

Fall 2019 Summary Report

Residential Drinking Water Well Sampling

LRI Landfill

December 2019
Drinking Water Program
Residential Water Sampling Project

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Summary

BACKGROUND

This report is a summary of the water quality sampling event conducted in the Fall of 2019.

All drinking water wells within one-half (1/2) mile of the boundary of the LRI Landfill are eligible for free water quality sampling once a year. Substances chosen for testing by the Health Department are to assess groundwater quality. These tests can show information about possible groundwater impacts from the landfill.

Property owners can have their well water sampled in either the Spring or Fall of each year and may drop out of the program at any time.

The water samples are tested annually for twenty characteristics and substances, including conductivity, pH, ammonia, nitrate, chloride, iron, manganese, magnesium, and Coliform bacteria. In addition to the annual water quality test, participants will have their water tested every five years for 'Volatile Organic Compounds' (VOCs). Starting in Spring 2015, members of the Woodbrook Homeowners Association are eligible for annual VOC testing because of their legal settlement over the relocation of Woodbrook Road (317th Street East).

Although Coliform bacteria in groundwater from a landfill is unusual, the Health Department included Coliform bacteria testing as part of the sampling program. These tests are due to the known health effects of bacterial contamination in drinking water.

The Health Department requires the landfill operator to maintain an on-site groundwater monitoring program. This on-site monitoring program has been in effect since 1999 and every 3 months the landfill samples and tests nine wells around the perimeter of the landfill property. All groundwater monitoring data from these wells is available from the Health Department.

FALL 2019 SAMPLING EVENT

The Fall 2019 event collected water samples at 37 properties between October 7-10, 2019. Centric Analytical Labs performed bacteriological analyses, and OnSite Environmental Inc. performed organic and inorganic chemical analyses. Fall 2019 participants received detailed water quality test results in November 2019. No landfill-related impacts to groundwater quality were identified from the water quality test results.

A complete list of water quality test results is in **Table 1**.

The Fall 2019 sampling event tested VOC water samples from 24 residential wells. Analytical results showed VOCs in the water samples from 2 wells. Of the 68 different VOCs included, the tests found carbon disulfide in both wells. Earlier testing did not detect this VOC in either well. Health Department staff retested the VOCs at these two wells in duplicate, and the results showed no

carbon disulfide. It is unclear why the analytical results found carbon disulfide. Carbon disulfide can occur naturally in small amounts from past volcanic eruptions and in marshes. The Health Department recommends these wells be tested again next year for VOCs.

Arsenic testing results showed that one well was slightly above the 0.01 parts per million Maximum Contaminant Limit (MCL). Historical data shows arsenic in past sampling events, however, this is higher than previous levels for this well. Health Department staff will recommend that the owners have the well tested next year. Arsenic in drinking water information was provided to the well owner.

The remaining Fall 2019 water quality test results are consistent with water quality test results from previous sampling events. The results show groundwater near the landfill is still typical of groundwater chemistry in Pierce County. Iron and manganese levels are consistently above the secondary standards set by the Washington State Department of Health. Elevated iron and manganese levels are typical of groundwater conditions throughout much of Pierce County due to the underlying geology.

The Washington State Department of Health considers iron and manganese a “secondary contaminant.” Secondary contaminants pose aesthetic problems rather than health concerns. High levels of iron and manganese can give water a metallic taste, cause odors, and can cause brown or black staining of porcelain fixtures exposed to the water.

Tables 1 and 2 show the water quality sample results. Results that exceed the state water quality standards are shown in bold. For quality control purposes, duplicate samples were taken at four locations. **Tables 3 and 4** show the results of the quality control samples.

BACTERIA

During this sampling event, 16 of the 37 wells tested had bacteria present in their well water (bacteria in the water is shown as an “unsatisfactory” test result and indicated as a “U” on Table 1).

CONTACTS

For questions about this report or the sample results, please contact the Health Department’s Drinking Water Program.

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TABLE 1: Fall 2019 Water Quality Results

Chemical or Analyte*----->																							
		Dissolved Metals											Total Metals		General Chemistry								
Site	Sample Date	Arsenic	Barium	Calcium	Copper	Iron	Magnesium	Manganese	Potassium	Sodium	Vanadium	Zinc	Iron	Manganese	Ammonia	Chloride	Nitrate	Nitrite	Sulfate	Total Dissolved Solids	Conductivity	Bacteriological	pH
MCL**		0.01	2		1.3							5	0.3	0.05		250	10	1	250	500	700		
SR0117337	10/8/2019	0.0035	ND	24	ND	ND	10	0.17	3.2	12	ND	ND	0.89	0.18	0.094	2.6	ND	ND	ND	120	237	S	7.64
SR0117338	10/8/2019	ND	ND	12	ND	ND	8.7	ND	1.9	7.5	ND	ND	0.44	0.019	ND	3.6	0.63	ND	ND	19	170.4	U	7.16
SR0117339	10/10/2019	0.0032	ND	23	ND	ND	6.4	0.12	3.1	11	ND	ND	0.4	0.13	0.059	3.1	ND	ND	ND	150	217.8	S	7.45
SR0117362	10/10/2019	ND	ND	11	ND	ND	6.1	ND	1.6	8.1	ND	ND	ND	ND	ND	3.6	1.1	ND	ND	130	135.4	S	7.61
SR0117447	10/7/2019	ND	ND	12	0.037	ND	8.5	ND	2.1	7.9	ND	ND	ND	ND	ND	2.8	1.5	ND	ND	92	147.3	S	6.9
SR0117449	10/10/2019	ND	ND	19	ND	ND	6.9	0.16	1.4	13	ND	ND	0.24	0.16	ND	2.2	ND	ND	ND	120	197.1	U	7.97
SR0117450	10/9/2019	ND	ND	22	ND	ND	6.6	0.072	3.1	14	ND	0.028	0.23	0.092	ND	5.4	ND	ND	ND	130	214.4	U	7.19
SR0117451	10/10/2019	ND	ND	ND	ND	ND	ND	ND	ND	73	ND	ND	0.16	ND	ND	5	ND	ND	5.2	190	301	S	6.96
SR0117456	10/8/2019	0.0034	ND	ND	ND	0.062	ND	0.015	1.9	170	ND	ND	0.15	0.017	0.064	140	ND	ND	14	430	729	S	8.28
SR0117459	10/10/2019	ND	ND	14	ND	ND	6.6	0.15	1.5	12	ND	ND	0.47	0.18	ND	2.7	ND	ND	ND	110	180.8	S	7.03
SR0117478	10/10/2019	ND	ND	15	ND	0.13	6.3	0.19	1.7	12	ND	ND	0.74	0.2	ND	2.6	ND	ND	ND	100	183.5	U	7.51
SR0117479	10/10/2019	ND	ND	14	ND	0.23	6.2	0.16	1.3	9.9	ND	ND	0.58	0.16	ND	2.3	ND	ND	ND	130	164.4	U	7.39
SR0120517	10/8/2019	ND	ND	24	ND	ND	12	ND	4.7	9.1	ND	ND	ND	0.012	ND	6.9	0.34	ND	8.9	140	256	U	7.44
SR0120518	10/9/2019	0.0037	ND	ND	ND	ND	ND	ND	ND	49	ND	ND	0.068	ND	ND	2.6	ND	ND	ND	140	187.6	U	8.23
SR0120540	10/10/2019	0.0031	ND	33	0.077	ND	11	0.063	3.4	21	ND	0.034	0.11	0.066	ND	53	ND	ND	ND	160	358	S	7.53
SR0120557	10/7/2019	ND	ND	ND	ND	ND	ND	ND	ND	45	ND	ND	ND	ND	ND	2.3	ND	ND	ND	120	167	U	7.5
SR0120633	10/7/2019	ND	ND	16	ND	ND	6.3	0.16	1.3	14	ND	ND	0.19	0.16	ND	2.3	ND	ND	ND	81	165.2	U	7.5
SR0120639	10/8/2019	0.005	ND	24	ND	ND	14	0.37	3.6	10	ND	ND	0.45	0.35	0.28	4.9	ND	ND	ND	140	262	S	7.44
SR0120742	10/8/2019	ND	ND	16	ND	ND	6.2	0.14	1.1	7.8	ND	ND	ND	0.13	ND	2.3	ND	ND	ND	88	159.7	S	7.49
SR0120928	10/8/2019	ND	ND	ND	ND	ND	ND	ND	ND	62	ND	ND	ND	ND	ND	2.7	ND	ND	ND	150	236	S	8.28
SR0126801	10/7/2019	0.0049	ND	32	ND	ND	21	ND	4	9.4	ND	ND	ND	0.18	ND	8.7	ND	ND	13	200	310	U	7.6
SR0126807	10/9/2019	ND	ND	14	ND	0.082	9	0.018	1.9	8.6	ND	ND	0.098	0.02	ND	4.6	0.59	ND	7.1	110	165.9	U	7.27
SR0126808	10/8/2019	ND	ND	13	ND	ND	20	ND	2.1	9.3	ND	ND	0.067	ND	ND	7.6	4.1	ND	ND	170	246	U	7.44
SR0126809	10/10/2019	0.0034	ND	16	ND	ND	6	ND	1.4	9.2	ND	ND	0.074	0.015	ND	2.7	ND	ND	ND	110	173	S	7.23
SR0133428	10/7/2019	ND	ND	16	ND	ND	6.5	0.14	ND	12	ND	ND	0.72	0.15	ND	2.2	ND	ND	ND	99	164.2	U	7.8
SR0133429	10/9/2019	ND	ND	14	ND	0.34	6.1	0.14	1.3	10	ND	ND	0.99	0.15	ND	2.5	ND	ND	ND	97	161	S	7.17
SR0138417	10/10/2019	ND	ND	16	ND	ND	5.8	0.15	1.4	13	ND	ND	0.56	0.15	ND	2.4	ND	ND	ND	110	358	U	7.75
SR0154486	10/9/2019	ND	ND	12	ND	ND	6	0.24	ND	8.3	ND	ND	0.093	0.23	ND	2.2	ND	ND	ND	99	135	S	7.48
SR0169704	10/9/2019	0.011	ND	4.9	0.023	ND	3.5	ND	ND	27	ND	ND	ND	ND	ND	4	ND	ND	8.9	85	152.8	U	7.70
SR0185993	10/9/2019	ND	ND	16	ND	0.13	7.1	0.12	1.4	10	ND	ND	0.34	0.13	ND	2.6	ND	ND	ND	72	171.4	S	7.21
SR0192658	10/8/2019	0.0035	ND	ND	ND	ND	ND	ND	1.2	60	ND	ND	0.087	ND	ND	7	0.073	ND	ND	150	244	S	8.91
SR0198408	10/9/2019	ND	ND	20	ND	0.5	8.7	0.71	1.8	17	ND	ND	1.6	0.68	ND	2.4	ND	ND	ND	130	254	S	7.16
SR0198809	10/9/2019	ND	ND	18	ND	ND	9.6	0.13	ND	9.7	ND	ND	0.25	0.13	ND	4.5	ND	ND	ND	130	192.7	S	7.08
SR0217737	10/9/2019	ND	ND	ND	ND	ND	ND	ND	ND	43	ND	ND	0.063	ND	ND	2.4	ND	ND	ND	110	160.8	U	8.53
SR0217738	10/9/2019	ND	ND	17	ND	1	9.4	0.55	ND	19	ND	ND	1.9	0.54	0.15	2.8	ND	ND	ND	130	228	S	7.16
SR0244157	10/10/2019	ND	ND	15	ND	ND	6	0.6	1.8	12	ND	ND	0.069	0.63	ND	2.4	ND	ND	ND	120	185.4	S	7.02
SR0244897	10/10/2019	ND	ND	15	ND	0.28	6.8	0.12	2	7.4	ND	ND	0.42	0.12	ND	2.7	ND	ND	ND	120	174.5	S	7.81

Units of measurement = Parts Per Million (mg/L), except for bacteria, conductivity, and pH
ND = Not detected at the specified laboratory detection limit
U = Unsatisfactory (bacteria are present in the sample)
S = Satisfactory

**MCL = Maximum Contamination Level

*Please refer to the “Water Quality and Abbreviation and Notes” page for information about the terms used on this table.

TABLE 2: Fall 2019 Water Quality VOC Results

[illegible]

Units of measurement = Parts per Billion (ug/L)
 ND = Not detected at the specified laboratory detection limit
 MCL = Maximum Contamination Level

TABLE 3: Fall 2019 Water Quality Duplicate Results

Chemical or Analyte*----->

		Dissolved Metals											Total Metals		General Chemistry					
Site	Sample Date	Arsenic	Barium	Calcium	Copper	Iron	Magnesium	Manganese	Potassium	Sodium	Vanadium	Zinc	Iron	Manganese	Ammonia	Chloride	Nitrate	Nitrite	Sulfate	Total Dissolved Solids
MCL**		0.01	2		1.3							5	0.3	0.05		250	10	1	250	500
SR0117447	10/7/2019	ND	ND	12	0.038	ND	8.4	ND	2	8	ND	ND	ND	ND	ND	2.7	1.5	ND	ND	85
SR0117479	10/10/2019	ND	ND	13	ND	0.15	6.1	0.16	1.2	9.9	ND	ND	0.53	0.16	ND	2.5	ND	ND	ND	110
SR0120742	10/8/2019	ND	ND	16	ND	ND	5.7	0.15	1.3	7.7	ND	ND	ND	0.14	ND	2.5	ND	ND	ND	60
SR0198408	10/9/2019	ND	ND	20	ND	0.56	9.5	0.72	1.9	17	ND	ND	1.5	0.71	ND	2.6	ND	ND	ND	130

Units of measurement = Parts Per Million (mg/L)

ND = Not detected at the specified laboratory detection limit

**MCL = Maximum Contamination Level

MCL exceedances for Iron and Manganese do not pose a health risk.

*Please refer to the “Water Quality and Abbreviation and Notes” page for information about the terms used on this table

TABLE 4: Fall 2019 Water Quality VOC Duplicate Results

	MCL	SR0117479	SR0198408
1,1,1,2-Tetrachloroethane	---	ND	ND
1,1,1-Trichloroethane	0.2	ND	ND
1,1,2,2-Tetrachloroethane	---	ND	ND
1,1,2-Trichloroethane	---	ND	ND
1,1-Dichloroethane	1	ND	ND
1,1-Dichloroethene	---	ND	ND
1,1-Dichloropropene	---	ND	ND
1,2,3-Trichlorobenzene	---	ND	ND
1,2,3-Trichloropropane	---	ND	ND
1,2,4-Trichlorobenzene	---	ND	ND
1,2,4-Trimethylbenzene	---	ND	ND
1,2-Dibromo-3-chloropropane	---	ND	ND
1,2-Dichlorobenzene	---	ND	ND
1,2-Dichloroethane	0.5	ND	ND
1,2-Dichloropropane	0.6	ND	ND
1,3,5-Trimethylbenzene	---	ND	ND
1,3-Dichlorobenzene	---	ND	ND
1,3-Dichloropropane	---	ND	ND
1,4-Dichlorobenzene	4	ND	ND
2,2-Dichloropropane	---	ND	ND
2-Butanone	---	ND	ND
2-Chloroethylvinylether	---	ND	ND
2-Chlorotoluene	---	ND	ND
2-Hexanone	---	ND	ND
4-Chlorotoluene	---	ND	ND
Acetone	---	ND	ND
Benzene	1	ND	ND
Bromobenzene	---	ND	ND
Bromochloromethane	0.3	ND	ND
Bromoform	5	ND	ND
Bromomethane	---	ND	ND
Carbon Disulfide	---	ND	0.2
Carbon Tetrachloride	0.3	ND	ND
CFC-11	---	ND	ND
CFC-12	---	ND	ND
Chlorobenzene	---	ND	ND
Chloroethane	---	ND	ND
Chloroform	7	ND	ND
Chloromethane	---	ND	ND
Cis-1,2-Dichloroethene	---	ND	ND
Cis-1,3-Dichloropropene	---	ND	ND
Dibromochloromethane	---	ND	ND
Dibromo methane	---	ND	ND
Dichlorobromomethane	---	ND	ND
Ethylbenzene	---	ND	ND
Ethylene dibromide	---	ND	ND
Hexachlorobutadiene	---	ND	ND
Isopropyl benzene	---	ND	ND
m, p-Xylene	---	ND	ND
Methyl Iodide	---	ND	ND
Methyl Isobutyl Ketone	---	ND	ND
Methyl t-Butyl Ether	---	ND	ND
Methylene Chloride	5	ND	ND
Naphthalene	---	ND	ND
n-Butylbenzene	---	ND	ND
n-Propyl benzene	---	ND	ND
o-Xylene	---	ND	ND
p-Isopropyl toluene	---	ND	ND
sec-Butylbenzene	---	ND	ND
Styrene	---	ND	ND
tert-Butylbenzene	---	ND	ND
Tetrachloroethene	---	ND	ND
Toluene	---	ND	ND
Trans-1,2-Dichloroethene	---	ND	ND
Trans-1,3-Dichloropropene	---	ND	ND
Trichloroethene	---	ND	ND
Vinyl Acetate	---	ND	ND
Vinyl Chloride	0.02	ND	ND

Units of measurement = Parts per Billion (ug/L)
ND = Not detected at the specified laboratory detection limit
MCL = Maximum Contamination Level

Water Quality Abbreviations and Notes:

Analyte: The chemical or metal tested for in the water sample.

Result: The level of the chemical or mineral detected by the laboratory in this water sample.

ND: Non-Detect, the chemical or metal was not detected in this water sample.

Unit: The unit of measure reported by the laboratory.

mg/l: milligrams per liter, or 1 part per million.

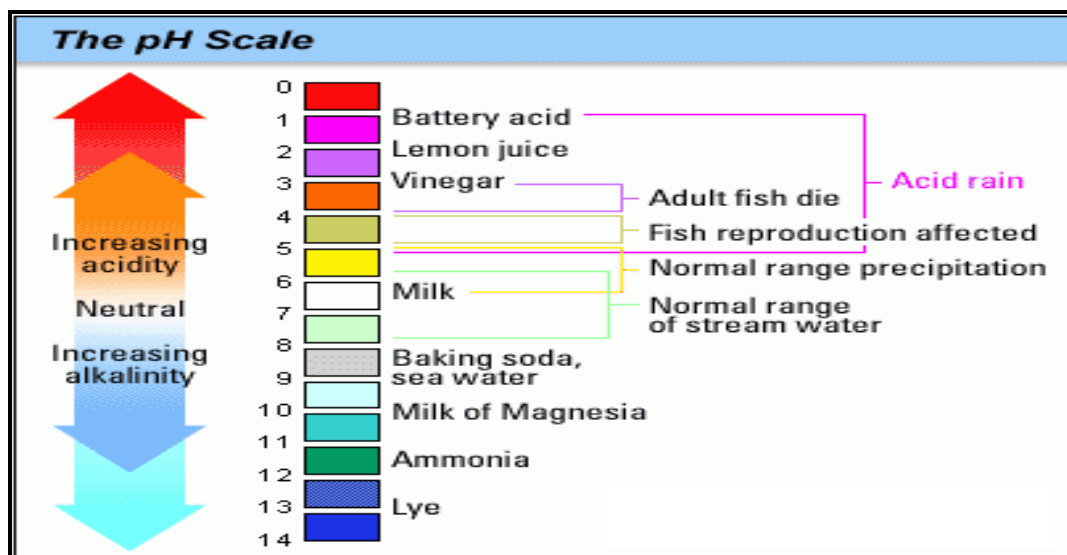
MCL: "Maximum Contaminant Level". The water quality standard established by state or federal regulation.

#/100ml: The number of bacteria colonies detected in 100 milliliters of water.

Note: An MCL of "0.00" means that there should be no bacteria detected in the water sample.

uS/cm: microSiemens per centimeter, a measurement of the ability of the water to conduct an electrical charge (sometimes reported as microMhos). Used to help determine the presence of some chemical ions.

pH: A numerical measure of the level of acidity or alkalinity of the water. See the table below.



ppb: Parts per billion often expressed as micrograms per liter (ug/L)

Unit: The unit of measure reported by the laboratory.

#/100ml: Unit of measure for *Bacteria* test, the number of bacteria colonies detected in 100 milliliters of water. Note: An MCL of "0/100" means that there should be zero bacteria detected in the 100-milliliter water sample.

(---): The Environmental Protection Agency and/or the Centers for Disease Control and Prevention have not established a health-risk based maximum contaminant level (MCL) for this chemical, metal, or property.

APPENDIX A

Sampling for Volatile Organic Compounds

In 2007, several program participants and members of the Graham Land Use Advisory Commission asked why ‘volatile organic compounds’ (VOCs) had not been included in the original LRI Landfill residential drinking water sampling program. They asked to have the sampling program modified to include testing for these volatile organic compounds. Because of the request and inquiries, the sampling program changed to include 68 VOCs for analysis.

The program modification included a provision to test each participating well every five-year period for VOCs. This modification began during the Fall 2007 sampling event with the testing of nine residential wells for VOCs.

Where do VOCs come from?

Common artificial sources of VOCs are many and varied, but can include paint thinners, dry cleaning solvents, and some constituents of petroleum-based fuels (e.g., gasoline and natural gas). Landfills, through the anaerobic digestion of waste generate methane gas, which is also considered a VOC.