REVISED ADDITIONAL SOIL INVESTIGATION REPORT AND HUMAN HEALTH SCREENING EVALUATION

Lower Main Meadow, Pogonip Open Space
501 Golf Club Drive
Santa Cruz, California

01-POG-002

Prepared For:

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1.0 INTRODUCTION

RMD Environmental Solutions, Inc. (RMD), on behalf of the City of Santa Cruz (the City), has prepared this *Revised Additional Soil Investigation Report and Human Health Screening Evaluation* (Report) for the Lower Main Meadow, Pogonip Open Space, located at 501 Golf Club Drive[1] in Santa Cruz, California (the Site, Figures 1 and 2). The investigation activities documented in this Report were conducted in accordance with the *Revised Delineation of Lead-Impacted Soil Work Plan*, dated May 26, 2021 (Work Plan; RMD, 2021a) and the County of Santa Cruz (the County) approval letter, dated June 2, 2021. This Report was prepared in response to the County's letter dated December 15, 2021, which requested a revised report to address comments to the *Additional Soil Investigation Report and Human Health Screening Evaluation* (Report) dated October 15, 2021 (RMD, 2021b).

The Site is located in the Pogonip Open Space Preserve. The City leased approximately 9.5 acres in the lower meadow area of the preserve to the Homeless Garden Project (HGP), a non-profit organization, for conversion from recreational and natural open space to an agricultural and educational farm. In 2019, the City learned that a portion of the Site had been used as a skeet and trap shooting range between the 1930s and 1950s. Metals, primarily lead and to a lesser extent antimony, arsenic, copper, and zinc, are associated with shot, and polycyclic aromatic hydrocarbons (PAHs) are associated with clay targets. In 2019, a *Phase I Environmental Site Assessment* (Phase I; Weber, Hayes & Associates [WHA], 2019) identified the following two recognized environmental conditions (RECs):

- The historic operation of a skeet shooting range with confirmed elevated lead and PAH concentrations in shallow soil samples; and
- The presence of trash and debris primarily observed within the ravine of the lower meadow where homeless encampments have been established.

Based on the proposed land use by HGP, these RECs were investigated and the results were reported in the *Preliminary Endangerment Assessment Report* (PEA Report; RMD, 2020b). Based on the findings of the PEA Report, PAHs and select metals, primarily lead, were identified in HGP's proposed planting areas of the Site. PAHs have been adequately delineated at the Site.

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[1] Note, the Site address changed from 333 Golf Club Drive to 501 Golf Club Drive in 2021.

1.1 Project Objective

The objective of this investigation was to delineate the horizontal and vertical extent of lead in shallow soil associated with the historic shooting range in areas not previously investigated at the Site.

1.2 Scope of Work

To meet this objective, the delineation investigation included the following scope of work:

- Field screening of surface and shallow soil samples for the presence of lead shot.
- Collection and laboratory analysis of soil samples for lead.
- Assess laboratory analytical results to determine the nature, concentration, and extent of lead at the surface and in shallow soil at the Site.
- Compare soil sample analytical results to human health and environmental screening levels presented in the Work Plan (RMD, 2021a).

This Report documents completion of the above-mentioned activities and considers results of this investigation to evaluate the nature and extent of lead and whether any corrective actions are warranted relative to the existing and proposed land-uses. Additionally, the Report includes an updated screening level evaluation for PAHs using data from the May 2020 investigation and development of screening levels for the hypothetical unauthorized camper receptor.

2.0 SITE BACKGROUND

2.1 Site Location and Description

The Site is identified as the Lower Main Meadow of the Pogonip Open Space Preserve in Santa Cruz, California (Figure 1). The Site is the southern portion of the larger Santa Cruz County Assessor's Parcel Number [APN] 001-211-01 (Figure 2), with the Site entrance located at 36.990364°N, 122.036831°W. The Site is currently undeveloped except for a series of dirt roads and hiking trails accessible from Golf Club Drive, which is located along the southern and western Site boundaries (Figure 2). The Site is divided into the east meadow, the west meadow, a ravine between the east and west meadows, the north orchard, and the Emma McCrary Trail Area (Figure 2). A 0.08-acre seasonal wetland has been identified in the northern portion of west meadow. The Site is bordered by additional open space and the Pogonip clubhouse to the northwest, additional open space and a former horse stable to the southwest, a forested slope to the east with a railroad line, Highway 9 and the San Lorenzo River beyond, and a plant nursery and Santa Cruz METRO office buildings to the south with commercial businesses beyond.

The California Department of Toxic Substances Control (DTSC) was the lead oversight agency during the PEA investigation described in the PEA Report. The County is the current lead oversight agency for the delineation activities described in this Report.

A record of environmental conditions at the Site (i.e., regulatory directives and correspondence, Site documents, and analytical data) may be obtained through a review of the case files for DTSC EnviroStor Database Number 60002874 at the following website: https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=60002874 (Site Code 202272).

2.2 Historical Land Use

The following summarizes the historical land use based on information presented in the Phase I:

- Beginning in approximately 1850, the area surrounding the Site was used for limestone mining and the production of lime;
- From approximately 1912 through 1986, the Site was part of a social club that included:
    - In 1912, the Site and surrounding open space were developed into a golf course and social club. The Pogonip clubhouse is located northeast of the Site;
    - In 1935, the golf course was turned into polo fields with horse stables located immediately off-Site to the west;

  - In 1937, the polo club constructed a skeet shooting range in the west meadow between Golf Club Drive and the ravine;
  - In 1948, a shooting range with a "Remington electrical trap" was added adjacent to the existing skeet shooting range, and the grounds were leveled by grading;
  - A 1956 aerial photograph of the Site shows the shooting range infrastructure removed and the area opened to rangeland;
  - From approximately 1958 to 1967, the Site was used for cattle grazing; and
  - In 1987, the Pogonip clubhouse was posted as unsafe for occupancy.

2.3 Current Land Use

In 1989, the Site was acquired by the City and has since been maintained as recreational open space. A fire break is maintained along the eastern boundary of the Site. During Phase I activities, Site inspection observations included concrete shooting pads and clay target fragments in the west meadow. In addition, the presence of unauthorized camping and some trash and debris, including shopping carts and hypodermic needles, were observed largely in the ravine area. City staff perform homeless encampment clean-ups; fire prevention work, such as removing vegetation and clearing dead trees; and trail work along the existing trails.

2.4 Anticipated Land Use

Based on results of the PEA Report, the HGP may develop portions of the west meadow, east meadow, and north orchard classified as unrestricted land use into active farming land. The HGP has considered plans to fence off the unrestricted portions of the Site to delineate their planting areas. An Operation and Maintenance Plan and Development Plans for the Pogonip Farm and Garden propose a building complex, consisting of an administrative building, a pole barn, two greenhouses, and parking in the northeast portion of the west meadow along Golf Club Drive (HGP, 2017). In areas of the Site classified as restricted land use, the City has posted signs notifying the public of known shallow soil contamination in the area. In July 2021, HGP sent a letter to the Mayor and City Councilmembers requesting to relocate the site of the planned Pogonip Farm and Garden from the Lower Main Meadow to the Upper Main Meadow. The Upper Main Meadow is located near the Pogonip clubhouse, an area outside the hypothetical range of lead shot and clay targets that is not expected to be impacted by the former skeet and trap shooting use. The City is currently evaluating the possibility of relocating the farm to this recently proposed location. In unfarmed areas, the Site is and would continue to be used for outdoor recreation (hiking and biking trails), natural resource and trail management, and homeless encampment clean-up activities.

2.5 Geological and Hydrogeological Setting

As described in the Phase I, grassland terraces are composed of fine-grained unconsolidated terrace deposits that overlie bedrock sandstones of the Santa Margarita Formation. Perched shallow groundwater supports seasonal wetlands and seeps. A 345-foot deep water supply well near the Pogonip clubhouse reported a depth to water of 128 feet below ground surface (bgs) in 1993. Previous investigations indicate shallow soil at the Site consist mainly of sandy silts with fine-grained sand to depths of 2 feet bgs.

2.6 Conceptual Shooting Range Contaminant Distribution

The types and distribution of contaminants associated with shooting ranges typically display a systematic pattern (Interstate Technology & Regulatory Council [ITRC], 2005). In general, metals, primarily lead and to a lesser extent antimony, arsenic, copper and zinc, are associated with shot, and PAHs are associated with clay targets. These materials are expected to be deposited on the surface or near surface.

Trap and skeet shooting ranges feature a fan-shaped clay target and shot fall zone radiating from the shooting pads. Although the distribution may vary, the following general dimensions relative to the shooting pads are hypothetically expected:

- 0 to 100 feet – Spent cartridge cases and wads;
- 200 to 325 feet – Clay target fragments; and
- 200 to 700 feet (skeet)/770 feet (trap) – Shot fall zone, with the greatest anticipated shot density at 400 to 600 feet.

This conceptual distribution of contaminants was generally observed during the PEA investigation conducted in May 2020 (Section 2.7.3).

2.7 Previous Site Investigations

Between November 2018 and March 2021, soil samples were collected. Consistent with the anticipated land use and the PEA Report, the following soil screening levels (SLs) were compared with Site investigation results:

- Background Concentrations for Metals – DTSC (2015) recommends that metals detected at background (ambient) levels not be identified as chemicals of potential concern

(COPCs) at a site. In accordance with the DTSC-approved *Preliminary Endangerment Assessment Work Plan* (RMD, 2020a), a 2009 Lawrence Berkeley National Laboratory (LBNL) study was used to identify acceptable background levels for metals except for arsenic, which used the background level for San Francisco Bay Region of 11 milligrams per kilogram (mg/kg, Duvergé, 2011). Table 1 of the PEA Report presents background levels for metals detected in soil.

- Risk-Based SLs – The risk-based soil SLs include U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs; USEPA, 2021) modified per DTSC Office of Human and Ecological Risk Human Health Risk Assessment (HHRA) Note Number 3 (HHRA Note 3; DTSC, 2020) in accordance with the PEA Manual (DTSC, 2015). The risk-based soil SLs were available for unrestricted residential and commercial/industrial receptors. Risk-based soil SLs for lead were developed separately, as described in the following bullet.
- Lead SLs – Unlike other COPCs, the soil SL for lead is based on blood-lead models. Neither USEPA nor California Environmental Protection Agency (CalEPA) publishes toxicity values for lead. In the absence of toxicity values, noncarcinogenic effects from exposure to lead are evaluated by predicting blood lead concentrations using toxicokinetic modeling. This section describes the blood-lead models used to develop lead soil SLs for the hypothetical long-term receptors anticipated at the Site.
    - **Future On-Site Unrestricted Receptor** - This receptor is a long-term receptor that includes unrestricted land use, which may include farming and gardening activities for the purpose of cultivating, consuming and/or selling produce. DTSC LeadSpread 8[2] is recommended by DTSC for evaluating lead exposure under unrestricted land use. This model is based on child exposures only and an exposure frequency of seven days per week. Based on this model, DTSC's soil SL for lead is 80 mg/kg (DTSC, 2020). The soil SL of 80 mg/kg represents a reasonably conservative soil SL to protect future on-Site unrestricted receptors (RMD, 2020b).
    - **Future On-Site Commercial Worker Receptor** - This receptor is a long-term adult receptor, a full-time employee that is assumed to spend 250 days per year

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[2] The DTSC LeadSpread 8 model (DTSC, 2011) calculates several blood lead concentrations, including the median, 90th, 95th, 98th, and 99th percentile estimates for the predicted distribution. Additionally, the model calculates the concentration in exterior soil and interior dust that will result in a 90th percentile estimate of blood lead equal to the target increase in children's blood lead level of concern by 1 microgram per deciliter (µg/dL; CalEPA benchmark incremental change criterion for lead).

working at the Site for 25 years. This receptor may spend the workday (8 hours per day) both indoors performing light office duties and outdoors performing moderate soil invasive activities in surface or near surface soil (e.g., maintenance or landscaping). For commercial worker exposure scenarios, DTSC recommends a modified version of USEPA's June 21, 2009 adult lead model (ALM; DTSC, 2011)[3]. Based on this model, DTSC's commercial soil SL for lead is 320 mg/kg (DTSC, 2020; RMD, 2020b).

- **Current/Future Recreational Trail User Receptor** – This receptor is a long-term receptor that includes receptors using the Site for outdoor recreation (hiking and biking trails). This receptor is anticipated to be primarily an adult receptor; however, a child receptor may occasionally visit the Site during organized field trips or other visits accompanied by an adult. For this reason, the LeadSpread 8 model based on child exposures was used to estimate a soil SL for on-Site recreational trail user receptors. In the LeadSpread 8 model, DTSC indicates that non-residential scenarios may involve fewer than seven days per week for exposure frequency. Based on best professional judgement, to evaluate a recreational trail user scenario, the exposure frequency in the model was reduced from seven days per week to one day per week. The resulting soil SL for lead of 540 mg/kg represents a reasonably conservative soil SL to protect current/future on-Site recreational trail user receptors (RMD, 2020b)[4].

The SLs for soil are shown on Tables 1 and 2. Unless otherwise specified, the results of the previous Site investigation activities are compared with the soil SLs and discussed below.

2.7.1 2018/2019 Soil Investigation

The HGP conducted agricultural soil testing and incorporated evaluation of the potential agricultural impacts of the lead associated with the historic shooting range (HGP, 2019). This evaluation indicated the following:

- Extractable lead concentrations ranging from 0.9 parts per million (ppm) to 89.8 ppm, which exceeded a laboratory-recommended threshold for safe agricultural use of 22 ppm; and

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[3] The model calculates the concentration in exterior soil and interior dust that will result in a 90th percentile estimate of blood lead among fetuses of adult workers of 1 µg/dL.

[4] The soil SL for lead of 540 mg/kg for on-Site recreational trail user receptors was included in the Work Plan (RMD, 2021) and subsequently approved by the County in their approval letter, dated June 2, 2021.

- Total sorbed lead concentrations ranging from 56.08 mg/kg to 145.86 mg/kg, which were below a threshold of 400 mg/kg that would require implementation of modified farming practices (HGP, 2019).

Based on these results, the City decided to conduct additional sampling at the Site.

2.7.2 February 2019 Soil Investigation

Soil samples were collected from 52 soil borings, each advanced to approximately 2 feet bgs, in the west meadow at the Site (Environmental Investigation Services, Inc., 2019). Twelve 4-part composite samples (B1 through B12) were collected from 48 borings at depths of approximately 0 to 0.5 foot bgs (surface) and 1.5 to 2 feet bgs (shallow). Additionally, one 4-part composite sample (B13) was collected from approximately 0 to 0.5 foot bgs. The surface composite samples were analyzed for select metals (total lead, arsenic, copper, and zinc), PAHs, and total petroleum hydrocarbons (TPH) as diesel and motor oil (with silica gel cleanup). The 1.5 to 2 feet bgs composite samples were analyzed for metals only. The 4-part composite sample results for surface soil at borings B1 (northwestern portion of the west meadow) and B3 (northern portion of the west meadow) reported lead concentrations exceeding the residential screening level of 80 mg/kg. Therefore, the four individual samples for these locations were analyzed for lead and reported lead concentrations exceeding the residential (unrestricted) screening level of 80 mg/kg. Samples with PAH concentrations exceeding screening levels were limited to surface soil in borings B5 and B7 (eastern portion of the west meadow) and borings B6 and B11 (central portion of the west meadow, near a former shooting pad location). Data summary tables for this investigation are provided as Tables A1 and A2 of Appendix A.

Based on the findings of the 2019 investigation, the following data gaps were identified:

- The magnitude of select metals (lead, antimony, arsenic, copper, zinc) concentrations in unsampled areas within the planned planting footprint in the west meadow;
- The extent and magnitude of select metals (lead, antimony, arsenic, copper, zinc) concentrations within the planned planting footprint in the north orchard and east meadow where higher shot fall density is anticipated;
- The extent and magnitude of PAH concentrations within the planned planting footprint in the western portion of the north orchard and east meadow; and
- The vertical extent of PAH concentrations that exceed screening levels in the west meadow and other areas.

2.7.3 May 2020 Soil Investigation

To address the data gaps identified during the 2019 investigation, soil samples were collected from 71 soil borings located across the Site, each advanced to approximately 2 feet bgs (RMD, 2020b). Twenty-six soil borings were located in the west meadow, 12 soil borings were located in the north orchard, and 33 soil borings were located in the east meadow. Soil sample locations were selected based on the planned farm and garden areas at the Site, findings of the 2019 soil investigation, and hypothetical shot and clay target fragment fall zones. During boring advancement, soil at approximate 6-inch intervals (0-0.5 foot bgs, 0.5-1.0 foot bgs, and 1.0-1.5 foot bgs [collectively referred to as the "surface"], and 1.5-2.0 foot bgs [shallow]) was visually inspected and logged. Soil from each boring location was screened with a X-Ray Fluorescence (XRF) analyzer to evaluate the vertical distribution of lead in the field. Two soil samples were collected from each boring location based on field observations. The selected soil samples were analyzed for select metals (lead, antimony, arsenic, copper, and zinc) and PAHs according to field observations and XRF screening (for lead) as described in the PEA Report. Data summary tables for this investigation are provided as Tables A3 and A4 of Appendix A.

Lead concentrations exceeded the commercial worker soil SL of 320 mg/kg and the recreational trail user soil SL of 540 mg/kg at one location south of the southern shooting range in the west meadow, in the western portion of the north orchard along the trail connecting the west meadow to the east meadow, and in the south and west portions of the east meadow along the ravine.

PAH concentrations exceeded one or more soil SLs at eight boring locations in the west meadow. As mentioned above, the extent of PAHs in soil have been delineated to the extent necessary.

Based on the findings of the 2020 investigation, the following data gaps were identified:

- The extent of lead concentrations near the north orchard along the trail connecting the west meadow to the east meadow;
- The extent of lead concentrations within the sloped ravine area between the west meadow and east meadow; and
- The extent of lead concentrations along the recreational trails located south of the east meadow (Emma McCrary Trail Area).

2.7.4 December 2020 Site Visit

On December 15, 2020, RMD, City, and County personnel conducted a Site visit to review previous sampling locations where lead concentrations exceeded the recreational trail user soil SL, discuss potential delineation sampling locations, and evaluate potential access issues.

The findings of the Site visit included:

- Two arcs of concrete pads, which are interpreted as the shooting pads for the historic trap and skeet ranges, were further observed in the central portion of the west meadow;
- Vegetation covers most of the Site with homeless encampments further observed in several wooded areas including the ravine area; and
- The southern side of the east meadow, the ravine area, and public recreation trails in the southeastern portion of the Site and connecting the west meadow to the east meadow had not been adequately delineated for lead concentrations in shallow soil.

The hypothetical fan-shaped clay target and shot fall distribution associated with the orientation of the shooting pads is depicted on Figure 2. These features are augmented with the prior and proposed soil sampling locations on Figure 3.

Based on previous investigations and the Site visit, the County determined that further investigation is needed to fully delineate the lateral and vertical extent of lead concentrations in shallow soil near the southern side of the east meadow, in accessible portions of the ravine, and along select public recreation trails in the southeastern portion of the Site.

2.7.5 March 2021 Soil Investigation

Based on findings of the PEA Report, WHA collected shallow soil samples from 12 soil borings located along the trail connecting the west meadow to the east meadow near the north orchard to delineate the extent of lead concentrations near boring NO-3 and to support the use of this trail (WHA, 2021). At each boring, soil samples were collected at the surface and at approximately 1.5 feet bgs and analyzed for lead. The reported lead concentrations of up to 208 mg/kg were below the commercial soil SL of 320 mg/kg and the recreational trail user soil SL of 540 mg/kg. Based on these results, additional soil investigation is no longer necessary in this portion of the Site. A data summary table for this investigation is provided as Table A5 of Appendix A.

2.7.6 Summary of COPCs

Based on the sample-by-sample comparison with background levels and risk-based soil SLs for the PEA investigation (RMD, 2020b), the following metals and PAHs were identified as COPCs in each area:

Summary of Chemicals of Potential Concern (COPCs)

Area	Unrestricted Land Use		Commercial Land Use
West Meadow	• Antimony • Arsenic • Copper • Lead • Zinc	• Benz(a)anthracene • Benzo(a)pyrene • Benzo(b)fluoranthene • Dibenz(a,h)anthracene • Indeno(1,2,3-c,d)pyrene • Naphthalene	• Benzo(a)pyrene • Lead • Benzo(b)fluoranthene • Dibenz(a,h)anthracene
North Orchard	• Lead		• Lead
East Meadow	• Lead		• Lead

Based on the findings of the PEA Report, PAHs and select metals, primarily lead, were identified in proposed planting areas of the Site, as described in the following sections.

2.7.6.1 Metals

A total of 103 samples were analyzed for metals, including 76 surface samples and 27 shallow samples. Based on comparison of detected concentrations with background levels and unrestricted and/or commercial soil SLs, select metals were identified as COPCs at the Site. Antimony, arsenic, copper, and zinc were only detected at concentrations above unrestricted soil SLs in soil sample WM-DG-13-1.5' in the west meadow. The extent of antimony, arsenic, copper, and zinc concentrations above unrestricted soil SLs are delineated and determined to be localized at a single sample location, where a shell casing was observed, and does not indicate a significant release area. However, lead was identified as a COPC in all three areas sampled during the PEA investigation. Based on the locations of lead concentrations above the recreational trail user soil SL of 540 mg/kg (Table 1, Figures 3 and 4), further delineation of the horizontal and vertical extent of lead in shallow soil in areas not previously investigated at the Site was warranted. This Report presents the results of additional delineation activities for lead.

2.7.6.2 Polycyclic Aromatic Hydrocarbons

A total of 48 samples were analyzed for PAHs, including 40 surface samples and 8 shallow samples. PAH concentrations exceeded one or more unrestricted and/or commercial soil SL at eight boring locations in the west meadow only. Benzo(a)pyrene and dibenz(a,h)anthracene, with or without benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene, and naphthalene, exceeded their soil SLs near the historic shooting ranges in the west meadow. PAHs were not detected above reporting limits in the north orchard or east meadow.

Based on this evaluation of potential human health risks from exposure to PAHs in the west meadow of the Lower Main Meadow, Pogonip Open Space (Appendix B), the noncancer adverse health effects or hazard index (HI) does not exceed the USEPA and CalEPA target level of one and the excess cancer risk is within CalEPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4}. The cumulative excess cancer risk of 4 x 10^{-6} slightly exceeds 1 x 10^{-6}, the most stringent end of the risk management; but the individual excess cancer risks for PAHs detected in soil did not exceed 1 x 10^{-6}, except for benzo(a)pyrene with an individual risk of 1.4 x 10^{-6}. According to USEPA (1989), cancer risk and hazard index should be expressed using one significant figure. Given the uncertainty in both exposure factors and toxicity data, expressing cancer risk and hazard index with more than one significant figure would imply greater precision than warranted. Therefore, benzo(a)pyrene does not pose a significant human health risk above acceptable thresholds.

Since there are no published soil SLs for recreational receptors, Site-specific risk-based recreational trail user soil SLs were developed for use at the Site. Using the HI and excess cancer risk estimates, soil exposure point concentrations (EPCs), and USEPA and CalEPA target HI and excess cancer risk, risk-based soil SLs were estimated for PAHs detected in soil (Appendix B). The recreational trail user soil SLs for PAHs detected in shallow soil at the Site are presented in Appendix B.

Based on comparison of detected concentrations with recreational trail user soil SLs, PAHs were identified as COPCs at four boring locations in the west meadow only (Table 2, Figure 4). Benzo(a)pyrene and/or dibenz(a,h)anthracene exceeded the recreational trail user soil SLs near the historic shooting ranges at borings WM-C-9A, WM-DG-6, WM-DG-11, and WM-DG-13. PAHs were not detected above reporting limits in the north orchard or east meadow. The extent of PAHs in the west meadow have been delineated to the extent necessary. Additional evaluation of PAHs and a sample-by-sample comparison with background levels and risk-based soil SLs was included in the PEA Report.

3.0 HUMAN HEALTH CONCEPTUAL SITE MODEL

To develop a conceptual understanding of the Site, information regarding potential chemical source, chemical release, and transport mechanisms; locations of potentially exposed human receptors; and potential exposure routes were assessed. This information was previously presented in the PEA Report. Based upon comments from the County, the human health conceptual site model (CSM) was updated to include the hypothetical recreational trail user receptor and hypothetical unauthorized camper receptor. The updated CSM is outlined schematically on Figure 5 and discussed below.

The CSM associates sources of chemicals with potentially exposed human receptors and associated complete exposure pathways. In this way, the CSM assists in quantifying potential impacts to human health. As defined by USEPA (1989), the following four components are necessary for a chemical exposure pathway to be considered complete and for chemical exposure to occur:

- A chemical source and a mechanism of chemical release to the environment;
- An environmental transport medium (e.g., soil) for the released chemical;
- A point of contact between the contaminated medium and the receptor (i.e., the exposure point); and
- An exposure route (e.g., incidental ingestion of soil) at the exposure point.

As described below, these components provide a basis for the CSM.

3.1 Chemical Source, Release, and Transport

To evaluate the first two components necessary for a complete exposure pathway, chemical properties of the detected chemicals and the physical characteristics of the Site were reviewed to identify factors that might allow the release and transport of chemicals. As discussed in Section 2.0, the potential source of impacts at the Site is related to the deposition of shot and clay target fragments. Based on historic land use as a shooting range and previous Site investigations, the COPCs include metals and PAHs, which tend to adsorb to soil particles and typically do not readily dissolve into water or volatilize into ambient air. Therefore, this CSM focuses on direct contact exposure routes to metals and PAHs in on-Site soil.

3.2 Potential Receptors

The third component necessary for an exposure pathway to be complete is identification of potential receptors at the Site based on anticipated land use. Based on the anticipated future land use as an agricultural and educational farm with a commercial building complex, the following hypothetical receptors were considered in this CSM:

- Future On-Site Unrestricted Receptor; and
- Future On-Site Commercial Worker Receptor.

Based on current and anticipated future land use as a recreational area, the following hypothetical receptors were considered in this CSM:

- Current/Future On-Site Recreational Trail User Receptor; and
- Current/Future On-Site Unauthorized Camper Receptor.

As stated in the PEA Report, a future on-Site construction worker receptor will be present during redevelopment of the Site; but this receptor will be a short-term receptor, performing activities subject to applicable administrative controls (e.g., Site Management Plan [SMP], Site Health and Safety Plan [HASP], and best management practices [BMPs]). This receptor is expected to be a short-term outdoor worker (i.e., 2 weeks to 1 year) for a single construction or development project at the Site. The exposures for a construction worker receptor are expected to be limited in comparison to long-term worker receptors.

The hypothetical on-Site receptors included in the CSM are described in more detail below.

3.2.1 Hypothetical On-Site Unrestricted Receptor

The hypothetical future on-Site unrestricted receptor was included to evaluate an unrestricted land use scenario, which is considered the most protective scenario for potential on-Site receptors including farm and garden workers. This receptor is a long-term receptor (i.e., greater than 7 years [USEPA, 1989]) that spends 350 days per year at the Site for a period of 26 years (as both a child [6 years] and an adult [20 years]). The unrestricted land use may include farming and gardening activities for the purpose of cultivating, consuming and/or selling produce (RMD, 2020b).

3.2.2 Hypothetical On-Site Commercial Worker Receptor

The hypothetical future on-Site commercial worker receptor is a long-term adult receptor. This receptor is a full-time employee that is assumed to spend 250 days per year working at the Site for 25 years. This receptor may spend the workday (8 hours per day) both indoors performing light office duties and outdoors performing moderate soil invasive activities in surface or near surface soil (e.g., maintenance or landscaping).

3.2.3 Hypothetical On-Site Recreational Trail User Receptor

The recreational trail user receptor is a long-term receptor that may include visitors using the recreational trails at the Site. Based on best professional judgment, this receptor is assumed to visit the Site one day per week (52 days per year) for a period of 26 years (as both a child [6 years] and an adult [20 years]). Potential exposures for this receptor are expected to occur from time spent outdoors only (8 hours per day). Typically, a recreational trail user that frequently visits a site would spend up to 4 hours per day on the trails (Gobster, 2005). It is conservative to assume that the recreational trail user that frequently visits the Site for 52 days a year will be using the trails for 8 hours a day at each visit, considering only short segments of the greater Pogonip Open Space trail system intersect the lead and PAH impacted areas of the Site.

3.2.4 Hypothetical On-Site Unauthorized Camper Receptor

Camping is prohibited at the Site and the exposure pathways for this receptor are incomplete due to the implementation of engineering controls to mitigate unauthorized camping at the Site. However, at the request of the County, the on-Site unauthorized camper receptor was included in the CSM[5]. Since camping is prohibited, it is unknown how long the average unauthorized camper receptor stays at the Site. Based on best professional judgment, two exposure frequencies were considered. For one exposure scenario, this receptor is assumed to camp at the Site for 14 days per year. This is consistent with the Bureau of Land Management (BLM) yearly recreational exposure frequency for a recreational visitor, which includes a range of possible activities including camping (BLM, 2017). For the second exposure scenario, this exposure frequency was doubled to be 28 days per year. This receptor is a long-term receptor for a period of 26 years (as both a child [6 years] and an adult [20 years]). Potential exposures

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[5] In addition, the County requested the development of risk-based soil SLs for the hypothetical unauthorized camper receptor. These soil SLs are presented in Appendix B.

for this receptor are expected to occur from time spent camping outdoors only (24 hours per day).

3.3 Complete Exposure Pathways

The fourth and final component, a complete exposure pathway (i.e., route of exposure) is discussed in combination with the third component (i.e., presence of receptors at an exposure point) to define those exposure pathways considered to be complete and significant for the future on-Site receptors. The exposure pathways assumed to be complete and significant for the hypothetical current/future on-Site receptors includes the following:

- Incidental ingestion of soil;
- Dermal contact with soil; and
- Inhalation of fugitive dust.

As a working farm and garden, it is assumed that the future on-Site farm and garden worker receptor will grow fruits and vegetables to consume and/or sell to the public. The produce sourced from the Pogonip Farm and Garden will only account for a portion of a potential receptors diet; therefore, is not likely a significant exposure pathway. Evaluation of the exposure pathways listed above for an unrestricted land use scenario are considered adequately protective for the proposed future land use at the Site (RMD, 2020b).

3.4 Summary of CSM

This CSM provides a scientifically defensible basis for the selection of potential hypothetical receptors and the most likely ways they might be exposed to chemicals at the Site (Figure 5). The future on-Site unrestricted and commercial worker receptors were evaluated in the PEA Report and are not considered further in this Report. On-Site camping is prohibited, but at the request of the County the on-Site unauthorized camper receptor was considered and is included in Appendix B. Based on the approved Work Plan scope, the remainder of this report focuses on the on-Site recreational trail user receptor. Due to the presence of COPCs in soil at the Site, further evaluation of potential exposure to COPCs via incidental ingestion of soil, dermal contact with soil, and inhalation of fugitive dust was performed, as described in the following sections.

4.0 SCOPE OF WORK

The following sections describe the pre-field activities, sampling, sample handling, decontamination, and borehole completion procedures.

4.1 Pre-field Activities

The following pre-field activities were conducted prior to mobilizing for the sampling event.

4.1.1 Site Health and Safety Plan

The Site-specific HASP was updated for the planned field activities. Field personnel were required to follow the procedures set forth in the HASP. Based on historical Site information, the work was completed using Occupational Safety and Health Administration (OSHA) Level D personal protective equipment (PPE).

4.1.2 Site Reconnaissance

On July 26, 2021 and January 6, 2022, RMD and City personnel conducted Site visits to evaluate potential access issues to the proposed sample locations and mark out the locations with survey stakes. Based on these Site visits, several proposed sample locations were shifted.

4.1.3 Borehole Clearance

To confirm the absence of obstructions and as required, the Site was marked with white paint and survey stakes. At least 72 hours before delineation sampling activities were conducted, Underground Services Alert (USA) was notified to mark the locations of potential subsurface utilities beneath the Site.

4.2 Soil Screening and Sampling Locations and Depths

In August 2021 and January 2022, soil samples were collected from 32 boring locations across the Site (Figures 3 and 4) as follows:

- Seven soil borings were located along the southwestern portion of the east meadow;
- Fourteen soil borings were located throughout the ravine;
- Seven soil borings were located in the Emma McCrary Trail Area in the southeastern portion of the Site;
- Two soil borings were located southwest of the north orchard; and

- Two soil borings were located northwest of the west meadow.

These soil boring locations were needed to fully delineate the lateral and vertical extent of lead concentrations in shallow soil based on findings of previous soil investigations and hypothetical shot fall zones. Soil boring locations and rationale are presented below in Table A.

Table A
Soil Sample Locations and Rationale

Area	Sampling Location	Rationale
East Meadow	EM-34 through EM-40	Evaluate lateral and vertical extent of lead concentrations between the southern portion of the east meadow and ravine
Ravine	R-1 through R-14	Improve data density and evaluate lateral and vertical extent of lead concentrations in the ravine area between the east and west meadows
Emma McCrary Trail Area	T-1 through T-7	Improve data density and evaluate lateral extent of lead concentrations south of the east meadow
North Orchard	NO-13 and NO-14	Evaluate lateral extent of lead concentrations northwest of borings NO-1, NO-2, and NO-4
West Meadow	WM-16 and WM-17	Evaluate lateral extent of lead concentrations northwest of borings WM-C-1 and WM-DG-1

During field activities, soil boring locations were measured and recorded using a Garmin eTrex 20x handheld global positioning system (GPS) navigator, which has an estimated GPS location accuracy of around 10 feet, 95% of the time, according to the manufacturer. The GPS coordinates of each boring location are included on the field sampling forms presented in Appendix C.

4.3 Soil Logging, Screening, Sampling, and Laboratory Analysis

The following presents the soil logging, screening, sampling and laboratory analysis procedures. Laboratory analyses that were performed by Pace Analytical National Center for Testing & Innovation in Mt. Juliet, Tennessee (Pace), a California-certified laboratory.

4.3.1 Soil Logging

The soil borings were advanced using a hand auger to an approximate depth of 2 feet bgs. During boring advancement, soil at approximate 6-inch intervals (0-0.5 foot bgs, 0.5-1.0 foot bgs, 1.0-1.5 foot bgs, and 1.5-2.0 foot bgs) was segregated and placed in a clean resealable plastic bag. Soil was visually inspected and logged using the Unified Soil Classification System (USCS). Visual observations were recorded on field forms and are presented in Appendix C.

4.3.2 Soil Screening

Visual Observations: Soil at the surface and from the four 6-inch intervals was visually inspected for evidence of shot fragments. Shot fragments were not observed at any of the boring locations.

XRF Screening: Soil from the four 6-inch intervals was screened in general accordance with USEPA Method 6200 using a handheld Olympus Vanta XRF analyzer to evaluate the vertical distribution of lead in the field. A summary of the XRF measurements includes the following:

- Lead concentrations of more than 1,000 ppm were measured at the following boring locations and depths:
    - EM-35 at 0-0.5 foot bgs;
    - EM-36 at 0-0.5 foot bgs;
    - R-4 at 0-0.5 foot bgs; and
    - R-14 at 0-0.5 foot bgs.
- Lead concentrations between 500 ppm and 1,000 ppm were measured at the following boring locations and depths:
    - EM-34 at 0.5-1.0 foot bgs;
    - EM-37 at 0-0.5 foot bgs;
    - EM-39 at 0-0.5 foot bgs;
    - R-3 at 0-0.5 foot bgs;
    - R-6 at 0-0.5 foot bgs; and
    - R-13 at 0-0.5 foot bgs.

The handheld XRF analyzer was factory calibrated. At the beginning of each day, the XRF analyzer was allowed to warm up for 15 to 30 minutes before analysis of samples and checked against a manufacturer-provided standard sample. XRF measurements for each boring location and depth were recorded on field forms (Appendix C). The downloaded XRF data are presented in Appendix D.

4.3.3 Soil Sample Selection

Two soil samples were collected from each boring location as follows:

- Of the 0-0.5 foot bgs, 0.5-1.0 foot bgs, and 1.0-1.5 foot bgs aliquots, the “surface” soil sample[6] was selected based on the 6-inch soil interval with the highest XRF reading. In the absence of field screening indicators (i.e., shot fragments or elevated XRF readings), the 0-0.5 foot bgs soil interval was collected; and
- The 1.5-2.0 foot bgs soil interval (the “shallow” soil sample).

4.3.4 Soil Sampling Procedures

Soil samples were collected in laboratory-supplied glass jars. The sample containers were labeled, placed in sealable, plastic bags, and stored in a chilled cooler for transportation to Pace, under standard chain-of-custody procedures.

4.3.5 Soil Analyses

At borings R-1 through R-14, T-1 through T-3, NO-13 and NO-14, and WM-16 and WM-17 where XRF readings for lead were less than 250 mg/kg, soil samples were collected and placed on hold at the laboratory pending analysis of the initial soil samples.

At borings EM-34 through EM-40 and at borings R-1 through R-14, T-1 through T-3, NO-13 and NO-14, and WM-16 and WM-17 where XRF readings for lead were greater than 250 mg/kg, soil samples were analyzed at the laboratory. Additionally, at borings where XRF readings were less than 250 mg/kg but were located adjacent to borings with elevated lead concentrations, soil samples were analyzed at the laboratory to define lateral extent of lead in soil. The samples were analyzed for lead using USEPA Method 6020. Prior to analysis, samples were sieved at the laboratory using a No. 10 sieve.

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[6] During the 2019 and 2020 soil investigations, the 0-0.5 foot bgs samples was referred to as the surface soil sample. This Report applies “surface” soil sample to the 6-inch interval selected for analysis from the upper 1.5 feet bgs.

Laboratory analytical reports are presented in Appendix E. Analytical results are summarized on Table 1 and in Section 5.0.

4.4 Borehole Completion

Following completion of soil screening and sampling activities, each boring was backfilled to the surface with soil cuttings.

4.5 Decontamination Procedures

Disposable equipment intended for one-time use was packaged for appropriate disposal. Reusable augering and sampling devices that were in contact with potentially contaminated soil were decontaminated between each boring location using the following procedures:

1. Knock off loose soil with a brush;
2. Wash with non-phosphate detergent and tap water;
3. Rinse with tap-water;
4. Rinse with distilled water; and
5. Set on clean surface to air dry.

Decontamination was repeated if observable or suspected organic material remained on the sampling equipment.

4.6 Investigation-Derived Waste Handling

The investigation-derived waste (IDW) generated during the field activities included several gallons of decontamination water with phosphate free soap. The IDW water was discharged to the ground and left to evaporate on Site.

4.7 Field Variances

Following review of XRF readings, soil samples were collected from two additional borings located west of boring R-4 that were not proposed in the Work Plan. The two additional borings (R-13 and R-14) were each advanced to approximately two feet bgs and soil samples were selected using the same criteria described above.

5.0 HUMAN HEALTH SCREENING EVALUATION OF LEAD ANALYTICAL RESULTS

Based on the approved Work Plan scope, the locations of lead concentrations above the recreational trail user soil SL of 540 mg/kg (Table 1, Figures 3 and 4) were delineated further. In accordance with the methods and procedures described in Section 4.3, a total of 46 samples[7] were analyzed for lead. Consistent with the approved Work Plan scope, the human health screening evaluation (HHSE) compared the lead results to the recreational trail user soil SL of 540 mg/kg. In addition to a point-by-point screening level evaluation, the soil data were evaluated separately for each designated use area (i.e., west meadow, east meadow, north orchard, ravine, recreational trail). Table 1 summarizes the analytical results and presents a point-by-point screening level evaluation, highlighting any lead concentrations that exceed the recreational trail user soil SL of 540 mg/kg. The laboratory analytical results are provided in Appendix E. Figure 3 depicts the locations of soil samples analyzed for lead with concentrations exceeding the recreational trail user SL shown and highlighted.

This HHSE was prepared in general accordance with the HHSE for lead presented in the PEA Report. This HHSE was conducted to further evaluate potential exposures associated with the anticipated future land uses to identify the need for any remediation, mitigation, or engineering controls to adequately protect human health. The anticipated future land uses include the continuation of recreational trail use, natural resource and trail maintenance, and a planned building complex as part of an agriculture farm and garden (i.e., perennial orchards and row crops) in relatively flat portions of the Site. The potential source of soil impacts at the Site is related to the deposition of lead shot fragments based on former land use as a shooting range.

It is unlikely that a potential receptor will spend the entire exposure duration (i.e., years) residing over maximum detected concentrations in soil. Therefore, for lead in soil, it is relevant and appropriate to statistically evaluate the soil data separately within each designated use area for the purpose of making risk management decisions. Consistent with USEPA (1989) procedures, when evaluating a reasonable maximum exposure scenario, the lesser of the maximum detected concentration and the 95-percent upper confidence limit of the mean concentration (95UCL)[8]

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[7] Sample EM-35-2′ initially reported a lead concentration of 5,810 mg/kg and was reanalyzed to confirm the result. The reanalyzed sample reported a lead concentration of 198 mg/kg.

[8] A USEPA software package, ProUCL Version 5.1, was used to estimate the 95UCL. The ProUCL software makes recommendations for estimating UCLs and was developed as a tool to support risk assessment.

will be selected as the appropriate soil EPC for each designated use area and compared to the recreational trail user soil SL of 540 mg/kg.

The HHSE for lead concentrations detected in soil for each designated use area are described below.

5.1 Analytical Summary

East Meadow

Based on soil data collected during the August 2021 investigation, lead was detected above laboratory reporting limits (RLs) in each of the 14 samples analyzed at concentrations ranging from 323 mg/kg to 2,090 mg/kg in the surface samples and from 14.7 mg/kg to 220 mg/kg in the shallow samples. Lead concentrations exceeded the soil SL of 540 mg/kg in four surface samples and none of the shallow samples.

When considering the soil data collected during the May 2020 and August 2021 investigations for the east meadow, the 95UCLs for surface and shallow soil samples were 702 mg/kg and 92 mg/kg, respectively (Appendix F). The 95UCLs were less than the maximum detected concentrations for surface and shallow soil samples; therefore, 95UCLs were selected as the appropriate EPC for comparison with the soil SL. The lead EPC for surface soil exceeded the soil SL of 540 mg/kg and the lead EPC for shallow soil did not exceed the soil SL.

Ravine

Based on soil data collected during the August 2021 investigation[9], lead was detected above RLs in each of the 24 samples analyzed at concentrations ranging from 9.86 mg/kg to 1,600 mg/kg in the surface samples and from 6.59 mg/kg to 341 mg/kg in the shallow samples. Lead concentrations exceeded the soil SL of 540 mg/kg in five surface samples and none of the shallow samples.

The 95UCLs for surface and shallow soil samples were 884 mg/kg and 170 mg/kg, respectively (Appendix F). The 95UCLs were less than the maximum detected concentrations for surface and shallow soil samples; therefore, 95UCLs were selected as the appropriate EPC for comparison with the soil SL. The lead EPC for surface soil exceeded the soil SL of 540 mg/kg and the lead EPC for shallow soil did not exceed the soil SL. At two borings (R-8 and R-12), XRF readings ranged from 28 ppm to 98 ppm and soil samples were not analyzed at the laboratory.

Emma McCrary Trail Area

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[9] The ravine area was not sampled during previous Site investigations.

Lead was detected above RLs in each of the eight samples collected and analyzed from the Emma McCrary Trail Area at concentrations ranging from 153 mg/kg to 474 mg/kg in the four surface samples and 7.07 mg/kg to 9.42 mg/kg in the four shallow samples. Lead concentrations did not exceed the soil SL of 540 mg/kg[10].

At three borings (T-1, T-2, and T-4), XRF readings ranged from 6 ppm to 48 ppm and soil samples were not analyzed at the laboratory.

North Orchard

Based on soil data collected during the August 2021 investigation, XRF readings ranged from 3 ppm to 56 ppm at borings NO-13 and NO-14. The corresponding samples were not analyzed for lead.

When considering the soil data collected during the May 2020 and August 2021 investigations for the north orchard, the 95UCLs for surface and shallow soil samples were 312 mg/kg and 32 mg/kg, respectively (Appendix F). The 95UCLs were less than the maximum detected concentrations for surface and shallow soil samples; therefore, 95UCLs were selected as the appropriate EPC for comparison with the soil SL. The lead EPCs for surface and shallow soil did not exceed the soil SL of 540 mg/kg.

West Meadow

Based on soil data collected during the August 2021 investigation, XRF readings ranged from 3 ppm to 133 ppm at borings WM-16 and WM-17. The corresponding samples were not analyzed for lead.

When considering the soil data collected during the May 2020 and August 2021 investigations for the west meadow, the 95UCLs for surface and shallow soil samples were 163 mg/kg and 34 mg/kg, respectively (Appendix F). The 95UCLs were less than the maximum detected concentrations for surface and shallow soil samples; therefore, 95UCLs were selected as the appropriate EPC for comparison with the soil SL. The lead EPCs for surface and shallow soil did not exceed the soil SL of 540 mg/kg.

5.2 Findings

The following summarizes the findings of the field sampling and laboratory analysis:

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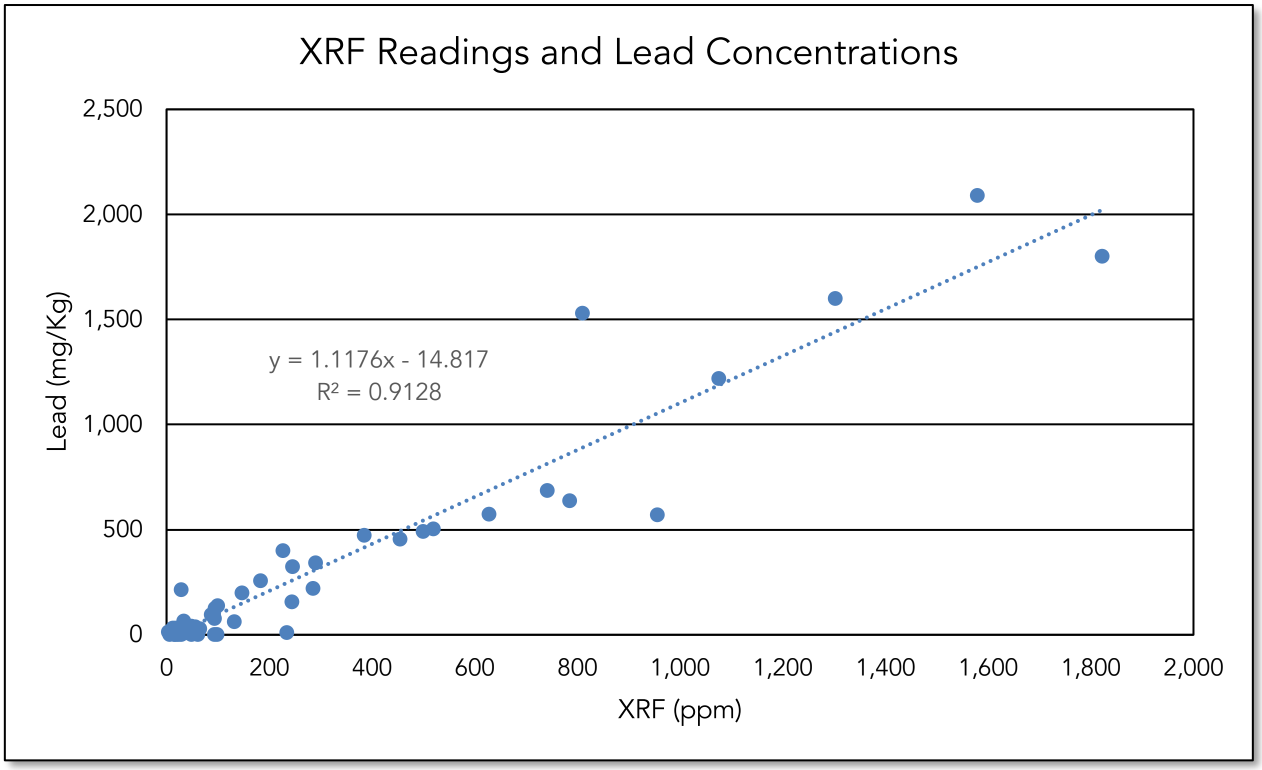
[10] Soil samples were not collected from the Emma McCrary Trail Area during previous Site investigations. Since maximum detected lead concentrations were below the soil SL of 540 mg/kg and the analytical data set only included 8 samples, a 95UCL was not estimated.

- Lead shot fragments were not observed during field screening of soil samples. As shown on the graph below, XRF readings exhibit a favorable correlation with lead concentrations in associated sieved soil samples. The absence of observed shot fragments and favorable correlation between XRF readings and lead concentrations in sieved soil samples suggest that the shot has dissolved and associated metals have sorbed to soil during the more than 60 years since deposition.



Lead concentrations indicated the following:

East Meadow

Lead exceeded the recreational trail user soil SL in surface samples collected from the southwestern portion of the east meadow along the border with the ravine. Lead did not exceed the soil SL in shallow samples collected from the east meadow. In the east meadow, lead concentrations above the soil SL are delineated by borings EM-6, EM-17, EM-18, and EM-19 to the north, borings EM-20, EM-22, and EM-39 to the east, borings EM-38 and EM-40 to the south, and borings R-2, R-5, R-7, R-10, and R-11 to the west.

Ravine

Lead exceeded the soil SL in surface samples collected from the northwestern and eastern portions of the ravine. Lead did not exceed the soil SL in shallow samples collected from the ravine. In the northwestern portion of the ravine, lead concentrations above soil SL are delineated by borings B-7, B-8, B-9, and R-1 to the north, borings R-2 and R-5 to the east, borings R-9 and WM-C-4 to the south, and borings B-5 and B-6 to the west. In the ravine, lead concentrations above the soil SL are delineated by borings EM-3, EM-4, and EM-5 to the north, borings EM-6, EM-19, EM-20, EM-22, and EM-39 to the east, borings R-7 and R-11 to the south, and borings R-2, R-5, and R-10 to the west.

Emma McCrary Trail Area

Based on lead concentrations at borings T-3, T-5, T-6, and T-7 and XRF readings at borings T-1, T-2, and T-4 lead did not exceed the soil SL in samples collected in this area.

North Orchard

Based on XRF readings at borings NO-13 and NO-14, lead did not exceed the soil SL in samples collected southwest of the north orchard. In the north orchard, the lead concentration above the soil SL at boring NO-3 is delineated by boring NO-4 to the north, boring B-7 to the east, boring B-6 to the south, and borings NO-1 and NO-2 to the west.

West Meadow

Based on XRF readings at borings WM-16 and WM-17, lead did not exceed the soil SL in samples collected northwest of the west meadow. In the west meadow, the lead concentration above the soil SL at boring WM-DG-13 is delineated by boring WM-C-9(A) to the north, borings WM-C-10 and WM-DG-15 to the east, boring WM-C-6 to the south, and boring WM-DG-14 to the west.

Based on findings of this Report and previous Site investigations, lead concentrations in soil are adequately delineated laterally and vertically and lead concentrations above the recreational trail user SL are limited to surface soil in previously identified areas, as described above.

6.0 CONCLUSIONS

As presented herein, lead and PAHs associated with shot and clay target deposition in soil from historic shooting range activities have been identified and adequately delineated at the Site. COPCs identified in prior investigations include select metals, primarily lead, and PAHs. The HHSE was revised to further characterize risk and evaluate lead concentrations above the recreational trail user SL.. The findings of the HHSE indicate that lead concentrations above the recreational trail user SL are limited to surface soil at the Site, as follows and displayed on Figures 3 and 4[11]:

- East Meadow – Lead concentrations exceeded the soil SL in surface samples collected from the southwestern portion of this area.
- Ravine – Lead concentrations exceeded the soil SL in surface samples collected from the northwestern and eastern portions of this area.
- North Orchard – The lead concentration exceeded the soil SL in the surface sample collected from boring NO-3, in the southwestern portion of this area.
- West Meadow – The lead concentration exceeded the soil SL in the surface sample collected from boring WM-DG-13, in the southern portion of this area.

Lead concentrations did not exceed the recreational trail user SL in samples collected in the Emma McCrary Trail Area.

The findings of the HHSE indicate that PAH concentrations above the recreational trail user SLs are limited to soil in the west meadow at the Site, as follows and displayed on Figure 4[13]:

- West Meadow – PAH concentrations exceeded the soil SLs in the surface samples collected from borings WM-C-9A, WM-DG-11, and WM-DG-13; and in the shallow sample collected from boring WM-DG-6 in the central portion of this area near the former shooting pads.

PAH concentrations did not exceed the soil SLs in samples collected in the north orchard and east meadow. PAHs were not analyzed in soil samples collected from the ravine or Emma McCrary Trail Area.

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[11] Figure 6 shows areas where lead and PAH concentrations exceeded the soil SLs for unrestricted land use.

Based on our evaluation of the Site conditions, consideration of the following activities is recommended:

- Prepare a draft Covenant and Environmental Restriction to establish the following use restrictions and controls for the Site:
    - Restrict land use in areas where COPCs may pose a human health risk at the Site (i.e., modify the proposed farm and garden development plan to restrict access to areas where soil samples exceed unrestricted SLs); and
    - Implement engineering controls (e.g., soil amendments or fence and post notices) and remediate (e.g., surface soil excavation and on-Site burial or off-Site disposal) in areas where COPC concentrations exceed SLs for the current and proposed land uses to reduce potential exposures.
    - Implement engineering controls to mitigate unauthorized camping at the Site.
- Prepare a Soil Management Plan to provide guidance for working around and handling potentially impacted soil encountered during Site activities.

7.0 LIMITATIONS

This document was prepared for the exclusive use of the City and County for the express purpose of complying with a client or regulatory directive for environmental investigation or restoration. RMD has used professional judgment to present the findings and opinions of a scientific and technical nature. The opinions expressed are based on the conditions of the Site existing at the time of the field investigation, current regulatory requirements, and any specified assumptions. The presented findings and recommendations in this report are intended to be taken in their entirety to assist City and County personnel in applying their own professional judgment in making decisions related to the property. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, conclusions, and recommendations.

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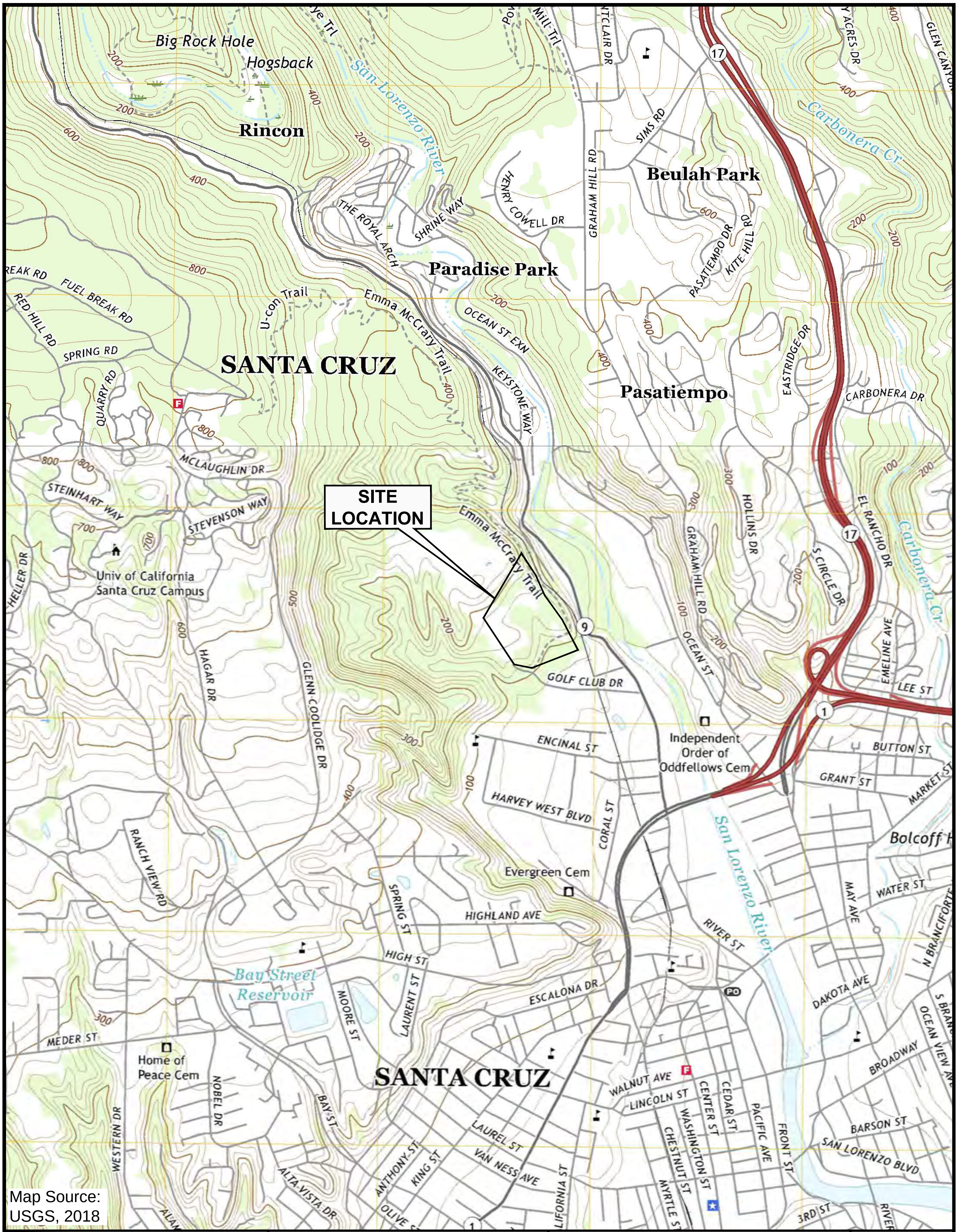
FIGURES



Map Source:
USGS, 2018

RMD
ENVIRONMENTAL
SOLUTIONS

LOWER MAIN MEADOW,
POGONIP OPEN SPACE
501 GOLF CLUB DRIVE
SANTA CRUZ, CALIFORNIA

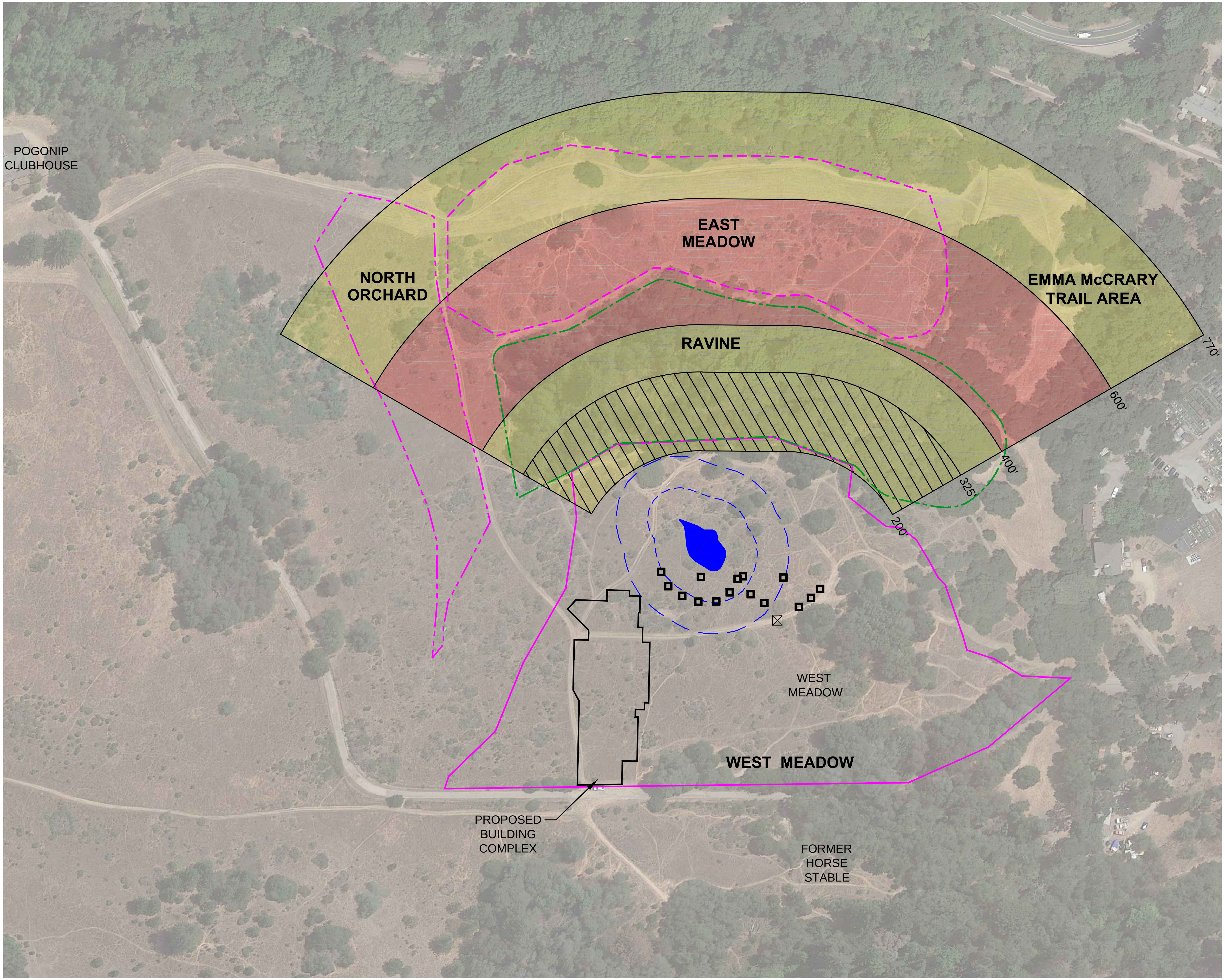
SITE LOCATION MAP

N

PROJECT NO.	DATE	DR.BY:	APP. BY:
01-POG-001	10/2021	EC	DW

0 2000 4000
SCALE: 1" = 2000'

FIGURE 1



LEGEND

- - -	PROPOSED EAST MEADOW BOUNDARY
—	PROPOSED WEST MEADOW BOUNDARY
-·-	PROPOSED NORTH ORCHARD BOUNDARY
-·-	APPROXIMATE RAVINE AREA
- - -	50' WETLAND BUFFER (NO PLANTING)
— —	100' WETLAND BUFFER (NATIVE PLANTS)
🟦	APPROXIMATE LOCATION OF SEASONAL WETLAND
🟨	HYPOTHETICAL RANGE OF LEAD SHOT (~200'-770')
🟥	HYPOTHETICAL RANGE OF HIGHEST LEAD SHOT CONCENTRATION (~400'-600')
▨	HYPOTHETICAL RANGE OF CLAY TARGETS (~200'-325')
□	SHOOTING PAD LOCATION
☒	UNKNOWN CONCRETE PAD

Notes:
1) Hypothetical Ranges of Lead Shot and Clay Pigeons Are Based On Standard Skeet Shooting Range Shot Fall Zones. (ITRC, 2015)
2) Proposed Garden Boundaries and Building Complex Based on GPS Coordinate Plan (Fall Creek Engineering, Inc, 2018) and Map of Pogonip Farm & Garden (Homeless Garden Project O&M Plan, 2017)

SITE PLAN

LOWER MAIN MEADOW, POGONIP OPEN SPACE
501 GOLF CLUB DRIVE
SANTA CRUZ, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-POG-001	10/2021	EC	DW

0 150 300
SCALE: 1" = 150'

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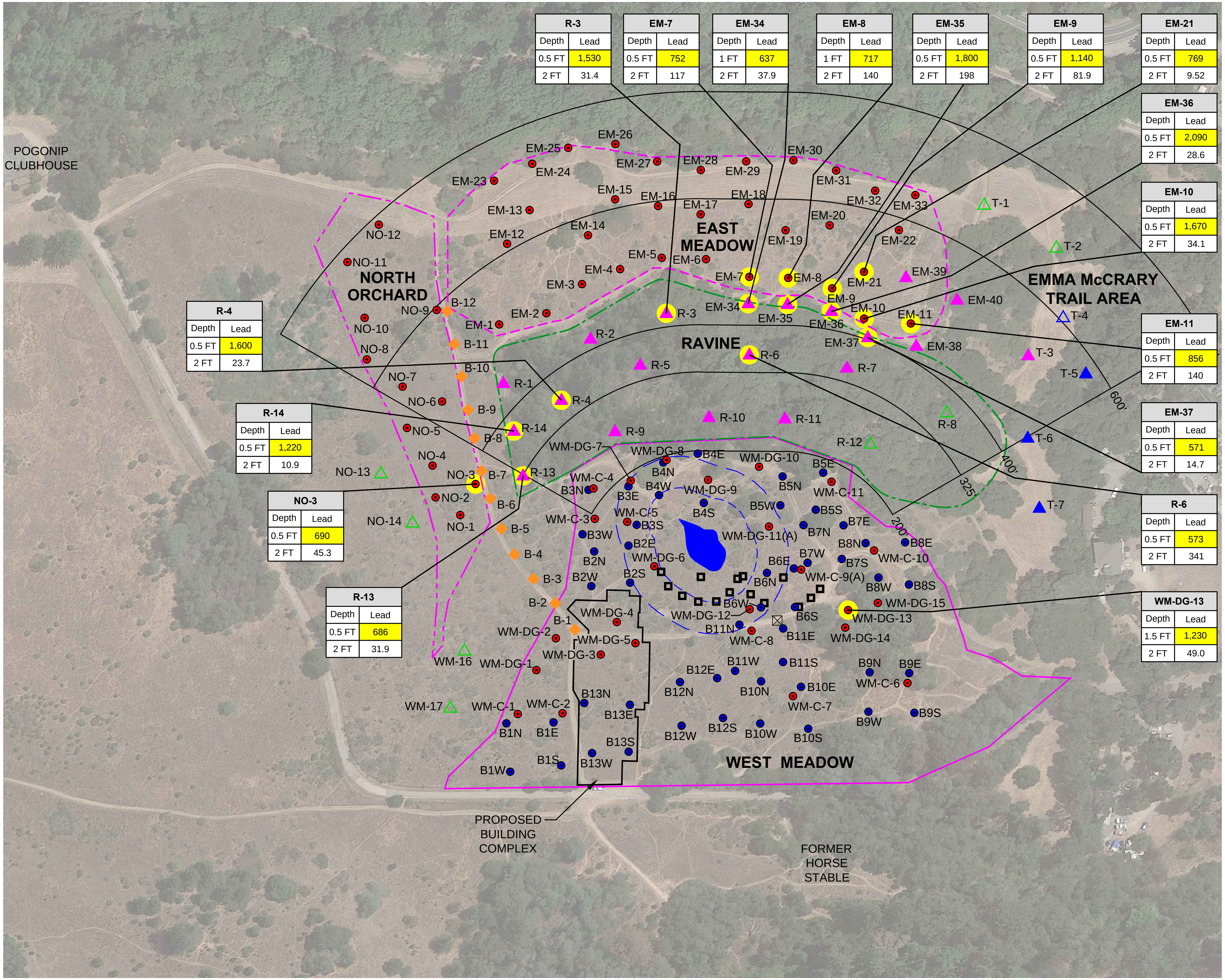
FIGURE
2



R-3

Depth	Lead
0.5 FT	1,530
2 FT	31.4

EM-7

Depth	Lead
0.5 FT	752
2 FT	117

EM-34

Depth	Lead
1 FT	637
2 FT	37.9

EM-8

Depth	Lead
1 FT	717
2 FT	140

EM-35

Depth	Lead
0.5 FT	1,800
2 FT	198

EM-9

Depth	Lead
0.5 FT	1,140
2 FT	81.9

EM-21

Depth	Lead
0.5 FT	769
2 FT	9.52

EM-36

Depth	Lead
0.5 FT	2,090
2 FT	28.6

EM-10

Depth	Lead
0.5 FT	1,670
2 FT	34.1

EM-11

Depth	Lead
0.5 FT	856
2 FT	140

EM-37

Depth	Lead
0.5 FT	571
2 FT	14.7

R-6

Depth	Lead
0.5 FT	573
2 FT	341

WM-DG-13

Depth	Lead
1.5 FT	1,230
2 FT	49.0

R-4

Depth	Lead
0.5 FT	1,600
2 FT	23.7

R-14

Depth	Lead
0.5 FT	1,220
2 FT	10.9

NO-3

Depth	Lead
0.5 FT	690
2 FT	45.3

R-13

Depth	Lead
0.5 FT	686
2 FT	31.9

LEGEND

‒ ‒ ‒	PROPOSED EAST MEADOW BOUNDARY
──	PROPOSED WEST MEADOW BOUNDARY
‒ · ‒	PROPOSED NORTH ORCHARD BOUNDARY
‒ · ‒	APPROXIMATE RAVINE AREA
‒ ‒ ‒	50' WETLAND BUFFER (NO PLANTING)
‒ ‒ ‒	100' WETLAND BUFFER (NATIVE PLANTS)
■	APPROXIMATE LOCATION OF SEASONAL WETLAND
▣	SHOOTING PAD LOCATION
☒	UNKNOWN CONCRETE PAD
●	SOIL SAMPLE LOCATION (EIS, 2019)
◉	SOIL SAMPLE LOCATION (RMD, 2020)
◆	SOIL SAMPLE LOCATION (WHA, 2021)
▲	SOIL SAMPLE LOCATION (RMD, 2021)
△	XRF SCREENING LOCATION (RMD, 2021)
△	XRF SCREENING LOCATION (RMD, 2022)
▲	SOIL SAMPLE LOCATION (RMD,2022)
0.5 FT	DEPTH IN FEET BELOW GROUND SURFACE
22.1	ANALYTICAL RESULT IN MILLIGRAMS PER KILOGRAM (mg/kg)
XRF	X-RAY FLUORESCENCE

Notes:
1) Yellow highlighted locations and values exceed the screening level for recreational trail use (540 mg/kg).
2) Data shown only for locations with lead concentration exceeding the recreational trail use screening level.
3) Hypothetical Ranges of Lead Shot and Clay Pigeons Are Based On Standard Skeet Shooting Range Shot Fall Zones (ITRC, 2015).
4) Proposed Garden Boundaries and Building Complex Based on GPS Coordinate Plan (Fall Creek Engineering, Inc, 2018) and Map of Pogonip Farm & Garden (Homeless Garden Project O&M Plan, 2017).

LEAD CONCENTRATIONS EXCEEDING SCREENING LEVEL FOR RECREATIONAL TRAIL USER

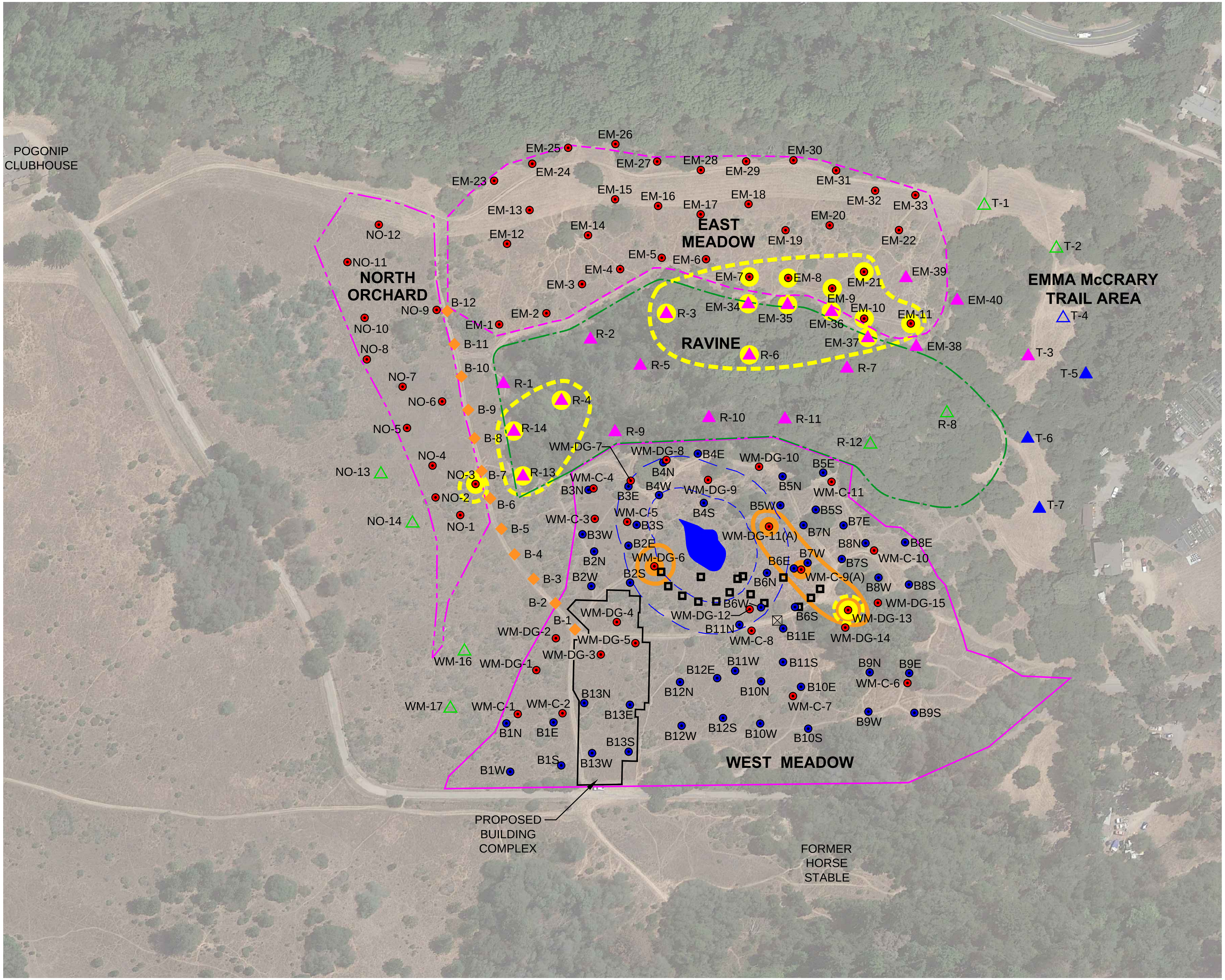
LOWER MAIN MEADOW, POGONIP OPEN SPACE
501 GOLF CLUB DRIVE
SANTA CRUZ, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-POG-001	02/2022	EC	DW

0 150 300
SCALE: 1" = 150'

RMD ENVIRONMENTAL SOLUTIONS

FIGURE 3



LEGEND

PROPOSED EAST MEADOW BOUNDARY
PROPOSED WEST MEADOW BOUNDARY
PROPOSED NORTH ORCHARD BOUNDARY
APPROXIMATE RAVINE AREA
50' WETLAND BUFFER (NO PLANTING)
100' WETLAND BUFFER (NATIVE PLANTS)
■ APPROXIMATE LOCATION OF SEASONAL WETLAND
□ SHOOTING PAD LOCATION
☒ UNKNOWN CONCRETE PAD
● SOIL SAMPLE LOCATION (EIS, 2019)
● SOIL SAMPLE LOCATION (RMD, 2020)
◆ SOIL SAMPLE LOCATION (WHA, 2021)
▲ SOIL SAMPLE LOCATION (RMD, 2021)
△ XRF SCREENING LOCATION (RMD, 2021)
△ XRF SCREENING LOCATION (RMD, 2022)
▲ SOIL SAMPLE LOCATION (RMD,2022)
XRF X-RAY FLUORESCENCE
○ APPROXIMATE AREA EXCEEDING LEAD SCREENING LEVEL FOR RECREATIONAL TRAIL USE
○ APPROXIMATE AREA EXCEEDING POLYCYCLIC AROMATIC HYDROCARBON SCREENING LEVELS FOR RECREATIONAL TRAIL USE

Notes:

1) Hypothetical Ranges of Lead Shot and Clay Pigeons Are Based On Standard Skeet Shooting Range Shot Fall Zones (ITRC, 2015).
2) Proposed Garden Boundaries and Building Complex Based on GPS Coordinate Plan (Fall Creek Engineering, Inc, 2018) and Map of Pogonip Farm & Garden (Homeless Garden Project O&M Plan, 2017).

AREAS EXCEEDING SCREENING LEVEL FOR RECREATIONAL TRAIL USE

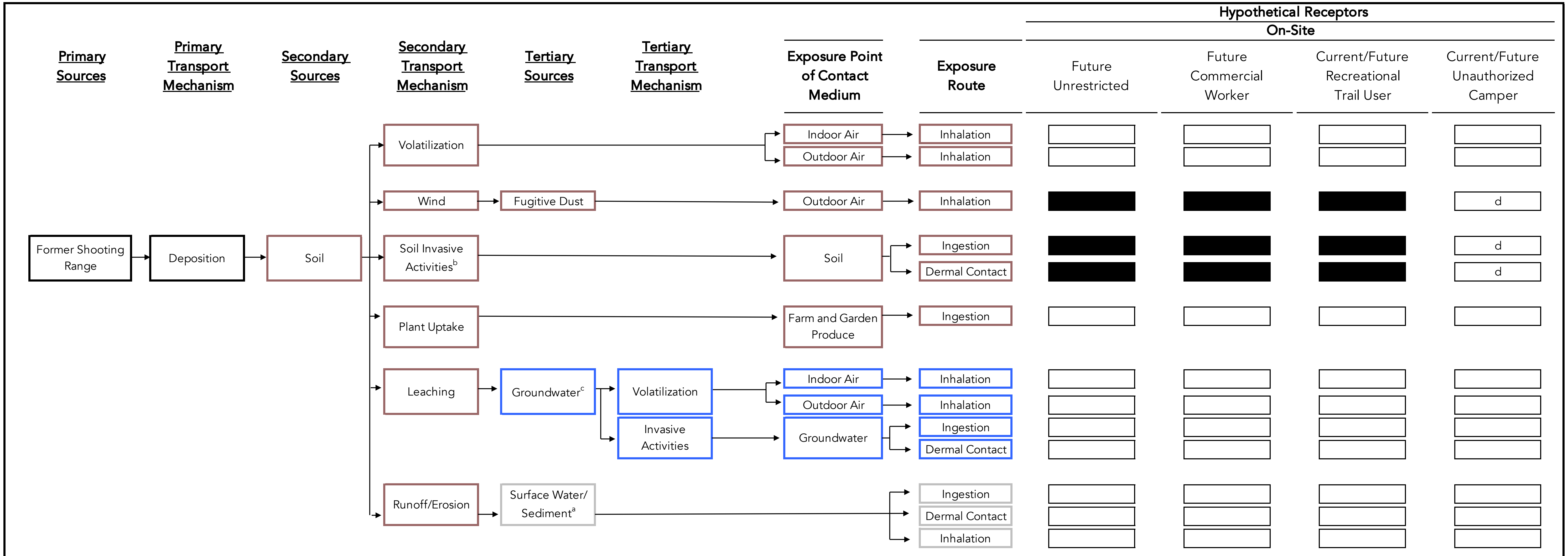
LOWER MAIN MEADOW, POGONIP OPEN SPACE
501 GOLF CLUB DRIVE
SANTA CRUZ, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-POG-001	01/2022	EC	DW

0 150 300
SCALE: 1" = 150'

RMD ENVIRONMENTAL SOLUTIONS

FIGURE 4



		Hypothetical Receptors			
		On-Site			
Exposure Point of Contact Medium	Exposure Route	Future Unrestricted	Future Commercial Worker	Current/Future Recreational Trail User	Current/Future Unauthorized Camper
Indoor Air	Inhalation	☐	☐	☐	☐
Outdoor Air	Inhalation	☐	☐	☐	☐
Outdoor Air	Inhalation	■	■	■	d
Soil	Ingestion	■	■	■	d
	Dermal Contact	■	■	■	d
Farm and Garden Produce	Ingestion	☐	☐	☐	☐
Indoor Air	Inhalation	☐	☐	☐	☐
Outdoor Air	Inhalation	☐	☐	☐	☐
Groundwater	Ingestion	☐	☐	☐	☐
	Dermal Contact	☐	☐	☐	☐
	Ingestion	☐	☐	☐	☐
	Dermal Contact	☐	☐	☐	☐
	Inhalation	☐	☐	☐	☐

🟫 CSM components related to soil.
🟦 CSM components related to groundwater.
⬜ CSM components related to surface water.

■ Receptor likely to be exposed via this route, so pathway is considered potentially complete.
▨ Receptor may be exposed via this route, so pathway is considered potentially complete; however, pathway is considered minor.
☐ Pathway is incomplete, no further evaluation required.

[a] With the exception of the seasonal wetland, there are no identified surface water bodies within a one-half mile radius of the site.
[b] Surface invasive activities are not expected to extend beyond 2 feet bgs.
[c] Perched shallow groundwater supports seasonal wetlands and seeps. A 345 foot deep water supply well near the Pogonip clubhouse reported a depth to water of 128 feet below ground surface (bgs) in 1993. Due to depth to groundwater, it is not a media of concern at the site.
[d] Camping is prohibited at the Site and the exposure pathways for this receptor are incomplete due to the implementation of engineering controls to mitigate unauthorized camping at the Site.

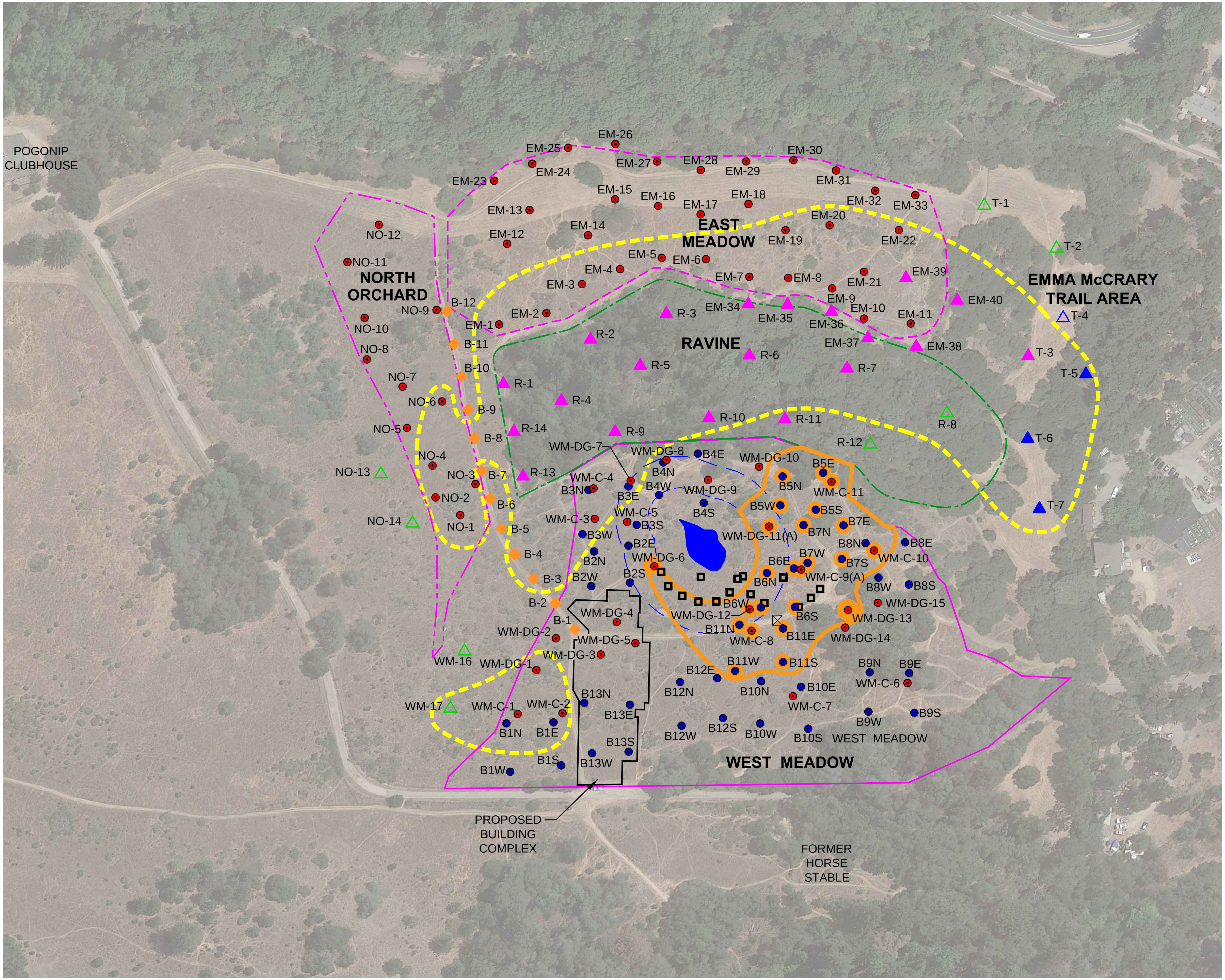
POGONIP FARM AND GARDEN
SANTA CRUZ, CALIFORNIA

HUMAN HEALTH CONCEPTUAL SITE MODEL

PROJECT NO.	DATE	DRAWN BY	APP. BY
01-POG-001	02/02/22	II	DW

RMD ENVIRONMENTAL SOLUTIONS

FIGURE
5



LEGEND

- - -	PROPOSED EAST MEADOW BOUNDARY
—	PROPOSED WEST MEADOW BOUNDARY
-·-·-	PROPOSED NORTH ORCHARD BOUNDARY
—·—	APPROXIMATE RAVINE AREA
- - -	50' WETLAND BUFFER (NO PLANTING)
— —	100' WETLAND BUFFER (NATIVE PLANTS)
■	APPROXIMATE LOCATION OF SEASONAL WETLAND
□	SHOOTING PAD LOCATION
☒	UNKNOWN CONCRETE PAD
●	SOIL SAMPLE LOCATION (EIS, 2019)
⊙	SOIL SAMPLE LOCATION (RMD, 2020)
◆	SOIL SAMPLE LOCATION (WHA, 2021)
▲	SOIL SAMPLE LOCATION (RMD, 2021)
△	XRF SCREENING LOCATION (RMD, 2021)
△	XRF SCREENING LOCATION (RMD, 2022)
▲	SOIL SAMPLE LOCATION (RMD,2022)
XRF	X-RAY FLUORESCENCE
○	APPROXIMATE AREA EXCEEDING LEAD SCREENING LEVEL FOR UNRESTRICTED LAND USE
○	APPROXIMATE AREA EXCEEDING POLYCYCLIC AROMATIC HYDROCARBON SCREENING LEVELS FOR UNRESTRICTED LAND USE

Notes:
1) Yellow highlighted sample locations exceed the lead screening level for unrestricted land use.
2) Orange highlighted sample locations exceed the polycyclic aromatic hydrocarbon screening levels for unrestricted land use.
3) Sample location WM-DG-13 also reports antimony, arsenic, copper, and zinc exceeding screening levels for unrestricted land use.
4) Shot fragments observed at locations WM-DG-11(A) and WM-DG-13.
5) Clay target fragments observed at locations WM-C-9(A), WM-DG-11(A), WM-DG-13, and EM-10.
6) Proposed Garden Boundaries and Building Complex Based on GPS Coordinate Plan (Fall Creek Engineering, Inc, 2018) and Map of Pogonip Farm & Garden (Homeless Garden Project O&M Plan, 2017).

AREAS EXCEEDING SCREENING LEVELS FOR UNRESTRICTED LAND USE

LOWER MAIN MEADOW, POGONIP OPEN SPACE
501 GOLF CLUB DRIVE
SANTA CRUZ, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-POG-001	01/2022	EC	DW

0 150 300
SCALE: 1" = 150'

RMD ENVIRONMENTAL SOLUTIONS

FIGURE 6

TABLES

Table 1
Lead Concentrations in Soil
Lower Main Meadow, Pogonip Open Space
Santa Cruz, California

Sample ID	Date	Sample Depth (feet bgs)	Lead Shot Observed (Yes / No)	XRF Reading (ppm)	Lead (mg/kg)	
				Background Level[1]	43	
				Unrestricted (Residential) Screening Level[2]	80	
				Commercial Screening Level[2]	320	
				Recreational Trail Use Screening Level[3]	540	
East Meadow						
EM-34-1'	8/3/2021	1	No	784	**637**	
EM-34-2'	8/3/2021	2	No	56	**37.9**	
EM-35-0.5'	8/3/2021	0.5	No	1,822	**1,800**	
EM-35-2'	8/3/2021[4]	2	No	147	**198**	
EM-36-0.5'	8/3/2021	0.5	No	1,579	**2,090**	
EM-36-2'	8/3/2021	2	No	64	**28.6**	
EM-37-0.5'	8/3/2021	0.5	No	955	**571**	
EM-37-2'	8/3/2021	2	No	13	**14.7**	
EM-38-0.5'	8/3/2021	0.5	No	499	**490**	
EM-38-2'	8/3/2021	2	No	48	**41.3**	
EM-39-0.5'	8/3/2021	0.5	No	519	**504**	
EM-39-2'	8/3/2021	2	No	285	**220**	
EM-40-0.5	8/3/2021	0.5	No	245	**323**	O1
EM-40-2'	8/3/2021	2	No	16	**18.6**	
Ravine						
R-1-0.5'	8/4/2021	0.5	No	226	**400**	
R-1-2'	8/4/2021	2	No	131	**61.5**	
R-2-0.5'	8/4/2021	0.5	No	28	**215**	
R-2-2'	8/4/2021	2	No	4	**8.80**	O1
R-3-0.5'	8/3/2021	0.5	No	810	**1,530**	
R-3-2'	8/3/2021	2	No	12	**31.4**	
R-4-0.5'	8/4/2021	0.5	No	1,302	**1,600**	
R-4-2'	8/4/2021	2	No	16	**23.7**	
R-5-0.5'	8/4/2021	0.5	No	234	**9.86**	
R-5-2'	8/4/2021	2	No	18	**17.9**	
R-6-0.5'	8/3/2021	0.5	No	628	**573**	
R-6-2'	8/3/2021	2	No	290	**341**	
R-7-0.5'	8/4/2021	0.5	No	454	**456**	
R-7-2'	8/4/2021	2	No	33	**66.0**	
R-8-1.5'	8/4/2021	1.5	No	98	--	
R-8-2'	8/4/2021	2	No	93	--	
R-9-0.5'	8/4/2021	0.5	No	182	**256**	
R-9-2'	8/4/2021	2	No	11	**6.59**	
R-10-0.5'	8/4/2021	0.5	No	86	**94.0**	
R-10-2'	8/4/2021	2	No	3	**12.5**	
R-11-0.5'	8/4/2021	0.5	No	93	**75.7**	
R-11-2'	8/4/2021	2	No	20	**23.3**	
R-12-0.5'	8/4/2021	0.5	No	61	--	
R-12-2'	8/4/2021	2	No	28	--	
R-13-0.5'	8/5/2021	0.5	No	741	**686**	
R-13-2'	8/5/2021	2	No	17	**31.9**	
R-14-0.5'	8/5/2021	0.5	No	1,075	**1,220**	
R-14-2'	8/5/2021	2	No	6	**10.9**	

Table 1
Lead Concentrations in Soil
Lower Main Meadow, Pogonip Open Space
Santa Cruz, California

Sample ID	Date	Sample Depth *(feet bgs)*	Lead Shot Observed *(Yes / No)*	XRF Reading *(ppm)*	Lead *(mg/kg)*	
				Background Level[1]	43	
				Unrestricted (Residential) Screening Level[2]	80	
				Commercial Screening Level[2]	320	
				Recreational Trail Use Screening Level[3]	540	
Emma McCrary Trail Area						
T-1-0.5'	8/3/2021	0.5	No	19	--	
T-1-2'	8/3/2021	2	No	14	--	
T-2-0.5'	8/4/2021	0.5	No	23	--	
T-2-2'	8/4/2021	2	No	6	--	
T-3-0.5'	8/4/2021	0.5	No	384	**474**	
T-3-2'	8/4/2021	2	No	8	**8.15**	
T-4-0.5'	1/11/2022	0.5	No	48	--	
T-4-2'	1/11/2022	2	No	15	--	
T-5-0.5'	1/11/2022	0.5	No	99	**159**	
T-5-2'	1/11/2022	2	No	13	**7.07**	
T-6-0.5'	1/11/2022	0.5	No	152 / 489 / 91	**187**	
T-6-2'	1/11/2022	2	No	12	**9.42**	
T-7-0.5'	1/11/2022	0.5	No	107 / 82	**153**	
T-7-2'	1/11/2022	2	No	33	**8.92**	
North Orchard						
NO-13-0.5'	8/5/2021	0.5	No	14	--	
NO-13-2'	8/5/2021	2	No	3	--	
NO-14-0.5'	8/5/2021	0.5	No	56	--	
NO-14-2'	8/5/2021	2	No	4	--	
West Meadow						
WM-16-0.5'	8/5/2021	0.5	No	18	--	
WM-16-2'	8/5/2021	2	No	3	--	
WM-17-0.5'	8/5/2021	0.5	No	133	--	
WM-17-2'	8/5/2021	2	No	5	--	

Notes:

Soil samples sieved using No. 10 sieve and metals analyzed using USEPA Method 6020.

Analytes detected above laboratory reporting limit are **emboldened**.

Analytes detected above background level and Recreational Trail User Screening Level are highlighted.

XRF = X-Ray Fluorescence.

bgs = below ground surface.

ppm = parts per million.

mg/kg = milligrams per kilogram.

-- = Not analyzed.

O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

[1] Lawrence Berkeley National Laboratory (LBNL, 2009), was used to establish an acceptable upper estimate background concentration for

[2] In order of priority, the screening level represents the Department of Toxic Substances Control (DTSC)-modified screening level (DTSC, 2020) followed by U.S. Environmental Protection Agency (USEPA) Regional Screening Level (RSL; USEPA, 2020).

[3] The Recreational Trail Use Screening Level was determined based on an evaluation of soil data collected from 2019-2020 and was described in the Preliminary Endangerment Assessment Report (RMD, 2020).

[4] Sample EM-35-2' initially reported a lead concentration of 5,810 mg/kg and was reanalyzed to confirm the result. The reanalyzed sample reported a lead concentration of 198 mg/kg.

References:

LBNL, 2009. Analysis of Background Distributions of Metals in Soil at Lawrence Berkeley National Laboratory. Revised April.

RMD, 2020. Preliminary Endangerment Assessment Report, Pogonip Farm and Garden, 333 Golf Club Drive, Santa Cruz, California. August

Table 2
Polycyclic Aromatic Hydrocarbon Concentrations in Soil
Lower Main Meadow, Pogonip Open Space
Santa Cruz, California

Sample ID	Date	Sample Depth (feet bgs)	Depth Clay Target Fragments Observed (feet bgs)	Notes	ANTHRACENE (mg/kg)		ACENAPHTHENE (mg/kg)		BENZO(A) ANTHRACENE (mg/kg)		BENZO(A) PYRENE (mg/kg)		BENZO(B) FLUORANTHENE (mg/kg)		BENZO(G,H,I) PERYLENE (mg/kg)		BENZO(K) FLUORANTHENE (mg/kg)		CHRYSENE (mg/kg)		DIBENZ(A,H) ANTHRACENE (mg/kg)		FLUORANTHENE (mg/kg)		FLUORENE (mg/kg)		INDENO(1,2,3-CD) PYRENE (mg/kg)		PHENANTHRENE (mg/kg)		PYRENE (mg/kg)		NAPHTHALENE (mg/kg)		1-METHYL NAPHTHALENE (mg/kg)		2-METHYL NAPHTHALENE (mg/kg)	
Unrestricted (Residential) Screening Level[1]					17,000		3,300		1.1		0.11		1.1		NE		11		110		0.028		2,400		2,300		1.1		NE		1,800		2.0		9.9		190	
Commercial Screening Level[1]					130,000		23,000		12		1.3		13		NE		130		1,300		0.31		18,000		17,000		13		NE		13,000		6.5		30		1,300	
Recreational Trail Use Screening Level[2]					120,000		23,000		45		4.5		45		NE		450		4,500		1.1		NE		16,000		45		NE		12,000		38		160		1,600	
West Meadow																																						
WM-C-5-0.5'	05/13/2020	0 - 0.5			<0.00645		<0.00645		0.00425	J	0.00642	J	0.00668		0.00606	J	0.00326	J	0.00552	J	<0.00645		0.00445	J	<0.00645		0.00467	J	<0.00645		0.00486	J	<0.0215		<0.0215		<0.0215	
WM-C-6-0.5'	05/14/2020	0 - 0.5			<0.00644		<0.00644		<0.00644		<0.00644		0.00244	J	<0.00644		<0.00644		<0.00644		<0.00644		<0.00644		<0.00644		<0.00644		<0.00644		<0.00644		<0.0215		<0.0215		<0.0215	
WM-C-7-0.5'	05/14/2020	0 - 0.5			<0.00752		<0.00752		0.00232	J	0.00283	J	0.00352	J	0.00295	J	<0.00752		<0.00752		<0.00752		<0.00752		<0.00752		<0.00752		<0.00752		0.00292	J	<0.0251		<0.0251		<0.0251	
WM-C-8-0.5'	05/14/2020	0 - 0.5			0.0273		0.0102		0.216		0.267		0.323		0.176		0.081		0.261		0.0532		0.340		0.00293	J	0.155		0.102		0.309		<0.0240		<0.0240		<0.0240	
WM-C-8-2'	05/14/2020	1.5 - 2			<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.00741		<0.0247		<0.0247		<0.0247	
WM-C-9A-1'	05/15/2020	0.5 - 1	0.5-1.5		0.231		0.0866		5.64		10.4		11.5		4.88		2.79		6.44		1.85		4.22		0.0319	J	4.99		<0.215		0.828		4.68		<0.215		<0.215	
WM-C-9-2'	05/14/2020	1.5 - 2			<0.00717		<0.00717		0.0332		0.0608		0.0593		0.0545		0.0232		0.0412		0.0145		0.0272		<0.00717		0.0446		0.00582	J	0.0319		<0.0239		<0.0239		<0.0239	
WM-C-10-0.5'	05/14/2020	0 - 0.5			0.0115		0.00499	J	0.121		0.185		0.192		0.131		0.0803		0.172		0.0395		0.162		<0.00706		0.112		0.0508		0.155		<0.0235		<0.0235		<0.0235	
WM-C-10-2'	05/14/2020	1.5 - 2			0.0258		0.00645	J	0.175		0.243		0.298		0.179		0.0819		0.217		0.0506		0.268		0.00249	J	0.153		0.0736		0.229		<0.0217		<0.0217		<0.0217	
WM-C-11-0.5'	05/13/2020	0 - 0.5			<0.00640		<0.00640		0.00257	J	0.00383	J	0.00553	J	0.00419	J	<0.00640		0.00307	J	<0.00640		0.00273	J	<0.00640		0.00306	J	<0.00640		0.0028	J	<0.0213		<0.0213		<0.0213	
WM-C-11-2'	05/13/2020	1.5 - 2			0.56		0.23		2.68		2.56		2.88		1.42		0.772		3.02		0.468		3.81		0.123		1.25		2.43		4.18		0.0112	J	0.0106	J	0.0215	J
WM-DG-1-0.5'	05/13/2020	0 - 0.5			<0.00687		<0.00687		<0.00687		<0.00687		0.00247	J	<0.00687		<0.00687		<0.00687		<0.00687		<0.00687		<0.00687		<0.00687		<0.00687		<0.00687		<0.0229		<0.0229		<0.0229	
WM-DG-2-0.5'	05/13/2020	0 - 0.5			<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.00725		<0.0242		<0.0242		<0.0242	
WM-DG-3-0.5'	05/13/2020	0 - 0.5			<0.00676		<0.00676		<0.00676		<0.00676		0.00267	J	0.00215	J	<0.00676		<0.00676		<0.00676		<0.00676		<0.00676		<0.00676		<0.00676		<0.00676		<0.0225		<0.0225		<0.0225	
WM-DG-4-0.5'	05/13/2020	0 - 0.5			<0.00726		<0.00726		<0.00726		0.0027	J	0.00347	J	0.00283	J	<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.0242		<0.0242		<0.0242	
WM-DG-5-0.5'	05/13/2020	0 - 0.5			<0.00733		<0.00733		<0.00733		0.00239	J	0.00287	J	0.00256	J	<0.00733		<0.00733		<0.00733		<0.00733		<0.00733		<0.00733		<0.00733		<0.00733		<0.0244		<0.0244		<0.0244	
WM-DG-6-0.5'	05/13/2020	0 - 0.5			0.131		0.0763		2.85		3.61		3.88		2.27		1.31		3.61		0.836		3.07		0.0173		2.03		0.633		3.23		0.00974	J	0.0111	J	0.0133	J
WM-DG-6-2'	05/13/2020	1.5 - 2			0.185		0.114		5.43		7.56		7.92		4.06		1.85		7.05		0.238		5.06		0.0248		3.58		0.942		6.73		0.0141	J	0.0162	J	0.0194	J
WM-DG-7-0.5'	05/13/2020	0 - 0.5			<0.00639		<0.00639		0.00345	J	0.00558	J	0.00635	J	0.00506	J	<0.00639		0.00452	J	<0.00639		0.00399	J	<0.00639		0.00419	J	<0.00639		0.00411	J	<0.0213		<0.0213		<0.0213	
WM-DG-8-0.5'	05/13/2020	0 - 0.5			<0.00730		<0.00730		0.0529		0.107		0.113		0.0893		0.0331		0.0669		0.0252		0.0409		<0.00730		0.0754		0.00898		0.0444		<0.0243		<0.0243		<0.0243	
WM-DG-9-0.5'	05/13/2020	0 - 0.5			<0.00694		<0.00694		<0.00694		0.00271	J	0.0034	J	0.00272	J	<0.00694		<0.00694		<0.00694		<0.00694		<0.00694		0.00213	J	<0.00694		<0.00694		<0.0231		<0.0231		<0.0231	
WM-DG-10-0.5'	05/13/2020	0 - 0.5			<0.00690		<0.00690		0.00254	J	0.00254	J	0.00298	J	<0.00690		<0.00690		0.00297	J	<0.00690		0.00366	J	<0.00690		<0.00690		<0.00690		0.00373	J	<0.0230		<0.0230		<0.0230	
WM-DG-11-0.5'	05/14/2020	0 - 0.5	0.5-1		<0.0242		<0.0242		0.041		0.0608		0.0665		0.0445		0.0224	J	0.0535		0.0115	J	0.0469		<0.0242		0.0371		0.0158	J	0.0477		<0.0804		<0.0804		<0.0804	
WM-DG-11-0.5'-DUP	05/14/2020	0 - 0.5		Duplicate	0.986		0.651		8.45		10.5		12.2		3.35		4.00		9.86		2.38		11.1		0.260		3.61		4.14		11.8		0.321		0.0762		0.11	
WM-DG-11A-1'	05/15/2020	0.5 - 1			0.00491	J	<0.00659		0.0544	J3	0.0886	J3,J6	0.0813	J3,J6	0.0751	J3	0.0336	J3	0.0709	J3	0.0196		0.0595		<0.00659		0.0637	J3	<0.0220		0.0152		0.061		<0.0220		<0.0220	
WM-DG-11-2'	05/14/2020	1.5 - 2			<0.00716		<0.00716		0.00212	J	0.00258	J	0.00271	J	<0.00716		<0.00716		<0.00716		<0.00716		<0.00716		<0.00716		<0.00716		<0.00716		<0.00716		0.00716	J	<0.0239		<0.0239	
WM-DG-12-0.5'	05/14/2020	0 - 0.5			0.0278		0.0132		0.304		0.354		0.415		0.243		0.12		0.365		0.0661		0.347		0.00273	J	0.203		0.13		0.498		<0.0222		<0.0222		<0.0222	
WM-DG-12-2'	05/14/2020	1.5 - 2			<0.00675		<0.00675		0.0100		0.00997		0.0102		0.00534	J	0.00445	J	0.0126		<0.00675		0.014		<0.00675		0.00474	J	0.00682		0.0159		<0.0225		<0.0225		<0.0225	
WM-DG-13-1.5'	05/14/2020	1 - 1.5	0.5-2		0.252		0.113		6.42		11.7		14.8		7.52		4.02		8.75		4.45		5.74		0.0241		6.25		0.901		5.68		0.0462		0.0166	J	0.0201	J
WM-DG-13-2'	05/14/2020	1.5 - 2			0.00609	J	<0.00670		0.19		0.358		0.393		0.365		0.123		0.257		0.105		0.123		<0.00670		0.292		0.0186		0.158		0.00491	J	<0.0223		<0.0223	
WM-DG-14-0.5'	05/14/2020	0 - 0.5			<0.00659		<0.00659		0.00997		0.0149		0.0169		0.0138		0.00589	J	0.0122		0.00377	J	0.0108		<0.00659		0.0107		0.00295	J	0.0124		<0.0220		<0.0220		<0.0220	
WM-DG-15-0.5'	05/14/2020	0 - 0.5			<0.00686		<0.00686		0.00482	J	0.00658	J	0.00832		0.00645	J	0.00264	J	0.00575	J	<0.00686		0.00552	J	<0.00686		0.00486	J	<0.00686		0.0065	J	<0.0229		<0.0229		<0.0229	
North Orchard																																						
NO-3-0.5'	05/14/2020	0 - 0.5			<0.00726		<0.00726		<0.00726		<0.00726		0.00191	J	<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.00726		<0.0242		<0.0242		<0.0242	
NO-4-0.5'	05/14/2020	0 - 0.5			<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.00700		<0.0233		<0.0233		<0.0233	
NO-6-0.5'	05/14/2020	0 - 0.5			<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.00786		<0.0262		<0.0262		<0.0262	
East Meadow																																						
EM-1-0.5'	05/12/2020	0 - 0.5			<0.00688		<0.00688	J3	<0.00688		<0.00688		0.00228	J	<0.00688		<0.00688	J3	<0.00688		<0.00688		<0.00688		<0.00688		<0.00688		<0.00688		<0.00688		<0.0229	J3	<0.0229	J3	<0.0229	J3
EM-2-0.5'	05/12/2020	0 - 0.5			<0.00693		<0.00693		0.00233	J	0.00267	J	0.00508	J	0.00326	J	<0.00693		0.0028	J	<0.00693		0.00337	J	<0.00693		0.00232	J	<0.00693		0.00292	J	<0.0231		<0.0231		<0.0231	
EM-3-0.5'	05/12/2020	0 - 0.5			<0.00690		<0.00690		<0.00690		<0.00690		0.00324	J	0.00258	J	<0.00690		<0.00690		<0.00690		<0.00690		<0.00690		<0.00690		<0.00690		<0.00690		<0.0230		<0.0230		<0.0230	
EM-4-1.5'	05/12/2020	1 - 1.5			<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.00656		<0.0219		<0.0219		<0.0219	
EM-5-0.5'	05/12/2020	0 - 0.5			<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.00647		<0.0216		<0.0216		<0.0216	
EM-6-0.5'	05/12/2020	0 - 0.5			<0.00671		<0.00671		<0.00671		<0.00671		0.00332	J	0.00223	J	<0.00671		<0.00671		<0.00671		<0.00671		<0.00671		<0.00671		<0.00671		<0.00671		<0.0224		<0.0224		<0.0224	
EM-7-0.5'	05/12/2020	0 - 0.5			<0.00663		<0.00663		<0.00663		<0.00663		0.00224	J	<0.00663		<0.00663		<0.00663		<0.00663		<0.00663		<0.00663		<0.00663		<0.00663		<0.00663		<0.0221		<0.0221		<0.0221	
EM-8-1'	05/12/2020	0.5 - 1			<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.00652		<0.0217		<0.0217		<0.0217	
EM-9-0.5'	05/12/2020	0 - 0.5			<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.00641		<0.0214		<0.0214		<0.0214	
EM-10-0.5'	05/12/2020	0 - 0.5	0-1.5		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.00633		<0.0211		<0.0211		<0.0211	
EM-11-0.5'	05/12/2020	0 - 0.5			<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		<0.00708		0.0114	J	<0.0236		0.0102	J
EM-21-0.5'	05/14/2020	0 - 0.5			<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.00646		<0.0215		<0.0215		<0.0215	
EM-21-0.5'-DUP	05/14/2020	0 - 0.5		Duplicate	<0.00650		<0.00650		<0.00650		<0.00650		0.00183	J	<0.00650		<0.00650		<0.00650		<0.00650		<0.00650		<0.00650		<0.00650		<0.00650		<0.00650		<0.0217		<0.0217		<0.0217	

Table 2

Polycyclic Aromatic Hydrocarbon Concentrations in Soil

Lower Main Meadow, Pogonip Open Space
Santa Cruz, California

Notes:

PAHs analyzed using USEPA Method 8270C-SIM.

Analytes detected above laboratory reporting limit are **emboldened**.

Analytes detected above Unrestricted (Residential) Screening Level are highlighted orange.

Analytes detected above Recreational Trail Use Screening Level are highlighted blue.

Analytes detected above Commercial Screening Level are underlined.

bgs = Below ground surface.

mg/kg = Milligrams per kilogram.

NE = Not Established.

PAHs = Polycyclic Aromatic Hydrocarbons.

SIM = Selective Ion Mode.

J = The identification of the analyte is acceptable; the reported value is an estimate.

J3 = The associated batch QC was outside the established quality control range for precision.

J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.

[1] The screening level represents the Department of Toxic Substances Control (DTSC)-modified screening level (DTSC, 2020).

[2] The Recreational Trail Use Screening Level was determined based on an evaluation of soil data collected from 2019-2020.

References:

DTSC, 2020. Human Health Risk Assessment (HHRA) Note Number 3. June.

APPENDIX A

EXCERPTS FROM PREVIOUS REPORTS

Report: Soil Lead Levels in the Lower Main Meadow of Pogonip

*This is report updated **January 18, 2019**.*
By the Homeless Garden Project

On November 18, 2018, following a meeting with Parks and Recreation staff, HGP received a formal letter alerting us to the presence of historic skeet shooting in the Lower Main Meadow, and the possibility of higher lead levels resulting from this use.

At the time agricultural soil testing was underway. The initial soil test results were received on December 7, 2018 and are shown in Table 1. Soil samples were taken using the best practices methodology outlined by the Soil and Plant Nutrient Testing Laboratory at the University of Massachusetts Amherst, for agriculture soil testing. Lead levels tested in this initial phase report plant available (extractible) lead levels, NOT total lead levels. (In addition to reporting plant available lead, 10 other agriculturally significant tests were reported including pH.)

Table 1 (below) shows the results of round 1 testing. Sample locations are shown with green pins on the map.

Table 1.

Location		Extractable Lead ppm	pH
Orchard		76.6	5.3
Field 1		1.4	5.3
Acacia		1.2	4.6
Field 2		4.9	5.5

One sample, from the area planned as the future orchard, showed lead levels that fell above the optimum range of 22 ppm recommended by the lab.

Further samples were collected from the lower meadow to explore what area of the Lower Meadow showed elevated lead levels. Three samples (numbers 2,3,6) showed elevated lead levels. These samples correspond to the 100 foot wetlands buffer zone. Table 2 shows the results of round 2 testing Samples locations are shown with red “pins” on the map.

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Table 2 shows the results of round 2 testing showing extractable Lead. Sample locations are shown on the map by red pins.

Location		Extractable Lead ppm	pH
1		8.1	5.4
2		89.8	5.3
3		50.2	5.4
4		11.2	5.2
5		16.5	5.5
6		69.4	5.3

January 2019 update

The lab at the University of Massachusetts recommends that soils with elevated levels of extractable lead (>22 ppm) be tested for Total Sorbed Lead. They recommend that samples be analyzed by the Agricultural Analytical Services Laboratory at the Pennsylvania State University Analytical Services Lab. Additional samples for both extractable and total Sorbed Lead were taken on December 19, 2018 and shipped to the lab on December 27, 2018. Table 3 and 4 show the results of this third round of soil testing. Locations of these samples are indicated on the map with light blue pins.

Table 3. Round 3 testing for extractable lead (same tests as shown in Table 1 and 2) Locations of these samples are indicated on the map with light blue pins. Plum Creek is indicated with a white pin.

Location		Extractable Lead ppm	pH
Plum Creek		0.9	6.2
Sample 7 (1 +2+3 from Table 2)		3.4	5.3
Sample 8 (4 +5 +6 from Table 2)		9.6	5.5

Table 4 shows total Sorbed Lead as measured by the Pennsylvania State University Analytical Services Lab. We are pleased to report that this testing indicates that while the area shows somewhat elevated lead levels, the results are below the EPA standards of 400 to 1200 ppm that would require modified farming practices.

Table 4. Shows total Sorbed Lead as measured by the Pennsylvania State University Analytical Services Lab. Note mg/kg = ppm. Light blue pins (Sorb 1 is near the road and Sorb two is further to the east)

Location		**Pb (Lead) mg/kg**	**Cd (Cadmium) mg/kg**	**Cu (Copper) mg/kg**	**Cr (Chromium) mg/kg**	**Ni (Nickel) mg/kg**	**Zn (Zink) mg/kg**
Sorb1 (1+2+3 from Table 2)		145.86	0.25	3.85	11.06	4.68	17.82
Sorb2 (4+5+6 from Table 2)		56.08	0.25	3.36	11.24	4.76	18.62

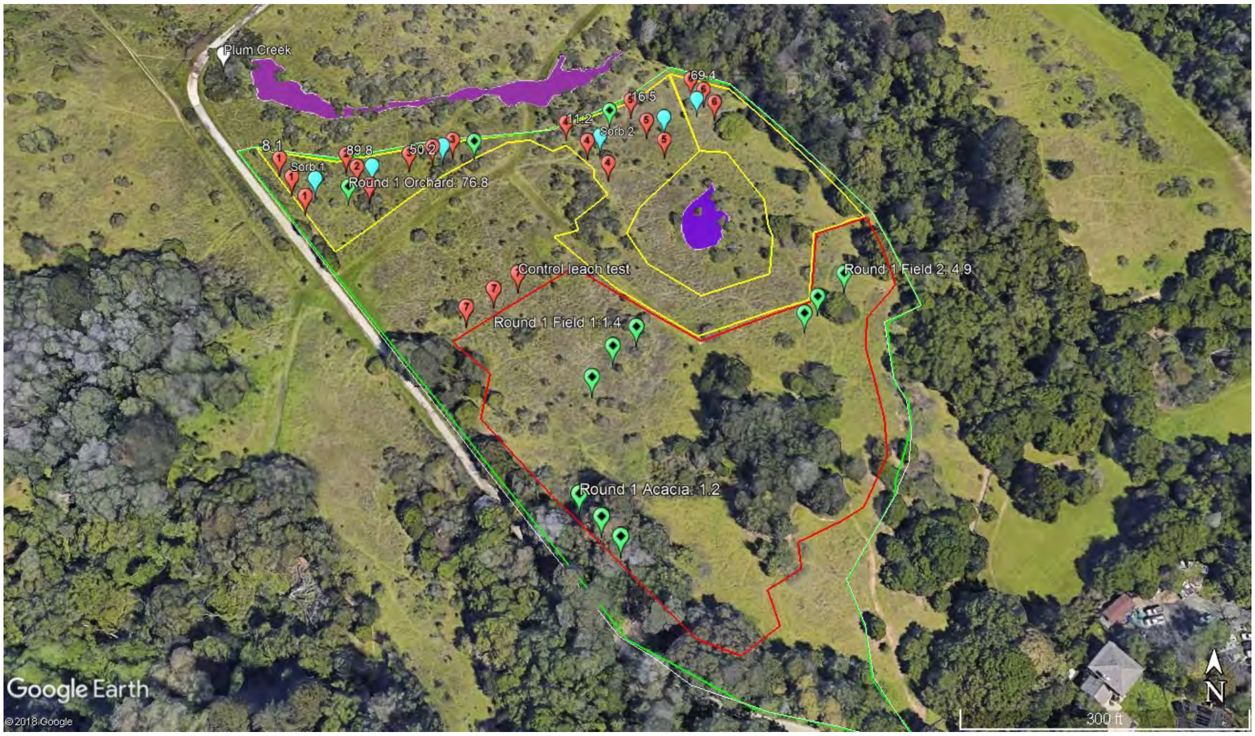
NOTE: 400 to 1200 ppm lead are set by the EPA and would require modified farming practices

Additional information:

According to Pennsylvania State College of Agriculture Science Lead Fact Sheet and other sources, the plant available Lead depends on its solubility and solubility is strongly impacted by soil pH. At low pH (pH 5 or less), lead is more soluble. At neutral (or more basic) pHs lead is held tightly in soil and its solubility is low.

Both the University of Massachusetts and Oregon State University publish guidelines for cultivation in areas impacted by higher lead levels. These recommendations are identical and allow for cultivations at lead levels up to 1200 ppm TOTAL LEAD. These recommendations follow the guidelines issued by the EPA.

Map showing sample locations:



References (shown in the order they appear linked in the text):

1) https://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/sampling-instructions-for-routine-soil-analysis
2) https://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/soil-lead-testing-interpretation-recommendations
3) https://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/soil-lead-testing-interpretation-recommendations
4) https://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/soil-lead-testing-interpretation-recommendations
5) Lead in Residential Soils: Sources, Testing, and Reducing Exposure. Pennsylvania State College of Agricultural Sciences. Copyright 1999
6) http://smallfarms.oregonstate.edu/sfn/su10toxicmetals
7) https://www.atsdr.cdc.gov/csem/csem.asp?csem=34&po=8

Table A1
Summary of Soil Analytical Results
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Sample Date	Sample Depth	Sample Type	Metals				TPH	
				Arsenic	Copper	Lead	Zinc	Diesel	Motor Oil
RWQCB Residential ESLs				0.26	3,100	80	23,000	260	12,000
RWQCB Commercial/Industrial ESLs				0.31	47,000	320	350,000	1,200	180,000
RWQCB Construction Worker ESLs				0.98	14,000	160	110,000	1,100	54,000
B1	2/28/2019	0.0-0.5	Composite	**2.1**	3.9	**120**	17	<0.24	<1.3
B1N-0.5	2/28/2019	0.0-0.5	Discrete	---	---	**150**	---	---	---
B1S-0.5	2/28/2019	0.0-0.5	Discrete	---	---	58	---	---	---
B1E-0.5	2/28/2019	0.0-0.5	Discrete	---	---	**110**	---	---	---
B1W-0.5	2/28/2019	0.0-0.5	Discrete	---	---	64	---	---	---
B1	2/28/2019	1.5-2.0	Composite	**2.9**	4.6	6.2	18	---	---
B1N-2.0	2/28/2019	1.5-2.0	Discrete	---	---	4.5	---	---	---
B1S-2.0	2/28/2019	1.5-2.0	Discrete	---	---	9.5	---	---	---
B1E-2.0	2/28/2019	1.5-2.0	Discrete	---	---	8.0	---	---	---
B1W-2.0	2/28/2019	1.5-2.0	Discrete	---	---	6.4	---	---	---
B2	2/28/2019	0.0-0.5	Composite	**2.0**	3.2	60	60	<0.24	<1.3
B2	2/28/2019	1.5-2.0	Composite	**1.6**	3.3	5.8	98	---	---
B3	2/28/2019	0.0-0.5	Composite	**2.8**	3.1	**84**	20	<0.24	<1.3
B3N-0.5	2/28/2019	0.0-0.5	Discrete	---	---	**190**	---	---	---
B3S-0.5	2/28/2019	0.0-0.5	Discrete	---	---	48	---	---	---
B3E-0.5	2/28/2019	0.0-0.5	Discrete	---	---	47	---	---	---
B3W-0.5	2/28/2019	0.0-0.5	Discrete	---	---	**89**	---	---	---
B3	2/28/2019	1.5-2.0	Composite	**2.5**	3.9	5.6	22	---	---
B3N-2.0	2/28/2019	1.5-2.0	Discrete	---	---	5.7	---	---	---
B3S-2.0	2/28/2019	1.5-2.0	Discrete	---	---	11	---	---	---
B3E-2.0	2/28/2019	1.5-2.0	Discrete	---	---	20	---	---	---
B3W-2.0	2/28/2019	1.5-2.0	Discrete	---	---	5.8	---	---	---
B4	2/28/2019	0.0-0.5	Composite	**1.8**	3.6	24	19	<0.24	<1.3
B4	2/28/2019	1.5-2.0	Composite	**1.8**	3.8	6.6	19	---	---
B5	2/28/2019	0.0-0.5	Composite	**9.6**	4.2	25	26	<0.24	<1.3
B5	2/28/2019	1.5-2.0	Composite	**7.3**	3.7	4.6	20	---	---
B6	2/28/2019	0.0-0.5	Composite	**1.6**	4.0	60	23	8.4 A01, A52	85 A01, A57
B6	2/28/2019	1.5-2.0	Composite	**2.1**	3.5	6.4	22	---	---
B7	2/28/2019	0.0-0.5	Composite	**3.2**	50	38	160	<0.24	<1.3
B7	2/28/2019	1.5-2.0	Composite	**2.9**	7.1	8.6	47	---	---
B8	2/28/2019	0.0-0.5	Composite	**3.7**	4.8	19	22	1.3 J, A52	2.1 J, A57
B8	2/28/2019	1.5-2.0	Composite	**4.4**	4.1	5.8	19	---	---
B9	2/28/2019	0.0-0.5	Composite	**1.8**	3.8	8.9	19	1.3 J, A52	3.4 J, A57

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				Arsenic	Copper	Lead	Zinc	Diesel	Motor Oil
RWQCB Residential ESLs				0.26	3,100	80	23,000	260	12,000
RWQCB Commercial/Industrial ESLs				0.31	47,000	320	350,000	1,200	180,000
RWQCB Construction Worker ESLs				0.98	14,000	160	110,000	1,100	54,000
B9	2/28/2019	1.5-2.0	Composite	**3.0**	4.3	12	20	---	---
B10	2/28/2019	0.0-0.5	Composite	**0.98**	3.2	6.1	19	1.3 J, A52	1.7 J, A57
B10	2/28/2019	1.5-2.0	Composite	**1.2**	3.4	4.4	17	---	---
B11	2/28/2019	0.0-0.5	Composite	**2.2**	4	11	20	<0.24	<1.3
B11	2/28/2019	1.5-2.0	Composite	**1.9**	3.5	5.1	19	---	---
B12	2/28/2019	0.0-0.5	Composite	**1.2**	2.9	10	15	<0.24	<1.3
B12	2/28/2019	1.5-2.0	Composite	**2.2**	3.3	6.9	24	NA	NA
B13	2/28/2019	0.0-0.5	Composite	**1.4**	2.8	70	17	NA	NA

Notes: 9.6 50.0 190.0 160.0

Sample results reported in milligrams per kilogram (mg/kg).
Metals analyzed by USEPA Method 6010B.
TPH analyzed by USEPA Method 8015B.
TPH = total petroleum hydrocarbons.
Bolded value = exceedence of Residential ESL.
<0.24 = not detected above analytical laboratory Method Detection Limit (MDL).
--- = not analyzed or not established.
J = Estimated Value.
A01 = Detection and quantation limits were raised due to sample dilution.
A52 = Chromatogram not typical of diesel.
A57 = Chromatogram not typical of motor oil.
RWQCB ESL = San Francisco Bay Regional Water Quality Control Board Environmental Screening Level (January 2019, Rev 1).

Table A2

Summary of Soil Analytical Results - PAHs

Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Sample Date	Sample Depth (feet)	PAHs													
			Acenaphthene	Anthracene	Benzo[a]anthracene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Benzo[g,h,i]perlyene	Chrysene	Dibenzo[a,h]anthracene	Fluoroanthene	Fluorene	Indeno[1,2,3-cd]pyrene	Phenanthrene	Pyrene
RWQCB Residential ESLs			3,600	18,000	1.1	1.1	11	0.11	NE	110	0.11	2,400	2,400	1.1	NE	1,800
RWQCB Commercial/Industrial ESLs			45,000	230,000	20	21	210	2.1	NE	2,100	2.1	30,000	30,000	21	NE	23,000
RWQCB Construction Worker ESLs			10,000	50,000	110	110	910	10	NE	9,100	11	6,700	6,700	110	NE	5,000
B1	2/28/2019	0.0-0.5	<0.0012	<0.0012	<0.0011	<0.00095	<0.0011	0.0020 J	<0.0011	<0.00097	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015
B2	2/28/2019	0.0-0.5	<0.0012	<0.0012	0.0012 J	0.0028 J	<0.0011	0.0031	<0.0011	0.0011 J	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015
B3	2/28/2019	0.0-0.5	<0.0012	<0.0012	0.0016 J	0.0034	<0.0011	0.0034	<0.0011	0.0016 J	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015
B4	2/28/2019	0.0-0.5	<0.0012	<0.0012	<0.0011	0.0019 J	<0.0011	0.0024 J	<0.0011	<0.00097	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015
B5	2/28/2019	0.0-0.5	0.026	0.13 A01	0.55 A01	0.49 A01	0.20 A01	**0.44 A01**	0.17 A01	0.59 A01	0.063	0.78 A01	0.013	0.18 A01	0.48 A01	0.85 A01
B6	2/28/2019	0.0-0.5	0.006	0.014	0.22 A01	0.33 A01	0.10 A01	**0.32 A01**	0.23 A01	0.25 A01	0.066 A01	0.19 A01	0.0012 J	0.20 A01	0.042	0.24 A01
B7	2/28/2019	0.0-0.5	0.0063	0.024	0.42 A01	0.66 A01	0.26 A01	**0.64 A01**	0.50 A01	0.49 A01	**0.17 A01**	0.31 A01	0.0019 J	0.45 A01	0.075 A01	0.39 A01
B8	2/28/2019	0.0-0.5	<0.0012	<0.0012	0.0095	0.19	0.0054	0.014	0.0097	0.011	0.0016 J	0.0092	<0.0011	0.0078	0.0025 J	0.012
B9	2/28/2019	0.0-0.5	<0.0012	<0.0012	0.0021 J	<0.00095	<0.0011	0.0043 J	0.0019 J	0.0023 J	<0.00099	0.0019 J	<0.0011	0.0015 J	<0.0012	0.0022 J
B10	2/28/2019	0.0-0.5	<0.0012	<0.0012	<0.0011	<0.00095	<0.0011	0.0019 J	<0.0011	<0.00097	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015
B11	2/28/2019	0.0-0.5	0.0050	0.0098	0.17 A01	0.21 A01	0.064	**0.19 A01**	0.091 A01	0.20 A01	0.031	0.17 A01	<0.0011	0.089 A01	0.028	0.20 A01
B12	2/28/2019	0.0-0.5	<0.0012	<0.0012	<0.0011	<0.00095	<0.0011	<0.00095	<0.0011	<0.00097	<0.00099	<0.0014	<0.0011	<0.00092	<0.0012	<0.0015

Notes:

Sample results reported in milligrams per kilogram (mg/kg).
PAHs analyzed by USEPA Method 8270C.
Bolded value = exceedence of Residential ESL.
<0.0012 = not detected above analytical laboratory Method Detection Limit (MDL).
PAHs = Polycyclic Aromatic Hydrocarbons.
NA = not analyzed.
J = Estimated Value.
NE = ESL not established.
A01 = Detection and quantation limits were raised due to sample dilution.
RWQCB ESL = San Francisco Bay Regional Water Quality Control Board Environmental Screening Level (January 2019, Rev 1).

Table A3
Metals in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Shot Observed	XRF Reading	Notes	Antimony		Arsenic		Copper		Lead		Zinc	
		(feet bgs)	*(feet bgs)*	*(ppm)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
Residential Screening Level						31		11		3,100		80		23,000	
Screening Level Source						USEPA RSLs		Background		USEPA RSLs		HHRA Note 3		USEPA RSLs	
West Meadow															
WM-C-1-0.5'	5/13/2020	0 - 0.5		222		**1.31**	J	**2.63**		**12.3**		**181**		**23.9**	
WM-C-1-2'	5/13/2020	1.5 - 2		54		-		-		-		**36.9**		-	
WM-C-2-0.5'	5/13/2020	0 - 0.5		202		**0.989**	J	**2.13**	J	**6.91**		**182**		**15.3**	
WM-C-2-0.5' DUP	5/13/2020	0 - 0.5		202	Duplicate	**1.57**	J	**2.45**		**7.54**		**156**		**13.6**	
WM-C-2-2'	5/13/2020	1.5 - 2		26		-		-		-		**11.1**		-	
WM-C-3-0.5'	5/13/2020	0 - 0.5		244		**1.23**	J	**2.14**	J	**8.38**		**161**		**53.6**	
WM-C-3-2'	5/13/2020	1.5 - 2		13		-		-		-		**23.5**		-	
WM-C-4-0.5'	5/13/2020	0 - 0.5		368		**0.683**	J	**1.92**	J	**6.96**		**141**		**15**	
WM-C-4-2'	5/13/2020	1.5 - 2		27		-		-		-		**12.6**		-	
WM-C-5-0.5'	5/13/2020	0 - 0.5		95		**0.568**	J	**1.58**	J	**77.7**	O1	**76.9**	O1	**78.5**	O1
WM-C-6-0.5'	5/14/2020	0 - 0.5		30		**0.897**	J,J6	**2.16**		**4.92**		**10.6**		**19.7**	
WM-C-7-0.5'	5/14/2020	0 - 0.5		13		**0.785**	J	<2.51		**47.3**		**8.57**		**59.1**	
WM-C-8-0.5'	5/14/2020	0 - 0.5		31		**0.879**	J	<2.40		**18.1**		**15.0**		**31.0**	
WM-C-9A-1'	5/15/2020	0.5 - 1		105		**0.727**	J	**1.55**	J	**5.61**		**71.2**		**18.6**	
WM-C-10-0.5'	5/14/2020	0 - 0.5		-		**1.65**	J	**3.81**		**9.09**		**27.0**		**26.6**	
WM-C-11-0.5'	5/13/2020	0 - 0.5		45		**1.47**	J	**10.7**		**7.86**		**29.3**		**24.3**	
WM-DG-1-0.5'	5/13/2020	0 - 0.5		241		**1.41**	J	**2.69**		**8.57**		**188**		**16.4**	
WM-DG-1-2'	5/13/2020	1.5 - 2		9		-		-		-		**15.9**		-	
WM-DG-2-0.5'	5/13/2020	0 - 0.5		168		<2.42		**2.74**		**10.3**		**6.16**		**12.9**	
WM-DG-3-0.5'	5/13/2020	0 - 0.5		90		**0.833**	J	**1.28**	J	**5.66**		**51.1**		**23.0**	
WM-DG-4-0.5'	5/13/2020	0 - 0.5		30		<2.42		**1.76**	J	**16.2**		**19.8**		**28.3**	
WM-DG-5-0.5'	5/13/2020	0 - 0.5		19		<2.44		**1.53**	J	**13.9**		**38.1**		**23.1**	
WM-DG-6-0.5'	5/13/2020	0 - 0.5		311		<2.22		**2.25**		**11.0**		**27.0**		**18.5**	
WM-DG-7-0.5'	5/13/2020	0 - 0.5		120		**0.721**	J	**1.77**	J	**7.01**		**116**		**17.0**	
WM-DG-7-2'	5/13/2020	1.5 - 2		29		-		-		-		**12.1**		-	
WM-DG-8-0.5'	5/13/2020	0 - 0.5		59		**0.637**	J	**1.43**	J	**9.12**		**55.7**		**21.0**	
WM-DG-9-0.5'	5/13/2020	0 - 0.5		28		<2.31		**1.52**	J	**299**		**17.5**		**91.1**	
WM-DG-10-0.5'	5/13/2020	0 - 0.5		46		**0.640**	J	**2.78**		**10.9**		**28.7**		**25.0**	
WM-DG-11-0.5'	5/14/2020	0 - 0.5	0.5-2	59		**2.01**	J	**2.72**	B	**263**		**76.0**		**689**	
WM-DG-11-0.5'-DUP	5/14/2020	0 - 0.5		59	Duplicate	**1.55**	J	**2.13**	B,J	**14.9**		**40.9**		**75.8**	
WM-DG-11A-1'	5/15/2020	0.5 - 1		16		<2.20		**1.77**	J	**9.01**		**11.5**		**15.6**	
WM-DG-12-0.5'	5/14/2020	0 - 0.5		64		**1.58**	J	**1.65**	B,J	**10.8**		**39.1**		**51.6**	
WM-DG-13-1.5'	5/14/2020	0 - 0.5	1-2	1,095		**41.7**	J	**15.9**	B,J	**6,320**		**1,230**		**28,500**	
WM-DG-13-2'	5/14/2020	1.5 - 2		33		**3.33**		**3.61**	B	**214**		**49.0**		**2,770**	
WM-DG-14-0.5'	5/14/2020	0 - 0.5		19		**0.817**	J	**2.82**	B	**8.28**		**13.8**		**40.8**	
WM-DG-15-0.5'	5/14/2020	0 - 0.5		23		**1.80**	J	**2.17**	B,J	**76.9**		**23.8**		**303**	
North Orchard															
NO-1-0.5'	5/14/2020	0 - 0.5		225		**3.54**		**3.05**	B	**6.32**		**265**		**24.0**	
NO-1-2'	5/14/2020	1.5 - 2		25		-		-		-		**6.55**		-	
NO-2-0.5'	5/14/2020	0 - 0.5		119		**1.65**	J	**1.94**	B,J	**8.14**		**107**		**17.6**	
NO-2-2'	5/14/2020	1.5 - 2		28		-		-		-		**5.58**		-	
NO-3-0.5'	5/14/2020	0 - 0.5		863		**6.94**		**4.77**	B	**11.3**		**690**		**21.5**	
NO-3-2'	5/14/2020	1.5 - 2		35		-		-		-		**45.3**		-	
NO-4-0.5'	5/14/2020	0 - 0.5		211		**2.03**	J	**1.60**	B,J	**8.16**		**180**		**15.7**	
NO-4-2'	5/14/2020	1.5 - 2		16		-		-		-		**3.97**		-	
NO-5-0.5'	5/14/2020	0 - 0.5		10		**1.08**	J	**1.57**	B,J	**50.8**		**40.0**		**44.2**	
NO-6-0.5'	5/14/2020	0 - 0.5		118		**1.97**	J	**2.32**	B,J	**23.2**		**144**		**41.8**	
NO-6-2'	5/14/2020	1.5 - 2		14		-		-		-		**13.9**		-	
NO-7-0.5'	5/14/2020	0 - 0.5		43		**0.926**	J	**1.91**	B,J	**8.08**		**29.8**		**24.8**	
NO-8-0.5'	5/15/2020	0 - 0.5		31		**0.928**	J	<2.46		**18.9**		**18.5**		**23.1**	
NO-9-0.5'	5/14/2020	0 - 0.5		39		**1.51**	J	**1.70**	B,J	**14.4**		**20.0**		**26.7**	
NO-10-0.5'	5/15/2020	0 - 0.5		17		<2.33		<2.33		**18.0**		**14.0**		**27.5**	
NO-11-0.5'	5/15/2020	0 - 0.5		18		**1.04**	J	**0.655**	J	**15.0**		**14.5**		**26.8**	
NO-12-0.5'	5/15/2020	0 - 0.5		21		**0.718**	J	<2.42		**17.1**		**10.5**		**49.8**	
East Meadow															
EM-1-0.5'	5/12/2020	0 - 0.5		119		**2.34**		**2.42**		**63.1**		**138**		**69.6**	
EM-1-2'	5/12/2020	1.5 - 2		39		-		-		-		**22.1**		-	
EM-2-0.5'	5/12/2020	0 - 0.5		153		**1.93**	J	**2.42**		**24.6**		**182**		**31.0**	
EM-2-2'	5/12/2020	1.5 - 2		15		-		-		-		**13.4**		-	
EM-3-0.5'	5/12/2020	0 - 0.5		219		**2.87**		**3.23**		**16.6**		**203**		**20.4**	
EM-3-2'	5/12/2020	1.5 - 2		24		-		-		-		**51.3**		-	
EM-4-1.5'	5/12/2020	1 - 1.5		166		**5.15**		**4.58**		**15.8**		**164**		**25.3**	
EM-4-2'	5/12/2020	1.5 - 2		47		-		-		-		**61.3**		-	
EM-5-0.5'	5/12/2020	0 - 0.5		139		**2.51**		**3.21**		**19.1**		**115**		**26.4**	
EM-5-2'	5/12/2020	1.5 - 2		95		-		-		-		**53.6**		-	
EM-6-0.5'	5/12/2020	0 - 0.5		372		**3.46**		**3.91**		**19.9**		**264**		**28.8**	
EM-6-2'	5/12/2020	1.5 - 2		83		-		-		-		**17.9**		-	
EM-7-0.5'	5/12/2020	0 - 0.5		758		**17.0**		**9.58**		**21.1**		**752**		**30.7**	
EM-7-2'	5/12/2020	1.5 - 2		46		-		-		-		**117**		-	
EM-8-1'	5/12/2020	0.5 - 1		549		**11.8**		**8.69**		**14.7**		**717**		**31.1**	
EM-8-2'	5/12/2020	1.5 - 2		94		-		-		-		**140**		-	
EM-9-0.5'	5/12/2020	0 - 0.5		1,227		**5.46**		**6.71**		**10.7**		**1,140**		**22.1**	
EM-9-2'	5/12/2020	1.5 - 2		168		-		-		-		**81.9**		-	

Table A3
Metals in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Shot Observed	XRF Reading	Notes	Antimony		Arsenic		Copper		Lead		Zinc	
		(feet bgs)	*(feet bgs)*	*(ppm)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
Residential Screening Level						31		11		3,100		80		23,000	
EM-10-0.5'	5/12/2020	0 - 0.5		2,973		**6.07**		**8.44**		**12.6**		**1,670**		**29.0**	
EM-10-2'	5/12/2020	1.5 - 2		15		-		-		-		**34.1**		-	
EM-11-0.5'	5/12/2020	0 - 0.5		569		**3.78**		**7.16**		**24.4**		**856**		**36.2**	
EM-11-2'	5/12/2020	1.5 - 2		94		-		-		-		**140**		-	
EM-12-0.5'	5/14/2020	0 - 0.5		31		<2.44		**3.04**	B	**38.6**		**9.15**		**98.3**	
EM-13-0.5'	5/15/2020	0 - 0.5		24		**0.815**	J	**0.554**	J	**9.98**		**11.2**		**25.4**	
EM-14-0.5'	5/14/2020	0 - 0.5		38		**1.58**	J	**2.92**	B	**12.5**		**33.0**		**44.5**	
EM-14-0.5'-DUP	5/14/2020	0 - 0.5		38	Duplicate	**2.14**	J	**2.80**	B	**14.0**		**32.5**		**55.3**	
EM-15-0.5'	5/15/2020	0 - 0.5		26		**1.12**	J	**1.72**	J	**13.0**		**16.1**		**33.0**	
EM-16-0.5'	5/15/2020	0 - 0.5		42		**1.00**	J	**1.33**	J	**14.0**		**24.6**		**37.3**	
EM-17-0.5'	5/15/2020	0 - 0.5		47		**1.50**	J	**1.13**	J	**13.8**		**40.3**		**35.0**	
EM-18-0.5'	5/15/2020	0 - 0.5		39		**3.29**		**2.35**		**11.2**		**44.5**		**30.5**	
EM-19-0.5'	5/14/2020	0 - 0.5		167		**3.13**		**3.57**	B	**12.7**		**116**		**46.0**	
EM-19-2'	5/14/2020	1.5 - 2		64		-		-		-		**38.4**		-	
EM-20-0.5'	5/15/2020	0 - 0.5		58		<2.53		**2.07**	J	**20.5**		**95.2**		**33.4**	
EM-20-2'	5/15/2020	1.5 - 2		10		-		-		-		**9.26**		-	
EM-21-0.5'	5/14/2020	0 - 0.5		776		**10.0**		**6.12**		**7.16**		**768**		**28.7**	
EM-21-0.5'-DUP	5/14/2020	0 - 0.5		776	Duplicate	**6.85**		**5.65**	B	**7.33**		**769**		**30.6**	
EM-21-2'	5/14/2020	1.5 - 2		17		-		-		-		**9.52**		-	
EM-22-0.5'	5/15/2020	0 - 0.5		100		<2.28		**2.39**		**12.3**		**92.6**		**22.8**	
EM-22-2'	5/15/2020	1.5 - 2		17		-		-		-		**25.9**		-	
EM-23-0.5'	5/15/2020	0 - 0.5		29		**0.932**	J	**1.24**	J	**12.8**		**10.7**		**26.0**	
EM-24-0.5'	5/15/2020	0 - 0.5		33		**0.886**	J	**0.686**	J	**9.50**		**9.18**		**26.8**	
EM-25-0.5'	5/15/2020	0 - 0.5		30		**0.786**	J	**0.810**	J	**12.2**		**10.3**		**28.7**	
EM-26-0.5'	5/15/2020	0 - 0.5		19		**0.656**	J	**1.02**	J	**11.7**		**10.8**		**25.1**	
EM-27-0.5'	5/15/2020	0 - 0.5		34		**1.02**	J	**0.823**	J	**13.6**		**6.12**		**26.4**	
EM-28-0.5'	5/15/2020	0 - 0.5		29		**0.813**	J	**0.865**	J	**14.4**		**14.3**		**31.9**	
EM-29-0.5'	5/15/2020	0 - 0.5		31		**0.720**	J	**1.02**	J	**10.8**		**17.8**		**36.8**	
EM-30-0.5'	5/15/2020	0 - 0.5		31		<2.25		**2.52**		**21.9**		**18.0**		**24.1**	
EM-31-0.5'	5/15/2020	0 - 0.5		33		<2.30		**2.07**	J	**9.94**		**15.4**		**19.1**	
EM-32-0.5'	5/15/2020	0 - 0.5		18		<2.34		**2.01**	J	**13.8**		**37.4**		**23.0**	
EM-33-0.5'	5/15/2020	0 - 0.5		17		<2.25		**2.23**	J	**8.74**		**12.3**		**19.0**	

Notes:
Metals analyzed using USEPA Method 6010B.
Analytes detected above laboratory reporting limit are **emboldened**.
Analytes detected above Residential Screening Level are highlighted.
Background = Duverge, 2011. Establishing Background Arsenic in Soil of the Urbanized San Francisco Bay Region. December.
HHRA Note 3 = DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 3. April.
USEPA RSLs = USEPA, 2020. Regional Screening Level (RSL) Summary Table (TR=1E-6, HQ=1). May.
DTSC = California Environmental Protection Agency, Department of Toxic Substances Control.
USEPA = United States Environmental Protection Agency.
bgs = Below ground surface.
mg/kg = Milligrams per kilogram.
- = Not analyzed.
B = The same analyte is found in the associated blank.
J = The identification of the analyte is acceptable; the reported value is an estimate.
J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Table A4
Polycyclic Aromatic Hydrocarbons in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Clay Target Fragments Observed	Notes	ANTHRACENE	ACENAPHTHENE	BENZO(A) ANTHRACENE	BENZO(A) PYRENE	BENZO(B) FLUORANTHENE	BENZO(G,H,I) PERYLENE	BENZO(K) FLUORANTHENE	CHRYSENE	DIBENZ(A,H) ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-CD) PYRENE	PHENANTHRENE	PYRENE	NAPHTHALENE	1-METHYL NAPHTHALENE	2-METHYL NAPHTHALENE
		(feet bgs)	*(feet 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)*
Residential Screening Level					17,000	3,300	1.1	0.11	1.1	NE	11	110	0.028	2,400	2,300	1.1	NE	1,800	2.0	9.9	190
West Meadow																					
WM-C-5-0.5'	05/13/2020	0 - 0.5			<0.00645	<0.00645	0.00425 J	0.00642 J	0.00668	0.00606 J	0.00326 J	0.00552 J	<0.00645	0.00445 J	<0.00645	0.00467 J	<0.00645	0.00486 J	<0.0215	<0.0215	<0.0215
WM-C-6-0.5'	05/14/2020	0 - 0.5			<0.00644	<0.00644	<0.00644	<0.00644	0.00244 J	<0.00644	<0.00644	<0.00644	<0.00644	<0.00644	<0.00644	<0.00644	<0.00644	<0.00644	<0.0215	<0.0215	<0.0215
WM-C-7-0.5'	05/14/2020	0 - 0.5			<0.00752	<0.00752	0.00232 J	0.00283 J	0.00352 J	0.00295 J	<0.00752	<0.00752	<0.00752	<0.00752	<0.00752	<0.00752	<0.00752	0.00292 J	<0.0251	<0.0251	<0.0251
WM-C-8-0.5'	05/14/2020	0 - 0.5			0.0273	0.0102	0.216	0.267	0.323	0.176	0.081	0.261	0.0532	0.340	0.00293 J	0.155	0.102	0.309	<0.0240	<0.0240	<0.0240
WM-C-8-2'	05/14/2020	1.5 - 2			<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.00741	<0.0247	<0.0247	<0.0247
WM-C-9A-1'	05/15/2020	0.5 - 1	0.5-1.5		0.231	0.0866	5.64	10.4	11.5	4.88	2.79	6.44	1.85	4.22	0.0319 J	4.99	<0.215	0.828	4.68	<0.215	<0.215
WM-C-9-2'	05/14/2020	1.5 - 2			<0.00717	<0.00717	0.0332	0.0608	0.0593	0.0545	0.0232	0.0412	0.0145	0.0272	<0.00717	0.0446	0.00582 J	0.0319	<0.0239	<0.0239	<0.0239
WM-C-10-0.5'	05/14/2020	0 - 0.5			0.0115	0.00499 J	0.121	0.185	0.192	0.131	0.0803	0.172	0.0395	0.162	<0.00706	0.112	0.0508	0.155	<0.0235	<0.0235	<0.0235
WM-C-10-2'	05/14/2020	1.5 - 2			0.0258	0.00645 J	0.175	0.243	0.298	0.179	0.0819	0.217	0.0506	0.268	0.00249 J	0.153	0.0736	0.229	<0.0217	<0.0217	<0.0217
WM-C-11-0.5'	05/13/2020	0 - 0.5			<0.00640	<0.00640	0.00257 J	0.00383 J	0.00553 J	0.00419 J	<0.00640	0.00307 J	<0.00640	0.00273 J	<0.00640	0.00306 J	<0.00640	0.0028 J	<0.0213	<0.0213	<0.0213
WM-C-11-2'	05/13/2020	1.5 - 2			0.56	0.23	2.68	2.56	2.88	1.42	0.772	3.02	0.468	3.81	0.123	1.25	2.43	4.18	0.0112 J	0.0106 J	0.0215 J
WM-DG-1-0.5'	05/13/2020	0 - 0.5			<0.00687	<0.00687	<0.00687	<0.00687	0.00247 J	<0.00687	<0.00687	<0.00687	<0.00687	<0.00687	<0.00687	<0.00687	<0.00687	<0.00687	<0.0229	<0.0229	<0.0229
WM-DG-2-0.5'	05/13/2020	0 - 0.5			<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.00725	<0.0242	<0.0242	<0.0242
WM-DG-3-0.5'	05/13/2020	0 - 0.5			<0.00676	<0.00676	<0.00676	<0.00676	0.00267 J	0.00215 J	<0.00676	<0.00676	<0.00676	<0.00676	<0.00676	<0.00676	<0.00676	<0.00676	<0.0225	<0.0225	<0.0225
WM-DG-4-0.5'	05/13/2020	0 - 0.5			<0.00726	<0.00726	<0.00726	0.0027 J	0.00347 J	0.00283 J	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.0242	<0.0242	<0.0242
WM-DG-5-0.5'	05/13/2020	0 - 0.5			<0.00733	<0.00733	<0.00733	0.00239 J	0.00287 J	0.00256 J	<0.00733	<0.00733	<0.00733	<0.00733	<0.00733	<0.00733	<0.00733	<0.00733	<0.0244	<0.0244	<0.0244
WM-DG-6-0.5'	05/13/2020	0 - 0.5			0.131	0.0763	2.85	3.61	3.88	2.27	1.31	3.61	0.836	3.07	0.0173	2.03	0.633	3.23	0.00974 J	0.0111 J	0.0133 J
WM-DG-6-2'	05/13/2020	1.5 - 2			0.185	0.114	5.43	7.56	7.92	4.06	1.85	7.05	0.238	5.06	0.0248	3.58	0.942	6.73	0.0141 J	0.0162 J	0.0194 J
WM-DG-7-0.5'	05/13/2020	0 - 0.5			<0.00639	<0.00639	0.00345 J	0.00558 J	0.00635 J	0.00506 J	<0.00639	0.00452 J	<0.00639	0.00399 J	<0.00639	0.00419 J	<0.00639	0.00411 J	<0.0213	<0.0213	<0.0213
WM-DG-8-0.5'	05/13/2020	0 - 0.5			<0.00730	<0.00730	0.0529	0.107	0.113	0.0893	0.0331	0.0669	0.0252	0.0409	<0.00730	0.0754	0.00898	0.0444	<0.0243	<0.0243	<0.0243
WM-DG-9-0.5'	05/13/2020	0 - 0.5			<0.00694	<0.00694	<0.00694	0.00271 J	0.0034 J	0.00272 J	<0.00694	<0.00694	<0.00694	<0.00694	<0.00694	0.00213 J	<0.00694	<0.00694	<0.0231	<0.0231	<0.0231
WM-DG-10-0.5'	05/13/2020	0 - 0.5			<0.00690	<0.00690	0.00254 J	0.00254 J	0.00298 J	<0.00690	<0.00690	0.00297 J	<0.00690	0.00366 J	<0.00690	<0.00690	<0.00690	0.00373 J	<0.0230	<0.0230	<0.0230
WM-DG-11-0.5'	05/14/2020	0 - 0.5	0.5-1		<0.0242	<0.0242	0.041	0.0608	0.0665	0.0445	0.0224 J	0.0535	0.0115 J	0.0469	<0.0242	0.0371	0.0158 J	0.0477	<0.0804	<0.0804	<0.0804
WM-DG-11-0.5'-DUP	05/14/2020	0 - 0.5		Duplicate	0.986	0.651	8.45	10.5	12.2	3.35	4.00	9.86	2.38	11.1	0.260	3.61	4.14	11.8	0.321	0.0762	0.11
WM-DG-11A-1'	05/15/2020	0.5 - 1			0.00491 J	<0.00659	0.0544 J3	0.0886 J3,J6	0.0813 J3,J6	0.0751 J3	0.0336 J3	0.0709 J3	0.0196	0.0595	<0.00659	0.0637 J3	<0.0220	0.0152	0.061	<0.0220	<0.0220
WM-DG-11-2'	05/14/2020	1.5 - 2			<0.00716	<0.00716	0.00212 J	0.00258 J	0.00271 J	<0.00716	<0.00716	<0.00716	<0.00716	<0.00716	<0.00716	<0.00716	<0.00716	<0.00716	0.00716 J	<0.0239	<0.0239
WM-DG-12-0.5'	05/14/2020	0 - 0.5			0.0278	0.0132	0.304	0.354	0.415	0.243	0.12	0.365	0.0661	0.347	0.00273 J	0.203	0.13	0.498	<0.0222	<0.0222	<0.0222
WM-DG-12-2'	05/14/2020	1.5 - 2			<0.00675	<0.00675	0.0100	0.00997	0.0102	0.00534 J	0.00445 J	0.0126	<0.00675	0.014	<0.00675	0.00474 J	0.00682	0.0159	<0.0225	<0.0225	<0.0225
WM-DG-13-1.5'	05/14/2020	1 - 1.5	0.5-2		0.252	0.113	6.42	11.7	14.8	7.52	4.02	8.75	4.45	5.74	0.0241	6.25	0.901	5.68	0.0462	0.0166 J	0.0201 J
WM-DG-13-2'	05/14/2020	1.5 - 2			0.00609 J	<0.00670	0.19	0.358	0.393	0.365	0.123	0.257	0.105	0.123	<0.00670	0.292	0.0186	0.158	0.00491 J	<0.0223	<0.0223
WM-DG-14-0.5'	05/14/2020	0 - 0.5			<0.00659	<0.00659	0.00997	0.0149	0.0169	0.0138	0.00589 J	0.0122	0.00377 J	0.0108	<0.00659	0.0107	0.00295 J	0.0124	<0.0220	<0.0220	<0.0220
WM-DG-15-0.5'	05/14/2020	0 - 0.5			<0.00686	<0.00686	0.00482 J	0.00658 J	0.00832	0.00645 J	0.00264 J	0.00575 J	<0.00686	0.00552 J	<0.00686	0.00486 J	<0.00686	0.0065 J	<0.0229	<0.0229	<0.0229
North Orchard																					
NO-3-0.5'	05/14/2020	0 - 0.5			<0.00726	<0.00726	<0.00726	<0.00726	0.00191 J	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.00726	<0.0242	<0.0242	<0.0242
NO-4-0.5'	05/14/2020	0 - 0.5			<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.00700	<0.0233	<0.0233	<0.0233
NO-6-0.5'	05/14/2020	0 - 0.5			<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.00786	<0.0262	<0.0262	<0.0262
East Meadow																					
EM-1-0.5'	05/12/2020	0 - 0.5			<0.00688	<0.00688 J3	<0.00688	<0.00688	0.00228 J	<0.00688	<0.00688 J3	<0.00688	<0.00688	<0.00688	<0.00688	<0.00688	<0.00688	<0.00688	<0.0229 J3	<0.0229 J3	<0.0229 J3
EM-2-0.5'	05/12/2020	0 - 0.5			<0.00693	<0.00693	0.00233 J	0.00267 J	0.00508 J	0.00326 J	<0.00693	0.0028 J	<0.00693	0.00337 J	<0.00693	0.00232 J	<0.00693	0.00292 J	<0.0231	<0.0231	<0.0231
EM-3-0.5'	05/12/2020	0 - 0.5			<0.00690	<0.00690	<0.00690	<0.00690	0.00324 J	0.00258 J	<0.00690	<0.00690	<0.00690	<0.00690	<0.00690	<0.00690	<0.00690	<0.00690	<0.0230	<0.0230	<0.0230
EM-4-1.5'	05/12/2020	1 - 1.5			<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.00656	<0.0219	<0.0219	<0.0219
EM-5-0.5'	05/12/2020	0 - 0.5			<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.00647	<0.0216	<0.0216	<0.0216
EM-6-0.5'	05/12/2020	0 - 0.5			<0.00671	<0.00671	<0.00671	<0.00671	0.00332 J	0.00223 J	<0.00671	<0.00671	<0.00671	<0.00671	<0.00671	<0.00671	<0.00671	<0.00671	<0.0224	<0.0224	<0.0224
EM-7-0.5'	05/12/2020	0 - 0.5			<0.00663	<0.00663	<0.00663	<0.00663	0.00224 J	<0.00663	<0.00663	<0.00663	<0.00663	<0.00663	<0.00663	<0.00663	<0.00663	<0.00663	<0.0221	<0.0221	<0.0221
EM-8-1'	05/12/2020	0.5 - 1			<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.00652	<0.0217	<0.0217	<0.0217
EM-9-0.5'	05/12/2020	0 - 0.5			<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.00641	<0.0214	<0.0214	<0.0214
EM-10-0.5'	05/12/2020	0 - 0.5	0-1.5		<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.00633	<0.0211	<0.0211	<0.0211
EM-11-0.5'	05/12/2020	0 - 0.5			<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	<0.00708	0.0114 J	<0.0236	0.0102 J

Table A4
Polycyclic Aromatic Hydrocarbons in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Clay Target Fragments Observed	Notes	ANTHRACENE	ACENAPHTHENE	BENZO(A) ANTHRACENE	BENZO(A) PYRENE	BENZO(B) FLUORANTHENE	BENZO(G,H,I) PERYLENE	BENZO(K) FLUORANTHENE	CHRYSENE	DIBENZ(A,H) ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-CD) PYRENE	PHENANTHRENE	PYRENE	NAPHTHALENE	1-METHYL NAPHTHALENE	2-METHYL NAPHTHALENE
		(feet bgs)	*(feet 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)*
Residential Screening Level					17,000	3,300	1.1	0.11	1.1	NE	11	110	0.028	2,400	2,300	1.1	NE	1,800	2.0	9.9	190
EM-21-0.5'	05/14/2020	0 - 0.5			<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.00646	<0.0215	<0.0215	<0.0215
EM-21-0.5'-DUP	05/14/2020	0 - 0.5		Duplicate	<0.00650	<0.00650	<0.00650	<0.00650	**0.00183** J	<0.00650	<0.00650	<0.00650	<0.00650	<0.00650	<0.00650	<0.00650	<0.00650	<0.00650	<0.0217	<0.0217	<0.0217

Notes:
PAHs analyzed using USEPA Method 8270C-SIM.
Analytes detected above laboratory reporting limit are **emboldened**.
Analytes detected above Residential Screening Level are highlighted.
Residential Screening Levels are based on HHRA Note 3 values.
bgs = Below ground surface.
mg/kg = Milligrams per kilogram.
NE = Not Established.
PAHs = Polycyclic Aromatic Hydrocarbons.
SIM = Selective Ion Mode.
HHRA Note 3 = DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 3. April.
DTSC = California Environmental Protection Agency, Department of Toxic Substances Control.
J = The identification of the analyte is acceptable; the reported value is an estimate.
J3 = The associated batch QC was outside the established quality control range for precision.
J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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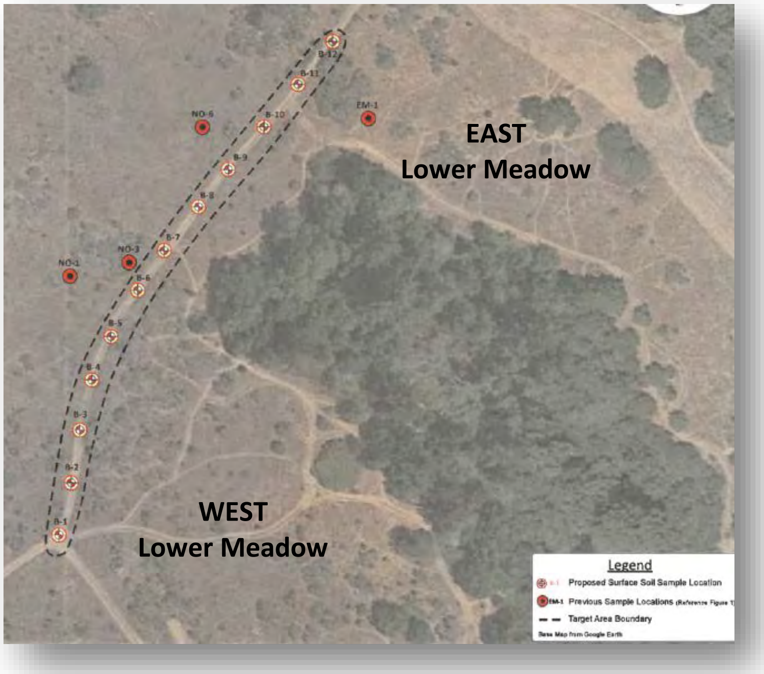
December 29, 2021

County of Santa Cruz Health Services Agency
Environmental Health Division
To the attention of: Heather Hanna, P.G.
701 Ocean Street, Suite 312
Santa Cruz, California 95060

Heather.Hanna@santacruzcounty.us
(831) 454- 4813

Subject: **Shallow Soil Sampling for Total Lead**

Location: **Lower Meadows Access Road, Pogonip, 333 Golf Club Drive, Santa Cruz**



This *Letter Report* describes completed field sampling and laboratory testing tasks designed to document Total Lead concentrations along an untested access road that is located in the vicinity of a historic skeet shooting range. The shallow soil sampling was completed to supplement the results of previous shallow sampling and testing conducted by RMD Environmental Solutions in August 2020 (see Attachment C).

These tasks were completed to evaluate *potential* environmental risks associated with using this dirt connector path as a walking/ vehicle road for possible future land uses. This report is being submitted in accordance with an approved *Workplan*[1], and includes the following attachments:

Figure 1:	Topographic Location Map
Figure 2:	Aerial Vicinity Map
Figure 3:	Soil Sample Location Map (including Lead Results
Table 1:	Summary of Soil Sample Analytical Results
Attachment A:	Field Documentation and Photos
Attachment B:	State-Certified Laboratory Report
Attachment C:	Reference: Previous Testing Results in the Vicinity (RMD, August 2020)

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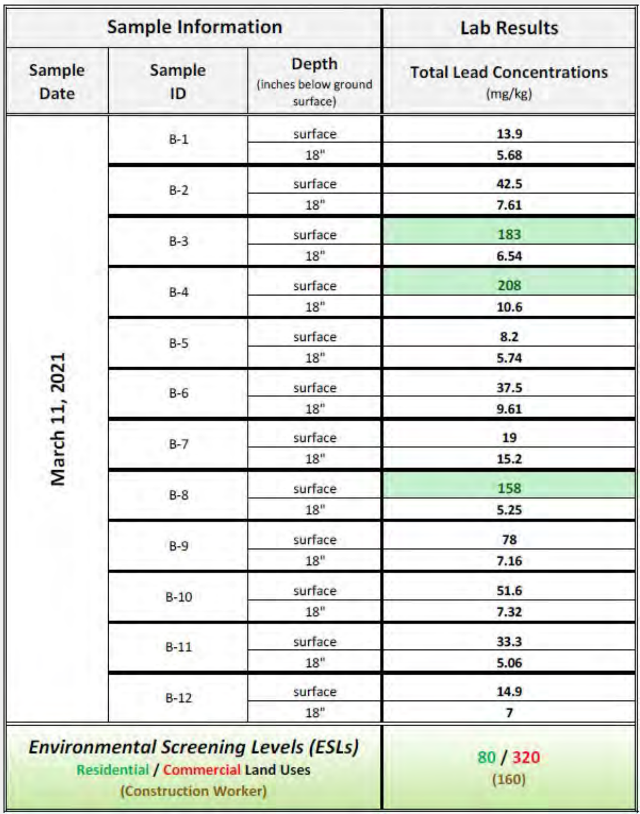
[1] Weber Hayes and Associates (WHA) report: Workplan: Shallow Soil Sampling for Total Lead, March 2021.

Field Sample Collection: On March 11, 2021, twelve (12) soil borings were hand-augured at sampling sites *B-1* through *B-12* to an approximate depth of 2-ft below ground surface (bgs). See Figure 3 for locations. The soil samples were obtained using a stainless-steel hand-auger used to remove soils to the target depth and logged noting the lithology of the soils, moisture content, and any unusual odor or discoloration. There was no evidence of chemical impacts observed in any of the soil borings.

Two (2) samples per location were selected for laboratory analysis: one sample was obtained from ground surface to 6-inches, and the second, deeper sample was collected from 18-to 24-inches below ground surface (bgs). Relatively undisturbed soil samples were obtained using a specialty-machined slide hammer. Borings were initially augured to a target depth whereupon the slide hammer was used to drive clean stainless-steel liners into native soils. The slide hammer was then gently back-tapped out of the boring to retrieve a relatively undisturbed soil sample. The stainless steel auger and sampling hammer was decontaminated between each boring location using non-phosphate detergent and distilled water.

The sample containers were labeled, placed in sealed, plastic bags, and stored in a chilled cooler for transportation under standard chain-of-custody procedures to Pace Analytical, a California-certified laboratory. Field notes and photo documentation of the field sampling is included in Appendix A.

Laboratory Analysis: The twenty-four (24) discrete soil samples were analyzed for Total Lead concentrations. The dry weight results are tabulated along with agency screening thresholds on Table 1 and clip of the results is presented to the right. Certified laboratory report is attached (Attachment B)



Sample Information			Lab Results
Sample Date	Sample ID	Depth (inches below ground surface)	Total Lead Concentrations (mg/kg)
March 11, 2021	B-1	surface	13.9
		18"	5.68
	B-2	surface	42.5
		18"	7.61
	B-3	surface	183
		18"	6.54
	B-4	surface	208
		18"	10.6
	B-5	surface	8.2
		18"	5.74
	B-6	surface	37.5
		18"	9.61
	B-7	surface	19
		18"	15.2
	B-8	surface	158
		18"	5.25
	B-9	surface	78
		18"	7.16
	B-10	surface	51.6
		18"	7.32
	B-11	surface	33.3
		18"	5.06
	B-12	surface	14.9
		18"	7
Environmental Screening Levels (ESLs) Residential / Commercial Land Uses (Construction Worker)			80 / 320 (160)

Data Summary: The majority of samples have Total Lead concentrations below risk-based, *Environmental Screening Levels (ESL)* for different land uses (i.e., commercial, construction worker, and unrestricted/ residential land uses. Three (3) of the twelve (12) *surface* samples have detectable concentrations of Total Lead that exceed the *residential/ unrestricted* land use ESL of 80 mg/kg, but do not exceed the commercial/construction worker threshold of 320 and 160 respectively (see Table 1 for details).

Note: This additional sampling and testing was originally completed to provide supporting data for an agricultural project (i.e., safe use as an access road for the possible location of Homeless Garden Project, HGP). Currently, HGP plans for farming on this portion of Pogonip have been postponed indefinitely.

Limitations: Our service consists of professional opinions and recommendations made in accordance with generally accepted geologic principles and practices. This warranty is in lieu of all others, either expressed or implied. The analysis and conclusions in this report are based on sampling and testing which are necessarily limited. Additional data from future work may lead to modifications of the options expressed herein.

If you have any questions or comments regarding this report, please contact us our office (722-3580).

Sincerely,

WEBER, HAYES AND ASSOCIATES

PROFESSIONAL GEOLOGIST
K. PATRICK HOBAN
No. 7995
STATE OF CALIFORNIA

By Pat Hoban

Pat Hoban, PG
Principal Geologist

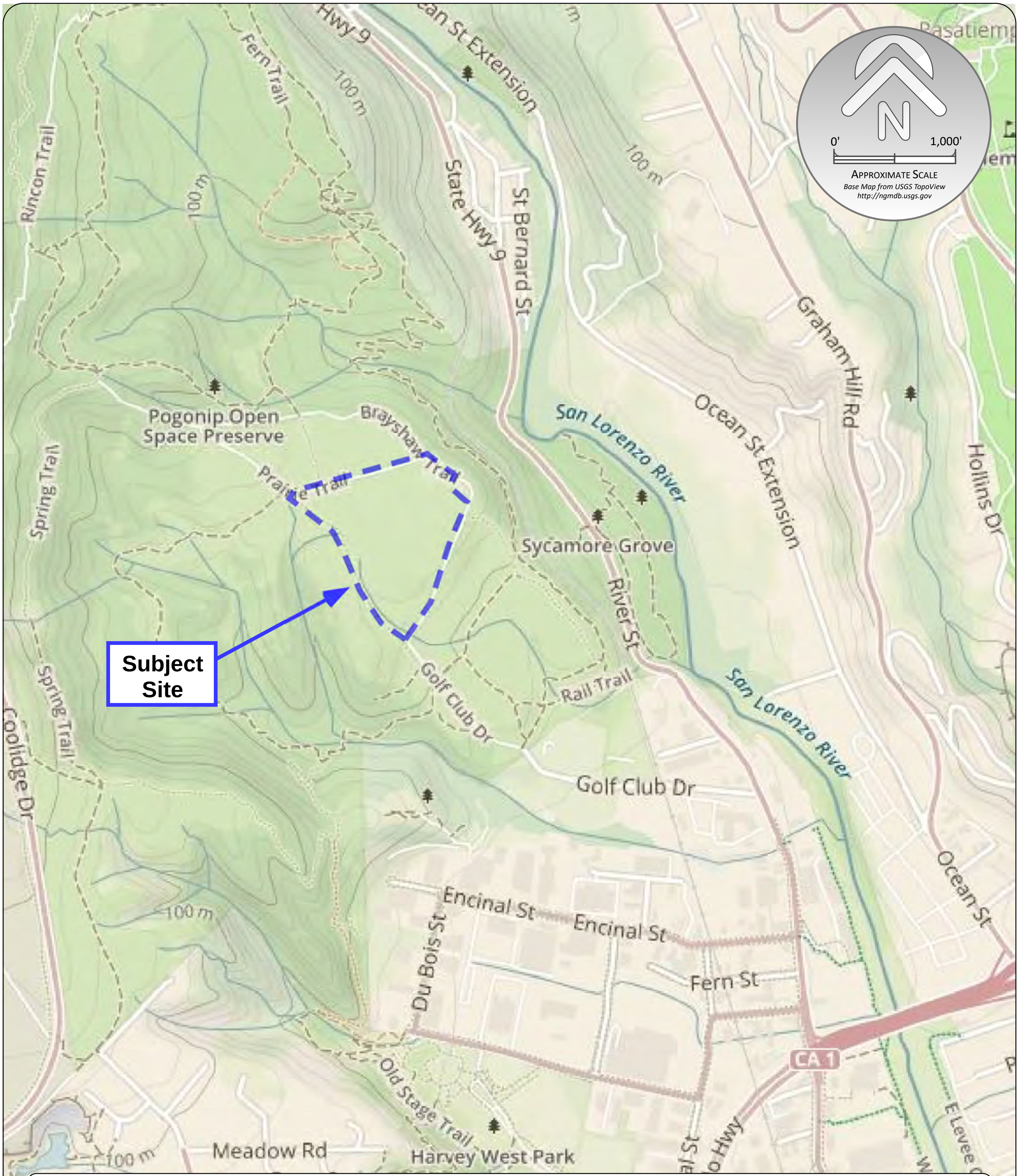
ATTACHMENTS:

Figure 1: Location
Figure 2: Vicinity Map
Figure 3: Soil Sample Locations and Lead Results

Table 1: Summary of Soil Sample Analytical Results

Attachment A: Field Documentation
Attachment B: Laboratory Report
Attachment C: Reference: Previous Testing Results in the Vicinity - RMD, August 2020

FIGURES



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Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
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LOCATION MAP
PHASE II ENVIRONMENTAL SITE ASSESSMENT

SITE: POGONIP - ACCESS ROAD
ADDRESS: 333 GOLF CLUB DRIVE, SANTA CRUZ, CA 95060

DATE: OCTOBER 2021

REVISIONS/NOTES:

FIGURE 1
Project 2T058

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Vicinity Map
Phase II Environmental Site Assessment

Site: Pogonip - Access Road
Address: 333 Golf Club Drive, Santa Cruz, CA 95060

Date: June 2021

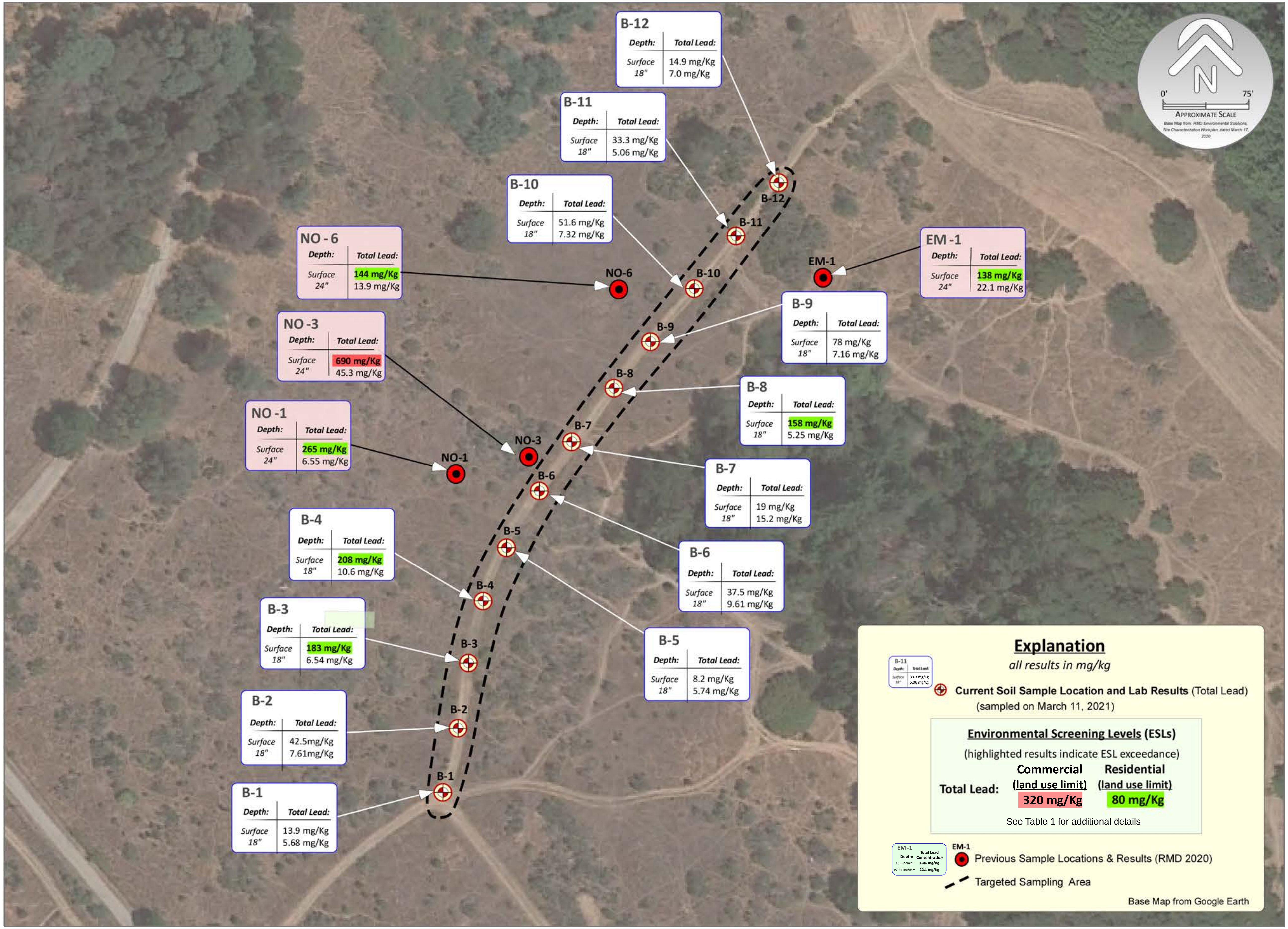
Revisions/Notes:

Figure 2
Project 2T058

Soil Sample Locations And Lead Results

SITE: **POGONIP ACCESS TRAIL EVALUATION**
ADDRESS: 333 GOLF CLUB DRIVE, SANTA CRUZ

DATE: MARCH 2021



Explanation

all results in mg/kg

Current Soil Sample Location and Lab Results (Total Lead)
(sampled on March 11, 2021)

Environmental Screening Levels (ESLs)

(highlighted results indicate ESL exceedance)

	Commercial (land use limit)	Residential (land use limit)
Total Lead:	🟥 320 mg/Kg	🟩 80 mg/Kg

See Table 1 for additional details

Previous Sample Locations & Results (RMD 2020)

Targeted Sampling Area

Base Map from Google Earth

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FIGURE 3
Project
2T058

TABLES

Table 1: Summary of Soil Analytical Results

Table 1

Summary of Soil Analytical Results

Pogonip Access Trail Evaluation

333 Golf Club Dr. Santa Cruz

All soil results are in milligrams per Kilogram (mg/Kg)

Sample Information			Lab Results
Sample Date	**Sample ID**	**Depth** (inches below ground surface)	**Total Lead Concentrations** (mg/kg)
March 11, 2021	B-1	surface	**13.9**
		18"	**5.68**
	B-2	surface	**42.5**
		18"	**7.61**
	B-3	surface	**183**
		18"	**6.54**
	B-4	surface	**208**
		18"	**10.6**
	B-5	surface	**8.2**
		18"	**5.74**
	B-6	surface	**37.5**
		18"	**9.61**
	B-7	surface	**19**
		18"	**15.2**
	B-8	surface	**158**
		18"	**5.25**
	B-9	surface	**78**
		18"	**7.16**
	B-10	surface	**51.6**
		18"	**7.32**
	B-11	surface	**33.3**
		18"	**5.06**
	B-12	surface	**14.9**
		18"	**7**
Environmental Screening Levels (ESLs) **Residential / Commercial Land Uses** **(Construction Worker)**			**80 / 320** **(160)**

Notes:

Environmental Screening Levels (ESLs): Regional Water Quality Control Board (San Francisco Bay Region) guideline document: *Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater* (Final version, 2019). The ESLs are intended to provide quantitative risk-based guidance on whether further assessment or remediation of contamination is warranted <**https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/ESL/new/ESL_Summary_Tables_24Jan19_Rev1.pdf** >

158	= **green-shaded cell** indicates detected concentration exceeds the ESL threshold limit for a residential land use
320	= **red-shaded cell** indicates detected concentration exceeds the ESL threshold limit for a residential land use

ATTACHMENT A

Field Documentation

Field Notes and Photo Sheets

This following provides detailed descriptions of methods used during shallow soil sampling investigations. Included are specifications for shallow soil sampling with a slide hammer, and decontamination procedures.

Shallow Soil Sampling Procedures: A backhoe, two-person power auger, or a hand auger will be used to get to a point immediately above the sampling depth. Once at the desired sampling depth, a slide hammer will be used to drive a clean stainless-steel liner encased in the slide hammer sampling shoe to obtain a relatively undisturbed sample. The slide hammer consists of a metal rod with one end containing a sampling shoe and cutting head with which a sample liner can be installed. At the other end of the metal rod there is a handle that is constrained on the rod, but slides up and down the rod allowing force to be applied to the sampling shoe. Manual operation is used to slide the handle down the rod to force the sampling shoe equipped with the liner into native soils.

Materials retrieved from the sampler will be logged on an as-needed basis by the experienced field geologist using the Unified Soil Classification System (USCS), noting in particular, the lithology of the soils, moisture content, and any unusual odor or discoloration. The liner and relatively undisturbed soils will then be removed from the sampling shoe. The liner is then protected at both ends with Teflon tape, sealed with non-reactive caps, taped, and immediately stored in an insulated container cooled with blue ice at a temperature of 4 degree Celsius or less. Soil samples selected for Volatile Organic Compound (VOC) analysis may follow field preservation protocols according to EPA Method 5035, as described in DTSC's *Guidance Document for the Implementation of United States Environmental Protection Agency Method 5035: Methodologies for Collection, Preservation, Storage, and Preparation of Soils to be Analyzed for Volatile Organic Compounds*, dated November 2004. Selected samples will be transported under appropriate chain-of-custody documentation to a State certified laboratory performing the targeted analysis.

Upon completion of sampling at the designated location, the location will be backfilled and compacted with the materials that were removed prior to sampling, supplemented by clean imported fill as necessary.

Equipment Decontamination and Containerization Procedures: All sampling equipment will be cleaned prior to arriving on site to prevent possible transfer of contamination from another site. Additionally, sampling equipment will be thoroughly cleaned between each sampling run with a Liqui-Nox ® or Alconox ® solution followed by a double rinsing with distilled water to prevent the vertical transfer of contamination, and/or contamination from location to location onsite. Accordingly, all sampling equipment will be cleaned following sampling operations to prevent the possible transfer of contamination to another site.

All cleaning rinsate, and wash water produced during the shallow soil sampling and decontamination process will be containerized on site in D.O.T. approved 55-gallon drums for subsequent profiling and disposal at an approved facility.

Pogonip - Access Road Sampling
333 Golf Club Drive, Santa Cruz, California
2021-3-11

Hand Auger used to collect samples

Example of Borehole showing shallow groundwater

Pogonip - Access Road Sampling
333 Golf Club Drive, Santa Cruz, California
2021-3-11

Hand Auger being decontaminated between samples

Collecting Soil from Hand Auger

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering

Page 1 of 1

Project / Client: Pogonip Homeless Garden Lead Soil Sampling
Project # : 21058
Site Location: 333 Golf Club Drive, Santa Cruz
Date: 3-11-21
Field tasks: Shallow Soil Sampling (Hand Auger)
Weather: cloudy morning
Personnel / Company On-Site: RN and OA (WHA)
Attachments: Site Map____ Data Sheets____ Geologic Logs____ Photos____ COC____ Chargeable Materials____

Time:	Notes:
0630	-Arrived onsite. Gate code 1321. Setting up samples and decon station on truck a B-1 location.
0700	- Finished sampling from B-1. Soil is a dark yellowish brown (10YR4/4) silt from 0-1.0' bgs and a brown (10YR 5/3) clayey silt with some orange mottling from 1-2' bgs. GPS Coordinate recorded from Google Maps dropped pin and written on soil logging Field Data Sheet.
0730	- Oliver onsite and Heather Hanna onsite as well.
0800	- Finished B-3. Saturated (standing water at 2') from 1.0 to 2.0' bgs.
0815	- Finished B-4. Standing water at 0.5' bgs.
0835	- Finished -B-5. Standing water at 1.5' bgs.
0845	Finished B-6
0900	- Finished B-7 Clay mostly (loose to medium dense)
0910	- Finished B-8 Silt mostly (loose).
0925	- Finished B-9 Silt to 1.5' bgs. Clayey Silt from 1.5-2.0'
0930	- Finished B-10
0945	- Finished B-11
1000	- Finished B-12. Mostly silt.
1030	- Samples are packed up.
1045	- Equipment is deconed/cleaned. Decon water is containerized and taken back to the office to be used as planter water.
1100	-Demobilizing

RN

Signature of Field Personnel & Date

Weber, Hayes & Associates
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120 Westgate Drive, Watsonville, CA 95076
831.722.3580 // www.weber-hayes.com

Soil Logging Field Data Sheet

Project Name / Number: Pogonip Lead Soil Sampling / 21-058

Recorded by: Ryan Nyberg / Oliver Abbott

Date: 3-11-2021

Boring/Pothole I.D./ GPS Coordinate	Sample Depths (change in lithology)	Soil Type & % (Gravel, Sand, Silt, Clay)	Color (Brown, Black Grey, etc)	Density (loose, med-dense, dense, v.dense)	Moisture (Dry, damp, moist, wet)	Odors/ Discoloration?	Additional Comments time of sample
B-1 (36.9921757, -122.0383443)	(0-0.5) (1.5-2.0)	0-1: Silt 1-2: Clayey SILT	dark yellowish brown light brown w/ orange mottling	loose loose	damp-wet damp-moist	None	0700
B-2 (36.9923864, -122.0382860)	[illegible] "	0-1.5: Silt 1.5-2: Clay	dark yellowish brown light brown w/ red mottling	loose loose	"	None	0730
B-3 (36.9925624, -122.0382454)	↓	0-1: Silt 1-2: Clayey Silt	dark yellowish brown	loose	damp-wet saturated	None	0750
B-4 (36.9926847, -122.0381974)		0-0.5: Silt 0.5-2: Silt	dark yellowish brown	loose	saturated from 0.5-2.0	None	0810
B-5 (36.9927929, -122.0381233)		0-1.5: Silt 1.5-2: Clayey Silt	dark yellowish brown light brown	loose	saturated from 1.5-2.0	None	0825
B-6 (36.9928754, -122.0380503)		0.-1.5: Silt 1.5-2.0: Clayey Silt	dark yellowish brown light brown	loose	damp-wet damp-wet	None	0840
B-7 (36.9929619, -122.0379614)		0-1.5: Clayey Silt 1.5-2: CLAY	dark yellowish brown light brown	loose to medium dense	damp to moist	None	0855
B-8 (36.9931065, -122.0378421)		0-1.5: Clayey Silt 1.5-2.0: Clayey Silt	dark yellowish brown light brown	loose	damp to moist saturated from 1.5-2.0	None	0910
B-9 (36.9932206, -122.0377093)		0-1.5: Silt 1.5-2: clay-silt	dark yellow brown light brown	loose	damp to moist ↓	none	0917
B-10 (36.9933007, -122.0376204)		0.0-1.5: Silt 1.5-2: clay-silt	dark yellowish brown light brown	loose	damp to moist	None	0930
B-11 (36.9934155, -122.0375125)		0.0-1.5: Silt 1.5-2: clayey silt	dark yellowish brown	loose	damp to moist	None	0940
B-12 (36.9935802, -122.0373690)		0-2.0: Silt	dark yellowish brown	loose	damp to moist	None	0955

Consistency (clays): Very soft, Soft, Firm, Stiff or Very Stiff.
Density (sands/silts): Very loose, loose, med-dense, dense, v.dens

ATTACHMENT B

State-Certified Analytical Laboratory Results

Soil - Pace Analytical L1326377

ANALYTICAL REPORT

March 18, 2021

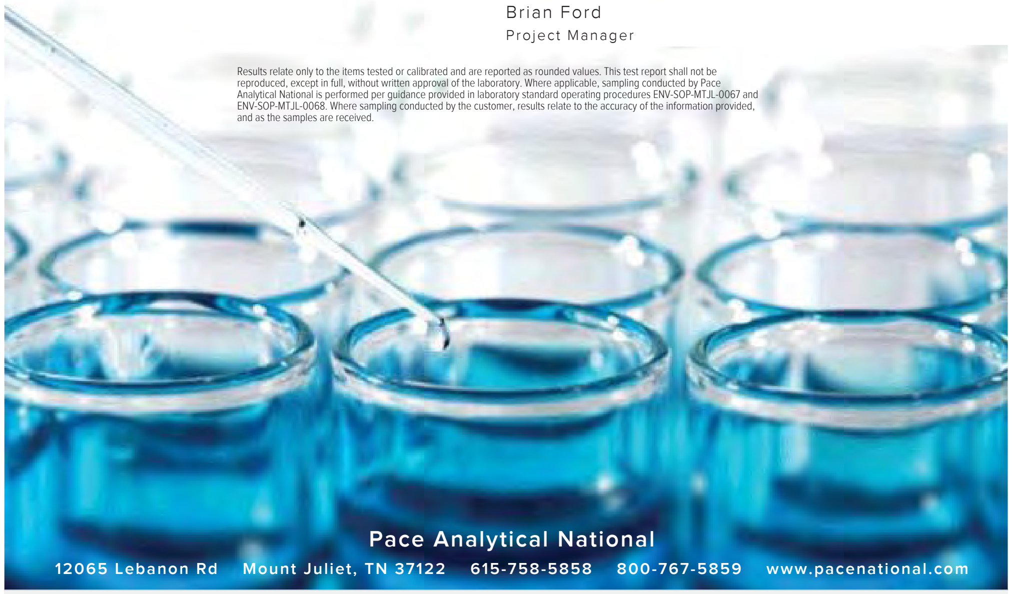
Weber, Hayes & Associates - CA

Sample Delivery Group: L1326377
Samples Received: 03/12/2021
Project Number: 2t058
Description:
Site: 333 GOLF CLUB DR SANTA CRUZ
Report To: Ryan Nyberg
120 Westgate Drive
Watsonville, CA 95076

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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TABLE OF CONTENTS

SAMPLE SUMMARY

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-1-D0 L1326377-01 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634799	1	03/16/21 08:52	03/16/21 09:00	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 00:31	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-1-D1.5 L1326377-02 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634799	1	03/16/21 08:52	03/16/21 09:00	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 00:47	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-2-D0 L1326377-03 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634799	1	03/16/21 08:52	03/16/21 09:00	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 00:51	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-2-D1.5 L1326377-04 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:06	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-3-D0 L1326377-05 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:09	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-3-D1.5 L1326377-06 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:13	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-4-D0 L1326377-07 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:16	TM	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SAMPLE SUMMARY

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-4-D1.5 L1326377-08 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:20	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-5-D0 L1326377-09 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:23	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-5-D1.5 L1326377-10 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:27	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-6-D0 L1326377-11 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:30	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-6-D1.5 L1326377-12 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:37	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-7-D0 L1326377-13 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634800	1	03/16/21 12:47	03/16/21 12:56	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:54	TM	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

B-7-D1.5 L1326377-14 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 01:58	TM	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SAMPLE SUMMARY

B-8-D0 L1326377-15 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 02:01	TM	Mt. Juliet, TN

B-8-D1.5 L1326377-16 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 02:05	TM	Mt. Juliet, TN

B-9-D0 L1326377-17 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 02:09	TM	Mt. Juliet, TN

B-9-D1.5 L1326377-18 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 02:12	TM	Mt. Juliet, TN

B-10-D0 L1326377-19 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634311	5	03/15/21 08:56	03/16/21 02:16	TM	Mt. Juliet, TN

B-10-D1.5 L1326377-20 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634316	5	03/15/21 14:09	03/16/21 10:46	TM	Mt. Juliet, TN

B-11-D0 L1326377-21 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634316	5	03/15/21 14:09	03/16/21 10:50	TM	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SAMPLE SUMMARY

B-11-D1.5 L1326377-22 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634316	5	03/15/21 14:09	03/16/21 10:53	TM	Mt. Juliet, TN

B-12-D0 L1326377-23 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634840	1	03/16/21 12:37	03/16/21 12:45	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634316	5	03/15/21 14:09	03/16/21 10:57	TM	Mt. Juliet, TN

B-12-D1.5 L1326377-24 Solid

Collected by	Collected date/time	Received date/time
Ryan Nyberg	03/11/21 00:00	03/12/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1634841	1	03/16/21 11:23	03/16/21 11:32	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1634316	5	03/15/21 14:09	03/16/21 11:00	TM	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Project Manager

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-1-D0
Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 01

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	87.5		1	03/16/2021 09:00	WG1634799

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	13.9		0.113	2.29	5	03/16/2021 00:31	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-1-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 02

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.2		1	03/16/2021 09:00	WG1634799

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	5.68		0.116	2.35	5	03/16/2021 00:47	WG1634311

B-2-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 03

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.1		1	03/16/2021 09:00	WG1634799

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	42.5		0.116	2.35	5	03/16/2021 00:51	WG1634311

B-2-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 04

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	79.6		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	7.61		0.124	2.51	5	03/16/2021 01:06	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-3-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 05

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.4		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	183		0.117	2.37	5	03/16/2021 01:09	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-3-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 06

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.7		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	6.54		0.123	2.48	5	03/16/2021 01:13	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-4-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 07

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	77.9		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	208		0.127	2.57	5	03/16/2021 01:16	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-4-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 08

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	77.5		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	10.6		0.128	2.58	5	03/16/2021 01:20	WG1634311

B-5-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 09

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	83.1		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	8.20		0.119	2.41	5	03/16/2021 01:23	WG1634311

B-5-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 10

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.7		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	5.74		0.114	2.31	5	03/16/2021 01:27	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-6-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 11

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	83.8		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	37.5		0.118	2.39	5	03/16/2021 01:30	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-6-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 12

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	78.3		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	9.61		0.127	2.56	5	03/16/2021 01:37	WG1634311

B-7-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 13

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	84.2		1	03/16/2021 12:56	WG1634800

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	19.0		0.118	2.37	5	03/16/2021 01:54	WG1634311

B-7-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 14

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	81.8		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	15.2		0.121	2.44	5	03/16/2021 01:58	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-8-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 15

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.9		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	158		0.117	2.36	5	03/16/2021 02:01	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-8-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 16

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.1		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	5.25		0.121	2.44	5	03/16/2021 02:05	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-9-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 17

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.0		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	78.0		0.118	2.38	5	03/16/2021 02:09	WG1634311

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-9-D1.5
Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 18

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.8		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	7.16		0.123	2.47	5	03/16/2021 02:12	WG1634311

B-10-D0
Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 19

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.7		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	51.6		0.120	2.42	5	03/16/2021 02:16	WG1634311

B-10-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 20

L1326377

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.2		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	7.32		0.118	2.38	5	03/16/2021 10:46	WG1634316

B-11-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 21

L1326377

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.8		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	33.3		0.115	2.33	5	03/16/2021 10:50	WG1634316

B-11-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 22

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.7		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	5.06		0.116	2.33	5	03/16/2021 10:53	WG1634316

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-12-D0

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 23

L1326377

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.3		1	03/16/2021 12:45	WG1634840

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	14.9		0.117	2.37	5	03/16/2021 10:57	WG1634316

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

B-12-D1.5

Collected date/time: 03/11/21 00:00

SAMPLE RESULTS - 24

L1326377

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	84.9		1	03/16/2021 11:32	WG1634841

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	7.00		0.117	2.35	5	03/16/2021 11:00	WG1634316

WG1634799

Total Solids by Method 2540 G-2011

QUALITY CONTROL SUMMARY

L1326377-01,02,03

Method Blank (MB)

(MB) R3631692-1 03/16/21 09:00

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000			

L1326366-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1326366-01 03/16/21 09:00 • (DUP) R3631692-3 03/16/21 09:00

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	62.7	59.2	1	5.88		10

Laboratory Control Sample (LCS)

(LCS) R3631692-2 03/16/21 09:00

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

WG1634800

Total Solids by Method 2540 G-2011

QUALITY CONTROL SUMMARY

L1326377-04,05,06,07,08,09,10,11,12,13

Method Blank (MB)

(MB) R3631725-1 03/16/21 12:56

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1326377-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1326377-05 03/16/21 12:56 • (DUP) R3631725-3 03/16/21 12:56

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	84.4	84.5	1	0.118		10

Laboratory Control Sample (LCS)

(LCS) R3631725-2 03/16/21 12:56

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

WG1634840

Total Solids by Method 2540 G-2011

QUALITY CONTROL SUMMARY

L1326377-14,15,16,17,18,19,20,21,22,23

Method Blank (MB)

(MB) R3631724-1 03/16/21 12:45

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00300			

L1326377-16 Original Sample (OS) • Duplicate (DUP)

(OS) L1326377-16 03/16/21 12:45 • (DUP) R3631724-3 03/16/21 12:45

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	82.1	82.7	1	0.719		10

Laboratory Control Sample (LCS)

(LCS) R3631724-2 03/16/21 12:45

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	99.9	85.0-115	

WG1634841

Total Solids by Method 2540 G-2011

QUALITY CONTROL SUMMARY

L1326377-24

Method Blank (MB)

(MB) R3631722-1 03/16/21 11:32

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000			

L1326381-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1326381-02 03/16/21 11:32 • (DUP) R3631722-3 03/16/21 11:32

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	89.0	87.1	1	2.22		10

Laboratory Control Sample (LCS)

(LCS) R3631722-2 03/16/21 11:32

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

WG1634311

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

L1326377-01,02,03,04,05,06,07,08,09,10,11,12,13,14,15,16,17,18,19

Method Blank (MB)

(MB) R3631049-1 03/16/21 00:24

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3631049-2 03/16/21 00:28

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Lead	100	96.1	96.1	80.0-120	

L1326377-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1326377-01 03/16/21 00:31 • (MS) R3631049-5 03/16/21 00:41 • (MSD) R3631049-6 03/16/21 00:44

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Lead	22.9	13.9	116	128	89.5	100	5	75.0-125			9.94	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

WG1634316

Metals (ICPMS) by Method 6020

QUALITY CONTROL SUMMARY

L1326377-20,21,22,23,24

Method Blank (MB)

(MB) R3631186-1 03/16/21 09:50

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3631186-2 03/16/21 09:53

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Lead	100	90.5	90.5	80.0-120	

L1326390-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1326390-02 03/16/21 09:57 • (MS) R3631186-5 03/16/21 10:07 • (MSD) R3631186-6 03/16/21 10:11

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Lead	20.0	13.9	105	101	90.7	87.2	5	75.0-125			3.42	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

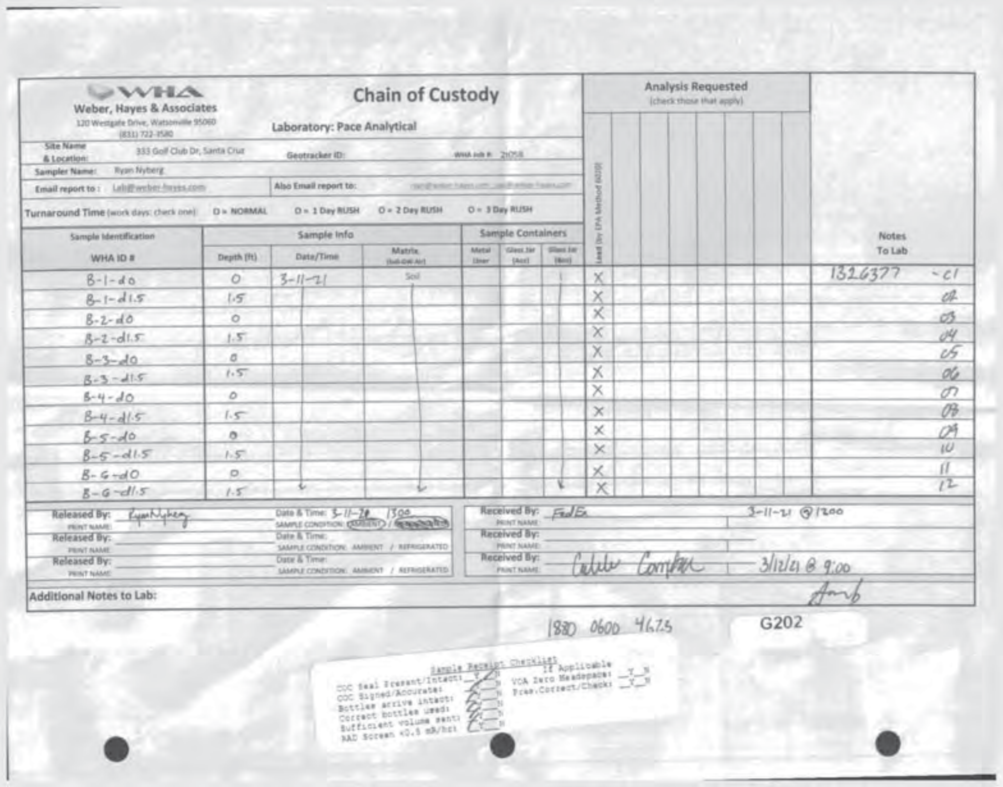
Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1 6]	KY90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana	LA018
Maine	TN00003
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN000032021-1
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004002
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T104704245-20-18
Texas [5]	LAB0152
Utah	TN000032021-11
Vermont	VT2006
Virginia	110033
Washington	C847
West Virginia	233
Wisconsin	998093910
Wyoming	A2LA

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



WHA
Weber, Hayes & Associates
120 Westgate Drive, Watsonville 95060
(831) 722-3580

Chain of Custody

Laboratory: Pace Analytical

Site Name & Location: 333 Golf Club Dr, Santa Cruz Geotracker ID: WHA Job #: 2t058

Sampler Name: Ryan Nyberg

Email report to : Lab@weber-hayes.com Also Email report to: [illegible]

Turnaround Time (work days: check one): O = NORMAL O = 1 Day RUSH O = 2 Day RUSH O = 3 Day RUSH

Sample Identification	Sample Info			Sample Containers			Analysis Requested (check those that apply)								
WHA ID #	Depth (ft)	Date/Time	Matrix (Soil-GW-Air)	Metal Liner	Glass Jar (4oz)	Glass Jar (8oz)	Lead (by EPA Method 6010)								Notes To Lab
B-1-d0	0	3-11-21	Soil			1	X								1326377 -01
B-1-d1.5	1.5						X								02
B-2-d0	0						X								03
B-2-d1.5	1.5						X								04
B-3-d0	0						X								05
B-3-d1.5	1.5						X								06
B-4-d0	0						X								07
B-4-d1.5	1.5						X								08
B-5-d0	0						X								09
B-5-d1.5	1.5						X								10
B-6-d0	0						X								11
B-6-d1.5	1.5						X								12

Released By: Ryan Nyberg PRINT NAME: Date & Time: 3-11-21 1300 SAMPLE CONDITION: [✓ AMBIENT] / ~~REFRIGERATED~~
Received By: FedEx PRINT NAME: 3-11-21 @1200

Released By: PRINT NAME: Date & Time: SAMPLE CONDITION: AMBIENT / REFRIGERATED
Received By: PRINT NAME:

Released By: PRINT NAME: Date & Time: SAMPLE CONDITION: AMBIENT / REFRIGERATED
Received By: Caleb Compton PRINT NAME: 3/12/21 @ 9:00

Additional Notes to Lab: Amb

1880 0600 4675

G202

Sample Receipt Checklist
COC Seal Present/Intact: _Y_N
COC Signed/Accurate: Y_N
Bottles arrive intact: Y_N
Correct bottles used: Y_N
Sufficient volume sent: Y_N
RAD Screen <0.5 mR/hr: Y_N
If Applicable
VOA Zero Headspace: _Y_N
Pres.Correct/Check: _Y_N

WHA
Weber, Hayes & Associates
120 Westgate Drive, Watsonville 95060
(831) 722-3580

Chain of Custody

Laboratory: Pace Analytical

Site Name & Location: 333 Golf Club Dr, Santa Cruz
Geotracker ID:
WHA Job #: 21058
Sampler Name: Ryan Nyberg
Email report to : Lab@weber-hayes.com
Also Email report to: [illegible]@weber-hayes.com; [illegible]@weber-hayes.com

Turnaround Time (work days: check one): O = NORMAL O = 1 Day RUSH O = 2 Day RUSH O = 3 Day RUSH

Sample Identification	Sample Info			Sample Containers			Analysis Requested (check those that apply)								
WHA ID #	Depth (ft)	Date/Time	Matrix (Soil-GW-Air)	Metal Liner	Glass Jar (4oz)	Glass Jar (8oz)	Lead (by EPA Method 6020)								Notes To Lab
B-7-d0	0	3-11-21	Soil				X								B26377 13
B-7-d1.5	1.5						X								14
B-8-d0	0						X								15
B-8-d1.5	1.5						X								16
B-9-d0	0						X								17
B-9-d1.5	1.5						X								18
B-10-d0	0						X								19
B-10-d1.5	1.5						X								20
B-11-d0	0						X								21
B-11-d1.5	1.5						X								22
B-12-d0	0						X								23
B-12-d1.5	1.5						X								24

Released By: Ryan Nyberg
PRINT NAME:
Date & Time: 3-11-21 @ 1300
SAMPLE CONDITION: [✓ AMBIENT] / REFRIGERATED

Received By: FedEx 3-11-21 @ 1300
PRINT NAME:

Released By:
PRINT NAME:
Date & Time:
SAMPLE CONDITION: AMBIENT / REFRIGERATED

Received By:
PRINT NAME:

Released By:
PRINT NAME:
Date & Time:
SAMPLE CONDITION: AMBIENT / REFRIGERATED

Received By: Caleb Compton 3/12/21 @ 9:00
PRINT NAME:

Additional Notes to Lab: Amb

1880 0600 4673

Sample Receipt Checklist
COC Seal Present/Intact: Y [✓ N]
COC Signed/Accurate: [✓ Y] N
Bottles arrive intact: [✓ Y] N
Correct bottles used: [✓ Y] N
Sufficient volume sent: [✓ Y] N
RAD Screen <0.5 mR/hr: [✓ Y] N

If Applicable
VOA Zero Headspace: _Y_N
Pres.Correct/Check: _Y_N

ATTACHMENT C

Previous Testing Results in the Vicinity - RMD, August 2020

PRELIMINARY ENDANGERMENT ASSESSMENT REPORT

Pogonip Farm and Garden
333 Golf Club Drive
Santa Cruz, California

01-DTSC-002

Prepared For:
California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, California 94710

Contract No. 19-T4727

Prepared By:
RMD ENVIRONMENTAL SOLUTIONS
1371 Oakland Boulevard, Suite 200
Walnut Creek, California 94596

August 10, 2020

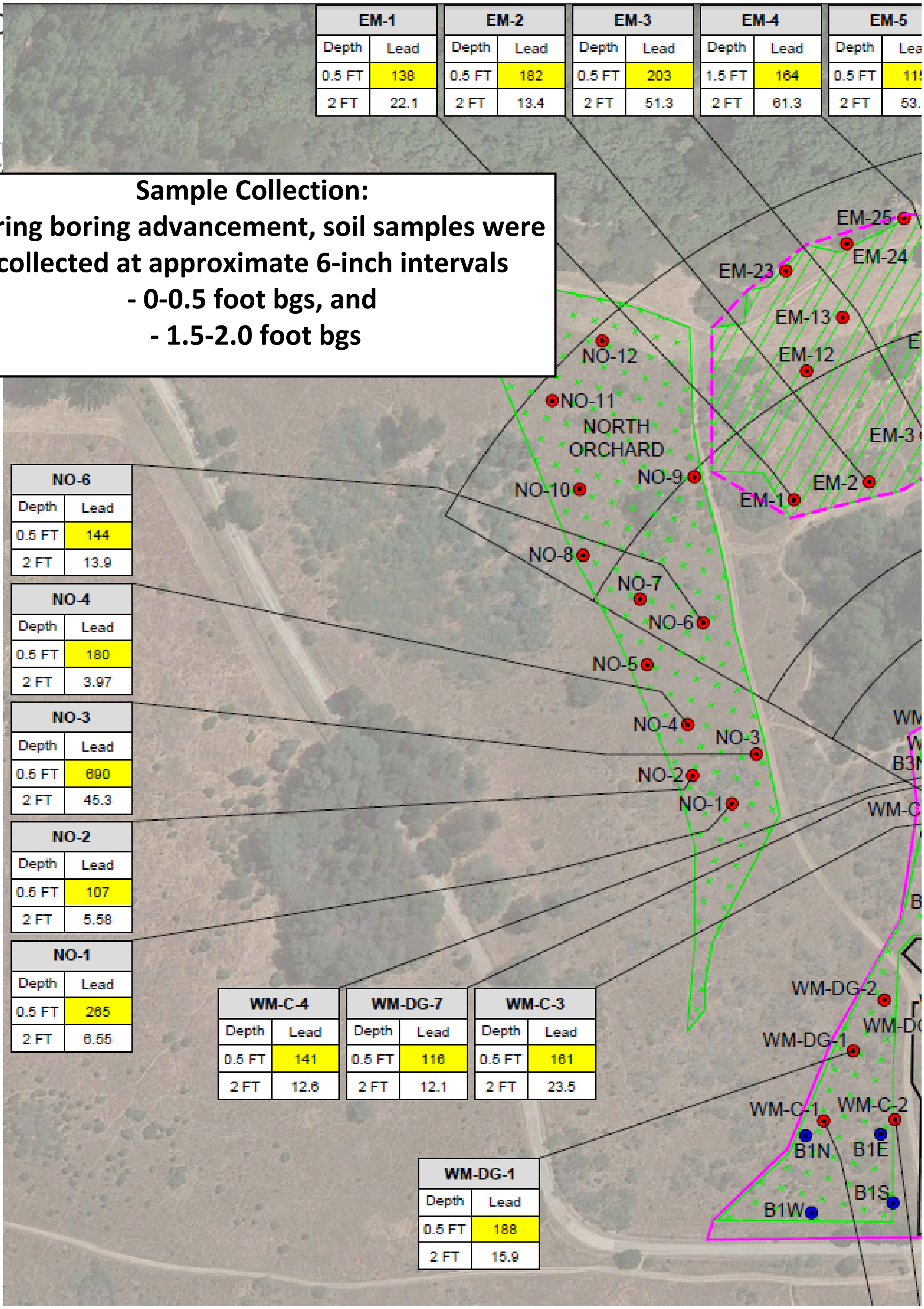
Douglas Whichard
Project Scientist

ivy inouye

Ivy Inouye
Principal Toxicologist

Khaled B. Rahman
No. 0261
CERTIFIED HYDROGEOLOGIST
Exp. 7/31/21

Khaled Rahman, P.G., C.HG.
Principal Hydrogeologist



Sample Collection:
During boring advancement, soil samples were collected at approximate 6-inch intervals
- 0-0.5 foot bgs, and
- 1.5-2.0 foot bgs

EM-1	
Depth	Lead
0.5 FT	138
2 FT	22.1

EM-2	
Depth	Lead
0.5 FT	182
2 FT	13.4

EM-3	
Depth	Lead
0.5 FT	203
2 FT	51.3

EM-4	
Depth	Lead
1.5 FT	164
2 FT	61.3

EM-5	
Depth	Lea
0.5 FT	11
2 FT	53.

NO-6	
Depth	Lead
0.5 FT	144
2 FT	13.9

NO-4	
Depth	Lead
0.5 FT	180
2 FT	3.97

NO-3	
Depth	Lead
0.5 FT	690
2 FT	45.3

NO-2	
Depth	Lead
0.5 FT	107
2 FT	5.58

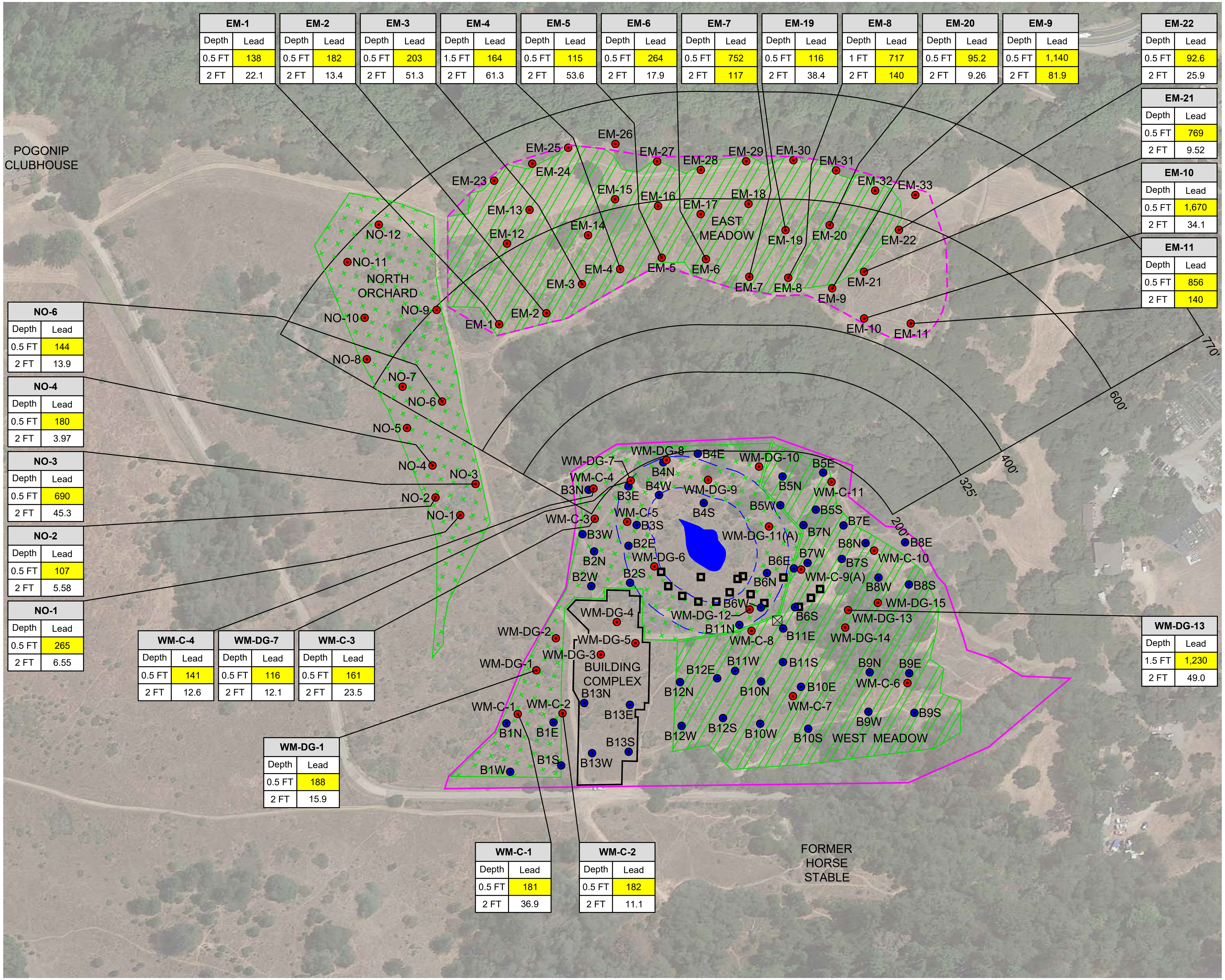
NO-1	
Depth	Lead
0.5 FT	265
2 FT	6.55

WM-C-4	
Depth	Lead
0.5 FT	141
2 FT	12.6

WM-DG-7	
Depth	Lead
0.5 FT	116
2 FT	12.1

WM-C-3	
Depth	Lead
0.5 FT	161
2 FT	23.5

WM-DG-1	
Depth	Lead
0.5 FT	188
2 FT	15.9



EM-1	
Depth	Lead
0.5 FT	138
2 FT	22.1

EM-2	
Depth	Lead
0.5 FT	182
2 FT	13.4

EM-3	
Depth	Lead
0.5 FT	203
2 FT	51.3

EM-4	
Depth	Lead
1.5 FT	164
2 FT	61.3

EM-5	
Depth	Lead
0.5 FT	115
2 FT	53.6

EM-6	
Depth	Lead
0.5 FT	264
2 FT	17.9

EM-7	
Depth	Lead
0.5 FT	752
2 FT	117

EM-19	
Depth	Lead
0.5 FT	116
2 FT	38.4

EM-8	
Depth	Lead
1 FT	717
2 FT	140

EM-20	
Depth	Lead
0.5 FT	95.2
2 FT	9.26

EM-9	
Depth	Lead
0.5 FT	1,140
2 FT	81.9

EM-22	
Depth	Lead
0.5 FT	92.6
2 FT	25.9

EM-21	
Depth	Lead
0.5 FT	769
2 FT	9.52

EM-10	
Depth	Lead
0.5 FT	1,670
2 FT	34.1

EM-11	
Depth	Lead
0.5 FT	856
2 FT	140

NO-6	
Depth	Lead
0.5 FT	144
2 FT	13.9

NO-4	
Depth	Lead
0.5 FT	180
2 FT	3.97

NO-3	
Depth	Lead
0.5 FT	690
2 FT	45.3

NO-2	
Depth	Lead
0.5 FT	107
2 FT	5.58

NO-1	
Depth	Lead
0.5 FT	265
2 FT	6.55

WM-C-4	
Depth	Lead
0.5 FT	141
2 FT	12.6

WM-DG-7	
Depth	Lead
0.5 FT	116
2 FT	12.1

WM-C-3	
Depth	Lead
0.5 FT	161
2 FT	23.5

WM-DG-1	
Depth	Lead
0.5 FT	188
2 FT	15.9

WM-C-1	
Depth	Lead
0.5 FT	181
2 FT	36.9

WM-C-2	
Depth	Lead
0.5 FT	182
2 FT	11.1

WM-DG-13	
Depth	Lead
1.5 FT	1,230
2 FT	49.0

LEGEND

- - -	PROPOSED EAST GARDEN BOUNDARY
—	PROPOSED WEST GARDEN BOUNDARY
- - -	50' WETLAND BUFFER (NO PLANTING)
— —	100' WETLAND BUFFER (NATIVE PLANTS)
■	APPROXIMATE LOCATION OF SEASONAL WETLAND
🟩	PROPOSED PERENNIAL/ORCHARD LAND
▨	PROPOSED ROW CROP ANNUAL PRODUCTION
□	SHOOTING PAD LOCATION
☒	UNKNOWN CONCRETE PAD
●	SOIL SAMPLE LOCATION (EIS, 2019)
●	SOIL SAMPLE LOCATION (RMD, 2020)
0.5 FT	DEPTH IN FEET BELOW GROUND SURFACE
22.1	ANALYTICAL RESULT IN MILLIGRAMS PER KILOGRAM (mg/kg)

Notes:
1) Yellow highlighted values exceed the screening level for unrestricted land use.
2) Data shown only for locations with lead concentration exceeding the unrestricted screening level.
3) Hypothetical Ranges of Lead Shot and Clay Pigeons Are Based On Standard Skeet Shooting Range Shot Fall Zones (ITRC, 2015).
4) Proposed Garden Boundaries and Building Complex Based on GPS Coordinate Plan (Fall Creek Engineering, Inc, 2018) and Map of Pogonip Farm & Garden (Homeless Garden Project O&M Plan, 2017).

LEAD CONCENTRATIONS IN SOIL

333 GOLF CLUB DRIVE
SANTA CRUZ, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-DTSC-002	08/05/20	DCB	KR

0 150 300
SCALE: 1" = 150'

RMD ENVIRONMENTAL SOLUTIONS

FIGURE 3

N

Table 1
Metals in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Shot Observed	XRF Reading	Notes	Antimony		Arsenic		Copper		Lead		Zinc	
		(feet bgs)	*(feet bgs)*	*(ppm)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
Background Level[1]						6		11		63		43		140	
Unrestricted (Residential) Screening Level[2]						31		0.11		3,100		80		23,000	
Commercial Screening Level[2]						470		0.36		47,000		320		350,000	
West Meadow															
WM-C-1-0.5'	5/13/2020	0 - 0.5		222		1.31	J	2.63		12.3		181		23.9	
WM-C-1-2'	5/13/2020	1.5 - 2		54		-		-		-		36.9		-	
WM-C-2-0.5'	5/13/2020	0 - 0.5		202		0.989	J	2.13	J	6.91		182		15.3	
WM-C-2-0.5' DUP	5/13/2020	0 - 0.5		202	Duplicate	1.57	J	2.45		7.54		156		13.6	
WM-C-2-2'	5/13/2020	1.5 - 2		26		-		-		-		11.1		-	
WM-C-3-0.5'	5/13/2020	0 - 0.5		244		1.23	J	2.14	J	8.38		161		53.6	
WM-C-3-2'	5/13/2020	1.5 - 2		13		-		-		-		23.5		-	
WM-C-4-0.5'	5/13/2020	0 - 0.5		368		0.683	J	1.92	J	6.96		141		15	
WM-C-4-2'	5/13/2020	1.5 - 2		27		-		-		-		12.6		-	
WM-C-5-0.5'	5/13/2020	0 - 0.5		95		0.568	J	1.58	J	77.7	O1	76.9	O1	78.5	O1
WM-C-6-0.5'	5/14/2020	0 - 0.5		30		0.897	J,J6	2.16		4.92		10.6		19.7	
WM-C-7-0.5'	5/14/2020	0 - 0.5		13		0.785	J	<2.51		47.3		8.57		59.1	
WM-C-8-0.5'	5/14/2020	0 - 0.5		31		0.879	J	<2.40		18.1		15.0		31.0	
WM-C-9A-1'	5/15/2020	0.5 - 1		105		0.727	J	1.55	J	5.61		71.2		18.6	
WM-C-10-0.5'	5/14/2020	0 - 0.5		-		1.65	J	3.81		9.09		27.0		26.6	
WM-C-11-0.5'	5/13/2020	0 - 0.5		45		1.47	J	10.7		7.86		29.3		24.3	
WM-DG-1-0.5'	5/13/2020	0 - 0.5		241		1.41	J	2.69		8.57		188		16.4	
WM-DG-1-2'	5/13/2020	1.5 - 2		9		-		-		-		15.9		-	
WM-DG-2-0.5'	5/13/2020	0 - 0.5		168		<2.42		2.74		10.3		6.16		12.9	
WM-DG-3-0.5'	5/13/2020	0 - 0.5		90		0.833	J	1.28	J	5.66		51.1		23.0	
WM-DG-4-0.5'	5/13/2020	0 - 0.5		30		<2.42		1.76	J	16.2		19.8		28.3	
WM-DG-5-0.5'	5/13/2020	0 - 0.5		19		<2.44		1.53	J	13.9		38.1		23.1	
WM-DG-6-0.5'	5/13/2020	0 - 0.5		311		<2.22		2.25		11.0		27.0		18.5	
WM-DG-7-0.5'	5/13/2020	0 - 0.5		120		0.721	J	1.77	J	7.01		116		17.0	
WM-DG-7-2'	5/13/2020	1.5 - 2		29		-		-		-		12.1		-	
WM-DG-8-0.5'	5/13/2020	0 - 0.5		59		0.637	J	1.43	J	9.12		55.7		21.0	
WM-DG-9-0.5'	5/13/2020	0 - 0.5		28		<2.31		1.52	J	299		17.5		91.1	
WM-DG-10-0.5'	5/13/2020	0 - 0.5		46		0.640	J	2.78		10.9		28.7		25.0	
WM-DG-11-0.5'	5/14/2020	0 - 0.5	0.5-2	59		2.01	J	2.72	B	263		76.0		689	
WM-DG-11-0.5'-DUP	5/14/2020	0 - 0.5		59	Duplicate	1.55	J	2.13	B,J	14.9		40.9		75.8	
WM-DG-11A-1'	5/15/2020	0.5 - 1		16		<2.20		1.77	J	9.01		11.5		15.6	
WM-DG-12-0.5'	5/14/2020	0 - 0.5		64		1.58	J	1.65	B,J	10.8		39.1		51.6	
WM-DG-13-1.5'	5/14/2020	1 - 1.5	1-2	1,095		41.7	J	15.9	B,J	6,320		1,230		28,500	
WM-DG-13-2'	5/14/2020	1.5 - 2		33		3.33		3.61	B	214		49.0		2,770	
WM-DG-14-0.5'	5/14/2020	0 - 0.5		19		0.817	J	2.82	B	8.28		13.8		40.8	
WM-DG-15-0.5'	5/14/2020	0 - 0.5		23		1.80	J	2.17	B,J	76.9		23.8		303	
North Orchard															
NO-1-0.5'	5/14/2020	0 - 0.5		225		3.54		3.05	B	6.32		265		24.0	
NO-1-2'	5/14/2020	1.5 - 2		25		-		-		-		6.55		-	
NO-2-0.5'	5/14/2020	0 - 0.5		119		1.65	J	1.94	B,J	8.14		107		17.6	
NO-2-2'	5/14/2020	1.5 - 2		28		-		-		-		5.58		-	
NO-3-0.5'	5/14/2020	0 - 0.5		863		6.94		4.77	B	11.3		690		21.5	
NO-3-2'	5/14/2020	1.5 - 2		35		-		-		-		45.3		-	
NO-4-0.5'	5/14/2020	0 - 0.5		211		2.03	J	1.60	B,J	8.16		180		15.7	
NO-4-2'	5/14/2020	1.5 - 2		16		-		-		-		3.97		-	
NO-5-0.5'	5/14/2020	0 - 0.5		10		1.08	J	1.57	B,J	50.8		40.0		44.2	
NO-6-0.5'	5/14/2020	0 - 0.5		118		1.97	J	2.32	B,J	23.2		144		41.8	
NO-6-2'	5/14/2020	1.5 - 2		14		-		-		-		13.9		-	
NO-7-0.5'	5/14/2020	0 - 0.5		43		0.926	J	1.91	B,J	8.08		29.8		24.8	
NO-8-0.5'	5/15/2020	0 - 0.5		31		0.928	J	<2.46		18.9		18.5		23.1	
NO-9-0.5'	5/14/2020	0 - 0.5		39		1.51	J	1.70	B,J	14.4		20.0		26.7	
NO-10-0.5'	5/15/2020	0 - 0.5		17		<2.33		<2.33		18.0		14.0		27.5	
NO-11-0.5'	5/15/2020	0 - 0.5		18		1.04	J	0.655	J	15.0		14.5		26.8	
NO-12-0.5'	5/15/2020	0 - 0.5		21		0.718	J	<2.42		17.1		10.5		49.8	
East Meadow															
EM-1-0.5'	5/12/2020	0 - 0.5		119		2.34		2.42		63.1		138		69.6	
EM-1-2'	5/12/2020	1.5 - 2		39		-		-		-		22.1		-	
EM-2-0.5'	5/12/2020	0 - 0.5		153		1.93	J	2.42		24.6		182		31.0	
EM-2-2'	5/12/2020	1.5 - 2		15		-		-		-		13.4		-	
EM-3-0.5'	5/12/2020	0 - 0.5		219		2.87		3.23		16.6		203		20.4	
EM-3-2'	5/12/2020	1.5 - 2		24		-		-		-		51.3		-	
EM-4-1.5'	5/12/2020	1 - 1.5		166		5.15		4.58		15.8		164		25.3	
EM-4-2'	5/12/2020	1.5 - 2		47		-		-		-		61.3		-	
EM-5-0.5'	5/12/2020	0 - 0.5		139		2.51		3.21		19.1		115		26.4	
EM-5-2'	5/12/2020	1.5 - 2		95		-		-		-		53.6		-	
EM-6-0.5'	5/12/2020	0 - 0.5		372		3.46		3.91		19.9		264		28.8	
EM-6-2'	5/12/2020	1.5 - 2		83		-		-		-		17.9		-	
EM-7-0.5'	5/12/2020	0 - 0.5		758		17.0		9.58		21.1		752		30.7	
EM-7-2'	5/12/2020	1.5 - 2		46		-		-		-		117		-	
EM-8-1'	5/12/2020	0.5 - 1		549		11.8		8.69		14.7		717		31.1	
EM-8-2'	5/12/2020	1.5 - 2		94		-		-		-		140		-	

Table 1
Metals in Soil
Pogonip Farm and Garden
Santa Cruz, California

Sample ID	Date	Sample Depth	Depth Shot Observed	XRF Reading	Notes	Antimony		Arsenic		Copper		Lead		Zinc	
		(feet bgs)	*(feet bgs)*	*(ppm)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
Background Level[1]						6		11		63		43		140	
Unrestricted (Residential) Screening Level[2]						31		0.11		3,100		80		23,000	
Commercial Screening Level[2]						470		0.36		47,000		320		350,000	
EM-9-0.5'	5/12/2020	0 - 0.5		1,227		**5.46**		**6.71**		**10.7**		**1,140**		**22.1**	
EM-9-2'	5/12/2020	1.5 - 2		168		-		-		-		**81.9**		-	
EM-10-0.5'	5/12/2020	0 - 0.5		2,973		**6.07**		**8.44**		**12.6**		**1,670**		**29.0**	
EM-10-2'	5/12/2020	1.5 - 2		15		-		-		-		**34.1**		-	
EM-11-0.5'	5/12/2020	0 - 0.5		569		**3.78**		**7.16**		**24.4**		**856**		**36.2**	
EM-11-2'	5/12/2020	1.5 - 2		94		-		-		-		**140**		-	
EM-12-0.5'	5/14/2020	0 - 0.5		31		<2.44		**3.04**	B	**38.6**		**9.15**		**98.3**	
EM-13-0.5'	5/15/2020	0 - 0.5		24		**0.815**	J	**0.554**	J	**9.98**		**11.2**		**25.4**	
EM-14-0.5'	5/14/2020	0 - 0.5		38		**1.58**	J	**2.92**	B	**12.5**		**33.0**		**44.5**	
EM-14-0.5'-DUP	5/14/2020	0 - 0.5		38	Duplicate	**2.14**	J	**2.80**	B	**14.0**		**32.5**		**55.3**	
EM-15-0.5'	5/15/2020	0 - 0.5		26		**1.12**	J	**1.72**	J	**13.0**		**16.1**		**33.0**	
EM-16-0.5'	5/15/2020	0 - 0.5		42		**1.00**	J	**1.33**	J	**14.0**		**24.6**		**37.3**	
EM-17-0.5'	5/15/2020	0 - 0.5		47		**1.50**	J	**1.13**	J	**13.8**		**40.3**		**35.0**	
EM-18-0.5'	5/15/2020	0 - 0.5		39		**3.29**		**2.35**		**11.2**		**44.5**		**30.5**	
EM-19-0.5'	5/14/2020	0 - 0.5		167		**3.13**		**3.57**	B	**12.7**		**116**		**46.0**	
EM-19-2'	5/14/2020	1.5 - 2		64		-		-		-		**38.4**		-	
EM-20-0.5'	5/15/2020	0 - 0.5		58		<2.53		**2.07**	J	**20.5**		**95.2**		**33.4**	
EM-20-2'	5/15/2020	1.5 - 2		10		-		-		-		**9.26**		-	
EM-21-0.5'	5/14/2020	0 - 0.5		776		**10.0**		**6.12**		**7.16**		**768**		**28.7**	
EM-21-0.5'-DUP	5/14/2020	0 - 0.5		776	Duplicate	**6.85**		**5.65**	B	**7.33**		**769**		**30.6**	
EM-21-2'	5/14/2020	1.5 - 2		17		-		-		-		**9.52**		-	
EM-22-0.5'	5/15/2020	0 - 0.5		100		<2.28		**2.39**		**12.3**		**92.6**		**22.8**	
EM-22-2'	5/15/2020	1.5 - 2		17		-		-		-		**25.9**		-	
EM-23-0.5'	5/15/2020	0 - 0.5		29		**0.932**	J	**1.24**	J	**12.8**		**10.7**		**26.0**	
EM-24-0.5'	5/15/2020	0 - 0.5		33		**0.886**	J	**0.686**	J	**9.50**		**9.18**		**26.8**	
EM-25-0.5'	5/15/2020	0 - 0.5		30		**0.786**	J	**0.810**	J	**12.2**		**10.3**		**28.7**	
EM-26-0.5'	5/15/2020	0 - 0.5		19		**0.656**	J	**1.02**	J	**11.7**		**10.8**		**25.1**	
EM-27-0.5'	5/15/2020	0 - 0.5		34		**1.02**	J	**0.823**	J	**13.6**		**6.12**		**26.4**	
EM-28-0.5'	5/15/2020	0 - 0.5		29		**0.813**	J	**0.865**	J	**14.4**		**14.3**		**31.9**	
EM-29-0.5'	5/15/2020	0 - 0.5		31		**0.720**	J	**1.02**	J	**10.8**		**17.8**		**36.8**	
EM-30-0.5'	5/15/2020	0 - 0.5		31		<2.25		**2.52**		**21.9**		**18.0**		**24.1**	
EM-31-0.5'	5/15/2020	0 - 0.5		33		<2.30		**2.07**	J	**9.94**		**15.4**		**19.1**	
EM-32-0.5'	5/15/2020	0 - 0.5		18		<2.34		**2.01**	J	**13.8**		**37.4**		**23.0**	
EM-33-0.5'	5/15/2020	0 - 0.5		17		<2.25		**2.23**	J	**8.74**		**12.3**		**19.0**	

Notes:

Soil samples sieved using No. 10 sieve and metals analyzed using USEPA Method 6010B.

Analytes detected above laboratory reporting limit are **emboldened**.

Analytes detected above background level and Unrestricted (Residential) Screening Level are highlighted.

Analytes detected above background level and Commercial Screening Level are underlined.

bgs = Below ground surface.

mg/kg = Milligrams per kilogram.

\- = Not analyzed.

B = The same analyte is found in the associated blank.

J = The identification of the analyte is acceptable; the reported value is an estimate.

J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low.

O1 = The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

[1] Lawrence Berkeley National Laboratory (LBNL, 2009), was used to establish acceptable upper estimate background concentrations for metals with the exception of arsenic. For arsenic, the background level represents the established background level for San Francisco Bay Region of 11 mg/kg (Duvergé, 2011).

[2] In order of priority, the screening level represents the Department of Toxic Substances Control (DTSC)-modified screening level (DTSC, 2020) followed by U.S. Environmental Protection Agency (USEPA) Regional Screening Level (RSL; USEPA, 2020).

References:

DTSC, 2020. Human Health Risk Assessment (HHRA) Note Number 3. June.

Duvergé, 2011. Establishing Background Arsenic in Soil of the Urbanized San Francisco Bay Region. December.

LBNL, 2009. Analysis of Background Distributions of Metals in Soil at Lawrence Berkeley National Laboratory. Revised April.

USEPA, 2020. Regional Screening Level (RSL) Summary Table (TR=1E-6, HQ=1). May.

APPENDIX B

SOIL SCREENING LEVELS FOR HYPOTHETICAL RECREATIONAL TRAIL USER RECEPTOR AND HYPOTHETICAL UNAUTHORIZED CAMPER RECEPTOR

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B.1.0 SOIL SCREENING LEVELS FOR HYPOTHETICAL RECREATIONAL TRAIL USER RECEPTOR AND HYPOTHETICAL UNAUTHORIZED CAMPER RECEPTOR

Based on current and anticipated future land use as a recreational area, the recreational trail user receptor and unauthorized camper receptor were included in the conceptual site model (CSM; Section 3.0 of this Report). The recreational trail user is a long-term receptor that may include visitors using the recreational trails and the unauthorized camper receptor is a long-term receptor camping at the Site. Although camping is prohibited at the Site, at the request of the County, the on-Site unauthorized camper receptor was included in the CSM and risk-based screening levels were developed for this receptor. The following exposure pathways were included in the development of soil screening levels (SLs) for lead and polycyclic aromatic hydrocarbons (PAHs):

- Incidental ingestion of soil;
- Dermal contact with soil; and
- Inhalation of dust in outdoor air.

B.1.1 Lead

Unlike other chemicals, toxicokinetic models are used to predict blood lead concentrations to determine if exposure to lead poses adverse noncarcinogenic effects to receptors and to develop soil screening levels (SLs) for lead.

B.1.1.1 Risk Characterization for Lead

The human health screening evaluation (HHSE) for lead for the hypothetical recreational trail user receptor is discussed in Section 5.0 of this Report.

For the hypothetical unauthorized camper receptor, the exposure pathways are incomplete due to the implementation of engineering controls to mitigate unauthorized camping at the Site. Regardless, as noted in the 2019 *Phase I Environmental Site Assessment* (Phase I; Weber, Hayes & Associates [WHA], 2019) and during Site visits, unauthorized camp sites have been observed within the ravine area. As discussed in Section 5.1 of this Report, the exposure point concentrations (EPCs) for surface and shallow soil samples collected from the ravine area were 884 milligrams per kilogram (mg/kg) and 170 mg/kg, respectively. These lead EPCs for surface soil and shallow soil do not exceed the unauthorized camper soil SLs of 1,800 mg/kg and 1,080 mg/kg for 14-day and 28-day exposure frequencies, respectively. In the event of unauthorized camping within the ravine area, lead does not pose an adverse noncarcinogenic risk to the hypothetical unauthorized camper receptor.

B.1.1.2 Screening Levels for Lead

Neither the U.S. Environmental Protection Agency (USEPA) nor the California Environmental Protection Agency (CalEPA) publishes toxicity values for lead; therefore, blood-lead models are used to predict blood lead concentrations and develop soil SLs for lead. This section describes the blood-lead model used to develop lead soil SLs for the hypothetical recreational trail user receptor and hypothetical unauthorized camper receptor.

DTSC LeadSpread 8 Model

The DTSC LeadSpread 8 model (DTSC, 2011) calculates several blood lead concentrations, including the median, 90th, 95th, 98th, and 99th percentile estimates for the predicted distribution. Additionally, the model calculates the concentration in exterior soil and interior dust that will result in a 90th percentile estimate of blood lead equal to the target increase in children’s blood lead level of concern by 1 microgram per deciliter (µg/dL; CalEPA benchmark incremental change criterion for lead). This target concentration is referred to as “PRG-90”. DTSC LeadSpread 8 addresses child exposures only and is recommended by DTSC for evaluating lead exposure under unrestricted land use. In the model, DTSC indicates that non-residential scenarios may involve fewer than seven days per week for exposure frequency. This model was used to develop soil screening levels for lead for the following non-residential receptors:

- **Hypothetical Recreational Trail User Receptor** - This receptor is assumed to visit the Site one day per week (52 days per year). Therefore, the exposure frequency in the model is reduced from seven days per week (default) to one day per week. Based on this model, the soil SL for lead is 540 mg/kg.
- **Hypothetical Unauthorized Camper Receptor** - Since camping is prohibited, the exposure frequency of this receptor is unknown. Based on best professional judgment, two exposure frequencies were considered. For one exposure scenario, this receptor is assumed to camp at the Site for 14 days per year. This is consistent with the Bureau of Land Management (BLM) yearly recreational exposure frequency for a recreational visitor, which includes a range of possible activities including camping (BLM, 2017). For the second exposure scenario, the exposure frequency was doubled to be 28 days per year. Therefore, the exposure frequency in the model is reduced from seven days per week (default) to 0.3 day per week and 0.5 day per week, which is equivalent to 14 days per

year and 28 days per year, respectively. Based on this model, the soil SLs for lead are 1,800 mg/kg and 1,080 mg/kg for 14-day and 28-day exposure frequencies, respectively.

The LeadSpread 8 model worksheets for the receptors described above are provided in Attachment B1.

B.1.2 Polycyclic Aromatic Hydrocarbons (PAHs)

Using data from the exposure and toxicity assessments, human noncancer adverse health effects (hazard index [HI]) and excess cancer risks from potential exposure to PAHs in shallow soil (0 to 2 feet below ground surface [bgs]) were estimated. Then, using the HI and excess cancer risk estimates, soil EPCs, and USEPA and CalEPA target HI and excess cancer risk, risk-based soil SLs were estimated for PAHs.

B.1.2.1 Risk Characterization for PAHs

This section summarizes the approach used to estimate noncancer adverse health effects and excess cancer risks from assumed exposure to PAHs in shallow soil. The risk characterization equations for each potentially complete and significant exposure pathway are presented in Attachment B2. The input parameters for the risk characterization equations are summarized below:

- All detected PAHs were retained as chemicals of potential concern (COPCs, Table B-1);
- Instead of an average exposure scenario (central tendency exposure [CTE]), an upper-bound exposure scenario was evaluated (otherwise referred to as a reasonable maximum exposure [RME]). The RME scenario assumes mostly conservative upper-bound intake assumptions (e.g., 90th or 95th percentile for nearly all intake assumptions) and upper-bound estimates of chemical concentrations;
- Chemical doses were estimated on the basis of a number of intake assumptions, also referred to as exposure factors, including EPCs, exposure frequency, exposure duration, body weight, and other parameters. Consistent with the parameters used for the development of soil SLs for lead, the exposure parameters are as follows:
    - **Hypothetical Recreational Trail User Receptor** – Eight hours a day, one day per week (52 days per year) for a period of 26 years (as both a child [6 years] and an adult [20 years]). Potential exposures for this receptor are expected to occur from time spent outdoors only.

  - **Hypothetical Unauthorized Camper Receptor** – For this receptor, two potential exposure scenarios were evaluated: (1) 24 hours a day for 14 days per year and (2) 24 hours a day for 28 days per year. Both scenarios are for an exposure period of 26 years (as both a child [6 years] and an adult [20 years]). Potential exposures for this receptor are expected to occur from time spent outdoors only.

  The intake assumptions for these receptors are summarized in Tables B-2, B-3, and B-4.

- The EPCs are conservative estimates of the chemical concentration in shallow soil. It is unlikely that a potential receptor will spend the entire exposure duration of 26 years residing over maximum detected concentrations in shallow soil. Therefore, it is appropriate to statistically evaluate the shallow soil data on an area-wide basis and consider a 95-percent upper confidence limit of the mean (95UCL) concentration as an appropriate EPC. A USEPA software package, ProUCL Version 5.1, was used to estimate the upper confidence limit of the mean concentration (UCL; [typically the 95UCL, but sometimes the 97.5UCL or 99UCL, depending on the data set]). The ProUCL output spreadsheets are presented in Attachment B3. Consistent with USEPA (1989) procedures, the lesser of the maximum detected concentration and the 95UCL was selected as shallow soil EPCs. The soil EPCs for PAHs are presented on Table B-1.
- Toxicity values are combined with exposure factors to estimate adverse noncancer health effects and excess cancer risks. Toxicity values include oral reference doses (RfDs), inhalation reference concentrations (RfCs), oral slope factors (SFs), and inhalation unit risk factors (IURs). Toxicity values were selected in accordance with Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals rule (Health and Safety Code [HSC] §25300 et seq., "Chapter 6.8"; Toxicity Criteria Rule) and DTSC (2019) Note Number 10. The toxicity values are presented on Tables B-5 and B-6.

The parameters described above were used in risk characterization equations (Attachment B2) to estimate noncancer HI and excess cancer risks as described in the following sections.

Noncancer Adverse Health Effects – Hazard Quotient and Hazard Index

Noncarcinogenic effects are typically evaluated by comparing an exposure level over a specified time period, with an RfD or RfC based on a similar time period. To estimate noncancer effects, the intake is divided by the RfD or RfC. The resulting value is referred to as a hazard quotient (HQ).

Exposures to multiple chemicals were evaluated by summing the HQs for each chemical for each exposure pathway to estimate the HI, using the following equation:

$$HI_p = \sum_{i=1}^{n} HQ_{i,p}$$

Where:

HI_p = HI for the receptor's exposure to n chemicals via pathway p (unitless);
n = Number of chemicals (i.e., detected PAHs); and
$HQ_{i,p}$ = HQ for chemical i for exposure pathway p (unitless).

A HI less than or equal to one indicates that no adverse noncancer health effects are expected to occur (USEPA, 1989). Consistent with methods used by USEPA (2021), the HI presented for the receptors is based on the child receptor, which is higher than the HI for the corresponding adult receptor. This is conservative because it assumes higher daily intake rates, lower body weight, and chronic toxicity values. The summation of HIs across age groups (i.e., child and adult) is inappropriate because noncancer hazard is not cumulative over time, as is assumed for cancer risk (USEPA, 2021).

Excess Cancer Risk

SFs/IURs were used to estimate the potential excess cancer risk associated with exposure to individual COPCs. Consistent with USEPA (1989) risk assessment guidelines, the SF/IUR was multiplied by the chronic daily intake averaged over 70 years to estimate lifetime excess cancer risk. The resulting values are referred to as excess cancer risks. These potential excess cancer risks are compared to CalEPA's risk management range of 1×10^{-6} to 1×10^{-4}. The CalEPA threshold value of one-in-one million (1×10^{-6}) represents the lower end (most stringent) of the CalEPA's risk management range and is the point of departure for risk management decisions for the receptors.

The potential cancer risks from exposure to multiple chemicals were then estimated by summing the excess cancer risks for each chemical for a given exposure pathway using the following equation:

$$CR_p = \sum_{i=1}^{n} CR_{i,p}$$

Where:

CR_p = Excess cancer risk for the receptor's exposure to n chemicals via pathway p (unitless);
n = Number of chemicals (i.e., detected PAHs); and
$CR_{i,p}$ = Excess cancer risk for chemical i for exposure pathway p (unitless).

Consistent with methods used by USEPA (2021), the excess cancer risk estimates for the receptors are the sum of the excess cancer risk estimates for the child and adult receptors.

The results of this risk characterization process for the hypothetical recreational trail user receptor are presented on Table B-7 and summarized in the following table:

Media	Exposure Pathway	Hazard Index (HI)	Cancer Risk (CR)	Comments
Shallow Soil (0 to 2 feet bgs)	Direct Exposure -Ingestion -Dermal Contact -Inhalation of Dust	0.05	4 x 10^{-6}	HI does not exceed target level of 1. CR exceeds target level of 1 x 10^{-6}. Individual HIs for all COPCs do not exceed 1 (see Table B-7). Individual CRs for all COPCs do not exceed 1 x 10^{-6} (see Table B-7).

The HI does not exceed the USEPA and CalEPA target level of one; therefore, PAHs do not pose adverse noncancer effects to the hypothetical recreational trail user receptor. The excess cancer risk is within CalEPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4}. The individual excess cancer risks for PAHs do not exceed 1 x 10^{-6}. Benzo(a)pyrene and dibenz(a,h)anthracene are the primary contributors to the excess cancer risk, each with an estimated cancer risk of 1 x 10^{-6}. They account for 63% of the total excess cancer risk. Individual excess cancer risks for all other PAHs are less than 1 x 10^{-6}.

The results of this risk characterization process for the hypothetical unauthorized camper receptor are presented on Tables B-8 and B-9 and summarized in the following table:

Media	Exposure Pathway	Hazard Index (HI)	Cancer Risk (CR)	Comments
Shallow Soil (0 to 2 feet bgs)	Direct Exposure -Ingestion -Dermal Contact -Inhalation of Dust (Exposure frequency of 14 days per year)	0.01	1 x 10^{-6}	HI does not exceed target level of 1. CR does not exceed target level of 1 x 10^{-6}. Individual HIs for all COPCs do not exceed 1 (see Table B-8). Individual CRs for all COPCs do not exceed 1 x 10^{-6} (see Table B-8).
Shallow Soil (0 to 2 feet bgs)	Direct Exposure -Ingestion -Dermal Contact -Inhalation of Dust (Exposure frequency of 28 days per year)	0.02	2 x 10^{-6}	HI does not exceed target level of 1. CR exceeds target level of 1 x 10^{-6}. Individual HIs for all COPCs do not exceed 1 (see Table B-9). Individual CRs for all COPCs do not exceed 1 x 10^{-6} (see Table B-9).

The HIs do not exceed the USEPA and CalEPA target level of one; therefore, PAHs do not pose adverse noncancer effects to the hypothetical recreational trail user receptor and hypothetical unauthorized camper receptor. The excess cancer risk is within CalEPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4}. The individual excess cancer risks for PAHs do not exceed 1 x 10^{-6}.

B.1.2.2 Screening Levels for PAHs

Using the HI and excess cancer risk estimates, source EPCs, and USEPA and CalEPA target HI of one and target excess cancer risk of 1 x 10^{-6}, a soil SL was estimated using the equations in the following sections.

Soil SL – Noncarcinogenic Effects

$$Soil\ SL_{nc} = \frac{HI_T \times EPC_{i,p}}{HI_{i,p}}$$

Where:

Soil SL_{nc}= Soil SL for noncarcinogenic effects for chemical i via pathway p (mg/kg);
HI_T = Target HI of one (unitless);
$EPC_{i,p}$= Exposure point concentration for soil for chemical i via pathway p (mg/kg); and
$HI_{i,p}$ = HI for chemical i via pathway p (unitless).

Soil SL – Carcinogenic Effects

$$Soil\ SL_c = \frac{CR_T \times EPC_{i,p}}{CR_{i,p}}$$

Where:

Soil SL_{nc}= Soil SL for carcinogenic effects for chemical i via pathway p (mg/kg);
CR_T = Target excess cancer risk of 1 x 10^{-6} (unitless);
$EPC_{i,p}$= Exposure point concentration for soil for chemical i via pathway p (mg/kg); and
$CR_{i,p}$ = Excess cancer risk for chemical i via pathway p (unitless).

The recreation trail user soil SLs for PAHs are presented on Table B-7. The unauthorized camper soil SLs for PAHs under the two exposure scenarios (i.e., exposure frequencies of 14 days per year and 28 days per year) are presented on Tables B-8 and B-9.

B.2.0 SUMMARY

Based on current and anticipated future land use in the Lower Main Meadow, Pogonip Open Space as a recreational area, the recreational trail user receptor and the unauthorized camper receptor were included in the CSM, and risk-based screening levels were developed.

Exposures to lead are evaluated separately from other COPCs by using toxicokinetic models to predict blood lead concentrations and soil SLs. The HHSE for lead for the hypothetical recreational trail user receptor is discussed in Section 5.0 of this Report. For the hypothetical unauthorized camper receptor, lead EPCs for surface soil and shallow soil in the ravine area do not exceed the unauthorized camper soil SLs of 1,800 mg/kg and 1,080 mg/kg for 14-day and 28-day exposure frequencies, respectively. In the event of unauthorized camping within the ravine area, lead does not pose an adverse noncarcinogenic risk to the hypothetical unauthorized camper receptor.

Based on the evaluation of potential human health risks to the recreational trail user receptor and the unauthorized camper receptor from exposure to PAHs, the HIs do not exceed the USEPA and CalEPA target level of one and the excess cancer risks are within CalEPA's risk management range of 1×10^{-6} to 1×10^{-4}. The individual excess cancer risks for PAHs detected in soil do not exceed 1×10^{-6}.

Since there are no published soil SLs for recreational receptors, Site-specific risk-based soil SLs were developed for use at the Site. The soil SLs for lead and PAHs detected in shallow soil at the Site are summarized in the following table.

COPC	Soil Screening Levels (mg/kg)		
	Recreational Trail User Receptor	Unauthorized Camper Receptor	
Primary Exposure Assumptions	*8 hours/day* *52 days/year* *26 years (adult/child)*	*24 hours/day* *14 days/year,* *26 years (adult/child)*	*24 hours/day* *28 days/year* *26 years (adult/child)*
Lead	540	1,800	1,080
Anthracene	120,000	430,000	220,000
Acenaphthene	23,000	87,000	43,000
Benz(a)anthracene	45	170	84
Benzo(a)pyrene	4.5	17.0	8.4
Benzo(b)fluoranthene	45	170	84

COPC	**Soil Screening Levels (mg/kg)**		
	Recreational Trail User Receptor	**Unauthorized Camper Receptor**	
Primary Exposure Assumptions	*8 hours/day 52 days/year 26 years (adult/child)*	*24 hours/day 14 days/year, 26 years (adult/child)*	*24 hours/day 28 days/year 26 years (adult/child)*
Benzo(g,h,i)perylene	NE	NE	NE
Benzo(k)fluoranthene	450	1,700	840
Chrysene	4,500	17,000	8,400
Dibenz(a,h)anthracene	1.1	4.1	2.1
Fluoranthene	NE	NE	NE
Fluorene	16,000	58,000	29,000
Indeno(1,2,3-c,d)pyrene	45	170	84
Phenanthrene	NE	NE	NE
Pyrene	12,000	43,000	22,000
Naphthalene	38	140	70
1-Methylnaphthalene	160	580	290
2-Methylnaphthalene	1,600	5,800	2,900

Notes:

NE = No toxicity values are available; therefore, risk-based screening level was not estimated.

B.3.0 REFERENCES

Bureau of Land Management (BLM), 2017. BLM Technical Memorandum, Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September 2017 Update.

Department of Toxic Substances Control (DTSC), 2011. User's Guide to LeadSpread 8 and Recommendations for Evaluation of Lead Exposures in Adults. Department of Toxic Substances Control. September.

DTSC, 2019. Human Health Risk Assessment Note Number 10: Required Toxicity Criteria under sections 69021(a), (b), and (c) of the Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals Rule and Specification of DTSC-Recommended Toxicity Criteria for Other Analytes Evaluated in Human Health Risk Assessments, Screening-Levels, and Remediation-Goal Calculations. February 25.

U.S. Environmental Protection Agency (USEPA), 1989. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. Interim Final. Solid Waste and Emergency Response. December.

USEPA, 2021. Regional Screening Level (RSL) Summary Table (TR=1E-6, HQ=1). May.

Weber, Hayes & Associates (WHA), 2019. Phase I Environmental Site Assessment for Recreational Open Space Property. November 19.

TABLES

Table B-1
Statistical Summary of Shallow Soil (0 to 2 feet bgs) Analytical Data - West Meadow
Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Chemical	Number of Samples	Number of Detections	Frequency of Detection	Arithmetic Mean of Detected (mg/kg)	Standard Deviation of Detected (mg/kg)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	95UCL [1] (mg/kg)	Soil EPC [2] (mg/kg)
Polynuclear Aromatic Hydrocarbons (PAHs)									
Anthracene	31	12	39%	0.20	0.30	0.00491	0.986	0.21	0.21
Acenaphthene	31	10	32%	0.13	0.20	0.00499	0.651	0.13	0.13
Benz(a)anthracene	31	23	74%	1.4	2.6	0.00212	8.45	3.6	3.6
Benzo(a)pyrene	31	26	84%	1.8	3.7	0.00239	11.7	7.7	7.7
Benzo(b)fluoranthene	31	29	94%	1.9	4.1	0.00244	14.8	9.0	9.0
Benzo(g,h,i)perylene	31	25	81%	1.0	1.9	0.00215	7.52	1.9	1.9
Benzo(k)fluoranthene	31	18	58%	0.85	1.4	0.00264	4.02	1.8	1.8
Chrysene	31	21	68%	1.9	3.2	0.00297	9.86	4.5	4.5
Dibenz(a,h)anthracene	31	15	48%	0.71	1.3	0.00377	4.45	1.0	1.0
Fluoranthene	31	21	68%	1.6	2.9	0.00273	11.1	3.9	3.9
Fluorene	31	9	29%	0.054	0.086	0.00249	0.260	0.053	0.053
Indeno(1,2,3-c,d)pyrene	31	21	68%	1.1	1.9	0.00213	6.25	1.7	1.7
Phenanthrene	31	14	45%	0.68	1.2	0.00295	4.14	0.90	0.90
Pyrene	31	22	71%	1.5	3.0	0.00280	11.8	2.7	2.7
Naphthalene	31	9	29%	0.57	1.5	0.00491	4.68	1.2	1.2
1-Methylnaphthalene	31	5	16%	0.026	0.028	0.0106	0.0762	0.028	0.028
2-Methylnaphthalene	31	5	16%	0.037	0.041	0.0133	0.110	0.038	0.038

Notes:

95UCL = 95 Percent Upper Confidence Limit of the Arithmetic Mean.

EPC = Exposure point concentration.

mg/kg = Milligrams per kilogram.

[1] A U.S. Environmental Protection Agency (USEPA) software package, ProUCL Version 5.1, was used to estimate the upper confidence limit of the mean concentration (UCL; [typically the 95UCL, but sometimes the 97.5UCL or 99UCL, depending on the data set]).

[2] Consistent with USEPA (1989) procedures, when evaluating a reasonable maximum exposure scenario the lesser of the maximum detected concentration and the 95UCL was selected as the appropriate soil EPC for comparison with the screening level.

References:

USEPA. 1989. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. Interim Final. Solid Waste and Emergency Response. December.

Table B-2

Exposure Intake Assumptions for Hypothetical Recreational Trail User Receptor[1]

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Parameter	Acronym	Value	Unit	Source
Target Cancer Risk	TR	1.00E-06	Unitless	DTSC, 2019
Target Hazard Index	THI	1	Unitless	DTSC, 2019
Child				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	2,190	days	DTSC, 2019
Exposure Duration	ED	6	years	BPJ[3]
Exposure Frequency	EF	52	days/year	BPJ[4]
Exposure Time	ET	8	hours/day	BPJ[5]
Body Weight	BW	15	kg	DTSC, 2019
Soil Ingestion Rate	IRs	200	mg/day	DTSC, 2019
Skin Surface Area	SA	2,373	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.2	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019
Adult				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	7,300	days	DTSC, 2019
Exposure Duration	ED	20	years	BPJ[3]
Exposure Frequency	EF	52	day/year	BPJ[4]
Exposure Time	ET	8	hours/day	BPJ[5]
Body Weight	BW	80	kg	DTSC, 2019
Soil Ingestion Rate	IRs	100	mg/day	DTSC, 2019
Skin Surface Area	SA	6,032	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.07	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019

Notes:

kg = kilograms.
mg/day = milligrams per day.
cm^2 = square centimeters.
mg/cm^2-day = milligrams per square centimeter per day.
m^3/kg = cubic meters per kilogram.

[1] Hypothetical recreational trail user receptor includes visitors and trespassers, which are expected to spend entire exposure duration outdoors.

[2] Based on a 70 year lifetime.

[3] Best professional judgment. Recreational receptor is expected to spend time as both a child and adult recreator receptor over a lifetim

[4] Best professional judgment. Recreational receptor was assumed to visit one day per week.

[5] Best professional judgment. Recreational receptor was assumed to visit 8 hours a day.

[6] In accordance with DTSC (2015), the dermal absorption fraction for polynuclear aromatic hydrocarbons can be assumed to be 0.15.

[7] In the absence of a PEF for the recreational scenario, the PEF was assumed to be the same value used for residential and industrial scenarios (DTSC, 2019).

References:

DTSC. 2015. Preliminary Endangerment Assessment Guidance Manual. Department of Toxic Substances Control. October.

DTSC. 2019. Human Health Risk Assessment Note Number 1, Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. April 9.

Table B-3
Exposure Intake Assumptions for Hypothetical Camper Receptor with an Exposure Frequency of 14 days per year[1]

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Parameter	Acronym	Value	Unit	Source
Target Cancer Risk	TR	1.00E-06	Unitless	DTSC, 2019
Target Hazard Index	THI	1	Unitless	DTSC, 2019
Child				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	2,190	days	DTSC, 2019
Exposure Duration	ED	6	years	BPJ[3]
Exposure Frequency	EF	14	days/year	BLM, 2017[4]
Exposure Time	ET	24	hours/day	BPJ[5]
Body Weight	BW	15	kg	DTSC, 2019
Soil Ingestion Rate	IRs	200	mg/day	DTSC, 2019
Skin Surface Area	SA	2,373	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.2	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019
Adult				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	7,300	days	DTSC, 2019
Exposure Duration	ED	20	years	BPJ[3]
Exposure Frequency	EF	14	day/year	BLM, 2017[4]
Exposure Time	ET	24	hours/day	BPJ[5]
Body Weight	BW	80	kg	DTSC, 2019
Soil Ingestion Rate	IRs	100	mg/day	DTSC, 2019
Skin Surface Area	SA	6,032	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.07	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019

Notes:

kg = kilograms.
mg/day = milligrams per day.
cm^2 = square centimeters.
mg/cm^2-day = milligrams per square centimeter per day.
m^3/kg = cubic meters per kilogram.

[1] Hypothetical camper receptor are expected to spend entire exposure duration outdoors.

[2] Based on a 70 year lifetime.

[3] Best professional judgment. Recreational receptor is expected to spend time as both a child and adult recreator receptor over a lifetim

[4] In accordance with the Bureau of Land Management (BLM) yearly recreational exposure frequency for recreational visitor, which includes a range of possible activities, including camping (BLM, 2017).

[5] Best professional judgment. Recreational receptor was assumed to camp at the site 24 hours a day.

[6] In accordance with DTSC (2015), the dermal absorption fraction for polynuclear aromatic hydrocarbons can be assumed to be 0.15.

[7] In the absence of a PEF for the recreational scenario, the PEF was assumed to be the same value used for residential and industrial scenarios (DTSC, 2019).

References:

BLM. 2017. BLM Technical Memorandum, Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September 2017 Update.

DTSC. 2015. Preliminary Endangerment Assessment Guidance Manual. Department of Toxic Substances Control. October.

DTSC. 2019. Human Health Risk Assessment Note Number 1, Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. April 9.

Table B-4
Exposure Intake Assumptions for Hypothetical Camper Receptor with an Exposure Frequency of 28 days per year[1]
Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Parameter	Acronym	Value	Unit	Source
Target Cancer Risk	TR	1.00E-06	Unitless	DTSC, 2019
Target Hazard Index	THI	1	Unitless	DTSC, 2019
Child				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	2,190	days	DTSC, 2019
Exposure Duration	ED	6	years	BPJ[3]
Exposure Frequency	EF	28	days/year	BPJ[4]
Exposure Time	ET	24	hours/day	BPJ[5]
Body Weight	BW	15	kg	DTSC, 2019
Soil Ingestion Rate	IRs	200	mg/day	DTSC, 2019
Skin Surface Area	SA	2,373	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.2	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019
Adult				
Averaging Time (carcinogens)[2]	ATc	25,550	days	DTSC, 2019
Averaging Time (noncarcinogens)	ATn	7,300	days	DTSC, 2019
Exposure Duration	ED	20	years	BPJ[3]
Exposure Frequency	EF	28	day/year	BPJ[4]
Exposure Time	ET	24	hours/day	BPJ[5]
Body Weight	BW	80	kg	DTSC, 2019
Soil Ingestion Rate	IRs	100	mg/day	DTSC, 2019
Skin Surface Area	SA	6,032	cm^2	DTSC, 2019
Soil Adherence Factor	AF	0.07	mg/cm^2-day	DTSC, 2019
Dermal Absorption Factor [6]	ABS	0.15	unitless	DTSC, 2019
Particulate Emission Factor [7]	PEF	1.32E+09	m^3/kg	DTSC, 2019

Notes:

kg = kilograms.
mg/day = milligrams per day.
cm^2 = square centimeters.
mg/cm^2-day = milligrams per square centimeter per day.
m^3/kg = cubic meters per kilogram.

[1] Hypothetical camper receptor are expected to spend entire exposure duration outdoors.

[2] Based on a 70 year lifetime.

[3] Best professional judgment. Recreational receptor is expected to spend time as both a child and adult recreator receptor over a lifetim

[4] Best professional judgment. As an upperbound evaluation, the Bureau of Land Management (BLM) yearly recreational exposure frequency for recreational visitor of 14 days per year (BLM, 2017) was doubled to 24 days per year.

[5] Best professional judgment. Recreational receptor was assumed to camp at the site 24 hours a day.

[6] In accordance with DTSC (2015), the dermal absorption fraction for polynuclear aromatic hydrocarbons can be assumed to be 0.15.

[7] In the absence of a PEF for the recreational scenario, the PEF was assumed to be the same value used for residential and industrial scenarios (DTSC, 2019).

References:

BLM. 2017. BLM Technical Memorandum, Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September 2017 Update.

DTSC. 2015. Preliminary Endangerment Assessment Guidance Manual. Department of Toxic Substances Control. October.

DTSC. 2019. Human Health Risk Assessment Note Number 1, Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. April 9.

Table B-5

Toxicity Values - Reference Doses/Reference Concentrations[1]

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

	Oral Reference Dose (RfD)[2]			GIABS		Inhalation Reference Concentration (RfC)		
Chemical	**Value** (mg/kg-day)	**Target Organ(s)/ System(s)**	**Source**	**Value** (unitless)	**Source**	**Value** ($\mu g/m^3$)	**Target Organ(s)/ System(s)**	**Source**
Polycyclic Aromatic Hydrocarbons								
Anthracene	3.0E-01	None	USEPA, 2021	1	USEPA, 2004	1.2E+03	RTR	USEPA, 2021
Acenaphthene	6.0E-02	Liver	USEPA, 2021	1	USEPA, 2004	2.4E+02	RTR	USEPA, 2021
Benz(a)anthracene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Benzo(a)pyrene	3.0E-04	Developmental	USEPA, 2021	1	USEPA, 2004	2.0E-03	Developmental	USEPA, 2021
Benzo(b)fluoranthene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Benzo(g,h,i)perylene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Benzo(k)fluoranthene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Chrysene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Dibenz(a,h)anthracene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Fluoranthene	4.0E-02	Liver, Blood	USEPA, 2021	1	USEPA, 2004	- -	- -	- -
Fluorene	4.0E-02	Blood	USEPA, 2021	1	USEPA, 2004	1.6E+02	RTR	USEPA, 2021
Indeno(1,2,3-c,d)pyrene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Phenanthrene	- -	- -	- -	1	USEPA, 2004	- -	- -	- -
Pyrene	3.0E-02	Kidney	USEPA, 2021	1	USEPA, 2004	1.2E+02	RTR	USEPA, 2021
Naphthalene	2.0E-02	Other (body weight)	USEPA, 2021	1	USEPA, 2004	3.0E+00	Nervous, Respiratory	USEPA, 2021
1-Methylnaphthalene	7.0E-02	Respiratory	ATSDR, 2021	1	USEPA, 2004	2.8E+02	RTR	ATSDR, 2021
2-Methylnaphthalene	4.0E-03	Respiratory	USEPA, 2021	1	USEPA, 2004	1.6E+01	RTR	USEPA, 2021

Notes:

GIABS = Gastrointestinal absorption factor.
mg/kg-day = milligrams per kilogram body weight per day.
$\mu g/m^3$ = micrograms per cubic meter.
RTR = route to route extrapolation.
- - = not available.

[1] Toxicity values were selected in accordance with *Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals* rule and DTSC (2019) Note Number 10.

[2] In the absence of dermal toxicity values the oral reference doses were multiplied by the gastrointestinal absorption (GIABS) factor and used to evaluate dermal exposure.

References:

ATSDR. 2021. Minimal Risk Levels (MRLs). August.

DTSC. 2019. Human Health Risk Assessment Note Number 10: Required Toxicity Criteria under sections 69021(a), (b), and (c) of the Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals Rule and Specification of DTSC-Recommended Toxicity Criteria for Other Analytes Evaluated in Human Health Risk Assessments, Screening-Levels, and Remediation-Goal Calculations. February 25.

USEPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final. Office of Superfund Remediation and Technology Innovation. July.

USEPA. 2021. Integrated Risk Information System (IRIS). On-line computer database. Last accessed September.

Table B-6

Toxicity Values - Slope Factors/Inhalation Unit Risk Factors[1]

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Chemical	**Oral Slope Factor (SF)[2]**		**GIABS**		**Inhalation Unit Risk Factor (IUR)**	
	Value (mg/kg-day)$^{-1}$	**Source**	**Value** (unitless)	**Source**	**Value** (µg/m^3)$^{-1}$	**Source**
Polycyclic Aromatic Hydrocarbons						
Anthracene	- -	- -	1	USEPA, 2004	- -	- -
Acenaphthene	- -	- -	1	USEPA, 2004	- -	- -
Benz(a)anthracene	1.0E-01	USEPA, 2021a	1	USEPA, 2004	1.1E-04	OEHHA, 2021
Benzo(a)pyrene	1.0E+00	USEPA, 2021c	1	USEPA, 2004	1.1E-03	OEHHA, 2021
Benzo(b)fluoranthene	1.0E-01	USEPA, 2021a	1	USEPA, 2004	1.1E-04	OEHHA, 2021
Benzo(g,h,i)perylene	- -	- -	1	USEPA, 2004	- -	- -
Benzo(k)fluoranthene	1.0E-02	USEPA, 2021a	1	USEPA, 2004	1.1E-04	OEHHA, 2021
Chrysene	1.0E-03	USEPA, 2021a	1	USEPA, 2004	1.1E-05	OEHHA, 2021
Dibenz(a,h)anthracene	4.1E+00	OEHHA, 2021	1	USEPA, 2004	1.2E-03	OEHHA, 2021
Fluoranthene	- -	- -	1	USEPA, 2004	- -	- -
Fluorene	- -	- -	1	USEPA, 2004	- -	- -
Indeno(1,2,3-c,d)pyrene	1.0E-01	USEPA, 2021a	1	USEPA, 2004	1.1E-04	OEHHA, 2021
Phenanthrene	- -	- -	1	USEPA, 2004	- -	- -
Pyrene	- -	- -	1	USEPA, 2004	- -	- -
Naphthalene	1.2E-01	OEHHA, 2021	1	USEPA, 2004	3.4E-05	OEHHA, 2021
1-Methylnaphthalene	2.9E-02	USEPA, 2021b	1	USEPA, 2004	7.3E-06	(RTR) USEPA, 2021b
2-Methylnaphthalene	- -	- -	1	USEPA, 2004	- -	- -

Notes:

GIABS = Gastrointestinal absorption factor.

mg/kg-day = milligrams per kilogram body weight per day.

µg/m^3 = micrograms per cubic meter.

- - = not available.

[1] Toxicity values were selected in accordance with *Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals* rule and DTSC (2019) Note Number 10.

[2] In the absence of dermal toxicity values the oral slope factors were divided by the gastrointestinal absorption (GIABS) factor and used to evaluate dermal exposure.

References:

DTSC. 2019. Human Health Risk Assessment Note Number 10: Required Toxicity Criteria under sections 69021(a), (b), and (c) of the Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals Rule and Specification of DTSC-Recommended Toxicity Criteria for Other Analytes Evaluated in Human Health Risk Assessments, Screening-Levels, and Remediation-Goal Calculations. February 25.

OEHHA. 2021. Toxicity Criteria Database. On-line computer database. Last accessed September.

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Table B-7

Total Risk Characterization for the Hypothetical Recreational Trail User Receptor

Direct Exposure to COPCs in Soil (0 to 2 feet bgs)

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

		Noncarcinogenic Effects			Carcinogenic Effects			Risk-Based Soil Screening Level (SL)		
Chemical of Potential Concern	Exposure Point Concentration (C_{soil}) (mg/kg)	Chronic Oral Reference Dose (cRfDo) (mg/kg-day)	Chronic Inhalation Reference Concentration (cRfCi) (µg/m^3)	Hazard Quotient (HQ) (unitless)	Oral Slope Factor (SFo) (mg/kg-day)$^{-1}$	Inhalation Unit Risk Factor (URF) (µg/m^3)$^{-1}$	Excess Cancer Risk (unitless)	Noncarcinogenic Effects[1] (mg/kg)	Carcinogenic Effects[2] (mg/kg)	Soil SL[1] (mg/kg)
Child Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	2 E-06	- -	- -	- -	1.2E+05	- -	1.2E+05
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	5 E-06	- -	- -	- -	2.3E+04	- -	2.3E+04
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	8 E-08	- -	4.5E+01	4.5E+01
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	5 E-02	1.00E+00	1.10E-03	1 E-06	1.2E+02	4.5E+00	4.5E+00
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	2 E-07	- -	4.5E+01	4.5E+01
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	4 E-09	- -	4.5E+02	4.5E+02
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	1 E-09	- -	4.5E+03	4.5E+03
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	1 E-06	- -	1.1E+00	1.1E+00
Fluoranthene	3.81E+00	4.00E-02	- -	2 E-04	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	3 E-06	- -	- -	- -	1.6E+04	- -	1.6E+04
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	6 E-08	- -	4.5E+01	4.5E+01
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	3 E-04	- -	- -	- -	1.2E+04	- -	1.2E+04
Naphthalene	1.12E+00	2.00E-02	3.00E+00	1 E-04	1.20E-01	3.40E-05	3 E-08	7.8E+03	3.8E+01	3.8E+01
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	1 E-06	2.90E-02	7.25E-06	2 E-10	2.7E+04	1.6E+02	1.6E+02
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	2 E-05	- -	- -	- -	1.6E+03	- -	1.6E+03
Adult Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	2 E-07	- -	- -	- -	1.0E+06	- -	1.0E+06
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	6 E-07	- -	- -	- -	2.1E+05	- -	2.1E+05
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	3 E-08	- -	1.2E+02	1.2E+02
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	5 E-03	1.00E+00	1.10E-03	4 E-07	1.0E+03	1.2E+01	1.2E+01
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	7 E-08	- -	1.2E+02	1.2E+02
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	1 E-09	- -	1.2E+03	1.2E+03
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	4 E-10	- -	1.2E+04	1.2E+04
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	5 E-07	- -	2.9E+00	2.9E+00
Fluoranthene	3.81E+00	4.00E-02	- -	3 E-05	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	4 E-07	- -	- -	- -	1.4E+05	- -	1.4E+05
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	2 E-08	- -	1.2E+02	1.2E+02
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	4 E-05	- -	- -	- -	1.0E+05	- -	1.0E+05
Naphthalene	1.12E+00	2.00E-02	3.00E+00	2 E-05	1.20E-01	3.40E-05	1 E-08	6.9E+04	1.0E+02	1.0E+02
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	1 E-07	2.90E-02	7.25E-06	7 E-11	2.4E+05	4.1E+02	4.1E+02
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	3 E-06	- -	- -	- -	1.4E+04	- -	1.4E+04
			Total Hazard Index =	**5 E-02**	**Total Excess Cancer Risk =**		**4 E-06**			

Notes: 2 E-06
mg/kg = milligrams per kilogram. 6.32 E-01
mg/kg-day = milligrams per kilogram body weight per day.
µg/m^3 = micrograms per cubic meter.
- - = not available or not applicable. No toxicity values are available; therefore, value was not estimated

[1] Soil SL represents the lower of the SLs based on noncarcinogenic and carcinogenic effects.

[2] Consistent with methods used by USEPA, the HI presented for the hypothetical recreational trail user receptor is based on the child receptor.

[1] Consistent with methods used by USEPA, the excess cancer risk estimates for the hypothetical recreational trail user receptor are the sum of the excess cancer risk estimates for the child and adult receptors.

Table B-8
Total Risk Characterization for the Hypothetical Camper Receptor
Direct Exposure to COPCs in Soil (0 to 2 feet bgs) with an Exposure Frequency of 14 days per year
Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

		Noncarcinogenic Effects			Carcinogenic Effects			Risk-Based Soil Screening Level (SL)		
Chemical of Potential Concern	**Exposure Point Concentration (C_{soil})** (mg/kg)	**Chronic Oral Reference Dose (cRfDo)** (mg/kg-day)	**Chronic Inhalation Reference Concentration (cRfCi)** ($\mu g/m^3$)	**Hazard Quotient (HQ)** (unitless)	**Oral Slope Factor (SFo)** $(mg/kg\text{-}day)^{-1}$	**Inhalation Unit Risk Factor (URF)** $(\mu g/m^3)^{-1}$	**Excess Cancer Risk** (unitless)	**Noncarcinogenic Effects[1]** (mg/kg)	**Carcinogenic Effects[2]** (mg/kg)	**Soil SL[1]** (mg/kg)
Child Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	5 E-07	- -	- -	- -	4.3E+05	- -	4.3E+05
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	1 E-06	- -	- -	- -	8.7E+04	- -	8.7E+04
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	2 E-08	- -	1.7E+02	1.7E+02
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	1 E-02	1.00E+00	1.10E-03	3 E-07	4.3E+02	1.7E+01	1.7E+01
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	5 E-08	- -	1.7E+02	1.7E+02
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	1 E-09	- -	1.7E+03	1.7E+03
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	3 E-10	- -	1.7E+04	1.7E+04
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	3 E-07	- -	4.1E+00	4.1E+00
Fluoranthene	3.81E+00	4.00E-02	- -	7 E-05	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	9 E-07	- -	- -	- -	5.8E+04	- -	5.8E+04
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	1 E-08	- -	1.7E+02	1.7E+02
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	9 E-05	- -	- -	- -	4.3E+04	- -	4.3E+04
Naphthalene	1.12E+00	2.00E-02	3.00E+00	4 E-05	1.20E-01	3.40E-05	8 E-09	2.9E+04	1.4E+02	1.4E+02
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	3 E-07	2.90E-02	7.25E-06	5 E-11	1.0E+05	5.8E+02	5.8E+02
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	6 E-06	- -	- -	- -	5.8E+03	- -	5.8E+03
Adult Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	5 E-08	- -	- -	- -	3.8E+06	- -	3.8E+06
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	2 E-07	- -	- -	- -	7.7E+05	- -	7.7E+05
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	8 E-09	- -	4.5E+02	4.5E+02
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	1 E-03	1.00E+00	1.10E-03	1 E-07	3.6E+03	4.5E+01	4.5E+01
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	2 E-08	- -	4.5E+02	4.5E+02
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	4 E-10	- -	4.5E+03	4.5E+03
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	1 E-10	- -	4.5E+04	4.5E+04
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	1 E-07	- -	1.1E+01	1.1E+01
Fluoranthene	3.81E+00	4.00E-02	- -	7 E-06	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	1 E-07	- -	- -	- -	5.1E+05	- -	5.1E+05
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	6 E-09	- -	4.5E+02	4.5E+02
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	1 E-05	- -	- -	- -	3.8E+05	- -	3.8E+05
Naphthalene	1.12E+00	2.00E-02	3.00E+00	4 E-06	1.20E-01	3.40E-05	3 E-09	2.5E+05	3.7E+02	3.7E+02
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	3 E-08	2.90E-02	7.25E-06	2 E-11	8.9E+05	1.5E+03	1.5E+03
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	7 E-07	- -	- -	- -	5.1E+04	- -	5.1E+04
			Total Hazard Index =	**1 E-02**		**Total Excess Cancer Risk =**	**1 E-06**			

Notes: 6 E-07
mg/kg = milligrams per kilogram. 6.32 E-01
mg/kg-day = milligrams per kilogram body weight per day.
$\mu g/m^3$ = micrograms per cubic meter.
- - = not available or not applicable. No toxicity values are available; therefore, value was not estimated
[1] Soil SL represents the lower of the SLs based on noncarcinogenic and carcinogenic effects.
[2] Consistent with methods used by USEPA, the HI presented for the hypothetical recreational trail user receptor is based on the child receptor.
[1] Consistent with methods used by USEPA, the excess cancer risk estimates for the hypothetical recreational trail user receptor are the sum of the excess cancer risk estimates for the child and adult receptors.

Table B-9
Total Risk Characterization for the Hypothetical Camper Receptor
Direct Exposure to COPCs in Soil (0 to 2 feet bgs) with an Exposure Frequency of 28 days per year
Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

		Noncarcinogenic Effects			Carcinogenic Effects			Risk-Based Soil Screening Level (SL)		
Chemical of Potential Concern	Exposure Point Concentration (C_{soil}) (mg/kg)	Chronic Oral Reference Dose (cRfDo) (mg/kg-day)	Chronic Inhalation Reference Concentration (cRfCi) ($\mu g/m^3$)	Hazard Quotient (HQ) (unitless)	Oral Slope Factor (SFo) $(mg/kg\text{-}day)^{-1}$	Inhalation Unit Risk Factor (URF) $(\mu g/m^3)^{-1}$	Excess Cancer Risk (unitless)	Noncarcinogenic Effects[1] (mg/kg)	Carcinogenic Effects[2] (mg/kg)	Soil SL[1] (mg/kg)
Child Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	9 E-07	- -	- -	- -	2.2E+05	- -	2.2E+05
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	3 E-06	- -	- -	- -	4.3E+04	- -	4.3E+04
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	4 E-08	- -	8.4E+01	8.4E+01
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	2 E-02	1.00E+00	1.10E-03	6 E-07	2.1E+02	8.4E+00	8.4E+00
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	1 E-07	- -	8.4E+01	8.4E+01
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	2 E-09	- -	8.4E+02	8.4E+02
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	5 E-10	- -	8.4E+03	8.4E+03
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	7 E-07	- -	2.1E+00	2.1E+00
Fluoranthene	3.81E+00	4.00E-02	- -	1 E-04	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	2 E-06	- -	- -	- -	2.9E+04	- -	2.9E+04
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	3 E-08	- -	8.4E+01	8.4E+01
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	2 E-04	- -	- -	- -	2.2E+04	- -	2.2E+04
Naphthalene	1.12E+00	2.00E-02	3.00E+00	8 E-05	1.20E-01	3.40E-05	2 E-08	1.4E+04	7.0E+01	7.0E+01
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	5 E-07	2.90E-02	7.25E-06	1 E-10	5.0E+04	2.9E+02	2.9E+02
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	1 E-05	- -	- -	- -	2.9E+03	- -	2.9E+03
Adult Resident Receptor										
Polycyclic Aromatic Hydrocarbons										
Anthracene	2.04E-01	3.00E-01	1.20E+03	1 E-07	- -	- -	- -	1.9E+06	- -	1.9E+06
Acenaphthene	1.24E-01	6.00E-02	2.40E+02	3 E-07	- -	- -	- -	3.8E+05	- -	3.8E+05
Benz(a)anthracene	3.51E+00	- -	- -	- -	1.00E-01	1.10E-04	2 E-08	- -	2.2E+02	2.2E+02
Benzo(a)pyrene	5.28E+00	3.00E-04	2.00E-03	3 E-03	1.00E+00	1.10E-03	2 E-07	1.8E+03	2.2E+01	2.2E+01
Benzo(b)fluoranthene	8.74E+00	- -	- -	- -	1.00E-01	1.10E-04	4 E-08	- -	2.2E+02	2.2E+02
Benzo(g,h,i)perylene	2.73E+00	- -	- -	- -	- -	- -	- -	- -	- -	- -
Benzo(k)fluoranthene	1.72E+00	- -	- -	- -	1.00E-02	1.10E-04	8 E-10	- -	2.2E+03	2.2E+03
Chrysene	4.33E+00	- -	- -	- -	1.00E-03	1.10E-05	2 E-10	- -	2.2E+04	2.2E+04
Dibenz(a,h)anthracene	1.37E+00	- -	- -	- -	4.10E+00	1.20E-03	3 E-07	- -	5.5E+00	5.5E+00
Fluoranthene	3.81E+00	4.00E-02	- -	1 E-05	- -	- -	- -	- -	- -	- -
Fluorene	5.09E-02	4.00E-02	1.60E+02	2 E-07	- -	- -	- -	2.6E+05	- -	2.6E+05
Indeno(1,2,3-c,d)pyrene	2.50E+00	- -	- -	- -	1.00E-01	1.10E-04	1 E-08	- -	2.2E+02	2.2E+02
Phenanthrene	8.72E-01	- -	- -	- -	- -	- -	- -	- -	- -	- -
Pyrene	3.95E+00	3.00E-02	1.20E+02	2 E-05	- -	- -	- -	1.9E+05	- -	1.9E+05
Naphthalene	1.12E+00	2.00E-02	3.00E+00	9 E-06	1.20E-01	3.40E-05	6 E-09	1.3E+05	1.9E+02	1.9E+02
1-Methylnaphthalene	2.77E-02	7.00E-02	2.80E+02	6 E-08	2.90E-02	7.25E-06	4 E-11	4.5E+05	7.7E+02	7.7E+02
2-Methylnaphthalene	3.72E-02	4.00E-03	1.60E+01	1 E-06	- -	- -	- -	2.6E+04	- -	2.6E+04
			Total Hazard Index =	**2 E-02**		**Total Excess Cancer Risk =**	**2 E-06**			

Notes:

1 E-06
6.32 E-01

mg/kg = milligrams per kilogram.
mg/kg-day = milligrams per kilogram body weight per day.
$\mu g/m^3$ = micrograms per cubic meter.
- - = not available or not applicable. No toxicity values are available; therefore, value was not estimated

[1] Soil SL represents the lower of the SLs based on noncarcinogenic and carcinogenic effects.

[2] Consistent with methods used by USEPA, the HI presented for the hypothetical recreational trail user receptor is based on the child receptor.

[1] Consistent with methods used by USEPA, the excess cancer risk estimates for the hypothetical recreational trail user receptor are the sum of the excess cancer risk estimates for the child and adult receptors.

ATTACHMENT B1

LEADSPREAD 8 WORKSHEETS

LeadSpread 8 for the Hypothetical Recreational Trail User Receptor

LEAD RISK ASSESSMENT SPREADSHEET 8

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	540
Respirable Dust (ug/m^3)	1.5

OUTPUT						
	Percentile Estimate of Blood Pb (ug/dl)					PRG-90
	50th	90th	95th	98th	99th	(ug/g)
BLOOD Pb, CHILD	0.5	1.0	1.2	1.4	1.6	540
BLOOD Pb, PICA CHILD	1.1	2.0	2.4	2.9	3.3	271

EXPOSURE PARAMETERS		
	units	children
Days per week	days/wk	1
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
Soil ingestion, pica	mg/day	200
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	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	8.3E-6	0.00	1%		0.00	0%
Soil Ingestion	1.0E-3	0.54	99%	2.0E-3	1.09	100%
Inhalation	2.8E-7	0.00	0%		0.00	0%

Click here for REFERENCES

Hypothetical Camper Receptor

$$Days\ per\ week\ =\ \frac{EF\ (days/year)}{52\ (weeks/year)}$$

EF = Exposure Frequency = 52 days per year (BLM, 2017)
Recreational trail user receptor was assumed to visit one day per week.

LeadSpread 8 for the Hypothetical Unauthorized Camper Receptor with an Exposure Frequency of 14 days per year

LEAD RISK ASSESSMENT SPREADSHEET 8

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	1800
Respirable Dust (ug/m^3)	1.5

OUTPUT						
	Percentile Estimate of Blood Pb (ug/dl)					PRG-90
	50th	90th	95th	98th	99th	(ug/g)
BLOOD Pb, CHILD	0.5	1.0	1.2	1.4	1.6	1799
BLOOD Pb, PICA CHILD	1.1	2.0	2.4	2.9	3.3	903

EXPOSURE PARAMETERS		
	units	children
Days per week	days/wk	0.3
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
Soil ingestion, pica	mg/day	200
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	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	2.5E-6	0.00	1%		0.00	0%
Soil Ingestion	3.0E-4	0.54	99%	6.0E-4	1.09	100%
Inhalation	8.4E-8	0.00	0%		0.00	0%

Click here for REFERENCES

Hypothetical Camper Receptor

$$Days\ per\ week\ =\ \frac{EF\ (days/year)}{52\ (weeks/year)}$$

EF = Exposure Frequency = 14 days per year (BLM, 2017)

In accordance with the Bureau of Land Management (BLM) yearly recreational exposure frequency for recreational visitor, which includes a range of possible activities, including campling (BLM, 2017).

Reference:

BLM. 2017. BLM Technical Memorandum, Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September 2017 Update.

LeadSpread 8 for the Hypothetical Unauthorized Camper Receptor - Upper Bound Exposure with an Exposure Frequency of 28 days per year

LEAD RISK ASSESSMENT SPREADSHEET 8

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	1080
Respirable Dust (ug/m^3)	1.5

OUTPUT						
	Percentile Estimate of Blood Pb (ug/dl)					PRG-90
	50th	90th	95th	98th	99th	(ug/g)
BLOOD Pb, CHILD	0.5	1.0	1.2	1.4	1.6	1079
BLOOD Pb, PICA CHILD	1.1	2.0	2.4	2.9	3.3	542

EXPOSURE PARAMETERS		
	units	children
Days per week	days/wk	0.5
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
Soil ingestion, pica	mg/day	200
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	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	4.1E-6	0.00	1%		0.00	0%
Soil Ingestion	5.0E-4	0.54	99%	1.0E-3	1.09	100%
Inhalation	1.4E-7	0.00	0%		0.00	0%

Click here for REFERENCES

Hypothetical Camper Receptor

$$Days\ per\ week\ =\frac{EF\ (days/year)}{52\ (weeks/year)}$$

EF = Exposure Frequency = 14 days per year (BLM, 2017)

As an upperbound evaluation, the Bureau of Land Management (BLM) yearly recreational exposure frequency for recreational visitor of 14 days per year (BLM, 2017) was doubled to 24 days per year.

Reference:

BLM. 2017. BLM Technical Memorandum, Screening Assessment Approaches for Metals in Soil at BLM HazMat/AML Sites. September 2017 Update.

ATTACHMENT B2

RISK CHARACTERIZATION EQUATIONS

Risk Characterization Equations for Direct Exposure to COPCs in Soil

Noncarcinogenic Effects

Incidental Ingestion of Soil

$$Hazard\ Quotient = \frac{EPC_{soil} \times EF \times ED \times \left(\frac{1}{RfD}\right) \times \left(\frac{IRs}{10^6\, mg/kg}\right)}{BW \times ATn}$$

Dermal Contact with Soil

$$Hazard\ Quotient = \frac{EPC_{soil} \times EF \times ED \times \left(\frac{1}{RfD \times GIABS}\right) \times \left(\frac{SA \times AF \times ABS}{10^6\, mg/kg}\right)}{BW \times ATn}$$

Inhalation of Fugitive Dust in Outdoor Air from Soil

$$Hazard\ Quotient = \frac{EPC_{soil} \times EF \times ED \times ET \times \frac{1\ day}{24\ hours} \times \left(\frac{1}{RfC \times 0.001\ mg/\mu g}\right) \times \left(\frac{1}{PEF}\right)}{ATn}$$

Carcinogenic Effects

Incidental Ingestion of Soil

$$Excess\ Cancer\ Risk = \frac{EPC_{soil} \times EF \times ED \times SF \times \left(\frac{IRs}{10^6\, mg/kg}\right)}{BW \times ATc}$$

Dermal Contact with Soil

$$Excess\ Cancer\ Risk = \frac{EPC_{soil} \times EF \times ED \times \left(\frac{SF}{GIABS}\right) \times \left(\frac{SA \times AF \times ABS}{10^6\, mg/kg}\right)}{BW \times ATc}$$

Inhalation of Fugitive Dust in Outdoor Air from Soil

$$Excess\ Cancer\ Risk = \frac{EPC_{soil} \times EF \times ED \times ET \times \frac{1\ day}{24\ hours} \times \left(\frac{IUR}{0.001\ mg/\mu g}\right) \times \left(\frac{1}{PEF}\right)}{ATc}$$

Definitions

EPC_{soil} = Exposure Point Concentration for Shallow Soil (mg/kg)

ATc = Averaging Time – Carcinogens (days)
ATn = Averaging Time – Noncarcinogens (days)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (year)
ET = Exposure Time (hours/day)
BW = Body Weight (kg)
IRs = Soil Ingestion Rate (mg/day)
SA = Skin Surface Area (cm^2)
AF = Soil Adherence Factor (mg/cm^2-day)
ABS = Dermal Absorption Factor (unitless)
PEF = Particulate Emission Factor (m^3/kg)

RfD = Oral Reference Dose (mg/kg-day)
RfC = Inhalation Reference Concentration ($\mu g/m^3$)
SF = Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
IUR = Inhalation Unit Risk Factor $(\mu g/m^3)^{-1}$
GIABS = Gastrointestinal absorption factor (unitless)

ATTACHMENT B3

PROUCL OUTPUT

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space

501 Golf Club Drive, Santa Cruz, California

ANTHRACENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	12	Number of Non-Detects	19
Number of Distinct Detects	12	Number of Distinct Non-Detects	19
Minimum Detect	0.00491	Minimum Non-Detect	0.00639
Maximum Detect	0.986	Maximum Non-Detect	0.00752
Variance Detects	0.087	Percent Non-Detects	61.29%
Mean Detects	0.204	SD Detects	0.295
Median Detects	0.0794	CV Detects	1.446
Skewness Detects	2.056	Kurtosis Detects	4.243
Mean of Logged Detects	-2.74	SD of Logged Detects	1.775
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.716	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.269	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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			
KM Mean	0.0824	KM Standard Error of Mean	0.0376
KM SD	0.201	95% KM (BCA) UCL	0.154
95% KM (t) UCL	0.146	95% KM (Percentile Bootstrap) UCL	0.145
95% KM (z) UCL	0.144	95% KM Bootstrap t UCL	0.247
90% KM Chebyshev UCL	0.195	95% KM Chebyshev UCL	0.246
97.5% KM Chebyshev UCL	0.317	99% KM Chebyshev UCL	0.457
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.414	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.781	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.234	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.258	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)	0.545	k star (bias corrected MLE)	0.464
Theta hat (MLE)	0.375	Theta star (bias corrected MLE)	0.44
nu hat (MLE)	13.08	nu star (bias corrected)	11.14
Mean (detects)	0.204		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00491	Mean	0.0851
Maximum	0.986	Median	0.01
SD	0.203	CV	2.383
k hat (MLE)	0.454	k star (bias corrected MLE)	0.432
Theta hat (MLE)	0.187	Theta star (bias corrected MLE)	0.197
nu hat (MLE)	28.17	nu star (bias corrected)	26.77
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (26.77, α)	15.98	Adjusted Chi Square Value (26.77, β)	15.51
95% Gamma Approximate UCL (use when n>=50)	0.143	95% Gamma Adjusted UCL (use when n<50)	0.147

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0824	SD (KM)	0.201
Variance (KM)	0.0402	SE of Mean (KM)	0.0376
k hat (KM)	0.169	k star (KM)	0.174
nu hat (KM)	10.45	nu star (KM)	10.78
theta hat (KM)	0.488	theta star (KM)	0.474
80% gamma percentile (KM)	0.0999	90% gamma percentile (KM)	0.248
95% gamma percentile (KM)	0.439	99% gamma percentile (KM)	0.979
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (10.78, α)	4.433	Adjusted Chi Square Value (10.78, β)	4.208
95% Gamma Approximate KM-UCL (use when n>=50)	0.2	95% Gamma Adjusted KM-UCL (use when n<50)	0.211
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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	0.0813	Mean in Log Scale	-4.483
SD in Original Scale	0.204	SD in Log Scale	1.771
95% t UCL (assumes normality of ROS data)	0.144	95% Percentile Bootstrap UCL	0.146
95% BCA Bootstrap UCL	0.18	95% Bootstrap t UCL	0.248
95% H-UCL (Log ROS)	0.167		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.253	KM Geo Mean	0.0142
KM SD (logged)	1.604	95% Critical H Value (KM-Log)	3.224
KM Standard Error of Mean (logged)	0.305	95% H-UCL (KM -Log)	0.132
KM SD (logged)	1.604	95% Critical H Value (KM-Log)	3.224
KM Standard Error of Mean (logged)	0.305		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0811	Mean in Log Scale	-4.533
SD in Original Scale	0.204	SD in Log Scale	1.804
95% t UCL (Assumes normality)	0.143	95% H-Stat UCL	0.174
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.211		
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.			

ACENAPHTHENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	29
Number of Detects	10	Number of Non-Detects	21
Number of Distinct Detects	10	Number of Distinct Non-Detects	20
Minimum Detect	0.00499	Minimum Non-Detect	0.00639
Maximum Detect	0.651	Maximum Non-Detect	0.00752
Variance Detects	0.0384	Percent Non-Detects	67.74%
Mean Detects	0.131	SD Detects	0.196
Median Detects	0.0815	CV Detects	1.501
Skewness Detects	2.481	Kurtosis Detects	6.663
Mean of Logged Detects	-3.053	SD of Logged Detects	1.65
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.664	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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			
KM Mean	0.0456	KM Standard Error of Mean	0.0229
KM SD	0.121	95% KM (BCA) UCL	0.0864
95% KM (t) UCL	0.0844	95% KM (Percentile Bootstrap) UCL	0.0838
95% KM (z) UCL	0.0832	95% KM Bootstrap t UCL	0.156
90% KM Chebyshev UCL	0.114	95% KM Chebyshev UCL	0.145
97.5% KM Chebyshev UCL	0.188	99% KM Chebyshev UCL	0.273
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.418	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.279	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)	0.607	k star (bias corrected MLE)	0.491
Theta hat (MLE)	0.215	Theta star (bias corrected MLE)	0.266
nu hat (MLE)	12.13	nu star (bias corrected)	9.826
Mean (detects)	0.131		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00499	Mean	0.0489
Maximum	0.651	Median	0.01
SD	0.122	CV	2.488
k hat (MLE)	0.573	k star (bias corrected MLE)	0.539
Theta hat (MLE)	0.0854	Theta star (bias corrected MLE)	0.0907
nu hat (MLE)	35.51	nu star (bias corrected)	33.41
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (33.41, α)	21.19	Adjusted Chi Square Value (33.41, β)	20.65
95% Gamma Approximate UCL (use when n>=50)	0.0771	95% Gamma Adjusted UCL (use when n<50)	0.0791

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0456	SD (KM)	0.121
Variance (KM)	0.0146	SE of Mean (KM)	0.0229
k hat (KM)	0.143	k star (KM)	0.15
nu hat (KM)	8.852	nu star (KM)	9.329
theta hat (KM)	0.32	theta star (KM)	0.303
80% gamma percentile (KM)	0.0498	90% gamma percentile (KM)	0.135
95% gamma percentile (KM)	0.251	99% gamma percentile (KM)	0.586
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (9.33, α)	3.527	Adjusted Chi Square Value (9.33, β)	3.33
95% Gamma Approximate KM-UCL (use when n>=50)	0.121	95% Gamma Adjusted KM-UCL (use when n<50)	0.128
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	0.0438	Mean in Log Scale	-5.064
SD in Original Scale	0.123	SD in Log Scale	1.691
95% t UCL (assumes normality of ROS data)	0.0814	95% Percentile Bootstrap UCL	0.0808
95% BCA Bootstrap UCL	0.109	95% Bootstrap t UCL	0.167
95% H-UCL (Log ROS)	0.0743		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.552	KM Geo Mean	0.0105
KM SD (logged)	1.366	95% Critical H Value (KM-Log)	2.892
KM Standard Error of Mean (logged)	0.26	95% H-UCL (KM -Log)	0.0552
KM SD (logged)	1.366	95% Critical H Value (KM-Log)	2.892
KM Standard Error of Mean (logged)	0.26		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0445	Mean in Log Scale	-4.826
SD in Original Scale	0.123	SD in Log Scale	1.538
95% t UCL (Assumes normality)	0.082	95% H-Stat UCL	0.063
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.128		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

BENZO(A)ANTHRACENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	23	Number of Non-Detects	8
Number of Distinct Detects	23	Number of Distinct Non-Detects	8
Minimum Detect	0.00212	Minimum Non-Detect	0.00644
Maximum Detect	8.45	Maximum Non-Detect	0.00741
Variance Detects	6.503	Percent Non-Detects	25.81%
Mean Detects	1.42	SD Detects	2.55
Median Detects	0.0544	CV Detects	1.796
Skewness Detects	1.725	Kurtosis Detects	1.78
Mean of Logged Detects	-2.517	SD of Logged Detects	2.953
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.621	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.408	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	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			
KM Mean	1.054	KM Standard Error of Mean	0.411
KM SD	2.236	95% KM (BCA) UCL	1.837
95% KM (t) UCL	1.751	95% KM (Percentile Bootstrap) UCL	1.755
95% KM (z) UCL	1.73	95% KM Bootstrap t UCL	2.127
90% KM Chebyshev UCL	2.286	95% KM Chebyshev UCL	2.844
97.5% KM Chebyshev UCL	3.619	99% KM Chebyshev UCL	5.14
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.447	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.874	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.199	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)	0.248	k star (bias corrected MLE)	0.245
Theta hat (MLE)	5.725	Theta star (bias corrected MLE)	5.804
nu hat (MLE)	11.41	nu star (bias corrected)	11.25
Mean (detects)	1.42		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00212	Mean	1.056
Maximum	8.45	Median	0.01
SD	2.272	CV	2.151
k hat (MLE)	0.231	k star (bias corrected MLE)	0.23
Theta hat (MLE)	4.567	Theta star (bias corrected MLE)	4.584
nu hat (MLE)	14.34	nu star (bias corrected)	14.28
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (14.28, α)	6.766	Adjusted Chi Square Value (14.28, β)	6.478
95% Gamma Approximate UCL (use when n>=50)	2.23	95% Gamma Adjusted UCL (use when n<50)	2.328

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.054	SD (KM)	2.236
Variance (KM)	5	SE of Mean (KM)	0.411
k hat (KM)	0.222	k star (KM)	0.222
nu hat (KM)	13.78	nu star (KM)	13.78
theta hat (KM)	4.742	theta star (KM)	4.742
80% gamma percentile (KM)	1.462	90% gamma percentile (KM)	3.184
95% gamma percentile (KM)	5.279	99% gamma percentile (KM)	10.95
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.78, α)	6.424	Adjusted Chi Square Value (13.78, β)	6.145
95% Gamma Approximate KM-UCL (use when n>=50)	2.262	95% Gamma Adjusted KM-UCL (use when n<50)	2.365
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	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	1.054	Mean in Log Scale	-3.323
SD in Original Scale	2.273	SD in Log Scale	2.886
95% t UCL (assumes normality of ROS data)	1.747	95% Percentile Bootstrap UCL	1.761
95% BCA Bootstrap UCL	1.904	95% Bootstrap t UCL	2.015
95% H-UCL (Log ROS)	35.92		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.365	KM Geo Mean	0.0346
KM SD (logged)	2.877	95% Critical H Value (KM-Log)	5.189
KM Standard Error of Mean (logged)	0.53	95% H-UCL (KM -Log)	33.13
KM SD (logged)	2.877	95% Critical H Value (KM-Log)	5.189
KM Standard Error of Mean (logged)	0.53		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.054	Mean in Log Scale	-3.326
SD in Original Scale	2.273	SD in Log Scale	2.888
95% t UCL (Assumes normality)	1.747	95% H-Stat UCL	36.17
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	3.619		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space

501 Golf Club Drive, Santa Cruz, California

BENZO(A)PYRENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	26	Number of Non-Detects	5
Number of Distinct Detects	26	Number of Distinct Non-Detects	5
Minimum Detect	0.00239	Minimum Non-Detect	0.00644
Maximum Detect	11.7	Maximum Non-Detect	0.00741
Variance Detects	13.75	Percent Non-Detects	16.13%
Mean Detects	1.848	SD Detects	3.708
Median Detects	0.0747	CV Detects	2.006
Skewness Detects	1.964	Kurtosis Detects	2.43
Mean of Logged Detects	-2.61	SD of Logged Detects	3.057
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.555	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.425	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.17	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			
KM Mean	1.551	KM Standard Error of Mean	0.622
KM SD	3.398	95% KM (BCA) UCL	2.686
95% KM (t) UCL	2.607	95% KM (Percentile Bootstrap) UCL	2.626
95% KM (z) UCL	2.575	95% KM Bootstrap t UCL	3.159
90% KM Chebyshev UCL	3.418	95% KM Chebyshev UCL	4.264
97.5% KM Chebyshev UCL	5.438	99% KM Chebyshev UCL	7.743
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.896	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.889	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.231	**Kolmogorov-Smirnov 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			
k hat (MLE)	0.224	k star (bias corrected MLE)	0.224
Theta hat (MLE)	8.244	Theta star (bias corrected MLE)	8.253
nu hat (MLE)	11.66	nu star (bias corrected)	11.65
Mean (detects)	1.848		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00239	Mean	1.552
Maximum	11.7	Median	0.01
SD	3.454	CV	2.226
k hat (MLE)	0.216	k star (bias corrected MLE)	0.216
Theta hat (MLE)	7.193	Theta star (bias corrected MLE)	7.172
nu hat (MLE)	13.38	nu star (bias corrected)	13.41
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (13.41, α)	6.172	Adjusted Chi Square Value (13.41, β)	5.9
95% Gamma Approximate UCL (use when n>=50)	3.373	95% Gamma Adjusted UCL (use when n<50)	3.528

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.551	SD (KM)	3.398
Variance (KM)	11.55	SE of Mean (KM)	0.622
k hat (KM)	0.208	k star (KM)	0.21
nu hat (KM)	12.91	nu star (KM)	13
theta hat (KM)	7.445	theta star (KM)	7.397
80% gamma percentile (KM)	2.093	90% gamma percentile (KM)	4.69
95% gamma percentile (KM)	7.892	99% gamma percentile (KM)	16.64
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.00, α)	5.891	Adjusted Chi Square Value (13.00, β)	5.626
95% Gamma Approximate KM-UCL (use when n>=50)	3.422	95% Gamma Adjusted KM-UCL (use when n<50)	3.583
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.17	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	1.551	Mean in Log Scale	-3.054
SD in Original Scale	3.454	SD in Log Scale	2.974
95% t UCL (assumes normality of ROS data)	2.604	95% Percentile Bootstrap UCL	2.651
95% BCA Bootstrap UCL	2.832	95% Bootstrap t UCL	3.34
95% H-UCL (Log ROS)	71.78		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.103	KM Geo Mean	0.0449
KM SD (logged)	2.971	95% Critical H Value (KM-Log)	5.34
KM Standard Error of Mean (logged)	0.545	95% H-UCL (KM -Log)	67.03
KM SD (logged)	2.971	95% Critical H Value (KM-Log)	5.34
KM Standard Error of Mean (logged)	0.545		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.551	Mean in Log Scale	-3.102
SD in Original Scale	3.454	SD in Log Scale	3.015
95% t UCL (Assumes normality)	2.604	95% H-Stat UCL	83.32
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			
99% KM (Chebyshev) UCL	7.743		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

BENZO(B)FLUORANTHENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	29	Number of Non-Detects	2
Number of Distinct Detects	29	Number of Distinct Non-Detects	2
Minimum Detect	0.00244	Minimum Non-Detect	0.00725
Maximum Detect	14.8	Maximum Non-Detect	0.00741
Variance Detects	17.21	Percent Non-Detects	6.452%
Mean Detects	1.901	SD Detects	4.149
Median Detects	0.0169	CV Detects	2.182
Skewness Detects	2.261	Kurtosis Detects	3.971
Mean of Logged Detects	-2.843	SD of Logged Detects	3.068
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.525	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.433	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	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			
KM Mean	1.779	KM Standard Error of Mean	0.726
KM SD	3.97	95% KM (BCA) UCL	3.104
95% KM (t) UCL	3.011	95% KM (Percentile Bootstrap) UCL	3.055
95% KM (z) UCL	2.973	95% KM Bootstrap t UCL	3.669
90% KM Chebyshev UCL	3.956	95% KM Chebyshev UCL	4.942
97.5% KM Chebyshev UCL	6.311	99% KM Chebyshev UCL	9
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.537	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.898	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.18	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)	0.21	k star (bias corrected MLE)	0.211
Theta hat (MLE)	9.07	Theta star (bias corrected MLE)	9.014
nu hat (MLE)	12.16	nu star (bias corrected)	12.23
Mean (detects)	1.901		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00244	Mean	1.779
Maximum	14.8	Median	0.0102
SD	4.036	CV	2.268
k hat (MLE)	0.207	k star (bias corrected MLE)	0.209
Theta hat (MLE)	8.588	Theta star (bias corrected MLE)	8.528
nu hat (MLE)	12.84	nu star (bias corrected)	12.94
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (12.94, α)	5.849	Adjusted Chi Square Value (12.94, β)	5.585
95% Gamma Approximate UCL (use when n>=50)	3.935	95% Gamma Adjusted UCL (use when n<50)	4.121

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.779	SD (KM)	3.97
Variance (KM)	15.76	SE of Mean (KM)	0.726
k hat (KM)	0.201	k star (KM)	0.203
nu hat (KM)	12.44	nu star (KM)	12.57
theta hat (KM)	8.862	theta star (KM)	8.771
80% gamma percentile (KM)	2.361	90% gamma percentile (KM)	5.38
95% gamma percentile (KM)	9.132	99% gamma percentile (KM)	19.44
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (12.57, α)	5.607	Adjusted Chi Square Value (12.57, β)	5.349
95% Gamma Approximate KM-UCL (use when n>=50)	3.989	95% Gamma Adjusted KM-UCL (use when n<50)	4.181
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	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	1.779	Mean in Log Scale	-3.005
SD in Original Scale	4.036	SD in Log Scale	3.029
95% t UCL (assumes normality of ROS data)	3.009	95% Percentile Bootstrap UCL	2.992
95% BCA Bootstrap UCL	3.408	95% Bootstrap t UCL	3.675
95% H-UCL (Log ROS)	98.44		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.024	KM Geo Mean	0.0486
KM SD (logged)	2.997	95% Critical H Value (KM-Log)	5.383
KM Standard Error of Mean (logged)	0.548	95% H-UCL (KM -Log)	82.53
KM SD (logged)	2.997	95% Critical H Value (KM-Log)	5.383
KM Standard Error of Mean (logged)	0.548		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.779	Mean in Log Scale	-3.021
SD in Original Scale	4.036	SD in Log Scale	3.043
95% t UCL (Assumes normality)	3.009	95% H-Stat UCL	103.6
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			
99% KM (Chebyshev) UCL	9		
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.			

BENZO(G,H,I)PERYLENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	25	Number of Non-Detects	6
Number of Distinct Detects	25	Number of Distinct Non-Detects	6
Minimum Detect	0.00215	Minimum Non-Detect	0.00644
Maximum Detect	7.52	Maximum Non-Detect	0.00741
Variance Detects	3.783	Percent Non-Detects	19.35%
Mean Detects	0.995	SD Detects	1.945
Median Detects	0.0751	CV Detects	1.955
Skewness Detects	2.247	Kurtosis Detects	4.728
Mean of Logged Detects	-2.743	SD of Logged Detects	2.803
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.591	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.387	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	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			
KM Mean	0.803	KM Standard Error of Mean	0.322
KM SD	1.756	95% KM (BCA) UCL	1.362
95% KM (t) UCL	1.349	95% KM (Percentile Bootstrap) UCL	1.342
95% KM (z) UCL	1.332	95% KM Bootstrap t UCL	1.713
90% KM Chebyshev UCL	1.768	95% KM Chebyshev UCL	2.206
97.5% KM Chebyshev UCL	2.813	99% KM Chebyshev UCL	4.005
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.504	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.872	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.191	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)	0.258	k star (bias corrected MLE)	0.254
Theta hat (MLE)	3.854	Theta star (bias corrected MLE)	3.919
nu hat (MLE)	12.9	nu star (bias corrected)	12.69
Mean (detects)	0.995		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00215	Mean	0.804
Maximum	7.52	Median	0.01
SD	1.784	CV	2.219
k hat (MLE)	0.247	k star (bias corrected MLE)	0.244
Theta hat (MLE)	3.26	Theta star (bias corrected MLE)	3.291
nu hat (MLE)	15.29	nu star (bias corrected)	15.15
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (15.15, α)	7.364	Adjusted Chi Square Value (15.15, β)	7.063
95% Gamma Approximate UCL (use when n>=50)	1.654	95% Gamma Adjusted UCL (use when n<50)	1.725

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.803	SD (KM)	1.756
Variance (KM)	3.082	SE of Mean (KM)	0.322
k hat (KM)	0.209	k star (KM)	0.21
nu hat (KM)	12.97	nu star (KM)	13.05
theta hat (KM)	3.839	theta star (KM)	3.816
80% gamma percentile (KM)	1.085	90% gamma percentile (KM)	2.428
95% gamma percentile (KM)	4.082	99% gamma percentile (KM)	8.598
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.05, α)	5.924	Adjusted Chi Square Value (13.05, β)	5.658
95% Gamma Approximate KM-UCL (use when n>=50)	1.768	95% Gamma Adjusted KM-UCL (use when n<50)	1.851
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	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	0.803	Mean in Log Scale	-3.222
SD in Original Scale	1.784	SD in Log Scale	2.697
95% t UCL (assumes normality of ROS data)	1.347	95% Percentile Bootstrap UCL	1.372
95% BCA Bootstrap UCL	1.529	95% Bootstrap t UCL	1.693
95% H-UCL (Log ROS)	16.89		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.296	KM Geo Mean	0.037
KM SD (logged)	2.717	95% Critical H Value (KM-Log)	4.933
KM Standard Error of Mean (logged)	0.5	95% H-UCL (KM -Log)	17.16
KM SD (logged)	2.717	95% Critical H Value (KM-Log)	4.933
KM Standard Error of Mean (logged)	0.5		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.803	Mean in Log Scale	-3.307
SD in Original Scale	1.785	SD in Log Scale	2.767
95% t UCL (Assumes normality)	1.347	95% H-Stat UCL	21.14
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	1.851		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

BENZO(K)FLUORANTHENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	18	Number of Non-Detects	13
Number of Distinct Detects	18	Number of Distinct Non-Detects	13
Minimum Detect	0.00264	Minimum Non-Detect	0.00639
Maximum Detect	4.02	Maximum Non-Detect	0.00752
Variance Detects	1.922	Percent Non-Detects	41.94%
Mean Detects	0.852	SD Detects	1.386
Median Detects	0.0815	CV Detects	1.627
Skewness Detects	1.617	Kurtosis Detects	1.363
Mean of Logged Detects	-2.228	SD of Logged Detects	2.484
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.662	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.367	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	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			
KM Mean	0.496	KM Standard Error of Mean	0.205
KM SD	1.109	95% KM (BCA) UCL	0.837
95% KM (t) UCL	0.844	95% KM (Percentile Bootstrap) UCL	0.851
95% KM (z) UCL	0.833	95% KM Bootstrap t UCL	1.018
90% KM Chebyshev UCL	1.111	95% KM Chebyshev UCL	1.389
97.5% KM Chebyshev UCL	1.776	99% KM Chebyshev UCL	2.535
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.881	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.836	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.26	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.22	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)	0.329	k star (bias corrected MLE)	0.311
Theta hat (MLE)	2.593	Theta star (bias corrected MLE)	2.74
nu hat (MLE)	11.83	nu star (bias corrected)	11.19
Mean (detects)	0.852		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00264	Mean	0.499
Maximum	4.02	Median	0.01
SD	1.126	CV	2.257
k hat (MLE)	0.276	k star (bias corrected MLE)	0.271
Theta hat (MLE)	1.805	Theta star (bias corrected MLE)	1.84
nu hat (MLE)	17.13	nu star (bias corrected)	16.81
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (16.81, α)	8.534	Adjusted Chi Square Value (16.81, β)	8.207
95% Gamma Approximate UCL (use when n>=50)	0.982	95% Gamma Adjusted UCL (use when n<50)	1.022

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.496	SD (KM)	1.109
Variance (KM)	1.229	SE of Mean (KM)	0.205
k hat (KM)	0.2	k star (KM)	0.203
nu hat (KM)	12.43	nu star (KM)	12.56
theta hat (KM)	2.476	theta star (KM)	2.45
80% gamma percentile (KM)	0.658	90% gamma percentile (KM)	1.501
95% gamma percentile (KM)	2.549	99% gamma percentile (KM)	5.427
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (12.56, α)	5.599	Adjusted Chi Square Value (12.56, β)	5.341
95% Gamma Approximate KM-UCL (use when n>=50)	1.114	95% Gamma Adjusted KM-UCL (use when n<50)	1.167
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	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	0.496	Mean in Log Scale	-3.614
SD in Original Scale	1.127	SD in Log Scale	2.499
95% t UCL (assumes normality of ROS data)	0.84	95% Percentile Bootstrap UCL	0.848
95% BCA Bootstrap UCL	0.935	95% Bootstrap t UCL	1.017
95% H-UCL (Log ROS)	4.961		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.622	KM Geo Mean	0.0267
KM SD (logged)	2.473	95% Critical H Value (KM-Log)	4.545
KM Standard Error of Mean (logged)	0.463	95% H-UCL (KM -Log)	4.429
KM SD (logged)	2.473	95% Critical H Value (KM-Log)	4.545
KM Standard Error of Mean (logged)	0.463		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.496	Mean in Log Scale	-3.667
SD in Original Scale	1.127	SD in Log Scale	2.542
95% t UCL (Assumes normality)	0.84	95% H-Stat UCL	5.614
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	1.776		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

CHRYSENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	21	Number of Non-Detects	10
Number of Distinct Detects	21	Number of Distinct Non-Detects	10
Minimum Detect	0.00297	Minimum Non-Detect	0.00644
Maximum Detect	9.86	Maximum Non-Detect	0.00752
Variance Detects	10.52	Percent Non-Detects	32.26%
Mean Detects	1.916	SD Detects	3.244
Median Detects	0.172	CV Detects	1.693
Skewness Detects	1.561	Kurtosis Detects	1.041
Mean of Logged Detects	-1.953	SD of Logged Detects	2.857
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.646	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.398	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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			
KM Mean	1.299	KM Standard Error of Mean	0.507
KM SD	2.754	95% KM (BCA) UCL	2.238
95% KM (t) UCL	2.159	95% KM (Percentile Bootstrap) UCL	2.179
95% KM (z) UCL	2.133	95% KM Bootstrap t UCL	2.681
90% KM Chebyshev UCL	2.82	95% KM Chebyshev UCL	3.509
97.5% KM Chebyshev UCL	4.465	99% KM Chebyshev UCL	6.342
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.145	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.861	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.207	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)	0.27	k star (bias corrected MLE)	0.263
Theta hat (MLE)	7.107	Theta star (bias corrected MLE)	7.29
nu hat (MLE)	11.32	nu star (bias corrected)	11.04
Mean (detects)	1.916		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00297	Mean	1.301
Maximum	9.86	Median	0.0122
SD	2.799	CV	2.151
k hat (MLE)	0.234	k star (bias corrected MLE)	0.233
Theta hat (MLE)	5.566	Theta star (bias corrected MLE)	5.592
nu hat (MLE)	14.49	nu star (bias corrected)	14.42
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (14.42, α)	6.862	Adjusted Chi Square Value (14.42, β)	6.572
95% Gamma Approximate UCL (use when n>=50)	2.734	95% Gamma Adjusted UCL (use when n<50)	2.855

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.299	SD (KM)	2.754
Variance (KM)	7.586	SE of Mean (KM)	0.507
k hat (KM)	0.222	k star (KM)	0.222
nu hat (KM)	13.79	nu star (KM)	13.79
theta hat (KM)	5.839	theta star (KM)	5.84
80% gamma percentile (KM)	1.802	90% gamma percentile (KM)	3.923
95% gamma percentile (KM)	6.504	99% gamma percentile (KM)	13.49
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.79, α)	6.429	Adjusted Chi Square Value (13.79, β)	6.15
95% Gamma Approximate KM-UCL (use when n>=50)	2.787	95% Gamma Adjusted KM-UCL (use when n<50)	2.913
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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	1.299	Mean in Log Scale	-3.095
SD in Original Scale	2.8	SD in Log Scale	2.876
95% t UCL (assumes normality of ROS data)	2.152	95% Percentile Bootstrap UCL	2.174
95% BCA Bootstrap UCL	2.336	95% Bootstrap t UCL	2.563
95% H-UCL (Log ROS)	43.07		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.089	KM Geo Mean	0.0456
KM SD (logged)	2.828	95% Critical H Value (KM-Log)	5.11
KM Standard Error of Mean (logged)	0.523	95% H-UCL (KM -Log)	34.78
KM SD (logged)	2.828	95% Critical H Value (KM-Log)	5.11
KM Standard Error of Mean (logged)	0.523		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.299	Mean in Log Scale	-3.143
SD in Original Scale	2.8	SD in Log Scale	2.918
95% t UCL (Assumes normality)	2.152	95% H-Stat UCL	50.13
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	4.465		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

DIBENZ(A,H)ANTHRACENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	15	Number of Non-Detects	16
Number of Distinct Detects	15	Number of Distinct Non-Detects	16
Minimum Detect	0.00377	Minimum Non-Detect	0.00639
Maximum Detect	4.45	Maximum Non-Detect	0.00752
Variance Detects	1.6	Percent Non-Detects	51.61%
Mean Detects	0.707	SD Detects	1.265
Median Detects	0.0661	CV Detects	1.79
Skewness Detects	2.275	Kurtosis Detects	5.15
Mean of Logged Detects	-2.063	SD of Logged Detects	2.082
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.311	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	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			
KM Mean	0.344	KM Standard Error of Mean	0.171
KM SD	0.92	95% KM (BCA) UCL	0.669
95% KM (t) UCL	0.634	95% KM (Percentile Bootstrap) UCL	0.649
95% KM (z) UCL	0.625	95% KM Bootstrap t UCL	1.031
90% KM Chebyshev UCL	0.857	95% KM Chebyshev UCL	1.089
97.5% KM Chebyshev UCL	1.412	99% KM Chebyshev UCL	2.045
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.793	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.817	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.232	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.237	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)	0.386	k star (bias corrected MLE)	0.353
Theta hat (MLE)	1.832	Theta star (bias corrected MLE)	2.001
nu hat (MLE)	11.57	nu star (bias corrected)	10.59
Mean (detects)	0.707		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00377	Mean	0.347
Maximum	4.45	Median	0.01
SD	0.934	CV	2.69
k hat (MLE)	0.298	k star (bias corrected MLE)	0.291
Theta hat (MLE)	1.165	Theta star (bias corrected MLE)	1.194
nu hat (MLE)	18.47	nu star (bias corrected)	18.02
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (18.02, α)	9.405	Adjusted Chi Square Value (18.02, β)	9.058
95% Gamma Approximate UCL (use when n>=50)	0.665	95% Gamma Adjusted UCL (use when n<50)	0.69

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.344	SD (KM)	0.92
Variance (KM)	0.846	SE of Mean (KM)	0.171
k hat (KM)	0.14	k star (KM)	0.148
nu hat (KM)	8.667	nu star (KM)	9.161
theta hat (KM)	2.46	theta star (KM)	2.327
80% gamma percentile (KM)	0.37	90% gamma percentile (KM)	1.017
95% gamma percentile (KM)	1.898	99% gamma percentile (KM)	4.461
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (9.16, α)	3.425	Adjusted Chi Square Value (9.16, β)	3.232
95% Gamma Approximate KM-UCL (use when n>=50)	0.92	95% Gamma Adjusted KM-UCL (use when n<50)	0.975
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	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	0.343	Mean in Log Scale	-4.373
SD in Original Scale	0.935	SD in Log Scale	2.682
95% t UCL (assumes normality of ROS data)	0.628	95% Percentile Bootstrap UCL	0.645
95% BCA Bootstrap UCL	0.8	95% Bootstrap t UCL	0.965
95% H-UCL (Log ROS)	5.007		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.879	KM Geo Mean	0.0207
KM SD (logged)	2.247	95% Critical H Value (KM-Log)	4.191
KM Standard Error of Mean (logged)	0.418	95% H-UCL (KM -Log)	1.439
KM SD (logged)	2.247	95% Critical H Value (KM-Log)	4.191
KM Standard Error of Mean (logged)	0.418		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.344	Mean in Log Scale	-3.924
SD in Original Scale	0.935	SD in Log Scale	2.319
95% t UCL (Assumes normality)	0.629	95% H-Stat UCL	1.799
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.975		
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.			

FLUORANTHENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	21	Number of Non-Detects	10
Number of Distinct Detects	21	Number of Distinct Non-Detects	10
Minimum Detect	0.00273	Minimum Non-Detect	0.00644
Maximum Detect	11.1	Maximum Non-Detect	0.00752
Variance Detects	8.374	Percent Non-Detects	32.26%
Mean Detects	1.639	SD Detects	2.894
Median Detects	0.123	CV Detects	1.766
Skewness Detects	2.121	Kurtosis Detects	4.768
Mean of Logged Detects	-2.084	SD of Logged Detects	2.83
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.639	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.387	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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			
KM Mean	1.111	KM Standard Error of Mean	0.45
KM SD	2.447	95% KM (BCA) UCL	1.912
95% KM (t) UCL	1.876	95% KM (Percentile Bootstrap) UCL	1.899
95% KM (z) UCL	1.852	95% KM Bootstrap t UCL	2.45
90% KM Chebyshev UCL	2.462	95% KM Chebyshev UCL	3.074
97.5% KM Chebyshev UCL	3.923	99% KM Chebyshev UCL	5.592
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.105	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.86	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.207	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)	0.272	k star (bias corrected MLE)	0.265
Theta hat (MLE)	6.029	Theta star (bias corrected MLE)	6.19
nu hat (MLE)	11.42	nu star (bias corrected)	11.12
Mean (detects)	1.639		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00273	Mean	1.113
Maximum	11.1	Median	0.0108
SD	2.486	CV	2.233
k hat (MLE)	0.238	k star (bias corrected MLE)	0.237
Theta hat (MLE)	4.673	Theta star (bias corrected MLE)	4.704
nu hat (MLE)	14.77	nu star (bias corrected)	14.67
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (14.67, α)	7.036	Adjusted Chi Square Value (14.67, β)	6.742
95% Gamma Approximate UCL (use when n>=50)	2.322	95% Gamma Adjusted UCL (use when n<50)	2.423

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.111	SD (KM)	2.447
Variance (KM)	5.986	SE of Mean (KM)	0.45
k hat (KM)	0.206	k star (KM)	0.208
nu hat (KM)	12.79	nu star (KM)	12.89
theta hat (KM)	5.386	theta star (KM)	5.346
80% gamma percentile (KM)	1.494	90% gamma percentile (KM)	3.361
95% gamma percentile (KM)	5.669	99% gamma percentile (KM)	11.98
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (12.89, α)	5.818	Adjusted Chi Square Value (12.89, β)	5.554
95% Gamma Approximate KM-UCL (use when n>=50)	2.462	95% Gamma Adjusted KM-UCL (use when n<50)	2.579
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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	1.111	Mean in Log Scale	-3.213
SD in Original Scale	2.487	SD in Log Scale	2.847
95% t UCL (assumes normality of ROS data)	1.869	95% Percentile Bootstrap UCL	1.895
95% BCA Bootstrap UCL	2.24	95% Bootstrap t UCL	2.433
95% H-UCL (Log ROS)	33.51		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.196	KM Geo Mean	0.0409
KM SD (logged)	2.789	95% Critical H Value (KM-Log)	5.048
KM Standard Error of Mean (logged)	0.515	95% H-UCL (KM -Log)	26.18
KM SD (logged)	2.789	95% Critical H Value (KM-Log)	5.048
KM Standard Error of Mean (logged)	0.515		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.111	Mean in Log Scale	-3.232
SD in Original Scale	2.487	SD in Log Scale	2.864
95% t UCL (Assumes normality)	1.869	95% H-Stat UCL	35.5
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	3.923		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

FLUORENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	30
Number of Detects	9	Number of Non-Detects	22
Number of Distinct Detects	9	Number of Distinct Non-Detects	21
Minimum Detect	0.00249	Minimum Non-Detect	0.00639
Maximum Detect	0.26	Maximum Non-Detect	0.00752
Variance Detects	0.00733	Percent Non-Detects	70.97%
Mean Detects	0.0544	SD Detects	0.0856
Median Detects	0.0241	CV Detects	1.575
Skewness Detects	2.173	Kurtosis Detects	4.571
Mean of Logged Detects	-4.011	SD of Logged Detects	1.662
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.662	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.381	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	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			
KM Mean	0.0177	KM Standard Error of Mean	0.00941
KM SD	0.0494	95% KM (BCA) UCL	0.0365
95% KM (t) UCL	0.0337	95% KM (Percentile Bootstrap) UCL	0.0343
95% KM (z) UCL	0.0332	95% KM Bootstrap t UCL	0.101
90% KM Chebyshev UCL	0.046	95% KM Chebyshev UCL	0.0587
97.5% KM Chebyshev UCL	0.0765	99% KM Chebyshev UCL	0.111
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.524	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.766	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.242	**Kolmogorov-Smirnov GOF**	
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			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.567	k star (bias corrected MLE)	0.452
Theta hat (MLE)	0.0959	Theta star (bias corrected MLE)	0.12
nu hat (MLE)	10.21	nu star (bias corrected)	8.138
Mean (detects)	0.0544		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00249	Mean	0.0229
Maximum	0.26	Median	0.01
SD	0.0487	CV	2.13
k hat (MLE)	0.893	k star (bias corrected MLE)	0.828
Theta hat (MLE)	0.0256	Theta star (bias corrected MLE)	0.0276
nu hat (MLE)	55.38	nu star (bias corrected)	51.35
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (51.35, α)	35.89	Adjusted Chi Square Value (51.35, β)	35.18
95% Gamma Approximate UCL (use when n>=50)	0.0327	95% Gamma Adjusted UCL (use when n<50)	0.0334

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0177	SD (KM)	0.0494
Variance (KM)	0.00244	SE of Mean (KM)	0.00941
k hat (KM)	0.128	k star (KM)	0.138
nu hat (KM)	7.963	nu star (KM)	8.526
theta hat (KM)	0.138	theta star (KM)	0.129
80% gamma percentile (KM)	0.0179	90% gamma percentile (KM)	0.0518
95% gamma percentile (KM)	0.099	99% gamma percentile (KM)	0.239
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (8.53, α)	3.043	Adjusted Chi Square Value (8.53, β)	2.863
95% Gamma Approximate KM-UCL (use when n>=50)	0.0496	95% Gamma Adjusted KM-UCL (use when n<50)	0.0527
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	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	0.0179	Mean in Log Scale	-5.304
SD in Original Scale	0.0502	SD in Log Scale	1.212
95% t UCL (assumes normality of ROS data)	0.0332	95% Percentile Bootstrap UCL	0.0337
95% BCA Bootstrap UCL	0.0434	95% Bootstrap t UCL	0.105
95% H-UCL (Log ROS)	0.0188		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.359	KM Geo Mean	0.00471
KM SD (logged)	1.208	95% Critical H Value (KM-Log)	2.681
KM Standard Error of Mean (logged)	0.232	95% H-UCL (KM -Log)	0.0176
KM SD (logged)	1.208	95% Critical H Value (KM-Log)	2.681
KM Standard Error of Mean (logged)	0.232		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0182	Mean in Log Scale	-5.187
SD in Original Scale	0.0501	SD in Log Scale	1.151
95% t UCL (Assumes normality)	0.0335	95% H-Stat UCL	0.0187
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.0527		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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INDENO(1,2,3-CD)PYRENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	21	Number of Non-Detects	10
Number of Distinct Detects	21	Number of Distinct Non-Detects	10
Minimum Detect	0.00213	Minimum Non-Detect	0.00644
Maximum Detect	6.25	Maximum Non-Detect	0.00752
Variance Detects	3.542	Percent Non-Detects	32.26%
Mean Detects	1.088	SD Detects	1.882
Median Detects	0.112	CV Detects	1.73
Skewness Detects	1.769	Kurtosis Detects	2.08
Mean of Logged Detects	-2.299	SD of Logged Detects	2.705
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.644	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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			
KM Mean	0.738	KM Standard Error of Mean	0.293
KM SD	1.594	95% KM (BCA) UCL	1.243
95% KM (t) UCL	1.236	95% KM (Percentile Bootstrap) UCL	1.23
95% KM (z) UCL	1.221	95% KM Bootstrap t UCL	1.477
90% KM Chebyshev UCL	1.618	95% KM Chebyshev UCL	2.017
97.5% KM Chebyshev UCL	2.571	99% KM Chebyshev UCL	3.658
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.996	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.85	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.206	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)	0.291	k star (bias corrected MLE)	0.281
Theta hat (MLE)	3.74	Theta star (bias corrected MLE)	3.87
nu hat (MLE)	12.22	nu star (bias corrected)	11.8
Mean (detects)	1.088		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00213	Mean	0.74
Maximum	6.25	Median	0.01
SD	1.62	CV	2.189
k hat (MLE)	0.258	k star (bias corrected MLE)	0.254
Theta hat (MLE)	2.871	Theta star (bias corrected MLE)	2.91
nu hat (MLE)	15.98	nu star (bias corrected)	15.77
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (15.77, α)	7.8	Adjusted Chi Square Value (15.77, β)	7.488
95% Gamma Approximate UCL (use when n>=50)	1.496	95% Gamma Adjusted UCL (use when n<50)	1.559

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.738	SD (KM)	1.594
Variance (KM)	2.542	SE of Mean (KM)	0.293
k hat (KM)	0.214	k star (KM)	0.215
nu hat (KM)	13.29	nu star (KM)	13.34
theta hat (KM)	3.444	theta star (KM)	3.432
80% gamma percentile (KM)	1.008	90% gamma percentile (KM)	2.231
95% gamma percentile (KM)	3.73	99% gamma percentile (KM)	7.809
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.34, α)	6.12	Adjusted Chi Square Value (13.34, β)	5.848
95% Gamma Approximate KM-UCL (use when n>=50)	1.609	95% Gamma Adjusted KM-UCL (use when n<50)	1.683
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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	0.738	Mean in Log Scale	-3.282
SD in Original Scale	1.621	SD in Log Scale	2.641
95% t UCL (assumes normality of ROS data)	1.232	95% Percentile Bootstrap UCL	1.249
95% BCA Bootstrap UCL	1.295	95% Bootstrap t UCL	1.543
95% H-UCL (Log ROS)	12.51		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.356	KM Geo Mean	0.0349
KM SD (logged)	2.664	95% Critical H Value (KM-Log)	4.848
KM Standard Error of Mean (logged)	0.493	95% H-UCL (KM -Log)	12.82
KM SD (logged)	2.664	95% Critical H Value (KM-Log)	4.848
KM Standard Error of Mean (logged)	0.493		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.738	Mean in Log Scale	-3.378
SD in Original Scale	1.621	SD in Log Scale	2.721
95% t UCL (Assumes normality)	1.232	95% H-Stat UCL	16.09
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	1.683		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space

501 Golf Club Drive, Santa Cruz, California

PHENANTHRENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	14	Number of Non-Detects	17
Number of Distinct Detects	14	Number of Distinct Non-Detects	17
Minimum Detect	0.00295	Minimum Non-Detect	0.00639
Maximum Detect	4.14	Maximum Non-Detect	0.215
Variance Detects	1.447	Percent Non-Detects	54.84%
Mean Detects	0.675	SD Detects	1.203
Median Detects	0.0878	CV Detects	1.783
Skewness Detects	2.309	Kurtosis Detects	5.232
Mean of Logged Detects	-2.349	SD of Logged Detects	2.39
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.633	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.318	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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			
KM Mean	0.308	KM Standard Error of Mean	0.158
KM SD	0.847	95% KM (BCA) UCL	0.616
95% KM (t) UCL	0.576	95% KM (Percentile Bootstrap) UCL	0.58
95% KM (z) UCL	0.567	95% KM Bootstrap t UCL	1.053
90% KM Chebyshev UCL	0.781	95% KM Chebyshev UCL	0.996
97.5% KM Chebyshev UCL	1.294	99% KM Chebyshev UCL	1.879
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.561	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.823	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.246	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)	0.345	k star (bias corrected MLE)	0.319
Theta hat (MLE)	1.957	Theta star (bias corrected MLE)	2.118
nu hat (MLE)	9.653	nu star (bias corrected)	8.918
Mean (detects)	0.675		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00295	Mean	0.31
Maximum	4.14	Median	0.01
SD	0.86	CV	2.773
k hat (MLE)	0.287	k star (bias corrected MLE)	0.281
Theta hat (MLE)	1.079	Theta star (bias corrected MLE)	1.103
nu hat (MLE)	17.82	nu star (bias corrected)	17.43
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (17.43, α)	8.981	Adjusted Chi Square Value (17.43, β)	8.644
95% Gamma Approximate UCL (use when n>=50)	0.602	95% Gamma Adjusted UCL (use when n<50)	0.626

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.308	SD (KM)	0.847
Variance (KM)	0.718	SE of Mean (KM)	0.158
k hat (KM)	0.132	k star (KM)	0.141
nu hat (KM)	8.18	nu star (KM)	8.722
theta hat (KM)	2.332	theta star (KM)	2.187
80% gamma percentile (KM)	0.317	90% gamma percentile (KM)	0.903
95% gamma percentile (KM)	1.714	99% gamma percentile (KM)	4.098
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (8.72, α)	3.16	Adjusted Chi Square Value (8.72, β)	2.976
95% Gamma Approximate KM-UCL (use when n>=50)	0.849	95% Gamma Adjusted KM-UCL (use when n<50)	0.902
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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	0.306	Mean in Log Scale	-4.358
SD in Original Scale	0.862	SD in Log Scale	2.44
95% t UCL (assumes normality of ROS data)	0.569	95% Percentile Bootstrap UCL	0.57
95% BCA Bootstrap UCL	0.718	95% Bootstrap t UCL	1.159
95% H-UCL (Log ROS)	1.861		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.024	KM Geo Mean	0.0179
KM SD (logged)	2.197	95% Critical H Value (KM-Log)	4.113
KM Standard Error of Mean (logged)	0.432	95% H-UCL (KM -Log)	1.04
KM SD (logged)	2.197	95% Critical H Value (KM-Log)	4.113
KM Standard Error of Mean (logged)	0.432		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.31	Mean in Log Scale	-4.02
SD in Original Scale	0.86	SD in Log Scale	2.291
95% t UCL (Assumes normality)	0.572	95% H-Stat UCL	1.473
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.902		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

PYRENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	31
Number of Detects	22	Number of Non-Detects	9
Number of Distinct Detects	22	Number of Distinct Non-Detects	9
Minimum Detect	0.0028	Minimum Non-Detect	0.00644
Maximum Detect	11.8	Maximum Non-Detect	0.00741
Variance Detects	9.213	Percent Non-Detects	29.03%
Mean Detects	1.543	SD Detects	3.035
Median Detects	0.0997	CV Detects	1.967
Skewness Detects	2.365	Kurtosis Detects	5.645
Mean of Logged Detects	-2.317	SD of Logged Detects	2.831
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.589	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	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			
KM Mean	1.096	KM Standard Error of Mean	0.477
KM SD	2.594	95% KM (BCA) UCL	1.955
95% KM (t) UCL	1.905	95% KM (Percentile Bootstrap) UCL	1.92
95% KM (z) UCL	1.88	95% KM Bootstrap t UCL	2.416
90% KM Chebyshev UCL	2.527	95% KM Chebyshev UCL	3.175
97.5% KM Chebyshev UCL	4.074	99% KM Chebyshev UCL	5.841
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.219	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.869	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.203	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)	0.257	k star (bias corrected MLE)	0.252
Theta hat (MLE)	6.001	Theta star (bias corrected MLE)	6.114
nu hat (MLE)	11.31	nu star (bias corrected)	11.1
Mean (detects)	1.543		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0028	Mean	1.098
Maximum	11.8	Median	0.0124
SD	2.636	CV	2.401
k hat (MLE)	0.234	k star (bias corrected MLE)	0.232
Theta hat (MLE)	4.7	Theta star (bias corrected MLE)	4.722
nu hat (MLE)	14.48	nu star (bias corrected)	14.41
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (14.41, α)	6.855	Adjusted Chi Square Value (14.41, β)	6.566
95% Gamma Approximate UCL (use when n>=50)	2.308	95% Gamma Adjusted UCL (use when n<50)	2.41

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

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Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.096	SD (KM)	2.594
Variance (KM)	6.729	SE of Mean (KM)	0.477
k hat (KM)	0.179	k star (KM)	0.183
nu hat (KM)	11.07	nu star (KM)	11.33
theta hat (KM)	6.139	theta star (KM)	5.997
80% gamma percentile (KM)	1.373	90% gamma percentile (KM)	3.308
95% gamma percentile (KM)	5.777	99% gamma percentile (KM)	12.68
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (11.33, α)	4.79	Adjusted Chi Square Value (11.33, β)	4.555
95% Gamma Approximate KM-UCL (use when n>=50)	2.593	95% Gamma Adjusted KM-UCL (use when n<50)	2.727
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	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	1.096	Mean in Log Scale	-3.272
SD in Original Scale	2.637	SD in Log Scale	2.814
95% t UCL (assumes normality of ROS data)	1.9	95% Percentile Bootstrap UCL	1.904
95% BCA Bootstrap UCL	2.203	95% Bootstrap t UCL	2.574
95% H-UCL (Log ROS)	27.15		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.256	KM Geo Mean	0.0386
KM SD (logged)	2.758	95% Critical H Value (KM-Log)	4.998
KM Standard Error of Mean (logged)	0.509	95% H-UCL (KM -Log)	21.43
KM SD (logged)	2.758	95% Critical H Value (KM-Log)	4.998
KM Standard Error of Mean (logged)	0.509		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.096	Mean in Log Scale	-3.284
SD in Original Scale	2.637	SD in Log Scale	2.824
95% t UCL (Assumes normality)	1.9	95% H-Stat UCL	28.1
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			
Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	2.727		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

NAPHTHALENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	26
Number of Detects	9	Number of Non-Detects	22
Number of Distinct Detects	9	Number of Distinct Non-Detects	17
Minimum Detect	0.00491	Minimum Non-Detect	0.0213
Maximum Detect	4.68	Maximum Non-Detect	0.0251
Variance Detects	2.382	Percent Non-Detects	70.97%
Mean Detects	0.573	SD Detects	1.543
Median Detects	0.0141	CV Detects	2.695
Skewness Detects	2.976	Kurtosis Detects	8.889
Mean of Logged Detects	-3.234	SD of Logged Detects	2.216
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.432	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.454	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	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			
KM Mean	0.173	KM Standard Error of Mean	0.157
KM SD	0.825	95% KM (BCA) UCL	0.472
95% KM (t) UCL	0.44	95% KM (Percentile Bootstrap) UCL	0.467
95% KM (z) UCL	0.431	95% KM Bootstrap t UCL	11.24
90% KM Chebyshev UCL	0.644	95% KM Chebyshev UCL	0.858
97.5% KM Chebyshev UCL	1.154	99% KM Chebyshev UCL	1.736
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.346	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.822	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.348	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.304	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)	0.263	k star (bias corrected MLE)	0.25
Theta hat (MLE)	2.177	Theta star (bias corrected MLE)	2.296
nu hat (MLE)	4.737	nu star (bias corrected)	4.491
Mean (detects)	0.573		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00491	Mean	0.173
Maximum	4.68	Median	0.01
SD	0.838	CV	4.835
k hat (MLE)	0.283	k star (bias corrected MLE)	0.278
Theta hat (MLE)	0.612	Theta star (bias corrected MLE)	0.625
nu hat (MLE)	17.58	nu star (bias corrected)	17.21
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (17.21, α)	8.822	Adjusted Chi Square Value (17.21, β)	8.488
95% Gamma Approximate UCL (use when n>=50)	0.338	95% Gamma Adjusted UCL (use when n<50)	0.352

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.173	SD (KM)	0.825
Variance (KM)	0.68	SE of Mean (KM)	0.157
k hat (KM)	0.044	k star (KM)	0.0612
nu hat (KM)	2.728	nu star (KM)	3.797
theta hat (KM)	3.932	theta star (KM)	2.825
80% gamma percentile (KM)	0.0442	90% gamma percentile (KM)	0.332
95% gamma percentile (KM)	0.974	99% gamma percentile (KM)	3.459
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (3.80, α)	0.643	Adjusted Chi Square Value (3.80, β)	0.578
95% Gamma Approximate KM-UCL (use when n>=50)	1.021	95% Gamma Adjusted KM-UCL (use when n<50)	1.136
95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	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	0.174	Mean in Log Scale	-4.212
SD in Original Scale	0.838	SD in Log Scale	1.368
95% t UCL (assumes normality of ROS data)	0.43	95% Percentile Bootstrap UCL	0.475
95% BCA Bootstrap UCL	0.626	95% Bootstrap t UCL	13.39
95% H-UCL (Log ROS)	0.0778		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.294	KM Geo Mean	0.0136
KM SD (logged)	1.35	95% Critical H Value (KM-Log)	2.87
KM Standard Error of Mean (logged)	0.291	95% H-UCL (KM -Log)	0.0689
KM SD (logged)	1.35	95% Critical H Value (KM-Log)	2.87
KM Standard Error of Mean (logged)	0.291		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.174	Mean in Log Scale	-4.108
SD in Original Scale	0.838	SD in Log Scale	1.278
95% t UCL (Assumes normality)	0.43	95% H-Stat UCL	0.0711
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
97.5% KM (Chebyshev) UCL	1.154		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

1-METHYLNAPHTHALENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	24
Number of Detects	5	Number of Non-Detects	26
Number of Distinct Detects	5	Number of Distinct Non-Detects	19
Minimum Detect	0.0106	Minimum Non-Detect	0.0213
Maximum Detect	0.0762	Maximum Non-Detect	0.215
Variance Detects	7.9088E-4	Percent Non-Detects	83.87%
Mean Detects	0.0261	SD Detects	0.0281
Median Detects	0.0162	CV Detects	1.076
Skewness Detects	2.181	Kurtosis Detects	4.805
Mean of Logged Detects	-3.969	SD of Logged Detects	0.807
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.638	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.433	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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			
KM Mean	0.0157	KM Standard Error of Mean	0.00274
KM SD	0.0116	95% KM (BCA) UCL	0.0206
95% KM (t) UCL	0.0204	95% KM (Percentile Bootstrap) UCL	0.0208
95% KM (z) UCL	0.0202	95% KM Bootstrap t UCL	0.0229
90% KM Chebyshev UCL	0.0239	95% KM Chebyshev UCL	0.0277
97.5% KM Chebyshev UCL	0.0328	99% KM Chebyshev UCL	0.043
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.834	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.686	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.411	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.361	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)	1.689	k star (bias corrected MLE)	0.809
Theta hat (MLE)	0.0155	Theta star (bias corrected MLE)	0.0323
nu hat (MLE)	16.89	nu star (bias corrected)	8.089
Mean (detects)	0.0261		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0163
Maximum	0.0762	Median	0.0133
SD	0.0118	CV	0.722
k hat (MLE)	4.693	k star (bias corrected MLE)	4.261
Theta hat (MLE)	0.00347	Theta star (bias corrected MLE)	0.00383
nu hat (MLE)	291	nu star (bias corrected)	264.2
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (264.15, α)	227.5	Adjusted Chi Square Value (264.15, β)	225.6
95% Gamma Approximate UCL (use when n>=50)	0.0189	95% Gamma Adjusted UCL (use when n<50)	0.0191

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0157	SD (KM)	0.0116
Variance (KM)	1.3366E-4	SE of Mean (KM)	0.00274
k hat (KM)	1.847	k star (KM)	1.689
nu hat (KM)	114.5	nu star (KM)	104.7
theta hat (KM)	0.00851	theta star (KM)	0.0093
80% gamma percentile (KM)	0.024	90% gamma percentile (KM)	0.0318
95% gamma percentile (KM)	0.0393	99% gamma percentile (KM)	0.0562
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (104.75, α)	82.13	Adjusted Chi Square Value (104.75, β)	81.02
95% Gamma Approximate KM-UCL (use when n>=50)	0.02	95% Gamma Adjusted KM-UCL (use when n<50)	0.0203
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.762	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.364	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	0.0164	Mean in Log Scale	-4.208
SD in Original Scale	0.0115	SD in Log Scale	0.366
95% t UCL (assumes normality of ROS data)	0.0199	95% Percentile Bootstrap UCL	0.0203
95% BCA Bootstrap UCL	0.0227	95% Bootstrap t UCL	0.0273
95% H-UCL (Log ROS)	0.018		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.259	KM Geo Mean	0.0141
KM SD (logged)	0.373	95% Critical H Value (KM-Log)	1.838
KM Standard Error of Mean (logged)	0.129	95% H-UCL (KM -Log)	0.0172
KM SD (logged)	0.373	95% Critical H Value (KM-Log)	1.838
KM Standard Error of Mean (logged)	0.129		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.017	Mean in Log Scale	-4.314
SD in Original Scale	0.0204	SD in Log Scale	0.522
95% t UCL (Assumes normality)	0.0232	95% H-Stat UCL	0.0185
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 (Chebyshev) UCL	0.0277		
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.			

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

2-METHYLNAPHTHALENE			
General Statistics			
Total Number of Observations	31	Number of Distinct Observations	23
Number of Detects	5	Number of Non-Detects	26
Number of Distinct Detects	5	Number of Distinct Non-Detects	19
Minimum Detect	0.0133	Minimum Non-Detect	0.0213
Maximum Detect	0.11	Maximum Non-Detect	0.215
Variance Detects	0.00168	Percent Non-Detects	83.87%
Mean Detects	0.0369	SD Detects	0.041
Median Detects	0.0201	CV Detects	1.112
Skewness Detects	2.203	Kurtosis Detects	4.887
Mean of Logged Detects	-3.643	SD of Logged Detects	0.824
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.624	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.446	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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			
KM Mean	0.0212	KM Standard Error of Mean	0.00379
KM SD	0.0168	95% KM (BCA) UCL	0.0278
95% KM (t) UCL	0.0276	95% KM (Percentile Bootstrap) UCL	0.0275
95% KM (z) UCL	0.0274	95% KM Bootstrap t UCL	0.035
90% KM Chebyshev UCL	0.0325	95% KM Chebyshev UCL	0.0377
97.5% KM Chebyshev UCL	0.0448	99% KM Chebyshev UCL	0.0589
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.917	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.686	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.437	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.361	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)	1.606	k star (bias corrected MLE)	0.776
Theta hat (MLE)	0.023	Theta star (bias corrected MLE)	0.0475
nu hat (MLE)	16.06	nu star (bias corrected)	7.755
Mean (detects)	0.0369		
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0193
Maximum	0.11	Median	0.0152
SD	0.0175	CV	0.907
k hat (MLE)	3.444	k star (bias corrected MLE)	3.132
Theta hat (MLE)	0.00561	Theta star (bias corrected MLE)	0.00617
nu hat (MLE)	213.5	nu star (bias corrected)	194.2
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (194.19, α)	163	Adjusted Chi Square Value (194.19, β)	161.4
95% Gamma Approximate UCL (use when n>=50)	0.023	95% Gamma Adjusted UCL (use when n<50)	0.0233

ProUCL Output for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil

Lower Main Meadow Pogonip Open Space
501 Golf Club Drive, Santa Cruz, California

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0212	SD (KM)	0.0168
Variance (KM)	2.8171E-4	SE of Mean (KM)	0.00379
k hat (KM)	1.588	k star (KM)	1.456
nu hat (KM)	98.46	nu star (KM)	90.27
theta hat (KM)	0.0133	theta star (KM)	0.0145
80% gamma percentile (KM)	0.0328	90% gamma percentile (KM)	0.0444
95% gamma percentile (KM)	0.0557	99% gamma percentile (KM)	0.0811
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (90.27, α)	69.36	Adjusted Chi Square Value (90.27, β)	68.34
95% Gamma Approximate KM-UCL (use when n>=50)	0.0275	95% Gamma Adjusted KM-UCL (use when n<50)	0.0279
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.751	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.394	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	0.0213	Mean in Log Scale	-3.959
SD in Original Scale	0.0168	SD in Log Scale	0.373
95% t UCL (assumes normality of ROS data)	0.0264	95% Percentile Bootstrap UCL	0.0271
95% BCA Bootstrap UCL	0.0308	95% Bootstrap t UCL	0.0404
95% H-UCL (Log ROS)	0.0232		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.969	KM Geo Mean	0.0189
KM SD (logged)	0.376	95% Critical H Value (KM-Log)	1.84
KM Standard Error of Mean (logged)	0.125	95% H-UCL (KM -Log)	0.023
KM SD (logged)	0.376	95% Critical H Value (KM-Log)	1.84
KM Standard Error of Mean (logged)	0.125		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0187	Mean in Log Scale	-4.262
SD in Original Scale	0.0242	SD in Log Scale	0.574
95% t UCL (Assumes normality)	0.0261	95% H-Stat UCL	0.0205
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 (Chebyshev) UCL	0.0377		
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.			

APPENDIX C

FIELD DATASHEETS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/3/21

BORING NUMBER: EM-34 **GPS COORDINATES:** 36°59'33.03"N 122°2'10.96"W **LOCATION ON SITE:** East Meadow **TIME:** 1230

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1245	0	☒	(SM) Silty sand, brown (10YR 5/3), moist, very loose, fine-grained sand, non-plastic, no odor.	NO	687	AUG 02-44
	0.5			NO	784	AUG 02-45
	1.0			NO	48	AUG 02-46
1250	1.5	☒		NO	56	AUG 02-47
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: EM-35 **GPS COORDINATES:** 36°59'32.50"N 122°2'10.30"W **LOCATION ON SITE:** East Meadow **TIME:** 1325

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1340	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	1,822 1,631	AUG 02-52 AUG 02-53
	0.5			NO	485	AUG 02-54
	1.0			NO	48	AUG 02-55
1345	1.5	☒		NO	147	AUG 02-56
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: EM-36 **GPS COORDINATES:** 36°59'32.00"N 122°2'9.99"W **LOCATION ON SITE:** East Meadow **TIME:** 1200

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1215	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non plastic, no odor.	NO	1,572 1,579	AUG 02-38 AUG 02-39
	0.5			NO	78	AUG 02-40
	1.0			NO	25	AUG 02-41
1220	1.5	☒		NO	64	AUG 02-42
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

SITE ADDRESS:	333 Golf Club Drive, Santa Cruz, CA	
PROJECT NUMBER AND TASK:	01-POG-001	Task:2.2
LOGGED & SAMPLED BY:	B. Angulo	**DATE:** 8/3/21

BORING NUMBER: EM-37 **GPS COORDINATES:** 36°59'31.22"N 122°2'9.90"W **LOCATION ON SITE:** East Meadow **TIME:** 1053

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1115	0	☒	(SW) Well graded sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	955 725	AUG 02-32 AUG 02-33
	0.5			NO	83	AUG 02-34
	1.0			NO	39	AUG 02-35
1120	1.5	☒		NO	13	AUG 02-36
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: EM-38 **GPS COORDINATES:** 36°59'30.46"N 122°2'9.32"W **LOCATION ON SITE:** East Meadow **TIME:** 1014

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1045	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	499	AUG 02-28
	0.5			NO	370	AUG 02-29
	1.0			NO	137	AUG 02-30
1050	1.5	☒		NO	48	AUG 02-31
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: EM-39 **GPS COORDINATES:** 36°59'31.20"N 122°2'8.41"W **LOCATION ON SITE:** East Meadow **TIME:** 0942

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1005	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	519	AUG 02-23
	0.5			NO	214	AUG 02-24
	1.0			NO	211	AUG 02-25
1010	1.5	☒		NO	285	AUG 02-27
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

SITE ADDRESS:	333 Golf Club Drive, Santa Cruz, CA		
PROJECT NUMBER AND TASK:	01-POG-001	Task:2.2	
LOGGED & SAMPLED BY:	B. Angulo	**DATE:**	8/3/21

BORING NUMBER: EM-40 **GPS COORDINATES:** 36°59'30.56"N 122°2'8.14"W **LOCATION ON SITE:** East Meadow **TIME:** 0908

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0935	0	☒	(SW) Well graded sand, grayish brown (10YR 5/2), moist, very loose, fine-grained sand, medium to coarse gravel, non-plastic, no odor.	NO	245	AUG 02-19
	0.5			NO	125	AUG 02-20
	1.0			NO	18	AUG 02-21
0940	1.5	☒		NO	16	AUG 02-22
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-1 **GPS COORDINATES:** 36°59'35.38"N 122°2'14.95"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 0720

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0745	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), moist, very loose, fine-grained sand, non-plastic, no odor.	NO	226	AUG 02-66
	0.5			NO	57	AUG 02-67
	1.0			NO	52	AUG 02-68
0750	1.5	☒		NO	131	AUG 02-69
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-2 **GPS COORDINATES:** 36°59'34.62"N 122°2'13.35"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 1044

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), moist, loose, fine-grained sand, non-plastic, no odor.	NO	28	AUG 02-89
1055	0.5			NO	21	AUG 02-90
	1.0		Mottled with yellowish red (5YR 4/6).	NO	4	AUG 02-91
	1.5	☒		NO	4	AUG 02-92
1100	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/3/21

BORING NUMBER: R-3 **GPS COORDINATES:** 36°59'33.96"N 122°2'11.99"W **LOCATION ON SITE:** Ravine **TIME:** 1300

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1315	0	☒	(SM) Silty sand, brown (10YR 5/3), moist, very loose, fine-grained sand, medium coarse gravel, non-plastic, no odor.	NO	810	AUG 02-48
	0.5			NO	19	AUG 02-49
	1.0			NO	11	AUG 02-50
1320	1.5	☒		NO	12	AUG 02-51
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-4 **GPS COORDINATES:** 36°59'34.52"N 122°2'14.34"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 0843

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0900	0	☒	(SM) Silty sand, dark brown (10YR 3/3), moist, very loose, fine-grained sand, non-plastic, no odor.	NO	1,302 1,027	AUG 02-71 AUG 02-72
	0.5			NO	73	AUG 02-73
	1.0			NO	16	AUG 02-75
0905	1.5	☒		NO	16	AUG 02-76
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-5 **GPS COORDINATES:** 36°59'33.56"N 122°2'13.00"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 1110

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1130	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	234	AUG 02-93
	0.5			NO	49	AUG 02-94
	1.0			NO	35	AUG 02-95
1135	1.5	☒		NO	18	AUG 02-96
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA
PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2
LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/3/21

BORING NUMBER: R-6 **GPS COORDINATES:** 36°59'32.53"N 122°2'11.73"W **LOCATION ON SITE:** Ravine **TIME:** 1350

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1430	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	628	AUG 02-57
	0.5			NO	540	AUG 02-58
	1.0			NO	155	AUG 02-59
1435	1.5	☒		NO	290	AUG 02-60
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-7 **GPS COORDINATES:** 36°59'30.97"N 122°2'10.64"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 1414

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1440	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	454	AUG 02-113
	0.5			NO	151	AUG 02-114
	1.0			NO	22	AUG 02-115
1445	1.5	☒		NO	33	AUG 02-116
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-8 **GPS COORDINATES:** 36°59'29.35"N 122°2'10.32"W **LOCATION ON SITE:** Ravine 8/4/21 **TIME:** 1312

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
	0		(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor. (20,80,0,0).	NO	67	AUG 02-105
	0.5			NO	79	AUG 02-106
1325	1.0	☒		NO	98	AUG 02-107
1330	1.5	☒		NO	93	AUG 02-108
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/4/21

BORING NUMBER: R-9 **GPS COORDINATES:** 36°59'33.35"N 122°2'14.40"W **LOCATION ON SITE:** Ravine **TIME:** 0908

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0920	0	☒	(SM) Silty sand, dark brown (10YR 3/3), moist, very loose, fine-grained sand, non-plastic, no odor.	NO	182	AUG 02-77
	0.5			NO	31	AUG 02-78
	1.0			NO	6	AUG 02-79
0925	1.5	☒		NO	11	AUG 02-80
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-10 **GPS COORDINATES:** 36°59'32.29"N 122°2'13.24"W **LOCATION ON SITE:** Ravine **TIME:** 0926

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0935	0	☒	(SM) Silty sand, dark brown (10YR 3/3), moist, very loose, fine-grained sand, non-plastic, no odor.	NO	86	AUG 02-81
	0.5			NO	23	AUG 02-82
	1.0			NO	5	AUG 02-83
0940	1.5	☒		NO	3	AUG 02-84
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-11 **GPS COORDINATES:** 36°59'31.19"N 122°2'12.33"W **LOCATION ON SITE:** Ravine **TIME:** 0949

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1000	0	☒	(SM) Silty sand, dark brown (10YR 3/3), very loose, fine-grained sand, non-plastic, no odor.	NO	93	AUG 02-85
	0.5			NO	18	AUG 02-86
	1.0			NO	6	AUG 02-87
1010	1.5	☒		NO	20	AUG 02-88
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/4/21

BORING NUMBER: R-12 **GPS COORDINATES:** 36°59'29.90"N 122°2'11.64"W **LOCATION ON SITE:** Ravine **TIME:** 1337

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1405	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), moist, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	61	AUG 02-109
	0.5			NO	19	AUG 02-110
	1.0			NO	50	AUG 02-111
1410	1.5	☒		NO	28	AUG 02-112
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-13 **GPS COORDINATES:** 36°59'34.08"N 122°2'16.14"W **LOCATION ON SITE:** Ravine 8/5/21 **TIME:** 0905

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0910	0	☒	(SW) Well graded sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	741	AUG 02-141
	0.5			NO	69	AUG 02-142
	1.0			NO	22	AUG 02-143
0915	1.5	☒		NO	17	AUG 02-144
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: R-14 **GPS COORDINATES:** 36°59'34.56"N 122°2'15.60"W **LOCATION ON SITE:** Ravine 8/5/21 **TIME:** 1010

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1020	0	☒	(SW) Well graded sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	1,075 1,038	AUG 02-145 AUG 02-146
	0.5			NO	34	AUG 02-147
	1.0			NO	6	AUG 02-148
1030	1.5	☒		NO	6	AUG 02-149
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA
PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2
LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/3/21

BORING NUMBER: T-1 **GPS COORDINATES:** 36°59'31.12"N 122°26'.55"W **LOCATION ON SITE:** Emma McCrary Trail Area **TIME:** 0800

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0900	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	19	AUG 02-15
	0.5			NO	15	AUG 02-16
	1.0			NO	11	AUG 02-17
0905	1.5	☒		NO	14	AUG 02-18
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: T-2 **GPS COORDINATES:** 36°59'31.12"N 122°26'.55"W **LOCATION ON SITE:** Trail Area 8/4/21 **TIME:** 1228

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1240	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, cobbles, non-plastic, no odor.	NO	23	AUG 02-97
	0.5			NO	9	AUG 02-98
	1.0			NO	5	AUG 02-99
1245	1.5	☒		NO	6	AUG 02-100
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: T-3 **GPS COORDINATES:** 36°59'31.12"N 122°26'.55"W **LOCATION ON SITE:** Trail Area 8/4/21 **TIME:** 1248

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
1305	0	☒	(SW) Well graded sand with gravel, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, coarse gravel, non-plastic, no odor.	NO	384	AUG 02-101
	0.5			NO	329	AUG 02-102
	1.0			NO	31	AUG 02-103
1310	1.5	☒		NO	8	AUG 02-104
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 501 Golf Club Drive, Santa Cruz, CA
PROJECT NUMBER AND TASK: 01-POG-002 Task 1
LOGGED & SAMPLED BY: B. Angulo **DATE:** 1/11/2022

BORING NUMBER: T-4 **GPS COORDINATES:** 36°59.479'N 122°02.118'W **LOCATION ON SITE:** Emma McCrary Trail Area **TIME:** 0825

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0840	0		(SM) Silty sand, dark brown (7.5YR 3/2), loose, fine-grained sand, non-plastic, no odor, roots.	NO	48	JAN 11-5
	0.5			NO	22	JAN 11-6
	1.0		(MH) Sandy silt, dark brown (7.5YR 3/2), soft, fine-grained sand, low plasticty, no odor, roots.	NO	16	JAN 11-7
0845	1.5		Wet.	NO	15	JAN 11-8
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: T-5 **GPS COORDINATES:** 36°59'468'N 122°02.136'W **LOCATION ON SITE:** Emma McCrary Trail Area **TIME:** 0855

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0910	0	☒	(SM) Silty sand, very dark gray (7.5YR 3/1), moist, loose, fine-grained sand, non-plastic, no odor, roots.	NO	99	JAN 11-13
	0.5			NO	27	JAN 11-14
	1.0		(MH) Sandy silt, very dark gray (7.5YR 3/1), wet, soft, fine-grained sand, low plasticity, no odor, roots.	NO	25	JAN 11-15
0915	1.5	☒		NO	13	JAN 11-16
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: T-6 **GPS COORDINATES:** 36°59.474'N 122°02.161'W **LOCATION ON SITE:** Emma McCrary Trail Area **TIME:** 0918

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0940	0	☒	(SM) Silty sand, very dark gray (7.5YR 3/1), moist, loose, fine-grained sand, non-plastic, no odor.	NO	152/489/91	JAN 11-19/20/21
	0.5			NO	22	JAN 11-22
	1.0		(MH) Sandy silt, very dark gray (7.5YR 3/1), wet, soft, fine-grained sand, low plasticity, no odor.	NO	17	JAN 11-23
0945	1.5	☒		NO	12	JAN 11-24
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 501 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-002 Task 1

LOGGED & SAMPLED BY: B. Angulo **DATE:** 1/11/2022

BORING NUMBER: T-7 **GPS COORDINATES:** 36°59.453'N 122°02.173'W **LOCATION ON SITE:** Emma McCrary Trail Area **TIME:** 0947

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0955	0	☒	(ML) Sandy silt, dark brown (7.5YR 3/2), loose, soft, fine-grained sand, non-plastic, no odor.	NO	107/82	JAN 11-25/26
	0.5			NO	54	JAN 11-27
	1.0		(MH) Sandy silt, dark brown (7.5YR 3/2), wet, soft, fine-grained sand, low plasticty, no odor.	NO	14	JAN 11-28
1000	1.5	☒		NO	33	JAN 11-29
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/5/21

BORING NUMBER: NO-13 **GPS COORDINATES:** 36°59'35.93"N 122°2'18.18"W **LOCATION ON SITE:** North Orchard **TIME:** 0828

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0840	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	14	AUG 02-133
	0.5			NO	3	AUG 02-134
	1.0			NO	3	AUG 02-135
0845	1.5	☒		NO	3	AUG 02-136
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: NO-14 **GPS COORDINATES:** 36°59'34.93"N 122°2'18.55"W **LOCATION ON SITE:** North Orchard **TIME:** 0848

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0855	0	☒	(SW) Well graded sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non plastic, no odor. (10,80,10,0).	NO	56	AUG 02-137
	0.5			NO	19	AUG 02-138
	1.0			NO	5	AUG 02-139
0900	1.5	☒		NO	4	AUG 02-140
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

RMD ENVIRONMENTAL SOLUTIONS

SITE ADDRESS: 333 Golf Club Drive, Santa Cruz, CA

PROJECT NUMBER AND TASK: 01-POG-001 Task:2.2

LOGGED & SAMPLED BY: B. Angulo **DATE:** 8/5/21

BORING NUMBER: WM-16 **GPS COORDINATES:** 36°59'33.22"N 122°2'19.72"W **LOCATION ON SITE:** West Meadow **TIME:** 0755

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0800	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), dry, very loose, fine-grained sand, non-plastic, no odor.	NO	133	AUG 02-129
	0.5			NO	6	AUG 02-130
	1.0			NO	6	AUG 02-131
0805	1.5	☒		NO	5	AUG 02-132
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

BORING NUMBER: WM-17 **GPS COORDINATES:** 36°59'32.64"N 122°2'21.09"W **LOCATION ON SITE:** West Meadow **TIME:** 0738

Time	Depth	Sample Interval	Soil Description	Lead shot visible?	XRF Analysis	
					Lead Conc. (ppm)	Sample #
0745	0	☒	(SM) Silty sand, grayish brown (10YR 5/2), moist, loose, fine-grained sand, non-plastic, no odor.	NO	18	AUG 02-125
	0.5			NO	7	AUG 02-126
	1.0			NO	ND	AUG 02-127
0750	1.5	☒	Very dark grayish brown (10YR 3/2).	NO	3	AUG 02-128
	2.0					
	2.5		End of boring at 2 feet bgs. Backfill boring with soil cuttings.			
	3.0					

APPENDIX D

XRF DATA

Data Acquisition: Olympus Vanta XRF Analyzer **Instrument Serial Number:** 800777

Reading #	Boring Location	Depth (feet bgs)	Date	Time	Units	Lead Concentration
15	T-1	0.5	8/2/2021	8:54:07	PPM	19
16		1	8/2/2021	8:57:13	PPM	15
17		1.5	8/2/2021	8:59:15	PPM	11
18		2	8/2/2021	9:00:50	PPM	14
19	EM-40	0.5	8/2/2021	8:54:05	PPM	245
20		1	8/2/2021	8:56:26	PPM	125
21		1.5	8/2/2021	9:04:08	PPM	18
22		2	8/2/2021	9:06:58	PPM	16
23	EM-39	0.5	8/2/2021	8:54:54	PPM	519
24		1	8/2/2021	8:57:14	PPM	214
25		1.5	8/2/2021	8:59:37	PPM	211
27		2	8/2/2021	9:01:55	PPM	285
28	EM-38	0.5	8/2/2021	8:54:32	PPM	499
29		1	8/2/2021	8:57:22	PPM	370
30		1.5	8/2/2021	8:59:42	PPM	137
31		2	8/2/2021	9:02:53	PPM	48
32	EM-37	0.5	8/2/2021	8:54:38	PPM	955
33			8/2/2021	8:56:37	PPM	725
34		1	8/2/2021	8:58:15	PPM	83
35		1.5	8/2/2021	8:59:57	PPM	39
36		2	8/2/2021	9:01:57	PPM	13
38	EM-36	0.5	8/2/2021	8:54:40	PPM	1572
39			8/2/2021	8:56:27	PPM	1579
40		1	8/2/2021	8:59:00	PPM	78
41		1.5	8/2/2021	9:00:35	PPM	25
42		2	8/2/2021	9:04:54	PPM	64
44	EM-34	0.5	8/2/2021	8:54:14	PPM	687
45		1	8/2/2021	8:56:22	PPM	784
46		1.5	8/2/2021	8:58:09	PPM	48
47		2	8/2/2021	9:04:01	PPM	56
48	R-3	0.5	8/2/2021	8:55:04	PPM	810
49		1	8/2/2021	8:56:56	PPM	19
50		1.5	8/2/2021	8:58:53	PPM	11
51		2	8/2/2021	9:00:40	PPM	12
52	EM-35	0.5	8/2/2021	8:55:15	PPM	1822
53			8/2/2021	8:57:17	PPM	1631
54		1	8/2/2021	8:59:12	PPM	485
55		1.5	8/2/2021	9:01:09	PPM	48
56		2	8/2/2021	9:03:27	PPM	147

Data Acquisition: Olympus Vanta XRF Analyzer **Instrument Serial Number:** 800777

Reading #	Boring Location	Depth (feet bgs)	Date	Time	Units	Lead Concentration
57	R-6	0.5	8/2/2021	8:54:18	PPM	628
58		1	8/2/2021	8:57:32	PPM	540
59		1.5	8/2/2021	9:12:45	PPM	155
60		2	8/2/2021	9:15:07	PPM	290
66	R-1	0.5	8/2/2021	8:55:00	PPM	226
67		1	8/2/2021	8:57:04	PPM	57
68		1.5	8/2/2021	8:58:38	PPM	52
69		2	8/2/2021	9:00:09	PPM	131
71	R-4	0.5	8/2/2021	8:54:44	PPM	1302
72			8/2/2021	8:56:34	PPM	1027
73		1	8/2/2021	8:58:31	PPM	73
75		1.5	8/2/2021	9:01:32	PPM	16
76		2	8/2/2021	9:03:11	PPM	16
77	R-9	0.5	8/2/2021	8:54:09	PPM	182
78		1	8/2/2021	8:56:07	PPM	31
79		1.5	8/2/2021	8:57:51	PPM	6
80		2	8/2/2021	9:00:58	PPM	11
81	R-10	0.5	8/2/2021	8:55:00	PPM	86
82		1	8/2/2021	8:58:21	PPM	23
83		1.5	8/2/2021	9:00:03	PPM	5
84		2	8/2/2021	9:03:53	PPM	3
85	R-11	0.5	8/2/2021	8:54:04	PPM	93
86		1	8/2/2021	8:55:43	PPM	18
87		1.5	8/2/2021	8:59:13	PPM	6
88		2	8/2/2021	9:13:50	PPM	20
89	R-2	0.5	8/2/2021	8:54:06	PPM	28
90		1	8/2/2021	8:55:48	PPM	21
91		1.5	8/2/2021	8:58:49	PPM	4
92		2	8/2/2021	9:01:29	PPM	4
93	R-5	0.5	8/2/2021	9:27:21	PPM	234
94		1	8/2/2021	9:29:32	PPM	49
95		1.5	8/2/2021	9:31:40	PPM	35
96		2	8/2/2021	9:33:26	PPM	18
97	T-2	0.5	8/2/2021	8:54:43	PPM	23
98		1	8/2/2021	8:56:20	PPM	9
99		1.5	8/2/2021	8:57:51	PPM	5
100		2	8/2/2021	8:59:27	PPM	6

Data Acquisition: Olympus Vanta XRF Analyzer **Instrument Serial Number:** 800777

Reading #	Boring Location	Depth (feet bgs)	Date	Time	Units	Lead Concentration
101	T-3	0.5	8/2/2021	9:08:27	PPM	384
102		1	8/2/2021	9:11:08	PPM	329
103		1.5	8/2/2021	9:13:31	PPM	31
104		2	8/2/2021	9:17:09	PPM	8
105	R-8	0.5	8/2/2021	8:56:16	PPM	67
106		1	8/2/2021	8:58:10	PPM	79
107		1.5	8/2/2021	9:05:33	PPM	98
108		2	8/2/2021	9:07:43	PPM	93
109	R-12	0.5	8/2/2021	8:54:51	PPM	61
110		1	8/2/2021	9:07:26	PPM	19
111		1.5	8/2/2021	9:15:05	PPM	50
112		2	8/2/2021	9:18:11	PPM	28
113	R-7	0.5	8/2/2021	9:39:20	PPM	454
114		1	8/2/2021	9:40:44	PPM	151
115		1.5	8/2/2021	9:45:02	PPM	22
116		2	8/2/2021	9:46:36	PPM	33
125	WM-17	0.5	8/2/2021	9:06:57	PPM	18
126		1	8/2/2021	9:08:54	PPM	7
127		1.5	8/2/2021	9:10:16	PPM	<LOD
128		2	8/2/2021	9:12:09	PPM	3
129	WM-16	0.5	8/2/2021	9:21:21	PPM	133
130		1	8/2/2021	9:23:22	PPM	6
131		1.5	8/2/2021	9:25:04	PPM	6
132		2	8/2/2021	9:27:18	PPM	5
133	NO-13	0.5	8/2/2021	8:54:28	PPM	14
134		1	8/2/2021	8:56:10	PPM	3
135		1.5	8/2/2021	8:57:41	PPM	3
136		2	8/2/2021	8:59:18	PPM	3
137	NO-14	0.5	8/2/2021	9:06:15	PPM	56
138		1	8/2/2021	9:08:22	PPM	19
139		1.5	8/2/2021	9:10:06	PPM	5
140		2	8/2/2021	9:11:40	PPM	4
141	R-13	0.5	8/2/2021	8:55:14	PPM	741
142		1	8/2/2021	8:57:51	PPM	69
143		1.5	8/2/2021	8:59:32	PPM	22
144		2	8/2/2021	9:00:46	PPM	17
145	R-14	0.5	8/2/2021	8:54:02	PPM	1075
146			8/2/2021	8:55:36	PPM	1038
147		1	8/2/2021	8:57:34	PPM	34
148		1.5	8/2/2021	8:59:48	PPM	6
149		2	8/2/2021	9:01:12	PPM	6

Reading #	Boring Location	Depth (feet bgs)	Date	Time	Units	Lead Concentration
5	T-4	0.5	1/11/2022	8:25:03	PPM	48
6	T-4	1	1/11/2022	8:26:56	PPM	22
7	T-4	1.5	1/11/2022	8:29:12	PPM	16
8	T-4	2	1/11/2022	8:30:59	PPM	15
9	T-5	0.5	1/11/2022	8:56:43	PPM	160
10	T-5	0.5	1/11/2022	9:00:15	PPM	236
11	T-5	0.5	1/11/2022	9:02:45	PPM	64
12	T-5	0.5	1/11/2022	9:03:43	PPM	126
13	T-5	0.5	1/11/2022	9:06:10	PPM	99
14	T-5	1	1/11/2022	9:07:44	PPM	27
15	T-5	1.5	1/11/2022	9:09:21	PPM	25
16	T-5	2	1/11/2022	9:11:24	PPM	13
17	T-6	0.5	1/11/2022	9:19:05	PPM	282
18	T-6	0.5	1/11/2022	9:22:24	PPM	153
19	T-6	0.5	1/11/2022	9:26:33	PPM	185
20	T-6	0.5	1/11/2022	9:29:26	PPM	489
21	T-6	0.5	1/11/2022	9:32:27	PPM	91
22	T-6	1	1/11/2022	9:34:21	PPM	22
23	T-6	1.5	1/11/2022	9:35:43	PPM	17
24	T-6	2	1/11/2022	9:38:04	PPM	12
25	T-7	0.5	1/11/2022	9:48:16	PPM	107
26	T-7	0.5	1/11/2022	9:50:06	PPM	82
27	T-7	1	1/11/2022	9:52:29	PPM	54
28	T-7	1.5	1/11/2022	9:53:59	PPM	14
29	T-7	2	1/11/2022	9:56:12	PPM	33

APPENDIX E

LABORATORY ANALYTICAL REPORTS

ANALYTICAL REPORT

August 13, 2021

RMD Environmental - Walnut Creek, CA

Sample Delivery Group:	L1387682
Samples Received:	08/06/2021
Project Number:	01-POG-001
Description:	Pogonip Farm and Garden

Report To:

Doug Whichard
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Entire Report Reviewed By: Jordan Zito

Jordan N Zito
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

EM-40-0.5' L1387682-03 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 09:35	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 18:54	LD	Mt. Juliet, TN

EM-40-2' L1387682-04 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 09:40	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:12	LD	Mt. Juliet, TN

EM-39-0.5' L1387682-05 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 10:05	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:16	LD	Mt. Juliet, TN

EM-39-2' L1387682-06 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 10:10	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:19	LD	Mt. Juliet, TN

EM-38-0.5' L1387682-07 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 10:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:39	LD	Mt. Juliet, TN

EM-38-2' L1387682-08 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 10:50	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:42	LD	Mt. Juliet, TN

EM-37-0.5' L1387682-09 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 11:15	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:46	LD	Mt. Juliet, TN

EM-37-2' L1387682-10 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 11:20	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:49	LD	Mt. Juliet, TN

EM-36-0.5' L1387682-11 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 12:15	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:53	LD	Mt. Juliet, TN

EM-36-2' L1387682-12 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 12:20	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721547	1	08/12/21 15:09	08/12/21 15:19	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 19:57	LD	Mt. Juliet, TN

EM-34-1' L1387682-13 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 12:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:00	LD	Mt. Juliet, TN

EM-34-2' L1387682-14 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 12:50	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:04	LD	Mt. Juliet, TN

EM-35-0.5' L1387682-15 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 13:40	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:07	LD	Mt. Juliet, TN

EM-35-2' L1387682-16 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 13:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	10	08/12/21 08:22	08/12/21 20:51	LD	Mt. Juliet, TN

SAMPLE SUMMARY

R-3-0.5' L1387682-17 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 13:15	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:22	LD	Mt. Juliet, TN

R-6-0.5' L1387682-19 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 14:30	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:26	LD	Mt. Juliet, TN

R-6-2' L1387682-20 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 14:35	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:29	LD	Mt. Juliet, TN

R-4-0.5' L1387682-23 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:00	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:33	LD	Mt. Juliet, TN

T-3-0.5' L1387682-37 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 13:05	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:36	LD	Mt. Juliet, TN

R-7-0.5' L1387682-43 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 14:40	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721548	1	08/12/21 14:54	08/12/21 15:04	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721876	5	08/12/21 08:22	08/12/21 20:41	LD	Mt. Juliet, TN

R-13-0.5' L1387682-53 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/05/21 09:10	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721549	1	08/12/21 10:34	08/12/21 10:41	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721883	5	08/12/21 08:23	08/12/21 17:25	JPD	Mt. Juliet, TN

SAMPLE SUMMARY

	Collected by	Collected date/time	Received date/time
R-14-0.5' L1387682-55 Solid	B. Angulo	08/05/21 10:20	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1721549	1	08/12/21 10:34	08/12/21 10:41	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1721883	5	08/12/21 08:23	08/12/21 17:42	JPD	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Unless qualified or notated within the narrative below, all sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jordan N Zito
Project Manager

Metals (ICPMS) by Method 6020

The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Batch	Lab Sample ID	Analytes
WG1721876	L1387682-03	Lead

DETECTION SUMMARY

Metals (ICPMS) by Method 6020

Client ID	Lab Sample ID	Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
EM-40-0.5'	L1387682-03	Lead	323	O1	0.123	2.49	5	08/12/2021 18:54	WG1721876
EM-40-2'	L1387682-04	Lead	18.6		0.105	2.12	5	08/12/2021 19:12	WG1721876
EM-39-0.5'	L1387682-05	Lead	504		0.106	2.14	5	08/12/2021 19:16	WG1721876
EM-39-2'	L1387682-06	Lead	220		0.114	2.31	5	08/12/2021 19:19	WG1721876
EM-38-0.5'	L1387682-07	Lead	490		0.111	2.25	5	08/12/2021 19:39	WG1721876
EM-38-2'	L1387682-08	Lead	41.3		0.117	2.36	5	08/12/2021 19:42	WG1721876
EM-37-0.5'	L1387682-09	Lead	571		0.102	2.07	5	08/12/2021 19:46	WG1721876
EM-37-2'	L1387682-10	Lead	14.7		0.107	2.17	5	08/12/2021 19:49	WG1721876
EM-36-0.5'	L1387682-11	Lead	2090		0.102	2.06	5	08/12/2021 19:53	WG1721876
EM-36-2'	L1387682-12	Lead	28.6		0.106	2.14	5	08/12/2021 19:57	WG1721876
EM-34-1'	L1387682-13	Lead	637		0.125	2.53	5	08/12/2021 20:00	WG1721876
EM-34-2'	L1387682-14	Lead	37.9		0.134	2.70	5	08/12/2021 20:04	WG1721876
EM-35-0.5'	L1387682-15	Lead	1800		0.105	2.12	5	08/12/2021 20:07	WG1721876
EM-35-2'	L1387682-16	Lead	5810		0.210	4.25	10	08/12/2021 20:51	WG1721876
R-3-0.5'	L1387682-17	Lead	1530		0.126	2.54	5	08/12/2021 20:22	WG1721876
R-6-0.5'	L1387682-19	Lead	573		0.108	2.18	5	08/12/2021 20:26	WG1721876
R-6-2'	L1387682-20	Lead	341		0.106	2.13	5	08/12/2021 20:29	WG1721876
R-4-0.5'	L1387682-23	Lead	1600		0.123	2.49	5	08/12/2021 20:33	WG1721876
T-3-0.5'	L1387682-37	Lead	474		0.111	2.24	5	08/12/2021 20:36	WG1721876
R-7-0.5'	L1387682-43	Lead	456		0.127	2.56	5	08/12/2021 20:41	WG1721876
R-13-0.5'	L1387682-53	Lead	686		0.102	2.07	5	08/12/2021 17:25	WG1721883
R-14-0.5'	L1387682-55	Lead	1220		0.102	2.07	5	08/12/2021 17:42	WG1721883

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.3		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	323	O1	0.123	2.49	5	08/12/2021 18:54	WG1721876

EM-40-2'

Collected date/time: 08/03/21 09:40

SAMPLE RESULTS - 04

L1387682

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.3		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	18.6		0.105	2.12	5	08/12/2021 19:12	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.3		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	504		0.106	2.14	5	08/12/2021 19:16	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.6		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	220		0.114	2.31	5	08/12/2021 19:19	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.1		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	490		0.111	2.25	5	08/12/2021 19:39	WG1721876

EM-38-2'

Collected date/time: 08/03/21 10:50

SAMPLE RESULTS - 08

L1387682

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.7		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	41.3		0.117	2.36	5	08/12/2021 19:42	WG1721876

EM-37-0.5'

Collected date/time: 08/03/21 11:15

SAMPLE RESULTS - 09

L1387682

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	96.8		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	571		0.102	2.07	5	08/12/2021 19:46	WG1721876

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	92.3		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	14.7		0.107	2.17	5	08/12/2021 19:49	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	96.9		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	2090		0.102	2.06	5	08/12/2021 19:53	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.4		1	08/12/2021 15:19	WG1721547

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	28.6		0.106	2.14	5	08/12/2021 19:57	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	79.1		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	637		0.125	2.53	5	08/12/2021 20:00	WG1721876

EM-34-2'
Collected date/time: 08/03/21 12:50

SAMPLE RESULTS - 14

L1387682

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	73.9		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	37.9		0.134	2.70	5	08/12/2021 20:04	WG1721876

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.4		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	1800		0.105	2.12	5	08/12/2021 20:07	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.1		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	5810		0.210	4.25	10	08/12/2021 20:51	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	78.8		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	1530		0.126	2.54	5	08/12/2021 20:22	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	91.5		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	573		0.108	2.18	5	08/12/2021 20:26	WG1721876

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.8		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	341		0.106	2.13	5	08/12/2021 20:29	WG1721876

R-4-0.5'
Collected date/time: 08/04/21 09:00

SAMPLE RESULTS - 23

L1387682

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	80.2		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	1600		0.123	2.49	5	08/12/2021 20:33	WG1721876

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.1		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	474		0.111	2.24	5	08/12/2021 20:36	WG1721876

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	78.1		1	08/12/2021 15:04	WG1721548

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	456		0.127	2.56	5	08/12/2021 20:41	WG1721876

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	96.8		1	08/12/2021 10:41	WG1721549

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	686		0.102	2.07	5	08/12/2021 17:25	WG1721883

R-14-0.5'

Collected date/time: 08/05/21 10:20

SAMPLE RESULTS - 55

L1387682

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	96.8		1	08/12/2021 10:41	WG1721549

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	1220		0.102	2.07	5	08/12/2021 17:42	WG1721883

QUALITY CONTROL SUMMARY

L1387682-03,04,05,06,07,08,09,10,11,12

Method Blank (MB)

(MB) R3691588-1 08/12/21 15:19

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1387682-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1387682-03 08/12/21 15:19 • (DUP) R3691588-3 08/12/21 15:19

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	80.3	79.4	1	1.07		10

Laboratory Control Sample (LCS)

(LCS) R3691588-2 08/12/21 15:19

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3691583-1 08/12/21 15:04

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1387682-17 Original Sample (OS) • Duplicate (DUP)

(OS) L1387682-17 08/12/21 15:04 • (DUP) R3691583-3 08/12/21 15:04

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	78.8	78.4	1	0.491		10

Laboratory Control Sample (LCS)

(LCS) R3691583-2 08/12/21 15:04

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3691553-1 08/12/21 10:41

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

Laboratory Control Sample (LCS)

(LCS) R3691553-2 08/12/21 10:41

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3691487-1 08/12/21 18:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3691487-2 08/12/21 18:50

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead	100	105	105	80.0-120	

L1387682-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1387682-03 08/12/21 18:54 • (MS) R3691487-4 08/12/21 19:05 • (MSD) R3691487-5 08/12/21 19:08

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	125	323	467	452	116	103	5	75.0-125			3.36	20

Method Blank (MB)

(MB) R3691431-1 08/12/21 17:18

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3691431-2 08/12/21 17:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead	100	102	102	80.0-120	

L1387682-53 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1387682-53 08/12/21 17:25 • (MS) R3691431-5 08/12/21 17:35 • (MSD) R3691431-6 08/12/21 17:39

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	103	686	803	786	113	96.3	5	75.0-125			2.19	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Report to:
Doug Whichard

Email To:
dwhichard@rmdes.net;bangulo@rmdes.net

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project #: 01-POG-001

Lab Project #: **RMDENVPHCA-POGONIP**

Collected by (print): B. Angulo

Site/Facility ID #:

P.O. #:

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day
X Five Day
___ Next Day
___ 5 Day (Rad Only)
___ Two Day
___ 10 Day (Rad Only)
___ Three Day

Quote #:

Date Results Needed: STD TAT

Immediately Packed on Ice N ___ Y ✓

Chain of Custody Page 1 of 6

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 1387682

A099

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD	Remarks	Sample # (lab only)
T-1-0.5'		SS		8/3/21	0900	1		X		-01
T-1-2'		SS			0905	1		X		-02
EM-40-0.5'		SS			0935	1	X			-03
EM-40-2'		SS			0940	1	X			-04
EM-39-0.5'		SS			1005	1	X			-05
EM-39-2'		SS			1010	1	X			-06
EM-38-0.5'		SS			1045	1	X			-07
EM-38-2'		SS			1050	1	X			-08
EM-37-0.5'		SS			1115	1	X			-09
EM-37-2'		SS			1120	1	X			-10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_________

Remarks: Metal samples to be sieved with No. 10 sieve at lab prior to metals analysis.

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N
8/6

Relinquished by : (Signature) Date: 8/5/21 Time: 1245 Received by: (Signature) M. Woody / PACE 8/5/21 12:45

Trip Blank Received: Yes [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) Date: Time: Received by: (Signature)

Temp: AG °C 2.3+0=2.3
Bottles Received: 56

If preservation required by Login: Date/Time

Relinquished by : (Signature) Date: Time: Received for lab by: (Signature)

Date: 8/6/21 Time: 11:00

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek. CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 2 of 6

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at:
https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to:
Doug Whichard

Email To:
dwhichard@rmdes.net;bangulo@rmdes.net

Project Description:
Pogonip Farm and Garden

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project #: 01-POG-001

Lab Project #: **RMDENVPHCA-POGONIP**

Collected by (print): B. Angulo

Site/Facility ID #:

P.O. #:

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ✗ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day STD TAT

Quote #:

Date Results Needed

Immediately Packed on Ice N ___ Y ✓

SDG # 1387682

Table #

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	on Hold	Remarks	Sample # (lab only)
EM-36-0.5'		SS		8/3/21	1215	1	X			-11
EM-36-2'		SS			1220	1	X			-12
EM-34-1'		SS			1245	1	X			-13
EM-34-2'		SS			1250	1	X			-14
EM-35-0.5'		SS			1340	1	X			-15
EM-35-2'		SS			1345	1	X			-16
R-3-0.5'		SS			1315	1	X			-17
R-3-2'		SS			1320	1		X		-18
R-6-0.5'		SS			1430	1	X			-19
R-6-2'		SS			1435	1	X			-20

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_________

Remarks: See page 1 for sieve instructions

pH _______ Temp _______

Flow _______ Other _______

Samples returned via:
__ UPS __ FedEx __ Courier ___________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date: 8/5/21	Time: 1245	Received by: (Signature) M. Woody/PACE 8/5/21 12:45	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.3+0=2.3 °C Bottles Received: 56	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8/6/21 Time: 11:00	Hold: Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Report to:
Doug Whichard

Email To:
dwhichard@rmdes.net;bangulo@rmdes.net

Project Description:
Pogonip Farm and Garden

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: 925-683-8177

Client Project # 01-POG-001

Lab Project # RMDENVPHCA-POGONIP

Collected by (print): B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day
___ Next Day
___ Two Day
___ Three Day
X Five Day
___ 5 Day (Rad Only)
___ 10 Day (Rad Only)

Quote #

Date Results Needed
STD TAT

Analysis / Container / Preservative

Chain of Custody Page 3 of 6

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SDG # 1387682

Table #

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD									Remarks	Sample # (lab only)
R-1-0.5'		SS		8/4/21	0745	1		X										-21
R-1-2'		SS			0750	1		X										-22
R-4-0.5'		SS			0900	1	X											-23
R-4-2'		SS			0905	1		X										-24
R-9-0.5'		SS			0920	1		X										-25
R-9-2'		SS			0925	1		X										-26
R-10-0.5'		SS			0935	1		X										-27
R-10-2'		SS			0940	1		X										-28
R-11-0.5'		SS			1000	1		X										-29
R-11-2'		SS			1010	1		X										-30

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_________

Remarks: See page 1 for sieve instructions

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__UPS __ FedEx __ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	
	8/5/21	1245	Woody Pace 8/5/21 12:45	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR NGNA
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C 2.3+0=2.3 Bottles Received: 56
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8/6/21 Time: 11:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek. CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 4 of 6

Pace Analytical®

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Report to:
Doug Whichard

Email To:
dwhichard@rmdes.net;bangulo@rmdes.net

Project Description:
Pogonip Farm and Garden

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project #: 01-POG-011

Lab Project #: **RMDENVPHCA-POGONIP**

Collected by (print): B. Angulo

Site/Facility ID #:

P.O. #:

Collected by (signature):

Immediately Packed on Ice N ____ Y ✓

Rush? (Lab MUST Be Notified)
- ___ Same Day
- X Five Day
- ___ Next Day
- ___ 5 Day (Rad Only)
- ___ Two Day
- ___ 10 Day (Rad Only)
- ___ Three Day

Quote #:

Date Results Needed: STD TAT

SDG # 1387682

Table #:

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	On Hold	Remarks	Sample # (lab only)
R-2-0.5'		SS		8/4/21	1055	1		X		-31
R-2-2'		SS			1100	1		X		-32
R-5-0.5'		SS			1130	1		X		-33
R-5-2'		SS			1135	1		X		-34
T-2-0.5'		SS			1240	1		X		-35
T-2-2'		SS			1245	1		X		-36
T-3-0.5'		SS			1305	1	X			-37
T-3-2'		SS			1310	1		X		-38
R-8-1.5'		SS			1325	1		X		-39
R-8-2'		SS			1330	1		X		-40

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other__________

Remarks: See page 1 for sieve instructions

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date: 8/5/21	Time: 1245	Received by: (Signature) m Woody /Pace 8/5/21 12:45
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR
AG

Temp: DL °C 2.3+0=2.3
Bottles Received: 56

Date: 8/6/21 Time: 11:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:

RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek. CA 94596

Billing Information:

Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 5 of 6

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SDG # 1387682

Table #

Acctnum: **RMDENVPHCA**

Template: **T189615**

Prelogin: **P854917**

PM: **942 - Jordan N Zito**

PB:

Shipped Via: **FedEX Ground**

Report to: **Doug Whichard**

Email To: **dwhichard@rmdes.net;bangulo@rmdes.net**

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project # 01-POG-001

Lab Project # **RMDENVPHCA-POGONIP**

Collected by (print): B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Quote #

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: STD TAT

Immediately Packed on Ice N ___ Y ✓

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD									Remarks	Sample # (lab only)
R-12-0.5'		SS		8/4/21	1405	1		X										-41
R-12-2'		SS			1410	1		X										-42
R-7-0.5'		SS			1440	1	X											-43
R-7-2'		SS			1445	1		X										-44
WM-17-0.5'		SS		8/5/21	0745	1		X										-45
WM-17-2'		SS			0750	1		X										-46
WM-16-0.5'		SS			0800	1		X										-47
WM-16-2'		SS			0805	1		X										-48
NO-13-0.5'		SS			0840	1		X										-49
NO-13-2'		SS			0845	1		X										-50

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_________

Remarks: See page 1 for sieve instructions

pH _______ Temp _______

Flow _______ Other _______

Samples returned via:
__ UPS __ FedEx __ Courier ___________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date: 8/5/21	Time: 1245	Received by: (Signature) M. Woody / Pace 8/5/21 12:45	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR AG
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C 2.3+0=2.3 Bottles Received: 56
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8/6/21 Time: 1:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:

RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:

Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 6 of 6

Pace Analytical®

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https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to: **Doug Whichard**

Email To: **dwhichard@rmdes.net;bangulo@rmdes.net**

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project #: 01-808-001

Lab Project #: **RMDENVPHCA-POGONIP**

Site/Facility ID #:

P.O. #:

Quote #:

Collected by (print): B. Angulo

Collected by (signature):

Immediately Packed on Ice N ____ Y ✓

Rush? (Lab MUST Be Notified)

- ____ Same Day
- ✗ Five Day
- ____ Next Day
- ____ 5 Day (Rad Only)
- ____ Two Day
- ____ 10 Day (Rad Only)
- ____ Three Day

Date Results Needed: STD TAT

SDG # 1387682

Table #

Acctnum: **RMDENVPHCA**

Template: **T189615**

Prelogin: **P854917**

PM: **942 - Jordan N Zito**

PB:

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	No Hold	Remarks	Sample # (lab only)
NO-14-0.5'		SS		8/5/21	0855	1		X		-S1
NO-14-2'		SS			0900	1		X		-S2
R-13-0.5'		SS			0910	1	X			-S3
R-13-2'		SS			0915	1		X		-S4
R-14-0.5'		SS			1020	1	X			-S5
R-14-2'		SS			1030	1		X		-S6
		SS								
		SS								
		SS								
		SS								

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other__________

Remarks: See Page 1 for sieve instructions.

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: [✓ NP] __Y __N
COC Signed/Accurate: [✓ Y] __N
Bottles arrive intact: [✓ Y] __N
Correct bottles used: [✓ Y] __N
Sufficient volume sent: [✓ Y] __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: [✓ Y] __N

Relinquished by : (Signature)	Date: 8/5/21	Time: 1245	Received by: (Signature) M. WOODY/PACE 8/5/21 12:45	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.3 °C Bottles Received: 56
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8/6/21 Time: 11:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

ANALYTICAL REPORT

August 25, 2021

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

RMD Environmental - Walnut Creek, CA

Sample Delivery Group:	L1391194
Samples Received:	08/06/2021
Project Number:	01-POG-001
Description:	Pogonip Farm and Garden

Report To:

Doug Whichard
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Entire Report Reviewed By:

Jordan N Zito
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

EM-35-2' L1391194-01 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 13:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726941	1	08/23/21 11:45	08/23/21 11:50	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:06	LD	Mt. Juliet, TN

R-3-2' L1391194-02 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/03/21 13:20	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726941	1	08/23/21 11:45	08/23/21 11:50	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:09	LD	Mt. Juliet, TN

R-1-0.5' L1391194-03 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 07:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726941	1	08/23/21 11:45	08/23/21 11:50	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:13	LD	Mt. Juliet, TN

R-1-2' L1391194-04 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 07:50	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:45	LD	Mt. Juliet, TN

R-4-2' L1391194-05 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:05	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:49	LD	Mt. Juliet, TN

R-9-0.5' L1391194-06 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:20	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:52	LD	Mt. Juliet, TN

R-9-2' L1391194-07 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:25	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 16:56	LD	Mt. Juliet, TN

SAMPLE SUMMARY

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

R-10-0.5' L1391194-08 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:35	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:00	LD	Mt. Juliet, TN

R-10-2' L1391194-09 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 09:40	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:03	LD	Mt. Juliet, TN

R-11-0.5' L1391194-10 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 10:00	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:07	LD	Mt. Juliet, TN

R-11-2' L1391194-11 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 10:10	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:11	LD	Mt. Juliet, TN

R-2-0.5' L1391194-12 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 10:55	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:15	LD	Mt. Juliet, TN

R-2-2' L1391194-13 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 11:00	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726943	1	08/23/21 11:35	08/23/21 11:41	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 15:47	LD	Mt. Juliet, TN

R-5-0.5' L1391194-14 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 11:30	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:19	LD	Mt. Juliet, TN

SAMPLE SUMMARY

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

R-5-2' L1391194-15 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 11:35	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:36	LD	Mt. Juliet, TN

T-3-2' L1391194-16 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 13:10	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:40	LD	Mt. Juliet, TN

R-7-2' L1391194-17 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/04/21 14:45	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:43	LD	Mt. Juliet, TN

R-13-2' L1391194-18 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/05/21 09:15	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:47	LD	Mt. Juliet, TN

R-14-2' L1391194-19 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	08/05/21 10:30	08/06/21 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1726944	1	08/23/21 11:28	08/23/21 11:34	KDW	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1724688	5	08/18/21 08:03	08/23/21 17:51	LD	Mt. Juliet, TN

CASE NARRATIVE

Unless qualified or notated within the narrative below, all sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jordan N Zito
Project Manager

Metals (ICPMS) by Method 6020

The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Batch	Lab Sample ID	Analytes
WG1724688	L1391194-13	Lead

DETECTION SUMMARY

Metals (ICPMS) by Method 6020

			Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Client ID	Lab Sample ID	Analyte	mg/kg		mg/kg	mg/kg		date / time	
EM-35-2'	L1391194-01	Lead	198		0.106	2.15	5	08/23/2021 16:06	WG1724688
R-3-2'	L1391194-02	Lead	31.4		0.127	2.57	5	08/23/2021 16:09	WG1724688
R-1-0.5'	L1391194-03	Lead	400		0.132	2.67	5	08/23/2021 16:13	WG1724688
R-1-2'	L1391194-04	Lead	61.5		0.122	2.47	5	08/23/2021 16:45	WG1724688
R-4-2'	L1391194-05	Lead	23.7		0.119	2.40	5	08/23/2021 16:49	WG1724688
R-9-0.5'	L1391194-06	Lead	256		0.126	2.54	5	08/23/2021 16:52	WG1724688
R-9-2'	L1391194-07	Lead	6.59		0.122	2.46	5	08/23/2021 16:56	WG1724688
R-10-0.5'	L1391194-08	Lead	94.0		0.120	2.43	5	08/23/2021 17:00	WG1724688
R-10-2'	L1391194-09	Lead	12.5		0.129	2.60	5	08/23/2021 17:03	WG1724688
R-11-0.5'	L1391194-10	Lead	75.7		0.105	2.12	5	08/23/2021 17:07	WG1724688
R-11-2'	L1391194-11	Lead	23.3		0.106	2.13	5	08/23/2021 17:11	WG1724688
R-2-0.5'	L1391194-12	Lead	215		0.105	2.12	5	08/23/2021 17:15	WG1724688
R-2-2'	L1391194-13	Lead	8.80	O1	0.110	2.23	5	08/23/2021 15:47	WG1724688
R-5-0.5'	L1391194-14	Lead	9.86		0.104	2.10	5	08/23/2021 17:19	WG1724688
R-5-2'	L1391194-15	Lead	17.9		0.107	2.17	5	08/23/2021 17:36	WG1724688
T-3-2'	L1391194-16	Lead	8.15		0.112	2.26	5	08/23/2021 17:40	WG1724688
R-7-2'	L1391194-17	Lead	66.0		0.122	2.46	5	08/23/2021 17:43	WG1724688
R-13-2'	L1391194-18	Lead	31.9		0.104	2.10	5	08/23/2021 17:47	WG1724688
R-14-2'	L1391194-19	Lead	10.9		0.112	2.26	5	08/23/2021 17:51	WG1724688

EM-35-2'

Collected date/time: 08/03/21 13:45

SAMPLE RESULTS - 01

L1391194

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.2		1	08/23/2021 11:50	WG1726941

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	198		0.106	2.15	5	08/23/2021 16:06	WG1724688

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

SAMPLE RESULTS - 02

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	77.9		1	08/23/2021 11:50	WG1726941

Metals (ICPMS) by Method 6020

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Lead	31.4		0.127	2.57	5	08/23/2021 16:09	WG1724688

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	74.9		1	08/23/2021 11:50	WG1726941

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	400		0.132	2.67	5	08/23/2021 16:13	WG1724688

SAMPLE RESULTS - 04

L1391194

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.8		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	61.5		0.122	2.47	5	08/23/2021 16:45	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	83.3		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	23.7		0.119	2.40	5	08/23/2021 16:49	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	78.7		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	256		0.126	2.54	5	08/23/2021 16:52	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	81.4		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	6.59		0.122	2.46	5	08/23/2021 16:56	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.2		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	94.0		0.120	2.43	5	08/23/2021 17:00	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	76.9		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	12.5		0.129	2.60	5	08/23/2021 17:03	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.3		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	75.7		0.105	2.12	5	08/23/2021 17:07	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.8		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	23.3		0.106	2.13	5	08/23/2021 17:11	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.4		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	215		0.105	2.12	5	08/23/2021 17:15	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.7		1	08/23/2021 11:41	WG1726943

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	8.80	O1	0.110	2.23	5	08/23/2021 15:47	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	95.4		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	9.86		0.104	2.10	5	08/23/2021 17:19	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	92.4		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	17.9		0.107	2.17	5	08/23/2021 17:36	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.5		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	8.15		0.112	2.26	5	08/23/2021 17:40	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	81.1		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	66.0		0.122	2.46	5	08/23/2021 17:43	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	95.1		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	31.9		0.104	2.10	5	08/23/2021 17:47	WG1724688

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.4		1	08/23/2021 11:34	WG1726944

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	10.9		0.112	2.26	5	08/23/2021 17:51	WG1724688

QUALITY CONTROL SUMMARY

L1391194-01,02,03

Method Blank (MB)

(MB) R3695514-1 08/23/21 11:50

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1391123-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1391123-01 08/23/21 11:50 • (DUP) R3695514-3 08/23/21 11:50

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	94.2	94.1	1	0.0551		10

Laboratory Control Sample (LCS)

(LCS) R3695514-2 08/23/21 11:50

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3695512-1 08/23/21 11:41

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1391194-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1391194-12 08/23/21 11:41 • (DUP) R3695512-3 08/23/21 11:41

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	94.4	94.0	1	0.481		10

Laboratory Control Sample (LCS)

(LCS) R3695512-2 08/23/21 11:41

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3695511-1 08/23/21 11:34

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1391194-14 Original Sample (OS) • Duplicate (DUP)

(OS) L1391194-14 08/23/21 11:34 • (DUP) R3695511-3 08/23/21 11:34

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	95.4	95.4	1	0.0336		10

Laboratory Control Sample (LCS)

(LCS) R3695511-2 08/23/21 11:34

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3695415-1 08/23/21 15:39

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3695415-2 08/23/21 15:43

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Lead	100	96.1	96.1	80.0-120	

L1391194-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1391194-13 08/23/21 15:47 • (MS) R3695415-5 08/23/21 15:58 • (MSD) R3695415-6 08/23/21 16:02

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Lead	111	8.80	135	136	113	114	5	75.0-125			1.16	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Company Name/Address:
RMD Environmental - Walnut Creek, CA
1371 Oakland Blvd.
Suite 200
Walnut Creek. CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 2 of 6

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to: **Doug Whichard**

Email To: dwhichard@rmdes.net;bangulo@rmdes.net

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project #: 01-POG-001

Lab Project #: **RMDENVPHCA-POGONIP**

SDG #: ~~1387682~~

Table #: L1391194

Collected by (print): B. Angulo

Site/Facility ID #:

P.O. #:

Acctnum: **RMDENVPHCA**

Template: **T189615**

Prelogin: **P854917**

PM: 942 - Jordan N Zito

PB:

Shipped Via: **FedEX Ground**

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day
✓ Five Day
___ Next Day
___ 5 Day (Rad Only)
___ Two Day
___ 10 Day (Rad Only)
___ Three Day

STD TAT

Quote #:

Date Results Needed:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	on Hold									Remarks	Sample # (lab only)
EM-36-0.5'		SS		8/3/21	1215	1	X											~~11~~
EM-36-2'		SS			1220	1	X											~~12~~
EM-34-1'		SS			1245	1	X											~~13~~
EM-34-2'		SS			1250	1	X											~~14~~
EM-35-0.5'		SS			1340	1	X											~~15~~
EM-35-2'		SS			1345	1	X											~~16~~ -01
R-3-0.5'		SS			1315	1	X											~~17~~
R-3-2'		SS			1320	1		X										~~18~~ -02
R-6-0.5'		SS			1430	1	X											~~19~~
R-6-2'		SS			1435	1	X											~~20~~

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: See page 1 for sieve instructions

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ~~Y~~ __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature) Date: 8/5/21 Time: 1245

Received by: (Signature) M. Woody / Pace 8/5/21 12:45

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR
AG

Relinquished by : (Signature) Date: Time:

Received by: (Signature)

Temp: 2.3+0=2.3 °C Bottles Received: 56

If preservation required by Login: Date/Time

Relinquished by : (Signature) Date: Time:

Received for lab by: (Signature)

Date: 8/6/21 Time: 11:00

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 3 of 6

Pace Analytical®

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Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to:
Doug Whichard

Email To:
dwhichard@rmdes.net;bangulo@rmdes.net

Project Description:
Pogonip Farm and Garden

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: 925-683-8177

Client Project #
01-POG-001

Lab Project #
RMDENVPHCA-POGONIP

SDG # L1387682

Table # L1391194

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: 942 - Jordan N Zito
PB:
Shipped Via: **FedEX Ground**

Collected by (print):
B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed
STD TAT

Immediately Packed on Ice N ___ Y ✓

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD	Remarks	Sample # (lab only)
R-1-0.5'		SS		8/4/21	0745	1		X		~~21~~ -03
R-1-2'		SS			0750	1		X		~~22~~ -04
R-4-0.5'		SS			0900	1	X			~~23~~
R-4-2'		SS			0905	1		X		~~24~~ -05
R-9-0.5'		SS			0920	1		X		~~25~~ -06
R-9-2'		SS			0925	1		X		~~26~~ -07
R-10-0.5'		SS			0935	1		X		~~27~~ -08
R-10-2'		SS			0940	1		X		~~28~~ -09
R-11-0.5'		SS			1000	1		X		~~29~~ -10
R-11-2'		SS			1010	1		X		~~30~~ -11

8/6

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: See page 1 for sieve instructions

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature) B. A
Date: 8/5/21
Time: 1245
Received by: (Signature) [illegible] Pace 8/5/21 12:45

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR
N6b4

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 2.3+0=2.3 °C Bottles Received: 56

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature) [illegible]

Date: 8/6/21 Time: 11:00

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA
1371 Oakland Blvd.
Suite 200
Walnut Creek. CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Report to: Doug Whichard

Email To: dwhichard@rmdes.net;bangulo@rmdes.net

Project Description: Pogonip Farm and Garden

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: 925-683-8177

Client Project # 01-POG-011

Lab Project # RMDENVPHCA-POGONIP

Collected by (print): B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature): B. A

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ✗ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

STD TAT

Quote #

Date Results Needed

Chain of Custody Page 4 of 6

Pace Analytical®

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SDG # L1387682

Table # L1391194

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: 942 - Jordan N Zito
PB:
Shipped Via: **FedEX Ground**

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	On HOLD	Remarks	Sample # (lab only)
R-2-0.5'		SS		8/4/21	1055	1		X		~~31~~ -12
R-2-2'		SS			1100	1		X		~~32~~ -13
R-5-0.5'		SS			1130	1		X		~~33~~ -14
R-5-2'		SS			1135	1		X		~~34~~ -15
T-2-0.5'		SS			1240	1		X		~~35~~
T-2-2'		SS			1245	1		X		~~36~~
T-3-0.5'		SS			1305	1	X			~~37~~
T-3-2'		SS			1310	1		X		~~38~~ -16
R-8-1.5'		SS			1325	1		X		~~39~~
R-8-2'		SS			1330	1		X		~~40~~

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ______

Remarks: See page 1 for sieve instructions

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature) B. A	Date: 8/5/21	Time: 1245	Received by: (Signature) m Woody / Pace 8/5/21 12:45	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: AG DL °C 2.3+0=2.3	Bottles Received: 56
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 8/6/21	Time: 11:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 5 of 6

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
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Report to: **Doug Whichard**

Email To: dwhichard@rmdes.net;bangulo@rmdes.net

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project # 01-POG-001

Lab Project # RMDENVPHCA-POGONIP

Collected by (print): B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: STD TAT

SDG # L1387682

Table # L1391194

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD	Remarks	Sample # (lab only)
R-12-0.5'		SS		8/4/21	1405	1		X		-41
R-12-2'		SS		|	1410	1		X		-42
R-7-0.5'		SS		|	1440	1	X			-43
R-7-2'		SS		|	1445	1		X		-44
WM-17-0.5'		SS		8/5/21	0745	1		X		-45
WM-17-2'		SS		|	0750	1		X		-46
WM-16-0.5'		SS		|	0800	1		X		-47
WM-16-2'		SS		|	0805	1		X		-48
NO-13-0.5'		SS		|	0840	1		X		-49
NO-13-2'		SS		|	0845	1		X		-50

-17

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ______

Remarks: See page 1 for sieve instructions

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature) B. A

Date: 8/5/21 Time: 1245

Received by: (Signature) M. Woody / Pace 8/5/21 12:45

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR
AG

Relinquished by : (Signature)
Date: Time:
Received by: (Signature)

Temp: IR °C 2.3+0=2.3 Bottles Received: 56

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date: Time:
Received for lab by: (Signature)

Date: 8/6/21 Time: 11:00

Hold:

Condition: NCF / [✓ OK]

Company Name/Address:
RMD Environmental - Walnut Creek, CA
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 6 of 6

Pace Analytical®

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Report to: **Doug Whichard**

Email To: dwhichard@rmdes.net;bangulo@rmdes.net

Project Description: **Pogonip Farm and Garden**

City/State Collected: Santa Cruz, CA

Please Circle: [✓ PT] MT CT ET

Phone: 925-683-8177

Client Project # 01-802-001

Lab Project # RMDENVPHCA-POGONIP

Collected by (print): B. Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day
___ Next Day
___ Two Day
___ Three Day
X Five Day
___ 5 Day (Rad Only)
___ 10 Day (Rad Only)

STD TAT

Quote #

Date Results Needed

Immediately Packed on Ice N___ Y ✓

SDG # 1387682

Table # L1391194

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P854917**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	NO HOLD	Remarks	Sample # (lab only)
NO-14-0.5'		SS		8/5/21	0835	1		X		-S1
NO-14-2'		SS			0900	1		X		-S2
R-13-0.5'		SS			0910	1	X			-S3
R-13-2'		SS			0915	1		X		-S4 -17
R-14-0.5'		SS			1020	1	X			-S5
R-14-2'		SS			1030	1		X		-S6 -18
		SS								
		SS								
		SS								
		SS								
		SS								

* Matrix:
SS - Soil
AIR - Air
F - Filter
GW - Groundwater
B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: See Page 1 for sieve instructions.

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
___ UPS ___ FedEx ___ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ✓NP _Y _N
COC Signed/Accurate: ✓Y _N
Bottles arrive intact: ✓Y _N
Correct bottles used: ✓Y _N
Sufficient volume sent: ✓Y _N
If Applicable
VOA Zero Headspace: _Y _N
Preservation Correct/Checked: _Y _N
RAD Screen <0.5 mR/hr: ✓Y _N

Relinquished by : (Signature)
Date: 8/5/21
Time: 1245
Received by: (Signature) M. Woody/Pace 8/5/21 12:45

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 2.3 °C
Bottles Received: 56

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature)

Date: 8/6/21
Time: 11:00

Hold:

Condition: NCF / [✓ OK]

RMDENVPHCA Pb HOLD Samples L1387682

R5

Please log these HOLD samples for PBG, SIEVE, TS. Note to sieve before analysis.

-18 (R-3 @ 2')
-21 and -22 (R-1 @ 0.5' and 2')
-24 (R-4 @ 2')
-25 and -26 (R-9 @ 0.5' and 2')
-27 and -28 (R-10 @ 0.5' and 2')
-29 and -30 (R-11 @ 0.5' and 2')
-31 and -32 (R-2 @ 0.5' and 2')
-33 and -34 (R-5 @ 0.5' and 2')
-38 (T-3 @ 2')
-44 (R-7 @ 2')
-54 (R-13 @ 2')
-56 (R-14 @ 2')

Please also RELOG the below sample for PBG, SIEVE, TS. Let me know if there are any volume issues

-16 (EM-35 @ 2')

Time estimate: 0h **Time spent:** 0h

Members

JZ Jordan Zito

ANALYTICAL REPORT

January 24, 2022

RMD Environmental - Walnut Creek, CA

Sample Delivery Group:	L1451658
Samples Received:	01/14/2022
Project Number:	01-POG-001
Description:	Pogonip Farm and Garden

Report To:

Doug Whichard
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Entire Report Reviewed By:

Jordan N Zito
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

T-5-0.5' L1451658-03 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 09:10	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:11	JDG	Mt. Juliet, TN

T-5-2' L1451658-04 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 09:15	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:28	JDG	Mt. Juliet, TN

T-6-0.5' L1451658-05 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 09:40	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:32	JDG	Mt. Juliet, TN

T-6-2' L1451658-06 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 09:45	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:36	JDG	Mt. Juliet, TN

T-7-0.5' L1451658-07 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 09:55	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:46	JDG	Mt. Juliet, TN

T-7-2' L1451658-08 Solid

Collected by	Collected date/time	Received date/time
B. Angulo	01/11/22 10:00	01/14/22 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1803687	1	01/18/22 17:03	01/18/22 17:23	CMK	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1803304	5	01/17/22 15:03	01/21/22 17:50	JDG	Mt. Juliet, TN

CASE NARRATIVE

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Unless qualified or notated within the narrative below, all sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jordan N Zito
Project Manager

DETECTION SUMMARY

Metals (ICPMS) by Method 6020

Client ID	Lab Sample ID	Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
T-5-0.5'	L1451658-03	Lead	159		0.113	2.29	5	01/21/2022 17:11	WG1803304
T-5-2'	L1451658-04	Lead	7.07		0.118	2.38	5	01/21/2022 17:28	WG1803304
T-6-0.5'	L1451658-05	Lead	187		0.120	2.42	5	01/21/2022 17:32	WG1803304
T-6-2'	L1451658-06	Lead	9.42		0.120	2.42	5	01/21/2022 17:36	WG1803304
T-7-0.5'	L1451658-07	Lead	153		0.120	2.43	5	01/21/2022 17:46	WG1803304
T-7-2'	L1451658-08	Lead	8.92		0.109	2.20	5	01/21/2022 17:50	WG1803304

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.4		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	159		0.113	2.29	5	01/21/2022 17:11	WG1803304

SAMPLE RESULTS - 04

L1451658

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.0		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	7.07		0.118	2.38	5	01/21/2022 17:28	WG1803304

SAMPLE RESULTS - 05

L1451658

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.7		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	187		0.120	2.42	5	01/21/2022 17:32	WG1803304

T-6-2'

Collected date/time: 01/11/22 09:45

SAMPLE RESULTS - 06

L1451658

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.8		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	9.42		0.120	2.42	5	01/21/2022 17:36	WG1803304

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

T-7-0.5'

Collected date/time: 01/11/22 09:55

SAMPLE RESULTS - 07

L1451658

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.4		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	153		0.120	2.43	5	01/21/2022 17:46	WG1803304

SAMPLE RESULTS - 08

L1451658

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	90.8		1	01/18/2022 17:23	WG1803687

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Lead	8.92		0.109	2.20	5	01/21/2022 17:50	WG1803304

WG1803687

Total Solids by Method 2540 G-2011

QUALITY CONTROL SUMMARY

L1451658-03,04,05,06,07,08

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Method Blank (MB)

(MB) R3751369-1 01/18/22 17:23

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1451658-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1451658-04 01/18/22 17:23 • (DUP) R3751369-3 01/18/22 17:23

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	84.0	81.8	1	2.69		10

Laboratory Control Sample (LCS)

(LCS) R3751369-2 01/18/22 17:23

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	49.0	98.0	85.0-115	

Method Blank (MB)

(MB) R3752474-1 01/21/22 17:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Lead	U		0.0990	2.00

Laboratory Control Sample (LCS)

(LCS) R3752474-2 01/21/22 17:07

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead	100	103	103	80.0-120	

L1451658-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1451658-03 01/21/22 17:11 • (MS) R3752474-5 01/21/22 17:21 • (MSD) R3752474-6 01/21/22 17:25

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	114	159	269	263	95.9	91.3	5	75.0-125			1.99	20

GLOSSARY OF TERMS

1 Cp
2 Tc
3 Ss
4 Cn
5 Ds
6 Sr
7 Qc
8 Gl
9 Al
10 Sc

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
RMD Environmental - Walnut Creek, CA

1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Billing Information:
Accounts Payable
1371 Oakland Blvd.
Suite 200
Walnut Creek, CA 94596

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Report to: **Doug Whichard**

Email To: **dwhichard@rmdes.net;bangulo@rmdes.net**

Project Description: **Pogonip Farm and Garden**

City/State Collected:

Please Circle: [✓ PT] MT CT ET

Phone: **925-683-8177**

Client Project # 01-POG-001

Lab Project # **RMDENVPHCA-POGONIP**

SDG # L1451658

H191

Table

Acctnum: **RMDENVPHCA**
Template: **T189615**
Prelogin: **P897732**
PM: **942 - Jordan N Zito**
PB:
Shipped Via: **FedEX Ground**

Collected by (print): B Angulo

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed STD TAT

Immediately Packed on Ice N ___ Y ✓

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Pb 6020 4ozClr-NoPres	ON HOLD	Remarks	Sample # (lab only)
T-4-0.5'		SS	0.5'	1/11/21	0840	1		X		-01
T-4-2'		SS	2'		0845	1		X		-02
T-5-0.5'		SS	0.5		0910	1	X			-03
T-5-2'		SS	2'		0915	1	X			-04
T-6-0.5'		SS	0.5'		0940	1	X			-05
T-6-2'		SS	2'		0945	1	X			-06
T-7-0.5'		SS	0.5'		0955	1	X			-07
T-7-2'		SS	2'		1000	1	X			-08
		SS								
		SS								

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: **SIEVE samples w/ no. 10 SIEVE PRIOR TO ANALYSIS**

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ________

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: _✓Y __N
Bottles arrive intact: _✓Y __N
Correct bottles used: _✓Y __N
Sufficient volume sent: _✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: _✓Y __N

Relinquished by : (Signature)	Date: 1/12/21	Time: 1400	Received by: (Signature) PN	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Relinquished by : (Signature) PN	Date: 1/13/21	Time: 1630	Received by: (Signature) SWA Cargo	Temp: 3.3+.2=3.5 °C Bottles Received: 8	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) T. Robertson	Date: 1/14/22 Time: 8	Hold:

Condition: NCF / [✓ OK]

APPENDIX F

LEAD MODEL SPREADSHEETS

EAST MEADOW

Summary of ProUCL Output

East Meadow Surface Soil (0 to 1.5 feet bgs)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	6.12	Mean	353.1
Maximum	2090	Median	105.1
SD	518.6	Std. Error of Mean	80.03
Coefficient of Variation	1.469	Skewness	1.958
Normal GOF Test			
Shapiro Wilk Test Statistic	0.677	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	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	487.8	95% Adjusted-CLT UCL (Chen-1995)	510.6
		95% Modified-t UCL (Johnson-1978)	491.8
Gamma GOF Test			
A-D Test Statistic	1.416	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.815	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.144	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.492	k star (bias corrected MLE)	0.473
Theta hat (MLE)	717.9	Theta star (bias corrected MLE)	747.2
nu hat (MLE)	41.32	nu star (bias corrected)	39.7
MLE Mean (bias corrected)	353.1	MLE Sd (bias corrected)	513.6
		Approximate Chi Square Value (0.05)	26.26
Adjusted Level of Significance	0.0443	Adjusted Chi Square Value	25.87
Assuming Gamma Distribution			
% Approximate Gamma UCL (use when n>=50))	533.7	95% Adjusted Gamma UCL (use when n<50)	541.8
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.135	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	1.812	Mean of logged Data	4.572
Maximum of Logged Data	7.645	SD of logged Data	1.811
Assuming Lognormal Distribution			
95% H-UCL	1299	90% Chebyshev (MVUE) UCL	980.5
95% Chebyshev (MVUE) UCL	1219	97.5% Chebyshev (MVUE) UCL	1550
99% Chebyshev (MVUE) UCL	2200		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	484.7	95% Jackknife UCL	487.8
95% Standard Bootstrap UCL	479.4	95% Bootstrap-t UCL	531.9
95% Hall's Bootstrap UCL	511	95% Percentile Bootstrap UCL	485.9
95% BCA Bootstrap UCL	509.6		
90% Chebyshev(Mean, Sd) UCL	593.2	95% Chebyshev(Mean, Sd) UCL	701.9
97.5% Chebyshev(Mean, Sd) UCL	852.9	99% Chebyshev(Mean, Sd) UCL	1149
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	701.9		
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.			

Summary of ProUCL Output

East Meadow Shallow Soil (>1.5 to 2 feet bgs)

General Statistics			
Total Number of Observations	22	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	9.26	Mean	62.49
Maximum	220	Median	38.15
SD	61.55	Std. Error of Mean	13.12
Coefficient of Variation	0.985	Skewness	1.478
Normal GOF Test			
Shapiro Wilk Test Statistic	0.79	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	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	85.07	95% Adjusted-CLT UCL (Chen-1995)	88.49
		95% Modified-t UCL (Johnson-1978)	85.76
Gamma GOF Test			
A-D Test Statistic	0.586	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	ected data appear Gamma Distributed at 5% Significance L	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.189	ected data appear Gamma Distributed at 5% Significance L	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.312	k star (bias corrected MLE)	1.164
Theta hat (MLE)	47.62	Theta star (bias corrected MLE)	53.7
nu hat (MLE)	57.75	nu star (bias corrected)	51.2
MLE Mean (bias corrected)	62.49	MLE Sd (bias corrected)	57.93
		Approximate Chi Square Value (0.05)	35.77
Adjusted Level of Significance	0.0386	Adjusted Chi Square Value	34.81
Assuming Gamma Distribution			
% Approximate Gamma UCL (use when n>=50)	89.45	95% Adjusted Gamma UCL (use when n<50)	91.93
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.094	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.184	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	2.226	Mean of logged Data	3.708
Maximum of Logged Data	5.394	SD of logged Data	0.949
Assuming Lognormal Distribution			
95% H-UCL	107.6	90% Chebyshev (MVUE) UCL	104.3
95% Chebyshev (MVUE) UCL	123.4	97.5% Chebyshev (MVUE) UCL	149.9
99% Chebyshev (MVUE) UCL	202		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	84.07	95% Jackknife UCL	85.07
95% Standard Bootstrap UCL	83.69	95% Bootstrap-t UCL	90.7
95% Hall's Bootstrap UCL	88.78	95% Percentile Bootstrap UCL	83.94
95% BCA Bootstrap UCL	86.14		
90% Chebyshev(Mean, Sd) UCL	101.9	95% Chebyshev(Mean, Sd) UCL	119.7
97.5% Chebyshev(Mean, Sd) UCL	144.4	99% Chebyshev(Mean, Sd) UCL	193.1
Suggested UCL to Use			
95% Adjusted Gamma UCL	91.93		
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.			

RAVINE

Summary of ProUCL Output

Ravine Surface Soil (0 to 1.5 feet bgs)

General Statistics			
Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	9.86	Mean	593
Maximum	1600	Median	428
SD	561.1	Std. Error of Mean	162
Coefficient of Variation	0.946	Skewness	0.944
Normal GOF Test			
Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.184	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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	883.9	95% Adjusted-CLT UCL (Chen-1995)	906.6
		95% Modified-t UCL (Johnson-1978)	891.2
Gamma GOF Test			
A-D Test Statistic	0.191	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.117	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.253	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.906	k star (bias corrected MLE)	0.735
Theta hat (MLE)	654.3	Theta star (bias corrected MLE)	806.5
nu hat (MLE)	21.75	nu star (bias corrected)	17.65
MLE Mean (bias corrected)	593	MLE Sd (bias corrected)	691.5
		Approximate Chi Square Value (0.05)	9.136
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	8.217
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1145	95% Adjusted Gamma UCL (use when n<50)	1273
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.243	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	2.288	Mean of logged Data	5.741
Maximum of Logged Data	7.378	SD of logged Data	1.471
Assuming Lognormal Distribution			
95% H-UCL	5038	90% Chebyshev (MVUE) UCL	1884
95% Chebyshev (MVUE) UCL	2382	97.5% Chebyshev (MVUE) UCL	3072
99% Chebyshev (MVUE) UCL	4427		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	859.4	95% Jackknife UCL	883.9
95% Standard Bootstrap UCL	852	95% Bootstrap-t UCL	1004
95% Hall's Bootstrap UCL	898.4	95% Percentile Bootstrap UCL	859.8
95% BCA Bootstrap UCL	929.2		
90% Chebyshev(Mean, Sd) UCL	1079	95% Chebyshev(Mean, Sd) UCL	1299
97.5% Chebyshev(Mean, Sd) UCL	1605	99% Chebyshev(Mean, Sd) UCL	2205
Suggested UCL to Use			
95% Student's-t UCL	883.9		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

Summary of ProUCL Output			
Ravine Shallow Soil (>1.5 to 2 feet bgs)			
General Statistics			
Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	6.59	Mean	52.96
Maximum	341	Median	23.5
SD	92.73	Std. Error of Mean	26.77
Coefficient of Variation	1.751	Skewness	3.21
Normal GOF Test			
Shapiro Wilk Test Statistic	0.504	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.361	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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	101	95% Adjusted-CLT UCL (Chen-1995)	123.5
		95% Modified-t UCL (Johnson-1978)	105.2
Gamma GOF Test			
A-D Test Statistic	0.995	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.762	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.27	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.254	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.841	k star (bias corrected MLE)	0.687
Theta hat (MLE)	62.95	Theta star (bias corrected MLE)	77.14
nu hat (MLE)	20.19	nu star (bias corrected)	16.48
MLE Mean (bias corrected)	52.96	MLE Sd (bias corrected)	63.92
		Approximate Chi Square Value (0.05)	8.299
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	7.429
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	105.1	95% Adjusted Gamma UCL (use when n<50)	117.4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.243	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	1.886	Mean of logged Data	3.269
Maximum of Logged Data	5.832	SD of logged Data	1.08
Assuming Lognormal Distribution			
95% H-UCL	127.4	90% Chebyshev (MVUE) UCL	88.11
95% Chebyshev (MVUE) UCL	108.1	97.5% Chebyshev (MVUE) UCL	135.9
99% Chebyshev (MVUE) UCL	190.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	96.99	95% Jackknife UCL	101
95% Standard Bootstrap UCL	96.48	95% Bootstrap-t UCL	243.7
95% Hall's Bootstrap UCL	244.4	95% Percentile Bootstrap UCL	104.4
95% BCA Bootstrap UCL	139		
90% Chebyshev(Mean, Sd) UCL	133.3	95% Chebyshev(Mean, Sd) UCL	169.6
97.5% Chebyshev(Mean, Sd) UCL	220.1	99% Chebyshev(Mean, Sd) UCL	319.3
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	169.6		
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.			

NORTH ORCHARD

Summary of ProUCL Output

North Orchard Surface Soil (0 to 1.5 feet bgs)

General Statistics			
Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	10.5	Mean	127.8
Maximum	690	Median	34.9
SD	195.1	Std. Error of Mean	56.32
Coefficient of Variation	1.527	Skewness	2.522
Normal GOF Test			
Shapiro Wilk Test Statistic	0.652	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.274	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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	228.9	95% Adjusted-CLT UCL (Chen-1995)	264.2
		95% Modified-t UCL (Johnson-1978)	235.8
Gamma GOF Test			
A-D Test Statistic	0.682	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.77	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.231	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.687	k star (bias corrected MLE)	0.571
Theta hat (MLE)	186.1	Theta star (bias corrected MLE)	223.9
nu hat (MLE)	16.48	nu star (bias corrected)	13.69
MLE Mean (bias corrected)	127.8	MLE Sd (bias corrected)	169.2
		Approximate Chi Square Value (0.05)	6.362
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	5.617
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	275	95% Adjusted Gamma UCL (use when n<50)	311.5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.243	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	2.351	Mean of logged Data	3.968
Maximum of Logged Data	6.537	SD of logged Data	1.372
Assuming Lognormal Distribution			
95% H-UCL	608.8	90% Chebyshev (MVUE) UCL	273.8
95% Chebyshev (MVUE) UCL	343.9	97.5% Chebyshev (MVUE) UCL	441.1
99% Chebyshev (MVUE) UCL	632.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	220.4	95% Jackknife UCL	228.9
95% Standard Bootstrap UCL	215.8	95% Bootstrap-t UCL	356.6
95% Hall's Bootstrap UCL	570.1	95% Percentile Bootstrap UCL	225.7
95% BCA Bootstrap UCL	273.9		
90% Chebyshev(Mean, Sd) UCL	296.7	95% Chebyshev(Mean, Sd) UCL	373.3
97.5% Chebyshev(Mean, Sd) UCL	479.5	99% Chebyshev(Mean, Sd) UCL	688.2
Suggested UCL to Use			
95% Adjusted Gamma UCL	311.5		
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.			

Summary of ProUCL Output

North Orchard Shallow Soil (>1.5 to 2 feet bgs)

General Statistics			
Total Number of Observations	5	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	3.97	Mean	15.06
Maximum	45.3	Median	6.55
SD	17.33	Std. Error of Mean	7.749
Coefficient of Variation	1.151	Skewness	1.988
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 5.1			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.723	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	31.58	95% Adjusted-CLT UCL (Chen-1995)	35.17
		95% Modified-t UCL (Johnson-1978)	32.73
Gamma GOF Test			
A-D Test Statistic	0.505	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.688	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.301	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.363	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.311	k star (bias corrected MLE)	0.658
Theta hat (MLE)	11.49	Theta star (bias corrected MLE)	22.89
nu hat (MLE)	13.11	nu star (bias corrected)	6.578
MLE Mean (bias corrected)	15.06	MLE Sd (bias corrected)	18.57
		Approximate Chi Square Value (0.05)	1.942
Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	1.033
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	51.01	95% Adjusted Gamma UCL (use when n<50)	95.87

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.262	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.343	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.379	Mean of logged Data	2.285
Maximum of Logged Data	3.813	SD of logged Data	0.97
Assuming Lognormal Distribution			
95% H-UCL	159.2	90% Chebyshev (MVUE) UCL	31.53
95% Chebyshev (MVUE) UCL	39.47	97.5% Chebyshev (MVUE) UCL	50.49
99% Chebyshev (MVUE) UCL	72.13		
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	31.58
95% Standard Bootstrap UCL	26.43	95% Bootstrap-t UCL	156.9
95% Hall's Bootstrap UCL	130.2	95% Percentile Bootstrap UCL	29.28
95% BCA Bootstrap UCL	31.08		
90% Chebyshev(Mean, Sd) UCL	38.31	95% Chebyshev(Mean, Sd) UCL	48.84
97.5% Chebyshev(Mean, Sd) UCL	63.46	99% Chebyshev(Mean, Sd) UCL	92.17
Suggested UCL to Use			
95% Student's-t UCL	31.58		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

WEST MEADOW

Summary of ProUCL Output **West Meadow Surface Soil (0 to 1.5 feet bgs)**			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	6.16	Mean	104.9
Maximum	1230	Median	39.1
SD	224.5	Std. Error of Mean	41.68
Coefficient of Variation	2.139	Skewness	4.803
Normal GOF Test			
Shapiro Wilk Test Statistic	0.4	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.33	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	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	175.8	95% Adjusted-CLT UCL (Chen-1995)	213.2
		95% Modified-t UCL (Johnson-1978)	182
Gamma GOF Test			
A-D Test Statistic	1.385	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.786	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.169	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.727	k star (bias corrected MLE)	0.674
Theta hat (MLE)	144.4	Theta star (bias corrected MLE)	155.6
nu hat (MLE)	42.14	nu star (bias corrected)	39.11
MLE Mean (bias corrected)	104.9	MLE Sd (bias corrected)	127.8
		Approximate Chi Square Value (0.05)	25.79
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	25.14
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	159.1	95% Adjusted Gamma UCL (use when n<50)	163.2
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0957	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.161	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	1.818	Mean of logged Data	3.826
Maximum of Logged Data	7.115	SD of logged Data	1.184
Assuming Lognormal Distribution			
95% H-UCL	169.4	90% Chebyshev (MVUE) UCL	158.8
95% Chebyshev (MVUE) UCL	190.4	97.5% Chebyshev (MVUE) UCL	234.2
99% Chebyshev (MVUE) UCL	320.4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	173.5	95% Jackknife UCL	175.8
95% Standard Bootstrap UCL	170.8	95% Bootstrap-t UCL	328.4
95% Hall's Bootstrap UCL	419.5	95% Percentile Bootstrap UCL	182.2
95% BCA Bootstrap UCL	228.2		
90% Chebyshev(Mean, Sd) UCL	230	95% Chebyshev(Mean, Sd) UCL	286.6
97.5% Chebyshev(Mean, Sd) UCL	365.2	99% Chebyshev(Mean, Sd) UCL	519.7
Suggested UCL to Use			
95% Adjusted Gamma UCL	163.2		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
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.			

Summary of ProUCL Output **West Meadow Surface Soil (>1.5 to 2 feet bgs)**			
General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	11.1	Mean	23.01
Maximum	49	Median	15.9
SD	14.65	Std. Error of Mean	5.539
Coefficient of Variation	0.637	Skewness	1.167
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 5.1			
Normal GOF Test			
Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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	33.78	95% Adjusted-CLT UCL (Chen-1995)	34.74
		95% Modified-t UCL (Johnson-1978)	34.18
Gamma GOF Test			
A-D Test Statistic	0.503	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.245	**Kolmogorov-Smirnov 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)	3.352	k star (bias corrected MLE)	2.011
Theta hat (MLE)	6.866	Theta star (bias corrected MLE)	11.45
nu hat (MLE)	46.93	nu star (bias corrected)	28.15
MLE Mean (bias corrected)	23.01	MLE Sd (bias corrected)	16.23
		Approximate Chi Square Value (0.05)	17.04
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	14.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	38.01	95% Adjusted Gamma UCL (use when n<50)	44.68

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.304	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.407	Mean of logged Data	2.98
Maximum of Logged Data	3.892	SD of logged Data	0.587
Assuming Lognormal Distribution			
95% H-UCL	44.07	90% Chebyshev (MVUE) UCL	37.99
95% Chebyshev (MVUE) UCL	44.89	97.5% Chebyshev (MVUE) UCL	54.46
99% Chebyshev (MVUE) UCL	73.28		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	32.12	95% Jackknife UCL	33.78
95% Standard Bootstrap UCL	31.45	95% Bootstrap-t UCL	50.28
95% Hall's Bootstrap UCL	52.74	95% Percentile Bootstrap UCL	31.5
95% BCA Bootstrap UCL	33.09		
90% Chebyshev(Mean, Sd) UCL	39.63	95% Chebyshev(Mean, Sd) UCL	47.16
97.5% Chebyshev(Mean, Sd) UCL	57.6	99% Chebyshev(Mean, Sd) UCL	78.12
Suggested UCL to Use			
95% Student's-t UCL	33.78		
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.			