Bullseye Glass Area-Wide

Soil Sampling Report

March 2016

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State of Oregon
Department of Environmental Quality

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Background

DEQ collected 67 soil samples and 5 mulch samples from three properties (Powell Park, Fred Meyer Corporate Center, Children's Creative Learning Center (CCLC Daycare) in the vicinity of SE 22nd Avenue and Powell Boulevard in Southeast Portland (Figure 1). DEQ performed the sampling in response to concerns related to particulate emission deposition, specifically metals, associated with the Bullseye Glass Company, located at 3722 SE 21st Avenue in Southeast Portland. Soil sample sites were selected based on available sampling locations (available soil media at three properties) in the vicinity of SE Portland adjacent to the Bullseye Glass Company (Figure 1).

Soil sampling objectives, study design, data collection methodology, and data quality were implemented as described in the *Bullseye Area-Wide Soil Sampling and Analysis Plan (SAP), DEQ, February 12, 2016*. Soil samples were collected on February 12, 16, and 17, 2016 and were transferred to Environmental Science Corp. (ESC) Lab Sciences along with chain of custody documentation for analysis of a suite of metals.

Soil samples were analyzed for the following metals that were thought to be potentially associated with the glass manufacturing process and subsequently emitted and deposited onto soil.

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

Uranium was added to the laboratory analyte list after the SAP was developed as this metal was discovered to have potentially been used in the glass manufacturing process. Iron and aluminum are commonly present in soil, and were added to assist with data interpretation.

Sampling Methods

Between February 12 and February 17, 2016, DEQ collected soil samples from the three properties adjacent to the Bullseye Glass Company property in accordance with DEQs *Bullseye Area-Wide Soil Sampling and Analysis Plan, February 12, 2016.* Samples were placed in an iced cooler, transported to and analyzed at ESC and Weck Laboratories following standard analytical Quality Assurance/Quality Control (QA/QC) procedures. Both laboratories are accredited under the National Environmental Laboratory Accreditation Program (NELAP). Weck Laboratories analyzed seven soil samples for hexavalent chromium (Cr+6) as verification, all other testing was performed by ESC laboratory.

A comparison of hexavalent chromium samples analyzed by both laboratories is discussed under“conclusions” on page 3.

The samples are generally representative of surface soil and were collected primarily at shallow depths up to six inches below ground surface (bgs). A small number of slightly deeper samples were also collected, up to 12 inches bgs.

Soil sample location at CCLC Daycare
February 12, 2016

Mulch sample location at Powell Park
February 16, 2016

The SAP described preliminary soil screening using a portable X-Ray Florescence analyzer (XRF). The SAP was prepared with the intention that XRF analysis would be used to determine sample locations for laboratory analysis. However, due to interference from the moisture content of saturated soil from recent rain, and inconsistent results between XRF measurements and laboratory analytical results, DEQ discontinued the use of the XRF. The XRF data are not presented in this report. DEQ collected soil samples for laboratory analysis at every location where XRF measurements were taken.

Analytical Results

DEQ staff collected a total of 67 soil samples from Powell Park, Fred Meyer Corporate Center, and CCLC Daycare properties with sampling locations shown on Figure 1. Of these 67 samples, 30, 22, and 15 samples were collected at Powell Park, Fred Meyer, and CCLC Daycare, respectively. These sample locations and corresponding concentrations for select metals are presented and compared to risk-based screening criteria on Figures 2 through 6. Analytical data are presented and compared to screening criteria in Appendix A, Tables 1-4. Five samples represent mulch (i.e., bark chips) collected from the Powell Park playground and are presented in Table 4 and Figure 7. It is important to note that the risk-based soil screening criteria presented in Table 5 are appropriate for comparison to average (i.e., mean) concentrations, not individual sample results. Comparing the average soil concentration from an area to the screening criteria provides a better analysis of risk, as people move around and are unlikely to be exposed to potential contamination at one specific location from ingesting or inhaling the soil. Individual sample concentrations represent small volumes of soil taken from one specific location and are not directly relevant for long-term exposure for which the comparision criteria were developed.

Screening criteria used for comparison to analytical data are presented in Table 5, and referenced here:

1. Background Levels of Metals in Soils for Cleanups, Fact Sheet, Oregon DEQ, Land Quality Division, Environmental Cleanup Program, March 20, 2013. Available at:

   http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf

2. ATSDRs Environmental Guidelines, used nationally. Available at:

   http://www.atsdr.cdc.gov/hac/phamanual/appf.html
   http://www.atsdr.cdc.gov/toxprofiles/tp150-c2.pdf

3. DEQs Risk-Based Concentrations (RBCs), last Updated November 2015. DEQ publishes RBCs for assessing sites within the state. Available at:

   www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf

Conclusions

At all soil sampling locations, aluminum, iron, manganese, uranium (where analyzed), mercury, selenium, nickel, cobalt, and total chromium were all within or below concentration ranges expected for naturally occurring levels of these metals. Important exceptions are arsenic, cadmium, and lead.

Lead levels did not exceed Oregon DEQ soil screening levels. However, lead concentrations exceeded concentrations expected for background in a subset of samples in Powell Park and at the CCLC day care location. Similarly, cadmium does not exceed soil screening levels at any location. However, a number of samples exceed cadmium concentrations expected for background at each of the three sampling areas.

Arsenic levels were generally consistent with background in most samples at the Powell Park and Fred Meyer locations. Estimates of average concentrations at these two locations are below DEQs estimate of background for the Portland Basin. At the CCLC daycare, concentrations exceed both estimates of background and soil screening levels, which are indicative of arsenic impacts to soil at this location.

Hexavalent chromium results were variable with most results below the method detection limit[1], but there were some detections. At Powell Park, an upper end estimate of average concentration is estimated at just below one milligram per kilogram (mg/kg) and at Fred Meyer there were too few detections to estimate an average. The CCLC daycare location had the most detections, with average concentration estimates at approximately 1.5 mg/kg. These average estimates exceed DEQs risk based concentration (RBC) of 0.3 mg/kg, but are less than the Agency for Toxic Substances and Disease Registry (ATSDR) guideline value of 45 mg/kg. Overall, the Powell Park and Fred Meyer locations are at very low levels, and the CCLC location is slightly higher.

Because the Oregon DEQ RBC for hexavalent chromium is very low, most if not all detections above the method detection limit exceed the RBC. During DEQs data review, DEQ sent seven samples analyzed by ESC Laboratories to Weck laboratories for analysis by the same analytical method. Comparison of results of the same samples by the same method by two independent laboratories provides an indication of the

[1] A method detection limit is the minimum concentration of a substance that can be measured and reported with 99% confidence that the substance concentration is greater than zero.

degree of variability, reported as relative percent difference (RPD), that can be attributable to the overall measurement process.

In the samples that were collected and had detectable levels, the relative percent difference (RPD) was as high as 100%. The RPD helps assess how precise a measurement might be. A high RPD indicates a less precise measurement. The differences in RPD show that there are difficulties with measuring very low metal concentrations in soils. Low level measurements are more uncertain because of the composition of the soil itself (particle size, substrate, homogeneity) and the limitations of the instrument used to measure the sample.

Because the method detection limits for hexavalent chromium in this investigation are essentially at the same level as the RBC, there is greater uncertainty regarding whether hexavalent chromium is present in these samples at levels that exceed DEQs RBC, as opposed to metals with higher RBCs that are above applicable method reporting limits. The difference between non-detections and exceedances of the RBC may be within the range of measurement uncertainty.

Based on a comparison of the soil data to health-based screening levels, there does not appear to be excess risk to human health from the metals deposition onto the soil in the vicinity of the Bullseye Glass Company Property.

References

Bullseye Area-Wide, Soil Sampling and Analysis Plan, Oregon Department of Environmental Quality, February 12, 2016.
www.deq.state.or.us/nwr/docs/metalsem/bullseyeSAP.pdf

Oregon Department of Environmental Quality, 2015. Oregon Administrative Rules, Division 41, http://www.deq.state.or.us/regulations/rules.htm.

Oregon Department of Environmental Quality, 2013.Background Levels of Metals in Soils for Cleanups. March 2013. http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf.

Oregon Department of Environmental Quality, 2015. Risk-Based Concentrations. November 2015. www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf.

Agency for Toxic Substances and Disease Registry (ATSDR), 2016. ATSDR values are environmental media evaluation guides (EMEGS). http://www.atsdr.cdc.gov/hac/phamanual/appf.html.

Environmental Science Corp (ESC) Laboratories. 12065 Lebanon Road, Mount Juliet, Tennessee, 37122, 615-773-9678, http://www.esclabsciences.com/

Weck Laboratories, Inc. 14859 East Clark Avenue City of Industry, California 91745-1396, 626-336-2139, http://www.wecklabs.com/

Appendix A – Analytical Results

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Table 1. Powell Park (mg/kg dry weight)

SampleID	As	Cd	Cr	Cr+6[a]	Co	Pb	Ni	Se	Hg	Fe	Mn	Al	U
PP-SS-03-01	7.9	9.9	22.9	1.3*	13.4	182	19.2	2.4	0.082	25200	618	11400	0.73
PP-SS-05-01	9.1	9.8	19.2	<0.38	12.9	122	18.5	2.3	0.095	24300	688	11900	0.66
PP-SS-07-01	8.4	4.8	20.2	<0.36	13.1	238	21.9	1.4	0.12	24500	745	11600	
PP-SS-07-06	6.5	1.8	19.9	<0.33	13.1	192	19.7	0.71	0.088	26500	794	12900	
PP-SS-11-01	7.7	5.2	20.8	<0.35	12.4	258	19.4	1.5	0.10	24800	646	12200	
PP-SS-12-06	4.0	1.2	12.2	2.0	4.0	72.4	10.7	<0.37	0.14	8240	195	6120	
PP-SS-14-01	3.0	*0.44*	11.8	*1.8^*	11.0	30.6	9.0	*0.32*	0.050	18600	689	7730	
PP-SS-15-08 *	2.2	0.742	18.5	<0.38	3.7	88.8	12.6	<0.28	0.083	8030	117	8040	
PP-SS-16-08 *	3.2	1.31	16.1	2.1	6.3	54.8	13.1	*0.35*	0.069	13500	231	9670	
PP-SS-18-06	4.0	1.1	11.2	2.9	5.0	62.8	8.5	*0.32*	0.25	10800	298	6390	
PP-SS-20-06	2.2	*0.98*	8.8	*0.94*	4.7	25.7	8.1	<0.44	*0.045*	7690	237	5540	
PP-SS-22-06	3.8	*0.30*	12.5	*1.2*	13.5	10.2	11.4	*0.33*	0.027	22000	1630	10900	
PP-SS-23-12	3.8	*0.81*	19.2	<0.64^	12.2	41.9	13.8	<0.32	0.096	22200	549	12900	
PP-SS-24-08	4.5	1.2	29.3	<0.43	5.1	105	8.85	*0.38*	0.091	11900	233	9100	
PP-SS-26-06	2.1	0.98	11.5	<1.16^	4.3	40.3	8.81	<0.35	0.062	10300	176	6740	
PP-SS-27-06	3.7	*0.82*	18.4	<0.60	7.7	36.5	14.5	*0.49*	0.067	18000	347	13700	
PP-SS-29-01	5.2	*0.18*	28.8	<0.85^	13.0	9.1	13.6	*0.43*	*0.023*	29400	546	12700	
PP-SS-32-01	2.8	*0.30*	9.2	<0.77^	8.4	4.82	17.7	*0.32*	<0.0034	14500	309	6350	
PP-SS-33-03	3.9	1.1	14.7	<0.95^	11.6	34.5	16.1	*0.50*	0.063	21600	712	10400	
PP-SS-34-01	2.7	*0.40*	10.7	*0.51*	13.6	5.1	26.3	*0.34*	*0.0039*	17100	499	7360	
PP-SS-36-01	2.0	0.88	6.0	<0.93^	5.3	15.3	4.7	<0.28	0.054	8680	365	4200	
PP-SS-37-01	2.2	0.88	7.6	*0.71*	6.2	26.0	6.0	*0.34*	0.072	10400	501	5150	
PP-SS-38-01	2.6	0.96	8.7	*0.52*	7.3	34.6	8.0	*0.38*	0.095	12700	492	6070	
PP-SS-39-01	2.6	*0.385*	7.8	<0.98^	7.2	31.7	5.8	<0.29	0.049	10600	418	4890	
PP-SS-40-03	1.4	*0.31*	6.1	<0.99^	4.7	17.7	5.0	<0.29	0.045	8220	269	4290	
PP-SS-41-03	2.3	*0.37*	11.2	<0.37	7.0	37.7	7.6	<0.28	0.048	12600	349	5740	
PP-SS-42-01	*5.9*	*4.1*	11.5	<0.41	8.8	66.4	11.3	<3.1	0.083	14900	557	7240	
PP-SS-42-01 (Dup)	*6.0*	*4.3*	9.5	<0.41	8.5	71.4	8.7	<3.1	0.076	13400	598	6560	
PP-SS-43-01	10.7	8.9	26.8	<0.43	20.7	169	27.2	*3.5*	0.11	35100	1460	17200	
PP-SS-44-01	*3.5*	*2.5*	9.8	<0.43	*8.3*	137	9.5	<3.2	0.10	14200	555	5760	
Background Estimate	8.8	0.63	76	NA	33	79	47	0.71	0.23	36100	1800	52300	3
Background Range	2.4 - 9.5	0.15 - 0.82	20 - 84	NA	4.1 - 151	6.9 - 100	13 - 49	0.2 - 1.1	0.02 - 0.23	16,350- 59,850	150 - 1,960	13,750 - 54,500	NA
DEQ Screening Value	0.43	78	120000	0.3	23	400	1500	390	23	55000	1800	77000	230
ATSDR Screening Value	15	5	75000	45	500	NA	1000	250	15	NA	2500	50000	150
90th UCL on Mean [1]	5.1	4.0	16	0.83	10	97	14	0.94	0.09	18912	641	9663	NC
95th UCL on Mean	5.3	4.7	17	0.88	11	106	15	0.99	0.09	19453	669	9979	NC

1- Averages estimated as upper confidence limits on mean of surface samples only using US EPA ProUCL software version 5.0.

NA- Not Available - No Screening value from this source.

NC- Not Calculated, insufficient detections.

*** PP-SS-15-08 and PP-SS-16-08 excluded from average estimates as subsurface samples.**

[a]Cr+6 analyzed by EPA 7199 unless otherwise noted

Estimated Data between the MDL and MRL (J Flag)

Raised reporting limit due to matrix

^ = Analyzed by EPA 7196A (colorimetric)

* = Anlyzed by Weck Laboratories

Table 2. Fred Meyer (mg/kg dry weight)

SampleID	As	Cd	Cr	Cr+6[a]	Co	Pb	Ni	Se	Hg	Fe	Mn	Al	U
FM-SS-01-01	*4.2*	7.7	*7.4*	<0.39	9.7	24.0	6.6	<2.9	0.041	9640	550	3270	< 1.2
FM-SS-02-01	*3.8*	*3.6*	11.1	<0.35	16.6	21.5	16.5	<2.6	*0.023*	16300	772	6560	<1.1
FM-SS-02-06	*1.5*	<0.93	7.9	<0.75^	18.1	5.74	18.5	<2.2	*0.0070*	15200	716	6830	
FM-SS-03-01	*1.9*	<0.96	8.9	<0.77^	16.1	*4.7*	12.8	<2.3	*0.0049*	15300	652	6320	
FM-SS-03-06	*1.5*	<0.94	6.3	<0.75^	12.8	*4.3*	10.9	<2.2	*0.0049*	12700	586	5900	
FM-SS-03-06 (Dup)	*1.6*	<0.95	7.5	<0.76^	15.6	*4.7*	12.6	<2.3	*0.0055*	14300	713	6400	
FM-SS-04-01	7.0	15.0	63	2.0	56.9	40.2	26.2	*3.3*	*0.022*	50900	2230	18100	
FM-SS-05-01	*1.9*	*2.5*	8.4	<0.31	14.2	*4.2*	21.7	<2.3	*0.0082*	16100	548	7010	
FM-SS-06-01	*2.7*	*2.9*	8.6	<0.79^	19.9	9.1	22.2	< 2.4	*0.016*	18200	787	7350	
FM-SS-07-01	*2.4*	*4.5*	8.6	<0.34	14.3	7.8	24.7	<2.5	*0.0098*	16200	738	6850	
FM-SS-08-03	*6.8*	*7.5*	18.3	<0.52	10.4	39.2	10.8	<3.9	0.059	18200	512	8830	
FM-SS-09-03	12.2	*8.4*	24.5	<0.49	*7.5*	47.4	6.7	<3.7	0.10	13700	307	5860	
FM-SS-10-01	7.0	*2.1*	15.7	<0.87^	9.4	63.1	10.7	<2.6	0.038	23600	432	9960	
FM-SS-11-01	*7.6*	12.2	15.0	<1.0^	12.5	45.0	11.7	*4.4*	0.055	19400	552	9320	
FM-SS-12-06	*4.5*	<1.0	13.2	1.6	13.5	19.5	9.3	<2.5	*0.026*	15300	775	8270	
FM-SS-12-01	9.2	7.5	22.0	<0.34	25.8	33.4	12.9	<2.5	0.033	36400	1440	11500	
FM-SS-13-01	*3.6*	<0.96	14.4	<0.79^	70.4	10.2	31.8	<2.3	*0.0056*	34400	1830	12600	
FM-SS-14-01	*5.8*	*1.4*	20.5	<0.32	26.3	24.4	40.2	<2.4	0.026	32600	961	14100	
FM-SS-15-01	5.9	*1.1*	16.0	<0.73^	20.9	73.5	23.5	<2.2	0.079	24600	817	8200	
FM-SS-16-01	*5.2*	<1.1	12.5	<0.35	12.1	25.2	16.7	<2.6	0.042	22600	551	9930	
FM-SS-17-01	*3.5*	<0.98	15.5	<0.31	20.0	*5.6*	38.4	<2.3	*0.0072*	30100	771	12600	
FM-SS-18-01	7.6	<1.0	18.2	*0.87*	13.5	29.3	15.4	<2.4	0.055	27200	555	14800	
Background Estimate	8.8	0.63	76	NA	33	79	47	0.71	0.23	36100	1800	52300	3
Background Range	2.4 - 9.5	0.15 - 0.82	20 - 84	NA	4.1 - 151	6.9 - 100	13 - 49	0.2 - 1.1	0.02 - 0.23	16,350- 59,850	150 - 1,960	13,750 - 54,500	NA
DEQ Screening Value	0.43	78	120000	0.3	23	400	1500	390	23	55000	1800	77000	230
ATSDR Screening Value	15	5	75000	45	500	NA	1000	250	15	NA	2500	50000	150
90th UCL on Mean [1]	5.7	5.0	19	NC	30	30	21	NC	0.04	25,018	938	10,120	NC
95th UCL on Mean	6.0	5.4	20	NC	34	32	22	NC	0.04	26,030	977	10,421	NC

1- Averages estimated as upper confidence limits on mean using US EPA ProUCL software version 5.0.

NA- Not Available - No Screening value from this source.

NC- Not Calculated, insufficient detections.

[a]Cr+6 analyzed by EPA 7199 unless otherwise noted

Estimated Data between the MDL and MRL (J Flag)

Raised reporting limit due to matrix

^ = Analyzed by EPA 7196A (colorimetric)

Table 3. CCLC Daycare (mg/kg dry weight)

SampleID	As	Cd	Cr	Cr+6[a]	Co	Pb	Ni	Se	Hg	Fe	Mn	Al	U
CCLC-SS-14-01	3.7	1.5	17.0	*1.6*	8.2	58.3	13.3	*0.84*	0.051	13200	296	6720	
CCLC-SS-17-01	8.8	5.2	22.3	<0.46	14.3	105	17.3	1.2	0.051	17800	395	8510	
CCLC-SS-19-01	2.5	*0.40*	7.7	*1.2*	6.2	7.8	7.8	*0.33*	*0.013*	9620	361	4020	
CCLC-SS-21-01	3.3	1.3	17.1	3.0	7.9	42.9	10.4	*0.72*	0.039	13400	411	7630	
CCLC-SS-25-01	5.9	0.96	16.4	*0.39*	16.7	16.1	10.5	0.70	*0.019*	24300	743	11200	
CCLC-SS-28-01	5.3	1.8	16.2	*0.77*	10.5	22.5	9.2	*0.73*	*0.026*	16300	512	9640	1.0
CCLC-SS-30-01	6.0	1.7	15.6	<1.1	10.6	18.8	9.0	*0.66*	*0.021*	19400	567	9170	
CCLC-SS-30-06	6.1	1.1	17.5	1.9	11.1	16.0	10.2	*0.51*	*0.028*	21900	555	11200	
CCLC-SS-34-01	5.3	2.1	17.8	*0.28*	8.8	31.3	10.5	*0.74*	*0.025*	15800	429	7520	
CCLC-SS-36-01	10.1	2.3	16.2	0.97	9.7	38.7	10.2	0.79	*0.023*	14800	793	7740	1.5
CCLC-SS-36-01 (Dup)	7.5	1.7	15.5	1.6	7.8	34.2	9.4	*0.71*	*0.020*	12700	386	7140	1.4
CCLC-SS-38-01	25.2	4.0	20.5	1.4*	10.2	122	14.7	1.3	0.053	17300	357	8980	1.4
CCLC-SS-41-01	42.6	5.3	20.2	1.9	8.4	93.3	12.5	1.4	*0.023*	12600	278	7730	
CCLC-SS-43-01	22.4	2.1	19.8	2.6	13.7	21.5	10.1	1.0	*0.019*	21000	540	11400	1.7
CCLC-SS-45-06	39.0	4.1	21.7	1.2*	7.2	85.5	15.5	1.0	*0.019*	11500	254	6670	1.1
Background Estimate	8.8	0.63	76	NA	33	79	47	0.71	0.23	36100	1800	52300	3
Background Range	2.4 - 9.5	0.15 - 0.82	20 - 84	NA	4.1 - 151	6.9 - 100	13 - 49	0.2 - 1.1	0.02 - 0.23	16,350- 59,850	150 - 1,960	13,750 - 54,500	NA
DEQ Screening Value	0.43	78	120000	0.3	23	400	1500	390	23	55000	1800	77000	230
ATSDR Screening Value	15	5	75000	45	500	NA	1000	250	15	NA	2500	50000	150
90th UCL on Mean [1]	20	3.1	19	1.6	11	60	12	0.94	0.03	17,560	514	9,046	NC
95th UCL on Mean	24	3.4	19	1.7	11	64	13	0.97	0.04	18,009	531	9,261	NC

1- Averages estimated as upper confidence limits on mean using US EPA ProUCL software version 5.0.

NA- Not Available - No Screening value from this source.

NC- Not Calculated, insufficient detections.

Estimated Data between the MDL and MRL (J Flag)

[a]Cr+6 analyzed by EPA 7199 unless otherwise noted

^ = Analyzed by EPA 7196A (colorimetric)

* = Anlyzed by Weck Laboratories

Table 4. Powell Park Mulch (mg/kg wet weight)

SampleID	As	Cd	Cr	Cr+6[a]	Co	Pb	Ni	Se	Hg	Fe	Mn	Al	U
PP-SS-13-01	*0.083*	<0.08	<0.27	< 0.64^	*0.19*	1.2	*0.30*	<0.19	<0.0028	291	15.6	97.9	
PP-SS-17-01	*0.10*	<0.08	0.75	< 0.255	*0.17*	1.6	0.55	<0.19	<0.0028	421	16.7	222	
PP-SS-19-01	*0.055*	<0.08	<0.27	< 0.255	<0.13	0.91	*0.42*	<0.19	<0.0028	213	8.72	111	
PP-SS-21-01	*0.14*	*0.31*	0.54	< 0.255	0.54	1.8	0.59	<0.19	*0.0039*	612	59.4	270	
PP-SS-24-01	*0.11*	< 0.08	*0.34*	< 0.255	*0.17*	1.4	*0.37*	<0.19	<0.0028	504	12.2	237	
Background Estimate	8.8	0.63	76	NA	33	79	47	0.71	0.23	36100	1800	52300	3
Background Range	2.4 - 9.5	0.15 - 0.82	20 - 84	NA	4.1 - 151	6.9 - 100	13 - 49	0.2 - 1.1	0.02 - 0.23	16,350- 59,850	150 - 1,960	13,750 - 54,500	NA
DEQ Screening Value	0.43	78	120000	0.3	23	400	1500	390	23	55000	1800	77000	230
ATSDR Screening Value	15	5	75000	45	500	NA	1000	250	15	NA	2500	50000	150

NA- Not Available - No Screening value from this source.

NC- Not Calculated, insufficient detections.

Estimated Data between the MDL and MRL (J Flag)

[a]Cr+6 analyzed by EPA 7199 unless otherwise noted

^ = Analyzed by EPA 7196A (colorimetric)

Table 5. Screening Table (mg/kg dry weight)

Metal	DEQ Background[1]	Residential [2]	ATSDR Values [3]
Aluminum [a]	52,300 [b]	77,000	50,000
Arsenic	8.8	0.43	15
Cadmium	0.63	78	5
Total Chromium [e]	76	120,000	75,000
Chromium(VI)	NA	0.3	45
Cobalt [a]	33 [c]	23	500
Iron [a]	36,100 [b]	55,000	NA
Lead	79	400	NA
Manganese	1,800	1,800	2,500
Mercury	0.23	23	15
Nickel	47	1,500	1,000
Selenium [a]	0.71	390	250
Uranium [a]	3 [d]	230	150

1- Source DEQ background metals fact sheet, http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf

2 - Residental values are DEQ soil screening values, where available, or EPA regional screening values (RSLs) when no DEQ residential value is published

DEQ Residential values assume the following:

· A person resides in the same residence 24 hours a day, 7 days a week, 350 days a year, for 26 years

· Adults incidentally ingest 100 mg of soil per day, children incidentally ingest 200 mg of soil per day

3 - Agency for Toxic Substances and Disease Registry (ATSDR) Screening Values. ATSDR values are environmental media evaluation guides (EMEGS), or reference dose media evaluation guides (RMEGs).

a - Residential values for these metals are the US EPA Regional Screening Values (RSLs) for residential use

b - Background values shown are from Washington Department of Ecology Pub. No. 94-115

c - No background estimate for cobalt has been published by DEQ. Value shown is average of Willamette Valley soil from DEQ database

d- Background estimate from Toxicological Profile for Uranium, US ATSDR, February 2013.

e- Background value is based on total chromium. Screening Values are based on trivalent chromium

NA - Not Available - No estimate of background soil concentration or screening values are available for these metals and agencies

Appendix B – Figures

Figure 1.

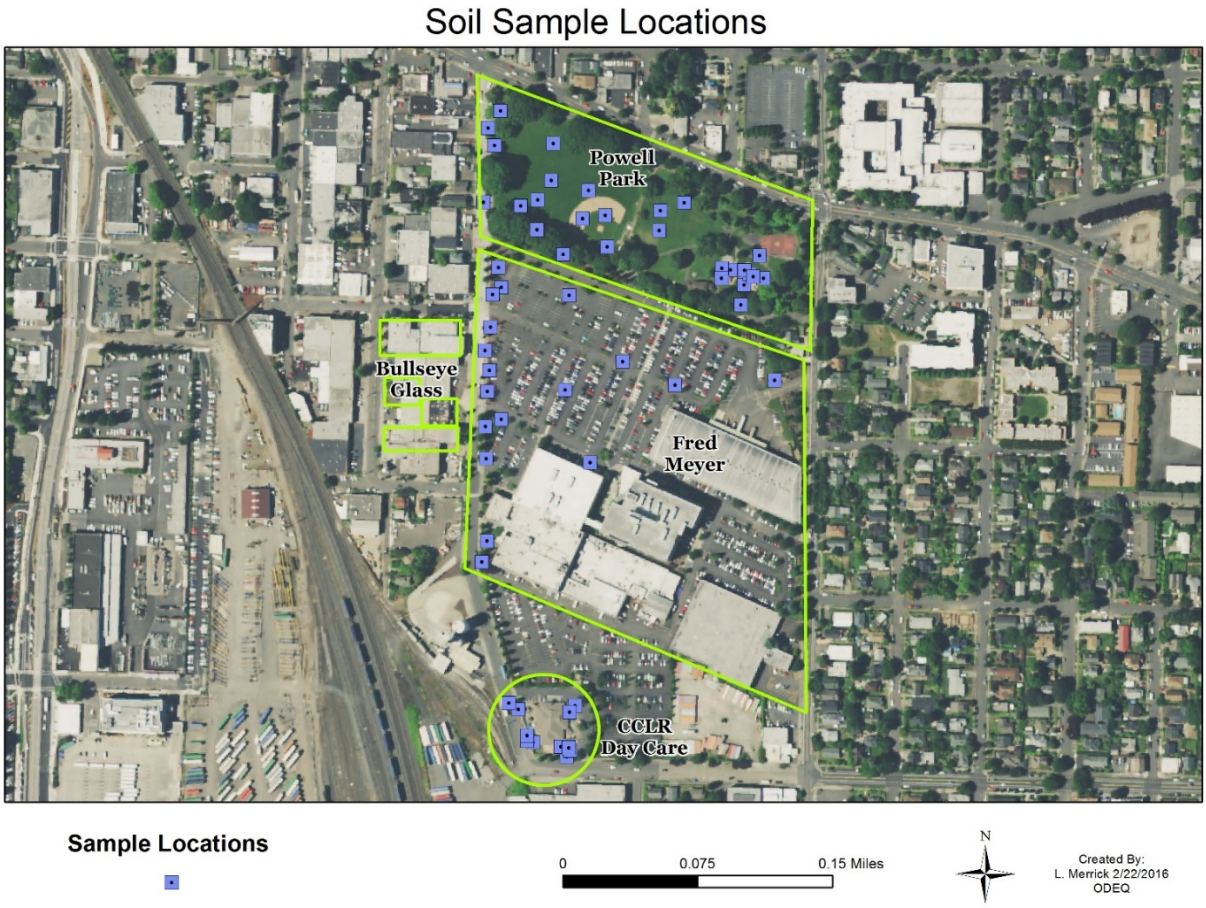

Soil Sample Locations
Powell Park
Bullseye Glass
Fred Meyer
CCLR Day Care
Sample Locations
0
0.075
0.15 Miles
N
Created By:
L. Merrick 2/22/2016
ODEQ

Figure 2.

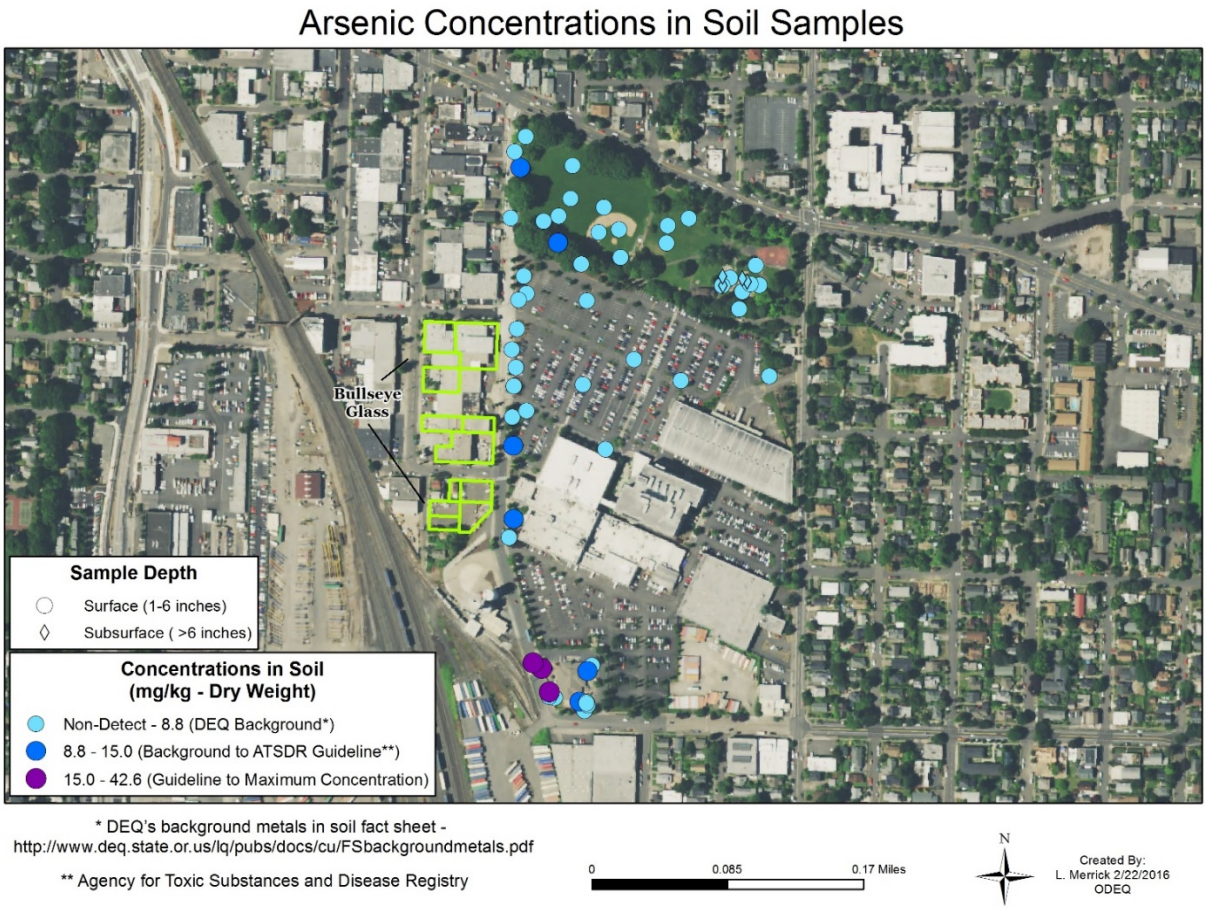

Arsenic Concentrations in Soil Samples
Bullseye Glass
Sample Depth
Surface (1-6 inches)
Subsurface (>6 inches)
Concentrations in Soil
(mg/kg - Dry Weight)
Non-Detect - 8.8 (DEQ Background*)
8.8 - 15.0 (Background to ATSDR Guideline**)
15.0 - 42.6 (Guideline to Maximum Concentration)
* DEQ's background metals in soil fact sheet -
http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf
** Agency for Toxic Substances and Disease Registry
0
0.085
0.17 Miles
N
Created By:
L. Merrick 2/22/2016
ODEQ

Figure 3.

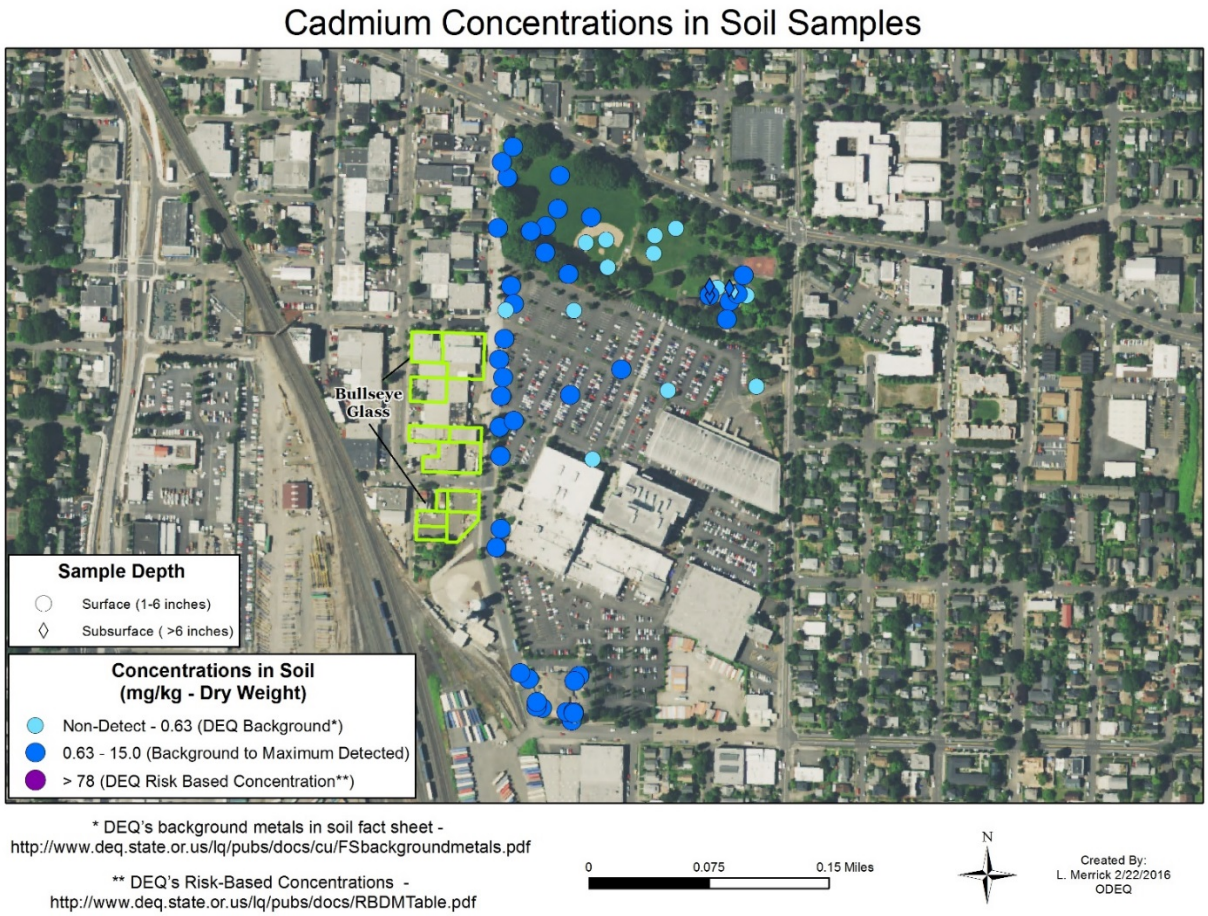

Cadmium Concentrations in Soil Samples
Bullseye Glass
Sample Depth
Surface (1-6 inches)
Subsurface (>6 inches)
Concentrations in Soil
(mg/kg - Dry Weight)
Non-Detect - 0.63 (DEQ Background*)
0.63 - 15.0 (Background to Maximum Detected)
> 78 (DEQ Risk Based Concentration**)
* DEQ's background metals in soil fact sheet -
http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf
** DEQ's Risk-Based Concentrations -
http://www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf
0
0.075
0.15 Miles
N
Created By:
L. Merrick 2/22/2016
ODEQ

Figure 4.

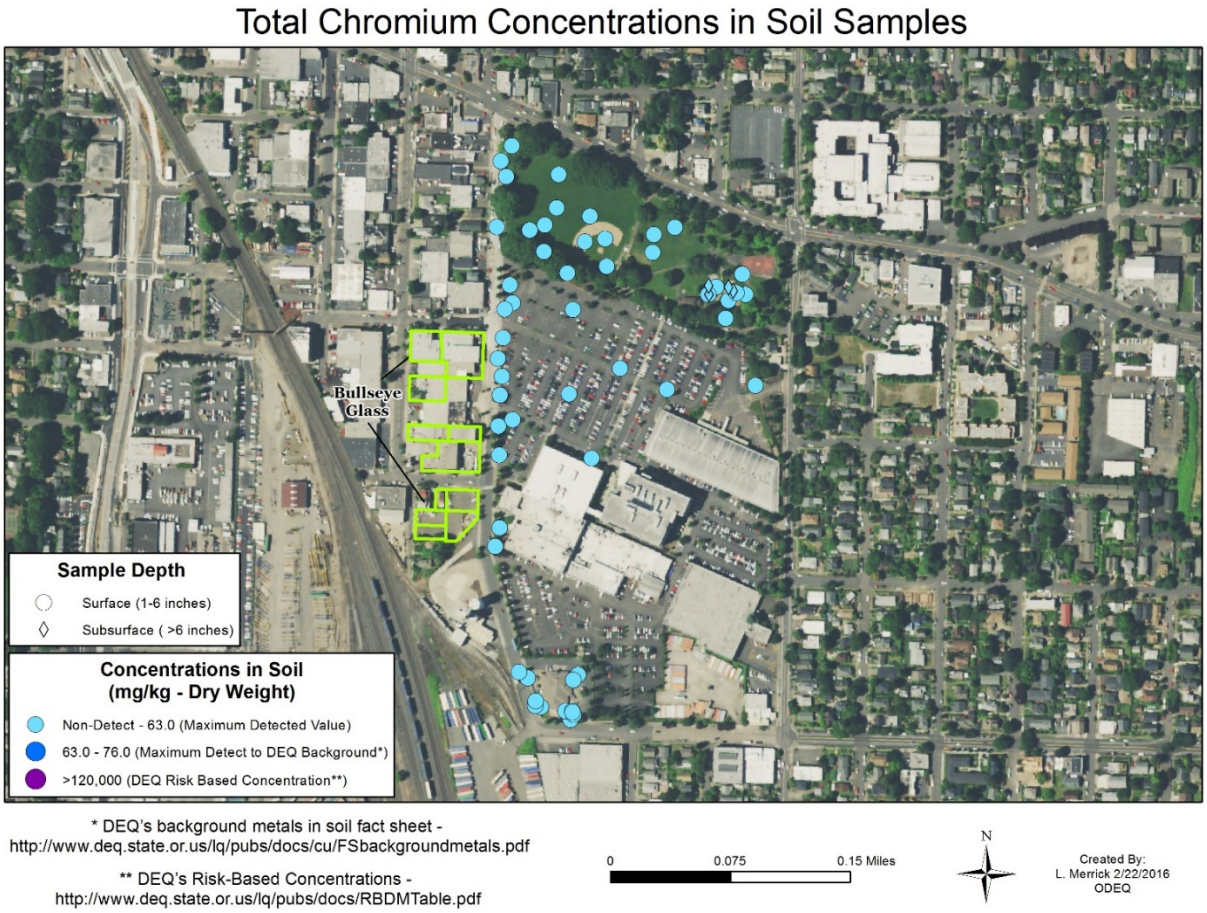

Total Chromium Concentrations in Soil Samples
Bullseye Glass
Sample Depth
Surface (1-6 inches)
Subsurface (>6 inches)
Concentrations in Soil
(mg/kg - Dry Weight)
Non-Detect - 63.0 (Maximum Detected Value)
63.0 - 76.0 (Maximum Detect to DEQ Background*)
>120,000 (DEQ Risk Based Concentration**)
* DEQ's background metals in soil fact sheet -
http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf
** DEQ's Risk-Based Concentrations -
http://www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf
0
0.075
0.15 Miles
N
Created By:
L. Merrick 2/22/2016
ODEQ

Figure 5.

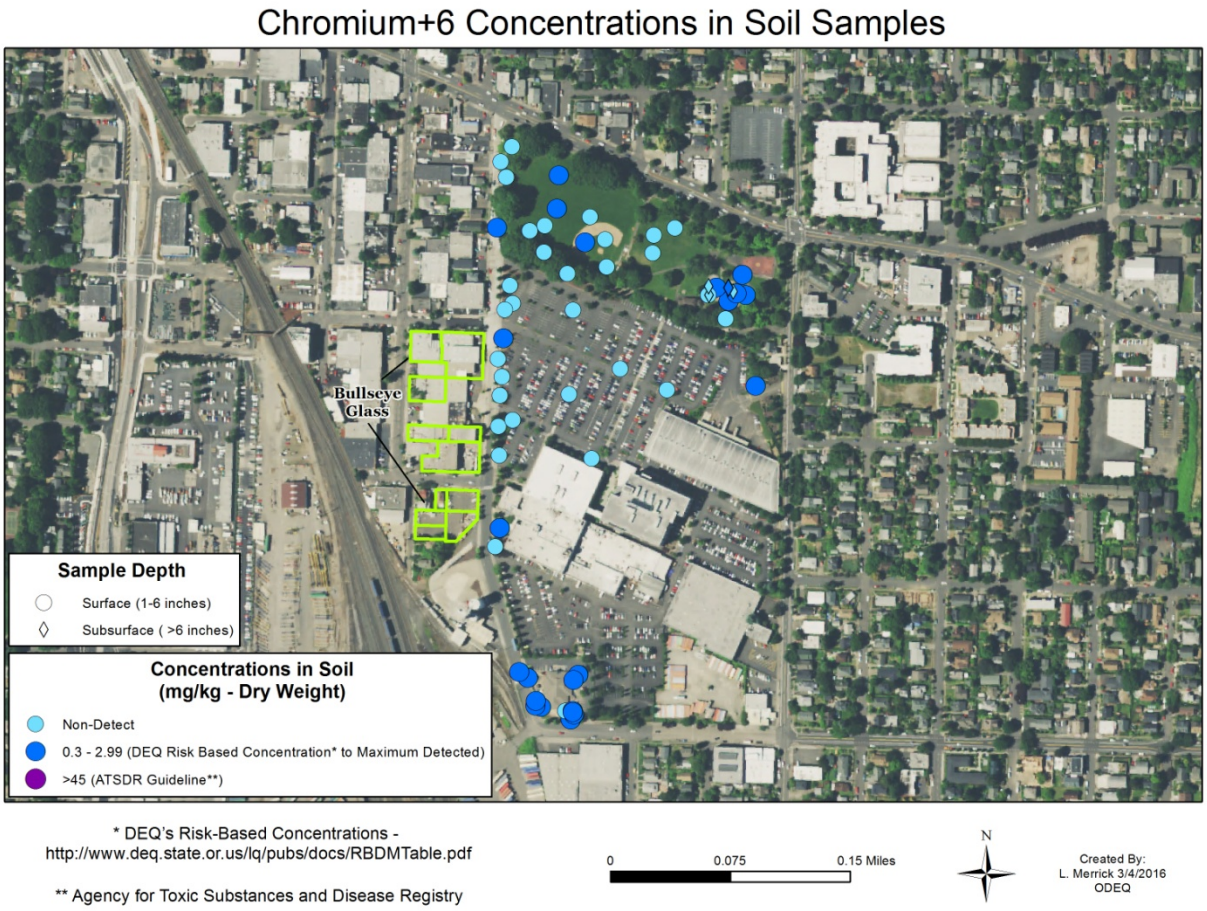

Chromium+6 Concentrations in Soil Samples
Bullseye Glass
Sample Depth
Surface (1-6 inches)
Subsurface (>6 inches)
Concentrations in Soil
(mg/kg - Dry Weight)
Non-Detect
0.3 - 2.99 (DEQ Risk Based Concentration* to Maximum Detected)
>45 (ATSDR Guideline**)
* DEQ's Risk-Based Concentrations -
http://www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf
** Agency for Toxic Substances and Disease Registry
0
0.075
0.15 Miles
N
Created By:
L. Merrick 3/4/2016
ODEQ

Figure 6.

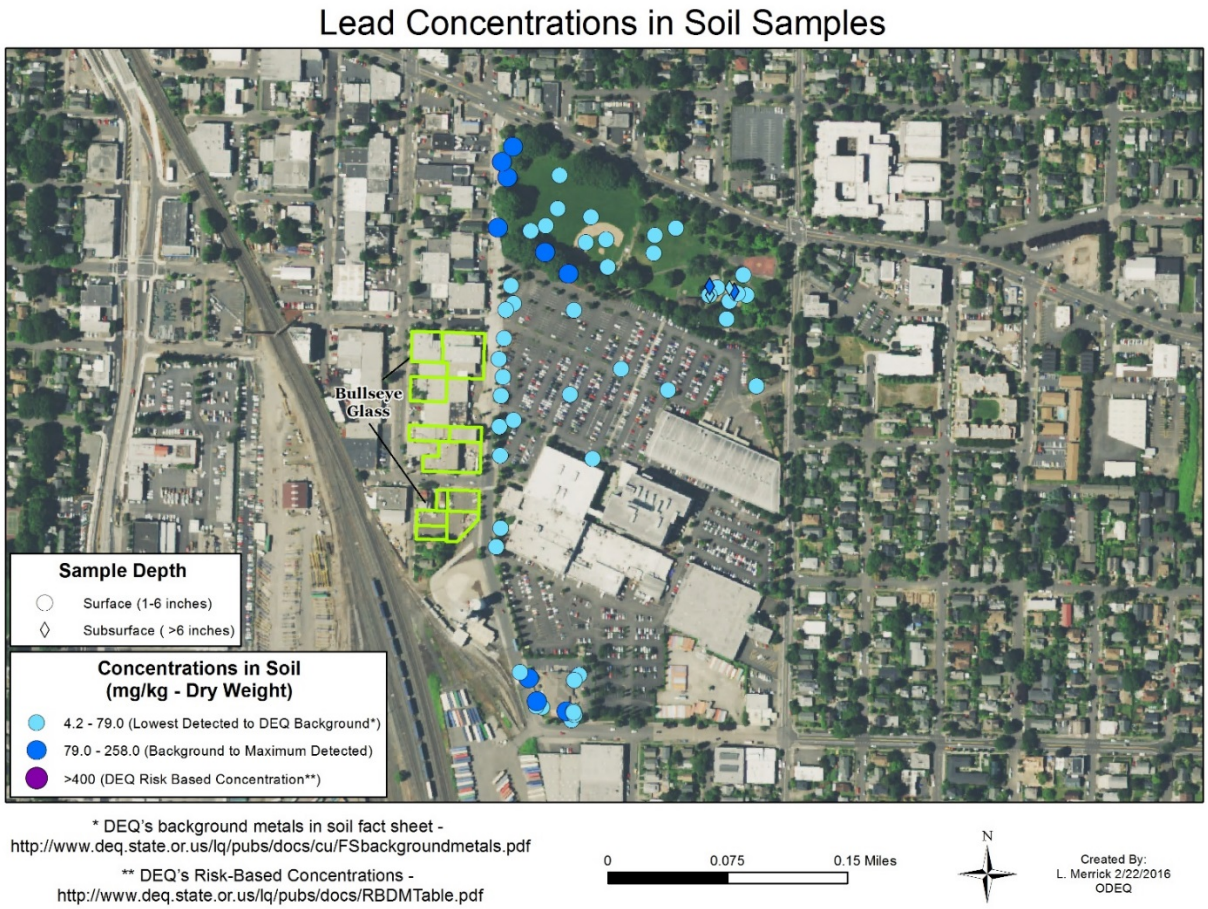
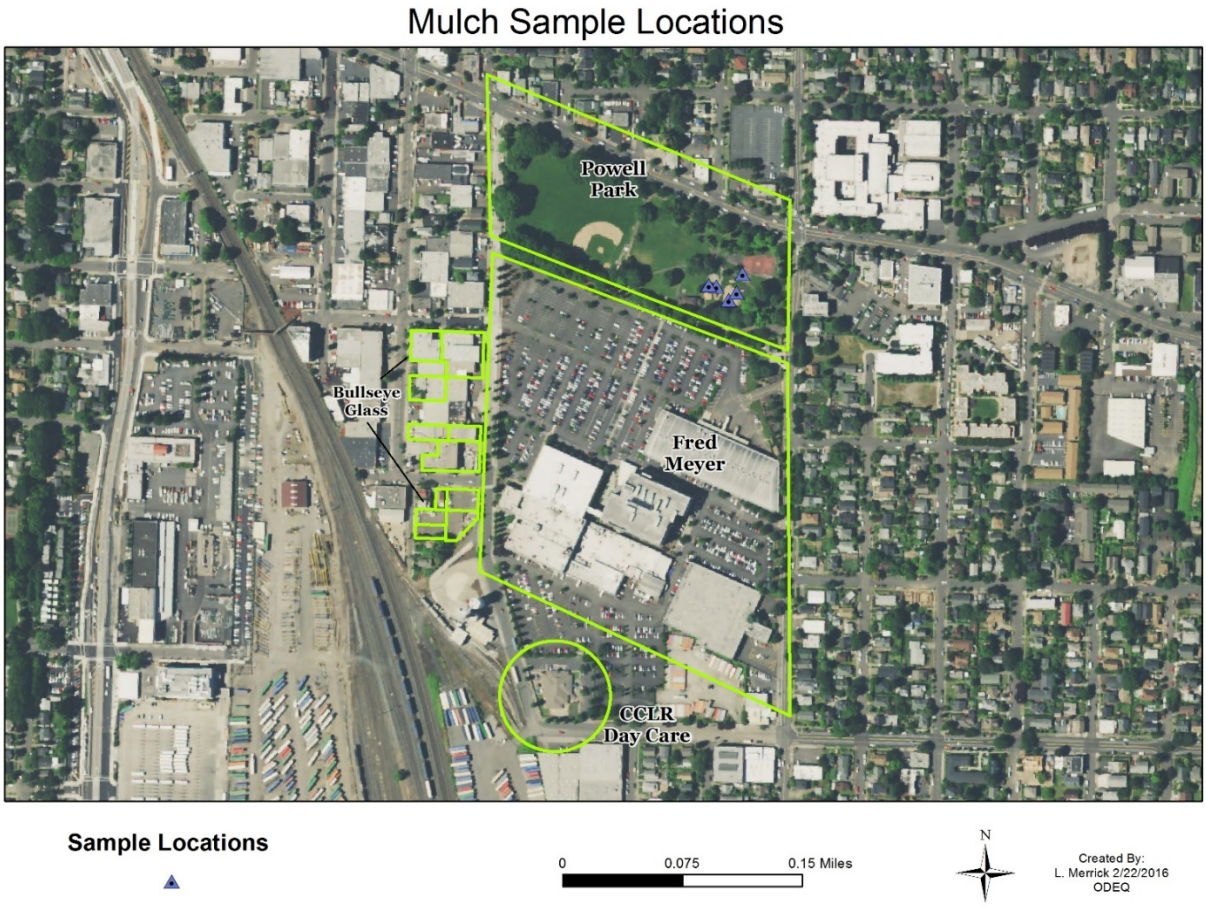

Lead Concentrations in Soil Samples
Bullseye Glass
Sample Depth
Surface (1-6 inches)
Subsurface (>6 inches)
Concentrations in Soil (mg/kg - Dry Weight)
4.2 - 79.0 (Lowest Detected to DEQ Background*)
79.0 - 258.0 (Background to Maximum Detected)
>400 (DEQ Risk Based Concentration**)
* DEQ's background metals in soil fact sheet - http://www.deq.state.or.us/lq/pubs/docs/cu/FSbackgroundmetals.pdf
** DEQ's Risk-Based Concentrations - http://www.deq.state.or.us/lq/pubs/docs/RBDMTable.pdf
0
0.075
0.15 Miles
N
Created By: L. Merrick 2/22/2016 ODEQ

Figure 7.


Mulch Sample Locations
Powell Park
Bullseye Glass
Fred Meyer
CCLR Day Care
Sample Locations
0
0.075
0.15 Miles
N
Created By:
L. Merrick 2/22/2016
ODEQ