Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities

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Fall 2016 Summary Report
Residential Drinking Water Well Sampling
LRI Landfill

Contents

Summary

Background

This report is a summary of the water quality sampling event conducted in the Fall of 2016.

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 each year. The Fall 2016 water sampling is a continuation of a *Residential Drinking Water Well Program (Program)* developed and implemented in 2006, by the Tacoma-Pierce County Health Department, in response to concerns raised during the LRI Landfill's solid waste permit re-issuance process. The Program is a requirement of the LRI Landfill Solid Waste Handling Permit, issued by the Health Department. Substances chosen for testing by the Health Department were selected in order to assess groundwater quality. These tests can provide information about possible groundwater impacts from the landfill.

The Program allows property owners to have their well water sampled in either the Spring ("Spring Participants") or Fall ("Fall Participants") of each year, and may decline participation in the Program or 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 once every five years for 'Volatile Organic Compounds' (VOCs). Approximately one fifth of the participating property owners will be selected to have their well water tested for VOCs each year, thereby ensuring all participants will have their water analyzed for VOCs once every five year cycle. However, effective with the spring 2015 sampling event, members of the Woodbrook Homeowners Association are now eligible for annual VOC testing. This change is the result of a legal settlement between the Woodbrook Homeowners Association and LRI over the relocation of Woodbrook Road (317th Street East). The legal settlement facilitated the relocation of Woodbrook Road around the perimeter of the landfill this past summer. Woodbrook Road previously bisected the southern portion of the landfill property and serves as the sole access point for residents of the Woodbrook community.

Although landfills are not regarded as a source of Coliform bacteria in groundwater, the Health Department elected to include Coliform bacteria testing as part of the sampling program. These tests are taken due to the known health effects of bacterial contamination, and because many homeowners in rural areas are unaware of possible bacterial contamination of their well water.

In addition to this Program, the landfill operator is required by the Health Department to maintain an on-site groundwater monitoring program. This on-site monitoring program has been in effect since 1999. For the on-site groundwater monitoring program, nine wells around the perimeter of the landfill property are sampled quarterly (four times a year). All groundwater monitoring data from these wells is available from the Health Department.

Fall 2016 Sampling Event

The Fall 2016 water samples were collected at 33 properties between October 3-6, 2016. Samples collected by the Health Department were analyzed by independent Washington State certified analytical laboratories. Centric Analytical Labs performed bacteriological analyses, and OnSite Environmental Inc. performed organic and inorganic chemical analyses. 2016 Fall participants

were sent detailed water quality test results in November 2016. No landfill-related impacts to groundwater quality were identified from the water quality test results.

A complete list of water quality test results may be found on **Table 1** of this summary report.

For the Fall 2016 sampling event, water samples from 19 residential wells were tested for VOCs. The analytical results indicated that VOCs were detected in water samples from 2 of the 19 wells tested. Of the 68 different VOCs that the testing process identifies, chloroform was detected in both wells along with dibromochloromethane (detected in 1 well) and dichlorobromomethane (detected in both wells).

The detection of chloroform (11 and 2.5 ppb) was from wells where the owners have a history of using chlorine as a water treatment process (disinfectant) and is well below the maximum contaminant limit (MCL) of 7.0 ppb. All three of the VOCs detected are breakdown by-products of the chlorine disinfection process, and pose no harm at their current levels. Re-sampling of these two wells was therefore not deemed necessary.

The Fall 2016 water quality test results are consistent with water quality test results from previous sampling events, and show groundwater near the landfill remains typical of groundwater chemistry in Pierce County. Iron and manganese levels were 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. They are not a health hazard and are not a result of the LRI Landfill.

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

Bacteria

During this sampling event, 5 of the 33 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 regarding this report or the sample results please contact representatives of the Health Department’s Drinking Water Program.

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TABLE 1: LRI Landfill Residential Well Sampling Program – Fall 2016 Water Quality Results

Chemical or Analyte*----------→

		General Chemistry						Dissolved Metals											Total Metals		Cond/Bact/pH		
Site	Sample Date	Ammonia	Chloride	Nitrogen, Nitrate	Nitrogen, Nitrite	Sulfate	Total Dissolved Solids	Arsenic	Barium	Calcium	Copper	Iron	Magnesium	Manganese	Potassium	Sodium	Vanadium	Zinc	Iron	Manganese	Conductivity	Bacteria	pH
MCL**			**250**	**10.0**	**1.0**	**250**	**500**	**0.01**	**2.0**		**1.3**							**5.0**	**0.3**	**0.05**	**700**		
SR0117337	10/3/2016	ND	3.5	ND	ND	ND	120	0.0034	ND	24	ND	ND	10	0.18	3.2	11	ND	ND	**0.76**	**0.2**	177.5	S	7.5
SR0117339	10/6/2016	0.073	2.8	0.07	ND	ND	130	0.0046	ND	26	ND	ND	7.3	0.13	3.3	12	ND	ND	**0.36**	**0.14**	170.8	**U**	7.4
SR0117362	10/6/2016	ND	3.8	1.1	ND	ND	120	ND	ND	12	ND	ND	6.9	ND	1.8	8.9	ND	ND	**ND**	**ND**	110.1	S	7.1
SR0117445	10/3/2016	ND	3.1	0.96	ND	ND	110	ND	ND	14	ND	ND	7	ND	1.9	8.7	ND	ND	**ND**	**ND**	112.4	S	7.1
SR0117447	10/4/2016	ND	3.1	1.6	ND	ND	110	ND	ND	12	0.037	ND	8	ND	2.2	7.7	ND	ND	**ND**	**ND**	NA	S	NA
SR0117449	10/5/2016	ND	2.1	ND	ND	ND	160	ND	ND	ND	ND	ND	ND	ND	ND	51	ND	ND	**ND**	**ND**	148.3	S	7.9
SR0117453	10/5/2016	ND	7.6	ND	ND	ND	130	ND	ND	19	ND	ND	6.3	ND	2.7	13	ND	ND	**0.52**	**0.032**	149.4	S	7.1
SR0117456	10/4/2016	ND	93	ND	ND	12	340	ND	ND	1.9	0.012	0.056	1.3	0.031	ND	120	ND	ND	**0.052**	**0.028**	425	S	7.5
SR0117459	10/6/2016	ND	2.5	ND	ND	ND	110	ND	ND	16	ND	0.21	7.6	0.18	1.6	13	ND	ND	**0.73**	**0.2**	138.0	S	7.2
SR0117478	10/6/2016	ND	2.9	ND	ND	ND	110	ND	ND	17	ND	0.24	7.4	0.2	1.7	13	ND	ND	**1.1**	**0.22**	139.6	S	7.2
SR0117479	10/5/2016	ND	2	ND	ND	ND	110	ND	ND	15	ND	0.39	7	0.18	1.3	11	ND	ND	**0.67**	**0.16**	124.4	S	7.2
SR0117480	10/4/2016	ND	3.6	ND	ND	ND	140	ND	ND	18	ND	0.16	9.5	0.57	1.3	18	ND	ND	**0.81**	**0.53**	185.7	**U**	7.1
SR0120517	10/4/2016	0.074	9.1	ND	ND	12	180	0.0053	ND	27	ND	ND	12	0.2	3.8	8.5	ND	ND	**0.3**	**0.19**	198.4	S	7.5
SR0120518	10/3/2016	ND	2.6	ND	ND	ND	99	0.0033	ND	16	ND	0.14	7.6	0.33	1.9	15	ND	ND	**0.28**	**0.33**	145.7	S	7.4
SR0120557	10/6/2016	ND	2.5	0.071	ND	ND	110	ND	ND	ND	ND	ND	ND	ND	ND	45	ND	ND	**ND**	**ND**	174.8	S	7.0
SR0120639	10/4/2016	0.16	8.8	ND	ND	6.7	160	0.0053	ND	24	ND	ND	14	0.31	3.7	12	ND	ND	**0.32**	**0.29**	131.4	S	7.8
SR0120742	10/6/2016	ND	2.2	ND	ND	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	40	ND	ND	**ND**	**ND**	208.6	S	7.5
SR0120928	10/3/2016	ND	2.7	ND	ND	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	62	ND	ND	**ND**	**ND**	116.5	S	7.9
SR0126801	10/4/2016	ND	9.7	ND	ND	13	200	0.0054	ND	34	ND	ND	19	0.042	3.9	9.2	ND	ND	**ND**	**0.039**	176.4	S	7.8
SR0126807	10/4/2016	ND	4.9	0.76	ND	7.6	99	0.0034	ND	14	ND	ND	8.3	ND	1.8	8.4	ND	0.033	**ND**	**ND**	259	**U**	7.2
SR0126808	10/6/2016	ND	6.5	3.9	ND	ND	150	ND	ND	12	0.031	ND	12	ND	2	8.9	0.011	ND	**ND**	**ND**	147.8	S	7.0
SR0126809	10/5/2016	ND	2.2	ND	ND	ND	100	0.0046	ND	17	ND	0.15	6.2	0.11	1.3	9.6	ND	ND	**0.18**	**0.098**	126.5	S	7.6
SR0133428	10/6/2016	ND	2.2	ND	ND	ND	110	ND	ND	17	ND	0.091	6.6	0.16	ND	12	ND	ND	**0.28**	**0.15**	130.1	S	7.3
SR0133429	10/6/2016	ND	2.7	0.061	ND	ND	110	ND	ND	15	ND	0.53	6.8	0.16	1.4	10	ND	ND	**1**	**0.15**	123.1	S	7.3
SR0133430	10/6/2016	ND	2.3	ND	ND	ND	100	ND	ND	17	ND	0.14	7.1	0.16	1.3	12	ND	ND	**0.54**	**0.16**	136.5	S	7.3
SR0133431	10/5/2016	ND	2.4	ND	ND	ND	150	ND	ND	16	ND	0.47	7.3	0.059	1.4	16	ND	ND	**0.56**	**0.052**	275	S	7.7
SR0145667	10/5/2016	ND	20	0.15	ND	8.6	140	ND	ND	33	ND	ND	12	0.65	1.6	12	ND	ND	**ND**	**0.59**	148.7	**U**	7.2
SR0169553	10/6/2016	ND	6.3	0.055	ND	ND	110	0.004	ND	21	ND	ND	7.9	ND	2.3	15	ND	0.041	**ND**	**ND**	228	S	7.3
SR0169703	10/5/2016	0.76	4	ND	ND	ND	150	0.0088	ND	23	ND	0.065	8.6	0.75	2.6	16	ND	ND	**1.4**	**0.75**	165.4	S	7.2
SR0169704	10/5/2016	ND	ND	ND	ND	ND	130	0.0031	ND	19	ND	0.091	7.2	0.11	1.3	13	ND	ND	**0.26**	**0.095**	190.3	**U**	7.1
SR0170781	10/3/2016	ND	9.7	ND	ND	ND	250	0.008	ND	ND	ND	ND	ND	ND	ND	89	ND	ND	**ND**	**ND**	143.1	S	7.3
SR0192658	10/4/2016	ND	3.1	ND	ND	ND	150	0.0052	ND	20	ND	ND	8	0.22	2.5	9.4	ND	ND	**0.43**	**0.2**	146.8	S	7.3

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**
1 = Sites with a "T" indicate a water treatment system was present.

<u>*Please refer to the "Water Quality and Abbreviation and Notes" page for information about the terms used on this table.</u>

TABLE 2: LRI Landfill Residential Well Sampling Program – Fall 2016 Water Quality VOC Results

	MCL	SR0117339	SR0117362	SR0117449	SR0117453	SR0117459	SR0117478	SR0117479	SR0120557	SR0120742	SR0126808	SR0126809	SR0133428	SR0133429	SR0133430	SR0133431	SR0145667	SR0169553	SR0169703	SR0169704
1,1,1,2-Tetrachloroethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	4.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinylether	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CFC-11	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CFC-12	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7.0	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5	ND	ND
Chloromethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,2-Dichloroethene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-1,3-Dichloropropene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	---	ND	ND	ND	.28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	---	ND	ND	ND	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.42	ND	ND
Ethylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylene dibromide	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m, p-Xylene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Iodide	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Isobutyl Ketone	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl t-Butyl Ether	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,3-Dichloropropene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Units of measurement = Parts per Billion (ug/L)

ND = Not detected at the specified laboratory detection limit
MCL = Maximum Contamination Level

TABLE 3: LRI Landfill Residential Well Sampling Program – Fall 2016 Water Quality Duplicate Results

Chemical or Analyte*----------→

		General Chemistry						Dissolved Metals											Total Metals		Cond/Bact/pH		
Site	Sample Date	Ammonia	Chloride	Nitrate	Nitrite	Sulfate	TDS	Arsenic	Barium	Calcium	Copper	Iron	Magnesium	Manganese	Potassium	Sodium	Vanadium	Zinc	Iron	Manganese	Conductivity	Bacteriological	pH
MCL**			**250**	**10.0**	**1.0**	**250**	**500**	**0.01**	**2.0**		**1.3**							**5.0**	**0.3**	**0.05**	**750**		
SR0117449	10/5/2016	ND	2.1	ND	ND	ND	160	ND	ND	ND	ND	ND	ND	ND	ND	51	ND	ND	ND	ND	148.3	S	7.9
SR0117449D	10/5/2016	ND	ND	ND	ND	ND	160	ND	ND	ND	ND	ND	ND	ND	ND	52	ND	ND	ND	ND	150.1	S	8.0
SR0120639	10/4/2016	0.16	8.8	ND	ND	6.7	160	0.0053	ND	24	ND	ND	14	0.31	3.7	12	ND	ND	**0.32**	**0.29**	131.4	S	7.8
SR0120639D	10/4/2016	0.16	5.8	ND	ND	6.8	170	0.006	ND	24	ND	ND	14	0.33	3.7	9.5	ND	ND	**0.32**	**0.31**	205.2	S	7.6
SR0120928	10/3/2016	ND	2.7	ND	ND	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	62	ND	ND	ND	ND	116.5	S	7.9
SR0120928D	10/3/2016	ND	2.9	ND	ND	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	62	ND	ND	ND	ND	178.8	S	7.8
SR0126808	10/6/2016	ND	6.5	3.9	ND	ND	150	ND	ND	12	0.031	ND	12	ND	2	8.9	0.011	ND	ND	ND	147.8	S	7.0
SR0126808D	10/6/2016	ND	6.3	3.8	ND	ND	160	ND	ND	12	0.034	ND	12	ND	2.1	8.8	0.011	ND	ND	ND	148.0	NA	7.0

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

ND = Not detected at the specified laboratory detection limit
****MCL = Maximum Contamination Level**

MCL excedences 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: LRI Landfill Residential Well Sampling Program – Fall 2016 Water Quality VOC Duplicate Results

	MCL	SR0117449	SR0117449D	SR0126808	SR0126808D
1,1,1,2-Tetrachloroethane	---	ND	ND	ND	ND
1,1,1-Trichloroethane	0.20	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	---	ND	ND	ND	ND
1,1,2-Trichloroethane	---	ND	ND	ND	ND
1,1-Dichloroethane	1.0	ND	ND	ND	ND
1,1-Dichloroethene	---	ND	ND	ND	ND
1,1-Dichloropropene	---	ND	ND	ND	ND
1,2,3-Trichlorobenzene	---	ND	ND	ND	ND
1,2,3-Trichloropropane	---	ND	ND	ND	ND
1,2,4-Trichlorobenzene	---	ND	ND	ND	ND
1,2,4-Trimethylbenzene	---	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	---	ND	ND	ND	ND
1,2-Dichlorobenzene	---	ND	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND	ND
1,2-Dichloropropane	0.6	ND	ND	ND	ND
1,3,5-Trimethylbenzene	---	ND	ND	ND	ND
1,3-Dichlorobenzene	---	ND	ND	ND	ND
1,3-Dichloropropane	---	ND	ND	ND	ND
1,4-Dichlorobenzene	4.0	ND	ND	ND	ND
2,2-Dichloropropane	---	ND	ND	ND	ND
2-Butanone	---	ND	ND	ND	ND
2-Chloroethylvinylether	---	ND	ND	ND	ND
2-Chlorotoluene	---	ND	ND	ND	ND
2-Hexanone	---	ND	ND	ND	ND
4-Chlorotoluene	---	ND	ND	ND	ND
Acetone	---	ND	ND	ND	ND
Benzene	1.0	ND	ND	ND	ND
Bromobenzene	---	ND	ND	ND	ND
Bromochloromethane	0.3	ND	ND	ND	ND
Bromoform	5.0	ND	ND	ND	ND
Bromomethane	---	ND	ND	ND	ND
Carbon Disulfide	---	ND	ND	ND	ND
Carbon Tetrachloride	0.3	ND	ND	ND	ND
CFC-11	---	ND	ND	ND	ND
CFC-12	---	ND	ND	ND	ND
Chlorobenzene	---	ND	ND	ND	ND
Chloroethane	---	ND	ND	ND	ND
Chloroform	7.0	ND	ND	ND	ND
Chloromethane	---	ND	ND	ND	ND
Cis-1,2-Dichloroethene	---	ND	ND	ND	ND
Cis-1,3-Dichloropropene	---	ND	ND	ND	ND
Dibromochloromethane	---	ND	ND	ND	ND
Dibromomethane	---	ND	ND	ND	ND
Dichlorobromomethane	---	ND	ND	ND	ND
Ethylbenzene	---	ND	ND	ND	ND
Ethylene dibromide	---	ND	ND	ND	ND
Hexachlorobutadiene	---	ND	ND	ND	ND
Isopropylbenzene	---	ND	ND	ND	ND
m, p-Xylene	---	ND	ND	ND	ND
Methyl Iodide	---	ND	ND	ND	ND
Methyl Isobutyl Ketone	---	ND	ND	ND	ND
Methyl t-Butyl Ether	---	ND	ND	ND	ND
Methylene Chloride	5.0	ND	ND	ND	ND
Naphthalene	---	ND	ND	ND	ND
n-Butylbenzene	---	ND	ND	ND	ND
n-Propylbenzene	---	ND	ND	ND	ND
o-Xylene	---	ND	ND	ND	ND
p-Isopropyltoluene	---	ND	ND	ND	ND
sec-Butylbenzene	---	ND	ND	ND	ND
Styrene	---	ND	ND	ND	ND
tert-Butylbenzene	---	ND	ND	ND	ND
Tetrachloroethene	---	ND	ND	ND	ND
Toluene	---	ND	ND	ND	ND
Trans-1,2-Dichloroethene	---	ND	ND	ND	ND
Trans-1,3-Dichloropropene	---	ND	ND	ND	ND
Trichloroethene	---	ND	ND	ND	ND
Vinyl Acetate	---	ND	ND	ND	ND
Vinyl Chloride	0.02	ND	ND	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.

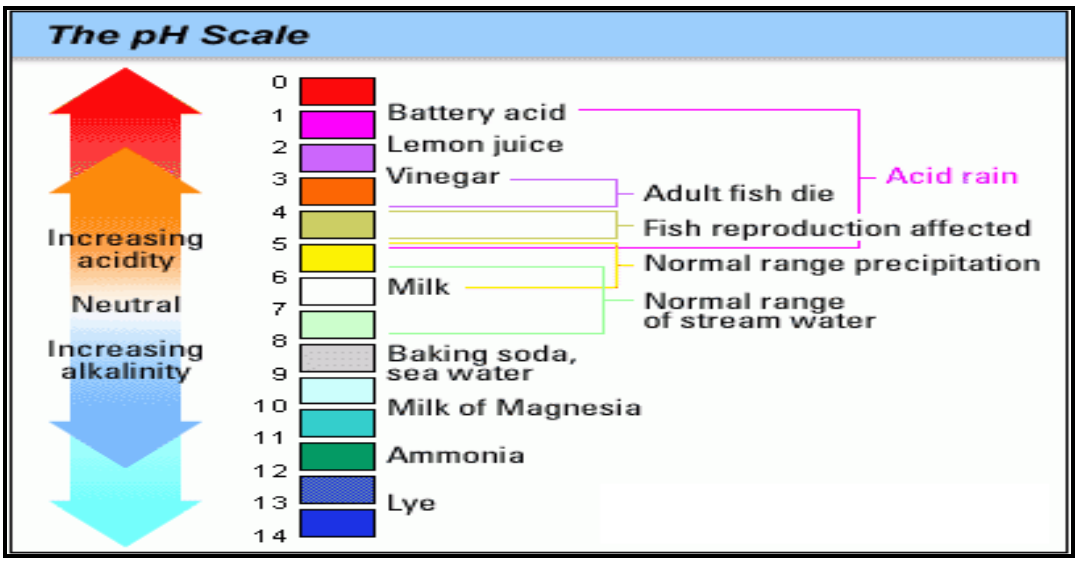
mg/l: milligrams per liter, or 1 part per million.

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

LRI Drinking Water Well Sampling Program

In 2007, several program participants and members of the Graham Land Use Advisory Commission asked why 'volatile organic compounds' (VOC) 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 was modified to include a limited suite of approximately 68 VOCs for analysis.

The program modification included a provision to test each participating well once every five-year period for VOCs. This modification began during the Fall 2007 sampling event with the testing of nine residential wells for VOCs. Twelve residential wells were sampled and tested for VOCs during the Fall 2016 sampling event. To date, 37 Spring Participant wells have been sampled for VOC's and 49 Fall Participant wells, for a total of 86 wells tested 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.