyshev) UCL	0.853
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.291
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A

ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Fluoranthene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	8
		Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.05	Minimum Detected	-2.996
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.443	Mean of Detected	-1.478
SD of Detected	0.529	SD of Detected	1.407
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.33%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.842	Shapiro Wilk Test Statistic	0.974
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.278	Mean	-1.581
SD	0.302	SD	0.739
95% DL/2 (t) UCL	0.434	95% H-Stat (DL/2) UCL	0.656
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.239
		SD in Log Scale	1.061
		Mean in Original Scale	0.205
		SD in Original Scale	0.33
		95% Percentile Bootstrap UCL	0.369
		95% BCA Bootstrap UCL	0.457
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.388	Data appear Normal at 5% Significance Level	
Theta Star	1.141		
nu star	3.101		
A-D Test Statistic	0.267	Nonparametric Statistics	
5% A-D Critical Value	0.668	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.668	Mean	0.201
5% K-S Critical Value	0.404	SD	0.316
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.107
		95% KM (t) UCL	0.393
Assuming Gamma Distribution		95% KM (z) UCL	0.377
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.381
Minimum	0.05	95% KM (bootstrap t) UCL	0.541
Maximum	1.2	95% KM (BCA) UCL	0.608
Mean	0.456	95% KM (Percentile Bootstrap) UCL	0.542
Median	0.388	95% KM (Chebyshev) UCL	0.667
SD	0.354	97.5% KM (Chebyshev) UCL	0.868
k star	1.288	99% KM (Chebyshev) UCL	1.264
Theta star	0.354		
Nu star	30.91	Potential UCLs to Use	
AppChi2	19.21	95% KM (t) UCL	0.393
95% Gamma Approximate UCL	0.734	95% KM (Percentile Bootstrap) UCL	0.542
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Indeno(1,2,3-cd)pyrene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	10
		Percent Non-Detects	83.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.13	Minimum Detected	-2.04
Maximum Detected	0.37	Maximum Detected	-0.994
Mean of Detected	0.25	Mean of Detected	-1.517
SD of Detected	0.17	SD of Detected	0.74
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.41	Maximum Non-Detect	-0.892
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	12
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.205	Mean	-1.611
SD	0.0555	SD	0.229
95% DL/2 (t) UCL	0.234	95% H-Stat (DL/2) UCL	0.291
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.25
5% K-S Critical Value	N/A	SD	0.12
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.12
Assuming Gamma Distribution		95% KM (t) UCL	0.466
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.447
Minimum	N/A	95% KM (jackknife) UCL	0.542
Maximum	N/A	95% KM (bootstrap t) UCL	N/A
Mean	N/A	95% KM (BCA) UCL	0.37
Median	N/A	95% KM (Percentile Bootstrap) UCL	0.37
SD	N/A	95% KM (Chebyshev) UCL	0.773
k star	N/A	97.5% KM (Chebyshev) UCL	0.999
Theta star	N/A	99% KM (Chebyshev) UCL	1.444
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.466
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	0.37
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Phenanthrene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	8
		Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.093	Minimum Detected	-2.375
Maximum Detected	3.2	Maximum Detected	1.163
Mean of Detected	0.991	Mean of Detected	-0.953
SD of Detected	1.486	SD of Detected	1.595
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.41	Maximum Non-Detect	-0.892
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.33%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.731	Shapiro Wilk Test Statistic	0.924
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.461	Mean	-1.404
SD	0.869	SD	0.897
95% DL/2 (t) UCL	0.912	95% H-Stat (DL/2) UCL	0.696
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.764
		SD in Log Scale	1.135
		Mean in Original Scale	0.419
		SD in Original Scale	0.885
		95% Percentile Bootstrap UCL	0.907
		95% BCA Bootstrap UCL	1.185
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.329	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	3.016		
nu star	2.628		
A-D Test Statistic	0.411	Nonparametric Statistics	
5% A-D Critical Value	0.675	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.675	Mean	0.408
5% K-S Critical Value	0.407	SD	0.85
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.284
		95% KM (t) UCL	0.917
Assuming Gamma Distribution		95% KM (z) UCL	0.874
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.87
Minimum	0.093	95% KM (bootstrap t) UCL	2.359
Maximum	3.2	95% KM (BCA) UCL	3.2
Mean	1	95% KM (Percentile Bootstrap) UCL	0.975
Median	0.649	95% KM (Chebyshev) UCL	1.644
SD	1	97.5% KM (Chebyshev) UCL	2.179
k star	0.861	99% KM (Chebyshev) UCL	3.23
Theta star	1.162		
Nu star	20.66	Potential UCLs to Use	
AppChi2	11.34	95% KM (t) UCL	0.917
95% Gamma Approximate UCL	1.822		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Pyrene			
General Statistics			
Number of Valid Data	12	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	8
		Percent Non-Detects	66.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.083	Minimum Detected	-2.489
Maximum Detected	0.91	Maximum Detected	-0.0943
Mean of Detected	0.398	Mean of Detected	-1.345
SD of Detected	0.382	SD of Detected	1.111
Minimum Non-Detect	0.38	Minimum Non-Detect	-0.968
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.33%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.892	Shapiro Wilk Test Statistic	0.935
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.263	Mean	-1.536
SD	0.223	SD	0.598
95% DL/2 (t) UCL	0.379	95% H-Stat (DL/2) UCL	0.512
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.947
		SD in Log Scale	0.839
		Mean in Original Scale	0.212
		SD in Original Scale	0.247
		95% Percentile Bootstrap UCL	0.328
		95% BCA Bootstrap UCL	0.394
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.497	Data appear Normal at 5% Significance Level	
Theta Star	0.801		
nu star	3.976		
A-D Test Statistic	0.313	Nonparametric Statistics	
5% A-D Critical Value	0.664	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.664	Mean	0.204
5% K-S Critical Value	0.401	SD	0.236
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.08
		95% KM (t) UCL	0.347
Assuming Gamma Distribution		95% KM (z) UCL	0.335
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.339
Minimum	0.083	95% KM (bootstrap t) UCL	0.381
Maximum	0.91	95% KM (BCA) UCL	0.543
Mean	0.403	95% KM (Percentile Bootstrap) UCL	0.543
Median	0.378	95% KM (Chebyshev) UCL	0.553
SD	0.234	97.5% KM (Chebyshev) UCL	0.704
k star	2.204	99% KM (Chebyshev) UCL	1
Theta star	0.183		
Nu star	52.91	Potential UCLs to Use	
AppChi2	37.2	95% KM (t) UCL	0.347
95% Gamma Approximate UCL	0.574	95% KM (Percentile Bootstrap) UCL	0.543
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
 ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
 RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\March 2010 redos\WBG sbs_NGT RA and MEC U
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Acetone			
General Statistics			
Number of Valid Data	8	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detected Data	6
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0049	Minimum Detected	-5.319
Maximum Detected	0.052	Maximum Detected	-2.957
Mean of Detected	0.0285	Mean of Detected	-4.138
SD of Detected	0.0333	SD of Detected	1.67
Minimum Non-Detect	0.011	Minimum Non-Detect	-4.51
Maximum Non-Detect	0.02	Maximum Non-Detect	-3.912
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0121	Mean	-4.818
SD	0.0162	SD	0.781
95% DL/2 (t) UCL	0.0229	95% H-Stat (DL/2) UCL	0.0344
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0108
5% K-S Critical Value	N/A	SD	0.0156
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.00779
		95% KM (t) UCL	0.0255
Assuming Gamma Distribution		95% KM (z) UCL	0.0236
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0449
Minimum	N/A	95% KM (bootstrap t) UCL	0.0108
Maximum	N/A	95% KM (BCA) UCL	0.052
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0447
SD	N/A	97.5% KM (Chebyshev) UCL	0.0594
k star	N/A	99% KM (Chebyshev) UCL	0.0883
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	97.5% KM (Chebyshev) UCL	0.0594
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Warning: Recommended UCL exceeds the maximum observation			
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Toluene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	3
		Percent Non-Detects	37.50%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.00043	Minimum Detected	-7.752
Maximum Detected	0.011	Maximum Detected	-4.51
Mean of Detected	0.00357	Mean of Detected	-6.179
SD of Detected	0.00426	SD of Detected	1.19
Minimum Non-Detect	0.0056	Minimum Non-Detect	-5.185
Maximum Non-Detect	0.006	Maximum Non-Detect	-5.116
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.50%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.752	Shapiro Wilk Test Statistic	0.975
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00332	Mean	-6.053
SD	0.00324	SD	0.916
95% DL/2 (t) UCL	0.00549	95% H-Stat (DL/2) UCL	0.0114
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.327
		SD in Log Scale	0.922
		Mean in Original Scale	0.00275
		SD in Original Scale	0.00341
		95% Percentile Bootstrap UCL	0.00499
		95% BCA Bootstrap UCL	0.00541
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.556	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.00641		
nu star	5.564		
A-D Test Statistic	0.32	Nonparametric Statistics	
5% A-D Critical Value	0.691	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.691	Mean	0.00287
5% K-S Critical Value	0.364	SD	0.0032
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0013
		95% KM (t) UCL	0.00533
Assuming Gamma Distribution		95% KM (z) UCL	0.005
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00527
Minimum	0.00043	95% KM (bootstrap t) UCL	0.00794
Maximum	0.011	95% KM (BCA) UCL	0.00534
Mean	0.00354	95% KM (Percentile Bootstrap) UCL	0.00503
Median	0.00309	95% KM (Chebyshev) UCL	0.00853
SD	0.00322	97.5% KM (Chebyshev) UCL	0.011
k star	1.097	99% KM (Chebyshev) UCL	0.0158
Theta star	0.00322		
Nu star	17.55	Potential UCLs to Use	
AppChi2	9.066	95% KM (BCA) UCL	0.00534
95% Gamma Approximate UCL	0.00685		
95% Adjusted Gamma UCL	0.00819		
Note: DL/2 is not a recommended method.			

APPENDIX A
Statistical Summary of Detected Analytes in Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended EPC mg/kg	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg						
Explosives									
1,3,5-Trinitrobenzene	6/28	4.20E-02	1.60E+00	4.07E-01	2.75E-01	Gamma	KM-t	2.75E-01	UCL
2,4,6-Trinitrotoluene	13/28	4.80E-02	5.20E+03	6.58E+02	2.50E+03	Lognormal	99% KM (Chebyshev)	2.50E+03	UCL
2-Amino-4,6-Dinitrotoluene	2/19	4.50E-01	1.40E+00	9.25E-01	6.39E-01	NP	KM-t	6.39E-01	UCL
HMX	7/28	1.20E-01	4.10E-01	2.54E-01	3.43E-01	Approx. Gamma	KM-t	3.43E-01	UCL
RDX	10/28	1.70E-01	2.60E+02	5.09E+01	1.46E+02		99% KM (Chebyshev)	1.46E+02	UCL
Tetryl	4/28	7.70E-02	2.40E-01	1.49E-01	2.13E-01	Normal	KM (Percentile Bootstrap)	2.13E-01	UCL
Inorganics									
Aluminum	31/31	5.81E+03	1.64E+04	1.14E+04	1.22E+04	Normal	Student's-t	1.22E+04	UCL
Antimony	18/31	4.10E-01	9.40E+00	1.94E+00	1.99E+00	NP	KM (Percentile Bootstrap)	1.99E+00	UCL
Arsenic	31/31	9.40E+00	2.88E+01	1.57E+01	1.69E+01	Gamma	Approx. Gamma	1.69E+01	UCL
Barium	31/31	3.46E+01	3.67E+02	1.03E+02	1.65E+02	NP	Chebyshev (Mean, Sd)	1.65E+02	UCL
Beryllium	23/31	2.30E-01	8.80E-01	5.24E-01	5.34E-01	Normal	KM (Percentile Bootstrap)	5.34E-01	UCL
Cadmium	15/31	8.10E-02	6.91E+01	6.72E+00	1.84E+01	NP	97.5% KM (Chebyshev)	1.84E+01	UCL
Chromium (total)	31/31	1.01E+01	2.88E+01	1.74E+01	1.86E+01	Normal	Student's-t	1.86E+01	UCL
Cobalt	31/31	5.40E+00	1.82E+01	1.17E+01	1.26E+01	Normal	Student's-t	1.26E+01	UCL
Copper	31/31	9.50E+00	2.20E+02	3.30E+01	6.31E+01	NP	Chebyshev (Mean, Sd)	6.31E+01	UCL
Lead	31/31	9.50E+00	1.73E+02	3.41E+01	6.63E+01	NP	Chebyshev (Mean, Sd)	6.63E+01	UCL
Manganese	31/31	2.36E+02	1.27E+03	5.00E+02	5.75E+02	NP	Modified-t	5.75E+02	UCL
Mercury	20/31	9.70E-03	6.50E-02	2.31E-02	2.73E-02	Gamma	KM (Percentile Bootstrap)	2.73E-02	UCL
Nickel	31/31	1.14E+01	4.68E+01	2.60E+01	2.82E+01	Normal	Student's-t	2.82E+01	UCL
Selenium	10/31	4.20E-01	1.90E+00	8.15E-01	6.60E-01	Gamma	KM-t	6.60E-01	UCL
Silver	3/31	2.50E-01	7.80E-01	4.37E-01	7.80E-01	Normal	KM (Percentile Bootstrap)	7.80E-01	MDC
Thallium	21/31	2.70E-01	7.60E-01	4.83E-01	5.08E-01	Normal	KM-t	5.08E-01	UCL
Vanadium	31/31	1.06E+01	2.80E+01	1.99E+01	2.13E+01	Normal	Student's-t	2.13E+01	UCL
Zinc	31/31	4.16E+01	8.90E+02	1.23E+02	2.57E+02	NP	Chebyshev (Mean, Sd)	2.57E+02	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.)

The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG sbs_NGT RA and M
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	22
		Percent Non-Detects	78.57%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.042	Minimum Detected	-3.17
Maximum Detected	1.6	Maximum Detected	0.47
Mean of Detected	0.407	Mean of Detected	-1.601
SD of Detected	0.593	SD of Detected	1.251
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.657	Shapiro Wilk Test Statistic	0.963
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.788	Mean	-1.485
SD	25.78	SD	1.781
95% DL/2 (t) UCL	15.09	95% H-Stat (DL/2) UCL	3.498
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.388
		SD in Log Scale	0.962
		Mean in Original Scale	0.162
		SD in Original Scale	0.293
		95% Percentile Bootstrap UCL	0.268
		95% BCA Bootstrap UCL	0.326
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.531	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.768		
nu star	6.367		
A-D Test Statistic	0.454	Nonparametric Statistics	
5% A-D Critical Value	0.719	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.719	Mean	0.162
5% K-S Critical Value	0.343	SD	0.295
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0661
Assuming Gamma Distribution		95% KM (t) UCL	0.275
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.271
Minimum	1E-09	95% KM (jackknife) UCL	0.272
Maximum	1.6	95% KM (bootstrap t) UCL	0.442
Mean	0.302	95% KM (BCA) UCL	0.305
Median	0.259	95% KM (Percentile Bootstrap) UCL	0.319
SD	0.315	95% KM (Chebyshev) UCL	0.45
k star	0.24	97.5% KM (Chebyshev) UCL	0.575
Theta star	1.26	99% KM (Chebyshev) UCL	0.82
Nu star	13.44	Potential UCLs to Use	
AppChi2	6.19	95% KM (t) UCL	0.275
95% Gamma Approximate UCL	0.656		
95% Adjusted Gamma UCL	0.69		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3-Dinitrobenzene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 1,3-Dinitrobenzene was not processed!			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	15
		Percent Non-Detects	53.57%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.048	Minimum Detected	-3.037
Maximum Detected	5200	Maximum Detected	8.556
Mean of Detected	657.6	Mean of Detected	1.211
SD of Detected	1641	SD of Detected	3.731
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.469	Shapiro Wilk Test Statistic	0.887
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	305.4	Mean	-0.552
SD	1144	SD	2.997
95% DL/2 (t) UCL	673.5	95% H-Stat (DL/2) UCL	470.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.079
		SD in Log Scale	3.723
		Mean in Original Scale	305.4
		SD in Original Scale	1144
		95% Percentile Bootstrap UCL	677.2
		95% BCA Bootstrap UCL	862.2
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.164	Data appear Lognormal at 5% Significance Level	
Theta Star	4016		
nu star	4.257		
A-D Test Statistic	1.738	Nonparametric Statistics	
5% A-D Critical Value	0.888	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.888	Mean	305.4
5% K-S Critical Value	0.264	SD	1123
Data not Gamma Distributed at 5% Significance Level		SE of Mean	220.9
Assuming Gamma Distribution		95% KM (t) UCL	681.6
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	668.7
Minimum	0.048	95% KM (jackknife) UCL	673.5
Maximum	5200	95% KM (bootstrap t) UCL	82623
Mean	630.4	95% KM (BCA) UCL	726.1
Median	546.9	95% KM (Percentile Bootstrap) UCL	676.8
SD	1097	95% KM (Chebyshev) UCL	1268
k star	0.276	97.5% KM (Chebyshev) UCL	1685
Theta star	2282	99% KM (Chebyshev) UCL	2503
Nu star	15.47	Potential UCLs to Use	
AppChi2	7.59	99% KM (Chebyshev) UCL	2503
95% Gamma Approximate UCL	1285		
95% Adjusted Gamma UCL	1345		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 2,4-Dinitrotoluene was not processed!			
2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 2,6-Dinitrotoluene was not processed!			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Amino-4,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	19	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	17
Number of Missing Values	9	Percent Non-Detects	89.47%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.45	Minimum Detected	-0.799
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.925	Mean of Detected	-0.231
SD of Detected	0.672	SD of Detected	0.803
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods).		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: Data set has only 2 Distinct Detected Values.			
This may not be adequate enough to compute meaningful and reliable test statistics and estimates.			
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).			
Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	N/A	Shapiro Wilk Test Statistic	N/A
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9.933	Mean	-1.196
SD	31.05	SD	2.088
95% DL/2 (t) UCL	22.28	95% H-Stat (DL/2) UCL	19.75
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.506
5% K-S Critical Value	N/A	SD	0.224
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0767
Assuming Gamma Distribution		95% KM (t) UCL	0.639
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.632
Minimum	N/A	95% KM (jackknife) UCL	1.135
Maximum	N/A	95% KM (bootstrap t) UCL	0.514
Mean	N/A	95% KM (BCA) UCL	1.4
Median	N/A	95% KM (Percentile Bootstrap) UCL	N/A
SD	N/A	95% KM (Chebyshev) UCL	0.84
k star	N/A	97.5% KM (Chebyshev) UCL	0.985
Theta star	N/A	99% KM (Chebyshev) UCL	1.269
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.639
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Nitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 2-Nitrotoluene was not processed!			
3-Nitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 3-Nitrotoluene was not processed!			
4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	19	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	18
Number of Missing Values	9	Percent Non-Detects	94.74%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 4-Amino-2,6-Dinitrotoluene was not processed!			
4-Nitrotoluene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable 4-Nitrotoluene was not processed!			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

HMX			
General Statistics			
Number of Valid Data	28	Number of Detected Data	7
Number of Distinct Detected Data	4	Number of Non-Detect Data	21
		Percent Non-Detects	75.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.12	Minimum Detected	-2.12
Maximum Detected	0.41	Maximum Detected	-0.892
Mean of Detected	0.254	Mean of Detected	-1.505
SD of Detected	0.138	SD of Detected	0.569
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.775	Shapiro Wilk Test Statistic	0.806
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.65	Mean	-0.879
SD	51.96	SD	1.752
95% DL/2 (t) UCL	30.38	95% H-Stat (DL/2) UCL	6.972
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.505
		SD in Log Scale	0.509
		Mean in Original Scale	0.251
		SD in Original Scale	0.131
		95% Percentile Bootstrap UCL	0.293
		95% BCA Bootstrap UCL	0.294
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.291	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.111		
nu star	32.07		
A-D Test Statistic	0.753	Nonparametric Statistics	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.254
5% K-S Critical Value	0.313	SD	0.128
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0522
		95% KM (t) UCL	0.343
Assuming Gamma Distribution		95% KM (z) UCL	0.34
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.349
Minimum	1E-09	95% KM (bootstrap t) UCL	0.368
Maximum	0.429	95% KM (BCA) UCL	0.341
Mean	0.255	95% KM (Percentile Bootstrap) UCL	0.335
Median	0.27	95% KM (Chebyshev) UCL	0.482
SD	0.118	97.5% KM (Chebyshev) UCL	0.58
k star	0.722	99% KM (Chebyshev) UCL	0.774
Theta star	0.353		
Nu star	40.44	Potential UCLs to Use	
AppChi2	26.86	95% KM (t) UCL	0.343
95% Gamma Approximate UCL	0.384		
95% Adjusted Gamma UCL	0.394		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nitrobenzene			
General Statistics			
Number of Valid Data	28	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	27
		Percent Non-Detects	96.43%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable Nitrobenzene was not processed!			
Nitrocellulose			
General Statistics			
Number of Valid Data	2	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	1
Number of Missing Values	7	Percent Non-Detects	50.00%
Warning: This data set only has 2 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable Nitrocellulose was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			
Nitroglycerin			
General Statistics			
Number of Valid Data	28	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	28
		Percent Non-Detects	100.00%
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).			
The data set for variable Nitroglycerin was not processed!			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

RDX			
General Statistics			
Number of Valid Data	28	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	18
		Percent Non-Detects	64.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	260	Maximum Detected	5.561
Mean of Detected	50.92	Mean of Detected	0.768
SD of Detected	105	SD of Detected	2.685
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	1.5	Maximum Non-Detect	0.405
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	85.71%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.528	Shapiro Wilk Test Statistic	0.804
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.37	Mean	-0.553
SD	65.48	SD	1.861
95% DL/2 (t) UCL	39.45	95% H-Stat (DL/2) UCL	7.777
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.725
		SD in Log Scale	2.25
		Mean in Original Scale	18.48
		SD in Original Scale	65.45
		95% Percentile Bootstrap UCL	37.3
		95% BCA Bootstrap UCL	46.91
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.226	Data do not follow a Discernable Distribution (0.05)	
Theta Star	225		
nu star	4.525		
A-D Test Statistic	1.528	Nonparametric Statistics	
5% A-D Critical Value	0.843	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.843	Mean	18.38
5% K-S Critical Value	0.292	SD	64.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	12.81
Assuming Gamma Distribution		95% KM (t) UCL	40.2
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	39.45
Minimum	1E-09	95% KM (jackknife) UCL	39.46
Maximum	260	95% KM (bootstrap t) UCL	1448
Mean	43.84	95% KM (BCA) UCL	44.18
Median	38.47	95% KM (Percentile Bootstrap) UCL	37.16
SD	63.67	95% KM (Chebyshev) UCL	74.22
k star	0.201	97.5% KM (Chebyshev) UCL	98.38
Theta star	218.3	99% KM (Chebyshev) UCL	145.8
Nu star	11.25	Potential UCLs to Use	
AppChi2	4.735	99% KM (Chebyshev) UCL	145.8
95% Gamma Approximate UCL	104.1		
95% Adjusted Gamma UCL	110.2		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Tetryl			
General Statistics			
Number of Valid Data	28	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	24
		Percent Non-Detects	85.71%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.077	Minimum Detected	-2.564
Maximum Detected	0.24	Maximum Detected	-1.427
Mean of Detected	0.149	Mean of Detected	-1.982
SD of Detected	0.0679	SD of Detected	0.468
Minimum Non-Detect	0.65	Minimum Non-Detect	-0.431
Maximum Non-Detect	2	Maximum Non-Detect	0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.987
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.336	Mean	-1.182
SD	0.16	SD	0.441
95% DL/2 (t) UCL	0.387	95% H-Stat (DL/2) UCL	0.461
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.982
		SD in Log Scale	0.532
		Mean in Original Scale	0.158
		SD in Original Scale	0.0864
		95% Percentile Bootstrap UCL	0.186
		95% BCA Bootstrap UCL	0.189
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.77	Data appear Normal at 5% Significance Level	
Theta Star	0.0843		
nu star	14.16		
A-D Test Statistic	0.227	Nonparametric Statistics	
5% A-D Critical Value	0.658	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.658	Mean	0.149
5% K-S Critical Value	0.396	SD	0.0588
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0339
		95% KM (t) UCL	0.207
Assuming Gamma Distribution		95% KM (z) UCL	0.205
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.215
Minimum	0.0003162	95% KM (bootstrap t) UCL	0.25
Maximum	0.251	95% KM (BCA) UCL	0.203
Mean	0.147	95% KM (Percentile Bootstrap) UCL	0.213
Median	0.152	95% KM (Chebyshev) UCL	0.297
SD	0.0692	97.5% KM (Chebyshev) UCL	0.361
k star	1.634	99% KM (Chebyshev) UCL	0.487
Theta star	0.0898		
Nu star	91.53	Potential UCLs to Use	
AppChi2	70.46	95% KM (t) UCL	0.207
95% Gamma Approximate UCL	0.191	95% KM (Percentile Bootstrap) UCL	0.213
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbi.freer\My Documents\Ravenna\April 2010 rev data set\WBG sbs_NGT RA and ME
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Aluminum			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	29
Raw Statistics		Log-transformed Statistics	
Minimum	5810	Minimum of Log Data	8.667
Maximum	16400	Maximum of Log Data	9.705
Mean	11431	Mean of log Data	9.318
Median	10900	SD of log Data	0.238
SD	2590		
Coefficient of Variation	0.227		
Skewness	0.0849		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.968	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12221	95% H-UCL	12364
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	
95% Adjusted-CLT UCL	12204	97.5% Chebyshev (MVUE) UCL	14528
95% Modified-t UCL	12222	99% Chebyshev (MVUE) UCL	16358
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	17.35	Data appear Normal at 5% Significance Level	
Theta Star	658.7		
MLE of Mean	11431		
MLE of Standard Deviation	2744		
nu star	1076		
Approximate Chi Square Value (.05)	1001	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	
Adjusted Chi Square Value	996.7	95% Jackknife UCL	
		95% Standard Bootstrap UCL	
Anderson-Darling Test Statistic	0.379	95% Bootstrap-t UCL	
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	
Kolmogorov-Smirnov Test Statistic	0.11	95% Percentile Bootstrap UCL	
Kolmogorov-Smirnov 5% Critical Value	0.157	95% BCA Bootstrap UCL	
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	
		97.5% Chebyshev(Mean, Sd) UCL	
		99% Chebyshev(Mean, Sd) UCL	
Assuming Gamma Distribution			
95% Approximate Gamma UCL	12290		
95% Adjusted Gamma UCL	12339		
Potential UCL to Use		Use 95% Student's-t UCL	
			12221

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Antimony			
General Statistics			
Number of Valid Data	31	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	13
		Percent Non-Detects	41.94%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.41	Minimum Detected	-0.892
Maximum Detected	9.4	Maximum Detected	2.241
Mean of Detected	1.937	Mean of Detected	0.0864
SD of Detected	2.539	SD of Detected	0.994
Minimum Non-Detect	0.58	Minimum Non-Detect	-0.545
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.87%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.636	Shapiro Wilk Test Statistic	0.77
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.329	Mean	-0.274
SD	2.047	SD	0.893
95% DL/2 (t) UCL	1.953	95% H-Stat (DL/2) UCL	1.706
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	5.749	Mean in Log Scale	-0.266
SD	2.42	SD in Log Scale	0.917
95% MLE (t) UCL	6.487	Mean in Original Scale	1.349
95% MLE (Tiku) UCL	7.559	SD in Original Scale	2.046
		95% Percentile Bootstrap UCL	1.984
		95% BCA Bootstrap UCL	2.203
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.874	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.216		
nu star	31.46		
A-D Test Statistic	2.401	Nonparametric Statistics	
5% A-D Critical Value	0.767	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.767	Mean	1.354
5% K-S Critical Value	0.209	SD	2.003
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.371
Assuming Gamma Distribution		95% KM (t) UCL	1.983
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	1.964
Minimum	1E-09	95% KM (jackknife) UCL	1.976
Maximum	9.4	95% KM (bootstrap t) UCL	2.5
Mean	1.671	95% KM (BCA) UCL	2.018
Median	0.71	95% KM (Percentile Bootstrap) UCL	1.987
SD	2.132	95% KM (Chebyshev) UCL	2.97
k star	0.28	97.5% KM (Chebyshev) UCL	3.669
Theta star	5.973	99% KM (Chebyshev) UCL	5.041
Nu star	17.34	Potential UCLs to Use	
AppChi2	8.916	95% KM (t) UCL	1.983
95% Gamma Approximate UCL	3.249	95% KM (% Bootstrap) UCL	1.987
95% Adjusted Gamma UCL	3.376		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Arsenic				
General Statistics				
Number of Valid Observations		31	Number of Distinct Observations	30
Raw Statistics		Log-transformed Statistics		
Minimum	9.4	Minimum of Log Data	2.241	
Maximum	28.8	Maximum of Log Data	3.36	
Mean	15.66	Mean of log Data	2.721	
Median	14.8	SD of log Data	0.246	
SD	4.115			
Coefficient of Variation	0.263			
Skewness	1.226			
Relevant UCL Statistics				
Normal Distribution Test		Lognormal Distribution Test		
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk Test Statistic	0.981	
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929	
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
95% Student's-t UCL	16.92	95% H-UCL	16.95	
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.69	
95% Adjusted-CLT UCL	17.05	97.5% Chebyshev (MVUE) UCL	20.01	
95% Modified-t UCL	16.95	99% Chebyshev (MVUE) UCL	22.59	
Gamma Distribution Test		Data Distribution		
k star (bias corrected)	15.09	Data appear Gamma Distributed at 5% Significance Level		
Theta Star	1.038			
MLE of Mean	15.66			
MLE of Standard Deviation	4.032			
nu star	935.7			
Approximate Chi Square Value (.05)	865.7	Nonparametric Statistics		
Adjusted Level of Significance	0.0413	95% CLT UCL	16.88	
Adjusted Chi Square Value	862	95% Jackknife UCL	16.92	
		95% Standard Bootstrap UCL	16.84	
Anderson-Darling Test Statistic	0.319	95% Bootstrap-t UCL	17.19	
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	17.31	
Kolmogorov-Smirnov Test Statistic	0.103	95% Percentile Bootstrap UCL	16.87	
Kolmogorov-Smirnov 5% Critical Value	0.158	95% BCA Bootstrap UCL	16.96	
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	18.89	
		97.5% Chebyshev(Mean, Sd) UCL	20.28	
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	23.02	
95% Approximate Gamma UCL	16.93			
95% Adjusted Gamma UCL	17			
Potential UCL to Use		Use 95% Approximate Gamma UCL		16.93

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Barium			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	30
Raw Statistics		Log-transformed Statistics	
Minimum	34.6	Minimum of Log Data	3.544
Maximum	367	Maximum of Log Data	5.905
Mean	103.1	Mean of log Data	4.442
Median	73.4	SD of log Data	0.587
SD	79.01		
Coefficient of Variation	0.767		
Skewness	2.289		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.713	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	127.2	95% H-UCL	125
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	
95% Adjusted-CLT UCL	132.6	97.5% Chebyshev (MVUE) UCL	170.2
95% Modified-t UCL	128.1	99% Chebyshev (MVUE) UCL	211.7
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.497	Data do not follow a Discernable Distribution (0.05)	
Theta Star	41.27		
MLE of Mean	103.1		
MLE of Standard Deviation	65.22		
nu star	154.8		
Approximate Chi Square Value (.05)	127.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	
Adjusted Chi Square Value	125.7	95% Jackknife UCL	
		95% Standard Bootstrap UCL	
Anderson-Darling Test Statistic	1.373	95% Bootstrap-t UCL	
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	
Kolmogorov-Smirnov Test Statistic	0.2	95% Percentile Bootstrap UCL	
Kolmogorov-Smirnov 5% Critical Value	0.159	95% BCA Bootstrap UCL	
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	
		97.5% Chebyshev(Mean, Sd) UCL	
		99% Chebyshev(Mean, Sd) UCL	
Assuming Gamma Distribution			
95% Approximate Gamma UCL	125.6		
95% Adjusted Gamma UCL	127		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	
		164.9	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Beryllium			
General Statistics			
Number of Valid Data	31	Number of Detected Data	23
Number of Distinct Detected Data	18	Number of Non-Detect Data	8
		Percent Non-Detects	25.81%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.23	Minimum Detected	-1.47
Maximum Detected	0.88	Maximum Detected	-0.128
Mean of Detected	0.524	Mean of Detected	-0.696
SD of Detected	0.166	SD of Detected	0.326
Minimum Non-Detect	0.23	Minimum Non-Detect	-1.47
Maximum Non-Detect	0.69	Maximum Non-Detect	-0.371
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.10%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.935	Shapiro Wilk Test Statistic	0.944
5% Shapiro Wilk Critical Value	0.914	5% Shapiro Wilk Critical Value	0.914
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.448	Mean	-0.917
SD	0.198	SD	0.522
95% DL/2 (t) UCL	0.509	95% H-Stat (DL/2) UCL	0.577
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.461	Mean in Log Scale	-0.81
SD	0.206	SD in Log Scale	0.363
95% MLE (t) UCL	0.524	Mean in Original Scale	0.474
95% MLE (Tiku) UCL	0.675	SD in Original Scale	0.171
		95% Percentile Bootstrap UCL	0.523
		95% BCA Bootstrap UCL	0.528
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	9.03	Data appear Normal at 5% Significance Level	
Theta Star	0.058		
nu star	415.4		
A-D Test Statistic	0.541	Nonparametric Statistics	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.471
5% K-S Critical Value	0.182	SD	0.177
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0335
Assuming Gamma Distribution		95% KM (t) UCL	0.528
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.527
Minimum	0.23	95% KM (jackknife) UCL	0.526
Maximum	0.88	95% KM (bootstrap t) UCL	0.532
Mean	0.501	95% KM (BCA) UCL	0.543
Median	0.47	95% KM (Percentile Bootstrap) UCL	0.534
SD	0.162	95% KM (Chebyshev) UCL	0.618
k star	8.803	97.5% KM (Chebyshev) UCL	0.681
Theta star	0.0569	99% KM (Chebyshev) UCL	0.805
Nu star	545.8	Potential UCLs to Use	
AppChi2	492.6	95% KM (t) UCL	0.528
95% Gamma Approximate UCL	0.555	95% KM (Percentile Bootstrap) UCL	0.534
95% Adjusted Gamma UCL	0.558		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Cadmium			
General Statistics			
Number of Valid Data	31	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	16
		Percent Non-Detects	51.61%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.081	Minimum Detected	-2.513
Maximum Detected	69.1	Maximum Detected	4.236
Mean of Detected	6.719	Mean of Detected	-0.685
SD of Detected	18.68	SD of Detected	1.882
Minimum Non-Detect	0.56	Minimum Non-Detect	-0.58
Maximum Non-Detect	0.64	Maximum Non-Detect	-0.446
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	28
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.32%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.414	Shapiro Wilk Test Statistic	0.661
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.404	Mean	-0.959
SD	13.17	SD	1.314
95% DL/2 (t) UCL	7.419	95% H-Stat (DL/2) UCL	2.674
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.952
		SD in Log Scale	1.407
		Mean in Original Scale	3.447
		SD in Original Scale	13.16
		95% Percentile Bootstrap UCL	7.831
		95% BCA Bootstrap UCL	10.13
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.261	Data do not follow a Discernable Distribution (0.05)	
Theta Star	25.74		
nu star	7.83		
A-D Test Statistic	3.467	Nonparametric Statistics	
5% A-D Critical Value	0.848	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.848	Mean	3.381
5% K-S Critical Value	0.242	SD	12.96
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.409
		95% KM (t) UCL	7.47
Assuming Gamma Distribution		95% KM (z) UCL	7.344
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.397
Minimum	0.081	95% KM (bootstrap t) UCL	294.1
Maximum	69.1	95% KM (BCA) UCL	7.81
Mean	6.751	95% KM (Percentile Bootstrap) UCL	7.808
Median	6.47	95% KM (Chebyshev) UCL	13.88
SD	12.76	97.5% KM (Chebyshev) UCL	18.43
k star	0.478	99% KM (Chebyshev) UCL	27.35
Theta star	14.11		
Nu star	29.66	Potential UCLs to Use	
AppChi2	18.22	97.5% KM (Chebyshev) UCL	18.43
95% Gamma Approximate UCL	10.99		
95% Adjusted Gamma UCL	11.3		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Chromium				
General Statistics				
Number of Valid Observations		31	Number of Distinct Observations	27
Raw Statistics		Log-transformed Statistics		
Minimum		10.1	Minimum of Log Data	2.313
Maximum		28.8	Maximum of Log Data	3.36
Mean		17.35	Mean of log Data	2.827
Median		16.4	SD of log Data	0.234
SD		4.032		
Coefficient of Variation		0.232		
Skewness		0.56		
Relevant UCL Statistics				
Normal Distribution Test		Lognormal Distribution Test		
Shapiro Wilk Test Statistic		0.969	Shapiro Wilk Test Statistic	0.979
Shapiro Wilk Critical Value		0.929	Shapiro Wilk Critical Value	0.929
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
95% Student's-t UCL		18.58	95% H-UCL	18.73
95% UCLs (Adjusted for Skewness)			95% Chebyshev (MVUE) UCL	20.57
95% Adjusted-CLT UCL		18.62	97.5% Chebyshev (MVUE) UCL	21.96
95% Modified-t UCL		18.59	99% Chebyshev (MVUE) UCL	24.69
Gamma Distribution Test		Data Distribution		
k star (bias corrected)		17.44	Data appear Normal at 5% Significance Level	
Theta Star		0.995		
MLE of Mean		17.35		
MLE of Standard Deviation		4.154		
nu star		1081		
Approximate Chi Square Value (.05)		1006	Nonparametric Statistics	
Adjusted Level of Significance		0.0413	95% CLT UCL	18.54
Adjusted Chi Square Value		1002	95% Jackknife UCL	18.58
			95% Standard Bootstrap UCL	18.55
Anderson-Darling Test Statistic		0.249	95% Bootstrap-t UCL	18.67
Anderson-Darling 5% Critical Value		0.745	95% Hall's Bootstrap UCL	18.7
Kolmogorov-Smirnov Test Statistic		0.0959	95% Percentile Bootstrap UCL	18.57
Kolmogorov-Smirnov 5% Critical Value		0.157	95% BCA Bootstrap UCL	18.54
Data appear Gamma Distributed at 5% Significance Level			95% Chebyshev(Mean, Sd) UCL	20.5
			97.5% Chebyshev(Mean, Sd) UCL	21.87
Assuming Gamma Distribution			99% Chebyshev(Mean, Sd) UCL	24.55
95% Approximate Gamma UCL		18.65		
95% Adjusted Gamma UCL		18.72		
Potential UCL to Use			Use 95% Student's-t UCL	18.58
Chromium, hexavalent				
General Statistics				
Number of Valid Data		6	Number of Detected Data	1
Number of Distinct Detected Data		1	Number of Non-Detect Data	5
Number of Missing Values		20	Percent Non-Detects	83.33%
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set				
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).				
The data set for variable Chromium, hexavalent was not processed!				

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Cobalt			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	30
Raw Statistics		Log-transformed Statistics	
Minimum	5.4	Minimum of Log Data	1.686
Maximum	18.2	Maximum of Log Data	2.901
Mean	11.66	Mean of log Data	2.423
Median	11.4	SD of log Data	0.268
SD	2.977		
Coefficient of Variation	0.255		
Skewness	0.323		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12.57	95% H-UCL	12.76
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	
95% Adjusted-CLT UCL	12.58	97.5% Chebyshev (MVUE) UCL	15.25
95% Modified-t UCL	12.58	99% Chebyshev (MVUE) UCL	17.36
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.76	Data appear Normal at 5% Significance Level	
Theta Star	0.848		
MLE of Mean	11.66		
MLE of Standard Deviation	3.145		
nu star	853		
Approximate Chi Square Value (.05)	786.3	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	
Adjusted Chi Square Value	782.7	95% Jackknife UCL	
		95% Standard Bootstrap UCL	
Anderson-Darling Test Statistic	0.484	95% Bootstrap-t UCL	
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	
Kolmogorov-Smirnov Test Statistic	0.126	95% Percentile Bootstrap UCL	
Kolmogorov-Smirnov 5% Critical Value	0.158	95% BCA Bootstrap UCL	
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	
		97.5% Chebyshev(Mean, Sd) UCL	
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	
95% Approximate Gamma UCL	12.66		
95% Adjusted Gamma UCL	12.71		
Potential UCL to Use		Use 95% Student's-t UCL	
		12.57	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Copper			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	27
Raw Statistics		Log-transformed Statistics	
Minimum	9.5	Minimum of Log Data	2.251
Maximum	220	Maximum of Log Data	5.394
Mean	33.02	Mean of log Data	3.254
Median	22.9	SD of log Data	0.572
SD	38.43		
Coefficient of Variation	1.164		
Skewness	4.301		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.434	Shapiro Wilk Test Statistic	0.775
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	44.74	95% H-UCL	37.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	
95% Adjusted-CLT UCL	50.07	97.5% Chebyshev (MVUE) UCL	50.9
95% Modified-t UCL	45.63	99% Chebyshev (MVUE) UCL	63.11
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.015	Data do not follow a Discernable Distribution (0.05)	
Theta Star	16.39		
MLE of Mean	33.02		
MLE of Standard Deviation	23.26		
nu star	125		
Approximate Chi Square Value (.05)	100.1	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	
Adjusted Chi Square Value	98.9	95% Jackknife UCL	
		95% Standard Bootstrap UCL	
Anderson-Darling Test Statistic	3.99	95% Bootstrap-t UCL	
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	
Kolmogorov-Smirnov Test Statistic	0.309	95% Percentile Bootstrap UCL	
Kolmogorov-Smirnov 5% Critical Value	0.16	95% BCA Bootstrap UCL	
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	
		97.5% Chebyshev(Mean, Sd) UCL	
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	
95% Approximate Gamma UCL	41.21		
95% Adjusted Gamma UCL	41.72		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	
		63.11	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Lead			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	31
Raw Statistics		Log-transformed Statistics	
Minimum	9.5	Minimum of Log Data	2.251
Maximum	173	Maximum of Log Data	5.153
Mean	34.07	Mean of log Data	3.094
Median	15.9	SD of log Data	0.838
SD	41.11		
Coefficient of Variation	1.207		
Skewness	2.272		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.621	Shapiro Wilk Test Statistic	0.808
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	46.6	95% H-UCL	44.14
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	
95% Adjusted-CLT UCL	49.44	97.5% Chebyshev (MVUE) UCL	63.13
95% Modified-t UCL	47.11	99% Chebyshev (MVUE) UCL	82.28
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.187	Data do not follow a Discernable Distribution (0.05)	
Theta Star	28.69		
MLE of Mean	34.07		
MLE of Standard Deviation	31.27		
nu star	73.62		
Approximate Chi Square Value (.05)	54.86	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	
Adjusted Chi Square Value	53.96	95% Jackknife UCL	
		95% Standard Bootstrap UCL	
Anderson-Darling Test Statistic	3.334	95% Bootstrap-t UCL	
Anderson-Darling 5% Critical Value	0.769	95% Hall's Bootstrap UCL	
Kolmogorov-Smirnov Test Statistic	0.277	95% Percentile Bootstrap UCL	
Kolmogorov-Smirnov 5% Critical Value	0.161	95% BCA Bootstrap UCL	
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	
		97.5% Chebyshev(Mean, Sd) UCL	
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	
95% Approximate Gamma UCL	45.72		
95% Adjusted Gamma UCL	46.48		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	
		66.26	

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Manganese				
General Statistics				
Number of Valid Observations		31	Number of Distinct Observations	29
Raw Statistics		Log-transformed Statistics		
Minimum		236	Minimum of Log Data	5.464
Maximum		1270	Maximum of Log Data	7.147
Mean		500.4	Mean of log Data	6.137
Median		434	SD of log Data	0.377
SD		236		
Coefficient of Variation		0.472		
Skewness		2.1		
Relevant UCL Statistics				
Normal Distribution Test		Lognormal Distribution Test		
Shapiro Wilk Test Statistic		0.746	Shapiro Wilk Test Statistic	0.906
Shapiro Wilk Critical Value		0.929	Shapiro Wilk Critical Value	0.929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution		
95% Student's-t UCL		572.4	95% H-UCL	563.8
95% UCLs (Adjusted for Skewness)			95% Chebyshev (MVUE) UCL	645.6
95% Adjusted-CLT UCL		587.2	97.5% Chebyshev (MVUE) UCL	710.5
95% Modified-t UCL		575	99% Chebyshev (MVUE) UCL	838.1
Gamma Distribution Test		Data Distribution		
k star (bias corrected)		5.912	Data do not follow a Discernable Distribution (0.05)	
Theta Star		84.65		
MLE of Mean		500.4		
MLE of Standard Deviation		205.8		
nu star		366.5		
Approximate Chi Square Value (.05)		323.2	Nonparametric Statistics	
Adjusted Level of Significance		0.0413	95% CLT UCL	570.1
Adjusted Chi Square Value		320.9	95% Jackknife UCL	572.4
			95% Standard Bootstrap UCL	567.9
Anderson-Darling Test Statistic		1.585	95% Bootstrap-t UCL	599.4
Anderson-Darling 5% Critical Value		0.747	95% Hall's Bootstrap UCL	596.3
Kolmogorov-Smirnov Test Statistic		0.197	95% Percentile Bootstrap UCL	570.5
Kolmogorov-Smirnov 5% Critical Value		0.158	95% BCA Bootstrap UCL	594.3
Data not Gamma Distributed at 5% Significance Level			95% Chebyshev(Mean, Sd) UCL	685.2
			97.5% Chebyshev(Mean, Sd) UCL	765.1
			99% Chebyshev(Mean, Sd) UCL	922.1
Assuming Gamma Distribution				
95% Approximate Gamma UCL		567.6		
95% Adjusted Gamma UCL		571.6		
Potential UCL to Use			Use 95% Student's-t UCL	572.4
			or 95% Modified-t UCL	575

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Mercury			
General Statistics			
Number of Valid Data	31	Number of Detected Data	20
Number of Distinct Detected Data	15	Number of Non-Detect Data	11
		Percent Non-Detects	35.48%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0097	Minimum Detected	-4.636
Maximum Detected	0.065	Maximum Detected	-2.733
Mean of Detected	0.0231	Mean of Detected	-3.884
SD of Detected	0.0132	SD of Detected	0.473
Minimum Non-Detect	0.039	Minimum Non-Detect	-3.244
Maximum Non-Detect	0.12	Maximum Non-Detect	-2.12
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.798	Shapiro Wilk Test Statistic	0.96
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.032	Mean	-3.613
SD	0.0189	SD	0.595
95% DL/2 (t) UCL	0.0378	95% H-Stat (DL/2) UCL	0.0769
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.895
		SD in Log Scale	0.409
		Mean in Original Scale	0.0223
		SD in Original Scale	0.0111
		95% Percentile Bootstrap UCL	0.0257
		95% BCA Bootstrap UCL	0.0265
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.786	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.00611		
nu star	151.4		
A-D Test Statistic	0.55	Nonparametric Statistics	
5% A-D Critical Value	0.745	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.745	Mean	0.0227
5% K-S Critical Value	0.195	SD	0.0123
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00271
		95% KM (t) UCL	0.0273
Assuming Gamma Distribution		95% KM (z) UCL	0.0272
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0273
Minimum	0.0097	95% KM (bootstrap t) UCL	0.0298
Maximum	0.065	95% KM (BCA) UCL	0.0278
Mean	0.0236	95% KM (Percentile Bootstrap) UCL	0.0273
Median	0.023	95% KM (Chebyshev) UCL	0.0345
SD	0.0109	97.5% KM (Chebyshev) UCL	0.0396
k star	5.62	99% KM (Chebyshev) UCL	0.0497
Theta star	0.0042		
Nu star	348.4	Potential UCLs to Use	
AppChi2	306.2	95% KM (Percentile Bootstrap) UCL	0.0273
95% Gamma Approximate UCL	0.0269		
95% Adjusted Gamma UCL	0.0271		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Nickel			
General Statistics			
Number of Valid Observations		31	Number of Distinct Observations 27
Raw Statistics		Log-transformed Statistics	
Minimum		11.4	Minimum of Log Data 2.434
Maximum		46.8	Maximum of Log Data 3.846
Mean		26.01	Mean of log Data 3.216
Median		26.7	SD of log Data 0.309
SD		7.229	
Coefficient of Variation		0.278	
Skewness		0.193	
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic		0.942	Shapiro Wilk Test Statistic 0.897
Shapiro Wilk Critical Value		0.929	Shapiro Wilk Critical Value 0.929
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL		28.21	95% H-UCL 28.94
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL 32.54	
95% Adjusted-CLT UCL		28.19	97.5% Chebyshev (MVUE) UCL 35.32
95% Modified-t UCL		28.22	99% Chebyshev (MVUE) UCL 40.78
Gamma Distribution Test		Data Distribution	
k star (bias corrected)		10.87	Data appear Normal at 5% Significance Level
Theta Star		2.393	
MLE of Mean		26.01	
MLE of Standard Deviation		7.889	
nu star		673.9	
Approximate Chi Square Value (.05)		614.7	Nonparametric Statistics
Adjusted Level of Significance		0.0413	95% CLT UCL 28.15
Adjusted Chi Square Value		611.6	95% Jackknife UCL 28.21
			95% Standard Bootstrap UCL 28.13
Anderson-Darling Test Statistic		1.128	95% Bootstrap-t UCL 28.27
Anderson-Darling 5% Critical Value		0.746	95% Hall's Bootstrap UCL 28.38
Kolmogorov-Smirnov Test Statistic		0.172	95% Percentile Bootstrap UCL 28.13
Kolmogorov-Smirnov 5% Critical Value		0.158	95% BCA Bootstrap UCL 28.16
Data not Gamma Distributed at 5% Significance Level			95% Chebyshev(Mean, Sd) UCL 31.67
			97.5% Chebyshev(Mean, Sd) UCL 34.12
Assuming Gamma Distribution			99% Chebyshev(Mean, Sd) UCL 38.93
95% Approximate Gamma UCL		28.52	
95% Adjusted Gamma UCL		28.66	
Potential UCL to Use			Use 95% Student's-t UCL 28.21

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Selenium			
General Statistics			
Number of Valid Data	31	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	21
		Percent Non-Detects	67.74%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.42	Minimum Detected	-0.868
Maximum Detected	1.9	Maximum Detected	0.642
Mean of Detected	0.815	Mean of Detected	-0.3
SD of Detected	0.425	SD of Detected	0.439
Minimum Non-Detect	0.41	Minimum Non-Detect	-0.892
Maximum Non-Detect	0.86	Maximum Non-Detect	-0.151
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.10%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.775	Shapiro Wilk Test Statistic	0.924
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.469	Mean	-0.913
SD	0.339	SD	0.513
95% DL/2 (t) UCL	0.572	95% H-Stat (DL/2) UCL	0.517
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0237	Mean in Log Scale	-0.831
SD	0.722	SD in Log Scale	0.486
95% MLE (t) UCL	0.244	Mean in Original Scale	0.499
95% MLE (Tiku) UCL	0.791	SD in Original Scale	0.329
		95% Percentile Bootstrap UCL	0.602
		95% BCA Bootstrap UCL	0.644
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.855	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.211		
nu star	77.09		
A-D Test Statistic	0.463	Nonparametric Statistics	
5% A-D Critical Value	0.729	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.729	Mean	0.564
5% K-S Critical Value	0.267	SD	0.291
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0566
		95% KM (t) UCL	0.66
Assuming Gamma Distribution		95% KM (z) UCL	0.657
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.653
Minimum	0.42	95% KM (bootstrap t) UCL	0.715
Maximum	1.9	95% KM (BCA) UCL	0.725
Mean	0.81	95% KM (Percentile Bootstrap) UCL	0.691
Median	0.843	95% KM (Chebyshev) UCL	0.811
SD	0.268	97.5% KM (Chebyshev) UCL	0.918
k star	10.04	99% KM (Chebyshev) UCL	1.128
Theta star	0.0807		
Nu star	622.3	Potential UCLs to Use	
AppChi2	565.4	95% KM (t) UCL	0.66
95% Gamma Approximate UCL	0.891		
95% Adjusted Gamma UCL	0.896		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Silver			
General Statistics			
Number of Valid Data	31	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	28
		Percent Non-Detects	90.32%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	0.78	Maximum Detected	-0.248
Mean of Detected	0.437	Mean of Detected	-0.969
SD of Detected	0.298	SD of Detected	0.627
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.824
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.578	Mean	-0.567
SD	0.0934	SD	0.214
95% DL/2 (t) UCL	0.606	95% H-Stat (DL/2) UCL	0.738
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.969
		SD in Log Scale	0.681
		Mean in Original Scale	0.473
		SD in Original Scale	0.333
		95% Percentile Bootstrap UCL	0.567
		95% BCA Bootstrap UCL	0.592
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.437
5% K-S Critical Value	N/A	SD	0.243
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.172
Assuming Gamma Distribution		95% KM (t) UCL	0.728
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.719
Minimum	N/A	95% KM (jackknife) UCL	0.788
Maximum	N/A	95% KM (bootstrap t) UCL	4.543
Mean	N/A	95% KM (BCA) UCL	0.78
Median	N/A	95% KM (Percentile Bootstrap) UCL	0.78
SD	N/A	95% KM (Chebyshev) UCL	1.186
k star	N/A	97.5% KM (Chebyshev) UCL	1.51
Theta star	N/A	99% KM (Chebyshev) UCL	2.147
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.728
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	0.78
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Thallium			
General Statistics			
Number of Valid Data	31	Number of Detected Data	21
Number of Distinct Detected Data	15	Number of Non-Detect Data	10
		Percent Non-Detects	32.26%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.27	Minimum Detected	-1.309
Maximum Detected	0.76	Maximum Detected	-0.274
Mean of Detected	0.483	Mean of Detected	-0.753
SD of Detected	0.113	SD of Detected	0.235
Minimum Non-Detect	0.58	Minimum Non-Detect	-0.545
Maximum Non-Detect	0.82	Maximum Non-Detect	-0.198
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	31
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.961	Shapiro Wilk Test Statistic	0.974
5% Shapiro Wilk Critical Value	0.908	5% Shapiro Wilk Critical Value	0.908
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.43	Mean	-0.881
SD	0.123	SD	0.276
95% DL/2 (t) UCL	0.468	95% H-Stat (DL/2) UCL	0.578
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.773
		SD in Log Scale	0.2
		Mean in Original Scale	0.471
		SD in Original Scale	0.0965
		95% Percentile Bootstrap UCL	0.498
		95% BCA Bootstrap UCL	0.5
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	16.67	Data appear Normal at 5% Significance Level	
Theta Star	0.029		
nu star	700.1		
A-D Test Statistic	0.313	Nonparametric Statistics	
5% A-D Critical Value	0.743	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.743	Mean	0.472
5% K-S Critical Value	0.189	SD	0.103
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0213
		95% KM (t) UCL	0.508
Assuming Gamma Distribution		95% KM (z) UCL	0.507
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.508
Minimum	0.27	95% KM (bootstrap t) UCL	0.509
Maximum	0.76	95% KM (BCA) UCL	0.504
Mean	0.488	95% KM (Percentile Bootstrap) UCL	0.506
Median	0.49	95% KM (Chebyshev) UCL	0.564
SD	0.0951	97.5% KM (Chebyshev) UCL	0.604
k star	24.38	99% KM (Chebyshev) UCL	0.683
Theta star	0.02		
Nu star	1512	Potential UCLs to Use	
AppChi2	1423	95% KM (t) UCL	0.508
95% Gamma Approximate UCL	0.519	95% KM (Percentile Bootstrap) UCL	0.506
95% Adjusted Gamma UCL	0.521		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Vanadium			
General Statistics			
Number of Valid Observations	31	Number of Distinct Observations	26
Raw Statistics		Log-transformed Statistics	
Minimum	10.6	Minimum of Log Data	2.361
Maximum	28	Maximum of Log Data	3.332
Mean	19.89	Mean of log Data	2.965
Median	18.7	SD of log Data	0.236
SD	4.455		
Coefficient of Variation	0.224		
Skewness	-0.0326		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Test Statistic	0.959
Shapiro Wilk Critical Value	0.929	Shapiro Wilk Critical Value	0.929
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	21.25	95% H-UCL	21.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	23.63
95% Adjusted-CLT UCL	21.2	97.5% Chebyshev (MVUE) UCL	25.23
95% Modified-t UCL	21.25	99% Chebyshev (MVUE) UCL	28.39
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	17.64	Data appear Normal at 5% Significance Level	
Theta Star	1.128		
MLE of Mean	19.89		
MLE of Standard Deviation	4.736		
nu star	1094		
Approximate Chi Square Value (.05)	1018	Nonparametric Statistics	
Adjusted Level of Significance	0.0413	95% CLT UCL	21.21
Adjusted Chi Square Value	1014	95% Jackknife UCL	21.25
		95% Standard Bootstrap UCL	21.18
Anderson-Darling Test Statistic	0.381	95% Bootstrap-t UCL	21.25
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	21.2
Kolmogorov-Smirnov Test Statistic	0.127	95% Percentile Bootstrap UCL	21.23
Kolmogorov-Smirnov 5% Critical Value	0.157	95% BCA Bootstrap UCL	21.13
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.38
		97.5% Chebyshev(Mean, Sd) UCL	24.89
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	27.85
95% Approximate Gamma UCL	21.37		
95% Adjusted Gamma UCL	21.46		
Potential UCL to Use		Use 95% Student's-t UCL	21.25

APPENDIX A
ProUCL Output for Subsurface Soil, Investigation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Zinc			
General Statistics			
Number of Valid Observations		31	Number of Distinct Observations 28
Raw Statistics		Log-transformed Statistics	
Minimum		41.6	Minimum of Log Data 3.728
Maximum		890	Maximum of Log Data 6.791
Mean		123.3	Mean of log Data 4.462
Median		70.8	SD of log Data 0.671
SD		170.5	
Coefficient of Variation		1.383	
Skewness		3.689	
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic		0.438	Shapiro Wilk Test Statistic 0.689
Shapiro Wilk Critical Value		0.929	Shapiro Wilk Critical Value 0.929
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL		175.3	95% H-UCL 140
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL 168.5	
95% Adjusted-CLT UCL		195.4	97.5% Chebyshev (MVUE) UCL 194.9
95% Modified-t UCL		178.7	99% Chebyshev (MVUE) UCL 246.6
Gamma Distribution Test		Data Distribution	
k star (bias corrected)		1.433	Data do not follow a Discernable Distribution (0.05)
Theta Star		86.02	
MLE of Mean		123.3	
MLE of Standard Deviation		103	
nu star		88.87	
Approximate Chi Square Value (.05)		68.13	Nonparametric Statistics
Adjusted Level of Significance		0.0413	95% CLT UCL 173.7
Adjusted Chi Square Value		67.12	95% Jackknife UCL 175.3
			95% Standard Bootstrap UCL 174.2
Anderson-Darling Test Statistic		5.334	95% Bootstrap-t UCL 248.5
Anderson-Darling 5% Critical Value		0.763	95% Hall's Bootstrap UCL 201.7
Kolmogorov-Smirnov Test Statistic		0.354	95% Percentile Bootstrap UCL 179.2
Kolmogorov-Smirnov 5% Critical Value		0.16	95% BCA Bootstrap UCL 202.7
Data not Gamma Distributed at 5% Significance Level			95% Chebyshev(Mean, Sd) UCL 256.8
			97.5% Chebyshev(Mean, Sd) UCL 314.6
Assuming Gamma Distribution			99% Chebyshev(Mean, Sd) UCL 428.1
95% Approximate Gamma UCL		160.8	
95% Adjusted Gamma UCL		163.2	
Potential UCL to Use			Use 95% Chebyshev (Mean, Sd) UCL 256.8

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended	
		Minimum mg/kg	Maximum mg/kg					EPC mg/kg	UCL or MDC?
Explosives									
2,4,6-Trinitrotoluene	5/5	7.80E-02	1.20E+01	5.93E+00	1.16E+01	Normal	KM-t	1.16E+01	UCL
RDX	6/7	2.00E-01	1.80E+01	4.63E+00	1.52E+01	Gamma	KM (Chebyshev)	1.52E+01	UCL
SVOCs									
Benz(a)anthracene	5/5	9.60E-02	7.80E+00	2.80E+00	5.91E+00	Normal	KM-t	5.91E+00	UCL
Benzo(a)pyrene	5/5	8.60E-02	6.70E+00	2.46E+00	5.14E+00	Normal	KM-t	5.14E+00	UCL
Benzo(b)fluoranthene	5/5	1.20E-01	7.80E+00	3.08E+00	6.29E+00	Normal	KM-t	6.29E+00	UCL
Dibenz(a,h)anthracene	3/5	2.10E-01	1.40E+00	8.03E-01	1.40E+00	Normal	KM (Percentile Bootstrap)	1.40E+00	MDC
Indeno(1,2,3-cd)pyrene	5/5	6.40E-02	3.40E+00	1.34E+00	2.73E+00	Normal	KM-t	2.73E+00	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL.

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG MEC ss UCL outp
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	4	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	2
Number of Missing Values	3	Percent Non-Detects	50.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable 1,3,5-Trinitrobenzene was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	5
Number of Distinct Detected Data	4	Number of Non-Detect Data	0
Number of Missing Values	2	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.078	Minimum Detected	-2.551
Maximum Detected	12	Maximum Detected	2.485
Mean of Detected	5.932	Mean of Detected	0.62
SD of Detected	5.901	SD of Detected	2.269
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.826	Shapiro Wilk Test Statistic	0.849
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.932	Mean	0.62
SD	5.901	SD	2.269
95% DL/2 (t) UCL	11.56	95% H-Stat (DL/2) UCL	4126488
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.35	Data appear Normal at 5% Significance Level	
Theta Star	16.96		
nu star	3.497		
A-D Test Statistic	0.467	Nonparametric Statistics	
5% A-D Critical Value	0.709	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.709	Mean	5.932
5% K-S Critical Value	0.371	SD	5.278
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.639
		95% KM (t) UCL	11.56
Assuming Gamma Distribution		95% KM (z) UCL	10.27
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.56
Minimum	0.078	95% KM (bootstrap t) UCL	13.99
Maximum	12	95% KM (BCA) UCL	9.616
Mean	5.932	95% KM (Percentile Bootstrap) UCL	9.676
Median	5.2	95% KM (Chebyshev) UCL	17.43
SD	5.901	97.5% KM (Chebyshev) UCL	22.41
k star	0.35	99% KM (Chebyshev) UCL	32.19
Theta star	16.96		
Nu star	3.497	Potential UCLs to Use	
AppChi2	0.534	95% KM (t) UCL	11.56
95% Gamma Approximate UCL	38.87	95% KM (Percentile Bootstrap) UCL	9.676
95% Adjusted Gamma UCL	100.3		
Note: DL/2 is not a recommended method.			

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	4	Number of Detected Data	2
Number of Distinct Detected Data	2	Number of Non-Detect Data	2
Number of Missing Values	3	Percent Non-Detects	50.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable 2,4-Dinitrotoluene was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			
2-Amino-4,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	4	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	1
Number of Missing Values	3	Percent Non-Detects	25.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable 2-Amino-4,6-Dinitrotoluene was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			
4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	4	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	1
Number of Missing Values	3	Percent Non-Detects	25.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable 4-Amino-2,6-Dinitrotoluene was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			

HMX			
General Statistics			
Number of Valid Data	4	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	0
Number of Missing Values	3	Percent Non-Detects	0.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable HMX was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			
Nitrobenzene			
General Statistics			
Number of Valid Data	4	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	3
Number of Missing Values	3	Percent Non-Detects	75.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable Nitrobenzene was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			
Nitroglycerin			
General Statistics			
Number of Valid Data	4	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	3
Number of Missing Values	3	Percent Non-Detects	75.00%
Warning: This data set only has 4 observations!			
Data set is too small to compute reliable and meaningful statistics and estimates!			
The data set for variable Nitroglycerin was not processed!			
It is suggested to collect at least 8 to 10 observations before using these statistical methods!			
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.			

RDX			
General Statistics			
Number of Valid Data	7	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	1
		Percent Non-Detects	14.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.2	Minimum Detected	-1.609
Maximum Detected	18	Maximum Detected	2.89
Mean of Detected	4.63	Mean of Detected	0.228
SD of Detected	7.08	SD of Detected	1.895
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.875
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.986	Mean	-0.102
SD	6.684	SD	1.937
95% DL/2 (t) UCL	8.896	95% H-Stat (DL/2) UCL	251.3
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	2.429	Mean in Log Scale	-0.161
SD	7.853	SD in Log Scale	2.013
95% MLE (t) UCL	8.197	Mean in Original Scale	3.98
95% MLE (Tiku) UCL	8.401	SD in Original Scale	6.688
		95% Percentile Bootstrap UCL	8.071
		95% BCA Bootstrap UCL	10.04
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.355	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	13.03		
nu star	4.264		
A-D Test Statistic	0.495	Nonparametric Statistics	
5% A-D Critical Value	0.738	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.738	Mean	3.997
5% K-S Critical Value	0.349	SD	6.182
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.559
Assuming Gamma Distribution		95% KM (t) UCL	8.971
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	8.207
Minimum	1E-09	95% KM (jackknife) UCL	8.895
Maximum	18	95% KM (bootstrap t) UCL	42.95
Mean	3.969	95% KM (BCA) UCL	8.314
Median	0.3	95% KM (Percentile Bootstrap) UCL	8.097
SD	6.696	95% KM (Chebyshev) UCL	15.15
k star	0.198	97.5% KM (Chebyshev) UCL	19.98
Theta star	20.01	99% KM (Chebyshev) UCL	29.46
Nu star	2.777	Potential UCLs to Use	
AppChi2	0.31	95% KM (Chebyshev) UCL	15.15
95% Gamma Approximate UCL	35.61		
95% Adjusted Gamma UCL	69.04		
Note: DL/2 is not a recommended method.			

Benz(a)anthracene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	0
Number of Missing Values	2	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.096	Minimum Detected	-2.343
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	2.801	Mean of Detected	0.0807
SD of Detected	3.258	SD of Detected	1.826
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.872	Shapiro Wilk Test Statistic	0.948
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.801	Mean	0.0807
SD	3.258	SD	1.826
95% DL/2 (t) UCL	5.907	95% H-Stat (DL/2) UCL	14742
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.391	Data appear Normal at 5% Significance Level	
Theta Star	7.164		
nu star	3.91		
A-D Test Statistic	0.229	Nonparametric Statistics	
5% A-D Critical Value	0.704	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.704	Mean	2.801
5% K-S Critical Value	0.369	SD	2.914
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.457
		95% KM (t) UCL	5.907
Assuming Gamma Distribution		95% KM (z) UCL	5.198
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.907
Minimum	0.096	95% KM (bootstrap t) UCL	12.11
Maximum	7.8	95% KM (BCA) UCL	4.859
Mean	2.801	95% KM (Percentile Bootstrap) UCL	5.14
Median	1.5	95% KM (Chebyshev) UCL	9.152
SD	3.258	97.5% KM (Chebyshev) UCL	11.9
k star	0.391	99% KM (Chebyshev) UCL	17.3
Theta star	7.164		
Nu star	3.91	Potential UCLs to Use	
AppChi2	0.686	95% KM (t) UCL	5.907
95% Gamma Approximate UCL	15.96	95% KM (Percentile Bootstrap) UCL	5.14
95% Adjusted Gamma UCL	39.17		
Note: DL/2 is not a recommended method.			

Benzo(a)pyrene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	0
Number of Missing Values	2	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.086	Minimum Detected	-2.453
Maximum Detected	6.7	Maximum Detected	1.902
Mean of Detected	2.459	Mean of Detected	-0.0198
SD of Detected	2.813	SD of Detected	1.798
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Test Statistic	0.951
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.459	Mean	-0.0198
SD	2.813	SD	1.798
95% DL/2 (t) UCL	5.141	95% H-Stat (DL/2) UCL	9965
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.398	Data appear Normal at 5% Significance Level	
Theta Star	6.175		
nu star	3.982		
A-D Test Statistic	0.227	Nonparametric Statistics	
5% A-D Critical Value	0.703	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.703	Mean	2.459
5% K-S Critical Value	0.368	SD	2.516
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.258
		95% KM (t) UCL	5.141
Assuming Gamma Distribution		95% KM (z) UCL	4.529
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.141
Minimum	0.086	95% KM (bootstrap t) UCL	11.03
Maximum	6.7	95% KM (BCA) UCL	4.144
Mean	2.459	95% KM (Percentile Bootstrap) UCL	4.46
Median	1.3	95% KM (Chebyshev) UCL	7.943
SD	2.813	97.5% KM (Chebyshev) UCL	10.32
k star	0.398	99% KM (Chebyshev) UCL	14.98
Theta star	6.175	Potential UCLs to Use	
Nu star	3.982	95% KM (t) UCL	5.141
AppChi2	0.715	95% KM (Percentile Bootstrap) UCL	4.46
95% Gamma Approximate UCL	13.7		
95% Adjusted Gamma UCL	33.33		
Note: DL/2 is not a recommended method.			

Benzo(b)fluoranthene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	0
Number of Missing Values	2	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.12	Minimum Detected	-2.12
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	3.08	Mean of Detected	0.271
SD of Detected	3.368	SD of Detected	1.728
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.872	Shapiro Wilk Test Statistic	0.944
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.08	Mean	0.271
SD	3.368	SD	1.728
95% DL/2 (t) UCL	6.291	95% H-Stat (DL/2) UCL	6705
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.416	Data appear Normal at 5% Significance Level	
Theta Star	7.402		
nu star	4.161		
A-D Test Statistic	0.251	Nonparametric Statistics	
5% A-D Critical Value	0.7	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.7	Mean	3.08
5% K-S Critical Value	0.368	SD	3.012
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.506
		95% KM (t) UCL	6.291
Assuming Gamma Distribution		95% KM (z) UCL	5.557
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.291
Minimum	0.12	95% KM (bootstrap t) UCL	13.67
Maximum	7.8	95% KM (BCA) UCL	5.376
Mean	3.08	95% KM (Percentile Bootstrap) UCL	5.6
Median	1.6	95% KM (Chebyshev) UCL	9.645
SD	3.368	97.5% KM (Chebyshev) UCL	12.49
k star	0.416	99% KM (Chebyshev) UCL	18.07
Theta star	7.402		
Nu star	4.161	Potential UCLs to Use	
AppChi2	0.786	95% KM (t) UCL	6.291
95% Gamma Approximate UCL	16.3	95% KM (Percentile Bootstrap) UCL	5.6
95% Adjusted Gamma UCL	38.76		
Note: DL/2 is not a recommended method.			

Dibenz(a,h)anthracene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	2
Number of Missing Values	2	Percent Non-Detects	40.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.803	Mean of Detected	-0.482
SD of Detected	0.595	SD of Detected	0.975
Minimum Non-Detect	0.0068	Minimum Non-Detect	-4.991
Maximum Non-Detect	0.028	Maximum Non-Detect	-3.576
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	40.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	0.947
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.485	Mean	-2.28
SD	0.605	SD	2.605
95% DL/2 (t) UCL	1.063	95% H-Stat (DL/2) UCL	499915
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.267	Mean in Log Scale	-1.626
SD	0.807	SD in Log Scale	1.711
95% MLE (t) UCL	1.037	Mean in Original Scale	0.496
95% MLE (Tiku) UCL	1.138	SD in Original Scale	0.595
		95% Percentile Bootstrap UCL	0.922
		95% BCA Bootstrap UCL	0.92
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.566
5% K-S Critical Value	N/A	SD	0.476
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.26
		95% KM (t) UCL	1.121
Assuming Gamma Distribution		95% KM (z) UCL	0.994
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.167
Minimum	N/A	95% KM (bootstrap t) UCL	1.075
Maximum	N/A	95% KM (BCA) UCL	1.4
Mean	N/A	95% KM (Percentile Bootstrap) UCL	1.4
Median	N/A	95% KM (Chebyshev) UCL	1.701
SD	N/A	97.5% KM (Chebyshev) UCL	2.192
k star	N/A	99% KM (Chebyshev) UCL	3.157
Theta star	N/A	Potential UCLs to Use	
Nu star	N/A	95% KM (t) UCL	1.121
AppChi2	N/A	95% KM (Percentile Bootstrap) UCL	1.4
95% Gamma Approximate UCL	N/A		
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

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Indeno(1,2,3-cd)pyrene			
General Statistics			
Number of Valid Data	5	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	0
Number of Missing Values	2	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.064	Minimum Detected	-2.749
Maximum Detected	3.4	Maximum Detected	1.224
Mean of Detected	1.337	Mean of Detected	-0.542
SD of Detected	1.458	SD of Detected	1.682
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.876	Shapiro Wilk Test Statistic	0.937
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.337	Mean	-0.542
SD	1.458	SD	1.682
95% DL/2 (t) UCL	2.727	95% H-Stat (DL/2) UCL	1898
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.423	Data appear Normal at 5% Significance Level	
Theta Star	3.163		
nu star	4.226		
A-D Test Statistic	0.268	Nonparametric Statistics	
5% A-D Critical Value	0.7	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.7	Mean	1.337
5% K-S Critical Value	0.367	SD	1.304
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.652
		95% KM (t) UCL	2.727
Assuming Gamma Distribution		95% KM (z) UCL	2.409
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.727
Minimum	0.064	95% KM (bootstrap t) UCL	5.388
Maximum	3.4	95% KM (BCA) UCL	2.316
Mean	1.337	95% KM (Percentile Bootstrap) UCL	2.293
Median	0.74	95% KM (Chebyshev) UCL	4.178
SD	1.458	97.5% KM (Chebyshev) UCL	5.408
k star	0.423	99% KM (Chebyshev) UCL	7.823
Theta star	3.163		
Nu star	4.226	Potential UCLs to Use	
AppChi2	0.813	95% KM (t) UCL	2.727
95% Gamma Approximate UCL	6.949	95% KM (Percentile Bootstrap) UCL	2.293
95% Adjusted Gamma UCL	16.39		
Note: DL/2 is not a recommended method.			

APPENDIX A
Statistical Summary of Detected Analytes in Subsurface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of	95%	Distribution ^a	Method ^a
		Minimum mg/kg	Maximum mg/kg	Detects mg/kg	UCL ^a mg/kg		
Explosives							
RDX	5/6	8.90E-02	5.70E+02	1.26E+02	5.20E+02	Gamma	KM (Chebyshev)
Insufficient Sample Size for UCL Calculation							
Explosives							
1,3,5-Trinitrobenzene	2 / 2	4.90E-01	6.90E-01	5.90E-01		NA	
2,4,6-Trinitrotoluene	4 / 4	2.70E+00	1.60E+03	4.39E+02		NA	
2,4-Dinitrotoluene	1 / 2	5.40E-01	5.40E-01	5.40E-01		NA	
2-Amino-4,6-Dinitrotoluene	1 / 2	7.20E-01	7.20E-01	7.20E-01		NA	
4-Amino-2,6-Dinitrotoluene	2 / 2	8.70E-01	1.20E+00	1.04E+00		NA	
HMX	2 / 2	6.30E+00	1.10E+01	8.65E+00		NA	
SVOCs							
Benz(a)anthracene	3 / 3	3.10E-02	1.40E+00	7.77E-01		NA	
Benzo(a)pyrene	3 / 3	3.30E-02	1.20E+00	7.44E-01		NA	
Benzo(b)fluoranthene	3 / 3	4.00E-02	1.60E+00	1.05E+00		NA	
Dibenz(a,h)anthracene	2 / 3	2.40E-01	2.50E-01	2.45E-01		NA	
Indeno(1,2,3-cd)pyrene	3 / 3	2.20E-02	7.50E-01	4.77E-01		NA	

mg/kg - milligram per kilogram

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.) The recommended UCL was used unless the recommendation was the 97.5% or 99% Chebyshev UCL.

APPENDIX A
ProUCL Output for Subsurface Soil, Confirmation Data for Residential Farmer Land Use
RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\UCLs Feb 2010 WB\G\SBS UCL input.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

RDX			
General Statistics			
Number of Valid Data	6	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	1
		Percent Non-Detects	16.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.089	Minimum Detected	-2.419
Maximum Detected	570	Maximum Detected	6.346
Mean of Detected	125.7	Mean of Detected	1.725
SD of Detected	249	SD of Detected	3.737
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.61	Shapiro Wilk Test Statistic	0.918
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	104.7	Mean	1.054
SD	228.5	SD	3.725
95% DL/2 (t) UCL	292.7	95% H-Stat (DL/2) UCL	5.288E+13
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.13
		SD in Log Scale	3.646
		Mean in Original Scale	104.7
		SD in Original Scale	228.5
		95% Percentile Bootstrap UCL	287.6
		95% BCA Bootstrap UCL	380.1
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.226	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	556.3		
nu star	2.259		
A-D Test Statistic	0.323	Nonparametric Statistics	
5% A-D Critical Value	0.764	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764	Mean	104.7
5% K-S Critical Value	0.386	SD	208.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	95.23
		95% KM (t) UCL	296.6
Assuming Gamma Distribution		95% KM (z) UCL	261.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	292.7
Minimum	1E-09	95% KM (bootstrap t) UCL	3073
Maximum	570	95% KM (BCA) UCL	292.2
Mean	104.7	95% KM (Percentile Bootstrap) UCL	287.6
Median	7.585	95% KM (Chebyshev) UCL	519.8
SD	228.6	97.5% KM (Chebyshev) UCL	699.4
k star	0.171	99% KM (Chebyshev) UCL	1052
Theta star	613.6		
Nu star	2.048	Potential UCLs to Use	
AppChi2	0.157	95% KM (Chebyshev) UCL	519.8
95% Gamma Approximate UCL	1364		
95% Adjusted Gamma UCL	2449		
Note: DL/2 is not a recommended method.			

APPENDIX A
Statistical Summary of Detected Analytes in Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Detected Analyte	Frequency of Detection	Range of Detects		Mean of Detects mg/kg	95% UCL ^a mg/kg	Distribution ^a	Method ^a	Recommended EPC mg/kg	UCL or MDC?
		Minimum mg/kg	Maximum mg/kg						
Explosives									
1,3,5-Trinitrobenzene	4 / 6	3.60E-02	6.90E-01	4.44E-01	6.02E-01	Normal	KM (Percentile Bootstrap)	6.02E-01	UCL
2,4,6-Trinitrotoluene	9 / 9	7.80E-02	1.60E+03	1.99E+02	9.64E+02	Gamma	KM (Chebychev)	9.64E+02	UCL
2,4-Dinitrotoluene	3 / 6	2.70E-02	5.40E-01	2.32E-01	3.87E-01	Normal	KM-t	3.87E-01	UCL
2-Amino-4,6-Dinitrotoluene	4 / 6	2.60E-01	7.20E-01	5.10E-01	7.05E-01	Normal	KM (Percentile Bootstrap)	7.05E-01	UCL
4-Amino-2,6-Dinitrotoluene	5 / 6	1.70E-01	1.20E+00	7.42E-01	9.88E-01	Normal	KM-t	9.88E-01	UCL
HMX	6 / 6	1.60E-01	1.10E+01	3.83E+00	7.36E+00	Normal	KM-t	7.36E+00	UCL
RDX	11 / 13	8.90E-02	5.70E+02	5.96E+01	2.41E+02	Approx. Gamma	KM (Chebychev)	2.41E+02	UCL
SVOCs									
Benz(a)anthracene	8 / 8	3.10E-02	7.80E+00	2.04E+00	6.21E+00	Gamma	KM (Chebychev)	6.21E+00	UCL
Benzo(a)pyrene	8 / 8	3.30E-02	6.70E+00	1.82E+00	5.40E+00	Gamma	KM (Chebychev)	5.40E+00	UCL
Benzo(b)fluoranthene	8 / 8	4.00E-02	7.80E+00	2.32E+00	6.62E+00	Gamma	KM (Chebychev)	6.62E+00	UCL
Dibenz(a,h)anthracene	6 / 8	2.10E-01	1.40E+00	5.80E-01	7.48E-01	Normal	KM-t	7.48E-01	UCL
Indeno(1,2,3-cd)pyrene	8 / 8	2.20E-02	3.40E+00	1.02E+00	2.88E+00	Gamma	KM (Chebychev)	2.88E+00	UCL

mg/kg - milligram per kilogram

EPC - Exposure point concentration.

MDC - Maximum detected concentration.

NP - Nonparametric; distribution is not discernable

UCL - Upper confidence limit

^a Nature of distribution, statistical method, and 95% Upper Confidence Limit (UCL) determined using ProUCL Version 4.0 (EPA, 2007, ProUCL Version 4.0, Office of Research and Development, Technology Support Center Characterization and Monitoring Branch, Las Vegas, Nevada, April.) on line at <http://www.epa.gov/esd/tsc/form.htm>.)

The 95% UCL was used unless, as noted, the recommendation was the 97.5% or 99% UCL.

APPENDIX A
 ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
 RVAAP-05 Winklepeck Burning Grounds

General UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
From File	C:\Documents and Settings\debbl.freer\My Documents\Ravenna\April 2010 rev data set\WBG MEC and RA data_NG
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

1,3,5-Trinitrobenzene			
General Statistics			
Number of Valid Data	6	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	2
Number of Missing Values	9	Percent Non-Detects	33.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.036	Minimum Detected	-3.324
Maximum Detected	0.69	Maximum Detected	-0.371
Mean of Detected	0.444	Mean of Detected	-1.247
SD of Detected	0.284	SD of Detected	1.392
Minimum Non-Detect	0.24	Minimum Non-Detect	-1.427
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	3
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	50.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.877	Shapiro Wilk Test Statistic	0.724
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.337	Mean	-1.531
SD	0.276	SD	1.165
95% DL/2 (t) UCL	0.564	95% H-Stat (DL/2) UCL	2.599
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.297	Mean in Log Scale	-1.833
SD	0.317	SD in Log Scale	1.409
95% MLE (t) UCL	0.557	Mean in Original Scale	0.313
95% MLE (Tiku) UCL	0.617	SD in Original Scale	0.3
		95% Percentile Bootstrap UCL	0.504
		95% BCA Bootstrap UCL	0.504
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.489	Data appear Normal at 5% Significance Level	
Theta Star	0.908		
nu star	3.914		
A-D Test Statistic	0.672	Nonparametric Statistics	
5% A-D Critical Value	0.664	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.664	Mean	0.308
5% K-S Critical Value	0.401	SD	0.278
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.131
Assuming Gamma Distribution		95% KM (t) UCL	0.572
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.524
Minimum	0.036	95% KM (jackknife) UCL	0.629
Maximum	0.69	95% KM (bootstrap t) UCL	0.465
Mean	0.417	95% KM (BCA) UCL	0.603
Median	0.426	95% KM (Percentile Bootstrap) UCL	0.602
SD	0.224	95% KM (Chebyshev) UCL	0.88
k star	1.034	97.5% KM (Chebyshev) UCL	1.127
Theta star	0.403	99% KM (Chebyshev) UCL	1.613
Nu star	12.41	Potential UCLs to Use	
AppChi2	5.498	95% KM (t) UCL	0.572
95% Gamma Approximate UCL	0.94	95% KM (Percentile Bootstrap) UCL	0.602
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4,6-Trinitrotoluene			
General Statistics			
Number of Valid Data	9	Number of Detected Data	9
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	6	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.078	Minimum Detected	-2.551
Maximum Detected	1600	Maximum Detected	7.378
Mean of Detected	198.5	Mean of Detected	2.217
SD of Detected	526.8	SD of Detected	2.96
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 9 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.438	Shapiro Wilk Test Statistic	0.986
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	198.5	Mean	2.217
SD	526.8	SD	2.96
95% DL/2 (t) UCL	525	95% H-Stat (DL/2) UCL	4095272
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.23	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	863.6		
nu star	4.137		
A-D Test Statistic	0.686	Nonparametric Statistics	
5% A-D Critical Value	0.832	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.832	Mean	198.5
5% K-S Critical Value	0.305	SD	496.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	175.6
		95% KM (t) UCL	525
Assuming Gamma Distribution		95% KM (z) UCL	487.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	525
Minimum	0.078	95% KM (bootstrap t) UCL	7299
Maximum	1600	95% KM (BCA) UCL	549.1
Mean	198.5	95% KM (Percentile Bootstrap) UCL	542.8
Median	12	95% KM (Chebyshev) UCL	963.8
SD	526.8	97.5% KM (Chebyshev) UCL	1295
k star	0.23	99% KM (Chebyshev) UCL	1946
Theta star	863.6		
Nu star	4.137	Potential UCLs to Use	
AppChi2	0.777	95% KM (Chebyshev) UCL	963.8
95% Gamma Approximate UCL	1057		
95% Adjusted Gamma UCL	1571		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2,4-Dinitrotoluene			
General Statistics			
Number of Valid Data	6	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	3
Number of Missing Values	9	Percent Non-Detects	50.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.027	Minimum Detected	-3.612
Maximum Detected	0.54	Maximum Detected	-0.616
Mean of Detected	0.232	Mean of Detected	-2.089
SD of Detected	0.271	SD of Detected	1.498
Minimum Non-Detect	0.24	Minimum Non-Detect	-1.427
Maximum Non-Detect	1.2	Maximum Non-Detect	0.182
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	6
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 3 Distinct Detected Values in this data set			
The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.			
Those methods will return a 'N/A' value on your output display!			
It is necessary to have 4 or more Distinct Values for bootstrap methods.			
However, results obtained using 4 to 9 distinct values may not be reliable.			
It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk Test Statistic	0.999
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.257	Mean	-1.83
SD	0.246	SD	1.147
95% DL/2 (t) UCL	0.459	95% H-Stat (DL/2) UCL	12.78
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.408
		SD in Log Scale	1.02
		Mean in Original Scale	0.149
		SD in Original Scale	0.194
		95% Percentile Bootstrap UCL	0.298
		95% BCA Bootstrap UCL	0.318
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.171
5% K-S Critical Value	N/A	SD	0.19
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.107
		95% KM (t) UCL	0.387
Assuming Gamma Distribution		95% KM (z) UCL	0.347
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.386
Minimum	N/A	95% KM (bootstrap t) UCL	0.662
Maximum	N/A	95% KM (BCA) UCL	0.54
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.638
SD	N/A	97.5% KM (Chebyshev) UCL	0.84
k star	N/A	99% KM (Chebyshev) UCL	1.238
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	
AppChi2	N/A	95% KM (t) UCL	0.387
95% Gamma Approximate UCL	N/A	95% KM (Percentile Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

2-Amino-4,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	6	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	2
Number of Missing Values	9	Percent Non-Detects	33.33%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.26	Minimum Detected	-1.347
Maximum Detected	0.72	Maximum Detected	-0.329
Mean of Detected	0.51	Mean of Detected	-0.763
SD of Detected	0.235	SD of Detected	0.504
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	3	Maximum Non-Detect	1.099
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	6
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.843	Shapiro Wilk Test Statistic	0.864
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.615	Mean	-0.758
SD	0.492	SD	0.826
95% DL/2 (t) UCL	1.019	95% H-Stat (DL/2) UCL	2.453
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.888
		SD in Log Scale	0.463
		Mean in Original Scale	0.45
		SD in Original Scale	0.21
		95% Percentile Bootstrap UCL	0.583
		95% BCA Bootstrap UCL	0.585
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.594	Data appear Normal at 5% Significance Level	
Theta Star	0.32		
nu star	12.75		
A-D Test Statistic	0.458	Nonparametric Statistics	
5% A-D Critical Value	0.659	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.659	Mean	0.46
5% K-S Critical Value	0.396	SD	0.207
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.107
		95% KM (t) UCL	0.676
Assuming Gamma Distribution		95% KM (z) UCL	0.636
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.675
Minimum	0.26	95% KM (bootstrap t) UCL	0.996
Maximum	0.72	95% KM (BCA) UCL	0.708
Mean	0.493	95% KM (Percentile Bootstrap) UCL	0.705
Median	0.479	95% KM (Chebyshev) UCL	0.927
SD	0.204	97.5% KM (Chebyshev) UCL	1.129
k star	3.408	99% KM (Chebyshev) UCL	1.526
Theta star	0.145		
Nu star	40.9	Potential UCLs to Use	
AppChi2	27.25	95% KM (t) UCL	0.676
95% Gamma Approximate UCL	0.74	95% KM (Percentile Bootstrap) UCL	0.705
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

4-Amino-2,6-Dinitrotoluene			
General Statistics			
Number of Valid Data	6	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	1
Number of Missing Values	9	Percent Non-Detects	16.67%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.17	Minimum Detected	-1.772
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.742	Mean of Detected	-0.469
SD of Detected	0.373	SD of Detected	0.756
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Test Statistic	0.799
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.639	Mean	-0.738
SD	0.418	SD	0.943
95% DL/2 (t) UCL	0.983	95% H-Stat (DL/2) UCL	1.527
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.885	Mean in Log Scale	-0.645
SD	0.192	SD in Log Scale	0.801
95% MLE (t) UCL	1.043	Mean in Original Scale	0.655
95% MLE (Tiku) UCL	1.078	SD in Original Scale	0.396
		95% Percentile Bootstrap UCL	0.898
		95% BCA Bootstrap UCL	0.89
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.366	Data appear Normal at 5% Significance Level	
Theta Star	0.543		
nu star	13.66		
A-D Test Statistic	0.516	Nonparametric Statistics	
5% A-D Critical Value	0.683	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.683	Mean	0.647
5% K-S Critical Value	0.359	SD	0.372
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.17
Assuming Gamma Distribution		95% KM (t) UCL	0.988
Gamma ROS Statistics using Extrapolated Data		95% KM (z) UCL	0.926
Minimum	0.17	95% KM (jackknife) UCL	1.019
Maximum	1.2	95% KM (bootstrap t) UCL	0.906
Mean	0.688	95% KM (BCA) UCL	0.973
Median	0.735	95% KM (Percentile Bootstrap) UCL	0.93
SD	0.359	95% KM (Chebyshev) UCL	1.386
k star	1.727	97.5% KM (Chebyshev) UCL	1.706
Theta star	0.398	99% KM (Chebyshev) UCL	2.334
Nu star	20.73	Potential UCLs to Use	
AppChi2	11.39	95% KM (t) UCL	0.988
95% Gamma Approximate UCL	1.252	95% KM (Percentile Bootstrap) UCL	0.93
95% Adjusted Gamma UCL	1.585		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

HMX			
General Statistics			
Number of Valid Data	6	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	0
Number of Missing Values	9	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.16	Minimum Detected	-1.833
Maximum Detected	11	Maximum Detected	2.398
Mean of Detected	3.833	Mean of Detected	0.406
SD of Detected	4.292	SD of Detected	1.77
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.872	Shapiro Wilk Test Statistic	0.905
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.833	Mean	0.406
SD	4.292	SD	1.77
95% DL/2 (t) UCL	7.364	95% H-Stat (DL/2) UCL	1643
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.437	Data appear Normal at 5% Significance Level	
Theta Star	8.777		
nu star	5.241		
A-D Test Statistic	0.315	Nonparametric Statistics	
5% A-D Critical Value	0.727	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.727	Mean	3.833
5% K-S Critical Value	0.345	SD	3.918
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.752
		95% KM (t) UCL	7.364
Assuming Gamma Distribution		95% KM (z) UCL	6.715
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.364
Minimum	0.16	95% KM (bootstrap t) UCL	10.98
Maximum	11	95% KM (BCA) UCL	6.417
Mean	3.833	95% KM (Percentile Bootstrap) UCL	6.603
Median	2.65	95% KM (Chebyshev) UCL	11.47
SD	4.292	97.5% KM (Chebyshev) UCL	14.78
k star	0.437	99% KM (Chebyshev) UCL	21.27
Theta star	8.777		
Nu star	5.241	Potential UCLs to Use	
AppChi2	1.265	95% KM (t) UCL	7.364
95% Gamma Approximate UCL	15.88	95% KM (Percentile Bootstrap) UCL	6.603
95% Adjusted Gamma UCL	28.96		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

RDX			
General Statistics			
Number of Valid Data	13	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	2
Number of Missing Values	2	Percent Non-Detects	15.38%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.089	Minimum Detected	-2.419
Maximum Detected	570	Maximum Detected	6.346
Mean of Detected	59.64	Mean of Detected	0.908
SD of Detected	169.8	SD of Detected	2.827
Minimum Non-Detect	0.2	Minimum Non-Detect	-1.609
Maximum Non-Detect	0.25	Maximum Non-Detect	-1.386
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	5
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	38.46%
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.401	Shapiro Wilk Test Statistic	0.915
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	50.48	Mean	0.431
SD	156.6	SD	2.831
95% DL/2 (t) UCL	127.9	95% H-Stat (DL/2) UCL	9279
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.347
		SD in Log Scale	2.924
		Mean in Original Scale	50.47
		SD in Original Scale	156.6
		95% Percentile Bootstrap UCL	135.5
		95% BCA Bootstrap UCL	183
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.226	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	264.4		
nu star	4.963		
A-D Test Statistic	0.987	Nonparametric Statistics	
5% A-D Critical Value	0.849	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.849	Mean	50.49
5% K-S Critical Value	0.28	SD	150.4
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	43.76
		95% KM (t) UCL	128.5
Assuming Gamme Distribution		95% KM (z) UCL	122.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	127.9
Minimum	1E-09	95% KM (bootstrap t) UCL	1225
Maximum	570	95% KM (BCA) UCL	136.9
Mean	50.46	95% KM (Percentile Bootstrap) UCL	136.4
Median	0.3	95% KM (Chebyshev) UCL	241.2
SD	156.6	97.5% KM (Chebyshev) UCL	323.8
k star	0.147	99% KM (Chebyshev) UCL	485.9
Theta star	343.3		
Nu star	3.822	Potential UCLs to Use	
AppChi2	0.653	95% KM (Chebyshev) UCL	241.2
95% Gamma Approximate UCL	295.5		
95% Adjusted Gamma UCL	389.7		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benz(a)anthracene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	7	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.031	Minimum Detected	-3.474
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	2.042	Mean of Detected	-0.355
SD of Detected	2.702	SD of Detected	1.873
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.769	Shapiro Wilk Test Statistic	0.957
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.042	Mean	-0.355
SD	2.702	SD	1.873
95% DL/2 (t) UCL	3.852	95% H-Stat (DL/2) UCL	242
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.446	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	4.575		
nu star	7.142		
A-D Test Statistic	0.189	Nonparametric Statistics	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	2.042
5% K-S Critical Value	0.307	SD	2.527
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.955
		95% KM (t) UCL	3.852
Assuming Gamma Distribution		95% KM (z) UCL	3.613
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.852
Minimum	0.031	95% KM (bootstrap t) UCL	8.015
Maximum	7.8	95% KM (BCA) UCL	3.828
Mean	2.042	95% KM (Percentile Bootstrap) UCL	3.595
Median	1.15	95% KM (Chebyshev) UCL	6.206
SD	2.702	97.5% KM (Chebyshev) UCL	8.007
k star	0.446	99% KM (Chebyshev) UCL	11.55
Theta star	4.575	Potential UCLs to Use	
Nu star	7.142	95% KM (Chebyshev) UCL	6.206
AppChi2	2.249		
95% Gamma Approximate UCL	6.486		
95% Adjusted Gamma UCL	9.006		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(a)pyrene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	7	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.033	Minimum Detected	-3.411
Maximum Detected	6.7	Maximum Detected	1.902
Mean of Detected	1.816	Mean of Detected	-0.416
SD of Detected	2.328	SD of Detected	1.821
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.776	Shapiro Wilk Test Statistic	0.944
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.816	Mean	-0.416
SD	2.328	SD	1.821
95% DL/2 (t) UCL	3.376	95% H-Stat (DL/2) UCL	167
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.464	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	3.915		
nu star	7.421		
A-D Test Statistic	0.226	Nonparametric Statistics	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	1.816
5% K-S Critical Value	0.307	SD	2.178
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.823
		95% KM (t) UCL	3.376
Assuming Gamma Distribution		95% KM (z) UCL	3.17
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.376
Minimum	0.033	95% KM (bootstrap t) UCL	6.829
Maximum	6.7	95% KM (BCA) UCL	3.35
Mean	1.816	95% KM (Percentile Bootstrap) UCL	3.275
Median	1.1	95% KM (Chebyshev) UCL	5.404
SD	2.328	97.5% KM (Chebyshev) UCL	6.957
k star	0.464	99% KM (Chebyshev) UCL	10.01
Theta star	3.915	Potential UCLs to Use	
Nu star	7.421	95% KM (Chebyshev) UCL	5.404
AppChi2	2.405		
95% Gamma Approximate UCL	5.605		
95% Adjusted Gamma UCL	7.715		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Benzo(b)fluoranthene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	7	Number of Non-Detect Data	0
Number of Missing Values	7	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.04	Minimum Detected	-3.219
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	2.318	Mean of Detected	-0.123
SD of Detected	2.794	SD of Detected	1.81
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.789	Shapiro Wilk Test Statistic	0.926
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.318	Mean	-0.123
SD	2.794	SD	1.81
95% DL/2 (t) UCL	4.189	95% H-Stat (DL/2) UCL	210.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.481	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	4.822		
nu star	7.69		
A-D Test Statistic	0.276	Nonparametric Statistics	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	2.318
5% K-S Critical Value	0.306	SD	2.614
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.988
		95% KM (t) UCL	4.189
Assuming Gamma Distribution		95% KM (z) UCL	3.942
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.189
Minimum	0.04	95% KM (bootstrap t) UCL	7.791
Maximum	7.8	95% KM (BCA) UCL	3.95
Mean	2.318	95% KM (Percentile Bootstrap) UCL	3.89
Median	1.55	95% KM (Chebyshev) UCL	6.624
SD	2.794	97.5% KM (Chebyshev) UCL	8.487
k star	0.481	99% KM (Chebyshev) UCL	12.15
Theta star	4.822	Potential UCLs to Use	
Nu star	7.69	95% KM (Chebyshev) UCL	6.624
AppChi2	2.557		
95% Gamma Approximate UCL	6.97		
95% Adjusted Gamma UCL	9.519		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Dibenz(a,h)anthracene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	3
Number of Missing Values	7	Percent Non-Detects	37.50%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.21	Minimum Detected	-1.561
Maximum Detected	1.4	Maximum Detected	0.336
Mean of Detected	0.58	Mean of Detected	-0.852
SD of Detected	0.52	SD of Detected	0.855
Minimum Non-Detect	0.0068	Minimum Non-Detect	-4.991
Maximum Non-Detect	0.028	Maximum Non-Detect	-3.576
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	3
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	37.50%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.822
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.365	Mean	-2.487
SD	0.493	SD	2.388
95% DL/2 (t) UCL	0.695	95% H-Stat (DL/2) UCL	180
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.199	Mean in Log Scale	-1.709
SD	0.653	SD in Log Scale	1.363
95% MLE (t) UCL	0.637	Mean in Original Scale	0.38
95% MLE (Tiku) UCL	0.683	SD in Original Scale	0.481
		95% Percentile Bootstrap UCL	0.645
		95% BCA Bootstrap UCL	0.77
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.843	Data appear Normal at 5% Significance Level	
Theta Star	0.688		
nu star	8.433		
A-D Test Statistic	0.595	Nonparametric Statistics	
5% A-D Critical Value	0.685	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.685	Mean	0.441
5% K-S Critical Value	0.361	SD	0.409
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.162
		95% KM (t) UCL	0.748
Assuming Gamma Distribution		95% KM (z) UCL	0.707
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.728
Minimum	0.0913	95% KM (bootstrap t) UCL	5.667
Maximum	1.4	95% KM (BCA) UCL	0.8
Mean	0.449	95% KM (Percentile Bootstrap) UCL	0.745
Median	0.245	95% KM (Chebyshev) UCL	1.146
SD	0.439	97.5% KM (Chebyshev) UCL	1.451
k star	1.095	99% KM (Chebyshev) UCL	2.05
Theta star	0.41		
Nu star	17.52	Potential UCLs to Use	
AppChi2	9.041	95% KM (t) UCL	0.748
95% Gamma Approximate UCL	0.869	95% KM (Percentile Bootstrap) UCL	0.745
95% Adjusted Gamma UCL	1.04		
Note: DL/2 is not a recommended method.			

APPENDIX A
ProUCL Output for Surface Soil, Confirmation Data for National Guard Land Use
RVAAP-05 Winklepeck Burning Grounds

Indeno(1,2,3-cd)pyrene			
General Statistics			
Number of Valid Data	8	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	0
Number of Missing Values	7	Percent Non-Detects	0.00%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.022	Minimum Detected	-3.817
Maximum Detected	3.4	Maximum Detected	1.224
Mean of Detected	1.015	Mean of Detected	-0.904
SD of Detected	1.207	SD of Detected	1.735
Minimum Non-Detect	N/A	Minimum Non-Detect	N/A
Maximum Non-Detect	N/A	Maximum Non-Detect	N/A
Warning: There are only 8 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.8	Shapiro Wilk Test Statistic	0.935
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.015	Mean	-0.904
SD	1.207	SD	1.735
95% DL/2 (t) UCL	1.823	95% H-Stat (DL/2) UCL	62.56
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.498	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	2.037		
nu star	7.967		
A-D Test Statistic	0.261	Nonparametric Statistics	
5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	1.015
5% K-S Critical Value	0.306	SD	1.129
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.427
		95% KM (t) UCL	1.823
Assuming Gamma Distribution		95% KM (z) UCL	1.716
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.823
Minimum	0.022	95% KM (bootstrap t) UCL	3.218
Maximum	3.4	95% KM (BCA) UCL	1.788
Mean	1.015	95% KM (Percentile Bootstrap) UCL	1.738
Median	0.7	95% KM (Chebyshev) UCL	2.875
SD	1.207	97.5% KM (Chebyshev) UCL	3.68
k star	0.498	99% KM (Chebyshev) UCL	5.261
Theta star	2.037	Potential UCLs to Use	
Nu star	7.967	95% KM (Chebyshev) UCL	2.875
AppChi2	2.716		
95% Gamma Approximate UCL	2.976		
95% Adjusted Gamma UCL	4.033		
Note: DL/2 is not a recommended method.			

Appendix B

Comment Response Table

**DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011**

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
<i>Eileen Mohr, Ohio EPA (March 2, 2011)</i>				
1	General	In several places, there is a reference to surface soil (for OHARNG purposes) being 0-4' bgs.	This interval always used to be referred to as "deep surface." Unless this was changed in later facility-wide risk assessment, CUG etc. documents, please revise throughout the document as needed. Sometimes it is called deep surface, sometimes it isn't.	The text was revised as recommended to consistently use 'deep surface soil' when referencing the 0 to 4 ft bgs soil sample interval. Titles of and labels in tables and figures were also revised accordingly.
2	General	There are several places in the text where the FWCUGs are referred to as draft. The FWCUGs are final.	Please do a search, and replace draft with final, as needed. (This includes a number of the figures as well.)	The text was revised as recommended to change 'FWCUGs' to 'Final FWCUGs' for consistency.
3	General	Overall impressions/conclusions.	<p>a. Agree that currently there is inadequate characterization for the Residential Farmer – Adult for surface soil, subsurface soil and dry sediment.</p> <p>b. Agree that there is currently inadequate characterization for the Residential Farmer – Child for surface soil, subsurface soil and dry sediment.</p> <p>c. Agree that currently there is inadequate characterization for the National Guard Dust/Fire Control Worker for surface soil, dry sediment and perhaps sub-surface soil (see comment#32 below related to page 4-3) in areas that overlap target arrays for the proposed MPMG and the GLR and associated parking area.</p> <p>d. Agree that currently there is inadequate characterization for the National Guard Range Maintenance Soldier for surface soil, dry sediment and perhaps sub-surface soil (see comment #33 below related to page 4-4) in areas that overlap target arrays for the proposed MPMG and the GLR and associated parking area.</p> <p>e. Agree that currently there is inadequate</p>	Acknowledged. No changes were made to the document.

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
			characterization for surface soil, subsurface soil and dry sediment for the National Guard Trainee.	
4	General	FYI	Did not go back to previous reports and review the data inputted into this document as it would have been extraordinarily labor intensive (as Shaw undoubtedly knows). I just assumed the data is correct.	Acknowledged. No changes were made to the document.
5	General	In the sum of ratios approach/screen was 1E-5 utilized?	Please clarify.	The Sum of Ratios approach was applied to the confirmation data set in the identification of COCs as described in Section 3.2.2 of the WBG DQO Report. The confirmation data set is a remediation data set and, thus, subject to evaluation using the 1×10^{-5} carcinogenic risk and HQ=1. Those criteria are also listed in the column headings of Tables 3-7b and c, 3-8b and c, and 3-9b and c. No change was made to the document.
6	Doc Dist Pg	Ohio EPA is listed as a Facility Manager.	Please change to Project Manager.	The change was made as recommended.
7	Doc Dist Pg	Ohio EPA is not listed in the text below the distribution information.	Please add Ohio EPA.	The change was made as recommended.
8	iii/10	Change requested. Also Figure 1-1.	Change Locus to Location.	The change was made as recommended.
9	1-1/15-16	The text discusses investigating data gaps associated with Lane 1 of the Mark 19 range which will be constructed in the future.	All data gaps in the area specific to the Mark 19 have been addressed, remediation conducted, and the property has been transferred. Please revise the text to be consistent with the current state of WBG.	The text was revised as recommended in Comment No. 41 to read as follows: "The purpose of this <i>DQO Report</i> is to review the previous reports to determine if there are areas at the WBG AOC that need additional investigation in relation to the proposed future use of the site as a Multi Purpose Machinegun (MPMG) Range and a Grenade Launcher Range (GLR)."
10	1-2/29-31.	The text indicates that the AOC boundary is subject to change. This is not correct. The AOC boundary is depicted in the ROD	Suggest eliminating the sentence.	The sentence was deleted as recommended (see also Comment No. 42).

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
		(AUG 2008) and will remain the same. [Later on you will see a comment regarding revising the AOC boundary in most, if not all, maps to be consistent with the ROD.]		
11	1-4/5-7	Paragraph construction.	a. End sentence after 4' bgs on line 5. Remove "and." Start next sentence with removal. b. Move "halted" on line 6 to after Pad 61 (same line).	The bullet text was revised as recommended to read as follows: "Excavation halted and not backfilled in 10 ft by 10 ft area centered on previous soil sampling station WBG-217 located south of Pad 61 to a depth of 4 ft bgs. Removal of the soil berm associated with Pad 61 halted pending further environmental investigation.
12	1-5/16-18	The text talks about transferring the remaining acreage. The acreage has transferred.	Please delete this statement from the revised text.	The sentence was revised to read as follows (see also Comment No. 43): " <i>Following the removal action, the area of the final firing lane (Lane 1) of the Mark 19 Grenade Machinegun Range was transferred.</i> "
13	1-5/27-37	Text addition requested.	At an appropriate point in the revised text, confirm that the Mark 19 and MPMG firing points are the same.	The following sentence was inserted in the last paragraph of Section 1.4 as the second sentence: "The firing point area for the MPMG Range is the same as for the Mark 19 Grenade Machinegun Range."
14	1-6/1-4	OHARNG has asked for this text to be deleted. I have no problem with the deletion.	Please delete.	The sentences were deleted as recommended (see also Comment No. 44).
15	2-2/28	Text change requested.	Revise text to read: "needed, would be required to satisfy...."	The sentence was revised as recommended to read as follows: "Additional investigation data, if necessary to finalize the decision process and determine whether additional response action is needed, would <i>be required</i> to satisfy the following data needs:."
16	2-3/8-9	Clarification requested.	Not sure what is meant by Ohio EPA making a decision regarding the regulatory status of the site. Please clarify.	The sentence in question was deleted.

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
17	2-3/9-10	Text change requested.	Revise text to read: "...the purposes of assessing sampling data...."	The sentence was revised as recommended to read as follows: "As stated in the <i>FSAP</i> , the purposes of <i>assessing sampling</i> data are to determine the type of contamination, to compare these data to the risk-based facility-wide CUGs for unrestricted land use or OHARNG use and to determine if further investigation is needed."
18	2-3/15	Text change requested.	Change text to read:in Mark 19 construction areas." (The 2 removals referenced were specific to the Mark 19.)	The sentence was revised as recommended to read as follows: "Two removal actions addressed the more contaminated surface and subsurface soils based on historical sampling results and collected and removed MEC debris in <i>Mark 19</i> construction areas."
19	2-3/15-17	Clarification requested.	The intent of this sentence is not clear.	The sentence in question was deleted.
20	2-3/22	Text change.	Change to read: adequately characterized for new uses."	The sentence was revised as recommended to read as follows: "The historical sampling data, including removal action confirmation sample data, are now to be compared to more current CUGs for multiple receptors as identified in Section 3.0 to determine if the site has been adequately characterized <i>for new uses</i> ."
21	2-3/36	Text addition requested.	Briefly add information to the text that indicates why inhalation exposure assumptions were revised, and whether or not they are more or less conservative.	The last sentence of Section 2.5 was revised to read as follows: "The National Guard Range Maintenance Soldier receptor presented in the March 2010 Final FWCUGs document incorporates revised exposure assumptions (i.e., inhalation) from those used in prior evaluations of <i>an equivalent</i> receptor at WBG." And the following sentences were added at the end of Section 2.5: "The exposure assumptions used specifically for the risk assessment that was the basis for the 2008 ROD for WBG were different from those used in developing the facility-wide risk assessment. The resulting Final FWCUGs for the National Guard Range Maintenance Soldier are more conservative for select

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
				constituents and less conservative for others compared to those used in prior evaluations of an equivalent receptor specifically at WBG.”
22	2-4/9-11	Lane 1 of the Mark 19 range has already been cleaned-up.	Remove the reference to the Mark 19 from the text. The data gap report solely deals with the MPMG and GLR.	The sentence was revised as recommended to read as follows (see also Comment No. 47): “Areas proposed for future construction of the MPMG and GLR ranges represent specific focus areas for additional surface and subsurface sampling.”
23	3-1/23	Text change.	Change to “into.”	The sentence was revised as recommended to read as follows: “The surface soil, subsurface soil, and dry sediment data for WBG are divided into multiple data sets for use in this evaluation based on if the data are investigation or confirmation data.”
24	3-3/11-15	Clarification requested.	The background values listed in the WBG and the FWHHRG document should be the same. Please advise if you have noticed any difference.	The background values listed in the FWHHCG document and the WBG Phase II RI are the same. However, the FWHHRG document does not list background criteria for potassium and sodium. The background values for these two inorganic constituents listed in the WBG DQO Report tables were obtained from the Phase II RI. No changes were made to the document.
25	3-3/35-38	The text indicates that the Range Maintenance Soldier would only be exposed to surface soil and dry sediment and the Trainee would be also be exposed to these 2 media as well as subsurface soil.	a. how is surface soil defined? 0-1’bgs or the 0-4’ bgs deep surface soil? b. the Range Maintenance soldier would have more of a chance for contacting subsurface soil than the Trainee, due to target maintenance, installation, etc.. c. No Trainees in the areas of WBG will be contacting sub-surface soil as there is no need for this to occur. The Trainees come in and use the range and leave, that was the original intent of the Trainee with respect to the WBG Mark 19 range.	a. The sentence was revised to read as follows: “The OHARNG receptors include the National Guard Dust/Fire Control Worker, National Guard Range Maintenance Soldier, and the National Guard Trainee for <i>deep</i> surface soil (0 to 4 ft bgs) and dry sediment and only the National Guard Trainee for subsurface soil (4 to 7 ft bgs).” b. There are no Final FWCUGs for subsurface soil for the National Guard Range Maintenance Soldier receptor. c. If the National Guard Trainee will not be exposed to subsurface soil, then the need for sampling to fill data gaps for this media can be

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
				<p>eliminated during the development of a sampling plan and/or remedial action plan.</p> <p>The following paragraph was added to the end of Section 2.5: "Although the National Guard Range Maintenance Soldier is the primary receptor for the planned future land use at WBG, there are no Final FWCUGs for subsurface soil for this receptor. Therefore, the National Guard Trainee receptor is evaluated for subsurface soil as there are Final FWCUGs for subsurface soil for this receptor. However, the National Guard Trainee receptor may still be limited to the firing point area only during range operation because the basis for remediation design of previous removal actions did not account for the National Guard Trainee being present in the firing range itself. Decisions on the need for additional sampling to fill data gaps for subsurface soil or receptor evaluations in this media can be eliminated during development of a sampling plan and/or remedial action plan."</p>
26	3-5/4	Text change.	Change to "Sum of Ratios."	The sentence was revised as recommended to read as follows: "For carcinogens and non-carcinogens, the chemical-specific concentrations were compared to the target risk Final FWCUG using the Sum <i>of</i> Ratios method presented in the <i>Position Paper</i> ."
27	3-5/18	Text change requested.	Change concurrence to approval.	The sentence was revised as recommended to read as follows: "In some instances, there may be a risk management analysis such as a "Weight of Evidence" approach that may allow for a COC to be reassessed; however, any re-evaluation of a COC and the proposed approach will require <i>approval</i> from USACE and Ohio EPA."

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
28	3-6/19	Text change requested.	Change text to read: “.....to the excavation. Analytical results.....”	The sentence was revised as recommended to read as follows: “Analytical results of samples collected during the RIs from the areas of future excavations prior to the actual MEC removal action are still applicable in the investigation data set for characterizing potential environmental contamination in the soil.”
29	3-6/23-26	Clarification requested.	Not sure what is intended by this text as written. Please clarify.	<p>The intent of the sentence in question was to conclude the paragraph and convey that RI data that used to be associated with single sampling locations are now mixed in with larger areas of soil as a result of the 2005 MEC removal action. The data were used in the COPC evaluation and shown on the figures. However, where the sampling points overlap the 2005 MEC removal action on the figures, the results do not apply to that single location for the top 1 ft of soil (i.e., up to 1 ft bgs).</p> <p>To clarify, the following sentence was added at the end of the second paragraph in Section 3.3: “Results for soil samples collected from locations that overlap 2005 MEC removal action areas as depicted on the figures, do not apply to the top 1 foot of soil (i.e., up to 1 ft bgs) at that specific sample location as a result of the soil mixing.” The same sentence was added as a new note on each figure where sample results are shown within 2005 MEC removal action areas.</p>
30	3-12/ lines 2-3 and 15-16	In the referenced text, it looks like one place indicates that the frequency of detection screen is not applicable, while the other part of the text indicates that it is.	Fix apparent disconnect.	The first paragraph of Section 3.3.1.3 was revised to read as follows: “Twenty-three SVOC analytes were detected in multiple surface <i>and deep surface</i> soil samples collected at WBG in the investigation data and 22 were <i>initially</i> retained as COPCs. The frequency of detection screening <i>resulted</i> in data reduction for the investigation

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
				data set <i>through the elimination of N-nitrosodiphenylamine</i> . N-nitrosodiphenylamine was detected in 2 of 42 samples both at Pad 38, and as this is less than 5 percent frequency, this constituent was not retained as a COPC.” Note that the sentence formerly on page 3-12/lines 15-16 was moved to be incorporated into this revised paragraph.
31	3-15/lines 17-18	Text changes.	a. change to: “...as a Mark 19 Firing....” b. change rage to range.	The sentence was revised as recommended to read as follows: “The 2008 removal action addressed select areas of contamination in surface soil for the planned future land use as a <i>Mark 19</i> firing <i>range</i> thereby reducing the potential future contribution of contaminants to sediment in the drainage ditches.”
32	4-3/25-29	Text addition requested.	For the National Guard Dust/Fire Control Worker, add in a subsurface data gap discussion or specify the depth to which this worker is allowed to penetrate the soil. (Goes back to the issue of surface soil vs. deep surface.)	The opening paragraph of Section 4.4 was revised to read as follows (also see response to Comment No. 1): “Based on the detection of COPCs at concentrations greater than screening criteria for the National Guard Dust/Fire Control Worker in <i>deep</i> surface (0 to 4 ft bgs) and subsurface soil (4 to 7 ft bgs) collected in areas that overlap the target arrays and the GLR, additional data is necessary to define the extent of these compounds in <i>deep</i> surface soil and dry sediment along the proposed target arrays.” Similarly, references to ‘surface soil’ in the rest of Section 4.4 were revised to read as ‘deep surface soil’.
33	4-4/25-29	Text addition requested.	For the National Guard Range Maintenance Soldier, add in a subsurface data gap discussion or specify the depth to which this worker is allowed to penetrate the soil. (Goes back to the issue of surface soil vs. deep surface.)	Consistent with response to Comment No. 32 above, references to ‘surface soil’ in the rest of Section 4.5 were revised to read as ‘deep surface soil’.
34	5-1/7-8	Remove reference to the Mark 19 Range.	The areas have already been cleared to the specified use of the area and the land transferred.	The sentence was revised as recommended to read as follows: “Data results from the remedial investigations have been compared to the Final

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
				FWCUGs (or RSLs where applicable and background values for inorganics) for unrestricted land use and the proposed future land use of a MPMG Range and GLR.”
35	Pgs 5-1 through 5-4	At this point in time, the additional sampling details will not be reviewed in detail, however, the information can definitely be used as a “springboard” for discussion in if the process moves forward.	I would need to see additional data presentations in the form of maps etc. that are outside the scope of this effort. Additionally, I want to make it clear that subsequent approval of this report does not mean that the information in Section 5.0 becomes the defacto sampling plan.	Acknowledged.
36	All Figures	The WBG AOC boundary is incorrect on most, if not all figures. For example (not all inclusive) the AOC boundary in this document is drawn to the north of Pallet Road A which is not correct; Building 4301 and Pads 56 and 57 are not included within the eastern boundary of the AOC and they should be; the northern boundary is too far south; and, the western boundary needs to be extended to the west.	Please refer to the WBG ROD (August, 2008) and adjust the AOC boundary on all of these maps so that it is consistent with the ROD. Before changing all the figures, run a sample by all the stakeholders with the revised AOC boundary.	The WBG AOC boundary was revised as recommended.
37	Many/most figures	On many of the figures there are target arrays that are depicted in a straw yellow color and whose description indicates “2 ft Buried Electrical Wire in Conduit and Target Array.” There are also several arrays that in orange that indicate that they need to be cleared for a target array.	<p>Please revise the map as the only arrays that were SURFACE CLEARED for the Mark 19 range are the 400m, 600m, 800m, 1100m and 1500m. This needs to be depicted on the map and described as such.</p> <p>The 1100m and 1500m which were SURFACE CLEARED for the Mark 19 are depicted in orange. Change color?</p> <p>The 100m, 175m, 200m, 250m, 300m, 475m, 500m, 700m, 900m, 1000m arrays which fall</p>	The figures were generated using a proposed range layout provided by OHARNG during the development of the document. Shaw will confirm updated surface features with OHARNG and other existing reports for WBG. The basemap used for the figures will be revised as recommended and circulated to stakeholders for review and approval prior to finalizing the document.

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
			<p>within the distance limit of the Mark 19, have not been SURFACE CLEARED. The maps show these arrays as having/needing a 2' bgs conduit. I am hoping that this is a future activity, as the previous clean-ups did not allow for these conduits to be in place.</p> <p>There was surface clearance (0-1)of some pads in WBG that did not coincide with the Mark 19 layout – ex. pads 37, 38, 45, 58, 60, and 66 (may not be all inclusive).</p> <p>There was overall NO SUBSURFACE CLEARANCE in the WBG AOC for the Mark 19 range except where a target or firing point was to be sited, or where digging into pads, or removing berms were required in order to chase contamination.</p> <p>Somehow, this additional information needs to be depicted on the maps using a combination of color-coding, hatch marks, footnotes etc.</p> <p>The parking area for the proposed GLR parking has not been cleared. Please depict as such.</p> <p>Again, cross-reference the figure in the ROD and use the needed information from there.</p> <p>Before changing all the figures, run a sample by all the stakeholders to see if it is fitting the bill.</p>	
38	Several maps	On several maps, but not all, there are concentrations of various COCs depicted.	Is there any way to do this on a large map (ex. engineering plan size) that has all the existing target arrays and proposed MPMG arrays, and GLR and parking areas, etc.? This would also really help with assessing/evaluating the	In preparing the document, this was evaluated. It was determined that it would be too convoluted to put all the information on one figure because of the variables (receptor, COC, soil depth, sample type, etc.). As a result, it was presented in the

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
			proposed sampling scheme in section 5.0 and for moving forward.	format included in the report. Please let us know if further discussion is required.
39	Fig 1-2	Please use the new USACE map showing all AOCs (IRP, MMRP, and CC).	If the map is not finalized, or if the SOW/PWS specifies the map that appears in this document, it can remain.	An updated version of the RVAAP facility plan was used for the revised Figure 1-2 (see also Comment No. 48).
40	Fig 1-4	Change in figure explanation requested.	Put a comma between Mark 19 and Grenade Machine Gun Range.	The figure title was revised as recommended.
<i>Katie Tait, OHARNG (October 19, 2010)</i>				
41	Pg 1-1, Line 12	“The purpose of this DQO report is to determine if there are any data gaps from past investigation and remedial activities at RVAAP-05 with respect to environmental contamination or munitions constituents associated with munitions and explosives of concern (MEC) for the proposed construction of an additional firing lane for the existing MK19 range, a MPMG range and a GLR at WBG AOC.”	This statement is incorrect as the final lane for the MK19 range has already been addressed. Additionally, this site is not eligible for the MMRP because it is active range so MEC is not being investigated at this point in time as part of this report. Please revise. Suggested revised text: “The purpose of the DQO report is to review the previous reports to determine if there are areas at Winklepeck Burning Grounds that need additional investigation in relation to the proposed future use of the site as a multi-purpose machinegun range (MPMG) and a grenade launcher range (GLR).”	The text was revised as recommended.
42	Pg 1-2, Line 29	“Note that the AOC boundary presented in the figures is subject to change based on continuing discussions with OHARNG and their development of the operational range.”	This statement is incorrect. The AOC boundary was set forth in the ROD and is finalized and not subject to change. Please delete this statement.	The sentence was deleted as recommended (see also Comment No. 10).
43	Pg 1-5, Line 16	“The remaining acreage of WBG (approximately 20 acres) will be transferred to the US Property and Fiscal Office (USPFO) for Ohio in order to construct the	The final 20 acres have been transferred. Please delete this statement.	The sentence was revised to read as follows (see also Comment No. 12): “ <i>Following the removal action, the area of the final firing lane (Lane 1) of the Mark 19 Grenade Machinegun Range was transferred.</i> ”

**DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011**

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
		final firing lane (Lane 1) of the Mark 19 Grenade Machinegun Range.”		
44	Pg 1-6, Line 1	“Personnel are not permitted forward of the forward edge of the firing position except for target maintenance, range maintenance, and for controlled burns. Activities are limited to the existing gravel roads, George Road, and the individual target array band access roads.”	This information is not needed in this document as it relates to LUCs for the MK19 range. Additionally it is listed under planned future use which is not a correct location for this info. Please delete.	The sentences were deleted as recommended (see also Comment No. 14).
45	Pg 2-2, Line 18-24	“A MPMG Range and GLR with associated parking are proposed to be constructed on the existing Mark 19 Grenade Machinegun Range and other undeveloped areas of the WBG AOC. Therefore, the AOC must be assessed to identify any sampling data gaps and address, as necessary, to facilitate the new range construction. There are no wet sediments at the WBG AOC. Surface water is not evaluated in this DQO Report. Groundwater is being evaluated separately as part of a facility-wide study and is removed from further consideration in this <i>DQO 23 Report</i> .”	Suggested revised text: “A MPMG Range and GLR with associated parking areas are proposed to be constructed on the WBG AOC. Therefore, the AOC must be reassessed to identify any sampling data gaps and address, as necessary, to facilitate the new proposed range construction. This document reviewed previous sampling activities at WBG and identified any additional areas that might require additional investigation as related to the future proposed ranges. There are no wet sediments at the WBG AOC. Surface water is not evaluated in this DQO Report. Groundwater is being evaluated separately as part of a facility-wide study and is removed from further consideration in this <i>DQO 23 Report</i> .”	The text was revised as recommended except the ‘23’ was not included in the ‘DQO Report’ title reference at the end of the paragraph.
46	Pg 2-3, Line 17	“However, the ROD established for the prior removal actions was specific to the future land use as a Mark 19 Grenade Machinegun	This statement is not completely accurate as the ROD was written to include use of the area for small arms ranges. Please delete this statement.	The sentence was deleted as recommended.

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
		Range (excluding the additional MPMG Range components and GLR)."		
47	Pg 2-4, Line 9	"Areas proposed for construction of the remaining firing lane of the Mark 19 Grenade Machinegun Range, the MPMG target arrays, and the GLR represent specific focus areas for additional surface and subsurface sampling."	Again, this document does not address or investigate the remaining lane construction for the MK19 range as it was already addressed. Please revise. Suggested revised text: "Areas proposed for future construction of the MPMG and GLR ranges represent specific focus areas for additional surface and subsurface sampling."	The sentence was revised as recommended (see also Comment No. 22).
48	Figure 1-2	Please use the new AOC map as created by USACE that includes all 81 cleanup sites.		An updated version of the RVAAP facility plan was used for the revised Figure 1-2 (see also Comment No. 39).
<i>Derek Kinder, USACE (December 10, 2010)</i>				
49	Table 3-9	Where are the concentrations of benzo(a)pyrene and explosives detected as COCs at Pads 61 and 61a for the National Guard Trainee and Range Maintenance Soldier.		The confirmation samples that correspond to Pads 61 and 61A have a 'P61' within the sample ID and are the last five sample columns shown on Table 3-9a. No change to the document was made.
50	4-4 and 3-33	3-Nitrotoluene is mentioned as a COPC that needs to be horizontally delineated in Section 4 for the National Guard Range Maintenance Soldier. However, there is no mention of 3-nitrotoluene in Section 4.4.1. Also, 3-nitrotoluene is not shown as a COPC on page 3-33.		The references to 3-nitrotoluene in the first sentences of Section 4.5.1 and 4.6.1 were removed. 3-Nitrotoluene is a COPC for the National Guard receptors; however, the associated sample location (at Pad 66) does not overlap the construction footprint and is bound horizontally by other samples. As such, 3-nitrotoluene does not appear to require further samples to determine extent.
51	4-5	For National Guard Range Maintenance Soldier for dry sediment, it states the horizontal extent of benz(a)anthracene is		This is a typo. Section 4.5.2 was revised to include benzo(a)pyrene and not benz(a)anthracene.

DRAFT DATA QUALITY OBJECTIVES REPORT FOR RVAAP-05 WINKLEPECK BURNING GROUNDS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
MAY 25, 2011

Cmt. No.	Page No. / Line No.	Comment	Recommendation / Required Change	Response
		not defined in drainage ditches upstream and downstream of WBGsd-156(d) located southeast of pad 70. However, in Table 3-4, it states the max detect of benz(a)anthracene is 0.56, but the 10 ⁻⁶ CUG is 2.62, and the table says it is not retained as a COPC.		
52	Figure 3-13 and other figures	Note refers to "Draft FWCUGs."	Change to "Final FWCUGs."	The notes in the figures were revised as requested to reference the Final FWCUGs instead of the Draft FWCUGs.

Appendix C
Ohio EPA Approval Letter

Note: This is a placeholder page. Shaw will supply a signed authorization page to be inserted into the final hard copy document as soon as it becomes available. Replacement CDs that include the signed authorization page will also be supplied.

