Technical Memorandum

To: Grant County Public Works and City of Ephrata

From: Dawn Chapel (Pacific Groundwater Group) and Brian Pippin (Parametrix)

Re: Addendum to Results of Interim Remedial Action (Ephrata Landfill Corrective Action): Elevated Arsenic Soil Sampling and Removal

Date: March 16, 2018

This memorandum summarizes sampling and removal of remaining north end soil (NES) containing arsenic concentrations above site background (3.2 mg/kg). This work was performed on February 28 and March 1, 2018 as an addendum to the 2017 soil removal interim action (Parametrix, 2017) to address arsenic concentrations above background (3.2 mg/kg) in the 2017 confirmation samples (A-1, A-2, and A-3 in Figure 1). The 2017 confirmation soils were characterized as clean (not mixed with refuse) but appeared to be reworked material near an old cut bank possibly associated with historic grading and leveling of this area.

To address the elevated arsenic, a work plan was developed to collect soil samples in a grid on approximately 30-ft centers both east and west of the 2017 confirmation samples with the objective of delineating soils with arsenic concentrations in excess of site background and then remove those soils to bedrock (PGG, 2018).

SOIL TEST PITS AND SAMPLING

Twenty-five soil test pits were excavated to bedrock using the County's excavator. The depth to bedrock varied from 1 to 10.5 feet (Table 1). Soils were generally characterized as brown sand and cobbles with some locations having more silt and fine sand. Water was observed above bedrock in a few test pits (Table 1). In accordance with the work plan, soil samples collected from discrete depth intervals in test pits west of the 2017 confirmation samples (W-series test pits) were submitted to the lab as discrete soil samples, while those east of the 2017 samples (E-series test pits) were submitted to the lab as composite soil samples (Table 1).

LAB RESULTS

In accordance with the work plan, the test-pit soil samples were collected in three phases (Table 1), with each phase of samples occurring with distance from the 2017 confirmation samples. Phase 1 test-pit samples (those closest to the 2017 confirmation samples) were analyzed first. Those results showed an isolated area of arsenic above background near the 2017 confirmation samples, with concentrations above background ranging from 3.34

mg/kg (at E-1) to 12.6 mg/kg (at W-1-1). A subset of Phase 2 test-pit samples was then analyzed to delineate the area of elevated arsenic and to confirm that arsenic decreases to below background with distance from the isolated area (Figure 1). Soils from a total of 12 test pit locations were analyzed. Results are shown in Table 2.

Soils were analyzed for total arsenic by Analytical Resources Inc. in Tukwila, Washington, using EPA Method 200.8 (ARI Job #18B0216 and #18B0228). All laboratory quality control measures were met:

- Initial and continuing calibrations were within method requirements
- Method blanks were clean at the reporting limits
- Lab control sample (LCS) percent recoveries were within control limits
- Matrix spike and matrix spike duplicate RPDs were within limits.

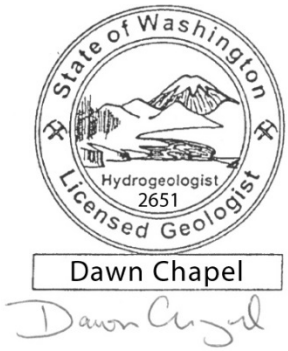
SOIL REMOVAL

The area of elevated arsenic in soil was removed and disposed of to the active landfill. Soils were removed vertically to the top of bedrock and laterally to test pit locations where arsenic concentrations were below background. Approximately 1,210 cubic yards of NES were removed. Photos documenting removal activities are provided as an attachment.

REFERENCES

Parametrix, 2017. Results of Interim Remedial Action Plan (Ephrata Landfill Corrective Action): Contaminated Soil Removal and Confirmation Sampling. Letter report prepared for Grant County Public Works and City of Ephrata dated December 21, 2017.

Pacific Groundwater Group (PGG), 2018. Continued Arsenic Investigation – North End Soils. Technical memo work plan prepared for Ephrata Landfill RI/FS PLPs dated February 5, 2018.



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Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

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TECHNICAL MEMORANDUM

DATE: March 22, 2018

TO: Grant County Public Works and City of Ephrata

FROM: Brian Pippin, PE

SUBJECT: Addendum to Results of Interim Remedial Action (Ephrata Landfill Corrective Action): Contaminated Soil Removal and Confirmation Sampling - Elevated Arsenic Soil Removal

CC: File

PROJECT NUMBER: 553-1860-012

PROJECT NAME: Ephrata Landfill RI/FS, Final NES Removal

INTRODUCTION

This memo summarizes efforts to identify and remove soil with elevated arsenic concentration at the north end of Ephrata Landfill and an adjacent parcel to the north which is owned by Grant County (i.e., former Akerblade parcel). All three confirmation soil samples from north end soil (NES) removal last fall (Parametrix 2017) had arsenic concentrations above the site background for soil (3.2 mg/kg) calculated in the Remedial Investigation Report (Pacific Groundwater Group [PGG] 2010).

ARSENIC SOIL DELINEATION AND REMOVAL

Soil with elevated arsenic concentration was delineated and removed as described in the attached work plan and technical memorandum, which were developed by PGG in coordination with the PLP Group. In summary, 25 test pits were sampled on February 14 and 15, 2018. Samples were analyzed in phases based on proximity to the 2017 confirmation sample locations. This revealed a confined area of elevated arsenic soil, which was excavated to bedrock on February 28 and March 1, 2018, and disposed of in the Grant County Regional Landfill. Approximately 1,210 cubic yards of soil were removed and disposed. Photo 1 (photos are at the end of this memo) shows the rough excavation. Photo 2 shows an area of soils scraped to bedrock and an excavator scraping another area. The attached PGG report provides additional details.

COST SUMMARY UPDATE

Costs to perform the additional NES removal, including the elevated arsenic soils, are summarized in Table 1 (update of Table 5 in the 2017 report).

Table 1. NES Removal Interim Remedial Action Cost Summary

Firm	Description	Cost
Parametrix[1]	Planned, performed, and reported NES removal and field testing	$130,000
Pacific Groundwater Group[1]	Developed arsenic work plan, results memo	$3,518
Environmental West	Licensed driller, performed well decommissioning	$5,280
Analytical Resources, Inc.	Certified laboratory, analyzed confirmation samples	$2,017
Grant County Public Works	Equipment and labor	$21,000
Grant County Regional Landfill	Soil disposal	$54,000
Total		**$215,815**

[1] Estimated costs through report and addendum completion and EIM data submittal.

REFERENCES

Parametrix. 2017. Results of Interim Remedial Action Plan (Ephrata Landfill Corrective Action): Contaminated Soil Removal and Confirmation Sampling. Prepared by Parametrix, Seattle, Washington. December 2017.

PGG. 2010. Preliminary Public Review Draft Remedial Investigation Report Ephrata Landfill. Prepared by PGG, Seattle, Washington. December 2010.

PHOTOS

Photo 1. Rough excavation, elevated arsenic soil removal, Ephrata Landfill.

Photo 2. Soils scraped to bedrock (left) and excavator performing that process.

Table 1. Summary of North End Soil Test Pits (2018)
(Expanded North End Soil Interime Remedial Action - Ephrata Landfill RI/FS)

Test Pit	Phase	Depth To Bedrock	Physical Description of Soils	Soil Sample Intervals (feet)	Sample Type[1]	Analyzed by Lab (Y/N)
E-1	1	1	Damp, brown, silty, coarse sand and cobbles.	0.5	Discrete	Y
E-2	1	3.8	Damp, brown, silty, coarse sand and cobbles.	0.5, 1.5, 2.5, 3.5	Composite	Y
E-3	1	4.5	Damp, brown, silty, coarse sand and cobbles. Water at bottom.	0.5, 1.5, 2.5, 3.5, 4.5	Composite	Y
E-4	2	3	Damp, brown, silty, coarse sand and cobbles.	0.5, 1.5, 2.5, 3	Composite	Y
E-5	2	4	Damp, brown, silty, coarse sand and cobbles. Water at bottom.	0.5, 1.5, 2.5, 3.5, 4	Composite	Y
E-6	2	3	Damp, brown, silty, coarse sand and cobbles.	0.5, 1.5, 2.5, 3	Composite	Y
W-1	1	3.5	Damp, brown, fine sand (0-1 ft), coarse sand and cobbles (1-3.5 ft)	1, 1.5, 3	Discrete	Y
W-2	1	5	Damp, brown, coarse sand and cobbles.	1, 3, 5	Discrete	Y
W-3	1	6	Damp, brown, coarse sand and cobbles.	1, 3.5, 6	Discrete	Y
W-4	1	8.5	Damp, brown, coarse sand and cobbles.	1, 4, 8	Discrete	Y
W-5	1	8.8	Damp, brown, coarse sand and cobbles.	1, 5, 8	Discrete	Y
W-6	1	10.5	Damp, brown, coarse sand and cobbles. Turn dark brown/gray at 3 feet. Water at bottom.	1, 5, 10	Discrete	Y
W-8	2	3.5	Damp, brown, slightly sandy silt with some cobbles (0-2.5 feet). Gray, coarse sand and cobbles (2.5 to 3.5 feet)	1, 2, 3.5	Discrete	N
W-9	2	4	Damp, brown, slightly sandy silt with some cobbles (0-3 feet). Gray, coarse sand and cobbles (3-4 feet)	1, 2.5, 4	Discrete	N
W-10	2	8	Damp, brown, silty, coarse sand and cobbles. Gray-brown (2-8 feet).	1, 4, 8	Discrete	N
W-11	2	6.5	Damp, brown, silty, coarse sand and cobbles (0-3 feet), Light brown/gray with smaller cobbles (3-5 feet).	1, 4, 6	Discrete	N
W-12	2	2.5	Damp, brown, silt with coarse gravel.	1, 1.5, 2.5	Discrete	N
W-13	2	3	Damp, brown, silt with cobbles.	1, 2, 3	Discrete	N
W-14	2	2	Damp, brown silt with some coarse sand.	1, 1.5, 2	Discrete	N
W-15	3	2.5	Damp, brown silt (some cobbles).	1, 2	Discrete	N
W-16	3	2.5	Damp, brown silt.	1, 2	Discrete	N
W-17	3	2.5	Damp, brown silt with some coarse sand.	1, 2	Discrete	N
W-18	3	2	Damp, brown silt with some coarse sand.	1, 1.5, 2	Discrete	N
W-19	3	1	Damp, brown silt (some cobbles).	0.5	Discrete	N
W-20	3	1	Damp, brown silt (some cobbles).	0.5	Discrete	N

Notes

1. Sample type refers to whether samples collected at specific depths were submitted as discrete samples (mulitple samples for each test pit) or combined into one composite sample (one sample for each test pit).

Table 2. Total Arsenic Soil Sample Results (2018)
(Expanded North End Soil Interime Remedial Action - Ephrata Landfill RI/FS)

Sample ID	Results	Units
E-1	4.64	mg/kg
E-2	2.59	mg/kg
E-3	2.25	mg/kg
E-4	3.34	mg/kg
E-5	2.69	mg/kg
E-6	2.6	mg/kg
W-1-1	12.6	mg/kg
W-1-1.5	3.2	mg/kg
W-1-3	3.49	mg/kg
W-2-1	1.56	mg/kg
W-2-3	2.11	mg/kg
W-2-5	1.69	mg/kg
W-3-1	1.39	mg/kg
W-3-3.5	1.91	mg/kg
W-3-6	1.91	mg/kg
W-4-1	1.86	mg/kg
W-4-4	1.74	mg/kg
W-4-8	2.11	mg/kg
W-5-1	2.09	mg/kg
W-5-5	1.41	mg/kg
W-5-8	1.62	mg/kg
W-6-1	1.89	mg/kg
W-6-10	1.27	mg/kg
W-6-5	1.39	mg/kg

Note:

E-series samples are a composite samples

W-series samples were collected at discrete depths. Last number in Sample ID indicates depth in feet.

Shaded results are above site background (3.2 mg/kg) - see map Figure 1

W-19
W-15
W-20
W-12
W-16
W-9
W-13
W-10
W-17
W-14
W-18
W-11
W-8
W-4-1 1.86
W-4-4 1.74
W-4-8 2.11
W-5-1 2.09
W-5-5 1.41
W-5-8 1.62
W-6-1 1.89
W-6-5 1.39
W-6-10 1.27
W-3-1 1.39
W-3-3.5 1.91
W-3-6 1.91
W-2-1 1.56
W-2-3 2.11
W-2-5 1.69
W-1-1 12.6
W-1-1.5 3.20
W-1-3 3.49
A1 21.9
A2 13.4
A3 7.5J
E-1 4.64
E-2 2.59
E-3 2.25
E-4 3.34
E-5 2.69
E-6 2.6
Old Cutbank
Historic Regrade Area
MW-7b
MW-40p2
MW-41a
MW-3b
NES-1
NES-2
NES-3
NES-4
NES-5
NES-6
NES-7
NES-8
NES-10
NES-11
NES-12
NES-13
NES-14
T-1
T-2
T-3
T-4
T-5
T-6
T-7
T-8
T-9
T-10
T-11
10
6
8
4
12
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Quarterly Monitoring Well (MW)
Remedial Investigation Monitoring Well (MW)
RI Test Pit

Approximate Area of Landfill Refuse Not Capped
Approximate Area of Contaminated Soils Not Capped

County Owned Parcels
Landfill Boundary Parcel
Approximate Basalt Outcrops
Approximate Soil Thickness Contours (feet)

Soil Sample Location 2012
Composite Soil Sample Location 2012
Soil Sample Location 2017 (with Arsenic Concentrations in mg/kg)
Soil Sample Location 2018 (with Arsenic Concentrations in mg/kg)
NES Removed to Bedrock in 2012
NES Removed to Bedrock in 2017
NES Removed to Bedrock in 2018

2018 Soil Test Pits (Not Analyzed for Arsenic)

0 Feet 40
2017 Google Aerial Photo

N

Figure 1
2018 Arsenic Investigation North End Ephrata Landfill

PgG