REMOVAL ACTION WORK PLAN

The Landing – Mt. Shasta Commerce Park
South Mt. Shasta Boulevard
Mt. Shasta, California

Prepared For:

Siskiyou County Economic Development Council
1512 S. Oregon Street
Yreka, CA 96097

Prepared By:

10680 White Rock Road Suite 100
Rancho Cordova, California

TRC Project No.
202311.0000

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ACRONYMS

ARAR	Applicable or relevant and appropriate requirements
AST	Aboveground Storage Tank
ASTM	American Society of Testing Materials
AUL	Activity and Use Limitation
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Administrative Manual (CCR Title 22 section 66261.24)
COC	Contaminants of Concern
DI	De-ionized
DOT	Department of Transportation
DTSC	California Department of Toxic Substances Control
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
ESL	RWQCB Environmental Screening Levels
ft bgs	Feet below ground surface
ft/ft	Feet per foot
GPS	Global Positioning System
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
IDW	Investigation derived waste
JSA	Job Safety Analysis
LCS	Laboratory control samples
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
µg/L	Micrograms per liter
MSA	Master Services Agreement
MS/MSD	Matrix spike/matrix spike duplicate
NCP	EPA National Contingency Plan
NELAC	National Environmental Laboratory Accreditation Conference
ND	Not Detected
NSR	No Significant Risk
NTU	Nephelometric Turbidity Units
PAL	Project Action Limits
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol
PID	Photo-Ionization Detector
PPE	Personal protective equipment
QA	Quality assurance
QA/QC	Quality assurance/quality control
QAPP	Quality assurance project plan
QC	Quality control
QL	Quantitation limit
RFP	Roseburg Forest Products
RSL	EPA Region 9 Regional Screening Levels
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SCEDC	Siskiyou County Economic Development Council
SIM	Selective ion monitoring
SOP	Standard Operating Procedure

ACRONYMS – CONTINUED

SVOC	Semi-volatile organic compound
TCDD TEQ	Tetrachlordibenzo-p-dioxin toxic equivalency concentration
TPH	Total Petroleum Hydrocarbons
TPH-d	TPH as diesel
TPH-g	TPH as gasoline
TPH-mo	TPH as motor oil
USA	Underground Service Alert
USCS	Unified Soil Classification System
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The site of the proposed Mount Shasta Commerce Park (also referred to as The Landing) (Figure 1) historically operated as a lumber mill and box factory from 1900 to 1985. The property as a whole consists of a total of 149 acres of land. The entire property has been divided into two primary study areas: the western property ("site"), consisting of 95 acres to the west of Mt. Shasta Boulevard, the eastern property, consisting of a 51-acre parcel, and a 3-acre parcel located to the east of Mt. Shasta Boulevard. On the western property, a lumber mill was originally located in the "Old Mill" area at the northern end of the site. A more recently constructed lumber mill, referred to as the "New Mill", was located in the central portion of the site and was last operated by Roseburg Forest Products. This Removal Action Work Plan (RAWP) specifically addresses the New Mill portion of the property and does not address the Old Mill portion of the property. Former facilities in the New Mill study area included a pentachlorophenol (PCP) dip tank for wood treatment, diesel fuel aboveground storage tank (AST), gasoline fuel underground storage tank (UST), dump area, and an equipment maintenance shed.

The property, which is currently a vacant lot, will be developed by the City of Mt. Shasta to include various commercial businesses and recreational facilities, including a performing arts center. Current environmental concerns at the site include contaminated surface and subsurface soil which likely occurred during historical lumber mill operations. Contamination is primarily concentrated in areas of historical New Mill site facilities, including the former equipment shed and former dump area (Figure 2). Additionally, contaminated soil has been identified in the vicinity of the former box factory located on the property. The box factory operated power transformers and also a burner which have impacted surface and shallow soil with various contaminants, primarily polychlorinated biphenyls (PCBs), dioxins, and furans. Contaminants of concern (COC) present in soil at specific areas of the property do currently exceed state and federal regulatory standards for human health. The purpose of the proposed environmental cleanup at the site is to remedy the environmental impacts to the soil to ensure the protection of human health and the environment.

To date, approximately 80 of the 149 acres of the property have been thoroughly assessed and approved for redevelopment by the Department of Toxic Substances Control (DTSC). Areas of the New Mill that have been adequately assessed for soil contamination include the former New Mill equipment shed area, the New Mill dip tank area, and the former Box Factory transformer area. Areas of the New Mill study area that have not yet been adequately assessed for environmental impacts include: the former New Mill aboveground storage tank (AST) area, the former New Mill underground storage tank (UST) area, and the New Mill dump area. This RAWP specifically addresses proposed actions at the New Mill equipment shed area, the Box Factory transformer and burner areas, and the New Mill dump area. The AST and UST require additional assessment and will not be addressed as part of the proposed cleanup actions. The AST and UST will be addressed at a later date.

Additionally, it is suspected that groundwater at the New Mill site may have been impacted by contaminants from past site operations, specifically at the AST and UST areas. Groundwater in those areas will be assessed for impacts during future work at the site and will not be addressed in this RAWP.

The proposed remedies for the site include the excavation and off-site disposal of contaminated soil from the site and in the case of the New Mill dump area containing soil and applying property deed restrictions to prevent human contact with impacted soil (Figure 3).

1.0 INTRODUCTION

This Site Removal Action Work Plan (RAWP) has been prepared to address the remediation of contaminated shallow soil in the New Mill and Box Factory areas of The Landing – Mt. Shasta Commerce Park (formerly Roseburg Lumber Mill) in Mt. Shasta, California (Figures 1 and 2) under a United States Environmental Protection Agency (U.S. EPA) Brownfields Multi-Purpose Cooperative Agreement Grant (#BF-00T93701-0) for assessment and cleanup, awarded to the City of Mt. Shasta (City)(recipient) and the Siskiyou County Economic Development Council (SCEDC; sub-recipient). The proposed remedial actions are based on the soil analytical results of the Phase II soil and groundwater investigation conducted by TRC in November 2014 (TRC, 2015) and soil analytical data from historical site investigations (Section 3.4).

The work performed will be in general conformance with the National Contingency Plan (NCP), codified as 40 Code of Federal Regulations (CFR) Part 300.

1.1 Removal Action Process

1.1.1 Regulatory Basis for RAWP

In California HSC 25323.1, a RAWP is defined as "a workplan prepared or approved by the Department (DTSC) or a California Regional Water Quality Control Board (RWQCB) which is developed to carry out a removal action, in an effective manner, that is protective of the public health and safety and the environment." A RAWP is appropriate when the estimated cost of the removal action is less than $2,000,000. If the estimated capital cost of implementing the chosen action will exceed $2,000,000, a Remedial Action Plan should be prepared.

The estimated cost of the selected removal alternative recommended in this RAW is estimated to be less than $2,000,000.

1.1.2 Objectives of the RAWP

The scope of the Removal Action Work Plan is to:

- Present a brief description of the site, including location, geology, and hydrogeology (Sections 3.0);
- Discuss the nature and extent of Contaminants of Concern (COCs) in soil (Section 4.0);
- Summarize the Remedial Action Objectives (Section 5.0);
- Present a feasibility study with remedial options (Section 6.0);
- Outline remedial design and field activities (Section 7.0); and
- Indicate the Removal Action deliverables and schedule.

1.1.3 Elements of the RAWP

In accordance with the selection of the remedial alternative presented in Sections 7.0 of this RAWP, the proposed scope of work for remedial activities at the site include the following:

- California Environmental Quality Act (CEQA) documentation and review of the site, including biological resources and cultural resources permitting and reporting;
- Excavation and removal of impacted soil in the New Mill (excluding the former diesel fuel aboveground storage tank and gasoline underground storage tank study areas) and Box Factory study areas that exceeds environmental cleanup concentrations for COCs;
- Confirmation soil sampling in areas where soil excavation was conducted to confirm all impacted soil exceeding cleanup levels has been removed;
- Application of land use restrictions for soil in the area of the former Dump;
- Completion and Submittal of the *Removal Action Summary Report*.

1.2 Site Description

The site is located in the southern portion of the City of Mt. Shasta, Siskiyou County, California and is bordered by a residential area to the north, Interstate 5 to the west, and a mixture of residences, business parcels, and forest to the south and east.

1.2.1 Land Use

The property as a whole consists of a total of 149 acres of land. The property is currently owned by the City of Mt. Shasta and has undergone planning and marketing for a future development (The Landing – Mt. Shasta Commerce Park), with approximately 80 of the 149 acres ready for redevelopment. The entire property has been divided into two primary study areas: the western property, consisting of 95 acres to the west of Mt. Shasta Boulevard, and the eastern property, consisting of a 51-acre parcel and a 3-acre parcel located to the east of Mt. Shasta Boulevard. The western property has been further divided into two independent study areas, the "New Mill" area, which includes the "New Mill" and former "Box Factory", and the "Old Mill" area. The various study areas are shown on Figure 2. The New Mill area is central to the access to the western property and lies between investigation areas that have already been cleared for redevelopment.

1.2.2 Historic Uses

The property was formerly used primarily for lumber milling and log storage. A lumber mill was originally located in the Old Mill area at the northern end of the site. A more recently constructed lumber mill (New Mill) was located in the central portion of the western property. Former facilities in the New Mill study area included a pentachlorophenol (PCP) dip tank for wood treatment, diesel fuel aboveground storage tank (AST), gasoline fuel underground storage tank (UST), dump area, and an equipment maintenance shed. Southwest of the New Mill facilities is a former box factory, which previously contained a planing mill, a burner, and transformers. The site milling operations ceased in 1985.

PCP and Total Petroleum Hydrocarbons (TPH) impacts to shallow soil and groundwater have been documented at the former New Mill facilities during past site assessments. The presence of PCP in shallow soil in the vicinity of the former dip tank was the likely result of spills which occurred over the duration of site operations. Historical documentation has stated that the former dip tank was cleaned three times per year and the rinsate may have been discharged directly to the ground surface (E&E, 2005). Historical releases of TPH in the New Mill area have primarily been the result of spills over the duration of site operations. TPH in the vicinity of the former equipment shed has historically been observed as surface staining (URSa, 2007) suggesting product was spilled from containers and/or equipment. No historical documentation was found explaining the release of TPH in the vicinity of the dump area, gasoline UST, or the diesel AST. The UST and AST were removed from the site prior to 1987 (E&E, 2005).

Polychlorinated biphenyl (PCBs) have historically been reported in soil samples collected near the transformers and dioxins/furans have been identified in soil at the former burner location (Ecology and Environment, Inc. [E&E], 1998). No documented historical PCB releases were found. Additionally, various wastes of an unknown nature were incinerated in the burner adjacent to the transformer area. Based on data collected during previous investigations the dioxins found at the burner are found primarily in shallow soil and asphalt-capped surface material (URSb, 2007).

1.2.2.1 Operational History

1900: The property was first developed by the Pioneer Box Company.

1928: Mount Shasta Pine Manufacturing Company purchased the property.

1954: Property acquired by the Ralph L. Smith Lumber Company (Smith Lumber).

1963: Kimberly-Clark Corporation purchased the property.

1979: Roseburg Forest Products (RFP) purchased the property.

1985: RFP ceased all operations on property and subsequently moved equipment to other facilities.

1.2.2.2 Regulatory Involvement

A summary of previous investigations is summarized below.

1959: The Regional Water Quality Control Board (RWQCB) [formerly the Water Pollution Control Board] required Smith Lumber to comply with waste discharge requirements. The RWQCB restricted waste discharge into Cold Creek and required yearly inspections by the RWQCB. At this time, it was noted that a log pond was utilized to store logs and it continuously drained at 1,000 gallons per minute to Cold Creek.

1964: A RWQCB inspection noted that sodium pentachlorophenol, which is also called PCP, was used in a New Mill dip tank which was cleaned three times a year by discharging to the ground surface.

1987: An October RWQCB inspection reported that eight (8) 55-gallon drums were located within the New Mill area with indication of spillage. Documentation describing the exact location of these drums is not available. One underground storage tank (UST) had been excavated.

1988: A letter in August to Roseburg Forest Product (RFP) from the RWQCB stated that soil contamination at the former New Mill dip tank needed to be evaluated (it is unknown whether this task was completed).

1989: RFP deeded property to the City of Mt. Shasta with the City accepting responsibility for implementing the Closure Plan.

1.2.3 Adjacent Properties

The location of the property is in a primarily rural setting. Located to the east of the New Mill site on the eastern side of South Mount Shasta Boulevard is a mix of commercial and industrial businesses and several hotels. Approximately ¼-mile west of the New Mill site is low to medium density residential housing.

The nearest building to the New Mill site is located approximately 50 yards away on the eastern side of South Mount Shasta Boulevard.

1.3 Site Owner

After the mill operations ceased at the site the property was sold to the City of Mount Shasta in 1989.

1.4 Purpose

Based on the information developed during the site characterization activities, the DTSC has determined that further action is required for the site due to elevated concentrations of petroleum hydrocarbons, PCBs, and dioxins and furans detected in soil and groundwater samples collected from the site. When the remedy has been implemented, a Removal Action Completion Report will be submitted to DTSC for review and certification.

2.0 SITE CHARACTERIZATION

2.1 Site Characterization

2.1.1 Historical Environmental Assessments

1988: In May, Steffen, Robertson and Kirsten (SRK) collected two subsurface, soil samples near the area of the New Mill dip tank. Metal results indicated 0.2 milligrams per kilogram (mg/kg) of mercury in one sample. Semi-volatile organic compound (SVOCs), including Pentachlorophenol (PCP), were not detected.

1998: E&E conducted a Brownfields Targeted Site Assessment for the EPA, which involved collecting soil, sediment, surface water, and groundwater samples (E&E, 1998). Fifteen areas of potential contamination were identified based on available historical information. Analytical results indicated that additional investigation was warranted at four of the 15 areas where samples were collected. These included the New Mill Dip Tank and the Old Mill Dip Tank. Diesel contamination was reported in near surface soil at the New Mill aboveground storage tank (AST). A sample collected at the dump reported diesel at 2,250 mg/kg. Several other petroleum-contaminated areas were also recommended for delineation of contaminated soil. Elevated concentrations of metals, including arsenic, chromium, and lead, were also identified in site soils. A soil sample collected from 1 ft bgs from the transformer area of the former box factory reported a polychlorinated biphenyls (PCB) (Aroclor-1260) at a concentration of 0.120 mg/kg.

2005: E&E conducted a second Brownfields Targeted Site Assessment to delineate the previously identified areas of contamination (E&E, 2005). PCP contamination was confirmed in soil and groundwater at the Old Mill Dip Tank and at the New Mill Dip Tank. However, the vertical and lateral extent of the PCP groundwater contamination was not delineated in these areas.

December 6, 2006: The City excavated the petroleum-stained soils at the former New Mill AST and at the former equipment shed, under the direction of DTSC. Soils beneath the former AST were excavated to an approximate depth of 8 ft bgs. As part of this investigation, URS collected confirmation samples from approximately 1 ft bgs at nine locations along the excavation perimeter (URSa, 2007). Impacted soil appeared to be limited to the upper 3 feet of the excavation. A portion of the stained surface soil at the equipment shed was excavated to approximately 2 ft bgs. Results of the confirmation soil samples indicated that significant motor oil contamination remained in the vicinity of the equipment shed.

February 15, 2007: The City excavated impacted soil at the former New Mill AST and the former New Mill equipment shed. Stained soil from the New Mill dump area to the west of the former equipment shed was also excavated to approximately 3 ft bgs. Confirmation soil samples from the edges of the excavations indicated that motor oil concentrations above screening remained in shallow soil. All excavated soil was stockpiled on the concrete foundation of the New Mill and covered with plastic sheeting. URS collected soil samples for PCB analysis from the box factory transformer area in December 2006 and again in February 2007 (URSb, 2007). Additional soil sampling was conducted during this phase of the TSI to define the appropriate excavation area and depth for remediation of this location.

April 29, 2009: Under the terms of a DTSC Targeted Site Investigation grant, the City contracted for the installation and sampling of four groundwater monitoring wells in the area of the New Mill dip tank. The goal of this work was to determine the vertical and lateral extent of soil and groundwater contamination previously identified and investigate groundwater gradient and flow direction. The four wells were installed to depths up to 40 ft bgs and developed. Groundwater samples were obtained from two sampling events separated by a two-month time interval and were analyzed for dissolved metals, diesel/motor oil and PCP. A steep easterly gradient was determined to be the case during both monitoring events. Limited impacts to groundwater from PCP in the east end of the New Mill dip tank above the screening level were detected (URS, 2009). During the January 2009 sampling event groundwater levels in MW-2 were documented as being low and slow to recharge and MW-4 was documented as being dry. In March 2009 MW-4 was sampled; however, the groundwater level was low and the well was slow to recharge.

November 11-14, 2014: TRC conducted a soil and groundwater site investigation of the New Mill, including the former equipment shed, former dip tank, dump area in accordance with the Sampling and Analysis Plan (SAP) (TRC, 2014) approved by the EPA and DTSC. A soil investigation was also conducted at the former transformer and former burner areas of the Box factory. Additionally, TRC attempted to collect groundwater samples from the existing monitoring well MW-1 through MW-4; however, the monitoring wells were found to have insufficient amounts of groundwater to sample. Results of the soil and groundwater investigation are presented in the Site Investigation Report (TRC, 2015).

2.1.2 Site Geology and Hydrogeology

The site is located on the southwestern side of Mt. Shasta, a composite volcano near the southern end of the Cascade Range. Bedrock beneath the site is encountered at a depth of approximately 50 feet below ground surface (ft bgs), and is composed of Pleistocene volcanic debris flow, ash, and tuft deposits, and Pleistocene volcanic rock such as andesite. Site soils are typically gravelly sandy clay to clayey sands with some volcanic cobbles (URS, 2009).

Groundwater is typically encountered at 15 to 35 ft bgs in the vicinity of the New Mill and between 5 and 10 feet in the vicinity of the Old Mill. Groundwater flow beneath the New Mill area has historically been toward the west, away from Mt. Shasta and toward Cold Creek, at a gradient between 0.12 ft/ft and 0.15 ft/ft (URS, 2009). Cold Creek is located 1,500 feet east of the New Mill dip tank and flows into Lake Siskiyou, which drains into the Sacramento River (Figure 1).

2.1.3 Background Concentrations of Metals in Soil

Background soil sampling was conducted for the site in March 2005. A total of six (6) background samples were collected from four (4) sample locations: Two (2) sample locations for the western property and two (2) sample locations for the eastern property. The two (2) western property background samples locations appear to be located along the western side of South Mount Shasta Boulevard. The eastern property samples were collected from the vicinity of the former truck stop. The background samples were analyzed for TPH (as diesel, motor oil, and gasoline) and metals. TPH detections from the western property samples included only motor oil at depths of 0.5 feet. The TPH as motor oil detections are below cleanup levels. Of the metals detected in western property background samples, the only elevated concentrations were aluminum and iron, with maximum concentrations of 72,900 mg/kg and 28,600 mg/kg, respectively. No metals detected in background soil samples for the western property exceeded established cleanup levels.

2.2 Nature and Extent of Contamination

2.2.1 Conceptual Site Model

A conceptual site model (CSM) is a site assessment tool developed to identify potential exposure pathways from contaminant sources to human and/or ecological receptors. A CSM should:

(1) Identify known or suspected sources of contamination.
(2) Consider how and where the contaminants are likely to migrate (pathways).
(3) Identify who is likely to be affected by them (receptors).

The development of the CSM should be considered an iterative process, enabling refinements as additional analytical and geologic data are collected and/or new land uses are considered. The CSM presented is based on information obtained during previous site investigations.

2.2.1.1 Soil and Groundwater Impacts

2.2.1.1.1 Soil Impacts

New Mill Equipment Shed/ Drainage Ditch Area

In November 2014, TRC completed ten (10) soil borings to a depth of 15 ft bgs at the former equipment shed to further delineate the presence of TPH-d, TPH-g, and TPH-mo in shallow soil. The locations represented areas that had elevated TPH detections during past assessments or had not been previously sampled. The highest TPH-d concentration in soil observed in the equipment shed area was 3,100 mg/kg in sample EQSH-5-7.5. The highest TPH-mo concentration in soil observed in the equipment shed area was 7,400 mg/kg in sample EQSH-5-7.5. TPH-g was not detected above the investigation screening level and only one soil sample, EQSH-1-0, had a TPH-g concentration above the laboratory reporting limit.

Historical soil analytical data from the former equipment shed and surrounding area includes seven (7) surface soil samples from December 2006 (samples SLD-22 through SLD-28), two (2) shallow soil samples from February 2007, and nine (9) shallow soil samples from May 2007. Soil samples SLD-27-0 and SLD-28-0 were collected from the edge of a December 2006 excavation (identified as Pit 5), which was completed by the City and targeted stained surface soils (URS, January 2007). Sample depths from the 2007 equipment shed samples range from surface to 2 ft bgs. Historical concentrations of TPH-d in soil samples from the equipment shed area have ranged from 3.8 mg/kg to 12,000 mg/kg (at SLD-27-0) utilizing a silica gel clean-up to decrease the probability of interference by the presence of other organic material. Historical concentrations of TPH-mo in soil samples from the equipment shed area have ranged from 47 mg/kg to 34,000 mg/kg (at SLD-27-0). No PCP has been detected in historical soil samples from the equipment shed area.

New Mill Dump Area

In November 2014, TRC completed five (5) soil borings to a depth of 15 ft bgs at the New Mill dump area to delineate the vertical extent of TPH-d, TPH-g, and TPH-mo impacts in soil. TPH-d maximum concentration of 310 mg/kg at NMDU-5-10. TPH-mo maximum concentration of 3,400 mg/kg at NMDU-5-10. No TPH-g detections above the laboratory reporting limit.

Historical soil analytical data from the former dump and surrounding area includes one (1) soil sample from May 1998, four (4) surface soil samples from December 2006, two (2) surface soil samples from February 2007, and seven (7) surface soil and shallow soil samples from May 2007. TPH-d and TPH-mo were detected at elevated levels in shallow soil, with a maximum TPH-d concentration of 2,250 mg/kg (May 1998) and a maximum TPH-mo concentration of 1,900 mg/kg (February 2007). A silica gel clean-up was used in the analysis of the 2007 investigation samples to decrease the probability of interference by the presence of other organic material.

Historical metal detections above both current U.S. EPA Regional Screening Levels (RSLs) shallow soil within the Dump area include only arsenic, which was detected above the RSL of 0.25 mg/kg in two (2) historical soil samples. The highest historic arsenic detection in shallow soil is 0.78 mg/kg at soil sample DUMP-3 (surface). Although the RSL is exceeded the value is below the background concentrations for arsenic in soil, which should be taken into account when determining cleanup goals.

New Mill Dip Tank Area

In November 2014, TRC completed eight (8) soil borings to a depth of 15 ft bgs to investigate the vertical extent of PCP in soil. Additionally, the soil samples from the Dip Tank were analyzed for TPH and metals. There were no detections of PCP or any other analytes over the laboratory reporting limit.

Historical soil analytical data from the former dip tank and surrounding area includes six (6) shallow soil samples from May 1998, nineteen (19) shallow soil samples from March 2005, and ten (10) shallow soil samples from May 2007. Sample depths from the dip tank area range from surface to 10 ft bgs. Historical detections of Contaminants of Concern (COC) include one (1) detection of Total Petroleum Hydrocarbons as Diesel (TPH-d) and multiple detections of Total Petroleum Hydrocarbons as Motor Oil (TPH-mo) and Pentachlorophenol (PCP). Historical concentrations of TPH-d and TPH-mo in shallow soil have all been below current ESLs. Historical concentrations of PCP in shallow soil have ranged from <0.020 mg/kg to 340 mg/kg (at NMDT-2-2). Six (6) soil samples from the former dip tank area have exceeded the current RSL of 2.7 mg/kg for PCP.

Metals detected above both current RSLs and background concentrations in shallow soil within the dip tank area include only arsenic, which was detected above the RSL of 0.25 mg/kg and the maximum background concentration of 2.4 mg/kg in two (2) historical soil samples. The highest historic arsenic detection in shallow soil is 5.1 mg/kg at soil sample NMDT-7-1 (1 foot bgs).

Box Factory Transformer Area

In November 2014, TRC completed four (4) soil borings to a depth of 15 ft bgs to investigate the lateral and vertical extent of PCBs in shallow soil that were detected during previous investigations. There were no detections of PCBs over the method detection limit.

Historical soil analytical data from the former transformer area includes three (3) shallow soil samples from May 1998, seven (7) surface soil samples from December 2006, ten (10) surface soil samples from February 2007, and six (6) surface soil samples from May 2007. Historical investigations of the transformer area have primarily addressed polychlorinated biphenyls (PCBs) and metals in shallow soil. Historical detections of the PCBs Aroclor 1254 and Aroclor 1260 have been relatively low; however, two (2) historical soil samples (BFT-6-0 and BFT-21-0) have exceeded the current RSL of 1.0 mg/kg for Aroclor 1254 and Aroclor 1260 in shallow soil.

Box Factory Burner Area

In November 2014, TRC completed four (4) soil borings to a depth of 15 ft bgs in the vicinity of the former Box Factory burner to investigate dioxins and furans in shallow soil. Four (4) soil samples exceeded the U.S. EPA screening level of 22 pg/g. The maximum TCDD toxic equivalency concentration (TEQ) detected was 272.76 pg/g at sample point BFBU-2-0.

Historical soil analytical data from the former burner area includes one (1) surface soil samples from May 1998 and three (3) surface soil samples from December 2006. Analysis of soil during historical investigations has been limited to dioxin and furan analysis and suggests that minor dioxin and furan impacts to shallow soil are present. Three samples from the December 2006 soil investigation, NBFB-1-0 through NBFB-3-0, had TCDD Toxic Equivalency Concentrations (TEQ) that exceed the current November 2013 USEPA RSLs. This impacted soil appears to be limited in size and likely confined to shallow soils.

2.2.1.1.2 Groundwater Impacts

State law defines beneficial uses of California's waters that may be protected against quality degradation to include (and not be limited to) "...domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wild-life, and other aquatic resources or preserves" (Water Code Section 13050(f)).

Groundwater in the vicinity of the site may be used for domestic and municipal supply.

Former New Mill Dip Tank

In November 2014, TRC collected one (1) grab groundwater sample was from soil boring DIPT-1, located at the northern end of the former dip tank footprint. Groundwater was analyzed for PCP by EPA Method 515.1, TPH-d with silica gel cleanup, TPH-mo, TPH-g by EPA Method 8015B (M), BTEX by EPA Method 8260B, and metals by EPA Methods 601oB and 7470A. No analytes were detected above screening levels in groundwater.

Historical groundwater analytical data from the former dip tank and surrounding area includes two (2) groundwater samples from May 1998, seven (7) groundwater samples from May 2007, and data collected from four groundwater monitoring wells (MW-1 through MW-4) which were installed in January 2009. Historical concentrations of TPH-d in groundwater have ranged from <50 µg/L to 1,700 µg/L (at NMDT-1), which exceeds the current ESL of 640 µg/L for TPH-d in groundwater. Historical concentrations of PCP in groundwater have ranged from <0.31 µg/L to 400 µg/L (at NDT-2-25). Seven (7) historical PCP detections in groundwater have exceeded the current RSL of 1.0 µg/L for PCP in groundwater. The most recent sampling of the four (4) groundwater monitoring wells was in March 2009.

2.2.1.2 Release Mechanisms

Historical releases of TPH in the New Mill area have primarily been the result of spills over the duration of site operations. TPH in the vicinity of the former equipment shed has historically been observed as surface staining (URS, 2007) suggesting product was spilled from containers and/or equipment. No historical documentation was found explaining the release of TPH in the vicinity of the gasoline UST and the 8,000 gallon diesel AST. The UST and AST were removed from the site prior to 1987 (E&E, 2005).

The presence of PCP in shallow soil in the vicinity of the former dip tank is the likely result of spills which occurred over the duration of site operations. Historical documentation has stated that the former dip tank was cleaned three times per year and the rinsate may have been discharged to the ground surface (E&E, 2005).

In the area of the former Box Factory PCBs originated from transformers serving the factory operations. No documented historical PCB releases were found. Additionally, various wastes of an unknown nature were incinerated in the burner adjacent to the transformer area. Based on data collected during previous investigations the dioxins found at the burner are found primarily in shallow soil and asphalt-capped surface material (URS, 2007).

2.2.1.3 Pathways

The current and reasonably anticipated future land uses were used to identify potentially exposed populations and to determine possible exposure pathways. Land use and zoning at the site is commercial and light industrial.

The current understanding of contaminant pathways and potential receptors at the site is illustrated in Figure 4.

Based on the analytical soil data collected to date, and specifically the data obtained during the Phase II Site Investigation (TRC, 2015), the distribution of COCs in soil beneath the site has been adequately defined and is considered to be a low threat to groundwater due to the shallow depth of soil impacts and the depth of groundwater at the site. The pathway analysis is described below:

- <u>Pathways describing the mechanism through which COCs could come into contact with receptors (i.e., potential exposure to humans or wildlife)</u>. There must be a complete exposure pathway from the source of the COCs in the environment (in shallow soil) to human or ecological receptors for chemical intake to occur. As a result of the future construction plans for the site, there are potentially (2) complete and significant pathways. These pathways include 1) dermal contact with impacted shallow soil and 2) dermal contact with surface water that has come in contact with surface and shallow soil.

2.2.1.4 Receptors

Potential receptor points considered include:

- Recreational Users
- Future Commercial/ Industrial workers
- Construction workers

The soil and groundwater exposure route is typically evaluated as either:

- Incomplete - meaning that there is no possibility for the workers and building occupants to come into contact with contaminants via the exposure route;
- Complete - meaning that it is potentially a significant mechanism of exposure; and
- Complete but insignificant - meaning that it is not considered to be a significant source of contaminants via the exposure route.

The review of source, pathways, and receptors at the site indicate that dermal contact with impacted shallow soil and surface water are the only complete exposure pathways. The full extent of groundwater impacts at the site may not be fully characterized. Therefore, the groundwater exposure route is assumed to be unknown and will be addressed during future investigations.

The current understanding of contaminant pathways and potential receptors at the site is illustrated in Figure 4.

2.2.1.5 Data Gap Analysis

Data gaps within the New Mill and Box Factory areas of the site exist with respect to the lateral and vertical extent of soil impacted with TPH in the dump area and dioxins and furans in the burner area. Additionally, groundwater impacted with TPH and PCP has not been fully delineated in regards to lateral extent. Previous investigations have confirmed that elevated groundwater concentrations of TPH and PCP do exist in the vicinity of the New Mill dip tank and AST/UST areas. Future work proposed for the site includes attempting to rehabilitate the four (4) groundwater monitoring wells in the dip tank area to collect additional groundwater samples.

2.3 Human Health Risk Assessment

A comprehensive Human Health Risk Assessment (HHRA) has been prepared for the site (Appendix D). The HHRA evaluated for the potential of human health impacts from chemicals released due to past activities at the site. Potential human health risks associated with current and future exposures to contaminated environmental media were considered. The results of this assessment along with an assessment of the potential for the contaminated environmental media to impact environmental receptors, if applicable, were used to provide a basis for requiring further action at the site. Risk screening for specific COCs and receptors has been evaluated through comparison to state and federal cleanup concentration levels (ESLs and RSLs).

2.3.1 Identification of Chemicals of Concern

Former New Mill Equipment Shed

Shallow soil in specific areas surrounding the former New Mill equipment shed exceeds RSLs for TPH-diesel and TPH-motor oil. The depth of soil impacts exceeding cleanup goals have been shown to vary from the surface to 7.5 ft bgs. Refer to Tables 2a through 2c for historical chemical detections in soil.

New Mill Dump Area

Soil located at the former New Mill dump exceeds RSLs for TPH-diesel and TPH-motor oil. The depth of soil impacts exceeding cleanup goals have been shown to vary from the surface to 10 ft bgs. Refer to Tables 2a through 2c for historical chemical detections in soil.

New Mill Dip Tank

During the most recent soil investigation conducted in November 2014 there were no detections of COCs over the laboratory reporting limit. Historically, soil samples collected in the vicinity of the former dip tank have exceeded cleanup levels for PCP. Refer to Tables 2a through 2c for historical chemical detections in soil.

Box Factory Transformer Area

During the most recent soil investigation conducted in November 2014 there were no detections of PCBs over the method detection limit. Historically, PCBs exceeding cleanup levels have been detected in surface soil. Refer to Tables 2a through 2c for historical chemical detections in soil.

Box Factory Burner

Shallow soil in specific areas of the former Box Factory burner exceeds RSLs for dioxins and furans. The depth of soil impacts exceeding cleanup goals have been shown to vary from the surface to 3 ft bgs. Refer to Tables 2a through 2c for historical chemical detections in soil.

2.3.2 Exposure Assessment

The site pathways and receptors have been identified as part of the site CSM in Sections 2.2.1.3 and 2.2.1.4.

2.3.3 Risk Evaluation

The HHRA was conducted to evaluate the potential human health risks associated with current (pre-development) and anticipated future (post-development) site conditions. The exposure assumptions and risk assessment methodologies employed for the pre-development and post-development conditions are identical, with the exception of the exposure point concentrations utilized in the analysis. This analysis was performed without considering the impact of remedial action on reducing the exposure point concentrations of COCs in soil (pre-development only), the influence of engineered structures in reducing the potential for future exposure, or the application of administrative or institutional controls that could serve to reduce or eliminate potential receptors or exposure pathways from quantitative analysis. The HHRA quantitatively evaluated non-cancer health effects and theoretical cancer risks using the RME scenario for the following exposure pathways and receptors:

Exposure Pathway	**Recreational Receptor**	**Commercial Worker**	**Construction Worker**
Incidental Ingestion of Soil	✓	✓	✓
Dermal Contact with Soil	✓	✓	✓
Inhalation of Fugitive Dust	✓	✓	✓

For the purpose of this assessment, the COCs include both naturally-occurring elements (e.g., metals) and a subset of COCs that were the primary focus of Site evaluations. The results of previous environmental assessment activities were used to define the COCs that were included for quantitative analysis and to establish EPCs for the COCs by investigation area.

The results of the HHRA indicate that naturally-occurring elements contribute most-significantly to the cumulative non-carcinogenic and carcinogenic risk estimates. Adjustment of the cumulative risk estimates to exclude the contributions of naturally-occurring elements provides a more accurate representation of post-development conditions as related to the future development and use of the property. Based on the quantitative results of the HHRA, TRC offers the following conclusions with regard to the future development and use of the subject property. The conclusions are presented by investigation area as described below:

New Mill – Dip Tank Area

- *Current Conditions:* The results of the HHRA indicate that the adjusted cumulative hazard indices for non-carcinogenic COCs and the adjusted upper-bound lifetime incremental cancer risks are below levels that warrant consideration of remediation or mitigation measures.

- *Future Conditions:* Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.

- *Construction Worker Considerations:* While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil.

New Mill – Equipment Shed Area

- Primary COC – TPHd

- *Current Conditions*: Under current conditions, potential recreational exposure to near-surface soil could result in adverse non-carcinogenic health impacts under the defined conditions of exposure. Potential exposures to commercial receptors in this area are not anticipated to result in adverse health effects. Excavation and removal of soil containing elevated concentrations of TPHd would be expected to further reduce potential exposures and risks in this area.

- *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.

- *Construction Worker Considerations*: Work in this area would not require extraordinary health and safety provisions. However, construction workers involved in earth work in this area should be informed of the possible presence of TPHd in soil and encouraged to take measures to reduce potential for dermal contact and incidental ingestion of soil.

New Mill – Dump Area

- Primary COCs – TPHd and nickel

- *Current Conditions*: Under current conditions, potential recreational exposure to near-surface soil could result in adverse non-carcinogenic health impacts under the defined conditions of exposure. Potential exposures to commercial receptors in this area are not anticipated to result in adverse health effects. Excavation and removal of soil containing elevated concentrations of TPHd would be expected to further reduce potential exposures and risks in this area.

- *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.

- *Construction Worker Considerations*: The presence of nickel in soil presents a potential hazard to future construction workers through the inhalation of fugitive dust exposure pathway. Construction workers involved in earth work in this area should be informed of the possible presence of TPHd and nickel in soil and should take measures to reduce the generation of fugitive dust during construction through industry standard dust control measures (e.g., water application and/or use of dust palliatives). Future site contractors should also adhere to standard environmental procedures related to dust and stormwater control. In addition, it is recommended that a construction contingency plan be developed in order to address previously undiscovered Site conditions that may warrant additional investigation, analysis or mitigation.

<u>Box Factory – Transformer Area</u>

- Primary COC: PCBs (i.e., Aroclor 1254 and Aroclor 1260)

- *Current Conditions*: Under current conditions, potential exposures to Aroclor 1254 and Aroclor 1260 in near-surface soil could result in unacceptable lifetime incremental cancer risks for recreational and commercial receptors. Upper-bound lifetime incremental cancer risks for the recreational receptor and commercial worker are approximately 2 times higher than the lowest range of acceptable risks typically used in risk management decision-making (i.e., 1 in 1,000,000). Excavation and removal of soil containing elevated concentrations of to Aroclor 1254 and Aroclor 1260 would be expected to reduce potential exposures and risks in this area.

  - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.

  - *Construction Worker Considerations*: While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil. In addition, construction workers engaged in earth moving activities in this area should be informed of the presence of PCBs in soil.

Box Factory – Burner

- Primary COC: TCDD Eqs (dioxins/furans)

- *Current Conditions*: Under current conditions, potential exposures to TCDD Eqs in near-surface soil could result in unacceptable lifetime incremental cancer risks for recreational and commercial receptors. Upper-bound lifetime incremental cancer risks for the recreational receptor are approximately 60 times higher than the lowest range of acceptable risks typically used in risk management decision-making (i.e., 1 in 1,000,000). Similarly, upper-bound lifetime incremental cancer risks for the commercial worker receptor are approximately 4 times higher than the acceptable risk level that is typically utilized for exposures in a commercial or industrial land use scenario (i.e., 1 in 100,000). Excavation and removal of soil containing elevated concentrations of TCDD Eqs would be expected to reduce potential exposures and risks in this area. In the absence of source removal activities, administrative or engineering controls could be employed to eliminate the potential exposure pathways in this area.

  - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. However, potential risks to the recreational receptor are estimated to meet the lowest value in the range of acceptable risks (i.e., 1 in 1,000,000).

  - *Construction Worker Considerations*: While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil. In addition, construction workers engaged in earth moving activities in this area should be informed of the presence of TCDD Eqs in soil. Future site contractors should also adhere to standard environmental procedures related to dust and stormwater control. In addition, it is recommended that a construction contingency plan be developed in order to address previously undiscovered Site conditions that may warrant additional investigation, analysis or mitigation.

3.0 REMOVAL ACTION GOALS AND OBJECTIVES

3.1 Removal Action Objectives

Site characterization has revealed the presence of COCs in shallow soil onsite. Remedial Action Objectives (RAOs) have been developed based upon the current environmental conditions and the current and reasonably anticipated future uses of the site and the downgradient properties. Based on the RAOs, cleanup goals were developed that establish specific concentrations of chemicals in environmental media that are protective of both human health and the environment.

The objective of remediation at the site is to eliminate significant human health and environmental risks and achieve a condition of No Significant Risk (NSR) for the New Mill and Box Factory facilities. The NSR will be achieved by:

- Eliminating the potential for direct human contact with contaminated soils at the site by future tenants and construction/utility workers; and

- Preventing future activities and uses at the site (i.e., daycare, ball parks, gardening for human consumption, etc.) that may be associated with Significant Risk.

A discussion of regulatory requirements, human health risks, and the remedial goals developed for the site is presented below.

3.2 Applicable or Relevant and Appropriate Requirements

Applicable or relevant and appropriate requirements (ARARs) are federal and state environmental statutes, regulations, and standards. Applicable requirements are federal or state laws or regulations that specifically address a hazardous substance, pollutant, contaminant, removal action, or location. Relevant and appropriate requirements that, while not "applicable," address problems or situations sufficiently similar to those encountered that their use is well suited to the particular site. State requirements are ARARs only if they are more stringent than federal requirements.

In addition to ARARs, this analysis includes an evaluation of To-Be-Considered criteria (TBCs). TBCs are advisories, criteria, or guidance that may be considered for a particular action or specific issue, as appropriate. TBCs are not ARARs because they are neither promulgated nor enforceable.

The ARARs or TBCs may be: 1) chemical; 2) location; or 3) activity specific. Chemical specific ARARs or TBCs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in, or discharged to, the environment. Location-specific ARARs or TBCs restrict actions or contaminant concentrations in certain environmentally sensitive areas.

Summary of Site ARARs and TBCs

Requirement	Description	ARAR or TBC
CWA, Section 304	Establishes water quality criteria based on the designated or potential use of the water and designated use of the receiving waters.	
Safe Drinking Water Act	Establishes primary and secondary drinking water standards.	
Occupational Safety and Health Act (29 CFR 1910.120 et seq.)	Identifies permissible exposure limits (PELs) for inhalation or dermal exposure of workers to chemicals. When PELs are exceeded, OSHA requires the use of personal protective equipment or other methods to block exposure.	

Hazardous Waste Generator Requirements (22 CCR 66262.1 et seq.)	Establishes standards applicable to generators of hazardous waste.	
Stockpiling Requirements for Contaminated Soil (HSC Section 25123.3(a)(2)	Establishes standards for stockpiling of non-RCRA contaminated soil.	
Porter Cologne Water Quality Act (23 CCR Chapter 3 Subchapter 15, WC Section 13000 et seq.)	Establishes the authority of the State Water Resources Control Board and Regional Water Quality Control Boards to protect water quality by identifying beneficial uses of the waters of the State, establishing water quality objectives, and regulating discharges to waters of the State.	
Regional Water Quality Control Board Basin Plan	Adopts narrative standards and permissible concentrations of organic and inorganic chemicals for surface water, groundwater, point sources, and non-point sources. Establishes beneficial uses of surface waters and groundwater.	
California Occupational Health and Safety (8 CCR 5192)	Requires workers involved in hazardous substance operations associated with cleanup of sites perform the cleanup operations in accordance with Cal OSHA Health and Safety requirements.	Applicable requirement for all workers who can come into contact with contaminated media at the site.

3.3 Removal Goals

U.S. EPA RSLs are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. RSLs are considered by the U.S. EPA to be protective for humans (including sensitive groups) over a lifetime; however, RSLs do not address non-human health endpoints, such as ecological impacts. The RSLs contained in the RSL table are generic; they are calculated without site-specific information. They may be re-calculated using site-specific data (U.S. EPA, 2015).

Generally, at sites where contaminant concentrations fall below RSLs, no further action or study is warranted under the U.S. EPA Superfund program, so long as the exposure assumptions at a site match those taken into account by the RSL calculations. Chemical concentrations above the RSL would not automatically designate the site as "dirty" or trigger a response action; however, exceeding a RSL suggests that further evaluation of the potential risks by site contaminants is appropriate. RSLs provide long-term targets to use during the analysis of different remedial alternatives (U.S. EPA, 2015).

3.3.1 Soil Cleanup Goals

TRC proposes to use the U.S. EPA RSLs for industrial site soils (U.S EPA, 2015). Using these RSLs will create the following soil cleanup goals for the site:

- 440 mg/kg for TPH-diesel;
- 3,300 mg/kg for TPH-motor oil;
- 420 mg/kg for TPH-gasoline;
- 4 mg/kg for PCP;
- 0.66 mg/kg to 30 mg/kg for PCBs depending on Aroclor; and
- 22 pg/g for dioxins and furans.

All COC cleanup values for soil are presented in Table 1.

4.0 ALTERNATIVE EVALUATION

4.1 Identification and Analysis of Removal Action Alternatives

The remedial alternatives analysis identification process focuses on several options that exhibit the potential to eliminate or significantly reduce exposure to the COCs observed in shallow soil at the site and are most likely to achieve a Permanent or Temporary Solution.

The following remedial alternatives are evaluated for effectiveness and implementation with respect to current site conditions.

4.1.1 Option 1 – No Action

No Action assumes no additional efforts are undertaken to eliminate potential future exposures to surface and subsurface soil impacts at the site. It appears that this technology would not eliminate risk to human health or the environment and is therefore not retained for consideration.

4.1.2 Option 2 – Use Restrictions/Institutional Controls

Institutional controls establish restrictions on the use of a site that would otherwise result in exposure to the COCs that remain. Restrictions can be in the form of allowed uses and controls and also physical barriers such as fences. This would require the filing of a deed restriction in the form of an Activity and Use Limitation (AUL). The current use of the site is a vacant lot and anticipated future use of this site is commercial and light industrial. In order to achieve a condition of NSR, certain uses of the site would need to be restricted. Therefore institutional controls have been retained for consideration in the development of remedial alternatives for soil.

An institutional control in the form of an AUL is not appropriate if the remediation objective is to achieve unrestricted future use of this site. An AUL may be used in conjunction with other alternatives to achieve a condition of NSR of harm to human health and the environment.

The objectives of the AUL would include the following:

- Restrict direct contact with the historic fill material;
- Restrict vegetable cultivation;
- Require maintenance of pavement areas and landscaping;
- Restrict use of property for single-family residential use, unpaved playgrounds, parks, and daycare facilities unless additional exposure mitigation is conducted; and
- Restrict access to the historic fill material unless supervised by an environmental professional utilizing a Soil Management Plan.

4.1.3 Option 3 – Use Restrictions/Institutional Controls with Containment

Containment measures are designed to isolate chemicals to prevent direct contact, erosion, and, depending on the chemicals, leaching. The alternative of excavating soil can be difficult based on site conditions and also expensive, particularly when the volume of impacted soil is large as is the case at the New Mill dump area. Capping generally provides a cost-effective and proven method of containment for managing large volumes of impacted soil where related groundwater issues are not also present.

A containment remedy could consist of a layer of soil, asphalt, concrete, or other containment technology consistent with site development plans which will eliminate or minimize direct contact with the underlying soils, and will address all chemicals. When containment is selected for a remedial solution, it is implemented in conjunction with an institutional control that would require cap maintenance and prohibit uncontrolled cap removal or penetration. Containment is retained as a remedy for further consideration in the detailed evaluation.

4.1.4 Option 4 – Excavation and Off-Site Disposal

Physical removal addresses COCs in soil by physically removing impacted media from the site with disposal or recycling at an appropriately licensed off-site facility. Excavation and off-site disposal is a proven and commonly used method that addresses all contaminants. Screening of fill material to separate debris waste (e.g. concrete, wood) from unconsolidated soil may be necessary. This alternative often targets small volumes due to the increased costs associated with excavation, transportation, and disposal fees. Given the proven performance of excavation as a site remedy at similar sites, this technology will be retained for further evaluation.

Under this remedial alternative, soil in specific areas of the New Mill and Box Factory will be excavated and disposed of or recycled off-site.

Estimated soil volumes to be excavated and transported for off-site disposal are presented in Table 2 and areas to be excavated are presented on Figure 3.

Removed soil volumes contained herein are estimates based on field observations and analytical data obtained to date and are presented as in-place volumes. Further refinement of soil volume estimates by additional soil sampling and/or inspection may be warranted. However, changes to the soil volume estimates will not adversely impact the analysis and selection of remedial alternatives contained herein.

The proposed excavations at the site are discussed below:

1. *New Mill Equipment Shed*

The New Mill equipment shed, located along the eastern portion of the site along South Mt. Shasta Boulevard, consists of a total area of approximately 7,275 square feet that exceeds proposed cleanup levels for TPH. Approximately 5,127 square feet will be excavated to a depth of 1 ft bgs. Approximately 1,092 square feet will be excavated to a depth of 3 ft bgs. Lastly, approximately 1,056 square feet will be excavated to a depth of 8 ft bgs. The in-place volume of TPH impacted soil in this area is estimated to be 623 cubic yards. Excavated areas with depths of 3 ft bgs and 8 ft bgs will be backfilled to grade with clean backfill material.

2. *Box Factory Transformer Area*

The Box Factory transformer area, located on the southern portion of the site, consists of a total area of approximately 1,362 square feet that exceeds proposed cleanup levels for PCBs. The entire remediation area for the transformer area square feet will be excavated to a depth of 1 ft bgs. The in-place volume of PCB impacted soil in this area is estimated to be 50 cubic yards.

3. *Box Factory Burner*

The Box Factory burner area, located along the southern portion of the site, consists of a total area of approximately 4,561 square feet that exceeds proposed cleanup levels for dioxins and furans. Approximately 3,880 square feet will be excavated to a depth of 1 ft bgs. Approximately 681 square feet will be excavated to a depth of 3 ft bgs. The in-place volume of dioxin and furan impacted soil in this area is estimated to be 219 cubic yards. Excavated areas with depths of 3 ft bgs will be backfilled to grade with clean backfill material.

4.2 Comparative Evaluation Criteria

This section presents a relative comparison of the selected soil remedial alternatives for the study areas discussed above.

4.2.1 Effectiveness

In the effectiveness evaluation, the following factors are considered:

- *Overall Protection of Human Health and the Environment* - This criterion evaluates whether the removal alternative provides adequate protection to human health and the environment and is able to meet the site's RAOs.

- *Compliance with ARARs/TBCs* - This criterion evaluates the ability of the removal alternative to comply with ARARs and TBCs.

- *Short-Term Effectiveness* - This criterion evaluates the effects of the removal alternative during the construction and implementation phase until removal objectives are met. It accounts for the protection of workers and the community during removal activities and environmental impacts from implementing the removal action.

- *Long-Term Effectiveness and Permanence* - This criterion addresses issues related to the management of residual risk remaining on site after a removal action has been performed and has met it objectives. The primary focus is on the controls that may be required to manage risk posed by treatment residuals and/or untreated wastes.

- *Reduction of Toxicity, Mobility, or Volume* - This criterion evaluates whether the removal technology employed results in significant reduction in toxicity, mobility, or volume of the hazardous substances.

4.2.2 Difficulty of Implementation

This criterion evaluates the technical and administrative feasibility of implementing the alternative, as well as the availability of the necessary equipment and services. This includes the ability to design and perform a removal alternative, ability to obtain services and equipment, ability to monitor the performance and effectiveness of technologies, and the ability to obtain necessary permits and approvals from agencies, and acceptance by the State and the community.

4.2.3 Cost Effectiveness

This criterion assesses the relative cost of each technology based on estimated fixed capital for construction or initial implementation and ongoing operational and maintenance costs. The actual costs will depend on true labor and material cost, competitive market conditions, final project scope, and the implementation schedule.

4.2.4 Potential Risks

This criterion includes any potential risks that could impact worker health, community health, or the environment. Potential risks may include soil spills, impact to air quality, or exposure of COCs to the public.

4.3 Analysis of Removal Action Alternatives

4.3.1 Option 1 – No Action

The No Action alternative would not require implementing any measures at the site, and no costs would be incurred. Consequently, there would be no activities that would disturb site soil, and therefore, no short-term risks to site workers or the community as a result of implementing this alternative.

However, under the No Action alternative, the impacts due to the presence of site COCs in soil would not be addressed and there would be no reduction in the potential risks to human health and the environment. This alternative, therefore, does not meet the effectiveness criterion. As a result, acceptance by the State and the community would be unobtainable.

4.3.2 Option 2 – Use Restrictions/Institutional Controls

4.3.2.1 Effectiveness

The use restrictions/ institutional controls alternative would involve no disturbance of the impacted soil. Therefore, there would be very little exposure to the COCs via dermal contact by workers or potential inhalation of COCs via fugitive dust. Use restrictions and institutional controls would require long-term inspection and maintenance to meet ARARs and provide long-term effectiveness.

Implementing use restrictions and institutional controls would not lessen toxicity or volume of the COCs, but would limit potential exposure of COCs to the public and the environment by restricting activities that could take place at the site.

4.3.2.2 Implementability

The Implementability of this option would be easy and would require the recording of deed restrictions and institutional controls. However, the toxicity and volume of site COCs would remain and the potential for exposure to COCs by the community could be high. The approval of this option by the City, State, and community would likely be low.

4.3.2.3 Cost

The cost associated with this option would be low in the short-term. The costs for recording deed restrictions would largely be administrative. There would be long-term costs associated with monitoring site institutional controls to ensure compliance with the deed restrictions. Costs of this option are evaluated is Section 4.4.3.

4.3.2.4 Potential Risks

Long-term risks of this option could be high due to the potential of contact with site COCs. Precautions would have to be taken to ensure that the use restrictions and institutional controls are not compromised by land use activities. Additional mitigation measures would be addressed in a Soil Management Plan developed for the site.

4.3.3 Option 3 – Use Restrictions/Institutional Controls with Containment

4.3.3.1 Effectiveness

The containment/capping-in-place alternative would involve little to no disturbance of the impacted soil. Therefore, there would be very little exposure to the COCs and the short-term risks would be low. The installation of a surface cap would require long-term inspection and maintenance to meet ARARs and provide long-term effectiveness.

Periodic inspections would be required for settlement, cracking, ponding of liquids, erosion, and naturally occurring invasion by deep-rooted vegetation. Additionally, precautions would have to be taken to ensure that the integrity of the cap is not compromised by land use activities.

Containment through surface capping would not lessen toxicity or volume of the COCs, but would limit mobility, specifically the prevention of surface water infiltration and thus, the potential downward migration of contaminants.

4.3.3.2 Implementability

Containment is a relatively simple technology that is easily implemented and can be quickly installed. As COCs would remain on site, obtaining permits and regulatory approval could be difficult. In addition, community acceptance for this alternative may be more difficult since the COCs would remain on site.

4.3.3.3 Cost

Containment technologies typically involve low to moderate costs. The costs would be dependent upon the type of containment cap utilized, such as asphalt or a low permeability clay cover. Costs of this option are evaluated is Section 4.4.3.

4.3.3.4 Potential Risks

The potential risks associated with a containment cap would include the failure of the cap over time which could result in exposure of site COCs to the public and/or environment. Regular inspections of the cap integrity would help mitigate the risk of cap failure.

4.3.4 Option 4 – Excavation and Off-Site Disposal

4.3.4.1 Effectiveness

Excavation and disposal would remove the COCs from the site, and therefore, eliminates the long-term risks and accomplishes the RAOs.

Although the COCs will be removed from the site, excavation and off-site land disposal does not result in the reduction of toxicity or volume of the COCs. By placing the impacted soil in an engineered landfill suitable for receiving the concentrations of COCs, the mobility of the COCs will be reduced.

4.3.4.2 Implementability

Excavation/off-site disposal is a well-proven, readily implementable technology that is a common method for cleaning up contaminated sites. It is a relatively simple process with proven results. Equipment and labor required to implement this alternative are uncomplicated and readily available. The shallow depths of the soil contamination make excavation readily implementable. It is anticipated that regulatory approval would be granted since it is a proven and permanent technology. Acceptance by the State and the community for this alternative is considered high.

4.3.4.3 Cost

The costs associated with this option include permitting, excavation and loading of soil, transportation, and disposal of the impacted soils at a waste handling facility. Costs of this option are evaluated is Section 4.4.3.

4.3.4.4 Potential Risks

Potential short-term risks to onsite workers, public health, and the environment could result from dust or particulates that may be generated during excavation and soil handling activities. These risks could be mitigated using personal protective equipment for onsite workers and engineering controls, such as dust suppression and additional traffic and equipment operating safety procedures, for protection of the surrounding community and to meet all ARARs.

4.4 Comparative Analysis of Removal Action Alternatives

4.4.1 Effectiveness

Remedial Option #4 is the most effective means to mitigate exposure from site COCs as all material is removed off-site. Remedial Option #3 is also effective in mitigating exposure to COCs but does not remove COCs from the site. Remedial Options #1 and #2 are considered the least effective.

4.4.2 Implementability

Since the site is currently a vacant lot with small areas of concrete foundations, excavation and off-site disposal of targeted soil is relatively easy to implement. However, Remedial Option #4 would become more difficult to implement in areas where large amounts of soil would require excavation, such as the New Mill dump area.

The implementation of remedial Option #3 would be difficult due to the engineering that would be required to stabilize site soils, including areas of steep slopes or inadequately compacted soil. The containment cap would require engineering to ensure lasting protection from the underlying soil.

4.4.3 Cost Effectiveness

- For Option #1, there would be no costs;
- For Option #2, For Option #2, the estimated costs are $11,000. This estimate includes administrative costs associated with recording a deed restriction to specific areas of the site. Additionally, costs include a property survey by a professional surveyor and regular monitoring and reporting of the site’s institutional controls to ensure compliance and ensure protection to human health.
- For Option #3, For Option #3, the estimated costs are $435,710. This estimate includes the costs associated with Option #2 in addition to costs for applying a soil containment technology to specific areas of the site. The application of a containment technology (e.g. AC pavement) would likely be conducted concurrently with development of the property and would be paid for by property development funds. The option would also include regular monitoring of the containment technology to ensure its integrity.
- For Option #4, the estimated costs are $197,383. This estimate includes costs for an excavation subcontractor to excavate and dispose of site soils at a certified disposal facility. The estimate also includes field oversight by an environmental consultant and confirmation soil sampling and analysis costs.

4.4.4 Potential Risks

The potential short-term and long-term risks associated with each alternative are considered low to moderate. Potential short-term risks associated with soil excavation/disposal include possible accidental spills of contaminated soil during soil transport, which could result in short-term exposure to the contaminated soil by surrounding human populations. However, any accidental spill of contaminated soil would be immediately cleaned-up, and therefore, the duration of any potential human exposure to the contaminated soil would be extremely short-term. The short term risks for no-action or the sole use of an AUL would be considered moderate to high, due to concerns over worker health and safety during redevelopment of the site.

4.5 Recommended Removal Action Alternative

Remedial Options #3 and #4 are the best selections as targeted removal of soil and an implementation of a soil containment technology along with an AUL are anticipated to achieve NSR in a relatively efficient manner.

5.0 REMOVAL ACTION IMPLIMENTATION

5.1 Selecting Excavation Locations

The elements of the proposed removal action are as follows:

1. Remove TPH impacted shallow soil at the former New Mill equipment shed to varying depths of 0 to 7.5 ft bgs, dispose of excavated soil off-site, and backfill excavations with clean soil where needed;

2. Remove dioxins and furans and PCB impacted shallow soil at the former Box Factory burner and transformer area, respectively, to varying depths of 0 to 3 ft bgs, dispose of excavated soil off-site, and backfill excavations with clean soil where needed;

The approximate limits of soil excavation areas have been determined with the use of boring log data and analytical data from both historical and recent site investigations. The locations of proposed soil excavations are shown on Figure 3.

5.2 Permitting and Site Preparation

Prior to conducting soil removal activities, all appropriate permits will be obtained from both City and County agencies. All soil excavation areas will be marked with white paint or staked according to Underground Services Alert (USA) requirements. At least two days prior to commencing work at the site, USA will be notified. The USA ticket will be maintained as long as work continues at the site, and will be updated if necessary. In addition, a private utility locator will be contracted to confirm the absence of buried utilities.

Laws and regulations that are applicable to the portion of this cleanup that is being funded by the EPA Brownfields grant include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act, State of California environmental law, City of Mt. Shasta and Siskiyou County by-laws. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed.

5.3 Excavation Methodology

Excavation will be conducted using conventional excavation equipment such as an excavator, backhoe, or skid steer loader. Proposed excavation areas are shown in Figure 3. Initially, the excavations will proceed as proposed in this RAWP (Figure 3). If, after completion of confirmation sampling (Section 6.1), it is determined that chemical impacts are still present, then additional excavation of soil will be completed.

TRC personnel will be present during site activities to oversee the excavation, stockpiling, and off-site transport of soil. During excavation, excavated soils will be visually examined for the presence of hydrocarbon staining in order to segregate potentially more contaminated soils from less contaminated or uncontaminated soils. Soil will be segregated based on site data and/or waste characterization results in order to optimize disposal options.

5.3.1 Backfill

Excavated areas that exceed 1 ft bgs will be backfilled with clean fill up to the existing surface elevation after excavation and confirmation sampling have been completed. If possible, the excavations will be backfilled with clean dirt onsite. Additionally, during the removal action the excavated soil will be field screened and placed into appropriate stockpiles (e.g. contaminated, possibly contaminated, and possibly clean). These stockpiles will then be sampled and analyzed at a state certified analytical laboratory. The classification samples will be analyzed for: TPH-d, TPH-g, TPH-mo, BTEX, and CAM 17 metals. One composite sample will be collected for every 250 yards of excavated soil. Depending on the results of the waste classification results, soil will be transported to an appropriate disposal facility (addressed below) or will be used as backfill (if clean).

5.3.2 Green and Sustainable Remediation

The following measures will be implemented where applicable, beneficial, or feasible to improve the overall sustainability of the proposed remedial alternative as recommended by the U.S. EPA's Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites (U.S. EPA, 2008) document.

5.3.2.1 Administrative

- Green remediation principles will be incorporated into the contracting process, as possible.
- Interim and final documents will be submitted in digital rather than hardcopy format, unless otherwise requested by EPA, DTSC, or required by law, in an effort to save paper. This is especially applicable to voluminous data reports.

5.3.2.2 General Site Operations

- Use energy efficient equipment;
- Reuse or recycle waste;
- Protect and conserve water;
- Use alternative fuel vehicles (hybrid-electric, biodiesel, ultra-low sulfur diesel);
- Carpool for site visits and project meetings; and
- Schedule activities efficiently so as to minimize travel to and from the site

5.3.2.3 Remediation Operations

- Minimize use of heavy equipment requiring high volumes of fuel;
- Use cleaner fuels and retrofit diesel engines to operate heavy equipment, when possible;
- Reduce atmospheric release of toxic or priority pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead); and

- Minimize dust export of contaminants.

5.4 Control Measures

5.4.1 Soil Management

Excavated soil will be directly loaded into waste hauler trucks for transportation to a certified recycling or disposal facility. When characterization of the soil is required, the soil will be temporarily stockpiled on 10-mil polyethylene plastic sheeting and sampled for characterization parameters. Appropriate Best Management Practices (BMPs) will be utilized for stockpiled soil in order to contain the soil and prevent storm water run-off.

5.4.2 Groundwater Management

The depth to groundwater at the site, based on investigations conducted by others, is expected to be between 6 and 13 ft bgs in the vicinity of the New Mill equipment shed. Groundwater may be encountered during excavations beyond 6 feet. Groundwater elevations in the vicinity of the Box Factory is unknown. If groundwater is encountered the soil excavation operations will be stopped. If any groundwater is removed it will be placed directly in DOT-approved 55-gallon drums and transported to an appropriate disposal facility.

5.4.3 Erosion Control

As stated in Section 7.3, appropriate BMPs will be utilized around excavations and stockpiled soil in order to contain soil and prevent stormwater run-off. BMPs may include straw waddles, 10-mil polyethylene plastic sheeting, or a combination of both. Since the disturbance to the site will be less than one acre a Stormwater Pollution Prevention Plan (SWPPP) will not be required.

5.5 Air Monitoring During Excavation

Air and meteorological monitoring strategies and methodologies will be implemented during the removal action activities to achieve several goals:

- Identify and measure the air contaminants generated during the soil excavation and loading activities to assign the appropriate personal protective equipment and safety measures specified for those activities.

- Provide feedback to site personnel regarding potential hazards from exposure to hazardous air contaminants generated through excavation activities.

- Identify and measure air contaminants at points outside of the soil excavation and loading exclusion zones. Air monitoring will be conducted during work activities to measure potential exposure of sensitive receptors to site COCs, occurring as a result of excavation activities and to monitor the dust control measures implemented. Environmental ambient air monitoring will be conducted at the site during excavation activities using a handheld Photoionization Detector (PID) to ensure that the soil removal activities are not resulting in odor and/or nuisance dust conditions for surrounding populations.

TRC will be onsite during removal action activities to monitor the excavation, segregation and stockpiling of soil, and perform soil screening and environmental monitoring.

If nuisance odor and/or dust conditions are found to exist, corrective actions will be implemented, which may include one or more of the following actions:

- Temporarily discontinuing or slowing work;
- Implementing dust suppression (i.e., wetting soils);
- Covering soil stockpiles; or
- Other necessary corrective actions.

5.6 Field Variances

Variances from the work plan will be discussed with DTSC prior to any action being taken except for emergencies (when an immediate response is required). The DTSC will be notified if an emergency response is implemented. The field variances will be documented in the Removal Action Completion Report prepared for the project.

6.0 SAMPLING AND ANALYSIS PLAN

6.1 Confirmation Soil Sampling

The objective of the RAWP is to remove the site-related COCs present in the targeted excavation areas to proposed depths (Figure 3), depending on the location. Confirmation soil sampling will be conducted along the bottom and sidewalls of all excavations to ensure removal of impacted soil exceeding soil clean up goals. The analytes to be sampled for will depend on the location being excavated.

6.2 Sampling Protocol

Confirmation soil samples will be collected from sidewalls every 10 feet and from the bottom of the excavation every 10 feet in each direction (north, south, east, west). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

A PID will be used to measure for elevated volatile compounds within the excavation. PID measurements will be documented on the boring log or field notebook.

Soil samples being analyzed for TPH will be homogenized with a stainless-steel hand trowel in a decontaminated stainless-steel bowl. Homogenized material from the bowl will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis will be filled sequentially before jars designated for another analysis are filled. For TPH samples, laboratory supplied sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample.

6.3.1 Decontamination

The decontamination procedures that will be followed are in accordance with approved procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and hand augers, will be steam-cleaned or decontaminated according to EPA Region 9 recommended procedures. TRC's RMD SOP for equipment decontamination (SOP RMD-010; dated April 9, 2014) included in Appendix A will be followed.

The following, to be carried out in sequence, is an EPA Region 9 recommended procedure for the decontamination of sampling equipment.

- Non-phosphate detergent and tap-water wash, using a brush if necessary
- Tap-water rinse
- Deionized/distilled water rinse
- Pesticide-grade solvent (acetone) rinse in a decontamination bucket for organic analyses.
- Deionized/distilled water rinse (twice)

Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

6.3.2 Sample Containers, Preservation, Packaging, and Shipping

Soil samples for TPH will be homogenized in a decontaminated stainless-steel bowl with a decontaminated steel spoon and transferred into laboratory supplied soil-sample containers.

All samples will be labeled with the sample ID, date of collection, time of collection, company name, and requested analysis. The samples will be chilled to 4°C immediately upon collection. Sample containers and preservation for soil samples is outlined in Table 5a.

6.3.2.1 Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Refer to RMD SOP-002 (March 1. 2013) (Appendix B), Chain of Custody Procedures for more details.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person;
- the item is in the view of the person after being in actual possession of the person;
- the item was in the actual physical possession of the person but is locked up to prevent tampering; and, the item is in a designated and identified secure area.

6.3.2.2 Packaging and Shipping

All sample containers will be placed in a strong-outside shipping container (a steel-belted cooler). The following outlines the packaging procedures that will be followed for low concentration samples.

1. When ice is used, pack it in zip-lock, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.

2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.

3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.

4. Secure bottle/container tops with clear tape and custody seal all container tops.

5. Affix sample labels onto the containers with clear tape.

6. Wrap all glass sample containers in bubble wrap to prevent breakage.

7. Seal all sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.

8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate chain-of-custodies in a zip-lock plastic bag affixed to the underside of the cooler lid.

9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Vermiculite should also be placed in the cooler to absorb spills if they occur.

10. Ice used to cool samples will be double sealed in two zip-lock plastic bags and placed on top and around the samples to chill them to the correct temperature.

11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

6.3.2.3 Sample Documentation

TRC onsite field personnel will document all site conditions and daily field activities throughout the duration of the removal action. This includes daily field activity reports, daily health and safety meeting sign-in, and laboratory chain-of-custodies. TRC's RMP SOP on field activity documentation (RMD SOP-001; January 30, 2014), included in Appendix B will be used as a guide.

6.3.2.4 Field Quality Control Samples

Equipment Blanks

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. Additionally, equipment blanks are used to evaluate possible cross contamination of samples from the field (ambient) conditions that are present at the sampling location. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory. Blind samples submitted for analysis will be assigned consecutive increasing whole numbers for identification. The identification numbers, and their associated well numbers, will be recorded on the field sampling and the Sample Control Log for traceability.

Trip Blanks

Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples. The use of trip blanks provides a way to determine whether contamination of a sample occurred during shipment from the analytical laboratory, or during analysis at a lab. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks will be supplied by the laboratory. The sealed trip blanks are not opened in the field and are shipped to the laboratory in the same cooler with the samples collected for volatile analyses. The trip blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each trip sample and it will be submitted blind to the laboratory. Blind samples submitted for analysis will be assigned consecutive increasing whole numbers for identification. The identification numbers, and their associated well numbers, will be recorded on the field sampling and the Sample Control Log for traceability.

Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory a 40-milliliter (ml) VOA vial will be included that is marked "temperature blank". The laboratory uses these temperature blanks to ensure that proper preservation of the samples has been maintained during sample shipment. The temperature of these blanks must be 4 °C ± 2°C to demonstrate that proper preservation has been maintained. The laboratory records the results of the temperature blanks on the chain-of-custody or sample login form immediately upon receipt of the samples at the laboratory, prior to inventory and refrigeration.

Field Duplicates

Field duplicates for soil and groundwater samples will be collected at a rate of one-per-20 field samples collected during the removal action. Duplicates will be collected using the same equipment as the original sample, and will be collected immediately after primary sample collection. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory. Blind samples submitted for analysis will be assigned consecutive increasing whole numbers for identification. The identification numbers, and their associated well numbers, will be recorded on the field sampling and the Sample Control Log for traceability.

6.3 Waste Disposal Classification Sampling

During the removal action the excavated soil will be field screened and placed into appropriate stockpiles (e.g. contaminated, possibly contaminated, and possibly clean). These stockpiles will then be sampled and analyzed at a state certified analytical laboratory. The classification samples will be analyzed for: TPH-d, TPH-g, TPH-mo, BTEX, and CAM 17 metals. One composite sample will be collected for every 250 yards of excavated soil. Depending on the results of the waste classification results, soil will be transported to an appropriate disposal facility (addressed below) or will be used as backfill (if clean).

7.0 TRANSPORTATION PLAN

7.1 Characteristics of Waste/Material to be Transported

As discussed in previous sections the waste soil that will be excavated has been determined to be non-hazardous. The soil is expected to be impacted primarily with low levels of TPH (as diesel and motor oil). In the area of the Box Factory soil may be impacted with low levels of PCBs and/or dioxins and furans. Additionally, in order to access some of the excavation areas miscellaneous materials may need to be removed (e.g. old concrete footings/foundations, rebar, miscellaneous brush, etc.).

7.2 Destination of Waste/Material

The waste soil/material will be transported to either the Anderson Landfill in Anderson, California (74 miles from the site) or the Recology Landfill in Wheatland, California (191 miles from the site). The final location will be determined prior to beginning work and will depend on facility acceptance of the waste based on soil contamination levels. The waste facility could be changed based on waste disposal classification sampling results.

7.3 Transportation Mode

All waste soil and materials will be transported from the site via 20-yard dump trucks. All trucks will have dust covers to ensure material does not leave the truck during transportation. All trucks will be appropriately licensed to transport contaminated soil. Hazardous waste certifications and licensing will not be required since the soil has been determined to be non-hazardous.

7.4 Route

The transportation route to be taken by the waste handlers will be entail primarily highway travel. The main highway used to transport the waste will be Interstate 5. Minimal off-highway travel will be required with the exception of facility access roads. The transportation routes for the two (2) possible waste handling facilities are presented on Figure 5.

7.5 Traffic Control and Loading Procedures

The proposed excavation areas are located on the site property and will not interfere with any traffic. South Mount Shasta Boulevard, which is the main access road to the site, is a low density travel route so traffic control will not be necessary during excavation activities. If it determined that entering/exiting vehicles are impacting traffic on South Mount Shasta Boulevard then appropriate traffic control will be put in place.

Loading procedures will involve an excavator loading soil and/or material into 3-5 dump trucks per day during the removal action activities. The site is currently vacant and has large open areas for trucks to stage prior to being loaded. The excavation contractor (Pluim Environmental Contractors, Inc.) will coordinate the movement of dump trucks during the removal action activities.

7.6 Record Keeping

During the loading of trucks during removal action activities appropriate records will be maintained by onsite personnel. Daily truck activity records will be maintained (e.g. truck count, volume/weight of soil loaded into trucks, time of departure, etc.). Prior to the trucks leaving the site the drivers will receive soil profile documentation along with waste facility directions from onsite personnel. Waste manifests will be acquired for each truck delivery and will be included in the Removal Action Completion Report.

7.7 Health and Safety

Health and Safety procedures as outlined in Section 8 and Appendix A will be followed during removal action activities. Additionally, the excavation contractor (Pluim Environmental Contractors, Inc.) will provide any additional health and safety documentation prior to field work. A "tailgate safety meeting" will be conducted each day of onsite work to address any health and safety issues that could be encountered.

The excavation contractor (Pluim Environmental Contractors, Inc.) will be responsible for coordinating with soil transportation truck drivers. In the event of an off-site spill of soil the environmental contractor will notify TRC Solutions and all appropriate agencies (DTSC, CalEPA, etc.). The excavation contractor will make any necessary actions to clean up spilled soil in order to protect human health and the environment.

8.0 HEALTH AND SAFETY PLAN

A site and job specific health and safety plan that promotes personnel safety and preparedness during the planned activities has been developed and is included in Appendix A. On the morning of the day that the field activities are to commence, a "tailgate" meeting will be conducted with all exclusion zone workers to discuss the health and safety issues and concerns related to the specific work.

9.0 PUBLIC PARTICIPATION

The public participation requirements for this RAWP include:

1. The development of a community profile.

2. Publishing a notice of the availability of the Removal Action Work Plan for public review and comment.

3. Making the RAWP and other supporting documents available to DTSC's office and in the local information repository.

4. Responding to public comments received on the RAWP and CEQA documents.

In accordance with the Community Profile prepared for this site, the following additional activities will be conducted:

1. Fact sheet will also be sent out to the site mailing list describing the site and the proposed removal action.

2. The length of the public review and comment period will be 30-days.

3. Public meeting or workshop will be held if there is sufficient community interest.

4. Site documents will be available in electronic format on DTSC's publicly accessible EnviroStor database.

Once the public comment period is completed, DTSC will review and respond to the comments received. The RAWP will be revised, as necessary, to address the comments received. If significant changes to the RAWP are required, the RAWP will be revised and be resubmitted for public review and comment. If significant changes are not required to the RAWP, the RAWP will be modified and DTSC will approve the modified RAWP for implementation.

As part of the public participation requirements an Analysis of Brownfields Cleanup Alternatives (ABCA) document will be submitted for public comment. A public notice of availability of the draft ABCA document will be provided and a 30-day public comment period will be provided.

10.0 CEQA DOCUMENTATION

Prior to conducting the site remediation activities all approvals associated with the California Environmental Quality Act (CEQA) will be obtained including biological resource and cultural resource approvals. The current status of the CEQA documents is submitted and under review by the DTSC. See Appendix C for CEQA documentation.

Included in the CEQA documentation in Appendix C is the Initial Study/Mitigated Negative Declaration (IS/MND) which has been prepared by TRC in accordance with the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq.*, and the State CEQA Guidelines, 14 California Code Regulations Section 15000 *et seq.*

An Initial Study is conducted by a lead agency to determine if a project may have a significant effect on the environment. In accordance with CEQA Guidelines Section 15063, an EIR must be prepared if an Initial Study indicates that the proposed project under review may have a potentially significant impact on the environment. A Negative Declaration is a written statement prepared by the lead agency describing the reasons why the proposed project would not have a significant effect on the environment, and therefore would not require the preparation of an EIR (CEQA Guidelines Section 15371). According to CEQA Guidelines Section 15070, a Negative Declaration shall be prepared for a project subject to CEQA when either:

a. *The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the proposed project may have a significant effect on the environment; or*

b. *The initial study identifies potentially significant effects, but:*

   1. *Revisions in the project plans or proposals made by or agreed to by the applicant before the proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and*

   2. *There is no substantial evidence,* in *light of the whole record before the agency, that the proposed project as revised may have a significant effect on the environment.*

As discussed in the IS/MND in Appendix C the proposed removal action at the site will not have a significant impact to the environment or human health.

11.0 LIMITATIONS

This report was prepared by TRC for the sole use of the City of Mt. Shasta and the SCEDC in evaluating soil conditions and remedial options at The Landing, Mt. Shasta Commerce Park. We make no warranty, expressed or implied, except that our services have been performed in accordance with environmental principles generally accepted at this time and location. We are not responsible for data presented by others.

The accuracy and reliability of geo- or hydro-chemical studies are a reflection of the number and type of samples taken and extent of the analyses conducted, and are thus inherently limited and dependent upon the resources expended. Please note that additional constituents not analyzed for during this evaluation may be present in soil and groundwater at the site. Our RAWP was designed using accepted environmental principles and was based on the degree of investigation that was authorized.

12.0 REFERENCES

EPA, 2012. Sampling and Analysis Plan Guidance and Template, Version 3, Brownfield Assessment Projects. R9QA/008.1. August 8.

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US Environmental Protection Agency, 2008. *Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites.* April.

TABLES

Table 1
Proposed Site Cleanup Levels
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Contaminant of Concern (COC) in Soil		Industrial Soil Standards (USEPA RSLs, January 2015) (mg/kg)
Total Petroleum Hydrocarbons (TPH)	Gasoline	420 (Aromatic)/ 2,200 (Aliphatic)
	Diesel	600 (Aromatic)/ 440 (Aliphatic)
	Motor Oil	3,300 (Aromatic)/ 3,500,000 (Aliphatic)
Pentachlorophenol (PCP)		4
Polychlorinated Biphenyls (PCB)	Aroclor 1016	30
	Aroclor 1221	0.66
	Aroclor 1232	0.66
	Aroclor 1242	1
	Aroclor 1248	1
	Aroclor 1254	1
	Aroclor 1260	1
Dioxins and Furans	2,3,7,8-TCDD TEQ	22 pg/g

Notes
mg/kg = milligrams per kilogram
pg/g = picograms per gram
TEQ = Toxic Equivalency Factor

Table 2a
Contaminants of Concern in Soil (TPH/PCP) - New Mill
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Study Area	Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP
			(ft bgs)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Background	BG-1-0.5	Mar-05	0.5	< 8.6	82	--	--
	BG-2-0.5	Mar-05	0.5	< 5.9	38	--	--
	BG-2-2	Mar-05	2	< 6.9	< 28	< 7.7	--
	BG-2-7.5	Mar-05	7.5	< 6.8	< 27	--	--
	BG-3-0.5	Mar-05	0.5	< 6.4	< 26	--	--
	BG-4-0.5	Mar-05	0.5	< 160	2,600	--	--
Dip Tank	NMDT-1-1	May-98	1	--	--	--	3.2
	NMDT-1-5	May-98	5	--	--	--	**64**
	NMDT-2-2	May-98	2	--	--	--	**340**
	NMDT-2-5	May-98	5	--	--	--	**120**
	NMDT-3-1	May-98	1	--	--	--	0.48 J
	NMDT-4-1	May-98	1	--	--	--	1.0 U
	NM-1-0.5	Mar-05	0.5	< 6.6	18	NA	--
	NM-1-2	Mar-05	2	< 6.8	< 27	< 7.6	--
	NM-2-2	Mar-05	2	< 7.1	< 28	NA	--
	NM-3-0.5	Mar-05	0.5	< 7.0	36	NA	< 0.9
	NM-3-2	Mar-05	2	< 6.7	38	< 10	0.98
	NM-3-7.5	Mar-05	7.5	< 6.6	< 26	NA	1.70
	NM-4-2 Dup	Mar-05	2	< 7.1	< 28	NA	--
	NM-14-2 Dup	Mar-05	2	< 7.1	< 28	NA	--
	NM-5-0.5	Mar-05	0.5	ND	ND	NA	--
	NM-5-2	Mar-05	2	ND	ND	< 12	--
	NM-5-6	Mar-05	6	ND	ND	NA	--
	NM-6-2	Mar-05	2	ND	ND	NA	--
	NM-7-0.5	Mar-05	0.5	ND	94	NA	--
	NM-7-2	Mar-05	2	ND	31	< 7.0	--
	NM-7-7	Mar-05	7	ND	ND	NA	--
	NM-8-2	Mar-05	2	ND	35	NA	--
	NM-9-0.5	Mar-05	0.5	21	160	NA	--
	NM-9-2	Mar-05	2	ND	ND	< 7.3	--
	NM-9-5	Mar-05	5	ND	ND	NA	--
	NDT-1-2	May-07	2	NA	NA	--	< 0.020
	NDT-1-8	May-07	8	NA	NA	--	0.028
	NDT-1-10	May-07	10	NA	NA	--	**12**
	NDT-2-2	May-07	2	NA	NA	--	0.69
	NDT-2-3 Dup	May-07	3	NA	NA	--	0.93
	NDT-2-8	May-07	8	NA	NA	--	**31**
	NDT-2-10	May-07	10	NA	NA	--	0.81
	NDT-3-2	May-07	2	NA	NA	--	0.025
	NDT-3-8	May-07	8	NA	NA	--	<0.020
	NDT-3-10	May-07	10	NA	NA	--	0.99
	DIPT-1-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-1-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-1-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-1-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-2-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-2-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-2-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-2-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-3-0	11/12/2014	0	NA	NA	NA	<25*
	DIPT-3-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-3-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-3-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-4-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-4-5	11/12/2014	5	NA	NA	NA	<13*
	DIPT-4-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-4-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-5-0	11/12/2014	0	NA	NA	NA	<12*
	DIPT-5-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-5-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-5-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-6-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-6-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-6-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-6-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-7-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-7-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-7-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-7-15	11/12/2014	15	NA	NA	NA	<2.5
	DIPT-8-0	11/12/2014	0	NA	NA	NA	<2.5
	DIPT-8-5	11/12/2014	5	NA	NA	NA	<2.5
	DIPT-8-10	11/12/2014	10	NA	NA	NA	<2.5
	DIPT-8-15	11/12/2014	15	NA	NA	NA	<2.5

Table 2a
Contaminants of Concern in Soil (TPH/PCP) - New Mill
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Study Area	Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	TPH-gasoline (mg/kg)	PCP (mg/kg)
Equipment Shed	ES-1-0	Feb-07	0	**4,600**	**27,000**	--	NA
	ES-2-2	Feb-07	2	27	130	--	NA
	ES-3-0	May-07	0	250	1,000	--	NA
	ES-4-2	May-07	2	120	490	--	NA
	ES-5-2	May-07	2	290	1,000	--	NA
	ES-6-0	May-07	0	280	820	--	NA
	ES-7-0	May-07	0	150	580	--	NA
	ES-8-0	May-07	0	**3,000**	**6,700**	--	NA
	ES-9-2	May-07	2	190	360	--	NA
	ES-10-2	May-07	2	35	150	--	NA
	ES-11-0	May-07	0	15	88	--	NA
	EQSH-1-0	11/11/2014	0	230	980	0.29	NA
	EQSH-1-2.5	11/11/2014	2.5	<5.0	<25	<0.33	NA
	EQSH-1-5	11/11/2014	5	12	29	<0.42	NA
	EQSH-1-7.5	11/11/2014	7.5	<5.0	<25	<0.33	NA
	EQSH-1-10	11/11/2014	10	<5.0	<25	<0.35	NA
	EQSH-1-12.5	11/11/2014	12.5	<5.0	<25	<0.34	NA
	EQSH-1-15	11/11/2014	15	<4.9	<25	<0.29	NA
	EQSH-2-0	11/11/2014	0	200	2,300	<0.24	NA
	EQSH-2-2.5	11/11/2014	2.5	<5.0	<25	<0.30	NA
	EQSH-2-5	11/11/2014	5	<5.0	<25	<0.29	NA
	EQSH-2-7.5	11/11/2014	7.5	<5.0	<25	<0.28	NA
	EQSH-2-10	11/11/2014	10	<5.0	<25	<0.28	NA
	EQSH-2-12.5	11/11/2014	12.5	<5.0	<25	<0.28	NA
	EQSH-2-15	11/11/2014	15	<4.9	<25	<0.27	NA
	EQSH-3-0	11/11/2014	0	41	150	<0.28	NA
	EQSH-3-2.5	11/11/2014	2.5	**970**	**3,500**	<0.30	NA
	EQSH-3-5	11/11/2014	5	<4.9	<25	<0.30	NA
	EQSH-3-7.5	11/11/2014	7.5	<5.0	<25	<0.27	NA
	EQSH-3-10	11/11/2014	10	<5.0	<25	<0.26	NA
	EQSH-3-12.5	11/11/2014	12.5	<5.0	<25	<0.28	NA
	EQSH-3-15	11/11/2014	15	<5.0	<25	<0.28	NA
	EQSH-4-0	11/11/2014	0	730	1,100	<0.30	NA
	EQSH-4-2.5	11/11/2014	2.5	<5.0	<25	<0.28	NA
	EQSH-4-5	11/11/2014	5	18	38	<0.25	NA
	EQSH-4-7.5	11/11/2014	7.5	16	<25	<0.23	NA
	EQSH-4-10	11/11/2014	10	31	40	<0.25	NA
	EQSH-4-12.5	11/11/2014	12.5	7.6	<25	<0.25	NA
	EQSH-4-15	11/11/2014	15	6.8	<25	<0.27	NA
	EQSH-5-0	11/11/2014	0	15	73	<0.29	NA
	EQSH-5-2.5	11/11/2014	2.5	71	280	<0.24	NA
	EQSH-5-5	11/11/2014	5	<5.0	<25	<0.26	NA
	EQSH-5-7.5	11/11/2014	7.5	**3,100**	**7,400**	<0.25	NA
	EQSH-5-10	11/11/2014	10	110	160	<0.25	NA
	EQSH-5-12.5	11/11/2014	12.5	170	550	<0.25	NA
	EQSH-5-15	11/11/2014	15	9.0	<25	<0.26	NA
	EQSH-6-0	11/12/2014	0	<4.9	<25	<0.25	NA
	EQSH-6-2.5	11/12/2014	2.5	33	77	<0.26	NA
	EQSH-6-5	11/12/2014	5	<5.0	<25	<0.26	NA
	EQSH-6-7.5	11/12/2014	7.5	8.7	33	<0.25	NA
	EQSH-6-10	11/12/2014	10	<5.0	<25	<0.26	NA
	EQSH-6-12.5	11/12/2014	12.5	<5.0	<25	<0.29	NA
	EQSH-6-15	11/12/2014	15	5.9	<25	<0.26	NA
	EQSH-7-0	11/12/2014	0	120	700	<0.25	NA
	EQSH-7-2.5	11/12/2014	2.5	<5.0	<25	<0.26	NA
	EQSH-7-5	11/12/2014	5	<5.0	<25	<0.28	NA
	EQSH-7-7.5	11/12/2014	7.5	<5.0	<25	<0.27	NA
	EQSH-7-10	11/12/2014	10	9.1	36	<0.26	NA
	EQSH-7-12.5	11/12/2014	12.5	<4.9	<25	<0.26	NA
	EQSH-7-15	11/12/2014	15	5.1	<25	<0.25	NA
	EQSH-8-0	11/11/2014	0	350	900	<0.28	NA
	EQSH-8-2.5	11/11/2014	2.5	<5.0	<25	<0.27	NA
	EQSH-8-5	11/11/2014	5	<4.9	<25	<0.40	NA
	EQSH-8-7.5	11/11/2014	7.5	<4.9	<25	<0.27	NA
	EQSH-8-10	11/11/2014	10	<4.9	<25	<0.25	NA
	EQSH-8-12.5	11/11/2014	12.5	<5.0	<25	<0.27	NA
	EQSH-8-15	11/11/2014	15	<4.9	<25	<0.27	NA
	EQSH-9-0	11/11/2014	0	320	2,700	<0.26	NA
	EQSH-9-2.5	11/11/2014	2.5	<4.9	<25	<0.26	NA
	EQSH-9-5	11/11/2014	5	61	150	<0.28	NA
	EQSH-9-7.5	11/11/2014	7.5	<4.9	<25	<0.25	NA
	EQSH-9-10	11/11/2014	10	35	75	<0.28	NA

Table 2a
Contaminants of Concern in Soil (TPH/PCP) - New Mill
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Study Area	Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP
			(ft bgs)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Equipment Shed (Cont.)	EQSH-9-12.5	11/11/2014	12.5	<5.0	<25	<0.27	NA
	EQSH-9-15	11/11/2014	15	<5.0	<25	<0.30	NA
	EQSH-10-0	11/12/2014	0	**1,300**	1,500	<0.31	NA
	EQSH-10-2.5	11/12/2014	2.5	7.3	<25	<0.27	NA
	EQSH-10-5	11/12/2014	5	<5.0	<25	<0.29	NA
	EQSH-10-7.5	11/12/2014	7.5	60	110	<0.27	NA
	EQSH-10-10	11/12/2014	10	<5.0	<25	<0.27	NA
	EQSH-10-12.5	11/12/2014	12.5	<4.9	<25	<0.28	NA
	EQSH-10-15	11/12/2014	15	5.7	<25	<0.26	NA
Dump Area	DUMP	May-98	--	**2,250**	--	--	--
	DUMP-1	Dec-06	0	61 H Y	680	--	NA
	DUMP-2	Dec-06	0	220 H Y	1,400	--	NA
	DUMP-3	Dec-06	0	32 H Y	320	--	NA
	DUMP-4	Dec-06	0	69 H Y	560	--	NA
	DUMP-5	Feb-07	0	85	540	--	NA
	DUMP-6	Feb-07	0	130	1,900	--	NA
	Dump-7-0	May-07	0	100	440	--	NA
	Dump-8-0	May-07	0	33	300	--	NA
	Dump-8-1 Dup	May-07	1	37	330	--	NA
	Dump-9-0	May-07	0	85	530	--	NA
	Dump-10-2	May-07	2	78	370	--	NA
	Dump-11-0	May-07	0	58	210	--	NA
	Dump-12-0	May-07	0	120	720	--	NA
	NMDU-1-0	11/13/2014	0	190	680	<0.27	NA
	NMDU-1-2.5	11/13/2014	2.5	180	510	<0.28	NA
	NMDU-1-5	11/13/2014	5	<5.0	<25	<0.30	NA
	NMDU-1-7.5	11/13/2014	7.5	24	69	<0.26	NA
	NMDU-1-10	11/13/2014	10	31	71	<0.27	NA
	NMDU-1-12.5	11/13/2014	12.5	13	30	<0.25	NA
	NMDU-1-15	11/13/2014	15	<5.0	<25	<0.25	NA
	NMDU-2-0	11/13/2014	0	<5.0	<25	<0.23	NA
	NMDU-2-2.5	11/13/2014	2.5	210	400	<0.29	NA
	NMDU-2-5	11/13/2014	5	160	1,000	<0.25	NA
	NMDU-2-7.5	11/13/2014	7.5	51	470	<0.25	NA
	NMDU-2-10	11/13/2014	10	69	610	<0.28	NA
	NMDU-2-12.5	11/13/2014	12.5	<5.0	<25	<0.28	NA
	NMDU-2-15	11/13/2014	15	<4.9	<25	<0.29	NA
	NMDU-3-0	11/13/2014	0	33	320	<0.25	NA
	NMDU-3-2.5	11/13/2014	2.5	43	430	<0.25	NA
	NMDU-3-5	11/13/2014	5	26	230	<0.26	NA
	NMDU-3-7.5	11/13/2014	7.5	47	210	<0.27	NA
	NMDU-3-10	11/13/2014	10	170	680	<0.26	NA
	NMDU-3-12.5	11/13/2014	12.5	41	16	<0.36	NA
	NMDU-3-15	11/13/2014	15	6.9	<25	<0.25	NA
	NMDU-4-0	11/13/2014	0	45	500	<0.24	NA
	DUP-4	11/13/2014	0	48	750	<0.28	NA
	NMDU-4-2.5	11/13/2014	2.5	21	400	<0.26	NA
	NMDU-4-5	11/13/2014	5	19	110	<0.24	NA
	NMDU-4-7.5	11/13/2014	7.5	37	240	<0.24	NA
	NMDU-4-10	11/13/2014	10	79	400	<0.29	NA
	NMDU-4-12.5	11/13/2014	12.5	230	1,600	<0.27	NA
	NMDU-4-15	11/13/2014	15	<5.0	27	<0.24	NA
	NMDU-5-0	11/13/2014	0	160	960	<0.27	NA
	NMDU-5-2.5	11/13/2014	2.5	27	1,000	<0.26	NA
	NMDU-5-5	11/13/2014	5	28	720	<0.30	NA
	NMDU-5-7.5	11/13/2014	7.5	41	560	<0.24	NA
	NMDU-5-10	11/13/2014	10	310	**3,400**	<0.23	NA
	NMDU-5-12.5	11/13/2014	12.5	48	690	<0.27	NA
	NMDU-5-15	11/13/2014	15	<5.0	<25	<0.27	NA
Commercial/Industrial Screening Levels [1]				440	3,300	420	4

NOTES:
Bold = Exceeds commercial/industrial screening levels.

1) Regional Water Quality Control Board San Francisco Bay Region Environmental Screening Level (ESL), Commercial/ Industrial Land Use, Current or Potential Drinking Water Source (December 2013) for TPH and United States Environmental Protection Agency Industrial Regional Screening Level (November 2013) for PCP.

-- = Not applicable/available
< = Parameter was not detected at or above the specified laboratory reporting limit.
ft bgs = Feet below ground surface
Dup = Duplicate sample
H = Heavier hydrocarbons contributed to the quantitation
J = The analyte was positively identified; the associated numerical value is the approximate concentration in the sample.

Table 2a
Contaminants of Concern in Soil (TPH/PCP) - New Mill
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Study Area	Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP
			(ft bgs)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)

L = Lighter hydrocarbons contributed to the quantitation
mg/kg = Milligrams per kilogram
NA = Not analyzed
ND = Not detected above laboratory reporting limits (RL), RL value not available
PCP = Pentachlorophenol
TPH = Total petroleum hydrocarbons
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
Y = Sample exhibits chromatographic pattern which does not resemble standard (likely represents weathered product).

Table 2b
Contaminants of Concern in Soil (TPH/PCP/PCB) - Box Factory
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Study Area	Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	PCP (mg/kg)	PCB (mg/kg)							Organochlorine Pesticides	
							Aroclor-1016	**Aroclor-1221**	**Aroclor-1232**	**Aroclor-1242**	**Aroclor-1248**	**Aroclor-1254**	**Aroclor-1260**	**DDT (mg/kg)**	**Dieldrin (mg/kg)**
Burner Area	BFB-1-1C	May-98	1	No Data Available			No Data Available							No Data Available	
	NBFB-1-0	Dec-06	0	No Data Available			No Data Available							No Data Available	
	NBFB-2-0	Dec-06	0	No Data Available			No Data Available							No Data Available	
	NBFB-3-0	Dec-06	0	No Data Available			No Data Available							No Data Available	
Transformer Area	BFT-1-1	May-98	1	--	--	--	--	--	--	--	--	--	0.04 J	<0.0042 U	--
	BFT-2-1	May-98	1	--	--	--	--	--	--	--	--	--	0.12	0.0073	--
	BFT-3-1	May-98	1	--	--	--	--	--	--	--	--	--	0.06	0.0062 NJ	--
	BFT-1-0	Dec-06	0	130 H Y	750	NA	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.17	<0.033	<0.033
	BFT-2-0	Dec-06	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.15	<0.033	<0.033
	BFT-3-0	Dec-06	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.037	<0.066	<0.066
	BFT-4-0	Dec-06	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.067	<0.066	<0.066
	BFT-4-1 Dup	Dec-06	1	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.097	<0.066	<0.066
	BFT-5-0	Dec-06	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.041	0.14	<0.033	<0.033
	BFT-5-1	Dec-06	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.026	0.036	<0.033	<0.033
	BFT-6-0	Dec-06	0	--	--	--	<0.048	<0.096	<0.048	<0.048	<0.048	**1.8**	0.40	<0.033	0.033 C
	BFT-7-0	Feb-07	0	--	--	--	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.025	--	--
	BFT-8-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.056	--	--
	BFT-9-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--
	BF-10-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.028	--	--
	BFT-11-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.038	--	--
	BFT-12-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.035	--	--
	BFT-13-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.076	--	--
	BFT-14-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--
	BFT-15-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.039	--	--
	BFT-16-0	Feb-07	0	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--
	BFT-17-1 Dup	Feb-07	1	--	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.031	--	--
	BFT-18-0	May-07	0	--	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--
	BFT-19-0	May-07	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFT-19-1 Dup	May-07	1	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFT-20-0	May-07	0	--	--	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	--
	BFT-21-0	May-07	0	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**	**2.0**	--	--
	BFT-22-0	May-07	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFT-23-1	May-07	1	--	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--
	BFTR-1-0	11/13/2014	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-1-5	11/13/2014	5	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-1-10	11/13/2014	10	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-1-15	11/13/2014	15	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-2-0	11/13/2014	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-2-5	11/13/2014	5	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-2-10	11/13/2014	10	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-2-15	11/13/2014	15	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-3-0	11/13/2014	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-3-5	11/13/2014	5	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-3-10	11/13/2014	10	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-3-15	11/13/2014	15	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-4-0	11/13/2014	0	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-4-5	11/13/2014	5	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-4-10	11/13/2014	10	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
	BFTR-4-15	11/13/2014	15	--	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--
Commercial/Industrial Screening Levels [1]				440	3,300	4	3,000	0.66	0.66	1	1	1	1	7	0.11

NOTES:
Bold = Exceeds commercial/industrial screening levels.

[1)] Regional Water Quality Control Board San Francisco Bay Region Environmental Screening Level (ESL), Commercial/ Industrial Land Use, Current or Potential Drinking Water Source (December 2013) for TPH and United States Environmental Protection Agency Industrial Regional Screening Level (November 2013).

-- = Not applicable/available
< = Parameter was not detected at or above the specified laboratory reporting limit.
C = Estimated value
Dup = Duplicate sample
ft bgs = Feet below ground surface
H = Heavier hydrocarbons contributed to the quantitation
J = The analyte was positively identified; the associated numerical value is the approximate concentration in the sample.
mg/kg = milligrams per kilogram
NA = Not analyzed
NJ = The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
PCB = Polychlorinated biphenyl
PCP = Pentachlorophenol
TPH = Total petroleum hydrocarbons
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
Y = Sample exhibits chromatographic pattern which does not resemble standard (likely represents weathered product).

Table 2c
Contaminants of Concern in Soil (Dioxins and Furans) - Box Factory
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFB-1-1C		NBFB-1-0		NBFB-2-0		NBFB-3-0		BFBU-1-0		BFBU-1-2.5		BFBU-1-4		BFBU-2-0	
		5/1/1998		12/1/2006		12/1/2006		12/1/2006		11/14/2014		11/14/2014		11/14/2014		11/14/2014	
		1 feet bgs		0 feet bgs		0 feet bgs		0 feet bgs		0 feet bgs		2.5 feet bgs		4 feet bgs		0 feet bgs	
		Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]
2,3,7,8-TCDD	1	2 U	1	1.3	1.3	0.9	0.9	5.8	5.8	0.81 I,D	0.81	0.24 I,B	0.24	0.22 I,B	0.22	0.75 I,D	0.75
1,2,3,7,8-PeCDD	1	3.3	3.3	13.7	13.7	10.6	10.6	71.1	71.1	3.89 D	3.89	1.10 I,B	1.10	0.75 B	0.75	17.5	17.5
1,2,3,4,7,8-HxCDD	0.1	3.4	0.34	18.3	1.83	18	1.8	106	10.6	5.44	0.544	0.38 I,B	0.038	0.48 I,B	0.048	23.3	2.33
1,2,3,6,7,8-HxCDD	0.1	18	1.8	203	20.3	139	13.9	916	91.6	12.4	1.24	0.18 I,B	0.018	1.43 I,D	0.143	276	27.6
1,2,3,7,8,9-HxCDD	0.1	13	1.3	51.5	5.15	42	4.2	248	24.8	7.17	0.717	0.65 I,B	0.065	1.66 I,D	0.166	53.4	5.34
1,2,3,4,6,7,8-HpCDD	0.01	230	2.3	2,940	29.4	3,060	30.6	38,660	386.6	323	3.23	11.97	0.1197	33.1	0.331	5,520	55.2
OCDD	0.0003	870	0.261	29,500	8.85	36,270	10.881	566,470	169.941	2370	0.711	35	0.010509	189	0.0567	42,100	12.63
2,3,7,8-TCDF	0.1	1.7 U	0.085	3.1	0.31	0.6	0.06	3.1	0.31	2.93	0.293	0.25 B	0.025	0.98 D	0.098	70.4	7.04
1,2,3,7,8-PeCDF	0.03	1.3 U	0.0195	4.5	0.135	2	0.06	17.4	0.522	0.72 I,B	0.0216	0.67 B	0.0201	1.72 I,D	0.0516	4.34	0.1302
2,3,4,7,8-PeCDF	0.3	0.87	0.261	5.8	1.74	1.8	0.54	19.5	5.85	0.56 I,B	0.168	0.49 I,B	0.147	1.35 B	0.405	59.9	17.97
1,2,3,4,7,8-HxCDF	0.1	1.6	0.16	61.3	6.13	51	5.1	324	32.4	1.72 I,D	0.172	0.73 I,B	0.073	2.22 I,D	0.222	80.7	8.07
1,2,3,6,7,8-HxCDF	0.1	1.2	0.12	44.1	4.41	33.6	3.36	195	19.5	1.17 I,D	0.117	0.49 B	0.049	0.77 I,B	0.077	57.2	5.72
2,3,4,6,7,8-HxCDF	0.1	0.61 U	0.0305	0.2	0.02	0.2	0.02	252	25.2	1.88 I,B	0.188	0.39 I,B	0.039	0.73 ND	0.073	15.7	1.57
1,2,3,7,8,9-HxCDF	0.1	2.2 U	0.11	16.6	1.66	11.6	1.16	66.2	6.62	2.75 I	0.275	0.43 I,B	0.043	1.81 I,D	0.181	96.1	9.61
1,2,3,4,6,7,8-HpCDF	0.01	74	0.74	3,820	38.2	3,030	30.3	71,880	718.8	98.2	0.982	1.34 B	0.0134	2.11 B	0.0211	9,580	95.8
1,2,3,4,7,8,9-HpCDF	0.01	1.2	0.012	97	0.97	73	0.73	261	2.61	2.02 I,D	0.0202	1.00 B	0.01	2.26 I,D	0.0226	199	1.99
OCDF	0.0003	27	0.0081	3,860	1.158	3,970	1.191	62,910	18.873	65.6	0.01968	8.60 I	0.00258	17.5 I,D	0.00525	11,700	3.51
TCDD TEQ [c]			11.85		**135.26**		**115.40**		**1,591.13**		13.40		2.01		2.87		**272.76**

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFBU-2-2.5		BFBU-2-3		BFBU-3-0		BFBU-3-2.5		BFBU-4-0		BFBU-4-2.5		BFBU-4-3.5	
		11/14/2014		11/14/2014		11/14/2014		11/14/2014		11/14/2014		11/14/2014		11/14/2014	
		2.5 feet bgs		3 feet bgs		0 feet bgs		2.5 feet bgs		0 feet bgs		2.5 feet bgs		3.5 feet bgs	
		Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]	Lab Results (pg/g)	TEF Adjusted [b]
2,3,7,8-TCDD	1	0.64 I,D	0.64	0.76 I,D	0.76	1.49 D	1.49	0.22 I,B	0.22	2.79 D	2.79	0.32 I,B	0.32	0.08	0.08
1,2,3,7,8-PeCDD	1	0.94 I,B	0.94	9.88	9.88	18.8	18.8	3.79 D	3.79	23.8	23.8	1.52 I,B	1.52	0.70	0.7
1,2,3,4,7,8-HxCDD	0.1	12.5 I	1.25	7.40	0.74	21.9	2.19	2.68 D	0.268	17.1	1.71	0.95 B	0.095	0.93	0.093
1,2,3,6,7,8-HxCDD	0.1	12.5	1.25	52.4	5.24	179	17.9	20.5	2.05	127	12.7	3.31 D	0.331	6.13	0.613
1,2,3,7,8,9-HxCDD	0.1	1.29 I,D	0.129	22.7	2.27	68.6	6.86	5.72	0.572	68.9	6.89	2.24 D	0.224	2.89	0.289
1,2,3,4,6,7,8-HpCDD	0.01	210	2.1	818	8.18	2,740	27.4	479	4.79	1,260	12.6	46.8	0.468	64.4	0.644
OCDD	0.0003	1,620	0.486	5,930	1.779	27,900	8.37	5,100	1.53	5,636	1.6908	244	0.0732	352	0.1056
2,3,7,8-TCDF	0.1	4.44	0.444	28.9	2.89	107	10.7	5.58	0.558	17.7	1.77	0.63 I,B	0.063	0.84	0.084
1,2,3,7,8-PeCDF	0.03	0.38 I,B	0.0114	3.83	0.1149	8.45 D	0.2535	3.22 B	0.0966	3.92 B	0.1176	0.57 I,B	0.0171	0.80	0.024
2,3,4,7,8-PeCDF	0.3	0.55 I,B	0.165	6.01	1.803	11.3	3.39	4.05 D	1.215	4.72 D	1.416	0.22 I,B	0.066	0.37	0.111
1,2,3,4,7,8-HxCDF	0.1	2.91 I,D	0.291	15.5	1.55	41.1	4.11	7.84	0.784	23.2	2.32	1.00 I,B	0.1	1.78	0.178
1,2,3,6,7,8-HxCDF	0.1	2.92 I,D	0.292	14.8	1.48	33.1	3.31	5.63 D	0.563	24.2	2.42	1.19 B	0.119	1.51	0.151
2,3,4,6,7,8-HxCDF	0.1	2.41 B	0.241	4.02	0.402	11.8	1.18	1.70 I,D	0.17	7.01	0.701	1.31 I,B	0.131	0.61	0.061
1,2,3,7,8,9-HxCDF	0.1	5.67	0.567	22.9	2.29	45.5	4.55	11.3	1.13	38.9	3.89	1.23 B	0.123	1.91	0.191
1,2,3,4,6,7,8-HpCDF	0.01	240	2.4	1,540	15.4	2,299	22.99	303	3.03	2,720	27.2	90.8	0.908	163	1.63
1,2,3,4,7,8,9-HpCDF	0.01	3.03 I,D	0.0303	11.8	0.118	36.2	0.362	4.44 D	0.0444	15.1	0.151	0.71 ND	0.0071	1.63	0.0163
OCDF	0.0003	199	0.0597	881	0.2643	1,770	0.531	372	0.1116	1,360	0.408	37.3 D	0.01119	77	0.02301
TCDD TEQ [c]			11.30		**55.16**		**134.39**		20.92		**102.57**		4.58		4.99

USEPA January 2015 Regional Screening Levels
Commercial/Industrial Soil = 22 pg/g

pg/g = picogram per gram
Bold = Exceeds United States Environmental Protection Agency Industrial Regional Screening Level (January 2015).
D = Less than Quantification Limit (QL)
I = Laboratory Interference
B = Upper Limit
ND = Less than Method Detection Limit (MDL)

Abbreviations:
bgs = below ground surface
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlordibenzo-p-dioxin
TCDF = tetrachlordibenzofuran
TEQ = toxic equivalency concentration
U = not detected above the reporting limit
USEPA = United States Environmental Protection Agency (http://www.epa.gov/region9/superfund/prg/)

Footnotes:
[a] The TEFs are values from *The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds* (*van den Berg, et. al., 2006*) and adopted by the Department of Toxic Substances Control (DTSC) and presented in DTSC May 2009 Human Health Risk Assessment (HHRA) Note 2, *Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites.*
[b] The TEF adjusted value is calculated by multipling the laboratory result by the TEF. Values that were not detected, one half the reporting limit was used as the result.
[c] The TCDD TEQ value is the sum of the TEF Adjusted value for each dioxin/furan compound.

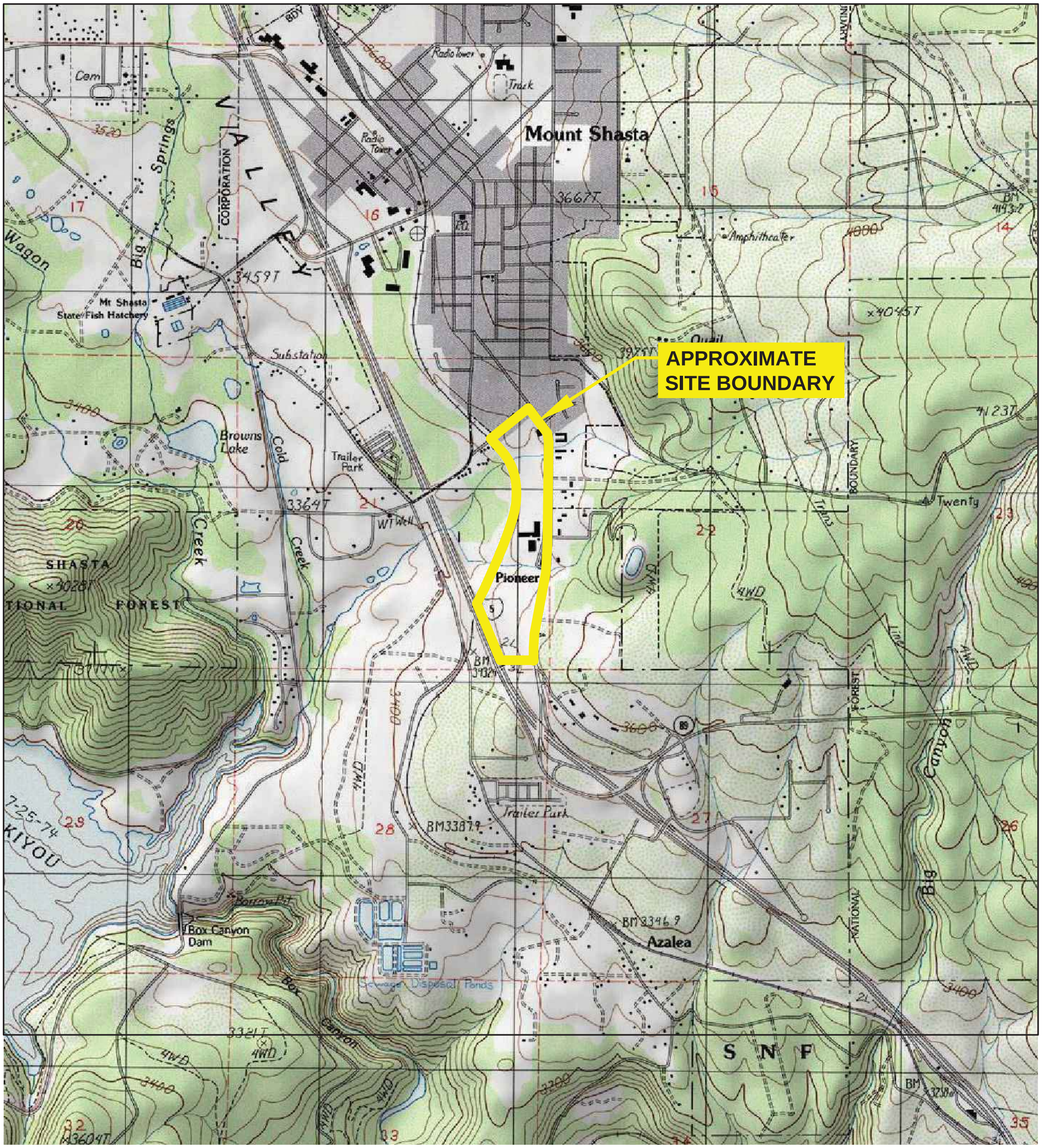
Table 3
Estimated Soil Excavation Volumes
Removal Action Work Plan
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Area ID	Proposed Excavation Depth (feet bgs)	Proposed Excavation Area (square feet)	Proposed Excavation Volume (cubic feet)	Volume (cubic yard)
New Mill Equipment Shed	1	5,127	5,127	190
	3	1,092	3,276	121
	8	1,056	8,448	312
Box Factory Transformer Area	1	1,362	1,362	50
Box Factory Burner	1	3,880	3,880	144
	3	681	2,043	75
			Total cubic yards	892
			Total tons	941

Notes

1. Assume material is Earth (loam, dry, excavated) with a weight of 78 lb/ft^3.

FIGURES



APPROXIMATE SCALE (MILES)

1.5 1.0 0.5 0.25 0 0.25 0.5 1.0 1.5

N

SOURCE:
United States Geological Survey
7.5 Minute Topographic Maps:
City of Mount Shasta Quadrangle, California

VICINITY MAP

The Landing - Mt. Shasta Commerce Park
Mount Shasta, California

TRC | 202311 | **FIGURE 1**

FILE NAME: N:\PROJECTS\CAD\Roseburg Lumber Mill_Mt Shasta\Fig1_Vicinity Map.dwg | Layout Tab: 8x11

Legend

Former Industrial Area (approx.)

Groundwater Monitoring Well (approx.)

Figure 2
The Landing - Mt. Shasta Commerce Park
Site Plan

N

0 175 350 Feet

1 in = 175 ft

TRC

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Former Industrial Area (approx.)
- Groundwater Monitoring Well (approx.)
- Excavate to 1 foot below ground surface
- Excavate to 3 feet below ground surface
- Excavate to 8 feet below ground surface

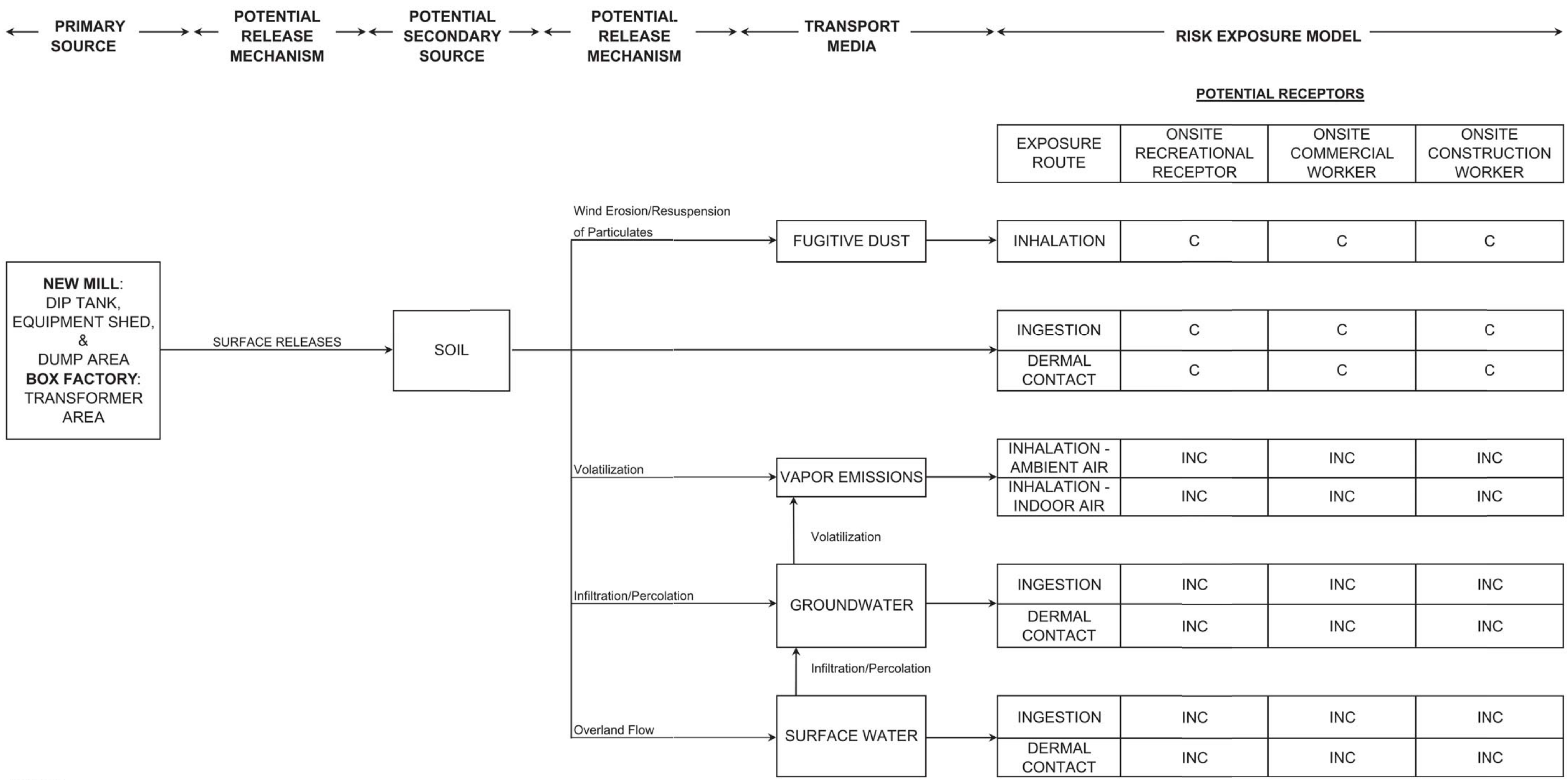
Figure 3
The Landing - Mt. Shasta Commerce Park
Removal Action Work Plan

N

0 175 350 Feet

1 in = 175 ft

TRC



NOTES:

INC - Incomplete Exposure Pathway (Not evaluated quantitatively in this assessment)

C - Potentially Complete Exposure Pathway (Evaluated quantitatively in this assessment)

CONCEPTUAL SITE MODEL
HUMAN HEALTH RISK ANALYSIS

Mount Shasta Commerce Park
Mount Shasta, California

TRC | 202311 | **FIGURE 4**

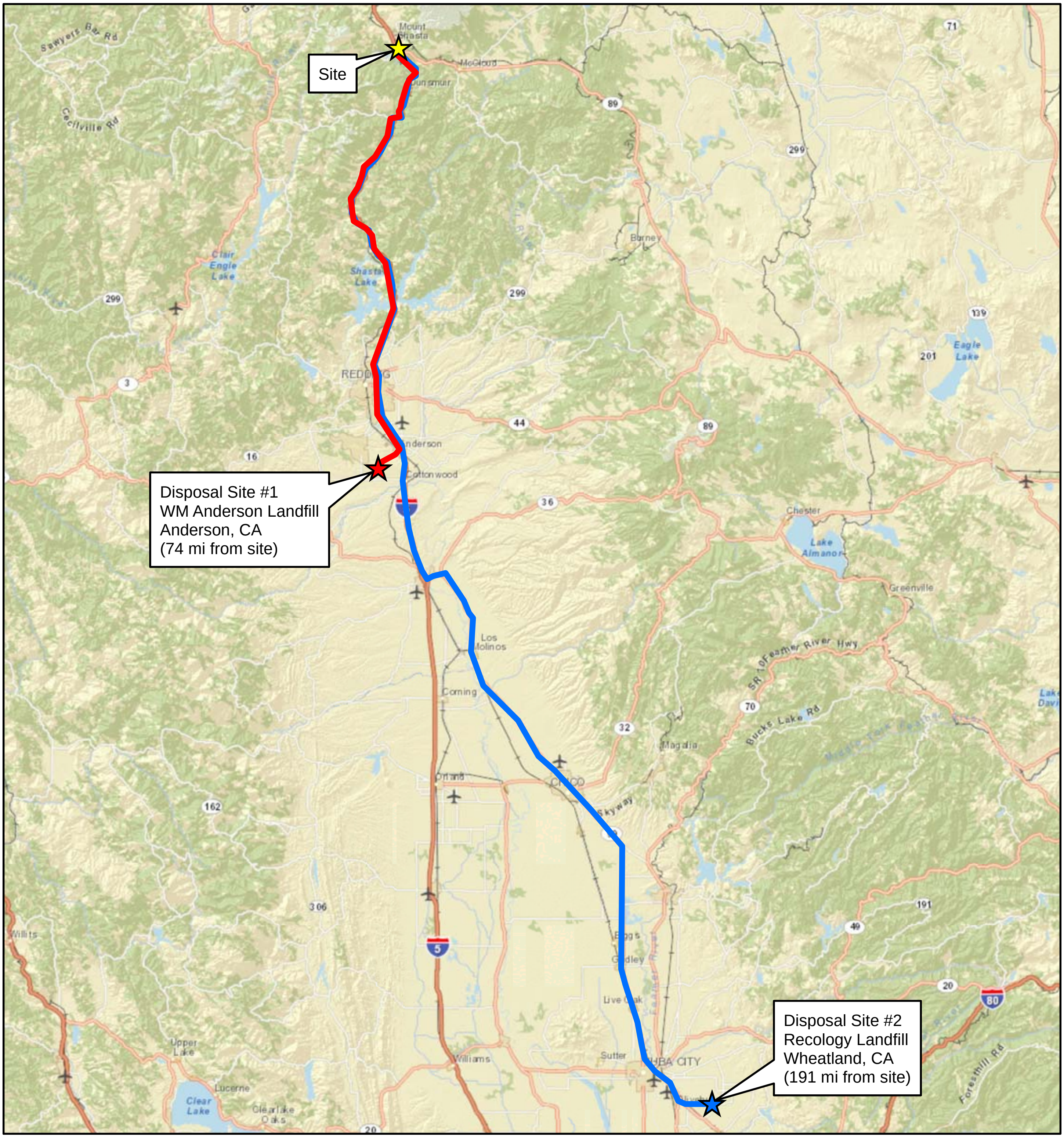


Figure 5
The Landing - Mt. Shasta Commerce Park
Disposal Transportation Routes

N

0 10 20 Miles

1 in = 21 miles

TRC

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

APPENDIX A

TRC Site-Specific Health and Safety Plan

SITE SPECIFIC
HEALTH & SAFETY PLAN

Former Roseburg Lumber Mill
Mt. Shasta, California

Project No. 202311

Prepared April 2014

TABLE OF CONTENTS

SECTION **PAGE**

TABLES

ATTACHMENTS

SITE SPECIFIC HEALTH AND SAFETY PLAN (HSP)

Former Roseburg Lumber Mill
Mt. Shasta, California

1.0 INTRODUCTION

The purpose of this Health and Safety Plan (HSP) is to establish responsibilities, procedures and contingencies for the protection of TRC employees, contractors, visitors, and the public while performing activities at the Former Roseburg Lumber Mill. This site-specific HSP is to be implemented in conjunction with TRC Solutions, Inc (TRC) Health and Safety Programs, including the Injury and Illness Prevention Program (IIPP) and Hazard Communication Program.

The use of proper health and safety procedures in accordance with applicable OSHA regulations shall be required during site work. The procedures presented in this HSP are intended to serve as guidelines. They are not a substitute for sound judgment by site personnel.

1.1 Key Companies Involved In Project

CUSTOMER OR CLIENT:	City of Mt. Shasta, SCEDC
DESIGN ENGINEER:	TRC
CONTRACTOR:	TRC
SUBCONTRACTORS:	TBD

Job Safety Analyses (JSAs) for contractor scopes of work are included in **Attachment E**.

1.2 Scope of Work

This H&S Plan is intended to address health and safety hazards associated with the Phase II soil and groundwater investigation at the Site. The proposed work will be performed by TRC and its subcontractors and will include but may not be limited to the activities listed below. JSAs are included in **Attachment E**.

- Hole Clearance (Hand Augering)
- Well development and rehabilitation (performed by drilling subcontractor)
- Drilling and Soil Sampling (performed primarily by drilling subcontractor)
- Grab groundwater sampling using a Geoprobe Hydropunch system.

2.0 SITE INFORMATION

This HSP considers the physical, chemical, and biological hazards that may be encountered during work activities at the site. Operations associated with this HSP will be conducted in accordance with the scope of work and approved design drawings/specifications.

Summary information for this project is provided in the following table:

Table 1: Site Information

Anticipated Work Period:	Summer 2014
Site Description (see Attachment A for site map):	The Western Site was formerly used primarily for lumber milling and log storage. A lumber mill (Old Mill) was formerly located at the northern end of the Site. A more recently constructed lumber mill (New Mill) was located in the central portion of the Western Site. Former facilities present at the New Mill location included a PCP dip tank for wood treatment, diesel fuel AST, gasoline fuel UST, dump area, and an equipment maintenance shed. Southwest of the New Mill is a former box factory, which previously contained a planing mill, a burner, and transformers. The Site milling operations ceased in 1985.
Approximate depth to groundwater:	40 feet to 50 feet
Contaminants of Concern (see Attachment B):	TPH-d, TPH-g, TPH-mo, metals, PCP, PCBs, dioxins/furans

3.0 ROLES & RESPONSIBILITIES

Contact information and names of key project personnel are listed below. A description of their responsibilities follows.

Table 2: Key Project Personnel and Contact Information

Role	Name	Contact Information
TRC Personnel		
TRC Project Manager/Supervisor	Gary Gunderson	Cell: (916) 217-7685
TRC Site Safety Officer (SSO)	Mike Sellwood	Cell: (925) 260-3654
TRC Assistant Site Safety Officer (Assistant SSO)		Office Cell:

<u>TRC Site Safety Officer or Assistant Safety Officer must report all site incidents immediately to the TRC Project Manager</u>

TRC PM/Supervisor must report all incidents INVOLVING PERSONAL INJURY immediately to:		
WorkCare		888-449-7787
TRC Human Resources Manager	Suzanne Micallef	(978) 656-3628
Worker's Comp Insurance	Sargent & Associates	1-888-567-6468 Fax: 1-978-256-4941
TRC PM/Supervisor must report all incidents NOT INVOLVING PERSONAL INJURY within 24 hours to:		
TRC National Safety Director	Mike Glenn	Office: T: (949) 727-7347 Cell: (949) 697-7418

3.1 TRC Project Manager/Supervisor

- Overall responsibility for development of a complete and accurate HSP. The HSP shall account for all <u>foreseeable</u> hazards.
- Responsible for the management and technical direction of all aspects of the project.
- Ensure the completion of periodic site inspections.
- Conduct incident investigations.
- Delegate responsibility for field implementation of the HSP to TRC Site Safety Officer.

3.2 Site Safety Officers (SSO) – TRC & Contractor Personnel

- Responsible for the daily implementation of the HSP.
- Ensures HSP is available onsite and that the plan is understood and signed by all personnel entering the site. (See **Attachment F** "Safety Compliance Agreement").
- Conducts (or coordinates the completion of) Tailgate Safety Meetings and ensures documentation of these meeting is available for review.
- Uses JSAs to emphasize hazards and protective measures discussed in the HSP.

- Communicates any revisions to the scope of work or HSP to affected personnel and Project Manager/Supervisor.
- Implements emergency response procedures.

3.3 Assistant Site Safety Officer (Asst SSO) – TRC & Contractor Personnel

- In the event the SSO is not on site, the Assistant SSO will assume the responsibilities of the SSO.

- It is TRC's intent to have a TRC SSO or Assistant SSO available onsite during work activities. On the occasion neither person are physically onsite, they will be available by phone or pager. See "Table 2: Key Project Personnel and Contact Information".

3.4 TRC Employees

- Responsible for understanding and complying with this HSP, including the JSAs.
- Are required to participate in daily Tailgate Safety Meetings prior to commencement of site work.
- Each employee must acknowledge an understanding of the HSP by signing the "Safety Compliance Agreement" (See **Attachment F**) on a daily basis.

3.5 Contractors & Subcontractors

A copy of the HSP will be made available to each designated Contractor/Subcontractor (from now on to be referred to "Contractors") Site Health and Safety Officer (SSO) prior to coming to the site. Upon review or briefing of the HSP, each contractor and their personnel working at the site will be required to sign the "Safety Compliance Agreement" (See **Attachment F**) to verify their understanding and willingness to comply with the HSP.

TRC hires Contractors to apply their technical expertise to specific work tasks (i.e. construction, drilling, grading and heavy equipment operation/maintenance). Although TRC has a certain level of knowledge in these areas, the contractor is most knowledgeable of the hazards within their particular area of expertise and is in the best position to implement and monitor an effective H&S program. Contractors are required to follow and operate within their company's health and safety program and policies. TRC will exercise reasonable care to prevent and detect safety violations on the site. However, direct supervision of contractor employee safety is the responsibility of the contractor.

Contractors are to designate a company representative as their own Site Safety Officer and, if applicable, Assistant Safety Officer. This individual shall monitor the contractor's employees and ensure that safe working procedures are being followed. The Site Safety Officer and, if applicable, Assistant Safety Officer shall be identified to the TRC in writing, either by email, letter or by having the individual sign and provide contact information on "Safety Compliance Agreement" (See **Attachment F**).
Contractors are to:

- Provide a copy of their HSP to the TRC SSO or Project Manager/Supervisor before work commences, if applicable.
- Provide safety equipment and personal protective equipment for their employees.
- Ensure their equipment is in proper working order and their employees are trained and medically fit to complete the work assigned to them.
- Upon request, provide evidence that personnel working at the site have received the necessary training, certifications and, if applicable, medical surveillance.

The Contractor must inform the TRC SSO if the risks associated with a particular task exceed day-to-day safety requirements and necessitate additional safety precautions to protect the employees performing the particular task. In such cases, TRC may dictate that additional safety precautions be implemented. In the event a discrepancy arises between contractor safety procedures and those of TRC, the more stringent is to be implemented.

3.6 Visitors / Regulatory Agents

- Visitors / regulatory agents will be provided an overview of the basic site safety information. A copy of this HSP will be made available for review.
- All visitors / regulatory agents are required to sign-in on "Safety Compliance Agreement" (See **Attachment F**) each time they enter the project site.
- Visitors / regulatory agents should be escorted by a TRC or designated contractor employee and should not be allowed to move about the site alone.

4.0 COMMUNICATION

Communication is an important aspect of project safety and this HSP. There are several processes incorporated in this HSP to ensure communication of health and safety hazards.

- Pre-job project planning meetings to discuss the scope of work and potential hazards
- Site walks with the TRC workgroup, subcontractors and the customer/client.
- Development of site-specific HSP and JSAs.
- Communication and acknowledgement of understanding of HSP & JSAs by signing the "Safety Compliance Agreement" (See **Attachment F**) at the start of each day. Additional communication may be needed if conditions change or when changing tasks.
- Daily tailgate meetings emphasizing that hazard assessment is a continuous process, and any potentially unsafe actions or condition are to be communicated immediately to the SSO.
- Near misses are to be communicated to the onsite staff and Project Manager by the SSO. The near misses will be discussed during the next tailgate meeting to ensure all onsite staff are aware of the near miss.

- Communicating results of field observations/audits. Visual observations are to be conducted daily by the SSO. Periodic field observations will also be recorded on the TRC Site Safety Observation Form (See **Attachment G**). Results from either observation will be communicated during Tailgate Safety Meetings.

5.0 REVISIONS TO HSP

If a situation arises where the HSP requires revision, the following options are available:

- Except in the case of emergency situations, no deviations from the HSP may be implemented without the prior notification and approval of the TRC Site Safety Officer (SSO) and the Project Manager/Supervisor.
- If HSP revisions are minor (i.e. not involving significant changes to the scope of work, associated hazards or PPE requirements), the TRC Site Safety Officer (SSO) can make hand-written revisions to the HSP in the field. HSP Revisions must then be communicated to affected personnel and the Project Manager/Supervisor.
- If HSP revisions are substantial (i.e. involving significant changes to the scope of work, associated hazards or PPE requirements), the TRC Site Safety Officer (SSO) must consult with the Project Manager/Supervisor before making revisions. The TRC Site Safety Officer (SSO) can make hand-written revisions to the HSP in the field. HSP Revisions must then be communicated to affected personnel and the Project Manager/Supervisor. It is up to the discretion of the Project Manager/Supervisor whether a revised HSP will be reissued to replace the original HSP on the work site.

6.0 HAZARD ASSESSMENT

Hazard assessment is essential for establishing hazard prevention measures. Below is a list of potential physical, chemical and biological hazards associated with various TRC project sites. Not all hazards apply to this site-specific HSP. In addition, the list is not all-inclusive and may require additional hazards associated with a particular project/site to be added.

JSAs are included in **Attachment E** of this HSP.

6.1 Physical Hazards

☐ Excavation & trenching (where personnel will be entering the excavation)
☐ Heavy equipment (not drilling related)
☒ Drilling
☒ Overhead lines
☒ Underground utilities
☐ Energy control – lock out / tag out
☒ Flammable atmospheres (> 10% LEL)
☒ Traffic - vehicular and pedestrian
☒ Trips, slips & falls
☒ Head, foot, eye, and back injuries
☒ Falling objects
☒ Working from elevated surface (greater than 6 feet); fall protection / fall arrest
☐ Ladders use
☒ Sharp objects
☐ Welding hazards
☐ Confined spaces

Equipment (JSAs for specific equipment are included in **Attachment E**):

☒ Electrical equipment
☒ Hydraulic equipment
☒ Pneumatic equipment
☒ Cutting equipment (non-powered)
☒ Other equipment (4,000-psi and 2,000-psi pressure washers)

6.2 Chemical Hazards

☒ Refined Petroleum products / waste oil
☒ Dioxins/furans
☒ PCBs
☒ Metals
☐ Asbestos
☐ Serpentine Soils
☐ Ozone
☐ Hydrogen Sulfide
☐ Environmental samples, soil cuttings, decontamination water, dust (nuisance, silica)
☐ Industrial chemicals

6.3 Biological Hazards

☒ Noise Exposure
☒ Heat Stress
☒ Cold Stress
☒ Weather - heat, cold, rain, fog
☐ Poisonous Plants
☒ Animals/Insects
☒ Misc. Pathogens

7.0 GENERAL SAFETY RULES

This section presents general safety rules for all persons working at the project site. Failure to follow safety protocols and/or continued negligence of health and safety policies will result in expulsion of a worker or firm from the site and may result in termination of employment.

1. Horseplay, fighting, gambling or the possession of firearms are not permitted.
2. Work shall be well planned and supervised to prevent injuries. Supervisors shall assure that employees observe and obey safety rules and regulations.
3. An employee reporting for work who, in the opinion of his supervisor, is unable to perform his assigned duties in a safe and reasonable manner shall not be allowed on the job.
4. No employee shall be assigned a task without first having been instructed on proper methods, including safety training, of carrying out the task. Any employee who feels they have not received proper instruction shall notify their supervisor prior to carrying out the task.
5. Injuries and accidents shall be reported immediately to the immediate supervisor, who will then report it to the SSO.
6. There shall be no consumption of food or drink in operational areas of the site. Hands should be thoroughly cleansed prior to eating.
7. Smoking is not permitted on the site.

8. When personnel are conducting hazardous operations, there shall be at least one other person (buddy system) on duty in the immediate area as a backup in case of emergency.
9. Wear required personal protective equipment (PPE) in the workplace when appropriate and/or when specified in the site specific health & safety plan. Loose clothing and jewelry should not be worn when operating machinery.
10. Do not operate any machinery if you are not authorized or qualified to do so. If unsure how to operate a machine or perform any assigned task, ask the Project Manager/Supervisor before proceeding.
11. Do not operate motorized equipment until proper training and certification has been provided (e.g. forklifts, etc.)
12. No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness or other causes that it might unnecessarily expose the employee or others to injury.
13. Alcohol and drugs are strictly prohibited on any TRC premises, customer property, and/or in Company vehicles. Employees shall not report to work under the influence of drugs or alcohol. Employees are prohibited from possessing, using, manufacturing, distributing, dispensing, selling or purchasing illegal drugs or other controlled substances (as defined under federal and state law).

8.0 PERSONAL PROTECTIVE EQUIPMENT

TRC and contractor personnel are required to wear PPE appropriate for the task and potential physical, chemical and biological exposures. Selection of PPE is based on hazard assessment (i.e. JSAs) and air monitoring.

PPE required by all personnel at all times on the site:
☐ Hard Hat
☒ Safety Shoes/Boots
☐ Safety Vest
☒ Eye Protection - ☒ glasses ☐ goggles ☐ face shield
☒ Hand Protection - ☒Kevlar ☐ nitrile ☐ other ________
☐ Hearing Protection
☐ Respiratory Protection - ☐ APR Particulate ☐ APR Chemical cartridge ☐ other _______
☐ Protective Clothing - ☐ Tyvex ☐ Nomex ☐ Coveralls ☐ other _______

PPE which should be available at all times on the site:
☒ Hard Hat
☐ Safety Shoes/Boots
☒ Safety Vest
☒ Eye Protection - ☐ glasses ☒ goggles ☒ face shield
☒ Hand Protection - ☐ Kevlar ☒ nitrile ☐ other ________
☒ Hearing Protection
☐ Respiratory Protection - ☐ APR Particulate ☐ APR Chemical cartridge ☐ other _______
☐ Protective Clothing - ☐ Tyvex ☐ Nomex ☐ Coveralls ☐ other _______

Please refer to the Glove Selection Guideline in **Attachment G** in order to use the appropriate Kevlar glove for the task you are about to start.

9.0 RESPIRATORY PROTECTION

For operations that require the use of a respirator, the TRC and Contractor SSOs must verify that field personnel are medically approved to use respiratory equipment, fit tested, and trained in the proper use of respirators. Only respirators that are NIOSH/MSHA approved are to be used.

Respiratory protection is mandatory if workers are required to complete tasks within a hazardous atmosphere. According to OSHA, a hazardous atmosphere is defined as:

- Flammable gas, vapor, or mist in excess of 10% of LEL.
- Atmospheric oxygen is below 19.5% or above 23.5%.
- When concentration of a known contaminant is greater than the permissible exposure limit (PEL).
- Airborne combustible dust exceeds its LEL (approximated when dust obscures vision at a distance of 5 feet or less).

If conditions warrant, air monitoring may be required to verify the presence or absence of a hazardous atmosphere. Air monitoring is to be conducted whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

9.1 Air-Purifying Particulate Respirators

Employees involved in construction and earthmoving operations that result in nuisance dust and particulates may use air-purifying respirators. These are commonly referred to as "dust masks" and do not require fit testing. Particulate respirators can to be used in situations where nuisance dust and particulates are the only contaminants posing an inhalation hazard. Particulate respirators are not to be used in oxygen deficient atmosphere or if hazardous levels of gas/vapor contaminants are also present.

A high efficiency particulate air (HEPA), P100 respirator should be used in place of commercially available "dust masks".

9.2 Air-Purifying Gas/Vapor Respirators

TRC employees and Contractors are required to wear half-face, air-purifying respirators with the appropriate chemical cartridge under the following circumstances:

- When concentration of a known contaminant continuously exceeds permissible exposure limit (PEL) time-weighted average or the threshold limit value (TLV) time-weighted average.
- When volatile organic compound (VOC) vapors in the work area continuously exceed the threshold limit value- time-weighted average (TLV-TWA) for gasoline (300 parts per million [ppm]).
- When, at any time, VOC vapors in the work area exceed the threshold limit value - short-term exposure limit (TLV-STEL) for gasoline (500 ppm).

See **ATTACHMENT B** for additional information and regulatory exposure limits for chemicals of concern at this site.

Air purifying respirators (APRs) with chemical cartridges can be used under the following conditions:

- If the oxygen concentration is between 19.5% and 23.5%.
- If chemical contaminants have been identified.

- The toxic concentrations are known and the respirator cartridges are effective in removing the contaminants.
- The respirator and cartridges are NIOSH/MSHA approved.
- The contaminants have noticeable warning qualities such as odor and visibility characteristics including color.

In the event workers are required to wear air purifying respirators (APRs) with chemical cartridges, the following requirements must be met:

- The TRC or Contractor SSO must verify that workers are:
  - Medically approved (within one year) to use respiratory protection.
  - Fit-tested for the specific respirator to be used.
  - Trained in the proper use and limitations of the respirator to be used.
- Contractors must provide proof of the above to the TRC SSO, upon request.
- If an employee or contractor has not cleared by the SSO to use a respirator, they will not be assigned tasks that may potentially expose them to contaminants.
- Personnel with interfering facial hair are not permitted to wear respirators and shall not be permitted in areas where respiratory protection is required.

9.3 Air-Supplied Respirators

Air-supplied respirators, such as SCBA or airline, full-face respiratory protection, are not anticipated to be required at the site. This level of respiratory protection is utilized in oxygen deficient atmospheres or atmospheres considered to be at or above immediately dangerous to life and health (IDLH) levels. These conditions will only occur in rare, if any, circumstances such as confined space entry or emergency situations. The use of air-supplied respiratory protection is not permitted without approval and guidance from the Project Manager.

10.0 AIR MONITORING

Air monitoring is required to verify the presence or absence of a hazardous gas/vapor atmosphere whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

Based on OSHA's definition of a hazardous atmosphere, there are 4 different hazards that require monitoring. The table below describes the type of hazard, what air monitoring equipment to use and what levels constitute a hazard. The information provided in the table does not take into consideration all the possible variations of hazardous atmosphere; however it will provide guidance when determining the presence of a hazardous atmosphere. Any questions or concerns should be directed to the SSO before work begins.

Table 3: Air Monitoring Guidance

Hazard	Appropriate Air Monitoring Equipment	Hazardous Levels	Comments
Flammability	Combustible gas indicators (CGI) are direct-reading instruments; measures % LEL and oxygen.	Methane: ≥ 10% of LEL (5% by volume) Other flammable gases: >25% of the LEL during cold work >10% of the LEL during hot work	Since many flammable vapors are heavier than air, be sure to take readings at ground level. Work be suspended if CGI readings exceed 10% of LEL.
Oxygen deficiency or abundance	Same as above or an Oxygen Meter	<19.5% and >23.5%	Concentrations >23.5% may present an increased flammability hazard.
Exceeding the permissible exposure limit (PEL)	Photoionization detector (PID) can detect organic and inorganic vapors/gases	Varies depending on chemical. See **Attachment B** for hazardous levels of common chemicals	It is impossible to differentiate the different chemicals using a PID meter. However, the PID will indicate whether chemicals are present and at what levels. Measurements taken within worker's breathing zone will be used to determine respiratory protection requirements.

Airborne combustible dust is not anticipated at the work site.

When conducting, air monitoring the following actions should be considered:

- Be familiar with the proper use and limitations of the air monitoring equipment to be used.
- Ensure air-monitoring equipment (TRC's or otherwise) is in working order and has been properly calibrated. The TRC SSO is to document verification of calibration (i.e. in a field log book).
- Clearly document the results of air monitoring, including:
  - Equipment name / type and calibration data
  - Date, time and site location of air monitoring (use a site map to clarify the locations of readings.
  - Indication of what is being measured (LEL, oxygen, or ppm)
  - Results of the air monitoring
- Measurements for volatile organics should be taken at low point where vapors could accumulate.
- Measurements taken to determine the need for respiratory protection should be take within the worker's "breathing zone", keeping in mind the worker's closest proximity to the hazard source.
- An individual should never enter a confined area or excavation in order to conduct initial air monitoring. Instead, actions should be taken to lower the air monitoring equipment into the area to indicate the presence (or absence) of a hazardous atmosphere. Most air monitoring equipment has audible alarms.
- In the event that CGI readings on the site exceed 10 percent of the LEL, work will be suspended until the source can be eliminated or controlled.

11.0 SITE CONTROL

The primary objective of site control is to minimize the exposure to potentially hazardous substances and/or situations. Supervision and controlling access to the work site is necessary to protect site personnel, visitors and the public.

For this site, the following areas will be designated as hot, warm and cold zones:

Hot Zones: (1) Around drilling rig
Warm Zone: ☒ NA
Cold Zone: All other site locations

For the purposes of this HSP, site control will be discussed under two circumstances: (1) work involving physical hazards and (2) work involving chemical hazards.

In either case, site control areas are to be clearly identified and communicated by the SSO. The hot zone must be clearly identified and should be isolated with cones, barricades, or high visibility caution tape. In addition, sufficient area also must be available to conduct operations while providing a protective buffer for persons and property outside the controlled areas.

☒ Work involving Physical Hazards

Work does *not* involve direct contact with hazardous substances. However, if the scope of work primarily involves physical hazards (i.e. vehicular traffic, heavy equipment operation, etc.), the establishment of a warm zone is not necessary. Instead, a hot zone must be established to surround all the physical hazards. The hot zone area shall provide enough room and buffer to protect both workers and the public. A cold zone is established outside the hot zone to allow "support" activities to be conducted in a safe location.

☒ Work involving Chemical Hazards

The concept of site control and the establishment of hot/warm/cold work zones are intended for work involving the exposure (or potential exposure) to hazardous chemical concentrations. Under these circumstances, the purpose of work zones is two-fold: 1) minimize the exposure to potentially hazardous substances and 2) minimize the spread of hazardous substances outside the immediate work area through decontamination procedures.

A brief overview of site control work zones is provided below:

Hot Zone

- Where personnel may be subject to chemical or physical hazards.
- Where known or suspected contamination exists and may also be where equipment operation and/or environmental sampling will take place.
- To be clearly identified and should be isolated with cones, barricades, or high visibility caution tape.
- Large enough to provide sufficient room and buffer to protect both workers and the public.

Warm Zone

- Located between the hot and cold zones; beginning at the edge of the hot zone and extends to the cold zone.
- Utilized as a control point or corridor for persons entering or exiting the hot zone.
- Where personnel and equipment are decontaminated.

Cold Zone

- Located outside the hot zone where administrative and other support functions are located.
- Where adverse exposure to contaminants and physical hazards are unlikely.

11.1 Decontamination

The purpose of decontamination is to: (1) remove chemical containments from personnel and/or equipment and (2) significantly reduce the spread of chemical contaminants beyond the hot/warm zone.

Decontamination is intended to occur within the warm zone. Depending on the project, there may be a need to decontaminate both personnel and equipment. The decontamination process should be appropriate to the chemical hazards present. For example refined petroleum contaminated soil on work boots/shoes may only require physical removal of the soil with a sturdy brush. However, decontamination of equipment (i.e. drilling augers) may require additional steps to ensure contaminants are not spread beyond the hot/warm zones. Heavy equipment (i.e. excavators, trucks used for waste transportation, etc.) may require a combination of steps, including the placement of gravel at the entrance/exit of the site.

Personnel Decontamination Procedures:

Remove contaminated items (i.e. gloves) in an "inside out" manner. Contaminated garments are to be placed in designated plastic bags or drums prior to disposal or transfer offsite.

Equipment Decontamination Procedures:

Follow proper procedures (i.e. groundwater sampling procedures) when the need arises to properly decontaminate onsite equipment.

11.2 Site Security

Appropriate security measures will be established in coordination with the site owner/operator and communicated to site personnel. The objective of these measures is to (1) protect the public from potential exposure to physical/chemical hazards; (2) avoid public interference with personnel and safe work practices; and (3) prevent theft or vandalism of equipment at the site.

Site specific security measures include:
- ❑ Locked gates at all Site access points
- ❑ Locking gates to the groundwater system compound and the landfill flare compound

12.0 PERSONNEL TRAINING

TRC and contractor personnel are required to acknowledge their understanding and willingness to comply with this HSP before admission to the site by signing the "Safety Compliance Agreement" (See **Attachment F**).

Site specific training requirements are indicated below:

☒ TRC Personnel shall meet the training requirements specified in the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard [29 CFR 1910.120(e) and CCR Title 8 Section 5192(e)].

13.0 MEDICAL PROGRAM

TRC has established a medical surveillance program to assess, monitor, and help protect the health of employees, in particular, employees who may be exposed to potentially hazardous substances during site work. Personnel undergo medical examinations as follows:

- ❑ **Initial:** Pre-employment / prior to any assignment involving work in a hazardous or potentially hazardous environment. The initial examination is used to establish a baseline picture of health against which future changes can be measured, and to identify any underlying illnesses or conditions that might be aggravated by chemical exposures or job activities. This exam also certifies whether an employee is medically fit to wear a respirator.

- ❑ **Periodic:** At least once every 12 to 24 months (depending on the employees involvement in field activities) to measure changes in health status. This exam certifies whether an employee is still medically fit to wear a respirator.

- ❑ **Upon notification:** As soon as possible upon notification by an employee that they have developed signs or symptoms indicating possible overexposure to hazardous substances, or in response to an injury or exposure during an emergency situation.

- ❑ **Exit**: At termination of employment.

14.0 EMERGENCY RESPONSE PLAN

The TRC SSO (depending on which is present) will have controlling authority during an emergency. In the SSO's absence, the Alternate SSO will be in charge.

14.1 Evacuation Protocol

Evacuation protocol, routes and assembly areas from the site will be established by the SSO, and communicated to Field Personnel during the Tailgate Safety Meeting(s) prior to initiating work. In the event of an evacuation, personnel will meet at a pre-established assembly areas and the TRC SSO conduct a "head count" to see that everyone is accounted for. Contractor SSO is responsible for being able to provide an accurate head-count of contractor personnel.

Primary assembly area – Entrance to Site along South Mt. Shasta Blvd.
Secondary assembly area – Equipment Shed area

14.2 First Aid & CPR

TRC employees and contractors with current First Aid and CPR certification and who are willing to provide First Aid and CPR will be asked to identify themselves at Tailgate Safety Meetings. Their names will be documented on the Tailgate Meeting Checklist (**Attachment F**).

14.3 Emergency Medical Assistance

A list of emergency medical assistance sources has been established as part of this HSP. **ATTACHMENT C** lists the names, locations, and telephone numbers of emergency response organizations in the vicinity of the project site, and a map to the nearest hospital(s) with an *emergency room*.

A vehicle shall be available onsite during work activities to transport injured personnel to the identified emergency medical facilities, if necessary. Company vehicles are to be equipped with a fire extinguisher and first aid kit.

14.4 Emergency Procedures

In the event of an accident, injury, or other emergency, remember to:

- ❑ **Stop work and REMAIN CALM.**
- ❑ **Move personnel to a safe location (evacuation plan).**
- ❑ **Call 911 or notify other emergency facilities, as necessary.**
- ❑ **Address medical emergencies and apply first aid, if necessary.**
  - Move injured or exposed person(s) from immediate area only if it is safe to do so.
  - If serious injury or life-threatening condition exists, call 911. Clearly describe the location, injury and conditions to the dispatcher. Designate a person to direct emergency equipment to the injured person.
- ❑ **Contain physical hazards.**
  - Act only if hazard is minimal and you are trained to deal with the situation. Otherwise evacuate and wait for emergency services to arrive.

- **Notify SSO and initiate incident reporting procedures.**
  - See page 2 of this HSP for contact information. In the event the SSO is not available, the order of notification should be 1) Assistant SSO, 2) TRC Project Manager and 3) HR Manager (if incident involves injury) or EHS Supervisor (if incident does not involves injury).
  - TRC SSO is to notify TRC Project Manager/Supervisor as soon as reasonably possible.
- Do not resume work until the SSO has determined it is safe to do so.

15.0 INCIDENT REPORTING

In case of an accident, TRC personnel are to immediately report the incident to their Project Manager/Supervisor and follow the TRC incident reporting procedures detailed in the TRC IIPP. TRC's incident reporting forms are available through the Project Manager/Supervisor and include:

- TRC Incident Report
- Driver's Report of Accident
- TRC Potential / Near Miss Reporting Form
- TRC Employees Report of Incident
- TRC Witness Report of Incident
- Corrective Action Form

All incidents and near misses are investigated in accordance with TRC's IIPP. The TRC Incident Report Form is to be completed and submitted to the TRC National Safety Director within 24 hours following any incident. The TRC incident and near miss form can be found in **Attachment H.**

Contractor personnel are to report incidents to their SSO who is then required to report the incident to the TRC SSO, TRC Alternate SSO or TRC Project Manager immediately.

Some important information to include when reporting an incident is:

1. A description of the event (including date and time)
2. Details regarding personal injury and property damage, if any.
3. Whether emergency services were notified (i.e., medical facilities, fire department, police department) and the basis for that decision. Including time and names of persons/agencies notified, and their response.
4. Clarify the need for and type of TRC support.
5. Immediate corrective action(s) taken.

16.0 HEALTH AND SAFETY PLAN (HSP) SIGNATURE PAGE

Job Safety Analysis Author	**Date:**	**HSP Author**	**Date:**
Mike Sellwood		Mike Sellwood	
Mike Sellwood	**4/3/14**	**Mike Sellwood**	**4/3/14**

Review/Approvals:

Site Safety Officer Facility/Field Supervisor	**Date:**	**Project Manager/Supervisor***	**Date:**
Mike Sellwood	**4/3/14**	Gary E. Gunderson	**4/3/14**
Mike Sellwood		**Gary Gunderson**	
Local Safety Coordinator* ☐NA	**Date**	**EHS Supervisor/Safety * ☒NA Professional (CIH, CSP, other)***	**Date**
Rachelle Clair ______________________ **Rachelle Clair**			

Additional Information or Instructions:

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* Note: **For most projects, the Project Manager/Supervisor will review, approve and sign the HSP.** In the event the operations are beyond the normal scope of work, additional review is available upon the request from the PM/Supervisor. The Local Safety Coordinator is the first recourse for reviewing HSPs **not** involving high-risk operations. It is recommended that for HSPs involving high-risk operations (i.e. hazardous exposures to chemicals, large scale or deep excavations, confined space entry, etc.), the EHS Supervisor and/or a Safety Professional [Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) or other professionally qualified person] be consulted for review of the HSP to ensure proper protective measures are being implemented.

ATTACHMENT A

SITE PLAN

ATTACHMENT B

OCCUPATIONAL HEALTH GUIDELINES
AND TOXICOLOGICAL INFORMATION

Contaminant	ACGIH TLV-TWA (ppm)	NIOSH REL (ppm)	OSHA PEL (ppm)	STEL (ppm)	IDLH (ppm)	Routes of Exposure	Known or Suspected Carcinogen	Symptoms
TPH-d	for Diesel fuel/ Kerosene 14.4 (skin only)	Approx. 60-98	500	250-500 (NIOSH ceiling)	Approx. 3000-5600	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration, weakness, restlessness, lack of coordination
TPH-g	300	n/a	n/a	500 (ACGIH)	n/a	Inhalation, Absorption, Ingestion, Contact	Yes	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration
PCP	0.5 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	n/a	2.5 mg/m^3	Inhalation, Ingestion, Contact	Probable	coughing, dizziness, headache, difficulty breathing, sore throat, redness, blisters, chloracne, stomach cramps, diarrhea, nausea, vomiting, weakness, unconsciousness
PCBs	1 mg/m^3	1 µg/m^3	1 mg/m^3	2 mg/m^3	5 mg/m3	Inhalation, Ingestion, Contact	Unknown	chloracne, hyperpigmentation, gastrointestinal disturbances, elevated serum enzyme and triglyceride levels, and numbness of the extremities
Dioxins/Furans	n/a	n/a	n/a	n/a	n/a	Inhalation, Ingestion, Contact	Yes	Chloracne, weakness, personality change, pain, numbness, skin rashes, discoloration, suppression of the immune system, increased heart disease and diabetes, changes in hormonal levels, liver damage, and abnormalities of the pancreas, circulatory, and respiratory systems
Benzene	0.5	0.1	1	1 (NIOSH) 5 (OSHA)	500	Inhalation, Absorption,	Yes	Irritation to eyes, skin, nose, respiratory system, giddiness, headache, nausea,

Contaminant	ACGIH TLV-TWA (ppm)	NIOSH REL (ppm)	OSHA PEL (ppm)	STEL (ppm)	IDLH (ppm)	Routes of Exposure	Known or Suspected Carcinogen	Symptoms
						Ingestion, Contact		staggered gait, fatigue, anorexia, weakness/exhaustion, dermatitis
Toluene	50	100	200	150 (NIOSH)	500	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, tears, nervousness, muscle fatigue, insomnia, dermatitis
Ethylbenzene	100	100	100	125 (NIOSH& ACGIH)	800	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membranes; headache, dermatitis, narcosis, coma
Xylenes	100	100	100	150 (NIOSH & ACGIH)	900	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, lack of coordination, staggering gait, nausea, vomiting, abdominal pain, dermatitis

Table B-1

OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

TABLE KEY

ACGIH TLV-TWA	American Conference of Governmental Industrial Hygienists, Threshold Limit Value-Time Weighted Average
NIOSH REL	National Institute of Occupational Safety & Health, Recommended Exposure Limit
STEL	Short Term Exposure Limit (BTEX STELs are by NIOSH)
OSHA PEL	Occupational Safety and Health Administration, Permissible Exposure Limit
IDLH	Immediately Dangerous to Life and Health
ppm	parts per million
CNS	Central Nervous System
n/a	not available (i.e., no value has been established)

DEFINITIONS

Threshold Limit Value: Threshold limit values (TLVs) refer to airborne concentrations of substances and represent conditions under which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

Threshold Limit Value - Time Weighted Average: The time weighted average (TWA) is a concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLV-TWAs are established by the ACGIH.

Recommended Exposure Limit: Unless otherwise noted, the recommended exposure limit (REL) is a TWA concentration for up to a 10-hour workday during a 40-hour workweek. RELs are established by NIOSH to reduce or eliminate adverse occupational health effects.

Short Term Exposure Limit: A short term exposure limit (STEL) is defined as a 15-minute TWA exposure that should not be exceeded at any time during a workday. When compared to the REL (or TLV-TWA for ACGIH standards), the STEL allows the worker to be exposed to a higher concentration, BUT for a shorter period of time. Exposures above the REL up to the STEL should not be longer than 15 minutes and should not occur more than four times per day.

Permissible Exposure Limit: Permissible exposure limits (PELs) are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. PELs are established by OSHA (29 CFR 1910.1000).

Immediately Dangerous to Life and Health: Immediately dangerous to life and health (IDLH) values are established as concentrations from which a worker can escape within 30 minutes without suffering loss of life, irreversible health effects, or other deleterious effects that could prevent him/her from escaping the hazardous environment. The purpose of establishing an IDLH exposure concentration is to ensure that workers can escape from a given contaminated environment in the event of failure of respiratory protection equipment.

Known or Suspected Carcinogen Classification: ACGIH categories for carcinogenicity classification:

A1 – Confirmed Human Carcinogen – The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies.

A2 – Suspected Human Carcinogen – Human data are accepted as adequate in quality but are conflicting or insufficient to classify the agent as a confirmed human carcinogen; OR the agent is carcinogenic in experimental animals at dose(s), by route(s) of exposure, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. The A2 is used primarily when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals with relevance to humans.

A3 – Confirmed Animal Carcinogen with Unknown Relevance to Humans – The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to human exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

A4 – Not Classifiable as a Human Carcinogen – Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories.

A5 – Not Suspected as a Human Carcinogen – The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiologic studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, or adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans; OR evidence suggesting a lack of carcinogenicity in experimental animals is supported by mechanistic data.

ATTACHMENT C

EMERGENCY SERVICES

FACILITY / LOCATION — **TELEPHONE**

Emergency Situation **911**
Non-Emergency (Police) .... **(530) 926-7540**

Hospital:
Mercy Medical Center – Mt. Shasta
914 Pine Street
Mt. Shasta, California 96067

Phone Number .... **(530) 926-6111**

Directions:

1. Head **north** on **S Mt Shasta Blvd** toward **Church St**

1.5 mi

2. Turn left onto **E Alma St**

0.1 mi

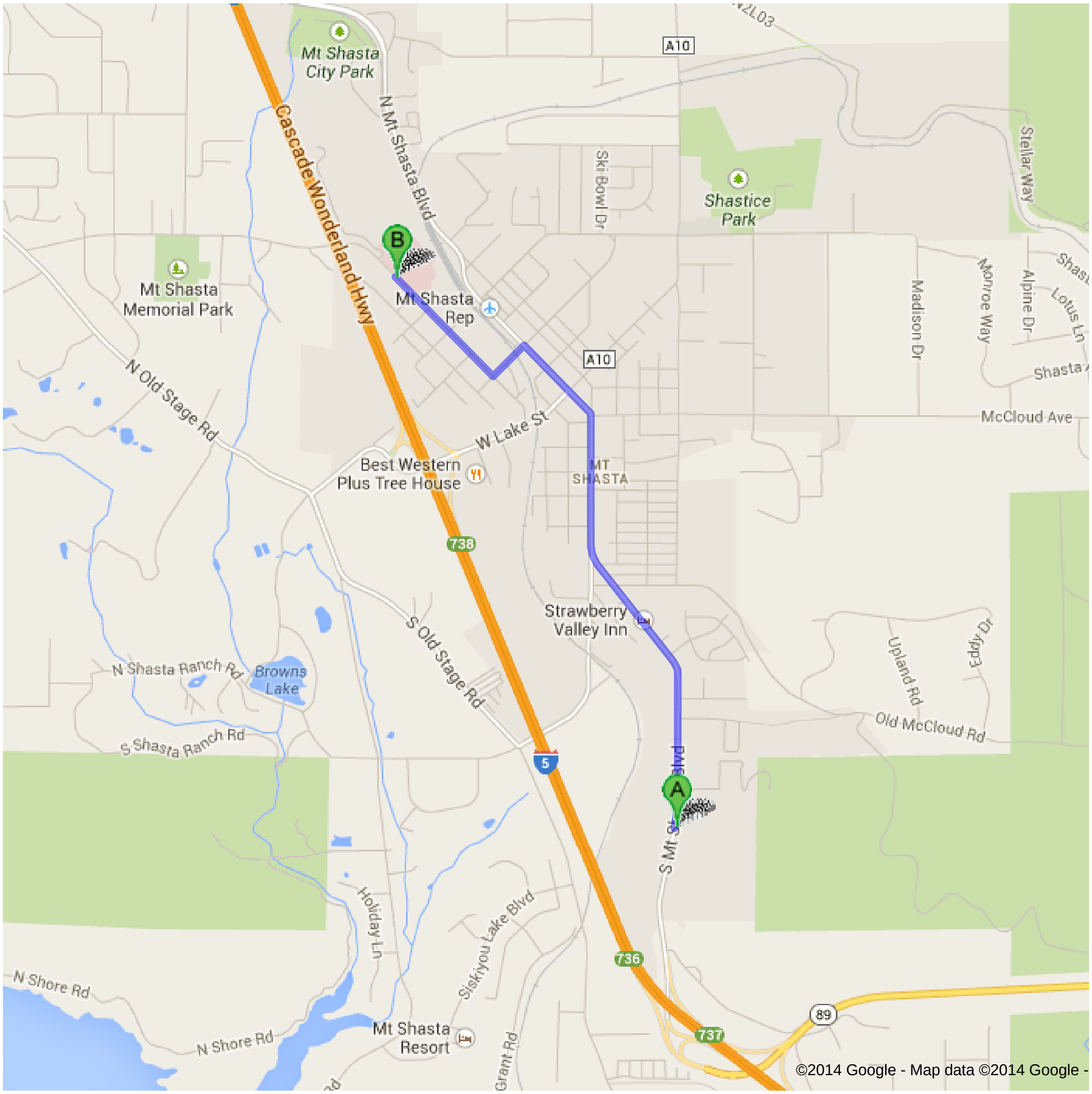
3. Take the 1st right onto **Pine St**
Destination will be on the right

0.4 mi

ATTACHMENT D

LOCAL AREA MAP

Directions to Mercy Medical Center Mount Shasta
914 Pine St, Mt Shasta, CA 96067
2.1 mi – about **6 mins**



S Mt Shasta Blvd

1. Head **north** on **S Mt Shasta Blvd** toward **Church St** About 4 mins		go 1.5 mi total 1.5 mi
2. Turn left onto **E Alma St**		go 0.1 mi total 1.7 mi
3. Take the 1st right onto **Pine St** Destination will be on the right About 1 min		go 0.4 mi total 2.1 mi

Mercy Medical Center Mount Shasta
914 Pine St, Mt Shasta, CA 96067

ATTACHMENT E

JOB SAFETY ANALYSES

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	
Former Roseburg Lumber Mill, Mt. Shasta, CA	4/17/15	☒ NEW ☐ REVISED
JSA WORK ACTIVITY (Description): **Excavation**	List of Contractor(s) and key work activity: **TRC, TBD**	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Kristin Bolen	Projet Scientist	RMD	[signature]

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL DATE
Rachelle Clair	Con/SF/MV Safety Coordinator	[signature]
Dave Sullivan	RMD Safety Director	
Mike Glenn	National Safety Director	

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

_R___ HARD HAT _R/A___ GLOVES Specify: ☒ Kevlar ☒ Nitrile ☐ Other _________. _R___SAFETY GLASSES ____GOGGLES ____FACE SHIELD	_R___ REFLECTIVE VEST _A___ HEARING PROTECTION _R___SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls _A__Tyvek Suit ____Nomex ___Other (specify):	RESPIRATORY PROTECTION: ☐ NA __A___Dust Mask __A__½ face Air Purifying Respirator (APR) _A_Particulate Mask: ☒ PM100 ☐ PM95 ___Cartridge: ☐ P100-Multigas ☐ ____________ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Set-up Activities	a. Lack of concentration or focus b. Malfunctioning Heavy Equipment Safety Devices	a. Review all plans (HASP, Work, Utility Plans, etc.) and logs in field notebook prior to starting a new task. Identify daily tasks and required personnel actions. b. Perform all equipment and safety checks prior to event startup (per operating manual).
2 Excavation	a. Eye injury from flying debris b. Being struck by moving vehicles or equipment onsite. c. Equipment tip over d. Excavation cave-in	a. Wear ANSI approved-safety goggles and face mask at all times. a. Excavating equipment will not be operated near tops of cuts, banks, and cliffs if employees are working below b. Establish eye contact with operators when moving about. Use hazard communications contained in HASP. c. Tractors, bulldozers, scrapers, and carryalls should not operated where there is possibility of overturning in dangerous areas like edges of deep fills, cut banks, and steep slopes. c. Watch equipment location & swing points, monitor live & dead loads adjacent to the excavation. c. Maintain 2-foot safety buffer at edge of excavation. d. For excavations 4 feet or deeper a Competent Person will need to inspect the excavation daily to determine if the excavation is safe for entry. d. Excavations 5 feet or deeper or wherever there is an unstable sidewall that could endanger persons entering the excavation will be sloped or shored. d. Egress will need to be provided for excavations 4 feet or deeper. Travel distance to egress should not exceed 25 feet. d. Keep spoils and equipment a minimum of 2 feet from the edge of the excavation.

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	
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JSA WORK ACTIVITY (Description): **Excavation**	List of Contractor(s) and key work activity: **TRC, TBD**	

	e. Fugitive dust	e. Cover or wet stockpiles of debris, soil, sand or other materials that can be blown by the wind. e. Keep vehicle speeds on unpaved surfaces below 5 miles per hour e. Mist or spray water while excavating and loading soil. e. Suspend earthmoving or other dust-producing activities during periods of high winds whenever dust control measures are not effective in preventing visible dust plumes.
	f. Suspected munitions and explosives of concern (MEC)	f. STOP WORK. DO NOT DISTURB ITEM. Take note of the characteristics of the item if it can be done safely. Be prepared to convey your observations to the appropriate individuals. f. All personnel will need to leave immediate area and take appropriate cover in an upwind position. f. Secure the area. f. Contact the Trust Project Manager f. Do not proceed with work or leave the item unattended until directed by the Trust.
3. Staging and Dumping of Soil	a. Bad organization creating confusion and hazard	a. Identify staging area, clearly mark and keep area clear of parked vehicles or stored materials/equipment. a. Identify truck ingress/egress lanes and keep clear. a. Clear stockpile area (including overhead obstructions) so that loader bucket doesn't impact a surface appurtenance or overhead line. a. Keep Spoils and equipment a minimum of 2 feet from the edge of the excavation.
Field Changes: 4.	a. b. c.	a. b. c.

GENERAL SAFETY HAZARDS	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	³ HAZARD CONTROLS (beyond wearing "Required" PPE)
5. Slips, trips, and falls	a. In exclusion zone.	a. Clean as you work. Put equipment away when done using it. Blot up puddles of standing water and sweep work area. a. Cover or use appropriate warning to protect all unattended open holes.
6. Cut/Pinched fingers or toes	a. Throughout work area; particularly when moving materials.	a. Wear Kevlar gloves when lifting sharp or heavy equipment.
7. Strained muscles.	a. Throughout work area.	a. Use proper lifting techniques; get help when moving heavy objects (>70 lbs).
8. Unauthorized Personnel	a. In exclusion zone.	a. Use visitor check-in log; do not allow anyone in remedial enclosure without proper PPE and HASP review/signature.
9. Loud Noise	a. Throughout work area; particularly when moving materials.	a. Wear ANSI-approved hearing protection around operating equipment.

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/17/15	☒ NEW ☐ REVISED
JSA WORK ACTIVITY (Description): **Excavation**	List of Contractor(s) and key work activity: **TRC, TBD**	

10. Explosion/Fire	a. Throughout work area; particularly when moving materialst.	a. No smoking or open flame. Continuously monitor ambient air concentrations with FID/LEL Meter. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are **>50 ppm or >10% of LEL.** a. Place 1-5lb ABC Fire extinguisher in remediation compound. a. Follow TRC's Cell Phone Use Guidelines.

Field Notes:

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[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowledgeable & informed, sense to identify what could reasonably be expected to cause danger.

[2] CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object? caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

[3] Describe actions, procedures or limits necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	
Former Roseburg Lumber Mill, Mt. Shasta, CA	4/3/14	☐ NEW ☒ REVISED

JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:
Driving Company Vehicle	**TRC**

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Kristin Bolen	**Project Scientist**	**RMD**	Kristin Bolen

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL
Gary Gunderson	**PM**	Gary E. Gunderson
Rachelle Clair	**Safety Coordinator**	Rochelle Clair

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

____ REFLECTIVE VEST _____HARD HAT _____GLOVES _____SAFETY GLASSES _____GOGGLES _____FACE SHIELD	____ HEARING PROTECTION ____SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____Dust Mask _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ P100-Multigas ☐ _____________ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Have correct directions and know best route of travel to make it safely to intended destination.	a. Getting lost in a bad area or showing up at the wrong location. Having doubt about where you are exactly supposed to be could cause undo stress while driving.	a. Ask questions and get safest route if destination is not known, use map quest or other online locators to assist with travel plans. Give other people your travel plans with addresses and phone numbers so you can be contacted.
2. Knowing what TRC's driving rules and policies are before getting behind the wheel on company time.	a. Driver using excuse that they didn't know the rules or policies and following common bad practices while driving.	a. Strong Driver Training and Driving Safety Stewardship prior to personnel driving company owned vehicles or driving personal vehicles on company time. Certification of understanding through training documentations.
3. Vehicle walk around and perimeter check.	a.Trip, slip, fall and possible human contact from unknown assailants. Also be aware of other vehicle activity in surrounding areas.	a. Visual verification that vehicle tires are in safe working condition and that there are no sharp objects or foreign debris under the tires. Check for possible unsafe human interaction in the surrounding area and be conscious of other vehicle activity close by.
4. Unlock and open vehicle door, enter the vehicle and secure seatbelts.	a. This activity leaves driver open for a pinch or crush hazard if hand or fingers are not secured inside the vehicle before shutting vehicle door.	a. Ensure drivers seatbelt is functioning properly and verify that passengers seatbelt is also in good working condition then buckle up. If assessed lock vehicle doors once inside as added protection factor.
5. Interior visual inspection rearview mirror and visual checks of both side mirrors.	a. In area's of high crime be sure to lock vehicle doors after entering besides that there aren't many other hazards during this activity.	a. Ensuring that mirrors are properly adjusted to maximize visual indications of approaching vehicles from the rear, checking for identified blind spots. Lock doors in areas of identified questionable areas for safety reasons.

[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

[2] CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object?; caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

[3] Describe actions, procedures or limits necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Driving Company Vehicle**	List of Contractor(s) and key work activity: **TRC**	

6. Ensure mobile phone has been deactivated.	a. Drivers are easily distracted by mobile phones while either by answering or making calls.	a. It is TRC Company policy that all mobile phones will be turned off prior to any vehicle trips, no exceptions.
7. If driving a company vehicle or personal vehicle on company time the headlamps will be turned on at all times. Also headlamps are required by Ca Law to be activated if foul weather conditions warrant their use.	a. If driving in foul weather conditions such as heavy rain, fog or dusk vehicles without headlamps on are more difficult to see.	a. TRC Driving Policy requires all employees driving company vehicles or personal vehicles on company time to have their headlamps on. No exceptions. This activity gives an extra line of defensive visual identification by allowing other vehicles to better see oncoming traffic that might otherwise blend into the poor weathered gray backgrounds.
8. Traveling safely at posted speed limits and following all road rules while driving on Roadways or Freeways.	a. Not obeying posted speed limits and following road rules can result in traffic violations and vehicle accidents involving all motor vehicle maneuvers, watch for slower moving and fast approaching vehicles in roadway.	a. Driver must maintain TRC policy of allowing a 4 second gap between vehicles while driving, this supersedes California's DMV best Practice of following a 3 second gap. Keep good visual contact of all lanes and identifying an out incase of emergency maneuver due to other vehicle hazards and poor driving.
9. Merging while entering Multilane Freeways and Making lane changes while traveling on multilane Freeways.	a. Struck from side, rear contact with other vehicles, struck from behind.	a. Use vehicle signals, look over shoulder, check mirrors, be aware of fast approaching or slower moving vehicles and maintain speed while initiating merge, maintain speed and repeat same steps with all lane changes.
10. Exiting off of Multilane Freeways.	a. Changing the flow of traffic speed, slowing down to exit off ramps.	a. Use vehicle signals, look over shoulder, check mirrors, be aware of fast approaching or slower moving vehicles.
11. Stopping at posted stop signs, signal controlled intersections and cross walks while yielding right away to all oncoming traffic.	a. By not allowing enough space a vehicle can be struck and pushed into an intersection or crosswalk striking other vehicles or pedestrians.	a. Keeping a full vehicle length away from intersections, crosswalks and stop signs gives a driver that extra cushion needed in case there is a strike from behind pushing the vehicle forward.
12. Proceeding through marked or signal controlled intersections or crosswalks after coming to a full stop.	a. Driver should use good visual eye contact of all directions to the left and right and allow another vehicle to proceed first before accelerating forward watching for other vehicle crossing into other lanes.	a. The driver carefully looking left and right should maintain lane selection through the intersection and proceed forward remaining in the same lane they stopped in. This prevents rear-end striking and side striking accidents and allows for better adjustments if a possible hazard is identified.

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[2] <u>CONCENTRATE ON SIGNIFICANT HAZARDS</u>. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object?; caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Driving Company Vehicle**	List of Contractor(s) and key work activity: **TRC**	

13. Staying aware of oversized and wide vehicles making wide and slow turns through intersections and regular turning maneuvers.	a. There are numerous blind spots that the driver of a loaded Semi has to deal with, they can occur at the beginning or the finishing of the turning maneuver.	a. Using a 4 second rule while following a semi truck is a must and leaving enough extra space to the sides and rear of the Semi when stopping behind it will prevent an avoidable strike from the trailer due to blind spots created by wide and large loaded vehicles.
14. Staying constantly aware of all surroundings and keeping identified routes of escape open when traffic conditions warrant added attention.	a. When driving a vehicle on Roadways or Freeways we do not have control over all the other drivers in vehicles around us and we must keep constant attention elevated to the poor driving skills of others.	a. Understanding all company vehicle operation policies, follow identified driving best practices and keep full attention of driving safely without rushing to get to destinations.
15. Reaching final destination in vehicle and coming to a complete stop while parking.	a. Striking other parked vehicles or striking pedestrian walking traffic, vehicle engine not completely stopping causing the vehicle to lunge forward.	a. Pay full attention to the new surrounding areas where you'll park, ensure vehicle's engine has completely stopped and set parking break. Look outside vehicle before jumping out into street traffic or parking lot traffic.
16. Opening vehicle door and exiting.	a. Struck by other vehicles stepping onto uneven surface, approached by someone unwanted.	a. Take a good look at surrounding areas and make sure there are no signs of oncoming traffic, take a look outside at the ground before you step out making sure surface is level and object free, keep aware of unwanted approaching personnel.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

Field Notes:

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	☐ NEW
Former Roseburg Lumber Mill, Mt. Shasta, CA	4/3/14	☒ REVISED
JSA WORK ACTIVITY (Description): **Mob - Demob**	List of Contractor(s) and key work activity: **TRC**	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Kristin Bolen	**Project Scientist**	**RMD**	[signature]

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL
Gary Gunderson	**PM**	[signature]
Rachelle Clair	**Safety Coordinator**	[signature]

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__A___ REFLECTIVE VEST __A___HARD HAT __A__GLOVES: Kevlar __A__SAFETY GLASSES ______GOGGLES ______FACE SHIELD	_A___ HEARING PROTECTION _R___SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____Dust Mask _____½ face Air Purifying Respirator (APR) ___Particulate Mask: ☐ PM100 ☐ PM95 ___Cartridge: ☐ P100-Multigas ☐ _____________ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Inspect Vehicle Equipment	a. Vehicle failures	a. Inspect fluids, tires, connections and safety equipment regularly. a. Inspect gas tank level. a. Note any hazards with vehicle and report to the appropriate employee/supervisor.
2. Loading/Unloading	a. Muscle strains, cuts and pinches	a. Ensure that appropriate PPE is worn and/or accessible including: Kevlar gloves, steel toed boots and safety glasses or goggles. a. Select vehicle size to meet project requirements. a. Prepare an equipment check off list. a. Use proper lifting techniques (Squat to lift and lower. Do not bend at the waist. Keep the weight as close to you as possible. Bow your back in and raise up with your head first. If you must turn, turn with your feet, not your body. Never jerk or twist. Put the weight down by keeping your low back bowed in. Keep you feet apart.), and if necessary (object > 50 lbs.) use additional mechanical lifting aid (tripod and winch) or additional labor. a. Get assistance for heavy objects (object > 50 lbs.).
3. Driving	a. Accidents	a. Pay attention to the task at hand. a. Do not use cell phone while driving. a. Obey traffic laws and drive defensively.
4. Arrival at site	a. Site conditions changed from plan	a. Observe traffic flow. a. Modify traffic control plan if necessary.
5. Loading/Unloading 5. Loading/Unloading (contuined)	a. Muscle strains, cuts and pinches	a. Ensure that appropriate PPE is worn and/or accessible including: Kelvar gloves, steel toed boots and safety glasses or goggles. a. Select vehicle size to meet project requirements. a. Prepare an equipment check off list.

[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	
Former Roseburg Lumber Mill, Mt. Shasta, CA	4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Mob - Demob**	List of Contractor(s) and key work activity: **TRC**	

		a. Use proper lifting techniques (Squat to lift and lower. Do not bend at the waist. Keep the weight as close to you as possible. Bow your back in and raise up with your head first. If you must turn, turn with your feet, not your body. Never jerk or twist! Put the weight down by keeping your low back bowed in. Keep you feet apart.), and if necessary (object > 50 lbs.) use additional mechanical lifting aid (tripod and winch) or additional labor. a. Get assistance for heavy objects (object > 50 lbs.). a. Do not use a fixed open blade knife for cutting.Use safety knife or approved alternative tool. a. Use proper tools for the task to performed.
6. Inspect Vehicle Equipment	a. Vehicle failures	a. Inspect fluids, tires, connections and safety equipment regularly. a. Inspect gas tank level. a. Note any hazards with vehicle and report to the appropriate employee.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**³ HAZARD CONTROLS (beyond wearing “Required” PPE)**
1.Vehicle Rolling Unattended	a. When parked on slope or with engine idling.	a. All large trucks should use chocks at all times when parking or leaving the vehicle unattended. a. When parking on a hill or stopping with the engine idling, use parking brakes, parking gear if available and use chocks immediately upon leaving the driver’s compartment. If other personnel are available ask them do the chocking before the driver exits the vehicle, then the driver should double-check the chocks. a. All towed trailers need chocking before disconnecting from main vehicle. a. Vehicles with leveling jacks do not need chocks if the jacks are in use.
2.	a.	a.
3.	a.	a.

Field Notes:

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[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

[2] CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object?; caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

[3] Describe actions, procedures or limits necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Work Area and Exclusion Zone Set-up**	List of Contractor(s) and key work activity: **TRC**	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Kristin Bolen	**Project Scientist**	**RMD**	[signature]

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL
Gary Gunderson	**PM**	[signature]
Rachelle Clair	**Safety Coordinator**	[signature]

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

_R_ REFLECTIVE VEST _R_ HARD HAT _R_ GLOVES Kevlar _A_ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	____ HEARING PROTECTION _R_ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☐ NA _A_ Dust Mask _A_ ½ face Air Purifying Respirator (APR) _X_ Particulate Mask: ☒ PM100 ☐ PM95 _X_ Cartridge: ☒ P100-Multigas ☐ ____________ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Pre-start Meeting and Site Safety Analysis	a. Bad organization creating confusion and hazard	a. Arrive at site prior to planned start time to evaluate vehicle and pedestrian traffic flow in the work area and in the site vicinity. a. Review site plan with traffic control set-up. a. Identify staging area with good access lateral and vertical for loading and unloading of trucks. a. Identify material and equipment laydown areas.
2. Exclusion Zone Set-up	a. Physical injury or equipment damage from onsite and offsite traffic flow.	a. Use the 'buddy system (one person watching traffic, one person working) when working in a high-use traffic area. a. Use of cones/delineators and caution signs to alert foot traffic moving about the site of potential trip hazards. a . Utilize snow fencing, barricades, delineators, cones and caution tape to provide exclusion zone around proposed work locations. Set-up exclusion zone in accordance with TRC's Exclusion Zone Set-up procedures.
3. Control of Work Area and Exclusion Zone	a. Delivery vehicles b. Personnel/vehicle entry onto site c. Fatigue	a. All vehicles moving on site shall use reverse beepers or flaggers. b. Set-up fencing around entire site with gated entry points. Limit access to staging area by keeping gate to work area closed and check documents of all vehicles entering work area. b. Use visitor check-in log and allow no-one into an exclusion area with out proper PPE as designated on this JSA. b. All personnel onsite must wear appropriate work and protective clothing including:long pants, sleeved-shirt, steel-toed boots, safety vest, safety glasses, and hard hat, Kevlar hi-flex gloves. b. Limit number of times materials, equipment and debris are handled by staging as close to work area as possible. c. Watch on-site personnel for signs of fatigue (shuffling,

List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Work Area and Exclusion Zone Set-up**	List of Contractor(s) and key work activity: **TRC**	

	d. Noise and flying debris	disorientation, small mistakes, sloppiness, etc.) and have them go to a shaded, protected area where they can rest and rehydrate. c. Set up and maintain rehydrating station. d. Always wear safety glasses and hearing protection working around operating heavy equipment.
4. Clean-up and overnight/over weekend storage	a. Slips, trips, and falls b. Bad organization creating confusion and hazard c. Run-off and soil cross-contamination d. Site Security and Anti-Thievery	a.Clean-up work area as you go. Maintain a clean, unobstructed work area by good house keeping and placing unused equipment away from work area. b. Delineate and block access to open pits/trenches with snow-fencing, delineators, and caution tape as a warning and prevent persons from falling into these items overnight. c. Place debris/detritus areas away from soil stockpile for future use. c. Cover all soil stockpiles with plastic-sheeting overnight against possible stormwater run-off and in accordance with local health regulations. d. Do not leave expensive equipment in open. d. Lock all vehicles and large equipment. Do not leave keys in vehicles.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**³ HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

Field Notes:

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

² CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object?; caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	☐ NEW ☒ REVISED
Former Roseburg Lumber Mill, Mt. Shasta, CA	4/3/14	
JSA WORK ACTIVITY (Description): **Using Hand Tools**	List of Contractor(s) and key work activity: **TRC**	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Kristin Bolen	**Project Scientist**	**RMD**	[signature]

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL
Gary Gunderson	**PM**	[signature]
Rachelle Clair	**Safety Coordinator**	[signature]

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__A__ REFLECTIVE VEST __A__ HARD HAT __R__ GLOVES:Kevlar __R__SAFETY GLASSES __A__GOGGLES __A__FACE SHIELD	____ HEARING PROTECTION __R__SAFETY SHOES: Protective Toe ____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____½ face Air Purifying Respirator (APR) ____Particulate Mask: ☐ PM100 ☐ PM95 ____ Cartridge: ☐ VOC ☐ ________ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Inspection of tool prior to use	a. Misalignment of parts/ binding of moving parts/ breakage of any parts b. Dull or dirty parts	a. If damaged, have the tool repaired prior to use b. Keeping cutting tools sharp and clean makes them easier to control and less likely to bind or break
2. Use of tools	a. Strains, cuts, scrapes b. Flying parts	a. Avoid wet conditions, where tool can become slippery a. Do not wear loose clothing or jewelry. Keep hair, clothing, and gloves away from moving parts. a. Do not overreach. Keeping proper footing and balance will enable better control of the tool in unexpected situations. a. Wear appropriate Kevlar gloves when using a cutting tool and lifting sharp, heavy equipment or material which is likey to break or splinter. a. Do not use a fixed open blade knife for cutting.Use safety knife or approved alternative tool.a. If possible, use a vise or clamp to hold the item to be cut instead of attempting to hold it with your hands. a. Always cut away from the body. b. Wear safety glasses
3. Field Changes:		

[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowleable & informed, sense to identify what could reasonably be expected to cause danger.

[2] CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object?; caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

[3] Describe actions, procedures or limits necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Using Hand Tools**	List of Contractor(s) and key work activity: **TRC**	

GENERAL SAFETY HAZARDS	**LOCATION(S) WHERE HAZARD IS TO BE EXPECTED**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
4. Slips, trips, and falls	a. In exclusion zone	a. Clean as you work. Put equipment away when done using it. Blot up puddles of standing water and sweep work area. a. Cover or use appropriate warning to protect all unattended open holes.

Field Notes:

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JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Former Roseburg Lumber Mill, Mt. Shasta, CA**	DATE PREPARED FOR HSP: 4/3/14	☐ NEW ☒ REVISED from S: Drive
JSA WORK ACTIVITY (Description): Soil Sampling	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
Mike Sellwood	Project Geologist	RMD/Con	Mike Sellwood

"TRC APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL DATE
Rachelle Clair	Con./SF/MV Safety Coordinator	
Mike Glenn	National Safety Director	

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ HARD HAT __R__ GLOVES Specify: ☒ Kevlar ☒ Nitrile ☐ Other ________. __R__ SAFETY GLASSES ____GOGGLES ____FACE SHIELD	__A__ REFLECTIVE VEST ____ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe ____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ VOC ☐ ____________ _____Full face ARP; specify cartiridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Soil Sampling	a. Collapse of soil stockpile. b. Broken sample jar. c. Jagged edges in sample material.	a. Look over soil stock pile prior to approachingor removing soil sample to confirm its integrity. a. Chose a sample location that will not cause the pile to collapse. a. Notify someone prior to sampling of your activites and when you expect them to be complete and that you will check in when complete. b. Wear Kevlar gloves beneath the nitriles to add a layer of protection from cuts. b. Be aware of material that is being placed in the jar and do not place jagged edged materials in the jar that may cause the jar to break. c. Wear Kevlar gloves beneath the nitriles to add a layer of protection from cuts. c. Be aware of material and watch hand placement when gathering the material. c. Use a shovel or other tool if possible to transfer the soil from the stockpile to the container.
2. Placing cooler in vehicle	a. Muscle strain from weight of the cooler	a. Be aware of how much ice and samples are in the cooler. a. Use more than one cooler if the weight will be over 50 lbs. a. Get assistance moving cooler if it is too heavy.
3.	a.	a.
Field Changes: 4.	a. b. c. d.	a. b. c. d.

[1] List all activities/steps which present a significant hazard, preferably in sequence. FOCUS ON POTENTIALLY HAZARDOUS ACTIVITIES; not the trivial ones. Apply common, yet knowledgeable & informed, sense to identify what could reasonably be expected to cause danger.

[2] CONCENTRATE ON SIGNIFICANT HAZARDS. What can go wrong? How can someone get hurt? Can someone be struck by or strike an object? caught on, in or between objects?; fall to ground or lower level?; experience excessive strain or stress? Be exposed to inhalation or skin hazards. Specify the hazards; be descriptive.

[3] Describe actions, procedures or limits necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS

GENERAL SAFETY HAZARDS	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
5. Slips, trips, and falls	a. In exclusion zone	a. Clean as you work. Put equipment away when done using it. Blot up puddles of standing water and sweep work area. a. Cover or use appropriate warning to protect all unattended open holes.
6. Cut/Pinched fingers or toes	a. Throughout work area; particularly when moving materials.	a. Wear Kevlar gloves when lifting sharp or heavy equipment.
7. Strained muscles.	a. Throughout work area; particularly when moving augers	a. Use proper lifting techniques; get help when moving heavy objects (>70 lbs).
8. Unauthorized Personnel in exclusion zone	a. In exclusion zone	a. Use visitor check-in log; do not allow anyone in exclusion zone without proper PPE and training documentation. (HAZWOPER).
9. Flying debris	a. In exclusion zone	a. Wear ANSI-approved safety glasses working around operating equipment.
10. Loud Noise	a. In exclusion zone	a. Wear ANSI-approved hearing protection around operating equipment.
11. Explosion/Fire	a. In exclusion zone	a. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meter. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are **> 300 ppm or >10% of LEL.** a. Place 2-20lb ABC Fire extinguishers in location specified by SSO. a. Follow TRC's Cell Phone Use Guidelines.
12. Exposure to hydrocarbon impacted soil or groundwater	a. In exclusion zone	a. Wear nitrile gloves during handling of soil or groundwater.
13. Soil and groundwater cross-contamination	a. In exclusion zone	a. Identify and delineate soil stockpile area or storage area of drummed soil cuttings/decontamination water.

Field Notes:

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ATTACHMENT F

TAILGATE SAFETY MEETING CHECKLIST

Date / Time of Tailgate Meeting: ________________________________

- ☐ **Vehicle Inspection:** Driver will perform Driver's Daily Vehicle Inspection Checklist before leaving the yard or if changing drivers during the day.

- ☐ **Personnel training/qualifications:** Check cards for OSHA HAZWOPER 40-hour certification/8-hour-refresher training (or any other specialized training to perform the task if appropriate). TRC personnel have been trained on the Company's Drug and Alcohol Policy and will inform all site personnel.

- ☐ **Supplies:** Indicate location of first aid kit, fire extinguisher, clean water supply (drinking, eye wash), and Site Health and Safety Plan (HSP).

- ☐ **Emergency services:** Discuss location of nearest telephone and directions to hospital. Map, directions, phone numbers are provided in the HSP (Attachment C).

  First-Aid/CPR volunteers: ________________________________

- ☐ **Site background:** Discuss types, locations, and concentrations of chemicals found onsite, presence of free product, depth to groundwater, etc.

- ☐ **Offsite Permits/Access Permits:** Discuss any permitting requirements for the site.

- ☐ **Work activities:** Discuss scope of work for the day and activities to be performed.

- ☐ **Potential hazards: Review JSAs.** Discuss physical, chemical and biological hazards Discuss the prohibiting of any eating, drinking, and/or smoking in the work zone

- ☐ **Personal protective equipment (PPE):** Discuss required level of protection; review additional PPE requirements in JSAs, as needed.

  ☐ Hard Hat ☐ Safety Shoes/Boots ☐ Safety Vest ☐ Eye Protection - ☐ glasses

  ☐ goggles ☐ face shield

  ☐ Hand Protection - ☐ Kevlar ☐ nitrile ☐ other ________

  ☐ Hearing Protection

  ☐ Respiratory Protection - ☐ APR Particulate ☐ APR Chemical cartridge

  ☐ other _______

  ☐ Protective Clothing - ☐ Tyvex ☐ Nomex ☐ Coveralls ☐ other _______

- ☐ **Utilities:** Utilities have been cleared/marked by appropriate divisions.

- ☐ **Traffic control** (vehicular and pedestrian): Work area is properly delineated and cordoned off from traffic. Technician will put a traffic cone at all four corners of his parked vehicle. Upon completion of work, walk around vehicle to pick up cones and check all four sides and underneath vehicle for obstacles prior to moving truck.

- ☐ **Emergency Shut-off Switch:** Location has been identified/communicated with field personnel.

By signing below, I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

TRC

Signature: ________________________________ Site Safety Officer (SSO)

Print Name: _________________________________ Date: _____________________

Signature: __________________________________ Asst. Site Safety Officer (Asst. SSO)

Print Name: ___________________________________ Date: ____________________

Contractor:

Signature: _____________________________________, Site Safety Officer (SSO)

Print Name: ____________________________________ Date: _____________________

Signature: ___________________________________, Asst. Site Safety Officer (Asst. SSO)

Print Name: ___________________________________Date:_____________________

Contractor:

Signature: _____________________________________, Site Safety Officer (SSO)

Print Name: ___________________________________ Date: ___________________

Signature: ___________________________________, Asst. Site Safety Officer (Asst. SSO)

Print Name: ___________________________________ Date: ____________________

By signing below, I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

TRC Employees / Contractor Personnel / Visitors (cont.)

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

Signature: ___________________________ Print Name: _________________________________
Date: _______________________________ Company: ____________________________________

ATTACHMENT G

GLOVE SELECTION GUIDELINE

Glove Selection Guideline

Hazard	Tasks	Standard *	Representative gloves*
Impact Hazards, Med/Heavy Duty Puncture Cut	All drilling/direct push activities, staging to breakdown. Heavy materials handling Power tools Air knifing Hydro excavation	ANSI Cut and Abrasion Resistance Level 3 EN 388 4522	Hexarmor™ Chrome Hexarmor™ GGT5 Hexarmor™ L5 Hexarmor™ SteelLeather III Ironclad™ Kong Glove
Med/Heavy Duty Puncture Cut Oil/Solvent Resistant	Tasks where materials are treated with oil or solvents.	ANSI Cut and Abrasion Resistance Level 3 EN 388 4522	Ansell Alpha-Tec Memphis™ Ultra Tech Nitrile Cut & Splash Best™ Neoprene 6780 Hexarmor™ TenX Threesixty
Medium Duty Cut/Puncture Gloves with Oily Surface Grip	Light materials handling, wet service	ANSI Cut and Abrasion Resistance Level 3 EN 388 44xx	Best™ Zorb-It Ultimate HV 4567 Ansell™ Cut Protective Glove 97-505
Med/Heavy Duty Cut/Puncture	Light Materials Handling System O&M Use of hand tools Hand Auguring Heavy Equipment Operator	ANSI Cut and Abrasion Resistance Level 2 EN 388 33xx	Perfect Fit™ PF570 Hexarmor™ Level Six 9010/9012 Ironclad™ Cut Resistant Glove
Light Duty Cut/Puncture Abrasion Only	Handling soil and groundwater samples Opening spoons Well construction	ANSI Cut and Abrasion Resistance Level 2 EN 388 21xx	Memphis™ Ninja Max N9676GL Memphis™ UltraTech Dyneema 9676 Memphis™ Ninja Ice (Cold Weather) Ansell™ Hyflex 11-511 Ansell™ Powerflex 80-813 Ironclad™ Workforce
Light Duty Utility Glove	Observation	NA	Mechanix™ Original or Utility glove
* Reference to ANSI and EN 388 glove testing standards. Listed gloves meet the standards in the table, but are not the only gloves that meet the standard.			
This selection chart is not intended to address all chemical hazards. Gloves used for chemical protection shall provide cut/puncture resistance, or be used in tandem with cut/puncture protection. Nitrile gloves less than 8 ml thickness used for environmental sampling must be used in tandem with a cut/puncture resistant glove.			
Gloves available in high visibility colors have shown to be effective and are preferred.			

ATTACHMENT H

TRC SITE SAFETY OBSERVATION FORM

ATTACHMENT I

TRC NEAR MISS/INCIDENT REPORT FORM

TRC Near Miss/Incident Report Form

Date of Near Miss/Incident:

(To be completed by Employee's Supervisor and by Employee involved in the Incident/Accident immediately after an Injury or Illness/Incident/Accident)

Incident Category:

☐ Employee Injury ☐ Property Damage ☐ Vehicle Damage ☐ Fire ☐ Near Miss ☐ Other

Incident Location:	
Site Identification/Project No./WNO No:	
Site Address:	
Date Incident Occurred:	
Time Incident Occurred:	
Date Incident Reported:	
Time Incident Reported:	
Customer Project Manager:	

Employee Information:

Name:		
Field Office/Address:		
Supervisor Name/Phone:		
Employee Phone/Cell:		
Title or Occupation:		
Department:		

Type of Employee Injury or Illness:

☐ First Aid Only ☐ Medical Treatment Only ☐ Restricted Work-case ☐ Lost Workday ☐ Extended Time Away From Work (3 days or more) ☐ Fatality

Estimated Number of Days on Restricted Work:	
Estimated Number of Days Away from Work:	

Employee Injury or Illness Description:

Describe the Injury or Illness:
First Aid/Medical Treatment Administered:
Name of Doctor's Office, Clinic, or Hospital:
Address and Phone Number:

Incident Description:

Equipment Involved:
Site Type:
What task was being performed at time of incident?

TRC Near Miss/Incident Report Form

Describe Incident in Detail :
Conditions at time of Incident: (weather, lighting):
Non-TRC Involvement:
Subcontractor Involved: ☐ No ☐ Yes
Name of Company:
Address:
Contact Name and Phone Number:
Additional Information:
Witnesses(s) to Incident: ☐ No ☐ Yes
Name(s) and Address(s):
Phone Number(s):
Additional Information:

Personal Protective Equipment (PPE):

List PPE required to complete the task: (glasses, safe. shoes, hard hat, respirator, hearing protection, etc.)
Was the employee using the proper PPE at the time of the Incident?

Safety Violation ☐ No ☐ Yes (Explain):

State the company safety rule, OSHA regulation, or specific training that was violated:
Describe the training the employee received to prevent this violation:

Immediate Corrective Actions:

Describe the immediate corrective actions taken:

TRC Near Miss/Incident Report Form

Signature of Investigating Supervisor: **Date:**
Signature of Employee: **Date:**

Supervisor's Post-Incident Review and Recommendations

Lessons Learned:

Root Cause Analysis:
Conclusion: Why did the Incident Occur?
Recommended Corrective Actions:
1) Root Cause:
Corrective Action:
Responsible Party:
Target Completion Date:
Actual Completion Date:
2) Root Cause:
Corrective Action:
Responsible Party:
Target Completion Date:
Actual Completion Date:
3) Root Cause:
Corrective Action:
Responsible Party:
Target Completion Date:
Actual Completion Date:

TRC Near Miss/Incident Report Form

4) Root Cause:
Corrective Action:
Responsible Party:
Target Completion Date:
Actual Completion Date:

Supervisor: ___________________________________**Signature:** _________________________**Date:** ________________

National Safety Director: _________________________**Signature:** _____________________**Date:**_____________

APPENDIX B

TRC Standard Operating Procedures

Title: **Field Activity Documentation for Environmental Investigations**	Procedure Number: **RMD 001**
	Revision Number: **0**
	Effective Date: **January 2013**

Authorization Signatures

Terrance Hertz 1/25/2013	Elizabeth Denly 1/30/2013
Technical Reviewer — Date Terrance Hertz	Remediation Practice Quality Coordinator — Date Elizabeth Denly

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Attachment A: Example Page from Field Book
Attachment B: Example Daily Field Report Log
Attachment C: SOP Fact Sheet

1.0 INTRODUCTION

1.1 Scope & Applicability

This Standard Operating Procedure (SOP) guides TRC personnel in the documentation of field activities for environmental investigations.

Field activity documentation is one of the most important activities that occur during field work. There is abundant information available for documenting the details of field work at the time the field work is taking place. It is critical that sufficient detail be documented during field work as it happens to allow others not present during the field activities to fully comprehend the field procedures and conditions at the time of the field work.

The objective of documenting field activities is to ensure that a collection of facts is recorded, the activities can be reconstructed from the documentation, and that the field activities are adequately logged in a manner that will be acceptable if the record is required as evidence in legal proceedings. An additional objective of adequately documenting field activities is to provide complete information that is useful and understandable to someone other than the note taker. Because the field books and field data forms provide the basis for future reports and analysis, facts and observations must be accurately recorded. Some regulatory agencies require that a copy of the field notes be included as part of the report submittal.

This SOP was not intended for use if computer tablets will be used. Consult with the Remediation Practice Quality Coordinator for procedures when tablets will be used.

1.2 Equipment

The following list is an example of items that may be utilized for field activity documentation. Project-specific conditions or requirements may warrant the use of additional items or deletion of items from this list.

- Field book(s) – bound book with water-resistant pages
- Indelible marking pens
- Field data forms – generic or project-specific
- Digital camera
- Pocket ruler
- GPS device

2.0 PROCEDURES

All entries must be legible and must be made in blue or black permanent ink, signed or initialed, and dated. No erasures or obliterations can be made. If an incorrect entry is made, the information must be crossed out with a single strike mark which is signed or initialed and dated by the person recording the information. The correction must be written adjacent to the error.

The original entry should still be legible even though crossed out. Pages should never be removed from a field book.

2.1 Setup of Field Book and Logs

When multiple field personnel are on site, the Field Team Leader should decide the appropriate distribution of field books, field logs or project-specific forms necessary to document field activities. It is not necessary for each participant to take field notes.

1. Each field book assigned to a project should have the following information on the title page (the inside cover of the field book):

    - Project name
    - Site address
    - Site contact, if available
    - Project number(s)
    - TRC's name, address and phone number
    - Start and end dates of field book entries

2. Each field book may have a designated number (i.e., Book #1, Book #2, etc.) listed on the outside front cover.

3. Each field book will be a bound field survey book or notebook, water-resistant, and have sequentially numbered pages.

4. Other field books may or may not be required, dependent on the project needs, at the discretion of the Project Manager.

2.2 Documentation Requirements for Field Books or Daily Field Report Logs

Data collection activities performed during the field effort will be recorded in field books or on Daily Field Report Logs. Entries will be of adequate detail so that others will be able to comprehend a particular situation and it will be possible to reconstruct each activity without reliance on memory.

Entries into the field book or Daily Field Report Log may contain a variety of information. The terminology used in recording all field data should be objective, factual, and free of personal interpretation that may prove inappropriate. At the beginning of each daily entry, the date, start time, weather, and names of all field team members present will be entered. It is good practice to record the date on every page. The start and end of each day's entries in the field book or Daily Field Report Log will be signed or initialed and dated by the person(s) making the entry.

In general, it is expected that field notes will be collected every 15 minutes, as appropriate. Information included in the field book or Daily Field Report Log may include, but need not be limited to, the following:

- Chronology of activities, including entry and exit times;
- Names of all people involved in field activities and organizational affiliations;
- Level of personal protection used (if different from site-specific protocol/plan);

- Any changes made to site-specific protocol/plan
- Names of visitors to the site during field work and reason for their visit (unless in Daily Personnel Log)
- Sample location and identification
- Weather conditions, including temperature and any precipitation
- Day's objectives/scope of work
- Vehicle used (personal, rental) with travel time to site and mileage
- Measurement equipment identification (model/manufacturer) and calibration information
- Summary of equipment brought by subcontractor
- Communications while on site impacting site-specific protocol/plan
- Field screening results
- Site observations
- Sample collection methods and equipment
- Sample collection date (month/day/year) and time (military)
- Sample depths
- Whether grab or composite sample collected
- How sample composited, if applicable
- Sample description (color, odor, texture, etc.)
- Tests or analyses to be performed
- Sample preservation and storage conditions
- Equipment decontamination procedures
- QC sample collection
- Sample shipping methods, including tracking numbers, if applicable
- Unusual events or observations
- Record of photographs (unless in Photograph Log)
- Volume and type of investigation derived waste generated
- Sketches or diagrams
- Signature or initials of person recording the information

Upon receipt of the field book or Daily Field Report Log for a particular activity, the designated person recording the notes will begin recording notes on a new page. The person(s) recording the notes will sign/initial the new page and indicate the date, time, and weather conditions, prior to recording information about the field activity. The field book or Daily Field Report Log should indicate whether any Field Data Forms are being used. When the designated person recording the notes either relinquishes the field book or Daily Field Report Log to another team member or turns the book or log in at the end of the day, the person relinquishing the field book or Daily Field Report Log will affix a signature and date to the bottom of the last page used. If the page is not full, a diagonal line should be struck across the blank portion of the page. An example field book page is provided in Attachment A. An example Daily Field Report Log is provided in Attachment B.

Field data forms may be used to document sampling information for routine activities that have an associated form. A stockpile of blank forms will be kept in the field trailer/office or with the Field Team Leader. The field book or Daily Field Report Log should reference the form used during that event. Examples of TRC field data forms include:

- Sample log sheets (e.g., groundwater, sediment, soil gas, indoor air)
- Groundwater static water level data sheet
- Slug test data sheet

- Monitoring well construction summary/well development
- Monitoring well decommissioning
- Photograph log
- Soil boring/Rock core log
- Equipment log
- Calibration log

2.3 Documentation Requirements for Daily Personnel Logs

If applicable, the Daily Personnel Log will be maintained in the field trailer/office or by the Field Team Leader for the duration of the project to record the identities of all personnel who are on site. The following information will be recorded on Daily Personnel Logs:

- Names of field personnel
- Names of subcontractor personnel
- Names of visitors
- Affiliation of each person on site
- Date/time of entry and exit

2.4 Documentation Requirements for Photograph Logs

A field book/Daily Field Report Log entry or Photograph Log will be used to record the date and time of photographs taken at the project site. Digital cameras that imprint the date and time of the photograph may also be used to document conditions; however, prior to taking any site photographs with a digital camera, the photographer must verify the correct clock and calendar settings in the camera. An appropriate site figure may be used to note the location and direction of photographic documentation and should be referenced and attached to the log, if used. Examples of items that warrant photographic documentation include:

- General site topography
- Sampling and/or drilling locations
- Existing monitoring well locations
- Pre-existing property conditions and conditions following restoration
- Physical appearance of environmental samples
- Evidence of possible contamination
- Well casing or pad damage
- Rock cores

2.5 Documentation Requirements for Equipment Calibration Logs

A field book/Daily Field Report Log entry or Equipment Calibration Log will be completed to record appropriate information for the instruments calibrated each day. This information may include:

- Equipment manufacturer, model number and serial number
- Dates and times of calibration
- Supplies used (e.g., calibration gas)
- Individual who performed the calibration
- Adjustments made to the instrument during calibration

- Notes regarding the maintenance of the instrument

2.6 Documentation Requirements for Health and Safety Logs

A field book/Daily Field Report Log entry or Health and Safety Log will be completed to record Health and Safety issues during field activities. Entries may include:

- Daily health and safety meeting prior to performing work
- Any injuries, illnesses, near-misses, or the use of first aid supplies
- Activity under Level D conditions or the use of specific personal protective equipment (for Levels A, B or C only, if needed)
- Occurrence of possible work-related symptoms
- The date, name(s) of affected individuals and a description of the issue or incident and response
- A record of air monitoring results, any action level exceedances, and actions taken as the result of any action level exceedances

2.7 Documentation Requirements for Air Monitoring Logs

A field book/Daily Field Report Log entry or Air Monitoring Log will be completed to record monitoring results from real-time air monitoring instruments during field activities. The air monitoring devices will be located and operated in accordance with the Air Monitoring Plan. For hand-held instruments without data logging capabilities, readings will be recorded in the field book/Daily Field Report Log or on the Air Monitoring Log. For instruments with data logging capabilities, the instruments will be periodically checked, with results recorded in the field book/Daily Field Report Log or on the Air Monitoring Log. Data will be downloaded at the end of each workday and maintained in the project files.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

The Field Team Leader has the responsibility to maintain the various logs, forms, and books that document daily field activities. Individual responsibilities may be delegated to other field staff, as appropriate.

Quality control procedures will place emphasis on the completeness and accuracy of all information recorded in the field and will be used to confirm that field notes contain statements that are legible, accurate, and comprehensive documentation of project activities. Field books/Daily Field Report Logs should be reviewed on a frequent basis by the Field Team Leader to confirm that:

- Field books/Daily Field Report Logs and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.

- Records are legible and in accordance with good record-keeping procedures, i.e., entries are signed or initialed and dated, data are not obliterated, and changes are initialed, dated, and explained.

- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the project plans, and that any deviations were documented and approved by the appropriate personnel.

- Instruments were calibrated and operated in accordance with the procedures specified in the project plans.

4.0 INVESTIGATION-DERIVED WASTE DISPOSAL

Field personnel should discuss specific documentation requirements for investigation-derived waste disposal with the Project Manager.

5.0 DATA MANAGEMENT AND RECORDS MANAGEMENT

The Project Manager or Field Team Leader will maintain an inventory of all field books/Daily Field Report Logs used during the program and will be responsible for ensuring that they are archived in the project files following the completion of the field work.

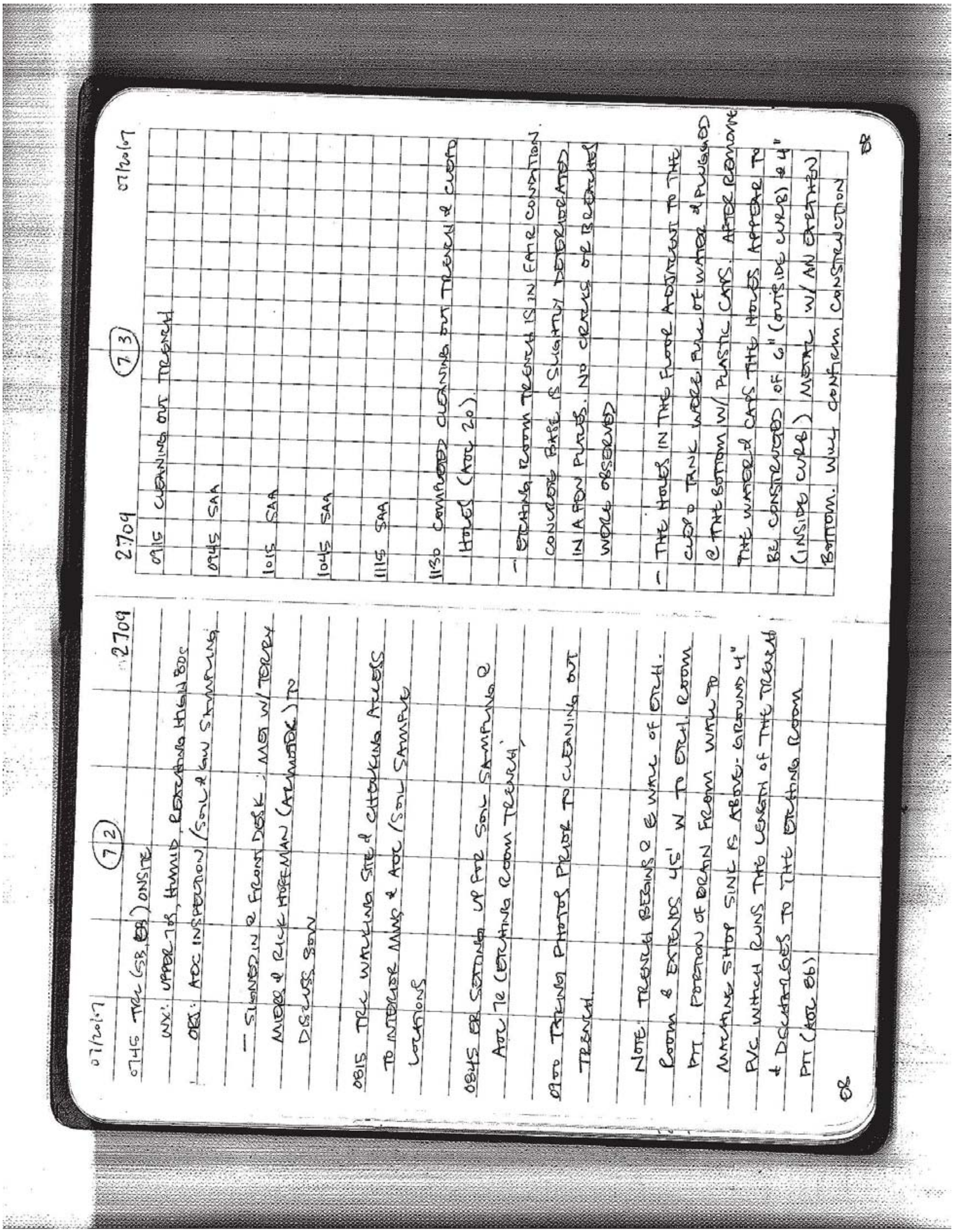
Completed standardized forms will be maintained by the Project Manager or Field Team Leader during the duration of the program and will be archived in the project files following completion of the field effort.

It is good practice to scan field notes and logs at the conclusion of field activities and store the resulting pdf files in the project directory.

6.0 SOP REVISION HISTORY

REVISION NUMBER	REVISION DATE	REASON FOR REVISION
0	JANUARY 2013	NOT APPLICABLE

Attachment A: Example Page from Field Book



07/20/07 (72) 2709

0745 TRC (SB, EB) ONSITE

WX: UPPER 70s, HUMID, REACHING HIGH 80s

OBJ: AOC INSPECTION / SOIL & GW SAMPLING

— SIGNED IN @ FRONT DESK; MET W/ TERRY MIERS & RICK HOFFMAN (ARMOTEK) TO DISCUSS SOW

0815 TRC WALKING SITE & CHECKING ACCESS TO INTERIOR AIMS & AOC / SOIL SAMPLE LOCATIONS

0845 EB SETTING UP FOR SOIL SAMPLING @ AOC 72 (ETCHING ROOM TRENCH)

0900 TAKING PHOTOS PRIOR TO CLEANING OUT TRENCH.

NOTE: TRENCH BEGINS @ E WALL OF ETCH. ROOM & EXTENDS 45' W TO ETCH. ROOM PIT. PORTION OF DRAIN FROM WALL TO MACHINE SHOP SINK IS ABOVE-GROUND 4" PVC WHICH RUNS THE LENGTH OF THE TRENCH & DISCHARGES TO THE ETCHING ROOM PIT (AOC 86)

EB

2709 (73) 07/20/07

0915 CLEANING OUT TRENCH

0945 SAA

1015 SAA

1045 SAA

1115 SAA

1130 COMPLETED CLEANING OUT TRENCH & CLOGGED HOLES (AOC 20).

— ETCHING ROOM TRENCH IS IN FAIR CONDITION. CONCRETE BASE IS SLIGHTLY DETERIORATED IN A FEW PLACES. NO CRACKS OR BREACHES WERE OBSERVED

— THE HOLES IN THE FLOOR ADJACENT TO THE CLOGD TANK WERE FULL OF WATER & PLUGGED @ THE BOTTOM W/ PLASTIC CAPS. AFTER REMOVING THE WATER & CAPS THE HOLES APPEAR TO BE CONSTRUCTED OF 6" (OUTSIDE CURB) & 4" (INSIDE CURB) METAL W/ AN EARTHEN BOTTOM. WILL CONFIRM CONSTRUCTION

EB

Attachment B: Example Daily Field Report Log

DAILY FIELD REPORT LOG

CLIENT: PROJECT :	DATE:
ADDRESS:	PROJECT #:
WEATHER:	PAGE: _____ OF ______
FIELD ACTIVITY:	

TIME	DESCRIPTION OF DAILY ACTIVITIES

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY TRC PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By:	TRC
Date/Time:	123 Technology Drive Irvine, California 92618

Attachment C: SOP Fact Sheet

FIELD ACTIVITY DOCUMENTATION

PURPOSE AND OBJECTIVE

The objective of documenting field activities is to ensure that a collection of facts is recorded, the activities can be reconstructed from the documentation, and the field activities are adequately logged in a manner that will be acceptable if the record is required as evidence in legal proceedings. An additional objective of adequately documenting field activities is to provide complete information that is useful and understandable to someone other than the note taker. Facts and observations must be accurately recorded because the field books and field data forms provide the basis for future reports and analysis.

WHAT TO BRING

- Field book(s) – bound book with water-resistant pages
- Indelible marking pens
- Field data forms – generic or project-specific
- Digital camera
- Pocket ruler
- GPS device

OFFICE

- Ensure that there is adequate space for notes on the upcoming field event in the existing field book.
- If a new field book must be issued, note the field book number on the spine.
- A new field book should contain the following information on the inside cover: Project name; site address; site contact, if available; project number(s); TRC's name, address and phone number; and start and end dates of field book entries.
- Each field book may have a designated number (i.e., Book #1, Book #2, etc.) listed on the outside front cover.

ON-SITE

- Data collection activities will be recorded in field books. Entries will be of adequate detail so that individuals who were not onsite can reconstruct the day.
- The terminology used in recording all field data should be objective, factual, and free of personal interpretation.
- At the beginning of each daily entry, the date, start time, weather, and names of all field team members present will be entered.
- The start and end of each day's entries in the field book or Daily Field Report Log will be signed or initialed and dated by the person(s) making the entry.
- It is expected that field notes will generally be collected every 15 minutes. Information included in the field book may include, but need not be limited to, the following:
  - Names of all people involved in field activities;
  - Weather conditions;
  - Day's objectives/scope of work;
  - Vehicle used, travel time to site and mileage;
  - Equipment calibration information;
  - Summary of equipment brought by subcontractor;
  - Any changes made to site-specific protocol/plan;
  - Sample location and identification;
  - Communications while on site;
  - Field screening results;
  - Sample collection methods and equipment;
  - Sample collection date (month/day/year) and time (24-hour);
  - Sample depths;
  - Sample description (color, odor, texture, etc.);
  - Tests or analyses to be performed;
  - Sample preservation and storage conditions;
  - Unusual events or observations;
  - Volume and type of waste generated;
  - Sketches or diagrams.
- Upon receipt of the field book or Daily Field Report Log for a particular activity, the designated person recording the notes will begin recording notes on a new page.
- The person(s) recording the notes will sign/initial the new page and indicate the date, time, and weather conditions, prior to recording information about the field activity.
- The field book or Daily Field Report Log should indicate whether any Field Data Forms are being used.
- Additional logs such as photo logs, health and safety logs or equipment logs may be required depending on the site requirements.

FIELD ACTIVITY DOCUMENTATION

DOS AND DO NOTS OF FIELD ACTIVITY DOCUMENTATION

DOs:

- DO have the following items when going into the field: Field Book and an indelible marking pen (i.e. ball-point pen) ONLY; field forms; contact phone numbers; business cards.
- DO review all available figures and workplans.
- DO take note of any atypical conditions at the site.
- DO call the Project Manager or Field Team Leader if unexpected conditions are encountered or at least twice during the work day to update them. It is also recommended to call when activities are winding down for the day to make sure that the workplan has been fully implemented and there are no additional tasks to complete.
- DO have the numbers for contractors, vehicle and equipment rental providers and utility companies readily available while in the field.

DO NOTs:

- DO NOT sign anything in the field. This includes disposal documentation, statements, etc.; call the Project Manager if there are any concerns.
- DO NOT use markers to label samples or record field notes.

2

Title: **Soil Sampling**	Procedure Number: **RMD 003**
	Revision Number: **0**
	Effective Date: **September 2013**

Authorization Signatures

Darby VanAntwerp	9/4/13	Elizabeth Denly	9/4/13
Technical Review Darby VanAntwerp	Date	Remediation Practice Quality Coordinator Elizabeth Denly	Date

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LIST OF ATTACHMENTS

1.0 INTRODUCTION

1.1 Scope and Applicability

This Standard Operating Procedure (SOP) was prepared to direct TRC personnel in the logistics, collection techniques, and documentation requirements for collecting representative soil samples. These are standard (i.e., typically applicable) operating procedures that may be changed, as required, dependent upon site conditions, equipment limitations, or limitations imposed by the procedure. In addition, other state or federal requirements may be above and beyond the scope of this SOP and will be followed, if applicable. In all instances, the actual procedures used should be documented and described in the field notes. Portions of this SOP may be applicable to soil sample collection for geotechnical analysis. However, specific instructions for collection of geotechnical samples are not provided; these samples should be collected in accordance with ASTM methods or other applicable standards.

1.2 Summary of Method

The objective of soil sampling is to obtain a representative sample of soil for laboratory analysis of constituents of interest at a given site. This objective requires that the sample be of sufficient quantity and quality for analysis by the selected analytical method. Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be sampled using a spade, trowel, and/or scoop. Sampling at greater depths typically is performed using a hand auger, continuous flight auger, a split-spoon, direct-push methods (i.e., Geoprobe®), sonic drilling, a backhoe or an excavator. The following reference may be used as a guide to aid in selecting an appropriate method or sampling device for the collection of subsurface soil samples with a drill rig: ASTM D6169–98 Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigation

1.3 Equipment

The following equipment may be utilized when collecting soil samples. Project-specific conditions or laboratory requirements may warrant the addition or deletion of items from this list.

- Appropriate level of personal protective equipment (PPE), as specified in the site-specific Health and Safety Plan (HASP).
- <u>Sample containers</u> (may be supplied by the laboratory, depending upon the regulatory program): The proper containers should be determined in conjunction with the analytical laboratory in the planning stages of the project.

  For non-volatile organic compound (VOC) parameters, glass containers with Teflon®-lined caps are typically utilized. Typical containers used for VOC parameters are provided in Attachment A. Brass liners, steel liners, or soil core acetate liners with Teflon® tape and plastic end caps may also be used.
- En-Core® samplers.
- Disposable plastic syringes or Terra Core™ samplers.

- Stainless steel mixing bowl.
- Stainless steel spoon or spatula.
- Hand auger, mud auger, sand auger, bucket auger and T-handle.
- Post hole auger.
- Extension rods.
- Stainless steel trowel.
- Shovel.
- Tape measure, folding ruler.
- Wooden stakes and spray paint, plastic flagging (highly visible), or steel pin flags.
- Field book and/or boring log.
- Sample container labels.
- Chain-of-custody (COC) forms (TRC or laboratory, as appropriate).
- Camera.
- Maps/site plan.
- Survey equipment and/or global positioning system (GPS) and/or other means of measuring sample locations.
- Indelible marking pens or markers.
- Organic absorbent (e.g., Slickwick, ground corn cob, sawdust).
- Sample coolers.
- Bubble wrap.
- Ice (for sample storage/preservation).
- Zip-loc® plastic bags (for ice and COCs).
- Equipment decontamination supplies.

1.4 Definitions

Composite sample	Composed of a number of grab samples collected over a period of time or space during a single sampling event and mixed together.
En-Core® sampler	A disposable volumetric sampling device with an airtight sealing cap.
Grab sample	Individual discrete sample collected at a particular time.
High-level VOC analysis	VOC soil analysis that yields high reporting limits (approximately 50-200 μg/kg, depending on the laboratory). Samples are typically preserved in methanol and cooled to 4°C.

	High-level VOC analyses are used for samples that are expected to contain elevated concentrations of VOCs (>200 µg/kg).
Low-level VOC analysis	VOC soil analysis that yields low reporting limits (approximately 5 µg/kg, depending on the laboratory). Samples are typically preserved in water, cooled to 4°C, and frozen within 48 hours of collection. Low-level VOC analyses are used for samples that are expected to contain lower concentrations of VOCs (≤200 µg/kg).
Terra Core™ sampler	A disposable volumetric sampling device used to transfer soil samples to the appropriate sample containers.

1.5 Health & Safety Considerations

TRC personnel will be on site when implementing this SOP. Therefore, TRC personnel shall follow the site-specific HASP. TRC personnel will use the appropriate level of PPE, as defined in the HASP.

Soil samples containing chemical contaminants may be handled during implementation of this SOP. Additionally, sample preservatives including caustics and/or acids may be considered hazardous materials and TRC employees will appropriately handle and store them at all times Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate. Hazardous substances may be incompatible or may react to produce heat, chemical reactions, or toxic products. Hazardous substances may be incompatible with clothing or equipment; some substances can permeate or degrade protective clothing or equipment. Also, hazardous substances may pose a direct health hazard to workers through inhalation or skin contact or if exposed to heat/flame and they combust. Material safety data sheets for chemicals handled by TRC should be maintained in the field.

1.6 Cautions and Potential Problems

- Cross contamination: Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary.

- Improper sample collection: Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

- Special considerations for the different soil sampling techniques are provided below in the applicable sections. Cautions and potential problems associated with soil sampling for VOCs are provided in Attachment A.

1.7 Personnel Qualifications

Since this SOP will be implemented at sites or in work areas that entail potential exposure to toxic chemicals or hazardous environments, all TRC personnel must be adequately trained.

Project and client-specific training requirements for samplers and other personnel on site should be developed in project planning documents, such as the sampling plan or project work plan. These requirements may include:

- OSHA 40-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response (HAZWOPER) workers
- 8-hour annual HAZWOPER refresher training

2.0 PROCEDURES

Always review the site-specific work plan and/or scope of work for any site-specific sampling procedures.

2.1 Pre-Sampling Activities

Pre-sampling activities that the sampling team should consider include the following: preparing a sampling strategy; reviewing the work plan approved by the regulatory agency; selecting a laboratory, and determining laboratory-specific procedures related to bottle orders, holding times, work orders, methods of analysis, COC procedures, data deliverables, schedule, and cost. Additional activities include determining shipping logistics, utility clearance, and handling of investigation-derived waste disposal. Pre-labeling bottles can help to reduce sampling and labeling errors.

The following steps should also be employed.

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or clean equipment, and ensure that it is in working order.

4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific HASP.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminants, should be considered when selecting sample locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
   NOTE: If spray paint is used to mark stakes, the spray paint should be carefully isolated from the space used to hold sample bottles, sampling equipment, etc.

7. Prior to any subsurface soil sampling, especially that completed with a drill rig or backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities by conducting a utility survey/markout.

2.2 General Soil Sampling Procedures

1. Refer to other TRC SOPs for the proper procedures for classifying soil samples and for screening of samples for VOCs.

2. **For sampling in the state of California only:** When the sampling interval is predetermined and soil samples are collected by direct-push methods into an acetate liner, the section of the liner corresponding to the predetermined depth interval may be cut off and submitted to the laboratory for analysis with the exception of samples for VOC, volatile petroleum hydrocarbon (VPH), or gasoline-range organics (GRO) analysis. If VOC, VPH, or GRO analysis is required, then these samples can be collected from either open end of the acetate liner section according to the procedures outlined in Attachment A prior to packaging and submitting it to the laboratory. The laboratory should be consulted for the required length of liner tube (i.e., sample volume) depending on the analytical suite and to ensure that the use of acetate liners is appropriate for the analytical method(s). After collecting material for the VOC, VPH, or GRO analysis samples (if required), seal each end of the acetate liner section with Teflon tape and plastic end caps. Wrap the ends with non-volatile tape and label the acetate liner with the sample identification (ID) and date and time of collection. Ensure that the laboratory will perform homogenization of the soil sample within the acetate liner and proceed to Step #9.

3. Prior to the collection of soil samples from a particular location or depth, the soil is typically screened for organic vapors with a portable meter equipped with a flame ionization detector (FID) and/or photoionization detector (PID) depending upon the suspected contaminants of concern and site-specific work plan requirements. Such organic vapor screening may be used to determine appropriate soil sample locations or depths for laboratory VOC analysis depending upon established site-specific work plan requirements. Soil should be screened *in situ* or immediately upon retrieval of the soil sample from the subsurface.

4. Samples for VOC, VPH or GRO analysis are then collected as soon as possible after the soil has been exposed to the atmosphere and prior to sample collection for other analyses.

    - **These samples are NOT homogenized.**
    - These samples are generally collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. Note that En-Core® samplers are not recommended for non-cohesive soils (see Attachment A).
    - Refer to the site-specific work plan or governing regulatory authority for preservation requirements for VOC, VPH or GRO analysis. Attachment A of this SOP includes typical procedures on the collection and preservation of soil samples for VOC, VPH and GRO analysis.

5. After collecting the sample for VOC analysis, the sample portion for the remaining analysis should be well homogenized, *in situ* (if possible, such as with surface soil sampling), or in a decontaminated stainless steel bowl or disposable new aluminum pie pan. These soil samples must be thoroughly mixed to ensure that the sample is as representative as possible of the sample media. Soil can be homogenized and transferred to sample containers using soil sampling devices that have been decontaminated prior to use or individually wrapped, sterile, new polystyrene devices. Such sterile, polystyrene devices are generally for one-time use. Stainless steel devices may be decontaminated and individually foil wrapped, plastic bagged,

or field decontaminated and foil wrapped between uses. Decontamination of sampling equipment shall be conducted in accordance with TRC's SOP on equipment decontamination.

6. Stones, gravel, or vegetation should be removed from the soil sample as much as practical prior to placement in sample containers, since these materials will not be analyzed. Visible asphalt, concrete, ash, slag, and coal debris should also be removed from the sample as much as possible to ensure sufficient soil quantity for laboratory analyses, unless these matrices are part of the overall characterization program. The soil sample must be representative of what the end user is trying to characterize. In addition, if such debris is to be tested, further sample preparation (e.g., pulverizing) will likely be necessary in the field or laboratory. In any case, the presence of any such materials in the soil at the sample location must be documented in the field book.

7. Filling of the sample bottles should be completed immediately after sample collection to minimize losses due to volatilization and biodegradation. Soil classification can be completed following sample collection.

8. Place the sample into an appropriate, labeled container(s) by using the alternate shoveling method and secure the cap(s) tightly. The alternate shoveling method involves placing a spoonful of soil in each container in sequence and repeating until the containers are full or the sample volume has been exhausted. Threads on the container and lid should be cleaned to ensure a tight seal when closed.

9. Restore the sampling location to grade in accordance with applicable state or federal guidelines and/or the site-specific work plan. Options include backfilling the sample location with the remaining removed soil, bentonite pellets or, cement/bentonite grout depending on site conditions and patching the surface to match the surrounding area (e.g., topsoil with grass seed, asphalt or concrete patch), as necessary. Boreholes must be abandoned or backfilled after the completion of sampling. In general, shallow boreholes (e.g., less than 10 feet deep) that remain open and do not approach the water table may be abandoned by pouring a cement/bentonite grout mixture from the surface or pouring bentonite pellets from the surface and hydrating the pellets in lifts. The grout mixture should be based on site-specific conditions (e.g., boring depth, groundwater depth, and formation permeability), site-specific work plan procedures, and local regulatory requirements. Boreholes where bridging of the bentonite may be an issue, such as boreholes that intercept groundwater or are greater than approximately 10 feet in depth, should be backfilled by pressure grouting with a cement/bentonite grout mixture, either through a re-entry tool string or through a tremie pipe introduced to within several feet of the borehole bottom.

10. Record locations of soil borings/samples in the field book by sketching a map and/or providing a description of the location. Always measure and record distances to fixed landmarks, such as buildings, fences, curbs, existing surveyed wells, etc. Additionally, a GPS unit with real-time sub-meter accuracy (not applicable for interior samples or other site conditions such as heavy tree/brush cover and thick cloud cover that limit unit connection with satellites) could be used to document sample locations. Note observations about elevation changes between sample locations.

2.2.1 Surface Soil Sampling Methods

The depth of surface soil samples will be determined on a site-specific basis and may be influenced by site-specific conditions and/or applicable local, state, or federal regulatory programs and potential exposure pathways. Surface soils are generally classified as soils between the ground surface and 6 to 12 inches below ground surface (bgs). The most common interval is 0 to 6 inches; however, the data quality objectives of the investigation may dictate another interval, such as 0 to 3 inches for risk assessment purposes.

The following procedure should be used for surface soil sampling:

1. If a thick, matted root zone, leaf layer, gravel, surface debris, concrete, etc. is present at or near the surface, it should be carefully removed using clean decontaminated tools or clean nitrile gloves before the soil sample is collected. The presence and thickness of any such material should be recorded in the field book for each location. The depth measurement for the soil sample begins at the top of the soil horizon, immediately following any such removed materials.

2. A decontaminated stainless steel spoon, scoop or trowel is typically used for surface soil sampling depths from 0 to 12 inches bgs where conditions are generally soft, and there is no problematic vegetative layer to penetrate. A hand auger or shovel may also be used to dig down to the desired depth and then after careful removal of the dug soils from the hole, a decontaminated stainless steel spoon, scoop or trowel is used to collect the soil sample from the bottom of the hole for laboratory chemical analysis. Plated trowels typically available from garden supply centers should not be used due to potential heavy metal impacts from the trowel plating.

3. When using stainless steel spoons or trowels, consideration must be given to the procedure used to collect a soil sample for VOC analysis. Samples for VOC, VPH or GRO analysis must be collected first and never homogenized or composited. These samples are collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. If the soil being sampled is cohesive and holds its *in situ* texture in the spoon or trowel, the En-Core® sampler or disposable syringe used to collect the sub-sample should be plugged directly from the spoon or trowel. However, if the soil is not cohesive and crumbles when removed from the ground surface for sampling, the sub-sample should be plugged directly from the surface of the appropriate sample depth. Additionally, note that En-Core® samplers are not recommended for non-cohesive soils (see Attachment A). Generally, the sample portion for VOC analysis is collected from several inches below grade to minimize volatilization from the *in situ* soil.

4. Continue by following the General Soil Sampling Procedures in Section 2.2.

2.2.2 Hand Auger Sampling Methods

The shallow subsurface interval may be considered to extend from approximately 12 inches bgs to a site-specific depth at which sample collection using manual collection with a spoon or trowel becomes difficult or impractical. Hand augers may be used to advance boreholes and collect soil samples in shallow subsurface intervals. Often, 4-inch diameter stainless steel auger buckets with cutting heads are used. The auger is advanced by simultaneously pushing and turning using an attached T-handle with extensions (if needed).

Auger holes are advanced one bucket at a time until the appropriate sample depth is achieved. When the sample depth is reached, the bucket used to advance the hole is removed and decontaminated or a clean bucket is attached. The clean auger bucket is then placed in the hole and filled with soil to make up the sample and then carefully removed. The practical depth of investigation using a hand auger largely depends upon the soil properties and depth of investigation. In sand, augering is typically easy to perform, but the depth of collection is limited to the depth at which the sand begins to flow or collapse. The use of hand augers may be of limited use in soils containing large amounts of unnatural fill (e.g., brick, slag, concrete), coarse gravel and cobbles (or larger grain size), and in tight clays or cemented sands. In these soil types, it becomes more difficult to recover a sample due to increased friction and torqueing of the hand auger extensions as the depth increases. At some point, these problems become so severe that alternate methods (i.e., power equipment) must be used.

The following procedure is used for collecting soil samples with the hand auger:

1. Attach the auger head to a drill rod extension and attach the T-handle to the rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first several inches of surface soil and any root layer for an area approximately 6 inches in radius around the borehole location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the borehole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding rod extensions. It also facilitates refilling the borehole and avoids possible contamination of the surrounding area.

4. When the sample depth is reached, remove the bucket used to advance the borehole and attach a decontaminated or clean bucket. Place the clean auger bucket in the borehole, advance the clean auger bucket to fill it with the soil sample and then carefully remove the clean auger bucket.

5. If VOC analysis is to be performed, collect a sample directly at the bottom of the boring, if within reach, and not from the auger bucket. If not within reach, collect the sample directly from the auger bucket or from minimally disturbed material immediately after the auger bucket is emptied. Use an En-Core® sampler or other coring device (i.e., syringe, Terra Core™) to collect the sub-sample as described in Attachment A. Note: some regulatory agencies do not allow for subsurface VOC sample collection directly with a hand auger; refer to the site-specific work plan and regulatory requirements to ensure the collection of VOC samples with a hand auger is appropriate.

6. Continue by following the General Soil Sampling Procedures in Section 2.2. Note that if another sample is to be collected in the same borehole, but at a greater depth, reattach the auger bucket to the rod assembly, and follow steps 1 through 5 above, making sure to decontaminate the sampling device between samples.

Special Considerations for Hand Auger Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Slough* - Because of the tendency for the auger bucket to scrape material from the sides of the auger hole while being extracted, the top several inches of soil in the auger bucket should be discarded prior to placing the bucket contents in the homogenization container for processing.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - If sampling equipment is to be reused at a new sampling location or at a deeper depth in the same location, proper decontamination of sampling equipment is required.

2.2.3 Direct-Push Sampling Methods

Direct-push sampling methods are used primarily to collect shallow and deep subsurface soil samples. Soil sampling probes may range from simple hand tools to truck-mounted or track-mounted hydraulically operated rigs. The basic concept is the same for all of these samplers: the tool is hydraulically driven into the soil, filling the tube, and then the tool is withdrawn. All of the sampling tools involve the collection and retrieval of the soil sample within a thin-walled liner. The following sections describe two specific sampling methods using direct-push techniques, along with details specific to each method.

- *Macro-Core® Sampler (Direct-push)* - The Macro-Core® (MC®) sampler is a solid barrel, direct-push sampler equipped with a piston-rod point assembly used primarily for collection of either continuous or depth-discrete subsurface soil samples. Although other lengths are available, the standard MC® sampler has an assembled length of approximately 52 inches (1321 mm) with an outside diameter (OD) of 2.2 inches (56 mm). The MC® sampler is capable of recovering a discrete sample core 45 inches x 1.5 inches (1143 mm x 38 mm) contained inside a removable liner. The resultant sample volume is a maximum of 1300 mL. The MC® sampler may be used in either an open-tube or closed-point configuration.

- *Dual-tube Soil Sampling System (Direct-push)* - The Dual-tube 21 soil sampling system is a direct-push system for collecting continuous core samples of unconsolidated materials from within a sealed outer casing of 2.125-inch (54 mm) OD probe rod. The samples are collected within a liner that is threaded onto the leading end of a string of 1.0-inch diameter probe rod. Collected samples have a volume of up to 800 mL in the form of a 1.125-inch x 48-inch (29 mm x 1219 mm) core. Use of this method allows for collection of a continuous core inside a cased hole, minimizing or preventing cross contamination between different intervals during sample collection. The outer casing is advanced, one core length at a time, with only the inner probe rod and core being removed and replaced between samples. If the sampling zone of interest begins at some depth below ground surface, a solid drive tip must be used to drive the dual-tube assembly and core to its initial sample depth.

The following procedure is used for collecting soil samples from direct-push soil cores:

1. The driller will advance and extract the soil sampler liner which will then be given to the field sampler - confirm with the driller which end is top and which end is bottom. Record the time of core collection (military time), the soil boring ID and the depth interval in feet bgs in the field book.

2. Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs, or gravel sub-base should be excluded from the depth measurement unless otherwise specified in the site-specific work plan. However, the presence and thickness of these items should be noted in the field book.

3. Measure the length of recovered soil in inches and record in the field book.

4. Continue by following the General Soil Sampling Procedures in Section 2.2.

   If a specific depth interval is targeted for sampling, be sure to give consideration to the percent recovery of soil when selecting the sample interval. For example, if the targeted sample interval was from 2.0 to 2.5-ft, and the core barrel was advanced from 0 to 4 ft bgs, and 30 inches (2.5 ft) of soil was recovered, the sample should be collected immediately below the mid-point of the recovered soil, or 15- inches below the top of the recovered soil (not including slough). The sample designation will indicate that the depth was 2.0 to 2.5 ft bgs.

Special Considerations for Direct-push Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Liner Use and Material Selection* - Direct-push soil samples are collected within a dedicated new or decontaminated liner to facilitate removal of sample material from the sample barrel. The liners may only be available in a limited number of materials for a given sample tool, although overall, liners are available in brass, stainless steel, cellulose acetate butyrate (CAB), polyethylene terephthalate glycol (PETG), polyvinyl chloride (PVC) and Teflon®. For most investigations, the standard disposable new polymer liner material for a sampling tool will be acceptable. When the study objectives require very low reporting levels or unusual contaminants of concern, the use of more inert liner materials such as Teflon® or stainless steel may be necessary. However, such costly liner materials typically are not disposable and therefore require decontamination between each use.
- *Sample Orientation* - When the liners and associated sample are removed from the sample tubes, it is important to confirm and maintain the proper orientation of the sample. This is particularly important when multiple sample depths are collected from the same push. It is also important to maintain proper orientation to define precisely the depth at which an aliquot was collected. Maintaining proper orientation is typically accomplished using vinyl end caps. Convention is to place red caps on the top of the liner and black caps on the bottom to maintain proper sample orientation. Orientation can also be indicated by marking on the exterior of the liner with a permanent marker.

- *Core Catchers* - Occasionally the material being sampled lacks cohesiveness and is subject to crumbling and falling out of the sample liner. In such cases, the use of core catchers on the leading end of the sampler may help retain the soil until it is retrieved to the surface. Core catchers may only be available in specific materials and should be evaluated for suitability. However, given the limited sample contact that core catchers have with the sample material, most standard core catchers available for a tool system will be acceptable.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - The cutting shoe and piston rod point are to be decontaminated between each sample. Within a borehole, the sample barrel, rods, and drive head may be subjected to an abbreviated cleaning to remove obvious and loose material, but must be cleaned between boreholes, such as with high-pressure water or steam.

2.2.4 Split-spoon Sampling Methods

All split-spoon samplers, regardless of size, are basically split cylindrical barrels that are threaded on each end. The leading end is held together with a beveled threaded collar that functions as a cutting shoe. The other end is held together with a threaded collar that serves as the stub used to attach the spoon to a string of drill rod.

- Standard Split Spoon - A drill rig auger is used to advance a borehole to the target depth. The drill auger string is then removed and a standard split spoon is attached to a string of drill rod. Split spoons used for soil sampling must be constructed of stainless steel and are typically 2.0- inches OD (1.5-inches inside diameter) and 18- inches to 24- inches in length. Other diameters and lengths are common and may be used if constructed of the proper material. After the spoon is attached to the string of drill rod, it is lowered into the borehole. The safety hammer is then used to drive the split spoon into the soil at the bottom of the borehole. After the split spoon has been driven into the soil, filling the spoon, it is retrieved to the surface, where it is removed from the drill rod string and opened for sample acquisition. Split-spoon soil sampling for geotechnical purposes should be conducted in accordance with ASTM Method D1586 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soil*.

The following procedure is used for collecting soil samples from split-spoon soil cores:

1. Record the blow count per 6-inch interval when advancing split-spoon samplers with the hollow stem auger rig. Record the hammer weight (e.g., 140 pounds [lb] is standard, but 300 lb may also be used to advance the spoon). Blow counts are an indication of soil density and are a measure of the number of blows it takes for a 140 lb slide hammer falling over a distance of 30- inches to penetrate 6- inches of soil. The drillers will keep the count and will repeat them to the field sampler (e.g., 11, 13, 16 – means the number of blows the hammer advanced the spoon every 6 inches over a total depth interval of the split-spoon sampler, in this case over 18 inches). If refusal is encountered, the count is recorded in the book as "# of hammer blows / depth in inches the spoon is driven" (e.g., 50/3 – means 50 blows of the hammer advanced the spoon 3 inches).

2. The driller will advance, extract, and open the split spoon, which will then be given to the field sampler - confirm with the driller which end is top and which end is bottom, if a soil

sampler liner is used and removed from the spoon. Record the time of core collection (military time), the soil boring ID and the depth interval in feet bgs in the field book.

3. Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs or gravel sub-base should be excluded from the depth measurement unless otherwise specified in the site-specific work plan. However, the presence and thickness of these items should be noted in the field book.

4. Measure the length of recovered soil in inches and record in the field book.

5. Continue by following the General Soil Sampling Procedures in Section 2.2.

Special Considerations for Split-spoon Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Slough* - Generally discard the top several inches of material in the spoon before removing any portion for sampling. This material normally consists of borehole wall material that has sloughed off of the borehole wall after removal of the drill string prior to and during insertion of the split spoon.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - The split-spoon sampler(s) is to be decontaminated between each sample. Within a borehole, the split spoon sample barrels must be cleaned between each sample - the driller typically has multiple barrels and can alternate between clean and dirty barrels so drilling progress is not affected by decontamination of the barrels. The augers should be decontaminated between boreholes (such as with high-pressure steam).

2.2.5 Shelby Tube/Thin-walled Sampling Methods

Shelby tubes, also referred to generically as thin-walled push tubes or Acker thin-walled samplers, are used to collect subsurface soil samples in cohesive soils and clays during drilling activities. In addition to samples for chemical analyses, Shelby tubes are also used to collect relatively undisturbed soil samples for geotechnical analyses of physical properties such as shear strength, grain size distribution, density, hydraulic conductivity and permeability, to support engineering design, construction, and hydrogeologic characterizations at hazardous waste and other sites.

A typical Shelby tube is 30 inches in length, has a 3.0-inch OD (2.875-inch inside diameter) and may be constructed of steel, stainless steel, galvanized steel, or brass. They are typically attached to push heads constructed with a ball check to aid in holding the sample in the tube during retrieval. If used for collecting samples for chemical analyses, it must be constructed of stainless steel. If used for collecting samples for standard geotechnical parameters, any material is acceptable. To collect a sample, the tube is attached to a string of drill rod and is lowered into the borehole, where the sampler is then pressed into the undisturbed material by hydraulic force from the drill rig. Shelby tube or thin-walled soil sampling should be conducted in accordance with

ASTM Method D1587 *Practice for Thin-walled Tube Sampling of Soils for Geotechnical Purposes*.

After retrieval to the surface, the tube containing the sample is then removed from the sampler head. If samples for chemical analyses are needed, the soil contained inside the tube is then removed for sample acquisition by following the direct-push sampling procedures in Section 2.2.3. If the sample is collected for geotechnical parameters, the tube is typically sealed, to maintain the sample in its relatively undisturbed state, capped, labeled appropriately (including sample ID, top end of sample, inches of recovery, etc.), and shipped to the appropriate geotechnical laboratory. The tube is typically stored in an upright position to maintain the integrity of the undisturbed sample. For geotechnical use, check with the laboratory prior to sampling to understand sample volume recoveries needed to perform the actual tests.

2.2.6 Sonic Drilling Sampling Methods

Sonic drilling/rotary vibratory drilling employs the use of high-frequency, resonant energy to advance a core barrel or casing into subsurface formations. Although sonic drilling is not technically a direct-push method of soil sampling, it is similar because soil sample collection from cores of recovered unconsolidated soil would follow the same procedures as described for direct-push methodologies. The soil core is extruded from the core barrel or casing into a plastic sleeve.

Sonic drilling is different than conventional drilling, as sonic drilling minimizes the friction between the borehole wall and the drilling tool by maintaining the resonance of the drill string with a sonic drill head. Typically the drilling method utilizes dual casings that independently resonate into the subsurface with an inner core barrel that is overrun by an outer casing.

Typically core runs are 10- feet. The core barrel is removed from the borehole and the core is extruded into a plastic sleeve. The plastic sleeve is placed on dedicated plastic sheeting. The plastic sleeve is then slit with a razor knife (or similar) vertically along the core run, exposing the soil inside.

The procedures for collecting soil samples from sonic cores are the same as the procedures presented for collecting soil samples from direct-push sampling methods in Section 2.2.3.

<u>Special Considerations for Sonic Drilling Sampling</u>

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- Sonic-generated soils are not undisturbed. The resonation of the core barrel during advancement energizes the skin of the sample immediately adjacent to the barrel, approximately ⅛ to ¼ inch around the OD of the sample. Heating of the soils is possible.
- Coring is always accomplished without air or fluids. Depending on site conditions, the outer casing may require adding some water to the borehole if heaving or flowing sands/sand and gravel are present.
- Resistance is not measured during core barrel advancement, as in split-spoon sampling where blow counts are measured. To collect conventional split-spoon samples and obtain blow

counts, the sonic drill rigs can be outfitted with automatic hammers to advance split spoons or thin-walled push tubes, although the advantage of drilling speed with the sonic drilling technique is diminished.

2.2.7 Excavator Sampling Methods

A backhoe or excavator can be used to assist with soil sampling. This method is typically used during remedial excavation activities (to collect floor and sidewall samples within the excavation), test pit installation, or trenching operations. Test pit excavations are commonly completed to allow for greater observation of physical soil characteristics (e.g., stockpiles) and/or to further investigate buried suspect areas of concern (e.g., petroleum tanks, drums, waste, fill).

The following procedures are used for collecting soil samples excavated with a backhoe or excavator:

1. Prior to any excavation, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout.

2. For test pits or trench excavation, excavate in accordance with the site-specific work plan. Typically, this will be approximately 3 feet wide and approximately 1 foot deep below the cleared sampling location with the backhoe. Remedial excavations may be much wider and deeper. The work plan may also require that excavated soils be placed on plastic sheets or another impervious surface and protected from rain.

3. Refer to the site-specific work plan for the number of floor and/or sidewall samples, which is typically driven by the surface area and can vary depending on the governing regulatory agency.

4. Samples can be collected using a trowel, spoon, or coring device at the desired intervals. A clean shovel may be used to remove a 1 to 2- inch layer of soil from the vertical face of the pit that contacted the backhoe bucket and where soil sampling is planned. Scrape the vertical face at the point of sampling to remove any soil that may have fallen from above and to expose fresh soil for sampling. In many instances, soil sample locations within the excavation area are inaccessible (do not physically enter backhoe excavations to collect a sample). In these cases, soil samples can be collected directly from the backhoe bucket – use caution not to collect a soil sample from edges that may have come into contact with the backhoe bucket.

5. If VOC analyses are required, collect the sample in accordance with the procedures in Attachment A and/or the site-specific work plan. With a dedicated decontaminated spoon, or equivalent, place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations and the site-specific work plan. Generally, shallow excavations can simply be backfilled with the removed soil material.

Special Considerations for Excavator Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- Do not physically enter backhoe excavations to collect a sample if the excavations are unstable or not sloped and protected with shoring. A trench with non-cohesive soils (i.e., sand, saturated/wet muds, or flowing water at the base) is particularly susceptible to collapsing suddenly. Never enter a trench without a confined space entry permit, as required by OSHA regulations.
- Smearing is an important issue when sampling with a backhoe or excavator. Any time a vertical or near vertical surface is sampled, such as achieved when shovels or similar devices are used for subsurface sampling, the surface should be dressed (scraped) to remove smeared soil. This is necessary to minimize the effects of contaminant migration interferences due to smearing of material from other levels.
- Loose paint, grease and rust should be removed and the backhoe bucket decontaminated prior to use for sample collection if the bucket will come in direct contact with the material to be sampled. Care should be taken to collect the soil sample from the center of the excavated material within the bucket (i.e., material that has not touched the bucket walls).

2.2.8 Stockpile Soil Sampling Methods

Stockpiled soils are typically sampled to characterize the soils for reuse or disposal. The stockpile sampling strategy used must consider the source of the soil and all available data, field observations, shape/dimensions and volume of the pile, and sampling frequency requirements established by oversight regulatory agencies or potential soil disposal facilities.

If the stockpile is known to be a representative mixture of soil with no known or suspected significant variability of contamination with depth in the pile, the stockpile sampling may be conducted according to the surface soil sampling method described in Section 2.2.1. However, if the soil characteristics are not known or are known or suspected to vary with depth in the pile, both surface soil and deeper subsurface soil samples will be required to properly characterize the soil pile.

A backhoe or excavator equipped with a bucket can be used to collect subsurface soil samples from stockpiles. This method is often preferred for collecting subsurface soil samples from a stockpile, since it allows the sampler greater opportunity to inspect the physical characteristics of the pile for any potential signs of variability for determining appropriate sample depths and locations.

Typically, based on the minimum required number of samples for the estimated stockpile volume, the stockpile is divided into the appropriate number of estimated volumes equal to that sample number. For example, if the specified sample frequency is 1 sample per 1,000 cubic yards (cy) and the estimated stockpile size is 4,000 cy, the stockpile would be broken down into approximately four equal volumes or quadrants. Grab VOC samples and composite non-VOC samples, as required, would then be collected from each of the areas for characterization of the stockpile.

2.3 Post-sampling Activities

1. After the samples have been collected, the sampling location may be marked with wooden stakes colored with highly visible spray paint and/or flagging in order to identify the sample location for surveying purposes. The sample and/or location identification should be written on the stake in indelible ink or marking pen. The sample location should be surveyed in the field with a GPS unit if not surveyed later by some other means. A sketch of the sampling locations should also be included in the field book.

2. Package the samples with bubble wrap and/or organic absorbent, as necessary.

3. Place the samples into a shipping container and cool to 4ºC. If wet ice is used to cool the samples, place the ice in double-bags to prevent water from the melting ice from damaging the samples during shipment.

4. Complete the COC form.

5. Decontaminate non-disposable sampling equipment.

3.0 INVESTIGATION-DERIVED WASTE DISPOSAL

Field personnel should discuss specific documentation and containerization requirements for investigation-derived waste disposal with the Project Manager.

Each project must consider investigation-derived waste disposal methods and have a plan in place prior to performing the field work. Provisions must be in place as to what will be done with investigation-derived waste. If investigation-derived waste cannot be returned to the site, consider material containment, such as a composite drum, proper labeling, on-site storage by the client, testing for disposal approval of the materials, and ultimately the pickup and disposal of the materials by appropriately licensed vendors.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The collection of specific field quality control (QC) samples will be specified in the project-specific planning documents and may include one or more of the following: field blank, equipment blank, trip blank, field duplicate, and matrix spike/matrix spike duplicates.

4.1 Duplicate Soil Sample Collection

The following procedures should be used for collecting duplicate soil samples:

1. For QC purposes, each duplicate sample will be submitted to the laboratory as a "blind" duplicate sample, in that a unique sample identification not tied to the primary sample identification will be assigned to the duplicate (e.g., DUP-01). Standard labeling procedures used for soil sampling will be employed. However, a sample collection time will not be included on the sample label or the COC form. The actual source of the duplicate sample will be recorded in the field book.

2. Each duplicate sample will be collected simultaneously with the actual sample. At the coincident step in the sampling procedures that the VOC, VPH and/or GRO containers are filled and sealed, the duplicate sample VOC, VPH and/or GRO containers will also be filled and sealed. Duplicates for all parameters other than VOCs, VPH and GRO should be filled from the homogenized sample to ensure consistency between the sample and the duplicate. Following the order of collection specified for each set of containers (i.e., VOCs, VPH, GRO, semivolatile organic compounds [SVOCs], other organics and then inorganic compounds), the duplicate sample containers will be filled simultaneously with each parameter.

3. All collection and preservation procedures outlined for soil sampling will be followed for each duplicate sample.

5.0 DATA MANAGEMENT AND RECORDS MANAGEMENT

Record the general sample collection information such as location, identification, and date/time in the field book or on a field data sheet. Typical field documentation recorded in a field book includes the following information:

- Sample identification number
- Sample location (description or sketch of the sample point)
- Sample depth interval
- GPS coordinates and coordinate system
- Time and date sample was collected
- Personnel performing the task
- Visual or sensory description of the sample (e.g., odors, staining)
- Brief soil descriptions (e.g., color, texture, appearance)
- Presence of any fill materials (e.g., concrete, asphalt, ash)
- Readings from field screening equipment (e.g., PID)
- Weather conditions during sampling
- Other pertinent observations including whether photographs were taken
- Sample collection equipment used
- Decontamination procedure
- Analytical parameters

Affix a properly completed label to each sample container.

All sample numbers must be documented on the COC form that accompanies the samples during shipment. Any deviations from the record management procedures specified in the site-specific work plan must be approved by the Project Manager and documented in the field book.

6.0 REFERENCES

ASTM Methods D1586 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soil,* D1587 *Practice for Thin-walled Tube Sampling of Soils for Geotechnical Purposes*, ASTM D6169 *Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigation,* ASTM International, Most Current Version.

MassDEP, *Method for the Determination of Volatile Petroleum Hydrocarbons (VPH)*, May 2004.

U.S, EPA, SW-846 Method 5035A, *Closed System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples*, Draft Revision 1, July 2002.

U.S. EPA Environmental Response Team, Soil Sampling SOP #2012, February 18, 2000.

U.S. EPA Science and Ecosystem Support Division, Soil Sampling Operating Procedure (SESDPROC-300-R2), December 20, 2011.

7.0 SOP REVISION HISTORY

REVISION NUMBER	REVISION DATE	REASON FOR REVISION
0	SEPTEMBER 2013	NOT APPLICABLE

Attachment A:

Procedure for Collection of Samples for VOCs, VPH or GRO (SW-846 Method 5035A)

1.0 SAMPLING FOR VOLATILE ORGANIC COMPOUNDS IN SOIL BY EPA METHOD 5035/5035A

The following sampling protocol is recommended for site investigations assessing the extent of VOCs (including VPH and GRO) in soils at a project site. Because of the large number of options available, careful coordination between field and laboratory personnel is needed. The specific sampling containers and sampling tools required will depend upon the required detection levels and intended data use. Once this information has been established, selection of the appropriate sampling procedure and preservation method best applicable to the investigation can be made.

SW-846 Method 5035 provides instructions and options on the preservation of soil samples for low-level and high-level VOC analyses:

- Low-level (≤ 200 µg/kg) and
- High-level (> 200 µg/kg).

The choice of low-level or high-level analysis is determined by the requirements of the project. However, since the low-level method is only valid for a certain concentration range, a sample for analysis by the high-level method must also be collected to ensure quantification of all target analytes is possible, if needed.

The low-level method uses one or more of the following options for the sampling/preservation of soils:

- Soil sampled into a vial with a sodium bisulfate ($NaHSO_4$) solution.
- Soil collected in an En-Core® sampler and immediately shipped to the laboratory for further preservation (within 48 hours).
- Soil collected in a vial with organic-free water, sealed in the field, and shipped to the laboratory immediately in order to meet the method preservation requirement to freeze within 48 hours of collection.

Based on project-specific requirements, trip blanks may be recommended. Refer to the site-specific work plan for quality assurance (QA)/QC requirements.

1.1 Low-level Method (VOCs)

Option A - Direct sampling into En-Core® samplers

- Three 5 gram size En-Core® samplers for each sample.
- One nonpreserved container for moisture determination.

Option B - Direct sampling into vial with chemical preservative

- Two 5 gram size cores are added to volatile organic analysis (VOA) vials (one soil core is added to each of two VOA vials with sodium bisulfate solution) for each sample using a Terra Core™ or other coring sampler (e.g., disposable syringe). Once the vials are sealed in the field, these are not opened again.
- One nonpreserved container for moisture determination.

Option C - Direct sampling into vial with water (to be frozen at the laboratory)

- Two 5 gram size cores are added to VOA vials (one soil core is added to each of two VOA vials with water) for each sample using a Terra Core™ or other coring sampler (e.g., disposable syringe). Once the vials are sealed in the field, these are not opened again.
- One nonpreserved container for moisture determination.

1.2 High-level Method (VOC, VPH, GRO)

Option D - Direct sampling into En-Core® samplers

- One 5 gram size En-Core® sampler for each sample.
- One nonpreserved container for moisture determination.

Option E - Direct sampling into a methanol-preserved vial

- For VOCs: 5 or 10 grams of soil is added to a VOA vial (with 5 or 10 grams of methanol, respectively) for each sample using a Terra Core™ or other coring sampler (e.g., disposable syringe). This may also depend upon the regulatory agency (e.g., New Jersey Department of Environmental Protection requires 8 to 12 grams in 25 mL methanol or 5 grams in 10 mL methanol).
- For VPH or GRO: The coring device will be filled with 25 grams of undisturbed soil if 60-ml vials with 25 ml of methanol are used, or 15 grams of undisturbed soil if 40-ml vials with 15 ml of methanol are used. The goal is to have a 1:1 ratio of soil- to-methanol.
- One nonpreserved container for moisture determination.

1.3 Cautions and Potential Problems

1. Potential leaking sample containers for VOC, VPH and GRO analyses:

   Options for evaluating containers for leaking preservatives:

   a. When ordering pre-preserved sample containers, laboratories should be encouraged to mark the meniscus of the preservative on all sample containers. The preservative level should be checked before sampling as a quick check that there has not been any loss of liquid.
   b. Compare preservative level in multiple bottles and select one for comparison purposes to subsequent sample bottles.
   c. Weigh methanol-preserved sample containers prior to sampling. Sample containers found to have lost greater than 0.2 grams of methanol compared to their initial weight should not be used. In order to perform this option, initial container weights must be provided by the laboratory.

2. Potential methanol absorption:

   Soil may be encountered that absorbs all of the methanol preservative (e.g., organic-rich soil, fine-grain soil). These soils can absorb the methanol leaving no methanol extract for the laboratory to analyze. In these instances, the use of additional methanol is required. The laboratory must be contacted for sample containers with an increased volume of methanol.

Using a 1:2 ratio of soil to methanol will help to ensure that there will be adequate volume of methanol remaining for analysis. **NOTE: Additional methanol should not be added to the sample container by the sampler in the field. Containers with additional methanol must be obtained from the laboratory.**

3. Collection of samples with high moisture content:

   Soil samples with high (>50%) moisture content (e.g., sediments, soil samples below the water table) may prevent the attainment of the ideal 1:1 soil-to-preservative ratio. In these instances, depending on the data quality objectives, it may be necessary to evaluate the soil to determine what level in the disposable syringe corresponds to the required weight (typically 5 grams for VOCs and 15 or 25 grams for VPH). This can be performed by collecting several trial samples with disposable syringes. Weigh each trial sample and note the length of the soil in the syringe. These measurements would be used to determine how much soil in the syringe corresponds to 5 ± 0.5 grams (or the desired weight ± 0.5). All trial samples should be discarded and not used for analysis.

4. En-Core® sampler cautions:

   a. En-Core® samplers, or equivalent, should only be used on fine-grain or cohesive soils (soils that stay together in the En-Core® sampler and do not fall apart). En-Core® samplers should not be used to collect soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table). In the case of soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table), a stainless steel spatula or scoop should be used with field preservation techniques.
   b. The En-Core® sampler is a single-use device and cannot be decontaminated and reused.
   c. The volume of material collected in an En-Core® sampler should not cause excessive stress on the coring tool.
   d. The volume of material collected should not be so large that the sample easily falls apart during extrusion.
   e. The En-Core® sampler should not be used if any of the components are damaged as the seals may be compromised. Under no circumstances should any components be removed or disturbed.
   f. It is important to make sure air is not trapped behind the sample, as this could cause air to pass through the sample, resulting in a loss of VOCs, or it could cause the sample to be pushed prematurely from the coring tool.

5. Potential effervescence with use of sodium bisulfate as a preservative for low-level VOC analysis of soils:

   This method of preservation is not preferred and, therefore, is not outlined below. If it is used, the following cautions exist:

   a. Carbonaceous or strongly alkaline soils may cause potential effervescence when reacting with the sodium bisulfate and may result in a loss of VOCs and a shattered vial. If effervescence occurs, sodium bisulfate should not be used. The laboratory must be contacted and low-level preservation techniques, using water only, should be followed.

b. Loamy materials or materials containing decayed material may result in false positive results for acetone due to the interaction with the sodium bisulfate.

c. Some VOCs may be lost due to the resulting acidification when sodium bisulfate is used (e.g., styrene, 2-chloroethyl vinyl ether, acrylonitrile).

d. Some VOCs may be lost if the laboratory is using a heated purge in combination with the sodium bisulfate preservative (e.g., methyl tert butyl ether [MTBE] and other fuel oxygenates).

1.4 Sample Containers and VOC Sampling Equipment

- Method 5035A-compatible containers or kits (for VOCs, VPH and GRO). Preservatives may be required for some samples with certain variations of SW-846 method 5035A – consult the governing regulatory agency or principal analytical chemist to determine which preservatives are necessary.
  - Low-level VOCs: two 40-mL VOA vials pre-preserved with 5 mL organic-free water and also containing a magnetic stir bar.
  - High-level (or medium-level) VOCs: one 40-mL VOA vial pre-preserved with 5 or 10 mL of purge-and-trap-grade methanol. Volume will be dependent upon laboratory's preference or regulatory agency requirements (e.g., New Jersey Department of Environmental Protection prefers vials with 10 or 25 mL of purge-and-trap-grade methanol).
  - VPH and GRO: One 60-mL vial pre-preserved with 25 mL of purge-and-trap-grade methanol **or** One 40-mL VOA vial pre-preserved with 15 mL of purge-and-trap-grade methanol

    and
  - One glass container (or other appropriate container) with no preservative to allow the laboratory to perform the percent solids measurement. NOTE: The laboratory typically requires a minimum of 20 grams to perform this test. Therefore, submitting a sample size less than 4 ounces may be acceptable. This additional container will not be required if the sample is also being submitted for other non-VOC parameters.

- En-Core® samplers, or equivalent, for VOC, VPH and/or GRO analysis:
  - High-level VOC or GRO analysis: one 5-gram En-Core® sampler.
  - Low-level VOC analysis: two 5-gram En-Core® samplers.
  - VPH, GRO or toxicity characteristic leaching procedure (TCLP) VOC analysis: one 25-gram En-Core® sampler.

- Disposable plastic syringes or Terra Core™ samplers.

- Foam VOC vial holders.

- Portable digital scale (accurate to ± 0.01 grams) with calibration weights.

2.0 COLLECTION OF SAMPLES USING EN-CORE® SAMPLERS, OR EQUIVALENT

- The sample will be collected using an En-Core® sampler, or equivalent, as soon as possible after the soil has been exposed to the atmosphere.
- Check that the En-Core® sampler, or equivalent, is full using both of the following procedures:
  a. Be sure that the back o-ring on the plunger can be seen when looking through the viewing hole on the handle. This will mean that the soil has pushed the plunger fully to the back.
  b. The plunger can only be rotated when it is fully pushed to the back of the body. Therefore, it is important to twist the plunger to guarantee that the soil has filled the sampler and the back o-rings have sealed.
- Immediately seal the En-Core® sampler, or equivalent. Be sure to twist the cap as it is pushed on. The cap is properly sealed when the two locking arms are completely and symmetrically over the body ridge.
- The samples must be shipped to a laboratory within 24 hours of sampling to ensure the 48-hour hold time for preservation will be met.
- In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.
- If samples are collected for only VOC and VPH analyses, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

3.0 COLLECTION OF SAMPLES USING FIELD PRESERVATION

- Samples for VOCs will be collected as soon as possible after the soil has been exposed to the atmosphere.
- Samples for VOCs will be collected first (prior to collection of samples for other parameters) using an open-barrel disposable syringe, Terra Core™ sampler, or equivalent. In the case of soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table), an open-barrel disposable syringe may not be practical; a stainless steel spatula or scoop can be used with field preservation techniques.
- Soil samples for VOC analyses should **never** be homogenized.
- Each pre-preserved sample container will be weighed prior to sample collection, and the container/preservative weight will be recorded. This procedure will generally be performed by the laboratory prior to shipping the containers to the field.
- Depending upon project requirements, samples for VOC analysis will be collected as low-level, high-level, or both.

A. Low-level VOCs

1. The syringe will be filled with undisturbed soil of the following volume: 5 grams of soil.

   As an option to the syringes, 5-gram Terra Core™ samplers, or equivalent, can be used. The goal is to have a 1:1 ratio of soil- to- preservative.

2. The soil will be extruded into a pre-preserved VOA vial containing a magnetic stir bar and 5 mL organic-free water. This will be done in replicate.

3. Any sand grains present on the container rim or cap must be removed to ensure an air-tight seal of the vial. The VOA vial will be capped quickly and labeled with the sample ID, date, and time of collection. Labels should not be written on the cap of the vial.

4. Gently swirl sample to break up the soil aggregate, if necessary, until the soil is covered with preservative. It is imperative that the soil sample be completely immersed in the preservative solution.

5. In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.

6. If samples are collected for only VOC analysis, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

B. High-level VOCs, VPH, or GRO

1. High-level VOCs: The syringe will be filled with undisturbed soil of the following volume: 5 or 10 grams of soil for high-level analysis (added to the 5 or 10 ml of methanol, respectively). This may also depend upon the regulatory agency (e.g., New Jersey Department of Environmental Protection requires 8 to 12 grams in 25 mL methanol or 5 grams in 10 mL methanol).

   VPH or GRO: The syringe will be filled with 25 grams of undisturbed soil if 60-ml vials with 25 ml of methanol are used, or 15 grams of undisturbed soil if 40-ml vials with 15 ml of methanol are used. The goal is to have a 1:1 ratio of soil- to- methanol.

   As an option to the syringes, 5-gram Terra Core™ samplers, or equivalent, can be used. Typically, the goal is to have a 1:1 ratio of soil- to- preservative.

2. The sample will be extruded into a VOA vial containing purge-and-trap grade methanol

3. Any sand grains present on the container rim or cap must be removed to ensure an air-tight seal of the vial. The VOA vial will be capped quickly and labeled with the sample ID, date, and time of collection. Labels should not be written on the cap of the vial.

4. Gently swirl sample to break up the soil aggregate, if necessary, until the soil is covered with preservative. It is imperative that the soil sample be completely immersed in the preservative solution.

5. In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.

6. Methanol is considered to be a hazardous material by the US Department of Transportation (DOT) and the International Air Transportation Association (IATA). Shipments containing methanol between the field and the laboratory must conform to the rules established in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179) and the most current edition of the IATA Dangerous Goods Regulations. The volumes of methanol recommended in the VOC method fall under the small quantity exemption of 49 CFR section 173.4. Refer to Attachment B for further details.
7. If samples are collected for only VOC analysis, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

Attachment B:

Shipping Methanol-preserved Samples

Shipping of Hazardous Materials

Methanol is considered a hazardous material by the US Department of Transportation (DOT) and the International Air Transport Association (IATA). Shipments of methanol between the field and the laboratory must conform to the rules established in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179) and the most current edition of the IATA Dangerous Goods Regulations. Consult these documents or your shipping company for complete details.

Small Quantity Exemption

The volumes of methanol recommended in the high-level VOC, VPH and GRO methods fall under the small quantity exemption of 49 CFR section 173.4. To qualify for this exemption, all of the following conditions must be met:

◊ the maximum volume of methanol in each sample container must not exceed 30 mL
◊ the sample container must not be full of methanol
◊ the sample container must be securely packed and cushioned in an upright position and be surrounded by a sorbent material capable of absorbing spills from leaks or breakage of sample containers
◊ the package weight must not exceed 64 pounds
◊ the volume of methanol per shipping container must not exceed 500 mL
◊ the packaging and shipping container must be strong enough to hold up to the intended use
◊ the package must not be opened or altered while in transit
◊ the shipper must mark the shipping container as follows:

"This package conforms to 49 CFR 173.4"

When shipping domestically by Federal Express via ground or air, the following rules apply:

◊ follow the inner packaging requirements of 49 CFR 173.4
◊ no labels, placards, up arrows, or dangerous goods shipping papers are required
◊ if the Federal Express airbill has a shipper's declaration for hazardous goods on it, check the Yes box under *Shipper's Declaration not Required*

When shipping internationally by Federal Express, the following rules apply:

◊ follow the inner packaging requirements of 49 CFR 173.4
◊ use dangerous goods shipping papers
◊ apply orientation arrows on opposite vertical sides on the exterior of the package

Shipping Papers for International Shipments

International shipments must be accompanied by dangerous goods shipping papers that include the following:

Proper Shipping Name:	Methyl Alcohol
Hazardous Class:	Flammable Liquid
Identification Number:	UN1230
Total Quantity:	*(mL methanol/container x the number of containers)*
Emergency Response Info:	Methanol MSDS attached
Emergency Response Phone:	1-800-424-9300

Attachment C:

SOP Fact Sheet

SOIL SAMPLING PROCEDURES

PURPOSE AND OBJECTIVE

Soil sampling is conducted in order to obtain a representative sample for laboratory analysis of constituents of interest at a given site. Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type.

WHAT TO BRING

- Stainless steel mixing bowl and stainless steel spoon or spatula
- Hand auger or post hole auger, if applicable
- Stainless steel trowel and/or shovel
- Tape measure, folding ruler
- Wooden stakes and spray paint, plastic flagging (highly visible), or steel pin flags
- Field book and/or boring log
- Camera
- Maps/site plan
- Survey equipment and/or GPS and/or other means of measuring sample locations
- Indelible marking pens or markers
- Sample coolers, sample containers (including any necessary En-Core® samplers, disposable plastic syringes or Terra Core™ samplers), sample container labels, COCs, and ice
- Bubble wrap and Zip-loc® plastic bags (for ice and COCs)
- Equipment decontamination supplies
- Any required field screening equipment, such as PID

OFFICE

- Prepare/update the HASP; make sure the field team is familiar with the latest version.
- Discuss the objective for the soil sampling program with the Project Manager and/or the field lead. Discuss sample order, collection method, designation, analytical parameters, turn-around times, laboratory, etc.
  - Are the soil cuttings to be containerized in drums or returned to borehole?
  - Volume of soil required for each sample?
  - QA/QC sample collection?
  - Field decontamination required?
- Verify whether police traffic control will be required for work completed on or near public roadways.
- Confirm that all necessary equipment is available in-house or has been ordered. Rental equipment is typically delivered the day before fieldwork is scheduled. Prior to departure, test equipment and make sure it is in proper working order.
- Verify that a utility survey/mark-out has been performed to ensure that sample locations are clear of overhead and buried utilities. Obtain a copy of the markout ticket or confirmation number. Additionally, a private geophysical sub-surface survey may be necessary.
- Review sample bottle order for accuracy and completeness.
- Make sure soil boring locations (or specific sampling areas) are clearly identified on figure and that soil boring and sample designations are understood.

ON-SITE

- Verify that underground utilities have been marked out and that the markouts are clear. Stay at least two feet away from any marked utility. Identify if any overhead obstructions or limited access areas exist near proposed borings and contact the Project Manager if any proposed locations need to be moved. Sketch/photograph markout locations.
- Review the HASP with all field personnel, conduct Health & Safety tailgate meeting.
- Make sure appropriate PPE is worn by all personnel and work area is safe (i.e., utilize traffic cones; minimize interference with on-site activities and pedestrian traffic, etc.)
- Calibrate equipment (if applicable) and record all rental equipment serial numbers in the field book.

GENERAL SOIL SAMPLING PROCEDURES

- Refer to other TRC SOPs for the proper procedures for classifying soil samples and for screening of samples for VOCs.
- Perform any required field screening in situ or immediately upon retrieval of the soil sample from the subsurface.

SOIL SAMPLING PROCEDURES

- Samples for VOC, VPH or GRO analysis are then collected as soon as possible after the soil has been exposed to the atmosphere and prior to sample collection for other analyses.
  - **These samples are NOT homogenized.**
  - These samples are generally collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. Refer to the site-specific work plan or governing regulatory authority for preservation requirements for VOC, VPH or GRO analysis and Attachment A of RMD 003.
- After collecting the sample for VOC analysis, the sample portion for the remaining analysis should be well homogenized, in situ (if possible, such as with surface soil sampling), or in a decontaminated stainless steel bowl or disposable new aluminum pie pan to ensure that the sample is as representative as possible of the sample media.
- Stones, gravel, vegetation or debris (such as concrete, asphalt, ash or slag) should be removed from the soil sample as much as practical prior to placement in sample containers, unless these matrices are part of the overall characterization program.
- Transfer to sample containers using clean new or decontaminated spoons/scoops.
- Filling of the sample bottles should be completed immediately after sample collection to minimize losses due to volatilization and biodegradation. Soil classification can be completed following sample collection.
- Place the sample into an appropriate, labeled container(s) by using the alternate shoveling method and secure the cap(s) tightly. The alternate shoveling method involves placing a spoonful of soil in each container in sequence and repeating until the containers are full or the sample volume has been exhausted. Threads on the container and lid should be cleaned to ensure a tight seal when closed.
- Make sure ALL sample containers are clearly labeled with the site name, sample date, sample collection time and sample designation including depth in indelible ink. Samples should be entered on the COC as they are collected. Make sure to clearly identify requested sample analyses on the COC.
- Labeled samples should be immediately put into a cooler with ice; sample coolers should always be kept within eyesight or stored within the cab of the vehicle or other secured place such as a locked office.
- Be aware of sample holding times, and arrange for samples to be in the laboratory's possession accordingly.
- Restore the sampling location to grade in accordance with applicable state regulations and/or the site-specific work plan. Options include backfilling the sample location with the remaining removed soil, bentonite pellets or, cement/bentonite grout depending on site conditions and patching the surface to match the surrounding area (e.g., topsoil with grass seed, asphalt or concrete patch), as necessary.
- Record locations of soil borings/samples in the field book by sketching a map and/or providing a description of the location. When measuring locations of soil borings/samples, always use fixed landmarks such as buildings, fences, curbs, etc.
- Decontaminate sampling equipment in accordance with TRC's SOP on equipment decontamination.
- Ensure any IDW is appropriately managed. If IDW cannot be returned to the site, consider material containment, such as a composite drum, proper labeling, on-site storage by the client, testing for disposal approval of the materials, and ultimately the pickup and disposal of the materials by appropriately licensed vendors.

SURFACE SOIL SAMPLING PROCEDURES

The depth of surface soil samples are typically collected from 0-6 in. or 0-12 in. and will be determined on a site-specific basis and may be influenced by site-specific conditions. The following procedure should be used for surface soil sampling:

- If a thick, matted root zone, leaf layer, gravel, surface debris, concrete, etc. is present at or near the surface, it should be carefully removed using clean decontaminated tools before the soil sample is collected. The presence and thickness of any such material should be recorded in the field book for each location. The depth measurement for the soil sample begins at the top of the soil horizon, immediately following any such removed materials.
- A decontaminated stainless steel spoon, scoop or trowel is typically used for surface soil sampling depths from 0 to 12 inches bgs. A hand auger or shovel may also be used to dig down to the desired depth and then after careful removal of the dug soils from the hole, a decontaminated stainless steel spoon, scoop or trowel is used to collect the soil sample from the bottom of the hole for laboratory chemical analysis.
- Continue by following the General Soil Sampling Procedures.

HAND AUGER SAMPLING PROCEDURES

Hand augers may be used to advance boreholes and collect soil samples in shallow subsurface intervals. Often, 4-inch diameter stainless steel auger buckets with cutting heads are used. The auger is advanced by simultaneously pushing and turning using an attached T-handle with extensions (if needed). Auger holes are advanced one bucket at a time until the appropriate sample depth is achieved. The following procedure should be used for hand auger sampling:

- Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the borehole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding rod extensions. It also facilitates refilling the borehole and avoids possible contamination of the surrounding area.

SOIL SAMPLING PROCEDURES

- When the sample depth is reached, remove the bucket used to advance the borehole and attach a decontaminated or clean bucket. Place the clean auger bucket in the borehole, advance the clean auger bucket to fill it with the soil sample and then carefully remove the clean auger bucket.
- If VOC analysis is to be performed, collect a sample directly at the bottom of the boring, if within reach, and not from the auger bucket. If not within reach, collect the sample directly from the auger bucket or from minimally disturbed material immediately after the auger bucket is emptied.
- Continue by following the General Soil Sampling Procedures.

DIRECT PUSH/SPLIT SPOON/SONIC DRILLING SAMPLING PROCEDURES

For some soil investigations, soil logs provide justification for sample locations and intervals so be descriptive and precise.

- The driller will advance the soil sampler (macrocore, split spoon, sonic casing, etc.) which will then be given to the sampler - confirm with driller which end is top and which end is bottom. Record the time of core collection in the field book (military time). Begin the soil record by indicating the soil boring location, followed by the depth interval in feet bgs [e.g., B-1/0-4].
- Record the blow count per six inch interval when collecting split-spoon samplers with hollow stem auger rig. The drillers will keep the count and repeat them to you. If refusal is encountered, the count is recorded in the book as "# of hammer blows / depth in inches the spoon is driven" (e.g., 50/3 – means 50 blows of the hammer advanced the spoon 3 inches).
- Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs or gravel sub-base should be excluded from depth measurement (however, the presence and thickness of these items should be noted in the field book).
- Measure the length of recovered soil in inches and record in the field book.
- Continue by following the General Soil Sampling Procedures. If a specific depth interval is targeted for sampling, be sure to account for percent recovery when selecting the sample interval.

SHELBY TUBE SAMPLING PROCEDURES

A typical Shelby tube is 30 inches in length, has a 3.0-inch OD (2.875-inch inside diameter) and may be constructed of steel, stainless steel, galvanized steel, or brass, depending on the specific application. They are typically attached to push heads constructed with a ball check to aid in holding the sample in the tube during retrieval. To collect a sample, the tube is attached to a string of drill rod and is lowered into the borehole, where the sampler is then pressed into the undisturbed material by hydraulic force from the drill rig. After retrieval to the surface, the tube containing the sample is then removed from the sampler head.

- If samples for chemical analyses are needed, the soil contained inside the tube is then removed for sample acquisition by following the direct-push sampling procedures.
- If the sample is collected for geotechnical parameters, the tube is typically sealed, to maintain the sample in its relatively undisturbed state, capped, labeled appropriately (including sample ID, top end of sample, inches of recovery, etc.), and shipped to the appropriate geotechnical laboratory. The tube is typically stored in an upright position to maintain the integrity of the undisturbed sample.
- For geotechnical use, check with the laboratory prior to sampling to understand sample volume recoveries needed to perform the actual tests.

EXCAVATOR SAMPLING PROCEDURES

A backhoe or excavator can be used to assist with soil sampling such as during remedial excavation activities (to collect floor and sidewall samples within the excavation), test pit installation, or trenching operations. Test pit excavations are commonly completed to allow for greater observation of physical soil characteristics (e.g., stockpiles) and/or to further investigate buried suspect areas of concern (e.g., petroleum tanks, drums, waste, fill). The following procedures are used for collecting soil samples excavated with a backhoe or excavator:

- For test pits or trench excavation, excavate in accordance with the site-specific work plan. Typically, this will be approximately 3 feet wide and approximately 1 foot deep below the cleared sampling location with the backhoe. Remedial excavations may be much wider and deeper. The work plan may also require that excavated soils be placed on plastic sheets or another impervious surface and protected from rain.
- Refer to the site-specific work plan for the number of floor and/or sidewall samples, which is typically driven by the surface area and can vary depending on the governing regulatory agency.
- Samples can be collected using a trowel, spoon, or coring device at the desired intervals. A clean shovel may be used to remove a 1 to 2- inch layer of soil from the vertical face of the pit that contacted the backhoe bucket and where soil sampling is planned. Scrape the vertical face at the point of sampling to remove any soil that may have fallen from above and to expose fresh soil for sampling. In many instances, soil sample locations within the excavation area are inaccessible (do not physically enter backhoe excavations to collect a sample). In these cases, soil samples can be collected directly from the backhoe bucket – use caution not to collect a soil sample from edges that may have come into contact with the backhoe bucket.
- Continue by following the General Soil Sampling Procedures.
- Abandon the pit or excavation according to applicable state regulations and the site-specific work plan. Generally, shallow excavations can simply be backfilled with the removed soil material.

SOIL SAMPLING PROCEDURES

STOCKPILE SOIL SAMPLING PROCEDURES

Stockpiled soils are typically sampled to characterize the soils for reuse or disposal. The stockpile sampling strategy used must consider the source of the soil and all available data, field observations, shape/dimensions and volume of the pile, and sampling frequency requirements established by oversight regulatory agencies or potential soil disposal facilities.

If the stockpile is known to be a representative mixture of soil with no known or suspected significant variability of contamination with depth in the pile, the stockpile sampling may be conducted according to the surface soil sampling method described above. However, if the soil characteristics are not known or are known or suspected to vary with depth in the pile, both surface soil and deeper subsurface soil samples will be required to properly characterize the soil pile. Based on the minimum required number of samples for the estimated stockpile volume, the stockpile is divided into the appropriate number of estimated volumes equal to that sample number.

POST SAMPLING ACTIVITIES

- After the samples have been collected, the sampling location may be marked with wooden stakes colored with highly visible spray paint and/or flagging with the sample location identification written on the stake in indelible ink. The sample location should be surveyed in the field with a GPS unit if not surveyed later by some other means. A sketch of the sampling locations should also be included in the field book.
- Package the samples with bubble wrap as necessary.
- Place the samples into a shipping container and cool to 4°C. If wet ice is used to cool the samples, place the ice in double-bags to prevent water from the melting ice from damaging the samples during shipment.
- Complete and cross check the COC form.
- Decontaminate non-disposable sampling equipment.

DOs AND DO NOTs OF SOIL SAMPLING

DOs:

- No matter the work plan or the site, DO have the following items when going into the field:
  - Site-Specific HASP
  - Steel-toed boots
  - Field book and a pen with indelible ink.
  - Nitrile gloves
  - Business cards
- DO review soil boring logs or cross sections from previous sampling events, if available.
- DO call the Project Manager or field team leader if unexpected conditions are encountered or at least twice during the work day to update them. Even if everything is fine and there are no questions, call with an update. It is also recommended to call when sampling is winding down for the day to make sure that the work plan has been fully implemented and there are no additional tasks to complete.
- DO have the numbers for laboratory, vehicle rental and equipment rental providers readily available while in the field.
- DO decontaminate any heavy equipment used for the advancement of sampling devices by steam cleaning or high pressure/hot water wash prior to and between sample locations. This would include, but is not limited to auger flights, drill rods, backhoe buckets and other respective accessories.
- DO review and count the sample bottles and compare to the COC prior to leaving the site.
- DO record sampler type (e.g., macrocore, split spoon, etc.) and boring method (e.g., direct push, hammer, etc.) in the field book.
- DO record the hammer weight, the distance of the hammer drop and the method for hammer lift (i.e., cathead and rope, hydraulic, etc.) in the field book at least once per day when collecting split-spoon samples with a drill rig.

DO NOTs:

- DO NOT sign anything in the field. This includes disposal documentation, statements, etc; call the Project Manager if there is an issue.
- DO NOT use non-indelible ink to label samples or record field notes – if the field book gets wet, notes become illegible.
- DO NOT include any upper soils which may "fall" as a result of the open borehole caving in (slough) when recording recovery.
- DO NOT use general terms such as "Fill" or "Till" as a sole description for layers – always give detailed description of soil components.

APPENDIX C

CEQA Documentation

CALIFORNIA ENVIRONMENTAL QUALITY ACT
INITIAL STUDY

The Department of Toxic Substances Control (DTSC) has completed the following document for this project in accordance with the California Environmental Quality Act (CEQA) [Pub. Resources Code, div. 13, § 21000 et seq] and accompanying Guidelines [Cal. Code Regs., tit. 14, § 15000 et seq].

PROJECT TITLE: The Landing – Mt. Shasta Commerce Park		CALSTARS CODING: --
PROJECT ADDRESS: Property located west of intersection of South Mt. Shasta Boulevard and Church Street	CITY: Mt. Shasta	COUNTY: Siskiyou
PROJECT SPONSOR: --	CONTACT: --	PHONE: --

APPROVAL ACTION UNDER CONSIDERATION BY DTSC:

☐ Initial Permit Issuance ☐ Permit Renewal ☐ Permit Modification ☐ Closure Plan
☒ Removal Action Workplan ☐ Remedial Action Plan ☐ Interim Removal ☐ Regulations
☐ Other (specify):

STATUTORY AUTHORITY:

☐ California H&SC, Chap. 6.5 ☐ California H&SC, Chap. 6.8 ☐ Other (specify):

DTSC PROGRAM/ ADDRESS: Brownfields and Environmental Restoration Program 8800 Cal Center Drive Sacramento, CA 95826-3200	CONTACT: Duane White, P.E.	PHONE: (916) 255-3585

PROJECT DESCRIPTION: The proposed scope of work for remedial activities at the project site include the following:

- California Environmental Quality Act documentation and review of the project site, including biological resources and natural resources permitting and reporting;
- Excavation and removal of impacted soil in the New Mill (excluding the former diesel fuel aboveground storage tank and gasoline underground storage tank study areas) and Box Factory study areas that exceeds environmental cleanup concentrations for Contaminants of Concern;
- Confirmation soil sampling in areas where soil excavation was conducted to confirm all impacted soil exceeding cleanup levels has been removed;
- Completion and Submittal of the Remedial Action Summary Report.

ENVIRONMENTAL IMPACT ANALYSIS:

1. Aesthetics

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions. Machinery for these purposes would be present for the duration of the project.

Description of Baseline Environmental Conditions: The area around Mt. Shasta is considered to be a scenic area. The City of Mt. Shasta is located to the southwest of Mt. Shasta, a dormant volcano at 14,179 feet in height. Mt. Shasta is visible from the City of Mt. Shasta. The portions of Interstate 5 and State Highway 89 that run near the project area are part of the Volcanic Legacy Scenic Byway. According to Caltrans, Interstate 5 and State Highway 89 are eligible for scenic highway status, but they have not been officially designated. The project area is situated on an old mill site that ceased active operations in 1989. Several concrete slab structures, log decks, concrete paved surfaces, and barren disturbed land are found throughout the study area. Sapling to pole-sized trees have established throughout the mill site.

Analysis as to whether or not project activities would:

a. Have a substantial adverse effect on a scenic vista.

Impact Analysis: The proposed project would involve the excavation and backfilling of soil. Project activities would be temporary, lasting only approximately 15 days. Upon completion of the project, the project area would be returned to pre-project conditions, with the exception of a few tree removals. Therefore, the project would have no substantial adverse effect on a scenic vista.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings and historic buildings within a state scenic highway.

Impact Analysis: The proposed project would conduct activities on land that has been previously disturbed. Some sporadic trees and other vegetation may need to be removed during project activities. However, the relatively small number of potentially affected trees and other vegetation would not be significant given the disturbed nature of the site and small project footprint. Therefore, impacts to scenic resources would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Substantially degrade the existing visual character or quality of the site and its surroundings.

Impact Analysis: During the course of the project, machinery would be used to excavate soil within previously disturbed areas. This would result in various holes throughout the project site. The excavations would be backfilled and the site's topography would be returned to pre-project conditions at the conclusion of the project. Consequently, the project would have no impact on the visual character of the site or surrounding areas.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Impact Analysis: The proposed project is a soil remediation project that would excavate contaminated soil and backfill with clean fill. No structures or other sources of potential light or glare would be constructed as part of this project. Therefore, no day or nighttime views in the project area would be impacted.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

Caltrans California Scenic Highway Mapping System, Volcanic Legacy Scenic Byway

2. Agricultural Resources

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions. The project site occurs on previously disturbed land with no agricultural resources present; therefore, the project will have no impact on these resources.

Description of Baseline Environmental Conditions: The project is located within the City of Mt. Shasta. No significant agriculture exists within or immediately surrounding the City. Review of the Farmland Mapping and Monitoring Program (FMMP) reveals the project area is split between Urban and Built-Up Land, and Other Land. Other Land is defined as low density rural development, heavily forested land, mined land, or government land with restrictions on use.

Analysis as to whether or not project activities would:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

   Impact Analysis: The Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) shows no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance on the project site or in the vicinity. The project is located within the city limits of Mt. Shasta and will have no impact on these agricultural resources.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

b. Conflict with existing zoning or agriculture use, or Williamson Act contract.

   Impact Analysis: The project is not located within any agriculture-related zone, and is not located within any Williamson Act contract.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.

   Impact Analysis: There are no agricultural uses within the project area, and the project would result in no conversion of farmland.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

References:

FMMP, California Department of Conservation

3. Air Quality

The excavation activities related emissions were quantified using the California Emissions Estimator Model (CalEEMod) Version 2013.2.2 (ENVIRON & Cal Air, 2013 and CAPCOA, 2015). CalEEMod is an accurate and comprehensive land use emissions computer model designed to quantify potential criteria pollutant emissions associated with construction and operation of land use projects in California. The model applies default values for various land uses, including trip generation rates for weekend trips, average speed, vehicle mix, and trip length. The model also allows for project-specific data to be entered where available.

The project is located in Siskiyou County Air Pollution Control District (SCAPCD) which has approved Thresholds of Significance to be used in evaluating air quality related project impacts (SCAPCD, 2015). The thresholds are used to determine the level of significance for air quality impacts from land use projects. The thresholds are developed with consideration of the National Ambient Air Quality Standards (NAAQS) attainment strategies developed by SCAPCD in conjunction with the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA). Additional discussion of the Proposed Project impact and how it relates to the significance thresholds is contained in the CEQA checklist responses.

Various types of both gasoline- and diesel-powered heavy machinery and equipment will be employed at the project site during excavation activities. Combustion-related criteria pollutant emissions will result from equipment exhaust. Fugitive dust particulate emissions will result from excavating, off-haul of impacted materials, import of clean fill, and general equipment movement. Table 1 presents the anticipated short-term construction-related emissions impacts associated with excavation activities compared to the corresponding SCAPCD significance threshold. Attachment A presents the CalEEMod outputs.

The following assumptions were incorporated in the model:

- Land use was identified as a city park. A city park was determined to be the most appropriate land use designation for the property, since it is a vacant lot. The city park land use designation assumes no structures will be constructed as part of the construction activities and the population will equal zero after activities. The area for the land use is 95 acres, but it assumed that excavation activities will be associated with a total of 3 acres. The 3 acres includes the areas of excavation and areas where the dump trucks will be driving.

- The construction phase of the model will last for 15 days. To account for winter and summer emissions, the model was run assuming excavation will take place in October 2015 or June 2016.

- Project related equipment would be limited to three 20-yard dump trucks, one backhoe, and two personnel trucks.

- Trips related to the removal of impacted materials assumes one trip per day for each of the three dump trucks for 15 days for a total of 45 trips hauling material.

- The amount of materials exported associated with the excavation is 895 cubic yards. It is assumed that the same volume of clean materials will be imported to the property to fill the excavation pits.

As indicated in Table 1, the project's short-term construction-related criteria pollutant emissions impacts are below the respective thresholds of significance. The construction emissions from the Proposed Project would therefore result in a **less-than-significant impact**. Refer to Appendix A for the CalEEMod output files for summer and winter.

Additional analysis as to whether or not project activities would:

a. Conflict with or obstruct implementation of the applicable air quality plan.

Impact Analysis: The proposed project area is located within the Northeast Plateau Air Basin. There are no applicable air quality plans that must be adhered to. Therefore, the project will not be in conflict with an applicable air quality plan.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Impact Analysis: Project activities would be temporary, lasting only approximately 15 days. After project activities have concluded, no machinery would remain on the project. Localized degradation of air quality may occur due to operating equipment. The diesel and gasoline engines associated with these vehicles have the potential to negatively affect the surrounding air quality. However, the number of dump truck trips is expected to be limited to one round-trip each per day; therefore, the proposed project's impact on air quality is expected to be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Impact Analysis: Siskiyou County is currently in attainment for all federal and state air quality standards. Therefore, there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Expose sensitive receptors to substantial pollutant concentrations.

Impact Analysis: The nearest sensitive receptors are located in a residential area more than 700 feet to the southwest of the proposed project area across Interstate 5. Given the temporary nature of the project and small amount of equipment that will be used, it would be highly unlikely that any pollutants would have an impact on residents over 700 feet away and on the other side of a major transportation corridor. Therefore, the proposed project would have no impact as it relates to exposing sensitive receptors to substantial pollutant concentrations.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Create objectionable odors affecting a substantial number of people.

Impact Analysis: The proposed project would involve the operation of heavy machinery and their diesel and gasoline engines. The fumes from these engines could be considered to be objectionable by some people. However, the fumes from these engines would be localized to the project site. It is highly unlikely that these odors would migrate to an area of any substantial population (more than 700 feet away and on the other side of Interstate 5). Therefore, any objectionable odors would be limited to the project area and have no impact on a substantial number of people.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Result in human exposure to Naturally Occurring Asbestos.

Impact Analysis: According to the California Geological Survey, the proposed project area and the City of Mt. Shasta is not located in an area that is likely to contain naturally occurring asbestos. It is reasonable to assume that there is none present on the project site. No humans would be exposed to naturally occurring asbestos, and therefore there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

CAPCOA, 2015. California Emission Estimator Model (CalEEMod)® Version 2013.2.2 Available at www.caleemod.com. Accessed August.

ENVIRON International Corporation and the California Air Districts (ENVIRON & Cal Air), 2013. California Emissions Estimator Model User's Guide Version 2013.2. July 2013.

Siskiyou County Air Pollution Control District (SCAPCD), 2015. Personal communications between Eric Olson, Air Pollution Specialist with SCAPCD, and Nyree Melancon with TRC. August 12.

4. Biological Resources

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions. The project area is situated on an old mill site that ceased active operations in 1989. Several concrete slab structures, log decks, concrete paved surfaces, and barren disturbed land are found throughout the study area. Sapling to pole-sized trees have established throughout the mill site.

Description of Baseline Environmental Conditions: A biological reconnaissance was performed and a report prepared for this document by North State Resources. This report, entitled "The Landing Mt. Shasta Commerce Park Biological Resources Characterization", contains an assessment based on consulted sources as well as a reconnaissance-level site visit performed on April 25, 2015. This site visit consisted of walking meandering transects to view all areas in the study area. The following resources were consulted in conjunction with this site visit:

- The *City of Mt. Shasta, California* USGS 7.5-minute topographic quadrangle;
- Color aerial photographs of the study area and vicinity;
- The U.S. Fish and Wildlife Service (USFWS) official list of endangered and threatened species that may occur, or be affected by projects, as provided by the Yreka Fish and Wildlife Office (Consultation Code 08EYRE00-2015-SLI-0018)
- The California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2015a) records for the *City of Mt. Shasta, California* 7.5-minute quadrangle and the eight adjacent quadrangles;
- The California Native Plant Society (CNPS) online Inventory of Rare and Endangered Plants (California Native Plant Society 2015) records for the *City of Mt. Shasta, California* 7.5-minute quadrangle and the eight adjacent quadrangles;
- GIS shapefiles of designated critical habitat from the USFWS Critical Habitat Portal website;
- U.S. Department of Agriculture Web Soil Survey;
- CDFW publications including State and Federally Listed Endangered, Threatened and Rare Plants of California (California Department of Fish and Wildlife 2015b); Special Vascular Plants, Bryophytes, and Lichens, (California Department of Fish and Wildlife 2015c); State and Federally Listed and Threatened Animals of California (California Department of Fish and Wildlife 2015d); and Special Animals List (California Department of Fish and Wildlife 2015e);
- Pertinent biological literature including the following: *The Jepson Manual: Vascular Plants of California (*Baldwin et al. 2012) and *Bird Species of Special Concern in California (*Shuford and Gardli 2008); and
- The wetland delineation and biological characterization completed for the site by NSR (North State Resources) in 2005

Potential habitat for one special-status plant species, northern clarkia (*Clarkia borealis* ssp. *Borealis*), was observed on the site. No listed animal species were found. However, migratory bird species were observed in the vicinity around the project area. The biological report prepared for the project provided recommended mitigation measures to help prevent project-related impacts to these biological resources. These recommendations are discussed further in the impact analyses below.

Analysis as to whether or not project activities would:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

   Impact Analysis: According to the biological resources survey conducted for the proposed project, suitable habitat for northern clarkia (*Clarkia borealis* ssp. *Borealis*), a special-status plant species, occurs on the project site. The site also provides suitable nesting habitat for migratory birds and raptors. Implementation of **Mitigation Measures 4.1 and 4.2** would reduce the impacts to special-status plants or wildlife species to less than significant levels.

   MM 4.1 – Conduct botanical surveys. Impacts on northern clarkia could occur if work occurs in populations that could be found in the study area. The following measures may be implemented to avoid impacts on northern clarkia.

   - If vegetation removal is required in the treed areas in the study area, a survey for northern clarkia should be conducted during its blooming period from June to September. If no special-status species are observed, then no further measures are necessary. If any of the species are observed in the area of proposed disturbance, the following measures may be implemented to reduce impacts.

- Prior to the start of construction activities in the project area, exclusionary fencing shall be erected around any known populations of northern clarkia. If necessary, a qualified botanist shall be present to assist with locating populations. The exclusionary fencing shall be periodically inspected throughout each period of construction and be repaired if necessary.
- If special-status plants cannot be fully avoided, CDFW shall be contacted to determine the appropriate salvage and relocation measures. Appropriate measures may include transplanting the individual special-status plants, collecting seeds, propagating the plants and then replanting the seedlings to a suitable location.

MM 4.2 – Protect nesting migratory birds and raptors. Vegetation removal and construction activities could affect nesting migratory birds and raptors. The following measures should be considered to avoid impacts on nesting birds:

- If vegetation removal or construction occurs outside of the breeding season (September 1 – February 14), no further measures are necessary.
- If vegetation removal and construction activities occur within 250 feet of habitat for migratory birds and 500 feet of raptors between February 15 and August 31, a qualified biologist should conduct a preconstruction survey no more than two weeks before construction activities begin.
- If an active nest is found, a qualified biologist, in consultation with CDFW, should establish a construction-free buffer zone around a nest until the young have fledged. A plan should be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Impact Analysis: There are no riparian habitats or other sensitive natural communities on the project site; therefore, the proposed project will have no impact on these resources.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Impact Analysis: According to the biological survey performed for the proposed project, there are no federally protected wetlands or other aquatic features; therefore, the project will have no impact on these resources.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Impact Analysis: The project site occurs on previously disturbed land with several concrete slab structures, log decks, concrete paved surfaces, and barren disturbed land found throughout the site. The site provides no migratory wildlife corridor and will have no impact on the movement of any wildlife species.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Impact Analysis: The Mt. Shasta City tree ordinance (Chapter 12.10.150 of the Mt. Shasta City Municipal Code) applies only to street trees, and would not apply to trees that may be removed during the course of the proposed project. Therefore, the project would not be in conflict with any local biological policies or ordinances.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Impact Analysis: No Habitat Conservation Plans or Natural Community Conservation Plans were identified in the biological survey. Therefore, the project would not be in conflict with such plans.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

North State Resources – The Landing Mt. Shasta Commerce Park Biological Resources Characterization, 2015

5. Cultural Resources

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: An Archeological Inventory Survey was prepared for the proposed project by Sean Michael Jensen, M.A., of the Genesis Society. The survey is entitled “Roseburg Lumber Mill Cleanup Project, Archeological Inventory Survey”. This survey indicated that no historic or prehistory resources are present on the proposed project area.

Analysis as to whether or not project activities would:

a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5.

Impact Analysis: The proposed project area does not contain any resource of historic or prehistoric value. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Cause a substantial adverse change in the significance of an archeological resource pursuant to 15064.5.

Impact Analysis: There is no resource of archeological value present at the proposed project area. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Impact Analysis: According to a site visit performed in preparation for the archaeological inventory survey, there is no evidence to suggest the presence of any unique paleontological resources or unique geologic features. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Disturb any human remains, including those interred outside of formal cemeteries.

Impact Analysis: Although the Archeological Inventory Survey prepared for the project did not discover any human remains, the inadvertent discovery of human remains could occur during project implementation. Mitigation Measure 5.1 provides guidance to follow in the event such discoveries are made. Implementation of this mitigation meaure would reduce the impact to less than significant.

MM 5.1 – Inadvertent discovery of human remains. Evidence of human burial or scattered human remains related to prehistoric occupation of the area could be inadvertently encountered anywhere within the project area during future construction activity or other actions involving disturbance to the ground surface and subsurface components. In the event of such an inadvertent discovery, the County Coroner would have to be informed and consulted, per State law. Ultimately, the goal of consultation is to establish an agreement between the most likely lineal descendant designated by the Native American Heritage Commission and the project proponent(s) with regard to a plan for treatment and disposition of any human remains and artifacts, which might be found in association. Such treatment and disposition may require reburial of any identified human remains/burials within a “preserve” or other designated portion of the development property not subject to ground disturbing impacts.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References:

Roseburg Lumber Mill Cleanup Project, Archeological Inventory Survey, Genesis Society, April 2015

6. Geology and Soils

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: According to the Web Soil Survey of the Natural Resources Conservation Service (NRCS), the only soil type present at the project area is Ponto-Neer Complex, 2 to 15 percent slope. This soil is well drained and highly permeable. The project site is located in an area considered to be a moderate seismic hazard zone. The 2010 California Geological Survey *Fault Activity Map of California* shows no active or potentially active fault at the project area.

Analysis as to whether or not project activities would:

a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

❖ Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42). According to the 2010 California Geological Survey *Fault Activity Map of California*, there are two Quaternary-age faults approximately 6-8 miles to the northeast of the City of Mt. Shasta. These faults are concealed faults that run through Mt. Shasta. The age of these faults is listed as undifferentiated, indicating there is no reasonable expectation of seismic activity occurring there. There are also no designated Alquist-Priolo fault zones in the vicinity of the proposed project.

❖ Strong seismic ground shaking. The project area is categorized as a moderate seismic hazard zone. Seismic shaking in this area may be felt as a result of seismic activity in faults in eastern Siskiyou County, or of volcanic eruption of Mt. Shasta itself. However, the proposed project would not result in any newly constructed structures of any kind. The project would simply involve temporary excavation and filling of soil, and would not introduce risk of property damage or injury/death due to structural collapse in seismic events. Therefore, there would be no impact.

❖ Seismic-related ground failure, including liquefaction. Liquefaction is expected to occur relative to seismic ground shaking. However, the risk to life and property would be low, since the proposed project would not result in construction of permanent structures. See seismic ground shaking discussion above for more information.

❖ Landslides. The proposed project area is located in an area defined as low landslide susceptibility by USGS. The terrain at the project site is relatively flat, and landslides are not expected to occur. Furthermore, the project would not result in structures that could be damaged or destroyed by landslide. Therefore, there would be no impact.

Impact Analysis: The proposed project is not in an area particularly prone to seismic activity, and no structures would result from the project that could pose risk of property damage or loss of life. Therefore, there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Result in substantial soil erosion or the loss of topsoil.

Impact Analysis: Though no construction activity would occur that would erect new structures, the proposed project would, by necessity, remove topsoil in the excavation and backfilling process. However, the contaminated soil removed by the project would be replaced with clean fill. The compaction and stabilization of the fill would help prevent erosion potential. Upon project completion, erosion Best Management Practices (BMP) would be employed to address any erosion concerns. Since this project would not result in any new construction, any erosion that does occur would not pose any threat to foundations of any structures. Therefore, the impact to soil erosion would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

Impact Analysis: The only soil type present at the project area is Ponto-Neer Complex, 2 to 15 percent slope. This soil is well drained and highly permeable. There is little to suggest that this soil would be unstable in a seismic event. Since no structures would be constructed on the project area in the course of proposed project, there would be no impact due to unstable soils.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Impact Analysis: The Ponto-Neer Complex has low expansive potential. As such, it is unlikely that risk due to expansive soil at the project area would be significant. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Impact Analysis: The proposed project would not introduce any need for septic tanks or wastewater disposal systems, as no development would occur. Such systems would be unnecessary, and so no impact would occur.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

2010 CGS Fault Activity Map of California

2014 USGS Landslide Incidence and Susceptibility in the Conterminous United States

NRCS Web Soil Survey

7. Greenhouse Gas Emissions

The excavation activities related emissions were quantified using the California Emissions Estimator Model (CalEEMod) Version 2013.2.2 (ENVIRON & Cal Air, 2013 and CAPCOA, 2015). CalEEMod is an accurate and comprehensive land use emissions computer model designed to quantify potential criteria pollutant and greenhouse gas emissions associated with construction and operation of land use projects in California. The model applies default values for various land uses, including trip generation rates for weekend trips, average speed, vehicle mix, and trip length. The model also allows for project-specific data to be entered where available.

The project is located in Siskiyou County Air Pollution Control District (SCAPCD) which has approved Thresholds of Significance to be used in evaluating air quality related project impacts and greenhouse gas emissions (SCAPCD, 2015a and 2015b). The thresholds are used to determine the level of significance for greenhouse gas emissions from land use projects. The thresholds are developed with consideration of the National Ambient Air Quality Standards (NAAQS) attainment strategies developed by SCAPCD in conjunction with the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA). Additional discussion of the Proposed Project impact and how it relates to the significance thresholds is contained in the CEQA checklist responses.

Various types of both gasoline- and diesel-powered heavy machinery and equipment will be employed at the project site during excavation activities. Combustion-related criteria pollutant emissions will result from equipment exhaust. Fugitive dust particulate emissions will result from excavating, off-haul of impacted materials, import of clean fill, and general equipment movement. Table 1 presents the anticipated short-term construction-related emissions impacts associated with excavation activities compared to the corresponding SCAPCD significance threshold. Attachment A presents the CalEEMod outputs.

The following assumptions were incorporated in the model:

- Land use was identified as a city park. A city park was determined to be the most appropriate land use designation for the property, since it is a vacant lot. The city park land use designation assumes no structures will be constructed as part of the construction activities and the population will equal zero after activities. The area for the land use is 95 acres, but it assumed that excavation activities will be associated with a total of 3 acres. The 3 acres includes the areas of excavation and areas where the dump trucks will be driving.

- The construction phase of the model will last for 15 days. To account for winter and summer emissions, the model was run assuming excavation will take place in October 2015 or June 2016.

- Project related equipment would be limited to three 20-yard dump trucks, one backhoe, and two personnel trucks.

- Trips related to the removal of impacted materials assumes one trip per day for each of the three dump trucks for 15 days for a total of 45 trips hauling material.

- The amount of materials exported associated with the excavation is 895 cubic yards. It is assumed that the same volume of clean materials will be imported to the property to fill the excavation pits.

As indicated in Table 1, the project's short-term construction-related criteria pollutant emissions impacts and greenhouse gas emissions are below the respective thresholds of significance. The construction emissions from the Proposed Project would therefore result in a **<u>less-than-significant impact</u>**. Refer to Appendix A for the CalEEMod output files for summer and winter.

Additional analysis as to whether or not project activities would:

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Impact Analysis: Considering the very small amount of machinery proposed for use on the project, with only three total round-trip truck trips per day, the amount of greenhouse gas emissions generated by the project would be negligible. Furthermore, the proposed project would be temporary in nature, lasting only approximately 15 days. Upon project completion, no greenhouse gas emission will be produced by the site as it relates to this project. Therefore, the impact of greenhouse gas emissions would be considered to be less than significant.

Conclusion:

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Impact Analysis: The proposed project activities do not conflict with any greenhouse gas plan, policy or regulation. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

CAPCOA, 2015. California Emission Estimator Model (CalEEMod) ® Version 2013.2.2 Available at www.caleemod.com. Accessed August.

ENVIRON International Corporation and the California Air Districts (ENVIRON & Cal Air), 2013. California Emissions Estimator Model User's Guide Version 2013.2. July 2013.

Siskiyou County Air Pollution Control District (SCAPCD), 2015a. Personal communications between Eric Olson, Air Pollution Specialist with SCAPCD, and Nyree Melancon with TRC. August 12.

Siskiyou County Air Pollution Control District (SCAPCD), 2015b. Personal communications between Eric Olson, Air Pollution Specialist with SCAPCD, and Nyree Melancon with TRC. August 21.

8. Hazards and Hazardous Materials

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: The majority of hazardous waste cases in Siskiyou County are managed by the Siskiyou County Health Department. Larger cases are referred to the Central Valley Regional Water Quality Control Board (RWQCB) and the State Department of Toxic Substances Control (DTSC). The DTSC manages a list of hazardous substance sites throughout the state. This list, or Cortese List, was reviewed in preparation of this document. No Cortese List sites appeared on or near the project area. The State Water Resources Control Board (SWRCB) GeoTracker was also reviewed. GeoTracker revealed that a property adjacent to the project area had a leaking underground storage tank that was reported, cleaned up, and closed in 2003. There were no other sites nearby.

Analysis as to whether or not project activities would:

a. Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.

Impact Analysis: Once contaminated soil has been excavated, it will be loaded onto waiting trucks and hauled away. These trucks will transport the soil to a certified recycling or disposal facility, where the contaminated soil will be properly handled. Barring any reasonably unforeseeable circumstance or event, the impact to the public and the environment would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Impact Analysis: The proposed project would employ the use of one backhoe and three 20-yard dump trucks. The only potential for release of hazardous material would be spillage of motor fuel and oil. In the event of such a spill, the material would be properly remediated during project activities. Furthermore, the project would be temporary in nature, lasting approximately 15 days, and any spill would only occur for a short time before remediation. Because any release of hazardous material would be promptly and prudently remediated, the impact to the environment would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

Impact Analysis: The nearest school is over a mile away from the proposed project area. No school would be affected.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.

Impact Analysis: The Cortese List was reviewed in preparation for this document, and no identified hazardous material site was listed on the project area. Therefore, there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

Impact Analysis: The project area is immediately adjacent to South Mt. Shasta Blvd, which is a main thoroughfare for the City of Mt. Shasta. The movement of trucks and other heavy machinery on this road may impede emergency response or evacuation plans. However, there would only be three truck trips per day, as well as two personnel truck trips per day. The chance of these few truck trips interfering with emergency response is negligible. The project proponent and contractor will work in conjunction with the Mt. Shasta City Police Department and the Mt. Shasta Fire Protection District to ensure movement of emergency vehicles is unimpeded. The on-site construction personnel would direct traffic as needed. For more information, see Section 16: Transportation and Traffic. Due to the low frequency of truck trips and traffic direction, the impact to emergency response would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References:

Mt. Shasta Union School District www.mtshastaandweedschooldistricts.com

SWRCB GeoTracker, https://geotracker.waterboards.ca.gov

DTSC EnviroStor (Cortese List) http://www.envirostor.dtsc.ca.gov/public

9. Hydrology and Water Quality

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: The proposed project area has relatively flat topography and contains no wetlands, streams or other aquatic resources. The project area is situated on an old mill site that ceased active operations in 1989. Several concrete slab structures, log decks, concrete paved surfaces, and barren disturbed land are found throughout the study area. Sapling to pole-sized trees have established throughout the mill site. The project area is within the jurisdiction of the Central Valley Regional Water Quality Control Board (RWQCB).

Analysis as to whether or not project activities would:

a. Violate any water quality standards or waste discharge requirements.

Impact Analysis: The proposed project would not require excavation substantial enough to have an impact on water quality, and would discharge no waste. Therefore, the project would not violate water quality standards or waste discharge requirements.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

Impact Analysis: Based on previous site investigations, the groundwater is expected to be between 6 and 13 feet below ground surface in the vicinity of the New Mill equipment shed. Groundwater may be encountered during excavations deeper than 6 feet. In the event that groundwater is encountered, excavation will be stopped. If any groundwater is removed, it will be placed directly in DOT-approved 55-gallon drums and be transported to a certified disposal facility. Groundwater would not be substantially depleted, and the impact to groundwater would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site.

Impact Analysis: There are no streams, rivers or other aquatic features on the site and the excavations would be backfilled to re-establish pre-project conditions. Therefore, the project would have no impact on existing drainage patterns or result in substantial erosion or siltation on or off the site.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site.

Impact Analysis: See item c. above. The project would have no impact on existing on-site drainage patterns.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

Impact Analysis: The amount of runoff from the site would not change as a result of the proposed project. The project would not create additional runoff. Also, considering the fact that the proposed project would entail the removal of contaminated fill, the threat of contaminated runoff would be reduced as a result of the project. There would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Otherwise substantially degrade water quality.

Impact Analysis: Proposed project activities would be temporary, would not affect any aquatic resources, and would not create additional runoff. Therefore, the project would have no impact on water quality.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

g. Place within a 100-flood hazard area structures which would impede or redirect flood flows.

Impact Analysis: No structures would be constructed as a result of the proposed project. There would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Impact Analysis: No structures would be constructed as a result of the proposed project. No people or structures would be at risk of flooding. There would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

i. Inundation by sieche, tsunami or mudflow.

Impact Analysis: The proposed project area is not located in an area of significant landslide susceptibility (see section 6: Geology and Soils for more information). It is also not located near any substantial body of water. Therefore, there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

National Hydrography Dataset

Central Valley Regional Water Quality Control Board

California Department of Fish and Wildlife

North State Resources – The Landing Mt. Shasta Commerce Park Biological Resources Characterization, 2015.

10. Land Use and Planning

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: The proposed project area is located within the Mt. Shasta City limits. The project area is zoned as Planned Development. Its General Plan land use designation is Mixed Use – Planned Development. The project area is currently undeveloped. All appropriate agreements would be secured from the City prior to the start of the proposed project.

Analysis as to whether or not project activities would:

a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

   Impact Analysis: Given the project site's zoning code and land use designation, as well as the scope of work and temporary nature of the proposed project, the proposed project would not conflict with applicable policies.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

b. Conflict with any applicable habitat conservation plan or natural community conservation plan.

   Impact Analysis: The project area is not included in any habitat conservation plans or natural community conservation plans; therefore, the project would not be in conflict with such plans. See Section 4: Biological Resources for more information.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

References:

City of Mt. Shasta Zoning Ordinance, 2008

City of Mt. Shasta General Plan, 2005

North State Resources – The Landing Mt. Shasta Commerce Park Biological Resources Characterization, 2015

11. Mineral Resources

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: According to the California Division of Mines and Geology, there has been no significant mining operation at or in the vicinity of the proposed project area. Review of locations of active mines shows there are no active mines on or near the project area.

Analysis as to whether or not project activities would:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

Impact Analysis: No minerals have been determined to be present within the proposed project area, and there are no mining operations occurring. Therefore, the project would have no impact to known mineral resources.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Impact Analysis: No City of Mt. Shasta land use plans indicate the presence of mineral recovery sites on the proposed project area. Therefore, the project will have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

California Division of Mines and Geology "Mines and Mineral Producers Active in California 1994-1995"

Find The Data – Active Mines http://active-mines.findthedata.com/d/d/California

12. Noise

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: The project area is adjacent to Interstate 5, the Union Pacific Railroad, and Mt. Shasta Blvd. Noise present on the proposed project area is largely generated from road and rail noise from these transportation corridors. One residential area is approximately 700 feet to the southwest of the project area, and another residential area is approximately 800 feet to the northeast. The residential area to the southwest is located on the other side of Interstate 5, and the residential area to the northeast is located on the other side of a commercial area.

Analysis as to whether or not project activities would result in:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

   Impact Analysis: The equipment used during the course of the proposed project would most likely produce noise levels approximately between 75-80 dBA L_{Max} @ 50 ft. This noise would be received at approximately 50-60 dBA L_{Max} at the two nearest residential areas. This noise level is comparable to a normal conversation. The City of Mt. Shasta General Plan Noise Element allows for daytime noise of 50 dB Leq in residential areas. However, the Noise Element also states that construction noise occurring between 7 AM and 5 PM is exempt from these standards. Since these noise levels are exempted by the City of Mt. Shasta General Plan, the impact of noise levels on people would not violate any ordinances or standards, and would be considered as less than significant.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☒ Less Than Significant Impact
   ☐ No Impact

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

   Impact Analysis: The proposed project would not result in any ongoing operational groundborne vibration or noise. Any groundborne vibration that would occur would be temporary, as the project is expected to last only approximately 15 days. For more information see item a. above. Therefore, the impact of groundborne vibration on people would be less than significant.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☒ Less Than Significant Impact
   ☐ No Impact

c. A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.

   Impact Analysis: The proposed project would be temporary in nature, and would not result in any increased ambient noise. There would be no impact.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

   Impact Analysis: Execution of the proposed project would temporarily increase ambient noise levels in the area due to the operation of heavy machinery, namely one backhoe and three 20-yard dump trucks at various times throughout the workday. The City of Mt. Shasta General Plan Noise Element includes a noise survey performed in the City. This survey states that at the location that the Union Pacific Railroad crosses Interstate 5, which is at the southwest corner of the project area, the average sound level is 68 dBA Leq during the day, jumping up to, on occasion, 95 dBA L_{Max}. The temporary project activities would be consistent with this level of ambient noise, and the increased noise would not be out of the ordinary. Furthermore, the General Plan Noise Element provides exemption for construction activities occurring between the hours of 7 AM and 5 PM. The machinery involved in the proposed project would only operate during that timeframe. Therefore, the ambient noise in the project vicinity would be of a consistent character, and the impact would be less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

References:

City of Mt. Shasta General Plan Noise Element

USDOT Federal Highway Administration

13. Population and Housing

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: According to the 2010 US Census, the population of Mt. Shasta was 3,394. The proposed project area is undeveloped and completely devoid of housing structures.

Analysis as to whether or not project activities would:

a. Induce substantial population growth in area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

Impact Analysis: The proposed project is a soil remediation project, and would not introduce new or expanded homes, businesses, roads, or other infrastructure. Therefore, the project would have no impact on population growth.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

Impact Analysis: The proposed project would not interfere with existing housing, as no housing is present at the site. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Impact Analysis: See item b. above.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

2010 US Census

14. Public Services

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: The proposed project area is located within the City of Mt. Shasta. The City provides all services that exist within and surrounding the project site, including police, fire, water, sewer, parks, libraries, garbage collection, with schools administered by Mt. Shasta Union School District.

Analysis as to whether or not project activities would:

a. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

❖ Fire protection: The proposed project would not include any activities or result in any situation that would affect the current fire protection service.

❖ Police protection: The proposed project would not result in any change in police protection services.

❖ Schools: The proposed project would not affect any housing units, school aged children, or current school facilities, and therefore would not require any new or altered schools.

❖ Parks: The proposed project is located on barren land that has no parks. It also would not affect any housing units. Therefore, there would be no impact to existing parks, and no demand for new parks. For more details, see Section 15 Recreation.

❖ Other public facilities: The nature of the proposed project and the barren land it is located on would not warrant any other impacts on any other public facilities.

Impact Analysis: The proposed project would not involve any activity that could potentially affect any public services. Therefore, the project would have no impact. For more information on City services, see Section 17 Utilities and Service Systems.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

City of Mt. Shasta *www.ci.mt-shasta.ca.us*

Mt. Shasta Union School District *www.mtshastaandweedschooldistricts.com*

Mt. Shasta Recreation & Parks District *www.msrec.org*

Mt. Shasta Police Department *www.ci.mt-shasta.ca.us/police*

Mt. Shasta Fire Department *www.ci.mt-shasta.ca.us/fire*

15. Recreation

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions. The project would not result in any impact to recreational facilities, as none are present at the project site.

Description of Baseline Environmental Conditions: The proposed project area is currently undeveloped. There are no recreational facilities of any kind on or near the project area.

Analysis as to whether or not project activities would:

a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

   Impact Analysis: The proposed project does not include new development or expansion of current development, and would not introduce increased demand on existing recreational facilities.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

b. Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

   Impact Analysis: No new recreation facilities or expansion of existing facilities of any kind would result from implementation of the proposed project; therefore, the project would have no impact.

   Conclusion:
   ☐ Potentially Significant Impact
   ☐ Potentially Significant Unless Mitigated
   ☐ Less Than Significant Impact
   ☒ No Impact

References:

Mt. Shasta Recreation & Parks District www.msrec.org

16. Transportation and Traffic

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions. Project activities would be temporary, lasting only approximately 15 days. Project-related equipment would be limited to three 20-yard dump trucks, one backhoe, and two personnel trucks. The dump trucks will make a total of one round-trip each per day.

Description of Baseline Environmental Conditions: The proposed project area is located between South Mt. Shasta Blvd and the Union Pacific Railroad, near Interstate 5 on the south side of the City of Mt. Shasta. The project area does not cross over any public roadways, and would utilize only South Mt. Shasta Blvd for truck traffic. This truck traffic would travel away from the City and use the nearby on-ramp for Interstate 5, then travel Interstate 5 to the soil recycling center in Red Bluff, CA approximately 91 miles to the south.

Analysis as to whether or not project activities would:

a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).

Impact Analysis: The proposed project would employ the use of one backhoe on-site for the duration of the project, three 20-yard dump trucks hauling away soil per day, and two construction personnel trucks on-site per day, Additionally, there would be one flatbed tractor trailer truck used to deliver the backhoe to the site at the beginning of the project and remove it from the site at the conclusion of the project. For the main project activities, there would be a total of three dump truck trips occurring per day. Construction personnel would engage in directing traffic as needed for these three trips. Because the number of vehicles and frequency of truck trips is negligible, the proposed project would not change the capacity of roadways, and the impact on traffic would less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

b. Exceed, either individually or cumulatively, a level of service standard established by the County congestion management agency for designated roads or highway.

Impact Analysis: It is expected that the three 20-yard dump truck trips per day, as well as the two personnel truck trips per day, would not degrade the level of service for nearby intersections, and any marginally increased traffic would be considered less than significant.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Impact Analysis: The proposed project would not result in the construction of any man-made structure or improvements. Likewise, the machinery utilized during project activities would be consistent with the general character of the site and the surrounding area, and would be considered compatible. Therefore, no hazards would be introduced, and there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact

☒ No Impact

d. Result in inadequate emergency access.

Impact Analysis: The result of the proposed project would not result in lasting impacts to emergency access, as no structures or facilities would be constructed. During project activities, the frequency of truck trips would be very low, and would be very unlikely to interfere in any emergency movement. Furthermore, construction personnel directing traffic would do so in accordance with the Police and Fire departments, and would give priority to emergency vehicles and personnel. Because of this, emergency access would remain adequate, and there would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

e. Result in inadequate parking capacity.

Impact Analysis: The proposed project would not generate vehicle trips beyond those related to proposed project activities, as no housing units or structures would be constructed. During project activities, two construction personnel trucks would be present and parked on the site. Therefore, the project would have no impact on parking capacity.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Impact Analysis: The proposed project would not conflict with any alternative transportation plans, policies or programs since the project is temporary in nature, and no development of any kind is present at the project site. Therefore, the project would have no conflict with such policies, plans or programs.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

TRC – Remedial Action Work Plan, 2015

17. Utilities and Service Systems

Project Activities Likely to Create an Impact: The proposed soil remediation project would involve the excavation of contaminated soil. Excavation depths would range from 1 foot to 7 feet. After excavation, backfilling with clean fill would occur and the project area would be returned to pre-project conditions.

Description of Baseline Environmental Conditions: Water and wastewater conveyance services, as well as storm drain mains, at the proposed project area are provided by the City of Mt. Shasta. The City also operates a wastewater treatment plant near the City. Other utilities, such as electricity, are provided by private companies. The proposed project area is mostly barren, undeveloped land, and therefore is not actively being serviced by these utilities.

Analysis as to whether or not project activities would:

a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

Impact Analysis: The proposed project does not include the construction of any structure that would generate wastewater. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Impact Analysis: The proposed project does not include the construction of new or expanded water or wastewater treatment facilities. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Impact Analysis: The proposed project does not include the construction of new storm water drainage facilities or expansion of existing facilities. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed.

Impact Analysis: The implementation of this project would not result in any new construction, and would therefore not require water supplies. There would be no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact

☒ No Impact

e. Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments.

Impact Analysis: See item b. above.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

f. Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs.

Impact Analysis: The proposed project would not result in any generation of solid waste. Solid waste disposal would not be affected. Soil remediated during project activities would be disposed of in a designated soil recycling facility. Therefore, the project would have no impact.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

g. Comply with federal, state, and local statutes and regulations related to solid waste.

Impact Analysis: See f. above.

Conclusion:
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

References:

City of Mt. Shasta Public Works Department

Mandatory Findings of Significance

Based on evidence provided in this Initial Study, DTSC makes the following findings:

a. The project ☐ has ☐ does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

b. The project ☐ has ☐ does not have impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

c. The project ☐ has ☐ does not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

Determination of Appropriate Environmental Document

Based on evidence provided in this Initial Study, DTSC makes the following determination:

☐ The proposed project COULD NOT HAVE a significant effect on the environment. A **Negative Declaration** will be prepared.

☐ The proposed project COULD HAVE a significant effect on the environment. However, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **Mitigated Negative Declaration** will be prepared.

☐ The proposed project MAY HAVE a significant effect on the environment. An **Environmental Impact Report** is required.

☐ The proposed project MAY HAVE a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **Environmental Impact Report** is required, but it must analyze only the effects that remain to be addressed.

☐ The proposed project COULD HAVE a significant effect on the environment. However, all potentially significant effects (a) have been analyzed adequately in an earlier Environmental Impact Report or Negative Declaration pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier Environmental Impact Report or Negative Declaration, including revisions or mitigation measures that are imposed upon the proposed project. Therefore, nothing further is required.

Certification

I hereby certify that the statements furnished above and in the attached exhibits, present the data and information required for this initial study evaluation to the best of my ability and that the facts, statements and information presented are true and correct to the best of my knowledge and belief.

Preparer's Signature		Date
Preparer's Name	Preparer's Title	Phone #
Branch or Unit Chief Signature		Date
Branch or Unit Chief Name	Branch or Unit Chief Title	Phone #

TABLE 1

Table 1
Emission Conversions and Summary
The Landing - Mt. Shasta Commerce Park
Mt. Shasta, California

Pollutant	lbs/day [a]	tons/year [b]	SCAPCD Significance Threshold (tons/year) [c]	Exceedance?
Unmitigated Construction Emissions - Work Completed October 2015				
ROG	2.7711	0.021	40	No
NO_x	28.1244	0.21	40	No
CO	18.3966	0.14	100	No
SO_2	0.0249	0.00019	40	No
Total PM_{10}	1.8862	0.014	15	No
CO_2e	2,595	19	900	No
Unmitigated Construction Emissions - Work Completed June 2016				
ROG	2.5056	0.019	40	No
NO_x	26.1305	0.20	40	No
CO	16.9639	0.13	100	No
SO_2	0.0249	0.00019	40	No
Total PM_{10}	1.7881	0.013	15	No
CO_2e	2,569	19	900	No

Abbreviations:
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
lbs/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate Matter < 10 microns
ROG = reactive organic compounds
SCAPCD = Siskiyou County Air Pollution Control District
SO_2 = sulfur dioxide
tons/year = tons per year

Footnotes:
a From the CalEEMod August 11, 2015 Proposed Project Results.
b Calculation
Construction Emissions (tons/year) = (pollutant lbs/day * 15 days of construction) / 2000 lbs/ton
15 days of excavation assumes 5-day workweek for 3 weeks
c Values from SCAPCD. Personal communications between Eric Olson with SCAPCD and Nyree Melancon with TRC.

APPENDIX A

CalEEMOD Outputs

The Landing - Mt. Shasta Commerce Park

Siskiyou County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	0.00	Acre	95.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	85
Climate Zone	3			**Operational Year**	2016

Utility Company

CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - The site is currently an undeveloped property that is scheduled for redevelopment as a commercial park. The site will remain an undeveloped lot after excavation of contaminanted soil.

Construction Phase - The excavation activities will take approximately 15 days.

Off-road Equipment - Project-related equipment would be limited to three 20-yard dump trucks, one backhoe, and two personnel trucks. After project activities have concluded, no machinery would remain on the project site.

Trips and VMT - The number of truck trips for the 20-yard dump trucks is expected to be limited to one round-trip each per day.
3 trucks for 15 days = 45 trips hauling

Grading - The excavation will take place at two locations at the property, but one location is located approximately 1,000 feet from the the road. It was conservatively assumed that the trucks will be going back and forth on the dirt road to this location.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	155.00	15.00
tblConstructionPhase	PhaseEndDate	1/21/2011	6/24/2016
tblConstructionPhase	PhaseStartDate	1/1/2011	6/6/2016
tblGrading	AcresOfGrading	0.00	3.00
tblGrading	MaterialExported	0.00	895.00
tblGrading	MaterialImported	0.00	895.00
tblLandUse	LotAcreage	0.00	95.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2016
tblTripsAndVMT	HaulingTripNumber	112.00	45.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	2.5056	26.1305	16.9639	0.0249	0.3604	1.4277	1.7881	0.0612	1.3135	1.3747	0.0000	2,554.6369	2,554.6369	0.6842	0.0000	2,569.0059
Total	**2.5056**	**26.1305**	**16.9639**	**0.0249**	**0.3604**	**1.4277**	**1.7881**	**0.0612**	**1.3135**	**1.3747**	**0.0000**	**2,554.6369**	**2,554.6369**	**0.6842**	**0.0000**	**2,569.0059**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	2.5056	26.1305	16.9639	0.0249	0.3604	1.4277	1.7881	0.0612	1.3135	1.3747	0.0000	2,554.6368	2,554.6368	0.6842	0.0000	2,569.0059
Total	**2.5056**	**26.1305**	**16.9639**	**0.0249**	**0.3604**	**1.4277**	**1.7881**	**0.0612**	**1.3135**	**1.3747**	**0.0000**	**2,554.6368**	**2,554.6368**	**0.6842**	**0.0000**	**2,569.0059**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	6/6/2016	6/24/2016	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 3

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Other Construction Equipment	3	8.00	171	0.42
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	4	10.00	0.00	45.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2256	0.0000	0.2256	0.0250	0.0000	0.0250			0.0000			0.0000
Off-Road	2.3335	25.3624	15.1684	0.0215		1.4132	1.4132		1.3002	1.3002		2,238.7730	2,238.7730	0.6753		2,252.9541
Total	**2.3335**	**25.3624**	**15.1684**	**0.0215**	**0.2256**	**1.4132**	**1.6388**	**0.0250**	**1.3002**	**1.3251**		**2,238.7730**	**2,238.7730**	**0.6753**		**2,252.9541**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0972	0.6880	0.9279	2.2500e-003	0.0526	0.0134	0.0660	0.0144	0.0123	0.0268		225.7638	225.7638	1.7200e-003		225.7999
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0749	0.0801	0.8676	1.1000e-003	0.0822	1.1100e-003	0.0833	0.0218	1.0100e-003	0.0228		90.1001	90.1001	7.2300e-003		90.2519
Total	**0.1722**	**0.7681**	**1.7955**	**3.3500e-003**	**0.1348**	**0.0145**	**0.1493**	**0.0362**	**0.0133**	**0.0496**		**315.8639**	**315.8639**	**8.9500e-003**		**316.0518**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2256	0.0000	0.2256	0.0250	0.0000	0.0250			0.0000			0.0000
Off-Road	2.3335	25.3624	15.1684	0.0215		1.4132	1.4132		1.3002	1.3002	0.0000	2,238.7730	2,238.7730	0.6753		2,252.9541
Total	**2.3335**	**25.3624**	**15.1684**	**0.0215**	**0.2256**	**1.4132**	**1.6388**	**0.0250**	**1.3002**	**1.3251**	**0.0000**	**2,238.7730**	**2,238.7730**	**0.6753**		**2,252.9541**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0972	0.6880	0.9279	2.2500e-003	0.0526	0.0134	0.0660	0.0144	0.0123	0.0268		225.7638	225.7638	1.7200e-003		225.7999
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0749	0.0801	0.8676	1.1000e-003	0.0822	1.1100e-003	0.0833	0.0218	1.0100e-003	0.0228		90.1001	90.1001	7.2300e-003		90.2519
Total	**0.1722**	**0.7681**	**1.7955**	**3.3500e-003**	**0.1348**	**0.0145**	**0.1493**	**0.0362**	**0.0133**	**0.0496**		**315.8639**	**315.8639**	**8.9500e-003**		**316.0518**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.281054	0.095738	0.151657	0.138591	0.099170	0.010531	0.010363	0.197103	0.002398	0.001230	0.006169	0.001757	0.004239

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

The Landing - Mt. Shasta Commerce Park

Siskiyou County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	0.00	Acre	95.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	85
Climate Zone	3			**Operational Year**	2015
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - The site is currently an undeveloped property that is scheduled for redevelopment as a commercial park. The site will remain an undeveloped lot after excavation of contaminated soil.

Construction Phase - The excavation activities will take approximately 15 days.

Off-road Equipment - Project-related equipment would be limited to three 20-yard dump trucks, one backhoe, and two personnel trucks. After project activities have concluded, no machinery would remain on the project site.

Trips and VMT - The number of truck trips for the 20-yard dump trucks is expected to be limited to one round-trip each per day.
3 trucks for 15 days = 45 trips hauling

Grading - The excavation will take place at two locations at the property, but one location is located approximately 1,000 feet from the the road. It was conservatively assumed that the trucks will be going back and forth on the dirt road to this location.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	155.00	15.00
tblConstructionPhase	PhaseEndDate	1/21/2011	10/23/2015
tblConstructionPhase	PhaseStartDate	1/1/2011	10/5/2015
tblGrading	AcresOfGrading	0.00	3.00
tblGrading	MaterialExported	0.00	895.00
tblGrading	MaterialImported	0.00	895.00
tblLandUse	LotAcreage	0.00	95.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2015
tblTripsAndVMT	HaulingTripNumber	112.00	45.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	2.7711	28.1244	18.3966	0.0249	0.3604	1.5258	1.8862	0.0612	1.4037	1.4649	0.0000	2,580.1913	2,580.1913	0.6856	0.0000	2,594.5878
Total	**2.7711**	**28.1244**	**18.3966**	**0.0249**	**0.3604**	**1.5258**	**1.8862**	**0.0612**	**1.4037**	**1.4649**	**0.0000**	**2,580.1913**	**2,580.1913**	**0.6856**	**0.0000**	**2,594.5878**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	2.7711	28.1244	18.3966	0.0249	0.3604	1.5258	1.8862	0.0612	1.4037	1.4649	0.0000	2,580.1913	2,580.1913	0.6856	0.0000	2,594.5878
Total	**2.7711**	**28.1244**	**18.3966**	**0.0249**	**0.3604**	**1.5258**	**1.8862**	**0.0612**	**1.4037**	**1.4649**	**0.0000**	**2,580.1913**	**2,580.1913**	**0.6856**	**0.0000**	**2,594.5878**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	10/5/2015	10/23/2015	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 3

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Other Construction Equipment	3	8.00	171	0.42
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37

<u>Trips and VMT</u>

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	4	10.00	0.00	45.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Grading - 2015

<u>Unmitigated Construction On-Site</u>

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2256	0.0000	0.2256	0.0250	0.0000	0.0250			0.0000			0.0000

Off-Road	2.4775	27.1085	15.2768	0.0215		1.5091	1.5091		1.3883	1.3883		2,262.8864	2,262.8864	0.6756		2,277.0732
Total	**2.4775**	**27.1085**	**15.2768**	**0.0215**	**0.2256**	**1.5091**	**1.7347**	**0.0250**	**1.3883**	**1.4133**		**2,262.8864**	**2,262.8864**	**0.6756**		**2,277.0732**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1936	0.8855	1.8946	2.2700e-003	0.0526	0.0155	0.0682	0.0144	0.0143	0.0287		228.3773	228.3773	1.8600e-003		228.4164
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1000	0.1305	1.2252	1.0600e-003	0.0822	1.2100e-003	0.0834	0.0218	1.1000e-003	0.0229		88.9276	88.9276	8.1200e-003		89.0981
Total	**0.2936**	**1.0160**	**3.1198**	**3.3300e-003**	**0.1348**	**0.0167**	**0.1515**	**0.0362**	**0.0154**	**0.0516**		**317.3049**	**317.3049**	**9.9800e-003**		**317.5146**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2256	0.0000	0.2256	0.0250	0.0000	0.0250			0.0000			0.0000
Off-Road	2.4775	27.1085	15.2768	0.0215		1.5091	1.5091		1.3883	1.3883	0.0000	2,262.8864	2,262.8864	0.6756		2,277.0732
Total	**2.4775**	**27.1085**	**15.2768**	**0.0215**	**0.2256**	**1.5091**	**1.7347**	**0.0250**	**1.3883**	**1.4133**	**0.0000**	**2,262.8864**	**2,262.8864**	**0.6756**		**2,277.0732**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1936	0.8855	1.8946	2.2700e-003	0.0526	0.0155	0.0682	0.0144	0.0143	0.0287		228.3773	228.3773	1.8600e-003		228.4164
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1000	0.1305	1.2252	1.0600e-003	0.0822	1.2100e-003	0.0834	0.0218	1.1000e-003	0.0229		88.9276	88.9276	8.1200e-003		89.0981
Total	**0.2936**	**1.0160**	**3.1198**	**3.3300e-003**	**0.1348**	**0.0167**	**0.1515**	**0.0362**	**0.0154**	**0.0516**		**317.3049**	**317.3049**	**9.9800e-003**		**317.5146**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH

0.281054	0.095738	0.151657	0.138591	0.099170	0.010531	0.010363	0.197103	0.002398	0.001230	0.006169	0.001757	0.004239

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX D

Human Health Risk Assessment

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Tables

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Acronyms

μg/dL	micrograms per deciliter of blood
μg/m³	micrograms per cubic meter
AAC	Average Air Concentration
AAD	Average Daily Dose
ALM	Adult Lead Model
AST	aboveground storage tank
ATSDR	Agency for Toxic Substances Disease Registry
BLL	blood lead level
CalEPA	California Environmental Protection Agency
cm²	centimeter squared
COPCs	chemicals of potential concern
CR	cancer risk
CSM	conceptual site model
days/year	days per year
DTSC	Department of Toxic Substances Control
EPCs	exposure point concentrations
fbg	feet below grade
HEAST	Health Effects Assessment Summary Tables
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
kg	kilogram
LAC	Lifetime Air Concentration
LAD	Lifetime Average Daily Dose
m³/day	cubic meters per day
mg/cm²-day	milligrams per centimeter squared per day
mg/day	milligrams per day
mg/kg-day	milligrams per kilogram per day
MRL	Minimal Risk Levels
NCEA	National Center for Environmental Assessment
NJDEP	New Jersey Department of Environmental Protection
OEHHA	Office of Environmental Health Hazard Assessment
PCBs	polychlorinated biphenyls
PCP	pentachlorophenol
PEFs	particulate emission factor
PPRTVs	Provisional Peer Reviewed Toxicity Values
RELs	reference exposure levels
RfCs	reference concentrations
RfDs	reference doses
RME	reasonable maximum exposure
SCEDC	Siskiyou County Economic Development Council
SF	slope factors
Site	the Landing – Mount Shasta Commerce Park
TCDD	tetrachlordibenzo-p-dioxin
TPH	total petroleum hydrocarbons
UCLs	upper confidence limits of the means
URFs	unit risk factors
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOCs	volatile organic compounds

1.0 INTRODUCTION

This human health risk assessment (HHRA) has been prepared by TRC on behalf of Siskiyou County Economic Development Council (SCEDC) for the Landing – Mount Shasta Commerce Park (the Site) located at South Mount Shasta Boulevard, Mount Shasta, California. This HHRA provides a quantitative assessment of the potential for adverse human health effects that may result from exposure to contaminants currently in the Site soil and following completion of remediation activities.

The Site is located in the southern portion of the City of Mount Shasta, Siskiyou County, California and is bordered by a recreational area to the north, Interstate 5 to the west, and a mixture of residences, business parcels, and forest to the south and east. The Site as a whole consists of a total of 149 acres of land. Historically, the Site was used primarily for lumber milling and log storage. A lumber mill was originally located within the northern portion of the Site referred to as the Old Mill area. A more recently constructed lumber mill (New Mill) was located in the central portion of the western property. Former facilities in the New Mill study area included a pentachlorophenol (PCP) dip tank for wood treatment, diesel fuel aboveground storage tank (AST), gasoline fuel underground storage tank (UST), dump area, and an equipment maintenance shed. Southwest of the New Mill facilities is a former box factory, which previously contained a planing mill, a burner, and transformers. The Site milling operations ceased in 1985.

The Site is currently owned by the City of Mount Shasta and has undergone planning and marketing for a future development (The Landing – Mount Shasta Commerce Park), with approximately 80 of the 149 acres ready for redevelopment. The entire Site has been divided into two primary study areas as defined below:

- The Western Property consists of approximately 95 acres of land located along the west side of Mount Shasta Boulevard. The Western Property is further differentiated by two independent study areas (i.e., New Mill and Old Mill areas). The New Mill area is central to the access to the Western Property and lies between the New Mill and former Box Factory investigation areas that have been cleared for redevelopment. The New Mill area is the focus of this HHRA.
- The Eastern Property consists of a 51-acre parcel and a 3-acre parcel located to the east of Mount Shasta Boulevard.

This HHRA was prepared to evaluate potential human exposures and risks for potential receptors under current and post-remediation Site conditions. The HHRA is intended to provide insight regarding the contaminants, transport mechanisms, exposure pathways, and/or exposure points that may contribute to site-related risks. More specifically, the objectives of the HHRA are to determine if the potential human health risks based on current and anticipated future site conditions warrant consideration of additional risk management and/or mitigation measures.

The HHRA was performed in accordance with California Environmental Protection Agency (CalEPA) and United States Environmental Protection Agency (USEPA) guidance set forth in the following documents and models:

- *Human Health Risk Assessment Note 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities* (Department of Toxic Substances Control [DTSC], 2014);
- *Preliminary Endangerment Assessment, Guidance Manual* (DTSC, 2013)*;*
- *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part A)* (USEPA, 1989);
- *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* (USEPA, 2004);
- *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)* (USEPA, 2009); and

- *Revised California Human Health Screening Levels for Lead* (Office of Environmental Health Hazard Assessment [OEHHA], 2009).

The HHRA follows the traditional risk assessment methodology and is structured in accordance with the following report sections:

- Section 2.0, Data Evaluation
    - summarizes the available data for soil;
    - presents the background data and the HHRA dataset; and
    - identifies and describes the selection of COPCs.
- Section 3.0, Exposure Assessment – identifies the potentially exposed populations and potentially complete exposure pathways; describes the approach for developing exposure point concentrations (EPCs); and presents exposure parameters.
- Section 4.0, Toxicity Assessment – identifies the sources of the toxicity values and describes non-carcinogenic and carcinogenic toxicity criteria.
- Section 5.0, Risk Characterization – describes the process for estimating non-cancer hazard and cancer risk.
- Section 6.0, Uncertainty Analysis – presents the uncertainties of the HHRA.
- Section 7.0, Conclusions – presents the conclusions of the HHRA.
- Section 8.0, References – provides references used in the document.

2.0 DATA EVALUATION

Data evaluation is the process of analyzing site characteristics and analytical data to identify COPCs to be evaluated in the HHRA. This section of the HHRA presents the datasets and background data used in the risk assessment and describes the methodology for identifying COPCs selected for quantitative evaluation as a component of this HHRA.

2.1 Summary of Available Data

This section summarizes the available data for soil that have been collected at the Site and are considered most representative of current and anticipated future Site conditions. Attachment A presents a summary of the historical soil sampling results used in this HHRA. Soil samples were collected from five investigation areas (i.e., New Mill Dip Tank, New Mill Equipment Shed, New Mill Dump Area, Box Factory Transformer Area, and Box Factory Burner). Soil samples collected from these four investigation areas were analyzed for the following constituents:

- New Mill – Dip Tank: Title 22 Metals, hexavalent chromium, total petroleum hydrocarbons (TPH) as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo), and PCP;
- New Mill – Equipment Shed: TPHg, TPHd, and TPHmo;
- New Mill – Dump Area: Title 22 Metals, TPHg, TPHd, and TPHmo;
- Box Factory – Transformer Area: Title 22 Metals, TPHg, TPHd, TPHmo, organochlorine pesticides, and polychlorinated biphenyls (PCBs); and
- Box Factory – Burner: dioxins/furans.

Six sample locations were excluded from the PCP data set in this HHRA. Three of the samples were collected in 1998, one sample in 2005, and the other two in 2007. Additional samples were collected at these locations in 2014 and reanalyzed for PCP. Therefore, the 2014 samples are considered to be reflective of current conditions at these locations and laboratory analytical results of these samples comprise the data set for the HHRA.

It should be noted that limited environmental assessment of groundwater has been performed to date and groundwater impacts are not fully characterized at this time. Limited groundwater sampling was performed in portions of the Site in 2006 and one grab groundwater sample was collected near the Dip

Tank area in 2014. In consideration of this limitation, this HHRA does not include a quantitative evaluation of potential health risks associated with groundwater.

2.1.1 Soil – Pre-Development Conditions

For the purpose of this HHRA, potential exposures and risks were evaluated based on pre-development conditions. Under the pre-development condition, it is assumed that soil within the upper 2.5 feet of ground surface will remain undisturbed. Soil within the upper 2.5 feet of ground surface is presumed to be exposed and available for potential human contact under both recreational and commercial land use assumptions. The pre-development site conditions incorporate laboratory analytical results of soil samples collected during previous site investigations to depths of up to 2.5 feet below grade (fbg). Attachment A, Tables A-1 through A-5 present the soil data reflecting the pre-development Site conditions that serve as the basis for the quantitative evaluation of current exposures and risks.

2.1.2 Soil – Post-Development Conditions

In addition to evaluation pre-development conditions, this HHRA evaluated potential exposures and risks for construction workers during site development activities and recreational and commercial receptors following site development. For the purpose of this HHRA, post-development conditions are based on the assumption that rough grading and site excavation activities during development of the commerce park will disturb underlying soil to depths of approximately 15 fbg. The laboratory analytical results of all soil samples collected from the investigation areas to depths of up to 15 fbg are assumed to be available for potential direct contact. Attachment A Tables A-6 through A-10 presents the soil data reflecting the post-development Site conditions that serve as the basis for the quantitative evaluation of future exposures and risks.

2.1.3 Background

Background soil sampling was conducted for the site in March 2005 to provide data on the typical concentration of metals and TPH in the general site area. A total of six (6) background samples were collected from four (4) sample locations: Two (2) sample locations were collected along the western side of South Mount Shasta Boulevard and two (2) sample locations were collected from the vicinity of the former truck stop. The background samples were analyzed for TPH (as diesel, motor oil, and gasoline) and metals. Background data are presented in Attachment A Table A-11.

2.2 Selection of Chemicals of Potential Concern

COPCs include constituents that are present in soil that may result in adverse health effects under the defined conditions of exposure. Previous environmental sampling activities have focused on a subset of laboratory analytes that includes metals. It should be noted that the metals detected in soil include elements that occur naturally at the Site. The naturally-occurring metals detected in the soil at the Site could be eliminated as COPCs if detected at concentrations that are consistent with site-specific "background" conditions (i.e., conditions unaffected by site-related activities). However, for this risk assessment, potential exposures and risks were determined for all receptors and scenarios based on the exposure point concentrations determined for the Site. In order to differentiate between potential site-related and background contributions, exposures and risks were also calculated for naturally-occurring COPCs based on estimated background concentrations.

A statistical summary of the data was developed for each chemical detected at the Site. The statistical soil summary tables for pre-development and post development (Tables D-1 and D-2, respectively) includes total samples analyzed, number of samples detected, range of detects, maximum background concentration, 95 percent upper confidence limit (UCL), and EPC. The following sections summarize the selection of COPCs for each media.

Dioxin and furans were adjusted using the 2005 World Health Organization toxic equivalency factors (DTSC, 2009) and summed to calculate a tetrachlordibenzo-p-dioxin toxic equivalency concentration

(TCDD TEQ). The TCDD TEQ was used as the COPC for dioxin and furans in this HHRA. All other chemicals that were detected in one or more soil samples were retained as COPCs. The COPCs in soil that were evaluated in this HHRA include:

- Pre-Development (Table D-1):
  - New Mill – Dip Tank:
    - metals: antimony, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, lead, manganese, mercury, nickel, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
    - Organochlorine pesticide: PCP;
  - New Mill – Equipment Shed:
    - TPH: TPHg, TPHd, and TPHmo;
  - New Mill – Dump Area:
    - metals: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
  - Box Factory – Transformer Area:
    - metals: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
    - organochlorine pesticide: dichlorodiphenyltrichloroethane (DDT) and dieldrin;
    - PCBs: aroclor 1254 and aroclor 1260;
  - Box Factory – Burner:
    - dioxin/furans: TCDD TEQ;

- Post-Development (Table D-2):
  - New Mill – Dip Tank:
    - metals: antimony, arsenic, barium, beryllium, cadmium, chromium, hexavalent chromium, cobalt, copper, lead, manganese, mercury, nickel, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
    - Organochlorine pesticide: PCP;
  - New Mill – Equipment Shed:
    - TPH: TPHg, TPHd, and TPHmo;
  - New Mill – Dump Area:
    - metals: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
  - Box Factory – Transformer Area:
    - metals: arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, vanadium, and zinc;
    - TPH: TPHd and TPHmo;
    - organochlorine pesticide: DDT;
    - PCBs: aroclor 1254 and aroclor 1260
  - Box Factory – Burner:
    - dioxin/furans: TCDD TEQ.

3.0 EXPOSURE ASSESSMENT

An exposure assessment is the process of estimating potential human exposure to a chemical in the environment. It is conducted to estimate the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans may potentially be exposed. In a typical exposure assessment, reasonable maximum estimates of exposure (RME) are developed for the current baseline land-use assumptions (USEPA, 1989). Similarly, RME may also be developed to reflect future land-use assumptions, particularly if the land use changes significantly from the baseline condition or if the conditions of exposure are expected to change as a result of future Site development. This section describes the potential receptors and exposure pathways selected for the quantitative risk characterization, exposure assumptions (or factors), and methods used to derive soil EPCs.

3.1 Exposure Pathways and Scenarios

Exposure pathways are identified based on consideration of the sources, releases, types, and locations of chemicals at the Site, the environmental fate of chemicals, and the location and activities of potentially exposed populations (USEPA, 1989). For a complete exposure pathway to exist, the following elements must be present:

- A source or mechanism for chemical release.
- An environmental transport medium.
- A point of human exposure with the medium.
- A route of exposure.

Typical exposure pathways as specified by the USEPA (USEPA, 1991a) have been considered for this HHRA. This evaluation identifies both the potential receptors and exposure pathways through which humans (i.e., receptors) may potentially be exposed to the COPCs. The evaluation included potential exposure pathways that are reflective of the actual site conditions and anticipated future land use, without being unrealistically conservative.

An incomplete exposure pathway is one that does not result in potential human exposure and, therefore, does not result in a significant risk. If a complete exposure pathway is identified, potential exposures may be quantified and the risk evaluation performed, or the exposure pathway may be eliminated through remedial measures or other engineering and administrative controls. According to the USEPA (1989), exposure pathways may be excluded from quantitative evaluation based on the following conditions:

- The exposure resulting from the pathway is much less than that from another pathway involving the same medium at the same exposure point.
- The potential magnitude of exposure from a pathway is low.
- The probability of exposure occurring is very low and the risks associated with the occurrence are not high.

Pathways that do not exist, are not relevant to potential future property development plans, or have a low potential of exposure were excluded from further consideration and were not evaluated quantitatively. The potential exposure pathways identified as complete and further evaluated for each receptor in this HHRA include:

- Inhalation of fugitive dust;
- Incidental soil ingestion; and
- Dermal contact with soil.

The frequency, magnitude and duration of exposure for the exposure pathways identified above is variable. USEPA guidance recommends that exposures and risks be characterized for potential receptors located on or near a release site as these receptors may have the greatest potential for exposure to the COPCs (USEPA, 1989). The frequency, duration and magnitude of exposures for the potential receptors vary depending on the location relative to the Site and the exposure pathways associated with each receptor group. In general, the combination of receptors and exposure scenarios is intended to yield a range of estimated exposures and risks. The range of exposures and risks provides additional insight regarding the receptors and/or exposure pathways that may warrant further consideration with regard to mitigation and/or risk management. For the purpose of this evaluation, the three potential receptor groups identified below were selected for quantitative evaluation of potential exposures and risks:

1. **Current/Future Onsite Recreational Receptors**: The Site is currently an empty lot and scheduled for redevelopment as a commerce park with planned open space. Potential exposure pathways associated with the onsite recreational receptor include incidental ingestion of soil, dermal contact with soil, and inhalation of fugitive dust.
2. **Current/Future Onsite Commercial Worker**: Certain activities performed by onsite commercial workers may require periodic, direct contact with soil at the Site (i.e. gardening). Potential exposure pathways associated with the onsite commercial worker include incidental ingestion of soil, dermal contact with soil, and inhalation of fugitive dust.
3. **Onsite Construction Worker**: Certain activities performed by onsite construction workers may require periodic, direct contact with soil at the Site (i.e. grading of the Site, utility trenching). Potential exposure pathways associated with the onsite construction worker include incidental ingestion of soil, dermal contact with soil, and inhalation of fugitive dust.

Figure D-1 presents the conceptual site model (CSM) for the Site.

3.2 Exposure Parameters

Exposure parameters are quantitative estimates of the frequency, duration, and magnitude of exposure to soil based on information contained in DTSC and USEPA guidance, as well as professional judgment. The exposure parameters were selected from DTSC (2014) and USEPA (2009 and 2011) guidance. Table D-3 presents the exposure assumptions that were used in this HHRA for the recreational receptor, outdoor commercial worker, and construction worker.

Common Exposure Parameters

The exposure frequency represents the number of days a year a receptor may be expected to be exposed to COPCs. The exposure frequency for recreational receptors is 150 days per year, which is assumed to be 3 days per week for 50 weeks per year (professional judgment). The exposure frequency for the commercial and construction worker is 250 days per year, which assumes 5 days per week for 50 weeks per year (DTSC, 2014).

The exposure duration for child recreational receptors is 6 years and for an adult is 24 years, for the commercial worker is 25 years, and for the construction worker is 1 year (DTSC, 2014).

The average body weight for an adult receptor is 70 kilograms (kg) and for a child is 15 kg (DTSC, 2014).

The averaging time parameter averages exposure over a period of time. For non-carcinogenic effects, the averaging time is based on the exposure duration multiplied by 365 days per year. The averaging time for non-carcinogenic effects for a child recreational receptor is 2,190 days, for an adult receptor is 8,760 days, for a commercial worker is 9,125 days, and for a construction worker is 365 days (DTSC, 2014). The averaging time for carcinogenic effects is based on a lifetime exposure of 70 years multiplied by 365 days/year for 25,550 days (DTSC, 2014).

Inhalation Exposure Parameters

The exposure time represents the amount of time in a day that a receptor may be exposed to fugitive dust via inhalation. The exposure time for a recreational receptor assumes an eight hour per day exposure (professional judgment), and commercial and construction worker assumes an 8 hour work day (DTSC, 2014).

Incidental Soil Ingestion Exposure Parameters

The ingestion rate represents the amount of soil a receptor may accidently ingest in a day at the Site. The ingestion rate for an adult recreational receptor is 100 milligrams per day (mg/day) and 200 mg/day for a child. The ingestion rate for a commercial worker assumes 100 mg/day, and a construction worker is 330 mg/day (DTSC, 2014).

The particulate emission factor (PEF) relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions from the surface of the Site (USEPA, 1991b). The PEF for a recreational receptor and a commercial worker is 1,360,000,000 cubic meters per kilogram (m^3/kg) and for a construction worker is 1,000,000 m^3/kg (DTSC, 2014).

Dermal Contact with Soil Exposure Parameters

The skin surface area represents how much skin is exposed for dermal contact with soil. The surface area is 6,032 centimeters squared (cm^2) for the adult recreational receptor, commercial worker, and construction worker and 2,900 cm^2 for a child recreational receptor (DTSC, 2014).

The soil-to-skin adherence factor represents how much soil will remain on the skin after direct contact with the soil is no longer available. The soil-to-skin adherence factor is 0.2 milligrams per centimeter squared per day (mg/cm^2-day) for the child recreational receptor and commercial worker, 0.07 mg/cm^2-day for an adult recreational receptor, and 0.8 mg/cm^2-day for a construction worker (DTSC, 2014).

3.3 Exposure Point Concentrations

The concentrations of COPCs at specific exposure points will vary over space and time. However, a single estimate of an EPC is required for risk assessment calculations (USEPA, 1989). This single value must be representative of the average concentration to which a person would be exposed over the duration of the exposure. EPCs generally are estimated using either measured concentrations in environmental media or developed using fate and transport models. Independent EPCs were developed for each data set at the Site pre-development and post development.

The EPC of measured data are calculated as the 95 percent upper confidence limit (95% UCL) ($\alpha = 0.05$) of the arithmetic mean concentration. The most current statistical program and guidance from USEPA (currently ProUCL 5.0.00) (USEPA, 2013) was used to calculate the 95% UCL. ProUCL provides guidance and a range of parametric and nonparametric methodologies for handling datasets of different distributions, left-censored datasets, identification of outliers, datasets with non-detect values, and treatment of datasets with small sample sizes. The appropriate ProUCL method ultimately used depends on the characteristics of each data set and is documented in Tables D-1 and D-2. If the 95% UCL is higher than the maximum detected concentration, the maximum detected concentration is used as the EPC, consistent with USEPA guidance.

The data used to develop the UCLs for soil are presented in Attachment A. USEPA's ProUCL software (Version 5.0.00; USEPA, 2013) was used to develop UCLs based on the distribution of the data for each chemical. This software considers non-detect values in the development of the UCLs. In the event that the calculated UCLs exceed the maximum detected value or there were insufficient data to calculate a meaningful UCL, the maximum detected value was used as the EPC. The ProUCL outputs are provided in Attachment B, and the soil UCLs for the pre-development and post-development data sets are summarized in Tables D-1 and D-2, respectively.

In order to evaluate hazards and risks associated with exposures to naturally-occurring metals, the chemical-specific background concentrations presented in Tables D-1 and D-2 were used.

3.5 Exposure Equations

The "Average Daily Dose" (ADD) and "Lifetime Average Daily Dose" (LDD) are the parameters used to quantify exposure doses in a risk assessment for non-inhalation exposure pathways. The ADD is used as a standard measure for characterizing long-term, non-carcinogenic effects. The LADD is used to estimate potential carcinogenic risks for exposures that may occur over varying durations, from a single event to an average 70-year human lifetime. For inhalation exposure pathways, the correlated parameters are the "Averaged Air Concentration" (AAC) and the "Lifetime Air Concentration" (LAC).

The equations for calculating ADD and LDD for ingestion exposures are those presented by the USEPA in its 1989 RAGS guidance (USEPA, 1989). The ADD and LDD equations for dermal exposures are taken from the 2004 RAGS dermal guidance (USEPA, 2004). The AAC and LAC equations for inhalation exposures are taken from the 2009 RAGS inhalation guidance (USEPA, 2009).

4.0 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is accomplished in two-steps (USEPA, 1989):

- Hazard Identification; and
- Dose-Response Assessment.

Hazard identification entails determining if a chemical can cause an increase in a particular adverse effect (e.g., cancer) and the likelihood that the adverse effect will occur in humans. The result of hazard identification is a profile of the available toxicological information and its relevance to human exposure under conditions present in the environment. This process has been completed by either the USEPA or CalEPA, Office of Environmental Health Hazard Assessment (OEHHA), for all of the COPCs at the Site.

Dose-response assessment entails quantifying the relationship between the dose of a chemical and the incidence of adverse effects in the exposed population. The result of the dose-response assessment is toxicity criteria that are used in the risk characterization to estimate the likelihood of adverse effects occurring in humans at different exposure levels. The toxicity criteria used to evaluate non-carcinogenic health risks are commonly referred to as reference doses (RfDs) for oral and dermal exposures and reference concentrations (RfCs) for inhalation exposures. For carcinogenic health risks, the toxicity criteria used to estimate risk are slope factors (SFs) for oral and dermal exposures and unit risk factors (URFs) for inhalation exposures. The basis for these criteria is described briefly in the following sections.

Toxicological values and information regarding the potential for COPCs to cause adverse health effects in humans were obtained from a hierarchy of California and USEPA sources, beginning with the OEHHA online Toxicity Criteria Database (OEHHA, 2015) and Integrated Risk Information System (IRIS) online database (USEPA, 2015b). OEHHA and IRIS provide chemical-specific toxicity data that represent CalEPA and the USEPA's consensus. The quantitative toxicity values and supporting explanations in IRIS have been reviewed and agreed upon by the USEPA using available studies on a chemical.

4.1 Non-Carcinogenic Health Effects

For the evaluation of non-carcinogenic effects, chronic RfDs for the ingestion route and RfCs for the inhalation route are used. A chronic RfD (in milligrams per kilogram per day, or mg/kg-day) is an estimate of a daily exposure level for the human population, including sensitive subpopulations that are likely to be without appreciable risk of deleterious effects during a lifetime. The RfC is expressed in units of micrograms of chemical per cubic meter of air ($\mu g/m^3$) and is an estimate of the maximum air concentration that can be present over a specified time period without an appreciable risk of deleterious effects. Chronic reference doses and reference concentrations are generally used to evaluate the potential non-carcinogenic effects associated with exposure periods between 6 years and a lifetime. Non-carcinogenic toxicity criteria for the COPCs are presented in Table D-4.

For non-carcinogenic COPCs, toxicity criteria were selected according to the following hierarchy of sources:

- The OEHHA's chronic reference exposure levels (RELs) or RfDs from the OEHHA Toxicity Criteria Database (OEHHA, 2015).
- The RfDs/RfCs from IRIS (USEPA, 2015b).
- USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), as provided for specific chemicals in the USEPA, Regional Screening Level Table (USEPA, 2015a); and

- Other toxicity values, as provided for specific chemicals in the USEPA Regional Screening Level Table (USEPA, 2015a). Other sources referenced in the USEPA tables include Minimal Risk Levels (MRLs) from the Agency for Toxic Substances Disease Registry (ATSDR); values from the National Center for Environmental Assessment (NCEA); values from New Jersey Department of Environmental Protection (NJDEP); and values from USEPA Health Effects Assessment Summary Tables (HEAST).

Non-carcinogenic toxicity criteria for direct exposure pathways (incidental ingestion of soil and dermal contact) for TPHg and TPHd is based on the toxicity data presented in USEPA's Regional Screening, and TPH mo is based on the toxicity data presented in DTSC's Note 3 DTSC-Modified Screening Levels (DTSC, 2015).

4.2 Carcinogenic Health Effects

In human health risk assessment, a slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. Specifically, a slope factor is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime and is usually the 95% UCL of the slope of the dose-response curve expressed in $(mg/kg\text{-}day)^{-1}$ for non-inhalation pathways and $(\mu g/m^3)^{-1}$ for inhalation pathways.

For carcinogenic COPCs, toxicity criteria were selected from the OEHHA Toxicity Criteria Database. If no OEHHA toxicity criteria are available, toxicity criteria were selected from USEPA IRIS or USEPA Regional Screening Level Table (USEPA, 2015a). Carcinogenic toxicity criteria for the COPCs are presented in Table D-4.

4.3 Dermal Exposure

For dermal exposure, the exposure assessment results in an estimate of absorbed dose. However, oral toxicity criteria, which are often used to assess risk from dermal exposure, are typically based on administered dose. The difference between administered and absorbed dose in the development of oral toxicity criteria can result in an underestimation of potential health risks from dermal exposure (USEPA, 2004). Oral toxicity criteria based on an administered dose may therefore need to be adjusted to account for the difference between the administered dose in the critical study (which formed the basis of the toxicity criterion) and the absorption efficiency of the chemical in question so the oral toxicity criteria can be adjusted and appropriately applied to dermal exposures. Dermal toxicity criteria are adjusted for each COPC consistent with DTSC and USEPA guidance (USEPA, 2004). Dermal toxicity adjustments (i.e., dermal reference doses) were calculated for antimony, barium, beryllium, cadmium, chromium, hexavalent chromium, and nickel, in accordance with USEPA guidance, as presented in Table D-4.

4.4 Lead

Lead is an element that occurs naturally in the environment and is commonly used in many types of industrial processes and products. In general, exposure to lead is most harmful to children 6 years old and younger. The USEPA has classified lead as a probable human carcinogen (B2) based on sufficient animal evidence (USEPA, 2015b). However, the Carcinogen Assessment Group (USEPA, 2015b) did not recommend derivation of a quantitative estimate of oral carcinogenic risk, due to a lack of understanding pertaining to the toxicological and pharmacokinetic characteristics of lead. Data from human studies are inconclusive as to whether lead causes cancer. Currently, there is insufficient data to quantitatively evaluate the potential of lead to cause cancer in humans. The neurobehavioral effects of lead in children were considered to be the most relevant endpoint in determining whether exposure to lead may result in adverse non-carcinogenic health effects.

Traditional risk assessment methodologies rely on the use of dose-response criteria (e.g., Cancer Slope Factors and Reference Doses). The traditional reference dose approach to toxic chemicals is not applicable to lead because most human health effects data are based on concentrations of lead in the blood stream rather than an external dose. Consequently, the potential for lead to cause non-cancer adverse health effects is measured by the level of lead in the blood stream. The concentration of lead in the blood stream is often referred to as the Blood Lead Level (BLL). The BLL represents an integrated measure of internal dose and reflects total exposure resulting from both site related and background sources and is expressed in terms of micrograms of lead per deciliter of blood (µg/dL).

The California OEHHA recently developed a 1 µg/dL benchmark for source-specific incremental change in blood lead levels for protection of school children and fetuses (OEHHA, 2009). Based on the DTSC's Leadspread model (DTSC, 2011), a soil/dust lead concentration resulting in a 90th percentile estimate of increase in blood lead of 1 µg/dL was established. For potential exposures to children, the LeadSpread model can be used to establish the probability of exceeding the 90th percentile estimate of an increase in blood lead concentration of 1 µg/dL. OEHHA recommends that potential exposures to adults, including pregnant women, be evaluated using the USEPA Adult Lead Model (ALM). Regardless of the model used to estimate exposure, an increase in estimated BLL of greater than 1 µg/dL at the 90th percentile estimate would represent an unacceptable exposure and may warrant further evaluation or consideration of additional risk management measures. Conversely, estimated increases in BLL concentrations of less than 1 µg/dL would not exceed the defined point of departure under the characterized exposure conditions and would not warrant additional risk management considerations. For the purpose of this study, lead soil screening levels were developed using the LeadSpread 8 model developed by DTSC (2011) for recreational receptors and ALM by USEPA for commercial and construction workers.

5.0 RISK CHARACTERIZATION

In this section of the HHRA, toxicity and exposure assessments were integrated into quantitative expressions of non-carcinogenic hazards and carcinogenic risks. As was previously discussed, the exposure and risk assessment methodology utilized in this analysis accounts for potential exposure to all COPCs, including those that may be present at concentrations at or below background levels. The reader is encouraged to consider the relative difference between absolute and background risks before determining the significance of the cumulative risks.

The estimates of hazard and risk for individual COPCs and exposure pathways are presented numerically in Tables D-5 through D-19, the hazards and risks are summarized on Tables D-20 through D-25 for individual receptors, and Tables D-26 through D-28 presents the BLL. The risk characterization results are presented by receptors assumed in this HHRA.

The following sections provide a summary overview of the cumulative risks associated with the exposure scenarios that were quantified as a component of this evaluation. The cumulative exposures and risks presented in the following sections include the risk contributions from naturally-occurring metals, dioxin and furans, PCBs, TPH as diesel, and VOCs. The following paragraphs also provide a discussion of the potential exposures and risks associated with exposure to naturally-occurring metals based on the background concentrations of these constituents.

5.1 Non-Carcinogenic Health Effects

Potential non-carcinogenic effects are typically evaluated by comparing exposure over a specified time period with a reference dose derived for a similar exposure period. This ratio of exposure to toxicity is referred to as a Hazard Quotient (HQ). The HQ was calculated as follows for each COPC:

Inhalation Pathways:

$$HQ_i = \frac{AAC_i}{RfC_i}$$

Ingestion and Dermal Pathways:

$$HQ_i = \frac{ADD_i}{RfD_i}$$

where:

HQ_i	= Hazard quotient for chemical "i" (unitless);
AAC_i	= Average air concentration for chemical "i" (µg/m^3);
RfC_i	= Inhalation reference concentration for chemical "i" (µg/m^3);
ADD_i	= Average daily dose for chemical "i" (mg/kg); and
RfD_i	= Reference dose for chemical "i" (mg/kg for metals).

In cases where individual COPCs potentially act on the same organs or result in the same health endpoint (e.g., respiratory irritants), potential additive effects may be addressed by calculating a hazard index (HI) as follows:

$$HazardIndex = \sum_{i=1}^{n} HazardQuotient_i$$

where: i = specific health endpoint

A HI or HQ (for effects which are not additive) of less than or equal to 1 (referred to herein as the significance threshold) indicates acceptable levels of exposure for COPCs having an additive effect. In this HHRA, a HI was calculated by summing the HQs for all COPCs, regardless of toxic endpoint, as recommended by agency guidance (USEPA, 1989). This approach is generally believed to overestimate the potential for non-carcinogenic health effects due to simultaneous exposure to multiple chemicals because it does not account for different toxic endpoints (USEPA, 1989).

It should be noted that HQs or HIs greater than 1 do not necessarily mean that adverse health effects will be observed. As discussed in Section 4.1, a substantial margin of safety has been incorporated into some of the RfDs and RfCs developed for the COPCs. Therefore, for these chemicals, adverse health effects may not be observed even if the HQ or HI is much larger than 1.

The following sections summarize the results of the non-carcinogenic risk characterization for each receptor evaluated. The non-cancer hazards estimated for each chemical evaluated are presented on Tables D-5 through D-19 and summarized on Table D-20 for recreational receptors, Table D-22 for commercial worker, and Table D-24 for construction worker.

Recreational Receptor

The non-cancer HQs and HIs associated with potential exposure by the onsite recreational receptors are summarized on Table D-20. Non-cancer HQs for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-5 through D-7 for pre-development conditions and Tables D-8 through D-10 for post development conditions. The non-cancer HI for recreational receptors exposed to all of the COPCs in soil is summarized by investigation area below:

- **New Mill – Dip Tank**:
    - *Pre-Development Conditions*: The cumulative HI for the recreational receptor is 3.7. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (3.3) and cobalt (0.1). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 92% of the cumulative HI. Approximately 99% of the cumulative HI estimate is related to metals (e.g., arsenic and cobalt) that occur at concentrations that are representative of background. When the cumulative HI is adjusted to exclude the contributions of background concentrations of naturally-

occurring metals, the cumulative HI for the recreational receptor is 0.05, which is below the significance threshold.
  - *Post-Development Conditions*: The cumulative HI for the recreational receptor is 3.1. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (2.7) and cobalt (0.1). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 90% of the cumulative HI. Approximately 97% of the cumulative HI estimate is related to metals (e.g., arsenic and cobalt) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is 0.1, which is below the significance threshold.

- **New Mill – Equipment Shed**:
  - *Pre-Development Conditions*: The cumulative HI for the recreational receptor in this area is 1.4, which slightly exceeds the significance threshold of 1.0. TPHd is the only COPCs resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 78% of the cumulative HI.
  - *Post-Development Conditions*: The cumulative HI for the recreational receptor is 0.1, which is below the significance threshold. TPHd is the only COPCs resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 78% of the cumulative HI.

- **New Mill – Dump Area**:
  - *Pre-Development Conditions*: The cumulative HI for the recreational receptor is 3.0. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (1.3), cobalt (0.2), nickel (0.1), and TPHd (1.3). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 85% of the cumulative HI. Approximately 53% of the cumulative HI estimate is related to metals (e.g., arsenic and cobalt) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is 1.4, which is slightly exceeds the significance threshold.
  - *Post-Development Conditions*: The cumulative HI for the recreational receptor is 2.2. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (1.3), cobalt (0.2), nickel (0.1), and TPHd (0.6). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 87% of the cumulative HI. Approximately 71% of the cumulative HI estimate is related to metals (e.g., arsenic and cobalt) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is 0.6, which is below the significance threshold.

- **Box Factory – Transformer Area**:
  - *Pre-Development Conditions*: The cumulative HI for the recreational receptor is 3.0. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (2.3), cobalt (0.1), TPHd (0.2), and aroclor 1254 (0.2). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 90% of the cumulative HI. Approximately 83% of the cumulative HI estimate is related to metals (e.g., arsenic and cobalt) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is 0.5, which is below the significance threshold.
  - *Post-Development Conditions*: The cumulative HI for the recreational receptor is 2.8. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic

(2.3), cobalt (0.1), and TPHd (0.2). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 91% of the cumulative HI. Approximately 88% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is 0.3, which is below the significance threshold.

- **Box Factory – Burner**:
  - *Pre-Development Conditions*: The cumulative HI for the recreational receptor in this area is 0.4, which is below the significance threshold of 1.0.
  - *Post-Development Conditions*: The cumulative HI for the recreational receptor in this area is 0.008, which is below the significance threshold of 1.0.

Commercial Worker

The non-cancer HQs and HIs associated with potential exposure by the onsite commercial workers are summarized on Table D-22. Non-cancer HQs for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-11 through D-13 for pre-development conditions and Tables D-14 through D-16 for post development conditions. The non-cancer HI for commercial workers exposed to all of the COPCs in soil is summarized by investigation area below:

- **New Mill – Dip Tank**:
  - *Pre-Development Conditions*: The cumulative HI for the commercial worker is 0.8. Arsenic (0.7) is the only COPCs resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 72% of the cumulative HI. Approximately 99% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.01, which is below the significance threshold.
  - *Post-Development Conditions*: The cumulative HI for the commercial worker is 0.7. Arsenic (0.6) is the only COPC resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 72% of the cumulative HI. Approximately 98% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.02, which is below the significance threshold.

- **New Mill – Equipment Shed**:
  - *Pre-Development Conditions*: The cumulative HI for the commercial worker is 0.4, which is below the significance threshold. TPHd is the only COPCs resulting in HI estimate greater than or equal to 0.1. Dermal contact with soil represents the primary exposure pathway and accounts for approximately 55% of the cumulative HI.
  - *Post-Development Conditions*: The cumulative HI for the commercial receptor is 0.03, which is below the significance threshold.

- **New Mill – Dump Area**:
  - *Pre-Development Conditions*: The cumulative HI for the commercial worker is 0.8. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (0.3) and TPHd (0.4). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 57% of the cumulative HI. Approximately 46% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at

concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.4, which is below the significance threshold.
    - *Post-Development Conditions*: The cumulative HI for the commercial worker is 0.6. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (0.3) and TPHd (0.2). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 62% of the cumulative HI. Approximately 66% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.2, which is below the significance threshold.

- **Box Factory – Transformer Area**:
    - *Pre-Development Conditions*: The cumulative HI for the commercial worker is 0.7. Arsenic (0.5) is the only COPC resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 67% of the cumulative HI. Approximately 79% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.1, which is below the significance threshold.
    - *Post-Development Conditions*: The cumulative HI for the commercial worker is 0.7. Arsenic (0.5) is the only COPC resulting in HI estimate greater than or equal to 0.1. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 70% of the cumulative HI. Approximately 86% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 0.09, which is below the significance threshold.

- **Box Factory – Burner**:
    - *Pre-Development Conditions*: The cumulative HI for the commercial worker is 0.09, which is below the significance threshold.
    - *Post-Development Conditions*: The cumulative HI for the commercial worker is 0.002, which is below the significance threshold.

Construction Worker

The non-cancer HQs and HIs associated with potential exposure by the onsite construction workers are summarized on Table D-24. Non-cancer HQs for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-17 through D-19 post development conditions. The non-cancer HI for construction workers exposed to all of the COPCs in soil is summarized by investigation area below:

- **New Mill – Dip Tank**: The cumulative HI for the construction worker is 3.8. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (2.2), cobalt (0.3), manganese (0.5), nickel (0.4), and vanadium (0.2). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 44% of the cumulative HI, but dermal contact with soil represents 21% and inhalation to fugitive dust represents 35%. Approximately 98% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the construction worker receptor is 0.07, which is below the significance threshold.

- **New Mill – Equipment Shed**: The cumulative HI for the construction worker is 0.1, which is below the significance threshold. TPHd is the only COPCs resulting in HI estimate greater than or equal to 0.1. Dermal contact with soil represents the primary exposure pathway and accounts for approximately 57% of the cumulative HI, with incidental ingestion and inhalation of fugitive dust contributing to 39% and 4% of the cumulative HI, respectively.

- **New Mill – Dump Area**: The cumulative HI for the construction worker is 4.4. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (1), cobalt (0.5), nickel (2), and TPHd (0.7). Inhalation of fugitive dust represents the primary exposure pathway and accounts for approximately 55% of the cumulative HI. Incidental ingestion and dermal contact with soil account for 26% and 19% of the cumulative HI, respectively. Approximately 60% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the construction worker receptor is 1.8. COPCs that contribute most significantly to the adjusted cumulative hazard index include nickel (1) and TPHd (0.7). Inhalation of fugitive dust containing nickel and incidental ingestion and dermal contact with soil containing TPHd are the exposure pathways that contribute most-significantly to the construction worker exposures in this area. It should be noted that target endpoints for the two primary COPCs (i.e., nickel and TPHd) are different. Consequently, summing the hazard indices for nickel and TPHd results in overestimating the potential for non-carcinogenic health effects due to simultaneous exposure to multiple chemicals (USEPA, 1989). It should also be noted that the exposure point concentration for nickel used in this analysis is based on the maximum concentration of nickel detected in this area. These factors should be considered when evaluating the potential significance of the calculated hazard indices for this area.

- **Box Factory – Transformer Area**: The cumulative HI for the construction worker is 3.0. Individual COPCs resulting in HI estimates greater than or equal to 0.1 include arsenic (1.8), cobalt (0.3), nickel (0.4), vanadium (0.1), and TPHd (0.3). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 50% of the cumulative HI. Dermal contact with soil and inhalation of fugitive dust both account for 25% of the cumulative HI. Approximately 88% of the cumulative HI estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative HI (i.e., the cumulative HI adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the construction worker is 0.4, which is below the significance threshold.

- **Box Factory – Burner**: The cumulative HI for the construction worker is 0.006, which is below the significance threshold.

5.2 Carcinogenic Health Effects

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The SF converts estimated daily intakes averaged over a lifetime of exposure to incremental risk of an individual developing cancer (USEPA, 1989). This carcinogenic risk estimate is generally an upper-bound value since the slope factor is often a 95% UCL of probability of response based on experimental animal data. Cancer risk for COPCs were calculated as follows:

Inhalation Pathways:

$$CR_i = LAC_i \times IUR_i$$

Ingestion and Dermal Pathways:

$$CR_i = LDD_i \times SF_i$$

where:

CR_i	= Cancer risk for chemical "i" (unitless);
LAC_i	= Lifetime air concentration for chemical "i" ($\mu g/m^3$);
IUR_i	= Inhalation unit risk factor for chemical "i" $(\mu g/m^3)^{-1}$;
LDD_i	= Lifetime daily dose for chemical "i" (mg/kg-day); and
SF_i	= Slope factor for chemical "i" $(mg/kg\text{-}day)^{-1}$.

The estimated excess cancer risks for each chemical are summed regardless of toxic endpoint to estimate the total excess cancer risk for the exposed individual:

$$CR = \sum_{i=1}^{n} CR_i$$

where: i = specific health endpoint

The USEPA and CalEPA have defined what is considered to be an acceptable level of risk in similar, though slightly different, ways. The USEPA considers one in one-million (1×10^{-6}) to one in ten thousand (1×10^{-4}) to be the target range for acceptable risk (USEPA, 1990a, 1990b). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than 1×10^{-6} are considered *de minimis,* a risk level that is so low as to not warrant any further investigation or analysis (USEPA, 1990a). Within the state of California, CalEPA also generally targets the same range for acceptable risks.

It should be noted that cancer risks in the 1×10^{-6} to 1×10^{-4} range or higher do not necessarily mean that adverse health effects will be observed. To further characterize carcinogenic health risks for commercial and construction workers, a target risk of $1x10^{-5}$ was also used for comparison.

The following sections summarize the results of the carcinogenic risk characterization for each receptor evaluated. The cancer risks estimated for each chemical evaluated are presented on Tables D-5 through D-19 and summarized on Table D-21 for recreational receptors, Table D-23 for commercial worker, and Table D-25 for construction worker.

Recreational Receptor

The upper-bound cumulative lifetime incremental cancer risks associated with potential exposure by the onsite recreational receptors are summarized on Table D-21. Cancer risks for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-5 through D-7 for pre-development conditions and Tables D-8 through D-10 for post development conditions. The upper-bound cumulative lifetime incremental cancer risks for recreational receptors exposed to all of the COPCs in soil are summarized by investigation area below:

- **New Mill – Dip Tank**:
  - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $1x10^{-5}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimates greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 92% of the cumulative risk estimate. Approximately 98% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of

naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $2x10^{-7}$, which is below the *de minimis* risk level.

- *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $1x10^{-5}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimates greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 90% of the cumulative risk estimate. Approximately 95% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $6x10^{-7}$, which is below the *de minimis* risk level.

- **New Mill – Equipment Shed**: Cancer risks were not calculated for the New Mill – equipment shed as no carcinogenic COPCs were detected in soil samples collected in this area.

- **New Mill – Dump Area**:
  - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $5x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 91% of the cumulative risk estimate. Approximately 99.99% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $7x10^{-10}$, which is below the *de minimis* risk level.
  - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $5x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 91% of the cumulative risk estimate. Approximately 99.99% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $7x10^{-10}$, which is below the de minimis risk level.

- **Box Factory – Transformer Area**:
  - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $1x10^{-5}$. Individual COPCs resulting in an incremental cancer risk estimates greater than or equal to $1x10^{-6}$ include arsenic ($9x10^{-6}$) and aroclor 1260 ($1x10^{-6}$). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 86% of the cumulative risk estimate. Approximately 80% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $2x10^{-6}$. Aroclor 1260 is the primary COPC that contributes to the adjusted cumulative risk estimate.
  - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks is $1x10^{-5}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 90% of the cumulative risk estimate. Approximately 98% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the recreational receptor is $2x10^{-7}$, which is below the de minimis risk level.

- **Box Factory – Burner**:
    - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks for TCDD TEQ is $6x10^{-5}$.
    - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks for TCDD TEQ is $1x10^{-6}$, which is at the de minimis risk level.

Commercial Worker

The upper-bound cumulative lifetime incremental cancer risks associated with potential exposure by the onsite recreational receptors are summarized on Table D-23. Cancer risks for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-5 through D-7 for pre-development conditions and Tables D-8 through D-10 for post development conditions. The upper-bound cumulative lifetime incremental cancer risks for commercial receptors exposed to all of the COPCs in soil are summarized by investigation area below:

- **New Mill – Dip Tank**:
    - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $9x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 75% of the cumulative risk estimate. Approximately 98% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is $2x10^{-7}$, which is below the de minimis risk level.
    - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $8x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 70% of the cumulative risk estimate. Approximately 92% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is $6x10^{-7}$, which is below the de minimis risk level.

- **New Mill – Equipment Shed**: Cancer risks were not calculated for the New Mill – equipment shed as no carcinogenic COPCs were detected in soil sample collected in this area.

- **New Mill – Dump Area**:
    - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $4x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 73% of the cumulative risk estimate. Approximately 99.97% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is $1x10^{-9}$, which is below the *de minimis* risk level.
    - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is $4x10^{-6}$. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to $1x10^{-6}$. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 73% of the cumulative risk estimate. Approximately 99.97% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted

cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 1x10^{-9}, which is below the *de minimis* risk level.

- **Box Factory – Transformer Area**:
    - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risk is 1x10^{-5}. Individual COPCs resulting in an incremental cancer risk estimates greater than or equal to 1x10^{-6} include arsenic (6x10^{-6}) and aroclor 1260 (1x10^{-6}). Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 67% of the cumulative risk estimate. Approximately 81% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 2x10^{-6}. Aroclor 1254 and aroclor 1260 are the COPCs that contribute significantly to the adjusted cumulative risk estimate.
    - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks is 1x10^{-5}. Arsenic is the only individual COPC resulting in an incremental cancer risk estimates greater than or equal to 1x10^{-6}. Incidental ingestion of soil represents the primary exposure pathway and accounts for approximately 73% of the cumulative risk estimate. Approximately 98% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the commercial receptor is 2x10^{-7}, which is below the *de minimis* risk level.

- **Box Factory – Burner**:
    - *Pre-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks for TCDD TEQ is 4x10^{-5}.
    - *Post-Development Conditions*: The upper-bound cumulative lifetime incremental cancer risks for TCDD TEQ is 8x10^{-7}, which is below the *de minimis* risk level.

Construction Worker

The upper-bound cumulative lifetime incremental cancer risks associated with potential exposure by the onsite recreational receptors are summarized on Table D-23. Cancer risks for incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust are presented in Tables D-5 through D-7 for pre-development conditions and Tables D-8 through D-10 for post development conditions. The upper-bound cumulative lifetime incremental cancer risks for construction worker receptors exposed to all of the COPCs in soil are summarized by investigation area below:

- **New Mill – Dip Tank**: The upper-bound cumulative lifetime incremental cancer risk for the construction worker is 1x10^{-6}. Arsenic is the only individual COPC resulting in an incremental cancer risk estimate greater than or equal to 1x10^{-6}. Dermal contact with soil represents the primary exposure pathway and accounts for approximately 51% of the cumulative cancer risk estimate. Incidental ingestion of soil and inhalation of fugitive dust account for 27% and 23% of the cumulative cancer risk estimate. Approximately 93% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the construction worker is 1x10^{-7}, which is below the *de minimis* risk level.

- **New Mill – Equipment Shed**: Cancer risks were not calculated for the New Mill – equipment shed as no carcinogenic COPCs were detected in soil samples collected in this area.

- **New Mill – Dump Area**: The upper-bound cumulative lifetime incremental cancer risk is $9x10^{-7}$. Approximately 94% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk (i.e., the cumulative risk adjusted to exclude the contributions of naturally-occurring metals present at concentrations representative of background) for the construction worker is $5x10^{-8}$, which is below the *de minimis* risk level.

- **Box Factory – Transformer Area**: The upper-bound cumulative lifetime incremental cancer risk is $1x10^{-6}$. Approximately 96% of the cumulative risk estimate is related to metals (e.g., arsenic) that occur at concentrations that are representative of background. The adjusted cumulative risk for the construction worker is $4x10^{-8}$, which is below the *de minimis* risk level.

- **Box Factory – Burner**: The upper-bound cumulative lifetime incremental cancer risks for TCDD TEQ is $1x10^{-7}$, which is below the *de minimis* risk level.

5.3 Lead Evaluation

The BLL for recreational receptor were calculated using the DTSC's LeadSpread 8 Model (Table D-26) and for the commercial worker and recreational receptor the USEPA's ALM (Tables D-27 and D-28, respectively). Site-specific parameters were used in the models. The BLLs for each receptor for the Site are as follows:

- Recreational Receptor:
  - New Mill – Dip Tank:
    - Pre-development – 0.1;
    - Post development – 0.1;
  - New Mill – Equipment Shed: Lead was not sampled at the equipment shed area;
  - New Mill – Dump Area:
    - Pre-development – 0.1;
    - Post development – 0.1;
  - Box Factory – Transformer Area:
    - Pre-development – 0.3;
    - Post development – 0.3;
  - Box Factory – Burner: Lead was not sampled at the burner area;
- Commercial Worker:
  - New Mill – Dip Tank:
    - Pre-development – 0.03;
    - Post development – 0.02;
  - New Mill – Equipment Shed: Lead was not sampled at the equipment shed area;
  - New Mill – Dump Area:
    - Pre-development – 0.03;
    - Post development – 0.03;
  - Box Factory – Transformer Area:
    - Pre-development – 0.08;
    - Post development – 0.08;
  - Box Factory – Burner: Lead was not sampled at the burner area;
- Construction Worker:
  - New Mill – Dip Tank: Post development – 0.02;
  - New Mill – Equipment Shed: Lead was not sampled at the equipment shed area;
  - New Mill – Dump Area: Post development – 0.03;
  - Box Factory – Transformer Area: Post development – 0.08; and
  - Box Factory – Burner: Lead was not sampled at the burner area.

6.0 UNCERTAINTIES AND LIMITATIONS

There is a certain degree of uncertainty in estimating exposures to chemicals in the environment. To account for these uncertainties, the risk assessment methodology was designed to be conservative. Where values are uncertain because of a lack of site-specific data, regulatory agency default values and/or conservative values were used. Specific sources of conservatism associated with this HHRA are discussed below:

- The exposure assessment performed as a component of this analysis incorporates a number of assumptions regarding the current or future presence of receptors and the frequency and duration of activities that may result in exposure to the receptors. The exposure factors utilized in calculating exposures and risks are intended to provide a reasonable upper-bound estimate of exposure for the receptors and exposure pathways considered. While these assumptions are unlikely to underestimate exposure and risk, alternative assumptions based on average or most-likely conditions could yield lower estimates of exposure and risk. For example, the actual period of time that a recreational receptor, commercial worker, or construction worker would be involved in direct contact with soils is anticipated to be substantially less than the exposure frequency and duration utilized in this HHRA.

- Some of the toxicity values utilized in this HHRA involve the extrapolation of results from animal studies. When the results of these animal studies are extrapolated to humans, safety factors or other conservative assumptions are typically applied to ensure that human health effects are not underestimated. For carcinogenic effects, the risk assessment methodology assumes the absence of a threshold dose.

- Exposures and associated risks resulting from contact with multiple COPCs were conservatively assumed to be additive. Furthermore, the additivity of risk was assumed to apply without regard to health effects endpoints (e.g., target organs, tumor type, toxic endpoint, or mode of action). If the health effects endpoints were considered, the cumulative risks would be lower than the values presented in this assessment.

- All chemicals detected in soil were retained as COPCs regardless of frequency of detection or concentration relative to background. Certain naturally-occurring metals contribute significantly to the cumulative exposure and non-carcinogenic risk estimates. Review of cumulative exposure and risk estimates should consider the influence of naturally-occurring metals and the representative contribution to the cumulative risk associated with background concentrations of these constituents. This assessment has attempted to illustrate the relative contribution of naturally-occurring elements by presented adjusted hazard index and cancer risk estimates for all COPCs and the subset of COPCs that may be considered to be site-related.

- Exposure point concentrations for COPCs in fugitive dust were estimated utilizing default PEFs. While this approach is reasonable in the absence of suitable data derived from air sampling and gravimetric analysis, the actual concentrations of dust may be different. In general, the estimated concentrations of COPCs in fugitive dust predicted in this assessment are anticipated to be higher than the actual concentrations. For instance, the construction worker PEF corresponds to a respirable dust concentration of 1 milligrams per cubic meter (mg/m^3), which is based on a maximum concentration of dust in air of 10 mg/m^3 recommended by the American Conference of Governmental Industrial Hygienists, and the assumption that 10 percent of the mass of particles are in the respirable PM10 range (DTSC, 2014).

- This assessment presumes that all areas of the Site would be potentially available for contact by the recreational, commercial, and construction worker receptors. This assumption does not account for the future presence of engineered surfaces, buildings, or the presence of vegetation across the Site. These features could serve to further reduce potential exposures. However, the statistical methodology utilized to establish potential EPCs of the purpose the quantitative health risk assessment is believed to be reasonable and appropriate regardless of the future Site development activities.

7.0 CONCLUSIONS

This HHRA was conducted to evaluate the potential human health risks associated with current (pre-development) and anticipated future (post-development) site conditions. The exposure assumptions and risk assessment methodologies employed for the pre-development and post-development conditions are identical, with the exception of the exposure point concentrations utilized in the analysis. This analysis was performed without considering the impact of remedial action on reducing the exposure point concentrations of COPCs in soil (pre-development only), the influence of engineered structures in reducing the potential for future exposure, or the application of administrative or institutional controls that could serve to reduce or eliminate potential receptors or exposure pathways from quantitative analysis. The HHRA quantitatively evaluated non-cancer health effects and theoretical cancer risks using the RME scenario for the following exposure pathways and receptors:

Exposure Pathway	Recreational Receptor	Commercial Worker	Construction Worker
Incidental Ingestion of Soil	✓	✓	✓
Dermal Contact with Soil	✓	✓	✓
Inhalation of Fugitive Dust	✓	✓	✓

For the purpose of this assessment, the COPCs include both naturally-occurring elements (e.g., metals) and a subset of COPCs that were the primary focus of Site evaluations. The results of previous environmental assessment activities were used to define the COPCs that were included for quantitative analysis and to establish EPCs for the COPCs by investigation area.

The results of the HHRA indicate that naturally-occurring elements contribute most-significantly to the cumulative non-carcinogenic and carcinogenic risk estimates. Adjustment of the cumulative risk estimates to exclude the contributions of naturally-occurring elements provides a more accurate representation of post-development conditions as related to the future development and use of the property. Based on the quantitative results of the HHRA, TRC offers the following conclusions with regard to the future development and use of the subject property. The conclusions are presented by investigation area as described below:

- New Mill – Dip Tank Area
    - *Current Conditions:* The results of the HHRA indicate that the adjusted cumulative hazard indices for non-carcinogenic COPCs and the adjusted upper-bound lifetime incremental cancer risks are below levels that warrant consideration of remediation or mitigation measures.
    - *Future Conditions:* Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.
    - *Construction Worker Considerations:* While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil.

- New Mill – Equipment Shed Area
    - Primary COPC – TPHd
    - *Current Conditions*: Under current conditions, potential recreational exposure to near-surface soil could result in adverse non-carcinogenic health impacts under the defined conditions of exposure. Potential exposures to commercial receptors in this area are not anticipated to result in adverse health effects. Excavation and removal of soil containing elevated concentrations of TPHd would be expected to further reduce potential exposures and risks in this area.
    - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.
    - *Construction Worker Considerations*: Work in this area would not require extraordinary health and safety provisions. However, construction workers involved in earth work in this area should be informed of the possible presence of TPHd in soil and encouraged to take measures to reduce potential for dermal contact and incidental ingestion of soil.

- New Mill – Dump Area
    - Primary COPCs – TPHd and nickel
    - *Current Conditions*: Under current conditions, potential recreational exposure to near-surface soil could result in adverse non-carcinogenic health impacts under the defined conditions of exposure. Potential exposures to commercial receptors in this area are not anticipated to result in adverse health effects. Excavation and removal of soil containing elevated concentrations of TPHd would be expected to further reduce potential exposures and risks in this area.
    - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors during or following completion of rough grading activities are not expected to result in adverse health impacts.
    - *Construction Worker Considerations*: The presence of nickel in soil presents a potential hazard to future construction workers through the inhalation of fugitive dust exposure pathway. Construction workers involved in earth work in this area should be informed of the possible presence of TPHd and nickel in soil and should take measures to reduce the generation of fugitive dust during construction through industry standard dust control measures (e.g., water application and/or use of dust palliatives). Future site contractors should also adhere to standard environmental procedures related to dust and stormwater control. In addition, it is recommended that a construction contingency plan be developed in order to address previously undiscovered Site conditions that may warrant additional investigation, analysis or mitigation.

- Box Factory – Transformer Area
    - Primary COPC: PCBs (i.e., Aroclor 1254 and Aroclor 1260)
    - *Current Conditions*: Under current conditions, potential exposures to aroclor 1254 and aroclor 1260 in near-surface soil could result in unacceptable lifetime incremental cancer risks for recreational and commercial receptors. Upper-bound lifetime incremental cancer risks for the recreational receptor and commercial worker are approximately 2 times higher than the lowest range of acceptable risks typically used in risk management decision-making (i.e., 1 in 1,000,000). Excavation and removal of soil containing elevated concentrations of to aroclor 1254 and aroclor 1260 would be expected to reduce potential exposures and risks in this area.
    - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. Potential exposures to recreational, commercial, and construction worker receptors

during or following completion of rough grading activities are not expected to result in adverse health impacts.

  - *Construction Worker Considerations*: While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil. In addition, construction workers engaged in earth moving activities in this area should be informed of the presence of PCBs in soil.

- Box Factory – Burner
  - Primary COPC: TCDD Eqs (dioxins/furans)
  - *Current Conditions*: Under current conditions, potential exposures to TCDD Eqs in near-surface soil could result in unacceptable lifetime incremental cancer risks for recreational and commercial receptors. Upper-bound lifetime incremental cancer risks for the recreational receptor are approximately 60 times higher than the lowest range of acceptable risks typically used in risk management decision-making (i.e., 1 in 1,000,000). Similarly, upper-bound lifetime incremental cancer risks for the commercial worker receptor are approximately 4 times higher than the acceptable risk level that is typically utilized for exposures in a commercial or industrial land use scenario (i.e., 1 in 100,000). Excavation and removal of soil containing elevated concentrations of TCDD Eqs would be expected to reduce potential exposures and risks in this area. In the absence of source removal activities, administrative or engineering controls could be employed to eliminate the potential exposure pathways in this area.
  - *Future Conditions*: Future site development activities, including rough grading, would be expected to result in a reduction in the calculated exposure point concentration. However, potential risks to the recreational receptor are estimated to meet the lowest value in the range of acceptable risks (i.e., 1 in 1,000,000).
  - *Construction Worker Considerations*: While potential exposures to construction workers engaged in earth working activities in this area are not expected to result in significant risks, appropriate measures should be taken while working in this area to reduce the potential for dermal contact and incidental ingestion of soil. In addition, construction workers engaged in earth moving activities in this area should be informed of the presence of TCDD Eqs in soil. Future site contractors should also adhere to standard environmental procedures related to dust and stormwater control. In addition, it is recommended that a construction contingency plan be developed in order to address previously undiscovered Site conditions that may warrant additional investigation, analysis or mitigation.

8.0 REFERENCES

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Table D-1
Descriptive Statistical Summary for Soil Samples - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
New Mill - Dip Tank									
Metals									
Antimony	21	1	4.2	4.2	ND	Yes	NA	4.2	Max
Arsenic	21	10	0.96	5.1	2.4	Yes	1.9	1.9	UCL
Barium	21	16	10	144	429	No	83	83	UCL
Beryllium	21	15	0.43	1.6	1.5	Yes	1.2	1.2	UCL
Cadmium	20	20	0.43	1.0	0.93	Yes	0.83	0.83	UCL
Chromium	21	21	4.5	40	49	No	26	26	UCL
Chromium (VI)	10	1	0.2	0.2	1.1	No	NA	0.20	Max
Cobalt	21	11	1.4	13	11	Yes	6.1	6.1	UCL
Copper	21	21	14	39	46	No	28	28	UCL
Lead	21	21	5.6	33	28	Yes	20	20	UCL
Manganese	21	21	47	493	365	Yes	218	218	UCL
Mercury	21	7	0.043	1.5	0.057	Yes	0.29	0.29	UCL
Nickel	21	21	5.9	75	57	Yes	27	27	UCL
Vanadium	21	21	39	96	98	No	73	73	UCL
Zinc	21	21	5.2	36	64	No	26	26	UCL
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	15	1	21	21	--	--	NA	21	Max
TPH as Motor Oil	15	7	18	160	--	--	172	160	Max
Organochlorine Pesticides									
Pentachlorophenol	9	1	3.2	3.2	--	--	NA	3.2	Max
New Mill - Equipment Shed									
Total Petroleum Hydrocarbons (TPH)									
TPH as Gasoline	20	1	0.29	0.29	--	--	NA	0.29	Max
TPH as Diesel	30	23	7.3	3,000	--	--	768	768	UCL
TPH as Motor Oil	30	22	73	6,700	--	--	1,980	1,980	UCL

Table D-1
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Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
New Mill - Dump Area									
Metals									
Arsenic	3	2	0.54	0.78	2.4	No	NA	0.78	Max
Barium	3	3	23	39	429	No	NA	39	Max
Beryllium	3	2	0.12	0.14	1.5	No	NA	0.14	Max
Cadmium	3	3	0.41	0.53	0.93	No	NA	0.53	Max
Chromium	3	3	19	36	49	No	NA	36	Max
Cobalt	3	3	6.3	9.4	11	No	NA	9.4	Max
Copper	3	3	19	25	46	No	NA	25	Max
Lead	3	3	8.6	18	28	No	NA	18	Max
Nickel	3	3	52	120	57	Yes	NA	120	Max
Vanadium	3	3	15	27	98	No	NA	27	Max
Zinc	3	3	27	49	64	No	NA	49	Max
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	24	23	21	2,250	--	--	747	747	UCL
TPH as Motor Oil	23	22	210	1,900	--	--	923	923	UCL
Box Factory - Transformer Area									
Metals									
Arsenic	8	8	0.72	1.4	2.4	No	1.3	1.3	UCL
Barium	8	8	35	75	429	No	64	64	UCL
Beryllium	8	8	0.27	0.41	1.5	No	0.36	0.36	UCL
Cadmium	8	8	1.2	2.7	0.93	Yes	2.1	2.1	UCL
Chromium	8	8	6.5	24	49	No	18	18	UCL
Cobalt	8	8	3.1	5.8	11	No	5.5	5.5	UCL
Copper	8	8	14	55	46	Yes	36	36	UCL
Lead	8	8	12	82	28	Yes	50	50	UCL
Mercury	8	8	0.021	1.7	0.057	Yes	2.3	2.3	UCL
Molybdenum	8	1	4.4	4.4	NA	No	NA	4.4	Max
Nickel	8	8	9.3	42	57	No	29	29	UCL
Selenium	8	4	0.49	0.8	ND	Yes	0.58	0.58	UCL
Vanadium	8	8	30	35	98	No	34	34	UCL

Table D-1
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Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
Zinc	8	8	22	210	64	Yes	146	146	UCL

Table D-1
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Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	1	1	130	130	--	--	NA	130	Max
TPH as Motor Oil	1	1	750	750	--	--	NA	750	Max
Organochlorine Pesticides									
DDT	11	2	0.0062	0.0073	--	--	NA	0.0073	Max
Dieldrin	8	1	0.033	0.033	--	--	NA	0.033	Max
Polychlorinated Biphenyls (PCBs)									
Aroclor-1254	30	4	0.026	3.5	--	--	0.44	0.44	UCL
Aroclor-1260	33	20	0.025	2.0	--	--	0.50	0.50	UCL
Box Factory - Burner									
Dioxin/Furans									
TCDD TEQ	12	12	2.0E-06	1.6E-03	--	--	6.5E-04	6.5E-04	UCL

Note: Only chemicals with one or more detections are presented in this table.

Abbreviations:
-- = not applicable
DDT = dichlorodiphenyltrichloroethane
mg/kg = milligrams per kilogram
NA = not available
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
a Data set used in this evaluation provided in Appendix D, Attachment A.
[b] Background concentrations are site specific values collected along the western side of South Mount Shasta Boulevard and the vicinity of the former truck stop.
[c] The 95% upper confidence limit (UCL) calculated using United States Environmental Protection Agency (USEPA) ProUCL Model Version 5.0.00 published September 2013. ProUCL outputs are provided in Appendix D, Attachment B.
[d] The EPC is the 95% UCL. If there was insufficient data to calculate a meaningful 95% UCL or the 95% UCL was greater than the maximum concentration, then the maximum concentration was selected as the EPC.

Table D-2
Descriptive Statistical Summary for Soil Samples - Post Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
New Mill - Dip Tank									
Metals									
Antimony	29	2	0.82	4.2	ND	Yes	NA	4.2	Max
Arsenic	29	14	0.66	5.1	2.4	Yes	1.6	1.6	UCL
Barium	29	21	8	144	429	No	68	68	UCL
Beryllium	29	20	0.43	1.6	1.5	Yes	1.2	1.2	UCL
Cadmium	28	28	0.34	1.2	0.93	Yes	0.83	0.83	UCL
Chromium	29	29	4.5	42	49	No	28	28	UCL
Chromium (VI)	14	1	0.2	0.2	1.1	No	NA	0.20	Max
Cobalt	29	12	1.4	13	11	Yes	5.7	5.7	UCL
Copper	29	29	14	39	46	No	27	27	UCL
Lead	29	29	4.9	33	28	Yes	14	14	UCL
Manganese	29	29	47	493	365	Yes	183	183	UCL
Mercury	29	9	0.043	1.5	0.057	Yes	0.23	0.23	UCL
Nickel	29	29	5.3	75	57	Yes	23	23	UCL
Vanadium	29	29	35	99	98	Yes	71	71	UCL
Zinc	29	29	5.2	36	64	No	22	22	UCL
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	19	1	21	21	--	--	NA	21	Max
TPH as Motor Oil	19	7	18	160	--	--	158	158	UCL
Organochlorine Pesticides									
Pentachlorophenol	37	4	0.028	64	--	--	5.6	5.6	UCL
New Mill - Equipment Shed									
Total Petroleum Hydrocarbons (TPH)									
TPH as Gasoline	61	1	0.29	0.29	--	--	NA	0.29	Max
TPH as Diesel	70	32	5.1	350	--	--	59	59	UCL
TPH as Motor Oil	70	24	29	2,300	--	--	294	294	UCL

Table D-2
Descriptive Statistical Summary for Soil Samples - Post Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
New Mill - Dump Area									
Metals									
Arsenic	3	2	0.54	0.78	2.4	No	NA	0.8	Max
Barium	3	3	23	39	429	No	NA	39.0	Max
Beryllium	3	2	0.12	0.14	1.5	No	NA	0.1	Max
Cadmium	3	3	0.41	0.53	0.93	No	NA	0.5	Max
Chromium	3	3	19	36	49	No	NA	36.0	Max
Cobalt	3	3	6.3	9.4	11	No	NA	9.4	Max
Copper	3	3	19	25	46	No	NA	25.0	Max
Lead	3	3	8.6	18	28	No	NA	18.0	Max
Nickel	3	3	52	120	57	Yes	NA	120.0	Max
Vanadium	3	3	15	27	98	No	NA	27.0	Max
Zinc	3	3	27	49	64	No	NA	49.0	Max
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	49	42	7	2,250	--	--	316	316	UCL
TPH as Motor Oil	48	41	16	3,400	--	--	825	825	UCL
Box Factory - Transformer Area									
Metals									
Arsenic	7	7	0.72	1.4	2.4	No	1.4	1.4	UCL
Barium	7	7	35	75	429	No	64	64	UCL
Beryllium	7	7	0.27	0.41	1.5	No	0.37	0.37	UCL
Cadmium	7	7	1.2	2.3	0.93	Yes	1.9	1.9	UCL
Chromium	7	7	6.5	24	49	No	18	18	UCL
Cobalt	7	7	3.1	5.7	11	No	5.4	5.4	UCL
Copper	7	7	14	55	46	Yes	37	37	UCL
Lead	7	7	12	82	28	Yes	51	51	UCL
Mercury	7	7	0.021	1.7	0.057	Yes	2.1	2.1	UCL
Nickel	7	7	9.3	26	57	No	24	24	UCL
Selenium	7	3	0.49	0.8	ND	Yes	0.61	0.61	UCL
Vanadium	7	7	30	35	98	No	34	34	UCL
Zinc	7	7	22	170	64	Yes	126	126	UCL

Table D-2
Descriptive Statistical Summary for Soil Samples - Post Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Sample Summary [a]				Maximum Background Concentration [b]	Maximum Concentration Greater Than Background?	95% Upper Confidence Limit (UCL) [c]	Exposure Point Concentration [d]	
	Total Soil Samples Analyzed	Samples Detected	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)	(mg/kg)		(mg/kg)	(mg/kg)	Basis
Total Petroleum Hydrocarbons (TPH)									
TPH as Diesel	1	1	130	130	--	--	NA	130	Max
TPH as Motor Oil	1	1	750	750	--	--	NA	750	Max
Organochlorine Pesticides									
DDT	10	2	0.0062	0.0073	--	--	NA	0.0073	Max
Polychlorinated Biphenyls (PCBs)									
Aroclor-1254	40	2	0.026	0.041	--	--	NA	0.041	Max
Aroclor-1260	43	18	0.025	0.17	--	--	0.056	0.056	UCL
Box Factory - Burner									
Dioxin/Furans									
TCDD TEQ	8	8	2.0E-06	2.1E-05	--	--	1.3E-05	1.3E-05	UCL

Note: Only chemicals with one or more detections are presented in this table.

Abbreviations:
-- = not applicable
DDT = dichlorodiphenyltrichloroethane
mg/kg = milligrams per kilogram
NA = not available
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
a Data set used in this evaluation provided in Appendix D, Attachment A.
[b] Background concentrations are site specific values collected along the western side of South Mount Shasta Boulevard and the vicinity of the former truck stop.
[c] The 95% upper confidence limit (UCL) calculated using United States Environmental Protection Agency (USEPA) ProUCL Model Version 5.0.00 published September 2013. ProUCL outputs are provided in Appendix D, Attachment B.
[d] The EPC is the 95% UCL. If there was insufficient data to calculate a meaningful 95% UCL or the 95% UCL was greater than the maximum concentration, then the maximum concentration was selected as the EPC.

Table D-3
Summary of Exposure Parameters
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Exposure Parameter	Symbol	Units	Recreational Receptor		Commercial Worker	Construction Worker
			Adult	Child		
Common Exposure Parameters						
Exposure Frequency	EF	days/year	150	150	250	250
Exposure Duration	ED	year	24	6	25	1
Body Weight	BW	kg	70	15	70	70
Averaging Time-Non-cancer	ATnc	days	8,760	2,190	9,125	365
Averaging Time-Cancer	ATca	days	25,550	25,550	25,550	25,550
Inhalation						
Exposure Time	ET	hours/day	8	8	8	8
Particulate Emission Factor	PEF	m^3/kg	1.36E+09	1.36E+09	1.36E+09	1.00E+06
Incidental Soil Ingestion						
Ingestion Rate	IngR	mg/day	100	200	100	330
Dermal Contact with Soil						
Skin Surface Area	SA	cm^2	6,032	2,900	6,032	6,032
Soil-to-Skin Adherence Factor	SAF	mg/cm^2-day	0.07	0.2	0.2	0.8

Note: Residential exposure parameters were used for the recreational receptor unless noted below.

Abbreviations:
cm^2 = centimeter squared
kg = kilograms
m^3/kg = cubic meters per kilograms
mg/cm^2-day= milligrams per centimeter squared per day
mg/day= milligrams per day

References:
Common Exposure Parameters
Exposure frequency for recreational receptors assumes 3 days per week for 50 weeks per year (best professional judgement)
Exposure frequency for commercial and construction workers from DTSC, 2014
Exposure durations from DTSC, 2014
Exposure durations from DTSC, 2014
Exposure duration evaluating muagenic chemicals for recreational receptors are as follows:
2 years for a child receptor 0 to 2 years of age
4 years for a child receptor 2 to 6 years of age
10 years for an adult receptor 6 to 16 years of age
14 years for an adult receptor 16 to 30 years of age
Body weight from DTSC, 2014
Averaging time for noncarcinogens equals exposure duration (years) x 365 days per year (DTSC, 2014)
Averaging time for carcinogens equal 365 days/year x 70 years (DTSC, 2014)

Inhalation
Exposure time:
Residential assumes a full day (24-hour) exposure (USEPA, 2009) for both indoor and ambient exposure scenarios
Commercial and construction workers assumed to have an eight hour work day (DTSC, 2014)
Particulate emission factor from DTSC, 2014

Incidental Ingestion of Soil
Soil ingestion rates from DTSC, 2014

Dermal Contact with Soil
Skin surface area from DTSC, 2014
Soil-to-Skin adherence factor from DTSC, 2014

Department of Toxic Substances Control (DTSC), 2014, Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities, Office of Human and Ecological Risk (HERO), HERO Human Health Risk Assessment (HHRA) Note Number: 1, Issue Date: September 30, 2014.

United States Environmental Protection Agency (USEPA), 2009, Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), Final: Office of Superfund Remediation and Technology Innovation, Washington, D.C.

Table D-4
Summary of Constituent Toxicity Criteria
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituent	Carcinogenic									Chronic Noncarcinogenic						
	Oral			Dermal [c]		Inhalation				Oral		Dermal [c]		Inhalation		
	Slope Factor (SFo) $(mg/kg\text{-}day)^{-1}$	Source [a]	Weight- of-evidence [b]	Dermal Adjustment Factor (ABS_{GI})	Slope Factor (SFd) $(mg/kg\text{-}day)^{-1}$	Unit Risk Factor (URF) $(\mu g/m^3)^{-1}$	Slope Factor (SFi) $(mg/kg\text{-}day)^{-1}$	Source [a]	Weight- of-evidence [b]	Reference Dose (RfDo) (mg/kg-day)	Source [a]	Dermal Adjustment Factor (ABS_{GI})	Reference Dose (RfDd) (mg/kg-day)	Reference Concentration (RfC) $(\mu g/m^3)$	Reference Dose (RfDi) (mg/kg-day)	Source [a]
Metals																
Antimony	NA	--	NC	0.15	NA	NA	NA	--	NC	4.0E-04	IRIS	0.15	6.0E-05	NA	NA	--
Arsenic	9.5E+00	OEHHA	A	1	9.5E+00	3.3E-03	1.2E+01	OEHHA	A	3.5E-06	OEHHA	1	3.5E-06	1.5E-02	4.3E-06	OEHHA
Barium	NA	--	D	0.07	NA	NA	NA	--	D	2.0E-01	IRIS	0.07	1.4E-02	5.0E-01	1.4E-04	HEAST
Beryllium	NA	--	ID	0.007	NA	2.4E-03	8.4E+00	OEHHA	B1	2.0E-03	OEHHA	0.007	1.4E-05	7.0E-03	2.0E-06	OEHHA
Cadmium	NA	--	ID	0.025	NA	4.2E-03	1.5E+01	OEHHA	B1	5.0E-04	OEHHA	0.025	1.3E-05	2.0E-02	5.7E-06	OEHHA
Chromium	NA	--	D	0.013	NA	NA	NA	--	D	1.5E+00	IRIS	0.013	2.0E-02	NA	NA	--
Chromium (VI)	5.0E-01	OEHHA	D	0.025	1.3E-02	1.5E-01	5.1E+02	OEHHA	A	2.0E-02	OEHHA	0.025	5.0E-04	2.0E-01	5.7E-05	OEHHA
Cobalt	NA	--	NA	1	NA	9.0E-03	3.2E+01	PPRTV	B2	3.0E-04	PPRTV	1	3.0E-04	6.0E-03	1.7E-06	PPRTV
Copper	NA	--	D	1	NA	NA	NA	--	D	4.0E-02	HEAST	1	4.0E-02	NA	NA	--
Lead	LeadModel	LeadModel	B2	--	LeadModel	LeadModel	LeadModel	LeadModel	B2	LeadModel	LeadModel	--	LeadModel	LeadModel	LeadModel	--
Manganese	NA	--	D	1	NA	NA	NA	--	D	1.4E-01	IRIS	1	1.4E-01	9.0E-02	2.6E-05	OEHHA
Mercury	NA	--	D	1	NA	NA	NA	--	D	1.6E-04	OEHHA	1	1.6E-04	3.0E-02	8.6E-06	OEHHA
Molybdenum	NA	--	NA	1	NA	NA	NA	--	NA	5.0E-03	IRIS	1	5.0E-03	NA	NA	--
Nickel	NA	--	A	0.04	NA	2.6E-04	9.1E-01	OEHHA	A	1.1E-02	OEHHA	0.04	4.4E-04	1.4E-02	4.0E-06	OEHHA
Selenium	NA	--	D	1	NA	NA	NA	--	D	5.0E-03	OEHHA	1	5.0E-03	2.0E+01	5.7E-03	OEHHA
Thallium	NA	--	ID	1	NA	NA	NA	--	ID	1.0E-05	PPTRV	1	1.0E-05	NA	NA	--
Vanadium	NA	--	NA	1	NA	NA	NA	--	NA	5.0E-03	RSL	1	5.0E-03	1.0E-01	2.9E-05	ATSDR
Zinc	NA	--	D	1	NA	NA	NA	--	D	3.0E-01	IRIS	1	3.0E-01	NA	NA	--
Total Petroleum Hydrocarbons (TPH)																
TPH as Gasoline	NA	--	NA	1	NA	NA	NA	--	NA	4.0E-03	PPTRV	1	4.0E-03	3.0E+01	8.6E-03	PPRTV
TPH as Diesel	NA	--	NA	1	NA	NA	NA	--	NA	4.0E-03	PPTRV	1	4.0E-03	3.0E+00	8.6E-04	PPRTV
TPH as Motor Oil	NA	--	NA	1	NA	NA	NA	--	NA	2.0E+00	DTSC	1	2.0E+00	8.0E+03	2.3E+00	DTSC
Organochlorine Pesticides																
DDT	3.40E-01	OEHHA	B2	1	3.4E-01	9.7E-05	3.4E-01	OEHHA	B2	5.0E-04	IRIS	1	5.0E-04	NA	NA	--
Dieldrin	1.60E+01	OEHHA	B2	1	1.6E+01	4.6E-03	1.6E+01	OEHHA	B2	5.0E-05	IRIS	1	5.0E-05	NA	NA	--
Pentachlorophenol	8.10E-02	OEHHA	B2	1	8.1E-02	5.1E-06	1.8E-02	OEHHA	B2	5.0E-03	IRIS	1	5.0E-03	NA	NA	--
Polychlorinated Biphenyls (PCBs)																
Aroclor-1254	2.0E+00	OEHHA	B2	1	2.0E+00	5.7E-04	2.0E+00	OEHHA	B2	2.0E-05	IRIS	1	2.0E-05	NA	NA	--
Aroclor-1260	2.0E+00	OEHHA	B2	1	2.0E+00	5.7E-04	2.0E+00	OEHHA	B2	NA	--	1	NA	NA	NA	--
Dioxin/Furans																
TCDD TEQ	1.30E+05	OEHHA	B2	1	1.30E+05	38	1.3E+05	OEHHA	B2	1.0E-08	OEHHA	1	1.0E-08	4.00E-05	1.1E-08	OEHHA

Table D-4
Summary of Constituent Toxicity Criteria
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Abbreviations:

-- = Not applicable
DDT = dichlorodiphenyltrichloroethane
LeadModel = Recreational Receptors evaluated by LeadSpread 8 (Table D-26) and Commercial and Construction workers by Adult Lead Model (Tables D-27 and D-28, respectively)
mg/kg-day = milligrams per kilograms-day
NA = Not available
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration
$\mu g/m^3$ = micrograms per cubic meter

Footnotes:

[a] Sources for the toxicity criteria from the following sources:
ATSDR = Agency for Toxic Substances Disease Registry, from United States Environmental Protection Agency (USEPA) June 2015 Regional Screening Levels for Chemical Contaminants at Superfund Sites
DTSC = Department of Toxic Substances Control, from DTSC May 2015 Human and Ecological Risk Office (HERO) Note 3: DTSC-Modified Screening Levels (DTSC-SL)
HEAST = Health Effects Assessment Summary Tables (HEAST), from USEPA June 2015 Regional Screening Levels for Chemical Contaminants at Superfund Sites
IRIS = Integrated Risk Information System (IRIS) Data Base, USEPA accessed September 2015
NJDEP = New Jersey Department of Environmental Protection, from USEPA June 2015 Regional Screening Levels for Chemical Contaminants at Superfund Sites
OEHHA = Office of Environmental Health Hazard Assessment (OEHHA), OEHHA accessed September 2015, Toxicity Criteria Database.
PPRTV = Provisional Peer Reviewed Toxicity Values, from USEPA June 2015 Regional Screening Levels for Chemical Contaminants at Superfund Sites
RSLs = Regional Screening Levels, from USEPA June 2015 Regional Screening Levels for Chemical Contaminants at Superfund Sites

[b] Weight-of-Evidence (Guidelines for Carcinogen Risk Assessment, Final, EPA/630/R-03/001F, March 2005.)
A = Known human carcinogen
B1 = Probable human carcinogen - based on limited evidence of carcinogenicity in humans (or Group 2A per IARC classification)
B2 = Likely to be carcinogenic to humans based on strong evidence of carcinogenicity in animals and inconclusive evidence of carcinogenicity in an exposed human population
C = Possible human carcinogen
D = Inadequate evidence to assess carcinogenic potential
ID = Inadequate information to assess carcinogenic potential according to the Draft U.S. EPA 1999 or the Final 2005 Guidelines for Carcinogen Risk Assessment

[c] The dermal slope factor and reference dose for metals and lanthanide metals were calculated using the following equations:
$SFd = SFo \times 1/ABS_{GI}$
$RfDd = RfDo \times ABS_{GI}$

Table D-5
Incidental Ingestion of Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	2.3E-05	NA	4.0E-04	5.8E-02	NA	NA	2.8E-06	NA	NA	NA	NA	NA
Arsenic	1.9	1.1E-05	1.3E-05	3.5E-06	3.0E+00	3.8E+00	NA	1.3E-06	1.6E-06	9.5E+00	1.2E-05	1.5E-05	NA
Barium	83	4.6E-04	2.4E-03	2.0E-01	2.3E-03	1.2E-02	NA	5.6E-05	2.9E-04	NA	NA	NA	NA
Beryllium	1.2	6.6E-06	8.2E-06	2.0E-03	3.3E-03	4.1E-03	NA	8.1E-07	1.0E-06	NA	NA	NA	NA
Cadmium	0.83	4.5E-06	5.1E-06	5.0E-04	9.1E-03	1.0E-02	NA	5.5E-07	6.2E-07	NA	NA	NA	NA
Chromium	26	1.4E-04	2.7E-04	1.5E+00	9.3E-05	1.8E-04	NA	1.7E-05	3.3E-05	NA	NA	NA	NA
Chromium (VI)	0.20	1.1E-06	6.0E-06	2.0E-02	5.5E-05	3.0E-04	NA	5.7E-07	3.2E-06	5.0E-01	2.9E-07	1.6E-06	NA
Cobalt	6.1	3.3E-05	6.1E-05	3.0E-04	1.1E-01	2.0E-01	NA	4.1E-06	7.5E-06	NA	NA	NA	NA
Copper	28	1.5E-04	2.5E-04	4.0E-02	3.8E-03	6.2E-03	NA	1.9E-05	3.1E-05	NA	NA	NA	NA
Lead	20	1.1E-04	1.5E-04	LeadModel	NA	NA	NA	1.3E-05	1.8E-05	LeadModel	NA	NA	NA
Manganese	218	1.2E-03	2.0E-03	1.4E-01	8.5E-03	1.4E-02	NA	1.5E-04	2.4E-04	NA	NA	NA	NA
Mercury	0.29	1.6E-06	3.1E-07	1.6E-04	1.0E-02	2.0E-03	8.0E-03	2.0E-07	3.8E-08	NA	NA	NA	NA
Nickel	27	1.5E-04	3.1E-04	1.1E-02	1.3E-02	2.8E-02	NA	1.8E-05	3.8E-05	NA	NA	NA	NA
Vanadium	73	4.0E-04	5.4E-04	5.0E-03	8.0E-02	1.1E-01	NA	4.9E-05	6.6E-05	NA	NA	NA	NA
Zinc	26	1.4E-04	3.5E-04	3.0E-01	4.7E-04	1.2E-03	NA	1.7E-05	4.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	1.2E-04	NA	4.0E-03	2.9E-02	NA	2.9E-02	1.4E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	160	8.8E-04	NA	2.0E+00	4.4E-04	NA	4.4E-04	1.1E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	3.2	1.8E-05	NA	5.0E-03	3.5E-03	NA	3.5E-03	2.1E-06	NA	8.1E-02	1.7E-07	NA	1.7E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					3.4	4.1	0.04				1.E-05	2.E-05	2.E-07
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	1.6E-06	NA	4.0E-03	4.0E-04	NA	4.0E-04	1.9E-07	NA	NA	NA	NA	NA
TPH as Diesel	768	4.2E-03	NA	4.0E-03	1.1E+00	NA	1.1E+00	5.2E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	1.1E-02	NA	2.0E+00	5.4E-03	NA	5.4E-03	1.3E-03	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.1	NA	1.1				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	4.3E-06	1.3E-05	3.5E-06	1.2E+00	3.8E+00	NA	5.2E-07	1.6E-06	9.5E+00	5.0E-06	1.5E-05	NA
Barium	39	2.1E-04	2.4E-03	2.0E-01	1.1E-03	1.2E-02	NA	2.6E-05	2.9E-04	NA	NA	NA	NA
Beryllium	0.14	7.7E-07	8.2E-06	2.0E-03	3.8E-04	4.1E-03	NA	9.4E-08	1.0E-06	NA	NA	NA	NA
Cadmium	0.53	2.9E-06	5.1E-06	5.0E-04	5.8E-03	1.0E-02	NA	3.6E-07	6.2E-07	NA	NA	NA	NA
Chromium	36	2.0E-04	2.7E-04	1.5E+00	1.3E-04	1.8E-04	NA	2.4E-05	3.3E-05	NA	NA	NA	NA
Cobalt	9.4	5.2E-05	6.1E-05	3.0E-04	1.7E-01	2.0E-01	NA	6.3E-06	7.5E-06	NA	NA	NA	NA
Copper	25	1.4E-04	2.5E-04	4.0E-02	3.4E-03	6.2E-03	NA	1.7E-05	3.1E-05	NA	NA	NA	NA
Lead	18	9.9E-05	1.5E-04	LeadModel	NA	NA	NA	1.2E-05	1.8E-05	LeadModel	NA	NA	NA
Nickel	120	6.6E-04	3.1E-04	1.1E-02	6.0E-02	2.8E-02	3.2E-02	8.1E-05	3.8E-05	NA	NA	NA	NA
Vanadium	27	1.5E-04	5.4E-04	5.0E-03	3.0E-02	1.1E-01	NA	1.8E-05	6.6E-05	NA	NA	NA	NA
Zinc	49	2.7E-04	3.5E-04	3.0E-01	8.9E-04	1.2E-03	NA	3.3E-05	4.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	747	4.1E-03	NA	4.0E-03	1.0E+00	NA	1.0E+00	5.0E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	923	5.1E-03	NA	2.0E+00	2.5E-03	NA	2.5E-03	6.2E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					2.5	4.1	1.1				5.E-06	2.E-05	0.E+00

Table D-5
Incidental Ingestion of Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.3	7.4E-06	1.3E-05	3.5E-06	2.1E+00	3.8E+00	NA	9.0E-07	1.6E-06	9.5E+00	8.6E-06	1.5E-05	NA
Barium	64	3.5E-04	2.4E-03	2.0E-01	1.8E-03	1.2E-02	NA	4.3E-05	2.9E-04	NA	NA	NA	NA
Beryllium	0.36	2.0E-06	8.2E-06	2.0E-03	1.0E-03	4.1E-03	NA	2.4E-07	1.0E-06	NA	NA	NA	NA
Cadmium	2.1	1.1E-05	5.1E-06	5.0E-04	2.3E-02	1.0E-02	1.3E-02	1.4E-06	6.2E-07	NA	NA	NA	NA
Chromium	18	1.0E-04	2.7E-04	1.5E+00	6.7E-05	1.8E-04	NA	1.2E-05	3.3E-05	NA	NA	NA	NA
Cobalt	5.5	3.0E-05	6.1E-05	3.0E-04	1.0E-01	2.0E-01	NA	3.7E-06	7.5E-06	NA	NA	NA	NA
Copper	36	2.0E-04	2.5E-04	4.0E-02	4.9E-03	6.2E-03	NA	2.4E-05	3.1E-05	NA	NA	NA	NA
Lead	50	2.7E-04	1.5E-04	LeadModel	NA	NA	NA	3.4E-05	1.8E-05	LeadModel	NA	NA	NA
Mercury	2.3	1.3E-05	3.1E-07	1.6E-04	7.9E-02	2.0E-03	7.8E-02	1.6E-06	3.8E-08	NA	NA	NA	NA
Molybdenum	4.4	2.4E-05	NA	5.0E-03	4.8E-03	NA	NA	3.0E-06	NA	NA	NA	NA	NA
Nickel	29	1.6E-04	3.1E-04	1.1E-02	1.4E-02	2.8E-02	NA	1.9E-05	3.8E-05	NA	NA	NA	NA
Selenium	0.58	3.2E-06	NA	5.0E-03	6.4E-04	NA	NA	3.9E-07	NA	NA	NA	NA	NA
Vanadium	34	1.9E-04	5.4E-04	5.0E-03	3.8E-02	1.1E-01	NA	2.3E-05	6.6E-05	NA	NA	NA	NA
Zinc	146	8.0E-04	3.5E-04	3.0E-01	2.7E-03	1.2E-03	1.5E-03	9.8E-05	4.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	7.1E-04	NA	4.0E-03	1.8E-01	NA	1.8E-01	8.7E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	4.1E-03	NA	2.0E+00	2.1E-03	NA	2.1E-03	5.0E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	4.0E-08	NA	5.0E-04	8.0E-05	NA	8.0E-05	4.9E-09	NA	3.4E-01	1.7E-09	NA	1.7E-09
Dieldrin	0.033	1.8E-07	NA	5.0E-05	3.6E-03	NA	3.6E-03	2.2E-08	NA	1.6E+01	3.5E-07	NA	3.5E-07
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.44	2.4E-06	NA	2.0E-05	1.2E-01	NA	1.2E-01	2.9E-07	NA	2.0E+00	5.9E-07	NA	5.9E-07
Aroclor-1260	0.50	2.8E-06	NA	NA	NA	NA	NA	3.4E-07	NA	2.0E+00	6.7E-07	NA	6.7E-07
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					2.7	4.1	0.4				1.E-05	2.E-05	2.E-06
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	6.5E-04	3.6E-09	NA	1.0E-08	3.6E-01	NA	3.6E-01	4.4E-10	NA	1.3E+05	5.7E-05	NA	5.7E-05
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.4	NA	0.4				6.E-05	NA	6.E-05

Equations

Noncancer

Average Daily Dose (ADD)

$$ADD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{nc} \times BW)$$

Hazard Quotient (HQ)

$$HQ = AADD / RfDo$$

Cancer

Lifetime Daily Dose (LDD)

$$LDD = (Cs \times IngF \times EF \times FI \times CF_{kg/mg}) / AT_c$$

Excess Cancer Risk (CR)

$$CR = LADD \times SFo$$

Ingestion Rate Factor (IngF)

Nonmutagenic

$$IngF = ([ED_c \times IngR_c] / BW_c) + ([ED_a \times IngR_a] / BW_a)$$

Mutagenic

$$IngF_m = (([ED_{c0\text{-}2} \times IngR_c] / BW_c) \times 10) + (([ED_{c2\text{-}6} \times IngR_c] / BW_c) \times 3) + (([ED_{a6\text{-}16} \times IngR_a] / BW_a) \times 3) + (([ED_{a16\text{-}30} \times IngR_a] / BW_a) \times 1)$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Fraction Ingested from Source	FI	1	unitless
Ingestion Rate	IngR	Table D-3	mg/day
Ingestion Rate Factor	IngF	114	mg-yr/kg-day
Ingestion Rate Factor - Mutagenic	$IngF_m$	490	mg-yr/kg-day

Table D-5
Incidental Ingestion of Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-26
mg/day = milligrams per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-6
Dermal Contact with Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank														
Metals														
Antimony	4.2	0.01	6.7E-07	NA	6.0E-05	1.1E-02	NA	NA	9.3E-08	NA	NA	NA	NA	NA
Arsenic	1.9	0.03	9.2E-07	1.1E-06	3.5E-06	2.6E-01	3.3E-01	NA	1.3E-07	1.6E-07	9.5E+00	1.2E-06	1.5E-06	NA
Barium	83	0.01	1.3E-05	6.8E-05	1.4E-02	9.4E-04	4.9E-03	NA	1.8E-06	9.5E-06	NA	NA	NA	NA
Beryllium	1.2	0.01	1.9E-07	2.4E-07	1.4E-05	1.4E-02	1.7E-02	NA	2.7E-08	3.3E-08	NA	NA	NA	NA
Cadmium	0.83	0.001	1.3E-08	1.5E-08	1.3E-05	1.1E-03	1.2E-03	NA	1.8E-09	2.1E-09	NA	NA	NA	NA
Chromium	26	0.01	4.1E-06	7.7E-06	2.0E-02	2.1E-04	4.0E-04	NA	5.6E-07	1.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	0.01	3.2E-08	1.7E-07	5.0E-04	6.4E-05	3.5E-04	NA	1.8E-08	9.7E-08	1.3E-02	2.2E-10	1.2E-09	NA
Cobalt	6.1	0.01	9.7E-07	1.8E-06	3.0E-04	NA	NA	NA	1.4E-07	2.5E-07	NA	NA	NA	NA
Copper	28	0.01	4.4E-06	7.2E-06	4.0E-02	1.1E-04	1.8E-04	NA	6.2E-07	1.0E-06	NA	NA	NA	NA
Lead	20	0.01	3.2E-06	4.4E-06	LeadModel	NA	NA	NA	4.5E-07	6.1E-07	LeadModel	NA	NA	NA
Manganese	218	0.01	3.5E-05	5.8E-05	1.4E-01	2.5E-04	4.1E-04	NA	4.8E-06	8.1E-06	NA	NA	NA	NA
Mercury	0.29	0.01	4.6E-08	9.1E-09	1.6E-04	2.9E-04	5.7E-05	2.3E-04	6.5E-09	1.3E-09	NA	NA	NA	NA
Nickel	27	0.01	4.2E-06	9.0E-06	4.4E-04	9.6E-03	2.0E-02	NA	5.9E-07	1.3E-06	NA	NA	NA	NA
Vanadium	73	0.01	1.2E-05	1.6E-05	5.0E-03	2.3E-03	3.1E-03	NA	1.6E-06	2.2E-06	NA	NA	NA	NA
Zinc	26	0.01	4.1E-06	1.0E-05	3.0E-01	1.4E-05	3.4E-05	NA	5.7E-07	1.4E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	21	0.1	3.3E-05	NA	4.0E-03	8.3E-03	NA	8.3E-03	4.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	160	0.1	2.5E-04	NA	2.0E+00	1.3E-04	NA	1.3E-04	3.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
Pentachlorophenol	3.2	0.1	5.1E-06	NA	5.0E-03	1.0E-03	NA	1.0E-03	7.1E-07	NA	8.1E-02	5.7E-08	NA	5.7E-08
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.4	0.01				1.E-06	2.E-06	6.E-08
New Mill - Equipment Shed														
Total Petroleum Hydrocarbons (TPH)														
TPH as Gasoline	0.29	0.1	4.6E-07	NA	4.0E-03	1.2E-04	NA	1.2E-04	6.4E-08	NA	NA	NA	NA	NA
TPH as Diesel	768	0.1	1.2E-03	NA	4.0E-03	3.1E-01	NA	3.1E-01	1.7E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	0.1	3.1E-03	NA	2.0E+00	1.6E-03	NA	1.6E-03	4.4E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	NA	0.3				NA	NA	NA
New Mill - Dump Area														
Metals														
Arsenic	0.78	0.03	3.7E-07	4.4E-07	3.5E-06	1.1E-01	1.3E-01	NA	5.2E-08	6.2E-08	9.5E+00	4.9E-07	5.9E-07	NA
Barium	39	0.01	6.2E-06	7.7E-06	1.4E-02	4.4E-04	5.5E-04	NA	8.6E-07	1.1E-06	NA	NA	NA	NA
Beryllium	0.14	0.01	2.2E-08	1.8E-06	1.4E-05	1.6E-03	1.3E-01	NA	3.1E-09	2.5E-07	NA	NA	NA	NA
Cadmium	0.53	0.001	8.4E-09	7.2E-07	1.3E-05	6.7E-04	5.8E-02	NA	1.2E-09	1.0E-07	NA	NA	NA	NA
Chromium	36	0.01	5.7E-06	4.4E-06	2.0E-02	2.9E-04	2.2E-04	6.9E-05	8.0E-07	6.1E-07	NA	NA	NA	NA
Cobalt	9.4	0.01	1.5E-06	1.6E-05	3.0E-04	NA	NA	NA	2.1E-07	2.2E-06	NA	NA	NA	NA
Copper	25	0.01	4.0E-06	1.0E-05	4.0E-02	9.9E-05	2.6E-04	NA	5.5E-07	1.4E-06	NA	NA	NA	NA
Lead	18	0.01	2.9E-06	0.0E+00	LeadModel	NA	NA	NA	4.0E-07	0.0E+00	LeadModel	NA	NA	NA
Nickel	120	0.01	1.9E-05	0.0E+00	4.4E-04	4.3E-02	0.0E+00	4.3E-02	2.7E-06	0.0E+00	NA	NA	NA	NA
Vanadium	27	0.01	4.3E-06	0.0E+00	5.0E-03	8.6E-04	0.0E+00	8.6E-04	6.0E-07	0.0E+00	NA	NA	NA	NA
Zinc	49	0.01	7.8E-06	3.8E-07	3.0E-01	2.6E-05	1.3E-06	2.5E-05	1.1E-06	5.3E-08	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	747	0.1	1.2E-03	NA	4.0E-03	3.0E-01	NA	3.0E-01	1.7E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	923	0.1	1.5E-03	NA	2.0E+00	7.3E-04	NA	7.3E-04	2.0E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.5	0.3	0.3				5.E-07	6.E-07	0.E+00

Table D-6
Dermal Contact with Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area														
Metals														
Arsenic	1.3	0.03	6.4E-07	1.1E-06	3.5E-06	1.8E-01	3.3E-01	NA	8.9E-08	1.6E-07	9.5E+00	8.5E-07	1.5E-06	NA
Barium	64	0.01	1.0E-05	6.8E-05	1.4E-02	7.3E-04	4.9E-03	NA	1.4E-06	9.5E-06	NA	NA	NA	NA
Beryllium	0.36	0.01	5.8E-08	2.4E-07	1.4E-05	4.1E-03	1.7E-02	NA	8.1E-09	3.3E-08	NA	NA	NA	NA
Cadmium	2.1	0.001	3.3E-08	1.5E-08	1.3E-05	2.6E-03	1.2E-03	1.5E-03	4.6E-09	2.1E-09	NA	NA	NA	NA
Chromium	18	0.01	2.9E-06	7.7E-06	2.0E-02	1.5E-04	4.0E-04	NA	4.1E-07	1.1E-06	NA	NA	NA	NA
Cobalt	5.5	0.01	8.7E-07	1.8E-06	3.0E-04	NA	NA	NA	1.2E-07	2.5E-07	NA	NA	NA	NA
Copper	36	0.01	5.7E-06	7.2E-06	4.0E-02	1.4E-04	1.8E-04	NA	8.0E-07	1.0E-06	NA	NA	NA	NA
Lead	50	0.01	8.0E-06	4.4E-06	LeadModel	NA	NA	NA	1.1E-06	6.1E-07	LeadModel	NA	NA	NA
Mercury	2.3	0.01	3.7E-07	9.1E-09	1.6E-04	2.3E-03	5.7E-05	2.2E-03	5.1E-08	1.3E-09	NA	NA	NA	NA
Molybdenum	4.4	0.01	7.0E-07	NA	5.0E-03	1.4E-04	NA	NA	9.7E-08	NA	NA	NA	NA	NA
Nickel	29	0.01	4.5E-06	9.0E-06	4.4E-04	1.0E-02	2.0E-02	NA	6.3E-07	1.3E-06	NA	NA	NA	NA
Selenium	0.58	0.01	9.2E-08	NA	5.0E-03	1.8E-05	NA	NA	1.3E-08	NA	NA	NA	NA	NA
Vanadium	34	0.01	5.5E-06	1.6E-05	5.0E-03	1.1E-03	3.1E-03	NA	7.6E-07	2.2E-06	NA	NA	NA	NA
Zinc	146	0.01	2.3E-05	1.0E-05	3.0E-01	7.8E-05	3.4E-05	4.3E-05	3.2E-06	1.4E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	130	0.1	2.1E-04	NA	4.0E-03	5.2E-02	NA	5.2E-02	2.9E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	0.1	1.2E-03	NA	2.0E+00	6.0E-04	NA	6.0E-04	1.7E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides														
DDT	0.0073	0.03	3.5E-09	NA	5.0E-04	7.0E-06	NA	7.0E-06	4.8E-10	NA	3.4E-01	1.6E-10	NA	1.6E-10
Dieldrin	0.033	0.1	5.2E-08	NA	5.0E-05	1.0E-03	NA	1.0E-03	7.3E-09	NA	1.6E+01	1.2E-07	NA	1.2E-07
Polychlorinated Biphenyls (PCBs)														
Aroclor-1254	0.44	0.15	1.0E-06	NA	2.0E-05	5.2E-02	NA	5.2E-02	1.4E-07	NA	2.0E+00	2.9E-07	NA	2.9E-07
Aroclor-1260	0.50	0.15	1.2E-06	NA	NA	NA	NA	NA	1.7E-07	NA	2.0E+00	3.3E-07	NA	3.3E-07
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.4	0.1				2.E-06	2.E-06	7.E-07
Box Factory - Burner														
Dioxin/Furans														
TCDD TEQ	6.5E-04	0.03	3.1E-10	NA	1.0E-08	3.1E-02	NA	3.1E-02	4.3E-11	NA	1.3E+05	5.6E-06	NA	5.6E-06
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.03	NA	0.03				6.E-06	NA	6.E-06

Equations

Noncancer

Average Daily Dose (ADD)

$$ADD = (Cs \times SA \times SAF \times ABS_d \times EF \times ED \times CF_{kg/mg}) / (AT_{nc} \times BW)$$

Hazard Quotient (HQ)

$$HQ = AADD / RfDd$$

Cancer

Lifetime Daily Dose (LDD)

$$LDD = (Cs \times DF \times ABS_d \times EF \times CF_{kg/mg}) / AT_c$$

Excess Cancer Risk (CR)

$$CR = LADD \times SFd$$

Dermal Factor (DF)

Nonmutagenic

$$DF = ([ED_c \times SA_c \times SAF_c] / BW_c) + ([ED_a \times SA_a \times SAF_a] / BW_a)$$

Mutagenic

$$DF_m = (([ED_{c0\text{-}2} \times SA_c \times SAF_c] / BW_c) \times 10) + (([ED_{c2\text{-}6} \times SA_c \times SAF_c] / BW_c) \times 3) + (([ED_{a6\text{-}16} \times SA_a \times SAF_a] / BW_a) \times 3) + (([ED_{a16\text{-}30} \times SA_a \times SAF_a] / BW_a) \times 1)$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Dermal Factor	DF	377	mg-yr/kg-day
Dermal Factor - Mutagenic	DFm	1,503	mg-yr/kg-day
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Soil-to-Skin Adherence Factor	SAF	Table D-3	mg/cm^2-d
Surface Area	SA	Table D-3	cm^2

Table D-6
Dermal Contact with Soil - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
cm^2 = centimeter squared
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-26
mg/cm^2-d = milligrams per centimeter squared per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment, Guidance Manual, Interim Final - Revised October 2013 and United States Environmental Protection Agency (USEPA), 2004, Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005. July.
[c] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[d] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[e] From Table D-4.
[f] Site-related HQs and CRs are difference between the EPC and background.
[g] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-7
Inhalation to Fugitive Dust - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m³)	(µg/m³)	(µg/m³)	(unitless)	(unitless)	(unitless)	(µg/m³)	(µg/m³)	(µg/m³)⁻¹	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	4.2E-07	NA	NA	NA	NA	NA	1.8E-07	NA	NA	NA	NA	NA
Arsenic	1.9	2.0E-07	2.4E-07	1.5E-02	1.3E-05	1.6E-05	NA	8.4E-08	1.0E-07	3.3E-03	2.8E-10	3.4E-10	NA
Barium	83	8.4E-06	4.3E-05	5.0E-01	1.7E-05	8.6E-05	NA	3.6E-06	1.9E-05	NA	NA	NA	NA
Beryllium	1.2	1.2E-07	1.5E-07	7.0E-03	1.7E-05	2.2E-05	NA	5.2E-08	6.5E-08	2.4E-03	1.2E-10	1.6E-10	NA
Cadmium	0.83	8.3E-08	9.4E-08	2.0E-02	4.2E-06	4.7E-06	NA	3.6E-08	4.0E-08	4.2E-03	1.5E-10	1.7E-10	NA
Chromium	26	2.6E-06	4.9E-06	NA	NA	NA	NA	1.1E-06	2.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	2.0E-08	1.1E-07	2.0E-01	1.0E-07	5.5E-07	NA	2.2E-08	1.2E-07	1.5E-01	3.3E-09	1.8E-08	NA
Cobalt	6.1	6.2E-07	1.1E-06	6.0E-03	1.0E-04	1.9E-04	NA	2.6E-07	4.8E-07	9.0E-03	2.4E-09	4.4E-09	NA
Copper	28	2.8E-06	4.6E-06	NA	NA	NA	NA	1.2E-06	2.0E-06	NA	NA	NA	NA
Lead	20	2.0E-06	2.8E-06	LeadModel	NA	NA	NA	8.7E-07	1.2E-06	LeadModel	NA	NA	NA
Manganese	218	2.2E-05	3.7E-05	9.0E-02	2.4E-04	4.1E-04	NA	9.4E-06	1.6E-05	NA	NA	NA	NA
Mercury	0.29	2.9E-08	5.7E-09	3.0E-02	9.8E-07	1.9E-07	7.9E-07	1.3E-08	2.5E-09	NA	NA	NA	NA
Nickel	27	2.7E-06	5.7E-06	1.4E-02	1.9E-04	4.1E-04	NA	1.2E-06	2.4E-06	2.6E-04	3.0E-10	6.4E-10	NA
Vanadium	73	7.3E-06	9.9E-06	1.0E-01	7.3E-05	9.9E-05	NA	3.1E-06	4.2E-06	NA	NA	NA	NA
Zinc	26	2.6E-06	6.5E-06	NA	NA	NA	NA	1.1E-06	2.8E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	2.1E-06	NA	3.0E+00	7.1E-07	NA	7.1E-07	9.1E-07	NA	NA	NA	NA	NA
TPH as Motor Oil	160	1.6E-05	NA	8.0E+03	2.0E-09	NA	2.0E-09	6.9E-06	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	3.2	3.2E-07	NA	NA	NA	NA	NA	1.4E-07	NA	5.1E-06	7.0E-13	NA	7.0E-13
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.0007	0.001	0.000001				7.E-09	2.E-08	7.E-13
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	2.9E-08	NA	3.0E+01	9.7E-10	NA	9.7E-10	1.3E-08	NA	NA	NA	NA	NA
TPH as Diesel	768	7.7E-05	NA	3.0E+00	2.6E-05	NA	2.6E-05	3.3E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	2.0E-04	NA	8.0E+03	2.5E-08	NA	2.5E-08	8.5E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.00003	NA	0.00003				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	7.9E-08	2.4E-07	1.5E-02	5.2E-06	1.6E-05	NA	3.4E-08	1.0E-07	3.3E-03	1.1E-10	3.4E-10	NA
Barium	39	3.9E-06	4.3E-05	5.0E-01	7.9E-06	8.6E-05	NA	1.7E-06	1.9E-05	NA	NA	NA	NA
Beryllium	0.14	1.4E-08	1.5E-07	7.0E-03	2.0E-06	2.2E-05	NA	6.0E-09	6.5E-08	2.4E-03	1.5E-11	1.6E-10	NA
Cadmium	0.53	5.3E-08	9.4E-08	2.0E-02	2.7E-06	4.7E-06	NA	2.3E-08	4.0E-08	4.2E-03	9.6E-11	1.7E-10	NA
Chromium	36	3.6E-06	4.9E-06	NA	NA	NA	NA	1.6E-06	2.1E-06	NA	NA	NA	NA
Cobalt	9.4	9.5E-07	1.1E-06	6.0E-03	1.6E-04	1.9E-04	NA	4.1E-07	4.8E-07	9.0E-03	3.7E-09	4.4E-09	NA
Copper	25	2.5E-06	4.6E-06	NA	NA	NA	NA	1.1E-06	2.0E-06	NA	NA	NA	NA
Lead	18	1.8E-06	2.8E-06	LeadModel	NA	NA	NA	7.8E-07	1.2E-06	LeadModel	NA	NA	NA
Nickel	120	1.2E-05	5.7E-06	1.4E-02	8.6E-04	4.1E-04	4.6E-04	5.2E-06	2.4E-06	2.6E-04	1.3E-09	6.4E-10	7.1E-10
Vanadium	27	2.7E-06	9.9E-06	1.0E-01	2.7E-05	9.9E-05	NA	1.2E-06	4.2E-06	NA	NA	NA	NA
Zinc	49	4.9E-06	6.5E-06	NA	NA	NA	NA	2.1E-06	2.8E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	747	7.5E-05	NA	3.0E+00	2.5E-05	NA	2.5E-05	3.2E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	923	9.3E-05	NA	8.0E+03	1.2E-08	NA	1.2E-08	4.0E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	0.001	0.0005				5.E-09	6.E-09	7.E-10

Table D-7
Inhalation to Fugitive Dust - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m³)	(µg/m³)	(µg/m³)	(unitless)	(unitless)	(unitless)	(µg/m³)	(µg/m³)	(µg/m³)⁻¹	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.3	1.4E-07	2.4E-07	1.5E-02	9.0E-06	1.6E-05	NA	5.8E-08	1.0E-07	3.3E-03	1.9E-10	3.4E-10	NA
Barium	64	6.5E-06	4.3E-05	5.0E-01	1.3E-05	8.6E-05	NA	2.8E-06	1.9E-05	NA	NA	NA	NA
Beryllium	0.36	3.7E-08	1.5E-07	7.0E-03	5.2E-06	2.2E-05	NA	1.6E-08	6.5E-08	2.4E-03	3.8E-11	1.6E-10	NA
Cadmium	2.1	2.1E-07	9.4E-08	2.0E-02	1.0E-05	4.7E-06	5.8E-06	9.0E-08	4.0E-08	4.2E-03	3.8E-10	1.7E-10	2.1E-10
Chromium	18	1.9E-06	4.9E-06	NA	NA	NA	NA	8.0E-07	2.1E-06	NA	NA	NA	NA
Cobalt	5.5	5.5E-07	1.1E-06	6.0E-03	9.2E-05	1.9E-04	NA	2.4E-07	4.8E-07	9.0E-03	2.1E-09	4.4E-09	NA
Copper	36	3.6E-06	4.6E-06	NA	NA	NA	NA	1.6E-06	2.0E-06	NA	NA	NA	NA
Lead	50	5.0E-06	2.8E-06	LeadModel	NA	NA	NA	2.2E-06	1.2E-06	LeadModel	NA	NA	NA
Mercury	2.3	2.3E-07	5.7E-09	3.0E-02	NA	NA	NA	1.0E-07	2.5E-09	NA	NA	NA	NA
Molybdenum	4.4	4.4E-07	NA	NA	NA	NA	NA	1.9E-07	NA	NA	NA	NA	NA
Nickel	29	2.9E-06	5.7E-06	1.4E-02	2.1E-04	4.1E-04	NA	1.2E-06	2.4E-06	2.6E-04	3.2E-10	6.4E-10	NA
Selenium	0.58	5.9E-08	NA	2.0E+01	2.9E-09	NA	NA	2.5E-08	NA	NA	NA	NA	NA
Vanadium	34	3.5E-06	9.9E-06	1.0E-01	3.5E-05	9.9E-05	NA	1.5E-06	4.2E-06	NA	NA	NA	NA
Zinc	146	1.5E-05	6.5E-06	NA	NA	NA	NA	6.3E-06	2.8E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	1.3E-05	NA	3.0E+00	4.4E-06	NA	4.4E-06	5.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	7.6E-05	NA	8.0E+03	9.4E-09	NA	9.4E-09	3.2E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	7.4E-10	NA	NA	NA	NA	NA	3.2E-10	NA	9.7E-05	3.1E-14	NA	3.1E-14
Dieldrin	0.033	3.3E-09	NA	NA	NA	NA	NA	1.4E-09	NA	4.6E-03	6.6E-12	NA	6.6E-12
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.44	4.4E-08	NA	NA	NA	NA	NA	1.9E-08	NA	5.7E-04	1.1E-11	NA	1.1E-11
Aroclor-1260	0.50	5.1E-08	NA	NA	NA	NA	NA	2.2E-08	NA	5.7E-04	1.2E-11	NA	1.2E-11
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.0004	0.0008	0.00001				3.E-09	6.E-09	2.E-10
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	6.5E-04	6.5E-11	NA	4.0E-05	1.6E-06	NA	1.6E-06	2.8E-11	NA	3.8E+01	1.1E-09	NA	1.1E-09
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.000002	NA	0.000002				1.E-09	NA	1.E-09

Equations

Noncancer

Averaged Air Concentration (AAC)

$$AAC = ((Cs/PEF) \times ET \times EF \times ED \times CF_{\mu g/mg}) / (AT_{nc} \times CF_{hr/d})$$

Hazard Quotient (HQ)

$$HQ = AAC / RfC$$

Cancer

Lifetime Air Concentration (LAC)

$$LAC = ((Cs/PEF) \times ET \times EF \times EDF \times CF_{\mu g/mg}) / (AT_{c} \times CF_{hr/d})$$

Excess Cancer Risk (CR)

$$CR = LAC \times IUR$$

Exposure Duration Factor (EDF)

Nonmutagenic

$$EDF = (ED_c + ED_a)$$

Mutagenic

$$EDF_m = (ED_{c0\text{-}2} \times 10) + (ED_{c2\text{-}6} \times 3) + (ED_{a6\text{-}16} \times 3) + (ED_{a16\text{-}30} \times 1)$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{hr/d}$	24	hours/day
Conversion Factor	$CF_{\mu g/mg}$	1000	µg/mg
Exposure Duration	ED	Table D-3	year
Exposure Duration Factor	EDF	30	year
Exposure Duration Factor - Mutagenic	EDFm	76	year
Exposure Frequency	EF	Table D-3	days/year
Exposure Time	ET	Table D-3	hours/day
Particulate Emission Factor	PEF	Table D-3	m³/kg

Table D-7
Inhalation to Fugitive Dust - Recreational Receptor - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m³)	(µg/m³)	(µg/m³)	(unitless)	(unitless)	(unitless)	(µg/m³)	(µg/m³)	(µg/m³)⁻¹	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
LeadModel = Evaluated by LeadSpread 8, Table D-26
m^3/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
µg/m^3 = micrograms per cubic meter
µg/mg = micrograms per milligrams
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The AAC was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the AAC and LAC is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk.

Table D-8
Incidental Ingestion of Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	2.3E-05	NA	4.0E-04	5.8E-02	NA	NA	2.8E-06	NA	NA	NA	NA	NA
Arsenic	1.6	8.8E-06	1.3E-05	3.5E-06	2.5E+00	3.8E+00	NA	1.1E-06	1.6E-06	9.5E+00	1.0E-05	1.5E-05	NA
Barium	68	3.7E-04	2.4E-03	2.0E-01	1.9E-03	1.2E-02	NA	4.5E-05	2.9E-04	NA	NA	NA	NA
Beryllium	1.2	6.6E-06	8.2E-06	2.0E-03	3.3E-03	4.1E-03	NA	8.1E-07	1.0E-06	NA	NA	NA	NA
Cadmium	0.83	4.6E-06	5.1E-06	5.0E-04	9.1E-03	1.0E-02	NA	5.6E-07	6.2E-07	NA	NA	NA	NA
Chromium	28	1.5E-04	2.7E-04	1.5E+00	1.0E-04	1.8E-04	NA	1.8E-05	3.3E-05	NA	NA	NA	NA
Chromium (VI)	0.20	1.1E-06	6.0E-06	2.0E-02	5.5E-05	3.0E-04	NA	5.7E-07	3.2E-06	5.0E-01	2.9E-07	1.6E-06	NA
Cobalt	5.7	3.1E-05	6.1E-05	3.0E-04	1.0E-01	2.0E-01	NA	3.8E-06	7.5E-06	NA	NA	NA	NA
Copper	27	1.5E-04	2.5E-04	4.0E-02	3.7E-03	6.2E-03	NA	1.8E-05	3.1E-05	NA	NA	NA	NA
Lead	14	7.4E-05	1.5E-04	LeadModel	NA	NA	NA	9.1E-06	1.8E-05	LeadModel	NA	NA	NA
Manganese	183	1.0E-03	2.0E-03	1.4E-01	7.1E-03	1.4E-02	NA	1.2E-04	2.4E-04	NA	NA	NA	NA
Mercury	0.23	1.3E-06	3.1E-07	1.6E-04	8.0E-03	2.0E-03	6.0E-03	1.6E-07	3.8E-08	NA	NA	NA	NA
Nickel	23	1.2E-04	3.1E-04	1.1E-02	1.1E-02	2.8E-02	NA	1.5E-05	3.8E-05	NA	NA	NA	NA
Vanadium	71	3.9E-04	5.4E-04	5.0E-03	7.7E-02	1.1E-01	NA	4.7E-05	6.6E-05	NA	NA	NA	NA
Zinc	22	1.2E-04	3.5E-04	3.0E-01	4.0E-04	1.2E-03	NA	1.5E-05	4.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	1.2E-04	NA	4.0E-03	2.9E-02	NA	2.9E-02	1.4E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	158	8.7E-04	NA	2.0E+00	4.3E-04	NA	4.3E-04	1.1E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	3.0E-05	NA	5.0E-03	6.1E-03	NA	6.1E-03	3.7E-06	NA	8.1E-02	3.0E-07	NA	3.0E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					2.8	4.1	0.04				1.E-05	2.E-05	3.E-07
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	1.6E-06	NA	4.0E-03	4.0E-04	NA	4.0E-04	1.9E-07	NA	NA	NA	NA	NA
TPH as Diesel	59	3.2E-04	NA	4.0E-03	8.1E-02	NA	8.1E-02	4.0E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	294	1.6E-03	NA	2.0E+00	8.1E-04	NA	8.1E-04	2.0E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.08	NA	0.08				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	4.3E-06	1.3E-05	3.5E-06	1.2E+00	3.8E+00	NA	5.2E-07	1.6E-06	9.5E+00	5.0E-06	1.5E-05	NA
Barium	39	2.1E-04	2.4E-03	2.0E-01	1.1E-03	1.2E-02	NA	2.6E-05	2.9E-04	NA	NA	NA	NA
Beryllium	0.14	7.7E-07	8.2E-06	2.0E-03	3.8E-04	4.1E-03	NA	9.4E-08	1.0E-06	NA	NA	NA	NA
Cadmium	0.53	2.9E-06	5.1E-06	5.0E-04	5.8E-03	1.0E-02	NA	3.6E-07	6.2E-07	NA	NA	NA	NA
Chromium	36	2.0E-04	2.7E-04	1.5E+00	1.3E-04	1.8E-04	NA	2.4E-05	3.3E-05	NA	NA	NA	NA
Cobalt	9.4	5.2E-05	6.1E-05	3.0E-04	1.7E-01	2.0E-01	NA	6.3E-06	7.5E-06	NA	NA	NA	NA
Copper	25	1.4E-04	2.5E-04	4.0E-02	3.4E-03	6.2E-03	NA	1.7E-05	3.1E-05	NA	NA	NA	NA
Lead	18	9.9E-05	1.5E-04	LeadModel	NA	NA	NA	1.2E-05	1.8E-05	LeadModel	NA	NA	NA
Nickel	120	6.6E-04	3.1E-04	1.1E-02	6.0E-02	2.8E-02	3.2E-02	8.1E-05	3.8E-05	NA	NA	NA	NA
Vanadium	27	1.5E-04	5.4E-04	5.0E-03	3.0E-02	1.1E-01	NA	1.8E-05	6.6E-05	NA	NA	NA	NA
Zinc	49	2.7E-04	3.5E-04	3.0E-01	8.9E-04	1.2E-03	NA	3.3E-05	4.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	1.7E-03	NA	4.0E-03	4.3E-01	NA	4.3E-01	2.1E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	825	4.5E-03	NA	2.0E+00	2.3E-03	NA	2.3E-03	5.5E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.9	4.1	0.5				5.E-06	2.E-05	0.E+00

Table D-8
Incidental Ingestion of Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	7.4E-06	1.3E-05	3.5E-06	2.1E+00	3.8E+00	NA	9.1E-07	1.6E-06	9.5E+00	8.6E-06	1.5E-05	NA
Barium	64	3.5E-04	2.4E-03	2.0E-01	1.7E-03	1.2E-02	NA	4.3E-05	2.9E-04	NA	NA	NA	NA
Beryllium	0.37	2.0E-06	8.2E-06	2.0E-03	1.0E-03	4.1E-03	NA	2.5E-07	1.0E-06	NA	NA	NA	NA
Cadmium	1.9	1.0E-05	5.1E-06	5.0E-04	2.0E-02	1.0E-02	1.0E-02	1.2E-06	6.2E-07	NA	NA	NA	NA
Chromium	18	9.9E-05	2.7E-04	1.5E+00	6.6E-05	1.8E-04	NA	1.2E-05	3.3E-05	NA	NA	NA	NA
Cobalt	5.4	3.0E-05	6.1E-05	3.0E-04	9.9E-02	2.0E-01	NA	3.6E-06	7.5E-06	NA	NA	NA	NA
Copper	37	2.0E-04	2.5E-04	4.0E-02	5.1E-03	6.2E-03	NA	2.5E-05	3.1E-05	NA	NA	NA	NA
Lead	51	2.8E-04	1.5E-04	LeadModel	NA	NA	NA	3.4E-05	1.8E-05	LeadModel	NA	NA	NA
Mercury	2.1	1.2E-05	3.1E-07	1.6E-04	7.2E-02	2.0E-03	7.0E-02	1.4E-06	3.8E-08	NA	NA	NA	NA
Nickel	24	1.3E-04	NA	1.1E-02	1.2E-02	NA	NA	1.6E-05	NA	NA	NA	NA	NA
Selenium	0.6	3.3E-06	5.4E-04	5.0E-03	6.6E-04	1.1E-01	NA	4.1E-07	6.6E-05	NA	NA	NA	NA
Vanadium	34	1.9E-04	3.5E-04	5.0E-03	3.7E-02	7.1E-02	NA	2.3E-05	4.3E-05	NA	NA	NA	NA
Zinc	126	6.9E-04	0.0E+00	3.0E-01	2.3E-03	0.0E+00	2.3E-03	8.5E-05	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	7.1E-04	NA	4.0E-03	1.8E-01	NA	1.8E-01	8.7E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	4.1E-03	NA	2.0E+00	2.1E-03	NA	2.1E-03	5.0E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	4.0E-08	NA	5.0E-04	8.0E-05	NA	8.0E-05	4.9E-09	NA	3.4E-01	1.7E-09	NA	1.7E-09
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	2.2E-07	NA	2.0E-05	1.1E-02	NA	1.1E-02	2.8E-08	NA	2.0E+00	5.5E-08	NA	5.5E-08
Aroclor-1260	0.0563	3.1E-07	NA	NA	NA	NA	NA	3.8E-08	NA	2.0E+00	7.6E-08	NA	7.6E-08
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					2.6	4.2	0.3				9.E-06	2.E-05	1.E-07
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	7.3E-11	NA	1.0E-08	7.3E-03	NA	7.3E-03	9.0E-12	NA	1.3E+05	1.2E-06	NA	1.2E-06
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.007	NA	0.007				1.E-06	NA	1.E-06

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDo$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times IngF \times EF \times FI \times CF_{kg/mg}) / AT_c$

Excess Cancer Risk (CR)

$CR = LADD \times SFo$

Ingestion Rate Factor (IngF)

Nonmutagenic

$IngF = ([ED_c \times IngR_c] / BW_c) + ([ED_a \times IngR_a] / BW_a)$

Mutagenic

$IngF_m = (([ED_{c0\text{-}2} \times IngR_c] / BW_c) \times 10) + (([ED_{c2\text{-}6} \times IngR_c] / BW_c) \times 3) + (([ED_{a6\text{-}16} \times IngR_a] / BW_a) \times 3) + (([ED_{a16\text{-}30} \times IngR_a] / BW_a) \times 1)$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Fraction Ingested from Source	FI	1	unitless
Ingestion Rate	IngR	Table D-3	mg/day
Ingestion Rate Factor	IngF	114	mg-yr/kg-day
Ingestion Rate Factor - Mutagenic	$IngF_m$	490	mg-yr/kg-day

Table D-8
Incidental Ingestion of Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-26
mg/day = milligrams per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-2.
[b] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-9
Dermal Contact with Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank														
Metals														
Antimony	4.2	0.01	6.7E-07	NA	6.0E-05	1.1E-02	NA	NA	9.3E-08	NA	NA	NA	NA	NA
Arsenic	1.6	0.03	7.6E-07	1.1E-06	3.5E-06	2.2E-01	3.3E-01	NA	1.1E-07	1.6E-07	9.5E+00	1.0E-06	1.5E-06	NA
Barium	68	0.01	1.1E-05	6.8E-05	1.4E-02	7.7E-04	4.9E-03	NA	1.5E-06	9.5E-06	NA	NA	NA	NA
Beryllium	1.2	0.01	1.9E-07	2.4E-07	1.4E-05	1.4E-02	1.7E-02	NA	2.7E-08	3.3E-08	NA	NA	NA	NA
Cadmium	0.83	0.001	1.3E-08	1.5E-08	1.3E-05	1.1E-03	1.2E-03	NA	1.8E-09	2.1E-09	NA	NA	NA	NA
Chromium	28	0.01	4.4E-06	7.7E-06	2.0E-02	2.2E-04	4.0E-04	NA	6.1E-07	1.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	0.01	3.2E-08	1.7E-07	5.0E-04	6.4E-05	3.5E-04	NA	1.8E-08	9.7E-08	1.3E-02	2.2E-10	1.2E-09	NA
Cobalt	5.7	0.01	9.1E-07	1.8E-06	3.0E-04	NA	NA	NA	1.3E-07	2.5E-07	NA	NA	NA	NA
Copper	27	0.01	4.3E-06	7.2E-06	4.0E-02	1.1E-04	1.8E-04	NA	6.0E-07	1.0E-06	NA	NA	NA	NA
Lead	14	0.01	2.2E-06	4.4E-06	LeadModel	NA	NA	NA	3.0E-07	6.1E-07	LeadModel	NA	NA	NA
Manganese	183	0.01	2.9E-05	5.8E-05	1.4E-01	2.1E-04	4.1E-04	NA	4.0E-06	8.1E-06	NA	NA	NA	NA
Mercury	0.23	0.01	3.7E-08	9.1E-09	1.6E-04	2.3E-04	5.7E-05	1.7E-04	5.2E-09	1.3E-09	NA	NA	NA	NA
Nickel	23	0.01	3.6E-06	9.0E-06	4.4E-04	8.2E-03	2.0E-02	NA	5.0E-07	1.3E-06	NA	NA	NA	NA
Vanadium	71	0.01	1.1E-05	1.6E-05	5.0E-03	2.2E-03	3.1E-03	NA	1.6E-06	2.2E-06	NA	NA	NA	NA
Zinc	22	0.01	3.5E-06	1.0E-05	3.0E-01	1.2E-05	3.4E-05	NA	4.8E-07	1.4E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	21	0.1	3.3E-05	NA	4.0E-03	8.3E-03	NA	8.3E-03	4.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	158	0.1	2.5E-04	NA	2.0E+00	1.3E-04	NA	1.3E-04	3.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
Pentachlorophenol	6	0.25	2.2E-05	NA	5.0E-03	4.4E-03	NA	4.4E-03	3.1E-06	NA	8.1E-02	2.5E-07	NA	2.5E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.4	0.01				1.E-06	2.E-06	2.E-07
New Mill - Equipment Shed														
Total Petroleum Hydrocarbons (TPH)														
TPH as Gasoline	0.29	0.1	4.6E-07	NA	4.0E-03	1.2E-04	NA	1.2E-04	6.4E-08	NA	NA	NA	NA	NA
TPH as Diesel	59	0.1	9.4E-05	NA	4.0E-03	2.4E-02	NA	2.4E-02	1.3E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	294	0.1	4.7E-04	NA	2.0E+00	2.3E-04	NA	2.3E-04	6.5E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.02	NA	0.02				NA	NA	NA
New Mill - Dump Area														
Metals														
Arsenic	0.78	0.03	3.7E-07	4.4E-07	3.5E-06	1.1E-01	1.3E-01	NA	5.2E-08	6.2E-08	9.5E+00	4.9E-07	5.9E-07	NA
Barium	39	0.01	6.2E-06	7.7E-06	1.4E-02	4.4E-04	5.5E-04	NA	8.6E-07	1.1E-06	NA	NA	NA	NA
Beryllium	0.14	0.01	2.2E-08	1.8E-06	1.4E-05	1.6E-03	1.3E-01	NA	3.1E-09	2.5E-07	NA	NA	NA	NA
Cadmium	0.53	0.001	8.4E-09	7.2E-07	1.3E-05	6.7E-04	5.8E-02	NA	1.2E-09	1.0E-07	NA	NA	NA	NA
Chromium	36	0.01	5.7E-06	4.4E-06	2.0E-02	2.9E-04	2.2E-04	6.9E-05	8.0E-07	6.1E-07	NA	NA	NA	NA
Cobalt	9.4	0.01	1.5E-06	1.6E-05	3.0E-04	NA	NA	NA	2.1E-07	2.2E-06	NA	NA	NA	NA
Copper	25	0.01	4.0E-06	1.0E-05	4.0E-02	9.9E-05	2.6E-04	NA	5.5E-07	1.4E-06	NA	NA	NA	NA
Lead	18	0.01	2.9E-06	0.0E+00	LeadModel	NA	NA	NA	4.0E-07	0.0E+00	LeadModel	NA	NA	NA
Nickel	120	0.01	1.9E-05	0.0E+00	4.4E-04	4.3E-02	0.0E+00	4.3E-02	2.7E-06	0.0E+00	NA	NA	NA	NA
Vanadium	27	0.01	4.3E-06	0.0E+00	5.0E-03	8.6E-04	0.0E+00	8.6E-04	6.0E-07	0.0E+00	NA	NA	NA	NA
Zinc	49	0.01	7.8E-06	3.8E-07	3.0E-01	2.6E-05	1.3E-06	2.5E-05	1.1E-06	5.3E-08	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	316	0.1	5.0E-04	NA	4.0E-03	1.3E-01	NA	1.3E-01	7.0E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	825	0.1	1.3E-03	NA	2.0E+00	6.6E-04	NA	6.6E-04	1.8E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.3	0.2				5.E-07	6.E-07	0.E+00

Table D-9
Dermal Contact with Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area														
Metals														
Arsenic	1.4	0.03	6.5E-07	1.1E-06	3.5E-06	1.8E-01	3.3E-01	NA	9.0E-08	1.6E-07	9.5E+00	8.5E-07	1.5E-06	NA
Barium	64	0.01	1.0E-05	6.8E-05	1.4E-02	7.2E-04	4.9E-03	NA	1.4E-06	9.5E-06	NA	NA	NA	NA
Beryllium	0.37	0.01	5.9E-08	2.4E-07	1.4E-05	4.2E-03	1.7E-02	NA	8.2E-09	3.3E-08	NA	NA	NA	NA
Cadmium	1.9	0.001	3.0E-08	1.5E-08	1.3E-05	2.4E-03	1.2E-03	1.2E-03	4.1E-09	2.1E-09	NA	NA	NA	NA
Chromium	18	0.01	2.9E-06	7.7E-06	2.0E-02	1.5E-04	4.0E-04	NA	4.0E-07	1.1E-06	NA	NA	NA	NA
Cobalt	5.4	0.01	8.6E-07	1.8E-06	3.0E-04	NA	NA	NA	1.2E-07	2.5E-07	NA	NA	NA	NA
Copper	37	0.01	5.9E-06	7.2E-06	4.0E-02	1.5E-04	1.8E-04	NA	8.2E-07	1.0E-06	NA	NA	NA	NA
Lead	51	0.01	8.1E-06	4.4E-06	LeadModel	NA	NA	NA	1.1E-06	6.1E-07	LeadModel	NA	NA	NA
Mercury	2.1	0.01	3.4E-07	9.1E-09	1.6E-04	2.1E-03	5.7E-05	2.0E-03	4.7E-08	1.3E-09	NA	NA	NA	NA
Nickel	24	0.01	3.7E-06	NA	4.4E-04	8.5E-03	NA	NA	5.2E-07	NA	NA	NA	NA	NA
Selenium	0.6	0.01	9.6E-08	1.6E-05	5.0E-03	1.9E-05	3.1E-03	NA	1.3E-08	2.2E-06	NA	NA	NA	NA
Vanadium	34	0.01	5.4E-06	1.0E-05	5.0E-03	1.1E-03	2.0E-03	NA	7.6E-07	1.4E-06	NA	NA	NA	NA
Zinc	126	0.01	2.0E-05	0.0E+00	3.0E-01	6.7E-05	0.0E+00	6.7E-05	2.8E-06	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	130	0.1	2.1E-04	NA	4.0E-03	5.2E-02	NA	5.2E-02	2.9E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	0.1	1.2E-03	NA	2.0E+00	6.0E-04	NA	6.0E-04	1.7E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides														
DDT	0.0073	0.03	3.5E-09	NA	5.0E-04	7.0E-06	NA	7.0E-06	4.8E-10	NA	3.4E-01	1.6E-10	NA	1.6E-10
Polychlorinated Biphenyls (PCBs)														
Aroclor-1254	0.041	0.15	9.8E-08	NA	2.0E-05	4.9E-03	NA	4.9E-03	1.4E-08	NA	2.0E+00	2.7E-08	NA	2.7E-08
Aroclor-1260	0.0563	0.15	1.3E-07	NA	NA	NA	NA	NA	1.9E-08	NA	2.0E+00	3.7E-08	NA	3.7E-08
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.4	0.06				9.E-07	2.E-06	6.E-08
Box Factory - Burner														
Dioxin/Furans														
TCDD TEQ	1.3E-05	0.03	6.4E-12	NA	1.0E-08	6.4E-04	NA	6.4E-04	8.9E-13	NA	1.3E+05	1.2E-07	NA	1.2E-07
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.0006	NA	0.0006				1.E-07	NA	1.E-07

Equations

Noncancer

Average Daily Dose (ADD)

$$ADD = (Cs \times SA \times SAF \times ABS_d \times EF \times ED \times CF_{kg/mg}) / (AT_{nc} \times BW)$$

Hazard Quotient (HQ)

$$HQ = AADD / RfDd$$

Cancer

Lifetime Daily Dose (LDD)

$$LDD = (Cs \times DF \times ABS_d \times EF \times CF_{kg/mg}) / AT_c$$

Excess Cancer Risk (CR)

$$CR = LADD \times SFd$$

Dermal Factor (DF)

Nonmutagenic

$$DF = ([ED_c \times SA_c \times SAF_c] / BW_c) + ([ED_a \times SA_a \times SAF_a] / BW_a)$$

Mutagenic

$$DF_m = (([ED_{c0\text{-}2} \times SA_c \times SAF_c] / BW_c) \times 10) + (([ED_{c2\text{-}6} \times SA_c \times SAF_c] / BW_c) \times 3) + (([ED_{a6\text{-}16} \times SA_a \times SAF_a] / BW_a) \times 3) + (([ED_{a16\text{-}30} \times SA_a \times SAF_a] / BW_a) \times 1)$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Dermal Factor	DF	377	mg-yr/kg-day
Dermal Factor - Mutagenic	DFm	1,503	mg-yr/kg-day
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Soil-to-Skin Adherence Factor	SAF	Table D-3	$mg/cm^2\text{-}d$
Surface Area	SA	Table D-3	cm^2

Table D-9
Dermal Contact with Soil - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
cm^2 = centimeter squared
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-26
mg/cm^2-d = milligrams per centimeter squared per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-2.
[b] Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment, Guidance Manual, Interim Final - Revised October 2013 and United States Environmental Protection Agency (USEPA), 2004, Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005. July.
[c] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[d] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[e] From Table D-4.
[f] Site-related HQs and CRs are difference between the EPC and background.
[g] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-10
Inhalation to Fugitive Dust - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(unitless)	(unitless)	(unitless)	(µg/m^3)	(µg/m^3)	(µg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	4.2E-07	NA	NA	NA	NA	NA	1.8E-07	NA	NA	NA	NA	NA
Arsenic	1.6	1.6E-07	2.4E-07	1.5E-02	1.1E-05	1.6E-05	NA	6.9E-08	1.0E-07	3.3E-03	2.3E-10	3.4E-10	NA
Barium	68	6.8E-06	4.3E-05	5.0E-01	1.4E-05	8.6E-05	NA	2.9E-06	1.9E-05	NA	NA	NA	NA
Beryllium	1.2	1.2E-07	1.5E-07	7.0E-03	1.7E-05	2.2E-05	NA	5.2E-08	6.5E-08	2.4E-03	1.2E-10	1.6E-10	NA
Cadmium	0.83	8.4E-08	9.4E-08	2.0E-02	4.2E-06	4.7E-06	NA	3.6E-08	4.0E-08	4.2E-03	1.5E-10	1.7E-10	NA
Chromium	28	2.8E-06	4.9E-06	NA	NA	NA	NA	1.2E-06	2.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	2.0E-08	1.1E-07	2.0E-01	1.0E-07	5.5E-07	NA	2.2E-08	1.2E-07	1.5E-01	3.3E-09	1.8E-08	NA
Cobalt	5.7	5.8E-07	1.1E-06	6.0E-03	9.6E-05	1.9E-04	NA	2.5E-07	4.8E-07	9.0E-03	2.2E-09	4.4E-09	NA
Copper	27	2.7E-06	4.6E-06	NA	NA	NA	NA	1.2E-06	2.0E-06	NA	NA	NA	NA
Lead	14	1.4E-06	2.8E-06	LeadModel	NA	NA	NA	5.8E-07	1.2E-06	LeadModel	NA	NA	NA
Manganese	183	1.8E-05	3.7E-05	9.0E-02	2.0E-04	4.1E-04	NA	7.9E-06	1.6E-05	NA	NA	NA	NA
Mercury	0.23	2.3E-08	5.7E-09	3.0E-02	7.8E-07	1.9E-07	5.9E-07	1.0E-08	2.5E-09	NA	NA	NA	NA
Nickel	23	2.3E-06	5.7E-06	1.4E-02	1.6E-04	4.1E-04	NA	9.8E-07	2.4E-06	2.6E-04	2.5E-10	6.4E-10	NA
Vanadium	71	7.1E-06	9.9E-06	1.0E-01	7.1E-05	9.9E-05	NA	3.0E-06	4.2E-06	NA	NA	NA	NA
Zinc	22	2.2E-06	6.5E-06	NA	NA	NA	NA	9.4E-07	2.8E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	2.1E-06	NA	3.0E+00	7.1E-07	NA	7.1E-07	9.1E-07	NA	NA	NA	NA	NA
TPH as Motor Oil	158	1.6E-05	NA	8.0E+03	2.0E-09	NA	2.0E-09	6.8E-06	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	5.6E-07	NA	NA	NA	NA	NA	2.4E-07	NA	5.1E-06	1.2E-12	NA	1.2E-12
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.0006	0.001	0.000001				6.E-09	2.E-08	1.E-12
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	2.9E-08	NA	3.0E+01	9.7E-10	NA	9.7E-10	1.3E-08	NA	NA	NA	NA	NA
TPH as Diesel	59	6.0E-06	NA	3.0E+00	2.0E-06	NA	2.0E-06	2.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	294	3.0E-05	NA	8.0E+03	3.7E-09	NA	3.7E-09	1.3E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.000002	NA	0.000002				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	7.9E-08	2.4E-07	1.5E-02	5.2E-06	1.6E-05	NA	3.4E-08	1.0E-07	3.3E-03	1.1E-10	3.4E-10	NA
Barium	39	3.9E-06	4.3E-05	5.0E-01	7.9E-06	8.6E-05	NA	1.7E-06	1.9E-05	NA	NA	NA	NA
Beryllium	0.14	1.4E-08	1.5E-07	7.0E-03	2.0E-06	2.2E-05	NA	6.0E-09	6.5E-08	2.4E-03	1.5E-11	1.6E-10	NA
Cadmium	0.53	5.3E-08	9.4E-08	2.0E-02	2.7E-06	4.7E-06	NA	2.3E-08	4.0E-08	4.2E-03	9.6E-11	1.7E-10	NA
Chromium	36	3.6E-06	4.9E-06	NA	NA	NA	NA	1.6E-06	2.1E-06	NA	NA	NA	NA
Cobalt	9.4	9.5E-07	1.1E-06	6.0E-03	1.6E-04	1.9E-04	NA	4.1E-07	4.8E-07	9.0E-03	3.7E-09	4.4E-09	NA
Copper	25	2.5E-06	4.6E-06	NA	NA	NA	NA	1.1E-06	2.0E-06	NA	NA	NA	NA
Lead	18	1.8E-06	2.8E-06	LeadModel	NA	NA	NA	7.8E-07	1.2E-06	LeadModel	NA	NA	NA
Nickel	120	1.2E-05	5.7E-06	1.4E-02	8.6E-04	4.1E-04	4.6E-04	5.2E-06	2.4E-06	2.6E-04	1.3E-09	6.4E-10	7.1E-10
Vanadium	27	2.7E-06	9.9E-06	1.0E-01	2.7E-05	9.9E-05	NA	1.2E-06	4.2E-06	NA	NA	NA	NA
Zinc	49	4.9E-06	6.5E-06	NA	NA	NA	NA	2.1E-06	2.8E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	3.2E-05	NA	3.0E+00	1.1E-05	NA	1.1E-05	1.4E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	825	8.3E-05	NA	8.0E+03	1.0E-08	NA	1.0E-08	3.6E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	0.001	0.0005				5.E-09	6.E-09	7.E-10

Table D-10
Inhalation to Fugitive Dust - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(unitless)	(unitless)	(unitless)	(µg/m^3)	(µg/m^3)	(µg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	1.4E-07	2.4E-07	1.5E-02	9.1E-06	1.6E-05	NA	5.8E-08	1.0E-07	3.3E-03	1.9E-10	3.4E-10	NA
Barium	64	6.4E-06	4.3E-05	5.0E-01	1.3E-05	8.6E-05	NA	2.7E-06	1.9E-05	NA	NA	NA	NA
Beryllium	0.37	3.7E-08	1.5E-07	7.0E-03	5.3E-06	2.2E-05	NA	1.6E-08	6.5E-08	2.4E-03	3.8E-11	1.6E-10	NA
Cadmium	1.9	1.9E-07	9.4E-08	2.0E-02	9.4E-06	4.7E-06	4.7E-06	8.0E-08	4.0E-08	4.2E-03	3.4E-10	1.7E-10	1.7E-10
Chromium	18	1.8E-06	4.9E-06	NA	NA	NA	NA	7.8E-07	2.1E-06	NA	NA	NA	NA
Cobalt	5.4	5.4E-07	1.1E-06	6.0E-03	9.1E-05	1.9E-04	NA	2.3E-07	4.8E-07	9.0E-03	2.1E-09	4.4E-09	NA
Copper	37	3.7E-06	4.6E-06	NA	NA	NA	NA	1.6E-06	2.0E-06	NA	NA	NA	NA
Lead	51	5.2E-06	2.8E-06	LeadModel	NA	NA	NA	2.2E-06	1.2E-06	LeadModel	NA	NA	NA
Mercury	2.1	2.1E-07	5.7E-09	3.0E-02	NA	NA	NA	9.1E-08	2.5E-09	NA	NA	NA	NA
Nickel	24	2.4E-06	NA	1.4E-02	1.7E-04	NA	NA	1.0E-06	NA	2.6E-04	2.6E-10	NA	NA
Selenium	0.6	6.1E-08	9.9E-06	2.0E+01	3.1E-09	5.0E-07	NA	2.6E-08	4.2E-06	NA	NA	NA	NA
Vanadium	34	3.4E-06	6.5E-06	1.0E-01	3.4E-05	6.5E-05	NA	1.5E-06	2.8E-06	NA	NA	NA	NA
Zinc	126	1.3E-05	0.0E+00	NA	NA	NA	NA	5.4E-06	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	1.3E-05	NA	3.0E+00	4.4E-06	NA	4.4E-06	5.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	7.6E-05	NA	8.0E+03	9.4E-09	NA	9.4E-09	3.2E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	7.4E-10	NA	NA	NA	NA	NA	3.2E-10	NA	9.7E-05	3.1E-14	NA	3.1E-14
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	4.1E-09	NA	NA	NA	NA	NA	1.8E-09	NA	5.7E-04	1.0E-12	NA	1.0E-12
Aroclor-1260	0.0563	5.7E-09	NA	NA	NA	NA	NA	2.4E-09	NA	5.7E-04	1.4E-12	NA	1.4E-12
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.0003	0.0004	0.000009				3.E-09	5.E-09	2.E-10
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	1.3E-12	NA	4.0E-05	3.4E-08	NA	3.4E-08	5.8E-13	NA	3.8E+01	2.2E-11	NA	2.2E-11
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.00000003	NA	0.00000003				2.E-11	NA	2.E-11

Equations

Noncancer

Averaged Air Concentration (AAC)

$$AAC = ((Cs/PEF) \times ET \times EF \times ED \times CF_{\mu g/mg}) / (AT_{nc} \times CF_{hr/d})$$

Hazard Quotient (HQ)

$$HQ = AAC / RfC$$

Cancer

Lifetime Air Concentration (LAC)

$$LAC = ((Cs/PEF) \times ET \times EF \times EDF \times CF_{\mu g/mg}) / (AT_c \times CF_{hr/d})$$

Excess Cancer Risk (CR)

$$CR = LAC \times IUR$$

Exposure Duration Factor (EDF)

Nonmutagenic

$$EDF = (ED_c + ED_a)$$

Mutagenic

$$EDF_m = (ED_{c0\text{-}2} \times 10) + (ED_{c2\text{-}6} \times 3) + (ED_{a6\text{-}16} \times 3) + (ED_{a16\text{-}30} \times 1)$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{hr/d}$	24	hours/day
Conversion Factor	$CF_{\mu g/mg}$	1000	µg/mg
Exposure Duration	ED	Table D-3	year
Exposure Duration Factor	EDF	30	year
Exposure Duration Factor - Mutagenic	EDFm	76	year
Exposure Frequency	EF	Table D-3	days/year
Exposure Time	ET	Table D-3	hours/day
Particulate Emission Factor	PEF	Table D-3	m^3/kg

Table D-10
Inhalation to Fugitive Dust - Recreational Receptor - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(μg/m³)	(μg/m³)	(μg/m³)	(unitless)	(unitless)	(unitless)	(μg/m³)	(μg/m³)	(μg/m³)⁻¹	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
LeadModel = Evaluated by LeadSpread 8, Table D-26
m^3/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
μg/m^3 = micrograms per cubic meter
μg/mg = micrograms per milligrams
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-2.
[b] The AAC was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the AAC and LAC is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk.

Table D-11
Incidental Ingestion of Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	4.1E-06	NA	4.0E-04	1.0E-02	NA	NA	1.5E-06	NA	NA	NA	NA	NA
Arsenic	1.9	1.9E-06	1.1E-05	3.5E-06	5.4E-01	3.1E+00	NA	6.8E-07	8.4E-07	9.5E+00	6.4E-06	8.0E-06	NA
Barium	83	8.1E-05	2.0E-03	2.0E-01	4.1E-04	9.8E-03	NA	2.9E-05	1.5E-04	NA	NA	NA	NA
Beryllium	1.2	1.2E-06	6.8E-06	2.0E-03	5.9E-04	3.4E-03	NA	4.2E-07	5.2E-07	NA	NA	NA	NA
Cadmium	0.83	8.1E-07	4.2E-06	5.0E-04	1.6E-03	8.5E-03	NA	2.9E-07	3.2E-07	NA	NA	NA	NA
Chromium	26	2.5E-05	2.2E-04	1.5E+00	1.7E-05	1.5E-04	NA	8.9E-06	1.7E-05	NA	NA	NA	NA
Chromium (VI)	0.20	2.0E-07	5.0E-06	2.0E-02	9.8E-06	2.5E-04	NA	7.0E-08	3.8E-07	5.0E-01	3.5E-08	1.9E-07	NA
Cobalt	6.1	6.0E-06	5.1E-05	3.0E-04	2.0E-02	1.7E-01	NA	2.1E-06	3.9E-06	NA	NA	NA	NA
Copper	28	2.7E-05	2.1E-04	4.0E-02	6.8E-04	5.2E-03	NA	9.8E-06	1.6E-05	NA	NA	NA	NA
Lead	20	2.0E-05	1.3E-04	LeadModel	NA	NA	NA	7.0E-06	9.6E-06	LeadModel	NA	NA	NA
Manganese	218	2.1E-04	1.7E-03	1.4E-01	1.5E-03	1.2E-02	NA	7.6E-05	1.3E-04	NA	NA	NA	NA
Mercury	0.29	2.9E-07	2.6E-07	1.6E-04	1.8E-03	1.6E-03	1.6E-04	1.0E-07	2.0E-08	NA	NA	NA	NA
Nickel	27	2.6E-05	2.6E-04	1.1E-02	2.4E-03	2.3E-02	NA	9.3E-06	2.0E-05	NA	NA	NA	NA
Vanadium	73	7.1E-05	4.5E-04	5.0E-03	1.4E-02	9.0E-02	NA	2.5E-05	3.4E-05	NA	NA	NA	NA
Zinc	26	2.5E-05	2.9E-04	3.0E-01	8.4E-05	9.8E-04	NA	9.0E-06	2.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	2.1E-05	NA	4.0E-03	5.1E-03	NA	5.1E-03	7.3E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	160	1.6E-04	NA	2.0E+00	7.8E-05	NA	7.8E-05	5.6E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	3.2	3.1E-06	NA	5.0E-03	6.3E-04	NA	6.3E-04	1.1E-06	NA	8.1E-02	9.1E-08	NA	9.1E-08
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.6	3.5	0.01				7.E-06	8.E-06	9.E-08
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	2.8E-07	NA	4.0E-03	7.1E-05	NA	7.1E-05	1.0E-07	NA	NA	NA	NA	NA
TPH as Diesel	768	7.5E-04	NA	4.0E-03	1.9E-01	NA	1.9E-01	2.7E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	1.9E-03	NA	2.0E+00	9.7E-04	NA	9.7E-04	6.9E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.2	NA	0.2				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	7.6E-07	1.1E-05	3.5E-06	2.2E-01	3.1E+00	NA	2.7E-07	8.4E-07	9.5E+00	2.6E-06	8.0E-06	NA
Barium	39	3.8E-05	2.0E-03	2.0E-01	1.9E-04	9.8E-03	NA	1.4E-05	1.5E-04	NA	NA	NA	NA
Beryllium	0.14	1.4E-07	6.8E-06	2.0E-03	6.8E-05	3.4E-03	NA	4.9E-08	5.2E-07	NA	NA	NA	NA
Cadmium	0.53	5.2E-07	4.2E-06	5.0E-04	1.0E-03	8.5E-03	NA	1.9E-07	3.2E-07	NA	NA	NA	NA
Chromium	36	3.5E-05	2.2E-04	1.5E+00	2.3E-05	1.5E-04	NA	1.3E-05	1.7E-05	NA	NA	NA	NA
Cobalt	9.4	9.2E-06	5.1E-05	3.0E-04	3.1E-02	1.7E-01	NA	3.3E-06	3.9E-06	NA	NA	NA	NA
Copper	25	2.4E-05	2.1E-04	4.0E-02	6.1E-04	5.2E-03	NA	8.7E-06	1.6E-05	NA	NA	NA	NA
Lead	18	1.8E-05	1.3E-04	LeadModel	NA	NA	NA	6.3E-06	9.6E-06	LeadModel	NA	NA	NA
Nickel	120	1.2E-04	2.6E-04	1.1E-02	1.1E-02	2.3E-02	NA	4.2E-05	2.0E-05	NA	NA	NA	NA
Vanadium	27	2.6E-05	4.5E-04	5.0E-03	5.3E-03	9.0E-02	NA	9.4E-06	3.4E-05	NA	NA	NA	NA
Zinc	49	4.8E-05	2.9E-04	3.0E-01	1.6E-04	9.8E-04	NA	1.7E-05	2.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	747	7.3E-04	NA	4.0E-03	1.8E-01	NA	1.8E-01	2.6E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	923	9.0E-04	NA	2.0E+00	4.5E-04	NA	4.5E-04	3.2E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.4	3.4	0.2				3.E-06	8.E-06	0.E+00

Table D-11
Incidental Ingestion of Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.3	1.3E-06	1.1E-05	3.5E-06	3.8E-01	3.1E+00	NA	4.7E-07	8.4E-07	9.5E+00	4.5E-06	8.0E-06	NA
Barium	64	6.3E-05	2.0E-03	2.0E-01	3.2E-04	9.8E-03	NA	2.3E-05	1.5E-04	NA	NA	NA	NA
Beryllium	0.36	3.6E-07	6.8E-06	2.0E-03	1.8E-04	3.4E-03	NA	1.3E-07	5.2E-07	NA	NA	NA	NA
Cadmium	2.1	2.0E-06	4.2E-06	5.0E-04	4.1E-03	8.5E-03	NA	7.3E-07	3.2E-07	NA	NA	NA	NA
Chromium	18	1.8E-05	2.2E-04	1.5E+00	1.2E-05	1.5E-04	NA	6.4E-06	1.7E-05	NA	NA	NA	NA
Cobalt	5.5	5.4E-06	5.1E-05	3.0E-04	1.8E-02	1.7E-01	NA	1.9E-06	3.9E-06	NA	NA	NA	NA
Copper	36	3.5E-05	2.1E-04	4.0E-02	8.8E-04	5.2E-03	NA	1.3E-05	1.6E-05	NA	NA	NA	NA
Lead	50	4.9E-05	1.3E-04	LeadModel	NA	NA	NA	1.8E-05	9.6E-06	LeadModel	NA	NA	NA
Mercury	2.3	2.3E-06	2.6E-07	1.6E-04	1.4E-02	1.6E-03	1.3E-02	8.1E-07	2.0E-08	NA	NA	NA	NA
Molybdenum	4.4	4.3E-06	NA	5.0E-03	8.6E-04	NA	NA	1.5E-06	NA	NA	NA	NA	NA
Nickel	29	2.8E-05	2.6E-04	1.1E-02	2.5E-03	2.3E-02	NA	1.0E-05	2.0E-05	NA	NA	NA	NA
Selenium	0.58	5.7E-07	NA	5.0E-03	1.1E-04	NA	NA	2.0E-07	NA	NA	NA	NA	NA
Vanadium	34	3.4E-05	4.5E-04	5.0E-03	6.7E-03	9.0E-02	NA	1.2E-05	3.4E-05	NA	NA	NA	NA
Zinc	146	1.4E-04	2.9E-04	3.0E-01	4.8E-04	9.8E-04	NA	5.1E-05	2.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	1.3E-04	NA	4.0E-03	3.2E-02	NA	3.2E-02	4.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	7.3E-04	NA	2.0E+00	3.7E-04	NA	3.7E-04	2.6E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	7.1E-09	NA	5.0E-04	1.4E-05	NA	1.4E-05	2.6E-09	NA	3.4E-01	8.7E-10	NA	8.7E-10
Dieldrin	0.033	3.2E-08	NA	5.0E-05	6.5E-04	NA	6.5E-04	1.2E-08	NA	1.6E+01	1.8E-07	NA	1.8E-07
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.44	4.3E-07	NA	2.0E-05	2.1E-02	NA	2.1E-02	1.5E-07	NA	2.0E+00	3.1E-07	NA	3.1E-07
Aroclor-1260	0.50	4.9E-07	NA	NA	NA	NA	NA	1.8E-07	NA	2.0E+00	3.5E-07	NA	3.5E-07
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.5	3.4	0.1				5.E-06	8.E-06	8.E-07
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	6.5E-04	6.4E-10	NA	1.0E-08	6.4E-02	NA	6.4E-02	2.3E-10	NA	1.3E+05	3.0E-05	NA	3.0E-05
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.1	NA	0.1				3.E-05	NA	3.E-05

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDo$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_c \times BW)$

Excess Cancer Risk (CR)

$CR = LADD \times SFo$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Fraction Ingested from Source	FI	1	unitless
Ingestion Rate	IngR	Table D-3	mg/day

Table D-11
Incidental Ingestion of Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-27
mg/day = milligrams per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-12
Dermal Contact with Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank														
Metals														
Antimony	4.2	0.01	5.0E-07	NA	6.0E-05	8.3E-03	NA	NA	1.8E-07	NA	NA	NA	NA	NA
Arsenic	1.9	0.03	6.9E-07	8.5E-07	3.5E-06	2.0E-01	2.4E-01	NA	2.4E-07	3.0E-07	9.5E+00	2.3E-06	2.9E-06	NA
Barium	83	0.01	9.8E-06	5.1E-05	1.4E-02	7.0E-04	3.6E-03	NA	3.5E-06	1.8E-05	NA	NA	NA	NA
Beryllium	1.2	0.01	1.4E-07	1.8E-07	1.4E-05	1.0E-02	1.3E-02	NA	5.1E-08	6.3E-08	NA	NA	NA	NA
Cadmium	0.83	0.001	9.8E-09	1.1E-08	1.3E-05	7.8E-04	8.8E-04	NA	3.5E-09	3.9E-09	NA	NA	NA	NA
Chromium	26	0.01	3.0E-06	5.7E-06	2.0E-02	1.5E-04	2.9E-04	NA	1.1E-06	2.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	0.01	2.4E-08	1.3E-07	5.0E-04	4.7E-05	2.6E-04	NA	8.4E-09	4.6E-08	1.3E-02	1.1E-10	5.8E-10	NA
Cobalt	6.1	0.01	7.2E-07	1.3E-06	3.0E-04	NA	NA	NA	2.6E-07	4.7E-07	NA	NA	NA	NA
Copper	28	0.01	3.3E-06	5.4E-06	4.0E-02	8.2E-05	1.3E-04	NA	1.2E-06	1.9E-06	NA	NA	NA	NA
Lead	20	0.01	2.4E-06	3.2E-06	LeadModel	NA	NA	NA	8.5E-07	1.2E-06	LeadModel	NA	NA	NA
Manganese	218	0.01	2.6E-05	4.3E-05	1.4E-01	1.8E-04	3.1E-04	NA	9.2E-06	1.5E-05	NA	NA	NA	NA
Mercury	0.29	0.01	3.4E-08	6.7E-09	1.6E-04	2.2E-04	4.2E-05	1.7E-04	1.2E-08	2.4E-09	NA	NA	NA	NA
Nickel	27	0.01	3.1E-06	6.7E-06	4.4E-04	7.2E-03	1.5E-02	NA	1.1E-06	2.4E-06	NA	NA	NA	NA
Vanadium	73	0.01	8.6E-06	1.2E-05	5.0E-03	1.7E-03	2.3E-03	NA	3.1E-06	4.1E-06	NA	NA	NA	NA
Zinc	26	0.01	3.0E-06	7.6E-06	3.0E-01	1.0E-05	2.5E-05	NA	1.1E-06	2.7E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	21	0.1	2.5E-05	NA	4.0E-03	6.2E-03	NA	6.2E-03	8.9E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	160	0.1	1.9E-04	NA	2.0E+00	9.4E-05	NA	9.4E-05	6.7E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
Pentachlorophenol	3.2	0.1	3.8E-06	NA	5.0E-03	7.6E-04	NA	7.6E-04	1.3E-06	NA	8.1E-02	1.1E-07	NA	1.1E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	0.3	0.01				2.E-06	3.E-06	1.E-07
New Mill - Equipment Shed														
Total Petroleum Hydrocarbons (TPH)														
TPH as Gasoline	0.29	0.1	3.4E-07	NA	4.0E-03	8.6E-05	NA	8.6E-05	1.2E-07	NA	NA	NA	NA	NA
TPH as Diesel	768	0.1	9.1E-04	NA	4.0E-03	2.3E-01	NA	2.3E-01	3.2E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	0.1	2.3E-03	NA	2.0E+00	1.2E-03	NA	1.2E-03	8.3E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	NA	0.2				NA	NA	NA
New Mill - Dump Area														
Metals														
Arsenic	0.78	0.03	2.8E-07	8.5E-07	3.5E-06	7.9E-02	2.4E-01	NA	9.9E-08	3.0E-07	9.5E+00	9.4E-07	2.9E-06	NA
Barium	39	0.01	4.6E-06	5.1E-05	1.4E-02	3.3E-04	3.6E-03	NA	1.6E-06	1.8E-05	NA	NA	NA	NA
Beryllium	0.14	0.01	1.7E-08	1.8E-07	1.4E-05	1.2E-03	1.3E-02	NA	5.9E-09	6.3E-08	NA	NA	NA	NA
Cadmium	0.53	0.001	6.3E-09	1.1E-08	1.3E-05	5.0E-04	8.8E-04	NA	2.2E-09	3.9E-09	NA	NA	NA	NA
Chromium	36	0.01	4.2E-06	5.7E-06	2.0E-02	2.2E-04	2.9E-04	NA	1.5E-06	2.1E-06	NA	NA	NA	NA
Cobalt	9.4	0.01	1.1E-06	1.3E-06	3.0E-04	NA	NA	NA	4.0E-07	4.7E-07	NA	NA	NA	NA
Copper	25	0.01	3.0E-06	5.4E-06	4.0E-02	7.4E-05	1.3E-04	NA	1.1E-06	1.9E-06	NA	NA	NA	NA
Lead	18	0.01	2.1E-06	3.2E-06	LeadModel	NA	NA	NA	7.6E-07	1.2E-06	LeadModel	NA	NA	NA
Nickel	120	0.01	1.4E-05	6.7E-06	4.4E-04	3.2E-02	1.5E-02	1.7E-02	5.1E-06	2.4E-06	NA	NA	NA	NA
Vanadium	27	0.01	3.2E-06	1.2E-05	5.0E-03	6.4E-04	2.3E-03	NA	1.1E-06	4.1E-06	NA	NA	NA	NA
Zinc	49	0.01	5.8E-06	7.6E-06	3.0E-01	1.9E-05	2.5E-05	NA	2.1E-06	2.7E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	747	0.1	8.8E-04	NA	4.0E-03	2.2E-01	NA	2.2E-01	3.1E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	923	0.1	1.1E-03	NA	2.0E+00	5.4E-04	NA	5.4E-04	3.9E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.3	0.3	0.2				9.E-07	3.E-06	0.E+00

Table D-12
Dermal Contact with Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c] EPC	Average Daily Dose [c] Background [d]	Dermal Chronic Reference Dose [e]	Hazard Quotient [c] EPC	Hazard Quotient [c] Background [d]	Hazard Quotient [c] Site-Related [f]	Lifetime Daily Dose EPC	Lifetime Daily Dose Background [d]	Oral Slope Factor [e]	Incremental Cancer Risk EPC	Incremental Cancer Risk Background [d]	Incremental Cancer Risk Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area														
Metals														
Arsenic	1.3	0.03	4.8E-07	8.5E-07	3.5E-06	1.4E-01	2.4E-01	NA	1.7E-07	3.0E-07	9.5E+00	1.6E-06	2.9E-06	NA
Barium	64	0.01	7.6E-06	5.1E-05	1.4E-02	5.4E-04	3.6E-03	NA	2.7E-06	1.8E-05	NA	NA	NA	NA
Beryllium	0.36	0.01	4.3E-08	1.8E-07	1.4E-05	3.1E-03	1.3E-02	NA	1.5E-08	6.3E-08	NA	NA	NA	NA
Cadmium	2.1	0.001	2.4E-08	1.1E-08	1.3E-05	2.0E-03	8.8E-04	1.1E-03	8.7E-09	3.9E-09	NA	NA	NA	NA
Chromium	18	0.01	2.2E-06	5.7E-06	2.0E-02	1.1E-04	2.9E-04	NA	7.8E-07	2.1E-06	NA	NA	NA	NA
Cobalt	5.5	0.01	6.5E-07	1.3E-06	3.0E-04	NA	NA	NA	2.3E-07	4.7E-07	NA	NA	NA	NA
Copper	36	0.01	4.3E-06	5.4E-06	4.0E-02	1.1E-04	1.3E-04	NA	1.5E-06	1.9E-06	NA	NA	NA	NA
Lead	50	0.01	5.9E-06	3.2E-06	LeadModel	NA	NA	NA	2.1E-06	1.2E-06	LeadModel	NA	NA	NA
Mercury	2.3	0.01	2.7E-07	6.7E-09	1.6E-04	1.7E-03	4.2E-05	1.7E-03	9.8E-08	2.4E-09	NA	NA	NA	NA
Molybdenum	4.4	0.01	5.2E-07	NA	5.0E-03	1.0E-04	NA	NA	1.9E-07	NA	NA	NA	NA	NA
Nickel	29	0.01	3.4E-06	6.7E-06	4.4E-04	7.7E-03	1.5E-02	NA	1.2E-06	2.4E-06	NA	NA	NA	NA
Selenium	0.58	0.01	6.9E-08	NA	5.0E-03	1.4E-05	NA	NA	2.4E-08	NA	NA	NA	NA	NA
Vanadium	34	0.01	4.1E-06	1.2E-05	5.0E-03	8.1E-04	2.3E-03	NA	1.4E-06	4.1E-06	NA	NA	NA	NA
Zinc	146	0.01	1.7E-05	7.6E-06	3.0E-01	5.8E-05	2.5E-05	3.2E-05	6.2E-06	2.7E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	130	0.1	1.5E-04	NA	4.0E-03	3.8E-02	NA	3.8E-02	5.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	0.1	8.9E-04	NA	2.0E+00	4.4E-04	NA	4.4E-04	3.2E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides														
DDT	0.0073	0.03	2.6E-09	NA	5.0E-04	5.2E-06	NA	5.2E-06	9.2E-10	NA	3.4E-01	3.1E-10	NA	3.1E-10
Dieldrin	0.033	0.1	3.9E-08	NA	5.0E-05	7.8E-04	NA	7.8E-04	1.4E-08	NA	1.6E+01	2.2E-07	NA	2.2E-07
Polychlorinated Biphenyls (PCBs)														
Aroclor-1254	0.44	0.15	7.7E-07	NA	2.0E-05	3.9E-02	NA	3.9E-02	2.8E-07	NA	2.0E+00	5.5E-07	NA	5.5E-07
Aroclor-1260	0.50	0.15	8.9E-07	NA	NA	NA	NA	NA	3.2E-07	NA	2.0E+00	6.3E-07	NA	6.3E-07
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	0.3	0.08				3.E-06	3.E-06	1.E-06
Box Factory - Burner														
Dioxin/Furans														
TCDD TEQ	6.5E-04	0.03	2.3E-10	NA	1.0E-08	2.3E-02	NA	2.3E-02	8.2E-11	NA	1.3E+05	1.1E-05	NA	1.1E-05
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.02	NA	0.02				1.E-05	NA	1.E-05

Equations

Noncancer

Average Daily Dose (ADD)

$$ADD = (Cs \times SA \times SAF \times ABS_d \times EF \times ED \times CF_{kg/mg}) / (AT_{nc} \times BW)$$

Hazard Quotient (HQ)

$$HQ = AADD / RfDd$$

Cancer

Lifetime Daily Dose (LDD)

$$LDD = (Cs \times DF \times ABS_d \times EF \times CF_{kg/mg}) / AT_c$$

Excess Cancer Risk (CR)

$$CR = LADD \times SFd$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Soil-to-Skin Adherence Factor	SAF	Table D-3	mg/cm^2-d
Surface Area	SA	Table D-3	cm^2

Table D-12
Dermal Contact with Soil - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
cm^2 = centimeter squared
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-27
mg/cm^2-d = milligrams per centimeter squared per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment, Guidance Manual, Interim Final - Revised October 2013 and United States Environmental Protection Agency (USEPA), 2004, Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005. July.
[c] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[d] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[e] From Table D-4.
[f] Site-related HQs and CRs are difference between the EPC and background.
[g] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-13
Inhalation to Fugitive Dust - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(unitless)	(unitless)	(unitless)	($\mu g/m^3$)	($\mu g/m^3$)	$(\mu g/m^3)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	7.1E-07	NA	NA	NA	NA	NA	2.5E-07	NA	NA	NA	NA	NA
Arsenic	1.9	3.3E-07	4.0E-07	1.5E-02	2.2E-05	2.7E-05	NA	1.2E-07	1.4E-07	3.3E-03	3.8E-10	4.7E-10	NA
Barium	83	1.4E-05	7.2E-05	5.0E-01	2.8E-05	1.4E-04	NA	5.0E-06	2.6E-05	NA	NA	NA	NA
Beryllium	1.2	2.0E-07	2.5E-07	7.0E-03	2.9E-05	3.6E-05	NA	7.2E-08	9.0E-08	2.4E-03	1.7E-10	2.2E-10	NA
Cadmium	0.83	1.4E-07	1.6E-07	2.0E-02	6.9E-06	7.8E-06	NA	5.0E-08	5.6E-08	4.2E-03	2.1E-10	2.3E-10	NA
Chromium	26	4.3E-06	8.2E-06	NA	NA	NA	NA	1.5E-06	2.9E-06	NA	NA	NA	NA
Chromium (VI)	0.20	3.4E-08	1.8E-07	2.0E-01	1.7E-07	9.2E-07	NA	1.2E-08	6.6E-08	1.5E-01	1.8E-09	9.9E-09	NA
Cobalt	6.1	1.0E-06	1.9E-06	6.0E-03	1.7E-04	3.1E-04	NA	3.7E-07	6.7E-07	9.0E-03	3.3E-09	6.0E-09	NA
Copper	28	4.7E-06	7.7E-06	NA	NA	NA	NA	1.7E-06	2.7E-06	NA	NA	NA	NA
Lead	20	3.4E-06	4.6E-06	LeadModel	NA	NA	NA	1.2E-06	1.6E-06	LeadModel	NA	NA	NA
Manganese	218	3.7E-05	6.1E-05	9.0E-02	4.1E-04	6.8E-04	NA	1.3E-05	2.2E-05	NA	NA	NA	NA
Mercury	0.29	4.9E-08	9.6E-09	3.0E-02	1.6E-06	3.2E-07	1.3E-06	1.8E-08	3.4E-09	NA	NA	NA	NA
Nickel	27	4.5E-06	9.5E-06	1.4E-02	3.2E-04	6.8E-04	NA	1.6E-06	3.4E-06	2.6E-04	4.2E-10	8.8E-10	NA
Vanadium	73	1.2E-05	1.7E-05	1.0E-01	1.2E-04	1.7E-04	NA	4.4E-06	5.9E-06	NA	NA	NA	NA
Zinc	26	4.3E-06	1.1E-05	NA	NA	NA	NA	1.5E-06	3.9E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	3.5E-06	NA	3.0E+00	1.2E-06	NA	1.2E-06	1.3E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	160	2.7E-05	NA	8.0E+03	3.4E-09	NA	3.4E-09	9.6E-06	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	3.2	5.4E-07	NA	NA	NA	NA	NA	1.9E-07	NA	5.1E-06	9.8E-13	NA	9.8E-13
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	0.002	0.000002				6.E-09	2.E-08	1.E-12
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	4.9E-08	NA	3.0E+01	1.6E-09	NA	1.6E-09	1.7E-08	NA	NA	NA	NA	NA
TPH as Diesel	768	1.3E-04	NA	3.0E+00	4.3E-05	NA	4.3E-05	4.6E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	1,980	3.3E-04	NA	8.0E+03	4.2E-08	NA	4.2E-08	1.2E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.00004	NA	0.00004				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	1.3E-07	4.0E-07	1.5E-02	8.7E-06	2.7E-05	NA	4.7E-08	1.4E-07	3.3E-03	1.5E-10	4.7E-10	NA
Barium	39	6.5E-06	7.2E-05	5.0E-01	1.3E-05	1.4E-04	NA	2.3E-06	2.6E-05	NA	NA	NA	NA
Beryllium	0.14	2.4E-08	2.5E-07	7.0E-03	3.4E-06	3.6E-05	NA	8.4E-09	9.0E-08	2.4E-03	2.0E-11	2.2E-10	NA
Cadmium	0.53	8.9E-08	1.6E-07	2.0E-02	4.4E-06	7.8E-06	NA	3.2E-08	5.6E-08	4.2E-03	1.3E-10	2.3E-10	NA
Chromium	36	6.0E-06	8.2E-06	NA	NA	NA	NA	2.2E-06	2.9E-06	NA	NA	NA	NA
Cobalt	9.4	1.6E-06	1.9E-06	6.0E-03	2.6E-04	3.1E-04	NA	5.6E-07	6.7E-07	9.0E-03	5.1E-09	6.0E-09	NA
Copper	25	4.2E-06	7.7E-06	NA	NA	NA	NA	1.5E-06	2.7E-06	NA	NA	NA	NA
Lead	18	3.0E-06	4.6E-06	LeadModel	NA	NA	NA	1.1E-06	1.6E-06	LeadModel	NA	NA	NA
Nickel	120	2.0E-05	9.5E-06	1.4E-02	1.4E-03	6.8E-04	7.6E-04	7.2E-06	3.4E-06	2.6E-04	1.9E-09	8.8E-10	9.9E-10
Vanadium	27	4.5E-06	1.7E-05	1.0E-01	4.5E-05	1.7E-04	NA	1.6E-06	5.9E-06	NA	NA	NA	NA
Zinc	49	8.2E-06	1.1E-05	NA	NA	NA	NA	2.9E-06	3.9E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	747	1.3E-04	NA	3.0E+00	4.2E-05	NA	4.2E-05	4.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	923	1.5E-04	NA	8.0E+03	1.9E-08	NA	1.9E-08	5.5E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.002	0.001	0.001				7.E-09	8.E-09	1.E-09

Table D-13
Inhalation to Fugitive Dust - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(unitless)	(unitless)	(unitless)	(µg/m^3)	(µg/m^3)	(µg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.3	2.3E-07	4.0E-07	1.5E-02	1.5E-05	2.7E-05	NA	8.1E-08	1.4E-07	3.3E-03	2.7E-10	4.7E-10	NA
Barium	64	1.1E-05	7.2E-05	5.0E-01	2.2E-05	1.4E-04	NA	3.9E-06	2.6E-05	NA	NA	NA	NA
Beryllium	0.36	6.1E-08	2.5E-07	7.0E-03	8.7E-06	3.6E-05	NA	2.2E-08	9.0E-08	2.4E-03	5.2E-11	2.2E-10	NA
Cadmium	2.1	3.5E-07	1.6E-07	2.0E-02	1.7E-05	7.8E-06	9.6E-06	1.2E-07	5.6E-08	4.2E-03	5.2E-10	2.3E-10	2.9E-10
Chromium	18	3.1E-06	8.2E-06	NA	NA	NA	NA	1.1E-06	2.9E-06	NA	NA	NA	NA
Cobalt	5.5	9.2E-07	1.9E-06	6.0E-03	1.5E-04	3.1E-04	NA	3.3E-07	6.7E-07	9.0E-03	3.0E-09	6.0E-09	NA
Copper	36	6.0E-06	7.7E-06	NA	NA	NA	NA	2.2E-06	2.7E-06	NA	NA	NA	NA
Lead	50	8.4E-06	4.6E-06	LeadModel	NA	NA	NA	3.0E-06	1.6E-06	LeadModel	NA	NA	NA
Mercury	2.3	3.9E-07	9.6E-09	3.0E-02	NA	NA	NA	1.4E-07	3.4E-09	NA	NA	NA	NA
Molybdenum	4.4	7.4E-07	NA	NA	NA	NA	NA	2.6E-07	NA	NA	NA	NA	NA
Nickel	29	4.8E-06	9.5E-06	1.4E-02	3.4E-04	6.8E-04	NA	1.7E-06	3.4E-06	2.6E-04	4.4E-10	8.8E-10	NA
Selenium	0.58	9.8E-08	NA	2.0E+01	4.9E-09	NA	NA	3.5E-08	NA	NA	NA	NA	NA
Vanadium	34	5.8E-06	1.7E-05	1.0E-01	5.8E-05	1.7E-04	NA	2.1E-06	5.9E-06	NA	NA	NA	NA
Zinc	146	2.5E-05	1.1E-05	NA	NA	NA	NA	8.8E-06	3.9E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	2.2E-05	NA	3.0E+00	7.3E-06	NA	7.3E-06	7.8E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	1.3E-04	NA	8.0E+03	1.6E-08	NA	1.6E-08	4.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	1.2E-09	NA	NA	NA	NA	NA	4.4E-10	NA	9.7E-05	4.2E-14	NA	4.2E-14
Dieldrin	0.033	5.5E-09	NA	NA	NA	NA	NA	2.0E-09	NA	4.6E-03	9.1E-12	NA	9.1E-12
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.44	7.3E-08	NA	NA	NA	NA	NA	2.6E-08	NA	5.7E-04	1.5E-11	NA	1.5E-11
Aroclor-1260	0.50	8.4E-08	NA	NA	NA	NA	NA	3.0E-08	NA	5.7E-04	1.7E-11	NA	1.7E-11
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	0.001	0.00002				4.E-09	8.E-09	3.E-10
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	6.5E-04	1.1E-10	NA	4.0E-05	2.7E-06	NA	2.7E-06	3.9E-11	NA	3.8E+01	1.5E-09	NA	1.5E-09
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.000003	NA	0.000003				1.E-09	NA	1.E-09

Equations

Noncancer

Averaged Air Concentration (AAC)

$$AAC = ((Cs/PEF) \times ET \times EF \times ED \times CF_{\mu g/mg}) / (AT_{nc} \times CF_{hr/d})$$

Hazard Quotient (HQ)

$$HQ = AAC / RfC$$

Cancer

Lifetime Air Concentration (LAC)

$$LAC = ((Cs/PEF) \times ET \times EF \times EDF \times CF_{\mu g/mg}) / (AT_c \times CF_{hr/d})$$

Excess Cancer Risk (CR)

$$CR = LAC \times IUR$$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{hr/d}$	24	hours/day
Conversion Factor	$CF_{\mu g/mg}$	1000	µg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Exposure Time	ET	Table D-3	hours/day
Particulate Emission Factor	PEF	Table D-3	m^3/kg

Table D-13
Inhalation to Fugitive Dust - Commercial Worker - Pre-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m³)	(µg/m³)	(µg/m³)	(unitless)	(unitless)	(unitless)	(µg/m³)	(µg/m³)	(µg/m³)⁻¹	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
LeadModel = Evaluated by LeadSpread 8, Table D-27
m^3/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
µg/m^3 = micrograms per cubic meter
µg/mg = micrograms per milligrams
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The AAC was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the AAC and LAC is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk.

Table D-14
Incidental Ingestion of Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	4.1E-06	NA	4.0E-04	1.0E-02	NA	NA	1.5E-06	NA	NA	NA	NA	NA
Arsenic	1.6	1.6E-06	1.1E-05	3.5E-06	4.5E-01	3.1E+00	NA	5.6E-07	8.4E-07	9.5E+00	5.3E-06	8.0E-06	NA
Barium	68	6.6E-05	2.0E-03	2.0E-01	3.3E-04	9.8E-03	NA	2.4E-05	1.5E-04	NA	NA	NA	NA
Beryllium	1.2	1.2E-06	6.8E-06	2.0E-03	5.9E-04	3.4E-03	NA	4.2E-07	5.2E-07	NA	NA	NA	NA
Cadmium	0.83	8.1E-07	4.2E-06	5.0E-04	1.6E-03	8.5E-03	NA	2.9E-07	3.2E-07	NA	NA	NA	NA
Chromium	28	2.7E-05	2.2E-04	1.5E+00	1.8E-05	1.5E-04	NA	9.6E-06	1.7E-05	NA	NA	NA	NA
Chromium (VI)	0.20	2.0E-07	5.0E-06	2.0E-02	9.8E-06	2.5E-04	NA	7.0E-08	3.8E-07	5.0E-01	3.5E-08	1.9E-07	NA
Cobalt	5.7	5.6E-06	5.1E-05	3.0E-04	1.9E-02	1.7E-01	NA	2.0E-06	3.9E-06	NA	NA	NA	NA
Copper	27	2.7E-05	2.1E-04	4.0E-02	6.7E-04	5.2E-03	NA	9.5E-06	1.6E-05	NA	NA	NA	NA
Lead	14	1.3E-05	1.3E-04	LeadModel	NA	NA	NA	4.7E-06	9.6E-06	LeadModel	NA	NA	NA
Manganese	183	1.8E-04	1.7E-03	1.4E-01	1.3E-03	1.2E-02	NA	6.4E-05	1.3E-04	NA	NA	NA	NA
Mercury	0.23	2.3E-07	2.6E-07	1.6E-04	1.4E-03	1.6E-03	NA	8.1E-08	2.0E-08	NA	NA	NA	NA
Nickel	23	2.2E-05	2.6E-04	1.1E-02	2.0E-03	2.3E-02	NA	7.9E-06	2.0E-05	NA	NA	NA	NA
Vanadium	71	6.9E-05	4.5E-04	5.0E-03	1.4E-02	9.0E-02	NA	2.5E-05	3.4E-05	NA	NA	NA	NA
Zinc	22	2.1E-05	2.9E-04	3.0E-01	7.1E-05	9.8E-04	NA	7.6E-06	2.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	2.1E-05	NA	4.0E-03	5.1E-03	NA	5.1E-03	7.3E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	158	1.5E-04	NA	2.0E+00	7.7E-05	NA	7.7E-05	5.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	5.4E-06	NA	5.0E-03	1.1E-03	NA	1.1E-03	1.9E-06	NA	8.1E-02	1.6E-07	NA	1.6E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.5	3.5	0.01				6.E-06	8.E-06	2.E-07
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	2.8E-07	NA	4.0E-03	7.1E-05	NA	7.1E-05	1.0E-07	NA	NA	NA	NA	NA
TPH as Diesel	59	5.8E-05	NA	4.0E-03	1.5E-02	NA	1.5E-02	2.1E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	294	2.9E-04	NA	2.0E+00	1.4E-04	NA	1.4E-04	1.0E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.01	NA	0.01				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	7.6E-07	1.1E-05	3.5E-06	2.2E-01	3.1E+00	NA	2.7E-07	8.4E-07	9.5E+00	2.6E-06	8.0E-06	NA
Barium	39	3.8E-05	2.0E-03	2.0E-01	1.9E-04	9.8E-03	NA	1.4E-05	1.5E-04	NA	NA	NA	NA
Beryllium	0.14	1.4E-07	6.8E-06	2.0E-03	6.8E-05	3.4E-03	NA	4.9E-08	5.2E-07	NA	NA	NA	NA
Cadmium	0.53	5.2E-07	4.2E-06	5.0E-04	1.0E-03	8.5E-03	NA	1.9E-07	3.2E-07	NA	NA	NA	NA
Chromium	36	3.5E-05	2.2E-04	1.5E+00	2.3E-05	1.5E-04	NA	1.3E-05	1.7E-05	NA	NA	NA	NA
Cobalt	9.4	9.2E-06	5.1E-05	3.0E-04	3.1E-02	1.7E-01	NA	3.3E-06	3.9E-06	NA	NA	NA	NA
Copper	25	2.4E-05	2.1E-04	4.0E-02	6.1E-04	5.2E-03	NA	8.7E-06	1.6E-05	NA	NA	NA	NA
Lead	18	1.8E-05	1.3E-04	LeadModel	NA	NA	NA	6.3E-06	9.6E-06	LeadModel	NA	NA	NA
Nickel	120	1.2E-04	2.6E-04	1.1E-02	1.1E-02	2.3E-02	NA	4.2E-05	2.0E-05	NA	NA	NA	NA
Vanadium	27	2.6E-05	4.5E-04	5.0E-03	5.3E-03	9.0E-02	NA	9.4E-06	3.4E-05	NA	NA	NA	NA
Zinc	49	4.8E-05	2.9E-04	3.0E-01	1.6E-04	9.8E-04	NA	1.7E-05	2.3E-05	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	3.1E-04	NA	4.0E-03	7.7E-02	NA	7.7E-02	1.1E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	825	8.1E-04	NA	2.0E+00	4.0E-04	NA	4.0E-04	2.9E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.3	3.4	0.1				3.E-06	8.E-06	0.E+00

Table D-14
Incidental Ingestion of Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	1.3E-06	1.1E-05	3.5E-06	3.8E-01	3.1E+00	NA	4.7E-07	8.4E-07	9.5E+00	4.5E-06	8.0E-06	NA
Barium	64	6.2E-05	2.0E-03	2.0E-01	3.1E-04	9.8E-03	NA	2.2E-05	1.5E-04	NA	NA	NA	NA
Beryllium	0.37	3.6E-07	6.8E-06	2.0E-03	1.8E-04	3.4E-03	NA	1.3E-07	5.2E-07	NA	NA	NA	NA
Cadmium	1.9	1.8E-06	4.2E-06	5.0E-04	3.6E-03	8.5E-03	NA	6.5E-07	3.2E-07	NA	NA	NA	NA
Chromium	18	1.8E-05	2.2E-04	1.5E+00	1.2E-05	1.5E-04	NA	6.3E-06	1.7E-05	NA	NA	NA	NA
Cobalt	5.4	5.3E-06	5.1E-05	3.0E-04	1.8E-02	1.7E-01	NA	1.9E-06	3.9E-06	NA	NA	NA	NA
Copper	37	3.6E-05	2.1E-04	4.0E-02	9.1E-04	5.2E-03	NA	1.3E-05	1.6E-05	NA	NA	NA	NA
Lead	51	5.0E-05	1.3E-04	LeadModel	NA	NA	NA	1.8E-05	9.6E-06	LeadModel	NA	NA	NA
Mercury	2.1	2.1E-06	2.6E-07	1.6E-04	1.3E-02	1.6E-03	1.1E-02	7.4E-07	2.0E-08	NA	NA	NA	NA
Nickel	24	2.3E-05	NA	1.1E-02	2.1E-03	NA	NA	8.2E-06	NA	NA	NA	NA	NA
Selenium	0.6	5.9E-07	4.5E-04	5.0E-03	1.2E-04	9.0E-02	NA	2.1E-07	3.4E-05	NA	NA	NA	NA
Vanadium	34	3.3E-05	2.9E-04	5.0E-03	6.7E-03	5.9E-02	NA	1.2E-05	2.3E-05	NA	NA	NA	NA
Zinc	126	1.2E-04	0.0E+00	3.0E-01	4.1E-04	0.0E+00	4.1E-04	4.4E-05	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	1.3E-04	NA	4.0E-03	3.2E-02	NA	3.2E-02	4.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	7.3E-04	NA	2.0E+00	3.7E-04	NA	3.7E-04	2.6E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	7.1E-09	NA	5.0E-04	1.4E-05	NA	1.4E-05	2.6E-09	NA	3.4E-01	8.7E-10	NA	8.7E-10
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	4.0E-08	NA	2.0E-05	2.0E-03	NA	2.0E-03	1.4E-08	NA	2.0E+00	2.9E-08	NA	2.9E-08
Aroclor-1260	0.0563	5.5E-08	NA	NA	NA	NA	NA	2.0E-08	NA	2.0E+00	3.9E-08	NA	3.9E-08
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.5	3.5	0.05				5.E-06	8.E-06	7.E-08
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	1.3E-11	NA	1.0E-08	1.3E-03	NA	1.3E-03	4.7E-12	NA	1.3E+05	6.1E-07	NA	6.1E-07
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	NA	0.001				6.E-07	NA	6.E-07

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDo$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{c} \times BW)$

Excess Cancer Risk (CR)

$CR = LADD \times SFo$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Fraction Ingested from Source	FI	1	unitless
Ingestion Rate	IngR	Table D-3	mg/day

Table D-14
Incidental Ingestion of Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg-d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-27
mg/day = milligrams per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-15
Dermal Contact with Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank														
Metals														
Antimony	4.2	0.01	5.0E-07	NA	6.0E-05	8.3E-03	NA	NA	1.8E-07	NA	NA	NA	NA	NA
Arsenic	1.6	0.03	5.7E-07	8.5E-07	3.5E-06	1.6E-01	2.4E-01	NA	2.0E-07	3.0E-07	9.5E+00	1.9E-06	2.9E-06	NA
Barium	68	0.01	8.0E-06	5.1E-05	1.4E-02	5.7E-04	3.6E-03	NA	2.9E-06	1.8E-05	NA	NA	NA	NA
Beryllium	1.2	0.01	1.4E-07	1.8E-07	1.4E-05	1.0E-02	1.3E-02	NA	5.1E-08	6.3E-08	NA	NA	NA	NA
Cadmium	0.83	0.001	9.8E-09	1.1E-08	1.3E-05	7.9E-04	8.8E-04	NA	3.5E-09	3.9E-09	NA	NA	NA	NA
Chromium	28	0.01	3.3E-06	5.7E-06	2.0E-02	1.7E-04	2.9E-04	NA	1.2E-06	2.1E-06	NA	NA	NA	NA
Chromium (VI)	0.20	0.01	2.4E-08	1.3E-07	5.0E-04	4.7E-05	2.6E-04	NA	8.4E-09	4.6E-08	1.3E-02	1.1E-10	5.8E-10	NA
Cobalt	5.7	0.01	6.8E-07	1.3E-06	3.0E-04	NA	NA	NA	2.4E-07	4.7E-07	NA	NA	NA	NA
Copper	27	0.01	3.2E-06	5.4E-06	4.0E-02	8.0E-05	1.3E-04	NA	1.1E-06	1.9E-06	NA	NA	NA	NA
Lead	14	0.01	1.6E-06	3.2E-06	LeadModel	NA	NA	NA	5.7E-07	1.2E-06	LeadModel	NA	NA	NA
Manganese	183	0.01	2.2E-05	4.3E-05	1.4E-01	1.5E-04	3.1E-04	NA	7.7E-06	1.5E-05	NA	NA	NA	NA
Mercury	0.23	0.01	2.8E-08	6.7E-09	1.6E-04	1.7E-04	4.2E-05	1.3E-04	9.8E-09	2.4E-09	NA	NA	NA	NA
Nickel	23	0.01	2.7E-06	6.7E-06	4.4E-04	6.1E-03	1.5E-02	NA	9.5E-07	2.4E-06	NA	NA	NA	NA
Vanadium	71	0.01	8.3E-06	1.2E-05	5.0E-03	1.7E-03	2.3E-03	NA	3.0E-06	4.1E-06	NA	NA	NA	NA
Zinc	22	0.01	2.6E-06	7.6E-06	3.0E-01	8.6E-06	2.5E-05	NA	9.2E-07	2.7E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	21	0.1	2.5E-05	NA	4.0E-03	6.2E-03	NA	6.2E-03	8.9E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	158	0.1	1.9E-04	NA	2.0E+00	9.3E-05	NA	9.3E-05	6.7E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
Pentachlorophenol	6	0.25	1.6E-05	NA	5.0E-03	3.3E-03	NA	3.3E-03	5.9E-06	NA	8.1E-02	4.7E-07	NA	4.7E-07
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	0.3	0.01				2.E-06	3.E-06	5.E-07
New Mill - Equipment Shed														
Total Petroleum Hydrocarbons (TPH)														
TPH as Gasoline	0.29	0.1	3.4E-07	NA	4.0E-03	8.6E-05	NA	8.6E-05	1.2E-07	NA	NA	NA	NA	NA
TPH as Diesel	59	0.1	7.0E-05	NA	4.0E-03	1.8E-02	NA	1.8E-02	2.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	294	0.1	3.5E-04	NA	2.0E+00	1.7E-04	NA	1.7E-04	1.2E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.02	NA	0.02				NA	NA	NA
New Mill - Dump Area														
Metals														
Arsenic	0.78	0.03	2.8E-07	8.5E-07	3.5E-06	7.9E-02	2.4E-01	NA	9.9E-08	3.0E-07	9.5E+00	9.4E-07	2.9E-06	NA
Barium	39	0.01	4.6E-06	5.1E-05	1.4E-02	3.3E-04	3.6E-03	NA	1.6E-06	1.8E-05	NA	NA	NA	NA
Beryllium	0.14	0.01	1.7E-08	1.8E-07	1.4E-05	1.2E-03	1.3E-02	NA	5.9E-09	6.3E-08	NA	NA	NA	NA
Cadmium	0.53	0.001	6.3E-09	1.1E-08	1.3E-05	5.0E-04	8.8E-04	NA	2.2E-09	3.9E-09	NA	NA	NA	NA
Chromium	36	0.01	4.2E-06	5.7E-06	2.0E-02	2.2E-04	2.9E-04	NA	1.5E-06	2.1E-06	NA	NA	NA	NA
Cobalt	9.4	0.01	1.1E-06	1.3E-06	3.0E-04	NA	NA	NA	4.0E-07	4.7E-07	NA	NA	NA	NA
Copper	25	0.01	3.0E-06	5.4E-06	4.0E-02	7.4E-05	1.3E-04	NA	1.1E-06	1.9E-06	NA	NA	NA	NA
Lead	18	0.01	2.1E-06	3.2E-06	LeadModel	NA	NA	NA	7.6E-07	1.2E-06	LeadModel	NA	NA	NA
Nickel	120	0.01	1.4E-05	6.7E-06	4.4E-04	3.2E-02	1.5E-02	1.7E-02	5.1E-06	2.4E-06	NA	NA	NA	NA
Vanadium	27	0.01	3.2E-06	1.2E-05	5.0E-03	6.4E-04	2.3E-03	NA	1.1E-06	4.1E-06	NA	NA	NA	NA
Zinc	49	0.01	5.8E-06	7.6E-06	3.0E-01	1.9E-05	2.5E-05	NA	2.1E-06	2.7E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	316	0.1	3.7E-04	NA	4.0E-03	9.3E-02	NA	9.3E-02	1.3E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	825	0.1	9.7E-04	NA	2.0E+00	4.9E-04	NA	4.9E-04	3.5E-04	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	0.3	0.1				9.E-07	3.E-06	0.E+00

Table D-15
Dermal Contact with Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area														
Metals														
Arsenic	1.4	0.03	4.8E-07	8.5E-07	3.5E-06	1.4E-01	2.4E-01	NA	1.7E-07	3.0E-07	9.5E+00	1.6E-06	2.9E-06	NA
Barium	64	0.01	7.5E-06	5.1E-05	1.4E-02	5.4E-04	3.6E-03	NA	2.7E-06	1.8E-05	NA	NA	NA	NA
Beryllium	0.37	0.01	4.4E-08	1.8E-07	1.4E-05	3.1E-03	1.3E-02	NA	1.6E-08	6.3E-08	NA	NA	NA	NA
Cadmium	1.9	0.001	2.2E-08	1.1E-08	1.3E-05	1.8E-03	8.8E-04	8.8E-04	7.8E-09	3.9E-09	NA	NA	NA	NA
Chromium	18	0.01	2.1E-06	5.7E-06	2.0E-02	1.1E-04	2.9E-04	NA	7.6E-07	2.1E-06	NA	NA	NA	NA
Cobalt	5.4	0.01	6.4E-07	1.3E-06	3.0E-04	NA	NA	NA	2.3E-07	4.7E-07	NA	NA	NA	NA
Copper	37	0.01	4.4E-06	5.4E-06	4.0E-02	1.1E-04	1.3E-04	NA	1.6E-06	1.9E-06	NA	NA	NA	NA
Lead	51	0.01	6.0E-06	3.2E-06	LeadModel	NA	NA	NA	2.2E-06	1.2E-06	LeadModel	NA	NA	NA
Mercury	2.1	0.01	2.5E-07	6.7E-09	1.6E-04	1.6E-03	4.2E-05	1.5E-03	8.9E-08	2.4E-09	NA	NA	NA	NA
Nickel	24	0.01	2.8E-06	NA	4.4E-04	6.3E-03	NA	NA	9.9E-07	NA	NA	NA	NA	NA
Selenium	0.6	0.01	7.2E-08	1.2E-05	5.0E-03	1.4E-05	2.3E-03	NA	2.6E-08	4.1E-06	NA	NA	NA	NA
Vanadium	34	0.01	4.0E-06	7.6E-06	5.0E-03	8.1E-04	1.5E-03	NA	1.4E-06	2.7E-06	NA	NA	NA	NA
Zinc	126	0.01	1.5E-05	0.0E+00	3.0E-01	5.0E-05	0.0E+00	5.0E-05	5.3E-06	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	130	0.1	1.5E-04	NA	4.0E-03	3.8E-02	NA	3.8E-02	5.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	750	0.1	8.9E-04	NA	2.0E+00	4.4E-04	NA	4.4E-04	3.2E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides														
DDT	0.0073	0.03	2.6E-09	NA	5.0E-04	5.2E-06	NA	5.2E-06	9.2E-10	NA	3.4E-01	3.1E-10	NA	3.1E-10
Polychlorinated Biphenyls (PCBs)														
Aroclor-1254	0.041	0.15	7.3E-08	NA	2.0E-05	3.6E-03	NA	3.6E-03	2.6E-08	NA	2.0E+00	5.2E-08	NA	5.2E-08
Aroclor-1260	0.0563	0.15	1.0E-07	NA	NA	NA	NA	NA	3.6E-08	NA	2.0E+00	7.1E-08	NA	7.1E-08
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.2	0.3	0.04				2.E-06	3.E-06	1.E-07
Box Factory - Burner														
Dioxin/Furans														
TCDD TEQ	1.3E-05	0.03	4.7E-12	NA	1.0E-08	4.7E-04	NA	4.7E-04	1.7E-12	NA	1.3E+05	2.2E-07	NA	2.2E-07
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.0005	NA	0.0005				2.E-07	NA	2.E-07

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times SA \times SAF \times ABS_d \times EF \times ED \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDd$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times DF \times ABS_d \times EF \times CF_{kg/mg}) / AT_c$

Excess Cancer Risk (CR)

$CR = LADD \times SFd$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Soil-to-Skin Adherence Factor	SAF	Table D-3	mg/cm^2-d
Surface Area	SA	Table D-3	cm^2

Table D-15
Dermal Contact with Soil - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg-d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
cm^2 = centimeter squared
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-27
mg/cm^2-d = milligrams per centimeter squared per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment, Guidance Manual, Interim Final - Revised October 2013 and United States Environmental Protection Agency (USEPA), 2004, Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005. July.
[c] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[d] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[e] From Table D-4.
[f] Site-related HQs and CRs are difference between the EPC and background.
[g] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-16
Inhalation to Fugitive Dust - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(μg/m^3)	(μg/m^3)	(μg/m^3)	(unitless)	(unitless)	(unitless)	(μg/m^3)	(μg/m^3)	(μg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	7.1E-07	NA	NA	NA	NA	NA	2.5E-07	NA	NA	NA	NA	NA
Arsenic	1.6	2.7E-07	4.0E-07	1.5E-02	1.8E-05	2.7E-05	NA	9.6E-08	1.4E-07	3.3E-03	3.2E-10	4.7E-10	NA
Barium	68	1.1E-05	7.2E-05	5.0E-01	2.3E-05	1.4E-04	NA	4.1E-06	2.6E-05	NA	NA	NA	NA
Beryllium	1.2	2.0E-07	2.5E-07	7.0E-03	2.9E-05	3.6E-05	NA	7.2E-08	9.0E-08	2.4E-03	1.7E-10	2.2E-10	NA
Cadmium	0.83	1.4E-07	1.6E-07	2.0E-02	7.0E-06	7.8E-06	NA	5.0E-08	5.6E-08	4.2E-03	2.1E-10	2.3E-10	NA
Chromium	28	4.6E-06	8.2E-06	NA	NA	NA	NA	1.7E-06	2.9E-06	NA	NA	NA	NA
Chromium (VI)	0.20	3.4E-08	1.8E-07	2.0E-01	1.7E-07	9.2E-07	NA	1.2E-08	6.6E-08	1.5E-01	1.8E-09	9.9E-09	NA
Cobalt	5.7	9.6E-07	1.9E-06	6.0E-03	1.6E-04	3.1E-04	NA	3.4E-07	6.7E-07	9.0E-03	3.1E-09	6.0E-09	NA
Copper	27	4.6E-06	7.7E-06	NA	NA	NA	NA	1.6E-06	2.7E-06	NA	NA	NA	NA
Lead	14	2.3E-06	4.6E-06	LeadModel	NA	NA	NA	8.1E-07	1.6E-06	LeadModel	NA	NA	NA
Manganese	183	3.1E-05	6.1E-05	9.0E-02	3.4E-04	6.8E-04	NA	1.1E-05	2.2E-05	NA	NA	NA	NA
Mercury	0.23	3.9E-08	9.6E-09	3.0E-02	1.3E-06	3.2E-07	9.8E-07	1.4E-08	3.4E-09	NA	NA	NA	NA
Nickel	23	3.8E-06	9.5E-06	1.4E-02	2.7E-04	6.8E-04	NA	1.4E-06	3.4E-06	2.6E-04	3.5E-10	8.8E-10	NA
Vanadium	71	1.2E-05	1.7E-05	1.0E-01	1.2E-04	1.7E-04	NA	4.2E-06	5.9E-06	NA	NA	NA	NA
Zinc	22	3.7E-06	1.1E-05	NA	NA	NA	NA	1.3E-06	3.9E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	3.5E-06	NA	3.0E+00	1.2E-06	NA	1.2E-06	1.3E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	158	2.7E-05	NA	8.0E+03	3.3E-09	NA	3.3E-09	9.5E-06	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	9.3E-07	NA	NA	NA	NA	NA	3.3E-07	NA	5.1E-06	1.7E-12	NA	1.7E-12
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.001	0.002	0.000002				6.E-09	2.E-08	2.E-12
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	4.9E-08	NA	3.0E+01	1.6E-09	NA	1.6E-09	1.7E-08	NA	NA	NA	NA	NA
TPH as Diesel	59	1.0E-05	NA	3.0E+00	3.3E-06	NA	3.3E-06	3.6E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	294	4.9E-05	NA	8.0E+03	6.2E-09	NA	6.2E-09	1.8E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.000003	NA	0.000003				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	1.3E-07	4.0E-07	1.5E-02	8.7E-06	2.7E-05	NA	4.7E-08	1.4E-07	3.3E-03	1.5E-10	4.7E-10	NA
Barium	39	6.5E-06	7.2E-05	5.0E-01	1.3E-05	1.4E-04	NA	2.3E-06	2.6E-05	NA	NA	NA	NA
Beryllium	0.14	2.4E-08	2.5E-07	7.0E-03	3.4E-06	3.6E-05	NA	8.4E-09	9.0E-08	2.4E-03	2.0E-11	2.2E-10	NA
Cadmium	0.53	8.9E-08	1.6E-07	2.0E-02	4.4E-06	7.8E-06	NA	3.2E-08	5.6E-08	4.2E-03	1.3E-10	2.3E-10	NA
Chromium	36	6.0E-06	8.2E-06	NA	NA	NA	NA	2.2E-06	2.9E-06	NA	NA	NA	NA
Cobalt	9.4	1.6E-06	1.9E-06	6.0E-03	2.6E-04	3.1E-04	NA	5.6E-07	6.7E-07	9.0E-03	5.1E-09	6.0E-09	NA
Copper	25	4.2E-06	7.7E-06	NA	NA	NA	NA	1.5E-06	2.7E-06	NA	NA	NA	NA
Lead	18	3.0E-06	4.6E-06	LeadModel	NA	NA	NA	1.1E-06	1.6E-06	LeadModel	NA	NA	NA
Nickel	120	2.0E-05	9.5E-06	1.4E-02	1.4E-03	6.8E-04	7.6E-04	7.2E-06	3.4E-06	2.6E-04	1.9E-09	8.8E-10	9.9E-10
Vanadium	27	4.5E-06	1.7E-05	1.0E-01	4.5E-05	1.7E-04	NA	1.6E-06	5.9E-06	NA	NA	NA	NA
Zinc	49	8.2E-06	1.1E-05	NA	NA	NA	NA	2.9E-06	3.9E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	5.3E-05	NA	3.0E+00	1.8E-05	NA	1.8E-05	1.9E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	825	1.4E-04	NA	8.0E+03	1.7E-08	NA	1.7E-08	4.9E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.002	0.001	0.001				7.E-09	8.E-09	1.E-09

Table D-16
Inhalation to Fugitive Dust - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(μg/m^3)	(μg/m^3)	(μg/m^3)	(unitless)	(unitless)	(unitless)	(μg/m^3)	(μg/m^3)	(μg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	2.3E-07	4.0E-07	1.5E-02	1.5E-05	2.7E-05	NA	8.1E-08	1.4E-07	3.3E-03	2.7E-10	4.7E-10	NA
Barium	64	1.1E-05	7.2E-05	5.0E-01	2.1E-05	1.4E-04	NA	3.8E-06	2.6E-05	NA	NA	NA	NA
Beryllium	0.37	6.2E-08	2.5E-07	7.0E-03	8.9E-06	3.6E-05	NA	2.2E-08	9.0E-08	2.4E-03	5.3E-11	2.2E-10	NA
Cadmium	1.9	3.1E-07	1.6E-07	2.0E-02	1.6E-05	7.8E-06	7.8E-06	1.1E-07	5.6E-08	4.2E-03	4.7E-10	2.3E-10	2.3E-10
Chromium	18	3.0E-06	8.2E-06	NA	NA	NA	NA	1.1E-06	2.9E-06	NA	NA	NA	NA
Cobalt	5.4	9.1E-07	1.9E-06	6.0E-03	1.5E-04	3.1E-04	NA	3.2E-07	6.7E-07	9.0E-03	2.9E-09	6.0E-09	NA
Copper	37	6.2E-06	7.7E-06	NA	NA	NA	NA	2.2E-06	2.7E-06	NA	NA	NA	NA
Lead	51	8.6E-06	4.6E-06	LeadModel	NA	NA	NA	3.1E-06	1.6E-06	LeadModel	NA	NA	NA
Mercury	2.1	3.5E-07	9.6E-09	3.0E-02	NA	NA	NA	1.3E-07	3.4E-09	NA	NA	NA	NA
Nickel	24	4.0E-06	NA	1.4E-02	2.8E-04	NA	NA	1.4E-06	NA	2.6E-04	3.7E-10	NA	NA
Selenium	0.6	1.0E-07	1.7E-05	2.0E+01	5.1E-09	8.3E-07	NA	3.6E-08	5.9E-06	NA	NA	NA	NA
Vanadium	34	5.7E-06	1.1E-05	1.0E-01	5.7E-05	1.1E-04	NA	2.1E-06	3.9E-06	NA	NA	NA	NA
Zinc	126	2.1E-05	0.0E+00	NA	NA	NA	NA	7.6E-06	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	2.2E-05	NA	3.0E+00	7.3E-06	NA	7.3E-06	7.8E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	1.3E-04	NA	8.0E+03	1.6E-08	NA	1.6E-08	4.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	1.2E-09	NA	NA	NA	NA	NA	4.4E-10	NA	9.7E-05	4.2E-14	NA	4.2E-14
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	6.9E-09	NA	NA	NA	NA	NA	2.5E-09	NA	5.7E-04	1.4E-12	NA	1.4E-12
Aroclor-1260	0.0563	9.5E-09	NA	NA	NA	NA	NA	3.4E-09	NA	5.7E-04	1.9E-12	NA	1.9E-12
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.0006	0.0006	0.00002				4.E-09	7.E-09	2.E-10
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	2.2E-12	NA	4.0E-05	5.6E-08	NA	5.6E-08	8.0E-13	NA	3.8E+01	3.0E-11	NA	3.0E-11
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.00000006	NA	0.00000006				3.E-11	NA	3.E-11

Equations

Noncancer

Averaged Air Concentration (AAC)

$AAC = ((Cs/PEF) \times ET \times EF \times ED \times CF_{\mu g/mg}) / (AT_{nc} \times CF_{hr/d})$

Hazard Quotient (HQ)

$HQ = AAC / RfC$

Cancer

Lifetime Air Concentration (LAC)

$LAC = ((Cs/PEF) \times ET \times EF \times EDF \times CF_{\mu g/mg}) / (AT_c \times CF_{hr/d})$

Excess Cancer Risk (CR)

$CR = LAC \times IUR$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{hr/d}$	24	hours/day
Conversion Factor	$CF_{\mu g/mg}$	1000	μg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Exposure Time	ET	Table D-3	hours/day
Particulate Emission Factor	PEF	Table D-3	m^3/kg

Table D-16
Inhalation to Fugitive Dust - Commercial Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m³)	(µg/m³)	(µg/m³)	(unitless)	(unitless)	(unitless)	(µg/m³)	(µg/m³)	(µg/m³)⁻¹	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
LeadModel = Evaluated by LeadSpread 8, Table D-27
m^3/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
µg/m^3 = micrograms per cubic meter
µg/mg = micrograms per milligrams
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The AAC was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the AAC and LAC is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk.

Table D-17
Incidental Ingestion of Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg-d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	1.4E-05	NA	4.0E-04	3.4E-02	NA	NA	1.9E-07	NA	NA	NA	NA	NA
Arsenic	1.6	5.2E-06	7.7E-06	3.5E-06	1.5E+00	2.2E+00	NA	7.4E-08	1.1E-07	9.5E+00	7.0E-07	1.1E-06	NA
Barium	68	2.2E-04	1.4E-03	2.0E-01	1.1E-03	6.9E-03	NA	3.1E-06	2.0E-05	NA	NA	NA	NA
Beryllium	1.2	3.9E-06	4.8E-06	2.0E-03	1.9E-03	2.4E-03	NA	5.5E-08	6.9E-08	NA	NA	NA	NA
Cadmium	0.83	2.7E-06	3.0E-06	5.0E-04	5.4E-03	6.0E-03	NA	3.8E-08	4.3E-08	NA	NA	NA	NA
Chromium	28	8.9E-05	1.6E-04	1.5E+00	5.9E-05	1.0E-04	NA	1.3E-06	2.2E-06	NA	NA	NA	NA
Chromium (VI)	0.20	6.5E-07	3.6E-06	2.0E-02	3.2E-05	1.8E-04	NA	9.2E-09	5.1E-08	5.0E-01	4.6E-09	2.5E-08	NA
Cobalt	5.7	1.8E-05	3.6E-05	3.0E-04	6.2E-02	1.2E-01	NA	2.6E-07	5.2E-07	NA	NA	NA	NA
Copper	27	8.8E-05	1.5E-04	4.0E-02	2.2E-03	3.7E-03	NA	1.3E-06	2.1E-06	NA	NA	NA	NA
Lead	14	4.4E-05	8.9E-05	LeadModel	NA	NA	NA	6.3E-07	1.3E-06	LeadModel	NA	NA	NA
Manganese	183	5.9E-04	1.2E-03	1.4E-01	4.2E-03	8.4E-03	NA	8.4E-06	1.7E-05	NA	NA	NA	NA
Mercury	0.23	7.5E-07	1.8E-07	1.6E-04	4.7E-03	1.2E-03	3.6E-03	1.1E-08	2.6E-09	NA	NA	NA	NA
Nickel	23	7.3E-05	1.8E-04	1.1E-02	6.6E-03	1.7E-02	NA	1.0E-06	2.6E-06	NA	NA	NA	NA
Vanadium	71	2.3E-04	3.2E-04	5.0E-03	4.6E-02	6.4E-02	NA	3.3E-06	4.5E-06	NA	NA	NA	NA
Zinc	22	7.0E-05	2.1E-04	3.0E-01	2.3E-04	6.9E-04	NA	1.0E-06	3.0E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	6.8E-05	NA	4.0E-03	1.7E-02	NA	1.7E-02	9.7E-07	NA	NA	NA	NA	NA
TPH as Motor Oil	158	5.1E-04	NA	2.0E+00	2.6E-04	NA	2.6E-04	7.3E-06	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	1.8E-05	NA	5.0E-03	3.6E-03	NA	3.6E-03	2.6E-07	NA	8.1E-02	2.1E-08	NA	2.1E-08
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.7	2.4	0.02				7.E-07	1.E-06	2.E-08
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	9.4E-07	NA	4.0E-03	2.3E-04	NA	2.3E-04	1.3E-08	NA	NA	NA	NA	NA
TPH as Diesel	59	1.9E-04	NA	4.0E-03	4.8E-02	NA	4.8E-02	2.7E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	294	9.5E-04	NA	2.0E+00	4.7E-04	NA	4.7E-04	1.4E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.05	NA	0.05				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	2.5E-06	7.7E-06	3.5E-06	7.2E-01	2.2E+00	NA	3.6E-08	1.1E-07	9.5E+00	3.4E-07	1.1E-06	NA
Barium	39	1.3E-04	1.4E-03	2.0E-01	6.3E-04	6.9E-03	NA	1.8E-06	2.0E-05	NA	NA	NA	NA
Beryllium	0.14	4.5E-07	4.8E-06	2.0E-03	2.3E-04	2.4E-03	NA	6.5E-09	6.9E-08	NA	NA	NA	NA
Cadmium	0.53	1.7E-06	3.0E-06	5.0E-04	3.4E-03	6.0E-03	NA	2.4E-08	4.3E-08	NA	NA	NA	NA
Chromium	36	1.2E-04	1.6E-04	1.5E+00	7.7E-05	1.0E-04	NA	1.7E-06	2.2E-06	NA	NA	NA	NA
Cobalt	9.4	3.0E-05	3.6E-05	3.0E-04	1.0E-01	1.2E-01	NA	4.3E-07	5.2E-07	NA	NA	NA	NA
Copper	25	8.1E-05	1.5E-04	4.0E-02	2.0E-03	3.7E-03	NA	1.2E-06	2.1E-06	NA	NA	NA	NA
Lead	18	5.8E-05	8.9E-05	LeadModel	NA	NA	NA	8.3E-07	1.3E-06	LeadModel	NA	NA	NA
Nickel	120	3.9E-04	1.8E-04	1.1E-02	3.5E-02	1.7E-02	1.9E-02	5.5E-06	2.6E-06	NA	NA	NA	NA
Vanadium	27	8.7E-05	3.2E-04	5.0E-03	1.7E-02	6.4E-02	NA	1.2E-06	4.5E-06	NA	NA	NA	NA
Zinc	49	1.6E-04	2.1E-04	3.0E-01	5.3E-04	6.9E-04	NA	2.3E-06	3.0E-06	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	1.0E-03	NA	4.0E-03	2.6E-01	NA	2.6E-01	1.5E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	825	2.7E-03	NA	2.0E+00	1.3E-03	NA	1.3E-03	3.8E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.1	2.4	0.3				3.E-07	1.E-06	0.E+00

Table D-17
Incidental Ingestion of Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	4.4E-06	7.7E-06	3.5E-06	1.3E+00	2.2E+00	NA	6.3E-08	1.1E-07	9.5E+00	5.9E-07	1.1E-06	NA
Barium	64	2.1E-04	1.4E-03	2.0E-01	1.0E-03	6.9E-03	NA	2.9E-06	2.0E-05	NA	NA	NA	NA
Beryllium	0.37	1.2E-06	4.8E-06	2.0E-03	6.0E-04	2.4E-03	NA	1.7E-08	6.9E-08	NA	NA	NA	NA
Cadmium	1.9	6.0E-06	3.0E-06	5.0E-04	1.2E-02	6.0E-03	6.0E-03	8.6E-08	4.3E-08	NA	NA	NA	NA
Chromium	18	5.8E-05	1.6E-04	1.5E+00	3.9E-05	1.0E-04	NA	8.3E-07	2.2E-06	NA	NA	NA	NA
Cobalt	5.4	1.7E-05	3.6E-05	3.0E-04	5.8E-02	1.2E-01	NA	2.5E-07	5.2E-07	NA	NA	NA	NA
Copper	37	1.2E-04	1.5E-04	4.0E-02	3.0E-03	3.7E-03	NA	1.7E-06	2.1E-06	NA	NA	NA	NA
Lead	51	1.7E-04	8.9E-05	LeadModel	NA	NA	NA	2.4E-06	1.3E-06	LeadModel	NA	NA	NA
Mercury	2.1	6.8E-06	1.8E-07	1.6E-04	4.3E-02	1.2E-03	4.1E-02	9.7E-08	2.6E-09	NA	NA	NA	NA
Nickel	24	7.6E-05	NA	1.1E-02	6.9E-03	NA	NA	1.1E-06	NA	NA	NA	NA	NA
Selenium	0.61	2.0E-06	3.2E-04	5.0E-03	3.9E-04	6.4E-02	NA	2.8E-08	4.5E-06	NA	NA	NA	NA
Vanadium	34	1.1E-04	2.1E-04	5.0E-03	2.2E-02	4.2E-02	NA	1.6E-06	3.0E-06	NA	NA	NA	NA
Zinc	126	4.1E-04	0.0E+00	3.0E-01	1.4E-03	0.0E+00	1.4E-03	5.8E-06	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	4.2E-04	NA	4.0E-03	1.0E-01	NA	1.0E-01	6.0E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	2.4E-03	NA	2.0E+00	1.2E-03	NA	1.2E-03	3.5E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	2.4E-08	NA	5.0E-04	4.7E-05	NA	4.7E-05	3.4E-10	NA	3.4E-01	1.1E-10	NA	1.1E-10
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	1.3E-07	NA	2.0E-05	6.6E-03	NA	6.6E-03	1.9E-09	NA	2.0E+00	3.8E-09	NA	3.8E-09
Aroclor-1260	0.0563	1.8E-07	NA	NA	NA	NA	NA	2.6E-09	NA	2.0E+00	5.2E-09	NA	5.2E-09
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.5	2.5	0.2				6.E-07	1.E-06	9.E-09
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	4.3E-11	NA	1.0E-08	4.3E-03	NA	4.3E-03	6.2E-13	NA	1.3E+05	8.0E-08	NA	8.0E-08
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.004	NA	0.004				8.E-08	NA	8.E-08

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDo$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times IngR \times EF \times ED \times FI \times CF_{kg/mg}) / (AT_{c} \times BW)$

Excess Cancer Risk (CR)

$CR = LADD \times SFo$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Fraction Ingested from Source	FI	1	unitless
Ingestion Rate	IngR	Table D-3	mg/day

Table D-17
Incidental Ingestion of Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration (EPC) Soil [a]	Average Daily Dose [b]		Oral Chronic Reference Dose [d]	Hazard Quotient [b]			Lifetime Daily Dose		Oral Slope Factor [d]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	ADD	ADD	RfDo	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg-d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-28
mg/day = milligrams per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-18
Dermal Contact with Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank														
Metals														
Antimony	4.2	0.01	2.0E-06	NA	6.0E-05	3.3E-02	NA	NA	2.8E-08	NA	NA	NA	NA	NA
Arsenic	1.6	0.03	2.3E-06	3.4E-06	3.5E-06	6.5E-01	9.7E-01	NA	3.2E-08	4.9E-08	9.5E+00	3.1E-07	4.6E-07	NA
Barium	68	0.01	3.2E-05	2.0E-04	1.4E-02	2.3E-03	1.4E-02	NA	4.6E-07	2.9E-06	NA	NA	NA	NA
Beryllium	1.2	0.01	5.7E-07	7.1E-07	1.4E-05	4.0E-02	5.1E-02	NA	8.1E-09	1.0E-08	NA	NA	NA	NA
Cadmium	0.83	0.001	3.9E-08	4.4E-08	1.3E-05	3.1E-03	3.5E-03	NA	5.6E-10	6.3E-10	NA	NA	NA	NA
Chromium	28	0.01	1.3E-05	2.3E-05	2.0E-02	6.7E-04	1.2E-03	NA	1.9E-07	3.3E-07	NA	NA	NA	NA
Chromium (VI)	0.20	0.01	9.4E-08	5.2E-07	5.0E-04	1.9E-04	1.0E-03	NA	1.3E-09	7.4E-09	1.3E-02	1.7E-11	9.3E-11	NA
Cobalt	5.7	0.01	2.7E-06	5.3E-06	3.0E-04	NA	NA	NA	3.9E-08	7.6E-08	NA	NA	NA	NA
Copper	27	0.01	1.3E-05	2.2E-05	4.0E-02	3.2E-04	5.4E-04	NA	1.8E-07	3.1E-07	NA	NA	NA	NA
Lead	14	0.01	6.4E-06	1.3E-05	LeadModel	NA	NA	NA	9.1E-08	1.9E-07	LeadModel	NA	NA	NA
Manganese	183	0.01	8.6E-05	1.7E-04	1.4E-01	6.2E-04	1.2E-03	NA	1.2E-06	2.5E-06	NA	NA	NA	NA
Mercury	0.23	0.01	1.1E-07	2.7E-08	1.6E-04	6.9E-04	1.7E-04	5.2E-04	1.6E-09	3.8E-10	NA	NA	NA	NA
Nickel	23	0.01	1.1E-05	2.7E-05	4.4E-04	2.4E-02	6.1E-02	NA	1.5E-07	3.8E-07	NA	NA	NA	NA
Vanadium	71	0.01	3.3E-05	4.6E-05	5.0E-03	6.7E-03	9.3E-03	NA	4.8E-07	6.6E-07	NA	NA	NA	NA
Zinc	22	0.01	1.0E-05	3.0E-05	3.0E-01	3.4E-05	1.0E-04	NA	1.5E-07	4.3E-07	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	21	0.1	9.9E-05	NA	4.0E-03	2.5E-02	NA	2.5E-02	1.4E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	158	0.1	7.5E-04	NA	2.0E+00	3.7E-04	NA	3.7E-04	1.1E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
Pentachlorophenol	6	0.25	6.6E-05	NA	5.0E-03	1.3E-02	NA	1.3E-02	9.4E-07	NA	8.1E-02	7.6E-08	NA	7.6E-08
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.8	1.1	0.04				4.E-07	5.E-07	8.E-08
New Mill - Equipment Shed														
Total Petroleum Hydrocarbons (TPH)														
TPH as Gasoline	0.29	0.1	1.4E-06	NA	4.0E-03	3.4E-04	NA	3.4E-04	2.0E-08	NA	NA	NA	NA	NA
TPH as Diesel	59	0.1	2.8E-04	NA	4.0E-03	7.0E-02	NA	7.0E-02	4.0E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	294	0.1	1.4E-03	NA	2.0E+00	6.9E-04	NA	6.9E-04	2.0E-05	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.07	NA	0.07				NA	NA	NA
New Mill - Dump Area														
Metals														
Arsenic	0.78	0.03	1.1E-06	3.4E-06	3.5E-06	3.2E-01	9.7E-01	NA	1.6E-08	4.9E-08	9.5E+00	1.5E-07	4.6E-07	NA
Barium	39	0.01	1.8E-05	2.0E-04	1.4E-02	1.3E-03	1.4E-02	NA	2.6E-07	2.9E-06	NA	NA	NA	NA
Beryllium	0.14	0.01	6.6E-08	7.1E-07	1.4E-05	4.7E-03	5.1E-02	NA	9.4E-10	1.0E-08	NA	NA	NA	NA
Cadmium	0.53	0.001	2.5E-08	4.4E-08	1.3E-05	2.0E-03	3.5E-03	NA	3.6E-10	6.3E-10	NA	NA	NA	NA
Chromium	36	0.01	1.7E-05	2.3E-05	2.0E-02	8.7E-04	1.2E-03	NA	2.4E-07	3.3E-07	NA	NA	NA	NA
Cobalt	9.4	0.01	4.4E-06	5.3E-06	3.0E-04	NA	NA	NA	6.3E-08	7.6E-08	NA	NA	NA	NA
Copper	25	0.01	1.2E-05	2.2E-05	4.0E-02	3.0E-04	5.4E-04	NA	1.7E-07	3.1E-07	NA	NA	NA	NA
Lead	18	0.01	8.5E-06	1.3E-05	LeadModel	NA	NA	NA	1.2E-07	1.9E-07	LeadModel	NA	NA	NA
Nickel	120	0.01	5.7E-05	2.7E-05	4.4E-04	1.3E-01	6.1E-02	6.8E-02	8.1E-07	3.8E-07	NA	NA	NA	NA
Vanadium	27	0.01	1.3E-05	4.6E-05	5.0E-03	2.5E-03	9.3E-03	NA	1.8E-07	6.6E-07	NA	NA	NA	NA
Zinc	49	0.01	2.3E-05	3.0E-05	3.0E-01	7.7E-05	1.0E-04	NA	3.3E-07	4.3E-07	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	316	0.1	1.5E-03	NA	4.0E-03	3.7E-01	NA	3.7E-01	2.1E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	825	0.1	3.9E-03	NA	2.0E+00	1.9E-03	NA	1.9E-03	5.6E-05	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.8	1.1	0.4				1.E-07	5.E-07	0.E+00

Table D-18
Dermal Contact with Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area														
Metals														
Arsenic	1.4	0.03	1.9E-06	3.4E-06	3.5E-06	5.5E-01	9.7E-01	NA	2.7E-08	4.9E-08	9.5E+00	2.6E-07	4.6E-07	NA
Barium	64	0.01	3.0E-05	2.0E-04	1.4E-02	2.1E-03	1.4E-02	NA	4.3E-07	2.9E-06	NA	NA	NA	NA
Beryllium	0.37	0.01	1.7E-07	7.1E-07	1.4E-05	1.2E-02	5.1E-02	NA	2.5E-09	1.0E-08	NA	NA	NA	NA
Cadmium	1.9	0.001	8.8E-08	4.4E-08	1.3E-05	7.0E-03	3.5E-03	3.5E-03	1.3E-09	6.3E-10	NA	NA	NA	NA
Chromium	18	0.01	8.5E-06	2.3E-05	2.0E-02	4.4E-04	1.2E-03	NA	1.2E-07	3.3E-07	NA	NA	NA	NA
Cobalt	5.4	0.01	2.5E-06	5.3E-06	3.0E-04	NA	NA	NA	3.6E-08	7.6E-08	NA	NA	NA	NA
Copper	37	0.01	1.8E-05	2.2E-05	4.0E-02	4.4E-04	5.4E-04	NA	2.5E-07	3.1E-07	NA	NA	NA	NA
Lead	51	0.01	2.4E-05	1.3E-05	LeadModel	NA	NA	NA	3.5E-07	1.9E-07	LeadModel	NA	NA	NA
Mercury	2.1	0.01	1.0E-06	2.7E-08	1.6E-04	6.2E-03	1.7E-04	6.1E-03	1.4E-08	3.8E-10	NA	NA	NA	NA
Nickel	24	0.01	1.1E-05	NA	4.4E-04	2.5E-02	NA	NA	1.6E-07	NA	NA	NA	NA	NA
Selenium	0.61	0.01	2.9E-07	4.6E-05	5.0E-03	5.7E-05	9.3E-03	NA	4.1E-09	6.6E-07	NA	NA	NA	NA
Vanadium	34	0.01	1.6E-05	3.0E-05	5.0E-03	3.2E-03	6.1E-03	NA	2.3E-07	4.3E-07	NA	NA	NA	NA
Zinc	126	0.01	5.9E-05	0.0E+00	3.0E-01	2.0E-04	0.0E+00	2.0E-04	8.5E-07	0.0E+00	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)														
TPH as Diesel	130	0.1	6.1E-04	NA	4.0E-03	1.5E-01	NA	1.5E-01	8.8E-06	NA	NA	NA	NA	NA
TPH as Motor Oil	750	0.1	3.5E-03	NA	2.0E+00	1.8E-03	NA	1.8E-03	5.1E-05	NA	NA	NA	NA	NA
Organochlorine Pesticides														
DDT	0.0073	0.03	1.0E-08	NA	5.0E-04	2.1E-05	NA	2.1E-05	1.5E-10	NA	3.4E-01	5.0E-11	NA	5.0E-11
Polychlorinated Biphenyls (PCBs)														
Aroclor-1254	0.041	0.15	2.9E-07	NA	2.0E-05	1.5E-02	NA	1.5E-02	4.1E-09	NA	2.0E+00	8.3E-09	NA	8.3E-09
Aroclor-1260	0.0563	0.15	4.0E-07	NA	NA	NA	NA	NA	5.7E-09	NA	2.0E+00	1.1E-08	NA	1.1E-08
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.8	1.1	0.2				3.E-07	5.E-07	2.E-08
Box Factory - Burner														
Dioxin/Furans														
TCDD TEQ	1.3E-05	0.03	1.9E-11	NA	1.0E-08	1.9E-03	NA	1.9E-03	2.7E-13	NA	1.3E+05	3.5E-08	NA	3.5E-08
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [g] =						0.002	NA	0.002				4.E-08	NA	4.E-08

Equations

Noncancer

Average Daily Dose (ADD)

$ADD = (Cs \times SA \times SAF \times ABS_d \times EF \times ED \times CF_{kg/mg}) / (AT_{nc} \times BW)$

Hazard Quotient (HQ)

$HQ = AADD / RfDd$

Cancer

Lifetime Daily Dose (LDD)

$LDD = (Cs \times DF \times ABS_d \times EF \times CF_{kg/mg}) / AT_c$

Excess Cancer Risk (CR)

$CR = LADD \times SFd$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{kg/mg}$	0.000001	kg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Soil-to-Skin Adherence Factor	SAF	Table D-3	mg/cm^2-d
Surface Area	SA	Table D-3	cm^2

Table D-18
Dermal Contact with Soil - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Dermal Absorption Fraction from Soil [b]	Average Daily Dose [c]		Dermal Chronic Reference Dose [e]	Hazard Quotient [c]			Lifetime Daily Dose		Oral Slope Factor [e]	Incremental Cancer Risk		
			EPC	Background [d]		EPC	Background [d]	Site-Related [f]	EPC	Background [d]		EPC	Background [d]	Site-Related [f]
	Cs	ABS_d	ADD	ADD	RfDd	HQ	HQ	HQ	LDD	LDD	SFo	CR	CR	CR
	(mg/kg)	(unitless)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(unitless)	(unitless)	(unitless)	(mg/kg-d)	(mg/kg-d)	$(mg/kg\text{-}d)^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
cm^2 = centimeter squared
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
kg/mg = kilograms per milligram
LeadModel = Evaluated by LeadSpread 8, Table D-28
mg/cm^2-d = milligrams per centimeter squared per day
mg/kg = milligrams per kilogram
mg/kg-d = milligrams per kilogram per day
mg-yr/kg-day = milligrams-year per kilogram-day
NA = not applicable
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment, Guidance Manual, Interim Final - Revised October 2013 and United States Environmental Protection Agency (USEPA), 2004, Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), EPA/540/R/99/005. July.
[c] The ADD was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[d] The background concentration were used in calculating the ADD and LDD is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[e] From Table D-4.
[f] Site-related HQs and CRs are difference between the EPC and background.
[g] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk is the sum of the cancer risks.

Table D-19
Inhalation to Fugitive Dust - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(unitless)	(unitless)	(unitless)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)$^{-1}$	(unitless)	(unitless)	(unitless)
New Mill - Dip Tank													
Metals													
Antimony	4.2	9.6E-04	NA	NA	NA	NA	NA	1.4E-05	NA	NA	NA	NA	NA
Arsenic	1.6	3.7E-04	5.5E-04	1.5E-02	2.4E-02	3.7E-02	NA	5.2E-06	7.8E-06	3.3E-03	1.7E-08	2.6E-08	NA
Barium	68	1.5E-02	9.8E-02	5.0E-01	3.1E-02	2.0E-01	NA	2.2E-04	1.4E-03	NA	NA	NA	NA
Beryllium	1.2	2.7E-04	3.4E-04	7.0E-03	3.9E-02	4.9E-02	NA	3.9E-06	4.9E-06	2.4E-03	9.4E-09	1.2E-08	NA
Cadmium	0.83	1.9E-04	2.1E-04	2.0E-02	9.5E-03	1.1E-02	NA	2.7E-06	3.0E-06	4.2E-03	1.1E-08	1.3E-08	NA
Chromium	28	6.3E-03	1.1E-02	NA	NA	NA	NA	9.0E-05	1.6E-04	NA	NA	NA	NA
Chromium (VI)	0.20	4.6E-05	2.5E-04	2.0E-01	2.3E-04	1.3E-03	NA	6.5E-07	3.6E-06	1.5E-01	9.8E-08	5.4E-07	NA
Cobalt	5.7	1.3E-03	2.6E-03	6.0E-03	2.2E-01	4.3E-01	NA	1.9E-05	3.7E-05	9.0E-03	1.7E-07	3.3E-07	NA
Copper	27	6.2E-03	1.0E-02	NA	NA	NA	NA	8.9E-05	1.5E-04	NA	NA	NA	NA
Lead	14	3.1E-03	6.3E-03	LeadModel	NA	NA	NA	4.4E-05	9.0E-05	LeadModel	NA	NA	NA
Manganese	183	4.2E-02	8.3E-02	9.0E-02	4.6E-01	9.3E-01	NA	6.0E-04	1.2E-03	NA	NA	NA	NA
Mercury	0.23	5.3E-05	1.3E-05	3.0E-02	1.8E-03	4.3E-04	1.3E-03	7.6E-07	1.9E-07	NA	NA	NA	NA
Nickel	23	5.2E-03	1.3E-02	1.4E-02	3.7E-01	9.2E-01	NA	7.4E-05	1.8E-04	2.6E-04	1.9E-08	4.8E-08	NA
Vanadium	71	1.6E-02	2.2E-02	1.0E-01	1.6E-01	2.2E-01	NA	2.3E-04	3.2E-04	NA	NA	NA	NA
Zinc	22	5.0E-03	1.5E-02	NA	NA	NA	NA	7.1E-05	2.1E-04	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	21	4.8E-03	NA	3.0E+00	1.6E-03	NA	1.6E-03	6.8E-05	NA	NA	NA	NA	NA
TPH as Motor Oil	158	3.6E-02	NA	8.0E+03	4.5E-06	NA	4.5E-06	5.2E-04	NA	NA	NA	NA	NA
Organochlorine Pesticides													
Pentachlorophenol	6	1.3E-03	NA	NA	NA	NA	NA	1.8E-05	NA	5.1E-06	9.2E-11	NA	9.2E-11
New Mill - Dip Tank Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					1.3	2.8	0.003				3.E-07	1.E-06	9.E-11
New Mill - Equipment Shed													
Total Petroleum Hydrocarbons (TPH)													
TPH as Gasoline	0.29	6.6E-05	NA	3.0E+01	2.2E-06	NA	2.2E-06	9.5E-07	NA	NA	NA	NA	NA
TPH as Diesel	59	1.4E-02	NA	3.0E+00	4.5E-03	NA	4.5E-03	1.9E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	294	6.7E-02	NA	8.0E+03	8.4E-06	NA	8.4E-06	9.6E-04	NA	NA	NA	NA	NA
New Mill - Equipment Shed Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.005	NA	0.005				NA	NA	NA
New Mill - Dump Area													
Metals													
Arsenic	0.78	1.8E-04	5.5E-04	1.5E-02	1.2E-02	3.7E-02	NA	2.5E-06	7.8E-06	3.3E-03	8.4E-09	2.6E-08	NA
Barium	39	8.9E-03	9.8E-02	5.0E-01	1.8E-02	2.0E-01	NA	1.3E-04	1.4E-03	NA	NA	NA	NA
Beryllium	0.14	3.2E-05	3.4E-04	7.0E-03	4.6E-03	4.9E-02	NA	4.6E-07	4.9E-06	2.4E-03	1.1E-09	1.2E-08	NA
Cadmium	0.53	1.2E-04	2.1E-04	2.0E-02	6.1E-03	1.1E-02	NA	1.7E-06	3.0E-06	4.2E-03	7.3E-09	1.3E-08	NA
Chromium	36	8.2E-03	1.1E-02	NA	NA	NA	NA	1.2E-04	1.6E-04	NA	NA	NA	NA
Cobalt	9.4	2.1E-03	2.6E-03	6.0E-03	3.6E-01	4.3E-01	NA	3.1E-05	3.7E-05	9.0E-03	2.8E-07	3.3E-07	NA
Copper	25	5.7E-03	1.0E-02	NA	NA	NA	NA	8.2E-05	1.5E-04	NA	NA	NA	NA
Lead	18	4.1E-03	6.3E-03	LeadModel	NA	NA	NA	5.9E-05	9.0E-05	LeadModel	NA	NA	NA
Nickel	120	2.7E-02	1.3E-02	1.4E-02	2.0E+00	9.2E-01	1.0E+00	3.9E-04	1.8E-04	2.6E-04	1.0E-07	4.8E-08	5.4E-08
Vanadium	27	6.2E-03	2.2E-02	1.0E-01	6.2E-02	2.2E-01	NA	8.8E-05	3.2E-04	NA	NA	NA	NA
Zinc	49	1.1E-02	1.5E-02	NA	NA	NA	NA	1.6E-04	2.1E-04	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	316	7.2E-02	NA	3.0E+00	2.4E-02	NA	2.4E-02	1.0E-03	NA	NA	NA	NA	NA
TPH as Motor Oil	825	1.9E-01	NA	8.0E+03	2.4E-05	NA	2.4E-05	2.7E-03	NA	NA	NA	NA	NA
New Mill - Dump Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					2.4	1.9	1.1				4.E-07	4.E-07	5.E-08

Table D-19
Inhalation to Fugitive Dust - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(unitless)	(unitless)	(unitless)	(µg/m^3)	(µg/m^3)	(µg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)
Box Factory - Transformer Area													
Metals													
Arsenic	1.4	3.1E-04	5.5E-04	1.5E-02	2.1E-02	3.7E-02	NA	4.4E-06	7.8E-06	3.3E-03	1.5E-08	2.6E-08	NA
Barium	64	1.5E-02	9.8E-02	5.0E-01	2.9E-02	2.0E-01	NA	2.1E-04	1.4E-03	NA	NA	NA	NA
Beryllium	0.37	8.4E-05	3.4E-04	7.0E-03	1.2E-02	4.9E-02	NA	1.2E-06	4.9E-06	2.4E-03	2.9E-09	1.2E-08	NA
Cadmium	1.9	4.2E-04	2.1E-04	2.0E-02	2.1E-02	1.1E-02	1.1E-02	6.1E-06	3.0E-06	4.2E-03	2.5E-08	1.3E-08	1.3E-08
Chromium	18	4.1E-03	1.1E-02	NA	NA	NA	NA	5.9E-05	1.6E-04	NA	NA	NA	NA
Cobalt	5.4	1.2E-03	2.6E-03	6.0E-03	2.1E-01	4.3E-01	NA	1.8E-05	3.7E-05	9.0E-03	1.6E-07	3.3E-07	NA
Copper	37	8.5E-03	1.0E-02	NA	NA	NA	NA	1.2E-04	1.5E-04	NA	NA	NA	NA
Lead	51	1.2E-02	6.3E-03	LeadModel	NA	NA	NA	1.7E-04	9.0E-05	LeadModel	NA	NA	NA
Mercury	2.1	4.8E-04	1.3E-05	3.0E-02	NA	NA	NA	6.9E-06	1.9E-07	NA	NA	NA	NA
Nickel	24	5.4E-03	1.3E-02	1.4E-02	3.8E-01	9.2E-01	NA	7.7E-05	1.8E-04	2.6E-04	2.0E-08	4.8E-08	NA
Selenium	0.61	1.4E-04	NA	2.0E+01	6.9E-06	NA	NA	2.0E-06	NA	NA	NA	NA	NA
Vanadium	34	7.8E-03	2.2E-02	1.0E-01	7.8E-02	2.2E-01	NA	1.1E-04	3.2E-04	NA	NA	NA	NA
Zinc	126	2.9E-02	1.5E-02	NA	NA	NA	NA	4.1E-04	2.1E-04	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)													
TPH as Diesel	130	3.0E-02	NA	3.0E+00	9.9E-03	NA	9.9E-03	4.2E-04	NA	NA	NA	NA	NA
TPH as Motor Oil	750	1.7E-01	NA	8.0E+03	2.1E-05	NA	2.1E-05	2.4E-03	NA	NA	NA	NA	NA
Organochlorine Pesticides													
DDT	0.0073	1.7E-06	NA	NA	NA	NA	NA	2.4E-08	NA	9.7E-05	2.3E-12	NA	2.3E-12
Polychlorinated Biphenyls (PCBs)													
Aroclor-1254	0.041	9.4E-06	NA	NA	NA	NA	NA	1.3E-07	NA	5.7E-04	7.6E-11	NA	7.6E-11
Aroclor-1260	0.0563	1.3E-05	NA	NA	NA	NA	NA	1.8E-07	NA	5.7E-04	1.0E-10	NA	1.0E-10
Box Factory - Transformer Area Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.8	1.9	0.02				2.E-07	4.E-07	1.E-08
Box Factory - Burner													
Dioxin/Furans													
TCDD TEQ	1.3E-05	3.0E-09	NA	4.0E-05	7.6E-05	NA	7.6E-05	4.4E-11	NA	3.8E+01	1.7E-09	NA	1.7E-09
Box Factory - Burner Total Noncancer Hazard Index / Lifetime Cancer Risk [f] =					0.00008	NA	0.00008				2.E-09	NA	2.E-09

Equations

Noncancer

Averaged Air Concentration (AAC)

$AAC = ((Cs/PEF) \times ET \times EF \times ED \times CF_{\mu g/mg}) / (AT_{nc} \times CF_{hr/d})$

Hazard Quotient (HQ)

$HQ = AAC / RfC$

Cancer

Lifetime Air Concentration (LAC)

$LAC = ((Cs/PEF) \times ET \times EF \times EDF \times CF_{\mu g/mg}) / (AT_c \times CF_{hr/d})$

Excess Cancer Risk (CR)

$CR = LAC \times IUR$

Parameter	Symbol	Value	Units
Averaging Time - Cancer	AT_c	Table D-3	days
Averaging Time - Noncancer	AT_{nc}	Table D-3	days
Body Weight	BW	Table D-3	kg
Conversion Factor	$CF_{hr/d}$	24	hours/day
Conversion Factor	$CF_{\mu g/mg}$	1000	µg/mg
Exposure Duration	ED	Table D-3	year
Exposure Frequency	EF	Table D-3	days/year
Exposure Time	ET	Table D-3	hours/day
Particulate Emission Factor	PEF	Table D-3	m^3/kg

Table D-19
Inhalation to Fugitive Dust - Construction Worker - Post-Development
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Exposure Point Concentration Soil [a]	Averaged Air Concentration [b]		Inhalation Chronic Reference Concentration [c]	Hazard Quotient [b]			Lifetime Air Concentration		Inhalation Unit Risk Factor [c]	Incremental Cancer Risk		
		EPC	Background [c]		EPC	Background [c]	Site-Related [e]	EPC	Background [c]		EPC	Background [c]	Site-Related [e]
	Cs	AAC	AAC	RfC	HQ	HQ	HQ	LAC	LAC	IUR	CR	CR	CR
	(mg/kg)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(unitless)	(unitless)	(unitless)	(µg/m^3)	(µg/m^3)	(µg/m^3)$^{-1}$	(unitless)	(unitless)	(unitless)

Abbreviations:
DDT = dichlorodiphenyltrichloroethane
kg = kilograms
LeadModel = Evaluated by LeadSpread 8, Table D-28
m^3/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
NA = not applicable
µg/m^3 = micrograms per cubic meter
µg/mg = micrograms per milligrams
TCDD TEQ = 2,3,7,8-tetrachlordibenzo-p-dioxin toxic equivalency concentration

Footnotes:
[a] From Table D-1.
[b] The AAC was calculated for a child residential receptor, since the child represents the most sensitive residential receptor.
[c] The background concentration were used in calculating the AAC and LAC is from Table D-1. The EPCs were used for the metals where the concentrations were detected below the background concentration.
[d] From Table D-4.
[e] Site-related HQs and CRs are difference between the EPC and background.
[f] The total noncancer hazard index is the sum of the chemical-specific noncancer hazard and and the total lifetime cancer risk.

Table D-20
Summary of Noncancer Hazards for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
New Mill - Dip Tank								
Metals								
Antimony	5.8E-02	1.1E-02	NA	6.9E-02	5.8E-02	1.1E-02	NA	6.9E-02
Arsenic	3.0E+00	2.6E-01	1.3E-05	3.3E+00	2.5E+00	2.2E-01	1.1E-05	2.7E+00
Barium	2.3E-03	9.4E-04	1.7E-05	3.2E-03	1.9E-03	7.7E-04	1.4E-05	2.6E-03
Beryllium	3.3E-03	1.4E-02	1.7E-05	1.7E-02	3.3E-03	1.4E-02	1.7E-05	1.7E-02
Cadmium	9.1E-03	1.1E-03	4.2E-06	1.0E-02	9.1E-03	1.1E-03	4.2E-06	1.0E-02
Chromium	9.3E-05	2.1E-04	NA	3.0E-04	1.0E-04	2.2E-04	NA	3.3E-04
Chromium (VI)	5.5E-05	6.4E-05	1.0E-07	1.2E-04	5.5E-05	6.4E-05	1.0E-07	1.2E-04
Cobalt	1.1E-01	NA	1.0E-04	1.1E-01	1.0E-01	NA	9.6E-05	1.0E-01
Copper	3.8E-03	1.1E-04	NA	3.9E-03	3.7E-03	1.1E-04	NA	3.8E-03
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	8.5E-03	2.5E-04	2.4E-04	9.0E-03	7.1E-03	2.1E-04	2.0E-04	7.6E-03
Mercury	1.0E-02	2.9E-04	9.8E-07	1.0E-02	8.0E-03	2.3E-04	7.8E-07	8.2E-03
Nickel	1.3E-02	9.6E-03	1.9E-04	2.3E-02	1.1E-02	8.2E-03	1.6E-04	2.0E-02
Vanadium	8.0E-02	2.3E-03	7.3E-05	8.2E-02	7.7E-02	2.2E-03	7.1E-05	8.0E-02
Zinc	4.7E-04	1.4E-05	NA	4.9E-04	4.0E-04	1.2E-05	NA	4.1E-04
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	2.9E-02	8.3E-03	7.1E-07	3.7E-02	2.9E-02	8.3E-03	7.1E-07	3.7E-02
TPH as Motor Oil	4.4E-04	1.3E-04	2.0E-09	5.7E-04	4.3E-04	1.3E-04	2.0E-09	5.6E-04
Organochlorine Pesticides								
Pentachlorophenol	3.5E-03	1.0E-03	NA	4.5E-03	6.1E-03	4.4E-03	NA	1.1E-02
Total Noncancer Hazard Index[1]	3.4	0.3	0.0007	3.7	2.8	0.27	0.0006	3.1
Adjusted Hazard Index [1] [2]	0.04	0.010	0.000001	0.05	0.04	0.01	0.000001	0.1

Table D-20
Summary of Noncancer Hazards for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
New Mill - Equipment Shed								
Total Petroleum Hydrocarbons (TPH)								
TPH as Gasoline	4.0E-04	1.2E-04	9.7E-10	5.1E-04	4.0E-04	1.2E-04	9.7E-10	5.1E-04
TPH as Diesel	1.1E+00	3.1E-01	2.6E-05	1.4E+00	8.1E-02	2.4E-02	2.0E-06	1.0E-01
TPH as Motor Oil	5.4E-03	1.6E-03	2.5E-08	7.0E-03	8.1E-04	2.3E-04	3.7E-09	1.0E-03
Total Noncancer Hazard Index[1]	1.1	0.3	0.00003	1.4	0.1	0.02	0.000002	0.1
Adjusted Hazard Index [1] [2]	1.1	0.3	0.00003	1.4	0.1	0.02	0.000002	0.1
New Mill - Dump Area								
Metals								
Arsenic	1.2E+00	1.1E-01	5.2E-06	1.3E+00	1.2E+00	1.1E-01	5.2E-06	1.3E+00
Barium	1.1E-03	4.4E-04	7.9E-06	1.5E-03	1.1E-03	4.4E-04	7.9E-06	1.5E-03
Beryllium	3.8E-04	1.6E-03	2.0E-06	2.0E-03	3.8E-04	1.6E-03	2.0E-06	2.0E-03
Cadmium	5.8E-03	6.7E-04	2.7E-06	6.5E-03	5.8E-03	6.7E-04	2.7E-06	6.5E-03
Chromium	1.3E-04	2.9E-04	NA	4.2E-04	1.3E-04	2.9E-04	NA	4.2E-04
Cobalt	1.7E-01	NA	1.6E-04	1.7E-01	1.7E-01	NA	1.6E-04	1.7E-01
Copper	3.4E-03	9.9E-05	NA	3.5E-03	3.4E-03	9.9E-05	NA	3.5E-03
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	6.0E-02	4.3E-02	8.6E-04	1.0E-01	6.0E-02	4.3E-02	8.6E-04	1.0E-01
Vanadium	3.0E-02	8.6E-04	2.7E-05	3.0E-02	3.0E-02	8.6E-04	2.7E-05	3.0E-02
Zinc	8.9E-04	2.6E-05	NA	9.2E-04	8.9E-04	2.6E-05	NA	9.2E-04
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	1.0E+00	3.0E-01	2.5E-05	1.3E+00	4.3E-01	1.3E-01	1.1E-05	5.6E-01
TPH as Motor Oil	2.5E-03	7.3E-04	1.2E-08	3.3E-03	2.3E-03	6.6E-04	1.0E-08	2.9E-03
Total Noncancer Hazard Index[1]	2.5	0.5	0.001	3.0	1.9	0.3	0.001	2.2
Adjusted Hazard Index [1] [2]	1.1	0.3	0.0005	1.4	0.5	0.2	0.0005	0.6
Box Factory - Transformer Area								

Table D-20
Summary of Noncancer Hazards for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
Metals								
Arsenic	2.1E+00	1.8E-01	9.0E-06	2.3E+00	2.1E+00	1.8E-01	9.1E-06	2.3E+00
Barium	1.8E-03	7.3E-04	1.3E-05	2.5E-03	1.7E-03	7.2E-04	1.3E-05	2.5E-03
Beryllium	1.0E-03	4.1E-03	5.2E-06	5.1E-03	1.0E-03	4.2E-03	5.3E-06	5.2E-03
Cadmium	2.3E-02	2.6E-03	1.0E-05	2.5E-02	2.0E-02	2.4E-03	9.4E-06	2.3E-02
Chromium	6.7E-05	1.5E-04	NA	2.2E-04	6.6E-05	1.5E-04	NA	2.1E-04
Cobalt	1.0E-01	NA	9.2E-05	1.0E-01	9.9E-02	NA	9.1E-05	9.9E-02
Copper	4.9E-03	1.4E-04	NA	5.1E-03	5.1E-03	1.5E-04	NA	5.2E-03
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7.9E-02	2.3E-03	NA	8.2E-02	7.2E-02	2.1E-03	NA	7.4E-02
Molybdenum	4.8E-03	1.4E-04	NA	5.0E-03	NA	NA	NA	NA
Nickel	1.4E-02	1.0E-02	2.1E-04	2.5E-02	1.2E-02	8.5E-03	1.7E-04	2.0E-02
Selenium	6.4E-04	1.8E-05	2.9E-09	6.6E-04	6.6E-04	1.9E-05	3.1E-09	6.8E-04
Vanadium	3.8E-02	1.1E-03	3.5E-05	3.9E-02	3.7E-02	1.1E-03	3.4E-05	3.9E-02
Zinc	2.7E-03	7.8E-05	NA	2.8E-03	2.3E-03	6.7E-05	NA	2.4E-03
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	1.8E-01	5.2E-02	4.4E-06	2.3E-01	1.8E-01	5.2E-02	4.4E-06	2.3E-01
TPH as Motor Oil	2.1E-03	6.0E-04	9.4E-09	2.7E-03	2.1E-03	6.0E-04	9.4E-09	2.7E-03
Organochlorine Pesticides								
DDT	8.0E-05	7.0E-06	NA	8.7E-05	8.0E-05	7.0E-06	NA	8.7E-05
Dieldrin	3.6E-03	1.0E-03	NA	4.7E-03	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)								
Aroclor-1254	1.2E-01	5.2E-02	NA	1.7E-01	1.1E-02	4.9E-03	NA	1.6E-02
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA
Total Noncancer Hazard Index[1]	2.7	0.3	0.0004	3.0	2.6	0.3	0.0003	2.8
Adjusted Hazard Index [1] [2]	0.4	0.1	0.00001	0.5	0.3	0.1	0.00001	0.3

Table D-20
Summary of Noncancer Hazards for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
Box Factory - Burner								
Dioxin/Furans								
TCDD TEQ	3.6E-01	3.1E-02	1.6E-06	3.9E-01	7.3E-03	6.4E-04	3.4E-08	8.0E-03
Total Noncancer Hazard Index[1]	0.4	0.03	0.000002	0.4	0.007	0.0006	0.00000003	0.008
Adjusted Hazard Index [1] [2]	0.4	0.03	0.000002	0.4	0.007	0.0006	0.00000003	0.008

Abbreviations:
NA = not analyzed
[1] Cumulative hazard index based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-21
Summary of Cancer Risks for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
New Mill - Dip Tank								
Metals								
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.2E-05	1.2E-06	2.8E-10	1.4E-05	1.0E-05	1.0E-06	2.3E-10	1.1E-05
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	1.2E-10	1.2E-10	NA	NA	1.2E-10	1.2E-10
Cadmium	NA	NA	1.5E-10	1.5E-10	NA	NA	1.5E-10	1.5E-10
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	2.9E-07	2.2E-10	3.3E-09	2.9E-07	2.9E-07	2.2E-10	3.3E-09	2.9E-07
Cobalt	NA	NA	2.4E-09	2.4E-09	NA	NA	2.2E-09	2.2E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	3.0E-10	3.0E-10	NA	NA	2.5E-10	2.5E-10
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Organochlorine Pesticides								
Pentachlorophenol	1.7E-07	5.7E-08	7.0E-13	NA	3.0E-07	2.5E-07	1.2E-12	5.5E-07
Total Cancer Risk [1]	1.E-05	1.E-06	7.E-09	1.E-05	1.E-05	1.E-06	6.E-09	1.E-05
Adjusted Cancer Risk [1] [2]	2.E-07	6.E-08	7.E-13	2.E-07	3.E-07	2.E-07	1.E-12	6.E-07

Table D-21
Summary of Cancer Risks for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
New Mill - Equipment Shed								
Total Petroleum Hydrocarbons (TPH)								
TPH as Gasoline	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Total Cancer Risk [1]	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Cancer Risk [1] [2]	NA	NA	NA	NA	NA	NA	NA	NA
New Mill - Dump Area								
Metals								
Arsenic	5.0E-06	4.9E-07	1.1E-10	5.5E-06	5.0E-06	4.9E-07	1.1E-10	5.5E-06
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	1.5E-11	1.5E-11	NA	NA	1.5E-11	1.5E-11
Cadmium	NA	NA	9.6E-11	9.6E-11	NA	NA	9.6E-11	9.6E-11
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	3.7E-09	3.7E-09	NA	NA	3.7E-09	3.7E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	1.3E-09	1.3E-09	NA	NA	1.3E-09	1.3E-09
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Total Cancer Risk [1]	5.E-06	5.E-07	5.E-09	5.E-06	5.E-06	5.E-07	5.E-09	5.E-06
Adjusted Cancer Risk [1] [2]	0.E+00	0.E+00	7.E-10	7.E-10	0.E+00	0.E+00	7.E-10	7.E-10

Table D-21
Summary of Cancer Risks for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
Box Factory - Transformer Area								
Metals								
Arsenic	8.6E-06	8.5E-07	1.9E-10	9.4E-06	8.6E-06	8.5E-07	1.9E-10	9.5E-06
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	3.8E-11	3.8E-11	NA	NA	3.8E-11	3.8E-11
Cadmium	NA	NA	3.8E-10	3.8E-10	NA	NA	3.4E-10	3.4E-10
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	2.1E-09	2.1E-09	NA	NA	2.1E-09	2.1E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	3.2E-10	3.2E-10	NA	NA	2.6E-10	2.6E-10
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Organochlorine Pesticides								
DDT	1.7E-09	1.6E-10	3.1E-14	1.8E-09	1.7E-09	1.6E-10	3.1E-14	1.8E-09
Dieldrin	3.5E-07	1.2E-07	6.6E-12	4.7E-07	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)								
Aroclor-1254	5.9E-07	2.9E-07	1.1E-11	8.8E-07	5.5E-08	2.7E-08	1.0E-12	8.2E-08
Aroclor-1260	6.7E-07	3.3E-07	1.2E-11	1.0E-06	7.6E-08	3.7E-08	1.4E-12	1.1E-07
Total Cancer Risk [1]	1.E-05	2.E-06	3.E-09	1.E-05	9.E-06	9.E-07	3.E-09	1.E-05
Adjusted Cancer Risk [1] [2]	2.E-06	7.E-07	2.E-10	2.E-06	1.E-07	6.E-08	2.E-10	2.E-07

Table D-21
Summary of Cancer Risks for Recreational Receptors
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
Box Factory - Burner								
Dioxin/Furans								
TCDD TEQ	5.7E-05	5.6E-06	1.1E-09	6.2E-05	1.2E-06	1.2E-07	2.2E-11	1.3E-06
Total Cancer Risk [1]	6.E-05	6.E-06	1.E-09	6.E-05	1.E-06	1.E-07	2.E-11	1.E-06
Adjusted Cancer Risk [1] [2]	6.E-05	6.E-06	1.E-09	6.E-05	1.E-06	1.E-07	2.E-11	1.E-06

Abbreviations:
NA = not analyzed
[1] Cumulative cancer risk based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-22
Summary of Noncancer Hazards for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
New Mill - Dip Tank								
Metals								
Antimony	1.0E-02	8.3E-03	NA	1.9E-02	1.0E-02	8.3E-03	NA	1.9E-02
Arsenic	5.4E-01	2.0E-01	2.2E-05	7.4E-01	4.5E-01	1.6E-01	1.8E-05	6.1E-01
Barium	4.1E-04	7.0E-04	2.8E-05	1.1E-03	3.3E-04	5.7E-04	2.3E-05	9.3E-04
Beryllium	5.9E-04	1.0E-02	2.9E-05	1.1E-02	5.9E-04	1.0E-02	2.9E-05	1.1E-02
Cadmium	1.6E-03	7.8E-04	6.9E-06	2.4E-03	1.6E-03	7.9E-04	7.0E-06	2.4E-03
Chromium	1.7E-05	1.5E-04	NA	1.7E-04	1.8E-05	1.7E-04	NA	1.8E-04
Chromium (VI)	9.8E-06	4.7E-05	1.7E-07	5.7E-05	9.8E-06	4.7E-05	1.7E-07	5.7E-05
Cobalt	2.0E-02	NA	1.7E-04	2.0E-02	1.9E-02	NA	1.6E-04	1.9E-02
Copper	6.8E-04	8.2E-05	NA	7.7E-04	6.7E-04	8.0E-05	NA	7.5E-04
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1.5E-03	1.8E-04	4.1E-04	2.1E-03	1.3E-03	1.5E-04	3.4E-04	1.8E-03
Mercury	1.8E-03	2.2E-04	1.6E-06	2.0E-03	1.4E-03	1.7E-04	1.3E-06	1.6E-03
Nickel	2.4E-03	7.2E-03	3.2E-04	9.9E-03	2.0E-03	6.1E-03	2.7E-04	8.3E-03
Vanadium	1.4E-02	1.7E-03	1.2E-04	1.6E-02	1.4E-02	1.7E-03	1.2E-04	1.6E-02
Zinc	8.4E-05	1.0E-05	NA	9.4E-05	7.1E-05	8.6E-06	NA	8.0E-05
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	5.1E-03	6.2E-03	1.2E-06	1.1E-02	5.1E-03	6.2E-03	1.2E-06	1.1E-02
TPH as Motor Oil	7.8E-05	9.4E-05	3.4E-09	1.7E-04	7.7E-05	9.3E-05	3.3E-09	1.7E-04
Organochlorine Pesticides								
Pentachlorophenol	6.3E-04	7.6E-04	NA	1.4E-03	1.1E-03	3.3E-03	NA	4.4E-03
Total Noncancer Hazard Index[1]	0.6	0.2	0.001	0.8	0.5	0.2	0.001	0.7
Adjusted Hazard Index [1] [2]	0.01	0.007	0.000002	0.01	0.01	0.01	0.000002	0.02

Table D-22
Summary of Noncancer Hazards for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
New Mill - Equipment Shed								
Total Petroleum Hydrocarbons (TPH)								
TPH as Gasoline	7.1E-05	8.6E-05	1.6E-09	1.6E-04	7.1E-05	8.6E-05	1.6E-09	1.6E-04
TPH as Diesel	1.9E-01	2.3E-01	4.3E-05	4.1E-01	1.5E-02	1.8E-02	3.3E-06	3.2E-02
TPH as Motor Oil	9.7E-04	1.2E-03	4.2E-08	2.1E-03	1.4E-04	1.7E-04	6.2E-09	3.2E-04
Total Noncancer Hazard Index[1]	0.2	0.2	0.00004	0.4	0.01	0.02	0.000003	0.03
Adjusted Hazard Index [1] [2]	0.2	0.2	0.00004	0.4	0.01	0.02	0.000003	0.03
New Mill - Dump Area								
Metals								
Arsenic	2.2E-01	7.9E-02	8.7E-06	3.0E-01	2.2E-01	7.9E-02	8.7E-06	3.0E-01
Barium	1.9E-04	3.3E-04	1.3E-05	5.3E-04	1.9E-04	3.3E-04	1.3E-05	5.3E-04
Beryllium	6.8E-05	1.2E-03	3.4E-06	1.3E-03	6.8E-05	1.2E-03	3.4E-06	1.3E-03
Cadmium	1.0E-03	5.0E-04	4.4E-06	1.5E-03	1.0E-03	5.0E-04	4.4E-06	1.5E-03
Chromium	2.3E-05	2.2E-04	NA	2.4E-04	2.3E-05	2.2E-04	NA	2.4E-04
Cobalt	3.1E-02	NA	2.6E-04	3.1E-02	3.1E-02	NA	2.6E-04	3.1E-02
Copper	6.1E-04	7.4E-05	NA	6.9E-04	6.1E-04	7.4E-05	NA	6.9E-04
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1.1E-02	3.2E-02	1.4E-03	4.4E-02	1.1E-02	3.2E-02	1.4E-03	4.4E-02
Vanadium	5.3E-03	6.4E-04	4.5E-05	6.0E-03	5.3E-03	6.4E-04	4.5E-05	6.0E-03
Zinc	1.6E-04	1.9E-05	NA	1.8E-04	1.6E-04	1.9E-05	NA	1.8E-04
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	1.8E-01	2.2E-01	4.2E-05	4.0E-01	7.7E-02	9.3E-02	1.8E-05	1.7E-01
TPH as Motor Oil	4.5E-04	5.4E-04	1.9E-08	1.0E-03	4.0E-04	4.9E-04	1.7E-08	8.9E-04
Total Noncancer Hazard Index[1]	0.4	0.3	0.002	0.8	0.3	0.2	0.002	0.6
Adjusted Hazard Index [1] [2]	0.2	0.2	0.001	0.4	0.1	0.1	0.001	0.2

Table D-22
Summary of Noncancer Hazards for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
Box Factory - Transformer Area								
Metals								
Arsenic	3.8E-01	1.4E-01	1.5E-05	5.1E-01	3.8E-01	1.4E-01	1.5E-05	5.2E-01
Barium	3.2E-04	5.4E-04	2.2E-05	8.8E-04	3.1E-04	5.4E-04	2.1E-05	8.7E-04
Beryllium	1.8E-04	3.1E-03	8.7E-06	3.3E-03	1.8E-04	3.1E-03	8.9E-06	3.3E-03
Cadmium	4.1E-03	2.0E-03	1.7E-05	6.0E-03	3.6E-03	1.8E-03	1.6E-05	5.4E-03
Chromium	1.2E-05	1.1E-04	NA	1.2E-04	1.2E-05	1.1E-04	NA	1.2E-04
Cobalt	1.8E-02	NA	1.5E-04	1.8E-02	1.8E-02	NA	1.5E-04	1.8E-02
Copper	8.8E-04	1.1E-04	NA	9.9E-04	9.1E-04	1.1E-04	NA	1.0E-03
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	1.4E-02	1.7E-03	NA	1.6E-02	1.3E-02	1.6E-03	NA	1.4E-02
Molybdenum	8.6E-04	1.0E-04	NA	9.6E-04	NA	NA	NA	NA
Nickel	2.5E-03	7.7E-03	3.4E-04	1.1E-02	2.1E-03	6.3E-03	2.8E-04	8.7E-03
Selenium	1.1E-04	1.4E-05	4.9E-09	1.3E-04	1.2E-04	1.4E-05	5.1E-09	1.3E-04
Vanadium	6.7E-03	8.1E-04	5.8E-05	7.6E-03	6.7E-03	8.1E-04	5.7E-05	7.6E-03
Zinc	4.8E-04	5.8E-05	NA	5.4E-04	4.1E-04	5.0E-05	NA	4.6E-04
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	3.2E-02	3.8E-02	7.3E-06	7.0E-02	3.2E-02	3.8E-02	7.3E-06	7.0E-02
TPH as Motor Oil	3.7E-04	4.4E-04	1.6E-08	8.1E-04	3.7E-04	4.4E-04	1.6E-08	8.1E-04
Organochlorine Pesticides								
DDT	1.4E-05	5.2E-06	NA	1.9E-05	1.4E-05	5.2E-06	NA	1.9E-05
Dieldrin	6.5E-04	7.8E-04	NA	1.4E-03	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)								
Aroclor-1254	2.1E-02	3.9E-02	NA	6.0E-02	2.0E-03	3.6E-03	NA	5.6E-03
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA
Total Noncancer Hazard Index[1]	0.5	0.2	0.0006	0.7	0.5	0.2	0.0006	0.7
Adjusted Hazard Index [1] [2]	0.07	0.08	0.00002	0.1	0.05	0.04	0.00002	0.09

Table D-22
Summary of Noncancer Hazards for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [c]
Box Factory - Burner								
Dioxin/Furans								
TCDD TEQ	6.4E-02	2.3E-02	2.7E-06	8.7E-02	1.3E-03	4.7E-04	5.6E-08	1.8E-03
Total Noncancer Hazard Index[1]	0.06	0.02	0.000003	0.09	0.001	0.0005	0.00000006	0.002
Adjusted Hazard Index [1] [2]	0.06	0.02	0.000003	0.09	0.001	0.0005	0.00000006	0.002

Abbreviations:
NA = not analyzed
[1] Cumulative hazard index based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-23
Summary of Cancer Risks for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
New Mill - Dip Tank								
Metals								
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	6.4E-06	2.3E-06	3.8E-10	8.8E-06	5.3E-06	1.9E-06	3.2E-10	7.3E-06
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	1.7E-10	1.7E-10	NA	NA	1.7E-10	1.7E-10
Cadmium	NA	NA	2.1E-10	2.1E-10	NA	NA	2.1E-10	2.1E-10
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (VI)	3.5E-08	1.1E-10	1.8E-09	3.7E-08	3.5E-08	1.1E-10	1.8E-09	3.7E-08
Cobalt	NA	NA	3.3E-09	3.3E-09	NA	NA	3.1E-09	3.1E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	4.2E-10	4.2E-10	NA	NA	3.5E-10	3.5E-10
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Organochlorine Pesticides								
Pentachlorophenol	9.1E-08	1.1E-07	9.8E-13	NA	1.6E-07	4.7E-07	1.7E-12	6.3E-07
Total Cancer Risk [1]	7.E-06	2.E-06	6.E-09	9.E-06	6.E-06	2.E-06	6.E-09	8.E-06
Adjusted Cancer Risk [1] [2]	9.E-08	1.E-07	1.E-12	2.E-07	2.E-07	5.E-07	2.E-12	6.E-07

Table D-23
Summary of Cancer Risks for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
New Mill - Equipment Shed								
Total Petroleum Hydrocarbons (TPH)								
TPH as Gasoline	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Total Cancer Risk [1]	NA	NA	NA	NA	NA	NA	NA	NA
Adjusted Cancer Risk [1] [2]	NA	NA	NA	NA	NA	NA	NA	NA
New Mill - Dump Area								
Metals								
Arsenic	2.6E-06	9.4E-07	1.5E-10	3.5E-06	2.6E-06	9.4E-07	1.5E-10	3.5E-06
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	2.0E-11	2.0E-11	NA	NA	2.0E-11	2.0E-11
Cadmium	NA	NA	1.3E-10	1.3E-10	NA	NA	1.3E-10	1.3E-10
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	5.1E-09	5.1E-09	NA	NA	5.1E-09	5.1E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	1.9E-09	1.9E-09	NA	NA	1.9E-09	1.9E-09
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Total Cancer Risk [1]	3.E-06	9.E-07	7.E-09	4.E-06	3.E-06	9.E-07	7.E-09	4.E-06
Adjusted Cancer Risk [1] [2]	0.E+00	0.E+00	1.E-09	1.E-09	0.E+00	0.E+00	1.E-09	1.E-09

Table D-23
Summary of Cancer Risks for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
Box Factory - Transformer Area								
Metals								
Arsenic	4.5E-06	1.6E-06	2.7E-10	6.1E-06	4.5E-06	1.6E-06	2.7E-10	6.1E-06
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	5.2E-11	5.2E-11	NA	NA	5.3E-11	5.3E-11
Cadmium	NA	NA	5.2E-10	5.2E-10	NA	NA	4.7E-10	4.7E-10
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	3.0E-09	3.0E-09	NA	NA	2.9E-09	2.9E-09
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	4.4E-10	4.4E-10	NA	NA	3.7E-10	3.7E-10
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)								
TPH as Diesel	NA	NA	NA	NA	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA
Organochlorine Pesticides								
DDT	8.7E-10	3.1E-10	4.2E-14	1.2E-09	8.7E-10	3.1E-10	4.2E-14	1.2E-09
Dieldrin	1.8E-07	2.2E-07	9.1E-12	4.1E-07	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)								
Aroclor-1254	3.1E-07	5.5E-07	1.5E-11	8.6E-07	2.9E-08	5.2E-08	1.4E-12	8.1E-08
Aroclor-1260	3.5E-07	6.3E-07	1.7E-11	9.9E-07	3.9E-08	7.1E-08	1.9E-12	1.1E-07
Total Cancer Risk [1]	8.E-06	4.E-06	1.E-08	1.E-05	7.E-06	3.E-06	1.E-08	1.E-05
Adjusted Cancer Risk [1] [2]	8.E-07	1.E-06	3.E-10	2.E-06	7.E-08	1.E-07	2.E-10	2.E-07

Table D-23
Summary of Cancer Risks for Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Pre-Development [a]				Post Development [b]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [c]
Box Factory - Burner								
Dioxin/Furans								
TCDD TEQ	3.0E-05	1.1E-05	1.5E-09	4.0E-05	6.1E-07	2.2E-07	3.0E-11	8.3E-07
Total Cancer Risk [1]	3.E-05	1.E-05	1.E-09	4.E-05	6.E-07	2.E-07	3.E-11	8.E-07
Adjusted Cancer Risk [1] [2]	3.E-05	1.E-05	1.E-09	4.E-05	6.E-07	2.E-07	3.E-11	8.E-07

Abbreviations:
NA = not analyzed
[1] Cumulative cancer risk based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-24
Summary of Noncancer Hazards for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [b]
New Mill - Dip Tank				
Metals				
Antimony	3.4E-02	3.3E-02	NA	6.7E-02
Arsenic	1.5E+00	6.5E-01	2.4E-02	2.2E+00
Barium	1.1E-03	2.3E-03	3.1E-02	3.4E-02
Beryllium	1.9E-03	4.0E-02	3.9E-02	8.2E-02
Cadmium	5.4E-03	3.1E-03	9.5E-03	1.8E-02
Chromium	5.9E-05	6.7E-04	NA	7.3E-04
Chromium (VI)	3.2E-05	1.9E-04	2.3E-04	4.5E-04
Cobalt	6.2E-02	NA	2.2E-01	2.8E-01
Copper	2.2E-03	3.2E-04	NA	2.5E-03
Lead	NA	NA	NA	NA
Manganese	4.2E-03	6.2E-04	4.6E-01	4.7E-01
Mercury	4.7E-03	6.9E-04	1.8E-03	7.2E-03
Nickel	6.6E-03	2.4E-02	3.7E-01	4.0E-01
Vanadium	4.6E-02	6.7E-03	1.6E-01	2.1E-01
Zinc	2.3E-04	3.4E-05	NA	2.7E-04
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	1.7E-02	2.5E-02	1.6E-03	4.3E-02
TPH as Motor Oil	2.6E-04	3.7E-04	4.5E-06	6.3E-04
Organochlorine Pesticides				
Pentachlorophenol	3.6E-03	1.3E-02	NA	1.7E-02
Total Noncancer Hazard Index[1]	1.7	0.8	1.3	3.8
Adjusted Hazard Index [1] [2]	0.02	0.04	0.003	0.07
New Mill - Equipment Shed				
Total Petroleum Hydrocarbons (TPH)				
TPH as Gasoline	2.3E-04	3.4E-04	2.2E-06	5.8E-04
TPH as Diesel	4.8E-02	7.0E-02	4.5E-03	1.2E-01
TPH as Motor Oil	4.7E-04	6.9E-04	8.4E-06	1.2E-03
Total Noncancer Hazard Index[1]	0.05	0.07	0.005	0.1
Adjusted Hazard Index [1] [2]	0.05	0.07	0.005	0.1

Table D-24
Summary of Noncancer Hazards for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [b]
New Mill - Dump Area				
Metals				
Arsenic	7.2E-01	3.2E-01	1.2E-02	1.0E+00
Barium	6.3E-04	1.3E-03	1.8E-02	2.0E-02
Beryllium	2.3E-04	4.7E-03	4.6E-03	9.5E-03
Cadmium	3.4E-03	2.0E-03	6.1E-03	1.1E-02
Chromium	7.7E-05	8.7E-04	NA	9.5E-04
Cobalt	1.0E-01	NA	3.6E-01	4.6E-01
Copper	2.0E-03	3.0E-04	NA	2.3E-03
Lead	NA	NA	NA	NA
Nickel	3.5E-02	1.3E-01	2.0E+00	2.1E+00
Vanadium	1.7E-02	2.5E-03	6.2E-02	8.2E-02
Zinc	5.3E-04	7.7E-05	NA	6.0E-04
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	2.6E-01	3.7E-01	2.4E-02	6.5E-01
TPH as Motor Oil	1.3E-03	1.9E-03	2.4E-05	3.3E-03
Total Noncancer Hazard Index[1]	1.1	0.8	2.4	4.4
Adjusted Hazard Index [1] [2]	0.3	0.4	1.1	1.8
Box Factory - Transformer Area				
Metals				
Arsenic	1.3E+00	5.5E-01	2.1E-02	1.8E+00
Barium	1.0E-03	2.1E-03	2.9E-02	3.2E-02
Beryllium	6.0E-04	1.2E-02	1.2E-02	2.5E-02
Cadmium	1.2E-02	7.0E-03	2.1E-02	4.0E-02
Chromium	3.9E-05	4.4E-04	NA	4.8E-04
Cobalt	5.8E-02	NA	2.1E-01	2.6E-01
Copper	3.0E-03	4.4E-04	NA	3.4E-03
Lead	NA	NA	NA	NA
Mercury	4.3E-02	6.2E-03	NA	4.9E-02
Molybdenum	NA	NA	NA	NA
Nickel	6.9E-03	2.5E-02	3.8E-01	4.2E-01
Selenium	3.9E-04	5.7E-05	6.9E-06	4.6E-04
Vanadium	2.2E-02	3.2E-03	7.8E-02	1.0E-01
Zinc	1.4E-03	2.0E-04	NA	1.6E-03
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	1.0E-01	1.5E-01	9.9E-03	2.7E-01
TPH as Motor Oil	1.2E-03	1.8E-03	2.1E-05	3.0E-03
Organochlorine Pesticides				
DDT	4.7E-05	2.1E-05	NA	6.8E-05
Dieldrin	NA	NA	NA	NA

Table D-24
Summary of Noncancer Hazards for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Hazard Index [b]
Polychlorinated Biphenyls (PCBs)				
Aroclor-1254	6.6E-03	1.5E-02	NA	2.1E-02
Aroclor-1260	NA	NA	NA	NA
Total Noncancer Hazard Index[1]	1.5	0.8	0.8	3.0
Adjusted Hazard Index [1] [2]	0.2	0.2	0.02	0.4
Box Factory - Burner				
Dioxin/Furans				
TCDD TEQ	4.3E-03	1.9E-03	7.6E-05	6.3E-03
Total Noncancer Hazard Index[1]	0.004	0.002	0.00008	0.006
Adjusted Hazard Index [1] [2]	0.004	0.002	0.00008	0.006

Abbreviations:
NA = not analyzed
[1] Cumulative hazard index based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-25
Summary of Cancer Risks for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [b]
New Mill - Dip Tank				
Metals				
Antimony	NA	NA	NA	NA
Arsenic	7.0E-07	3.1E-07	1.7E-08	1.0E-06
Barium	NA	NA	NA	NA
Beryllium	NA	NA	9.4E-09	9.4E-09
Cadmium	NA	NA	1.1E-08	1.1E-08
Chromium	NA	NA	NA	NA
Chromium (VI)	4.6E-09	1.7E-11	9.8E-08	1.0E-07
Cobalt	NA	NA	1.7E-07	1.7E-07
Copper	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Mercury	NA	NA	NA	NA
Nickel	NA	NA	1.9E-08	1.9E-08
Vanadium	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA
Organochlorine Pesticides				
Pentachlorophenol	2.1E-08	7.6E-08	9.2E-11	9.7E-08
Total Cancer Risk [1]	7.E-07	4.E-07	3.E-07	1.E-06
Adjusted Cancer Risk [1] [2]	2.E-08	8.E-08	9.E-11	1.E-07
New Mill - Equipment Shed				
Total Petroleum Hydrocarbons (TPH)				
TPH as Gasoline	NA	NA	NA	NA
TPH as Diesel	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA
Total Cancer Risk [1]	NA	NA	NA	NA
Adjusted Cancer Risk [1] [2]	NA	NA	NA	NA

Table D-25
Summary of Cancer Risks for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [b]
New Mill - Dump Area				
Metals				
Arsenic	3.4E-07	1.5E-07	8.4E-09	5.0E-07
Barium	NA	NA	NA	NA
Beryllium	NA	NA	1.1E-09	1.1E-09
Cadmium	NA	NA	7.3E-09	7.3E-09
Chromium	NA	NA	NA	NA
Cobalt	NA	NA	2.8E-07	2.8E-07
Copper	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Nickel	NA	NA	1.0E-07	1.0E-07
Vanadium	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA
Total Cancer Risk [1]	3.E-07	1.E-07	4.E-07	9.E-07
Adjusted Cancer Risk [1] [2]	0.E+00	0.E+00	5.E-08	5.E-08
Box Factory - Transformer Area				
Metals				
Arsenic	5.9E-07	2.6E-07	1.5E-08	8.7E-07
Barium	NA	NA	NA	NA
Beryllium	NA	NA	2.9E-09	2.9E-09
Cadmium	NA	NA	2.5E-08	2.5E-08
Chromium	NA	NA	NA	NA
Cobalt	NA	NA	1.6E-07	1.6E-07
Copper	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Mercury	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA
Nickel	NA	NA	2.0E-08	2.0E-08
Selenium	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Total Petroleum Hydrocarbons (TPH)				
TPH as Diesel	NA	NA	NA	NA
TPH as Motor Oil	NA	NA	NA	NA
Organochlorine Pesticides				
DDT	1.1E-10	5.0E-11	2.3E-12	1.7E-10
Dieldrin	NA	NA	NA	NA

Table D-25
Summary of Cancer Risks for Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Constituents	Post Development [a]			
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation to Fugitive Dust	Cumulative Cancer Risk [b]
Polychlorinated Biphenyls (PCBs)				
Aroclor-1254	3.8E-09	8.3E-09	7.6E-11	1.2E-08
Aroclor-1260	5.2E-09	1.1E-08	1.0E-10	1.7E-08
Total Cancer Risk [1]	6.E-07	3.E-07	2.E-07	1.E-06
Adjusted Cancer Risk [1] [2]	9.E-09	2.E-08	1.E-08	4.E-08
Box Factory - Burner				
Dioxin/Furans				
TCDD TEQ	8.0E-08	3.5E-08	1.7E-09	1.2E-07
Total Cancer Risk [1]	8.E-08	4.E-08	2.E-09	1.E-07
Adjusted Cancer Risk [1] [2]	8.E-08	4.E-08	2.E-09	1.E-07

Abbreviations:
NA = not analyzed
[1] Cumulative cancer risk based on the sum of all exposure pathways and all COPCs.
[2] Adjusted cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.

Table D-26
Lead Evaluation - Recreational Receptor
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

LEAD RISK ASSESSMENT SPREADSHEET 8
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

INPUT	
MEDIUM	LEVEL
New Mill - Dip Tank	
Lead in Soil/Dust (ug/g) - Pre-Dev	20
Respirable Dust (ug/m3) - Pre-Dev	1.5E-05
Lead in Soil/Dust (ug/g) - Post Dev	14
Respirable Dust (ug/m3) - Post Dev	1.0E-05
New Mill - Dump Area	
Lead in Soil/Dust (ug/g) - Pre-Dev	18
Respirable Dust (ug/m3) - Pre-Dev	1.3E-05
Lead in Soil/Dust (ug/g) - Post Dev	18
Respirable Dust (ug/m3) - Post Dev	1.3E-05
Box Factory - Transformer Area	
Lead in Soil/Dust (ug/g) - Pre-Dev	50
Respirable Dust (ug/m3) - Pre-Dev	3.7E-05
Lead in Soil/Dust (ug/g) - Post Dev	51
Respirable Dust (ug/m3) - Post Dev	3.8E-05

OUTPUT					
Percentile Estimate of Blood Pb (ug/dl)					
	50th	90th	95th	98th	99th
New Mill - Dip Tank					
BLOOD Pb, CHILD - Pre-Development	0.061	0.11	0.13	0.16	0.18
BLOOD Pb, CHILD - Post-Development	0.041	0.075	0.089	0.11	0.12
New Mill - Dump Area					
BLOOD Pb, CHILD - Pre-Development	0.055	0.10	0.12	0.14	0.16
BLOOD Pb, CHILD - Post-Development	0.055	0.10	0.12	0.14	0.16
Box Factory - Transformer Area					
BLOOD Pb, CHILD - Pre-Development	0.15	0.28	0.33	0.40	0.46
BLOOD Pb, CHILD - Post-Development	0.16	0.28	0.34	0.41	0.47

EXPOSURE PARAMETERS		
	units	children
Days per week	days/wk	3
Geometric Standard Deviation		1.6
Blood lead level of concern (ug/dl)		1
Skin area, residential	cm^2	2900
Soil adherence	ug/cm^2	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001
Soil ingestion	mg/day	100
Ingestion constant	(ug/dl)/(ug/day)	0.16
Bioavailability	unitless	0.44
Breathing rate	m^3/day	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.192

PATHWAYS						
CHILDREN	Pre-Development			Post Development		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
New Mill - Dip Tank						
Soil Contact	2.5E-5	0.00	1%	2.5E-5	0.00	1%
Soil Ingestion	3.0E-3	0.06	99%	3.0E-3	0.04	99%
Inhalation	8.3E-12	0.00	0%	5.6E-12	0.00	0%
New Mill - Dump Area						
Soil Contact	2.5E-5	0.00	1%	2.5E-5	0.00	1%
Soil Ingestion	3.0E-3	0.05	89%	3.0E-3	0.05	89%
Inhalation	0.0E+0	0.00	0%	7.4E-12	0.00	0%
Box Factory - Transformer Area						
Soil Contact	2.5E-5	0.00	2%	2.5E-5	0.00	2%
Soil Ingestion	3.0E-3	0.15	247%	3.0E-3	0.15	247%
Inhalation	0.0E+0	0.00	0%	2.1E-11	0.00	0%

Click here for REFERENCES

Table D-27
Lead Evaluation - Commercial Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

MODIFIED VERSION OF USEPA ADULT LEAD MODEL

Variable	Description of Variable	Units	
PbS	Soil lead concentration		
New Mill - Dip Tank			
	Pre-Development	ug/g or ppm	20
	Post Development	ug/g or ppm	14
New Mill - Dump Area			
	Pre-Development	ug/g or ppm	18
	Post Development	ug/g or ppm	18
Box Factory - Transformer Area			
	Pre-Development	ug/g or ppm	50
	Post Development	ug/g or ppm	51
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	0.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	250
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	
New Mill - Dip Tank			
	Pre-Development	**ug/dL**	**0.03**
	Post Development	**ug/dL**	**0.02**
New Mill - Dump Area			
	Pre-Development	**ug/dL**	**0.03**
	Post Development	**ug/dL**	**0.03**
Box Factory - Transformer Area			
	Pre-Development	**ug/dL**	**0.08**
	Post Development	**ug/dL**	**0.08**
$PbB_{fetal, 0.90}$	90th percentile PbB among fetuses of adult workers	ug/dL	0.0
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**1.0**

Table D-28
Lead Evaluation - Construction Worker
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

MODIFIED VERSION OF USEPA ADULT LEAD MODEL

Variable	Description of Variable	Units	
PbS	Soil lead concentration		
New Mill - Dip Tank			
	Post Development	ug/g or ppm	14
New Mill - Dump Area			
	Post Development	ug/g or ppm	18
Box Factory - Transformer Area			
	Post Development	ug/g or ppm	51
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	0.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	250
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	
New Mill - Dip Tank			
	Post Development	**ug/dL**	**0.02**
New Mill - Dump Area			
	Post Development	**ug/dL**	**0.03**
Box Factory - Transformer Area			
	Post Development	**ug/dL**	**0.08**
$PbB_{fetal, 0.90}$	90th percentile PbB among fetuses of adult workers	ug/dL	0.0
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**1.0**

Table D-29
Summary of Noncancer Hazard Indices, Cancer Risks, and Blood Lead Levels
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Receptor	Noncancer Hazard Index	Cancer Risk	Blood Lead Level (ug/dL)
Pre-Development			
New Mill - Dip Tank			
Recreational			
Cumulative Hazard and Risk [a]	3.7	1.E-05	0.1
Adjusted Hazard and Risk [b]	0.05	2.E-07	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.8	9.E-06	0.03
Adjusted Hazard and Risk [b]	0.01	2.E-07	NA
New Mill - Equipment Shed			
Recreational			
Cumulative Hazard and Risk [a]	1.4	NA	NA
Adjusted Hazard and Risk [b]	1.4	NA	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.4	NA	NA
Adjusted Hazard and Risk [b]	0.4	NA	NA
New Mill - Dump Area			
Recreational			
Cumulative Hazard and Risk [a]	3.0	5.E-06	0.1
Adjusted Hazard and Risk [b]	1.4	7.E-10	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.8	4.E-06	0.03
Adjusted Hazard and Risk [b]	0.4	1.E-09	NA
Box Factory - Transformer Area			
Recreational			
Cumulative Hazard and Risk [a]	3.0	1.E-05	0.3
Adjusted Hazard and Risk [b]	0.5	2.E-06	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.7	1.E-05	0.08
Adjusted Hazard and Risk [b]	0.1	2.E-06	NA
Box Factory - Burner			
Recreational			
Cumulative Hazard and Risk [a]	0.4	6.E-05	NA
Adjusted Hazard and Risk [b]	0.4	6.E-05	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.1	4.E-05	NA
Adjusted Hazard and Risk [b]	0.1	4.E-05	NA
Post Development			
New Mill - Dip Tank			
Recreational			
Cumulative Hazard and Risk [a]	3.1	1.E-05	0.1
Adjusted Hazard and Risk [b]	0.05	6.E-07	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.7	8.E-06	0.02
Adjusted Hazard and Risk [b]	0.02	6.E-07	NA
Construction Worker			
Cumulative Hazard and Risk [a]	3.8	1.E-06	0.02
Adjusted Hazard and Risk [b]	0.07	1.E-07	NA

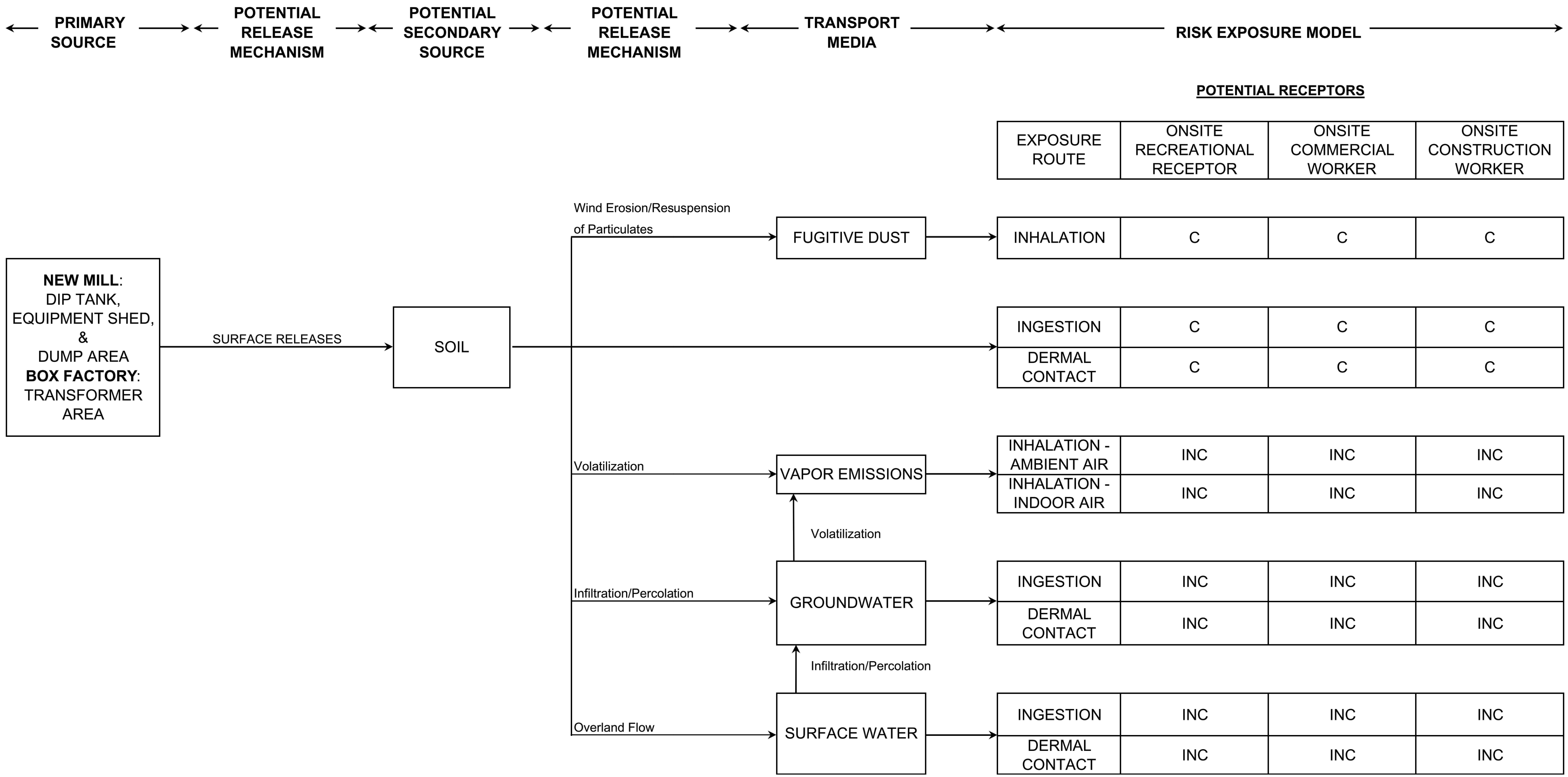
Table D-29
Summary of Noncancer Hazard Indices, Cancer Risks, and Blood Lead Levels
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Receptor	Noncancer Hazard Index	Cancer Risk	Blood Lead Level (ug/dL)
New Mill - Equipment Shed			
Recreational			
Cumulative Hazard and Risk [a]	0.1	NA	NA
Adjusted Hazard and Risk [b]	0.1	NA	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.03	NA	NA
Adjusted Hazard and Risk [b]	0.03	NA	NA
Construction Worker			
Cumulative Hazard and Risk [a]	0.1	NA	NA
Adjusted Hazard and Risk [b]	0.1	NA	NA
New Mill - Dump Area			
Recreational			
Cumulative Hazard and Risk [a]	2.2	5.E-06	0.1
Adjusted Hazard and Risk [b]	0.6	7.E-10	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.6	4.E-06	0.03
Adjusted Hazard and Risk [b]	0.2	1.E-09	NA
Construction Worker			
Cumulative Hazard and Risk [a]	4.4	9.E-07	0.03
Adjusted Hazard and Risk [b]	1.8	5.E-08	NA
Box Factory - Transformer Area			
Recreational			
Cumulative Hazard and Risk [a]	2.8	1.E-05	0.3
Adjusted Hazard and Risk [b]	0.3	2.E-07	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.7	1.E-05	0.08
Adjusted Hazard and Risk [b]	0.09	2.E-07	NA
Construction Worker			
Cumulative Hazard and Risk [a]	3.0	1.E-06	0.08
Adjusted Hazard and Risk [b]	0.4	4.E-08	NA
Box Factory - Burner			
Recreational			
Cumulative Hazard and Risk [a]	0.008	1.E-06	NA
Adjusted Hazard and Risk [b]	0.008	1.E-06	NA
Commercial Worker			
Cumulative Hazard and Risk [a]	0.002	8.E-07	NA
Adjusted Hazard and Risk [b]	0.002	8.E-07	NA
Construction Worker			
Cumulative Hazard and Risk [a]	0.006	1.E-07	NA
Adjusted Hazard and Risk [b]	0.006	1.E-07	NA

Notes:

[a] Cumulative hazard index and cancer risk based on the sum of all exposure pathways and all COPCs.

[b] Adjusted cumulative hazard index and cancer risk excludes naturally-occuring metals present in soil at concentrations that are consistent with or below background.



NOTES:

INC - Incomplete Exposure Pathway (Not evaluated quantitatively in this assessment)

C - Potentially Complete Exposure Pathway (Evaluated quantitatively in this assessment)

CONCEPTUAL SITE MODEL
HUMAN HEALTH RISK ANALYSIS

Mount Shasta Commerce Park
Mount Shasta, California

TRC | 202311 | **FIGURE D-1**

FILE NAME: Z:\CAD_DRAW\Current\Mount Shasta Commerce Park\FigD-1_Conceptual Site Model.dwg | Layout Tab: 11x17

Table A-1
Human Health Risk Assessment Data Set
Pre-Development - New Mill Dip Tank
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
		(ft bgs)	(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)
NMDT-1-1	05/1998	1	--	--	--	3.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-2-2	05/1998	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-3-1	05/1998	1	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-4-1	05/1998	1	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-7-1	05/1998	1	--	--	--	--	4.2	5.1	94.9	0.81	--	28.3	--	7.0	29.2	33.1	207	<0.06	24.7	--	<0.25	--	67.3	28.1
NM-1-0.5	03/2005	0.5	< 6.6	18	--	--	<8.2	<1.4	70.7	1.1	0.77	13	<0.5	1.5	21.6	7.5	122	0.058	14.6	<4.8	<1.4	<3.4	56.9	12
NM-1-2	03/2005	2	< 6.8	< 27	< 7.6	--	<8	<1.3	11	0.96	0.75	7.1	<0.3	<6.6	14.2	5.6	66.8	<0.13	10.7	<4.6	<1.3	<3.3	50.8	6.9
NM-2-0.5	03/2005	0.5	--	--	--	--	<8.5	<1.4	10.2	1.1	0.81	6.8	--	<7.1	16.7	7	55.1	<0.14	10.5	<4.9	<1.4	<3.5	51.6	6.2
NM-2-2	03/2005	2	< 7.1	< 28	--	--	<8.7	<1.5	59.2	1.3	0.96	11.1	--	<7.3	26.8	8.2	102	<0.15	12	<5.1	<1.5	<3.6	69.5	6.4
NM-3-0.5	03/2005	0.5	< 7.0	36	--	R	<6.8	<1.1	58.4	0.43	0.86	21.2	<0.4	8.7	18.2	12.4	194	1.5	75.1	<4	<1.1	<2.8	41.1	28.1
NM-3-2	03/2005	2	< 6.7	38	< 10	R	<8.2	<1.4	33.0	1.1	0.79	7.1	<0.3	<6.8	21.3	9.0	76.9	0.71	10.0	<4.8	<1.4	<3.4	47.1	7.2
NM-4-0.5	03/2005	0.5	--	--	--	--	<8.7	<1.4	<11.9	<1.2	0.69	4.5	--	<7.2	18.3	8.3	52.5	<0.14	5.9	<5.1	<1.4	<3.6	53.0	7.6
NM-4-2 Dup	03/2005	2	< 7.1	< 28	--	--	<8.4	1.1	<20.4	<1.1	0.47	13.5	--	<7	16.3	7.4	47.3	<0.14	8.8	<4.9	<1.4	<3.5	58.1	5.5
NM-5-0.5	03/2005	0.5	ND	ND	--	--	<8.2	0.96	<53	<1.2	0.67	24.1	<1.1	<6.8	22.3	24.9	96.1	<0.14	18.1	<4.8	<1.4	<3.4	72.0	9.7
NM-5-2	03/2005	2	ND	ND	< 12	--	<8.3	1.4	90.0	<1.3	0.69	19.6	0.2	<6.9	31.5	9.3	63.4	0.052	13.0	<4.8	<1.4	<3.4	90.8	7.2
NM-6-0.5	03/2005	0.5	--	--	--	--	<7.9	<1.3	<8.2	<1	0.43	6.0	--	<6.6	16.0	7.1	85.3	<0.13	7.8	<4.6	<1.3	<3.3	39.2	9.5
NM-6-2	03/2005	2	ND	ND	--	--	<8.5	<1.4	<23.7	<1.1	0.51	6.1	--	6.0	26.0	7.9	277	0.043	9.1	<5	<1.4	<3.5	51.8	8.2
NM-7-0.5	03/2005	0.5	ND	94	--	--	<7.8	2.2	141	0.99	0.52	27.6	<1	5.6	31.5	9.2	357	0.059	27.6	<4.5	<1.3	<3.2	67.1	35.7
NM-7-2	03/2005	2	ND	31	< 7.0	--	<7.7	**3.1**	144	1.3	0.82	34.7	<1	12.8	37.9	22.1	493	0.061	30.6	<4.5	<1.3	<3.2	88.4	31.9
NM-8-0.5	03/2005	0.5	--	--	--	--	<8.2	1.2	142	1.5	1.0	32.2	--	5.4	33.4	24.8	293	<0.14	38.0	<4.8	<1.4	<3.4	96.4	30.8
NM-8-2	03/2005	2	ND	35	--	--	<7.9	1.6	99.2	1.6	1.0	34.7	--	4.0	36.7	11.6	221	<0.13	28.2	<4.6	<1.3	<3.3	92.7	27.7
NM-9-0.5	03/2005	0.5	21	160	--	--	<8	1.3	102	1.3	0.82	33.1	<1.1	4.1	30.0	23.9	220	<0.13	25.4	<4.7	<1.3	<3.3	77.9	21.5
NM-9-2	03/2005	2	ND	ND	< 7.3	--	<8	1.5	77.3	1.5	0.98	39.7	<1.1	4.6	38.8	10.2	175	<0.13	29.8	<4.7	<1.3	<3.3	90.5	22.7
NM-12-0.5	03/2005	0.5	--	--	--	--	<8.5	<1.4	134	1.2	0.84	19.0	--	1.4	21.0	7.4	122	<0.14	13.2	<4.9	<1.4	<3.5	64.3	11.6
NM-14-2	03/2005	2	--	--	--	--	<8.2	<1.4	23.9	1.1	0.82	14.5	--	<6.8	16.8	6.6	96.3	<0.14	6.5	<4.8	<1.4	<3.4	60.3	5.2
NM-14-2 Dup	03/2005	2	< 7.1	< 28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-1-2	05/2007	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-2-2	05/2007	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-3-2	05/2007	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-1-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-2-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-3-0	11/12/2014	0	--	--	--	<25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-4-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-5-0	11/12/2014	0	--	--	--	<12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-6-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-7-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-8-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
ND = not detected
R = rejected data

Table A-2
Human Health Risk Assessment Data Set
Pre Development - New Mill Equipment Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	TPH-gasoline (mg/kg)
ES-2-2	02/2007	2	27	130	--
ES-3-0	05/2007	0	250	1,000	--
ES-4-2	05/2007	2	120	490	--
ES-5-2	05/2007	2	290	1,000	--
ES-6-0	05/2007	0	280	820	--
ES-7-0	05/2007	0	150	580	--
ES-8-0	05/2007	0	3,000	6,700	--
ES-9-2	05/2007	2	190	360	--
ES-10-2	05/2007	2	35	150	--
ES-11-0	05/2007	0	15	88	--
EQSH-1-0	11/11/2014	0	230	980	0.29
EQSH-1-2.5	11/11/2014	2.5	<5.0	<25	<0.33
EQSH-2-0	11/11/2014	0	200	2,300	<0.24
EQSH-2-2.5	11/11/2014	2.5	<5.0	<25	<0.30
EQSH-3-0	11/11/2014	0	41	150	<0.28
EQSH-3-2.5	11/11/2014	2.5	970	3,500	<0.30
EQSH-4-0	11/11/2014	0	730	1,100	<0.30
EQSH-4-2.5	11/11/2014	2.5	<5.0	<25	<0.28
EQSH-5-0	11/11/2014	0	15	73	<0.29
EQSH-5-2.5	11/11/2014	2.5	71	280	<0.24
EQSH-6-0	11/12/2014	0	<4.9	<25	<0.25
EQSH-6-2.5	11/12/2014	2.5	33	77	<0.26
EQSH-7-0	11/12/2014	0	120	700	<0.25
EQSH-7-2.5	11/12/2014	2.5	<4.9	<25	<0.26
EQSH-8-0	11/11/2014	0	350	900	<0.28
EQSH-8-2.5	11/11/2014	2.5	<5.0	<25	<0.27
EQSH-9-0	11/11/2014	0	320	2,700	<0.26
EQSH-9-2.5	11/11/2014	2.5	<4.9	<25	<0.26
EQSH-10-0	11/12/2014	0	1,300	1,500	<0.31
EQSH-10-2.5	11/12/2014	2.5	7.3	<25	<0.27

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram

Table A-3
Human Health Risk Assessment Data Set
Pre-Development - New Mill Dump Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
		(ft bgs)	(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)
DUMP	05/1998	NA	**2,250**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-1	12/2006	0	61	680	--	< 3.0	< 0.25	23	< 1.0	0.41	36	9.4	25	8.6	< 0.020	< 1.0	120	< 0.25	< 0.25	< 0.25	15	27
DUMP-2	12/2006	0	220	1,400	--	< 3.0	0.54	34	0.12	0.51	21	6.8	19	17	< 0.020	< 1.0	61	< 0.25	< 0.25	< 0.25	24	38
DUMP-3	12/2006	0	32	320	--	< 3.0	0.78	39	0.14	0.53	19	6.3	21	18	< 0.020	< 1.0	52	< 0.25	< 0.25	< 0.25	27	49
DUMP-4	12/2006	0	69	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-5	02/2007	0	85	540	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-6	02/2007	0	130	1,900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-7-0	05/2007	0	100	440	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-8-0	05/2007	0	33	300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-8-1 Dup	05/2007	1	37	330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-9-0	05/2007	0	85	530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-10-2	05/2007	2	78	370	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-11-0	05/2007	0	58	210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-12-0	05/2007	0	120	720	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-0	11/13/2014	0	190	680	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-2.5	11/13/2014	2.5	180	510	<0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-0	11/13/2014	0	<5.0	<25	<0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-2.5	11/13/2014	2.5	210	400	<0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-0	11/13/2014	0	33	320	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-2.5	11/13/2014	2.5	43	430	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-0	11/13/2014	0	48	750	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-2.5	11/13/2014	2.5	21	400	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-0	11/13/2014	0	160	960	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-2.5	11/13/2014	2.5	27	1,000	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
NA = not available

Table A-4
Human Health Risk Assessment Data Set
Pre-Development - Box Factory Transformer Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	PCB (mg/kg)							Organochlorine Pesticides		Metals in Soil (mg/kg)																
					Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	DDT (mg/kg)	Dieldrin (mg/kg)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BFT-1-1	05/1998	1	--	--	--	--	--	--	--	--	0.04	<0.0042	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-2-1	05/1998	1	--	--	--	--	--	--	--	--	0.12	0.0073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-3-1	05/1998	1	--	--	--	--	--	--	--	--	0.06	0.0062	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-1-0	12/2006	0	130	750	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.17	<0.033	<0.033	< 3.0	1.3	55	0.32	1.6	15	5.2	55	30	0.035	< 1.0	24	< 0.25	< 0.25	< 0.25	33	170
BFT-2-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.15	<0.033	<0.033	< 3.0	1.4	75	0.37	2.3	24	5.4	34	82	1.7	< 1.0	26	0.8	< 0.25	< 0.25	34	140
BFT-3-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.037	<0.066	<0.066	< 3.0	1.2	41	0.34	1.2	6.6	3.2	16	12	0.021	< 1.0	9.3	0.49	< 0.25	< 0.25	32	44
BFT-4-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.067	<0.066	<0.066	< 3.0	1.1	64	0.34	1.8	13	4.5	19	26	0.19	< 1.0	17	< 0.25	< 0.25	< 0.25	33	95
BFT-4-1 Dup	12/2006	1	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.097	<0.066	<0.066	< 3.0	1.3	52	0.27	1.5	13	5.7	25	44	0.29	< 1.0	23	< 0.25	< 0.25	< 0.25	35	83
BFT-5-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.041	0.14	<0.033	<0.033	< 3.0	0.72	54	0.31	1.4	17	5.2	25	28	0.051	< 1.0	21	0.63	< 0.25	< 0.25	34	56
BFT-5-1	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.026	0.036	<0.033	<0.033	< 3.0	1.3	35	0.41	1.3	6.5	3.1	14	14	0.025	< 1.0	12	< 0.25	< 0.25	< 0.25	30	22
BFT-6-0	12/2006	0	--	--	<0.048	<0.096	<0.048	<0.048	<0.048	1.8	0.40	<0.033	0.033	< 3.0	1.3	68	0.33	2.7	20	5.8	30	45	0.05	4.4	42	0.5	< 0.25	< 0.25	35	210
BFT-7-0	02/2007	0	--	--	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.025	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-8-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.056	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-9-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BF-10-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-11-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.038	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-12-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.035	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-13-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-14-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-15-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.039	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-16-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-17-1 Dup	02/2007	1	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.031	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-18-0	05/2007	0	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-19-0	05/2007	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-19-1 Dup	05/2007	1	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-20-0	05/2007	0	--	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-21-0	05/2007	0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	3.5	2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-22-0	05/2007	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-23-1	05/2007	1	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-1-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-2-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-3-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-4-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram

Table A-5
Human Health Risk Assessment Data Set
Pre-Development - Box Factory Burner
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFB-1-1C			NBFB-1-0			NBFB-2-0			NBFB-3-0			BFBU-1-0		
		5/1/1998			12/1/2006			12/1/2006			12/1/2006			11/14/2014		
		1 feet bgs			0 feet bgs			0 feet bgs			0 feet bgs			0 feet bgs		
		Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]
2,3,7,8-TCDD	1	2	U	1	1.3		1.3	0.9		0.9	5.8		5.8	0.81	I,D	0.81
1,2,3,7,8-PeCDD	1	3.3		3.3	13.7		13.7	10.6		10.6	71.1		71.1	3.89	D	3.89
1,2,3,4,7,8-HxCDD	0.1	3.4		0.34	18.3		1.83	18		1.8	106		10.6	5.44		0.544
1,2,3,6,7,8-HxCDD	0.1	18		1.8	203		20.3	139		13.9	916		91.6	12.4		1.24
1,2,3,7,8,9-HxCDD	0.1	13		1.3	51.5		5.15	42		4.2	248		24.8	7.17		0.717
1,2,3,4,6,7,8-HpCDD	0.01	230		2.3	2,940		29.4	3,060		30.6	38,660		386.6	323		3.23
OCDD	0.0003	870		0.261	29,500		8.85	36,270		10.881	566,470		169.941	2370		0.711
2,3,7,8-TCDF	0.1	1.7	U	0.085	3.1		0.31	0.6		0.06	3.1		0.31	2.93		0.293
1,2,3,7,8-PeCDF	0.03	1.3	U	0.0195	4.5		0.135	2		0.06	17.4		0.522	0.72	I,B	0.0216
2,3,4,7,8-PeCDF	0.3	0.87		0.261	5.8		1.74	1.8		0.54	19.5		5.85	0.56	I,B	0.168
1,2,3,4,7,8-HxCDF	0.1	1.6		0.16	61.3		6.13	51		5.1	324		32.4	1.72	I,D	0.172
1,2,3,6,7,8-HxCDF	0.1	1.2		0.12	44.1		4.41	33.6		3.36	195		19.5	1.17	I,D	0.117
2,3,4,6,7,8-HxCDF	0.1	0.61	U	0.0305	0.2		0.02	0.2		0.02	252		25.2	1.88	I,B	0.188
1,2,3,7,8,9-HxCDF	0.1	2.2	U	0.11	16.6		1.66	11.6		1.16	66.2		6.62	2.75	I	0.275
1,2,3,4,6,7,8-HpCDF	0.01	74		0.74	3,820		38.2	3,030		30.3	71,880		718.8	98.2		0.982
1,2,3,4,7,8,9-HpCDF	0.01	1.2		0.012	97		0.97	73		0.73	261		2.61	2.02	I,D	0.0202
OCDF	0.0003	27		0.0081	3,860		1.158	3,970		1.191	62,910		18.873	65.6		0.01968
TCDD TEQ [c]				11.85			**135.26**			**115.40**			**1,591.13**			13.40

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFBU-1-2.5			BFBU-2-0			BFBU-2-2.5			BFBU-3-0		
		11/14/2014			11/14/2014			11/14/2014			11/14/2014		
		2.5 feet bgs			0 feet bgs			2.5 feet bgs			0 feet bgs		
		Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]
2,3,7,8-TCDD	1	0.24	I,B	0.24	0.75	I,D	0.75	0.64	I,D	0.64	1.49	D	1.49
1,2,3,7,8-PeCDD	1	1.10	I,B	1.10	17.5		17.5	0.94	I,B	0.94	18.8		18.8
1,2,3,4,7,8-HxCDD	0.1	0.38	I,B	0.038	23.3		2.33	12.5	I	1.25	21.9		2.19
1,2,3,6,7,8-HxCDD	0.1	0.18	I,B	0.018	276		27.6	12.5		1.25	179		17.9
1,2,3,7,8,9-HxCDD	0.1	0.65	I,B	0.065	53.4		5.34	1.29	I,D	0.129	68.6		6.86
1,2,3,4,6,7,8-HpCDD	0.01	11.97		0.1197	5,520		55.2	210		2.1	2,740		27.4
OCDD	0.0003	35		0.010509	42,100		12.63	1,620		0.486	27,900		8.37
2,3,7,8-TCDF	0.1	0.25	B	0.025	70.4		7.04	4.44		0.444	107		10.7
1,2,3,7,8-PeCDF	0.03	0.67	B	0.0201	4.34		0.1302	0.38	I,B	0.0114	8.45	D	0.2535
2,3,4,7,8-PeCDF	0.3	0.49	I,B	0.147	59.9		17.97	0.55	I,B	0.165	11.3		3.39
1,2,3,4,7,8-HxCDF	0.1	0.73	I,B	0.073	80.7		8.07	2.91	I,D	0.291	41.1		4.11
1,2,3,6,7,8-HxCDF	0.1	0.49	B	0.049	57.2		5.72	2.92	I,D	0.292	33.1		3.31
2,3,4,6,7,8-HxCDF	0.1	0.39	I,B	0.039	15.7		1.57	2.41	B	0.241	11.8		1.18
1,2,3,7,8,9-HxCDF	0.1	0.43	I,B	0.043	96.1		9.61	5.67		0.567	45.5		4.55
1,2,3,4,6,7,8-HpCDF	0.01	1.34	B	0.0134	9,580		95.8	240		2.4	2,299		22.99
1,2,3,4,7,8,9-HpCDF	0.01	1.00	B	0.01	199		1.99	3.03	I,D	0.0303	36.2		0.362
OCDF	0.0003	8.60	I	0.00258	11,700		3.51	199		0.0597	1,770		0.531
TCDD TEQ [c]				2.01			**272.76**			11.30			**134.39**

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFBU-3-2.5			BFBU-4-0			BFBU-4-2.5		
		11/14/2014			11/14/2014			11/14/2014		
		2.5 feet bgs			0 feet bgs			2.5 feet bgs		
		Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]
2,3,7,8-TCDD	1	0.22	I,B	0.22	2.79	D	2.79	0.32	I,B	0.32
1,2,3,7,8-PeCDD	1	3.79	D	3.79	23.8		23.8	1.52	I,B	1.52
1,2,3,4,7,8-HxCDD	0.1	2.68	D	0.268	17.1		1.71	0.95	B	0.095
1,2,3,6,7,8-HxCDD	0.1	20.5		2.05	127		12.7	3.31	D	0.331
1,2,3,7,8,9-HxCDD	0.1	5.72		0.572	68.9		6.89	2.24	D	0.224
1,2,3,4,6,7,8-HpCDD	0.01	479		4.79	1,260		12.6	46.8		0.468
OCDD	0.0003	5,100		1.53	5,636		1.6908	244		0.0732
2,3,7,8-TCDF	0.1	5.58		0.558	17.7		1.77	0.63	I,B	0.063
1,2,3,7,8-PeCDF	0.03	3.22	B	0.0966	3.92	B	0.1176	0.57	I,B	0.0171
2,3,4,7,8-PeCDF	0.3	4.05	D	1.215	4.72	D	1.416	0.22	I,B	0.066
1,2,3,4,7,8-HxCDF	0.1	7.84		0.784	23.2		2.32	1.00	I,B	0.1
1,2,3,6,7,8-HxCDF	0.1	5.63	D	0.563	24.2		2.42	1.19	B	0.119
2,3,4,6,7,8-HxCDF	0.1	1.70	I,D	0.17	7.01		0.701	1.31	I,B	0.131
1,2,3,7,8,9-HxCDF	0.1	11.3		1.13	38.9		3.89	1.23	B	0.123
1,2,3,4,6,7,8-HpCDF	0.01	303		3.03	2,720		27.2	90.8		0.908
1,2,3,4,7,8,9-HpCDF	0.01	4.44	D	0.0444	15.1		0.151	0.71	ND	0.0071
OCDF	0.0003	372		0.1116	1,360		0.408	37.3	D	0.01119
TCDD TEQ [c]				20.92			**102.57**			4.58

Notes:
pg/g = picogram per gram
D = Less than Quantification Limit (QL)
I = Laboratory Interference
B = Upper Limit
ND = Less than Method Detection Limit (MDL)

Abbreviations:
bgs = below ground surface
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlordibenzo-p-dioxin
TCDF = tetrachlordibenzofuran
TEQ = toxic equivalency concentration
U = not detected above the reporting limit
USEPA = United States Environmental Protection Agency (http://www.epa.gov/region9/superfund/prg/

Footnotes:
[a] The TEFs are values from *The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds*(van den Berg, et. al., 2006) and adopted by the Department of Toxic Substances Control (DTSC) and presented in DTSC May 2009 Human Health Risk Assessment (HHRA) Note 2,*Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites.*
[b] The TEF adjusted value is calculated by multiplying the laboratory result by the TEF. Values that were not detected, one half the reporting limit was used as the result.
[c] The TCDD TEQ value is the sum of the TEF Adjusted value for each dioxin/furan compound.

Table A-6
Human Health Risk Assessment Data Set
Post Development - New Mill Dip Tank
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
		(ft bgs)	(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)
NMDT-1-1	05/1998	1	--	--	--	3.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-1-5	05/1998	5	--	--	--	64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-2-2	05/1998	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-2-5	05/1998	5	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-3-1	05/1998	1	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-4-1	05/1998	1	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDT-7-1	05/1998	1	--	--	--	--	4.2	5.1	94.9	0.81	--	28.3	--	7.0	29.2	33.1	207	<0.06	24.7	--	<0.25	--	67.3	28.1
NM-1-0.5	03/2005	0.5	< 6.6	18	--	--	<8.2	<1.4	70.7	1.1	0.77	13	<0.5	1.5	21.6	7.5	122	0.058	14.6	<4.8	<1.4	<3.4	56.9	12
NM-1-2	03/2005	2	< 6.8	< 27	< 7.6	--	<8	<1.3	11	0.96	0.75	7.1	<0.3	<6.6	14.2	5.6	66.8	<0.13	10.7	<4.6	<1.3	<3.3	50.8	6.9
NM-2-0.5	03/2005	0.5	--	--	--	--	<8.5	<1.4	10.2	1.1	0.81	6.8	--	<7.1	16.7	7	55.1	<0.14	10.5	<4.9	<1.4	<3.5	51.6	6.2
NM-2-2	03/2005	2	< 7.1	< 28	--	--	<8.7	<1.5	59.2	1.3	0.96	11.1	--	<7.3	26.8	8.2	102	<0.15	12	<5.1	<1.5	<3.6	69.5	6.4
NM-3-0.5	03/2005	0.5	< 7.0	36	--	R	<6.8	<1.1	58.4	0.43	0.86	21.2	<0.4	8.7	18.2	12.4	194	1.5	75.1	<4	<1.1	<2.8	41.1	28.1
NM-3-2	03/2005	2	< 6.7	38	< 10	R	<8.2	<1.4	33.0	1.1	0.79	7.1	<0.3	<6.8	21.3	9.0	76.9	0.71	10.0	<4.8	<1.4	<3.4	47.1	7.2
NM-3-7.5	03/2005	7.5	< 6.6	< 26	--	R	<2	<1.3	<22.6	<1	0.34	5.6	<0.1	<6.7	20.7	6.6	127	0.054	12.7	<4.7	<1.3	<3.4	37.6	7.5
NM-4-0.5	03/2005	0.5	--	--	--	--	<8.7	<1.4	<11.9	<1.2	0.69	4.5	--	<7.2	18.3	8.3	52.5	<0.14	5.9	<5.1	<1.4	<3.6	53.0	7.6
NM-4-2 Dup	03/2005	2	< 7.1	< 28	--	--	<8.4	1.1	<20.4	<1.1	0.47	13.5	--	<7	16.3	7.4	47.3	<0.14	8.8	<4.9	<1.4	<3.5	58.1	5.5
NM-4-7.5	03/2005	7.5	--	--	--	--	<8.4	1.4	<15.4	<1.2	0.43	7.4	--	<7	14.9	7.0	122	<0.14	5.9	<4.9	<1.4	<3.5	45.5	6.1
NM-5-0.5	03/2005	0.5	ND	ND	--	--	<8.2	0.96	<53	<1.2	0.67	24.1	<1.1	<6.8	22.3	24.9	96.1	<0.14	18.1	<4.8	<1.4	<3.4	72.0	9.7
NM-5-2	03/2005	2	ND	ND	< 12	--	<8.3	1.4	90.0	<1.3	0.69	19.6	0.2	<6.9	31.5	9.3	63.4	0.052	13.0	<4.8	<1.4	<3.4	90.8	7.2
NM-5-6	03/2005	6	ND	ND	--	--	<8.8	0.66	<6.7	<1.2	0.55	6.0	<1.1	<7.3	19.5	8.1	51.8	<0.15	7.2	<5.1	<1.5	<3.7	52.8	5.8
NM-6-0.5	03/2005	0.5	--	--	--	--	<7.9	<1.3	<8.2	<1	0.43	6.0	--	<6.6	16.0	7.1	85.3	<0.13	7.8	<4.6	<1.3	<3.3	39.2	9.5
NM-6-2	03/2005	2	ND	ND	--	--	<8.5	<1.4	<23.7	<1.1	0.51	6.1	--	6.0	26.0	7.9	277	0.043	9.1	<5	<1.4	<3.5	51.8	8.2
NM-6-7	03/2005	7	--	--	--	--	<7.9	0.70	9.0	0.83	0.39	6.5	--	<6.6	15.8	4.9	93.0	<0.13	11.8	<4.6	<1.3	<3.3	34.6	6.2
NM-7-0.5	03/2005	0.5	ND	94	--	--	<7.8	2.2	141	0.99	0.52	27.6	<1	5.6	31.5	9.2	357	0.059	27.6	<4.5	<1.3	<3.2	67.1	35.7
NM-7-2	03/2005	2	ND	31	< 7.0	--	<7.7	3.1	144	1.3	0.82	34.7	<1	12.8	37.9	22.1	493	0.061	30.6	<4.5	<1.3	<3.2	88.4	31.9
NM-7-7	03/2005	7	ND	ND	--	--	<8.7	<1.5	20.9	1.5	1.2	18.0	<1.2	<7.3	33.6	9.9	86.4	<0.15	10.7	<5.1	<1.5	<3.6	73.5	10.1
NM-8-0.5	03/2005	0.5	--	--	--	--	<8.2	1.2	142	1.5	1.0	32.2	--	5.4	33.4	24.8	293	<0.14	38.0	<4.8	<1.4	<3.4	96.4	30.8
NM-8-2	03/2005	2	ND	35	--	--	<7.9	1.6	99.2	1.6	1.0	34.7	--	4.0	36.7	11.6	221	<0.13	28.2	<4.6	<1.3	<3.3	92.7	27.7
NM-8-6	03/2005	6	--	--	--	--	<1.1	<1.3	7.5	1.1	0.89	5.7	--	<6.6	20.0	6.1	77.7	<0.13	5.3	<4.6	<1.3	<3.3	48.9	7.0
NM-9-0.5	03/2005	0.5	21	160	--	--	<8	1.3	102	1.3	0.82	33.1	<1.1	4.1	30.0	23.9	220	<0.13	25.4	<4.7	<1.3	<3.3	77.9	21.5
NM-9-2	03/2005	2	ND	ND	< 7.3	--	<8	1.5	77.3	1.5	0.98	39.7	<1.1	4.6	38.8	10.2	175	<0.13	29.8	<4.7	<1.3	<3.3	90.5	22.7
NM-9-5	03/2005	5	ND	ND		--	0.82	0.71	90.6	1.6	0.99	42.2	<1.1	4.4	36.3	10.7	171	<0.14	28.3	<4.8	<1.4	<3.4	99.3	21.2
NM-12-0.5	03/2005	0.5	--	--	--	--	<8.5	<1.4	134	1.2	0.84	19.0	--	1.4	21.0	7.4	122	<0.14	13.2	<4.9	<1.4	<3.5	64.3	11.6
NM-12-7	03/2005	7	--	--	--	--	<8.9	<1.5	19.6	1.4	1.2	24.7	--	<7.5	22.3	8.5	98.2	0.067	13.4	<5.2	<1.5	<3.7	88.3	8.6
NM-14-2	03/2005	2	--	--	--	--	<8.2	<1.4	23.9	1.1	0.82	14.5	--	<6.8	16.8	6.6	96.3	<0.14	6.5	<4.8	<1.4	<3.4	60.3	5.2
NM-14-2 Dup	03/2005	2	< 7.1	< 28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-1-2	05/2007	2	--	--	--	< 0.020	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-1-8	05/2007	8	--	--	--	0.028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-1-10	05/2007	10	--	--	--	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-2-2	05/2007	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-2-3 Dup	05/2007	3	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-2-8	05/2007	8	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-2-10	05/2007	10	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-3-2	05/2007	2	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-3-8	05/2007	8	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NDT-3-10	05/2007	10	--	--	--	R	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-1-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-1-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-1-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-1-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-2-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-2-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-2-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-2-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-3-0	11/12/2014	0	--	--	--	<25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-3-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-3-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-3-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-4-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-4-5	11/12/2014	5	--	--	--	<13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-4-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-4-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A-6
Human Health Risk Assessment Data Set
Post Development - New Mill Dip Tank
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	PCP	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
		(ft bgs)	(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)
DIPT-5-0	11/12/2014	0	--	--	--	<12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-5-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-5-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-5-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-6-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-6-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-6-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-6-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-7-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-7-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-7-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-7-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-8-0	11/12/2014	0	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-8-5	11/12/2014	5	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-8-10	11/12/2014	10	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DIPT-8-15	11/12/2014	15	--	--	--	<2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
ND = not detected
R = rejected data

Table A-7
Human Health Risk Assessment Data Set
Post Development - New Mill Equipment Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	TPH-gasoline (mg/kg)
ES-2-2	02/2007	2	27	130	--
ES-3-0	05/2007	0	250	1,000	--
ES-4-2	05/2007	2	120	490	--
ES-5-2	05/2007	2	290	1,000	--
ES-6-0	05/2007	0	280	820	--
ES-7-0	05/2007	0	150	580	--
ES-9-2	05/2007	2	190	360	--
ES-10-2	05/2007	2	35	150	--
ES-11-0	05/2007	0	15	88	--
EQSH-1-0	11/11/2014	0	230	980	0.29
EQSH-1-2.5	11/11/2014	2.5	<5.0	<25	<0.33
EQSH-1-5	11/11/2014	5	12	29	<0.42
EQSH-1-7.5	11/11/2014	7.5	<5.0	<25	<0.33
EQSH-1-10	11/11/2014	10	<5.0	<25	<0.35
EQSH-1-12.5	11/11/2014	12.5	<5.0	<25	<0.34
EQSH-1-15	11/11/2014	15	<4.9	<25	<0.29
EQSH-2-0	11/11/2014	0	200	2,300	<0.24
EQSH-2-2.5	11/11/2014	2.5	<5.0	<25	<0.30
EQSH-2-5	11/11/2014	5	<5.0	<25	<0.29
EQSH-2-7.5	11/11/2014	7.5	<5.0	<25	<0.28
EQSH-2-10	11/11/2014	10	<5.0	<25	<0.28
EQSH-2-12.5	11/11/2014	12.5	<5.0	<25	<0.28
EQSH-2-15	11/11/2014	15	<4.9	<25	<0.27
EQSH-3-5	11/11/2014	5	<4.9	<25	<0.30
EQSH-3-7.5	11/11/2014	7.5	<5.0	<25	<0.27
EQSH-3-10	11/11/2014	10	<5.0	<25	<0.26
EQSH-3-12.5	11/11/2014	12.5	<5.0	<25	<0.28
EQSH-3-15	11/11/2014	15	<5.0	<25	<0.28
EQSH-4-2.5	11/11/2014	2.5	<5.0	<25	<0.28
EQSH-4-5	11/11/2014	5	18	38	<0.25
EQSH-4-7.5	11/11/2014	7.5	16	<25	<0.23
EQSH-4-10	11/11/2014	10	31	40	<0.25
EQSH-4-12.5	11/11/2014	12.5	7.6	<25	<0.25
EQSH-4-15	11/11/2014	15	6.8	<25	<0.27
EQSH-5-10	11/11/2014	10	110	160	<0.25
EQSH-5-12.5	11/11/2014	12.5	170	550	<0.25
EQSH-5-15	11/11/2014	15	9	<25	<0.26
EQSH-6-0	11/12/2014	0	<4.9	<25	<0.25
EQSH-6-2.5	11/12/2014	2.5	33	77	<0.26
EQSH-6-5	11/12/2014	5	<5.0	<25	<0.26
EQSH-6-7.5	11/12/2014	7.5	8.7	33	<0.25
EQSH-6-10	11/12/2014	10	<5.0	<25	<0.26
EQSH-6-12.5	11/12/2014	12.5	<5.0	<25	<0.29
EQSH-6-15	11/12/2014	15	5.9	<25	<0.26
EQSH-7-0	11/12/2014	0	120	700	<0.25
EQSH-7-2.5	11/12/2014	2.5	<4.9	<25	<0.26
EQSH-7-5	11/12/2014	5	<5.0	<25	<0.28
EQSH-7-7.5	11/12/2014	7.5	<5.0	<25	<0.27
EQSH-7-10	11/12/2014	10	9.1	36	<0.26
EQSH-7-12.5	11/12/2014	12.5	<4.9	<25	<0.26
EQSH-7-15	11/12/2014	15	5.1	<25	<0.25
EQSH-8-0	11/11/2014	0	350	900	<0.28
EQSH-8-2.5	11/11/2014	2.5	<5.0	<25	<0.27
EQSH-8-5	11/11/2014	5	<4.9	<25	<0.40
EQSH-8-7.5	11/11/2014	7.5	<4.9	<25	<0.27
EQSH-8-10	11/11/2014	10	<4.9	<25	<0.25
EQSH-8-12.5	11/11/2014	12.5	<5.0	<25	<0.27
EQSH-8-15	11/11/2014	15	<4.9	<25	<0.27
EQSH-9-2.5	11/11/2014	2.5	<4.9	<25	<0.26

Table A-7
Human Health Risk Assessment Data Set
Post Development - New Mill Equipment Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	TPH-gasoline (mg/kg)
EQSH-9-5	11/11/2014	5	61	150	<0.28
EQSH-9-7.5	11/11/2014	7.5	<4.9	<25	<0.25
EQSH-9-10	11/11/2014	10	35	75	<0.28
EQSH-9-12.5	11/11/2014	12.5	<5.0	<25	<0.27
EQSH-9-15	11/11/2014	15	<5.0	<25	<0.30
EQSH-10-2.5	11/12/2014	2.5	7.3	<25	<0.27
EQSH-10-5	11/12/2014	5	<5.0	<25	<0.29
EQSH-10-7.5	11/12/2014	7.5	60	110	<0.27
EQSH-10-10	11/12/2014	10	<5.0	<25	<0.27
EQSH-10-12.5	11/12/2014	12.5	<4.9	<25	<0.28
EQSH-10-15	11/12/2014	15	5.7	<25	<0.26

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram

Table A-8
Human Health Risk Assessment Data Set
Post Development - New Mill Dump Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth	TPH-diesel	TPH-motor oil	TPH-gasoline	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
		(ft bgs)	(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)
DUMP	May-98	--	**2,250**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-1	Dec-06	0	61	680	--	< 3.0	< 0.25	23	< 1.0	0.41	36	9.4	25	8.6	< 0.020	< 1.0	120	< 0.25	< 0.25	< 0.25	15	27
DUMP-2	Dec-06	0	220	1,400	--	< 3.0	0.54	34	0.12	0.51	21	6.8	19	17	< 0.020	< 1.0	61	< 0.25	< 0.25	< 0.25	24	38
DUMP-3	Dec-06	0	32	320	--	< 3.0	0.78	39	0.14	0.53	19	6.3	21	18	< 0.020	< 1.0	52	< 0.25	< 0.25	< 0.25	27	49
DUMP-4	Dec-06	0	69	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-5	Feb-07	0	85	540	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DUMP-6	Feb-07	0	130	1,900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-7-0	May-07	0	100	440	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-8-0	May-07	0	33	300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-8-1 Dup	May-07	1	37	330	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-9-0	May-07	0	85	530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-10-2	May-07	2	78	370	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-11-0	May-07	0	58	210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dump-12-0	May-07	0	120	720	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-0	11/13/2014	0	190	680	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-2.5	11/13/2014	2.5	180	510	<0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-5	11/13/2014	5	<5.0	<25	<0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-7.5	11/13/2014	7.5	24	69	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-10	11/13/2014	10	31	71	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-12.5	11/13/2014	12.5	13	30	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-1-15	11/13/2014	15	<5.0	<25	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-0	11/13/2014	0	<5.0	<25	<0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-2.5	11/13/2014	2.5	210	400	<0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-5	11/13/2014	5	160	1,000	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-7.5	11/13/2014	7.5	51	470	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-10	11/13/2014	10	69	610	<0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-12.5	11/13/2014	12.5	<5.0	<25	<0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-2-15	11/13/2014	15	<4.9	<25	<0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-0	11/13/2014	0	33	320	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-2.5	11/13/2014	2.5	43	430	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-5	11/13/2014	5	26	230	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-7.5	11/13/2014	7.5	47	210	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-10	11/13/2014	10	170	680	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-12.5	11/13/2014	12.5	41	16	<0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-3-15	11/13/2014	15	6.9	<25	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-0	11/13/2014	0	48	750	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-2.5	11/13/2014	2.5	21	400	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-5	11/13/2014	5	19	110	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-7.5	11/13/2014	7.5	37	240	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-10	11/13/2014	10	79	400	<0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-12.5	11/13/2014	12.5	230	1,600	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-4-15	11/13/2014	15	<5.0	27	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-0	11/13/2014	0	160	960	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-2.5	11/13/2014	2.5	27	1,000	<0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-5	11/13/2014	5	28	720	<0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-7.5	11/13/2014	7.5	41	560	<0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-10	11/13/2014	10	310	**3,400**	<0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-12.5	11/13/2014	12.5	48	690	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NMDU-5-15	11/13/2014	15	<5.0	<25	<0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
NA = not available

Table A-9
Human Health Risk Assessment Data Set
Post Development - Box Factory Transformer Area
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	TPH-diesel (mg/kg)	TPH-motor oil (mg/kg)	PCB (mg/kg)							Organochlorine Pesticides		Metals in Soil (mg/kg)																	
					Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	DDT (mg/kg)	Dieldrin (mg/kg)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
BFT-1-1	05/1998	1	--	--	--	--	--	--	--	--	0.04	<0.0042	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-2-1	05/1998	1	--	--	--	--	--	--	--	--	0.12	0.0073	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-3-1	05/1998	1	--	--	--	--	--	--	--	--	0.06	0.0062	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-1-0	12/2006	0	130	750	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.17	<0.033	<0.033	< 3.0	1.3	55	0.32	1.6	15	5.2	55	30	0.035	< 1.0	24	< 0.25	< 0.25	< 0.25	33	170
BFT-2-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.15	<0.033	<0.033	< 3.0	1.4	75	0.37	2.3	24	5.4	34	82	1.7	< 1.0	26	0.8	< 0.25	< 0.25	34	140
BFT-3-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.037	<0.066	<0.066	< 3.0	1.2	41	0.34	1.2	6.6	3.2	16	12	0.021	< 1.0	9.3	0.49	< 0.25	< 0.25	32	44
BFT-4-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.067	<0.066	<0.066	< 3.0	1.1	64	0.34	1.8	13	4.5	19	26	0.19	< 1.0	17	< 0.25	< 0.25	< 0.25	33	95
BFT-4-1 Dup	12/2006	1	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.097	<0.066	<0.066	< 3.0	1.3	52	0.27	1.5	13	5.7	25	44	0.29	< 1.0	23	< 0.25	< 0.25	< 0.25	35	83
BFT-5-0	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.041	0.14	<0.033	<0.033	< 3.0	0.72	54	0.31	1.4	17	5.2	25	28	0.051	< 1.0	21	0.63	< 0.25	< 0.25	34	56
BFT-5-1	12/2006	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	0.026	0.036	<0.033	<0.033	< 3.0	1.3	35	0.41	1.3	6.5	3.1	14	14	0.025	< 1.0	12	< 0.25	< 0.25	< 0.25	30	22
BFT-7-0	02/2007	0	--	--	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	0.025	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-8-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.056	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-9-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BF-10-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-11-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.038	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-12-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.035	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-13-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.076	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-14-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-15-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.039	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-16-0	02/2007	0	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-17-1 Dup	02/2007	1	--	--	<0.0096	<0.0019	<0.0096	<0.0096	<0.0096	<0.0096	0.031	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-18-0	05/2007	0	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-19-0	05/2007	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-19-1 Dup	05/2007	1	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-20-0	05/2007	0	--	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-22-0	05/2007	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFT-23-1	05/2007	1	--	--	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-1-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-1-5	11/13/2014	5	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-1-10	11/13/2014	10	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-1-15	11/13/2014	15	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-2-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-2-5	11/13/2014	5	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-2-10	11/13/2014	10	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-2-15	11/13/2014	15	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-3-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-3-5	11/13/2014	5	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-3-10	11/13/2014	10	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-3-15	11/13/2014	15	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-4-0	11/13/2014	0	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-4-5	11/13/2014	5	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-4-10	11/13/2014	10	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BFTR-4-15	11/13/2014	15	--	--	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram

Table A-10
Human Health Risk Assessment Data Set
Post Development - Box Factory Burner
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFB-1-1C 5/1/1998 1 feet bgs			BFBU-1-0 11/14/2014 0 feet bgs			BFBU-1-2.5 11/14/2014 2.5 feet bgs			BFBU-1-4 11/14/2014 4 feet bgs		
		Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]
2,3,7,8-TCDD	1	2	U	1	0.81	I,D	0.81	0.24	I,B	0.24	0.22	I,B	0.22
1,2,3,7,8-PeCDD	1	3.3		3.3	3.89	D	3.89	1.10	I,B	1.1	0.75	B	0.75
1,2,3,4,7,8-HxCDD	0.1	3.4		0.34	5.44		0.544	0.38	I,B	0.038	0.48	I,B	0.048
1,2,3,6,7,8-HxCDD	0.1	18		1.8	12.4		1.24	0.18	I,B	0.018	1.43	I,D	0.143
1,2,3,7,8,9-HxCDD	0.1	13		1.3	7.17		0.717	0.65	I,B	0.065	1.66	I,D	0.166
1,2,3,4,6,7,8-HpCDD	0.01	230		2.3	323		3.23	11.97		0.1197	33.1		0.331
OCDD	0.0003	870		0.261	2370		0.711	35		0.010509	189		0.0567
2,3,7,8-TCDF	0.1	1.7	U	0.085	2.93		0.293	0.25	B	0.025	0.98	D	0.098
1,2,3,7,8-PeCDF	0.03	1.3	U	0.0195	0.72	I,B	0.0216	0.67	B	0.0201	1.72	I,D	0.0516
2,3,4,7,8-PeCDF	0.3	0.87		0.261	0.56	I,B	0.168	0.49	I,B	0.147	1.35	B	0.405
1,2,3,4,7,8-HxCDF	0.1	1.6		0.16	1.72	I,D	0.172	0.73	I,B	0.073	2.22	I,D	0.222
1,2,3,6,7,8-HxCDF	0.1	1.2		0.12	1.17	I,D	0.117	0.49	B	0.049	0.77	I,B	0.077
2,3,4,6,7,8-HxCDF	0.1	0.61	U	0.0305	1.88	I,B	0.188	0.39	I,B	0.039	0.73	ND	0.073
1,2,3,7,8,9-HxCDF	0.1	2.2	U	0.11	2.75	I	0.275	0.43	I,B	0.043	1.81	I,D	0.181
1,2,3,4,6,7,8-HpCDF	0.01	74		0.74	98.2		0.982	1.34	B	0.0134	2.11	B	0.0211
1,2,3,4,7,8,9-HpCDF	0.01	1.2		0.012	2.02	I,D	0.0202	1.00	B	0.01	2.26	I,D	0.0226
OCDF	0.0003	27		0.0081	65.6		0.01968	8.60	I	0.00258	17.5	I,D	0.00525
TCDD TEQ [c]				11.85			13.40			2.01			2.87

Dioxin/Furan Compounds	Toxic Equivalency Factors (TEFs) [a]	BFBU-2-2.5 11/14/2014 2.5 feet bgs			BFBU-3-2.5 11/14/2014 2.5 feet bgs			BFBU-4-2.5 11/14/2014 2.5 feet bgs			BFBU-4-3.5 11/14/2014 3.5 feet bgs		
		Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]	Lab Results (pg/g)		TEF Adjusted [b]
2,3,7,8-TCDD	1	0.64	I,D	0.64	0.22	I,B	0.22	0.32	I,B	0.32	0.08		0.08
1,2,3,7,8-PeCDD	1	0.94	I,B	0.94	3.79	D	3.79	1.52	I,B	1.52	0.70		0.7
1,2,3,4,7,8-HxCDD	0.1	12.5	I	1.25	2.68	D	0.268	0.95	B	0.095	0.93		0.093
1,2,3,6,7,8-HxCDD	0.1	12.5		1.25	20.5		2.05	3.31	D	0.331	6.13		0.613
1,2,3,7,8,9-HxCDD	0.1	1.29	I,D	0.129	5.72		0.572	2.24	D	0.224	2.89		0.289
1,2,3,4,6,7,8-HpCDD	0.01	210		2.1	479		4.79	46.8		0.468	64.4		0.644
OCDD	0.0003	1,620		0.486	5,100		1.53	244		0.0732	352		0.1056
2,3,7,8-TCDF	0.1	4.44		0.444	5.58		0.558	0.63	I,B	0.063	0.84		0.084
1,2,3,7,8-PeCDF	0.03	0.38	I,B	0.0114	3.22	B	0.0966	0.57	I,B	0.0171	0.80		0.024
2,3,4,7,8-PeCDF	0.3	0.55	I,B	0.165	4.05	D	1.215	0.22	I,B	0.066	0.37		0.111
1,2,3,4,7,8-HxCDF	0.1	2.91	I,D	0.291	7.84		0.784	1.00	I,B	0.1	1.78		0.178
1,2,3,6,7,8-HxCDF	0.1	2.92	I,D	0.292	5.63	D	0.563	1.19	B	0.119	1.51		0.151
2,3,4,6,7,8-HxCDF	0.1	2.41	B	0.241	1.70	I,D	0.17	1.31	I,B	0.131	0.61		0.061
1,2,3,7,8,9-HxCDF	0.1	5.67		0.567	11.3		1.13	1.23	B	0.123	1.91		0.191
1,2,3,4,6,7,8-HpCDF	0.01	240		2.4	303		3.03	90.8		0.908	163		1.63
1,2,3,4,7,8,9-HpCDF	0.01	3.03	I,D	0.0303	4.44	D	0.0444	0.71	ND	0.0071	1.63		0.0163
OCDF	0.0003	199		0.0597	372		0.1116	37.3	D	0.01119	77		0.02301
TCDD TEQ [c]				11.30			20.92			4.58			4.99

Notes:
pg/g = picogram per gram
D = Less than Quantification Limit (QL)
I = Laboratory Interference
B = Upper Limit
ND = Less than Method Detection Limit (MDL)

Abbreviations:
bgs = below ground surface
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlordibenzo-p-dioxin
TCDF = tetrachlordibenzofuran
TEQ = toxic equivalency concentration
U = not detected above the reporting limit
USEPA = United States Environmental Protection Agency (http://www.epa.gov/region9/superfund/prg/)

Footnotes:
[a] The TEFs are values from *The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds* (*van den Berg, et. al., 2006*) and adopted by the Department of Toxic Substances Control (DTSC) and presented in DTSC May 2009 Human Health Risk Assessment (HHRA) Note 2, *Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites.*
[b] The TEF adjusted value is calculated by multipling the laboratory result by the TEF. Values that were not detected, one half the reporting limit was used as the result.
[c] The TCDD TEQ value is the sum of the TEF Adjusted value for each dioxin/furan compound.

Table A-11
Human Health Risk Assessment Data Set
Background
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Sample ID	Sample Date	Depth (ft bgs)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(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)
BG-1-0.5	03/2005	0.5	<7.6	1.2	118	<1	0.64	48.4	0.5	10.5	38.5	27.5	229	<0.13	--	56.6	<4.4	<1.3	<3.2	90.1	64.4
BG-2-0.5	03/2005	0.5	<8.3	<1.4	37.8	<1.1	0.59	6.9	0.1	1.8	20.6	8.3	271	<0.14	--	7.4	<4.8	<1.4	<3.5	40.7	8.6
BG-2-2	03/2005	2	<0.96	<1.4	14.4	<1.1	0.54	10.8	0.2	<7.0	18.4	7.5	97.0	<0.14	--	11.9	<4.9	<1.4	<3.5	36.9	7.5
BG-2-7.5	03/2005	7.5	<1.6	0.97	199	<1.3	0.7	14.4	0.1	<7.1	34.1	9.6	206	0.057	--	13.9	<5	<1.4	<3.6	50	21.9
BG-3-0.5	03/2005	0.5	<7.7	2.4	429	1.5	0.93	48.7	0.5	11.2	45.6	23.0	365	<0.13	--	42.7	<4.6	<1.3	<3.2	98.4	55.7
BG-4-0.5	03/2005	0.5	<4.8	1.8	194	<1.3	0.66	43.6	1.1	6.1	39.6	20.5	196	<0.13	--	39.1	<4.6	<1.3	<3.3	94.3	49.7

Abbreviations:
-- = not analyzed
<# = not detected above reporting limit
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/10/2015 4:54:07 PM
From File	Soil Data Set_ProUCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-motor oil

General Statistics

Total Number of Observations	11	Number of Distinct Observations	9
		Number of Missing Observations	15
Number of Detects	7	Number of Non-Detects	4
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	18	Minimum Non-Detect	27
Maximum Detect	160	Maximum Non-Detect	28
Variance Detects	2573	Percent Non-Detects	36.36%
Mean Detects	58.86	SD Detects	50.72
Median Detects	36	CV Detects	0.862
Skewness Detects	1.705	Kurtosis Detects	2.38
Mean of Logged Detects	3.817	SD of Logged Detects	0.738

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.374	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	44	Standard Error of Mean	13.78
SD	42.3	95% KM (BCA) UCL	71.36
95% KM (t) UCL	68.97	95% KM (Percentile Bootstrap) UCL	66.64
95% KM (z) UCL	66.66	95% KM Bootstrap t UCL	148.2
90% KM Chebyshev UCL	85.33	95% KM Chebyshev UCL	104.1
97.5% KM Chebyshev UCL	130	99% KM Chebyshev UCL	181.1

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.649	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.351	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.315	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.089	k star (bias corrected MLE)	1.289
Theta hat (MLE)	28.18	Theta star (bias corrected MLE)	45.67
nu hat (MLE)	29.24	nu star (bias corrected)	18.04
MLE Mean (bias corrected)	58.86	MLE Sd (bias corrected)	51.84
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.082	nu hat (KM)	23.8
Approximate Chi Square Value (23.80, α)	13.7	Adjusted Chi Square Value (23.80, β)	12.46
95% Gamma Approximate KM-UCL (use when n>=50)	76.46	95% Gamma Adjusted KM-UCL (use when n<50)	84.03
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	37.88
Maximum	160	Median	31
SD	48.92	CV	1.291
k hat (MLE)	0.297	k star (bias corrected MLE)	0.277
Theta hat (MLE)	127.4	Theta star (bias corrected MLE)	136.8
nu hat (MLE)	6.541	nu star (bias corrected)	6.091
MLE Mean (bias corrected)	37.88	MLE Sd (bias corrected)	71.98
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (6.09, α)	1.686	Adjusted Chi Square Value (6.09, β)	1.338
95% Gamma Approximate UCL (use when n>=50)	136.8	95% Gamma Adjusted UCL (use when n<50)	172.4
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	42.54	Mean in Log Scale	3.375
SD in Original Scale	45.41	SD in Log Scale	0.857
95% t UCL (assumes normality of ROS data)	67.35	95% Percentile Bootstrap UCL	66.09
95% BCA Bootstrap UCL	73.92	95% Bootstrap t UCL	122.7
95% H-UCL (Log ROS)	88.42		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.48	95% H-UCL (KM -Log)	72.16
KM SD (logged)	0.704	95% Critical H Value (KM-Log)	2.473
KM Standard Error of Mean (logged)	0.229		

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	42.5	Mean in Log Scale	3.385
SD in Original Scale	45.37	SD in Log Scale	0.828
95% t UCL (Assumes normality)	67.3	95% H-Stat UCL	83.97

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Percentile Bootstrap) UCL	66.64	95% GROS Adjusted Gamma UCL	172.4
95% Adjusted Gamma KM-UCL	84.03		

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic

General Statistics

Total Number of Observations	21	Number of Distinct Observations	10
		Number of Missing Observations	4
Number of Detects	10	Number of Non-Detects	11
Number of Distinct Detects	10	Number of Distinct Non-Detects	4
Minimum Detect	0.96	Minimum Non-Detect	1.1
Maximum Detect	5.1	Maximum Non-Detect	1.5
Variance Detects	1.625	Percent Non-Detects	52.38%
Mean Detects	1.946	SD Detects	1.275
Median Detects	1.45	CV Detects	0.655
Skewness Detects	2.038	Kurtosis Detects	4.162
Mean of Logged Detects	0.526	SD of Logged Detects	0.516

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.74	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.28	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	1.489	Standard Error of Mean	0.22
SD	0.946	95% KM (BCA) UCL	1.935
95% KM (t) UCL	1.868	95% KM (Percentile Bootstrap) UCL	1.878

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% KM (z) UCL	1.851	95% KM Bootstrap t UCL	2.33
90% KM Chebyshev UCL	2.149	95% KM Chebyshev UCL	2.448
97.5% KM Chebyshev UCL	2.863	99% KM Chebyshev UCL	3.677
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.729	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.276	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.268	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.736	k star (bias corrected MLE)	2.682
Theta hat (MLE)	0.521	Theta star (bias corrected MLE)	0.726
nu hat (MLE)	74.72	nu star (bias corrected)	53.64
MLE Mean (bias corrected)	1.946	MLE Sd (bias corrected)	1.188
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	2.48	nu hat (KM)	104.1
Approximate Chi Square Value (104.14, α)	81.59	Adjusted Chi Square Value (104.14, β)	80.06
95% Gamma Approximate KM-UCL (use when n>=50)	1.901	95% Gamma Adjusted KM-UCL (use when n<50)	1.937
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.261
Maximum	5.1	Median	1.1
SD	1.132	CV	0.898
k hat (MLE)	1.203	k star (bias corrected MLE)	1.063
Theta hat (MLE)	1.048	Theta star (bias corrected MLE)	1.186
nu hat (MLE)	50.52	nu star (bias corrected)	44.64
MLE Mean (bias corrected)	1.261	MLE Sd (bias corrected)	1.223
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (44.64, α)	30.31	Adjusted Chi Square Value (44.64, β)	29.41
95% Gamma Approximate UCL (use when n>=50)	1.856	95% Gamma Adjusted UCL (use when n<50)	1.914
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.243	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Mean in Original Scale	1.435	Mean in Log Scale	0.217
SD in Original Scale	1.007	SD in Log Scale	0.499
95% t UCL (assumes normality of ROS data)	1.814	95% Percentile Bootstrap UCL	1.817
95% BCA Bootstrap UCL	2.002	95% Bootstrap t UCL	2.286
95% H-UCL (Log ROS)	1.756		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	0.284	95% H-UCL (KM -Log)	1.734
KM SD (logged)	0.417	95% Critical H Value (KM-Log)	1.919
KM Standard Error of Mean (logged)	0.101		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.284	Mean in Log Scale	0.0484
SD in Original Scale	1.073	SD in Log Scale	0.584
95% t UCL (Assumes normality)	1.688	95% H-Stat UCL	1.631
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.868	95% GROS Adjusted Gamma UCL	1.914
95% Adjusted Gamma KM-UCL	1.937		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Barium			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	21
		Number of Missing Observations	4
Number of Detects	16	Number of Non-Detects	5
Number of Distinct Detects	16	Number of Distinct Non-Detects	5
Minimum Detect	10.2	Minimum Non-Detect	8.2
Maximum Detect	144	Maximum Non-Detect	53
Variance Detects	2115	Percent Non-Detects	23.81%
Mean Detects	80.68	SD Detects	45.99
Median Detects	83.65	CV Detects	0.57
Skewness Detects	-0.0988	Kurtosis Detects	-1.121
Mean of Logged Detects	4.137	SD of Logged Detects	0.859
Normal GOF Test on Detects Only			

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	63.95	Standard Error of Mean	11.08
SD	49.1	95% KM (BCA) UCL	82.68
95% KM (t) UCL	83.05	95% KM (Percentile Bootstrap) UCL	81.77
95% KM (z) UCL	82.16	95% KM Bootstrap t UCL	84.51
90% KM Chebyshev UCL	97.17	95% KM Chebyshev UCL	112.2
97.5% KM Chebyshev UCL	133.1	99% KM Chebyshev UCL	174.2
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.65	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.125	k star (bias corrected MLE)	1.768
Theta hat (MLE)	37.97	Theta star (bias corrected MLE)	45.63
nu hat (MLE)	67.99	nu star (bias corrected)	56.57
MLE Mean (bias corrected)	80.68	MLE Sd (bias corrected)	60.68
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.696	nu hat (KM)	71.23
Approximate Chi Square Value (71.23, α)	52.8	Adjusted Chi Square Value (71.23, β)	51.58
95% Gamma Approximate KM-UCL (use when n>=50)	86.27	95% Gamma Adjusted KM-UCL (use when n<50)	88.31
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	4.763	Mean	65.49
Maximum	144	Median	59.2
SD	48.7	CV	0.744
k hat (MLE)	1.436	k star (bias corrected MLE)	1.262
Theta hat (MLE)	45.62	Theta star (bias corrected MLE)	51.88
nu hat (MLE)	60.29	nu star (bias corrected)	53.01
MLE Mean (bias corrected)	65.49	MLE Sd (bias corrected)	58.29
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (53.01, α)	37.29	Adjusted Chi Square Value (53.01, β)	36.27

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
95% Gamma Approximate UCL (use when n>=50)	93.11	95% Gamma Adjusted UCL (use when n<50)	95.71
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	64.79	Mean in Log Scale	3.77
SD in Original Scale	49.37	SD in Log Scale	1.015
95% t UCL (assumes normality of ROS data)	83.37	95% Percentile Bootstrap UCL	82.29
95% BCA Bootstrap UCL	82.4	95% Bootstrap t UCL	85.43
95% H-UCL (Log ROS)	130.5		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.698	95% H-UCL (KM -Log)	137.4
KM SD (logged)	1.078	95% Critical H Value (KM-Log)	2.671
KM Standard Error of Mean (logged)	0.245		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	64.26	Mean in Log Scale	3.688
SD in Original Scale	50.08	SD in Log Scale	1.154
95% t UCL (Assumes normality)	83.1	95% H-Stat UCL	159.4
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	83.05	95% KM (Percentile Bootstrap) UCL	81.77
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Beryllium			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	10
		Number of Missing Observations	4
Number of Detects	15	Number of Non-Detects	6
Number of Distinct Detects	9	Number of Distinct Non-Detects	4

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Minimum Detect	0.43	Minimum Non-Detect	1
Maximum Detect	1.6	Maximum Non-Detect	1.3
Variance Detects	0.0874	Percent Non-Detects	28.57%
Mean Detects	1.153	SD Detects	0.296
Median Detects	1.1	CV Detects	0.256
Skewness Detects	-0.787	Kurtosis Detects	1.403
Mean of Logged Detects	0.102	SD of Logged Detects	0.319
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.068	Standard Error of Mean	0.0787
SD	0.303	95% KM (BCA) UCL	1.187
95% KM (t) UCL	1.204	95% KM (Percentile Bootstrap) UCL	1.19
95% KM (z) UCL	1.197	95% KM Bootstrap t UCL	1.188
90% KM Chebyshev UCL	1.304	95% KM Chebyshev UCL	1.411
97.5% KM Chebyshev UCL	1.559	99% KM Chebyshev UCL	1.851
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.638	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.205	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.221	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	12.56	k star (bias corrected MLE)	10.09
Theta hat (MLE)	0.0918	Theta star (bias corrected MLE)	0.114
nu hat (MLE)	376.7	nu star (bias corrected)	302.7
MLE Mean (bias corrected)	1.153	MLE Sd (bias corrected)	0.363
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	12.41	nu hat (KM)	521.1
Approximate Chi Square Value (521.05, α)	469.1	Adjusted Chi Square Value (521.05, β)	465.3
95% Gamma Approximate KM-UCL (use when n>=50)	1.186	95% Gamma Adjusted KM-UCL (use when n<50)	1.196
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Minimum	0.43	Mean	1.07
Maximum	1.6	Median	1.1
SD	0.285	CV	0.266
k hat (MLE)	13.25	k star (bias corrected MLE)	11.38
Theta hat (MLE)	0.0808	Theta star (bias corrected MLE)	0.094
nu hat (MLE)	556.3	nu star (bias corrected)	478.2
MLE Mean (bias corrected)	1.07	MLE Sd (bias corrected)	0.317
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (478.16, α)	428.5	Adjusted Chi Square Value (478.16, β)	424.9
95% Gamma Approximate UCL (use when n>=50)	1.194	95% Gamma Adjusted UCL (use when n<50)	1.205
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.822	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.225	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.059	Mean in Log Scale	0.0167
SD in Original Scale	0.293	SD in Log Scale	0.306
95% t UCL (assumes normality of ROS data)	1.17	95% Percentile Bootstrap UCL	1.163
95% BCA Bootstrap UCL	1.168	95% Bootstrap t UCL	1.174
95% H-UCL (Log ROS)	1.208		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	0.0141	95% H-UCL (KM -Log)	1.244
KM SD (logged)	0.346	95% Critical H Value (KM-Log)	1.865
KM Standard Error of Mean (logged)	0.0968		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.988	Mean in Log Scale	-0.0864
SD in Original Scale	0.365	SD in Log Scale	0.408
95% t UCL (Assumes normality)	1.125	95% H-Stat UCL	1.187
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.204	95% KM (Percentile Bootstrap) UCL	1.19
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Cadmium

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
		Number of Missing Observations	5
Minimum	0.43	Mean	0.76
Maximum	1	Median	0.8
SD	0.173	Std. Error of Mean	0.0386
Coefficient of Variation	0.227	Skewness	-0.485
Normal GOF Test			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.827	95% Adjusted-CLT UCL (Chen-1995)	0.819
		95% Modified-t UCL (Johnson-1978)	0.826
Gamma GOF Test			
A-D Test Statistic	0.745	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.741	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.159	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	18.11	k star (bias corrected MLE)	15.43
Theta hat (MLE)	0.042	Theta star (bias corrected MLE)	0.0493
nu hat (MLE)	724.5	nu star (bias corrected)	617.2
MLE Mean (bias corrected)	0.76	MLE Sd (bias corrected)	0.193
		Approximate Chi Square Value (0.05)	560.5
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	556.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.837	95% Adjusted Gamma UCL (use when n<50)	0.843
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level	

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.844	Mean of logged Data	-0.302
Maximum of Logged Data	0	SD of logged Data	0.251
Assuming Lognormal Distribution			
95% H-UCL	0.847	90% Chebyshev (MVUE) UCL	0.891
95% Chebyshev (MVUE) UCL	0.95	97.5% Chebyshev (MVUE) UCL	1.031
99% Chebyshev (MVUE) UCL	1.191		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.823	95% Jackknife UCL	0.827
95% Standard Bootstrap UCL	0.825	95% Bootstrap-t UCL	0.824
95% Hall's Bootstrap UCL	0.821	95% Percentile Bootstrap UCL	0.821
95% BCA Bootstrap UCL	0.821		
90% Chebyshev(Mean, Sd) UCL	0.876	95% Chebyshev(Mean, Sd) UCL	0.928
97.5% Chebyshev(Mean, Sd) UCL	1.001	99% Chebyshev(Mean, Sd) UCL	1.144
Suggested UCL to Use			
95% Student's-t UCL	0.827		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Chromium

General Statistics			
Total Number of Observations	21	Number of Distinct Observations	19
		Number of Missing Observations	4
Minimum	4.5	Mean	19.23
Maximum	39.7	Median	19
SD	11.43	Std. Error of Mean	2.494
Coefficient of Variation	0.594	Skewness	0.293

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Normal GOF Test			
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	23.53	95% Adjusted-CLT UCL (Chen-1995)	23.51
		95% Modified-t UCL (Johnson-1978)	23.56
Gamma GOF Test			
A-D Test Statistic	0.579	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.161	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.191	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.576	k star (bias corrected MLE)	2.24
Theta hat (MLE)	7.467	Theta star (bias corrected MLE)	8.588
nu hat (MLE)	108.2	nu star (bias corrected)	94.06
MLE Mean (bias corrected)	19.23	MLE Sd (bias corrected)	12.85
		Approximate Chi Square Value (0.05)	72.7
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	71.25
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	24.89	95% Adjusted Gamma UCL (use when n<50)	25.39
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.157	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.504	Mean of logged Data	2.75
Maximum of Logged Data	3.681	SD of logged Data	0.698
Assuming Lognormal Distribution			
95% H-UCL	28.08	90% Chebyshev (MVUE) UCL	29.29
95% Chebyshev (MVUE) UCL	33.64	97.5% Chebyshev (MVUE) UCL	39.69
99% Chebyshev (MVUE) UCL	51.55		

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	23.34	95% Jackknife UCL	23.53
95% Standard Bootstrap UCL	23.14	95% Bootstrap-t UCL	23.54
95% Hall's Bootstrap UCL	23.55	95% Percentile Bootstrap UCL	23.1
95% BCA Bootstrap UCL	23.56		
90% Chebyshev(Mean, Sd) UCL	26.71	95% Chebyshev(Mean, Sd) UCL	30.1
97.5% Chebyshev(Mean, Sd) UCL	34.81	99% Chebyshev(Mean, Sd) UCL	44.04
Suggested UCL to Use			
95% Student's-t UCL	23.53		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Cobalt			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	17
		Number of Missing Observations	4
Number of Detects	11	Number of Non-Detects	10
Number of Distinct Detects	11	Number of Distinct Non-Detects	7
Minimum Detect	1.4	Minimum Non-Detect	6.6
Maximum Detect	12.8	Maximum Non-Detect	7.3
Variance Detects	10.38	Percent Non-Detects	47.62%
Mean Detects	5.555	SD Detects	3.223
Median Detects	5.4	CV Detects	0.58
Skewness Detects	0.981	Kurtosis Detects	1.677
Mean of Logged Detects	1.539	SD of Logged Detects	0.668
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	4.876	Standard Error of Mean	0.714
SD	2.608	95% KM (BCA) UCL	5.964
95% KM (t) UCL	6.107	95% KM (Percentile Bootstrap) UCL	5.987
95% KM (z) UCL	6.05	95% KM Bootstrap t UCL	6.055

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
90% KM Chebyshev UCL	7.018	95% KM Chebyshev UCL	7.988
97.5% KM Chebyshev UCL	9.335	99% KM Chebyshev UCL	11.98
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.344	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.257	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.997	k star (bias corrected MLE)	2.24
Theta hat (MLE)	1.853	Theta star (bias corrected MLE)	2.479
nu hat (MLE)	65.94	nu star (bias corrected)	49.29
MLE Mean (bias corrected)	5.555	MLE Sd (bias corrected)	3.711
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.495	nu hat (KM)	146.8
Approximate Chi Square Value (146.79, α)	119.8	Adjusted Chi Square Value (146.79, β)	117.9
95% Gamma Approximate KM-UCL (use when n>=50)	5.975	95% Gamma Adjusted KM-UCL (use when n<50)	6.07
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	1.4	Mean	4.795
Maximum	12.8	Median	4.059
SD	2.477	CV	0.517
k hat (MLE)	4.497	k star (bias corrected MLE)	3.886
Theta hat (MLE)	1.066	Theta star (bias corrected MLE)	1.234
nu hat (MLE)	188.9	nu star (bias corrected)	163.2
MLE Mean (bias corrected)	4.795	MLE Sd (bias corrected)	2.432
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (163.23, α)	134.7	Adjusted Chi Square Value (163.23, β)	132.7
95% Gamma Approximate UCL (use when n>=50)	5.811	95% Gamma Adjusted UCL (use when n<50)	5.898
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.648	Mean in Log Scale	1.414

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
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SD in Original Scale	2.524	SD in Log Scale	0.51
95% t UCL (assumes normality of ROS data)	5.598	95% Percentile Bootstrap UCL	5.556
95% BCA Bootstrap UCL	5.813	95% Bootstrap t UCL	6.139
95% H-UCL (Log ROS)	5.88		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	1.423	95% H-UCL (KM -Log)	6.634
KM SD (logged)	0.608	95% Critical H Value (KM-Log)	2.093
KM Standard Error of Mean (logged)	0.189		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.555	Mean in Log Scale	1.396
SD in Original Scale	2.521	SD in Log Scale	0.497
95% t UCL (Assumes normality)	5.503	95% H-Stat UCL	5.701

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	6.107	95% KM (Percentile Bootstrap) UCL	5.987

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Copper

General Statistics

Total Number of Observations	21	Number of Distinct Observations	20
		Number of Missing Observations	4
Minimum	14.2	Mean	24.98
Maximum	38.8	Median	22.3
SD	7.889	Std. Error of Mean	1.722
Coefficient of Variation	0.316	Skewness	0.366

Normal GOF Test

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	27.95	95% Adjusted-CLT UCL (Chen-1995)	27.95
		95% Modified-t UCL (Johnson-1978)	27.97
Gamma GOF Test			
A-D Test Statistic	0.511	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.189	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	10.59	k star (bias corrected MLE)	9.108
Theta hat (MLE)	2.359	Theta star (bias corrected MLE)	2.742
nu hat (MLE)	444.7	nu star (bias corrected)	382.5
MLE Mean (bias corrected)	24.98	MLE Sd (bias corrected)	8.276
		Approximate Chi Square Value (0.05)	338.2
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	335
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	28.25	95% Adjusted Gamma UCL (use when n<50)	28.52
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.653	Mean of logged Data	3.17
Maximum of Logged Data	3.658	SD of logged Data	0.319
Assuming Lognormal Distribution			
95% H-UCL	28.56	90% Chebyshev (MVUE) UCL	30.28
95% Chebyshev (MVUE) UCL	32.67	97.5% Chebyshev (MVUE) UCL	36
99% Chebyshev (MVUE) UCL	42.54		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	27.81	95% Jackknife UCL	27.95
95% Standard Bootstrap UCL	27.69	95% Bootstrap-t UCL	28.1
95% Hall's Bootstrap UCL	27.75	95% Percentile Bootstrap UCL	27.73

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% BCA Bootstrap UCL	27.53		
90% Chebyshev(Mean, Sd) UCL	30.14	95% Chebyshev(Mean, Sd) UCL	32.48
97.5% Chebyshev(Mean, Sd) UCL	35.73	99% Chebyshev(Mean, Sd) UCL	42.11
Suggested UCL to Use			
95% Student's-t UCL	27.95		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Lead

General Statistics			
Total Number of Observations	21	Number of Distinct Observations	20
		Number of Missing Observations	4
Minimum	5.6	Mean	12.55
Maximum	33.1	Median	9
SD	7.96	Std. Error of Mean	1.737
Coefficient of Variation	0.634	Skewness	1.432
Normal GOF Test			
Shapiro Wilk Test Statistic	0.744	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	15.54	95% Adjusted-CLT UCL (Chen-1995)	15.98
		95% Modified-t UCL (Johnson-1978)	15.63
Gamma GOF Test			
A-D Test Statistic	1.863	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.255	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.191	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.473	k star (bias corrected MLE)	3.009
Theta hat (MLE)	3.613	Theta star (bias corrected MLE)	4.17
nu hat (MLE)	145.9	nu star (bias corrected)	126.4

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
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MLE Mean (bias corrected)	12.55	MLE Sd (bias corrected)	7.234
		Approximate Chi Square Value (0.05)	101.4
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	99.69
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	15.64	95% Adjusted Gamma UCL (use when n<50)	15.91
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.23	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.723	Mean of logged Data	2.379
Maximum of Logged Data	3.5	SD of logged Data	0.529
Assuming Lognormal Distribution			
95% H-UCL	15.75	90% Chebyshev (MVUE) UCL	16.76
95% Chebyshev (MVUE) UCL	18.78	97.5% Chebyshev (MVUE) UCL	21.57
99% Chebyshev (MVUE) UCL	27.06		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	15.4	95% Jackknife UCL	15.54
95% Standard Bootstrap UCL	15.36	95% Bootstrap-t UCL	16.6
95% Hall's Bootstrap UCL	15.42	95% Percentile Bootstrap UCL	15.6
95% BCA Bootstrap UCL	16.07		
90% Chebyshev(Mean, Sd) UCL	17.76	95% Chebyshev(Mean, Sd) UCL	20.12
97.5% Chebyshev(Mean, Sd) UCL	23.39	99% Chebyshev(Mean, Sd) UCL	29.83
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	20.12		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Manganese			
General Statistics			

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Total Number of Observations	21	Number of Distinct Observations	20
		Number of Missing Observations	4
Minimum	47.3	Mean	163
Maximum	493	Median	122
SD	116.6	Std. Error of Mean	25.45
Coefficient of Variation	0.715	Skewness	1.371
Normal GOF Test			
Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	206.9	95% Adjusted-CLT UCL (Chen-1995)	213
		95% Modified-t UCL (Johnson-1978)	208.1
Gamma GOF Test			
A-D Test Statistic	0.455	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.153	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.191	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.39	k star (bias corrected MLE)	2.08
Theta hat (MLE)	68.2	Theta star (bias corrected MLE)	78.35
nu hat (MLE)	100.4	nu star (bias corrected)	87.37
MLE Mean (bias corrected)	163	MLE Sd (bias corrected)	113
		Approximate Chi Square Value (0.05)	66.82
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	65.44
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	213.1	95% Adjusted Gamma UCL (use when n<50)	217.6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.857	Mean of logged Data	4.87

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Maximum of Logged Data	6.201	SD of logged Data	0.682
Assuming Lognormal Distribution			
95% H-UCL	228.9	90% Chebyshev (MVUE) UCL	239.5
95% Chebyshev (MVUE) UCL	274.4	97.5% Chebyshev (MVUE) UCL	322.9
99% Chebyshev (MVUE) UCL	418.3		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	204.8	95% Jackknife UCL	206.9
95% Standard Bootstrap UCL	204.2	95% Bootstrap-t UCL	222.5
95% Hall's Bootstrap UCL	221.4	95% Percentile Bootstrap UCL	206.1
95% BCA Bootstrap UCL	210.9		
90% Chebyshev(Mean, Sd) UCL	239.3	95% Chebyshev(Mean, Sd) UCL	273.9
97.5% Chebyshev(Mean, Sd) UCL	321.9	99% Chebyshev(Mean, Sd) UCL	416.2
Suggested UCL to Use			
95% Adjusted Gamma UCL	217.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Mercury			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	11
		Number of Missing Observations	4
Number of Detects	7	Number of Non-Detects	14
Number of Distinct Detects	7	Number of Distinct Non-Detects	4
Minimum Detect	0.043	Minimum Non-Detect	0.06
Maximum Detect	1.5	Maximum Non-Detect	0.15
Variance Detects	0.315	Percent Non-Detects	66.67%
Mean Detects	0.355	SD Detects	0.561
Median Detects	0.059	CV Detects	1.582
Skewness Detects	1.866	Kurtosis Detects	2.972
Mean of Logged Detects	-2.074	SD of Logged Detects	1.459
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.65	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.414	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level	

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.154	Standard Error of Mean	0.0782
SD	0.332	95% KM (BCA) UCL	0.292
95% KM (t) UCL	0.289	95% KM (Percentile Bootstrap) UCL	0.293
95% KM (z) UCL	0.283	95% KM Bootstrap t UCL	3.387
90% KM Chebyshev UCL	0.389	95% KM Chebyshev UCL	0.495
97.5% KM Chebyshev UCL	0.643	99% KM Chebyshev UCL	0.933
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.194	Anderson-Darling GOF Test	
5% A-D Critical Value	0.746	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.437	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.325	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.596	k star (bias corrected MLE)	0.436
Theta hat (MLE)	0.595	Theta star (bias corrected MLE)	0.814
nu hat (MLE)	8.349	nu star (bias corrected)	6.104
MLE Mean (bias corrected)	0.355	MLE Sd (bias corrected)	0.537
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.217	nu hat (KM)	9.1
Approximate Chi Square Value (9.10, α)	3.388	Adjusted Chi Square Value (9.10, β)	3.124
95% Gamma Approximate KM-UCL (use when n>=50)	0.415	95% Gamma Adjusted KM-UCL (use when n<50)	0.45
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.173
Maximum	1.5	Median	0.052
SD	0.348	CV	2.012
k hat (MLE)	0.485	k star (bias corrected MLE)	0.448
Theta hat (MLE)	0.357	Theta star (bias corrected MLE)	0.386
nu hat (MLE)	20.39	nu star (bias corrected)	18.81
MLE Mean (bias corrected)	0.173	MLE Sd (bias corrected)	0.259
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (18.81, α)	9.978	Adjusted Chi Square Value (18.81, β)	9.485
95% Gamma Approximate UCL (use when n>=50)	0.326	95% Gamma Adjusted UCL (use when n<50)	0.343
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.711	Shapiro Wilk GOF Test	

Table B-1			
ProUCL Output - Pre-Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.404	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.172	Mean in Log Scale	-2.521
SD in Original Scale	0.338	SD in Log Scale	1.033
95% t UCL (assumes normality of ROS data)	0.299	95% Percentile Bootstrap UCL	0.299
95% BCA Bootstrap UCL	0.352	95% Bootstrap t UCL	0.959
95% H-UCL (Log ROS)	0.251		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.162	Mean in Log Scale	-2.519
SD in Original Scale	0.338	SD in Log Scale	0.88
95% t UCL (Assumes normality)	0.289	95% H-Stat UCL	0.191
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.292		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Nickel			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	21
		Number of Missing Observations	4
Minimum	5.9	Mean	19.98
Maximum	75.1	Median	13.2
SD	15.79	Std. Error of Mean	3.446
Coefficient of Variation	0.79	Skewness	2.288
Normal GOF Test			
Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Data Not Normal at 5% Significance Level	

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	25.92	95% Adjusted-CLT UCL (Chen-1995)	27.49
		95% Modified-t UCL (Johnson-1978)	26.21
Gamma GOF Test			
A-D Test Statistic	0.631	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.191	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.385	k star (bias corrected MLE)	2.076
Theta hat (MLE)	8.377	Theta star (bias corrected MLE)	9.624
nu hat (MLE)	100.2	nu star (bias corrected)	87.2
MLE Mean (bias corrected)	19.98	MLE Sd (bias corrected)	13.87
		Approximate Chi Square Value (0.05)	66.67
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	65.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	26.13	95% Adjusted Gamma UCL (use when n<50)	26.68
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.775	Mean of logged Data	2.771
Maximum of Logged Data	4.319	SD of logged Data	0.66
Assuming Lognormal Distribution			
95% H-UCL	27.26	90% Chebyshev (MVUE) UCL	28.62
95% Chebyshev (MVUE) UCL	32.7	97.5% Chebyshev (MVUE) UCL	38.36
99% Chebyshev (MVUE) UCL	49.47		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	25.65	95% Jackknife UCL	25.92

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% Standard Bootstrap UCL	25.62	95% Bootstrap-t UCL	29.38
95% Hall's Bootstrap UCL	50.27	95% Percentile Bootstrap UCL	25.93
95% BCA Bootstrap UCL	27.04		
90% Chebyshev(Mean, Sd) UCL	30.32	95% Chebyshev(Mean, Sd) UCL	35
97.5% Chebyshev(Mean, Sd) UCL	41.5	99% Chebyshev(Mean, Sd) UCL	54.27

Suggested UCL to Use

95% Adjusted Gamma UCL	26.68

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Vanadium

General Statistics

Total Number of Observations	21	Number of Distinct Observations	21
		Number of Missing Observations	4
Minimum	39.2	Mean	66.04
Maximum	96.4	Median	64.3
SD	17.65	Std. Error of Mean	3.852
Coefficient of Variation	0.267	Skewness	0.353

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.135	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	72.68	95% Adjusted-CLT UCL (Chen-1995)	72.69
		95% Modified-t UCL (Johnson-1978)	72.73

Gamma GOF Test

A-D Test Statistic	0.358	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.135	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.189	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.75	k star (bias corrected MLE)	12.67

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Theta hat (MLE)	4.477	Theta star (bias corrected MLE)	5.211
nu hat (MLE)	619.5	nu star (bias corrected)	532.3
MLE Mean (bias corrected)	66.04	MLE Sd (bias corrected)	18.55
		Approximate Chi Square Value (0.05)	479.8
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	476
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	73.27	95% Adjusted Gamma UCL (use when n<50)	73.85
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.669	Mean of logged Data	4.156
Maximum of Logged Data	4.569	SD of logged Data	0.27
Assuming Lognormal Distribution			
95% H-UCL	73.81	90% Chebyshev (MVUE) UCL	77.84
95% Chebyshev (MVUE) UCL	83.18	97.5% Chebyshev (MVUE) UCL	90.6
99% Chebyshev (MVUE) UCL	105.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	72.37	95% Jackknife UCL	72.68
95% Standard Bootstrap UCL	72.37	95% Bootstrap-t UCL	73.12
95% Hall's Bootstrap UCL	72.48	95% Percentile Bootstrap UCL	72.48
95% BCA Bootstrap UCL	72.42		
90% Chebyshev(Mean, Sd) UCL	77.59	95% Chebyshev(Mean, Sd) UCL	82.83
97.5% Chebyshev(Mean, Sd) UCL	90.09	99% Chebyshev(Mean, Sd) UCL	104.4
Suggested UCL to Use			
95% Student's-t UCL	72.68		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Zinc			

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

General Statistics			
Total Number of Observations	21	Number of Distinct Observations	19
		Number of Missing Observations	4
Minimum	5.2	Mean	15.7
Maximum	35.7	Median	9.7
SD	10.64	Std. Error of Mean	2.322
Coefficient of Variation	0.678	Skewness	0.663
Normal GOF Test			
Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	19.7	95% Adjusted-CLT UCL (Chen-1995)	19.88
		95% Modified-t UCL (Johnson-1978)	19.76
Gamma GOF Test			
A-D Test Statistic	1.338	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.203	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.191	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.401	k star (bias corrected MLE)	2.089
Theta hat (MLE)	6.54	Theta star (bias corrected MLE)	7.514
nu hat (MLE)	100.8	nu star (bias corrected)	87.76
MLE Mean (bias corrected)	15.7	MLE Sd (bias corrected)	10.86
		Approximate Chi Square Value (0.05)	67.16
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	65.78
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	20.51	95% Adjusted Gamma UCL (use when n<50)	20.95
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.193	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			

Table B-1
ProUCL Output - Pre-Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Lognormal Statistics			
Minimum of Logged Data	1.649	Mean of logged Data	2.531
Maximum of Logged Data	3.575	SD of logged Data	0.682
Assuming Lognormal Distribution			
95% H-UCL	22.09	90% Chebyshev (MVUE) UCL	23.1
95% Chebyshev (MVUE) UCL	26.47	97.5% Chebyshev (MVUE) UCL	31.16
99% Chebyshev (MVUE) UCL	40.36		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	19.52	95% Jackknife UCL	19.7
95% Standard Bootstrap UCL	19.31	95% Bootstrap-t UCL	20.14
95% Hall's Bootstrap UCL	19.53	95% Percentile Bootstrap UCL	19.53
95% BCA Bootstrap UCL	19.71		
90% Chebyshev(Mean, Sd) UCL	22.67	95% Chebyshev(Mean, Sd) UCL	25.82
97.5% Chebyshev(Mean, Sd) UCL	30.2	99% Chebyshev(Mean, Sd) UCL	38.8
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	25.82		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/10/2015 5:00:40 PM
From File	Soil Data Set_ProUCL Input_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-motor oil

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
		Number of Missing Observations	24
Number of Detects	7	Number of Non-Detects	5
Number of Distinct Detects	7	Number of Distinct Non-Detects	3
Minimum Detect	18	Minimum Non-Detect	26
Maximum Detect	160	Maximum Non-Detect	28
Variance Detects	2573	Percent Non-Detects	41.67%
Mean Detects	58.86	SD Detects	50.72
Median Detects	36	CV Detects	0.862
Skewness Detects	1.705	Kurtosis Detects	2.38
Mean of Logged Detects	3.817	SD of Logged Detects	0.738

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.374	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	41.83	Standard Error of Mean	12.83
SD	41.14	95% KM (BCA) UCL	69.17
95% KM (t) UCL	64.87	95% KM (Percentile Bootstrap) UCL	64.08
95% KM (z) UCL	62.93	95% KM Bootstrap t UCL	130.8
90% KM Chebyshev UCL	80.31	95% KM Chebyshev UCL	97.74
97.5% KM Chebyshev UCL	121.9	99% KM Chebyshev UCL	169.5

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.649	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.351	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.315	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.089	k star (bias corrected MLE)	1.289
Theta hat (MLE)	28.18	Theta star (bias corrected MLE)	45.67
nu hat (MLE)	29.24	nu star (bias corrected)	18.04
MLE Mean (bias corrected)	58.86	MLE Sd (bias corrected)	51.84
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.034	nu hat (KM)	24.82
Approximate Chi Square Value (24.82, α)	14.47	Adjusted Chi Square Value (24.82, β)	13.28
95% Gamma Approximate KM-UCL (use when n>=50)	71.74	95% Gamma Adjusted KM-UCL (use when n<50)	78.18
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	34.73
Maximum	160	Median	24.5
SD	47.9	CV	1.379
k hat (MLE)	0.259	k star (bias corrected MLE)	0.25
Theta hat (MLE)	134.1	Theta star (bias corrected MLE)	139
nu hat (MLE)	6.215	nu star (bias corrected)	5.995
MLE Mean (bias corrected)	34.73	MLE Sd (bias corrected)	69.48
		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (5.99, α)	1.637	Adjusted Chi Square Value (5.99, β)	1.315
95% Gamma Approximate UCL (use when n>=50)	127.2	95% Gamma Adjusted UCL (use when n<50)	158.2
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	40.09	Mean in Log Scale	3.307
SD in Original Scale	44.12	SD in Log Scale	0.852
95% t UCL (assumes normality of ROS data)	62.97	95% Percentile Bootstrap UCL	63.22
95% BCA Bootstrap UCL	68.67	95% Bootstrap t UCL	113
95% H-UCL (Log ROS)	77.63		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.431	95% H-UCL (KM -Log)	65.01
KM SD (logged)	0.694	95% Critical H Value (KM-Log)	2.405
KM Standard Error of Mean (logged)	0.216		

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	40.04	Mean in Log Scale	3.317
SD in Original Scale	44.09	SD in Log Scale	0.824
95% t UCL (Assumes normality)	62.9	95% H-Stat UCL	74.11
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	64.87	95% GROS Adjusted Gamma UCL	158.2
95% Adjusted Gamma KM-UCL	78.18		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
PCP			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	8
		Number of Missing Observations	41
Number of Detects	4	Number of Non-Detects	33
Number of Distinct Detects	4	Number of Distinct Non-Detects	5
Minimum Detect	0.028	Minimum Non-Detect	0.02
Maximum Detect	64	Maximum Non-Detect	25
Variance Detects	893.7	Percent Non-Detects	89.19%
Mean Detects	19.81	SD Detects	29.89
Median Detects	7.6	CV Detects	1.509
Skewness Detects	1.835	Kurtosis Detects	3.392
Mean of Logged Detects	1.058	SD of Logged Detects	3.323
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.77	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.353	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	2.19	Standard Error of Mean	1.996
SD	10.5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	5.56	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	5.473	95% KM Bootstrap t UCL	N/A

Table B-2			
ProUCL Output - Post Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
90% KM Chebyshev UCL	8.178	95% KM Chebyshev UCL	10.89
97.5% KM Chebyshev UCL	14.66	99% KM Chebyshev UCL	22.05
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.201	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.171	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.416	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.349	k star (bias corrected MLE)	0.254
Theta hat (MLE)	56.77	Theta star (bias corrected MLE)	78.01
nu hat (MLE)	2.791	nu star (bias corrected)	2.031
MLE Mean (bias corrected)	19.81	MLE Sd (bias corrected)	39.31
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0435	nu hat (KM)	3.215
Approximate Chi Square Value (3.22, α)	0.439	Adjusted Chi Square Value (3.22, β)	0.401
95% Gamma Approximate KM-UCL (use when n>=50)	16.04	95% Gamma Adjusted KM-UCL (use when n<50)	17.56
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2.288
Maximum	64	Median	0.01
SD	10.64	CV	4.653
k hat (MLE)	0.166	k star (bias corrected MLE)	0.171
Theta hat (MLE)	13.77	Theta star (bias corrected MLE)	13.4
nu hat (MLE)	12.3	nu star (bias corrected)	12.63
MLE Mean (bias corrected)	2.288	MLE Sd (bias corrected)	5.537
		Adjusted Level of Significance (β)	0.0431
Approximate Chi Square Value (12.63, α)	5.647	Adjusted Chi Square Value (12.63, β)	5.444
95% Gamma Approximate UCL (use when n>=50)	5.119	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Mean in Original Scale	2.192	Mean in Log Scale	-5.599
SD in Original Scale	10.64	SD in Log Scale	4.131
95% t UCL (assumes normality of ROS data)	5.145	95% Percentile Bootstrap UCL	5.608
95% BCA Bootstrap UCL	7.704	95% Bootstrap t UCL	43.91
95% H-UCL (Log ROS)	2422		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.207	95% H-UCL (KM -Log)	0.577
KM SD (logged)	1.802	95% Critical H Value (KM-Log)	3.442
KM Standard Error of Mean (logged)	0.369		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.797	Mean in Log Scale	0.332
SD in Original Scale	10.54	SD in Log Scale	1.387
95% t UCL (Assumes normality)	6.721	95% H-Stat UCL	7.078
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	5.56	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Arsenic			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	13
		Number of Missing Observations	6
Number of Detects	14	Number of Non-Detects	15
Number of Distinct Detects	13	Number of Distinct Non-Detects	4
Minimum Detect	0.66	Minimum Non-Detect	1.1
Maximum Detect	5.1	Maximum Non-Detect	1.5
Variance Detects	1.41	Percent Non-Detects	51.72%
Mean Detects	1.638	SD Detects	1.187
Median Detects	1.35	CV Detects	0.725
Skewness Detects	2.232	Kurtosis Detects	5.466
Mean of Logged Detects	0.32	SD of Logged Detects	0.573
Normal GOF Test on Detects Only			

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ProUCL Output - Post Development - New Mill Dip Tank

Human Health Risk Assessment

The Landing - Mount Shasta Commerce Park

Mount Shasta, California

Shapiro Wilk Test Statistic	0.737	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.254	Standard Error of Mean	0.179
SD	0.893	95% KM (BCA) UCL	1.554
95% KM (t) UCL	1.559	95% KM (Percentile Bootstrap) UCL	1.564
95% KM (z) UCL	1.549	95% KM Bootstrap t UCL	1.776
90% KM Chebyshev UCL	1.792	95% KM Chebyshev UCL	2.036
97.5% KM Chebyshev UCL	2.374	99% KM Chebyshev UCL	3.038
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.645	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.23	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.043	k star (bias corrected MLE)	2.438
Theta hat (MLE)	0.538	Theta star (bias corrected MLE)	0.672
nu hat (MLE)	85.19	nu star (bias corrected)	68.27
MLE Mean (bias corrected)	1.638	MLE Sd (bias corrected)	1.049
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.973	nu hat (KM)	114.4
Approximate Chi Square Value (114.44, α)	90.75	Adjusted Chi Square Value (114.44, β)	89.49
95% Gamma Approximate KM-UCL (use when n>=50)	1.581	95% Gamma Adjusted KM-UCL (use when n<50)	1.604
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0741	Mean	1.153
Maximum	5.1	Median	0.96
SD	0.982	CV	0.852
k hat (MLE)	1.88	k star (bias corrected MLE)	1.708
Theta hat (MLE)	0.613	Theta star (bias corrected MLE)	0.675
nu hat (MLE)	109	nu star (bias corrected)	99.07
MLE Mean (bias corrected)	1.153	MLE Sd (bias corrected)	0.882
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (99.07, α)	77.11	Adjusted Chi Square Value (99.07, β)	75.95

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ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
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Mount Shasta, California

95% Gamma Approximate UCL (use when n>=50)	1.481	95% Gamma Adjusted UCL (use when n<50)	1.504
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.245	Mean in Log Scale	0.0675
SD in Original Scale	0.914	SD in Log Scale	0.506
95% t UCL (assumes normality of ROS data)	1.534	95% Percentile Bootstrap UCL	1.552
95% BCA Bootstrap UCL	1.683	95% Bootstrap t UCL	1.807
95% H-UCL (Log ROS)	1.466		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	0.0811	95% H-UCL (KM -Log)	1.453
KM SD (logged)	0.482	95% Critical H Value (KM-Log)	1.932
KM Standard Error of Mean (logged)	0.109		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.146	Mean in Log Scale	-0.0413
SD in Original Scale	0.943	SD in Log Scale	0.531
95% t UCL (Assumes normality)	1.444	95% H-Stat UCL	1.346
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.559	95% GROS Adjusted Gamma UCL	1.504
95% Adjusted Gamma KM-UCL	1.604		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Barium			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	6
Number of Detects	21	Number of Non-Detects	8

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
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Number of Distinct Detects	21	Number of Distinct Non-Detects	8
Minimum Detect	7.5	Minimum Non-Detect	6.7
Maximum Detect	144	Maximum Non-Detect	53
Variance Detects	2325	Percent Non-Detects	27.59%
Mean Detects	68.5	SD Detects	48.22
Median Detects	70.7	CV Detects	0.704
Skewness Detects	0.202	Kurtosis Detects	-1.309
Mean of Logged Detects	3.854	SD of Logged Detects	1.009
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	52.21	Standard Error of Mean	9.148
SD	48.02	95% KM (BCA) UCL	67.22
95% KM (t) UCL	67.77	95% KM (Percentile Bootstrap) UCL	67.15
95% KM (z) UCL	67.25	95% KM Bootstrap t UCL	69.31
90% KM Chebyshev UCL	79.65	95% KM Chebyshev UCL	92.08
97.5% KM Chebyshev UCL	109.3	99% KM Chebyshev UCL	143.2
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.791	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.759	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.161	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.485	k star (bias corrected MLE)	1.304
Theta hat (MLE)	46.14	Theta star (bias corrected MLE)	52.52
nu hat (MLE)	62.35	nu star (bias corrected)	54.78
MLE Mean (bias corrected)	68.5	MLE Sd (bias corrected)	59.98
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.182	nu hat (KM)	68.56
Approximate Chi Square Value (68.56, α)	50.5	Adjusted Chi Square Value (68.56, β)	49.58
95% Gamma Approximate KM-UCL (use when n>=50)	70.87	95% Gamma Adjusted KM-UCL (use when n<50)	72.2
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	52.31
Maximum	144	Median	23.9
SD	48.81	CV	0.933
k hat (MLE)	0.75	k star (bias corrected MLE)	0.695
Theta hat (MLE)	69.76	Theta star (bias corrected MLE)	75.23
nu hat (MLE)	43.49	nu star (bias corrected)	40.33
MLE Mean (bias corrected)	52.31	MLE Sd (bias corrected)	62.73
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (40.33, α)	26.78	Adjusted Chi Square Value (40.33, β)	26.12
95% Gamma Approximate UCL (use when n>=50)	78.78	95% Gamma Adjusted UCL (use when n<50)	80.77
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.203	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.193	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	52.25	Mean in Log Scale	3.394
SD in Original Scale	48.79	SD in Log Scale	1.163
95% t UCL (assumes normality of ROS data)	67.67	95% Percentile Bootstrap UCL	68.09
95% BCA Bootstrap UCL	67.75	95% Bootstrap t UCL	68.39
95% H-UCL (Log ROS)	105.5		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	52.39	Mean in Log Scale	3.375
SD in Original Scale	48.78	SD in Log Scale	1.208
95% t UCL (Assumes normality)	67.8	95% H-Stat UCL	113.2
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	67.77	95% KM (Percentile Bootstrap) UCL	67.15
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Beryllium			

Table B-2			
ProUCL Output - Post Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	12
		Number of Missing Observations	6
Number of Detects	20	Number of Non-Detects	9
Number of Distinct Detects	11	Number of Distinct Non-Detects	4
Minimum Detect	0.43	Minimum Non-Detect	1
Maximum Detect	1.6	Maximum Non-Detect	1.3
Variance Detects	0.0889	Percent Non-Detects	31.03%
Mean Detects	1.186	SD Detects	0.298
Median Detects	1.15	CV Detects	0.251
Skewness Detects	-0.669	Kurtosis Detects	0.64
Mean of Logged Detects	0.132	SD of Logged Detects	0.306
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	1.086	Standard Error of Mean	0.067
SD	0.308	95% KM (BCA) UCL	1.193
95% KM (t) UCL	1.2	95% KM (Percentile Bootstrap) UCL	1.189
95% KM (z) UCL	1.196	95% KM Bootstrap t UCL	1.189
90% KM Chebyshev UCL	1.287	95% KM Chebyshev UCL	1.378
97.5% KM Chebyshev UCL	1.505	99% KM Chebyshev UCL	1.753
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.606	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.179	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	13.24	k star (bias corrected MLE)	11.29
Theta hat (MLE)	0.0896	Theta star (bias corrected MLE)	0.105
nu hat (MLE)	529.6	nu star (bias corrected)	451.5
MLE Mean (bias corrected)	1.186	MLE Sd (bias corrected)	0.353
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	12.45	nu hat (KM)	722.1
Approximate Chi Square Value (722.09, α)	660.7	Adjusted Chi Square Value (722.09, β)	657.2
95% Gamma Approximate KM-UCL (use when n>=50)	1.187	95% Gamma Adjusted KM-UCL (use when n<50)	1.193

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Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.43	Mean	1.091
Maximum	1.6	Median	1.1
SD	0.291	CV	0.267
k hat (MLE)	13.41	k star (bias corrected MLE)	12.05
Theta hat (MLE)	0.0814	Theta star (bias corrected MLE)	0.0906
nu hat (MLE)	777.8	nu star (bias corrected)	698.7
MLE Mean (bias corrected)	1.091	MLE Sd (bias corrected)	0.314
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (698.68, α)	638.3	Adjusted Chi Square Value (698.68, β)	634.9
95% Gamma Approximate UCL (use when n>=50)	1.194	95% Gamma Adjusted UCL (use when n<50)	1.201
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.081	Mean in Log Scale	0.0375
SD in Original Scale	0.299	SD in Log Scale	0.298
95% t UCL (assumes normality of ROS data)	1.175	95% Percentile Bootstrap UCL	1.172
95% BCA Bootstrap UCL	1.17	95% Bootstrap t UCL	1.178
95% H-UCL (Log ROS)	1.202		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.996	Mean in Log Scale	-0.0831
SD in Original Scale	0.38	SD in Log Scale	0.415
95% t UCL (Assumes normality)	1.116	95% H-Stat UCL	1.163
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.2	95% KM (Percentile Bootstrap) UCL	1.189
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			

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However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Cadmium

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	22
		Number of Missing Observations	7
Minimum	0.34	Mean	0.757
Maximum	1.2	Median	0.8
SD	0.235	Std. Error of Mean	0.0444
Coefficient of Variation	0.31	Skewness	-0.0414
Normal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0965	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.832	95% Adjusted-CLT UCL (Chen-1995)	0.829
		95% Modified-t UCL (Johnson-1978)	0.832
Gamma GOF Test			
A-D Test Statistic	0.626	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.139	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.165	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.706	k star (bias corrected MLE)	8.69
Theta hat (MLE)	0.078	Theta star (bias corrected MLE)	0.0871
nu hat (MLE)	543.5	nu star (bias corrected)	486.6
MLE Mean (bias corrected)	0.757	MLE Sd (bias corrected)	0.257
		Approximate Chi Square Value (0.05)	436.5
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	433.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.844	95% Adjusted Gamma UCL (use when n<50)	0.849
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	

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Lilliefors Test Statistic	0.158	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.167	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.079	Mean of logged Data	-0.331
Maximum of Logged Data	0.182	SD of logged Data	0.342
Assuming Lognormal Distribution			
95% H-UCL	0.859	90% Chebyshev (MVUE) UCL	0.91
95% Chebyshev (MVUE) UCL	0.978	97.5% Chebyshev (MVUE) UCL	1.073
99% Chebyshev (MVUE) UCL	1.258		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.83	95% Jackknife UCL	0.832
95% Standard Bootstrap UCL	0.828	95% Bootstrap-t UCL	0.833
95% Hall's Bootstrap UCL	0.836	95% Percentile Bootstrap UCL	0.825
95% BCA Bootstrap UCL	0.82		
90% Chebyshev(Mean, Sd) UCL	0.89	95% Chebyshev(Mean, Sd) UCL	0.95
97.5% Chebyshev(Mean, Sd) UCL	1.034	99% Chebyshev(Mean, Sd) UCL	1.198
Suggested UCL to Use			
95% Student's-t UCL	0.832		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Chromium

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	26
		Number of Missing Observations	6
Minimum	4.5	Mean	17.93
Maximum	42.2	Median	14.5
SD	11.9	Std. Error of Mean	2.21
Coefficient of Variation	0.664	Skewness	0.562

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Normal GOF Test			
Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	21.69	95% Adjusted-CLT UCL (Chen-1995)	21.81
		95% Modified-t UCL (Johnson-1978)	21.73
Gamma GOF Test			
A-D Test Statistic	1.001	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.227	k star (bias corrected MLE)	2.02
Theta hat (MLE)	8.051	Theta star (bias corrected MLE)	8.878
nu hat (MLE)	129.2	nu star (bias corrected)	117.2
MLE Mean (bias corrected)	17.93	MLE Sd (bias corrected)	12.62
		Approximate Chi Square Value (0.05)	93.16
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	91.88
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	22.55	95% Adjusted Gamma UCL (use when n<50)	22.86
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.504	Mean of logged Data	2.646
Maximum of Logged Data	3.742	SD of logged Data	0.731
Assuming Lognormal Distribution			
95% H-UCL	24.81	90% Chebyshev (MVUE) UCL	26.25
95% Chebyshev (MVUE) UCL	29.9	97.5% Chebyshev (MVUE) UCL	34.97
99% Chebyshev (MVUE) UCL	44.91		

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Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	21.57	95% Jackknife UCL	21.69
95% Standard Bootstrap UCL	21.5	95% Bootstrap-t UCL	21.83
95% Hall's Bootstrap UCL	21.88	95% Percentile Bootstrap UCL	21.4
95% BCA Bootstrap UCL	21.63		
90% Chebyshev(Mean, Sd) UCL	24.56	95% Chebyshev(Mean, Sd) UCL	27.57
97.5% Chebyshev(Mean, Sd) UCL	31.74	99% Chebyshev(Mean, Sd) UCL	39.93

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	27.57		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Cobalt

General Statistics

Total Number of Observations	29	Number of Distinct Observations	20
		Number of Missing Observations	6
Number of Detects	12	Number of Non-Detects	17
Number of Distinct Detects	12	Number of Distinct Non-Detects	9
Minimum Detect	1.4	Minimum Non-Detect	6.6
Maximum Detect	12.8	Maximum Non-Detect	7.5
Variance Detects	9.552	Percent Non-Detects	58.62%
Mean Detects	5.458	SD Detects	3.091
Median Detects	5	CV Detects	0.566
Skewness Detects	1.099	Kurtosis Detects	2.094
Mean of Logged Detects	1.534	SD of Logged Detects	0.637

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	4.697	Standard Error of Mean	0.602
SD	2.349	95% KM (BCA) UCL	5.661
95% KM (t) UCL	5.721	95% KM (Percentile Bootstrap) UCL	5.633
95% KM (z) UCL	5.687	95% KM Bootstrap t UCL	5.713

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90% KM Chebyshev UCL	6.503	95% KM Chebyshev UCL	7.321
97.5% KM Chebyshev UCL	8.457	99% KM Chebyshev UCL	10.69
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.393	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.201	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.247	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.219	k star (bias corrected MLE)	2.47
Theta hat (MLE)	1.695	Theta star (bias corrected MLE)	2.21
nu hat (MLE)	77.27	nu star (bias corrected)	59.28
MLE Mean (bias corrected)	5.458	MLE Sd (bias corrected)	3.473
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.998	nu hat (KM)	231.9
Approximate Chi Square Value (231.87, α)	197.6	Adjusted Chi Square Value (231.87, β)	195.7
95% Gamma Approximate KM-UCL (use when n>=50)	5.511	95% Gamma Adjusted KM-UCL (use when n<50)	5.564
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	1.4	Mean	4.618
Maximum	12.8	Median	4.055
SD	2.195	CV	0.475
k hat (MLE)	5.373	k star (bias corrected MLE)	4.84
Theta hat (MLE)	0.859	Theta star (bias corrected MLE)	0.954
nu hat (MLE)	311.6	nu star (bias corrected)	280.7
MLE Mean (bias corrected)	4.618	MLE Sd (bias corrected)	2.099
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (280.74, α)	242.9	Adjusted Chi Square Value (280.74, β)	240.8
95% Gamma Approximate UCL (use when n>=50)	5.336	95% Gamma Adjusted UCL (use when n<50)	5.383
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.465	Mean in Log Scale	1.395

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SD in Original Scale	2.225	SD in Log Scale	0.456
95% t UCL (assumes normality of ROS data)	5.168	95% Percentile Bootstrap UCL	5.141
95% BCA Bootstrap UCL	5.285	95% Bootstrap t UCL	5.455
95% H-UCL (Log ROS)	5.282		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	1.406	95% H-UCL (KM -Log)	5.95
KM SD (logged)	0.569	95% Critical H Value (KM-Log)	2.005
KM Standard Error of Mean (logged)	0.17		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.295	Mean in Log Scale	1.364
SD in Original Scale	2.18	SD in Log Scale	0.426
95% t UCL (Assumes normality)	4.984	95% H-Stat UCL	4.989
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	5.721	95% KM (Percentile Bootstrap) UCL	5.633
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Copper			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	6
Minimum	14.2	Mean	24.4
Maximum	38.8	Median	21.6
SD	7.8	Std. Error of Mean	1.449
Coefficient of Variation	0.32	Skewness	0.494
Normal GOF Test			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

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Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	26.86	95% Adjusted-CLT UCL (Chen-1995)	26.92
		95% Modified-t UCL (Johnson-1978)	26.89
Gamma GOF Test			
A-D Test Statistic	0.757	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.159	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	10.48	k star (bias corrected MLE)	9.421
Theta hat (MLE)	2.328	Theta star (bias corrected MLE)	2.59
nu hat (MLE)	608	nu star (bias corrected)	546.4
MLE Mean (bias corrected)	24.4	MLE Sd (bias corrected)	7.949
		Approximate Chi Square Value (0.05)	493.2
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	490.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	27.03	95% Adjusted Gamma UCL (use when n<50)	27.2
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.653	Mean of logged Data	3.146
Maximum of Logged Data	3.658	SD of logged Data	0.316
Assuming Lognormal Distribution			
95% H-UCL	27.23	90% Chebyshev (MVUE) UCL	28.76
95% Chebyshev (MVUE) UCL	30.74	97.5% Chebyshev (MVUE) UCL	33.48
99% Chebyshev (MVUE) UCL	38.87		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	26.78	95% Jackknife UCL	26.86
95% Standard Bootstrap UCL	26.76	95% Bootstrap-t UCL	27.18
95% Hall's Bootstrap UCL	26.83	95% Percentile Bootstrap UCL	26.83

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95% BCA Bootstrap UCL	26.75		
90% Chebyshev(Mean, Sd) UCL	28.75	95% Chebyshev(Mean, Sd) UCL	30.71
97.5% Chebyshev(Mean, Sd) UCL	33.45	99% Chebyshev(Mean, Sd) UCL	38.81
Suggested UCL to Use			
95% Adjusted Gamma UCL	27.2		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Lead

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	26
		Number of Missing Observations	6
Minimum	4.9	Mean	11.22
Maximum	33.1	Median	8.3
SD	7.143	Std. Error of Mean	1.326
Coefficient of Variation	0.637	Skewness	1.849
Normal GOF Test			
Shapiro Wilk Test Statistic	0.706	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	13.47	95% Adjusted-CLT UCL (Chen-1995)	13.89
		95% Modified-t UCL (Johnson-1978)	13.55
Gamma GOF Test			
A-D Test Statistic	2.485	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.227	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.759	k star (bias corrected MLE)	3.393
Theta hat (MLE)	2.984	Theta star (bias corrected MLE)	3.306
nu hat (MLE)	218	nu star (bias corrected)	196.8

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MLE Mean (bias corrected)	11.22	MLE Sd (bias corrected)	6.09
		Approximate Chi Square Value (0.05)	165.3
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	163.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	13.35	95% Adjusted Gamma UCL (use when n<50)	13.49
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.589	Mean of logged Data	2.279
Maximum of Logged Data	3.5	SD of logged Data	0.494
Assuming Lognormal Distribution			
95% H-UCL	13.22	90% Chebyshev (MVUE) UCL	14.13
95% Chebyshev (MVUE) UCL	15.55	97.5% Chebyshev (MVUE) UCL	17.53
99% Chebyshev (MVUE) UCL	21.42		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	13.4	95% Jackknife UCL	13.47
95% Standard Bootstrap UCL	13.34	95% Bootstrap-t UCL	14.28
95% Hall's Bootstrap UCL	13.63	95% Percentile Bootstrap UCL	13.5
95% BCA Bootstrap UCL	13.76		
90% Chebyshev(Mean, Sd) UCL	15.2	95% Chebyshev(Mean, Sd) UCL	17
97.5% Chebyshev(Mean, Sd) UCL	19.5	99% Chebyshev(Mean, Sd) UCL	24.41
Suggested UCL to Use			
95% Student's-t UCL	13.47	or 95% Modified-t UCL	13.55
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Manganese			
General Statistics			

Table B-2			
ProUCL Output - Post Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	6
Minimum	47.3	Mean	146.5
Maximum	493	Median	102
SD	103.8	Std. Error of Mean	19.28
Coefficient of Variation	0.708	Skewness	1.754
Normal GOF Test			
Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	179.3	95% Adjusted-CLT UCL (Chen-1995)	185
		95% Modified-t UCL (Johnson-1978)	180.4
Gamma GOF Test			
A-D Test Statistic	0.695	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.702	k star (bias corrected MLE)	2.446
Theta hat (MLE)	54.23	Theta star (bias corrected MLE)	59.91
nu hat (MLE)	156.7	nu star (bias corrected)	141.9
MLE Mean (bias corrected)	146.5	MLE Sd (bias corrected)	93.7
		Approximate Chi Square Value (0.05)	115.3
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	113.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	180.2	95% Adjusted Gamma UCL (use when n<50)	182.5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.857	Mean of logged Data	4.791

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Maximum of Logged Data	6.201	SD of logged Data	0.617
Assuming Lognormal Distribution			
95% H-UCL	185.1	90% Chebyshev (MVUE) UCL	197.5
95% Chebyshev (MVUE) UCL	221.5	97.5% Chebyshev (MVUE) UCL	254.8
99% Chebyshev (MVUE) UCL	320.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	178.3	95% Jackknife UCL	179.3
95% Standard Bootstrap UCL	177.1	95% Bootstrap-t UCL	190.5
95% Hall's Bootstrap UCL	192.5	95% Percentile Bootstrap UCL	180.3
95% BCA Bootstrap UCL	183.4		
90% Chebyshev(Mean, Sd) UCL	204.4	95% Chebyshev(Mean, Sd) UCL	230.6
97.5% Chebyshev(Mean, Sd) UCL	266.9	99% Chebyshev(Mean, Sd) UCL	338.4
Suggested UCL to Use			
95% Adjusted Gamma UCL	182.5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Mercury			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	13
		Number of Missing Observations	6
Number of Detects	9	Number of Non-Detects	20
Number of Distinct Detects	9	Number of Distinct Non-Detects	4
Minimum Detect	0.043	Minimum Non-Detect	0.06
Maximum Detect	1.5	Maximum Non-Detect	0.15
Variance Detects	0.253	Percent Non-Detects	68.97%
Mean Detects	0.289	SD Detects	0.503
Median Detects	0.059	CV Detects	1.738
Skewness Detects	2.224	Kurtosis Detects	4.644
Mean of Logged Detects	-2.237	SD of Logged Detects	1.306
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.57	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.449	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level	

Table B-2			
ProUCL Output - Post Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.128	Standard Error of Mean	0.0563
SD	0.285	95% KM (BCA) UCL	0.233
95% KM (t) UCL	0.224	95% KM (Percentile Bootstrap) UCL	0.227
95% KM (z) UCL	0.221	95% KM Bootstrap t UCL	1.987
90% KM Chebyshev UCL	0.297	95% KM Chebyshev UCL	0.373
97.5% KM Chebyshev UCL	0.48	99% KM Chebyshev UCL	0.688
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.812	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.459	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.292	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.617	k star (bias corrected MLE)	0.485
Theta hat (MLE)	0.469	Theta star (bias corrected MLE)	0.596
nu hat (MLE)	11.11	nu star (bias corrected)	8.738
MLE Mean (bias corrected)	0.289	MLE Sd (bias corrected)	0.415
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.202	nu hat (KM)	11.71
Approximate Chi Square Value (11.71, α)	5.036	Adjusted Chi Square Value (11.71, β)	4.776
95% Gamma Approximate KM-UCL (use when n>=50)	0.298	95% Gamma Adjusted KM-UCL (use when n<50)	0.314
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.151
Maximum	1.5	Median	0.054
SD	0.302	CV	2.005
k hat (MLE)	0.529	k star (bias corrected MLE)	0.497
Theta hat (MLE)	0.285	Theta star (bias corrected MLE)	0.304
nu hat (MLE)	30.67	nu star (bias corrected)	28.83
MLE Mean (bias corrected)	0.151	MLE Sd (bias corrected)	0.214
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (28.83, α)	17.58	Adjusted Chi Square Value (28.83, β)	17.05
95% Gamma Approximate UCL (use when n>=50)	0.247	95% Gamma Adjusted UCL (use when n<50)	0.255
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.654	**Shapiro Wilk GOF Test**	

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

5% Shapiro Wilk Critical Value	0.829	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.417	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.145	Mean in Log Scale	-2.573
SD in Original Scale	0.289	SD in Log Scale	0.914
95% t UCL (assumes normality of ROS data)	0.236	95% Percentile Bootstrap UCL	0.243
95% BCA Bootstrap UCL	0.297	95% Bootstrap t UCL	0.648
95% H-UCL (Log ROS)	0.174		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.136	Mean in Log Scale	-2.568
SD in Original Scale	0.289	SD in Log Scale	0.75
95% t UCL (Assumes normality)	0.227	95% H-Stat UCL	0.138
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.233		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Nickel			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	6
Minimum	5.3	Mean	17.76
Maximum	75.1	Median	12.7
SD	14.32	Std. Error of Mean	2.659
Coefficient of Variation	0.806	Skewness	2.512
Normal GOF Test			
Shapiro Wilk Test Statistic	0.736	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	22.28	95% Adjusted-CLT UCL (Chen-1995)	23.45
		95% Modified-t UCL (Johnson-1978)	22.48
Gamma GOF Test			
A-D Test Statistic	0.929	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.197	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.383	k star (bias corrected MLE)	2.16
Theta hat (MLE)	7.45	Theta star (bias corrected MLE)	8.222
nu hat (MLE)	138.2	nu star (bias corrected)	125.3
MLE Mean (bias corrected)	17.76	MLE Sd (bias corrected)	12.08
		Approximate Chi Square Value (0.05)	100.4
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	99.08
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	22.15	95% Adjusted Gamma UCL (use when n<50)	22.45
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.156	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.668	Mean of logged Data	2.652
Maximum of Logged Data	4.319	SD of logged Data	0.65
Assuming Lognormal Distribution			
95% H-UCL	22.61	90% Chebyshev (MVUE) UCL	24.1
95% Chebyshev (MVUE) UCL	27.14	97.5% Chebyshev (MVUE) UCL	31.37
99% Chebyshev (MVUE) UCL	39.68		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	22.13	95% Jackknife UCL	22.28

Table B-2			
ProUCL Output - Post Development - New Mill Dip Tank			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
95% Standard Bootstrap UCL	21.99	95% Bootstrap-t UCL	24.59
95% Hall's Bootstrap UCL	38.94	95% Percentile Bootstrap UCL	22.26
95% BCA Bootstrap UCL	23.12		
90% Chebyshev(Mean, Sd) UCL	25.73	95% Chebyshev(Mean, Sd) UCL	29.34
97.5% Chebyshev(Mean, Sd) UCL	34.36	99% Chebyshev(Mean, Sd) UCL	44.21
Suggested UCL to Use			
95% H-UCL	22.61		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			
Vanadium			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	6
Minimum	34.6	Mean	64.39
Maximum	99.3	Median	60.3
SD	19.36	Std. Error of Mean	3.596
Coefficient of Variation	0.301	Skewness	0.345
Normal GOF Test			
Shapiro Wilk Test Statistic	0.936	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.136	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	70.51	95% Adjusted-CLT UCL (Chen-1995)	70.55
		95% Modified-t UCL (Johnson-1978)	70.54
Gamma GOF Test			
A-D Test Statistic	0.424	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	Kolmogrov-Smirnoff Gamma GOF Test	

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	11.42	k star (bias corrected MLE)	10.27
Theta hat (MLE)	5.636	Theta star (bias corrected MLE)	6.272
nu hat (MLE)	662.6	nu star (bias corrected)	595.4
MLE Mean (bias corrected)	64.39	MLE Sd (bias corrected)	20.1
		Approximate Chi Square Value (0.05)	539.8
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	536.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	71.02	95% Adjusted Gamma UCL (use when n<50)	71.44
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.544	Mean of logged Data	4.121
Maximum of Logged Data	4.598	SD of logged Data	0.305
Assuming Lognormal Distribution			
95% H-UCL	71.64	90% Chebyshev (MVUE) UCL	75.58
95% Chebyshev (MVUE) UCL	80.63	97.5% Chebyshev (MVUE) UCL	87.64
99% Chebyshev (MVUE) UCL	101.4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	70.3	95% Jackknife UCL	70.51
95% Standard Bootstrap UCL	70.21	95% Bootstrap-t UCL	70.57
95% Hall's Bootstrap UCL	70.54	95% Percentile Bootstrap UCL	70.37
95% BCA Bootstrap UCL	70.83		
90% Chebyshev(Mean, Sd) UCL	75.18	95% Chebyshev(Mean, Sd) UCL	80.06
97.5% Chebyshev(Mean, Sd) UCL	86.85	99% Chebyshev(Mean, Sd) UCL	100.2
Suggested UCL to Use			
95% Student's-t UCL	70.51		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Zinc

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	26
		Number of Missing Observations	6
Minimum	5.2	Mean	13.87
Maximum	35.7	Median	8.6
SD	9.824	Std. Error of Mean	1.824
Coefficient of Variation	0.708	Skewness	1.019
Normal GOF Test			
Shapiro Wilk Test Statistic	0.776	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16.97	95% Adjusted-CLT UCL (Chen-1995)	17.24
		95% Modified-t UCL (Johnson-1978)	17.03
Gamma GOF Test			
A-D Test Statistic	2.152	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.479	k star (bias corrected MLE)	2.246
Theta hat (MLE)	5.594	Theta star (bias corrected MLE)	6.176
nu hat (MLE)	143.8	nu star (bias corrected)	130.3
MLE Mean (bias corrected)	13.87	MLE Sd (bias corrected)	9.255
		Approximate Chi Square Value (0.05)	104.9
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	103.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	17.22	95% Adjusted Gamma UCL (use when n<50)	17.45
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk Lognormal GOF Test**	

Table B-2
ProUCL Output - Post Development - New Mill Dip Tank
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.184	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.649	Mean of logged Data	2.415
Maximum of Logged Data	3.575	SD of logged Data	0.644
Assuming Lognormal Distribution			
95% H-UCL	17.71	90% Chebyshev (MVUE) UCL	18.88
95% Chebyshev (MVUE) UCL	21.25	97.5% Chebyshev (MVUE) UCL	24.54
99% Chebyshev (MVUE) UCL	31		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	16.87	95% Jackknife UCL	16.97
95% Standard Bootstrap UCL	16.82	95% Bootstrap-t UCL	17.43
95% Hall's Bootstrap UCL	17	95% Percentile Bootstrap UCL	16.8
95% BCA Bootstrap UCL	17.07		
90% Chebyshev(Mean, Sd) UCL	19.34	95% Chebyshev(Mean, Sd) UCL	21.82
97.5% Chebyshev(Mean, Sd) UCL	25.26	99% Chebyshev(Mean, Sd) UCL	32.02
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	21.82		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table B-3
ProUCL Output - Pre-Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/11/2015 2:22:45 PM
From File	Soil Data Set_ProUCL Input_2.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-diesel

General Statistics

Total Number of Observations	30	Number of Distinct Observations	23
Number of Detects	23	Number of Non-Detects	7
Number of Distinct Detects	21	Number of Distinct Non-Detects	2
Minimum Detect	7.3	Minimum Non-Detect	4.9
Maximum Detect	3000	Maximum Non-Detect	5
Variance Detects	430900	Percent Non-Detects	23.33%
Mean Detects	380.2	SD Detects	656.4
Median Detects	190	CV Detects	1.727
Skewness Detects	3.273	Kurtosis Detects	12.02
Mean of Logged Detects	4.93	SD of Logged Detects	1.532

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.568	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.344	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.185	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	292.6	Standard Error of Mean	109
SD	584.1	95% KM (BCA) UCL	493.8
95% KM (t) UCL	477.9	95% KM (Percentile Bootstrap) UCL	484.7
95% KM (z) UCL	472	95% KM Bootstrap t UCL	756.5
90% KM Chebyshev UCL	619.7	95% KM Chebyshev UCL	767.9
97.5% KM Chebyshev UCL	973.6	99% KM Chebyshev UCL	1378

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.601	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.795	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.182	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.19	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Table B-3			
ProUCL Output - Pre-Development - New Mill Equipment Shed			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
k hat (MLE)	0.61	k star (bias corrected MLE)	0.559
Theta hat (MLE)	623.2	Theta star (bias corrected MLE)	679.6
nu hat (MLE)	28.06	nu star (bias corrected)	25.73
MLE Mean (bias corrected)	380.2	MLE Sd (bias corrected)	508.3
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.251	nu hat (KM)	15.06
Approximate Chi Square Value (15.06, α)	7.302	Adjusted Chi Square Value (15.06, β)	6.991
95% Gamma Approximate KM-UCL (use when n>=50)	603.4	95% Gamma Adjusted KM-UCL (use when n<50)	630.3
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	291.5
Maximum	3000	Median	95.5
SD	594.7	CV	2.04
k hat (MLE)	0.241	k star (bias corrected MLE)	0.239
Theta hat (MLE)	1211	Theta star (bias corrected MLE)	1221
nu hat (MLE)	14.44	nu star (bias corrected)	14.33
MLE Mean (bias corrected)	291.5	MLE Sd (bias corrected)	596.5
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (14.33, α)	6.797	Adjusted Chi Square Value (14.33, β)	6.498
95% Gamma Approximate UCL (use when n>=50)	614.5	95% Gamma Adjusted UCL (use when n<50)	642.7
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.185	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	292.6	Mean in Log Scale	4.103
SD in Original Scale	594.1	SD in Log Scale	2.048
95% t UCL (assumes normality of ROS data)	476.9	95% Percentile Bootstrap UCL	489.8
95% BCA Bootstrap UCL	557.1	95% Bootstrap t UCL	719.2
95% H-UCL (Log ROS)	2268		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	4.151	95% H-UCL (KM -Log)	1599
KM SD (logged)	1.928	95% Critical H Value (KM-Log)	3.821
KM Standard Error of Mean (logged)	0.36		
DL/2 Statistics			

Table B-3
ProUCL Output - Pre-Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	292.1	Mean in Log Scale	3.992
SD in Original Scale	594.4	SD in Log Scale	2.185
95% t UCL (Assumes normality)	476.4	95% H-Stat UCL	3280
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	767.9	95% GROS Adjusted Gamma UCL	642.7
95% Adjusted Gamma KM-UCL	630.3		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
TPH-motor oil			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	21
Number of Detects	22	Number of Non-Detects	8
Number of Distinct Detects	20	Number of Distinct Non-Detects	1
Minimum Detect	73	Minimum Non-Detect	25
Maximum Detect	6700	Maximum Non-Detect	25
Variance Detects	2344776	Percent Non-Detects	26.67%
Mean Detects	1163	SD Detects	1531
Median Detects	760	CV Detects	1.317
Skewness Detects	2.609	Kurtosis Detects	7.891
Mean of Logged Detects	6.353	SD of Logged Detects	1.284
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.686	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	859.3	Standard Error of Mean	257.2
SD	1376	95% KM (BCA) UCL	1354
95% KM (t) UCL	1296	95% KM (Percentile Bootstrap) UCL	1311
95% KM (z) UCL	1282	95% KM Bootstrap t UCL	1650
90% KM Chebyshev UCL	1631	95% KM Chebyshev UCL	1980
97.5% KM Chebyshev UCL	2466	99% KM Chebyshev UCL	3418

Table B-3
ProUCL Output - Pre-Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.417	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.779	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.192	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.837	k star (bias corrected MLE)	0.753
Theta hat (MLE)	1389	Theta star (bias corrected MLE)	1544
nu hat (MLE)	36.82	nu star (bias corrected)	33.13
MLE Mean (bias corrected)	1163	MLE Sd (bias corrected)	1340
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.39	nu hat (KM)	23.38
Approximate Chi Square Value (23.38, α)	13.38	Adjusted Chi Square Value (23.38, β)	12.94
95% Gamma Approximate KM-UCL (use when n>=50)	1502	95% Gamma Adjusted KM-UCL (use when n<50)	1552
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	852.6
Maximum	6700	Median	320
SD	1404	CV	1.647
k hat (MLE)	0.219	k star (bias corrected MLE)	0.219
Theta hat (MLE)	3898	Theta star (bias corrected MLE)	3892
nu hat (MLE)	13.12	nu star (bias corrected)	13.15
MLE Mean (bias corrected)	852.6	MLE Sd (bias corrected)	1822
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (13.15, α)	5.991	Adjusted Chi Square Value (13.15, β)	5.713
95% Gamma Approximate UCL (use when n>=50)	1871	95% Gamma Adjusted UCL (use when n<50)	1962
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	861.5	Mean in Log Scale	5.54
SD in Original Scale	1399	SD in Log Scale	1.793
95% t UCL (assumes normality of ROS data)	1295	95% Percentile Bootstrap UCL	1309

Table B-3
ProUCL Output - Pre-Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% BCA Bootstrap UCL	1468	95% Bootstrap t UCL	1661
95% H-UCL (Log ROS)	4225		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	5.517	95% H-UCL (KM -Log)	3681
KM SD (logged)	1.754	95% Critical H Value (KM-Log)	3.549
KM Standard Error of Mean (logged)	0.328		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	855.9	Mean in Log Scale	5.333
SD in Original Scale	1402	SD in Log Scale	2.039
95% t UCL (Assumes normality)	1291	95% H-Stat UCL	7516
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	1980	95% GROS Adjusted Gamma UCL	1962
95% Adjusted Gamma KM-UCL	1552		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Table B-4
ProUCL Output - Post Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/10/2015 5:06:23 PM
From File	Soil Data Set_ProUCL Input_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-diesel

General Statistics

Total Number of Observations	70	Number of Distinct Observations	32
Number of Detects	32	Number of Non-Detects	38
Number of Distinct Detects	30	Number of Distinct Non-Detects	2
Minimum Detect	5.1	Minimum Non-Detect	4.9
Maximum Detect	350	Maximum Non-Detect	5
Variance Detects	10507	Percent Non-Detects	54.29%
Mean Detects	89.63	SD Detects	102.5
Median Detects	34	CV Detects	1.144
Skewness Detects	1.117	Kurtosis Detects	0.046
Mean of Logged Detects	3.66	SD of Logged Detects	1.424

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.797	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.265	Lilliefors GOF Test
5% Lilliefors Critical Value	0.157	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	43.63	Standard Error of Mean	9.741
SD	80.22	95% KM (BCA) UCL	59.31
95% KM (t) UCL	59.87	95% KM (Percentile Bootstrap) UCL	59.56
95% KM (z) UCL	59.66	95% KM Bootstrap t UCL	64.94
90% KM Chebyshev UCL	72.86	95% KM Chebyshev UCL	86.09
97.5% KM Chebyshev UCL	104.5	99% KM Chebyshev UCL	140.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.179	Anderson-Darling GOF Test
5% A-D Critical Value	0.79	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.162	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Table B-4
ProUCL Output - Post Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

k hat (MLE)	0.721	k star (bias corrected MLE)	0.674
Theta hat (MLE)	124.4	Theta star (bias corrected MLE)	133
nu hat (MLE)	46.12	nu star (bias corrected)	43.13
MLE Mean (bias corrected)	89.63	MLE Sd (bias corrected)	109.2
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.296	nu hat (KM)	41.42
Approximate Chi Square Value (41.42, α)	27.67	Adjusted Chi Square Value (41.42, β)	27.44
95% Gamma Approximate KM-UCL (use when n>=50)	65.32	95% Gamma Adjusted KM-UCL (use when n<50)	65.88
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	40.98
Maximum	350	Median	0.01
SD	82.11	CV	2.004
k hat (MLE)	0.167	k star (bias corrected MLE)	0.169
Theta hat (MLE)	245.8	Theta star (bias corrected MLE)	242.4
nu hat (MLE)	23.34	nu star (bias corrected)	23.67
MLE Mean (bias corrected)	40.98	MLE Sd (bias corrected)	99.66
		Adjusted Level of Significance (β)	0.0466
Approximate Chi Square Value (23.67, α)	13.6	Adjusted Chi Square Value (23.67, β)	13.44
95% Gamma Approximate UCL (use when n>=50)	71.33	95% Gamma Adjusted UCL (use when n<50)	72.19
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.157	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	41.8	Mean in Log Scale	1.529
SD in Original Scale	81.71	SD in Log Scale	2.416
95% t UCL (assumes normality of ROS data)	58.08	95% Percentile Bootstrap UCL	58.8
95% BCA Bootstrap UCL	61.06	95% Bootstrap t UCL	61.41
95% H-UCL (Log ROS)	202.3		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	2.536	95% H-UCL (KM -Log)	48.53
KM SD (logged)	1.401	95% Critical H Value (KM-Log)	2.163
KM Standard Error of Mean (logged)	0.17		
DL/2 Statistics			

Table B-4
ProUCL Output - Post Development - New Mill Equipment Shed
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	42.32	Mean in Log Scale	2.167
SD in Original Scale	81.44	SD in Log Scale	1.678
95% t UCL (Assumes normality)	58.55	95% H-Stat UCL	59.27
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	59.31		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
TPH-motor oil			
General Statistics			
Total Number of Observations	70	Number of Distinct Observations	23
Number of Detects	24	Number of Non-Detects	46
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	29	Minimum Non-Detect	25
Maximum Detect	2300	Maximum Non-Detect	25
Variance Detects	282616	Percent Non-Detects	65.71%
Mean Detects	449.8	SD Detects	531.6
Median Detects	155	CV Detects	1.182
Skewness Detects	1.994	Kurtosis Detects	5.257
Mean of Logged Detects	5.368	SD of Logged Detects	1.339
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.76	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	170.7	Standard Error of Mean	44.61
SD	365.4	95% KM (BCA) UCL	255.7
95% KM (t) UCL	245	95% KM (Percentile Bootstrap) UCL	244.3
95% KM (z) UCL	244	95% KM Bootstrap t UCL	281.5
90% KM Chebyshev UCL	304.5	95% KM Chebyshev UCL	365.1
97.5% KM Chebyshev UCL	449.3	99% KM Chebyshev UCL	614.6

Table B-4			
ProUCL Output - Post Development - New Mill Equipment Shed			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.765	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.78	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.195	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.185	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.801	k star (bias corrected MLE)	0.729
Theta hat (MLE)	561.5	Theta star (bias corrected MLE)	617.2
nu hat (MLE)	38.45	nu star (bias corrected)	34.98
MLE Mean (bias corrected)	449.8	MLE Sd (bias corrected)	526.9
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.218	nu hat (KM)	30.54
Approximate Chi Square Value (30.54, α)	18.92	Adjusted Chi Square Value (30.54, β)	18.72
95% Gamma Approximate KM-UCL (use when n>=50)	275.5	95% Gamma Adjusted KM-UCL (use when n<50)	278.3
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	154.2
Maximum	2300	Median	0.01
SD	374.8	CV	2.43
k hat (MLE)	0.126	k star (bias corrected MLE)	0.131
Theta hat (MLE)	1219	Theta star (bias corrected MLE)	1181
nu hat (MLE)	17.71	nu star (bias corrected)	18.28
MLE Mean (bias corrected)	154.2	MLE Sd (bias corrected)	426.8
		Adjusted Level of Significance (β)	0.0466
Approximate Chi Square Value (18.28, α)	9.596	Adjusted Chi Square Value (18.28, β)	9.464
95% Gamma Approximate UCL (use when n>=50)	293.9	95% Gamma Adjusted UCL (use when n<50)	298
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	159.6	Mean in Log Scale	2.592
SD in Original Scale	372.6	SD in Log Scale	2.563
95% t UCL (assumes normality of ROS data)	233.8	95% Percentile Bootstrap UCL	236.3
95% BCA Bootstrap UCL	257.3	95% Bootstrap t UCL	270

Table B-4			
ProUCL Output - Post Development - New Mill Equipment Shed			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
95% H-UCL (Log ROS)	890.3		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.956	95% H-UCL (KM -Log)	162.3
KM SD (logged)	1.277	95% Critical H Value (KM-Log)	2.072
KM Standard Error of Mean (logged)	0.156		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	162.4	Mean in Log Scale	3.5
SD in Original Scale	371.4	SD in Log Scale	1.564
95% t UCL (Assumes normality)	236.4	95% H-Stat UCL	176
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	245	95% GROS Approximate Gamma UCL	293.9
95% Approximate Gamma KM-UCL	275.5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Table B-5
ProUCL Output - Pre-Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/11/2015 2:23:24 PM
From File	Soil Data Set_ProUCL Input_2_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-diesel

General Statistics

Total Number of Observations	24	Number of Distinct Observations	22
Number of Detects	23	Number of Non-Detects	1
Number of Distinct Detects	21	Number of Distinct Non-Detects	1
Minimum Detect	21	Minimum Non-Detect	5
Maximum Detect	2250	Maximum Non-Detect	5
Variance Detects	206361	Percent Non-Detects	4.167%
Mean Detects	185.7	SD Detects	454.3
Median Detects	78	CV Detects	2.447
Skewness Detects	4.652	Kurtosis Detects	22.03
Mean of Logged Detects	4.432	SD of Logged Detects	1.004

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.327	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.426	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.185	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	178.1	Standard Error of Mean	91.09
SD	436.4	95% KM (BCA) UCL	355.4
95% KM (t) UCL	334.2	95% KM (Percentile Bootstrap) UCL	356.8
95% KM (z) UCL	328	95% KM Bootstrap t UCL	1038
90% KM Chebyshev UCL	451.4	95% KM Chebyshev UCL	575.2
97.5% KM Chebyshev UCL	747	99% KM Chebyshev UCL	1084

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.337	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.782	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.253	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.189	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Table B-5
ProUCL Output - Pre-Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

k hat (MLE)	0.755	k star (bias corrected MLE)	0.685
Theta hat (MLE)	245.9	Theta star (bias corrected MLE)	270.9
nu hat (MLE)	34.72	nu star (bias corrected)	31.53
MLE Mean (bias corrected)	185.7	MLE Sd (bias corrected)	224.3
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.167	nu hat (KM)	7.996
Approximate Chi Square Value (8.00, α)	2.733	Adjusted Chi Square Value (8.00, β)	2.521
95% Gamma Approximate KM-UCL (use when n>=50)	521.2	95% Gamma Adjusted KM-UCL (use when n<50)	565.1
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	177.9
Maximum	2250	Median	73.5
SD	445.9	CV	2.506
k hat (MLE)	0.555	k star (bias corrected MLE)	0.513
Theta hat (MLE)	320.6	Theta star (bias corrected MLE)	346.5
nu hat (MLE)	26.64	nu star (bias corrected)	24.64
MLE Mean (bias corrected)	177.9	MLE Sd (bias corrected)	248.3
		Adjusted Level of Significance (β)	0.0392
Approximate Chi Square Value (24.64, α)	14.34	Adjusted Chi Square Value (24.64, β)	13.79
95% Gamma Approximate UCL (use when n>=50)	305.8	95% Gamma Adjusted UCL (use when n<50)	318
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.126	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.185	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	178.2	Mean in Log Scale	4.333
SD in Original Scale	445.8	SD in Log Scale	1.095
95% t UCL (assumes normality of ROS data)	334.2	95% Percentile Bootstrap UCL	360.5
95% BCA Bootstrap UCL	453.1	95% Bootstrap t UCL	1026
95% H-UCL (Log ROS)	255.1		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	4.314	95% H-UCL (KM -Log)	260.4
KM SD (logged)	1.115	95% Critical H Value (KM-Log)	2.698
KM Standard Error of Mean (logged)	0.233		
DL/2 Statistics			

Table B-5
ProUCL Output - Pre-Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	178	Mean in Log Scale	4.285
SD in Original Scale	445.9	SD in Log Scale	1.216
95% t UCL (Assumes normality)	334	95% H-Stat UCL	313.1
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	747		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
TPH-motor oil			
General Statistics			
Total Number of Observations	23	Number of Distinct Observations	20
		Number of Missing Observations	1
Number of Detects	22	Number of Non-Detects	1
Number of Distinct Detects	19	Number of Distinct Non-Detects	1
Minimum Detect	210	Minimum Non-Detect	25
Maximum Detect	1900	Maximum Non-Detect	25
Variance Detects	158712	Percent Non-Detects	4.348%
Mean Detects	625	SD Detects	398.4
Median Detects	520	CV Detects	0.637
Skewness Detects	1.978	Kurtosis Detects	4.357
Mean of Logged Detects	6.29	SD of Logged Detects	0.532
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	598.9	Standard Error of Mean	85.34
SD	399.9	95% KM (BCA) UCL	743.9
95% KM (t) UCL	745.4	95% KM (Percentile Bootstrap) UCL	742.6
95% KM (z) UCL	739.3	95% KM Bootstrap t UCL	805.3
90% KM Chebyshev UCL	854.9	95% KM Chebyshev UCL	970.9
97.5% KM Chebyshev UCL	1132	99% KM Chebyshev UCL	1448

Table B-5			
ProUCL Output - Pre-Development - New Mill Dump Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.588	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.145	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.186	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.534	k star (bias corrected MLE)	3.083
Theta hat (MLE)	176.8	Theta star (bias corrected MLE)	202.8
nu hat (MLE)	155.5	nu star (bias corrected)	135.6
MLE Mean (bias corrected)	625	MLE Sd (bias corrected)	356
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	2.244	nu hat (KM)	103.2
Approximate Chi Square Value (103.20, α)	80.76	Adjusted Chi Square Value (103.20, β)	79.32
95% Gamma Approximate KM-UCL (use when n>=50)	765.3	95% Gamma Adjusted KM-UCL (use when n<50)	779.2
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	597.8
Maximum	1900	Median	510
SD	410.5	CV	0.687
k hat (MLE)	1	k star (bias corrected MLE)	0.898
Theta hat (MLE)	597.9	Theta star (bias corrected MLE)	665.4
nu hat (MLE)	45.99	nu star (bias corrected)	41.33
MLE Mean (bias corrected)	597.8	MLE Sd (bias corrected)	630.7
		Adjusted Level of Significance (β)	0.0389
Approximate Chi Square Value (41.33, α)	27.59	Adjusted Chi Square Value (41.33, β)	26.78
95% Gamma Approximate UCL (use when n>=50)	895.4	95% Gamma Adjusted UCL (use when n<50)	922.6
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	604.1	Mean in Log Scale	6.232
SD in Original Scale	401.9	SD in Log Scale	0.588
95% t UCL (assumes normality of ROS data)	748	95% Percentile Bootstrap UCL	752.6

Table B-5 ProUCL Output - Pre-Development - New Mill Dump Area Human Health Risk Assessment The Landing - Mount Shasta Commerce Park Mount Shasta, California			
95% BCA Bootstrap UCL	769.1	95% Bootstrap t UCL	817.8
95% H-UCL (Log ROS)	782.7		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	6.156	95% H-UCL (KM -Log)	967.6
KM SD (logged)	0.807	95% Critical H Value (KM-Log)	2.287
KM Standard Error of Mean (logged)	0.172		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	598.4	Mean in Log Scale	6.126
SD in Original Scale	409.6	SD in Log Scale	0.941
95% t UCL (Assumes normality)	745	95% H-Stat UCL	1166
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	743.9	95% GROS Adjusted Gamma UCL	922.6
95% Adjusted Gamma KM-UCL	779.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Table B-6
ProUCL Output - Post Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/11/2015 2:24:16 PM
From File	Soil Data Set_ProUCL Input_2_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH-diesel

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	37
Number of Detects	42	Number of Non-Detects	7
Number of Distinct Detects	35	Number of Distinct Non-Detects	2
Minimum Detect	6.9	Minimum Non-Detect	4.9
Maximum Detect	2250	Maximum Non-Detect	5
Variance Detects	116800	Percent Non-Detects	14.29%
Mean Detects	135.7	SD Detects	341.8
Median Detects	54.5	CV Detects	2.518
Skewness Detects	6.052	Kurtosis Detects	38.13
Mean of Logged Detects	4.173	SD of Logged Detects	1.021

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.306	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.137	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	117	Standard Error of Mean	45.68
SD	316	95% KM (BCA) UCL	212.1
95% KM (t) UCL	193.7	95% KM (Percentile Bootstrap) UCL	207.6
95% KM (z) UCL	192.2	95% KM Bootstrap t UCL	411.1
90% KM Chebyshev UCL	254.1	95% KM Chebyshev UCL	316.2
97.5% KM Chebyshev UCL	402.3	99% KM Chebyshev UCL	571.6

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	2.679	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.787	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.191	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.141	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only

Table B-6			
ProUCL Output - Post Development - New Mill Dump Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
k hat (MLE)	0.804	k star (bias corrected MLE)	0.762
Theta hat (MLE)	168.9	Theta star (bias corrected MLE)	178.1
nu hat (MLE)	67.5	nu star (bias corrected)	64.01
MLE Mean (bias corrected)	135.7	MLE Sd (bias corrected)	155.5
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.137	nu hat (KM)	13.45
Approximate Chi Square Value (13.45, α)	6.196	Adjusted Chi Square Value (13.45, β)	6.046
95% Gamma Approximate KM-UCL (use when n>=50)	254.1	95% Gamma Adjusted KM-UCL (use when n<50)	260.3
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	116.3
Maximum	2250	Median	47
SD	319.5	CV	2.746
k hat (MLE)	0.364	k star (bias corrected MLE)	0.355
Theta hat (MLE)	320	Theta star (bias corrected MLE)	327.8
nu hat (MLE)	35.63	nu star (bias corrected)	34.78
MLE Mean (bias corrected)	116.3	MLE Sd (bias corrected)	195.3
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (34.78, α)	22.29	Adjusted Chi Square Value (34.78, β)	21.99
95% Gamma Approximate UCL (use when n>=50)	181.5	95% Gamma Adjusted UCL (use when n<50)	184.1
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0932	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	117.3	Mean in Log Scale	3.847
SD in Original Scale	319.1	SD in Log Scale	1.249
95% t UCL (assumes normality of ROS data)	193.8	95% Percentile Bootstrap UCL	203
95% BCA Bootstrap UCL	258.8	95% Bootstrap t UCL	411.1
95% H-UCL (Log ROS)	163.8		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	3.804	95% H-UCL (KM -Log)	172.7
KM SD (logged)	1.3	95% Critical H Value (KM-Log)	2.683
KM Standard Error of Mean (logged)	0.188		
DL/2 Statistics			

Table B-6
ProUCL Output - Post Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	116.7	Mean in Log Scale	3.707
SD in Original Scale	319.4	SD in Log Scale	1.489
95% t UCL (Assumes normality)	193.2	95% H-Stat UCL	231.4
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	316.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
TPH-motor oil			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	33
		Number of Missing Observations	1
Number of Detects	41	Number of Non-Detects	7
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	16	Minimum Non-Detect	25
Maximum Detect	3400	Maximum Non-Detect	25
Variance Detects	366176	Percent Non-Detects	14.58%
Mean Detects	606.9	SD Detects	605.1
Median Detects	470	CV Detects	0.997
Skewness Detects	2.87	Kurtosis Detects	11.01
Mean of Logged Detects	5.957	SD of Logged Detects	1.112
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.733	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.941	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.236	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.138	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	520.7	Standard Error of Mean	86.28
SD	590.5	95% KM (BCA) UCL	686.4
95% KM (t) UCL	665.5	95% KM (Percentile Bootstrap) UCL	666.8
95% KM (z) UCL	662.7	95% KM Bootstrap t UCL	730.8
90% KM Chebyshev UCL	779.6	95% KM Chebyshev UCL	896.8
97.5% KM Chebyshev UCL	1060	99% KM Chebyshev UCL	1379

Table B-6
ProUCL Output - Post Development - New Mill Dump Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.649	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.772	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.249	k star (bias corrected MLE)	1.174
Theta hat (MLE)	486.1	Theta star (bias corrected MLE)	517.2
nu hat (MLE)	102.4	nu star (bias corrected)	96.23
MLE Mean (bias corrected)	606.9	MLE Sd (bias corrected)	560.2
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.778	nu hat (KM)	74.66
Approximate Chi Square Value (74.66, α)	55.76	Adjusted Chi Square Value (74.66, β)	55.26
95% Gamma Approximate KM-UCL (use when n>=50)	697.2	95% Gamma Adjusted KM-UCL (use when n<50)	703.6
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	518.4
Maximum	3400	Median	400
SD	598.7	CV	1.155
k hat (MLE)	0.364	k star (bias corrected MLE)	0.355
Theta hat (MLE)	1423	Theta star (bias corrected MLE)	1459
nu hat (MLE)	34.97	nu star (bias corrected)	34.12
MLE Mean (bias corrected)	518.4	MLE Sd (bias corrected)	869.5
		Adjusted Level of Significance (β)	0.045
Approximate Chi Square Value (34.12, α)	21.76	Adjusted Chi Square Value (34.12, β)	21.45
95% Gamma Approximate UCL (use when n>=50)	812.8	95% Gamma Adjusted UCL (use when n<50)	824.5
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.941	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.138	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	525	Mean in Log Scale	5.633
SD in Original Scale	593.1	SD in Log Scale	1.306
95% t UCL (assumes normality of ROS data)	668.7	95% Percentile Bootstrap UCL	677.1

Table B-6			
ProUCL Output - Post Development - New Mill Dump Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
95% BCA Bootstrap UCL	702.2	95% Bootstrap t UCL	738.1
95% H-UCL (Log ROS)	1095		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	520.2	Mean in Log Scale	5.457
SD in Original Scale	597.1	SD in Log Scale	1.597
95% t UCL (Assumes normality)	664.8	95% H-Stat UCL	1710
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	686.4	95% GROS Adjusted Gamma UCL	824.5
95% Adjusted Gamma KM-UCL	703.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/10/2015 5:11:00 PM
From File	Soil Data Set_ProUCL Input_f.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor-1254

General Statistics

Total Number of Observations	30	Number of Distinct Observations	8
		Number of Missing Observations	3
Number of Detects	4	Number of Non-Detects	26
Number of Distinct Detects	4	Number of Distinct Non-Detects	4
Minimum Detect	0.026	Minimum Non-Detect	0.0096
Maximum Detect	3.5	Maximum Non-Detect	0.5
Variance Detects	2.764	Percent Non-Detects	86.67%
Mean Detects	1.342	SD Detects	1.662
Median Detects	0.921	CV Detects	1.239
Skewness Detects	0.823	Kurtosis Detects	-1.455
Mean of Logged Detects	-1.251	SD of Logged Detects	2.528

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.188	Standard Error of Mean	0.146
SD	0.694	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.437	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.429	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.627	95% KM Chebyshev UCL	0.826
97.5% KM Chebyshev UCL	1.101	99% KM Chebyshev UCL	1.643

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.464	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.69	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.321	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.413	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.422	k star (bias corrected MLE)	0.272
Theta hat (MLE)	3.177	Theta star (bias corrected MLE)	4.929
nu hat (MLE)	3.378	nu star (bias corrected)	2.178
MLE Mean (bias corrected)	1.342	MLE Sd (bias corrected)	2.572
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.0735	nu hat (KM)	4.412
Approximate Chi Square Value (4.41, α)	0.891	Adjusted Chi Square Value (4.41, β)	0.806
95% Gamma Approximate KM-UCL (use when n>=50)	0.931	95% Gamma Adjusted KM-UCL (use when n<50)	1.029
Gamma (KM) may not be used when k hat (KM) is < 0.1			
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.188
Maximum	3.5	Median	0.01
SD	0.706	CV	3.762
k hat (MLE)	0.281	k star (bias corrected MLE)	0.275
Theta hat (MLE)	0.668	Theta star (bias corrected MLE)	0.683
nu hat (MLE)	16.84	nu star (bias corrected)	16.49
MLE Mean (bias corrected)	0.188	MLE Sd (bias corrected)	0.358
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (16.49, α)	8.306	Adjusted Chi Square Value (16.49, β)	7.972
95% Gamma Approximate UCL (use when n>=50)	0.372	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.179	Mean in Log Scale	-10.21
SD in Original Scale	0.708	SD in Log Scale	5.209
95% t UCL (assumes normality of ROS data)	0.399	95% Percentile Bootstrap UCL	0.415
95% BCA Bootstrap UCL	0.529	95% Bootstrap t UCL	16.03
95% H-UCL (Log ROS)	252225		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.148	95% H-UCL (KM -Log)	0.0942
KM SD (logged)	1.409	95% Critical H Value (KM-Log)	3.032
KM Standard Error of Mean (logged)	0.303		

Table B-7			
ProUCL Output - Pre-Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.204	Mean in Log Scale	-4.06
SD in Original Scale	0.703	SD in Log Scale	1.79
95% t UCL (Assumes normality)	0.422	95% H-Stat UCL	0.284
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.437	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Aroclor-1260			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	24
Number of Detects	20	Number of Non-Detects	13
Number of Distinct Detects	20	Number of Distinct Non-Detects	4
Minimum Detect	0.025	Minimum Non-Detect	0.0096
Maximum Detect	2	Maximum Non-Detect	0.5
Variance Detects	0.19	Percent Non-Detects	39.39%
Mean Detects	0.182	SD Detects	0.436
Median Detects	0.058	CV Detects	2.394
Skewness Detects	4.208	Kurtosis Detects	18.22
Mean of Logged Detects	-2.587	SD of Logged Detects	1.062
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.367	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.411	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.198	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.122	Standard Error of Mean	0.0608
SD	0.34	95% KM (BCA) UCL	0.242
95% KM (t) UCL	0.225	95% KM (Percentile Bootstrap) UCL	0.237
95% KM (z) UCL	0.222	95% KM Bootstrap t UCL	0.677

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

90% KM Chebyshev UCL	0.305	95% KM Chebyshev UCL	0.387
97.5% KM Chebyshev UCL	0.502	99% KM Chebyshev UCL	0.727
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.497	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.785	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.262	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.202	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.685	k star (bias corrected MLE)	0.616
Theta hat (MLE)	0.266	Theta star (bias corrected MLE)	0.296
nu hat (MLE)	27.42	nu star (bias corrected)	24.64
MLE Mean (bias corrected)	0.182	MLE Sd (bias corrected)	0.232
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.13	nu hat (KM)	8.558
Approximate Chi Square Value (8.56, α)	3.062	Adjusted Chi Square Value (8.56, β)	2.895
95% Gamma Approximate KM-UCL (use when n>=50)	0.342	95% Gamma Adjusted KM-UCL (use when n<50)	0.362
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.116
Maximum	2	Median	0.036
SD	0.347	CV	2.999
k hat (MLE)	0.535	k star (bias corrected MLE)	0.506
Theta hat (MLE)	0.216	Theta star (bias corrected MLE)	0.228
nu hat (MLE)	35.29	nu star (bias corrected)	33.42
MLE Mean (bias corrected)	0.116	MLE Sd (bias corrected)	0.162
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (33.42, α)	21.2	Adjusted Chi Square Value (33.42, β)	20.7
95% Gamma Approximate UCL (use when n>=50)	0.182	95% Gamma Adjusted UCL (use when n<50)	0.187
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.198	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.121	Mean in Log Scale	-3.116

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

SD in Original Scale	0.345	SD in Log Scale	1.169
95% t UCL (assumes normality of ROS data)	0.223	95% Percentile Bootstrap UCL	0.229
95% BCA Bootstrap UCL	0.353	95% Bootstrap t UCL	0.723
95% H-UCL (Log ROS)	0.152		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.069	95% H-UCL (KM -Log)	0.143
KM SD (logged)	1.111	95% Critical H Value (KM-Log)	2.576
KM Standard Error of Mean (logged)	0.214		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.131	Mean in Log Scale	-3.004
SD in Original Scale	0.345	SD in Log Scale	1.236
95% t UCL (Assumes normality)	0.233	95% H-Stat UCL	0.194
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	0.502		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Arsenic			
General Statistics			
Total Number of Observations	8	Number of Distinct Observations	5
		Number of Missing Observations	3
Minimum	0.72	Mean	1.203
Maximum	1.4	Median	1.3
SD	0.214	Std. Error of Mean	0.0756
Coefficient of Variation	0.178	Skewness	-1.984
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**	

Table B-7			
ProUCL Output - Pre-Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.346	95% Adjusted-CLT UCL (Chen-1995)	1.27
		95% Modified-t UCL (Johnson-1978)	1.337
Gamma GOF Test			
A-D Test Statistic	1.091	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.716	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.311	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.294	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	28.7	k star (bias corrected MLE)	18.02
Theta hat (MLE)	0.0419	Theta star (bias corrected MLE)	0.0667
nu hat (MLE)	459.3	nu star (bias corrected)	288.4
MLE Mean (bias corrected)	1.203	MLE Sd (bias corrected)	0.283
		Approximate Chi Square Value (0.05)	250
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	241
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.387	95% Adjusted Gamma UCL (use when n<50)	1.439
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.697	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.298	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.329	Mean of logged Data	0.167
Maximum of Logged Data	0.336	SD of logged Data	0.212
Assuming Lognormal Distribution			
95% H-UCL	1.414	90% Chebyshev (MVUE) UCL	1.477
95% Chebyshev (MVUE) UCL	1.601	97.5% Chebyshev (MVUE) UCL	1.772
99% Chebyshev (MVUE) UCL	2.108		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Nonparametric Distribution Free UCLs

95% CLT UCL	1.327	95% Jackknife UCL	1.346
95% Standard Bootstrap UCL	1.317	95% Bootstrap-t UCL	1.3
95% Hall's Bootstrap UCL	1.286	95% Percentile Bootstrap UCL	1.3
95% BCA Bootstrap UCL	1.275		
90% Chebyshev(Mean, Sd) UCL	1.429	95% Chebyshev(Mean, Sd) UCL	1.532
97.5% Chebyshev(Mean, Sd) UCL	1.675	99% Chebyshev(Mean, Sd) UCL	1.955

Suggested UCL to Use

95% Student's-t UCL	1.346

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Barium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	3
Minimum	35	Mean	55.5
Maximum	75	Median	54.5
SD	13.38	Std. Error of Mean	4.732
Coefficient of Variation	0.241	Skewness	-0.137

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	64.47	95% Adjusted-CLT UCL (Chen-1995)	63.04

Table B-7			
ProUCL Output - Pre-Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
		95% Modified-t UCL (Johnson-1978)	64.43
Gamma GOF Test			
A-D Test Statistic	0.238	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.171	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	18.45	k star (bias corrected MLE)	11.62
Theta hat (MLE)	3.007	Theta star (bias corrected MLE)	4.777
nu hat (MLE)	295.3	nu star (bias corrected)	185.9
MLE Mean (bias corrected)	55.5	MLE Sd (bias corrected)	16.28
		Approximate Chi Square Value (0.05)	155.3
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	148.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	66.41	95% Adjusted Gamma UCL (use when n<50)	69.58
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.952	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.191	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.555	Mean of logged Data	3.989
Maximum of Logged Data	4.317	SD of logged Data	0.255
Assuming Lognormal Distribution			
95% H-UCL	67.68	90% Chebyshev (MVUE) UCL	70.64
95% Chebyshev (MVUE) UCL	77.47	97.5% Chebyshev (MVUE) UCL	86.95
99% Chebyshev (MVUE) UCL	105.6		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	63.28	95% Jackknife UCL	64.47
95% Standard Bootstrap UCL	63.07	95% Bootstrap-t UCL	64.16
95% Hall's Bootstrap UCL	63.36	95% Percentile Bootstrap UCL	62.75
95% BCA Bootstrap UCL	62.75		
90% Chebyshev(Mean, Sd) UCL	69.7	95% Chebyshev(Mean, Sd) UCL	76.13
97.5% Chebyshev(Mean, Sd) UCL	85.05	99% Chebyshev(Mean, Sd) UCL	102.6

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Suggested UCL to Use

95% Student's-t UCL	64.47		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Beryllium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	0.27	Mean	0.336
Maximum	0.41	Median	0.335
SD	0.0414	Std. Error of Mean	0.0146
Coefficient of Variation	0.123	Skewness	0.339

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.364	95% Adjusted-CLT UCL (Chen-1995)	0.362
		95% Modified-t UCL (Johnson-1978)	0.364

Gamma GOF Test

A-D Test Statistic	0.235	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.196	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.293	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma Statistics			
k hat (MLE)	75.81	k star (bias corrected MLE)	47.46
Theta hat (MLE)	0.00444	Theta star (bias corrected MLE)	0.00708
nu hat (MLE)	1213	nu star (bias corrected)	759.4
MLE Mean (bias corrected)	0.336	MLE Sd (bias corrected)	0.0488
		Approximate Chi Square Value (0.05)	696.5
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	681.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.367	95% Adjusted Gamma UCL (use when n<50)	0.375
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.309	Mean of logged Data	-1.097
Maximum of Logged Data	-0.892	SD of logged Data	0.123
Assuming Lognormal Distribution			
95% H-UCL	0.367	90% Chebyshev (MVUE) UCL	0.38
95% Chebyshev (MVUE) UCL	0.4	97.5% Chebyshev (MVUE) UCL	0.428
99% Chebyshev (MVUE) UCL	0.482		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.36	95% Jackknife UCL	0.364
95% Standard Bootstrap UCL	0.359	95% Bootstrap-t UCL	0.368
95% Hall's Bootstrap UCL	0.38	95% Percentile Bootstrap UCL	0.359
95% BCA Bootstrap UCL	0.361		
90% Chebyshev(Mean, Sd) UCL	0.38	95% Chebyshev(Mean, Sd) UCL	0.4
97.5% Chebyshev(Mean, Sd) UCL	0.428	99% Chebyshev(Mean, Sd) UCL	0.482
Suggested UCL to Use			
95% Student's-t UCL	0.364		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Cadmium

General Statistics			
Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	3
Minimum	1.2	Mean	1.725
Maximum	2.7	Median	1.55
SD	0.523	Std. Error of Mean	0.185
Coefficient of Variation	0.303	Skewness	1.129

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.075	95% Adjusted-CLT UCL (Chen-1995)	2.108
		95% Modified-t UCL (Johnson-1978)	2.088
Gamma GOF Test			
A-D Test Statistic	0.374	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	13.9	k star (bias corrected MLE)	8.77
Theta hat (MLE)	0.124	Theta star (bias corrected MLE)	0.197
nu hat (MLE)	222.4	nu star (bias corrected)	140.3
MLE Mean (bias corrected)	1.725	MLE Sd (bias corrected)	0.582
		Approximate Chi Square Value (0.05)	113.9
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	107.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	2.124	95% Adjusted Gamma UCL (use when n<50)	2.243

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.182	Mean of logged Data	0.509
Maximum of Logged Data	0.993	SD of logged Data	0.282

Assuming Lognormal Distribution

95% H-UCL	2.149	90% Chebyshev (MVUE) UCL	2.238
95% Chebyshev (MVUE) UCL	2.472	97.5% Chebyshev (MVUE) UCL	2.796
99% Chebyshev (MVUE) UCL	3.434		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2.029	95% Jackknife UCL	2.075
95% Standard Bootstrap UCL	2.006	95% Bootstrap-t UCL	2.41
95% Hall's Bootstrap UCL	3.692	95% Percentile Bootstrap UCL	2.025
95% BCA Bootstrap UCL	2.075		
90% Chebyshev(Mean, Sd) UCL	2.28	95% Chebyshev(Mean, Sd) UCL	2.531
97.5% Chebyshev(Mean, Sd) UCL	2.88	99% Chebyshev(Mean, Sd) UCL	3.565

Suggested UCL to Use

95% Student's-t UCL	2.075

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Chromium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	6.5	Mean	14.39
Maximum	24	Median	14
SD	6.069	Std. Error of Mean	2.146
Coefficient of Variation	0.422	Skewness	0.0978

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18.45	95% Adjusted-CLT UCL (Chen-1995)	18
		95% Modified-t UCL (Johnson-1978)	18.46
Gamma GOF Test			
A-D Test Statistic	0.356	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.663	k star (bias corrected MLE)	3.623
Theta hat (MLE)	2.541	Theta star (bias corrected MLE)	3.971
nu hat (MLE)	90.61	nu star (bias corrected)	57.96
MLE Mean (bias corrected)	14.39	MLE Sd (bias corrected)	7.559
		Approximate Chi Square Value (0.05)	41.46
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	37.96
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	20.11	95% Adjusted Gamma UCL (use when n<50)	21.97
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.872	Mean of logged Data	2.575
Maximum of Logged Data	3.178	SD of logged Data	0.477

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Assuming Lognormal Distribution

95% H-UCL	22.35	90% Chebyshev (MVUE) UCL	21.9
95% Chebyshev (MVUE) UCL	25.25	97.5% Chebyshev (MVUE) UCL	29.91
99% Chebyshev (MVUE) UCL	39.05		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	17.92	95% Jackknife UCL	18.45
95% Standard Bootstrap UCL	17.77	95% Bootstrap-t UCL	18.52
95% Hall's Bootstrap UCL	18.39	95% Percentile Bootstrap UCL	17.58
95% BCA Bootstrap UCL	17.69		
90% Chebyshev(Mean, Sd) UCL	20.82	95% Chebyshev(Mean, Sd) UCL	23.74
97.5% Chebyshev(Mean, Sd) UCL	27.79	99% Chebyshev(Mean, Sd) UCL	35.74

Suggested UCL to Use

95% Student's-t UCL	18.45		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Cobalt

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	3.1	Mean	4.763
Maximum	5.8	Median	5.2
SD	1.07	Std. Error of Mean	0.378
Coefficient of Variation	0.225	Skewness	-0.942

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.479	95% Adjusted-CLT UCL (Chen-1995)	5.25
		95% Modified-t UCL (Johnson-1978)	5.458
Gamma GOF Test			
A-D Test Statistic	0.778	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.716	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.306	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.294	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	19.63	k star (bias corrected MLE)	12.35
Theta hat (MLE)	0.243	Theta star (bias corrected MLE)	0.386
nu hat (MLE)	314.1	nu star (bias corrected)	197.6
MLE Mean (bias corrected)	4.763	MLE Sd (bias corrected)	1.355
		Approximate Chi Square Value (0.05)	166.1
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	158.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.666	95% Adjusted Gamma UCL (use when n<50)	5.928
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.796	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.131	Mean of logged Data	1.535
Maximum of Logged Data	1.758	SD of logged Data	0.251
Assuming Lognormal Distribution			
95% H-UCL	5.794	90% Chebyshev (MVUE) UCL	6.048
95% Chebyshev (MVUE) UCL	6.626	97.5% Chebyshev (MVUE) UCL	7.429
99% Chebyshev (MVUE) UCL	9.005		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.385	95% Jackknife UCL	5.479

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% Standard Bootstrap UCL	5.356	95% Bootstrap-t UCL	5.34
95% Hall's Bootstrap UCL	5.222	95% Percentile Bootstrap UCL	5.338
95% BCA Bootstrap UCL	5.288		
90% Chebyshev(Mean, Sd) UCL	5.898	95% Chebyshev(Mean, Sd) UCL	6.412
97.5% Chebyshev(Mean, Sd) UCL	7.126	99% Chebyshev(Mean, Sd) UCL	8.528

Suggested UCL to Use

95% Student's-t UCL	5.479		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Copper

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	14	Mean	27.25
Maximum	55	Median	25
SD	13.11	Std. Error of Mean	4.636
Coefficient of Variation	0.481	Skewness	1.467

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	36.03	95% Adjusted-CLT UCL (Chen-1995)	37.44
		95% Modified-t UCL (Johnson-1978)	36.43

Gamma GOF Test

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

A-D Test Statistic	0.257	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.151	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.782	k star (bias corrected MLE)	3.697
Theta hat (MLE)	4.713	Theta star (bias corrected MLE)	7.371
nu hat (MLE)	92.51	nu star (bias corrected)	59.15
MLE Mean (bias corrected)	27.25	MLE Sd (bias corrected)	14.17
		Approximate Chi Square Value (0.05)	42.47
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	38.92
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	37.96	95% Adjusted Gamma UCL (use when n<50)	41.42
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.639	Mean of logged Data	3.216
Maximum of Logged Data	4.007	SD of logged Data	0.441
Assuming Lognormal Distribution			
95% H-UCL	40.02	90% Chebyshev (MVUE) UCL	39.9
95% Chebyshev (MVUE) UCL	45.69	97.5% Chebyshev (MVUE) UCL	53.73
99% Chebyshev (MVUE) UCL	69.52		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	34.88	95% Jackknife UCL	36.03
95% Standard Bootstrap UCL	34.4	95% Bootstrap-t UCL	40.78
95% Hall's Bootstrap UCL	72.7	95% Percentile Bootstrap UCL	35.13
95% BCA Bootstrap UCL	36.25		
90% Chebyshev(Mean, Sd) UCL	41.16	95% Chebyshev(Mean, Sd) UCL	47.46
97.5% Chebyshev(Mean, Sd) UCL	56.2	99% Chebyshev(Mean, Sd) UCL	73.38
Suggested UCL to Use			
95% Student's-t UCL	36.03		

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Lead

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	3
Minimum	12	Mean	35.13
Maximum	82	Median	29
SD	22.41	Std. Error of Mean	7.922
Coefficient of Variation	0.638	Skewness	1.382

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	50.13	95% Adjusted-CLT UCL (Chen-1995)	52.29
		95% Modified-t UCL (Johnson-1978)	50.78

Gamma GOF Test

A-D Test Statistic	0.265	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.296	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.102	k star (bias corrected MLE)	2.022
Theta hat (MLE)	11.32	Theta star (bias corrected MLE)	17.37
nu hat (MLE)	49.63	nu star (bias corrected)	32.35
MLE Mean (bias corrected)	35.13	MLE Sd (bias corrected)	24.7

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

		Approximate Chi Square Value (0.05)	20.35
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	17.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	55.84	95% Adjusted Gamma UCL (use when n<50)	63.19
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.485	Mean of logged Data	3.389
Maximum of Logged Data	4.407	SD of logged Data	0.629
Assuming Lognormal Distribution			
95% H-UCL	66.82	90% Chebyshev (MVUE) UCL	58.87
95% Chebyshev (MVUE) UCL	69.63	97.5% Chebyshev (MVUE) UCL	84.56
99% Chebyshev (MVUE) UCL	113.9		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	48.16	95% Jackknife UCL	50.13
95% Standard Bootstrap UCL	46.85	95% Bootstrap-t UCL	57.98
95% Hall's Bootstrap UCL	109.4	95% Percentile Bootstrap UCL	48.25
95% BCA Bootstrap UCL	50.38		
90% Chebyshev(Mean, Sd) UCL	58.89	95% Chebyshev(Mean, Sd) UCL	69.66
97.5% Chebyshev(Mean, Sd) UCL	84.6	99% Chebyshev(Mean, Sd) UCL	114
Suggested UCL to Use			
95% Student's-t UCL	50.13		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Mercury			
General Statistics			
Total Number of Observations	8	Number of Distinct Observations	8

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

		Number of Missing Observations	3
Minimum	0.021	Mean	0.295
Maximum	1.7	Median	0.0505
SD	0.576	Std. Error of Mean	0.204
Coefficient of Variation	1.95	Skewness	2.679
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.547	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.379	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.681	95% Adjusted-CLT UCL (Chen-1995)	0.836
		95% Modified-t UCL (Johnson-1978)	0.713
Gamma GOF Test			
A-D Test Statistic	0.857	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.318	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.308	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.531	k star (bias corrected MLE)	0.415
Theta hat (MLE)	0.556	Theta star (bias corrected MLE)	0.711
nu hat (MLE)	8.493	nu star (bias corrected)	6.642
MLE Mean (bias corrected)	0.295	MLE Sd (bias corrected)	0.458
		Approximate Chi Square Value (0.05)	1.976
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	1.399
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.992	95% Adjusted Gamma UCL (use when n<50)	1.402
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.273	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.863	Mean of logged Data	-2.406
Maximum of Logged Data	0.531	SD of logged Data	1.506

Assuming Lognormal Distribution

95% H-UCL	4.211	90% Chebyshev (MVUE) UCL	0.581
95% Chebyshev (MVUE) UCL	0.743	97.5% Chebyshev (MVUE) UCL	0.968
99% Chebyshev (MVUE) UCL	1.41		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.63	95% Jackknife UCL	0.681
95% Standard Bootstrap UCL	0.602	95% Bootstrap-t UCL	2.758
95% Hall's Bootstrap UCL	2.685	95% Percentile Bootstrap UCL	0.682
95% BCA Bootstrap UCL	0.76		
90% Chebyshev(Mean, Sd) UCL	0.906	95% Chebyshev(Mean, Sd) UCL	1.183
97.5% Chebyshev(Mean, Sd) UCL	1.566	99% Chebyshev(Mean, Sd) UCL	2.321

Suggested UCL to Use

99% Chebyshev (Mean, Sd) UCL	2.321		

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Nickel

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	3
Minimum	9.3	Mean	21.79
Maximum	42	Median	22
SD	10.06	Std. Error of Mean	3.556
Coefficient of Variation	0.462	Skewness	1.002

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	28.52	95% Adjusted-CLT UCL (Chen-1995)	28.98
		95% Modified-t UCL (Johnson-1978)	28.73
Gamma GOF Test			
A-D Test Statistic	0.242	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.16	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.504	k star (bias corrected MLE)	3.523
Theta hat (MLE)	3.959	Theta star (bias corrected MLE)	6.184
nu hat (MLE)	88.06	nu star (bias corrected)	56.37
MLE Mean (bias corrected)	21.79	MLE Sd (bias corrected)	11.61
		Approximate Chi Square Value (0.05)	40.11
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	36.67
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	30.62	95% Adjusted Gamma UCL (use when n<50)	33.49
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.23	Mean of logged Data	2.988
Maximum of Logged Data	3.738	SD of logged Data	0.47
Assuming Lognormal Distribution			
95% H-UCL	33.38	90% Chebyshev (MVUE) UCL	32.82
95% Chebyshev (MVUE) UCL	37.8	97.5% Chebyshev (MVUE) UCL	44.71

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

99% Chebyshev (MVUE) UCL	58.28		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	27.64	95% Jackknife UCL	28.52
95% Standard Bootstrap UCL	27.31	95% Bootstrap-t UCL	30.44
95% Hall's Bootstrap UCL	34.5	95% Percentile Bootstrap UCL	27.5
95% BCA Bootstrap UCL	28.13		
90% Chebyshev(Mean, Sd) UCL	32.45	95% Chebyshev(Mean, Sd) UCL	37.29
97.5% Chebyshev(Mean, Sd) UCL	43.99	99% Chebyshev(Mean, Sd) UCL	57.16

Suggested UCL to Use

95% Student's-t UCL	28.52		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Selenium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
		Number of Missing Observations	3
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.49	Minimum Non-Detect	0.25
Maximum Detect	0.8	Maximum Non-Detect	0.25
Variance Detects	0.021	Percent Non-Detects	50%
Mean Detects	0.605	SD Detects	0.145
Median Detects	0.565	CV Detects	0.239
Skewness Detects	1.043	Kurtosis Detects	-0.285
Mean of Logged Detects	-0.523	SD of Logged Detects	0.23

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Table B-7			
ProUCL Output - Pre-Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.428	Standard Error of Mean	0.081
SD	0.198	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.581	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.561	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.671	95% KM Chebyshev UCL	0.781
97.5% KM Chebyshev UCL	0.933	99% KM Chebyshev UCL	1.233
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.389	Anderson-Darling GOF Test	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.302	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	24.68	k star (bias corrected MLE)	6.338
Theta hat (MLE)	0.0245	Theta star (bias corrected MLE)	0.0955
nu hat (MLE)	197.5	nu star (bias corrected)	50.7
MLE Mean (bias corrected)	0.605	MLE Sd (bias corrected)	0.24
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	4.642	nu hat (KM)	74.27
Approximate Chi Square Value (74.27, α)	55.43	Adjusted Chi Square Value (74.27, β)	51.33
95% Gamma Approximate KM-UCL (use when n>=50)	0.573	95% Gamma Adjusted KM-UCL (use when n<50)	0.619
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0434	Mean	0.395
Maximum	0.8	Median	0.4
SD	0.255	CV	0.644
k hat (MLE)	1.891	k star (bias corrected MLE)	1.265
Theta hat (MLE)	0.209	Theta star (bias corrected MLE)	0.312
nu hat (MLE)	30.25	nu star (bias corrected)	20.24
MLE Mean (bias corrected)	0.395	MLE Sd (bias corrected)	0.351
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (20.24, α)	11.03	Adjusted Chi Square Value (20.24, β)	9.358
95% Gamma Approximate UCL (use when n>=50)	0.725	95% Gamma Adjusted UCL (use when n<50)	N/A
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk GOF Test	

Table B-7

ProUCL Output - Pre-Development - Box Factory Transformer Area

Human Health Risk Assessment

The Landing - Mount Shasta Commerce Park

Mount Shasta, California

5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.447	Mean in Log Scale	-0.892
SD in Original Scale	0.198	SD in Log Scale	0.447
95% t UCL (assumes normality of ROS data)	0.58	95% Percentile Bootstrap UCL	0.556
95% BCA Bootstrap UCL	0.574	95% Bootstrap t UCL	0.604
95% H-UCL (Log ROS)	0.664		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-0.955	95% H-UCL (KM -Log)	0.631
KM SD (logged)	0.454	95% Critical H Value (KM-Log)	2.278
KM Standard Error of Mean (logged)	0.185		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.365	Mean in Log Scale	-1.301
SD in Original Scale	0.274	SD in Log Scale	0.846
95% t UCL (Assumes normality)	0.548	95% H-Stat UCL	1.033
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.581	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Vanadium			
General Statistics			
Total Number of Observations	8	Number of Distinct Observations	5
		Number of Missing Observations	3
Minimum	30	Mean	33.25
Maximum	35	Median	33.5
SD	1.669	Std. Error of Mean	0.59
Coefficient of Variation	0.0502	Skewness	-1.014

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.37	95% Adjusted-CLT UCL (Chen-1995)	33.99
		95% Modified-t UCL (Johnson-1978)	34.33

Gamma GOF Test

A-D Test Statistic	0.383	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.193	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	441.1	k star (bias corrected MLE)	275.7
Theta hat (MLE)	0.0754	Theta star (bias corrected MLE)	0.121
nu hat (MLE)	7057	nu star (bias corrected)	4412
MLE Mean (bias corrected)	33.25	MLE Sd (bias corrected)	2.002
		Approximate Chi Square Value (0.05)	4259
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	4220

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	34.45	95% Adjusted Gamma UCL (use when n<50)	34.76

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.401	Mean of logged Data	3.503
Maximum of Logged Data	3.555	SD of logged Data	0.0513

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Assuming Lognormal Distribution

95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	35.06
95% Chebyshev (MVUE) UCL	35.88	97.5% Chebyshev (MVUE) UCL	37.02
99% Chebyshev (MVUE) UCL	39.25		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	34.22	95% Jackknife UCL	34.37
95% Standard Bootstrap UCL	34.16	95% Bootstrap-t UCL	34.16
95% Hall's Bootstrap UCL	34.06	95% Percentile Bootstrap UCL	34.13
95% BCA Bootstrap UCL	33.88		
90% Chebyshev(Mean, Sd) UCL	35.02	95% Chebyshev(Mean, Sd) UCL	35.82
97.5% Chebyshev(Mean, Sd) UCL	36.94	99% Chebyshev(Mean, Sd) UCL	39.12

Suggested UCL to Use

95% Student's-t UCL	34.37

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be

reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Zinc

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	3
Minimum	22	Mean	102.5
Maximum	210	Median	89
SD	65.49	Std. Error of Mean	23.15
Coefficient of Variation	0.639	Skewness	0.524

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**

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ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	146.4	95% Adjusted-CLT UCL (Chen-1995)	145.2
		95% Modified-t UCL (Johnson-1978)	147.1
Gamma GOF Test			
A-D Test Statistic	0.163	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.14	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.451	k star (bias corrected MLE)	1.615
Theta hat (MLE)	41.82	Theta star (bias corrected MLE)	63.45
nu hat (MLE)	39.22	nu star (bias corrected)	25.85
MLE Mean (bias corrected)	102.5	MLE Sd (bias corrected)	80.65
		Approximate Chi Square Value (0.05)	15.26
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	13.25
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	173.6	95% Adjusted Gamma UCL (use when n<50)	200
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.091	Mean of logged Data	4.412
Maximum of Logged Data	5.347	SD of logged Data	0.755
Assuming Lognormal Distribution			
95% H-UCL	247.3	90% Chebyshev (MVUE) UCL	190.7
95% Chebyshev (MVUE) UCL	229.5	97.5% Chebyshev (MVUE) UCL	283.3
99% Chebyshev (MVUE) UCL	389.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			

Table B-7
ProUCL Output - Pre-Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Nonparametric Distribution Free UCLs

95% CLT UCL	140.6	95% Jackknife UCL	146.4
95% Standard Bootstrap UCL	137.8	95% Bootstrap-t UCL	156
95% Hall's Bootstrap UCL	149	95% Percentile Bootstrap UCL	137.6
95% BCA Bootstrap UCL	139.6		
90% Chebyshev(Mean, Sd) UCL	172	95% Chebyshev(Mean, Sd) UCL	203.4
97.5% Chebyshev(Mean, Sd) UCL	247.1	99% Chebyshev(Mean, Sd) UCL	332.9

Suggested UCL to Use

95% Student's-t UCL	146.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/10/2015 5:13:26 PM
From File	Soil Data Set_ProUCL Input_g.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor-1260

General Statistics

Total Number of Observations	43	Number of Distinct Observations	22
Number of Detects	18	Number of Non-Detects	25
Number of Distinct Detects	18	Number of Distinct Non-Detects	4
Minimum Detect	0.025	Minimum Non-Detect	0.0096
Maximum Detect	0.17	Maximum Non-Detect	0.5
Variance Detects	0.00215	Percent Non-Detects	58.14%
Mean Detects	0.0692	SD Detects	0.0464
Median Detects	0.048	CV Detects	0.67
Skewness Detects	1.1	Kurtosis Detects	-0.0984
Mean of Logged Detects	-2.862	SD of Logged Detects	0.619

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.826	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.235	Lilliefors GOF Test
5% Lilliefors Critical Value	0.209	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0452	Standard Error of Mean	0.00657
SD	0.0383	95% KM (BCA) UCL	0.0563
95% KM (t) UCL	0.0563	95% KM (Percentile Bootstrap) UCL	0.0561
95% KM (z) UCL	0.056	95% KM Bootstrap t UCL	0.0578
90% KM Chebyshev UCL	0.0649	95% KM Chebyshev UCL	0.0739
97.5% KM Chebyshev UCL	0.0862	99% KM Chebyshev UCL	0.111

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.858	Anderson-Darling GOF Test
5% A-D Critical Value	0.747	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.235	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.205	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

Table B-8			
ProUCL Output - Post Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
k hat (MLE)	2.782	k star (bias corrected MLE)	2.355
Theta hat (MLE)	0.0249	Theta star (bias corrected MLE)	0.0294
nu hat (MLE)	100.1	nu star (bias corrected)	84.78
MLE Mean (bias corrected)	0.0692	MLE Sd (bias corrected)	0.0451
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.393	nu hat (KM)	119.8
Approximate Chi Square Value (119.80, α)	95.52	Adjusted Chi Square Value (119.80, β)	94.77
95% Gamma Approximate KM-UCL (use when n>=50)	0.0567	95% Gamma Adjusted KM-UCL (use when n<50)	0.0572
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0439
Maximum	0.17	Median	0.035
SD	0.039	CV	0.889
k hat (MLE)	1.63	k star (bias corrected MLE)	1.532
Theta hat (MLE)	0.0269	Theta star (bias corrected MLE)	0.0286
nu hat (MLE)	140.2	nu star (bias corrected)	131.8
MLE Mean (bias corrected)	0.0439	MLE Sd (bias corrected)	0.0355
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (131.76, α)	106.2	Adjusted Chi Square Value (131.76, β)	105.5
95% Gamma Approximate UCL (use when n>=50)	0.0544	95% Gamma Adjusted UCL (use when n<50)	0.0548
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0459	Mean in Log Scale	-3.328
SD in Original Scale	0.0372	SD in Log Scale	0.691
95% t UCL (assumes normality of ROS data)	0.0554	95% Percentile Bootstrap UCL	0.0558
95% BCA Bootstrap UCL	0.0569	95% Bootstrap t UCL	0.0585
95% H-UCL (Log ROS)	0.0568		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.393	95% H-UCL (KM -Log)	0.0586
KM SD (logged)	0.776	95% Critical H Value (KM-Log)	2.132
KM Standard Error of Mean (logged)	0.162		
DL/2 Statistics			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.052	Mean in Log Scale	-3.329
SD in Original Scale	0.0517	SD in Log Scale	0.872
95% t UCL (Assumes normality)	0.0652	95% H-Stat UCL	0.0707
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0563	95% KM (% Bootstrap) UCL	0.0561

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	5
		Number of Missing Observations	3
Minimum	0.72	Mean	1.189
Maximum	1.4	Median	1.3
SD	0.227	Std. Error of Mean	0.0858
Coefficient of Variation	0.191	Skewness	-1.792

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.803	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.26	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.355	95% Adjusted-CLT UCL (Chen-1995)	1.268
		95% Modified-t UCL (Johnson-1978)	1.346
Gamma GOF Test			

Table B-8			
ProUCL Output - Post Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
A-D Test Statistic	0.835	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.707	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.272	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	25.79	k star (bias corrected MLE)	14.83
Theta hat (MLE)	0.0461	Theta star (bias corrected MLE)	0.0801
nu hat (MLE)	361.1	nu star (bias corrected)	207.7
MLE Mean (bias corrected)	1.189	MLE Sd (bias corrected)	0.309
		Approximate Chi Square Value (0.05)	175.3
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	166.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.408	95% Adjusted Gamma UCL (use when n<50)	1.484
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.742	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.329	Mean of logged Data	0.153
Maximum of Logged Data	0.336	SD of logged Data	0.226
Assuming Lognormal Distribution			
95% H-UCL	1.443	90% Chebyshev (MVUE) UCL	1.496
95% Chebyshev (MVUE) UCL	1.635	97.5% Chebyshev (MVUE) UCL	1.827
99% Chebyshev (MVUE) UCL	2.204		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.33	95% Jackknife UCL	1.355
95% Standard Bootstrap UCL	1.311	95% Bootstrap-t UCL	1.304
95% Hall's Bootstrap UCL	1.281	95% Percentile Bootstrap UCL	1.3
95% BCA Bootstrap UCL	1.286		
90% Chebyshev(Mean, Sd) UCL	1.446	95% Chebyshev(Mean, Sd) UCL	1.563
97.5% Chebyshev(Mean, Sd) UCL	1.725	99% Chebyshev(Mean, Sd) UCL	2.043
Suggested UCL to Use			
95% Student's-t UCL	1.355		

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ProUCL Output - Post Development - Box Factory Transformer Area
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The Landing - Mount Shasta Commerce Park
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Barium

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	35	Mean	53.71
Maximum	75	Median	54
SD	13.39	Std. Error of Mean	5.06
Coefficient of Variation	0.249	Skewness	0.206

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	63.55	95% Adjusted-CLT UCL (Chen-1995)	62.46
		95% Modified-t UCL (Johnson-1978)	63.61

Gamma GOF Test			
A-D Test Statistic	0.226	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.19	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	18.31	k star (bias corrected MLE)	10.56

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ProUCL Output - Post Development - Box Factory Transformer Area
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The Landing - Mount Shasta Commerce Park
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Theta hat (MLE)	2.934	Theta star (bias corrected MLE)	5.088
nu hat (MLE)	256.3	nu star (bias corrected)	147.8
MLE Mean (bias corrected)	53.71	MLE Sd (bias corrected)	16.53
		Approximate Chi Square Value (0.05)	120.7
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	113.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	65.77	95% Adjusted Gamma UCL (use when n<50)	70.07
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.207	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.555	Mean of logged Data	3.956
Maximum of Logged Data	4.317	SD of logged Data	0.257
Assuming Lognormal Distribution			
95% H-UCL	67.31	90% Chebyshev (MVUE) UCL	69.4
95% Chebyshev (MVUE) UCL	76.5	97.5% Chebyshev (MVUE) UCL	86.34
99% Chebyshev (MVUE) UCL	105.7		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	62.04	95% Jackknife UCL	63.55
95% Standard Bootstrap UCL	61.32	95% Bootstrap-t UCL	64.09
95% Hall's Bootstrap UCL	65.42	95% Percentile Bootstrap UCL	61.14
95% BCA Bootstrap UCL	61		
90% Chebyshev(Mean, Sd) UCL	68.89	95% Chebyshev(Mean, Sd) UCL	75.77
97.5% Chebyshev(Mean, Sd) UCL	85.32	99% Chebyshev(Mean, Sd) UCL	104.1
Suggested UCL to Use			
95% Student's-t UCL	63.55		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Beryllium			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	3
Minimum	0.27	Mean	0.337
Maximum	0.41	Median	0.34
SD	0.0446	Std. Error of Mean	0.0169
Coefficient of Variation	0.132	Skewness	0.248
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.981	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.189	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.37	95% Adjusted-CLT UCL (Chen-1995)	0.367
		95% Modified-t UCL (Johnson-1978)	0.37
Gamma GOF Test			
A-D Test Statistic	0.191	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.171	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	66.6	k star (bias corrected MLE)	38.15
Theta hat (MLE)	0.00506	Theta star (bias corrected MLE)	0.00884
nu hat (MLE)	932.5	nu star (bias corrected)	534.2
MLE Mean (bias corrected)	0.337	MLE Sd (bias corrected)	0.0546
		Approximate Chi Square Value (0.05)	481.6
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	466.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.374	95% Adjusted Gamma UCL (use when n<50)	0.386
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.983	Shapiro Wilk Lognormal GOF Test	

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ProUCL Output - Post Development - Box Factory Transformer Area
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5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.309	Mean of logged Data	-1.095
Maximum of Logged Data	-0.892	SD of logged Data	0.133
Assuming Lognormal Distribution			
95% H-UCL	0.374	90% Chebyshev (MVUE) UCL	0.388
95% Chebyshev (MVUE) UCL	0.411	97.5% Chebyshev (MVUE) UCL	0.443
99% Chebyshev (MVUE) UCL	0.506		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.365	95% Jackknife UCL	0.37
95% Standard Bootstrap UCL	0.363	95% Bootstrap-t UCL	0.375
95% Hall's Bootstrap UCL	0.383	95% Percentile Bootstrap UCL	0.363
95% BCA Bootstrap UCL	0.366		
90% Chebyshev(Mean, Sd) UCL	0.388	95% Chebyshev(Mean, Sd) UCL	0.411
97.5% Chebyshev(Mean, Sd) UCL	0.442	99% Chebyshev(Mean, Sd) UCL	0.505
Suggested UCL to Use			
95% Student's-t UCL	0.37		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Cadmium			
General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	1.2	Mean	1.586
Maximum	2.3	Median	1.5
SD	0.372	Std. Error of Mean	0.14
Coefficient of Variation	0.234	Skewness	1.303
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			

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For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.859	95% Adjusted-CLT UCL (Chen-1995)	1.891
		95% Modified-t UCL (Johnson-1978)	1.87
Gamma GOF Test			
A-D Test Statistic	0.271	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	23.51	k star (bias corrected MLE)	13.53
Theta hat (MLE)	0.0674	Theta star (bias corrected MLE)	0.117
nu hat (MLE)	329.2	nu star (bias corrected)	189.4
MLE Mean (bias corrected)	1.586	MLE Sd (bias corrected)	0.431
		Approximate Chi Square Value (0.05)	158.6
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	150
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.894	95% Adjusted Gamma UCL (use when n<50)	2.002
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.182	Mean of logged Data	0.44
Maximum of Logged Data	0.833	SD of logged Data	0.219
Assuming Lognormal Distribution			
95% H-UCL	1.905	90% Chebyshev (MVUE) UCL	1.978

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95% Chebyshev (MVUE) UCL	2.156	97.5% Chebyshev (MVUE) UCL	2.403
99% Chebyshev (MVUE) UCL	2.889		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.817	95% Jackknife UCL	1.859
95% Standard Bootstrap UCL	1.803	95% Bootstrap-t UCL	2.06
95% Hall's Bootstrap UCL	3.122	95% Percentile Bootstrap UCL	1.814
95% BCA Bootstrap UCL	1.871		
90% Chebyshev(Mean, Sd) UCL	2.007	95% Chebyshev(Mean, Sd) UCL	2.198
97.5% Chebyshev(Mean, Sd) UCL	2.463	99% Chebyshev(Mean, Sd) UCL	2.983

Suggested UCL to Use

95% Student's-t UCL	1.859

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Chromium

General Statistics

Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	3
Minimum	6.5	Mean	13.59
Maximum	24	Median	13
SD	6.08	Std. Error of Mean	2.298
Coefficient of Variation	0.448	Skewness	0.493

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
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95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18.05	95% Adjusted-CLT UCL (Chen-1995)	17.82
		95% Modified-t UCL (Johnson-1978)	18.12
Gamma GOF Test			
A-D Test Statistic	0.369	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.23	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.504	k star (bias corrected MLE)	3.241
Theta hat (MLE)	2.468	Theta star (bias corrected MLE)	4.192
nu hat (MLE)	77.06	nu star (bias corrected)	45.37
MLE Mean (bias corrected)	13.59	MLE Sd (bias corrected)	7.547
		Approximate Chi Square Value (0.05)	30.92
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	27.36
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	19.94	95% Adjusted Gamma UCL (use when n<50)	22.52
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.872	Mean of logged Data	2.515
Maximum of Logged Data	3.178	SD of logged Data	0.482
Assuming Lognormal Distribution			
95% H-UCL	22.37	90% Chebyshev (MVUE) UCL	21.13
95% Chebyshev (MVUE) UCL	24.53	97.5% Chebyshev (MVUE) UCL	29.23
99% Chebyshev (MVUE) UCL	38.48		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	17.37	95% Jackknife UCL	18.05
95% Standard Bootstrap UCL	17.13	95% Bootstrap-t UCL	18.51
95% Hall's Bootstrap UCL	19.32	95% Percentile Bootstrap UCL	17.23
95% BCA Bootstrap UCL	17.36		

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90% Chebyshev(Mean, Sd) UCL	20.48	95% Chebyshev(Mean, Sd) UCL	23.6
97.5% Chebyshev(Mean, Sd) UCL	27.94	99% Chebyshev(Mean, Sd) UCL	36.45

Suggested UCL to Use

95% Student's-t UCL	18.05

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Cobalt

General Statistics

Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	3
Minimum	3.1	Mean	4.614
Maximum	5.7	Median	5.2
SD	1.064	Std. Error of Mean	0.402
Coefficient of Variation	0.231	Skewness	-0.802

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.396	95% Adjusted-CLT UCL (Chen-1995)	5.145
		95% Modified-t UCL (Johnson-1978)	5.375

Gamma GOF Test

A-D Test Statistic	0.699	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.301	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

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ProUCL Output - Post Development - Box Factory Transformer Area
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Gamma Statistics			
k hat (MLE)	19.47	k star (bias corrected MLE)	11.22
Theta hat (MLE)	0.237	Theta star (bias corrected MLE)	0.411
nu hat (MLE)	272.6	nu star (bias corrected)	157.1
MLE Mean (bias corrected)	4.614	MLE Sd (bias corrected)	1.377
		Approximate Chi Square Value (0.05)	129.1
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	121.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.614	95% Adjusted Gamma UCL (use when n<50)	5.968
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.808	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.288	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.131	Mean of logged Data	1.503
Maximum of Logged Data	1.74	SD of logged Data	0.254
Assuming Lognormal Distribution			
95% H-UCL	5.77	90% Chebyshev (MVUE) UCL	5.953
95% Chebyshev (MVUE) UCL	6.556	97.5% Chebyshev (MVUE) UCL	7.393
99% Chebyshev (MVUE) UCL	9.037		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.276	95% Jackknife UCL	5.396
95% Standard Bootstrap UCL	5.23	95% Bootstrap-t UCL	5.237
95% Hall's Bootstrap UCL	5.064	95% Percentile Bootstrap UCL	5.2
95% BCA Bootstrap UCL	5.129		
90% Chebyshev(Mean, Sd) UCL	5.82	95% Chebyshev(Mean, Sd) UCL	6.367
97.5% Chebyshev(Mean, Sd) UCL	7.125	99% Chebyshev(Mean, Sd) UCL	8.614
Suggested UCL to Use			
95% Student's-t UCL	5.396		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Table B-8
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Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Copper

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	3
Minimum	14	Mean	26.86
Maximum	55	Median	25
SD	14.11	Std. Error of Mean	5.334
Coefficient of Variation	0.525	Skewness	1.557

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.22	95% Adjusted-CLT UCL (Chen-1995)	38.98
		95% Modified-t UCL (Johnson-1978)	37.74
Gamma GOF Test			
A-D Test Statistic	0.321	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.219	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.117	k star (bias corrected MLE)	3.019
Theta hat (MLE)	5.249	Theta star (bias corrected MLE)	8.895
nu hat (MLE)	71.64	nu star (bias corrected)	42.27
MLE Mean (bias corrected)	26.86	MLE Sd (bias corrected)	15.46
		Approximate Chi Square Value (0.05)	28.36
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	24.98

Table B-8			
ProUCL Output - Post Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	40.02	95% Adjusted Gamma UCL (use when n<50)	45.45
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.189	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.639	Mean of logged Data	3.19
Maximum of Logged Data	4.007	SD of logged Data	0.469
Assuming Lognormal Distribution			
95% H-UCL	42.89	90% Chebyshev (MVUE) UCL	40.9
95% Chebyshev (MVUE) UCL	47.35	97.5% Chebyshev (MVUE) UCL	56.3
99% Chebyshev (MVUE) UCL	73.89		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	35.63	95% Jackknife UCL	37.22
95% Standard Bootstrap UCL	34.83	95% Bootstrap-t UCL	46.52
95% Hall's Bootstrap UCL	82.17	95% Percentile Bootstrap UCL	35.71
95% BCA Bootstrap UCL	37.86		
90% Chebyshev(Mean, Sd) UCL	42.86	95% Chebyshev(Mean, Sd) UCL	50.11
97.5% Chebyshev(Mean, Sd) UCL	60.17	99% Chebyshev(Mean, Sd) UCL	79.93
Suggested UCL to Use			
95% Student's-t UCL	37.22		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Lead			
General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	12	Mean	33.71
Maximum	82	Median	28

Table B-8			
ProUCL Output - Post Development - Box Factory Transformer Area			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			
SD	23.82	Std. Error of Mean	9.002
Coefficient of Variation	0.706	Skewness	1.642
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.834	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.276	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	51.21	95% Adjusted-CLT UCL (Chen-1995)	54.49
		95% Modified-t UCL (Johnson-1978)	52.14
Gamma GOF Test			
A-D Test Statistic	0.312	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.713	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.809	k star (bias corrected MLE)	1.7
Theta hat (MLE)	12	Theta star (bias corrected MLE)	19.83
nu hat (MLE)	39.32	nu star (bias corrected)	23.8
MLE Mean (bias corrected)	33.71	MLE Sd (bias corrected)	25.86
		Approximate Chi Square Value (0.05)	13.7
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	11.45
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	58.58	95% Adjusted Gamma UCL (use when n<50)	70.07
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.954	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Minimum of Logged Data	2.485	Mean of logged Data	3.329
Maximum of Logged Data	4.407	SD of logged Data	0.654

Assuming Lognormal Distribution

95% H-UCL	72.96	90% Chebyshev (MVUE) UCL	58.35
95% Chebyshev (MVUE) UCL	69.65	97.5% Chebyshev (MVUE) UCL	85.33
99% Chebyshev (MVUE) UCL	116.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	48.52	95% Jackknife UCL	51.21
95% Standard Bootstrap UCL	47.49	95% Bootstrap-t UCL	69.15
95% Hall's Bootstrap UCL	132.9	95% Percentile Bootstrap UCL	48.29
95% BCA Bootstrap UCL	53.71		
90% Chebyshev(Mean, Sd) UCL	60.72	95% Chebyshev(Mean, Sd) UCL	72.95
97.5% Chebyshev(Mean, Sd) UCL	89.93	99% Chebyshev(Mean, Sd) UCL	123.3

Suggested UCL to Use

95% Student's-t UCL	51.21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

Mercury

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	0.021	Mean	0.33
Maximum	1.7	Median	0.051
SD	0.613	Std. Error of Mean	0.232
Coefficient of Variation	1.855	Skewness	2.498

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.586	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data Not Normal at 5% Significance Level

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Lilliefors Test Statistic	0.383	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.78	95% Adjusted-CLT UCL (Chen-1995)	0.945
		95% Modified-t UCL (Johnson-1978)	0.817
Gamma GOF Test			
A-D Test Statistic	0.662	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.276	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.327	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.52	k star (bias corrected MLE)	0.393
Theta hat (MLE)	0.635	Theta star (bias corrected MLE)	0.841
nu hat (MLE)	7.284	nu star (bias corrected)	5.495
MLE Mean (bias corrected)	0.33	MLE Sd (bias corrected)	0.527
		Approximate Chi Square Value (0.05)	1.388
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	0.86
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1.308	95% Adjusted Gamma UCL (use when n<50)	2.11
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.23	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.863	Mean of logged Data	-2.321
Maximum of Logged Data	0.531	SD of logged Data	1.606
Assuming Lognormal Distribution			
95% H-UCL	13.25	90% Chebyshev (MVUE) UCL	0.727
95% Chebyshev (MVUE) UCL	0.936	97.5% Chebyshev (MVUE) UCL	1.228
99% Chebyshev (MVUE) UCL	1.8		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Nonparametric Distribution Free UCLs			
95% CLT UCL	0.711	95% Jackknife UCL	0.78
95% Standard Bootstrap UCL	0.683	95% Bootstrap-t UCL	3.086
95% Hall's Bootstrap UCL	3.044	95% Percentile Bootstrap UCL	0.766
95% BCA Bootstrap UCL	1.005		
90% Chebyshev(Mean, Sd) UCL	1.025	95% Chebyshev(Mean, Sd) UCL	1.34
97.5% Chebyshev(Mean, Sd) UCL	1.776	99% Chebyshev(Mean, Sd) UCL	2.634
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.11		
Recommended UCL exceeds the maximum observation			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Nickel

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	9.3	Mean	18.9
Maximum	26	Median	21
SD	6.338	Std. Error of Mean	2.396
Coefficient of Variation	0.335	Skewness	-0.597

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test		
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	23.55	95% Adjusted-CLT UCL (Chen-1995)	22.26
		95% Modified-t UCL (Johnson-1978)	23.46

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Gamma GOF Test			
A-D Test Statistic	0.424	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.237	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.703	k star (bias corrected MLE)	5.069
Theta hat (MLE)	2.172	Theta star (bias corrected MLE)	3.729
nu hat (MLE)	121.8	nu star (bias corrected)	70.96
MLE Mean (bias corrected)	18.9	MLE Sd (bias corrected)	8.395
		Approximate Chi Square Value (0.05)	52.57
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	47.82
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	25.51	95% Adjusted Gamma UCL (use when n<50)	28.05
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.235	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.23	Mean of logged Data	2.881
Maximum of Logged Data	3.258	SD of logged Data	0.388
Assuming Lognormal Distribution			
95% H-UCL	27.6	90% Chebyshev (MVUE) UCL	27.4
95% Chebyshev (MVUE) UCL	31.21	97.5% Chebyshev (MVUE) UCL	36.49
99% Chebyshev (MVUE) UCL	46.86		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	22.84	95% Jackknife UCL	23.55
95% Standard Bootstrap UCL	22.57	95% Bootstrap-t UCL	22.94
95% Hall's Bootstrap UCL	21.89	95% Percentile Bootstrap UCL	22.43
95% BCA Bootstrap UCL	22.14		
90% Chebyshev(Mean, Sd) UCL	26.09	95% Chebyshev(Mean, Sd) UCL	29.34
97.5% Chebyshev(Mean, Sd) UCL	33.86	99% Chebyshev(Mean, Sd) UCL	42.74
Suggested UCL to Use			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% Student's-t UCL	23.55		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Selenium

General Statistics

Total Number of Observations	7	Number of Distinct Observations	4
		Number of Missing Observations	3
Number of Detects	3	Number of Non-Detects	4
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.49	Minimum Non-Detect	0.25
Maximum Detect	0.8	Maximum Non-Detect	0.25
Variance Detects	0.0241	Percent Non-Detects	57.14%
Mean Detects	0.64	SD Detects	0.155
Median Detects	0.63	CV Detects	0.243
Skewness Detects	0.289	Kurtosis Detects	N/A
Mean of Logged Detects	-0.466	SD of Logged Detects	0.245

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.997	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.417	Standard Error of Mean	0.0972
SD	0.21	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.606	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.577	95% KM Bootstrap t UCL	N/A

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

90% KM Chebyshev UCL	0.709	95% KM Chebyshev UCL	0.841
97.5% KM Chebyshev UCL	1.024	99% KM Chebyshev UCL	1.385
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	25.3	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0253	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	151.8	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.943	nu hat (KM)	55.2
		Adjusted Level of Significance (β)	0.0158
Approximate Chi Square Value (55.20, α)	39.12	Adjusted Chi Square Value (55.20, β)	35.08
95% Gamma Approximate KM-UCL (use when n>=50)	0.589	95% Gamma Adjusted KM-UCL (use when n<50)	0.656
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.424	Mean in Log Scale	-0.982
SD in Original Scale	0.227	SD in Log Scale	0.544
95% t UCL (assumes normality of ROS data)	0.591	95% Percentile Bootstrap UCL	0.562
95% BCA Bootstrap UCL	0.574	95% Bootstrap t UCL	0.661
95% H-UCL (Log ROS)	0.766		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-0.992	95% H-UCL (KM -Log)	0.661
KM SD (logged)	0.474	95% Critical H Value (KM-Log)	2.406
KM Standard Error of Mean (logged)	0.219		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.346	Mean in Log Scale	-1.388
SD in Original Scale	0.29	SD in Log Scale	0.874
95% t UCL (Assumes normality)	0.558	95% H-Stat UCL	1.208
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Suggested UCL to Use			
95% KM (t) UCL	0.606	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Vanadium

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	5
		Number of Missing Observations	3
Minimum	30	Mean	33
Maximum	35	Median	33
SD	1.633	Std. Error of Mean	0.617
Coefficient of Variation	0.0495	Skewness	-0.964

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.2	95% Adjusted-CLT UCL (Chen-1995)	33.77
		95% Modified-t UCL (Johnson-1978)	34.16

Gamma GOF Test			
A-D Test Statistic	0.342	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.22	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

k hat (MLE)	464.6	k star (bias corrected MLE)	265.6
Theta hat (MLE)	0.071	Theta star (bias corrected MLE)	0.124
nu hat (MLE)	6505	nu star (bias corrected)	3718
MLE Mean (bias corrected)	33	MLE Sd (bias corrected)	2.025
		Approximate Chi Square Value (0.05)	3578
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	3536
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	34.3	95% Adjusted Gamma UCL (use when n<50)	34.71
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.401	Mean of logged Data	3.495
Maximum of Logged Data	3.555	SD of logged Data	0.0504
Assuming Lognormal Distribution			
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	34.89
95% Chebyshev (MVUE) UCL	35.74	97.5% Chebyshev (MVUE) UCL	36.93
99% Chebyshev (MVUE) UCL	39.26		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	34.02	95% Jackknife UCL	34.2
95% Standard Bootstrap UCL	33.96	95% Bootstrap-t UCL	33.93
95% Hall's Bootstrap UCL	33.81	95% Percentile Bootstrap UCL	33.86
95% BCA Bootstrap UCL	33.71		
90% Chebyshev(Mean, Sd) UCL	34.85	95% Chebyshev(Mean, Sd) UCL	35.69
97.5% Chebyshev(Mean, Sd) UCL	36.85	99% Chebyshev(Mean, Sd) UCL	39.14
Suggested UCL to Use			
95% Student's-t UCL	34.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Zinc

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	3
Minimum	22	Mean	87.14
Maximum	170	Median	83
SD	52.94	Std. Error of Mean	20.01
Coefficient of Variation	0.607	Skewness	0.519
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	126	95% Adjusted-CLT UCL (Chen-1995)	124.2
		95% Modified-t UCL (Johnson-1978)	126.7
Gamma GOF Test			
A-D Test Statistic	0.163	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.713	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.14	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.803	k star (bias corrected MLE)	1.697
Theta hat (MLE)	31.09	Theta star (bias corrected MLE)	51.36
nu hat (MLE)	39.24	nu star (bias corrected)	23.76
MLE Mean (bias corrected)	87.14	MLE Sd (bias corrected)	66.9
		Approximate Chi Square Value (0.05)	13.66
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	11.42
Assuming Gamma Distribution			

Table B-8
ProUCL Output - Post Development - Box Factory Transformer Area
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

95% Approximate Gamma UCL (use when n>=50))	151.5	95% Adjusted Gamma UCL (use when n<50)	181.3
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.091	Mean of logged Data	4.279
Maximum of Logged Data	5.136	SD of logged Data	0.706
Assuming Lognormal Distribution			
95% H-UCL	214.5	90% Chebyshev (MVUE) UCL	160.4
95% Chebyshev (MVUE) UCL	192.8	97.5% Chebyshev (MVUE) UCL	237.8
99% Chebyshev (MVUE) UCL	326.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	120.1	95% Jackknife UCL	126
95% Standard Bootstrap UCL	118.4	95% Bootstrap-t UCL	141.4
95% Hall's Bootstrap UCL	144.3	95% Percentile Bootstrap UCL	119.4
95% BCA Bootstrap UCL	120.3		
90% Chebyshev(Mean, Sd) UCL	147.2	95% Chebyshev(Mean, Sd) UCL	174.4
97.5% Chebyshev(Mean, Sd) UCL	212.1	99% Chebyshev(Mean, Sd) UCL	286.2
Suggested UCL to Use			
95% Student's-t UCL	126		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

Table B-9			
ProUCL Output - Pre-Development - Box Factory Burner			
Human Health Risk Assessment			
The Landing - Mount Shasta Commerce Park			
Mount Shasta, California			

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	9/14/2015 12:22:13 PM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TCDD TEQ

General Statistics			
Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	2
Minimum	2.0133E-6	Mean	2.0130E-4
Maximum	0.00159	Median	6.1748E-5
SD	4.4527E-4	Std. Error of Mean	1.2854E-4
Coefficient of Variation	2.212	Skewness	3.264
Normal GOF Test			
Shapiro Wilk Test Statistic	0.477	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.392	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.3214E-4	95% Adjusted-CLT UCL (Chen-1995)	5.4212E-4
		95% Modified-t UCL (Johnson-1978)	4.5232E-4
Gamma GOF Test			
A-D Test Statistic	0.702	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.801	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.221	Kolmogrov-Smirnoff Gamma GOF Test	
5% K-S Critical Value	0.261	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.418	k star (bias corrected MLE)	0.369
Theta hat (MLE)	4.8110E-4	Theta star (bias corrected MLE)	5.4498E-4
nu hat (MLE)	10.04	nu star (bias corrected)	8.865
MLE Mean (bias corrected)	2.0130E-4	MLE Sd (bias corrected)	3.3121E-4
		Approximate Chi Square Value (0.05)	3.245
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	2.748

Table B-9
ProUCL Output - Pre-Development - Box Factory Burner
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	5.4983E-4	95% Adjusted Gamma UCL (use when n<50)	6.4935E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.256	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-13.12	Mean of logged Data	-10.07
Maximum of Logged Data	-6.443	SD of logged Data	1.919
Assuming Lognormal Distribution			
95% H-UCL	0.00425	90% Chebyshev (MVUE) UCL	5.4044E-4
95% Chebyshev (MVUE) UCL	6.9804E-4	97.5% Chebyshev (MVUE) UCL	9.1678E-4
99% Chebyshev (MVUE) UCL	0.00135		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.1272E-4	95% Jackknife UCL	4.3214E-4
95% Standard Bootstrap UCL	4.0196E-4	95% Bootstrap-t UCL	0.00141
95% Hall's Bootstrap UCL	0.00134	95% Percentile Bootstrap UCL	4.5605E-4
95% BCA Bootstrap UCL	5.6802E-4		
90% Chebyshev(Mean, Sd) UCL	5.8691E-4	95% Chebyshev(Mean, Sd) UCL	7.6159E-4
97.5% Chebyshev(Mean, Sd) UCL	0.001	99% Chebyshev(Mean, Sd) UCL	0.00148
Suggested UCL to Use			
95% Adjusted Gamma UCL	6.4935E-4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

Table B-10
ProUCL Output - Post Development - Box Factory Burner
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	9/14/2015 12:22:13 PM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TCDD TEQ

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	7
Minimum	2.0133E-6	Mean	8.9900E-6
Maximum	2.0923E-5	Median	8.1452E-6
SD	6.5122E-6	Std. Error of Mean	2.3024E-6
Coefficient of Variation	N/A	Skewness	0.76

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.906	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.23	Lilliefors GOF Test
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.3352E-5	95% Adjusted-CLT UCL (Chen-1995)	1.3438E-5
		95% Modified-t UCL (Johnson-1978)	1.3455E-5

Gamma GOF Test

A-D Test Statistic	0.325	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.009	k star (bias corrected MLE)	1.339

Table B-10
ProUCL Output - Post Development - Box Factory Burner
Human Health Risk Assessment
The Landing - Mount Shasta Commerce Park
Mount Shasta, California

Theta hat (MLE)	4.4751E-6	Theta star (bias corrected MLE)	6.7145E-6
nu hat (MLE)	32.14	nu star (bias corrected)	21.42
MLE Mean (bias corrected)	8.9900E-6	MLE Sd (bias corrected)	7.7693E-6
		Approximate Chi Square Value (0.05)	11.91
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	10.16
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.6175E-5	95% Adjusted Gamma UCL (use when n<50)	1.8956E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-13.12	Mean of logged Data	-11.89
Maximum of Logged Data	-10.77	SD of logged Data	0.825
Assuming Lognormal Distribution			
95% H-UCL	2.4671E-5	90% Chebyshev (MVUE) UCL	1.7343E-5
95% Chebyshev (MVUE) UCL	2.1047E-5	97.5% Chebyshev (MVUE) UCL	2.6187E-5
99% Chebyshev (MVUE) UCL	3.6285E-5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.2777E-5	95% Jackknife UCL	1.3352E-5
95% Standard Bootstrap UCL	1.2577E-5	95% Bootstrap-t UCL	1.4373E-5
95% Hall's Bootstrap UCL	1.3214E-5	95% Percentile Bootstrap UCL	1.2617E-5
95% BCA Bootstrap UCL	1.2538E-5		
90% Chebyshev(Mean, Sd) UCL	1.5897E-5	95% Chebyshev(Mean, Sd) UCL	1.9026E-5
97.5% Chebyshev(Mean, Sd) UCL	2.3369E-5	99% Chebyshev(Mean, Sd) UCL	3.1899E-5
Suggested UCL to Use			
95% Student's-t UCL	1.3352E-5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.