

July 2013 Interim Site-wide Groundwater Monitoring Results

Prepared for

City of Seattle South Park Property Development, LLC

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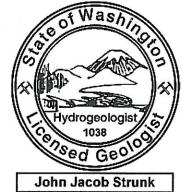




South Park Landfill July 2013 Interim Site-wide Groundwater **Monitoring Results**

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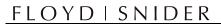
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List of Abbreviations/Acronyms

Acronym/

Abbreviation Definition

AO Agreed Order No. 6706
ARI Analytical Resources, Inc.

CAP Cleanup Action Plan
CKD Cement kiln dust
DCE Dichloroethene

DNAPL Dense non-aqueous phase liquid

DO Dissolved oxygen

Ecology Washington State Department of Ecology

Glitsa Glitsa American, Inc.

KIP Kenyon Industrial Park
Landfill South Park Landfill

LDPE Low density polyethylene

LFG Landfill gas

MTCA Model Toxics Control Act

NAPL Non-aqueous phase liquid

ORP Oxidation reduction potential

PVC Polyvinyl chloride
Redox Reduction-oxidation

RI/FS Remedial Investigation/Feasibility Study
SPPD South Park Property Development, LLC
SRDS South Recycling and Disposal Station

TCE Trichloroethene

USEPA U.S. Environmental Protection Agency

1.0 Introduction

This report provides the results of the July 2013 groundwater monitoring activities for the Interim Site-wide Groundwater Monitoring Program at the South Park Landfill (Landfill). The groundwater monitoring was conducted in accordance with the Interim Site-wide Groundwater Monitoring Plan (Floyd|Snider, 2012a), which provides groundwater monitoring prior to the completion and submittal of the Cleanup Action Plan (CAP) and development of a Long-term Site-wide Groundwater Monitoring Plan. The Interim Site-wide Groundwater Monitoring Program supplements the Draft South Park Landfill Remedial Investigation/Feasibility Study (RI/FS) (Floyd|Snider, 2012b), which is currently being reviewed by the Washington State Department of Ecology (Ecology).

This report includes a brief description of the Landfill; a summary of the sampling methods and procedures; an update of groundwater flow directions; and the analytical results. The July 2013 sampling event discussed in this report is the second groundwater quality monitoring event conducted as described in the Interim Site-wide Groundwater Monitoring Plan (Floyd|Snider, 2012a).

1.1 SITE DESCRIPTION

The Landfill is a former municipal solid waste landfill located in the South Park neighborhood of Seattle, Washington. The Landfill is located in the Duwamish Valley, between State Routes 509 and 99, and received solid wastes from the 1930s until it was closed in 1966 under King County's Title 10 provisions for solid waste regulation. Soil, groundwater, surface water, and landfill gas (LFG) monitoring began at the Landfill in the late 1980s and has continued through the present day. The Landfill consists of several parcels, including the approximately 20-acre South Park Property Development, LLC (SPPD), the South Recycling and Disposal Station (SRDS), the Kenyon Industrial Park (KIP), and several other smaller parcels. The SPPD parcel will be developed in 2013 as part of an interim action (Farallon, 2013).

In February 2007, the Landfill was added to Washington State's Hazardous Sites List, and an RI/FS was conducted under Model Toxics Control Act (MTCA) Agreed Order No. 6706 (Agreed Order [AO]) with Ecology. The RI/FS determined the nature and extent of contamination associated with the Landfill and evaluated potential remedial alternatives.

1.1.1 Monitoring Well Network

The monitoring wells included in the Interim Site-wide Groundwater Monitoring Program are illustrated on Figure 1.1. In addition to the proposed point of compliance (POC) wells (MW-08, MW-10, MW-18, MW-24, MW-25, MW-26, MW-27, MW-32, and MW-33), the monitoring well network also includes monitoring wells used to assess upgradient groundwater conditions (KMW-05, KMW-08, MW-12, MW-14, and MW-29); a monitoring well used to assess groundwater conditions along the northern edge of the KIP (KMW-03A); and downgradient monitoring wells used to assess groundwater conditions adjacent to the former Glitsa American, Inc. (Glitsa) property (MW-30 and MW-31). KMW-08 was sampled as a supplement to KMW-05 in assessing upgradient groundwater conditions because the groundwater in KMW-05 was dark brown, which may be indicative of the aqueous interaction of highly alkaline cement kiln dust (CKD) and organic rich soil. Several additional wells (MW-06, KMW-01A, KMW-02B, KMW-04, KMW-06, and KMW-07) and surface water monitoring locations (SG-1S and SG-2N) were

included in the monitoring network to measure groundwater and surface water levels for determining representative groundwater flow directions and gradients at the Landfill.

As discussed in Section 5.5 of the draft RI/FS, the monitoring wells are primarily completed in one of three groundwater zones of interest (Perched Zone, A-Zone, or B-Zone), all of which are part of the Shallow Aquifer. The Perched Zone is a thin discontinuous layer of groundwater that exists above the Silt Overbank Deposit, which can often be in contact with solid waste and is thus conceptually equivalent to leachate in those locations. The A-Zone is immediately below the Silt Overbank Deposit and is the critical zone where leachate (and perched water) can enter the groundwater system and move off-site. The B-Zone represents the base of the Shallow Aquifer, overlying finer grained estuarine deposits, where dense non-aqueous phase liquids (DNAPLs) would accumulate, if present. The completion zone for each well included in the monitoring well network is shown on Figure 1.1. Well construction logs are presented in Appendix A of the Interim Site-wide Groundwater Monitoring Plan.

2.0 Groundwater Level Monitoring

Water levels were measured in the monitoring wells and surface water monitoring locations at the Landfill in order to provide an indication of groundwater elevations, gradients, and flow directions for the July 2013 sampling event. Figure 1.1 provides the monitoring well and surface water monitoring locations.

2.1 MEASUREMENT PROCEDURE

Groundwater level measurements were conducted between July 15 and July 18, 2013, concurrent with groundwater sampling. Water level measurements were collected prior to the purging of the well for the collection of the groundwater samples. Groundwater levels were measured to a precision of 0.01 foot using an electric water level indicator. All groundwater level measurements were made relative to the surveyed top of the polyvinyl chloride (PVC) casing. Readings were recorded on a field form along with the measurement date and time (refer to Appendix A).

Due to the discoloration of the groundwater in KMW-05, an interface probe was used to confirm that no non-aqueous phase liquid (NAPL) was present within the well. No NAPL was detected in the well, and there was no noticeable petroleum-like odor. There were no indications of potential NAPL in any of the other monitoring wells.

Surface water levels were measured at two locations (SG-1S and SG-2N) in the West Ditch (refer to Figure 1.1). SG-1S is a permanent staff gage installed at the southern end of the West Ditch, and SG-2N is a surveyed measuring point from the top of a 2-inch-diameter PVC pipe set in concrete associated with a culvert at the northern end of the West Ditch. Due to the absence of the Silt Overbank Deposit in the northern portion of the West Ditch (refer to Section 5.5.4 of the RI/FS), surface water in the vicinity of SG-2N is expected to be in hydraulic continuity with groundwater in the A-zone of the Shallow Aquifer. Therefore, the surface water elevation at SG-2N is considered an expression of the groundwater elevation. However, the Silt Overbank Deposit is present in the vicinity of SG-1S, likely acting as an aquitard between the West Ditch and the underlying A-Zone of the Shallow Aquifer.

2.2 GROUNDWATER LEVELS AND FLOW DIRECTIONS

A shallow groundwater elevation and flow direction map for July 2013 is presented on Figure 2.1. Groundwater elevations at the two surface water locations and 23 monitoring wells with screens completed primarily in the A-Zone of the Shallow Aquifer were used for the contouring. The groundwater elevations were interpolated using triangulation, with linear interpolation to produce the contours.

The interpolated groundwater elevations were then used in a "raindrop" analysis, where virtual particles are placed on the map and their flow path is predicted based on the interpolated water table surface, to produce the inferred groundwater flow path lines depicted on Figure 2.1. Based on Figure 2.1, the groundwater flow direction in the vicinity of the Landfill is generally inferred to be to the northeast, toward the Duwamish River.

3.0 Groundwater Quality Monitoring

Groundwater samples were collected between July 15 and July 18, 2013, from the 17 monitoring wells (including KMW-08) according to low-flow sampling procedures as described in the Interim Site-wide Groundwater Monitoring Plan (Floyd|Snider, 2012a).

3.1 PROCEDURE

The wells were purged and sampled using either a dedicated bladder pump or a peristaltic pump with dedicated low density polyethylene (LDPE) and silicon tubing.

The wells were purged at a flow rate of less than 500 milliliters per minute until the field parameters stabilized or more than three casing volumes were purged from the well. The monitored field parameters included temperature, pH, conductivity, dissolved oxygen (DO), and oxidation reduction potential (ORP), which were recorded at 5-minute intervals using a calibrated multiparameter probe and flow-through cell. Stabilization was defined as three successive readings where DO varied by less than 10 percent and ORP varied by less than 10 millivolts (mV). Additional stability criteria included 0.5 degrees Celsius (°C) for temperature, 10 percent for conductivity, and 0.1 units for pH. Flow rate and depth to water were also measured during well purging. In addition, prior to sampling, a turbidity measurement was collected to evaluate the quality of dissolved/total metal analytical results. All field measurements were documented on the respective Groundwater Sampling Records for each well, which are provided in Appendix A. Purge water was placed in 55-gallon drums on-site, which were removed for off-site disposal on August 7, 2013.

Groundwater samples were collected from the discharge tubing in advance of the flow-through cell. All samples for analysis of dissolved metals (iron and manganese) were field filtered using disposable 0.45-micrometer filters. Samples were placed in containers provided by the laboratory, stored in coolers with ice, and delivered to Analytical Resources, Inc. (ARI) laboratory under industry-standard chain-of-custody procedures at the end of each sampling day. Groundwater samples were analyzed for the following parameters based on the Interim Site-wide Groundwater Monitoring Plan:

- cis-1,2-Dichloroethene (DCE), trichloroethene (TCE), and benzene by U.S. Environmental Protection Agency (USEPA) Method 8260C
- Vinyl chloride by USEPA Method 8260C SIM
- Dissolved iron and manganese by USEPA Method 6010B
- Total iron and manganese by USEPA Method 6010B

Benzene was analyzed only in MW-25 and the upgradient monitoring wells (KMW-05 and KMW-08) based on historical detections of benzene in MW-25 and KMW-05.

In addition, the groundwater samples were also analyzed for several parameters not included in the Interim Site-wide Groundwater Monitoring Plan, including geochemical indicator parameters, the sulfide-sulfate reduction-oxidation (redox) couple, and nitrogen redox couples:

- Major cations, including sodium, potassium, calcium, and magnesium, by USEPA Method 6010B
- Major anions, including alkalinity, carbonate, and bicarbonate, by SM 2320B

- Major anions, including chloride, sulfate, nitrate, and nitrite by USEPA Method 300.0
- Ammonia by USEPA 350.1M and sulfide by USEPA Method 376.2

Quality control/quality assurance measures included two field duplicates, one rinse blank, and six trip blanks (one submitted with each cooler containing samples for VOC analysis), which were submitted with the groundwater samples. The field duplicates were collected from MW-25 (identified as MW-60 in the laboratory report) and from KMW-08 (identified as MW-61 in the laboratory report), with the highest concentrations reported for MW-25 and KMW-08 (Figures 3.1, 3.2, and 3.3). The rinse blank is identified as MW-80 in the laboratory report. The chain-of-custodies and laboratory reports for the July 2013 sampling event are provided in Appendix B.

3.2 ANALYTICAL RESULTS

The results of the July 2013 sampling event were received from ARI on July 18, 2013 (Appendix B). Table 3.1 provides a summary of the analytical results and field parameters. Cleanup levels have not yet been established for this site but are expected to be based on either drinking water use (MCTA Method B) or protection of surface water quality. Table 3.1 lists both potential cleanup levels for the convenience of the reader.

A Level I data validation of the analytical results was performed by Floyd|Snider ,and the data validation report is included as Appendix C. Results of the data validation indicated the need for several data qualifiers, which are included in Table 3.1 and described in Appendix B of Appendix C.

The analytical results are spatially illustrated on Figures 3.1, 3.2, and 3.3. An analysis of major cations (sodium, potassium, calcium, and magnesium) and anions (chloride, sulfate, carbonate, and bicarbonate) is also shown on the trilinear plots in Figures 3.4 and 3.5.

4.0 References

- Farallon Consulting, LLC (Farallon). 2013. *Interim Action Work Plan South Park Landfill Site, Seattle, Washington*. Prepared for the South Park Property Development, LLC. 22 February.
- Floyd|Snider. 2012a. South Park Landfill Interim Site-wide Groundwater Monitoring Plan.

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 7 December.
- ——. 2012b. Draft Remedial Investigation/Feasibility Study, South Park Landfill, Seattle, Washington. Prepared for the City of Seattle and South Park Property Development, LLC. 16 April.
- U.S. Environmental Protection Agency (USEPA). 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA 600-R-98-128. September.
- Washington State Department of Ecology (Ecology). 2007. *Model Toxics Control Act (MTCA)*. Chapter 173-340 Washington Administrative Code. 12 October.

July 2013 Interim Site-wide Groundwater Monitoring Results

Table

FLOYD | SNIDER

Table 3.1
July 2013 Groundwater Sample Analytical Results

No.		Location	KMW-03A	KMW-05	KMW	/-08	MW-08	MW-10	MW-12	MW-14	MW-18	MW-24
V-coord 19788.9.9 197427.44 591-264. 197386.14 197386.14 198837.87 196837.87 196838.73 196398.73 197398		X-coord ¹	1270170.48	1269861.86	1269692.89	1269692.89	1271368.12	1270569.12	1269783.23	1269963.2	1271077.67	1271162.48
Sample Dis SPL-GW- MW083-071813 SPL-GW- MW081- SPL-GW-MW081- SPL-GW-MW082- O71813 O7												197102.37
Sample Date 7/18/2013 7/18/2013 7/18/2013 7/18/2013 7/18/2013 7/18/2013 7/16/2013 7/16/2013 7/17/2013 7		. 000.u										
Name Units Conventionals by USEPA 300.0, 350.1M, 376.2, and SM 2320		Sample ID	KMW03A-071813	KMW05-071813	071813	071813	071613	071513	071713	MW14-071713	071713	071613
Conventionals by USEPA 300.0, 350.1M, 376.2, and SM 2320		Sample Date	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/16/2013	7/15/2013	7/17/2013	7/17/2013	7/17/2013	7/16/2013
Chloride	Analyte	Units										
Sulfate mg/L 0.1 U 1,140 23.7 23.6 2.3 69.2 5.4 3.4 10.8 7.5 7.		300.0, 350.1M,	376.2, and SM 232									
Sulfide		mg/L										38.1
N-aimmonia mg-N/L 3.06 64.4 0.596 0.339 3.1 3.69 0.744 0.228 2.58 2.												4.9
N-nitrate mg-N/L 0.1 U 10 U 0.1 U												0.077
N-nitrite												2.53
Alkalinity mg/L CaCO ₃ 354 7,930 156 150 356 309 171 206 574 33 Bicarbonate mg/L CaCO ₃ 354 1 U 156 150 356 309 171 206 574 33 Carbonate mg/L CaCO ₃ 1 U 2,570 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1 U 1												0.1 U
Bicarbonate mg/L CaCO ₃ 354 1 U 156 150 356 309 171 206 574 3 3 4 4 4 4 4 4 4												0.1 U
Carbonate mg/L CaCO ₃ 1 U 2,570 1 U	Alkalinity	ů	354	7,930		150	356	309	171	206		340
Hydroxide mg/L CaCO ₃ 1 U 5,370 1 U	Bicarbonate	ů		_								340
Metals by SW6010C Calcium, dissolved mg/L 76.1 10.7 30.2 30.2 41.6 49.5 30.6 42.8 69.6 59.5 Iron, dissolved mg/L 10.4 5.2 0.16 0.16 17.7 21.9 8.49 4.04 44.4 14.1 Iron, total mg/L 10.8 5.9 0.31 0.29 17.6 22.7 17.7 4.64 48.9 14.4 Magnesium, dissolved mg/L 26 0.5 U 6.51 6.49 38.3 31.4 14.7 23.8 65.9 22 Manganese, dissolved mg/L 0.036 0.01 U 0.165 0.165 1.05 1.29 0.495 0.494 1.84 1. Manganese, total mg/L 0.04 0.01 U 0.172 0.17 1.03 1.32 0.504 0.48 1.83 1. Potassium, dissolved mg/L 14.7 4,280 28 27.5 15.1 9.2 3.7	Carbonate		1 U	2,570	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Calcium, dissolved mg/L 76.1 10.7 30.2 30.2 41.6 49.5 30.6 42.8 69.6 59 Iron, dissolved mg/L 10.4 5.2 0.16 0.16 17.7 21.9 8.49 4.04 44.4 1.1 Iron, total mg/L 10.8 5.9 0.31 0.29 17.6 22.7 17.7 4.64 48.9 1.4 Magnesium, dissolved mg/L 26 0.5 U 6.51 6.49 38.3 31.4 14.7 23.8 66.9 22 Manganese, dissolved mg/L 0.036 0.01 U 0.165 0.165 1.05 1.29 0.495 0.494 1.84 1. Manganese, total mg/L 0.04 0.01 U 0.172 0.17 1.03 1.32 0.504 0.48 1.83 1. Potassium, dissolved mg/L 14.7 4,280 28 27.5 15.1 9.2 3.7 4.6 16.9		mg/L CaCO ₃	1 U	5,370	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Iron, dissolved mg/L 10.4 5.2 0.16 0.16 17.7 21.9 8.49 4.04 44.4 14.4 14.4 14.4 15.4 10.8 5.9 0.31 0.29 17.6 22.7 17.7 4.64 48.9 14.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.7 23.8 65.9 22.4 14.8												
Iron, total mg/L 10.8 5.9 0.31 0.29 17.6 22.7 17.7 4.64 48.9 14.84 14.7 23.8 65.9 24.84 24.	·	mg/L										59.4
Magnesium, dissolved mg/L 26 0.5 U 6.51 6.49 38.3 31.4 14.7 23.8 65.9 20 Manganese, dissolved mg/L 0.036 0.01 U 0.165 0.165 1.05 1.29 0.495 0.494 1.84 1. Manganese, total mg/L 0.04 0.01 U 0.172 0.17 1.03 1.32 0.504 0.48 1.83 1. Potassium, dissolved mg/L 14.7 4,280 28 27.5 15.1 9.2 3.7 4.6 16.9 1 Sodium, dissolved mg/L 22.7 1,570 24.2 24.1 133 57.4 21.5 15.7 46 56 VOCs by SW8260C Benzene μg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 1.6 5.4 J 0.02 U 0.044 0.0 Trichloroethene μg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 0.2 U	,		-									14.6
Manganese, dissolved mg/L 0.036 0.01 U 0.165 0.165 1.05 1.29 0.495 0.494 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.83 1.84 1.83 1.83 1.83 1.83 1.83 1.84 1.84 1.84 1.84 1.83 1.83 1.83 1.83 1.83 1.83 1.83 1.83 1.83 1.83 1.83 1.84 1.84 1.84 1.84 1.84 1.83 1.83 1.83 1.83 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.83 1.83 1.83 1.84 <	- ,											14.1
Manganese, total mg/L 0.04 0.01 U 0.172 0.17 1.03 1.32 0.504 0.48 1.83	<u> </u>											26.8
Potassium, dissolved mg/L 14.7 4,280 28 27.5 15.1 9.2 3.7 4.6 16.9 11.5 Sodium, dissolved mg/L 22.7 1,570 24.2 24.1 133 57.4 21.5 15.7 46 56 VOCs by SW8260C Benzene μg/L 7.2 0.2 U 0.2 U 0.2 U 1.6 5.4 J 0.02 U 0.044 0.0 cis-1,2-Dichloroethene μg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 1.6 5.4 J 0.02 U 0.044 0.0 Trichloroethene μg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 0.2 U 0.15² 0.02 U 0.02 U VOCs by SW8260C-SIM Vinyl chloride μg/L 0.35 0.4 U 0.02 U 0.02 U 0.063 0.84 0.22 0.02 U 0.075 0.0	<u> </u>											1.15
Sodium, dissolved mg/L 22.7 1,570 24.2 24.1 133 57.4 21.5 15.7 46 56 VOCs by SW8260C Benzene μg/L 7.2 0.2 U 0.2 U 0.2 U 0.2 U 0.2 U 0.2 U 0.02 U 0.00 U 0.044 0.00 U 0.044 0.00 U 0.02 U 0.02 U 0.15² 0.02 U 0.075 0.00 U 0.00												1.13
VOCs by SW8260C Benzene μg/L 7.2 0.2 U 0.02 U 0.063 0.84 0.22 0.02 U 0.075 0.00 U 0.075 0.00 U												11.2
Benzene μg/L 7.2 0.2 U 0.2 U 0.2 U 0.2 U 0.2 U 0.02 U 0.02 U 0.02 U 0.044 0.02 U 0.044 0.02 U 0.044 0.02 U 0.075 0.02 U Vinyl chloride μg/L 0.35 0.4 U 0.02 U 0.02 U 0.063 0.84 0.22 0.02 U 0.075 0.00		mg/L	22.7	1,570	24.2	24.1	133	57.4	21.5	15.7	46	58.4
cis-1,2-Dichloroethene µg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 1.6 5.4 J 0.02 U 0.044 0.02 U Trichloroethene µg/L 0.2 U 4 U 0.2 U 0.2 U 0.2 U 0.15² 0.02 U 0.02 U VOCs by SW8260C-SIM Vinyl chloride µg/L 0.35 0.4 U 0.02 U 0.02 U 0.063 0.84 0.22 0.02 U 0.075 0.0					1 0011		1	1	I			
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Vinyl chloride μg/L 0.35 0.4 U 0.02 U 0.02 U 0.063 0.84 0.22 0.02 U 0.075 0.		μg/L	0.2 U	4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.15	0.02 U	0.02 U	0.2 U
		//	0.25	0.4.11	0.00.11	0.00.11	0.000	0.04	0.00	0.00.11	0.075	0.00.11
	Field Parameters	<u>μ</u> g/∟	0.35	0.4 0	0.02 0	0.02 0	0.063	0.84	0.22	0.02 0	0.075	0.02 U
		ma/l	1.46	1.05	1 42	I	2 22	1.00	2 20	1.70	2.51	2.52
						-						-43.20
	_											6.70
						-						768.00

		Proposed	CUL (Potential S	cenarios)
			Protection of	Upgradient or
Monitored Analytes	Units	Drinking Water	Surface Water	Background
Benzene	μg/L	5	51	
cis-1,2-Dichloroethene	μg/L	16	900	
Trichloroethene	μg/L	4.9	30	
Vinyl chloride	μg/L	0.29	2.40	
Iron	mg/L	-	-	18
Manganese	mg/L	-	-	2.0

Notes:

- -- Not analyzed for.
- 1 Coordinates are in Washington State Plane North NAD 83 feet.
- 2 Result is from SW8260C-SIM analysis due to trichloroethene carry over in the SW8260C analysis.

Abbreviations:

CaCO₃ Calcium carbonate

CUL Cleanup level

μg/L Micrograms per liter

μS/cm Microsiemens per centimeter

mg/L Milligrams per liter

mg-N/L Milligrams per liter as nitrogen mV Millivolt

NAD 83 North American Datum of 1983

ORP Oxidation reduction potential USEPA U.S. Environmental Protection Agency

VOC Volatile organic compound

Qualifiers:

- U Analyte was not detected at given reporting limit.
- J Analyte was detected; the result should be considered an estimate.
- JM Analyte was detected; the result should be considered an estimate due to poor spectral match.

FLOYD | SNIDER

Table 3.1
July 2013 Groundwater Sample Analytical Results

	Location	MV	N-25	MW-26	MW-27	MW-29	MW-30	MW-31	MW-32	MW-33
	X-coord ¹	1270572.18	1270572.18	1271163.2	1271347.6	1270272.103	1270826.64	1270825.71	1270622.16	1270751.02
	Y-coord ¹	197667.54	197667.54	197122.51	196835.03	196033.286	197655.77	197660.37	197416.52	197257.91
		SPL-GW-	SPL-GW-MW60-	SPL-GW-	SPL-GW-MW27-	SPL-GW-MW29-	SPL-GW-MW30-	SPL-GW-MW31-	SPL-GW-MW32-	SPL-GW-MW33-
	Sample ID	MW25-071513	071513	MW26-071613	071613	071713	071613	071613	071513	071513
	Sample Date	7/15/2013	7/15/2013	7/16/2013	7/16/2013	7/17/2013	7/16/2013	7/16/2013	7/15/2013	7/15/2013
Analyte	Units									
Conventionals by USEPA	300.0, 350.1M,	376.2, and SM 2	2320							
Chloride	mg/L	7.5	7.6	15.1	24.7	18.4	29.9	16.3	30.3	87.5
Sulfate	mg/L	0.4	0.4	11.6	0.4	295	11.3	0.1	19.2	0.1
Sulfide	mg/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
N-ammonia	mg-N/L	2.82	2.89	0.1	2.02	0.855	0.515	1.68	10	15.6
N-nitrate	mg-N/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
N-nitrite	mg-N/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Alkalinity	mg/L CaCO ₃	191	194	48.4	100	279	217	110	670	676
Bicarbonate	mg/L CaCO₃	191	194	48.4	100	279	217	110	670	676
Carbonate	mg/L CaCO ₃	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hydroxide	mg/L CaCO ₃	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Metals by SW6010C										
Calcium, dissolved	mg/L	32.3	33.1	11.1	14.4	158	68.5	13.6	77.2	37.7
Iron, dissolved	mg/L	11.1	11.2	7.11	17.8	18.2	4.58	7.89	26.4	19.3
Iron, total	mg/L	11.7	11.8	10.3	19.5	18.3	4.53	8.29	26.7	19.5
Magnesium, dissolved	mg/L	8.75	8.84	4.07	4.37	36.8	13	4	48.8	22.2
Manganese, dissolved	mg/L	0.84	0.831	0.16	0.507	1.25	0.111	0.258	2.46	1.87
Manganese, total	mg/L	0.856	0.839	0.165	0.528	1.24	0.111	0.264	2.48	1.88
Potassium, dissolved	mg/L	3.4	3.5	3.1	3.4	11.3	5	3.1	16.1	9.6
Sodium, dissolved	mg/L	35.4	35.7	11	31	22.7	16.8	35.1	138	273
VOCs by SW8260C										
Benzene	μg/L	0.28	0.33							
cis-1,2-Dichloroethene	μg/L	0.75	0.7	0.3	0.41	0.034	1.6	5.2	1.7	0.2 U
Trichloroethene	μg/L	0.2 U	0.2 U	0.37 JM	0.2 U	0.02 U	0.75	0.2 U	0.2 U	0.2 U
VOCs by SW8260C-SIM	1 0		1 000		0.11	0.00.11				0.70
Vinyl chloride	μg/L	1.1	0.99	0.022	0.14	0.02 U	0.5	4.3	0.3	0.78
Field Parameters	1 4	0.07	1	0.00	4.07	0.40	0.40	0.04	0.00	0.04
Dissolved oxygen	mg/L	2.27		2.08	1.97	2.18	3.16	2.31	3.26	3.01
ORP	mV	-54.00		10.40	-93.50	-40.30	2.60	-46.60	-89.10	-95.10
pH	pH	6.63		6.21	6.80	6.44	6.47	6.57	6.71	6.70
Specific conductance	μS/cm	400.40		185.10	323.20	1,095.00	519.80	293.00	1,333.00	1,576.00

		Proposed	CUL (Potential S	cenarios)
			Protection of	Upgradient or
Monitored Analytes	Units	Drinking Water	Surface Water	Background
Benzene	μg/L	5	51	
cis-1,2-Dichloroethene	μg/L	16	900	
Trichloroethene	μg/L	4.9	30	
Vinyl chloride	μg/L	0.29	2.40	
Iron	mg/L			18
Manganese	mg/L			2.0

Notes:

- -- Not analyzed for.
- 1 Coordinates are in Washington State Plane North NAD 83 feet.
- 2 Result is from SW8260C-SIM analysis due to trichloroethene carry over in the SW8260C analysis.

Abbreviations:

CaCO₃ Calcium carbonate

CUL Cleanup level

μg/L Micrograms per liter

μS/cm Microsiemens per centimeter mg/L Milligrams per liter

mg-N/L Milligrams per liter as nitrogen

mV Millivolt

NAD 83 North American Datum of 1983

ORP Oxidation reduction potential

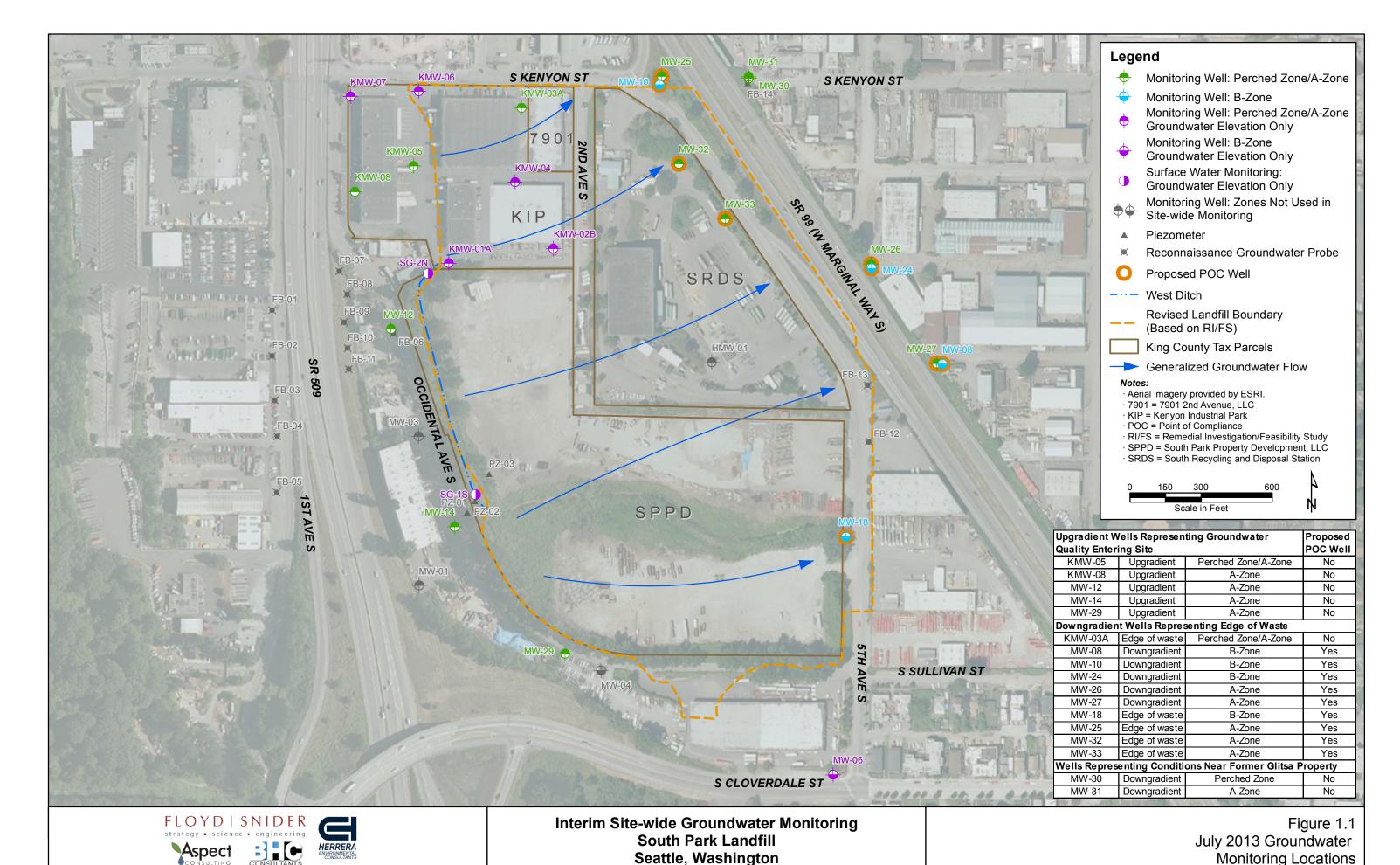
VOC Volatile organic compound

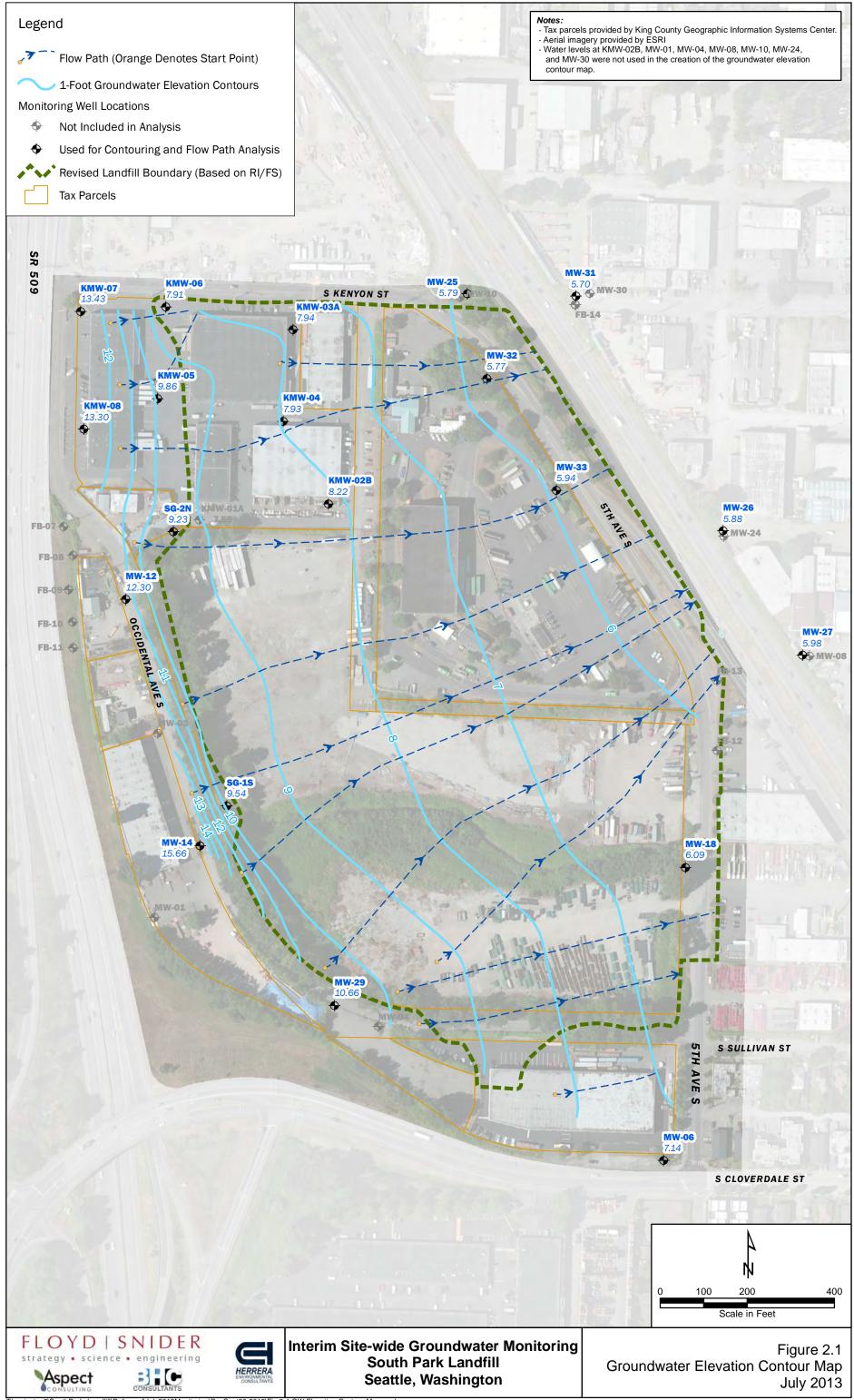
Qualifiers:

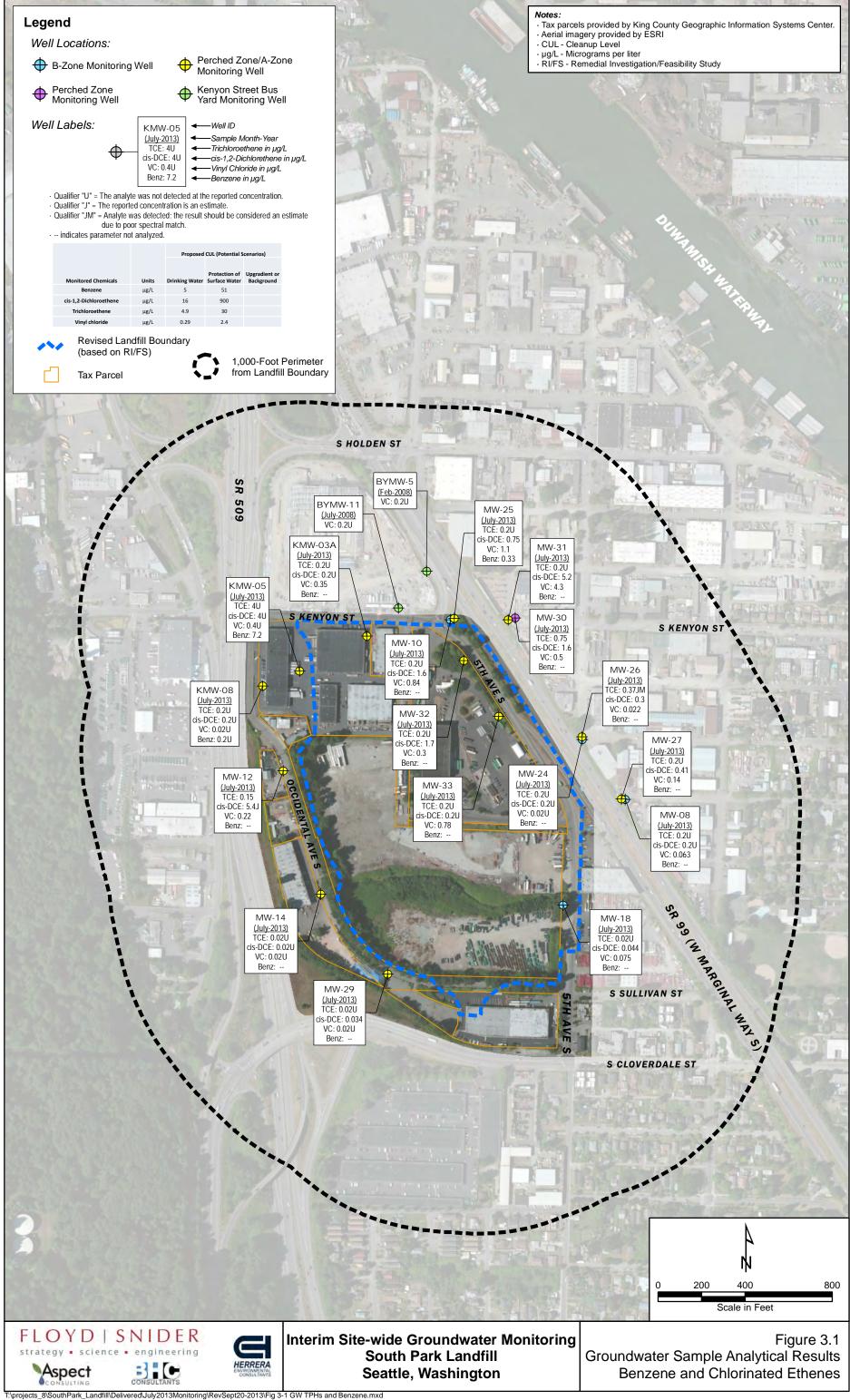
- U Analyte was not detected at given reporting limit.
- J Analyte was detected; the result should be considered an estimate.
- JM Analyte was detected; the result should be considered an estimate due to poor spectral match.

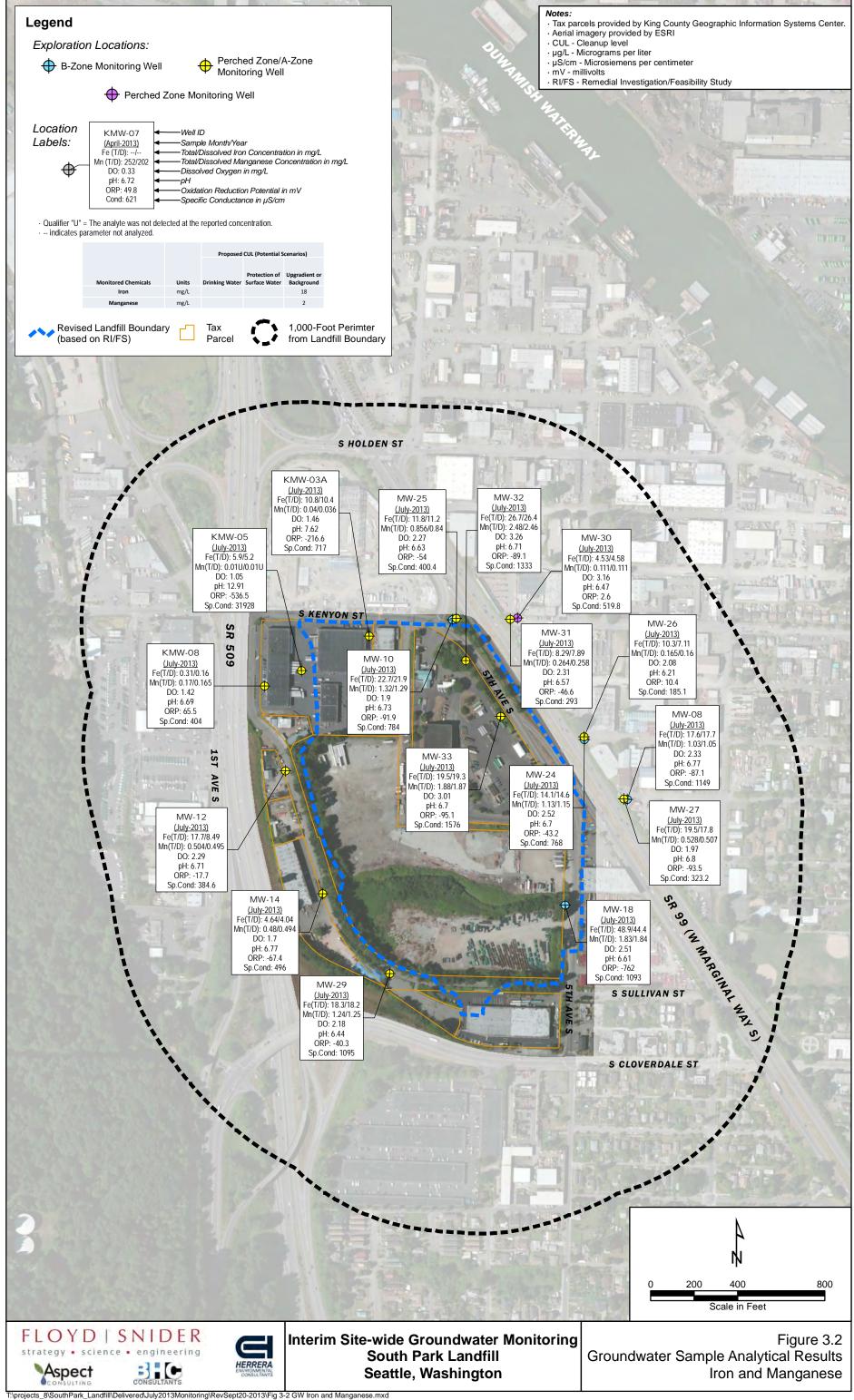
July 2013 Interim Site-wide Groundwater Monitoring Results

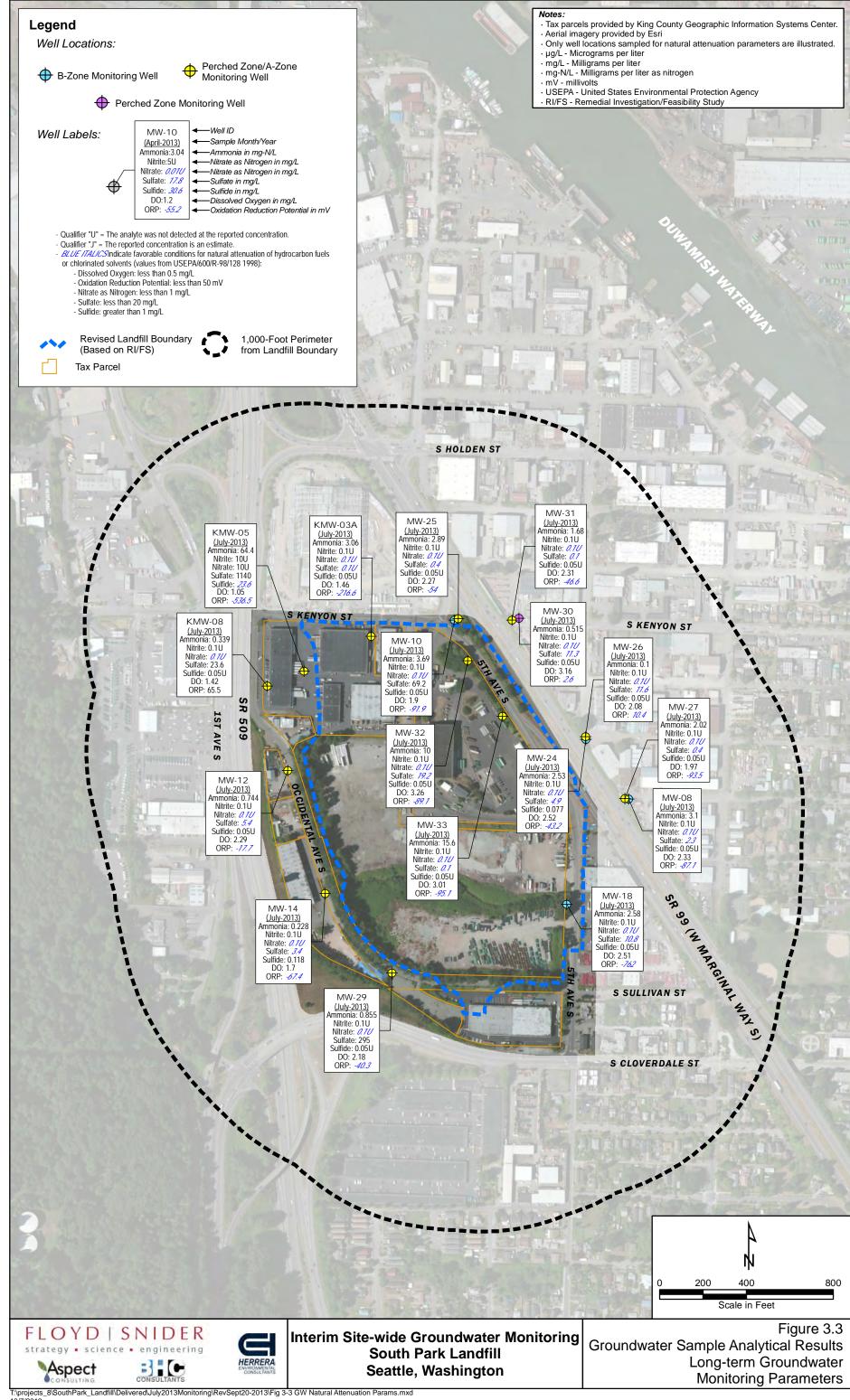
Figures

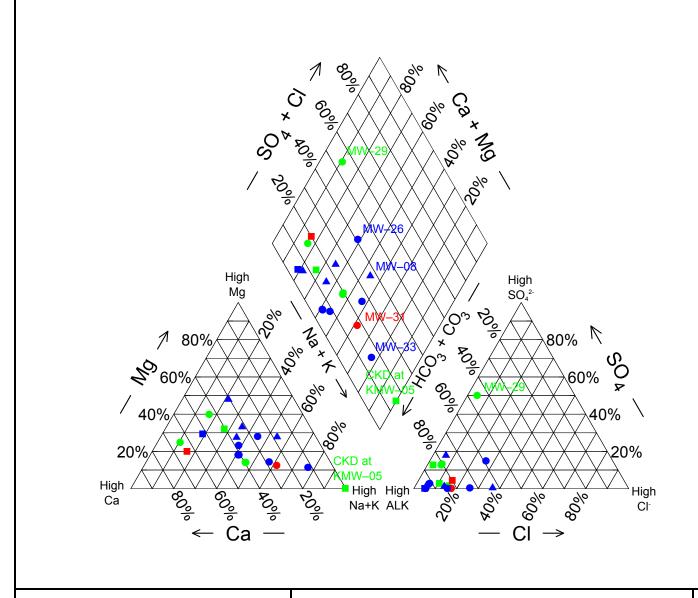












Legend

- Upgradient Perched and Perched/Shallow
 - KMW-05
- MW-12
- Downgradient Perched and Perched/Shallow
 - KMW-03A
- Off-site Perched and Perched/Shallow
- MW-30
- Upgradient Shallow
 - MW-14
 - MW-29
 - KMW-08
 - KMW-08Dup
- Downgradient Shallow
 - MW-25
 - MW–25Dup
 - MW–26
 - MW-27
 - MW-32
 - MW-33
- Off-site Shallow
- MW-31
- Downgradient Deep
 - ▲ MW-08
 - ▲ MW-10
 - ▲ MW–18
 - ▲ MW-24

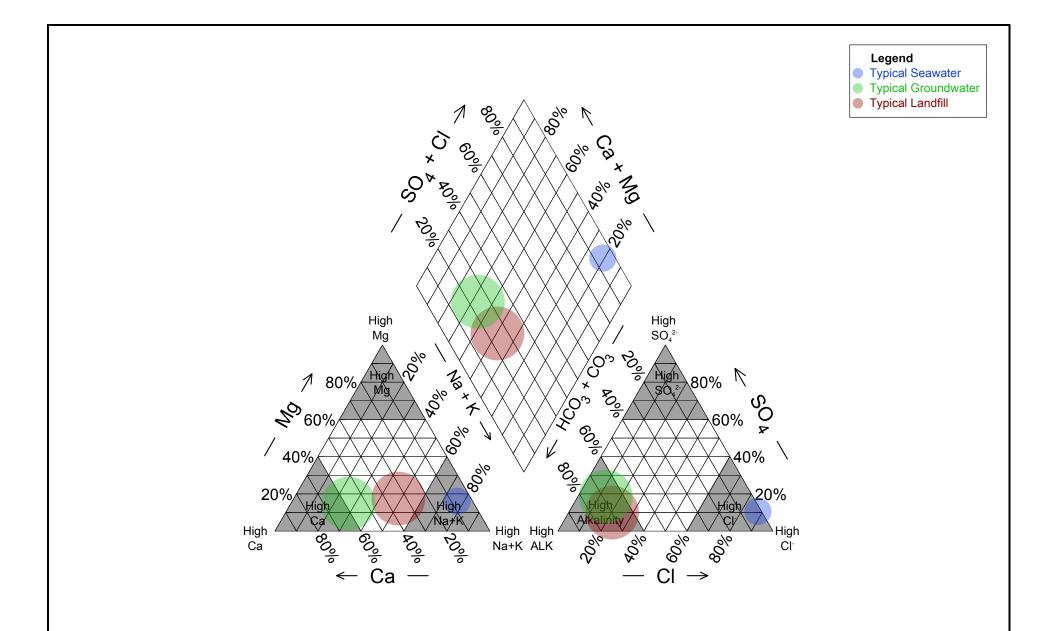
Note:

Companion information is provided on Figure 3.5.





Interim Site-Wide Groundwater Monitoring South Park Landfill Seattle, Washington Figure 3.4 July 2013 Groundwater Monitoring Trilinear Plot of Major Cations and Anions







Interim Site-wide Groundwater Monitoring
South Park Landfill
Seattle, Washington

Figure 3.5 Trilinear Plot of Major Cations and Anions for Typical Waters

July 2013 Interim Site-wide Groundwater Monitoring Results

Appendix A Groundwater Sampling Field Forms

GRO	WDNU.	ATER SAMPL	NG RECO	RD		WELL	NUMBE	p.	1111	_30	Page: of
Projec	ct Name:	South	~ Pa	CK.							Page: of
Date:	_7	1513					t Number		/ <i>DÔ/</i> (ft TOC):		
Samp	led by:	SM/	CM.			Casing	Stickup	(ft):	(11 100):	11.30	
Screen	ned Interv	al (ft. TOC)				_ Total D	epth (ft T	OC):			
Filter F	ack Inter	val (ft. TOC)				Casing	Diamete	r (incl	hes):		
		(ft	Water) v		1 -4 - 10 - 10						
Casing	10.011163	3/4 - 0.02 gpl	2 = 0.7	6 gpf	4" = 0.65 gpf	(l	_)(gal)			2.00	
		3/4"= 0.09 Lpf	2" = 0.62	Lpf 4	= 2.46 Lpf	6" = 5.	56 Lpf			Sample Inta	ake Depth (ft TOC):
PURG	ING ME	ASUREMENT			5 100	2					
Crite		Typica 0.1-0.5 L	l pm Stat		±3%	± 109	6 ±	0.1	± 10 mV	. 100/	
Time		mul. ume Purge Ra	ate Wat		Specific	Dissolv	red	_	1	± 10%	
	(gal	or L) (gpm or (om) Lev	61	Conductan	1 30	an .	рН	ORP	Turbidity	Comments
11:1.	3	- 0.4	3		(дологи)	(mg/L		_	(mv)	(NTU)	
111				14.	2 1301	2,95	1 4	54	5/15	Constitution of the Consti	S-121 pur
1:2				114	7 1286			_	-		N
1:25				14.3	i i i i	2.95		67	-70.5		
130					3 1379	5.80	-	9	- 81.9	11	
135		V		14,		3.11	6.3		-865	11	
			-	1-1,	3 1333	3.20	6.	71	-89.1	3.51	
			+	-	+	-					
			+	+	-						
_			+ .								
	1		-	+							
_	-	+	-								
	-	-	-					T			
	-	_						1			
_											
						i		+		_	
Gallor	ns Purgeo	l:				Total Casin	a Volume	o Da		~ 1	
na Wat	ter Level (# TOCL									
						Ending Total	l Depth (ft TO	C):		
ne T	Volume	1	12	Les .							
	VOIUITIE	Bottle Type	Quantity	Filtration	Preservation	Appea	rance				
1	/10 .					Color	Turbidity Sedimen			Ren	narks
	40nl		3	hio .	14cm, 2 no	clev.	3.51		Voc.	80/00	-
	90mb	VOA	3	No	14ch, 2 no	1	1	+	Voc	8260c	
_	scont	HDPE	1	YES?	HN0-3		1	-	-	8260C-	
-	500 ML	HOPE	1	No	HV03			1	-	ed Metal	S MA, K, Ea, Me, FE
1 4	Small	02		No	NO		-		total 1	uctals	FEIMA
	14	03		No.	No	1	U			, NO3, NO	504
	500 ML		1	No	H2504	V		1	AIK		
-	500 Mars	HOPF		No	ZM acctube				NH3 (movia)	100 m. 1
eters m	neasured i	with (instrument m	nodel & serie	al number):	YSIPM	+ 11	con	1	+		MD Heidspace
Equip	ment:	Medician	DAY OF	D+ tu		econ Equip		Δ	1 cons +	DI	
l of Di	scharged	Water:	Drv		sixc	Equip			· (mi t	121	
								_			

GRO	UNDWAT	TER SAMPLI				WELL	UMBER:	WM 33		Page: 1 of
Projec	t Name:	South	Par	CK		Project N	Jumber	1001	16	rage or _ t
Date:	led by:	SM/6	140			Starting	Water Leve	el (ft TOC):	11,4	0
Measu	uring Point o	f Well:	. //			Casing S	tickup (ft):		1111	
Screen	ned Interval	(ft. TOC)				_ Total Dep	oth (ft TOC	(): ():		
		(ft. TOC)						iones).		
Casing	Volume	(ft)	Nater) x	(Lpfv)(gpf) =	(L)(gal)			
Jasiriy	Volumes.	3/4"= 0.02 gpf 4"= 0.09 Lpf	2'' = 0.10	6 gpf	4" = 0.65 gpf	6" = 1.	47 gpf		Sample Int	ake Depth (ft TOC):
PURG		SUREMENT		.рт 4	" = 2.46 Lpf	6" = 5.56	Lpf			(n 100)
Crite		Typica	0/-1/-	le na	± 3%	. 100				
Time	Cumu		water Water	er T	C===#:	± 10%	± 0.1	± 10 mV	±10%	
	(gal or	e	LAVA		Conductan		1 2	ORP	Turbidity	Comments
17:5		()300 Lp	Ay -		(poroni)	(mg/c)		(mv)	(NTU)	0. 1
12:3			11.40	15.	9 1572	3.69	6.66	-775	CI	Start purp
12:3				15.3	3 1578	3.42	6.66	-36,5	Cleur	
12:4			1 ===	15.		3.19	6.69			ORP= 486.5
12:4	5	1		115,5		3.01	6.70			
2:5	2	U		15.5		3.01	6.70			
	700				11-70	13.01	0.40	73.1	4.25	
							<u> </u>	-		
				10 1	1					
									-	
				-	1	1				
				1						
			-							
				1.						
								-		
Gallo	ns Purged:									
						Total Casing	Volumes F	Removed:		
-	ter Level (ft					Ending Total I	Depth (ft To	OC):		
	INVENTO									
ne	Volume	Bottle Type	Quantity	Filtration	Preservation	Appeara	nce			
							Turbidity &		Re	marks
00	40 nl	VO.A	3	Nie	They 2 no		Sediment	Voc.	\$010	
	90mm	VOA	3	No	14ch, 2 no	1	100		\$2600	
4	sound	HOPE)	YES?	HN0-3		11	Voc	82600	
1	500 ML	HOPF	1	No	HU03		++	- September 1	red Meta	KA, K, Ea, My, FE
	Small	05		No	NO	1	1		udds	FEIMA
1	11	03	1	No.	No	1/	0 1	mions CI	, NO3, N	00,500
	500 ML	HOPE!	1	No	H2504	4	-	AIK NH3 (4	
E-	Sonnar	HOPF		No 1	ZM accture			13 (imona)	Mr. Harten +
eters m	neasured wit	h (instrument m	odel & seria	I number):	15)	relion	,			TENNAMUE!
Fourie	ment:	codicates c	Dur wat	al about Car		econ Equipm	ent:	Alcon	11 1	
Lquip								- CPANO	1-1-1	
al of Di	scharged W	ater:	1 site	Dow	wd					- · · · · · · · · · · · · · · · · · · ·

GRO	NDWA	TER SAMPL						WELL	NU	IMBER:	MW-2	5	
	ct Name:	Sout	nP	ar	K				_	ımber:	1001		Page: of
Date:	-21	15 115	2								I (ft TOC):		
Mane	ring Point	SM/	cm					Casing	Sti	ckup (ft):	(n 100).	14.3	0
		d (ft. TOC)						_ Total D	ept	h (ft TOC)):		
Filter I	ack Interv	al (ft. TOC)						Casing	Dia	meter (in	ches):		Book and
		(ft	Water) v										
Casing	volumes:	3/4"= 0.02 gpf	2" =	0.16.0	nof (Lptv	(gpt) = = 0.65 gpf	(_)(ga	al)			
		/4"= 0.09 Lpf		62 Lpf			2.46 Lpf			7 gpf		Sample In	take Depth (ft TOC):
PURC	ING ME	ASUREMENT	S				10 Lpt	6" = 5.	30 L	.pr			
Crite	eria:	Typica 0.1-0.5 L		Stable	na		± 3%	± 109	,	± 0.1	16.17		
Time	Cum	iul. Duran D		Vater	Trans	2	Specific	Dissolv		1 0.1	± 10 mV	± 10%	
	Volu (gal o	ine		evel	Tem		Conductant			pН	ORP	Turbidity	Comments
3:3		0,35		(ft)	(°C))	(µS/cm)	(mg/L)		(mv)	(NTU)	
3:4		10,00	4		177	~	5 2						Start Pump
13:5			-		16.0		3843	12,9	8	6.53	-57,4	Clear	LOWE
					17,1	1	387	7 2.60	3-	6.67	-464		
13:5			rate to state and the second to	and a law makes Marine	18.0	5	383	7 2 3		6.67			Pump off
14:5	_		3		15.2	1	379.0			6.60	-37.2	11	7017
4:05					15.	1	379.2	_	-		1	-	
1:10					15.	1	392.9		_	6,52	-38.3	11	
1:15					15.1			7	_	6,53			ORP = - 45,7
			+		13.1	+	\$ 400,4	2,27	Z	6.63	-54.0	7,55	
_		-				+			1				
	-		+-	_		4		1					
	+	-	-						1			2	
	-								1				
					- 40	1			+	-	-	-	
		(4)				1			+			-	
			1			+			+				
			-	1		+			+				
10-11-	L												
Gallo	ns Purged:	0	-					Total Casin	g V	olumes R	emoved:		
ng Wa	ter Level (f	t TOC):								Service and			-
IPLE	INVENT	ORY						Ending Total	il De	epth (ft TC	DC):		
ne	Volume	Bottle Type	Quan	in. 1	714	In						11	DZ
	3,505.112		Quan	ity '	Filtration	Pr	eservation	Appea	-		Collected	1	Time /1/1 2
-	710	1 h A	-	1				Color		ediment	1D: 571	-C-VI	emarks 11ml (14:30 mwd5-071513
10	40nh	V0.4	3		هنر	140	12 NO	clex	-	7,55	Voc.	8010	mwas-071513
	40mb	VOA	3		Vo		ch,2 no	1 735	-	1		\$2600	
	SconL	HOPE	1	X	154		1NO-3	\dashv	_		Voc	0,9400	-SIM (ve)
	SOOML	HOPF	1	1	10		NO3 1	-	-	++		el Meta	LS MA, K, Ea, My, FE
-	Small	05	+	-	-		003			1	total 1		FEIMA
+	11		1	1	VO	-		11		A	nions CI	NA I	102, SOL
1	500 ML	HOPE	1	11	0		0				AIK		1004
	500 March	HODE	1		Jo		So4				NH3 ((movia)	
-		ith (instrument	20d-12						1	+			MD HENGONE
. E-	.oaoaigu M	rith (instrument r	nodel & s	erial n	umber):	-	151 PR) + Ye	118	Tue			
cdnik	ment:	parastata 1					<u> </u>	econ Equip	mer	nt;	110000	1401	
al of Di	scharged \	Water: P	() m	ny	51	10						1-1	

		TER SAMPLI				WELL	NUMBER	· MW	6	P 1 .
Proje	ect Name:	15 South	~ Pa	ck				1001		Page: of
Date	i	SM/6	- 10			Startir	g Water Le	evel (ft TOC):	13.63	
Meas	uring Point	of Well:	- M			Casing	Stickup (f	1):	13.63	- 17
Scree	ened Interva	d (ft. TOC)				Total [Depth (ft TC)C):		
		ral (ft. TOC)					Diameter	(inches):	**	
Casin	g Volume .	3/4"- 0.02 ant	Water) x		(Lpfv)(apf) =		1)(001)			
Casin	g voidines.	3/4 - 0.02 gpl	2 = 0.7	6 apt	4" = 0 65 and	CH	4 47		Sample latel	
		V4"= 0.09 Lpf ASUREMENT	2 = 0.62	Lpf .	4" = 2.46 Lpf	$6^n = 5$.	56 Lpf		- ample intak	e Depth (ft TOC):
_	13 341	Typica			10*	7				
Crit	eria:	0.1-0.5 Lt	om Stat		a ±3%	± 10	% ±0	.1 ± 10 mV	± 10%	
Tim	e Cun Volu		ate Wat	Ton	p. Specif		I	ORP		
11.	(gal c	or L) (gpm or Lp	om) (ft)		Conducts (µS/cm		en		Turbidity	Comments
14:		0.3	0 _		/ Approxim	(mg/l	-/	(mv)	(NTU)	
144				15,	0 396	2.2	3 6.9	31-13,7	0/0	Stirl Pup
144				15.	1 765		1		cleu	
145			9 9 9	15.			1			, and the second se
145	55			15,	1 1	1.7	-	8 -81,8		
150	0					1,43				
150				15.1	784	1.90	0.7	3 -91,9	16.6	
			+			-	-			
	#	_		-	-	-	-	1		
-	+	+	+	+					12.00	
	+	+	-	-						
		+	-	1						
_	+	-								
	-									
	-					7				22 1-1
		1								
Gallo	ons Purged					Total Casir	a Value			
- 107		4 700)				rolai Casir	ig volumes	Removed:		
	ater Level (1					Ending Total	al Depth (ft	TOC):		
	INVENT			_						
ne	Volume	Bottle Type	Quantity	Filtration	Preservation	Appea	arance			
	71					Color	Turbidity & Sediment		Rema	arks
5	40 ml	VOA	3	Nio	14cm, 2 no	cles	16 th	Voc	8010	
	40 mb	VOA	3	No	14ch, 2 no		1		8260c	4.0
	Sount	HOPE)	YES	HNO3			Voc		SIM (ve)
	500 ML		1	No	HV03		-		red Metals	Ha, K, Ea, My, FE
T	Small	70		NO	No		-	total		FEIMA
1	11-	0.2		N a	No		1	Anions C	L, NO3, NOS	500
1	500 ML	HOPE	1	No	H2504	1	V	AK		,
-	5 Son March	HOPE		No	ZM acetate				Amorial	120 0 4
eters r	neasured v	with (instrument m	nodel & serie	al number):	V51	PO PI) 6	(100.)		MC Heidspur
Equi	pment:	delical w	phys o	mosth	àc y	Decon Equip				
l of D	ischarged !	Water:Dc	ا کس	15:4P		Secon Edult	ATTERIL:	A (CO)	ror + DI	() whom
			- 17	1110						

GR	OUNDWA	TER SAMPLI			4	WELL	IUMBER:	MW-3	D	Page: / -
	ect Name: _	1 South	~ Par	rk		Project N	Jumber:	1001	16	Page: _ (_ of _
Date	i	16713 SM/4	-	No. 11 Table				el (ft TOC):	10,67	n-
Sam Veas	suring Point	of Well:	TOL	FI		Casing S	Stickup (ft):	The New York	10.00	
Scre	ened Interva	(ft. TOC)	100				oth (ft TOC			
Filter	Pack Intervi	al (ft. TOC)				Casing D	liameter (in	iches): 2		
Casir	g Volume _	(ft '	Water) x	/	Lpfv)(gpf) =					
Casir	g volumes.	3/4 = 0.02 gpi	2'' = 0.10	6 gpf	4" = 0.65 gpf	(L)(12		200	
		4"= 0.09 Lpf		pf 4	" = 2.46 Lpf	6" = 5.56			Sample In	take Depth (ft TOC):
PUR	GING ME	ASUREMENT								-
Crit	teria:	Typica 0.1-0.5 L		e na	± 3%	± 10%	± 0.1	± 10 mV	1001	
Tim	e Cum Volum	ul. Pura De	wate Wate	Lom	p. Specific	Dissolved	11		± 10%	
	(gal or		Dm) Leve	1 9 9 9	Conductan		pH	ORP	Turbidity	Comments
794	8 0	0.3	10.6		(µS/CIII)	(mg/L)	-	(mv)	(NTU)	
95	3		1	14.4	456.5	3.00	120	- /10 2	-	Sturted
AS				14.2	1		6.35		clear	
	003					3,28	6.4		clear	
000				14.6					clear	
01			+	14,0	- "	3.00	147		dear	
		+	+	14.0	1 519.8	3.16	647	2.6	clear	
2	-	-	-						0.89	
_	-		VI.	1					0.01	
					10	1				
		V = 3-1					_			
	71V-									
				1	1					
				-						
-			-	-						
	-			1						Y
Gall	ons Purged:					Total Casing	Volumes R	lemoved:		
ng W	ater Level (fi	TOC):								-
	INVENT				=	Ending Total I	Depth (ft To	OC):		
ne	Volume	Bottle Type	Quantity	Filtration	Preservation					
			- Louinary	i ili alion	Freservation	Appeara			D	A Private
15	112 1	1 1 1 1					Turbidity & Sediment		He	emarks
13	40 ml	VOA	3	Nio	Her, 2 no			Voc	82600	4
	40 ml	VOA	3	No	14ch, 2 no			Voc	80/00	-SIM (ve)
_	Scent	HDPE		YES!	HN0-3				10000	SIALI (NE)
	500 ML	. HOPE	1	NO	HV03	+	1		red Meta	LS MA, K, Ea, My, FE
	Small	02		No	NO		-	total 1		FEIMA
1	14	03		No.	No			Mions C	4N03,N	00,500
1	500 mu	HOPE	1	NO	H2504		-	AIK		
10Q	s Soomal	HOPF		No	ZN acetale			NH3(Amoria)	175 - 1
eters	measured w	ith (instrument m	nodel & seria	I number):	usi yell	DW 17	V	171-1		NO HENGEMULE
Equ	ipment:	per i Sta	the	OUM				161	-	
		Vater: dru		1		econ Equipm	ent:			
		A sylver com-						-		
HIDNE	/Comments	2								

GR	OUN	DWAT	ER SAMPLI	NG RECO	ORD		WELLN	UMBER:	MWZI	1	071613
Proj	ect Na	nne: _	South	Pa	CK				1001	10	Page: of
Date	e: <u>7</u>	1161	13				Starting \	Water Leve	I (ft TOC):	11.45	
Sam	ipiea o surina	y: Point of	SM/c	700	E		Casing S	tickup (ft):		11:40	4
Scre	ened li	nterval	(ft. TOC)		-		_ Total Dep	oth (ft TOC)):	2	
			(ft. TOC)					iameter (in	ches):	2 .	
Casi	ng Volu	Jme	(ft \	Water) x	(Lpfv)(gpf) =	(L)(oal)			
Jasii	ng volu	11165.	3/4 = 0.02 gpt	2'' = 0.7	l6 gpf	4'' = 0.65 and	6" = 1.	47 gpf		Sample Int	ake Depth (ft TOC):
PUR	GING	MEA	SUREMENT	S = 0.62	Lpt 4	" = 2.46 Lpf	6" = 5.56	Lpf		4	
	iteria:		Typical	01.1	No	±3%	2				
Tin	no T	Cumu		7	er I	Considia		± 0.1	± 10 mV	± 10%	
1.01		Volum (gal or l	Contract of the contract of th	Lev	el Tem	Conductant			ORP	Turbidity	Comments
10,	23	(gai oi i	0,35	m) (ft	(°C	(μS/cm)	(mg/L)		(mv)	(NTU)	- Commonts
	:25		10102	+	1/1-	2 02/	-				Stri Pox
	30				114.		491	6.65	-H4	cleur	
	35		+		14.6		3.42				2.4
04		_		+	14.(1 - 1 -			
	15			-	14.4	-			-30.2		
	050	\	+	+	14,0	10.0	2.53		-38.0		
ST			1	-	14.7				-44.5	V	
754	1			+	14.=	293.0	2.31	6-57	146.6	9.74	
-	+		+	+							
_	+		-	+	-					1	
_	+		-	-	+		4				
_	+	-		-	-		2				
	+			1	1					- 1	
_	+	-		-							
_	+									1 _ 1	
				1	1		(4.11)				
Gal	lons P	urged: _					Total Casing \	Volumes R	emoved:		
ng W	ater Le	evel (ft	TOC):				Ending Total [Donallo //4 T/	201		
IPL	EINV	ENTO	RY				chang Total L	Depth (it 10	JC):		
ne	Vol	lume	Bottle Type	Quantity	Filtration	Preservation	Appeara	nce T		-	
							Color 1	Turbidity &		Re	marks
0	40	nt	VOA	3	Ni o	THEL, 2 no	10.01	Sediment	1200	e* A .	
	404		VOA	3	No	14ch,2 no		+	Voc	82600	
	500		HOPE)	YES?	HNO3	-	+	Voc	82600	-SIM (ve)
	500	-	HOPF	1	No	HV03	+	-	Pissol	red Meta	LS MA, K, Ea, My, FE
	Sim	alita	05		No	NO			the second secon	udds	FEIMA
	IL	-	03	1	Pa.	No		A		LNO3, N	02,504
	500	mu	HOPE		NO	H2504		-	AIK	1	
	SSO		HOPE		No	ZN accture			N H3 (Amoria)	We are to
eters	measi	ured with	h (instrument m	odel & seria	al number):	USI W	Moll	IZK.	1211		AU HERRALD
Equ	ipmen	t: _ <u>(</u>	veb id	echica-	tcd)		econ Equipme			or profit year	7.11
				INW			- J= .W. (1)	-40		CINS	hilled water
		ments:					141				

GR	OUNDWA	ATER SAMPLI	NG REC	ORE)	٠		WELL	NUMBER	: Mw-8	26	Power 1
Proje	ect Name:	South	Po	1	K					1001		Page: of
Date	:	11.1.3 SM/0	1	1	-			Starting	Water Le	evel (ft TOC):	10	
	suring Point		m	Ar	-1_		_	Casing 8	Stickup (f	t):	10.01	2
		al (ft. TOC)		-	-			Total De	V			
Filter	Pack Interv	ral (ft. TOC)						Casing [
Casin	g Volume	(ft \	Nater) x_		(Lpfv)(apf) =		0.5	(nol)			
Casin	g voidines.	3/4 = 0.02 gpi	2" = (0.16g	pf	4'' = 0.65 g	pf	6" = 1	47 anf		Somelal	
-		V4"= 0.09 Lpf ASUREMENT	2 = 0.6	2 Lpf	4	1" = 2.46 Lpf		6" = 5.56	S Lpf		o ample in	take Depth (ft TOC):
	eria:	Typical										
	T Cum	0.1-0.5 Lp	om St	able	na			± 10%	± (0.1 ± 10 mV	± 10%	
Tim	Volu	Puron De	ICE I	ater	Tem	Spec Conduc	cific	Dissolve	n n	H ORP	Turbidity	
	(gal c	or L) (gpm or Lp	m)	(ft)	(°C			Oxygen (mg/L)		(mv)		Comments
149			10	06	-	The books are supply to the supply of the su	particular transport	-		(1110)	(NTU)	ch I
150					13.0	172	8	3.68	6.1	4 -2.7	101	Sturted
153					13.0		7	3.12			Chew	
201					13.8			2.20		1 10.8		
205					13.5		_	2.06	- b-19	-	1	
210					13,=		_	2.08	1 6		-	
					121	100	•	2.00	10.5	111014	37.1	
									+-			
							-		-			
				1			\dashv	-	-			
	7		-	-	-	-	-					
_		-	+-	+		+	-					
_	1		+	-			-					
_	+	1		+	- "		-			-	4	
_	1	_	+	+			1				100	
-	-	+	-	+		4						
	4			1								
d Galle	ons Purged						To	otal Casing	Volumes	Removed:		
ng Wa	ater Level (f	ft TOC):										= 1
	INVENT			_			Er	nding Total	Depth (ft	TOC):		
me	Volume	Bottle Type	Quantit	. 1 -	7114	In .						
		Journal of the state of the sta	Quantit	, ,	iltration	Preservation	on	Appeara				Tay.
18	112 1	1 . I . A		4				Color	Turbidity & Sediment		He	emarks
5	40 ml		3	-	٥٠٠	THEL 2 no	0	cleur	37.1	Voc.	82600	A
1	90ml	VOA	3	-	00	1Ack, 2 u			1	1100	82600	-51m /
1	Sount	HDPE	1	Y	ES!	HN0-3		11		Disal	vel Meta	
1	500 ML		1	1	Jo	HN03	1	11	11	total		
1	Small	02		11	Jo	NO	1	11	V			FEIMA
VI	14	0.2	1	I	10.	No		1/		ALL	4NO3/N	00,504
10h	500 ML	HOPE	1		10	HaS04				AIK NH3(Amail	
-						2N acctod	e			1100	irona!	NO Hertary
eters i	measured w	vith (instrument m	odel & se	rial nu	umber):							an Bendary
	7	BED					Dec	con Equipm	ent:			
al of C	Discharged V	Water:							-			

GRO	DUNDWA	TER SAMPL	NG REC	ORD		WELL	UMBER:	MW-2	4	D 1			
Proje	ct Name:	South	~ Pa	rk				1701	10	Page: of			
Date:	<u>711</u>	6/12	* **			Starting	Project Number: 100116 Starting Water Level (ft TOC): 9,29 Casing Stickup (ft):						
Samp	uring Point	SM/	- m			Casing S	Stickup (ft)	:	7100	1			
Scree	ned Interva	al (ft. TOC)				_ Total De	pth (ft TO	C):					
		ral (ft. TOC)			-	_ Casing D	liameter (i	nches):					
	3 10/0/10/1003.	3/4 = 0.02 gpi	2'' = 0.62	.16 gpf	(Lpfv)(gpf) = 4" = 0.65 gpf 4" = 2.46 Lpf	6" = 1.	47 apf		Sample Inte	ake Depth (ft TOC):			
_		ASUREMENT			1.	4							
Crite		Typica 0.1-0.5 L		able n	a 01 ±3%	± 10%	± 0.	1 ± 10 mV	± 10%				
Time	S Cun	Pura D		ter Ten	Specific	The state of the s		-	11076				
	(gal c	/		vel (*C	Conductan		pH	1 1 3 3 3 5 1	Turbidity	Comments			
12-21	0	635 -			(долони)	(mg/L)	and of the Assessment	(mv)	(NTU)				
1221	51			14.	3 839	17711	111	/	. A .	Stri puno			
123				14.		2.34	1		Cleur				
123						2.44							
124			_	14,		2.52		1-30.5		к-			
		+	-		4 740	2.55	6.6:		V				
24	>	-	-	14.	1 764	2.52	6.7	0-43,2	3.22				
	1							1					
							-	-					
			+	-		-							
-	1	-	+	_									
-	-	-											
		-											
			1.	, or									
					6.			+ +					
		1						-					
0-11-													
Gallo	ns Purged					Total Casing	Volumes I	Removed:					
io Wa	ter Level (t TOC):								•			
	INVENT					Ending Total I	Depth (ft 7	OC):					
ne	Volume		12										
16	VOIUITIE	Bottle Type	Quantity	Filtration	Preservation	Appeara	ince						
							Turbidity &		Re	marks			
50	40ml	VOA	3	hie	1Her, 2 no	1 / / /	Sediment	110-	of A .				
	40 mm		3	No				VOC	82600				
	Sount		1	11	14ch,2 no			Voc	82600	-SIM (ve)			
				VES	HNO3			(Di3304	rel Metal	Ly Ma, K, Ea, Me, FE			
		HOPE	1	NO	HV03		T	total 1					
11	Small	1	1	100	NO					FEIMA			
1	11	03	1	NO.	No			Alie	4 NO3 / NO	00,504			
	500 ML	HOPE	_ (No	H2504		-	AIK	Amoria)				
-	Sonna	HOPE		No	ZM acetale			14 113 (mona)	1705 01: 1			
ters n	neasured v	vith (instrument m	odel & sei	ial number):			-			NO HENSPILE			
l of Di	ischarged !	Water:				econ Equipm	ent:						
		i											

			RSAMPLI				WELL	NUMBER	1: V	M.W. 2	?		D	1 .	
Proje	ect Name:	+ 6	South	Pa	rk		Project Number: 10016								
Date	:	1/15	SM/C	140-				Starting Water Level (ft TOC):							
Meas	suring Poir	t of W	ell:	M			Casing	Stickup (ft):		_6	- ()	0		
Scree	ened Inten	ral (ft.	TOC)				_ lotal D	epth (ft To Diameter	OC): (inch	na):					
			TOC)						(IIIC)	35) <u>. </u>					
Casin	g Volume	2//	= 0.02 gpf	Vater) x		(Lpfv)(gpf) =	(L	.)(gal)							
	gvolamos	3/4"= (0.02 gpr 0.09 Lpf	2'' = 0.62		4" = 0.65 gpf 4" = 2.46 Lpf	6" =	1.47 gpf			Sam	ple Int	ake Depth (ft TOC):		
PUR	GING M	EASU	REMENT	S		+ - 2.40 Lpi	6" = 5.5	o6 Lpf							
Crit	eria:		Typical 0.1-0.5 Lp		ole na	± 3%	. 100	,		0.48000					
Tim		mul.	Purge Ra	te Wat	ter	Consilia	± 109		0.1	± 10 mV	±1	0%			
	1 2000	ume or L)	(gpm or Lp	Lev	N A STATE OF THE S	Conductan	ce Oxyge	n P	Н	ORP	Turb	idity	Comme	ents	
32		100	0.3	8.		(μS/cm)	(mg/L		-	(mv)	(NT	-			
133	0				13.	7 1602	121-	0113	20	- 38.0	Cly	-	ester to		
335	5				13.5	Con the Branch	24=		-		119	V			
340				3	13,4	-	2.46				-	1			
34	7				13.4	1 1 0 0	2.40			-84.2	1	1			
35	0				13, 2		2.33		7-	-84.2		-			
					120	71111	10133	10.	1-11	87.1	0,14	-			
							-	+-	+			-			
						1	-	-	+	-		-			
							-	+	+	-	-	_			
								-	+			+			
			•		1			+	+						
								-	+	-	_	-			
								-	+			1			
					4		-		+	-	_	+	4		
									+			+			
Galle	ons Purge	d:		-		-		Oval.							
			40				Total Casin	g Volumes	Rem	noved:			-		
	ater Level						Ending Tota	Depth (f	TOC):					
30-	INVEN		2000											_	
ne	Volume		ottle Type	Quantity	Filtration	Preservation	Appea	rance						-	
2	//0 /						Color	or Turbidity & Sediment			Remarks				
50	40 nl	-	104	3	hi0	14er, 2 no	clear	0,14	+	Voc	820	00	9.		
-	40 mer		10A	3	No	14ch, 2 no		1	1	Voc	80	LAI	-SIM (ve	_	
_	SounL	-	DPE	1	YES	HNO3			1	Dissol	10 11	101	La Hank, Ea, M	(U) TI	
	500 ML			1	No	HV03		C		total 1	LA A	NA A	_	SIFE	
4	Small	1	02	1	No	NO							FEIMA		
1	500 M		200		No.	No			1	IK.	1003	YM	00,504	_	
100	SOUM	1 1	DPE	+	No	HaSo4 2M acotale			I	JH3 (Amoria	2)		_	
-			nstrument m	odel & soci	al numb = 1	IC O-							NO Hends	Pul	
Еоні	pment:	1	lichl	bullia seri	a number):	451 Pa	PLUS	Yelle	2.,						
al of C	ischargen	Water	: Do	20.0.7	RED	431 76	Decon Equip	ment:	_						
	/Commen			our 6	500 5 12					-					
	// Common	C'												_	

GR	OUNDW	ATE	RSAMPLI	NG RECO	ORD	4.0	WELLN	WELL NUMBER: WW37							
Proj	ect Name;	_ <	South	Pa	rk		Project Number: 100/16 Starting Water Level (ft TOC): 8.79 Casing Stickup (ft):								
Date	:	تاطا	SMA				Starting	Water Leve	(ft TOC)	970					
Mea	plea by: suring Poir	t of W	SM H	the f	T		l out in it	monup (it).		0: +4	-				
Scre	ened Inten	al (ft.	TOC)				_ Total Dep	oth (ft TOC)):						
			TOC)					Casing Diameter (inches):							
Dasii	ig volumes	3/4"=	0.02 gpi 0.09 Lpf	2'' = 0.62	16 gpf	(Lpfv)(gpf) = 4" = 0.65 gpf 4" = 2.46 Lpf	6" = 1.	47 gpf		Sample Intake	Depth (ft TOC):				
_		EASL	JREMENT:												
Cri	teria:		Typical 0.1-0.5 Lp		ole na	± 3%	± 10%	± 0.1	± 10 mV	± 10%					
Tim	Vol	mul. ume or L)	Purge Ra	Lev	el Tem	Conductant	10		ORP	Turbidity	Comments				
40	77		,400		1	(µa/cm)	(mg/L)	-	(mv)	(NTU)					
111	0				13.	8 325,3	206	11/2	1.7	- providence and the same					
413			/		13.			6.69		cleur					
17				111	13.(00.1.1	2.11	6.70	-63,3						
412	5			10	13.8		1.89								
13					14.0		11.95	6.75		4					
43					13.0		1.97								
					17.0	Dere E	1	10.80	1-93.5	898					
				A TOTAL											
	AL			1		1		_							
	7		•												
									-						
					1										
					1 -										
Gal	lons Purge	d:					Total Cartan								
			4.7				Total Casing	Volumes R	emoved:						
_	ater Level						Ending Total I	Depth (ft To	DC):						
ne	EINVEN														
ne	Volume		Bottle Type	Quantity	Filtration	Preservation	Appeara	ince							
10	110 (+) A	-				Turbidity & Sediment		Remar	rks				
15	40 nl		JO.A	3	bio .	Ther, 2 no			Voc	8260c					
	90 ml		10A	3	Vo	14ch, 2 no			Voc	82601-	I'm /				
-	Sount	\rightarrow	DPE	1	AES	HN0-3	==		Disal	red metals	Ma, K, Ea, My, FE				
-	500 ML		-	1	NO	HV03			total 1	1 1					
_	Small	—	92		No	No		A		1, NO3, NO2	FEIMA				
-	1L STOM		DPE	1	NO.	No		- 1	AIK		1 204				
100	S Sol Man		IDPE	1	No	Ha So4 2M acetale			NH3 (Amorial					
			nstrument m	odel & cori	al number	ysi Pr	Dis				NO HENDSPILE				
Еан	ipment: /	led:	ch/ DI	EDAL.	പ number <u>):</u> ഗ്രഹ										
			r:			D	econ Equipm	ent:							
			ξ												
. 41.															

GROU	NDWAT	ER SAMPL	NG RECO	RD		WELLA	UMBER:	Rinsp	Blook					
Project N	Name: _	South 1713	~ Par	rk			WELL NUMBER: RINSE Blank Page: 1 of 1 Project Number: 10016							
Date:	71	17/13	-					vel (ft TOC):	1					
p	g Point of	3/1//	m			Casing S	Stickup (ft)):	NA	-31				
Screened	Interval	(ft. TOC)					pth (ft TO							
Filter Pac	k Interval	(ft. TOC)				Casing D	liameter (i	inches);						
Casing V	olume	(ft	Water) x	1	Lpfv)(apf) -	(L)(gal)								
Casing vo	numes.	5/4 = 0.02 gpi	$2^{\circ} = 0.1$	6 gpf	4" = 0.65 gpf	6" = 1.	.yaı) 47 opf		Samulation					
DIIDCIA	3/4	"= 0.09 Lpf SUREMENT	2" = 0.62 L	pf 4	" = 2.46 Lpf	6" = 5.56	Lpf		Sample Intake I	Depth (ft TOC):				
Criteria	- 1	Typica												
	Cumu	0.1-0.5 L	om Stab		1070	± 10%	± 0.	1 ± 10 mV	± 10%					
Time	Volum	e Purge Ra	Leve	Tom	p. Specific Conductan			ORP	Turbidity					
	(gal or l	_) (gpm or L	om) (ft)	(°C)		(mg/L)		(mv)	(NTU)	Comments				
	-	1	_	-	-									
		16	1	10		11								
		1111	1 2C	· Fre) lav	K	1 -							
-	-	-	-	-										
			111	(11 -0								
-		-	10	0 4	Man	ety >								
-						G 1								
-														
_						7								
-										a"				
I Gallons	Purged: _					Total Casing	Volumos	Domes als						
na Water	Level (ft	TOC).												
						Ending Total I	Depth (ft 7	TOC):						
	VENTO	Bottle Type	Ιο	12										
	, Graine	Dottie Type	Quantity	Filtration	Preservation	Appeara								
20/1	2 1	. I. A					Turbidity & Sediment		Remark	s				
	ont	VOA	3	Wio .	14cm, 2 no			Voc	8260c					
140	my	VOA	3	No	14ch, 2 no			Voc	82606-5	100				
A 50	ant	HDPK	3/1/	YES.	14003	- Jef	-	5						
4	DWL	HOPE/	1/1//	WO/	H4103/1	11/1	A North	I total w	The state of the s	HA, K, Ea, My, FE				
13	yali /	102 1	11 11	N/0/	PPI	1/1/	1	ANOKS ICI	List of	BEIMAN				
111	- 1	031	1111	19 de	10/0 //	10		AIR	1003/NO26	301,				
ions S	50 ML	HODE	W.	No V	HX5041			TH H3 (India .					
- 6		h (instrument m	odal a				-	U		NO Heitspree				
Foulant	ent: Ox	racial chies	odel & seria	number):										
al of Disch	Darmed W	rastallic	omp+	1 to	so iny	econ Equipm	ent:			is a				
			<u> </u>	Z.	c Usin									
ations/Co	mments:	K	in 60	1250	m 11 m			to Sup	Λ					

GRO	DUNDWA.	TER SAMPLIN	G RECO	RD		WEL	L NUA	WBER: 1	1W-1	4	Page: of
Proje	ct Name: +	South	Par	rk		Prois	ect Nun	nber:	1001	16	, agei_ 01
Date:	led by:	SM/C	160			Start	ing Wa	ater Level	(ft TOC):	4.191	
	uring Point of	211/6	PV			Casin	ng Stick	kup (ft):		1/(1)	-
Scree	ned Interval	(ft. TOC)						(ft TOC):	hes):		<u> </u>
		I (ft. TOC)							nes) <u>:</u>	2 .	_
Casing	Volume _	(ft W	ater) x	(Lpfv)(gpf) =		(L)(gal	1)			
Casing	Voidings.	3/4 = 0.02 gpi	$2^{\circ} = 0.1$	6 gpf	4'' = 0.65 gpf	6"	= 1.47	gpf		Sample Intake	Depth (ft TOC):
PURC	ING ME	4"= 0.09 Lpf ASUREMENTS	2" = 0.62 L	_pf 4	" = 2.46 Lpf	6" = 5	5.56 Lp	of		- which intake	Deptil (# 10C):
Crite		Typical	Dist	lo so							
Time	Cumi	0.1-0.5 Lpm	1	er l	Specific	± 1		± 0.1	± 10 mV	± 10%	
THITE	Volun (gal or	ie	Leve	el Tem	Conducta	nce Oxy	· ·	pН	ORP	Turbidity	Comments
1410		0,3	(ft)		(µS/cm)	(mg	/L)		(mv)	(NTU)	
145	_		111	15,0	1 1 000 000	3.1		1 00	22.0		
50			1	15.2			-	6-87	-33.9		
55				15.1		2.0		6.98	-781		
200	_		-	14.0	635			6.94	-83.1		
205	_		+	14.0			_	0.38	-72.2		
10	_	+	-	121.0	1 1 4 1	1.73		18.0	-72.1		
7 ()		1	-	1=1,0	1 496.0	17	0	6.77	-67.4	6.59	
_	1	1	-	+			1		1 2 2 2		
-			-	-		4	-				
	1-		-	+							
		-	-								
			_	-	- 1						
	-		14	-							
	-			-						110	
				-		11					
l Gallo	ns Purged:					Total Cas	ing Vol	lumes Re	moved:		
ng Wa	ter Level (ft	TOC):									
IPLE	INVENTO	DRY				Ending To	tai Dep	pth (ft 10	C):		
me	Volume	Bottle Type	Quantity	Filtration	Preservation	Appe	earance	e T	-		
						Color	Turt	bidity &		Remark	ks
0	40 nl	VOA	3	hi0	Ther, 2 no	33-191	Sec	diment	100		M. I
	40mm	VOA	3	No	14ch, 2 no		+	-	Voc	8260c	
	scent	HOPE)	YES!	HNO3		+	+	VOC 82606-51		slm (ve)
_	500 ML	HOPF	1	No	HV03		+	-		red Metals	Ha, K, Ea, My, F
-	Small	05	1	No	NO		+		total 1		FEIMA
1	14	9.2	1	PO.	No		-	- JAh	ions C	, NO3, NO2	504
	500 ML	HOPE	1	NO	H2504			1	AIK		
-	Sonnand	HOPF		No	24 acetale					Amoria	178 0.1
eters n	neasured wi	th (instrument mo	del & seria	I number):	USI We	MON	17	14-17	H		NO Headson
	ment:	1176					1 April	1 6	- 11		

Z-\Equipment\Field Forms\Groundwater Sampling Form.xlsx

_			ER SAMPLI				WELL	UMBER:	MW-2	3		_
Proj	ect Na	mg:/	South	Par	rk				1001			Page: _/_ of/
Date		21171	13				Starting	wumber: Water Lev	rel (ft TOC):	1600		,
Sam	pled by suring	y: Point of	SMI	m	<u> </u>		Casing 5	tickup (ft):		8.51	0	
			t. TOC)		_			oth (ft TOC			-	J
Filter	Pack	Interval	(ft. TOC)				_ Casing D	liameter (i	nches):	2.		V. 0
Casir	ng Volu	mes. S	(ft \ /4"= 0.02 gpf = 0.09 Lpf	2'' = 0.1	6 gpf	_pfv)(gpf) = 4" = 0.65 gpf " = 2.46 Lpf	6" = 1.	47 gpf		Sample Int	ake Depti) (ft TOC):
PUR	GING	MEAS	SUREMENT				0 = 0.50	г рі				
Cri	teria:		Typical 0.1-0.5 Lp		le na	±3%	± 10%	± 0.1	1 10			
Tim	ne	Cumul.	Puras De	te Wate	Lam	Caratt		11		± 10%		
111.	4	Volume (gal or L	F	- Leve		Conductar	nce Oxygen	1 2	ORP (mv)	Turbidity (NTU)		Comments
11:1		_	1.22	-	+						Sto	480
17			+	-	15.5	1.01	2.78	164	5-58,2	cleur		
11			1		15.4		2.3		0 -46.2			
112		-		-	15.6		2.29	6.46				
12					154		2.25		4-39.0			
13	0				15.5	1095	2.18	6.46		9.87	_	
	1					The second			1.512	116/	Sm	ple
										\rightarrow		
				14					1	-		
								-				
					-		-		-			
			. A.				-		-			
0	1			1	-	+						
	1			+	+ -	-						
	+-			-	-							
-	+				-							
1550	1_											
Gal	lons Pu	urged: _	-				Total Casing	Volumes I	Removed:			
ig W	ater Le	evel (ft T	OC):								-	
		ENTO					Ending Total	Depth (ft T	OC):			
ne	1	ume	Bottle Type	Quantity	Filtration	De co						
				dodning	1 ill allon	Preservation	Appeara	Turbidity &		D.		
10	1/15	1	· la A	1	100		COIOI	Sediment		HE	marks	
W		nt	VO.A	3	W.	14er, 2 no	clew	9.87	Voc	82600	4	
-	404		VOA	3	No	14ch, 2 no			Voc	82600	-<1m	
	500		HOPE		YES.	HNO3			N. T.	rel Meta	1 HA	K, Ea, Me, FE
-	500	-	HOPE	1	NO	HV03		11	total 1	1	-	
	Sim	all	02	1	NO	NO		11	,			ima
4	IL	-	03		NO.	No	1	1/	Anions C	1 NO3 / N	02,50	04
07	500 S 500	my	HOPE	1	NO	H2504	V	1	AIK NH3(Amaria	_	
ters	measu	red with	(instrument m	odel & seria	l number):	2n accture	000(251)	10000			MI	Hedsone
Equ	ipmen	t:\	dedicate	A Jubic	BOAG	105+W+1.6	Decon Four	ent.	M.			
l of l	Discha	rged Wa	iter:	>rum	700	140	DOCON Equipm	eril.	KICAK	4+0	1	
					0.00	112						
COM		ments:										

GR	OUNDW	ATE	SAMPLI	NG RECO	RD		WELL	NUMBE	ER:	Mul-	14	Page: _ of _
Proje	ect Name:	1	South	Pa	CK			t Numbe	_	1 - 6		Page: of _
Date	:	117	SM/C				Startin	g Water	Level	(ft TOC):	15.94	
Meas	pled by: suring Poir	t of W	ell:	m			Casing	Stickup	(ft):		13.77	
Scree	ened Inten	al (ft.	TOC)	4				epth (ft Diamete				
			TOC)						er (inc	nes):	2.	
Casiri	ig volumes	3/4"=	0.02 gpt 0.09 Lpf	2'' = 0.1 2'' = 0.62	6 anf	Lpfv)(gpf) = 4" = 0.65 gpf " = 2.46 Lpf	6" = 6" = 5.	1.47 gpf			Sample Intal	ce Depth (ft TOC):
		EASL	JREMENT:									
Crit	teria:		0.1-0.5 Lp	m Stab		± 3%	± 109	6 :	± 0.1	± 10 mV	± 10%	
Tim	Voi (gai	mul. ume or L)	Purge Rai	n) Leve	el (*C	Conductan		n	рН	ORP	Turbidity	Comments
01-			~300	15.0	74					(mv)	(NTU)	
02					114.1	0970	5.66	10	77	30.5	clocus	
102					14.		3.78		Lon	-41.6	Crair	
03					14.3		3.21		61	-57.6		
03	7				14.0		2.50		60		-	
247					140		2.51	1	61	-73.8		
- إعار	7				14.1		251	6.1			2/2	
						1	5.21	10.	91	CO ALL	2.65	
								+				
		1					-	+-	-			
	17-1						-	+	-			
		1	•		-		-	+	-			
							6 - 1	7	-		. J. 6) [
		1		*	+			-	-			
	1	\neg			10	-		+	-			
	1-	+			-			-	4			
Call	ons Purge	٦.										
I Claim	ons ruige	u					Total Casin	g Volum	es Re	emoved:		
ng W	ater Level	(ft TO	C):				Ending Total	l Deoth	/ft TO	C)·		
APLE	EINVEN	TORY	1				3 1 4 1	Соры	(ii ro	.0)		
me	Volume	E	Bottle Type	Quantity	Filtration	Preservation	Appea	rance	T			
							Color	Turbidity	/&		Rem	arks
0	40 nl	- 1	JOA	3	Nie	140 n		Sedime		11-		
	40ml		10 A	3	No	THEL, 2 no	Claw	2.65	+	Voc	8260c	
	Sount		DPE)	YES!	14ch, 2 no			1	Voc	82606-	SIM (ve)
	500 MI	-	DPF	1		HN0-3	1	-	4		red Metale	Ma, K, Ea, My, FE
-	Small	-	25	+	No	HV03	-		1.	total 1	udds	FEIMA
+	11-	-	2.5	1				-1/_	14	nions CI	, NO3, NO.	501
1	SIDMI		EDPE !	1	NO !	NO 1	K		1	ALK		y with
-	S SOO MAN	LE	IDPE		No	ZM acctate			+	NH3 C	Amoria)	113
eters	measured	with (i	nstrument m	odel & seria	al number):	451 12	K-17 H	1	+			ND HENDSPILL
g Equi	ipment:	WE	D						-	Λ1		8
al of D	Discharged	Wate	r. dw	m			econ Equip	ment: _		HICOMO	LIPI	Dater
	:/Commen											

GRO	OUNDWA	TER SAMPLI	NG RECO	RD	*	WELL	UMBER:	NW-1	2	
Proje	ect Name:	Fliguth	~ Pa	CK				1001		Page:) of _
Date:	7/1	7113				_ Project I	Number:	I (ft TOC):	000	
Samp	oled by:	SM/c	MA	21		Casing S	Stickup (ft):	(IL 100):	8.53	
	uring Point ened Interva					_ Total De	pth (ft TOC)	:		
Filter	Pack Interva	al (ft. TOC)				Casing D	liameter (inc	ches): 2		
			Materi		V 88 - 27					
Casin	g volumes:	3/4'' = 0.02 and	2" - 0 1	(Lpfv)(gpf) = 4" = 0.65 gpf	(L)	gal)			
	3/	4"= 0.09 Lpf	2" = 0.62	Lof 4	4 = 0.65 gpf = 2.46 Lpf	6" = 1	47 gpf		Sample Int	take Depth (ft TOC):
PUR	GING ME	ASUREMENT	S			0 = 5.50	Lpr			
Crite	eria:	Typical 0.1-0.5 Lp		ole na	± 3%	± 10%	± 0.1	. 10 mV		
Time	e Cum	ul. Puras Pe	Wat Wat		Specific		d I	± 10 mV	± 10%	
	Volum (gal or	iie	I Lev	ei	Conductant	73-11	pH	ORP	Turbidity	Comments
230				(°C)	(μS/cm)	(mg/L)	-	(mv)	(NTU)	
24				111 5	07/10	10/0	1			Stant
245			-	14.8	10011		C.7		Clear	
		-	-	111.0	375.	1 3.29			/	
257		-	-	15.	1	2.32	6.70	-221		
255		-		15.3	384.6	2.29	6.71	-17.7	60.1	
300)	400	O.L.	4.5				1	0.1	
				1					-	
							-			
					7/1	-	-			
			-	-	_	-				
	+		+	+	+					
	-			-						
		-	1					1		
	1		1	0.00						
				4						
				15					-	
						-				
l Gallo	ons Purged:									
, Gune	ond rungeu.		_			Total Casing	Volumes R	emoved:		
ng Wa	ater Level (f	TOC):				Ending Total	Denth (# To	201		
IPLE	INVENT	ORY				Littling / Otal	Depti (it 10			
me .	Volume	Bottle Type	Quantity	Filtration	Preservation	Appeara	ince T			
							Turbidity &		Re	emarks
5	40ml	VO.A	3	Nia	They o	300	Sediment	. 1 -		
-	40ml	VOA	3	No	1Her, 2 no		-	Voc	82600	<i>-</i>
	Sound		1	1	14ch, 2 no			Voc	82600	-SIM (ve)
		HDPE		AEZ.	HN0-3			Dissol	red Meta	La Ma, K, Ea, Me, FE
		HOPE		No	HP03			total 1		
1	Small	02	1	No	NO		A	1006	1 115	FEIMA
	14	0.2		No.	No		1	Alle	1 NO3/N	00,504
100	500 ML	HOPE	1	No	H2504			AIK NH3(day : 1	
-	5 Soomal	HDDE			ZM quetale	-		1- 113 (mona)	Wo Hel
eters r	measured w	ith (instrument m	odel & serie	al number):						ND Headspace
	pment:(_		econ Emile	onti			
al of D	ischarged V	Vater:				econ Equipm	ent:			
									4	
41.										

-		TER SAMPL				WELL	NUMBER:	KMW	-D3A	Page: of
Proje	ect Name:	South	~ Pa	rk		Project	Number:_	1001	16	Page: of
Date	e: 7 1	8113 SM/	140			Starting	Water Le	vel (ft TOC):	10.6	1
Meas	suring Point	of Well:	- //			Casing	Stickup (ft)):	1010	<u>^</u>
Scree	ened Interva	d (ft. TOC)	1,000				epth (ft TO	C): inches):		
		ral (ft. TOC)								
	3	3/4"= 0.02 gpf 3/4"= 0.09 Lpf	2'' = 0.62	16 gpt	Lpfv)(gpf) = 4" = 0.65 gpf " = 2.46 Lpf	6" = 1	.47 gpf		Sample Inta	ike Depth (ft TOC):
PUR	GING ME	ASUREMENT	Table 1			0.00	у грі			
Crit	teria:	Typica 0.1-0.5 L		ole na	± 3%	± 10%	± 0.	1 ± 10 mV	7.44	
Tim	e Cun Volu	nul. me Purge R	ate Wat	I I nom	p. Specific	c Dissolve	ed	1	± 10%	
110	(gal c		oro) (ft	A Second				(mv)	Turbidity	Comments
110	-	.35	-				1		(NTU)	SLai
110	_	-	-	15.		1,49	7.5	5 -151.6	Cleve	Startpano
111				15.9	1	1.48	7.5	9-193,2	:]	
111.			+	15.7		1.49		6-203.9	11	
12	-		-	15.0		1,44		0 -211.1	1	
10	,		-	15.	7 717	7,96	7.6	2-216,6	12.7	
	+	-	-		1.4-45			0.0	.0.7	
	+	-		-						
	-	-	-						-	
_	+									
	-									
	-									
_					177				-	
	-									*
_										
Gall	ons Purged					Total Casing	Volumes	Removed:		
ng Wa	ater Level (f	t TOC):								
	INVENT					Ending Total	Depth (ft	TOC):		
ne	Volume	Bottle Type	Quantity	Filtration	Preservation					
				, madon	reservation	1	Turbidity &		Dom	
30	40 nl	VOA	3	1, 16	111.	Color	Sediment	6	nem	narks
1	40ml	VOA	2	No No	Ther, 2 no		cter	Voc	8260c	
11	Sount	HOPE	1	XIVCI	14ch,2 no	Clent	12.7	Voc	82606-	
7	500 ML		-	112	HN0-3		1	Dissolu	el Metal	(Ma, K, Ea, My, FE
1	Small	07	-	No	HP03				udas	FEIMA
1	11	9.3	1	100	No			Anions CI		SOL
1	STOMU	HOPE	1 1	NO	No		1	Alk		01.004
OD:	5 500 min	HDDE		No	24 acetale	- V	6	NH3 (funccia)	
eters	measured w	ith (instrument n	nodel & seri	al number).	US1 0	a Dl. s	in the			MC Hedspice
Equi	pment: _D	redically tob	und + Dec	stale o						0
l of D	ischarged \	Water: Po	ion on	< Je		Decon Equipn	ient:	Alconor	4-D1	
	/Comments		0	, ,,,						

GRO	DUNDWA	TER SAMPLI	NG RECO	RD		WELL	NUMBER	: Km	205		
Proje	ct Name: -	South	~ Pa	rk				10			Page: of
Date:		SMI				Startin	g Water Le	evel (ft TOC	10/1	600	
Meas	uring Point	of Well:	m			Casing	Stickup (f	t):	7.	2115	_
Scree	ned Interva	J (ft. TOC)					epth (ft TC				
Filter	Pack Interv	al (ft. TOC)						(inches):	2		
Casing	y Volume _	3/4"- 0.03 apt	Water) x		Lpfv)(gpf) =		\(nal)				
Casing	voidines.	3/4 - 0.02 gpi	2 = 0.	6 gpt	4'' = 0.65 gpf	6" =	1.47 gpf			Sample latel	
PURC	ING ME	4"= 0.09 Lpf ASUREMENT	2" = 0.62	Lpf 4	1" = 2.46 Lpf	6" = 5.	56 Lpf			- ample maki	e Depth (ft TOC):
Crite		Typica									
-	Cum	0.1-0.5 L	1 100		20,0).1 ± 10) mV	± 10%	
Time	Volu	me Purge Ra	Lev		p. Specific Conductat			1 01	RP	Turbidity	Comment
218	(gal o							(ri	iv)	(NTU)	Comments
2066		0.05	5.9		0 -0				-		
225	-	-	+		229,150	1 0			3,10	lone Drn	
02- 230		-		17.0	1				6.4		
		-	-	17,0		2 1,11	12.8				
235	_	-	-		31,146						
140		-		17.	5 32,02					U	
249	>	No.		17,5	31,928	3 1.05	_		4.0	5.60	
	1							1	-	2.60	
									-		
								1	+		
		1			4		1	+	+		
		-						+	+		
	/						+	+	+		
						+	+	-	+		
				-			-	-	+		
							-	+	+	-	
Gallo	ns Purged:					1000	_				
	-			-		Total Casin	g Volumes	Removed			
	ter Level (f					Ending Total	l Depth (ft	TOC):			
	INVENT							200			
ne	Volume	Bottle Type	Quantity	Filtration	Preservation	Appea	rance		_		
		1				Color	Turbidity &	1		Rema	arks
D	40 nl	VO.A	3	Nio	Her, 2 no	Dett Barry	Sediment 5,60	100	0	e* ^ .	
	40 mm	VOA	3	No	14ch, 2 no	1 - 1 10 CM	2,60	Vo		8260c	
4	sount	HOPE) -	YES!	HN0-3	+-		Vo	-	82606-	SIM (ve)
	500 ML		1	No	HV03		-			Metals	Ma, K, Ea, My, FE
1	Small	05		No	NO		-			etals	FEIMA
1	11	0.3	1	No			1	Anions	CI,	NO3, NOO	50%
	500 mu	HOPE	1	NO	NO 1			AIK	,	moria)	, , ,
-	Soonwel	HOPE		No	2M gistale	- V				movia)	105 2 1
eters n	neasured w	ith (instrument m	odel & seria	l number):	VS1 /	20 Plus		ales			NO HENGERSE
Equip	ment:	vora Jakkie	+ didi	12 4.		Decon Faul	mort:	11	-		
l of Di	scharged V	Vater:		-478	-	Decon Equip	ment:	Alia	124	101	
	Comments										

GR	OUNDW	ATER	SAMPLI						WELLN	UMBER:	K	mw.	08			Page: [`	. 1
Proj	ect Name:	1	South	Pa		K						1001	_	-	_	rage: <u>I</u>	of <u>l</u>
Date	eci ivaille.	118	SM/C						Starting \	Nater Lev	rel (f	ft TOC):		6.4	-		_
oam Meas	suring Poin	t of We	2 14/1	m	_				Casing S	tickup (ft)	:			O 1mg	6		
	ened Interv					-			Total Dep								
	Pack Inter								Casing D		nchi	es) <u>:</u>		- 9			
Casir	ng Volume		(ft \	Vater) x _		(1	pfv)(apf) =		(L)(ooll						7	
Casir	ig voidines	3/4	= 0.02 gpi	2" = 0	16 g	of	4'' = 0.65 g	pf	6" = 1.	gai) 47 oof		1.0	800		2.3	ar a hair	
).09 Lpf		Lpf		= 2.46 Lpf		6" = 5.56				Sar	npie inta	ake De	epth (ff TOC):_	
		ASU	REMENT	7													
Cri	teria:		Typical 0,1-0.5 Lp	m Sta	ble	na	±	3%	± 10%	± 0.	1	± 10 mV	-	10%	_		
Tim	18	mul. ume	Purge Ra		ter	Temp		cific	Dissolved	1 -41			1				
	(gal	or L)	(gpm or Lp	1	/el t)	(°C)	Condu		Oxygen (mg/L)	pn		ORP	1	rbidity		Commen	ts
:4			0.35		0.0		The state of the s	UNIDAMEN OF	(IIIQ/L)		Panalli v	(mv)	1	(TU)	-44		
1:4	15					15.1	54	Press	0/3	10	7	000	1	-	Che may	hert-fin C	
:5				1		15.0	_		2.27	6,8	-	V =	de				
:5					_	15.0				6.5	_		de	20			
5:8				1				1	1.88	6.7	_	79.8	cle	ar			
20			-	1		15.			1.60	6.7	-	7416					
0:1		-		+	\dashv	15.1	1418	-	1.51	6.70	-	70.9					
11	0	-	_	+	-	15,2	404	.0	1,42	6.69		65,5	1				
_	_	+		-	-	٨.							1,2	2			
_	-	-									T	1			-		
	_									1	1			+	-		
	-	1									T			+			
											+			+			
10				10				\neg			+			-			
	100				1			+			+	-					
								+			+			-			
					+			+			+						
Gall	ons Purge	١.															
Can	ons ruige	-			-			To	otal Casing	Volumes I	Rem	noved:					
ıg W	ater Level	ft TOC	c):					Fr	nding Total [Janes /# 7	-00						
PLI	E INVEN	TORY							iding rotal t	Jepui (it i	OC	,):	=	- 3			
ne	Volume	В	ottle Type	Quantity	F	iltration	Preservati	ion	Appeara			collec	tod	60	11		
		1		The state of			1100,100	-	1.	F. 41 W. 6	1	100		Re	marks	Time:	10:3
15	40 nl	1	Jo.A	1	+,	i.a	als	-		Sediment	81	PL-GU)-W	w61	-0	71813	, - , 5
1)		_		3		٥٥	1Her, 2 n	_				Voc	82	600		+ Be-7.	9 4
-	40ml	7	IOA	3	1	10	litch, 2	امه		- 10		VOC		160c		M	in the land
-	Sount	1	DPE		Y	ES	HNO3				1	Dissol				Ma, K, Ea, Me,	FE
-	500 ML	- 1. H1	DPE	1	11	10	HV03						ud	1			, E
	Small	1 6	22	1	1	10	NO	1			,				F	EIMA	
	14) >	1	IX	10.	No	1		-	MAI	ons C	ING	3,11	200	504	
1	SJO MU		DPE	1		10	H2504	1		-	1	VH3(4				
	S 500 Mar		DPF		-		211 aceto					- 113 (imor	-6-1	- 1	XD Hender	
ters	measured	with (in	strument m	odel & ser	ial nu	umber):	YSI PA	B PI	usyel	104						TEARLY	Let!
Equ	ipment: _	ded:	cated to	21271	W	المام لد	15		con Equipm		N	cana.	1 -	71	-	-	_
l of [Discharged	Water	:_ Dr	um		Site			quipiti		A	(010	4.)1	-		_
			Collec														1

South Park Landfill

July 2013 Interim Site-wide Groundwater Monitoring Results

Appendix B Laboratory Analytical Results

Oc.	Spec	1G		Sample number	SP					2-07/5/3
GROU	NOWATER	SAMPLING	RECOAD			WELL NUM	ABER: N	- کینه	-30	Page: of[
Sempled Measurin Screene	l by: ng Point of W d Interval (ft	SM/CM ell: toci				Project Num Starting Wa Casing Stice Total Dapth Casing Diar	kter Level (f kup (fil): (fil TOC):			
Casing V Casing v	olume olumes: 3/4*=	(fi Wets '= 0.02 gp/ 0.09 Lpf 2'	or) k 2 ^M = Ö 16 gg	ਜ 4" = 2	= 0.65 gpf 2.46 Lpf	B* = 1.47	' gpl		Sample in	take Depth (ff TOC)
PURGI	NG MEASI	JREMENTS		0.5	5 15%					
Criteri	e .	Typical 0.1-0.5 Lpm	Stable	DE.	±2%	± 10%	±01	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or (pm))	Water Level (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Coxygen (mg/L)	рН	ORP (riw)	Turbidity (NTU)	Comments
	3	104								Statour
11:15				14.2	1301	2,47	664	-34.3	Clent	
11:20					1286	2.95	6.67	-70.5	3.8	
11 25	1	 		143	1315	5.86	0.69	-21.9	11	
1130					1329	2.11	671	-865		
1135		V		14.3	1333	3.26	6.71	-84.1	3.5/	
·										·
				ļ						
				<u> </u>						
rata Culla	Pumpd					Total Cesing	Volumes F	lemowed:		
Ending We	ons Purged: _ uter Level (ft)	roc):				Ending Total				
	Valume	Bottle Type	Quantity	Filtration	Preservation	Appear	anon .	· · · · · · · · · · · · · · · · · · ·		
Time	ASIMile	Bottle Type			r idad: Validi)	Color	Turbicity & Sedenant			Remarks
1145	40mb	VOA_	3	٥٠٠	1ke,200	clevi	3.51	<u>Voc</u>		
1	40mm	VOA	3	No	1402,2 no			Voc	8260	oc-SIM (ve)
	المحادث	HDPE		YES!				(Di33	duct the	
	SOOML	HOPE		No	HV03			total	Medals	FEIMA
17	Small	20		No	No		_ \	ANIMS !	CL, NO3	NOO, SOU
0	1-	03	1 1	Y0,	No	V]		Alk		
(FT) OF	500 Mari	HOPE		10	Ho So4			N H3	Campria	M. Hertschall
REI MUL	S COLUMN		andal P non	nt number)	1/5:10	m L . d	con			C. Marie
arameters	measured w	ith (instrument m	COLOR OF SOLI	10 + h	(A) (A)	Decon Equip	enert.	Marin	4+D1	
			CAL	r~ //	site	-a-witter		21-10-0	- 1-1	
•	Discharged to	Water								

	Spe			Sample numbe	SP	1-(-W	Mu	33-	-071513
		R SAMPLING				WELL NU	MBER: Y	MN 33		Page: 1 of 1
Samplet Measuri Screens	ng Point of W	TOC)				Project Nu Starting W Casing Sta Total Dapti Casing Dia	eter Level (okup (ft): n (ft TOC);		6	D
	volumes 3/4	(fiWad 1" = 0.02 gpf : 0,09 Lpf 2	2° = 0.16 g;	of 4'	v)(gpf) = ' = 0.85 gpf 2.46 Lpf	$B^* = 1.43$	7 gpf		Sample In	ntake Depth (ft TOC)
PURGI	NG MEAS	UREMENTS		<u>, </u>						
Criteri		Typical 0.1-0.5 Lpm		na	±3%	± 10%	±0.1	± 10 mV	± 10%	
Time	Çumui. Volume (gai or L)	(gon ov.Lpm)		Temp.	Specific Conductance (µS/cm)	Oissolved Oxygen (mg/L)	pH	OAP (rinv)	Turbldity (NTU)	
12:26		()300 Lpm								Stat ano
12:3	\$		1140	15.3	1239		6.66	-86.5	Cleur	ORP: 48 -86.5
12:4	<u> </u>		<u> </u>	15 4			669	-910	//	
12.4		1-6	 	12.2	1577		6.70			
12:5	' 	1	 -	15.5	1576	3.01	6.70	-95.1	4.25	<u> </u>
	-		 		 		-			<u> </u>
	 	 		 	 			 		
					 					
					 			1		
		-								
									1	
otal Gelio	ns Purged:_					Total Casing	Voiumes F	Removed:		
nding We	ter Level (ft	TOC)				Ending Total	Depth (fi T	OC):		
AMPLE	INVENTO									
Time	Vojume	Bottle Type	Quantity	Fittration	Preservation	Appean	Turbidity & Sediment			Remarks
1300	40 ml	VOA	3	N.	1Her, 2 40	clew	4,25	Voc	\$260	7c
	40ml	VOA	3	Vo	1402,240			you	8261	oc-sim (ve)
	Scent	HOPE	1	YES	HN03		_ _	(Disse	wal you	tals the KICA, MU, FE
	500 ML	HOPE	- 1 -	No	HUOZ			•	Made	FEIMA
4.4	Small	02	-1	No	00	-/- 	レ		I, NAS,	NO0,504
<u>V</u> _	500 MW	DE DE		NO 1	NO 1	4		AIK	CAmoria	·
ETHOD	S Status	HOVE		νο	ZN ACCIAR			7,2		ID HELLOUIS
_		ith (instrument m	odal & serie	i number <u>).</u>	Y5)	vello-r	'			
ging Equ	ipmant:	holicola.	62×1×2×	14-04	· STORE	Decon Equip	пеп:	Alco	wy LF	र्ग
	Dispharged V		1 site	<u>⊅</u> (1)~	wd					
servation	s/Comments:	£	Sa Sa	-plin	n. Herm	oney to	Dinh U.J.	to dep	loyed	dedice's DEDRUM
pres	es wer L	DAS W	re ex	cer we c	: الد بديرا	to by the Same	וטעש ווה	AL 2 S		

# A 40	Spe			Sample number	SP	L-(-W	MV	V-25	-071513				
		RSAMPLING				WELL NU	WBEA:	MM-3:	5	Page:of				
Measur Screen	Name. d by: ng Point of Wed Interval (ft.	TOC)	Parl			Project Nur	mber:(factor); skup (fi); n (fi TOC);	/ <i>D0/ /</i>	6					
Casing Casing	/olume /olumes 3/4"=	(f: West 1°= 0.02 gpt 0.09 Lpf 2 UREMENTS	$2^{\circ} = 0.18 \text{ gg}$	of 4")(gp1) = = 0.65 gp1 2.46 Lpf	6" = 1 47	7 gpt		Sample in	fake Depih (ff YOC)				
Criter		Typical 0.1-0.5 Lpm	Stable	na.	± 3%	± 10%	± 0.1	± 10 mV	± 10%					
Time	Cumul. Volume (ga! or L)	Purge Rate (gom or Lpm)	Water Level (ft)	Temp.	Specific Conductence (µS/cm)	Dissolved Oxygen (mg/L)	рH	ORP (riv)	Turbidity (NTU)	Comments				
13:39		0.350		16.0	3843	2,98	6.53	-57,4	Clear	Start Pump				
	3150 - 17.4 387 7 2 60 662 76.4 Pump off													
14:5	4:50 15.2 379.0 3.00 6.60 -37.2 11 11,05 15.2 379.2 32.264 6.52 -38.3 11													
14:18 14:15				15.1	3929		6.63		73	ORP = 45.7				
	ons Purged:_ ater Level (ft	TOCh:				Total Casing Ending Total				_				
	INVENTO					CHON'S TOTAL	Dapor (II. C		1	10.2				
Time	Yoluma	Bottile Type	Quantity	Filtration	Preservation	Appear	ance Turbidity & Sedment	Collect ID: S		Hemarks Tim (4:30) 1-mw85-071513				
14:10	40ml	UOA USA	3	Nº 100	14ch, 2 no	cler	7,55	Voc	1260					
	Sant	HDPE		YES!	HN0-3			(Di55)	wal the	rals My KI Castle, FE				
	SOOML Small	NOSE		Nu	HV03	-,	-		Made					
\forall	IL SOM	DZ	1	NO.	NU H=504	<u> </u>		Alk	Chrone	7				
eremeters inging Eq	nessured w	HOVE ith (instrument notes of the line of	ledical is c	Uo I at number).	1/5/ F/	D+ Ye Decon Equip			וסד ל צים	WD Resignati				
bservation	ss/Comments	·												

-		N			-5.4								
	Spe			Sample number	SP	1-0	>W.	Mu	110-	-071513			
		R SAMPLING				WELL NU	MBER: _	۱ (درن	5	Page: of/			
Declari	Name: 1	South	Par	<u></u>		Project Nut	nher:	10011	6				
Date:	7116	113				Starting W	ater Level ((TOC)	13.63				
Sample	d by:	SM/CH	<u> </u>			Casing Stic	kup (ft)		1				
Measur	ing Point of v	Well				Total Depth							
	ed interval (fi					Casing Dia	meter (inch	es) <u>.</u>					
		n. TOC) :											
		(h Wa					_						
Casing	volumes: 3/	4°= 0.02 gp1 = <u>0.09 Lp1 2</u>	2″≃ប76g កែពeខាក់ក	pr 4" 	= 0.65 gpf	6" = 1 47			5 emple in	take Depth (fi TOC)			
PURG		UREMENTS	- OLOE LAN		,	0 - 0.00 L	<u> </u>						
Criter	ie:	Typical 0.1-0.5 Lpm	Stable	ngi .	+8% ≠8%	± 10%	±Q1	± 10 mV	±10%				
Time	Cumul. Volume	Linda unia	Water Level (ft)	Temp.	Specific Conductance (µ8/cm)	Dissalved Oxygen (mg/L)	рH	ORP	Turbidity	Comments			
143	(gal or L)	030	100	(3)	(Jacobn)	(ang/c)		(me)	(NTU)	Stripup			
1440		1035	+	15.0	36.	0.02	6.91	-13.7	cleu	STETANO			
			 		390	2.23							
1449		 -		15.1	765	1.65	6.64						
145			 	15.1	798	1.78	6.65						
145	<u> </u>			15,0	779	1,45	6.7						
150	3	<u> </u>		15.0	784	1-90	6.73	-91.9	16.6				
153			, –										
	1												
	1		-		 								
	┼	 		 	 			-					
	┼		 										
		 	 		 -								
		ļ											
		<u> </u>]				
الما الما	ns Purged:					Total Casing	Volumes E	emmed:					
	ater Level (ft					Ending Total !				-			
	INVENTO												
Time	Valume	Bottle Type	Quantity	Pitration	Preservation	Appeara							
)	ĺ	ì		Color	Torbidity & Sudiment			Semarks			
505	40mL	VOA	3	اهنو	They 2 no	(105)	16 16	Voc	8260) C.			
300	40 meh	VOA	3			1	- 1	Mag	8040				
				VEST	14ch-12 mas			V 1/2	hal the	L-SIM (VC)			
	Salbala 1	HOPE	 	-	11103					tels Mikita, Me, PE			
	500 ML	HOPE		NO	HP03				Mads	FE.MA			
	Emali	02	1	No	No		4	Mins C	1, NO3,	No., 500			
]	14	03		NO.	NU		V	Alk	•				
	500 My	HODE!		No	H2504			NH3	(Amoria	1/2 0			
	HOUS Some HOVE NO EN WALKE												
rameters	meters measured with (instrument model & sensi number). YSI PO PIDS YUNGU												
rging Eqi	ng Equipment: Dilicat Librat parastatic Decon Equipment: Atcoron 4 Dl conten												
posal of	Discharged l	WaterDr	., <u></u>	15ile		<u> </u>							
	eiCommante	»:											
PRI AGRICAL	HOTEL HOTEL												

Oc.	Spe	ct ,		Sample numbe	SP					-0716/3		
		R SAMPLI NG				WELL NU	MBER: _/	MW-3	D	Page; _ (of /		
Date: Sample: Measurir Screene	by Point of V	TOC)	X AE			Starting Wi Casing Stir Total Depti	eter Level (kup (ft) (ft TOC):		10.67			
Casing V Casing v	olumes 3/4*=		ter) x	(Lpf	v)(gpf) = = 0.65 gpf 2.46 Lpf	6" = 1.4	7 gpf		Sample In	itake Depth (ff TOC)		
PURGI	NG MEAS	Typical										
Criteria Time	Curnul	0.1-0.5 Lpm Purge Rate	Stable Water	Temp.	± 9% Specific	± 10%	±01	± 10 mV	± 10%			
	(gal or L)	(gpm or Lpm)		(*C)	Conductance (µS/cm)	Oxygen (mg/L)	-	(mv)	(NTU)			
0948		0.3	10.67	14.4	4565	3.00	1.30	40.0	6300	Stuited		
0953 0958		 	 	14.3	476.5	3,28	641	24.3	clear	 		
39 100		 	1	14.4	496.4	190	646					
1008	, — —			14,4	511.5	3.00			dear			
1013				14.4	519.8	3.16	647		clear			
Ø.									089			
		ļ	ļ		<u> </u>							
	ļ	 -					<u> </u>					
	 		<u> </u>	 								
												
		 	 -					 				
										·		
nding Wat	ns Purged:_ ter Level (ft					Total Casing Ending Total						
	Valume '	Bottle Type	Quantity	Filtretion	Preservation	Appean	1000					
Time	*DIDIIIo	DOTES TYPE		T ILI JELICAT	* 190c. VBUICHT	Color	Turbidity & Sadiment			Remarks		
1015	40ml	VOA	3	P30	1Her, 2 no			Voc)c		
	40mb	VOA	3	U a	14ch,200					oc-sim (ve)		
_	SconL	HOPE		YES				the Party of the P	wed the			
		HOPE		NO	HV03				<u> Midds</u>			
	Small	02		100				Anions (LINBA,	Nog. Soy		
	500mu	PDPE!		PO.	NO 1			N H3	Chroma	5		
remeters rging Equi	SSON Navel. measured w ipment.	HOVE ith (instrument in Stru	THE	NO Inumber):	451 yel	(UW Dacon Equip		121-		BY HEALTH		
		vater: _ Cl / C			-							

Project Name:											
Sampled by Sampled by Measuring Point of Well: Screened Interval (ft TOC) Filter Pack Interval (ft TOC) Casing Volume (ft Water) x (Lpfv)(gpf) = (L)(gal) Casing volumes: 3/4"= 0.02 gpf 2"= 0.16 gpf 4"= 0.65 gpf 6"= 1 47 gpf Sample Intake											
Casing Volume(fi Water) x(Lpfv)(gpf) =(L)(gal) Casing volumes: 3/4*= 0.02 gpf 2"= 0.16 gpf 4"= 0.65 gpf 6"= 1 47 gpf Sample intake											
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf PURGING MEASUREMENTS Typical Stable na ±2% ±10% ±0.1 ±10 mV ±10%											
Typical Stude 79 +395 +1095 +0.1 +10 mV +1095	Cump) Water Specific Dissolved										
V 1-0-3 (20)1	Comments										
	Etri Pup										
10:25 14.7 336 491 6.65 - A4 CIPUT											
10:30 4.6 296 3.42 6.57-17.1											
10:35 14.6 293.9 294 650-220											
1040 14.6 293.0 2.70 65 30.7											
14.7 292.9 2.36 6.57 44.5											
1055											
otal Gallons Purged Total Casing Volumes Flemoved:											
inding Water Level (ft TOC): Ending Total Depth (ft TOC):											
Time Volume Bottle Type Quartity Filtration Preservation Appearance											
Color Turbidhy & Rem	marka										
100 40ml UDA 3 No Ther, 2 no UDC 82600											
	SIM (VE.)										
SOUML HOPE I NO HVOS Disabel Metals	>										
	FEIMO										
Small OS NO NO Air	00 , 50 %										
SOUND HOPE I NO HOSOY N'H3 (Acronia)											
ETHOUS STEELING HOVE NO EN active	NO Heads is a										
remeters measured with (instrument model & senal number): W. I W 10W 12K-12H Irging Equipment. QED (ded (atcd) Decon Equipment: all those dis- aposal of Discharged Water. CWM	hilled water										
servations/Comments:											

1 2"	SPE	— ·		Sample	: 57	<u> </u>	7W	- M	126-1	571613
GRO	JNDWATE	R SAMPLING	RECORD			WELL NU	MBER: Y	nw-2	6	Page:of/
-		South	0.0			-		10011		
Project	Name:	 ,				Project Nu			10.00	
Date	— 11/1/17	SMICA	AE	4		Casing Str		n 100).	15.01	
Measur	ing Point of V	/elt:	-			Total Depti	h (ff TOC)			
Screen	ed Interval (ft.	TOC)				Casing Dia	meter (incl	nes). 2		
Filter Pi	ack interval (f	t. TOC)								
		(ft Wat			v)(gpi) =	(L)(g	al)			
Casing		l'= 0.02 gpf			" = 0.65 ਕੁਸਾਂ	$6^{\circ} = 1.4^{\circ}$	_		Semple In	take Depth (ft TOC)-
-		0.09 Lpf 2	= 0.62 Lpf	<u>4*≥</u>	2.46 Lpf	5° = 5.561	<u>pt</u>			
PURG	ING MEAS	UREMENTS								
Crite		Typical 0.1-0.5 Lpm	Stable	/AB	± 3%	± 10%	± 0.1	± 10 mV	±10%	
Time	Volume	I PUITIN HIND	Water Level	Temp.	Specific Conductance	Dissolved Oxygen	рH	ORP	Turbidity	Comments
	(galor L)	(spm or Lpm)		(10)	(µ8/cm)	(mg/L)	 	(mv)	(MTU)	·
1148			10.00				7			Sturted
1150				13.7	1728	3.68	6.14		Chew	
1155		<u> </u>		13.9	174.5	3.12	6.11	8.3	1	
1200)			13.8	1849	2.20	6-14	10.8		
1205				137	186.5	2.06	6.18	0-8	Ŵ	
1210	1			13,7	182.1	2.08	6.71	10.4	371	
16	7 7 7	1		1		"	-	-	777	
	 	<u> </u>			 	 				
	 	 	 		 -	 		 		
	-				 					
	 -		 -		 		 	 		
					 		<u> </u>			
		ļ <u> </u>					· · · · · ·			
		<u> </u>								
atal Gall	ona Purged:					Total Casing	Volumes F	temoved:		
O(a) CIBI	orio i oigos					. The country				
nding W	ater Level (ft	TOC):	<u> </u>			Ending Total	Depth (fl T	OC):		
AMPL	INVENTO	RY								
Time	Vatume	Bottle Type	Quantity	Fattretion	Preservation	Арреал	ance			
			1			Color	Turbidity & Sediment			Remarks
13/2	40 ml	VOA	3	٥نم	1164,200	clear	32.1	Unc	8266	20
215	1		3	Vo			- Y	1100	800	06-61-0
- \ -	40mb	VOA			10ch,240		-	VDC	0000	oc-sim (ve)
	Signl	HOPE		YES					July Me	
	SOUNL	HOPE		No	HV03		1		Midds	
Ш	Small	02	1	No	100			Anims (CI, NO.	Non Sou
1	11-	03	1	NO.	No !			AIK		1
V	500 ML	HOPE	-\-	No.	24 accide			NH3	(Amount)
	_	HDVE								WC Hestarul
ırametera	measured w	ith (instrument m	nodel & seria	i number <u>).</u>						
rging Eq	uipment:	QED.				Decon Equip	ment:			
sposal of	Dispharged V	Vater								
•		:								
Para i Veli (IC)	100 100 100 100 100 100 100 100 100 100									
										

	SOCIALI			Sample numbe	: <u>SP</u>	<u>L-(</u>	3W	-m	W24.	-07-1613
GRO	UNDWATE	R SAMPLING	RECORD	· · · · · · · · · · · · · · · · · · ·		WELL NU	MBER: _	MW-24		Page:of
Sampii Measu Screen	Name	TOC)	Par	<u>د</u>		Project Nu Starting W Casing Sta Total Depti Casing Dia	eter Level kup (ft) h (ft TOC):		9.29	
Casing	Volume volumes: 3/	(ft Wa: 4"= 0.02 gpf = 0.09 Lpf 2	2" =: 0 16 g	pf 4'	v)(gpf) = = 0 55 gpf 2.46 Lpf	6° = 14	7 gpį		Sample Inte	ske Depth (fil TOC)
PURG	ING MEAS	UREMENTS								
Crite	ria:	Typicai 0.1-0.5 Lpm				± 10%	± 0.1	± 10 mV	± 10%	
Tlma	Cumul Volume (gal or L	(gpm) of Lipm)	✓ LEVE	Temp.	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	На	ORP (rinv)	Turbidity (NTU)	Comments
100	5	535			1					Stripup
1221	51		-	14.3	839	2.34	6.66		Clear	
123			<u> </u>	14.6	800	244				
123		 	 	14.3		252		-30.5		
124		 	 	13.4		2.55	6,70	-36.1	3,22	
124	<u> </u>	 	 	14.1	764	2.52	0140	1-45/2	3, 22	
		 	 	 		 		 		
	 -			 			 	 		
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	1	1 .	<u></u>		<u></u>			ا با		
ing W	kins Purged: Vater Level (fi E INVENTO	TOC):				Total Casing Ending Total		_		-
ime Ime	Volume	Bottle Type	Quantity	Filtration	Preservation	Appear	ance			
						Color	Turbidity & Sedmont	i	F	Remarks
500	40nh	VOA	3	١١٥	1Her, 2 no	71		Vac	8260	c
1	40ml	VOA	3	V.	Itch, 2 mo					C-SIM (ve.)
+-	SoinL	HDPE-	1		-14 W03				well the	
	SOUML			NO	HUOZ			The same of the last	madel 5	EEMA
11.	Small	05		NO	120					Up., 500
\\/	اسا	0.2		No.	No					
V	SADIMA	HOPE	1	ND	H2504 1			NH3	(Ampris)	
	\$50 Ku	HODE		No	ZN LIST NE					NO Herristry:
		ith (instrument n		_		Decon Equip	erserd.			· · · · · · · · · · · · · · · · · · ·
		Weier								

CDOI	Spec	SAMPLING	BECORD			WELL NU	MBER: V	1(1).8		Page, of
										(ago, u(
Project I	Vame 1	SM/CH	Mar 1			Project Nur	mber	10011	7.8	
Dete Semolet	1 1/3	SMICH	<u> </u>			Gasing Stic			_ <u>v · v</u>	<u> </u>
Measuri	ng Point of W	ell:				Total Dapt				
Screene	d interval (fil.)	TOC)				Casing Dia	meter (inch	69)		
					/)(gpf) =	t) Vne	-11			
		= 0.02 gpf			= 9 65 gpf	6" = 1.47			Sample in	take Depth (fl TOC):
	3/4"==	0.09 Lpf 2			2.461.pf	6" = 5.56 L	pf			
PURGI	NG MEAS	JREMENTS								
Criteri		Typical 0.1-0.5 Lpm	Stable	na na	± 3%	± 10%	±0.1	± 10 mV	± 10%	
Time	Cumul. Volume (get or i.)	Purge Rate (gpm or Lom)	Water Level	Temp.	Specific Conductance (µ8/cm)	Dissolved Oxygen (mg/L)	₽H	ORP (mv)	Turbidity (NTU)	Comments
1325		0.3	8:5	_					-	10. Tona L
1320				13.7	1602	2.60		- 38.0	Cleur	
325				13.5	1195	247	6.74	-65.1	, J	
340				13.4	livo	2.46	6.76		1	
1345	1			134	1153	140	677	-84.0	0	
1350				13.3	1149	2.33	677	-87.1	2.10	
1.1.										
							ļ <u>.</u>			
				· ·						
										· · · · · · · · · · · · · · · · · · ·
					11					
tal Gallo	ns Purged:_					Total Casing	Volumes R	lewowed:		
dina We	tor Level (it T	OC)				Ending Total	Depth (ft T	OC):		
	INVENTO									
Time	Valume	Bottle Type	Quantity	Filtration	Preservation	Appear				Remarks
		!				Color	Turbicity & Sediment			
100	40ml	VOA	3	۵ ا	ther, 2 no	clear	0.14	Voc	8261	20
	40ml	VOA	3	Ug	14ch,240			Voc		oc-SIM (ve)
	Scan	HOPE	1	YES				(Di53)	wel Me	
	500 ML	HOPE	1	NO	HPOZ			total	Redals	
	Small	02		No	סט			Anims C	CI, NOT	NO. 504
	1-	0-2	1	PO.	No			AIK		
7110	SSOM	HOPE		No 1	Ha So4			N H3	(Amonia	KI: Healeste
	_					2014	ے عام ان			
am of acc	measured w	delicht	Judge a Barri	ii number <u>e</u> S OLEO	451 P	Decon Equip				
ging Equ	ilbatteric									
gıng Equ		aterD	* '						<u>.</u>	

	Spe			Sample number	SP	L-(~W.	MN	127-	071613
GROUI		SAMPLING				WELL NU	WBER: 🖍	Maz		Page of
Measurin Screenst	by: g Point of W Interval (fi. k Interval (fi.	TOC)	Parl			Project Nur Starting We Casing Stic Total Depth Casing Dia	tkup (ft):		8.79	
	olumes 3/4	(f) Wat '= 0.02 gpl 0.09 Lpf 2'	2" = 0.18 gg	of 4°	/)(gpf) = = 0 65 gpf 2.46 Lpf	£)(ga 6" = 1 47 6" ≈ 5.56 £	7 gpt		Sample i	ntake Depth (fi TOC)
PURGIA	IG MEAS	UREMENTS					<u> </u>	.,		
Criteria		Typkæl 0.1-0.5 Lpm	Stable	na	±3%	± 10%	±01	± 10 m∀	±10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm o(Lpm)	Water Level (ft)	Temp.	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	рH	ORP (mv)	Turbidity (NTU)	Comments
<u> 407</u>	<u> </u>	.400	<u> </u>							
1110	ļ	 	 	13.58	325.3	200	619		CIPUN	
1415				13.5	324.9	2.24	6,67	- 63.3		
1120	 	 	 -	13.6	325,0		6.70	-765 -87 C	 	
14725		 	 -	13.8	1321,7	1.87	6.75	900		
1435		<u> </u>		13.6	323 2	193	680	_	898	
147 >				15.6	200 2	11.14	6 80	123	0/18	
				<u> </u>	<u> </u>			ļ		
				-	<u> </u>					<u> </u>
										
				<u> </u>				 		
										
nding Wat	ns Furged:_ er Level (ft 1					Total Casing				
Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appaer	ance			
- 1	i	.				Color	Turbidity & Sediment			Remarks
445	40ni	VOA	3	1 14	Ther, 2 no			VOC	126	06
$\overline{}$	40mm	VOA	3	Vo	14ch,2 40			Voc		oc-sim (ve)
1	Scant.	HOPE	1	YES	HN03			Diss	hick Mc	
1	SOOML	KOPE		No	4403			The same of the same of	Medal	
	Small	20		No	Do			Anims (CLNOR	NO. 504
	11-	07	1	NO.	No			Alic		
TUOTI	SOUTH	HOPE		No]	Ha So4			N H3	(Amorio	NO Hearque
rameters r rging Equi posal of D	messureo w	ith (instrument m	EDIN	u number <u>):</u>		Plus Decan Equip				

60	Spe	NG .		Sample number	SP	1-6	zW.	- MV	U80-	-071713
GROU	INDWATE	SAMPLING	RECORD			WELL NU	ивел: 1	Rinse	Blan	V. Page: 1 of 1
Date: _ Sample Measuri Screens	d by: ing Point of W	FIZ SM/CM Fell: TOC)				Project Nur Starting Wa Casing Stk Total Depth Casing Dia	ater Level (skup (ft) <u>:</u> n (ft TOC <u>):</u>		6 NA	
Casing	/olumes: 3/4 3/4"=	(ft Wat '= 0.02 gpl 0.09 Lpf 2	2" = 0.16 gpf	4	r)(gpf) = = 0.65 gpf 2 46 Lpf	6" = 1.47 6" = 5.56 L	7 gipf		Semple Inte	ake Depth (fi TOC)
		UREMENTS Typical	Stable	ne.		± 10%	±0.1	± 10 mV	± 10%	
Time	Cumul. Volume (get or L)	O.1-0.5 Lpm Purge Rate (gpm or Lpm)	Water	Temp	Specific Conductance (uS/cm)	Disablyed	pH	ORP (riv)	Turbidity (NTU)	Comments
		Rin	50	B	lan					
			Vo	4	ran	frs				
										-
										· · · · · · · · · · · · · · · · · · ·
nding W	ons Purged:_ ater Level (ft)					Total Casing Ending Total				_
-	Volume	Bottle Type	Quartity	Fiftration	Preservation	Арреал	ance	<u> </u>		
Time	10 1110	Doub ()po		0.000		Color	Turbidity & Sediment		F	Remarks
3:00 3:00	40ml 40ml	VOA VOA		U.O.	14ch, 2 no 14ch, 2 no 72406	- 4	4	Voc Voc	8260 8260	C-SIM (VE)
	BOOKL Somali Some	102 N 02 N 102 N		W 6/ W 6/ W 6/	H402/1 40 /	1/4	<i>j</i> '	AUK IN H3	1. 12 pm	1. J.
eremeters uging Equ	upment Q	th (instrument in		number):	U A No my	Decan Equip	oment			NE HENGEREE
•	Discharged V	-	irse l	olan	K US	13 <u> </u>	- H	3° 5.	police	hylab

GRO	UNDWATE	R SAMPLING	RECORD	•		WELL NU	MBEA: 上	1W-11	1	Page: of
Projec Date	Name /	South	Par			Project Nu	inber	/ DOI /	6	
	ring Point of V					Total Dept				_
	ed Interval (ft. ack Interval (f	TOC)				Casing Dia	meter (incl	169):	2	
asing	Volume		$2^{*} = 0.16 g$	pf 4	v)(gpf) = " = 0.65 gpf 2.46 Lpf	(L)(g 6* = 1.4 6* = 5.56 t	7 gpŧ		Sample Intak	e Depth (ff TOC).
NIBC		UREMENTS	= 0.02 LD1	- 4 =	2.40 LH	0 = 0.501	<u> </u>			
Critis		Typical	Stable	na.	±3%	± 10%	*01	± 10 mV	± 10%	
Terrae	Cumui. Valume		Water Level	Temp.	Specific - Conductance	Dissolved Oxygen		ORP	Turbidity	Comments
	(ga) or L)	(gpm or Lpm)	4,19	(0)	(u5/om)	(mg/L)	-	(rinv)	(NTU)	
i이드	·	+,,,	1-19:	15.4	1025	2.19	6-67	. 32 9		
		+	1	15.2	643	218	6. 9		 	
4,7		 	 	15.1	12.25	1.99	633	-	 	
55		+	 	10.0	इनेडा-	1 500	6 8	7-	 	
200		 		149	5205	173	100	-72.1	 	
5 C.		 	 	12.5		1.70			6.59	
115	<u> </u>	 		1 i	19.16.0	1 ; 1 7 0	(3.77	677	0.2.1	
		 	 	- −	 	 -	 			
		 -	 		 		 			
	+	 	 	 	 	<u> </u>	 			
	+		 -	 	 			 		
	+		-	_	 		 			
	 		-		 -					
	-			 	 				 -	
	-	 -		 	 					
_	<u></u>	<u> </u>	L	<u> </u>	<u> </u>					
	ons Purged:	TOC):				Total Casing Ending Total				
MPL	EINVENTO					<u> </u>				
ime	Volume	Bottle Type	Quartity	Futnation	Preservation	Appear	Turbustry & Sedemans		Re	marks
20	40m	VOA	3	Nº 0	1Her, 2 40			Voc	\$2600	
	40ml	VOA	3	NB	1404,200			VOC	-42	-SIM (ve)
	Sient	HOPE		YES:	HN0-3			(Ďi35	was Kreto	LE MY KY EN MY, FE
_	500 ML	HOPE	_1_	Vo	H403			The Part of the Pa	Reddy	FEINA
	Small	02		No	No		1	Anims (I, NOT, N	
	14-	03	1]	Po.	No			Alk	_	-
	SOUNT	HOVE	-\-	Ub.	Ha So4			NH3	(Amoria)	173
meten		ith (instrument m	nodel & serie		USI UC					- KO HELDOV
ino Ea	uipment:	Veter _ C V				Decon Equip	men1			

Oc.	Spe	Ct ^{HG}		Sample	SP	L-(-W	— mи	129-	07/7/3
		R SAMPLING				WELL NU	WBER: <u>/</u>	NW-99		Page:/_ of/_
Date Sample Measu Screen	3 1 7 1 7 sci by: ring Point of V ed Interval (ft	SM/CM Vell: TOC)	<u> </u>				ater Level (kup (ft); : (ft TOC):			
Casing Casing	Volume volumes: 3/4*=	(ft Wet 1 = 0.02 gpf 0.09 Lpf 2	ier) x 2" = 0.16 gp	ਜ 4°	r)(gpl) = = 0.65 gpl 2.46 Lpf	$6^{h} = 1.47$	7 gpf		Semple In	take Depth (fl TOC)
		Typical			±2%			- 10 - 11		
Time	Cumul	Purge Raie	Veter Level (ft)	Temp.	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)		± 10 mV	± 10% Turbidity (NTU)	Comments
11:01		0.35								Stortfup
1170	- 1			15.5	1101	2.78		-58,2	clear	
1/15				15,4	1087	2.33				
1120		<u> </u>	 	15.6	1089	2.29	6.40			
1125		 	 	124	1090	2.25	644		2 0 2	<i>f</i> -
1130	<u> </u>	 	 -	15.5	1095	2.18	6,44	1-40,5	9.87	Emple
	+	 	 		{ -			 -		
	+	 	 		 					
	+		 							
			<u> </u>							
	 									
	ons Purged ater Level (It	TOC):				Total Casing Ending Total				
AMPL	E INVENTO									
Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appean Color	Trubitity &			Remarks
1140	40 m	U0.4	3	b 1*	1Her, 2 no	clew	9.47	<u>Voc</u>	8260	
	40mm	VOA	3	V0	14ch,2 40			Voc		oc-SIM (ve)
	Sinh	HDPE	K	YES	H1003	- - 		The same of the same of	wal the	
	500 ML	HOPE		No	HU03				Metal 5	
	SMAIL	02		No			-(Anions (I, NOS,	No. 504
₩	500 mg	D> HDPE		NO 1	No 1	- V - 1		AIK	(Avising	·
	S SOR YEAR	HDV		No	ZN (catale)					Vo Hending
iging Eq sposel of	Uipment:	ith (instrument m of Cold of the Weter	المصارمة الا	- 3 B DA	56 5-16-1- 5	クの 夕(ッち Decon Equip	yelisza ment.	Alco	101 t	DI
servation	ns/Comments									

I	Spe			Sample	SP					071713
GROL	NOWATE	R SAMPLING	RECORD	,		WELL NU	MBER: Y	NW-1	4	Page: [of [
Date Semple Measuri Screens	d by ing Point of Wad Interval (ft.	SM/CH				Project Nu Starting W Casing Sti Total Dept	mber /ater Level (/ <i>[Dû] </i> (# TOC):	6	
Casing	Volumes 3/4	(ft Wat i'= 0.02 gpf 0.09 Lpf 2'	er) x 2" ≈ 0:16 g	(Lph	= 0.65 gpf	6* = 1.4	7 gpi		Sample to	itake Depth (ft TOC)
PURG	NG MEAS	UREMENTS								
Criter	la:	Typical 0.1-0.5 Lpm ·		ma.	± 3%	± 10%	± 0.1	± 10 mV	±10%	
Time	Cumul. Volume (gal or L)	1	Water Level (ft)	Temp (°C)	Specific Conductanc (µS/em)	Dissolved a Oxygen (mg/L)	рH	ORP (mv)	Turbidity (ATU)	Comments
FIOI	10	~300	15.9							
1022			 	14.6		5.00		30.5	CPON	
1027		ļ		143	1031	3.78		-41.6		
1032		 	 -	143	1059	3.21	10.0	-576		
103-		 	 -	14.4	1039	259		168.1		
1042		 		144		2.51	66	-762	770	
1047	 	 		11714	1 107 2	25!	Cole!	* 7100	2.65	
	 -	 -	 	 		 	 -	-		
				-	 	 	 			
	 	 -		 	 	 	 			
	 					 -	 	1		
	 				 		-			
	1					 				
_	-			. —						
nding We	ons Purpad:					Total Casing Ending Total				
Time	Volume Volume	Bottle Type	Quantity	Filtration	Preservation	Appea	namuse			
Illine	10,2,					Color	Turbledy &			Remarks
100	40ml	VOA	3	N.	1Her, 2 no		Sedement .	VOC	8261	20
100	40ml	VoA	3	Vo	14ch, 2 40		(Vac		oc-SIM (ve)
	Sout	HOPE	7	YES!	HN03		-	7.7.	wel My	
	500ML	HOPE	1	NO	HV03		-/-	total		
	Small	05	_	No	No	7	1		1. NO2	
$\neg \neg$	11_	02	1	NO.	No	1/		AIK		1000
	500m	HOPE!		No	Ha 504	, V		NH3	Campia	
	5 500 Mars				ZY active					NO HEADER
ırging Equ	nibwaut, 📆	- 1		d number):	321 12	Decon Equip		Alcon	WID	ust-an
eposal of	Discharged V	Veter Clv	<i>/</i> ///							
servetion	s/Comments	<u> </u>			•		<u> </u>			

Oc.	Spe	C†		Sample	SP					071713
		R SAMPLING			-	WELL NU	MBEH: N	W-1;	2	Page: 1 of /
Semple Measur Screen	d by: ing Point of V ad Interval (fi	TOC)				Starting W Casing Sti Total Dept	ater Level ckup (ft): th (ft TOC):	1001 (fi TOC).	833	
Casing	volumes 3/	fLTOC)(ft Was 4*= 0.02 gp/ = 0.09 Lp/i 2	2" ≃ 0 16 g	pf · 4'	'= 0,65 gpri	6" × 1.4	7 gpf		Sample In	take Depth (ft TOC).
PURG	ING MEAS	UREMENTS								
Crite		Typical 0.1-0.5 Lpm	Stable	na na	± 3%	± 10%	±01	± 10 mV	± 10%	
Tittie	Cumul. Volume (gal or L)	(gpre or Lpm)	Water Level (ft)	Temp.	Specific Conductano (uS/cm)	Dissolved Oxygen (mg/L)	ρH	ORP (mv)	Turbidity (NTU)	
1235		03					1	-		512.,2
124:			↓	14.8	3803				5 821	1
1215				11:9	375 8	237	6.68			
1250			 -	15.	3241	232			(
12.55		↓	 	15.3	384 6	2.29	6.7	<u> -17,7</u>	60.1	
1300	4	 	 - -	ļ	 	 	 	 -		<u> </u>
			 	 		 				
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	 			ļ	 -	<u> </u>		 		
		<u> </u>			l	l	1			
nding W	ons Purged	TOC):	<u> </u>			Total Casing Ending Total				-
	Volume	Bottle Type	Quantity	Filtration	Preservation	Appear	mace.			
Time	*CPLING	DOLLOO TYPE	Operatory	(1)(1)(2)(2)	(Today Yallon)	Color	Turbidity & Sedeneral			Remarks
1315	40mb	VO4	3	٥٤٠	11er, 2 40			Voc	8260	76
	40mm	VOA	3	Ug	14ch,240					oc-sim (ve)
	Scant	HOPE		YES					wed the	
	500 ML	HOPE	1	No	HUOZ			total	Nedds	
	Small	02		No	20			Anions (LNOT	NO. 501
	11-	03		MOJ	No			Alk		
	5500 Mu	HOPE	1	No 1	H2504			N H3	(Among	Wil Henry
rameters	messured w	with (instrument n		al number):		Decon Equip	ज्ञानाः			·
•										

	Spe			Sample number	SP					4-071913
GROU	NDWATE	R SAMPLING	RECORD			WELL NU	MBER:	CMW.	-03A	Page: of
Sampled Measuri Screene Filter Pa Casing \	d by	/ell:	8r) ×	{Lptv		Project Nur Starting Wi Casing Site Yotal Depth Casing Dia	mberatey Level (1 skup (ft) 1 (ft TOC) meter (inch	/ DO//	6 10.6	-X
Casing v		1°= 0.02 gpf : 2°2°	2" = 0.16 gg ' = 0.62 Lof		= 0 65 gpt 2.46 Lpf	6" = 1.47 6" = 5.56 L			Sample int	take Depth (fl TOC).
PURGI		UREMENTS								
Criteri	a;	Typical 0.1-0.5 Lpm	Stable	AR.	±3%	± 10%	±0.5	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate	Water Level (ft)	Temp.	Specific Conductance (µS/om)	Dissolved Oxygen (mg/L)	pΗ	ORP (mv)	Turbidity (NTU)	Comments
110)		.35			-					Stertperp
1105				15.4	719	1,49	750			\
1110		 	ļ	15.5	715	1.48	7.54			
1115			ļ	15.7	717	1.49	7,56	_		
1120	 	 	 	15.6	719	1,44	7.60		-1	
1/25	 	 -	ļ	15.7	717	1.46	7.62	3,6,6	12.7	
	 	 -		<u> </u>						
	 									
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	-			<u> </u>				 		
	<u> </u>		<u> </u>	<u> </u>	<u> </u>			1		
nding We	ns Purged:_ iter Level (ft					Total Casing Ending Total	,	_		_
	Volume	Bottle Type	Quantity	Flitration	Preservation	Appear	mac			
Time	4-04-02116	Lower type		T WELLOW	· Justin Astrica)	Color	Turbicity & Bediment			Remarks
1130	40nb	VOA	3	b) to	11ther, 2 no	12.7	der	Voc	8260	20
1	40mm	VOA	3	Va.	14ch,2 no	Cler	127	Voc	8260	26-SIM (INC.)
	Sconl	HDPE	_ 1	YES:	HU03		Λ.	(Di330	was the	
	500 ML	HOPE	1	No.	H403			total	hidas	
	Small	02	1	No	No.	1		Anions (LINON.	NON SOL
17.	14	03	1 7	NO.	No			AIK	• •	
1/2	500ML	HOPE		No.	SK List ME	¥	W]	NH3	Amoria	MAIN THE TAX TO
	5 Salture					- 471 -	, to			MC Heads Just
rging Equ	iipment. 卫	ith (instrument m chical tyb: Water Po	AND TOTAL	sylan y	حرب وا	Oecon Equip		Alcor	× 4-101	
	s/Comments									
										

	Spe			Sample numbe	: 57	,T-(7W	- KW	WOS	-071813
GROU	NDWATE	R SAMPLING	RECORD			WELL NU	MBER:	CMLYOS		Page: 1 of 1
Measurin Screenet	ig Point of V	TOC)				Casing Stir Total Dept	ater Level o ckup (ft): h (ft TOC):	ft TOC).	5,93	
Casing V	olume olumes: 3/4"=	(fi Wa 4"= 0.02 gpf 0.09 Lpf 2	2" = 0 16 gy	of 4·	v)(gpf) = '= 0.65 ppf 2.46 Lpf	6" = 5.561	7 gpf		Sample i	intake Depth (fi TOC):
		UREMENTS Typical								
Criteria	Cumul. Valume	0.1 0.5 Lpm Purpe Rate	- Level	Тепр	± 3% Specific Conductance		± 0.1	± 10 mV	± 10%	y Commands
1218	(galort)	(gom of Lpm)	593	(°C)	(µS/om)	(mg/L)	-	(mv)	(NTU)	
1200	1	1	1 2 1 12	177,0	129,152	1.21	12.81	463.1	done on	·^
1225				17.2	0.00		1283	-486 1		
1230				17.4	29,602	1.11	12.84			
1335				17.5	31,146	1.08	12.88			
12412					30,007		12.71			
1245				17.5	31,928	1.05	12.91	-536.5	5.60	
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	ns Punged:_ er Level (ft	roc)				Total Casing Ending Total				
MAPLE	INVENTO									
Time	Valume	Batila Type	Quantity	Filtration .	Preservation	Color	Turbidity & Semment			Remarks
	40m	VOA	3	Nº	they 2 no	DAT BLOW	5,60	Voc	126	
-	40mm	Vo A	3	U.O.	14ch,240			You	45	oc-Sim (ve)
	ment_	HDPE		YES	74NO3	_ _	_	700,000	was H	
	500 ML	HOPE	-1-1	No	HP03		1	·	Middle	
-4-4	Small	02	1	No	00		1		L, NO3	, NO. , SO4
14	<u> </u>	07	_ !_	401	No			AK	Camoni	
THOUS	SOUTH	HOLE	__	Vo 1	24 acetate			N 113	CARMON	KD Heddare
ametera r ging Equi	measured w	ith (Instrument in	c + divisi	number):	ys1 (Decon Equip			المر ليسا	
ervations	/Comments									

Date: 7 17 13 Sempled by: 5 M/C M Measuring Point of Well:			T		- T		
Date 7 1713 Sempled by SM/CM Measuring Point of Well:			WELL NU	ивен: <u>К</u>	-MM	08	Page: 1 of 1
Project Name: Double Park Sampled by SM/CM			Project Number: 100/16 Starting Water Level (ft TOC): 6.46 Casing Stickup (ft). Total Depth (ft TCC): Casing Diarneter (inches):				
Casing Volume (ft Water) x (Lpfv)(gpf) = Casing volumes: 3/4"= 0.02 gpf 2" = 0.18 gpf 4" = 0.65 gpf 3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf			6" = 1.56 L	gpi		Semple int	ake Depth (ft TOC):
CITATION: Typical Stable	- Cal	± 3%	£ 10%	+ O.1	± 10 mV	± 10%	
Time Cumul Purge Rate Level (gal or L) (gpm or Lpm) (ft)	Tamp	Specific Conductance (uS/cm)	Dissolved	pH	ORP (riiv)	Turbidity (NTU)	Comments
7:40 0:35		AND THE PROPERTY.	-4/10-1	1 47			Et Hound
9:45		545	2.63	6.56		Ugus	
9:50	15.00	436.2	1.88	6.70	_	Clear	
96.60		426,0	1,60	6.70	200.00	150	<u> </u>
10:05		418.0	1.51		70.9		
10:10	7-7-1	404.0	1,42	6.69	65.5	1,22	
	┼			·	 		
	 						
	 						<u> </u>
	 				 		
dal Gallons Purged: ding Water Level (ft TOC): AMPLE INVENTORY	1		Total Casing		_		
Time Volume Bottle Type Quantity	Filtration P	reservation	Аррявл	EIDOS	colle	-	Remarks Time: 10:
		_	Color	Turbally & Sedment	SPL-GO	سس۔ در	Remarks TIME: 10.
015 40NU VOA 3	Nº 11	الاساع الما			Voc	8260	
1 90mm VOA 3	U8 11	kch, 2 ne			Voc		oc-sim (ve)
Scant HDPE]	YES 1	HN0-3			Mary or California	tuch the	tale Murky Ea, My, FE
		1403				Medals	FEIMA
SOOML HOPE	No	No				1, NO.	No. 504
Small 05	NO.	NU			AIK	77	
Small 05							
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SMAIL OS 1	Vo I≥	The accorded	01654	(101		Amoria	No Head Day
5mall 05 1 1 500mu HDPE 1	No A No ≥ et number). (15 FR F	Oligya Decon Equip	(Colu		CAMONIA No. + D'	No Acoustus
SMAIL OS STOMU HOPE THOUS SOURCE HOPE Tampters measured with (instrument model & serio	No A No ≥ et number). (15 FR F	Oligya Decon Equip	ment:			No Acoustus
Small 05 STOMU HOPE THOUS SOURCE HOPE Tampeters measured with (instrument model & serior ging Equipment: delicated to by a 1 For posel of Discharged Water Drum	No A No 2 et number)	15 \$10 K	Oligya Decon Equip	merat:			No Acoustus

South Park Landfill

July 2013 Interim Site-wide Groundwater Monitoring Results

Appendix C
Data Validation Report

July 2013 Groundwater Sampling Event South Park Landfill

Data Validation Report

Prepared for

Seattle Public Utilities

Prepared by

Floyd|Snider 601 Union Street Suite 600 Seattle, Washington 98101

September 2013

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List of Abbreviations and Acronyms

Abbreviation/	
Acronym	Definition
ARI	Analytical Resources, Inc. Laboratory
CLP	Contract Laboratory Program
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
mg/L	Milligrams per liter
MS	Matrix spike
RPD	Relative percent difference
QC	Quality control
SDG	Sample Delivery Group
USEPA	U. S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 Project Narrative

1.1 OVERVIEW OF DATA VALIDATION

This report summarizes the results of the Compliance Screening (Level I) performed on the groundwater and field quality control (QC) sample data for the South Park Landfill July 2013 Groundwater Monitoring Event. A complete list of samples is provided below.

Project Sample Index

SDG (Batch)	Sample ID	Lab ID	8260C	8260C-SIM	6010B
WX53	SPL-GW-MW32-071513	WX53A/WX53F	Х	Х	Х
WX53	SPL-GW-MW33-071513	WX53B/WX53G	Х	Х	Х
WX53	SPL-GW-MW25-071513	WX53C/WX53H	Х	Х	Х
WX53	SPL-GW-MW60-071513	WX53D/WX53I	Х	Х	Х
WX53	SPL-GW-MW10-071513	WX53E/WX53J	Х	Х	Х
WX53	TripBlank #1	WX53K	Х	Х	
WX53	TripBlank #2	WX53L	Х	Х	
WX67	SPL-GW-MW30-071613	WX67A/WX67I	Х	Х	Х
WX67	SPL-GW-MW31-071613	WX67B/WX67J	Х	Х	Х
WX67	SPL-GW-MW26-071613	WX67C/WX67K	Х	Х	Х
WX67	SPL_GW-MW24-071613	WX67D/WX67L	Х	Х	Х
WX67	SPL-GW-MW08-071613	WX67E/WX67M	Х	Х	Х
WX67	SPL-GW-MW27-071613	WX67F/WX67N	Х	Х	Х
WX67	TripBlank #1	WX67G	Х	Х	
WX67	TripBlank #2	WX67H	Х	Х	
WX79	SPL-GW-MW12-071713	WX79A/WX79G	Х	Х	Х
WX79	SPL-GW-MW18-071713	WX79B/WX79H	Х	Х	Х
WX79	SPL-GW-MW29-071713	WX79C/WX79I	Х	Х	Х
WX79	SPL-GW-MW14-071713	WX79D/WX79J	Х	Х	Х
WX79	SPL-GW-MW80-071713	WX79E	Х	Х	
WX79	TripBlank	WX79F	Х	Х	
WX91	SPL-GW-KMW05-071813	WX91A/WX91F	Х	Х	Х
WX91	SPL-GW-KMW03A-071813	WX91B/WX91G	Х	Х	Х
WX91	SPL-GW-KMW08-071813	WX91C/WX91H	Х	Х	Х
WX91	SPL-GW-MW61-071813	WX91D/WX91I	Х	Х	Х
WX91	TripBlank	WX91E	Х	Х	

The chemical analyses were performed by Analytical Resources, Inc. (ARI), located in Tukwila, Washington. Groundwater samples were collected between July 15 and July 18, 2013, and were submitted to ARI for chemical analyses. The analytical methods include the following:

- Select volatile organic compounds (VOCs)—U.S. Environmental Protection Agency (USEPA) Method 8260C
- Vinyl chloride—USEPA Method 8260C-SIM
- Select metals—USEPA Method 6010B

The data were reviewed using guidance and QC criteria documented in the analytical methods, National Functional Guidelines for Inorganic Data Review (USEPA 1994 and 2004), National Functional Guidelines for Organic Data Review (USEPA 1999 and 2008), and the Sampling and Analysis Plan, Appendix D of the Remedial Investigation/Feasibility Study Work Plan for South Park Landfill Site (Farallon Consulting, LLC 2010).

Conventional parameters such as alkalinity, nitrate, nitrite, chloride, sulfate, and sulfide were also analyzed; however, they do not have data quality compliance requirements, and, therefore, the results were not included in this data validation report.

Floyd|Snider's goal in assigning data assessment qualifiers is to assist in proper data interpretation. If values are estimated (J or UJ), data may be used for site evaluation and risk assessment purposes, but reasons for data qualification should be taken into consideration when interpreting sample concentrations. If values are assigned an R, the data are to be rejected and should not be used for any site evaluation purposes. When compounds are analyzed at multiple dilutions, select results will be assigned a Do Not Report (DNR) qualification as a more appropriate result is reported from another dilution. If values have no data qualifier assigned, then the data meet the data quality objectives as stated in the documents and methods referenced above.

Data qualifier definitions, reasons, and validation criteria are included as Appendix A. As no data were qualified for this data set, the standard Qualified Data Summary Table was not populated, and has not been included as an attachment. Data validation worksheets (Excel worksheets) will be kept on file at Floyd|Snider.

2.0 Data Validation Report Select VOCs by USEPA Method 8260C

This report documents the review of analytical data from the analyses of groundwater and field QC samples and the associated laboratory QC samples. Samples were analyzed by ARI. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

2.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

2.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	Surrogate recoveries
² Extraction and analysis holding times	² Analyte response
Blank contamination	Target analyte list
Laboratory control sample (LCS) and LCS duplicate (LCSD)	Reporting limits and reported results

Notes:

- 1 Quality control results are discussed below, but no data were qualified.
- 2 Quality control outliers that impact the reported data were noted. Data qualifiers were issued, as discussed below

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

2.2.1 Cooler Temperature and Preservation

For Sample Delivery Group (SDG) WX53 the laboratory noted that the sample cooler temperatures (9.3°C and 10.3°C) were outside of the laboratory standard of 4±2°C. Samples were delivered to the laboratory the same day they were collected from the field. Less than 60 minutes elapsed between when the final sample was collected and the cooler was delivered to the laboratory, leaving insufficient time for the cooler temperature to drop within the standard range. It is with professional judgment that no sample results be qualified based on cooler temperature, as the samples were delivered with minimal holding time.

2.2.2 Extraction and Analysis Holding Times

For SDG WX79 the laboratory noted that due to trichloroethene carry over with the USEPA Method 8260 analysis, cis-1,2-dichlorethene and trichloroethene were reported from the Select Ion Monitoring (SIM) Method 8260 (USEPA Method 8260C-SIM) analysis for more accurate quantification. For sample SPL-GW-MW12-071713, the cis-1,2-dichloroethene results exceeded

the USEPA Method 8260C-SIM detector range and has been qualified "DNR." Due to the previous 8260 carry over, all preserved vials had been used, and a dilution was run outside the method-recommended 7 day holding time on an unpreserved vial for analysis with USEPA Method 8260. It is with professional judgment that the cis-1,2-dichloroethene result for SPL-GW-MW12-071713 be given the data validation qualifier of "J-H" to indicated it is estimated due to analysis outside of holding time, with a final qualifier of "J."

2.2.3 Analyte Response

For SDG WX67, the laboratory assigned the trichloroethene result for SPL-GW-MW26-071613 with an "M" flag to indicate that the reported concentration is an estimated value that was confirmed by an analyst, but with low spectral match parameters. Therefore, the final qualifier for this result is a "JM" to comply with database qualifier standardization.

2.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the sample surrogate, LCS, and LCSD percent recovery values. Precision was acceptable, as demonstrated by the LCS/LCSD relative percent difference (RPD).

All data are acceptable for use as qualified. Refer to Appendix B for details.

3.0 Data Validation Report Vinyl Chloride by USEPA Method 8260C-SIM

This report documents the review of analytical data from the analyses of groundwater and field QC samples and the associated laboratory QC samples. Samples were analyzed by ARI. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

3.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

3.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	Surrogate recoveries
Extraction and analysis holding times	Target analyte list
Blank contamination	Reporting limits and reported results
LCS and LCSD	

Note:

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

3.2.1 Cooler Temperature and Preservation

For SDG WX53, the laboratory noted that the sample cooler temperatures (9.3°C and 10.3°C) were outside of the laboratory standard of 4±2°C. Samples were delivered to the laboratory the same day they were collected from the field. Less than 60 minutes elapsed between when the final sample was collected and the cooler was delivered to the laboratory, leaving insufficient time for the cooler temperature to drop within the standard range. It is with professional judgment that no sample results be qualified based on cooler temperature, as the samples were delivered with minimal holding time.

3.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by the sample surrogate, LCS, and LCSD percent recovery values. Precision was acceptable, as demonstrated by the LCS/LCSD RPD.

All data, as reported by the laboratory, are acceptable for use.

¹ Quality control results are discussed below, but no data were qualified.

4.0 Data Validation Report Select Metals by USEPA Method 6010B

This report documents the review of analytical data from the analyses of groundwater and field QC samples and the associated laboratory QC samples. Samples were analyzed by ARI. Compliance Screening (Level I) was performed on all analytical results by Chell Black as the primary data reviewer, and secondary review was performed by Jessi Massingale.

4.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative.

4.2 TECHNICAL DATA VALIDATION

The QC requirements that were reviewed are listed below.

QC Requirements

Cooler temperature and preservation	Lab Sample and Lab Sample Duplicate
Extraction and analysis holding times	Target analyte list
Blank contamination	Reporting limits and reported results
¹ Matrix Spike (MS)	

Note:

Appendix A presents data validation criteria tables for organic compound analysis. QC requirements that were met without exception are not discussed below. QC requirements that required further evaluation and had exceptions to the validation criteria are discussed below.

4.2.1 Cooler Temperature and Preservation

For SDG WX53, the laboratory noted that the sample cooler temperatures (9.3°C and 10.3°C) were outside of the laboratory standard of 4±2°C. Samples were delivered to the laboratory the same day they were collected from the field. Less than 60 minutes elapsed between when the final sample was collected and the cooler was delivered to the laboratory, leaving insufficient time for the cooler temperature to drop within the standard range. It is with professional judgment that no sample results be qualified based on cooler temperature, as the samples were delivered with minimal holding time.

4.2.2 Matrix Spike

For the analysis of total metals in SDG WX53, the laboratory noted that the MS for iron and manganese may not be applicable, as the original concentrations in the sample exceeded the spike concentration by a factor of four (4x) or greater. Iron was spiked at 2 milligrams per liter (mg/L) with an original concentration of 26.7 mg/L, and manganese was spiked at 0.5 mg/L with an original concentration of 2.48 mg/L. Per USEPA guidelines, spike recovery limits do not apply when a sample concentration exceeds the spike concentration by a factor of four (4x) or greater. In such an event, the results shall be reported unqualified even if the percent recovery

¹ Quality control results are discussed below, but no data were qualified.

does not meet the acceptance criteria. Consistent with USEPA Contract Laboratory Program (CLP) guidance, it is with professional judgment that no total metal results be qualified based on this MS recovery information.

For the analysis of dissolved metals in SDG WX53, the laboratory noted that the MS for calcium, iron, magnesium, manganese, and sodium may not be applicable, as the original concentrations in the sample exceeded the spike concentration by a factor of four (4x) or greater. Calcium, magnesium, manganese, and sodium had recoveries that were still within control limits. Iron was spiked at 2 mg/L with an original concentration of 26.4 mg/L. Per USEPA guidelines, spike recovery limits do not apply when a sample concentration exceeds the spike concentration by a factor of four (4x) or greater. In such an event, the results shall be reported unqualified even if the percent recovery does not meet the acceptance criteria. Consistent with USEPA CLP guidance, it is with professional judgment that no dissolved metal results be qualified based on this MS recovery information.

4.3 OVERALL ASSESSMENT

As was determined by this evaluation, the laboratory followed the specified analytical method. Accuracy was acceptable, as demonstrated by MS percent recovery values. Precision was acceptable, as demonstrated by the sample/sample duplicate RPDs as discussed above.

All data, as reported by the laboratory, are acceptable for use.

5.0 References

- Farallon Consulting, LLC. 2010. Sampling and Analysis Plan, Appendix D of the Remedial Investigation/Feasibility Study Work Plan for South Park Landfill Site.
- U.S. Environmental Protection Agency (USEPA). 2004, 1994. *National Functional Guidelines for Inorganic Data Review*.

——. 2008, 1999. National Functional Guidelines for Organic Data Review.

July 2013 Groundwater Sampling Event South Park Landfill

Data Validation Report

Appendix A
Data Qualifier Definitions
and Criteria Tables

Floyd|Snider Validation Guidelines for Volatile Analysis by GC/MS (Based on Organic NFG 1999)

Validation QC Element	Acceptance Criteria	Action			
Cooler Temperature	4°C±2°C Water: HCl to pH < 2	J/UJ if greater than 6 deg. C (Floyd Snider PJ)			
Hold Time	Waters: 14 days preserved 7 Days: unpreserved (for aromatics) Solids: 14 Days J/UJ if hold times exceeded by > 3X HT: J/ (Floyd Snider PJ)				
Tuning	BFB Beginning of each 12 hour period Method acceptance criteria	R all analytes in all samples associated with the tune			
Initial Calibration (Minimum 5 stds.)	RRF > 0.05	(Floyd Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05			
		If reporting limit > MDL: note in worksheet if RRF <0.05			
	%RSD < 30%	(Floyd Snider PJ) J if %RSD > 30%			
Continuing Calibration (Prior to each 12 hr. shift)	RRF > 0.05	(Floyd Snider PJ) If MDL= reporting limit: J/R if RRF < 0.05			
		If reporting limit > MDL: note in worksheet if RRF <0.05			
	%D <25%	(Floyd Snider PJ) If > +/-90%: J/RIf -90% to -26%: J (high bias) If 26% to 90%: J/UJ (low bias)			
Method Blank	One per matrix per batch No results > CRQL	U if sample result is less than CRQL and less than appropriate 5X or 10X rule (raise sample value to CRQL)			
		U if sample result is greater than or equal to CRQL and less than appropriate 5X and 10X rule (at reported sample value)			
	No TICs present	R TICs using 10X rule			
Storage Blank	One per SDG <crql< td=""><td colspan="3">U the specific analyte(s) results in all assoc. samples using the 5x or 10x rule</td></crql<>	U the specific analyte(s) results in all assoc. samples using the 5x or 10x rule			

Validation QC Element	Acceptance Criteria	Action			
Trip Blank	Frequency as per project QAPP	Same as method blank for positive results remaining in trip blank after method blank qualifiers are assigned			
Field Blanks (if required in QAPP)	No results > CRQL	Apply 5X/10X rule; U < action lev			
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria Qualify parent only unless indicates systematic proble J if both %R > UCL J/UJ if both %R < LCL J/R if both %R < 10% PJ if only one %R outlier				
MS/MSD (RPD)	One per matrix per batch Use method acceptance criteria	J in parent sample if RPD > CL			
LCS low conc. H2O VOA	One per lab batch Within method control limits	J assoc. cmpd if > UCL J/R assoc. cmpd if < LCL J/R all cmpds if half are < LCL			
LCS regular VOA (H2O & solid)	One per lab batch Lab or method control limits	J if %R > UCL J/UJ if %R <lcl J/R if %R < 10% (Floyd Snider PJ</lcl 			
LCS/LCSD (if required)	One set per matrix and batch of 20 samples RPD < 35%	J/UJ assoc. cmpd. in all samples			
Surrogates	Added to all samples Within method control limits	J if %R >UCL J/UJ if %R <lcl but="">10% J/R if <10%</lcl>			
Internal Standard (IS)	Added to all samples Acceptable Range: IS area 50% to 200% of CCAL area RT within 30 seconds of CC RT	J if > 200% J/UJ if < 50% J/R if < 25% RT>30 seconds, narrate and Notify PM			
Field Duplicates	Use QAPP limits. If no QAPP: Solids: RPD <50% OR absolute diff. < 2X RL (for results < 5X RL)	Narrate and qualify if required by project (Floyd Snider PJ)			
	Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)				
TICs	Major ions (>10%) in reference must be present in sample; intensities agree within 20%; check identification	NJ the TIC unless: R common laboratory contaminants See Technical Director for ID issues			

Validation QC Element	Acceptance Criteria	Action
Quantitation/ Identification	RRT within 0.06 of standard RRT lon relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers

Notes:

PJ¹ No action if there are 4+ surrogates and only 1 outlier

Floyd|Snider Validation Guidelines for Metals Analysis by ICP-MS (Based on Inorganic NFG 1994 & 2004)

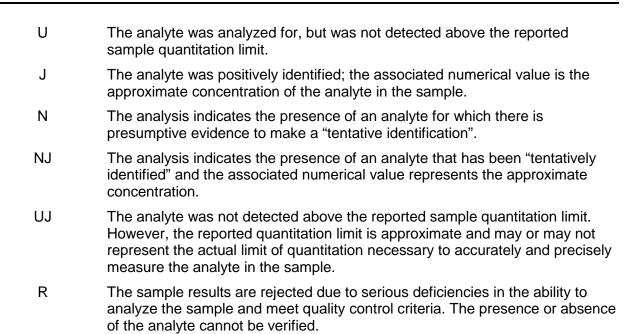
Validation QC Element	Acceptance Criteria	Action		
Cooler Temperature and Preservation	Cooler temperature: 4°C ±2° Waters: Nitric Acid to pH < 2 For Dissolved Metals: 0.45um filter & preserve after filtration	Floyd Snider Professional Judgment—no qualification based on cooler temperature outliers J/UJ if pH preservation requirements are not met		
Holding Time	180 days from date sampled Frozen tissues—HT extended to 2 years	J/UJ if holding time exceeded		
Tune	Prior to ICAL monitoring compounds analyzed 5 times wih Std Dev. < 5% mass calibration <0.1 amu from True Value Resolution < 0.9 AMU @ 10% peak height or <0.75 amu @ 5% peak height	Use Professional Judgment to evaluate tune J/UJ if tune criteria not met		
Initial Calibration	Blank + minimum 1 standard If more than 1 standard, r>0.995	J/UJ if r<0.995 (for multi point cal)		
Initial Calibration Verification (ICV)	Independent source analyzed immediately after calibration %R within ±10% of true value	J/UJ if %R 75–89% J if %R = 111-125% R if %R > 125% R if %R < 75%		
Continuing Calibration Verification (CCV)	Every ten samples, immediately following ICV/ICB and at end of run ±10% of true value	J/UJ if %R = 75–89% J if %R 111-125% R if %R > 125% R if %R < 75%		
Initial and Continuing Calibration Blanks (ICB/CCB)	After each ICV and CCV every ten samples and end of run blank < IDL (MDL)	Action level is 5x absolute value of blank conc. For (+)blanks, U results < action level For (-) blanks, J/UJ results < action level		

Validation QC Element	Acceptance Criteria	Action				
Reporting Limit Standard (CRI)	2x RL analyzed beginning of run Not required for Al, Ba, Ca, Fe, Mg, Na, K %R = 70%-130% (50%-150% Co,Mn, Zn)	R, < 2x RL if %R < 50% (< 30% Co,Mn, Zn) J < 2x RL, UJ if %R 50-69% (30%-49% Co,Mn, Zn) J < 2x RL if %R 130%-180% (150%-200% Co,Mn, Zn) R < 2x RL if %R > 180% (200% Co, Mn, Zn)				
Interference Check Samples (ICSA/ICSAB)	Required by SW 6020, but not 200.8 ICSAB %R 80% - 120% for all spiked elements ICSA < IDL (MDL) for all unspiked elements	For samples with AI, Ca, Fe, or M > ICS levels R if %R < 50% J if %R >120% J/UJ if %R = 50% to 79% Use Professional Judgment for ICSA to determine if bias is present				
Method Blank	One per matrix per batch (batch not to exceed 20 samples) blank < MDL	Action level is 5x blank concentration U results < action level				
Laboratory Control Sample (LCS)	One per matrix per batch Blank Spike: %R within 80%-120%	R if %R < 50% J/UJ if %R = 50-79% J if %R >120%				
	CRM: Result within manufacturer's certified acceptance range or project guidelines	J/UJ if < LCL, J if > UCL				
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	One per matrix per batch 75-125% for samples where results do not exceed 4x spike level	J if %R>125% J/UJ if %R <75% J/R if %R<30% or J/UJ if Post Spike %R 75%-125% Qualify all samples in batch				
Post-digestion Spike	If Matrix Spike is outside 75-125%, Spike parent sample at 2x the sample conc.	No qualifiers assigned based on this element				
Laboratory Duplicate (or MS/MSD)	One per matrix per batch RPD < 20% for samples > 5x RL Diff < RL for samples > RL and < 5 x RL (Diff < 2x RL for solids)	J/UJ if RPD > 20% or diff > RL All samples in batch				
Serial Dilution	5x dilution one per matrix %D < 10% for original sample values > 50x MDL	J/UJ if %D >10% All samples in batch				

Validation QC Element	Acceptance Criteria	Action			
Internal Standards	Every sample SW6020: 60%-125% of cal blank IS 200.8: 30%-120% of cal blank IS	J /UJ all analytes associated with IS outlier			
Field Blank	Blank < MDL	Action level is 5x blank conc. U sample values < AL in associated field samples only			
Field Duplicate	For results > 5x RL: Water: RPD < 35% Solid: RPD < 50% For results < 5 x RL: Water: Diff < RL Solid: Diff < 2x RL	J/UJ in parent samples only			
Linear Range	Sample concentrations must fall within range	J values over range			

DATA VALIDATION QUALIFIER CODES National Functional Guidelines

The following definitions provide brief explanations of the qualifiers assigned to results in the data review process.



The following is a Floyd|Snider qualifier that may also be assigned during the data review process:

DNR Do not report; a more appropriate result is reported from another analysis or dilution.

July 2013 Groundwater Sampling Event South Park Landfill

Data Validation Report

Appendix B **Qualified Data Summary Table**

Table B.1

Qualified Data Summary Table

July 2013 Groundwater Sampling Event

SDG	Sample ID	Lab ID	Method	Analyte	Result	Units	Lab Qualifier	DV Qualifier	Final Qualifier
WX67	SPL-GW-MW26- 071613	WX67C 13- 14991	EPA 8260C	Trichloroethene	0.37	μg/L	M	J	JM
WX79	SPL-GW-MW12- 071713	WX79A 13- 15130	EPA 8260C-SIM	cis-1,2-Dichloroethene	5.7	μg/L	E	DNR	DNR
WX79	SPL-GW-MW12- 071713	WX79A 13- 15130	EPA 8260C	cis-1,2-Dichloroethene	5.4	μg/L		J-H	J

Qualifiers:

DNR Do not report. A more appropriate result from another analysis or dilution is available.

Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

J The analyte was detected; the result should be considered an estimate.

J-H The analyte was positively identified; the associated numerical value should be considered an estimate due to analysis outside of method holding time.

JM The analyte was detected; the result should be considered an estimated due to poor spectral match.

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters.