Sampling and Analysis Plan

Bullseye Area-Wide Soil Sampling and Analysis Plan

February 12, 2016

State of Oregon
Department of Environmental Quality

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

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Alternative formats (Braille, large type) of this document can be made available.
Contact DEQ's Office of Communications & Outreach, Portland, at (503) 229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696.

PROJECT APPROVALS

Prepared By: _____ Date: _____
Rebecca Wells-Albers, DEQ Project Manager

Reviewed By _____ Date: _____
Scott Hoatson, DEQ Quality Assurance Officer

Reviewed By _____ Date: _____
Keith Johnson, DEQ Northwest Region Cleanup Manager

Signed Copy on File at DEQ

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A1. DISTRIBUTION LIST

The following personnel will be emailed regarding all aspects of this SAP. Deviations from this SAP must be communicated in writing (e-mail is acceptable) to all individuals identified in Table 1. Final reports from the DEQ Contract Laboratory (Environmental Science Corporation) will be emailed and mailed to the DEQ NWR Project Manager.

Table 1 Distribution List

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To track the time and expenses spent on this project DEQ personnel must use the **Q-Time number**:44747

A2. PROBLEM DEFINITION/BACKGROUND

DEQ is collecting soil samples from properties in the vicinity of SE 22nd Avenue and Powell Boulevard in Southeast Portland to determine if heavy metals associated with emissions from stained-glass production are present above human health risk-based concentrations (See Appendix A). DEQ is performing the sampling in response to concerns related to particulate emission deposition associated with the Bullseye Glass Company, located at 3722 SE 21st Avenue in Southeast Portland. DEQ's Air Quality Program is conducting air monitoring at other sources in Portland with similar emissions that may be included in future soil sampling efforts. Therefore, this SAP may be modified and used to conduct future soil investigations at similar sites.

In February, 2016, DEQ staff will use a portable X-Ray Florescence (XRF) analyzer to screen soil at properties adjacent to and in the vicinity of the Bullseye Glass Co. for the following metals that are likely associated with stained glass production at the facility:

- Arsenic (As)
- Cadmium (Cd)
- Chromium (Cr) and Cr+6 (laboratory only)
- Lead (Pb)
- Manganese (Mn)
- Cobalt (Co)
- Nickel (Ni)
- Mercury (Hg)
- Selenium (Se)
- Iron (Fe)
- Aluminum (Al)

DEQ will also collect soil samples from select locations at each property based on the results of the XRF screening analysis and submit them for laboratory analysis for the metals listed above.

DEQ will compare both laboratory-generated results and field XRF results to risk based concentrations and background concentrations for the Portland Basin, as presented in the following in order to assess potential risk:

- *Oregon DEQ Risk-Based Concentration Table, Revision: November 1, 2015*
- *Oregon DEQ Development of Oregon Background Metals Concentrations in Soil, March, 2013*
- *See also Appendix A*

Data from this project may also be used to determine the area of distribution of the potential contaminant deposition from air emissions from the facility. Oregon Health Authority may also utilize some of the data generated from this project as part of an OHA Health Consultation.

A3. PROJECT/TASK DESCRIPTION

Sampling Organization:	Oregon DEQ Northwest Region Cleanup Program 700 NE Multnomah Street, Suite 600 Portland, OR 97232-4100
Analytical Organization:	Environmental Science Corp. (ESC) 12065 Lebanon Road Mt. Juliet, TN 37122 Contact: Jarred Willis, Tech. Service Rep. 800-767-5859 x9678

A4. QUALITY OBJECTIVES AND CRITERIA

DEQ will conduct all sampling activities performed under this work plan in accordance with DEQ's *EPA PA/SI Investigations Quality Assurance Project Plan* dated August 14, 2012 (DEQ05-LQ-0069-QAPP). ESC will analyze the samples and report results following EPA methods and standard ESC Laboratory procedures. The laboratory will follow their standard analytical QA/QC procedures that are accredited under the National Environmental Laboratory Accreditation Program (NELAP) and QA/QC criteria that meets or exceed the PA/SI QAPP.

Field QA/QC procedures are those described in "*Metals in Soil Analysis Using Field Portable X-ray Fluorescence"* (2003, Innov-X Systems, Inc) – in situ testing, and *Field Portable X-Ray Fluorescence Spectrometry For The Determination of Elemental Concentrations in Soil and Sediment* (EPA Method 6200, February, 2007).

A5. DOCUMENTATION AND RECORDS

Sample locations will be surveyed in the field using a global positioning system (GPS) and onsite measurements/observations. GPS coordinates will be recorded on the field sheet. Approximate sample locations will be marked on a site map (aerial photograph) for each property (See Appendix B). Photographs will be taken of the sample area and any other site-related observations, including likely exposure areas (play areas, gardens, etc). Soil type and soils with excessive moisture or other conditions that may interfere with the accuracy of the XRF readings will also be noted on the field log. Field documents will be maintained by the DEQ Project Manager.

Samples collected from the field will be shipped to the analytical laboratory with the "Chain of Custody" form (Appendix E). Final analytical reports generated by the ESC Laboratory will follow their standard laboratory practices. Electronic versions of the reports will be e-mailed to the DEQ project manager and

the DEQ LEAP Data Coordinator in a Portable Document Format (PDF) and in standard DEQ defined MS Excel format. An original hard copy of the report with the supporting QC documentation will be kept on file at the DEQ Laboratory. Policies and procedures for the maintenance of analytical records are described in the LEAP Quality Manual (DEQ91-LAB-0006-LQM). Copies of the report will be available upon request.

Property access agreements will be obtained and maintained by the DEQ Project Manager.

SECTION B. DATA GENERATION AND ACQUISITION

B1. SAMPLING

Field Screening- In Situ XRF

The XRF analyzer will be standardized and the calibration verified according to manufacturer's instructions ("*Metals in Soil Analysis Using Field Portable X-ray Fluorescence,"* 2003, Innov-X Systems, Inc.) at the beginning and end of each day prior to conducting the analysis, and when the battery pack is replaced. Calibration verification will be conducted at least twice per day. Standardization, calibration verification, and operational protocols will be conducted as summarized in Appendix C.

For the purposes of this project, XRF readings will be taken directly from the soil surface (samples will not be bagged or sieved). Loose debris and vegetation will be removed at the surface to expose intact top soil. Moisture may affect XRF results[1] because water will absorb x-rays and can result in a low bias. A field moisture meter may be used to determine in situ moisture content and will be noted on the field sheet and field notebook. A clean, clear plastic bag will be placed over the XRF analysis window and the XRF will then be positioned to measure the total metals concentrations in surface soil (**Note:** the plastic bag is used to minimize cross-contamination, however it may result in a 20-30% reduction in apparent chromium concentration readings).

Each property will be screened for the metals of interest that are presented in Table 4. Soil screening will be conducted at the soil surface (generally within the top 1" and beneath the turf root layer/mulch) at ten or more discreet locations from each property. The number of screening locations may be adjusted depending on the ground surface type for each property and target concentrations found at the site.

The sampling locations will be identified in the most likely locations of exposure, including gardens and play areas. Additional XRF readings will be taken at approximately six inches below the ground surface at locations where XRF readings exceed residential risk-based concentrations (RBCs) for the metals listed in Table 4. If multiple surface soil XRF readings exceed RBCs, then deeper XRF readings will be collected from the three highest soil sample concentration locations at each property.

Two XRF readings of 60 seconds duration will be collected at each sample location. If the two readings at the location vary by more than 20 percent for arsenic, a third reading will be taken to determine the average. The XRF analyzer automatically saves the date and sequential number of sampling location data. A field sheet listing the property address and sample readings will also be used to record the XRF readings for field QA, and is included as Appendix D. Soil sample collection locations will be flagged and determined after all screening activities are completed for each property.

Soil Sample Collection (Grab)

Sampling design, collection, methods, and handling will be managed by DEQ. The DEQ team will ensure that all samples are collected in the appropriate sample containers, preserved as identified in the reference

[1] Moisture content above 20 percent may cause problems, since moisture alters the soil matrix for which the FPXRF has been calibrated - "*Metals in Soil Analysis Using Field Portable X-ray Fluorescence,"* 2003, Innov-X Systems, Inc.

methods, transported to the analytical organization within the established holding times, with proper documentation and sample transport conditions. The analytical laboratory assumes no responsibility for the quality of data resulting from samples that were collected, shipped, or stored under inappropriate conditions.

Grab soil samples will be collected from 10 percent of XRF screening locations with metal concentrations greater than RBCs/background (whichever is higher) based on field screening. If the average metal concentration/location is less than background, soil samples will be collected from 5 percent of the XRF screening locations. The sampling team will determine if additional soil samples should be collected.

One field duplicate will be collected for every property sampled, regardless of the number of samples collected. If more than 20 samples are collected for a single property, a field duplicate will be collected for every 20 samples.

Examples of the locations and media to be sampled are presented in Table 2.

Table 2: Summary of the example locations, sampling names, and media

Example Naming Scheme	Description	Sample media
PP-SS01-0-1	Powell Park Discrete Surface Soil Sample, Location 01, 0-1" depth	Soil
PP-SS01-0-6	Powell Park Discrete Soil Sample, Location 01, 0-6" depth	Soil
PP-SS02-0-1	Powell Park Discrete Soil Sample, Location 02, 0-1" depth	Soil
CCLC-SS01-0-1	CCLC Day Care Discrete Soil Sample, Location 01, 0-1" depth	Soil
CCLC-SS01-0-6	CCLC Day Care Discrete Soil Sample, Location 01, 0-6" depth	Soil
FM-SS01-0-1	Fred Meyer Soil Sample, Location 01, 0-1" depth	Soil
FM-SS01-0-6	Fred Meyer Soil Sample, Location 01, 0-6" depth	Soil

B2. SAMPLING METHODS, SAMPLE HANDLING, AND CUSTODY

Soil samples submitted for laboratory analysis will be collected with a new plastic trowel or spoon. The soil will be placed into a 4-ounce jar, labeled with a sample tag identifying the property sampling unit and location (depth) number. For samples collected at depth (6 inches), a clean shovel will be used and rinsed between locations. All soil samples will be placed into a cooler and transported using DEQ chain-of-custody procedures for delivery to the ESC laboratory. ESC will analyze the samples for the analysis and using the method presented in Table 4.

A summary of the sampling containers, preservation requirements, and holding times is presented in Table 3.

Table 3: Summary of sampling parameters

Sample Type	Container	Preservation	Holding Time
Soil Grab	4-oz jar	None Required	180 days
Soil Grab	4-oz jar	Cool <6° C (Mercury)	28 days
Soil In situ Analysis with	None Required	None Required	None Required

Sample Type	Container	Preservation	Holding Time
Innov-X XRF			

B3. ANALYTICAL PARAMETERS, METHODS, AND QUALITY CONTROL

A summary of the requested analytical parameters and methods is provided in Table 4. Standard DEQ Laboratory operating procedures will be following during the analyses of the samples, including analytical Quality Control measures and equipment inspection/maintenance.

Table 4: Summary of analytical parameters and methods

Sample Type	Analytical Parameters	Reference Method
Soil Grab	Total Metals – As, Cd, Cr (+3), Cr (+6), Pb, Mg, Co, Ni, Se, Fe, Al, Hg	EPA 6020A (ICPMS) Cr (+6) 3060A/, 7199 (preferred), 7196A if 7199 not available
Soil In-situ	Total Metals - As, Cd, Cr, Pb, Se, Fe, Al, Mn, Co, Ni , Hg	EPA 6200/Innov-X Systems

Metals analysis will be reported on a dry weight basis.

B4. DATA MANAGEMENT

Analytical data generated by ESC will be sent to the project manager and the DEQ LEAP Data Coordinator in a Portable Document Format (PDF) and in standard DEQ defined MS Excel format. The DEQ laboratory will enter all of the XRF and Lab generated sample results into their data management system (Element™).The DEQ Laboratory will maintain hard copies of the analytical reports, including all analytical QC measurements. Unless otherwise arranged, data generated by this project will be moved to the Laboratory online database following release to the project manager. Data in this database is publically available. Until the online database is available, the information is available upon request.

SECTION C. ASSESSMENT AND OVERSIGHT

Overall project assessment and oversight, including field activities, and coordination with ESC will be the responsibility of the project manager. Data assessment/evaluation may also be provided by the DEQ Quality Assurance Officer and/or Data Coordinator (LEAP) upon DEQ Project Manager request. Any analytical anomalies or delays encountered during laboratory operations must be communicated to the project manager in writing (e-mail is acceptable). The Project Manager will also be notified in writing of any data quality limitations that may be the result of laboratory operations.

SECTION D. DATA VALIDATION AND USABILITY

ESC Laboratory will provide standard data review, verification, and validation on all analytical data generated by this project. The extent of the data review, verification, and validation is limited to the analytical processes only. However, in the best judgment of the DEQ QAO, any data that may be inaccurate, misleading, or otherwise fails the DEQ quality standards due to field or sampling activities will be identified in the final analytical report. Moreover, this data will be appropriately qualified when transferred to Element™. The LEAP Data Coordinator will assign data quality levels (DQL) in accordance to DEQ guidance document *Data Validation and Qualification* (DEQ09-LAB-0006-QAG). Generally, only DQLs of A, or B will be acceptable for this project unless the basis for the data acceptability is approved and documented by the Project Manager. All data verification, validation, and assessment activities for project purposes are the responsibility of the Project Manager.

Field Items:

- Chain of Custody
- Innov-X XRF
- GPS unit
- Camera
- Clear, clean plastic bags
- Rubber bands (to hold plastic bag over XRF)
- Small hand trowels
- Paper towels
- Alconox® or similar cleansing agent
- 5-gallon bucket
- Sample containers (4-ounce jars)
- Sample coolers
- Ice
- Shovel
- Sample labels
- Sharpie pens

APPENDICES

Appendix A: DEQ Soil Screening Table

Appendix B: Site and Property Maps

Appendix C: XRF Operating Instructions

Appendix D: Field Sheet, Sample Recording Log

Appendix E: Chain of Custody

Appendix A

Table 1: Chronic Risk Based Concentrations in Soil

Metal	Residential (mg/Kg)	Park User (mg/Kg)	Day Care (mg/Kg)	DEQ Background (mg/Kg) [1]
Arsenic, Inorganic	0.43	6.2	0.80	8.8
Cadmium	78	1,100	110	0.63
Chromium(III)	120,000	> Max	160,000	76 [a]
Chromium(VI)	0.30	4.4	0.42	-
Lead	400	NA	NA	79
Mercury	23	340	33	0.23
Cobalt	23	340	33	-
Nickel	1,500	22,000	2,200	47
Selenium	390	5,700	550	0.71
Manganese	1,800	27,000	2,600	1,800
Iron	55,000	800,000	76,000	36,100 [b]
Aluminum	77,000	>Max	110,000	52,300 [b]

NA - Not Available - No modeling is available to estimate a soil lead concentration for these scenarios.

1 - DEQ estimates are based on upper prediction limits. Local site-specific background may be lower. Oregon DEQ Development of Oregon Background Metals Concentrations in Soil, March, 2013

a - Based on total chromium.

b - No background estimates were published for these metals by DEQ in 2013. Values shown are from Washington Department of Ecology Pub. No. 94-115

> Max- Value exeeds theoretical maximum of 1,000,000 mg/Kg.

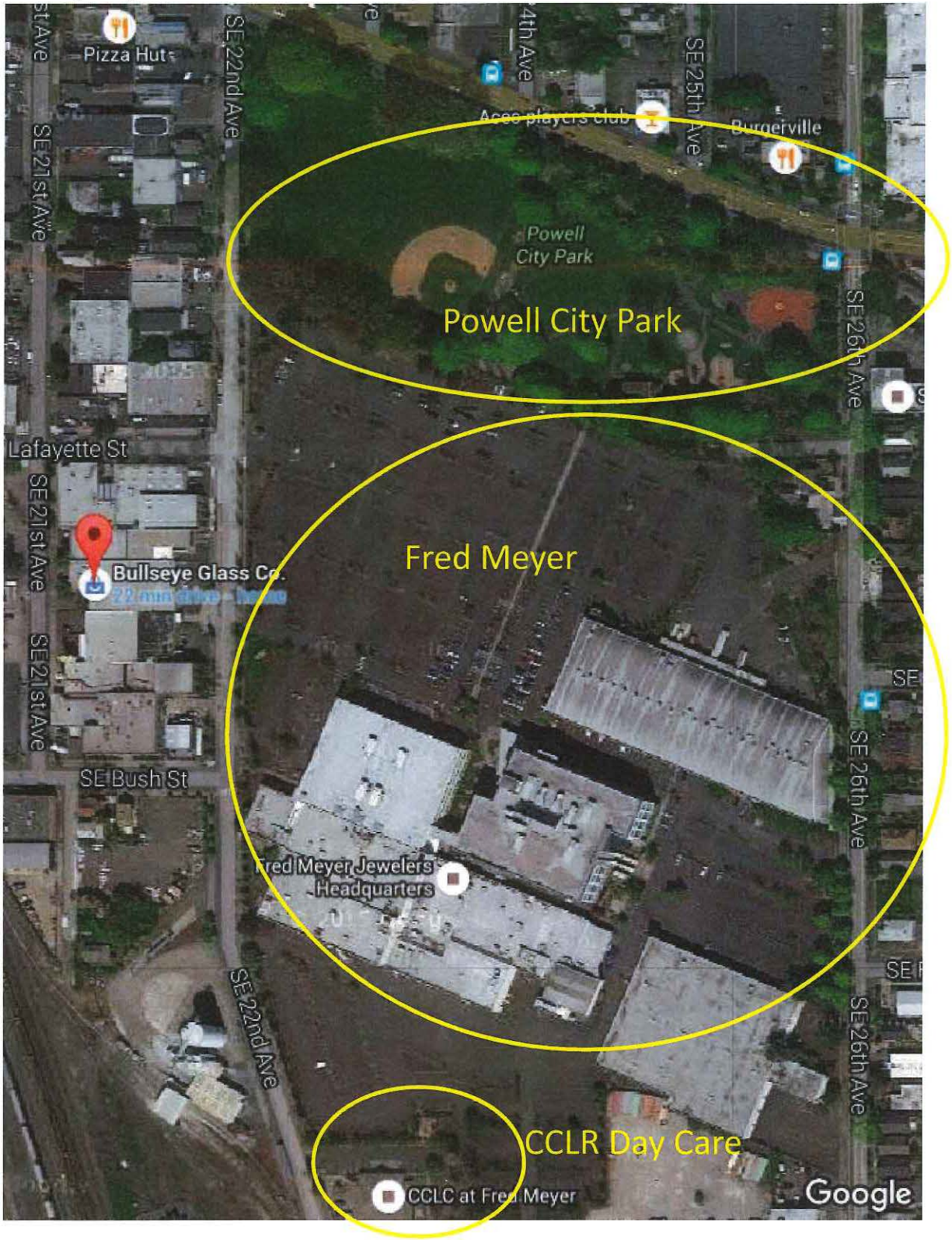
Residential: Assumes long term residence (26 years) and exposure for 350 days each year. Assumes six years of childhood exposure and includes ingestion, skin exposure and inhalation of soil particul

Park User: Same Assumptions as residential, with the modification of exposure for 2 days each week, for three months of each year -24 days per year.

Day Care: Assumes childhood exposure for six years, for 250 days each year.

Appendix B

Property locations shown with yellow circles

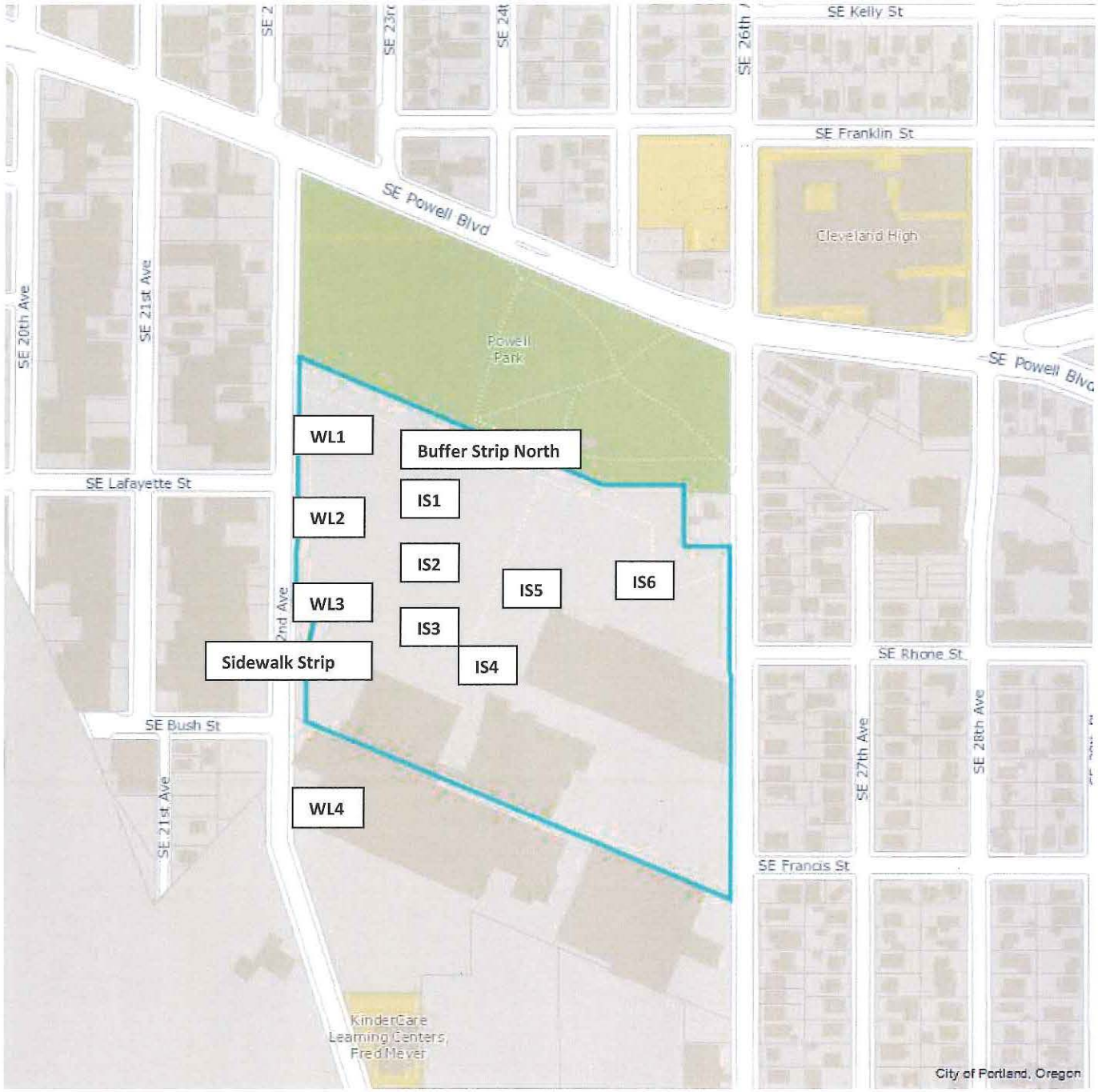


Appendix B

Powell Park

Appendix B

Fred Meyer



Appendix B

Kindercare – CCLC

APPENDIX C

Using the XRF

Turn on the instrument (white button on base) then turn on iPac (silver button, upper right corner

Tap START (upper left corner) then Innovx (in dropdown window)

A radiation warning sign will come up on the screen, tap START to proceed

Tap ENTER, then SOIL

The initializing process will begin. This takes a couple of minutes

A message saying standardization is needed will more than likely appear on the screen

Put the metal standard attachment over the front of the instrument and tap the standardization window. Standardization usually takes a couple of minutes

Notes that the red light near the front of the instrument will start blinking as will a light on the back of the instrument. This indicates that the X-ray tube is energized and emitting radiation. DO NOT remove the standardization attachment while the lights are blinking

If standardization is successful, tap OK, it is now ready to take readings. Record the time, date and result resolution in the red notebook in the instrument case. Now you can remove the standardization attachment

CALIBRATION

Following standardization, perform a calibration verification (at least twice per day) using the following protocol:

1) Place NIST standard (low [2709] or medium [2711]) to the XRF screen and depress the trigger on the unit to perform a 2-minute test. Record the reading in the field logbook. The difference between the XRF result for a chosen element (arsenic) and the value of the standard should be 20% or less.
   Calibration NIST standard values are included as a reference in this document.

SAMPLING

A plastic bag should be placed over the front of the instrument to protect the X-ray emitting window from direct contact with the soil. *Note: the plastic bag is used to minimize cross-contamination, however it may result in a 20-30% reduction in Cr concentration readings.*

Tap ENTER to enter the measurement mode.

Place the emitting window flat against the sample area. You might need to unlock the trigger (a warning note will let you know). To do this tap the padlock icon in the lower right corner. Place the emitting window against the soil. Hold the trigger down during the entire reading period (it is set up to do it for 60 seconds). If you release the trigger during the reading the sampling will stop. The seconds are counted on the instrument screen so you know how much time has elapsed. The instrument automatically stops the reading at 60 seconds.

Every 30 seconds the screen light goes off, tapping the screen brings it back and not interfere with the reading. The results will come up on the iPaq window in a few seconds and you can scroll through them to get an idea how they look

Record the reading number assigned by the instrument for this sample (upper left corner and the sample location in the field notebook. The readings are given consecutive numbers. The measurement number and the date it was taken will identify the reading in the memory. Make sure to write down the number as it appears on the instrument when the reading is finished

Place the window on the next sample location and pull the trigger to start the next reading

Saving the Data

When done for the day, tap FILE (lower left corner), then "EXPORT RESULTS"

Make sure "RESULTS ON DATE" is selected and mode is ALL, tap OK

Set save as to: Name – use the date, i.e. 5-2-13, or the general location (i.e. Day Care Center). There is a small icon in the lower right corner that looks like a key board that will bring one up to enter names.

Folder – other

Type – comma separated

Location – Main Memory

Tap OK. All the data is now saved in the iPaq.

Downloading the Data

Turn the instrument and IPaq off. Remove the iPaQ from the instrument. VERY IMPORTANT: push the iPaq forward, it should travel about half an inch or so. Lift the bottom of the iPaq and slide it toward the back of the instrument. Reverse the steps to replace the iPaq in the instrument when finished

Place the iPaq in the down loading cradle making sure the SUB connectors go together easily. Plug the outlet cord from the cradle into the SUB port on a computer. The program to download should automatically install itself on the computer. It will show up on your list of drives as Pocket-PC.

There are three sub-folders in Pocket-PC, two are named and one is not, you want to enter the one that is not, it just has an icon that is supposed to look like the iPaq. There are a number of folders here, the data is in the one called My Documents, your files should be there under the names that you used to save them. They are in comma delimited format and should upload directly into Excel.

Nist low

Table 1. Certified Values

Element	Mass Fraction (%)			Element	Mass Fraction (µg/g)		
Aluminum	7.50	±	0.06	Antimony	7.9	±	0.6
Calcium	1.89	±	0.05	Arsenic	17.7	±	0.8
Iron	3.50	±	0.11	Barium	968	±	40
Magnesium	1.51	±	0.05	Cadmium	0.38	±	0.01
Phosphorus	0.062	±	0.005	Chromium	130	±	4
Potassium	2.03	±	0.06	Cobalt	13.4	±	0.7
Silicon	29.66	±	0.23	Copper	34.6	±	0.7
Sodium	1.16	±	0.03	Lead	18.9	±	0.5
Sulfur	0.089	±	0.002	Manganese	538	±	17
Titanium	0.342	±	0.024	Mercury	1.40	±	0.08
				Nickel	88	±	5
				Selenium	1.57	±	0.08
				Silver	0.41	±	0.03
				Strontium	231	±	2
				Thallium	0.74	±	0.05
				Vanadium	112	±	5
				Zinc	106	±	3

Noncertified Values: Noncertified values, shown in parentheses, are provided for information only. An element concentration value may not be certified if a bias is suspected in one or more of the methods used for certification, or if two independent methods are not available.

Table 2. Noncertified Values

Element	Mass Fraction (%)	Element	Mass Fraction (µg/g)
Carbon	(1.2)	Cerium	(42)
		Cesium	(5.3)
		Dysprosium	(3.5)
		Europium	(0.9)
		Gallium	(14)
		Gold	(0.3)
		Hafnium	(3.7)
		Holmium	(0.54)
		Iodine	(5)
		Lanthanum	(23)
		Molybdenum	(2.0)
		Neodymium	(19)
		Rubidium	(96)
		Samarium	(3.8)
		Scandium	(12)
		Thorium	(11)
		Tungsten	(2)
		Uranium	(3)
		Ytterbium	(1.6)
		Yttrium	(18)
		Zirconium	(160)

Nist med

Table 1. Certified Values

Element	Mass Fraction (%)			Element	Mass Fraction (µg/g)		
Aluminum	6.53	±	0.09	Antimony	19.4	±	1.8
Calcium	2.88	±	0.08	Arsenic	105	±	8
Iron	2.89	±	0.06	Barium	726	±	38
Magnesium	1.05	±	0.03	Cadmium	41.70	±	0.25
Phosphorus	0.086	±	0.007	Copper	114	±	2
Potassium	2.45	±	0.08	Lead	1162	±	31
Silicon	30.44	±	0.19	Manganese	638	±	28
Sodium	1.14	±	0.03	Mercury	6.25	±	0.19
Sulfur	0.042	±	0.001	Nickel	20.6	±	1.1
Titanium	0.306	±	0.023	Selenium	1.52	±	0.14
				Silver	4.63	±	0.39
				Strontium	245.3	±	0.7
				Thallium	2.47	±	0.15
				Vanadium	81.6	±	2.9
				Zinc	350.4	±	4.8

Noncertified Values: Noncertified values, shown in parentheses, are provided for information only. An element concentration value may not be certified, if a bias is suspected in one or more of the methods used for certification, or if two independent methods are not available.

Table 2. Noncertified Values

Element	Mass Fraction (%)	Element	Mass Fraction (µg/g)
Carbon	(4)	Bromine	(5)
		Cerium	(69)
		Cesium	(6.1)
		Chromium	(47)
		Cobalt	(10)
		Dysprosium	(5.6)
		Europium	(1.1)
		Gallium	(15)
		Gold	(.03)
		Hafnium	(7.3)
		Holmium	(1)
		Indium	(1.1)
		Iodine	(3)
		Lanthanum	(40)
		Molybdenum	(1.6)
		Neodymium	(31)
		Rubidium	(110)
		Samarium	(5.9)
		Scandium	(9)
		Thorium	(14)
		Tungsten	(3)
		Uranium	(2.6)
		Ytterbium	(2.7)
		Yttrium	(25)
		Zirconium	(230)

Nist high
2710

Element	Mass Fraction (in %)			Element	Mass Fraction (in mg/kg)		
Aluminum	6.44	±	0.08	Antimony	38.4	±	3
Calcium	1.25	±	0.03	Arsenic	626	±	38
Iron	3.38	±	0.10	Barium	707	±	51
Magnesium	0.853	±	0.042	Cadmium	21.8	±	0.2
Manganese	1.01	±	0.04	Copper	2950	±	130
Phosphorus	0.106	±	0.015	Lead	5532	±	80
Potassium	2.11	±	0.11	Mercury	32.6	±	1.8
Silicon	28.97	±	0.18	Nickel	14.3	±	1.0
Sodium	1.14	±	0.06	Silver	35.3	±	1.5
Sulfur	0.240	±	0.006	Vanadium	76.6	±	2.3
Titanium	0.283	±	0.010	Zinc	6952	±	91

Noncertified Values: Noncertified values are provided for information only. An element concentration value is not certified if a bias is suspected in one or more of the methods used for certification, or if two independent methods are not available.

Table 2. Noncertified Values

Element	Mass Fraction (in %)	Element	Mass Fraction (in mg/kg)
Carbon	3	Bromine	6
		Cerium	57
		Cesium	107
		Chromium	39
		Cobalt	10
		Dysprosium	5.4
		Europium	1
		Gallium	34
		Gold	0.6
		Hafnium	3.2
		Holmium	0.6
		Indium	5.1
		Lanthanum	34
		Molybdenum	19
		Neodymium	23
		Rubidium	120
		Samarium	7.8
		Scandium	8.7
		Strontium	330
		Thallium	1.3
		Thorium	13
		Tungsten	93
		Uranium	25
		Ytterbium	1.3
		Yttrium	23

Sample ID	XRF ID	Date	Lat (DD)	Long (DD)	As (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Pb (mg/kg)	Mg (mg/kg)	Co (mg/kg)	Ni (mg/kg)	Hg (mg/kg)	Se (mg/kg)	Fe (mg/kg)	Al (mg/kg	Comment

Appendix D

Sample ID	XRF ID	Date	Lat (DD)	Long (DD)	As (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Pb (mg/kg)	Mg (mg/kg)	Co (mg/kg)	Ni (mg/kg)	Hg (mg/kg)	Se (mg/kg)	Fe (mg/kg)	Al (mg/kg	Comment

Appendix E

State of Oregon Chain of Custody

Agency, Authorized Purchaser or Agent: Oregon DEQ	Contract Laboratory Name:	Lab Selection Criteria:	Turn Around Time:
Send Lab Report To: Rebecca Wells-Albers Address: 700 NE Multnomah Street, Suite 600, Portland, OR 97232-4100 Tel. #: 503-229-5585 E-mail: wells-albers.rebecca@deq.state.or.us	**Lab Batch #:** **Invoice To:** Delia Chadwick Address: 811 SW 6th Ave, Portland, OR 97204 Tel. #: 503-229-6140	☐ Proximity (if TAT < 48 hrs) ☐ Prior work on same project ☐ Cost (for anticipated analyses) ☐ Other labs disqualified or unable to perform requested services ☐ Emergency work	☐ 10 days (std.) ☐ 5 days ☒ 72 hours ☐ 48 hours ☐ 24 hours ☐ Other _____

Project Name:
Project #: Bullseye Area-Wide
Sampler Name:

Sample ID#	Collection Date/Time	Matrix	Number of Contain-ers	As	Cd	Pb	Cr (+3)	Cr (+6)	Se	Ni	Co	Mn	Fe, Al, Hg	Comments
				Sample Preservative										
				Requested Analyses										

Notes: Please send .pdf and MS Excel report in the DEQ Excel format. Please report on dry weight basis.

Relinquished By:	Agency/Agent:	Received By:	Agency/Agent:
Signature:	Time & Date:	Signature:	Time & Date:
Relinquished By:	Agency/Agent:	Received By:	Agency/Agent:
Signature:	Time & Date:	Signature:	Time & Date:

THIS PURCHASE IS SUBMITTED PURSUANT TO STATE OF OREGON SOLICITATION #**102-1098-07** AND PRICE AGREEMENT # **8903**. THE PRICE AGREEMENT INCLUDING CONTRACT TERMS AND CONDITIONS AND SPECIAL CONTRACT TERMS AND CONDITIONS (T'S &C'S) CONTAINED IN THE PRICE AGREEMENT ARE HEREBY INCORPORATED BY REFERENCE AND SHALL APPLY TO THIS PURCHASE AND SHALL TAKE PRECEDENCE OVER ALL OTHER CONFLICTING T'S AND C'S, EXPRESS OR IMPLIED.