

Beatty-Mulhausen Park
320 E. Main Street
Jones, Oklahoma, Oklahoma County

Sampling Report

August 21, 2024



OKLAHOMA
Environmental
Quality

1. Introduction

The purpose of this investigation was to respond to formal complaint No. 185347 submitted to the Environmental Complaints and Local Services Division of DEQ on April 8th, 2024. The complainant is concerned about potential lead contamination at Beatty-Mulhausen Park (Park) located at 320 E. Main Street in Jones, Oklahoma due to a history of lead contamination at nearby areas and a battery recycling facility located adjacent to the site. Additionally, the complainant provided DEQ with soil sample results with exceedances of the EPA Regional Screening Level (RSL) for residential land use for lead (200 mg/kg) in January and May of 2024. The exact location of the complainant's sample locations was not provided upon request and therefore was unable to be replicated by DEQ.

2. Chronology of Site Activities

DEQ first became aware of concerns at the park in January 2024 when a concerned citizen submitted a sample result of 545 mg/kg for lead that they had taken from the park. The park is just southeast of the Jones Ballfields site which is built on top of a known historical battery casing dump and is currently managed by the Town of Jones City with technical direction from DEQ via a Memorandum of Agreement and Soil Management Plan.

In January 2024, DEQ staff inspected the walking trail through Beatty-Mulhausen Park, the playground, the basketball court, and walked halfway through the field that extends east towards Choctaw Road to determine if there were any obvious visual signs of battery casings or lead contamination. No battery casings were observed, and the site had good vegetative coverage which reduces immediate contact or exposure to the soil.

In April 2024, the above referenced formal complaint was submitted to the Environmental Complaints and Local Services Division along with an additional sample result taken from an unknown location at the park showing 2,630 mg/kg for lead which prompted immediate investigation by DEQ.

3.Environmental Setting

Beatty-Mulhausen Park is in the Town of Jones City, Oklahoma, in Oklahoma County (see **Figure 1**). The site is near a small tributary of the North Canadian River and a portion of the North Canadian River historically flowed through the site. The on-site pond is a disconnected oxbow of the North Canadian River. This area of Oklahoma County typically has short, mild winters and long, hot summers. Temperatures throughout the year can vary from below 0°F to above 100°F. Average annual precipitation is about 32 inches with most of it occurring in the spring. Soil along the North Canadian River and other large streams is best characterized by deep, nearly level, loamy sandy soils and is part of the Canadian-Dale soil complex. Soils in this complex are easy to till, have good water-holding capacity, and have medium to high fertility. The thickness of the terrace deposits typically range from 50 to 100 feet in depth. Terrace deposits along the North Canadian

River can be major aquifers. Groundwater wells in Jones, Oklahoma typically yield water that is good to fair chemical quality with some hardness and dissolved solids. These wells usually produce at a rate of 75 gallons per minute. The topographic gradient near the site appears to be to the southwest towards Jones Creek with some storm water runoff flowing into the on-site pond and to the south and east towards the disc golf course and sports fields.

4. 2024 Sampling Activities

On May 29th, 2024, DEQ personnel collected sixty-three (63) five (5) point composite soil samples and two (2) grab soil samples across the entirety of Beatty-Mulhausen Park. Both sample types were taken from the 0-6” soil interval.

On June 24, 2024 DEQ personnel collected three (3) unique surface water samples and five (5) unique sediment samples from the on-site pond.

All samples (soil, sediment, and water) were analyzed for lead using EPA Method 200.7. Refer to **Tables 1-3** for sample ID and lead concentrations and **Figure 2** for sample locations. See **Attachment A** for DEQ Sampling Analysis Plan for the May and June 2024 sampling activities.

Table 1: Soil Sample Results

Sample ID <small>*indicates grab sample</small>	Lead Concentration (mg/kg)	Exposure Area	Exceed EPA Residential Screening Level (200 mg/kg)?	Sample ID <small>*indicates grab sample</small>	Lead Concentration (mg/kg)	Exposure Area	Exceed EPA Residential Screening Level (200 mg/kg)?
SS-1	502	East	Yes	SS-34	173	West	No
SS-2	242	East	Yes	SS-35	117	West	No
SS-3	66	East	No	SS-36	22.5	West	No
SS-4	180	East	No	SS-37	51.8	West	No
SS-5	62.6	East	No	SS-38	68.9	West	No
SS-6	26.3	East	No	SS-39	47.4	West	No
SS-7	120	East	No	SS-40	17.7	Middle	No
SS-8	55.4	East	No	SS-41*	34.1	West	No
SS-9	62.4	East	No	SS-42	36.8	West	No
SS-10	33.3	East	No	SS-43	54.4	West	No
SS-11	75.9	East	No	SS-44	27.4	West	No
SS-12	81.8	East	No	SS-45	26.6	West	No
SS-13	89.6	Middle	No	SS-46	55.7	West	No
SS-14	46.4	Middle	No	SS-47	103	West	No
SS-15	30.4	Middle	No	SS-48	64.9	West	No
SS-16	38.9	Middle	No	SS-49	55.2	West	No
SS-17	53.7	Middle	No	SS-50	54.3	West	No
SS-18	38.6	Middle	No	SS-51	86.7	West	No
SS-19	76.2	Middle	No	SS-52	26.2	West	No
SS-20	51.7	Middle	No	SS-53	35.1	West	No
SS-21	56.3	Middle	No	SS-54	30.9	West	No
SS-22	26.7	Middle	No	SS-55	94.6	West	No
SS-23	22.2	Middle	No	SS-56	128	West	No
SS-24	41.7	Middle	No	SS-57	115	West	No
SS-25	22.6	Middle	No	SS-58	286.6	Middle	Yes
SS-26	14.4	Middle	No	SS-59	17.5	Middle	No
SS-27	68.8	West	No	SS-60	21.9	Middle	No
SS-28	22.9	West	No	SS-61	10.2	Middle	No
SS-29	48.3	West	No	SS-62	16.2	Middle	No
SS-30	49.3	West	No	SS-63	183	Middle	No
SS-31	159	West	No	SS-64	234	Middle	Yes
SS-32	33.4	West	No	SS-65*	123	East	No
SS-33	104	West	No				

Table 2: Sediment Sample Results

Sample ID	Lead Concentration (mg/kg)	Sample Type	Exceed EPA Residential Screening Level (200 mg/kg)?	Sample ID	Lead Concentration (mg/kg)	Sample Type	Exceed EPA Residential Screening Level (200 mg/kg)?
SED-1	95.1	Grab	No	SED-4	120	Grab	No
SED-2	83	Grab	No	SED-5	31.7	Grab	No
SED-3	90.8	Grab	No				

Table 3: Surface Water Sample Results

Sample ID	Lead Concentration (µg/L)	Sample Type	Exceed EPA Residential Screening Level (15µg/L)	Sample ID	Lead Concentration (µg/L)	Sample Type	Exceed EPA Residential Screening Level (15 µg/L)
SW-1	10.1	Grab	No	SW-3	13.9	Grab	No
SW-2	7.1	Grab	No				

5. Data Evaluation and Risk Assessment

a. Soil

All soil sample results were compared to the U.S Environmental Protection Agency (EPA) current residential screening level for lead (200 mg/kg). This value is established by the EPA using the Integrated Exposure Uptake Biokinetic model (IEUBK) and is based on a risk scenario that contemplates the multiple ways in which young children (aged 0-6) may be exposed to lead including soil, dust, drinking water, air, and ingestion exposure pathways. DEQ used site specific information for the soil exposure pathway but otherwise used default parameters throughout the model evaluation.

The raw sample results demonstrate that the lead concentrations at the surface (0-6”) of the park are generally below the current lead screening level for residential use. However, there are four samples that are above the screening level which prompted DEQ to conduct additional risk evaluation.

DEQ contemplated two risk scenarios for this additional evaluation. First, the exposure area was defined as the entirety of the Beatty-Mulhausen Park and the entire data set was evaluated. Second, DEQ divided the park property into three exposure areas, West (Main Park), Middle (Sports Fields) and East (Disc Golf) and utilized data from those specific areas. DEQ utilized the EPA ProUCL software to produce a 95% Upper Confidence Limit (UCL) to the mean (i.e average), which was utilized as the exposure point concentration (EPC) for each dataset evaluated. The 95% UCL of the mean (i.e. EPC) is a conservative estimate based on the average chemical concentration in an environmental medium. DEQ then utilized the EPC for the whole park and each park section individually as the soil concentration to run the IEUBK Model which determines a percentage of children that are predicted to have a blood lead concentration above 5 µg/dl in a residential scenario. Generally, the acceptable threshold is less than 5% with blood concentration over 5 µg/dl. Those results are outlined below and further in **Attachment B**:

Entire Park – EPC is 93 mg/kg, determined that approximately 0.89% of children are predicted to have blood lead concentration above 5 µg/dl

West (Main Park) - EPC is 81 mg/kg, determined that approximately 0.67% of children are predicted to have a blood lead concentration above 5 µg/dl.

Middle (Sports Fields) - EPC is 99 mg/kg, determined that approximately 1.01% of children are predicted to have a blood lead concentration above 5 µg/dl.

East (Disc Golf) - EPC is 210 ppm, determined that approximately 5.6% of children are predicted to have a blood lead concentration above 5 µg/dl.

As a whole, the park is well below the acceptable threshold of 5% for blood lead concentration above 5 µg/dl, as are the West and Middle portions of the park. The East end of the park is slightly above the acceptable blood lead threshold.

It’s worth noting that the IEUBK model contemplates a residential risk scenario in which the exposure frequency is daily, and the exposure duration is seven years (Age 0 to Age 7 or first 84 months of life). It is unlikely that the Beatty-Mulhausen Park is used by local children in a manner that is consistent with the IEUBK residential risk scenario; however, DEQ used the residential scenario in order to perform the most conservative evaluation possible.

b. Sediment

The sediment samples were compared to the residential screening level (RSL) for lead of 200 mg/kg and were all found to be below the RSL.

c. Surface Water

The surface water samples were compared to the drinking water Maximum Contaminant Level (MCL) for lead of 15 µg/L and were all found to be below the MCL.

d. Blood Lead

For additional evaluation, DEQ requested childhood blood lead data from the Oklahoma State Department of Health (OSDH) and found that the 2018-2023 combined percentage results are equal to blood lead concentrations in Oklahoma County and slightly below the Oklahoma state average concentration. This data can be found in **Attachment C**.

6. Next Steps

Based on the risk evaluations performed as part of this sampling report, the park as a whole does not pose a significant lead exposure risk to children and DEQ does not recommend any major changes or restrictions to the park. However, due to the East section (Disc Golf) having an exposure concentration point (EPC) slightly above the EPA Regional Screening Level (RSL) of 200 mg/kg and a 5.6% risk of blood lead concentration above 5 µg/dl, DEQ recommends that the Town of Jones City engage DEQ for technical assistance on possible solutions to mitigate any potential risks.

Figure 1: Site Vicinity – Jones, OK



Figure 1: Site boundary and three exposure areas (West, Middle, East).

Figure 2: Soil Sample Locations



Figure 2: Soil sampling locations. Highlighted grids indicate sample result over 200 mg/kg.

ATTACHMENT A
Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN
BEATY-MULHAUSEN PARK
JONES, OKLAHOMA COUNTY, OKLAHOMA

May 13, 2024

STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Prepared by:

Katrina Pollard
Environmental Programs Specialist

Approved by:

Brian Stanila
Environmental Programs Manager

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1. Introduction

The purpose of the investigation is to respond to a formal complaint No. 185347 submitted to the Environmental Complaints and Local Services Division of DEQ on April 8th, 2024. The complainant is concerned about potential lead contamination at Beauty-Mulhausen Park located at 320 E. Main Street in Jones, Oklahoma due to a history of lead contamination at nearby areas and a battery recycling facility located less than one mile from the site. Additionally, the complainant collected their own soil samples and reported two exceedances of the EPA Screening Level for lead (200 mg/kg) using EPA Method 6000/7000 in November of 2023 and May of 2024.

This project will follow the procedures set forth in the DEQ Quality Management Plan (QMP) and the Site Cleanup Assistance Program (SCAP) Quality Assurance Project Plan (QAPP) for fiscal year 2024.

2. Site Description

2.1 Location

Beauty-Mulhausen Park is owned by the Town of Jones City and is located at 320 E. Main Street in Jones, Oklahoma. The site is just southeast of the Jones Ballfields which was built atop a historic battery casing repository and is currently managed by the Town of Jones City with assistance from DEQ in a Memorandum of Agreement (MOA) to minimize exposure to the public (**Reference 1**).

2.2 Site Description and Operational History

Generally, the area in which the site is located is suburban. The area is mixed commercial/residential. The site is bounded by Henney Road to the West, Britton Road/Main Street to the North, N. Choctaw Rd. to the East, and a railroad track to the South. A gas station is located to the North, and Madewell & Madewell Inc. is located to the East.

2.3 Waste Characteristics

The contaminant of concern (COC) at the site is lead. Old battery casings contain lead and the complaint expresses concerns about the casings due to the proximity to the nearby Jones Ballfields Site and battery recycling facility. DEQ staff have previously walked and inspected the property and found no visible battery casings (**Reference 2**).

3. Collection of Non-Sampling Data

A GPS point will be collected from the center aliquot in each grid. Photographs will be taken of each sampling location.

4. Sampling Activities

The objective of this sampling event is to respond to a formal complaint No. 185347 submitted to the Environmental Complaints and Local Services Division of DEQ on April 8th, 2024. The complainant is concerned about potential lead contamination at Beauty-Mulhausen Park located at 320 E. Main Street in Jones, Oklahoma due to a history of lead contamination at nearby areas and a battery recycling facility located less than one mile from the site. A map of sampling locations is attached (**Attachment 1**).

DEQ will utilize the State Environmental Laboratory (SEL) for all sample analysis.

4.1 Soil Sampling

DEQ estimates collecting 64 composite samples and up to 5 discrete grab samples for lead. The grab samples will only be taken if there is visualized area of concern such as visible battery casings or stressed vegetation. As per DEQ's Quality Management Plan, a duplicate sample will be collected at the rate of one per every 10 samples. DEQ anticipates collecting seven duplicate soil samples.

Lead samples will be collected with dedicated stainless steel spoons and homogenized in 13" x 18" 6 mil poly zip-lock bags. Lead samples will be collected from 0-6" depth. Each spoon will be dedicated to its sample and bags will not be re-used, thus there is no need for decontamination in the field or between samples. Used spoons will be placed in used collection bags and stored in a large garbage bag until the sample team returns to DEQ. Upon returning to DEQ, used bags will be disposed of appropriately and used spoons will be decontaminated using DI water and liquinox.

One person from the sample team will be responsible for documenting the sample collection process in the field logbook. Items to be recorded include, but are not limited to; site name, description of field task, date and time field work begins, weather conditions, sample team members, time of sample collection, sample number, sample location, sample media, and physical properties or descriptions of media.

4.2 Surface Water Sampling

DEQ will collect 3 surface water samples taken according to DEQ's Standard Operating Procedure (SOP) #5 – Surface Water Sampling (**Attachment 2**). The three grab samples will be taken on the west, middle and east ends of the pond where accessible. As per DEQ's Quality Management Plan (QMP), a duplicate sample will be collected at the rate of one per every 10 samples. DEQ anticipates collecting one duplicate surface water sample.

The samples will be taken either by dipping the container into the surface water directly or using long handled dippers, depending on the water level at the time of sampling. If long handled dippers are needed, separate dippers will be used for each sample to prevent sample cross contamination. 10 to 20 mL of the sample water will be discharged so as not to cause contamination at the bottleneck.

For each surface water sample, field measurements for temperature, dissolved oxygen (DO), specific conductivity (SC), oxidation reduction potential (ORP), and pH will be taken with the YSI Multiparameter Meter in accordance with DEQ's Standard Operating Procedure (SOP) # 2 – Field Instruments (**Attachment 3**) and the manufacturer's instructions. The field measurements will be recorded in the field logbook.

One person from the sample team will be responsible for documenting the sample collection process in the field logbook. Items to be recorded include, but are not limited to; site name, description of field task, date and time field work begins, weather conditions, sample team members, time of sample collection, sample number, sample location, sample media, and physical properties or descriptions of media.

4.3 Sediment Sampling

Five grab sediment samples will be collected. Three of them will be co-located with the surface water grab samples. The other two grab samples will be located between the middle and end samples (see **Attachment 1**). The grab samples will be collected 0-6 inches deep using a long 15 inch stainless steel spoon. Sediment collected will be mixed thoroughly with a dedicated stainless steel spoon and bowl to obtain a homogenous sample before being placed in two 4-oz jars. The jars will be filled as full as possible, sealed tightly, and placed on ice in the cooler. All sample locations will be photographed. Duplicate samples will be collected at the rate of one per every 10 samples. DEQ anticipates taking 1 duplicate sediment sample.

One person from the sample team will be responsible for documenting the sample collection process in the field logbook. Items to be recorded include, but are not limited to; site name, description of field task, date and time field work begins, weather conditions, sample team members, time of sample collection, sample number, sample location, sample media, and physical properties or descriptions of media.

4.4 Quality Assurance/Quality Control

Quality assurance and quality control (QA/QC) for the sampling event will be provided by the use of duplicates and trip blanks. Duplicates will be collected at a rate of 1 per 10 samples. DEQ anticipates taking 7 duplicate soil samples, 1 duplicate surface water sample, and 1 duplicate sediment sample.

4.5 Field Activities

DEQ personnel are scheduled to sample the site in May 2024. Sampling will be conducted over one to two days. Three two-person teams will be utilized to sample. One team will collect the surface water and sediment samples and the other two teams will collect the soil samples. Upon collection, all samples will be properly packaged for transport. If conditions do not allow samples to be collected at their designated location, modifications will be made, documented in field logbook, and discussed in the final report.

4.6 Sample Transportation

Samples will be individually labeled, bagged, placed in hard plastic coolers, and packed with ice prior to transporting. Samples will be delivered to the State Environmental Laboratory (SEL) for the analysis of the samples collected during this sampling event. Incoming samples will be accounted for via chain-of-custody (COC) forms. An example COC is attached (**Attachment 4**). Sample collectors will have the responsibility for properly completing this form. When samples are received, Sample Receiving personnel will check for accuracy and completeness, accept custody, and file COCs with other sample login paperwork in file cabinets located in Sample Receiving. The Project Manager will be given duplicate copies of login forms for separate storage with other records related to this project. The Project Manager will act as sample custodian and will ensure that all samples are relinquished and received by Sample Receiving. If samples are delivered after operating business hours, sample custodian will follow appropriate Sample Receiving protocols and will lock samples in the sample cage outside the door of Sample Receiving. Sample coolers will need to be topped off with ice before being stored in the Sample Receiving cage. The sample number and parameters shall be logged into a computer for tracking. Sample custody shall be maintained in the sample receiving area until disbursement for analysis. All samples will be stored in the laboratory area until all analyses have been performed and results verified.

5. Investigation Derived Waste Plan

Investigation-derived wastes generated at the site will include disposable personal protective equipment (PPE) (i.e., Tyvek, nitrile gloves); contaminated sampling equipment; and solid waste. Used PPE, and solid waste will be double bagged in heavy-duty trash bags and returned to DEQ headquarters for proper disposal. Contaminated sampling equipment will be double bagged in heavy-duty trash bags and returned to DEQ laboratory for proper decontamination. Non-disposable PPE (i.e., steel-toed boots, leather gloves, respirators) will be decontaminated in the field to the extent possible and returned to DEQ headquarters for proper decontamination; it is unlikely that any PPE will become grossly contaminated.

6. Sampling Team and Project Management

Katrina Pollard	Environmental Programs Specialist	Project Manager/Sampling Team
Trenton Wilhelm	Environmental Programs Specialist	Sampling Team/Health & Safety Officer
TBD	Environmental Programs Specialist	Sampling Team
TBD	Environmental Programs Specialist	Sampling Team
TBD	Environmental Programs Specialist	Sampling Team
TBD	Environmental Programs Specialist	Sampling Team

During site activities, the DEQ sampling team may require additional personnel to assist or train in site activities. These additional staff members will be briefed on the sampling objectives and site conditions. The final report will document any additional staff that was used during the sampling event.

6.1 Project Schedule

Sampling activities are scheduled to take place during May 2024.

7. Health and Safety Plan

The field team will be briefed by the project health and safety officer on any apparent location specific health and safety concerns. Level D protective clothing and equipment is anticipated to be used for all on and off-site activities. However, if conditions warrant, the health and safety officer may require the sampling team to upgrade the level of protective gear. The site command center will be located in an area upwind of any exposed waste.

The Health and Safety Plan (HASP) will be reviewed by all DEQ sampling personnel, and all HASP guidelines will be followed during sampling activities. Health and safety issues are discussed more specifically in the HASP (**Attachment 5**) attached to the work plan.

Table 1

Item	Number (n)	Cost of Method (ea)	Total Cost
Total Lead Analysis (Method 6010D) – Soil Samples	71	\$27.50	\$1952.50
Total Lead Analysis (Method 200.8) – Surface Water Samples	4	27.50	\$110.00
Total Lead Analysis (Method 6010D)- Sediment Samples	6	27.50	\$165.00
Total Hardness (Method 130.1)- Surface Water Samples	4	20.96	\$83.84
TOTAL	85		\$2311.34

Attachment 1: Site Map



Attachment 2: LPD SOP-5: Surface Water Sampling

Standard Operating Procedure (SOP)
SOP - 5

Surface Water Sampling

Prepared and Approved by: Heather Mallory 7-3-19
Heather Mallory
Quality Assurance Coordinator Date

Approved by: Dustin Davidson 7/3/19
Dustin Davidson
Site Restoration and Revitalization Manager Date

Approved by: Ray Roberts 7/8/19
Ray Roberts
Risk Management and Groundwater Manager Date

Approved by: Kelly Dixon 7-8-19
Kelly Dixon
Land Protection Division Director Date

1.0 Scope and Application

- 1.1 The Site Restoration & Revitalization and Risk Management & Groundwater units, which include the Superfund, Brownfields, Site Cleanup Assistance Program, Voluntary Cleanup, and Chemical Reporting and Preparedness Sections, of the Land Protection Division, follow the EPA 2.0 Surface Water Sampling: SOP #2013. Sample collection is conducted in full accordance with the methods described in SOP #2013.
- 1.2 The purpose of this Standard Operating Procedure (SOP-5) is to describe the procedures for collecting representative liquid samples, both aqueous and non-aqueous from streams, rivers, lakes and ponds.
- 1.3 This document is prepared to address only sampling limited to the above mentioned surface water bodies and will not be used for sampling lagoons or other impoundments where contact with contaminants are a concern.
- 1.4 Sample preservation, containers, handling, storage, QA/QC samples, data validation, and health and safety issues are discussed in the EPA SOP #2013 and will be followed by LPD personnel during all types of surface water sampling.

2.0 Surface Water Sampling

2.1 *Sampling equipment*

Sampling equipment may include:

- Sampling containers as per the Sampling and Analysis Plan
- Sterile sample bottles
- Long handled dipper
- Sample labels
- Sample tags
- Field Logbook
- Chain-of-Custody Forms
- Jars and bottles
- Zip-lock bags
- Packing foam and tape
- Ice and coolers
- Indelible marking pen
- Disposable nitrile gloves
- Paper towels
- Utility knives
- Spray bottles
- DI water
- Disposable protective suits

Cameras

GPS units

Monitoring Instruments

Organic Vapors Analyzer (OVA)

Photoionization Detector (PID)

pH meter

Conductivity meter

Temperature gauge

Chemical field test kits

Garbage bags

Decontamination equipment (Alconox, DI water, scrub brush)

2.2 *Sample Collection – collecting in stream*

- 2.1.1 Samples should be collected downstream to upstream. The sampler will collect the first sample downstream and work their way upstream collecting samples.
- 2.1.2 Lower sterile sample bottles carefully to the desired depth. For shallow streams collect the sample under the water surface pointing the sample bottle upstream. The container must be upstream of the collector. Avoid disturbing the substrate.
- 2.1.3 Retrieve the sample bottle and discharge the first 10 to 20 mL to clear away potential contamination on the bottleneck.
- 2.1.4 Transfer the sample bottle to the appropriate sample cooler.
- 2.1.5 Record the sampling activities as described in SOP-1 (Field Logbooks).
- 2.1.6 Sampling equipment should be decontaminated in accordance with EPA SOP #2006.

2.2 *Sample Collection – collecting from stream bank*

- 2.3.1 Rinse long handled dipper three times with sample water
- 2.3.2 Lower long handled dipper carefully to the desired depth. Avoid disturbing the substrate. If surface debris is present, it can be cleared with the handle of the dipper, prior to collecting the sample.
- 2.3.3 Transfer the sample to a sterile sample bottle.
- 2.3.4 Transfer the sample bottle a cooler.

2.3.5 Record the sampling activities as described in SOP-1 (Field Logbooks).

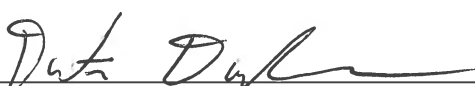
2.3.6 Sampling equipment should be decontaminated in accordance with EPA SOP #2006.


Attachment 3: LPD SOP-2: Field Instruments

Standard Operating Procedure (SOP) SOP - 2

Field Instruments

Prepared and Approved by:  7-3-19
Heather Mallory
Quality Assurance Coordinator
Date

Approved by:  7-3-19
Dustin Davidson
Site Restoration and Revitalization Manager
Date

Approved by:  7/8/19
Ray Roberts
Risk Management and Groundwater Manager
Date

Approved by:  7-8-19
Kelly Dixon
Land Protection Division Director
Date

1.0 Field Sampling and Measurement Procedures

1.0 Standard Procedures

The objective of this SOP is to ensure proper use of field instruments by Site Restoration & Revitalization and Risk Management & Groundwater personnel during site investigations. Site Restoration & Revitalization and Risk Management & Groundwater Units, which include the Superfund, Brownfields, Site Cleanup Assistance Program, Voluntary Cleanup Program, and Chemical Reporting & Preparedness Sections of the Land Protection Division. Appropriate handling of instruments protects not only the health and safety of on-site personnel but that of surrounding populations and environment as well. During all field operations one of the goals of sampling teams is to both prevent exposure of on-site personnel to contamination and to prevent inappropriate transport of contaminated material away from the site.

This SOP is prepared for all routine or repetitive instrument operations that are necessary for collecting samples and assessing environmental data. These may include but are not limited to:

- Instrument calibration
- Preventative/corrective maintenance
- Internal quality control procedures
- Instrument/equipment selection, use, cleaning and decontamination
- Field measurements

As a rule, personnel will follow manufacturer's guidance and instructions, which will be stored with field instruments, on how to operate and calibrate the equipment. However, new operating procedures may be adopted for use by unit personnel. All new procedures for field measurement and sampling activities and any deviations from the manufacturer instructions were developed within the Site Restoration & Revitalization and Risk Management & Groundwater Units and are included in this SOP, or will be developed for a specific project and included as an appendix to the site specific sampling and analysis plan (SAP). New SOPs will be evaluated to the extent necessary to ensure the result provided is equivalent to a currently used procedure or consistent results are achieved. Excerpts from the instrument manuals regarding operation of the field instruments have been included in this SOP. Documentation supporting the use and acceptance of all adopted procedures will be maintained by the unit's Quality Assurance Coordinator.

The Site Restoration & Revitalization and Risk Management & Groundwater Units will follow the EPA 1.0 Sampling Equipment Decontamination: SOP # 2006 for decontamination of field equipment.

Any in field deviations from this SOP, or from the SAP will be noted in the Field Logbooks as described in SOP-1 (Field Logbooks).

2.0 Equipment Procedures

2.1 Orion Model 1230

Sample pH Measurement:

1. Press the **pH/mV/O₂/χ** and **SCROLL** keys until the pH indicator is displayed.
2. Press **RUN/ENTER**, rinse the electrode with deionized water and immerse in the sample to start pH measurement.
3. Rinse the probe with deionized water and secure it when finished.

ORP mV Function (no calibration):

1. Attach Adapter Orion Cat. No. 090034
2. Turn the instrument on by pressing the **ON** key.
3. Press the **pH/mV/O₂/χ** and **SCROLL** keys until the mV indicator is displayed.
4. Rinse the electrode with deionized water and immerse into sample solution.
5. Absolute mV reading appears on the display.
6. Rinse the probe with deionized water and secure it when finished.

Dissolved Oxygen Measurement:

Note: For Salinity Corrected DO, measure and record the Salinity of the sample(s). When measuring the DO with Salinity Correction, press **CAL** until SAL displays. When SAL displays, use the **SCROLL** keys to adjust the displayed salinity to the salinity value of the sample being measured.

1. Connect the DO probe to the meter.
2. Press the **pH/mV/O₂/χ** key until the O₂ indicator displays.
3. For Salinity Correction, hold the **RUN/ENTER** key while pressing the **UP SCROLL** or **DOWN SCROLL** key to turn Salinity correction on or off, respectively. SAL will display when Salinity Correction is enabled.
4. Immerse the DO probe in the sample and wait a moment for the reading.

5. *Note:* If Auto-Read is enabled, press the **RUN/ENTER** key to take multiple measurements or disable Auto-Read.
6. Rinse the probe with deionized water and secure it when finished.

Conductivity and Salinity Measurement:

Note: To switch between Conductivity and Salinity, use the **SCROLL** keys.

1. Rinse with deionized water, blot dry, and immerse the probe into the sample.
2. Rinse the probe with deionized water and secure it when finished.

Temperature Measurement:

Note: There is no calibration for temperature. Also, the DO, pH, and Conductivity and Salinity probes measure temperature.

1. The temperature displays in real time. Note the temperature(s) when taking other measurement(s). If only temperature is to be taken, rinse the probe with deionized water before testing the sample.
2. Rinse the probe with deionized water and secure it when finished.

2.2 *Oakton PC 10*

pH and Conductivity Measurements:

1. If the probe is dehydrated, soak it for 30 minutes in tap water.
2. Attach the probe and rinse the probe well with deionized water.
3. Press the **ON** button.
4. Press the **CAL/MEAS** button so MEAS displays.
5. Immerse the probe deep enough in the sample to cover the conductivity electrodes and stir gently.
6. Allow time for the meter to sample. When stable, **READY** and the measurement displays.
7. Toggle between conductivity and pH using the **MODE** button.
8. When readings are finished, rinse the probe well with deionized water.
9. Fill the pH safety cap with pH electrolyte solution and replace the pH safety cap.
10. Clean the units, unthread the cable and socket, and secure all parts in the case.

2.3 *Hach Turbidimeter 2100P*

Measurements:


1. Turn on the 2100P by pressing the **I/O** key.
2. Select the proper range or auto range by pressing the **RANGE** key.
3. Pour a representative sample into the sample cell and dump the waste. Repeat this a second time.
4. Pour a representative sample into the sample cell and seal the lid.
5. Wipe the sample cell clean with a lint free cloth.
6. Invert the sample cell a few times and place the sample cell in the cell compartment. Close the lid.
7. With the lid closed, press **READ**, and wait a moment for the measurement to display next to NTU.
8. Remove the sample cell and rinse clean the sample cell.
9. Repeat steps 2-7 for each sample.
10. Wipe clean the instrument and sample cells and secure all parts in the carrying case.

2.4 *Hach Turbidimeter 2100Q*

1. Press the ON/Off key  to turn the meter on or off.

Calibrating the turbidimeter with StableCal Standards:

Note: It is recommended that the turbidimeter be calibrated quarterly.

1. Push the **CALIBRATION** key  to enter the Calibration mode. Follow the instructions on the display.
2. Vigorously shake the standard for 10 seconds and let it sit 3-5 minutes before inserting into the meter.
3. Carefully wipe the outside of the standard bottle with a lint free cloth before inserting it into the meter.
4. Insert the 20 NTU StablCal Standard and close the lid. Match the orientation arrows on the bottle and turbidimeter when inserting the standard.
5. Push **READ**. The display shows Stabilizing and then shows the result.

6. Repeat Steps 3 and 4 with the 100 NTU and 800 NTU StablCal Standard. Push **Done** to complete a 2 point calibration.
7. Push **Done** to review the calibration details.
8. Push **Store** to save the results.
9. After a calibration is complete, the meter automatically goes into Verify Cal mode. It will ask for the 20 NTU standard. Only insert the 20 NTU standard if you want to verify the calibration.

Analyzing turbidity in samples:

1. To enter Reading Mode, press the **UP** or **DOWN** key then **Select** (key on the right).
2. Two mode choices based on sample turbidity:
 - a. When measuring clean water samples or samples without settling particles (below 20 NTUs), select **Signal Average**.
 - b. When measuring samples with particles that settle quickly (above 20 NTUs), select **Rapidly Settling Turbidty**.
3. Clean and dry the sample cell (glass collection tube) with deionized water prior to use.
4. Before pouring the sample into the sample cell, carefully invert the sample to ensure it is homogeneous without creating bubbles.
5. Pour a representative sample into the sample cell and dump the waste. Repeat this a second time.
6. Pour a representative sample into the sample cell and seal the lid.
7. Hold the sample cell by the lid and wipe with a lint free cloth.
8. Invert the sample cell a few times to gently mix.
9. Insert into the turbidimeter compartment and immediately press **READ**.
10. Wait for the readings to stabilize.
11. Record the final reading.
12. Remove the sample cell and rinse clean the sample cell.

13. Repeat steps above for each sample.
14. Wipe clean the instrument and sample cells and secure all parts in the carrying case.

2.5 Hach Total Hardness Test Kit

Test preparation:

1. Rinse labware with deionized water between tests.
2. When titrating, count each drop of titrant. Hold the dropper vertically. Swirl after each drop is added.

Low range (1 to 20 mg/l) test procedure:

1. Fill the flask to the 100-mL mark with sample.
2. Add 2mL of Buffer Solution, Hardness 1 to the flask. Swirl to mix.
3. Add four drops of Hardness 2 Indicator. Swirl to mix. A blue color indicates soft water. If a red color develops, proceed to step 4.
4. Add Hardness 3 Titrant Reagent by drops. Count the drops until the color changes from red to blue. Swirl to mix after each drop.
5. Calculate the results. Each drop of Hardness 3 Titrant Reagent equals 1 mg/L of calcium carbonate (CaCO₃).

High range (1 to 20 gpg (17 to 342 mg/L)) test procedure:

1. Fill the plastic measuring tube to the top with sample. Pour the sample into the bottle.
2. Add three drops of Buffer solution, Hardness 1 to the mixing bottle. Swirl to mix.
3. Add one drop of Hardness 2 Indicator to the mixing bottle. Swirl to mix. A blue color indicates soft water. If a red color develops, proceed to step 4.
4. Add Hardness 3 Titrant Reagent by drops. Count the drops until the color changes from red to blue. Swirl to mix after each drop.

5. Calculate the results. Each drop of Hardness 3 Titrant Reagent equals 1 grain per gallon hardness of calcium carbonate (CaCO_3). One grain per gallon (gpg) equals 17.1 mg/L.

2.6 *Hach Accuvac Iron*

Measuring hints:

1. The AccuVac ampul must be broken far enough below the surface of the sample to prevent air from being drawn into the ampul.
2. Use care in handling reacted ampuls since the broken tip is sharp. Do not cover ampul tip with finger to invert.

Directions:

1. Collect 40 mL of sample in beaker. Pour 10 mL into the zeroing vial.
2. Place this vial in the left top opening of the AccuVac color comparator.
3. Place the ampul in the ampul breaker provided and push down on the ampul to break and fill the ampul, or fill the ampul by breaking the tip against the side of the beaker.
4. Invert ampul several times. It is not necessary for all of the reagent to dissolve.
5. Place the ampul in the right top opening of the color comparator.
6. Allow 3 minutes for color development.
7. Hold the comparator up to the light source (sky, window, or light). Look through the openings in the front.
8. Rotate the color disc until the color matches in the two openings.

2.7 *Trimble GPS Unit*

Notes: Indoors, heavy tree cover, power lines, and buildings will decrease signal strength. If the system ever asks to restore backup files, *always* say YES. For DEQ technical service contact Matt Wormus (405)702-5137 or Todd Downham (405)702-5136.

Collecting Data Points

1. Turn on receiver by pushing the power button
2. When the screen turns on, with the stylus hit START button. Scroll down to the TERRASYNC icon. Double click it.
Note: On older Trimble units, Terrasync may be located under START > PROGAMS or START > TERRASYNC.

Note: If TerraSync does not appear, perform a hard restart by holding down the power button for about 4 seconds. After the reboot, select **YES** when prompted to restore files.

3. TerraSync will open. In the “Status” window, wait for satellite collection.
Note: There must be at least 4 satellites and a PDOP less than 6.0. If the receiver does not connect to satellites, press SETUP > OPTIONS > CONNECT TO GPS.
4. Press the ▼ next to “Status.” From the dropdown menu, select **DATA**.
5. Select the Dictionary Name with the stylus that you would like to use. Press **CREATE**.
6. A “confirm antenna height” dialogue box will appear. Enter the distance from the ground to where the receiver will be held (usually 4 feet). Press **OK**.
7. Select a ‘feature type’ applicable to the collection point. Highlight that line with the stylus. Press **CREATE**.
8. Fill in the comment line with the stylus and keyboard. Wait for the flashing number in the upper right to be more than 36. Press **OK**.

Note: The flashing number represents the amount of readings used to average the single point being acquired.

9. Repeat steps 7 and 8 for all points sought.
10. Recollect data points as another data point if there is any uncertainty with the original collection.

11. When finished collecting data points, press **CLOSE**. Then, press **YES** to close TerraSync.
12. Press the power button to return the receiver to suspend.

Note: If suspend is to be for longer than 3 months, turn receiver off by holding the power button down for about 15 seconds.

2.8 *VRAE or MiniRAE Lite*

Note: Before use, make sure the analyzers are charged or there is an extra set of batteries. The analyzers lose charge when they are off.

Calibration

Calibrate the VRAE and MiniRAE Lite before field screening for vapors. The calibration room where the gas canisters are stored is located across the freight elevator on the first floor.

1. Turn the VRAE and MiniRAE Lite on by pressing the **MODE** button for 1 second. The analyzers will boot up and go through their settings.
2. Once the meters are turned on and have gone through all their settings, press and hold down the **MODE** and **N/-** button for 2 seconds. This will bring the calibration menu.
3. The password for both analyzers is 0000. On the MiniRAE Lite, press the **MODE** button to enter the password. The VRAE password is set to 0000 already. Press **MODE** for 1 second.
4. Highlight the calibrate monitor menu item and press the **Y/+** button to select for both monitors.
5. There will be a Zero Calibration and a Span Calibration shown to choose from on the MiniRAE Lite. Select the Zero Calibration and press the **Y/+** button. The VRAE has a “Fresh Air Calibration” for zero calibration. Select the **Y/+** button.
6. Apply Zero Gas for the MiniRAE Lite and VRAE and press the **Y/+** button to start. Ambient air (without vapors) or a carbon filter can be applied on the gas inlet. Each time the carbon filter is used, check off one of the boxes on the filter. Once all boxes have been checked, discard the filter. Zero gas will calibrate for 30 seconds on the MiniRAE Lite. The “Fresh Air Calibration” will zero out each of the VRAE sensors.

7. After the Zero Calibration, a Span Gas Calibration is needed for the MiniRAE Lite. Select Span Calibration and press the **Y/+** button. Hook the Isobutylene canister to the MiniRAE gas inlet and turn on the gas. Press **Y/+** to initiate calibration. Span calibration will go for 30 seconds on the MiniRAE Lite. The span calibration should be at or close to 100 ppm. After the “Fresh Air Calibration” is complete on the VRAE, “Multiple Sensor” will appear on the screen. Select **N/-** button. “Single Sensor Calibration” will appear next and press the **Y/+** button. Each of the 5 sensors have their own calibration gas and need to be calibrated separately in “Single Sensor Calibration.” Hook each sensor canister to the VRAE gas inlet and turn on the gas. The Calibration should begin for a countdown of 60 seconds. If not, press **Y/+** button. Each sensor calibration gas has its own concentration in ppm.
8. When done performing the zero, span, and sensor calibrations for each monitor, press **MODE**, which corresponds with “Back” on the display. You will see the following message: Updating settings... The MiniRAE Lite and VRAE updates their settings and then returns to the main display. It begins or resumes monitoring.

Note: Be sure to give the VRAE 5-10 minutes after calibration before pressing the **MODE** button to the sample display. The monitor might have an alarm due to calibration gases still inside the monitor from calibration. Give the VRAE monitor time to air out the calibration gases.

Measuring the sample (Survey Mode)

1. Turn the VRAE on by pressing the **MODE**, for MiniRae Lite press **Φ**, for 1 second. The air pump will turn on and the instrument will normally boot up into Survey mode/Display mode. The VRAE will beep once and the display will show “ON!...”. Wait for the MiniRAE to display “READY...”
2. **IMPORTANT:** Attach the water trap filter to the end of the gas inlet before screening. The filter will safeguard the meter from the intake of liquid, dust, and other particles.
3. In Survey mode/Display mode, place the sample port in the vicinity of suspected VOC vapors and press the **Y/+** button to start sampling.
4. Record the sample ID, Site ID, etc. and the peak meter reading.
5. To stop reading, press **MODE**. Then press **Y/+** to confirm stop sampling.
6. Repeat steps 2 and 4 for all samples.
7. Turn off both the VRAE and MiniRAE by holding the **MODE** button through the beeps for a 5-second countdown.

2.9 YSI 556 Multi-Probe System

The YSI should be calibrated prior to collecting field data. Refer to YSI556 User's Manual (included with YSI unit) for calibration instructions.

Taking measurements and storing data:

1. Press the **On/Off** key to display the run screen.
2. Remove the transport/calibration cup and replace it with the sensor guard or flow through cell.
3. Place the probe module in the sample. Be sure to completely immerse all the sensors.
4. For Dissolved Oxygen measurements rapidly move the probe module through the sample to provide fresh sample.
5. Watch the readings on the display until they are stable.
6. Record the instrument readings.

Note: Refer to YSI556 User's Manual (included with YSI unit) for Logging instructions on logging sample data.


7. Rinse the sensors with DI water to prevent cross-contamination.
8. Repeat steps 3-7 for all samples.
9. When finished, turn off the YSI556 by pushing the power button.
10. Rinse the sensors with DI water and store inside the clear screw-on container with tap water. If the meter will not be used for several weeks to months, store the sensors inside the clear screw-on container with 4.0 pH buffer solution. Only a quarter of an inch of tap water or 4.0 pH buffer solution is necessary for storage.
11. Turn the probe cable plug end counter clockwise. Pull gently on the probe cable plug to disconnect the probe cable from the YSI556 unit.
12. Place the cable, unit, and accessories back in the case for transport.

2.10 *YSI Professional Plus*

The YSI should be calibrated prior to collecting field data. For calibrations information, installing the DO membrane, and setting up sensors and reporting units see Attachment 1.

Note: mmHg = inHg value x 25.4

Taking measurements and storing data:

1. The instrument will be in Run mode when powered on.
2. To take readings, insert the probe into the sample. Move the probe in the sample until the readings stabilize. This releases any air bubbles and provides movement if measuring DO.
3. Log One Sample is already highlighted in Run mode. Press enter to open a submenu. Highlight Sites or Folders and press enter to select the site or folder to log the sample to.
4. If necessary, use the keypad to create a new Site or Folder name. If Site List and Folder List are disabled in the System menu, you will not see these options when logging a sample.
5. Once the Site and/or Folder name is selected, highlight Log Now and press enter. The instrument will confirm that the data point was logged successfully.
6. If you would like to log at a specific interval vs. logging one sample at a time, press the System  key. Use the arrow keys to highlight Logging and press enter. Enable Continuous Mode and adjust the time Interval if necessary. On the Run screen, the option to log will change from Log One Sample to Start Logging based on the time interval entered.
7. During a continuous log, the Start Logging dialog box on the Run screen will change to Stop Logging.
8. Record the instrument readings.
9. Rinse the sensors with DI water to prevent cross-contamination.

10. Repeat steps 2 – 9 for all samples.
11. When finished, rinse the sensors with DI water and store inside the clear screw-on container with tap water or the gray cal/transport sleeve with the damp yellow sponge inside. If the meter will not be used for several weeks to months, store the sensors inside the clear screw-on container with 4.0 pH buffer solution. Only a quarter of an inch of tap water or 4.0 pH buffer solution is necessary for storage.

2.11 Geotech Interface Meter/Solnist Water Level Meter/Testwell Interface Probe

Level Meter	Water Alarm Sound	Organic Alarm Sound
Geotech Water Level	Oscillating	None
Geotech Interface	Oscillating	Continuous
Testwell Interface	Continuous	Pulsing
Solinst Water Level	Continuous	None

Measurement:

1. Remove the Meter from the case, and if possible, hang the unit on the well casing by the ‘u-loop’ hangar. If hanging is not possible, use a tape guide to protect the tape from damage.
2. Turn on the Meter. An LED and/or a buzzer will function if the meter is operational.
3. Loosen the spool securing bolt. The spool should rotate freely.
4. Remove the probe from the holster and gently lower the probe down the structure in question.
5. If liquid is reached, the alarm will function.

Note: The reference point to measure a well is usually identified by a black mark (by permanent marker) on the PVC or chiseled for stainless steel wells. The marking is usually placed on the north side of the top of casing. If no mark is apparent, the water level and depth measurements should be taken from the north side of the top of casing.

For Surface to Liquid Depth:

6. Record the depth on the tape when the alarm first sounds. If there is doubt on the depth, raise the probe out of the liquid and lower the probe more slowly.

For Liquid Thickness:

7. Record the depth when the alarm first sounds.
8. Keep lowering the probe/tape, slowly, to the bottom of the liquid. When the tension on the measuring tape decreases substantially, record the depth.
9. Take the difference in the two depth measurements. That is the liquid depth.

For Liquid Layer Thicknesses:

10. Record the depth when the alarm first sounds.
11. Keep lowering the probe/tape, very slowly, to the bottom of the liquid. Each time the alarm type changes, record the depth.
13. Take the difference in the depth measurements. The difference is each liquid layer's thickness.
14. Repeat steps 8 and 9 of this section for multiple layers.

Decontamination:

15. As the tape and probe is wound up, wipe clean with an Alconox solution and rinse the tape and probe with deionized water and secure the probe to the spool. Replace the spool into the case.

2.12 Lumex RA-915 Light Zeeman Mercury Spectrometer

Preparation before starting device:

1. Connect the display and control unit to the spectrometer (base unit) via the supplied cable, or by connecting it directly to the top of the base unit.
2. Select the power supply mode of the analyzer (i.e. AC transformer or built-in battery).
3. The **Test handle** is located on the left panel of the spectrometer, and is labeled "Test". To prepare the analyzer for measurements, set the test handle to the "**Off**" position.

Powering on and warming up:

4. Press the **Power button** to turn on the spectrometer.
5. The spectrometer will power up and display the manufacturer's trademark.
6. Press the **Ent** button on the display and control unit. The MAIN MENU will be displayed and an * (asterisk) will appear in the upper left corner.
7. Press and hold the **LAMP IGNITION** button for several seconds. When the spectral lamp turns on, the * will go out.
8. Let the analyzer warm up for at least 20 minutes. Then the device is ready for measurement.

Selecting Settings (optional):

9. Using the cursor buttons, select the SETTINGS command on the display unit and press the **Ent** button. The Settings window will appear.
10. To change the alarm level, which is the value of the mercury vapor concentration measured in $\mu\text{g}/\text{m}^3$, select the PARAMETERS command. Once the Parameters window appears, press the **up** or **down arrows** on the control panel to set the concentration to the desired amount.
11. When finished editing settings, press **ESC** button.
12. The parameters saving window will appear. You can either save, apply (temporarily saves changes), cancel, or set the parameters back to default.

Measuring mercury vapor in outdoor air:

13. Make sure that the **Test handle** is in the **OFF** position.
14. Select ON STREAM mode from the MAIN MENU and press the **Ent** button. The compressor will switch on and the zero-signal measurement will be performed during 25 seconds.
15. The results will appear on the screen.
16. Record the instrument readings.

Measuring mercury vapor in indoor air:

17. If the device is already in ON STREAM mode, press the **Ent** button to switch to PROTOCOL mode. PROTOCOL mode will establish three mean values of the mercury vapor concentration.
18. The results will appear on the screen.
19. Record the instrument readings.

2.13 *Hilti Hammer Drill TE 60*

The Hilti hammer drill is primarily used for drilling through subsurface soil to install soil-gas samples.

Note: The Honda Generator is used with this hammer drill. The Honda Generator is located in the storage closet of the manager parking garage. DEQ maintenance can unlock the storage closet.

Fitting the side handle:

1. Release the side handle clamping band by turning the handle grip.
2. Slide the side handle clamping band over the chuck from the front and into the recess provided.
3. Bring the side handle into the desired position.
4. Tighten the side handle clamping band by turning the handle grip.

Fitting the depth gauge (optional):

1. Release the side handle clamping band by turning the handle grip.
2. Slide the depth gauge from the front into the 2 guide holes provided.
3. Tighten the side handle clamping band by turning the handle grip.

Setting the power level (optional):

1. Press the power reduction button. The product runs with reduced power (50%). The reduced-power LED lights up.
2. Press the power reduction button again. The product runs with full power. The reduced-power LED goes out.


Note: After connecting the supply cord to the electric supply, the product is always set to full power.

Changing the accessory tool:

Note: Wear protective gloves when changing the tool. LPD has a 1 ½ foot and 3 foot drill bit.

1. Apply a little grease to the connection end of the accessory tool.
2. Push the accessory tool into the chuck as far as it will go (until it engages).
Now the product is ready to use.
3. Pull the chuck back as far as it will go to remove the accessory tool.

Drilling with hammering action (hammer drilling):

1. Set the function selector switch to the “Hammer drilling” position .
2. Press the drill bit against the work surface.
3. Press the control switch to start the drill.

2.14 Geotech Geocontrol PRO (bladder pump)

1. Double check 12V system positive and negative are not reversed at any connection point.
2. Before turning the power switch ON, turn the pump’s FILL TIME and DISCHARGE TIME knobs to adjust the cycle times.
3. These knobs are located on the front face of the pump below the airline pressure gauge.
4. To the left is DISCHARGE TIME and to the right is FILL TIME.
5. Use the radial number scales around each timer knob to adjust timer values in seconds.

Discharge Time:

1. The discharge time is the time it takes to squeeze the bladder and push the water out of the pump.
2. Increase this time with increased depth to water and larger bladder pumps.

3. Decrease this time with lower depth to water and smaller bladder pumps.
4. Timer can be set from approximately 2-60 seconds.

Fill Time:

1. The fill time is the time allowed for the bladder to refill.
2. Increase the fill time with more depth to water and larger bladder pumps.
3. Decrease the fill time with less depth to water and smaller bladder pumps.
4. The timer can be set from approximately 2-60 seconds.
5. Fill rate depends on hydrostatic pressure (pressure from the water above the pump) and varies depending on pump placement within the water column; the more water above the pump the faster it will fill.
6. Turn the controller power switch ON.
7. If the water stops coming out of the discharge tube and the compressor is still running, the discharge time should be decreased.
8. If the volume of fluid after one pump cycle is less than the rated volume of the pump being used, then the fill rate can be increased.

Pressure Gauge:

1. If a quick pressure increase is noted on the pressure gauge, reduce the discharge time until the quick pressure increase is no longer noticeable.

2.15 GeoTech Peristaltic Pump

1. Remove the pump from the case, be sure pump is turned **OFF** (red, open circle)
2. For AC/DC combination units, plug in the appropriate power cord into the outlet in the back of the pump and other end of the power cord into the power source.
3. Insert the tubing into the pump head.
4. Put one end of the tubing into the sample source (i.e. well, surface water, etc.) and the other end into the sample container.
5. Determine the desired direction of flow and turn the direction toggle switch in that direction.
6. Turn the pump **ON** (the black filled circle)
7. When pumping has begun, the speed dial can be adjusted to the fluid pumping speed desired.

ATTACHMENT 1



Professional Plus Quick-Start Guide

This Quick-Start Guide is meant to serve as a quick reference in operating the Professional Plus. It is not intended to replace the information found in the Operations Manual. For your convenience, this quick start guide will enable you to unpack your instrument and get to the field quickly.

GETTING STARTED

Unpack the instrument and install (2) C size batteries in the back of the instrument. Tighten the four screws of the battery plate on to the back of the instrument.

If necessary, install the sensors into the cable assembly by inserting the sensors into the ports and then hand tightening them. Do not use a tool and do not over tighten.

If using a 1010 cable, a sensor must be installed in port 1 for correct operation. If installing a pH/ORP combo sensor into a 1010 cable, ORP will not be measured. If using a 1020 cable, install a pH, ORP, pH/ORP, or an ISE sensor in port 1 and a DO sensor in port 2.

If using a Quatro cable, install a pH, ORP, or ISE sensor in ports label 1 and 2. A sensor must be installed in port 1 for port 2 to operate correctly. If you install a pH/ORP combo sensor into port 1 or port 2, ORP will not be measured. Install the Dissolved Oxygen sensor in the port labeled DO. Install the Conductivity/Temperature sensor in the port labeled CT following the instructions included with the sensor. For ease of installation, YSI recommends that you install a sensor into port 1 first; followed by DO installation, then port 2, and lastly C/T.

Please refer to the Getting Started Setup section of the Manual for a complete list of sensor/cable port configurations.

Install a port plug into any port that does not have an installed sensor. Attach the cable assembly to your instrument.



INSTALLING THE DO MEMBRANE

Note: The DO sensor is shipped with a red protective cap to protect the electrode. A new membrane cap must be installed before the first use.





1. Prepare the O₂ probe solution according to the instructions on the bottle. After mixing, allow the solution to sit for 1 hour. This will help prevent air bubbles from later developing under the membrane.
2. Remove, and discard or save the red protective cap.
3. Thoroughly rinse the sensor tip with distilled or deionized water.
4. Fill a new membrane cap with probe solution. Avoid touching the membrane portion of the cap.
5. Thread the membrane cap onto the sensor, moderately tight. A small amount of electrolyte will overflow.
6. Screw the probe sensor guard on moderately tight.

MENU FUNCTIONS

The Professional Plus has a menu-based interface. Press the “hot keys” to access the System, Sensor, Calibration, and File menus (from left to right at the top of the keypad). To navigate through the menus, use the up and down arrow keys to highlight a desired



menu option with a highlight bar, and press the Enter  key to activate the selection. Use the left arrow key to go back one screen. Press the Esc  key to return to the run screen or to exit an alpha/numeric entry screen. The Pro Plus will automatically power on to the Run screen.

SETTING THE DATE AND TIME



1. Press the System  key.
2. Highlight **Date/Time** and press Enter.
3. Highlight **Date Format** and press Enter. Highlight the correct format and press Enter.
4. Highlight **Date** and press Enter. Use the keypad to enter the correct date, then highlight  on the display keypad, and press Enter.
5. Highlight **Time Format** and press Enter. Highlight the correct format and press Enter.
6. Highlight **Time** and press Enter. Use the keypad to enter the correct time, then highlight  on the display keypad, and press Enter.
7. Press Esc  to return to the Run screen.

SETTING UP SENSORS & REPORTING UNITS

A sensor must be enabled in the **Sensor** menu for it to operate. Once a sensor is enabled, the desired units for that sensor must be selected in the **Display** menu to determine what will be displayed.

1. Press the Sensor  key.
2. Highlight **Setup** and press enter. Highlight the parameter of interest and press enter. Highlight **Enabled** and press enter to ensure a checkmark in the box. When enabling the ISE1 and ISE2 ports, you must select the correct sensor after enabling the port.
3. When Dissolved Oxygen is enabled, a submenu allows the user to select the sensor type (Polarographic or Galvanic) and membrane type being used. Highlight **Sensor Type** or **Membrane** and press **Enter** to modify these settings.
4. Press the left arrow key to return to the previous screen or press Esc  to return to the Run screen.

Once changes to the Sensor menu have been completed, you must determine which units will be reported (i.e. %, mg/L, °C, °F, etc.).


1. Select the Sensor  hot key on the keypad, highlight **Display**, and press enter.
2. Highlight the parameter you want to access and press the Enter.
3. A submenu will open allowing you to select the reporting units. Some parameters can be reported in multiple units. For example, DO can be reported in DO%, DO mg/L, and DO ppm. Other parameters, for example temperature, can only be reported in one unit. Make selections from the submenu, and then press the left arrow key to return to the Display menu or press Esc  to return to the Run screen.

BAROMETER CALIBRATION



1. Determine your local barometric pressure (BP) in mmHg from a mercury barometer, an independent laboratory, or from a local weather service. If the

BP reading has been corrected to sea level, use the following equation to determine the true BP in mmHg for your altitude:

$$\text{True BP} = (\text{Corrected BP in mmHG}) - \{2.5 * (\text{Local Altitude in feet}/100)\}$$

2. Press the Cal  key.
3. Highlight **Barometer** and press Enter. Use the arrow keys to highlight the desired units and press Enter to confirm.
4. Highlight **Calibration Value** and press enter to adjust.
5. Use the Alpha/Numeric screen to enter your True BP, then highlight <<<ENTER>>> and press enter.
6. Highlight **Accept Calibration** and press enter to finish the calibration.


CONDUCTIVITY, PH, AND ORP CALIBRATION

1. Press the Cal  key.
2. Highlight the parameter you wish to calibrate and press enter. For Conductivity, a second menu will offer the option of calibrating **Specific Conductance, Conductivity, or Salinity**. Calibrating one automatically calibrates the other two. An additional sub-menu will require you to select the calibration units. For pH, auto-buffer recognition will determine which buffer the sensor is in and it will allow you to calibrate up to 6 points.
3. Place the correct amount of calibration standard into a clean, dry or pre-rinsed container.
4. Immerse the probe into the solution, making sure the sensor and thermistor are adequately immersed. Allow at least one minute for temperature to stabilize.
5. For any of parameters, enter the calibration solution value by highlighting **Calibration Value**, pressing enter, and then using the alpha/numeric keypad to enter the known value. Once you have entered the value of the calibration standard, highlight <<<ENTER>>> and press enter.
6. Wait for the readings to stabilize, highlight **Accept Calibration** and press enter to calibrate.
7. For pH, continue with the next point by placing the probe in a second buffer and following the on-screen instructions or press Cal  to complete the calibration.


DO CALIBRATION

The Pro Plus offers four options for calibrating dissolved oxygen. The first is an air calibration method in % saturation. The second and third calibrates in mg/L or ppm to a solution with a known DO concentration (usually determined by a Winkler Titration). Calibration of any option (% or mg/L and ppm) will automatically calibrate the other. The fourth option is a zero calibration. If performing a zero calibration, you must perform a % or mg/L calibration following the zero calibration. For both ease of use and accuracy, YSI recommends performing the following 1-point DO % calibration:


1. Moisten the sponge in the cal/transport sleeve with a small amount of water and install it on the probe. The cal/transport sleeve ensures venting to the atmosphere. For dual port and Quatro cables, place a small amount of water (1/8 inch) in the calibration/transport cup and screw it on the probe. Disengage a thread or two to ensure atmospheric venting. **Make sure the DO and temperature sensors are not immersed in the water.**
2. Turn the instrument on. If using a polarographic sensor, wait 10 minutes for the DO sensor to stabilize. Galvanic sensors do not require a warm up time.

3. Press the Cal  key, highlight **DO** and press enter.
4. Highlight **DO%**, then press Enter.
5. Verify the barometric pressure and salinity displayed are accurate. Once DO and temperature are stable, highlight **Accept Calibration** and press enter.

TAKING MEASUREMENTS AND STORING DATA

1. The instrument will be in Run mode when powered on.
2. To take readings, insert the probe into the sample. Move the probe in the sample until the readings stabilize. This releases any air bubbles and provides movement if measuring DO.
3. **Log One Sample** is already highlighted in Run mode. Press enter to open a submenu. Highlight **Sites or Folders** and press enter to select the site or folder to log the sample to.
4. If necessary, use the keypad to create a new Site or Folder name. If Site List and Folder List are disabled in the System menu, you will not see these options when logging a sample.
5. Once the Site and/or Folder name is selected, highlight **Log Now** and press enter. The instrument will confirm that the data point was logged successfully.
6. If you would like to log at a specific interval vs. logging one sample at a time, press the System  key. Use the arrow keys to highlight **Logging** and press enter. Enable **Continuous Mode** and adjust the time **Interval** if necessary. On the Run screen, the option to log will change from **Log One Sample** to **Start Logging** based on the time interval entered.
7. During a continuous log, the **Start Logging** dialog box on the Run screen will change to **Stop Logging**.

UPLOADING DATA TO A PC WITH DATA MANAGER

1. Make sure Data Manager and the USB drivers are installed on the PC. The USB drivers will be installed during the Data Manager installation.
2. Connect the Communications Saddle to the back of the Pro Plus instrument and use the USB cable to connect the saddle to the USB port on the PC.
3. If connecting for the first time, Windows[®] may prompt you through two 'New Hardware Found' Wizard in order to complete the USB driver installation.
4. Open Data Manager on the PC and turn on the Pro Plus.
5. Click on the correct instrument in Data Manager under the **Select Instrument** heading. Once you've highlighted the correct instrument, click the **Retrieve Instrument Data** tab and check **Data, GLP, Site List, Configuration** or **Select All** options to retrieve data. Click **Start**.
6. After the file transfer is complete, the data is available for viewing, printing, and exporting from Data Manager and the data can be deleted from the Pro Plus if desired.
7. Press the File  key and choose **Delete Data** if you no longer need the data on the Pro Plus.

CONTACT INFORMATION

YSI
1700/1725 Brannum Lane
Yellow Springs, OH 45387
Tel: 800-765-4974 (937-767-7241)
Fax: 937-767-1058
E-Mail: proseries@ysi.com
Website: www.ysi.com

Item # 605595
Drawing # A605595
Revision B
February 2009

Attachment 4: Site Specific Health and Safety Plan

HEALTH AND SAFETY PLAN

Beaty-Mulhausen Park
Oklahoma County
Jones, Oklahoma

Prepared by:

Katrina Pollard - Project Manager

State of Oklahoma
Department of Environmental Quality
Land Protection Division

May 14, 2024

Health and Safety Plan

A. General Information

Site Name: Beauty-Mulhausen Park

Location : 320 E. Main Street, Jones, OK 73049

Objective: The Health and Safety Plan (HASP) applies to all DEQ personnel entering the site as well as the off-site sampling areas during the sampling activities. The HASP is intended to establish requirements and procedures to be followed during the sampling event to protect the health and safety of investigative personnel and the nearby public.

Project Objective: The objective of this sampling event is to collect environmental samples for laboratory analysis, to determine if there are elevated levels of lead in soil, surface water, and sediments.

Background

Review: Complete X Preliminary

Overall Hazard: Serious Moderate Low X Unknown

Proposed Date of Sampling

Activities: May 2024

B. Waste Characteristics

Waste Types: Liquid X Solid X Sludge X Gas

Characteristics: Corrosive Ignitable Radioactive
Volatile Toxic X Reactive Unknown

Site Descriptions: The site is currently owned by the Town of Jones City. The site is a public park and disc golf course. The park is near the Jones Ballfields, a site known to DEQ to be built atop a historic battery casing dump. It is also near Madewell & Madewell Inc., a battery recycling facility. Based on the area concerns, lead is the primary contaminant of concern.

Generally, the area in which the site is located is suburban. The area is mixed commercial/residential. The site is bounded by Henney Road to the West, Britton Road/Main Street to the North, N. Choctaw Rd. to the East, and a railroad track to the South. A gas station is located to the North, and Madewell & Madewell Inc. is located to the East.

C. Hazard Evaluation

Primary Hazards:

The primary hazards associated with the site are trips and falls, biological (snakes, poisonous plants) and ingestion of contaminated soil. Other dangers include physical hazards and severe weather. The project team leader will monitor site conditions for changes in the weather and sampling crew will be instructed to move around the site with caution during the sampling activities. If necessary, sample team members will upgrade personal protection to include respiratory protection (dust masks).

Chemical Hazards:

The chemical of concern on the site is lead.

Heat stress: All field members will be monitored for heat stress and fatigue by the Site Health and Safety Officer. Appropriate clothing for weather conditions will be determined by Health and Safety Officer. The exact work periods will be determined by weather conditions. Breaks will be frequent and will focus on hydration and removal from direct sun. Water and sunscreen will be provided.

Cold stress: All field members will be monitored for cold stress by the Site Health and Safety Officer. Appropriate clothing for weather conditions will be determined by the Health and Safety Officers. The exact work periods will be determined by weather conditions. Breaks will be frequent and will focus on warming up and taking shelter from cold winds.

Physical and Mechanical Hazards:

Prior to entry, field members will be briefed on the physical hazards known to exist both on site and off site. Teams will be composed of two sampling team members, at a minimum. Possible physical hazards include animals, sharp plants, holes, ditches, slippery surfaces, loose soil, and uneven walking surfaces.

Severe Weather:

Thunderstorms can occur during May in Oklahoma. If high straight-line winds, tornadoes, lightning or torrential rain occur or are forecasted to occur during the sampling activities, the sampling event may be postponed. Weather forecasts will be monitored beginning two days before field activities are planned to occur and during on site activities.

D. Site Safety Work Plan

Perimeter Establishment: Map attached (yes/no): Yes Site Secured (yes/no): No
Yes X No _____

Zones of Possible Contamination Identified: _____

Personal Protection:

Level of Protection A _____ B _____ C _____ D X Note:

Equipment Required:

Disposable nitrile gloves, and steel-toed boots. The addition of respiratory protection (dust masks or respirators) may be necessary if visible waste is noted or windy conditions exist. The health and safety officer will make the determination if the use of masks is necessary.

The following are not allowed while sampling activities are in progress: smoking, eating, drinking, chewing gum, or horseplay. Fluid replenishment will be allowed, but only at the site command post. Individual sampling team personnel, while in the work zone, must remain within eyesight of each other. All DEQ personnel entering the work zone are required to have the OSHA 40-Hour (HAZWOPER) Operations training.

Decontamination Procedures:

Decontamination of sampling equipment and personal protection equipment in the field will be performed to the extent practical. A decontamination area will be established near the command post for the decontamination of personal protective equipment (PPE) and sampling equipment. While in the decontamination area, disposable PPE and disposable sampling tools will be collected, double bagged, and stored for proper disposal at DEQ facilities in Oklahoma City.

In an emergency, the primary concern is to prevent loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination will be delayed until the victim is stabilized. Due to the nature of the waste, which is expected to be composed of contaminated soil, removal of the boots and gloves of the victim en route to the hospital will ensure that the emergency room will not be contaminated from wastes at the site.

Special Equipment, Facilities, or Procedures:

Respirators could be required if blowing dust from the site is noted. Any modifications made in the field will be recorded in the site logbook and explained in the final report.

Site Control:

The sampling areas do not have controlled access. DEQ field team members will continually monitor for unauthorized persons entering the sampling areas during sampling activities. Trespassers will be asked to leave the sampling area. Property managers or local police will be notified if unauthorized persons are uncooperative. The property owners/tenants will be permitted to view all sampling activities from a safe distance of 50ft away from active sampling locations.

Work Limitations:

Limitations of site activity are: (1) length of day - sampling will take place only during daylight hours; (2) severe weather - samples will not be collected if adverse weather conditions exist; (3) heavy precipitation – samples will not be collected if sample integrity is questioned (rain may affect

the sample quality). If heavy precipitation is encountered, the sampling event will be postponed until weather conditions permit continuation.

Investigative-Derived Waste Disposal:

Contaminated sample equipment and personal protective equipment will be double bagged and returned to DEQ facilities in Oklahoma City for proper decontamination. Disposable PPE and other waste generated during the sample event will be double bagged and returned to DEQ headquarters for proper disposal.

E. Site Personnel

Katrina Pollard will act as Team Leader and organize the sampling event.

Sampling Team Member	Responsibility
Katrina Pollard	Team Leader
Trenton Wilhelm	Health and Safety Officer
Additional Sampling Team TBD	

Project personnel may change due to availability. All substitutes will have the appropriate training and medical monitoring.

F. Emergency Information

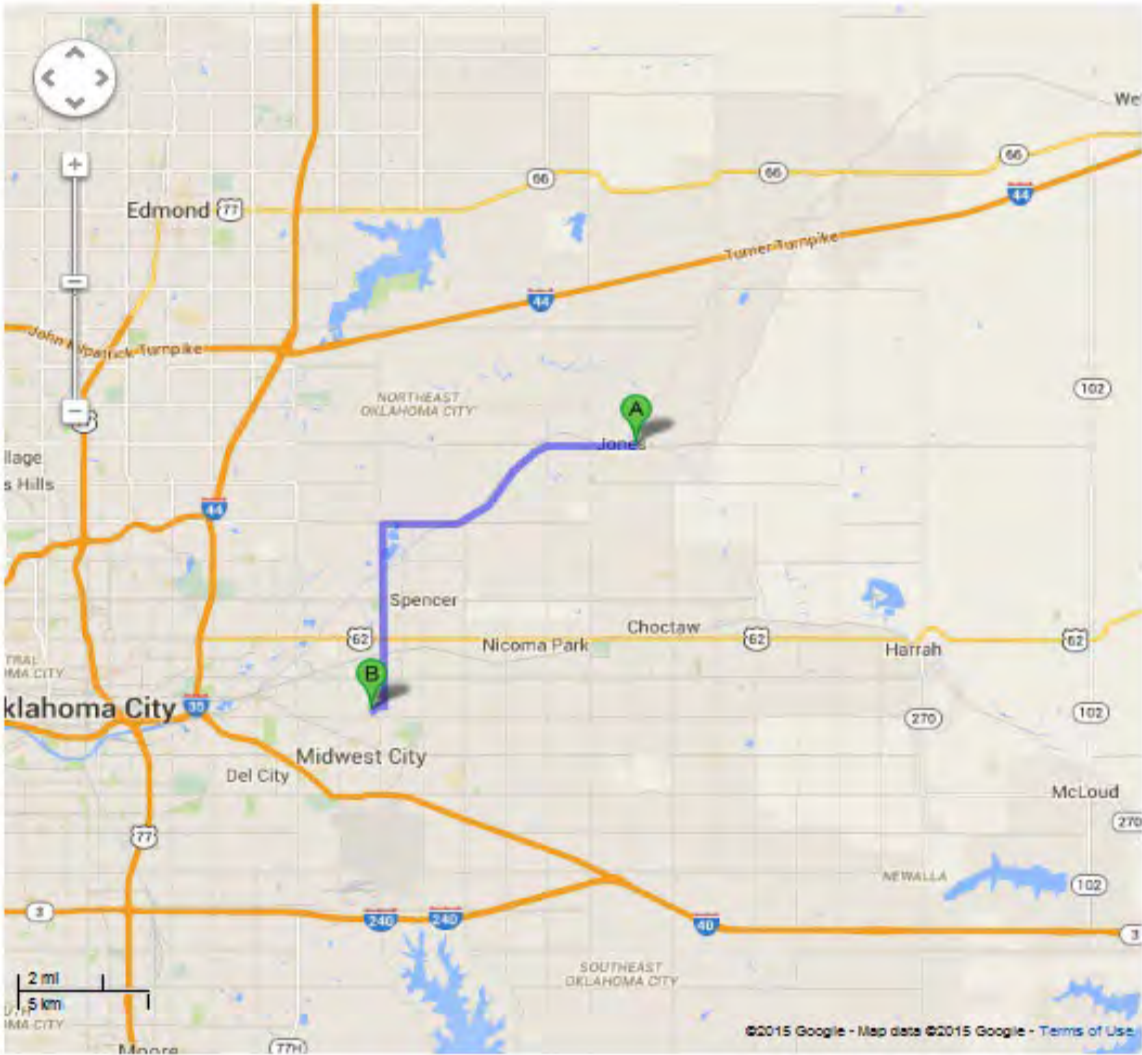
- Ambulance:** 911
- Fire Department:** 911
- Police:** 911
- Hospital:** Midwest Regional Medical Center
2825 Parklawn Drive
Midwest City, OK 73110
(405) 610-4411
- City Police:** 405-399-2255
- OK Poison Control:** 1-800-522-4611

All injuries or illness will be immediately reported to the team leader. These conditions will then be recorded in the site's logbook. A cellular phone will be taken to use in case of an emergency. A first aid kit will be located at the command center, enabling temporary first aid to be administered until necessary medical treatment can be obtained.

Chain of Command in case of emergency:

- Scott Thompson: ↑ODEQ Executive Director
- Kelly Dixon: ↑Land Protection Division Director
- Dustin Davidson: ↑Restoration and Revitalization Unit Manager
- Brian Stanila: ↑SCAP Manager
- Katrina Pollard: ↑Project Leader

Emergency Route to Hospital (see next page):



A 305 E Main St, Jones, OK 73049

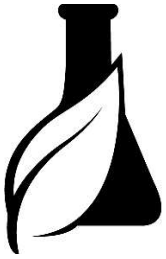
1. Head west on E Main St toward N Henney Rd
About 3 mins go 1.0 mi
total 1.0 mi
2. Continue onto E Britton Rd go 1.1 mi
total 2.1 mi
3. Slight left onto Jones Spencer Rd/Spencer Rd/Spencer-Jones Rd go 3.0 mi
total 5.1 mi
4. Keep right to continue on NE 63rd St go 1.8 mi
total 6.8 mi
5. Turn left onto N Midwest Blvd go 4.7 mi
total 11.5 mi
6. Turn right onto Country Club Cir go 0.1 mi
total 11.7 mi
7. Turn left onto Parklawn Dr
Destination will be on the right
About 53 secs go 0.2 mi
total 11.9 mi

B 2825 Parklawn Dr, Midwest City, OK 73110



Map of Beaty-Mulhausen Park

Attachment 5: Example Chain of Custody (COC)



State Environmental Laboratory Services Division

707 North Robinson Ave
Oklahoma City, OK 73102
General Inquires: 1 (405) 702-1000

Ad hoc Chain of Custody

Customer Name: _____
Project Description: _____

Return with samples

Sample Information	
Sample Collection By: _____	Phone Number: _____
Collection Notes: _____	
Traceability: _____	

Sample ID	Sample Address and Sampling Location	Collection		Container	Requested Analysis
		Date	Time		
1			AM PM		
2			AM PM		
3			AM PM		
4			AM PM		
5			AM PM		
6			AM PM		
7			AM PM		
8			AM PM		
9			AM PM		

Chain of Custody Record Must Be Signed				
Relinquished By: _____	Signature: _____	Date/Time: / / : AM / PM	Delivery Method <input type="checkbox"/> Hand Delivered <input type="checkbox"/> Courier <input type="checkbox"/> Mail	
Received By: _____	Signature: _____	Date/Time: / / : AM / PM		
Relinquished By: _____	Signature: _____	Date/Time: / / : AM / PM		
Received By: _____	Signature: _____	Date/Time: / / : AM / PM		
Receipt Condition:	<input type="checkbox"/> On Ice <input type="checkbox"/> No Ice <input type="checkbox"/> SELSD Bottles	Receipt Temp: _____ °C	Receipt Comments: _____	

References

1. *Memorandum of Agreement Between the Oklahoma Department of Environmental Quality and the City of Jones*, 2017
2. *Memo to File: Beaty-Mulhausen Park*, January 11th, 2024

ATTACHMENT B

ProUCL and IEUBK Model Data

	A	B	C	D	E	F	G	H	I	J	K	L
1	Lognormal UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.2 8/7/2024 3:44:24 PM										
5	From File	SampleResults_May2024_Sol_Only.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	LeadResult mg/kg											
12												
13	General Statistics											
14	Total Number of Observations	65				Number of Distinct Observations	65					
15						Number of Missing Observations	0					
16	Minimum	10.2				Mean	77.27					
17	Maximum	502				Median	54.3					
18	SD	78.95				Std Error of Mean	9.792					
19	Coefficient of Variation	1.022				Skewness	3.1					
20												
21	Lognormal GOF Test											
22	Shapiro Wilk Test Statistic	0.983				Shapiro Wilk Lognormal GOF Test						
23	10% Shapiro Wilk P Value	0.762				Data appear Lognormal at 10% Significance Level						
24	Lilliefors Test Statistic	0.0756				Lilliefors Lognormal GOF Test						
25	10% Lilliefors Critical Value	0.1				Data appear Lognormal at 10% Significance Level						
26	Data appear Lognormal at 10% Significance Level											
27												
28	Logged Statistics											
29	Minimum of Logged Data	2.322				Mean of logged Data	4.013					
30	Maximum of Logged Data	6.219				SD of logged Data	0.79					
31												
32	Lognormal Maximum likelihood Estimates (MLEs)											
33	MLE Mean	75.57				MLE Standard Deviation	70.35					
34	MLE Median	55.31				MLE Skewness	3.6					
35	MLE Coefficient of Variation	0.931				80% MLE Quantile	107.5					
36	90% MLE Quantile	152.2				95% MLE Quantile	202.8					
37	99% MLE Quantile	347.5										
38												
39	Lognormal Minimum Variance Unbiased Estimates (MVUEs)											
40	MVUE Mean	75.1				MVUE SD	68.26					
41	MVUE Median	55.04				MVUE SEM	8.268					
42												
43	Assuming Lognormal Distribution											
44	95% H-UCL	92.86				90% Chebyshev (MVUE) UCL	99.9					
45	95% Chebyshev (MVUE) UCL	111.1				97.5% Chebyshev (MVUE) UCL	126.7					
46	99% Chebyshev (MVUE) UCL	157.4										
47												
48	Nonparametric Distribution Free UCLs											
49	95% CLT UCL	93.37				95% BCA Bootstrap UCL	97.87					
50	95% Standard Bootstrap UCL	93.26				95% Bootstrap-t UCL	101.2					
51	95% Hall's Bootstrap UCL	106.5				95% Percentile Bootstrap UCL	94.08					
52	90% Chebyshev(Mean, Sd) UCL	106.6				95% Chebyshev(Mean, Sd) UCL	120					
53	97.5% Chebyshev(Mean, Sd) UCL	138.4				99% Chebyshev(Mean, Sd) UCL	174.7					
54												
55	Suggested UCL to Use											
56	95% H-UCL	92.86										
57												
58	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
59	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
60	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
61												

Entire Port

LEAD MODEL FOR WINDOWS Version 2.0

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.

While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

```

=====
Model Version: 2.0 Build1
User Name:
Date:
Site Name: Entire Portz
Operable Unit:
Run Mode: Research
=====
    
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

***** Diet *****

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

***** Drinking Water *****

Water Consumption:

Month Water (L/day)

6-12 0.400
12-24 0.430
24-36 0.510
36-48 0.540
48-60 0.570
60-72 0.600
72-84 0.630

Drinking Water Concentration: 0.900 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 75.100 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	93.000	75.100
12-24	93.000	75.100
24-36	93.000	75.100
36-48	93.000	75.100
48-60	93.000	75.100
60-72	93.000	75.100
72-84	93.000	75.100

***** Alternate Intake *****

Month Alternate (µg Pb/day)

6-12 0.000
12-24 0.000
24-36 0.000
36-48 0.000
48-60 0.000
60-72 0.000
72-84 0.000

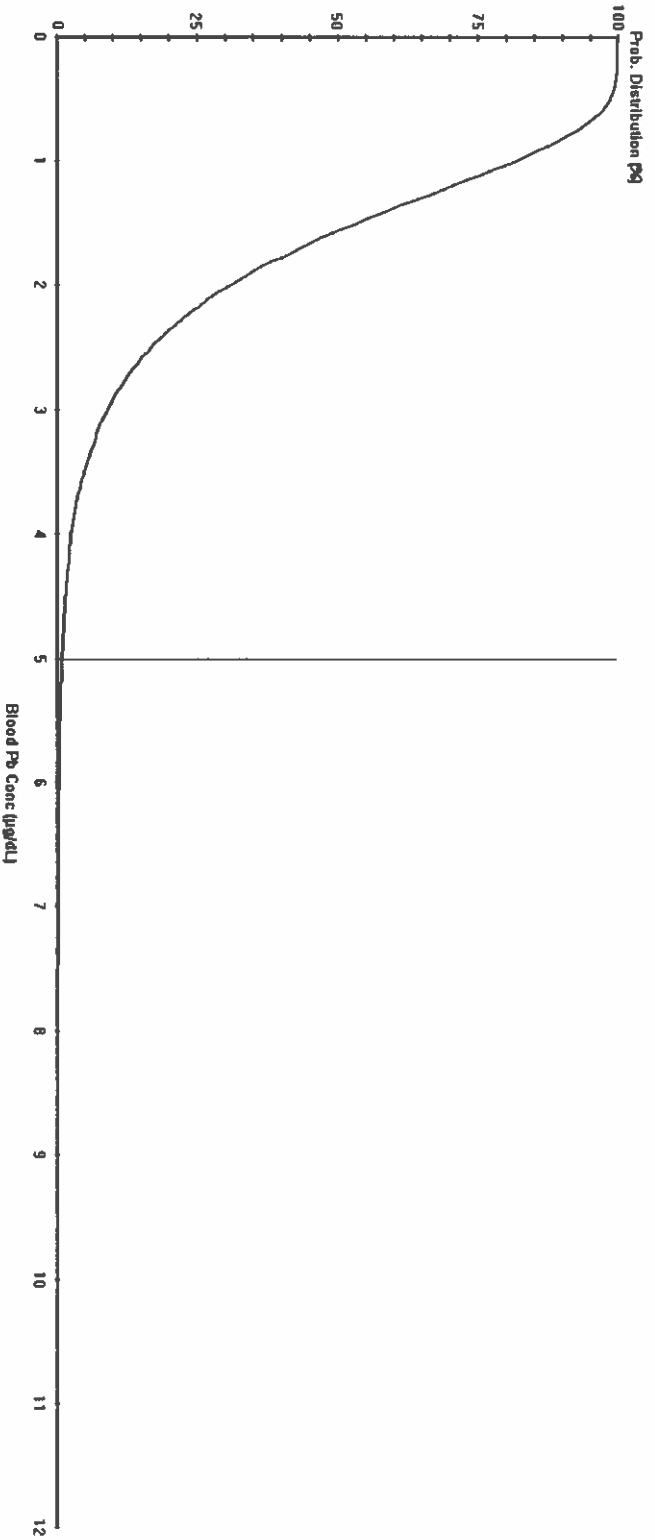
***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 0.600 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
-				
6-12	0.034	1.278	0.000	0.173
12-24	0.057	2.411	0.000	0.185
24-36	0.075	2.522	0.000	0.222
36-48	0.093	2.617	0.000	0.236
48-60	0.102	2.750	0.000	0.250
60-72	0.111	2.955	0.000	0.264
72-84	0.118	2.916	0.000	0.278

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	2.062	3.547	1.9
12-24	2.248	4.901	2.0
24-36	1.618	4.438	1.7
36-48	1.529	4.474	1.6
48-60	1.630	4.732	1.5
60-72	1.269	4.600	1.4
72-84	1.345	4.657	1.3



Cutoff = 5,000 µg/dl
Geo Mean = 1,542
GSD = 1,680
% Above = 0.993

Age Range = 0 to 84 months
Run Mode = Research

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Type here to search



	A	B	C	D	E	F	G	H	I	J	K	L				
1	Gamma UCL Statistics for Uncensored Full Data Sets															
2																
3	User Selected Options															
4	Date/Time of Computation		ProUCL 5.2 8/11/2024 5:58:24 PM													
5	From File		SoilSampleResults_May2024_Divided.xls													
6	Full Precision		OFF													
7	Confidence Coefficient		95%													
8	Number of Bootstrap Operations		2000													
9																
10																
11	ppm															
12																
13	General Statistics															
14	Total Number of Observations				30				Number of Distinct Observations				30			
15									Number of Missing Observations				0			
16	Minimum				22.5				Mean				66.51			
17	Maximum				173				Median				54.35			
18	SD				40.74				SD of logged Data				0.588			
19	Coefficient of Variation				0.613				Skewness				1.119			
20																
21	Gamma GOF Test															
22	A-D Test Statistic				0.55				Anderson-Darling Gamma GOF Test							
23	5% A-D Critical Value				0.752				Data appear Gamma Distributed at 5% Significance Level							
24	K-S Test Statistic				0.144				Kolmogorov-Smirnov Gamma GOF Test							
25	5% K-S Critical Value				0.161				Data appear Gamma Distributed at 5% Significance Level							
26	Data appear Gamma Distributed at 5% Significance Level															
27																
28	Gamma Statistics															
29	k hat (MLE)				3.114				k star (bias corrected MLE)				2.825			
30	Theta hat (MLE)				21.36				Theta star (bias corrected MLE)				23.54			
31	nu hat (MLE)				186.8				nu star (bias corrected)				169.5			
32	MLE Mean (bias corrected)				66.51				MLE Sd (bias corrected)				39.57			
33									Approximate Chi Square Value (0.05)				140.4			
34	Adjusted Level of Significance				0.041				Adjusted Chi Square Value				138.9			
35																
36	Assuming Gamma Distribution															
37	95% Approximate Gamma UCL				80.3				95% Adjusted Gamma UCL				81.18			
38																
39	Suggested UCL to Use															
40	95% Adjusted Gamma UCL				81.18											
41																
42	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.															
43	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.															
44	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.															
45																

West End (Main B/tz)

LEAD MODEL FOR WINDOWS Version 2.0

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=====
Model Version: 2.0 Build1

User Name:

Date:

Site Name: West End (Main Park)

Operable Unit:

Run Mode: Research
=====

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
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36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

***** Diet *****

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

***** Drinking Water *****

Water Consumption:

Month Water (L/day)

6-12 0.400
12-24 0.430
24-36 0.510
36-48 0.540
48-60 0.570
60-72 0.600
72-84 0.630

Drinking Water Concentration: 0.900 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 66.700 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	81.000	66.700
12-24	81.000	66.700
24-36	81.000	66.700
36-48	81.000	66.700
48-60	81.000	66.700
60-72	81.000	66.700
72-84	81.000	66.700

***** Alternate Intake *****

Month Alternate (µg Pb/day)

6-12 0.000
12-24 0.000
24-36 0.000
36-48 0.000
48-60 0.000
60-72 0.000
72-84 0.000

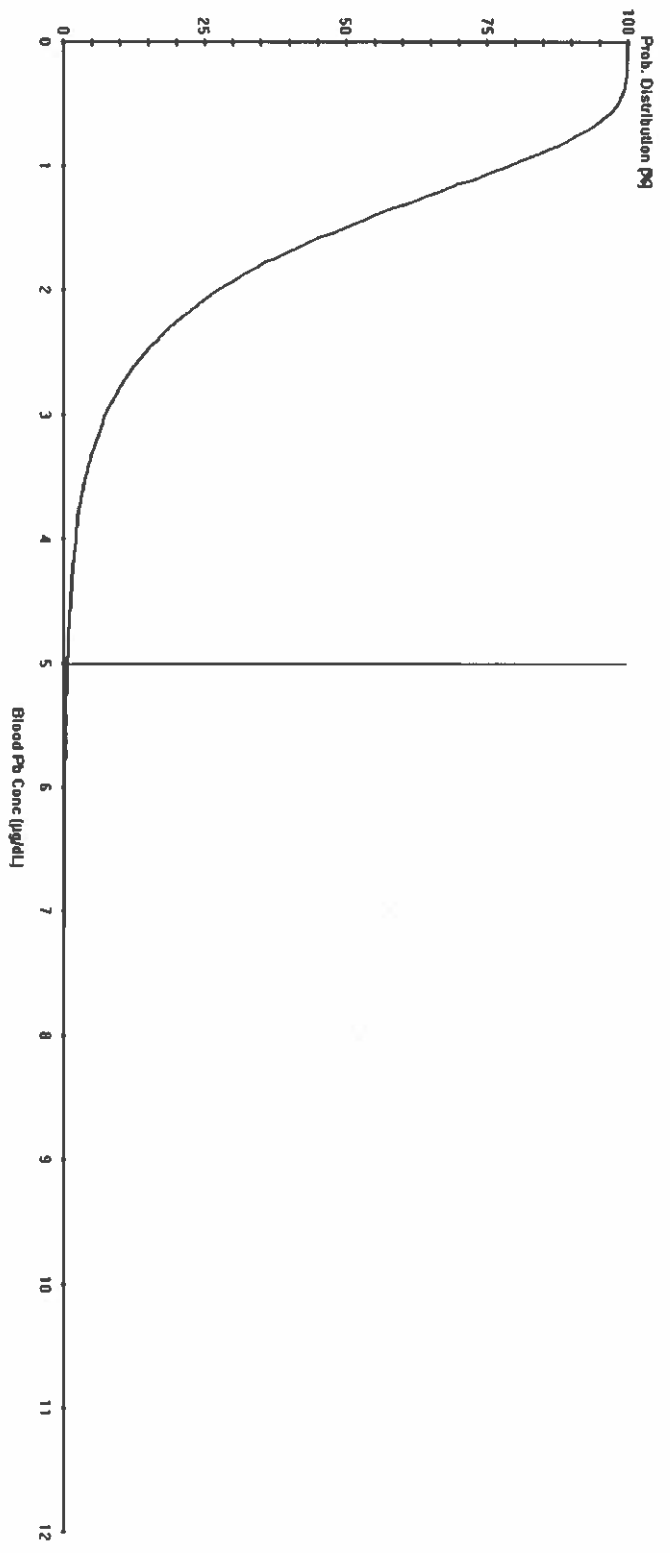
***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 0.600 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
-				
6-12	0.034	1.282	0.000	0.173
12-24	0.057	2.416	0.000	0.186
24-36	0.075	2.526	0.000	0.223
36-48	0.093	2.620	0.000	0.237
48-60	0.102	2.753	0.000	0.250
60-72	0.111	2.957	0.000	0.264
72-84	0.118	2.918	0.000	0.278

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	1.818	3.307	1.8
12-24	1.982	4.641	1.9
24-36	1.425	4.249	1.6
36-48	1.346	4.295	1.5
48-60	1.435	4.540	1.5
60-72	1.117	4.450	1.4
72-84	1.184	4.498	1.3



Cutoff = 5.000 µg/dL
Geo Mean = 1.566
GSD = 1.800
% Above = 0.577

Age Range = 0 to 84 months
Run Mode = Research

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AVI Monthly Salary

6:03 AM
8/25/2012

NUM

	A	B	C	D	E	F	G	H	I	J	K	L
1	Lognormal UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.2 8/11/2024 6:04:18 PM										
5	From File	SoilSampleResults_May2024_Divided_a.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	ppm											
12												
13	General Statistics											
14	Total Number of Observations	22					Number of Distinct Observations	22				
15							Number of Missing Observations	0				
16	Minimum	10.2					Mean	63.48				
17	Maximum	286.6					Median	38.75				
18	SD	74.16					Std. Error of Mean	15.81				
19	Coefficient of Variation	1.168					Skewness	2.168				
20												
21	Lognormal GOF Test											
22	Shapiro Wilk Test Statistic	0.939					Shapiro Wilk Lognormal GOF Test					
23	10% Shapiro Wilk Critical Value	0.926					Data appear Lognormal at 10% Significance Level					
24	Lilliefors Test Statistic	0.131					Lilliefors Lognormal GOF Test					
25	10% Lilliefors Critical Value	0.169					Data appear Lognormal at 10% Significance Level					
26	Data appear Lognormal at 10% Significance Level											
27												
28	Logged Statistics											
29	Minimum of Logged Data	2.322					Mean of logged Data	3.705				
30	Maximum of Logged Data	5.658					SD of logged Data	0.9				
31												
32	Lognormal Maximum likelihood Estimates (MLEs)											
33	MLE Mean	60.95					MLE Standard Deviation	68.1				
34	MLE Median	40.64					MLE Skewness	4.747				
35	MLE Coefficient of Variation	1.117					80% MLE Quantile	86.7				
36	90% MLE Quantile	128.8					95% MLE Quantile	178.7				
37	99% MLE Quantile	330										
38												
39	Lognormal Minimum Variance Unbiased Estimates (MVUEs)											
40	MVUE Mean	59.46					MVUE SD	60.96				
41	MVUE Median	39.9					MVUE SEM	12.64				
42												
43	Assuming Lognormal Distribution											
44	95% H-UCL	98.6					90% Chebyshev (MVUE) UCL	97.39				
45	95% Chebyshev (MVUE) UCL	114.6					97.5% Chebyshev (MVUE) UCL	138.4				
46	99% Chebyshev (MVUE) UCL	185.2										
47												
48	Nonparametric Distribution Free UCLs											
49	95% CLT UCL	89.49					95% BCA Bootstrap UCL	98.22				
50	95% Standard Bootstrap UCL	88.87					95% Bootstrap-t UCL	112.4				
51	95% Hall's Bootstrap UCL	96.07					95% Percentile Bootstrap UCL	90.77				
52	90% Chebyshev(Mean, Sd) UCL	110.9					95% Chebyshev(Mean, Sd) UCL	132.4				
53	97.5% Chebyshev(Mean, Sd) UCL	162.2					99% Chebyshev(Mean, Sd) UCL	220.8				
54												
55	Suggested UCL to Use											
56	95% H-UCL	98.6										
57												
58	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
59	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
60	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
61												

Middle (Sports Fields)

LEAD MODEL FOR WINDOWS Version 2.0

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```

=====
Model Version: 2.0 Build1
User Name: BDS
Date: 8/21/24
Site Name: Beatty-Mulhausen Prk - Middle (sportsfields)
Operable Unit: n/a
Run Mode: Research
=====
    
```

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

***** Diet *****

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

***** Drinking Water *****

Water Consumption:

Month Water (L/day)

6-12 0.400
12-24 0.430
24-36 0.510
36-48 0.540
48-60 0.570
60-72 0.600
72-84 0.630

Drinking Water Concentration: 0.900 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 79.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	99.000	79.300
12-24	99.000	79.300
24-36	99.000	79.300
36-48	99.000	79.300
48-60	99.000	79.300
60-72	99.000	79.300
72-84	99.000	79.300

***** Alternate Intake *****

Month Alternate (µg Pb/day)

6-12 0.000
12-24 0.000
24-36 0.000
36-48 0.000
48-60 0.000
60-72 0.000
72-84 0.000

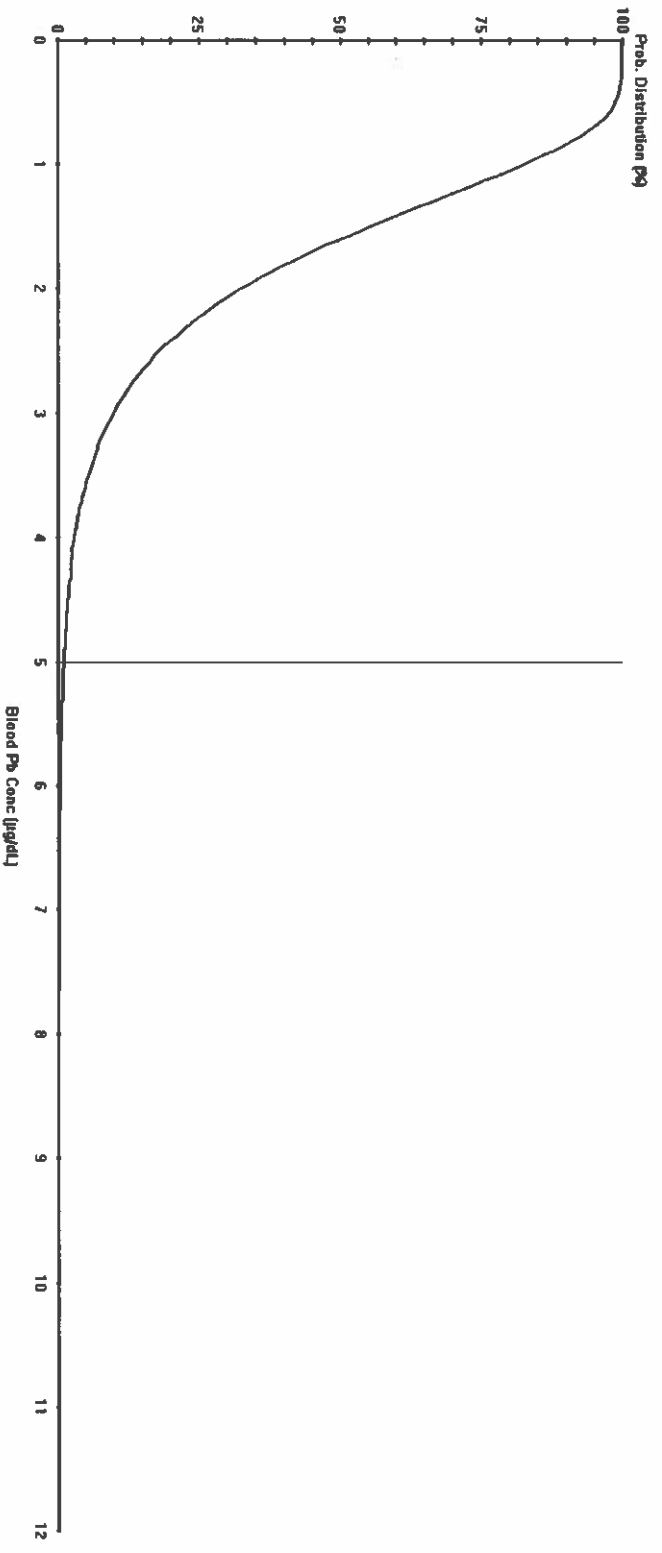
***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 0.600 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
-				
6-12	0.034	1.276	0.000	0.173
12-24	0.057	2.408	0.000	0.185
24-36	0.075	2.520	0.000	0.222
36-48	0.093	2.615	0.000	0.236
48-60	0.102	2.748	0.000	0.250
60-72	0.111	2.954	0.000	0.264
72-84	0.118	2.915	0.000	0.278

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
6-12	2.183	3.666	2.0
12-24	2.381	5.031	2.1
24-36	1.715	4.533	1.8
36-48	1.620	4.564	1.6
48-60	1.727	4.828	1.6
60-72	1.345	4.674	1.5
72-84	1.425	4.736	1.4



Cutoff = 5,000 µg/dL
Geo Mean = 1,500
GSD = 1,500
% Above = 1,017

Age Range = 0 to 84 months
Run Mode = Research

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	A	B	C	D	E	F	G	H	I	J	K	L
1	Gamma UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.2 8/11/2024 6:07:24 PM										
5	From File	SoilSampleResults_May2024_Divided_b.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	ppm											
12												
13	General Statistics											
14	Total Number of Observations	13			Number of Distinct Observations				13			
15					Number of Missing Observations				0			
16	Minimum	26.3			Mean				125.4			
17	Maximum	502			Median				75.9			
18	SD	128.3			SD of logged Data				0.803			
19	Coefficient of Variation	1.023			Skewness				2.433			
20												
21	Gamma GOF Test											
22	A-D Test Statistic	0.579			Anderson-Darling Gamma GOF Test							
23	5% A-D Critical Value	0.748			Data appear Gamma Distributed at 5% Significance Level							
24	K-S Test Statistic	0.211			Kolmogorov-Smirnov Gamma GOF Test							
25	5% K-S Critical Value	0.24			Data appear Gamma Distributed at 5% Significance Level							
26	Data appear Gamma Distributed at 5% Significance Level											
27												
28	Gamma Statistics											
29	k hat (MLE)	1.648			k star (bias corrected MLE)				1.319			
30	Theta hat (MLE)	76.11			Theta star (bias corrected MLE)				95.1			
31	nu hat (MLE)	42.85			nu star (bias corrected)				34.3			
32	MLE Mean (bias corrected)	125.4			MLE Sd (bias corrected)				109.2			
33					Approximate Chi Square Value (0.05)				21.9			
34	Adjusted Level of Significance	0.0301			Adjusted Chi Square Value				20.5			
35												
36	Assuming Gamma Distribution											
37	95% Approximate Gamma UCL	196.4			95% Adjusted Gamma UCL				209.9			
38												
39	Suggested UCL to Use											
40	95% Adjusted Gamma UCL	209.9										
41												
42	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
43	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
44	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
45												

East End (Disc Golf)

LEAD MODEL FOR WINDOWS Version 2.0

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While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

=====
Model Version: 2.0 Build1
User Name: BDS
Date: 8/21/2024
Site Name: Beatty-Mulhausen Prk - East (Disc Golf)
Operable Unit: n/a
Run Mode: Research
=====

***** Air *****

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Month	Time Outdoors (hours)	Ventilation Rate (m ³ /day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m ³)
6-12	1.000	3.216	32.000	0.100
12-24	2.000	4.970	32.000	0.100
24-36	3.000	6.086	32.000	0.100
36-48	4.000	6.954	32.000	0.100
48-60	4.000	7.682	32.000	0.100
60-72	4.000	8.318	32.000	0.100
72-84	4.000	8.887	32.000	0.100

***** Diet *****

Month	Diet Intake(µg/day)
6-12	2.660
12-24	5.030
24-36	5.210
36-48	5.380
48-60	5.640
60-72	6.040

72-84 5.950

***** Drinking Water *****

Water Consumption:

Month Water (L/day)

6-12 0.400
12-24 0.430
24-36 0.510
36-48 0.540
48-60 0.570
60-72 0.600
72-84 0.630

Drinking Water Concentration: 0.900 µg Pb/L

***** Soil & Dust *****

Multiple Source Analysis Used

Average multiple source concentration: 157.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Month	Soil (µg Pb/g)	House Dust (µg Pb/g)
6-12	210.000	157.000
12-24	210.000	157.000
24-36	210.000	157.000
36-48	210.000	157.000
48-60	210.000	157.000
60-72	210.000	157.000
72-84	210.000	157.000

***** Alternate Intake *****

Month Alternate (µg Pb/day)

6-12 0.000
12-24 0.000
24-36 0.000
36-48 0.000
48-60 0.000
60-72 0.000
72-84 0.000

***** Maternal Contribution: Infant Model *****

Maternal Blood Concentration: 0.600 µg Pb/dL

CALCULATED BLOOD LEAD AND LEAD UPTAKES:

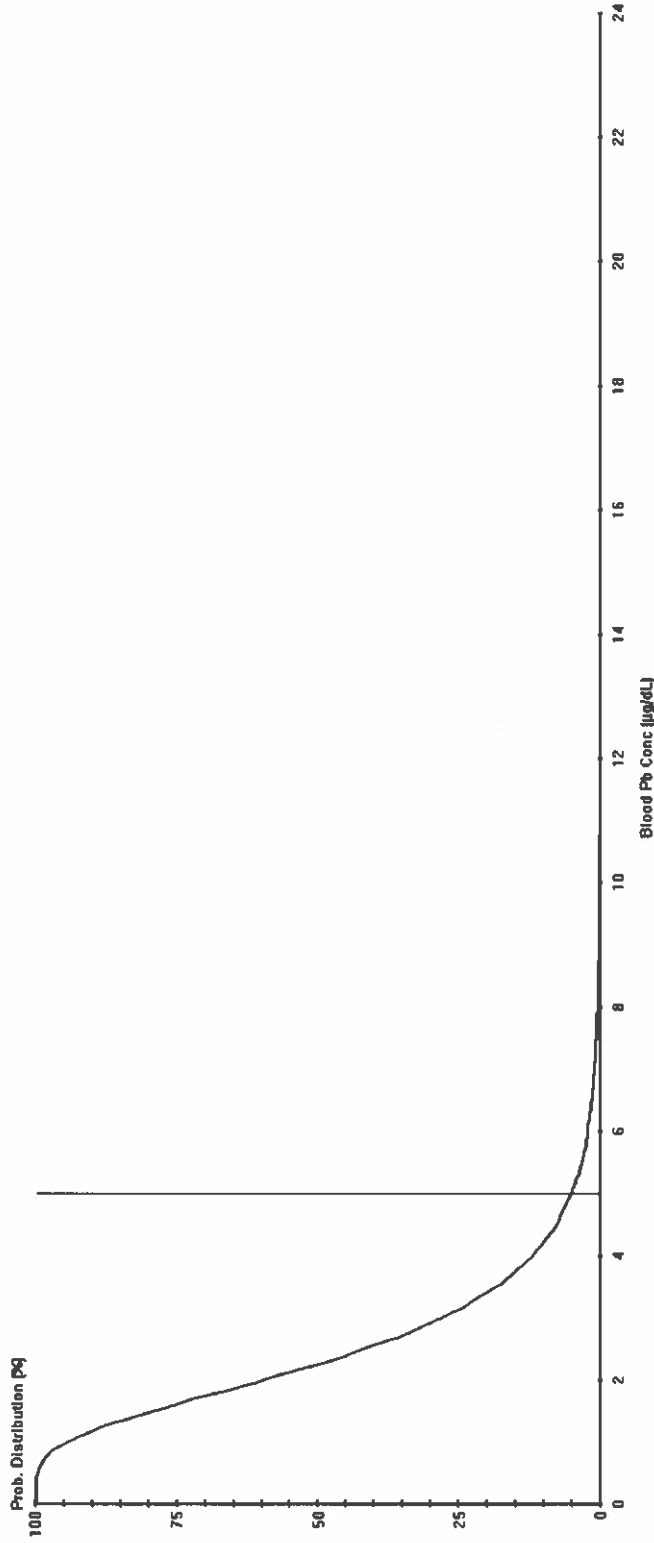
Month	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
-------	-----------------	------------------	-----------------------	-------------------

-

6-12	0.034	1.245	0.000	0.169
12-24	0.057	2.359	0.000	0.181
24-36	0.075	2.488	0.000	0.219
36-48	0.093	2.588	0.000	0.234
48-60	0.102	2.722	0.000	0.248
60-72	0.111	2.934	0.000	0.262
72-84	0.118	2.896	0.000	0.276

Month	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
-------	-----------------------	-------------------	------------------

6-12	4.368	5.816	3.1
12-24	4.783	7.380	3.1
24-36	3.472	6.255	2.5
36-48	3.288	6.203	2.2
48-60	3.509	6.581	2.1
60-72	2.741	6.049	1.9
72-84	2.905	6.195	1.8



Cutoff = 5.000 µg/dL
Geo Mean = 2.366
GSD = 1.600
% Above = 5.573

Age Range = 0 to 84 months
Run Mode = Research

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NUM

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ATTACHMENT C

Childhood Blood Lead Levels (BLLs) for
the Town of Jones City, Oklahoma County
and State of Oklahoma

Provisional Childhood Blood Lead Levels (BLLs) among Children Age 6 - 72 Months for Jones Zip Code Area (73049), Oklahoma County and State of Oklahoma, 2018-2023¹⁻⁴
Oklahoma Childhood Lead Poisoning Prevention Program - June 2024

Geographic Area	2018-2023 Combined				2018				2019				2020				2021				2022				2023			
	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age	Total Population of Children <72 Months of Age ⁴	BLL ≥ 3.5 µg/dL	BLL ≥ 3.5 µg/dL (%)	Total Screened, <72 Months of Age
73049 (JONES)	1578	11	3.6%	305	277	*	*	88	277	*	*	49	277	*	*	53	277	*	*	60	235	*	*	46	235	*	*	64
Oklahoma County	340750	1,685	3.6%	46,561	68,150	370	3.5%	10719	68,150	373	3.3%	11,313	68,150	346	3.8%	9,074	68,150	169	1.9%	8,740	66,404	341	3.7%	9,148	66,404	358	3.4%	10624
STATE OF OKLAHOMA	1,517,575	8,348	3.9%	211,936	303,515	2149	4.2%	51052	303,515	2,135	3.9%	54,686	303,515	1,823	4.3%	42,248	303,515	981	2.4%	40,066	296,959	1,411	3.1%	46,219	296,959	1,785	3.4%	52783

¹ Blood lead results were obtained from convenience sampling of children ages six months to six years of age residing in Oklahoma reported to the Oklahoma Childhood Lead Poisoning Prevention Program, Oklahoma State Department of Health. Blood lead test results are rounded to whole numbers for data analysis in accordance with guidelines established by the Centers for Disease Control and Prevention (CDC). Convenience sampling is a type of non-probability sampling, which is vulnerable to selection bias and may have a high level of sampling error. Consequently, percentages could fluctuate based on several factors other than lead levels in the environment such as access to screening and level of parental or provider concern.

² Number of Blood Lead Levels: These tests represent the highest venous blood lead test for an individual child. In absence of a venous blood lead test, the highest capillary blood lead test for an individual child is reported per year. Blood lead test results in the ranges 3.5 µg/dL or greater include children with capillary blood tests without a venous confirmation blood lead test.

³ Cell counts of <6 children and total counts of <20 children were suppressed to protect patient confidentiality.

⁴ Population estimates for zip codes are calculated as the count of the population under 5 years of age, plus 20% of the population ages 5-9 years, rounded to the nearest whole number. (From U.S. Census Bureau's ACS DP05, Demographic Profiles)