South Park Landfill

July 2013 Interim Site-wide Groundwater Monitoring Results

Prepared for

City of Seattle
South Park Property Development, LLC

October 2013

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CERTIFICATION

This document has been prepared for the City of Seattle under the direction of:

John Jacob Strunk

Name: John Strunk, LHG

Date: October 14, 2013

AUTHOR RECOGNITION

The following individuals have contributed to the preparation of this July 2013 Interim Site-wide Groundwater Monitoring Results:

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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.* Prepared for the City of Seattle and South Park Property Development, LLC. 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. T*echnical 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.

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Table

Table 3.1
July 2013 Groundwater Sample Analytical Results

	Location	KMW-03A	KMW-05	KMW-08		MW-08	MW-10	MW-12	MW-14	MW-18	MW-24
	X-coord[1]	1270170.48	1269861.86	1269692.89	1269692.89	1271368.12	1270569.12	1269783.23	1269963.2	1271077.67	1271162.48
	Y-coord[1]	197585.09	197427.44	197356.14	197356.14	196837.87	197647.09	196963.92	196398.73	196350.26	197102.37
	Sample ID	SPL-GW-KMW03A-071813	SPL-GW-KMW05-071813	SPL-GW-KMW08-071813	SPL-GW-MW61-071813	SPL-GW-MW08-071613	SPL-GW-MW10-071513	SPL-GW-MW12-071713	SPL-GW-MW14-071713	SPL-GW-MW18-071713	SPL-GW-MW24-071613
	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
Analyte	**Units**										
Conventionals by USEPA 300.0, 350.1M, 376.2, and SM 2320											
Chloride	mg/L	12.8	163	8.4	8.4	145	17.1	14.4	26.3	21.5	38.1
Sulfate	mg/L	0.1 U	1,140	23.7	23.6	2.3	69.2	5.4	3.4	10.8	4.9
Sulfide	mg/L	0.05 U	23.6	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.118	0.05 U	0.077
N-ammonia	mg-N/L	3.06	64.4	0.596	0.339	3.1	3.69	0.744	0.228	2.58	2.53
N-nitrate	mg-N/L	0.1 U	10 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	10 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 $CaCO_3$	354	7,930	156	150	356	309	171	206	574	340
Bicarbonate	mg/L $CaCO_3$	354	1 U	156	150	356	309	171	206	574	340
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
Hydroxide	mg/L $CaCO_3$	1 U	5,370	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
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	59.4
Iron, dissolved	mg/L	10.4	5.2	0.16	0.16	17.7	21.9	8.49	4.04	44.4	14.6
Iron, total	mg/L	10.8	5.9	0.31	0.29	17.6	22.7	17.7	4.64	48.9	14.1
Magnesium, dissolved	mg/L	26	0.5 U	6.51	6.49	38.3	31.4	14.7	23.8	65.9	26.8
Manganese, dissolved	mg/L	0.036	0.01 U	0.165	0.165	1.05	1.29	0.495	0.494	1.84	1.15
Manganese, total	mg/L	0.04	0.01 U	0.172	0.17	1.03	1.32	0.504	0.48	1.83	1.13
Potassium, dissolved	mg/L	14.7	4,280	28	27.5	15.1	9.2	3.7	4.6	16.9	11.2
Sodium, dissolved	mg/L	22.7	1,570	24.2	24.1	133	57.4	21.5	15.7	46	58.4
VOCs by SW8260C											
Benzene	µg/L		7.2	0.2 U	0.2 U						
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	0.2 U
Trichloroethene	µg/L	0.2 U	4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.15[2]	0.02 U	0.02 U	0.2 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	0.02 U
Field Parameters											
Dissolved oxygen	mg/L	1.46	1.05	1.42	--	2.33	1.90	2.29	1.70	2.51	2.52
ORP	mV	-216.60	-536.50	65.50	--	-87.10	-91.90	-17.70	-67.40	-762.00	-43.20
pH	pH	7.62	12.91	6.69	--	6.77	6.73	6.71	6.77	6.61	6.70
Specific conductance	µS/cm	717.00	31,928.00	404.00	--	1,149.00	784.00	384.60	496.00	1,093.00	768.00

		Proposed CUL (Potential Scenarios)		
Monitored Analytes	**Units**	**Drinking Water**	**Protection of Surface Water**	**Upgradient or 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:

$CaCO_3$ 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.

Table 3.1
July 2013 Groundwater Sample Analytical Results

	Location	MW-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
	Sample ID	SPL-GW-MW25-071513	SPL-GW-MW60-071513	SPL-GW-MW26-071613	SPL-GW-MW27-071613	SPL-GW-MW29-071713	SPL-GW-MW30-071613	SPL-GW-MW31-071613	SPL-GW-MW32-071513	SPL-GW-MW33-071513
	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 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 $CaCO_3$	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										
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										
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 Scenarios)		
Monitored Analytes	**Units**	**Drinking Water**	**Protection of Surface Water**	**Upgradient or 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.
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Abbreviations:

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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

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Figures

Legend

- Monitoring Well: Perched Zone/A-Zone
- Monitoring Well: B-Zone
- Monitoring Well: Perched Zone/A-Zone Groundwater Elevation Only
- Monitoring Well: B-Zone Groundwater Elevation Only
- Surface Water Monitoring: Groundwater Elevation Only
- Monitoring Well: Zones Not Used in Site-wide Monitoring
- Piezometer
- Reconnaissance Groundwater Probe
- Proposed POC Well
- West Ditch
- Revised Landfill Boundary (Based on RI/FS)
- King County Tax Parcels
- Generalized Groundwater Flow

Notes:

- Aerial imagery provided by ESRI.
- 7901 = 7901 2nd Avenue, LLC
- KIP = Kenyon Industrial Park
- POC = Point of Compliance
- RI/FS = Remedial Investigation/Feasibility Study
- SPPD = South Park Property Development, LLC
- SRDS = South Recycling and Disposal Station

0 150 300 600

Scale in Feet

N

Upgradient Wells Representing Groundwater Quality Entering Site			Proposed POC Well
KMW-05	Upgradient	Perched Zone/A-Zone	No
KMW-08	Upgradient	A-Zone	No
MW-12	Upgradient	A-Zone	No
MW-14	Upgradient	A-Zone	No
MW-29	Upgradient	A-Zone	No
Downgradient Wells Representing Edge of Waste			
KMW-03A	Edge of waste	Perched Zone/A-Zone	No
MW-08	Downgradient	B-Zone	Yes
MW-10	Downgradient	B-Zone	Yes
MW-24	Downgradient	B-Zone	Yes
MW-26	Downgradient	A-Zone	Yes
MW-27	Downgradient	A-Zone	Yes
MW-18	Edge of waste	B-Zone	Yes
MW-25	Edge of waste	A-Zone	Yes
MW-32	Edge of waste	A-Zone	Yes
MW-33	Edge of waste	A-Zone	Yes
Wells Representing Conditions Near Former Glitsa Property			
MW-30	Downgradient	Perched Zone	No
MW-31	Downgradient	A-Zone	No

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

Figure 1.1
July 2013 Groundwater Monitoring Locations

I:\GIS\Projects\COS-SPARK\MXD\Figure 1 (Groundwater Monitoring Locations)Version2.mxd
10/2/2013

Legend

- Flow Path (Orange Denotes Start Point)
- 1-Foot Groundwater Elevation Contours

Monitoring Well Locations

- Not Included in Analysis
- Used for Contouring and Flow Path Analysis
- Revised Landfill Boundary (Based on RI/FS)
- Tax Parcels

Notes:

· Tax parcels provided by King County Geographic Information Systems Center.
· Aerial imagery provided by ESRI
· Water levels at KMW-02B, MW-01, MW-04, MW-08, MW-10, MW-24, and MW-30 were not used in the creation of the groundwater elevation contour map.

SR 509
S KENYON ST
OCCIDENTAL AVE S
5TH AVE S
S SULLIVAN ST
S CLOVERDALE ST

KMW-07 13.43
KMW-06 7.91
KMW-03A 7.94
MW-25 5.79
MW-31 5.70
MW-30
FB-14
KMW-05 9.86
KMW-08 13.30
KMW-04 7.93
MW-32 5.77
KMW-02B 8.22
MW-33 5.94
SG-2N 9.23
KMW-01A 7.55
MW-26 5.88
MW-24
FB-07
FB-08
MW-12 12.30
FB-09
FB-10
FB-11
MW-27 5.98
MW-08
MW-03
SG-1S 9.54
MW-14 15.66
MW-18 6.09
MW-01
MW-29 10.66
MW-04
MW-06 7.14

12 11 13 10 14 12 9 8 7 6

0 100 200 400
Scale in Feet

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

Figure 2.1
Groundwater Elevation Contour Map
July 2013

T:\projects_8\SouthPark_Landfill\Delivered\July2013Monitoring\RevSept20-2013\Fig 2-1 GW Elevation Contour Map.mxd
10/7/2013

Legend

Well Locations:

- B-Zone Monitoring Well
- Perched Zone/A-Zone Monitoring Well
- Perched Zone Monitoring Well
- Kenyon Street Bus Yard Monitoring Well

Well Labels:

KMW-05
(July-2013)
TCE: 4U
cis-DCE: 4U
VC: 0.4U
Benz: 7.2

- KMW-05 — *Well ID*
- (July-2013) — *Sample Month-Year*
- TCE: 4U — *Trichloroethene in µg/L*
- cis-DCE: 4U — *cis-1,2-Dichlorethene in µg/L*
- VC: 0.4U — *Vinyl Chloride in µg/L*
- Benz: 7.2 — *Benzene in µg/L*

· Qualifier "U" = The analyte was not detected at the reported concentration.
· Qualifier "J" = The reported concentration is an estimate.
· Qualifier "JM" = Analyte was detected; the result should be considered an estimate due to poor spectral match.
· -- indicates parameter not analyzed.

Monitored Chemicals	Units	Proposed CUL (Potential Scenarios)		
		Drinking Water	Protection of Surface Water	Upgradient or 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	2.4	

Revised Landfill Boundary (based on RI/FS)

Tax Parcel

1,000-Foot Perimeter from Landfill Boundary

Notes:
· Tax parcels provided by King County Geographic Information Systems Center.
· Aerial imagery provided by ESRI
· CUL - Cleanup Level
· µg/L - Micrograms per liter
· RI/FS - Remedial Investigation/Feasibility Study

DUWAMISH WATERWAY

S HOLDEN ST
SR 509
S KENYON ST
5TH AVE S
OCCIDENTAL AVE S
S SULLIVAN ST
S CLOVERDALE ST
SR 99 (W MARGINAL WAY S)

BYMW-5
(Feb-2008)
VC: 0.2U

BYMW-11
(July-2008)
VC: 0.2U

KMW-03A
(July-2013)
TCE: 0.2U
cis-DCE: 0.2U
VC: 0.35
Benz: --

KMW-05
(July-2013)
TCE: 4U
cis-DCE: 4U
VC: 0.4U
Benz: 7.2

KMW-08
(July-2013)
TCE: 0.2U
cis-DCE: 0.2U
VC: 0.02U
Benz: 0.2U

MW-25
(July-2013)
TCE: 0.2U
cis-DCE: 0.75
VC: 1.1
Benz: 0.33

MW-31
(July-2013)
TCE: 0.2U
cis-DCE: 5.2
VC: 4.3
Benz: --

MW-30
(July-2013)
TCE: 0.75
cis-DCE: 1.6
VC: 0.5
Benz: --

MW-10
(July-2013)
TCE: 0.2U
cis-DCE: 1.6
VC: 0.84
Benz: --

MW-32
(July-2013)
TCE: 0.2U
cis-DCE: 1.7
VC: 0.3
Benz: --

MW-33
(July-2013)
TCE: 0.2U
cis-DCE: 0.2U
VC: 0.78
Benz: --

MW-12
(July-2013)
TCE: 0.15
cis-DCE: 5.4J
VC: 0.22
Benz: --

MW-14
(July-2013)
TCE: 0.02U
cis-DCE: 0.02U
VC: 0.02U
Benz: --

MW-29
(July-2013)
TCE: 0.02U
cis-DCE: 0.034
VC: 0.02U
Benz: --

MW-24
(July-2013)
TCE: 0.2U
cis-DCE: 0.2U
VC: 0.02U
Benz: --

MW-26
(July-2013)
TCE: 0.37JM
cis-DCE: 0.3
VC: 0.022
Benz: --

MW-27
(July-2013)
TCE: 0.2U
cis-DCE: 0.41
VC: 0.14
Benz: --

MW-08
(July-2013)
TCE: 0.2U
cis-DCE: 0.2U
VC: 0.063
Benz: --

MW-18
(July-2013)
TCE: 0.02U
cis-DCE: 0.044
VC: 0.075
Benz: --

N

0 200 400 800
Scale in Feet

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

Figure 3.1
Groundwater Sample Analytical Results
Benzene and Chlorinated Ethenes

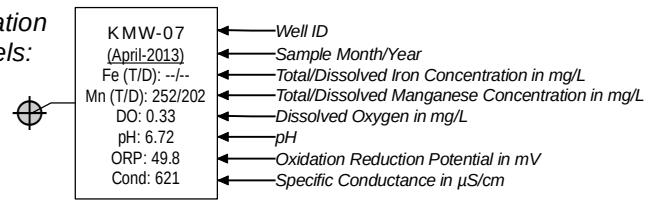
T:\projects_8\SouthPark_Landfill\Delivered\July2013Monitoring\RevSept20-2013\Fig 3-1 GW TPHs and Benzene.mxd
10/7/2013

Legend

Exploration Locations:

- B-Zone Monitoring Well
- Perched Zone/A-Zone Monitoring Well
- Perched Zone Monitoring Well

Location Labels:



· Qualifier "U" = The analyte was not detected at the reported concentration.
· -- indicates parameter not analyzed.

Monitored Chemicals	Units	Proposed CUL (Potential Scenarios)		
		Drinking Water	Protection of Surface Water	Upgradient or Background
Iron	mg/L			18
Manganese	mg/L			2

- Revised Landfill Boundary (based on RI/FS)
- Tax Parcel
- 1,000-Foot Perimter from Landfill Boundary

Notes:
· Tax parcels provided by King County Geographic Information Systems Center.
· Aerial imagery provided by ESRI
· CUL - Cleanup level
· µg/L - Micrograms per liter
· µS/cm - Microsiemens per centimeter
· mV - millivolts
· RI/FS - Remedial Investigation/Feasibility Study

DUWAMISH WATERWAY

S HOLDEN ST

KMW-03A
(July-2013)
Fe(T/D): 10.8/10.4
Mn(T/D): 0.04/0.036
DO: 1.46
pH: 7.62
ORP: -216.6
Sp.Cond: 717

MW-25
(July-2013)
Fe(T/D): 11.8/11.2
Mn(T/D): 0.856/0.84
DO: 2.27
pH: 6.63
ORP: -54
Sp.Cond: 400.4

MW-32
(July-2013)
Fe(T/D): 26.7/26.4
Mn(T/D): 2.48/2.46
DO: 3.26
pH: 6.71
ORP: -89.1
Sp.Cond: 1333

MW-30
(July-2013)
Fe(T/D): 4.53/4.58
Mn(T/D): 0.111/0.111
DO: 3.16
pH: 6.47
ORP: 2.6
Sp.Cond: 519.8

KMW-05
(July-2013)
Fe(T/D): 5.9/5.2
Mn(T/D): 0.01U/0.01U
DO: 1.05
pH: 12.91
ORP: -536.5
Sp.Cond: 31928

S KENYON ST

SR 509

MW-31
(July-2013)
Fe(T/D): 8.29/7.89
Mn(T/D): 0.264/0.258
DO: 2.31
pH: 6.57
ORP: -46.6
Sp.Cond: 293

MW-26
(July-2013)
Fe(T/D): 10.3/7.11
Mn(T/D): 0.165/0.16
DO: 2.08
pH: 6.21
ORP: 10.4
Sp.Cond: 185.1

KMW-08
(July-2013)
Fe(T/D): 0.31/0.16
Mn(T/D): 0.17/0.165
DO: 1.42
pH: 6.69
ORP: 65.5
Sp.Cond: 404

MW-10
(July-2013)
Fe(T/D): 22.7/21.9
Mn(T/D): 1.32/1.29
DO: 1.9
pH: 6.73
ORP: -91.9
Sp.Cond: 784

5TH AVE S

MW-08
(July-2013)
Fe(T/D): 17.6/17.7
Mn(T/D): 1.03/1.05
DO: 2.33
pH: 6.77
ORP: -87.1
Sp.Cond: 1149

1ST AVE S

MW-33
(July-2013)
Fe(T/D): 19.5/19.3
Mn(T/D): 1.88/1.87
DO: 3.01
pH: 6.7
ORP: -95.1
Sp.Cond: 1576

MW-24
(July-2013)
Fe(T/D): 14.1/14.6
Mn(T/D): 1.13/1.15
DO: 2.52
pH: 6.7
ORP: -43.2
Sp.Cond: 768

MW-27
(July-2013)
Fe(T/D): 19.5/17.8
Mn(T/D): 0.528/0.507
DO: 1.97
pH: 6.8
ORP: -93.5
Sp.Cond: 323.2

MW-12
(July-2013)
Fe(T/D): 17.7/8.49
Mn(T/D): 0.504/0.495
DO: 2.29
pH: 6.71
ORP: -17.7
Sp.Cond: 384.6

MW-14
(July-2013)
Fe(T/D): 4.64/4.04
Mn(T/D): 0.48/0.494
DO: 1.7
pH: 6.77
ORP: -67.4
Sp.Cond: 496

MW-18
(July-2013)
Fe(T/D): 48.9/44.4
Mn(T/D): 1.83/1.84
DO: 2.51
pH: 6.61
ORP: -762
Sp.Cond: 1093

SR 99 (W MARGINAL WAY S)

MW-29
(July-2013)
Fe(T/D): 18.3/18.2
Mn(T/D): 1.24/1.25
DO: 2.18
pH: 6.44
ORP: -40.3
Sp.Cond: 1095

5TH AVE S

S SULLIVAN ST

S CLOVERDALE ST

N

0 200 400 800
Scale in Feet

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

Figure 3.2
Groundwater Sample Analytical Results
Iron and Manganese

T:\projects_8\SouthPark_Landfill\Delivered\July2013Monitoring\RevSept20-2013\Fig 3-2 GW Iron and Manganese.mxd
10/7/2013

Legend

Well Locations:

- B-Zone Monitoring Well
- Perched Zone/A-Zone Monitoring Well
- Perched Zone Monitoring Well

Well Labels:

MW-10	*Well ID*
(April-2013)	*Sample Month/Year*
Ammonia:3.04	*Ammonia in mg-N/L*
Nitrite:5U	*Nitrate as Nitrogen in mg/L*
Nitrate: *0.01U*	*Nitrate as Nitrogen in mg/L*
Sulfate: *17.8*	*Sulfate in mg/L*
Sulfide: *30.6*	*Sulfide in mg/L*
DO:1.2	*Dissolved Oxygen in mg/L*
ORP: *-55.2*	*Oxidation Reduction Potential in mV*

- Qualifier "U" = The analyte was not detected at the reported concentration.
- Qualifier "J" = The reported concentration is an estimate.
- *BLUE ITALICS* indicate favorable conditions for natural attenuation of hydrocarbon fuels or chlorinated solvents (values from USEPA/600/R-98/128 1998):
  - Dissolved Oxygen: less than 0.5 mg/L
  - Oxidation Reduction Potential: less than 50 mV
  - Nitrate as Nitrogen: less than 1 mg/L
  - Sulfate: less than 20 mg/L
  - Sulfide: greater than 1 mg/L

- Revised Landfill Boundary (Based on RI/FS)
- 1,000-Foot Perimeter from Landfill Boundary
- Tax Parcel

Notes:

- Tax parcels provided by King County Geographic Information Systems Center.
- Aerial imagery provided by Esri
- Only well locations sampled for natural attenuation parameters are illustrated.
- µg/L - Micrograms per liter
- mg/L - Milligrams per liter
- mg-N/L - Milligrams per liter as nitrogen
- mV - millivolts
- USEPA - United States Environmental Protection Agency
- RI/FS - Remedial Investigation/Feasibility Study

DUWAMISH WATERWAY

S HOLDEN ST

S KENYON ST

S KENYON ST

SR 509

1ST AVE S

OCCIDENTAL AVE S

5TH AVE S

5TH AVE S

SR 99 (W MARGINAL WAY S)

S SULLIVAN ST

S CLOVERDALE ST

KMW-05
(July-2013)
Ammonia: 64.4
Nitrite: 10U
Nitrate: 10U
Sulfate: 1140
Sulfide: *23.6*
DO: 1.05
ORP: *-536.5*

KMW-03A
(July-2013)
Ammonia: 3.06
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *0.1U*
Sulfide: 0.05U
DO: 1.46
ORP: *-216.6*

MW-25
(July-2013)
Ammonia: 2.89
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *0.4*
Sulfide: 0.05U
DO: 2.27
ORP: *-54*

MW-31
(July-2013)
Ammonia: 1.68
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *0.1*
Sulfide: 0.05U
DO: 2.31
ORP: *-46.6*

KMW-08
(July-2013)
Ammonia: 0.339
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: 23.6
Sulfide: 0.05U
DO: 1.42
ORP: 65.5

MW-10
(July-2013)
Ammonia: 3.69
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: 69.2
Sulfide: 0.05U
DO: 1.9
ORP: *-91.9*

MW-30
(July-2013)
Ammonia: 0.515
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *11.3*
Sulfide: 0.05U
DO: 3.16
ORP: *2.6*

MW-26
(July-2013)
Ammonia: 0.1
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *11.6*
Sulfide: 0.05U
DO: 2.08
ORP: *10.4*

MW-27
(July-2013)
Ammonia: 2.02
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *0.4*
Sulfide: 0.05U
DO: 1.97
ORP: *-93.5*

MW-32
(July-2013)
Ammonia: 10
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *19.2*
Sulfide: 0.05U
DO: 3.26
ORP: *-89.1*

MW-24
(July-2013)
Ammonia: 2.53
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *4.9*
Sulfide: 0.077
DO: 2.52
ORP: *-43.2*

MW-08
(July-2013)
Ammonia: 3.1
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *2.3*
Sulfide: 0.05U
DO: 2.33
ORP: *-87.1*

MW-12
(July-2013)
Ammonia: 0.744
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *5.4*
Sulfide: 0.05U
DO: 2.29
ORP: *-17.7*

MW-33
(July-2013)
Ammonia: 15.6
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *0.1*
Sulfide: 0.05U
DO: 3.01
ORP: *-95.1*

MW-18
(July-2013)
Ammonia: 2.58
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *10.8*
Sulfide: 0.05U
DO: 2.51
ORP: *-762*

MW-14
(July-2013)
Ammonia: 0.228
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: *3.4*
Sulfide: 0.118
DO: 1.7
ORP: *-67.4*

MW-29
(July-2013)
Ammonia: 0.855
Nitrite: 0.1U
Nitrate: *0.1U*
Sulfate: 295
Sulfide: 0.05U
DO: 2.18
ORP: *-40.3*

N

0 200 400 800

Scale in Feet

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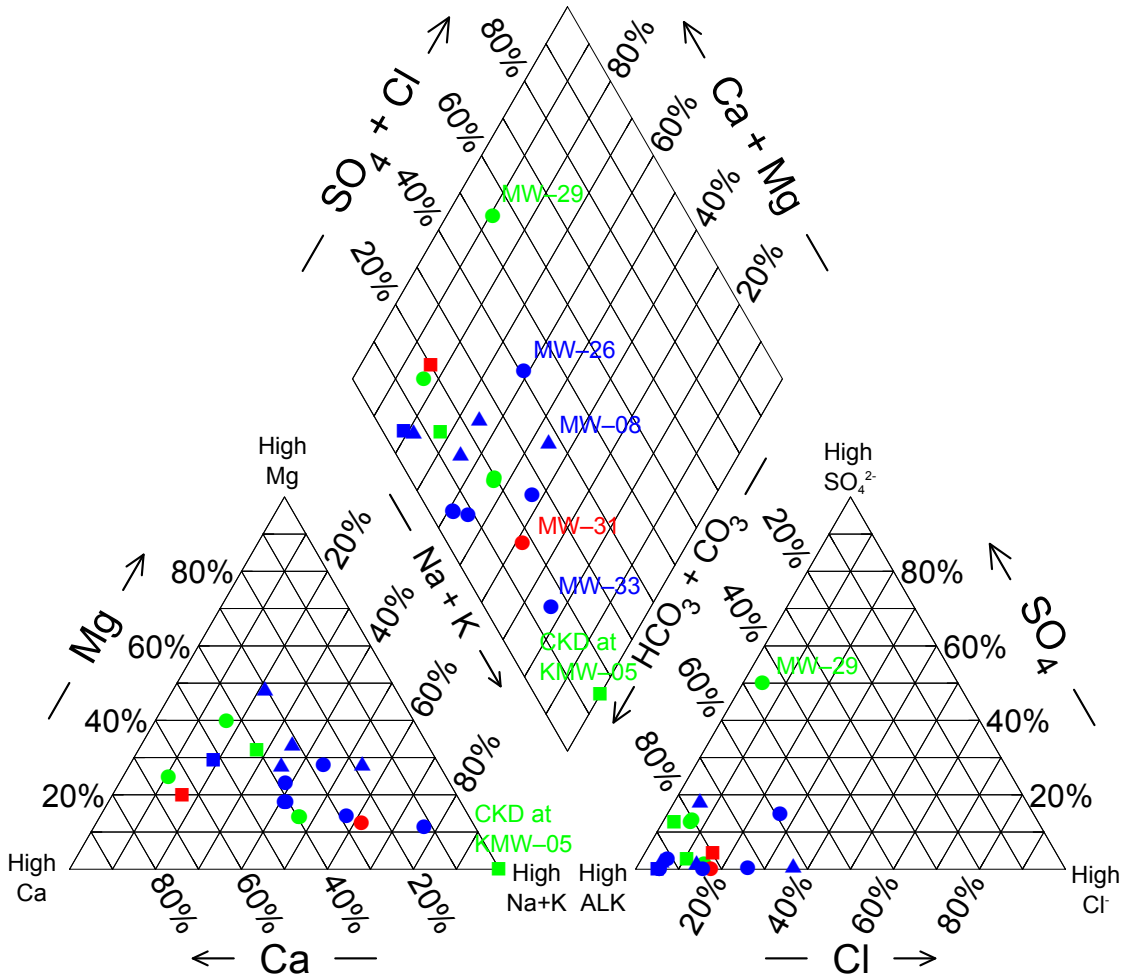
Interim Site-wide Groundwater Monitoring
South Park Landfill
Seattle, Washington

Figure 3.3
Groundwater Sample Analytical Results
Long-term Groundwater Monitoring Parameters

T:\projects_8\SouthPark_Landfill\Delivered\July2013Monitoring\RevSept20-2013\Fig 3-3 GW Natural Attenuation Params.mxd
10/7/2013



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.

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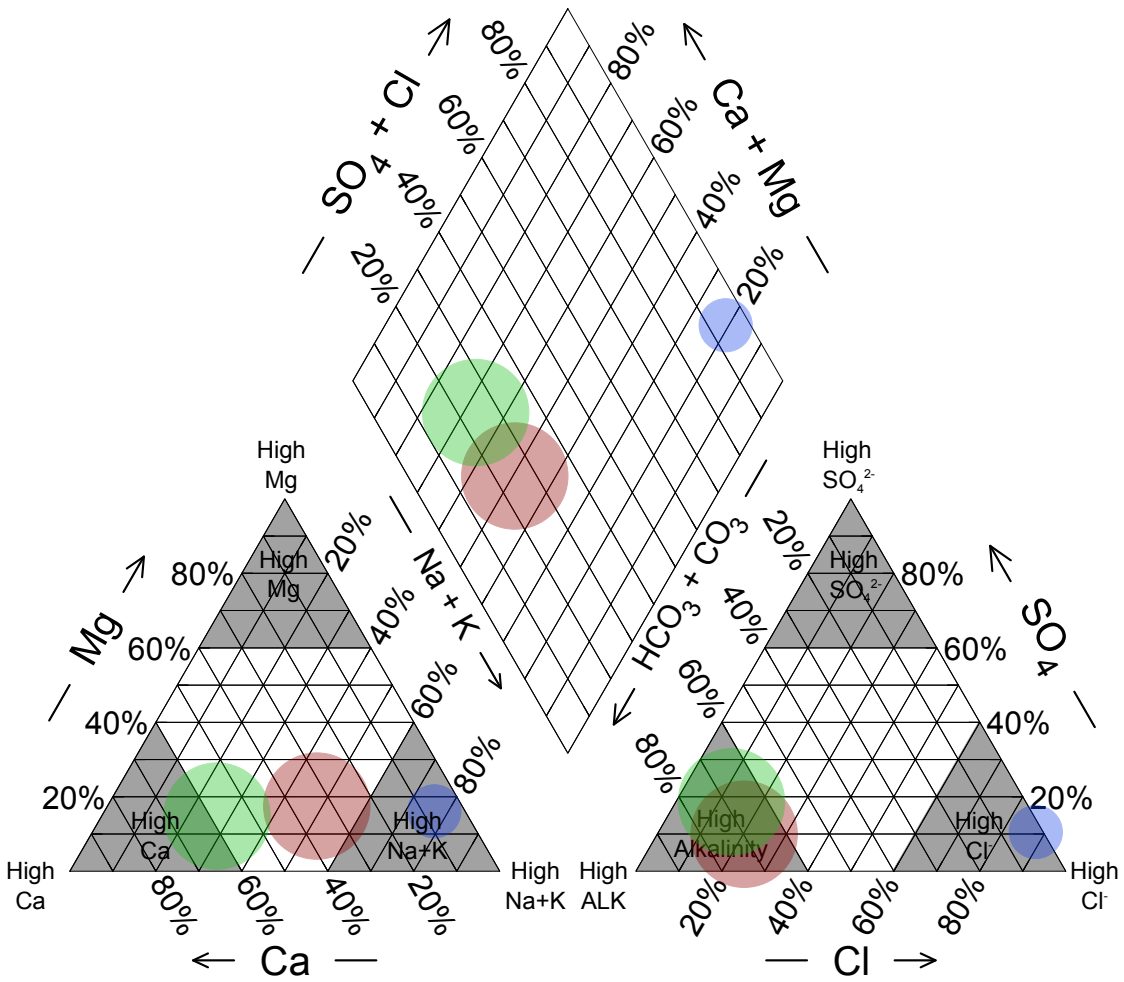
Interim Site-Wide Groundwater Monitoring
South Park Landfill
Seattle, Washington

Figure 3.4
July 2013 Groundwater Monitoring
Trilinear Plot of Major Cations and Anions



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

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

South Park Landfill

July 2013 Interim Site-wide Groundwater Monitoring Results

Appendix A
Groundwater Sampling Field Forms

Aspect CONSULTING

Sample number SPL-GW-MW-32-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-32 Page: 1 of 1

Project Name: South Park
Date: 7/15/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 11.30
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	0.5	10%?	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
11:13		0.4								
11:15				14.2	1301	2.97	6.64	-34.3	Clear	Start Purge
11:20				14.4	1286	2.95	6.67	-70.5	"	
11:25				14.3	1315	2.86	6.69	-81.4	"	
11:30				14.3	1329	3.11	6.71	-86.5	"	
11:35				14.3	1333	3.26	6.71	-84.1	3.51	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
11:45	40mL	VOA	3	No	HCl, 2 no	clear	3.51	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			MD Headspace

Parameters measured with (instrument model & serial number): YSI Pro+ y/cm

Purging Equipment: dedicated poly QED + tubing Decon Equipment: Alconox + DI

Disposal of Discharged Water: Drum on site

Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-MW-33-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW33 Page: 1 of 1

Project Name: South Park
Project Number: 100116
Date: 7/15/13
Sampled by: SM/CM
Starting Water Level (ft TOC): 11.40
Measuring Point of Well:
Casing Stickup (ft):
Screened Interval (ft. TOC)
Total Depth (ft TOC):
Filter Pack Interval (ft. TOC)
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
12:26		0.300 Lpm								
12:30			11.40	15.4	1572	3.69	6.66	-77.5	Clear	Start pump
12:35				15.3	1578	3.42	6.66	-86.5	"	
12:40				15.4	1578	3.19	6.69	-91.0	"	ORP= ~~-85~~ -86.5
12:45				15.5	1577	3.01	6.70	-93.8	"	
12:50				15.5	1576	3.01	6.70	-95.1	4.25	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____
Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1300	40mL	VOA	3	No	HCl, 2 no	clear	4.25	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			ALK
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			pH

NO Headspace!

Parameters measured with (instrument model & serial number): YSI yellow
Purging Equipment: dedicated peristaltic pump Decon Equipment: 4L Comply + DI
Disposal of Discharged Water: on site Drum
Observations/Comments: after sampling, removed tubing & deployed dedicated QED Pump preserved VOAs were effervescing resulting in small bubbles

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

Aspect CONSULTING

Sample number: SPL-GW-MW-25-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-25 Page: 1 of 1

Project Name: South Park
Date: 7/15/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 14.30
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
13:39		0.350								
13:45				16.0	384.3	2.98	6.53	-57.4	Clear	Start Pump
13:50				17.4	387.7	2.60	6.62	-46.4	"	
13:55				18.6	383.7	2.37	6.67	-44.2	"	Pump off
14:00				15.2	379.0	3.00	6.80	-37.2	"	
14:05				15.2	379.2	2.64	6.52	-38.3	"	
14:10				15.1	392.9	2.39	6.57	-45.7		ORP = -45.7
14:15				15.1	400.4	2.27	6.63	-54.0	7.55	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
14:10	40mL	VOA	3	No	HCl, 2 no	clear	7.55	Collected Field Dup Time (14:30) ID: SPL-GW-MW25-071513
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	500mL	HDPE	1	YES	HNO3			VOC 8260C-SIM (VC)
	500 mL	HDPE	1	NO	HNO3			Dissolved Metals Na, K, Ca, Mg, Fe, Mn
	Small	OS	1	NO	NO			total metals Fe, Mn
	1L	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	500mL	HDPE	1	No	H_2SO_4			Alk
	500mL	HDPE	1	No	Zn acetate			NH3 (Ammonia)

METHODS

ND Headspace

Parameters measured with (instrument model & serial number): YSI PRO+ yellow
Purging Equipment: peristaltic Redi-flo2 QED tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on site

Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW10-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW 10 Page: 1 of 1

Project Name: South Park
Date: 7/15/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 13.63
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	±3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1436		0.30								
1440				15.0	390	2.23	6.91	-13.7	clear	Start Pump
1445				15.1	765	1.65	6.64	-69.7		
1450				15.1	798	1.74	6.68	-81.8		
1455				15.0	779	1.45	6.71	-88.2		
1500				15.0	784	1.90	6.73	-91.9	16.6	
~~1505~~										

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1505	40mL	VOA	3	No	HCl, 2 no	clear	16 lb	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	~~500~~mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OJ	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OJ	1	NO	NO			Alk
	~~500 mL~~	HDPE	1	NO	H_2SO_4			NH3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			NO Headspace

Parameters measured with (instrument model & serial number): YSI Pro Plus yellow
Purging Equipment: Dedicated tubing + peristaltic Decon Equipment: Alconox + DI water
Disposal of Discharged Water: Drum on site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW30-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-3D Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/CM AFT
Measuring Point of Well: TOC
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 10.67
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
0948	0	0.3	10.67							
0953				14.4	456.5	3.00	6.35	40.0	clear	Started
0958				14.3	476.5	3.28	6.41	24.3	clear	
1003				14.4	496.4	2.90	6.46	13.6	clear	
1008				14.4	511.5	3.00	6.46	7.1	clear	
1013				14.4	519.8	3.16	6.47	2.6	clear	
									0.89	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1015	40mL	VOA	3	No	1HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	1HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500 mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			ND Headspace!

Parameters measured with (instrument model & serial number): YSI yellow 12K-121H
Purging Equipment: peristaltic pump Decon Equipment: _____
Disposal of Discharged Water: drum
Observations/Comments: _____

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Sample number SPL-GW-MW31-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW31 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/~~EM~~ AET
Measuring Point of Well: TOC
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 11.42
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	±3% 10%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
10:23		0.35								Start Pump
10:25				14.7	336	4.91	6.65	-14.4	clear	
10:30				14.6	296	3.42	6.57	-17.1		
10:35				14.6	293.9	2.96	6.50	-22.0		
1040				14.6	293.0	2.70	6.51	-30.2		
1045				14.5	293.0	2.53	6.54	-38.0		
~~1050~~ 1050				14.7	292.9	2.36	6.57	-44.5		
1055				14.7	293.0	2.31	6.57	46.6	9.74	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1100	40mL	VOA	3	No	Ther, 2 no			VOC 8260C
	40mL	VOA	3	No	Ther, 2 no			VOC 8260C-SIM (VC)
	~~500~~mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500 mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI Yellow 12K-12H
Purging Equipment: QED (dedicated) Decon Equipment: alconox, distilled water
Disposal of Discharged Water: drum
Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-MW26-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-26 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/CM AET
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 100116
Starting Water Level (ft TOC): 10.06
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1148	0		10.06							
1150				13.7	172.8	3.68	6.14	-2.7	clear	Started
1155				13.9	177.3	3.12	6.11	8.3		
1200				13.8	184.9	2.20	6.14	10.8		
1205				13.7	186.5	2.06	6.18	10.8		
1210				13.7	185.1	2.08	6.21	10.4	37.1	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1215	40mL	VOA	3	No	1HCl, 2 no	clear	37.1	VOC 8260c
	40mL	VOA	3	No	1HCl, 2 no			VOC 8260c-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	No	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	No	Zn acetate			NO Headspace

Parameters measured with (instrument model & serial number):
Purging Equipment: QED Decon Equipment:
Disposal of Discharged Water:
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW24-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-24 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 9.29
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na 6	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1220		0.35								Start pump
1225				14.3	839	2.34	6.66	7.2	clear	
1230				14.6	800	2.44	6.66	-17.9		
1235				14.3	786	2.52	6.69	-30.5		
1240				13.9	780	2.55	6.67	-36.1		
1245				14.1	768	2.52	6.70	-43.2	3.22	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1300	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VOC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500 mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number):

Purging Equipment: _____ Decon Equipment: _____

Disposal of Discharged Water: _____

Observations/Comments: _____

Aspect CONSULTING

Sample number: SPL-GW-MW08-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-8 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 100116
Starting Water Level (ft TOC): 8.82
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1325	0	0.3	8.82							
1330				13.7	1602	2.60	6.70	-38.0	clear	start
1335				13.5	1195	2.47	6.74	-65.1		
1340				13.4	1160	2.46	6.76	-80.1		
1345				13.4	1153	2.40	6.77	-84.2		
1350				13.3	1149	2.33	6.77	-87.1	2.14	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1450	40mL	VOA	3	No	HCl, 2 no	clear	2.14	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VE)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OJ	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OJ	1	NO	NO			ALK
	500mL	HDPE	1	NO	H_2SO_4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI Pro Plus Yello.
Purging Equipment: Helical tubing & QED
Decon Equipment:
Disposal of Discharged Water: Drum on site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW27-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW27 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/16/13
Sampled by: SM/KM AET
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)
Starting Water Level (ft TOC): 8.79
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1407		.400								
1410				13.8	325.3	2.06	6.69	-60.7	clear	
1415				13.5	324.9	2.24	6.67	-63.3		
1420				13.6	325.0	2.11	6.70	-76.5		
1425				13.8	322.4	1.89	6.75	-87.0		
1430				14.0	321.7	1.95	6.77	-90.0		
1435				13.6	323.2	1.97	6.80	-93.5	8.98	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1445	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI Pro Plus Yellow
Purging Equipment: dedicated QED tubing Decon Equipment:
Disposal of Discharged Water: Drum onsite
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW80-071713

GROUNDWATER SAMPLING RECORD

WELL NUMBER: Rinse Blank Page: 1 of 1

Project Name: South Park
Date: 7/17/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 100116
Starting Water Level (ft TOC): NA
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
		Rinse Blank								
		No Parmtrs								

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
13:00	40mL	VOA	3	No	1Hcl, 2 no			VOC 8260C
13:00	40mL	VOA	3	No	1Hcl, 2 no			VOC 8260C-Slm (VC)
	50mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total Metals FE, Mn
	1L	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	500 mL	HDPE	1	NO	H2SO4			ALK
	50mL	HDPE	1	NO	ZN acetate			TNH3 (Ammonia)

METHODS

NC Headspace!

Parameters measured with (instrument model & serial number): NA
Purging Equipment: peristaltic Pump + new tubing Decon Equipment:
Disposal of Discharged Water: NA
Observations/Comments: Rinse blank using DI H2O supplied by lab

Aspect CONSULTING

Sample number SPL-GW-MW14-071713-

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-14 Page: 1 of 1

Project Name: South Park
Date: 7/17/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 4.19'
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1140	0	0.3	4.19							
1145				15.4	625	3.14	6.87	-32.9		
1150				15.2	697	2.18	6.98	-78.1		
1155				15.1	625	1.93	6.94	-83.1		
1200				14.9	578.5	1.85	6.88	-78.8		
1205				14.9	520.5	1.73	6.81	-72.1		
1210				14.9	496.0	1.70	6.77	-67.7	6.59	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1220	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VOC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI 556 MPS 12K-12H

Purging Equipment: QED Decon Equipment: _____

Disposal of Discharged Water: drum

Observations/Comments: _____

Aspect CONSULTING

Sample number SPL-GW-MW29-071713

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-29 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/17/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)
Starting Water Level (ft TOC): 8.50
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	±3% (10%)	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1106		0.35								
1110				15.5	1101	2.28	6.45	-58.2	clear	Start Pump
1115				15.4	1082	2.33	6.40	-46.2		
1120				15.6	1082	2.29	6.42	-39.2		
1125				15.4	1090	2.25	6.44	-39.0		
1130				15.5	1095	2.18	6.44	-40.3	9.87	Sample

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1140	40mL	VOA	3	No	HCl, 2 no	clear	9.87	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	No	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI Pro plus/eXpress
Purging Equipment: dedicated tubing @ Peristaltic Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW18-071713

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-18 Page: 1 of 1

Project Name: South Park
Date: 7/17/17
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 15.94
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1017	0	~300	15.94							
1022				14.6	970	5.66	6.57	30.5	clear	
1027				14.3	1031	3.78	6.60	-41.6		
1032				14.3	1059	3.21	6.61	-57.6		
1037				14.4	1079	2.59	6.60	-68.4		
1042				14.4	1089	2.51	6.61	-73.8		
1047				14.6	1093	2.51	6.61	-76.2	2.65	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1100	40mL	VOA	3	No	HCl, 2 no	Clear	2.65	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total Metals FE, Mn
	Small	O.S	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	O.S	1	NO	NO			Alk
	500 mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			ND Headspace

Parameters measured with (instrument model & serial number): YSI 12K-12H
Purging Equipment: QED
Decon Equipment: Alconox + DI water
Disposal of Discharged Water: drum
Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-MW12-071713

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-12 Page: 1 of 1

Project Name: South Park
Project Number: 100116
Date: 7/17/13
Sampled by: SM/CM/KAET
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)
Starting Water Level (ft TOC): 8.33
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1235	0	0.3								
1240				14.8	384.7	2.67	6.71	-24.4	clear	Start
1245				14.9	385.7	2.09	6.68	-26.6		
1250				15.1	384.1	2.32	6.70	-22.1		
1255				15.3	384.6	2.29	6.71	-17.7	60.1	
1300										

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1315	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number):

Purging Equipment: ① Decon Equipment:

Disposal of Discharged Water:

Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-KMW03A-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW-03A Page: 1 of 1

Project Name: South Park
Date: 7/18/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 10.68
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1101		.35								
1105				15.4	714	1.49	7.50	-151.6	Clear	Start pump
1110				15.5	715	1.48	7.54	-193.2		
1115				15.7	718	1.49	7.56	-203.9		
1120				15.6	719	1.44	7.60	-211.1		
1125				15.7	717	1.46	7.62	-216.6	12.7	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____
Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1130	40mL	VOA	3	No	HCl, 2 no	12.7	clear	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no	Clear	12.7	VOC 8260C-SIM (VOC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			Total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	No	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	No	Zn acetate			

NO Headspace!

Parameters measured with (instrument model & serial number): YSI ProPlus yellow
Purging Equipment: Dedicated tubing + peristaltic pump Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on Site
Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-KMW05-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW05 Page: 1 of 1

Project Name: South Park
Date: 7/18/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)

Project Number: 10016
Starting Water Level (ft TOC): 5.93
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1218	0	0.35	5.93							
1220				17.2	29,152	1.21	12.81	-463.1	dark brn	
1225				17.2	29,147	1.15	12.83	-486.1		
1230				17.4	29,602	1.11	12.84	-498.4		
1235				17.5	31,146	1.08	12.88	-519.8		
1240				17.5	32,027	1.06	12.91	-526.5		
1245				17.5	31,928	1.05	12.91	-536.5	5.60	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1360	40mL	VOA	3	No	HCl, 2 no	Dark Brown	5.60	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Na, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO_3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI pro plus yellow
Purging Equipment: peristaltic + dedicated tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water:
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-KMW08-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW-08 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/18/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft. TOC)
Starting Water Level (ft TOC): 6.46
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
9:40		0.35								
9:45				15.1	545	2.63	6.83	85.5	clear	Start pump
9:50				15.0	436.2	2.27	6.56	83.7	clear	
9:55				15.00	426.9	1.88	6.70	79.8	clear	
10:00				15.1	426.0	1.60	6.70	74.6		
10:05				15.1	418.0	1.51	6.70	70.9		
10:10				15.2	404.0	1.42	6.69	65.5		
									1.22	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____
Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1015	40mL	VOA	3	No	HCl, 2 no			collected field Dup Time: 10:30
	40mL	VOA	3	No	HCl, 2 no			SPL-GW-MW61-071813
	500mL	HDPE	1	YES	HNO3			VOC 8260C + Benzene
	500 mL	HDPE	1	NO	HNO3			VOC 8260C-SIM (VC)
	Small	OS	1	NO	NO			Dissolved Metals Na, K, Ca, Mg, FE, Mn
	1L	OS	1	NO	NO			total metals FE, Mn
	500mL	HDPE	1	NO	H2SO4			Anions Cl, NO3, NO2, SO4
METHODS	500mL	HDPE	1	NO	Zn acetate			ALK
								NH3 (Ammonia)

NC Headspace!

Parameters measured with (instrument model & serial number): YSI pro plus/yellow
Purging Equipment: dedicated tubing + peristaltic Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum onsite
Observations/Comments: Collected Field Dup

South Park Landfill

July 2013 Interim Site-wide Groundwater Monitoring Results

Appendix B
Laboratory Analytical Results

Aspect CONSULTING

Sample number SPL-GW-MW-32-071513

GROUNDWATER SAMPLING RECORD | **WELL NUMBER:** MW-32 | Page: 1 of 1

Project Name: South Park
Date: 7/15/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft TOC)
Filter Pack Interval (ft TOC)

Project Number: 100116
Starting Water Level (ft TOC): 11.30
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

Casing Volume _____ (ft Water) x _____ (Lpf)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS 0.5 10720

Criteria:		Typical 0.1-0.5 Lpm	Stable	per	±3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp (°C)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
11:13		0.4								Start purge
11:15				14.2	1301	2.97	6.64	-34.3	Clear	
11:20				14.4	1286	2.95	6.67	-70.5	"	
11:25				14.3	1315	2.86	6.69	-91.4	"	
11:30				14.3	1329	3.11	6.71	-86.5	"	
11:35		V		14.3	1333	3.26	6.71	-84.1	3.51	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1145	40mL	VOA	3	No	1:1 HCl, 2 no	clear	3.51	VOC 8260C
	40mL	VOA	3	No	1:1 HCl, 2 no			VOC 8260C-SIM (VC)
	250mL	HDPE	1	YES	HNO3			Dissolved Metals Ca, K, Fe, Mg, Mn, FE
	500mL	HDPE	1	No	HNO3			total Metals FE, Mn
	Small	OS	1	No	No			Anions Cl, NO3, NO2, SO4
	1L	OS	1	No	No	V	V	Alk
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
	500mL	HDPE	1	No	ZN acetate			NO Headspace

METHODS

Parameters measured with (instrument model & serial number): YSI pH + yellow
Purging Equipment: Peristaltic pump QED + tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW-33-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW33 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/15/13
Starting Water Level (ft TOC): 11.40
Sampled by: SM/CM
Casing Stickup (ft):
Measuring Point of Well
Total Depth (ft TOC):
Screened Interval (ft. TOC)
Casing Diameter (inches):
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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.58 Lpf
Sample Intake Depth (ft TOC)

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
12:26		0.300 Lpm								Start Pump
12:30			11.40	15.4	1572	3.69	6.66	-77.5	Clear	
12:35				15.3	1578	3.42	6.66	-86.5	"	ORP= -86.5
12:40				15.4	1578	3.19	6.69	-91.0	"	
12:45				15.5	1577	3.01	6.70	-93.8	"	
12:50				15.5	1576	3.01	6.70	-95.1	4.75	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1300	40mL	VOA	3	No	HCl, 2 no	clear	4.75	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	250mL	HDPE	1	YES	HNO3			Dissolved Metals Mn, K, Ca, Mg, FE
	500mL	HDPE	1	No	HNO3			Total Metals FE, Mn
	Small	OS	1	No	No			Anions Cl, NO3, NO2, SO4
	1L	OS	1	No	No			Alk
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
	250mL	HDPE	1	No	Zn acetate			S2

METHODS

Parameters measured with (instrument model & serial number): YSI yellow
Purging Equipment: Bladder pump + disposable tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water: on site Drummed

Observations/Comments: after sampling, removed tubing & deployed bladder's DEDRump
preserved VOAs were effervescing resulting in small bubbles

Aspect CONSULTING

Sample number SPL-GW-MW-25-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-25 Page: 1 of 1

Project Name: South Park
Project Number: 100116
Date: 7/15/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC):
Filter Pack Interval (ft. TOC):
Starting Water Level (ft TOC): 14.30
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

Casing Volume _____ (ft Water) x _____ (Lpiv)(gpf) = _____ (L)(gal)
Casing volumes 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC) _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
13:39		0.350								Start Pump
13:45				16.0	3843	2.98	6.53	-57.4	Clear	
13:50				17.4	387.7	2.60	6.62	-46.4		
13:55				18.6	383.7	2.37	6.67	-44.2		Pump off
14:00				15.2	379.0	3.00	6.60	-37.2	"	
14:05				15.2	379.2	2.64	6.52	-38.3	"	
14:10				15.1	392.9	2.39	6.57	-45.7		ORP = -45.7
14:15				15.1	400.4	2.27	6.63	-54.0	7.55	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
14:10	40mL	VOA	3	NO	HCl, 2 no	clear	7.55	Collected Field DUP Time (14:30) ID: SPL-GW-MW25-071513
	40mL	VOA	3	NO	HCl, 2 no			VOC 8260C
	250mL	HDPE	1	YES	HNO3			VOC 8260C-SIM (VOC)
	500mL	HDPE	1	NO	HNO3			Dissolved Metals Na, K, Ca, Mg, Fe, Mn
	Small	OS	1	NO	NO			total Metals Fe, Mn
	1L	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	500mL	HDPE	1	NO	H2SO4			Alk
METHODS	500mL	HDPE	1	NO	Zn acetate			NH3 (Ammonia)

ND Headspace

Parameters measured with (instrument model & serial number): YSI PID+ Yellow
Purging Equipment: peristaltic Redi-Flo2 QED tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on Site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW10-071513

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW10 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/16/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC):
Filter Pack Interval (ft. TOC):

Starting Water Level (ft TOC): 13.63
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.48 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	±3% (10% if >10 µS/cm)	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1436		0.30								Start Pump
1440				15.0	390	2.23	6.91	-73.7	clear	
1445				15.1	765	1.65	6.64	-69.7		
1450				15.1	798	1.78	6.65	-81.8		
1455				15.0	779	1.45	6.71	-88.2		
1500				15.0	784	1.90	6.73	-91.9	16.6	
~~1505~~										

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1505	40mL	VOA	3	No	filter, 2 no	clear	light	VOC 8260C
	40mL	VOA	3	No	filter, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Mn, K, Ca, Mg, Fe
	500 mL	HDPE	1	NO	HNO_3			total metals Fe, Mn
	Small	OS	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OS	1	NO	NO		✓	Alk
	500mL	HDPE	1	No	H_2SO_4	✓		NH_3 (Ammonia)
METHODS	500mL	HDPE	1	NO	ice only			NO3 Headspace

Parameters measured with (instrument model & serial number): YSI Pro Plus + cell
Purging Equipment: Direct Waterra peristaltic Decon Equipment: Alconox + DI water
Disposal of Discharged Water: Drum on site

Observations/Comments:

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Aspect CONSULTING

Sample number SPL-GW-MW30-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-30 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/[illegible] AET
Measuring Point of Well: TOC
Screened Interval (ft TOC):
Filter Pack Interval (ft. TOC):

Project Number: 10016
Starting Water Level (ft TOC): 10.67
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

Casing Volume _____ (ft Water) x _____ (Lpiv)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
0948	0	0.3	10.67							start
0953				14.4	456.5	3.00	6.35	40.0	clear	
0958				14.3	476.5	3.28	6.41	24.3	clear	
1003				14.4	496.4	2.90	6.46	13.9	clear	
1008				14.4	511.5	3.00	6.46	7.1	clear	
1013				14.4	519.8	3.16	6.47	2.6	clear	
									0.89	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1015	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Mn, K, Ca, Mg, Fe
	500 mL	HDPE	1	NO	HNO3			total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			NO2 Hardness

Parameters measured with (instrument model & serial number): YSI yellow 12K - 12H
Purging Equipment: peristaltic pump Decon Equipment:
Disposal of Discharged Water: drum

Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW31-071613

GROUNDWATER SAMPLING RECORD | WELL NUMBER: MW31 | Page: 1 of 1

Project Name: South Park | Project Number: 10016
Date: 7/16/13 | Starting Water Level (ft TOC): 11.42
Sampled by: SM/[illegible] AET | Casing Stickup (ft):
Measuring Point of Well: TOC | Total Depth (ft TOC):
Screened Interval (ft TOC): | Casing Diameter (inches): 2
Filter Pack Interval (ft TOC):

Casing Volume _____ (ft Water) x _____ (Lpf/v)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.48 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	±3% 10%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
10:23		0.35	—							Start Pump
10:25				14.7	336	4.91	6.65	-14.4	clear	
10:30				14.6	296	3.42	6.57	-17.1		
10:35				14.6	293.9	2.96	6.50	-22.0		
1040				14.6	293.0	2.70	6.51	-30.2		
1045				14.5	293.0	2.53	6.54	-38.0		
~~1050~~ 1050				14.7	292.9	2.36	6.57	-44.5		
1055				14.7	293.0	2.31	6.57	-46.6	97.1	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1100	40mL	VOA	3	No	1 Hcl, 2 no			VOC 8260C
	40mL	VOA	3	No	1 Hcl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Ca, K, Na, Mn, FE
	500 mL	HDPE	1	NO	HNO3			total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500 mL	HDPE	1	NO	Zn acetate			NO Headspace

Parameters measured with (instrument model & serial number): YSI Yellow 12K-12H
Purging Equipment: QED (dedicated) Decon Equipment: alconox, distilled water
Disposal of Discharged Water: drum
Observations/Comments:

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Aspect CONSULTING

Sample number: SPL-GW-MW26-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-26 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/16/13
Sampled by: SM/~~CM~~ AET
Starting Water Level (ft TOC): 10.06
Measuring Point of Well:
Casing Stickup (ft):
Screened Interval (ft. TOC)
Total Depth (ft TOC):
Filter Pack Interval (ft. TOC)
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf, 2" = 0.62 Lpf, 4" = 2.46 Lpf, 6" = 5.56 Lpf
Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1148	0		10.06							Started
1150				13.7	172.8	3.68	6.14	-2.7	clear	
1155				13.9	177.3	3.12	6.11	8.3	"	
1200				13.8	184.9	2.20	6.14	10.8	"	
1205				13.7	186.5	2.06	6.18	10.8	"	
1210				13.7	185.1	2.08	6.21	10.4	37.1	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1215	40mL	VOA	3	NO	HCl, 2 no	clear	37.1	VOC 8260C
	40mL	VOA	3	NO	HCl, 2 no	"	"	VOC 8260C-SIM (VC)
	250mL	HDPE	1	YES	HNO_3	"	"	Dissolved Metals Mn, K, Ca, Mg, Fe
	500mL	HDPE	1	NO	HNO_3	"	"	total metals Fe, Mn
	Small	OJ	1	NO	NO	"	"	Anions Cl, NO_3, NO_2, SO_4
	1L	OJ	1	NO	NO	"	"	Alk
	500mL	HDPE	1	NO	H_2SO_4	"	"	NH_3 (Ammonia)
	250mL	HDPE	1	NO	Zn acetate	"	"	NO Headspace

METHODS

Parameters measured with (instrument model & serial number):
Purging Equipment: QED
Decon Equipment:
Disposal of Discharged Water:
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW24-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-24 Page: 1 of 1

Project Name: South Park
Project Number: 10416
Date: 7/16/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft TOC):
Filter Pack Interval (ft TOC):
Starting Water Level (ft TOC): 9.29
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

Casing Volume _____ (ft Water) x _____ (Lpf)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	~~3~~ 6	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1220		0.35								Start pump
1225				14.3	839	2.34	6.66	7.2	clear	
1230				14.6	800	2.44	6.66	-17.9	1	
1235				14.3	786	2.52	6.67	-30.5	1	
1240				13.9	780	2.55	6.67	-36.1	V	
1245				14.1	768	2.52	6.70	-43.2	3.22	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1300	40mL	VOA	3	NO	HCl, 2 no			VOC 8260C
	40mL	VOA	3	NO	HCl, 2 no			VOC 8260C-SIM (VC)
	250mL	HDPE	1	YES	HNO3			Dissolved Metals Mn, K, Ca, Mg, FE Mn
	500 mL	HDPE	1	NO	HNO3			total metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
V	1L	OS	1	NO	NO			ALK
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	ZN acetate			NO3 Nitrate/Nitrite

Parameters measured with (instrument model & serial number):
Purging Equipment: _____ Decon Equipment: _____
Disposal of Discharged Water: _____
Observations/Comments: _____

Aspect CONSULTING

Sample number SPL-GW-MW08-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-8 Page 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/16/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC):
Filter Pack Interval (ft. TOC):
Starting Water Level (ft TOC): 8.82
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1325	6	0.3	8.82							6.7 pH 4
1330				13.7	1602	2.60	6.70	-38.0	clear	
1335				13.5	1195	2.47	6.74	-65.1	↓	
1340				13.4	1160	2.46	6.76	-77.1	↓	
1345				13.4	1153	2.40	6.77	-84.2	↓	
1350				13.3	1149	2.33	6.77	-87.1	2.10	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1450	40mL	VOA	3	No	HCl, 2 no	clear	0.14	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no		↓	VOC 8260C-SIM (VC)
	250mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, Fe, Mn
	500mL	HDPE	1	NO	HNO3			total metals Fe, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	No	Zn acetate			NO Headspace!

Parameters measured with (instrument model & serial number): YSI PRO Plus Yellow
Purging Equipment: Bailer & QED
Decon Equipment:
Disposal of Discharged Water: Drum on site
Observations/Comments:

Aspect CONSULTING

Sample number SPL-GW-MW27-071613

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW27 Page: 1 of 1

Project Name: South Park
Date: 7/16/13
Sampled by: SM/KAK/AET
Measuring Point of Well:
Screened Interval (ft. TOC)
Filter Pack Interval (ft TOC)

Project Number: 10016
Starting Water Level (ft TOC): 8.79
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

Casing Volume ____ (ft Water) x ____ (Lpf)(gpf) = ____ (L)(gal)
Casing volumes 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1407		.400								
1410				13.8	325.3	2.06	6.69	-60.7	clear	
1415				13.5	324.9	2.24	6.67	-63.3		
1420				13.6	325.0	2.11	6.70	-76.5		
1425				13.8	322.4	1.89	6.75	-87.6		
1430				14.0	321.7	1.95	6.77	-90.0		
1435				13.6	323.2	1.97	6.80	-93.5	8.98	

Total Gallons Purged: Total Casing Volumes Removed:

Ending Water Level (ft TOC): Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1445	40mL	VOA	3	No	Ice, 2 no			VOC 8260C
	40mL	VOA	3	No	Ice, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Ca, K, Na, Mg, Fe Mn
	500 mL	HDPE	1	NO	HNO3			total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			Alk
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	ZN acetate			NO Headspace

Parameters measured with (instrument model & serial number): YSI Pro Plus Yellow

Purging Equipment: Alchemist QED & tubing Decon Equipment:

Disposal of Discharged Water: Drum onsite

Observations/Comments

Aspect CONSULTING

Sample number SPL-GW-MW80-071713

GROUNDWATER SAMPLING RECORD WELL NUMBER: Rinse Blank Page: 1 of 1

Project Name: South Park
Date: 7/17/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft TOC):
Filter Pack Interval (ft TOC):

Project Number: 10016
Starting Water Level (ft TOC): NA
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

Casing Volume _____ (ft Water) x _____ (Lpf/v)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.55 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp (°C)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
		Rinse Blank								
		No Parmtrs								

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
13:00	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
13:00	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	Small	HDPE	1	YES	HNO3			Dissolved Metals: Mn, K, Ca, Mg, Fe
	500mL	HDPE	1	No	HNO3			Total Metals: Mn, Fe
	Small	OS	1	No	No			Anions: Cl, NO3, NO2, SO4
	1L	OS	1	No	No			AVK
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
	Small	HDPE	1	No	TSR acetate			MC Headspace

METHODS

Parameters measured with (instrument model & serial number): NA
Purging Equipment: Peristaltic Pump + new tubing Decon Equipment: _____
Disposal of Discharged Water: NA
Observations/Comments: Rinse blank using DI H2O supplied by lab

Aspect CONSULTING

Sample number SPL-GW-MW14-071713-

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-14 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/17/13
Sampled by: SM/CM
Starting Water Level (ft TOC): 4.19'
Measuring Point of Well:
Casing Stickup (ft):
Screened Interval (ft. TOC):
Total Depth (ft TOC):
Filter Pack Interval (ft. TOC):
Casing Diameter (inches): 2

Casing Volume _____ (ft Water) x ___ ___ (Lpf)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1140	0	0.3	4.19							
1145				15.4	1025	2.11	6.64	-32.9		
1150				15.2	693	2.18	6.65	-38.1		
1155				15.1	6.95	1.93	6.64	-38.1		
1200				14.9	595.5	1.85	6.68	-37.8		
1205				14.9	520.5	1.73	6.71	-32.1		
1210				14.9	496.0	1.70	6.72	-67.7	0.59	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1220	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VOC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, Mn, Fe
	500mL	HDPE	1	No	HNO3			total metals Fe, Mn
	Small	OJ	1	No	No			Anions Cl, NO3, NO2, SO4
	1L	OJ	1	No	No			Alk
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	No	Zinc acetate			NO3 Hardcopied

Parameters measured with (instrument model & serial number) YSI ProPlus 12K-12H
Purging Equipment: QED Decon Equipment: _____
Disposal of Discharged Water On-site
Observations/Comments: _____

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Sample number SPL-GW-MW29-071713

GROUNDWATER SAMPLING RECORD

WELL NUMBER: MW-29 Page: 1 of 1

Project Name: South Park
Date 7/17/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft TOC)
Filter Pack Interval (ft TOC)

Project Number: 1D0116
Starting Water Level (ft TOC): 8.50
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

Casing Volume _____ (ft Water) x _____ (Lpf/v)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	ns	±3% 10%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1100		0.35								Start Pump
1110				15.5	1101	2.28	6.45	-58.2	clear	
1115				15.4	1082	2.33	6.40	-44.2		
1120				15.6	1082	2.29	6.42	-39.2		
1125				15.4	1090	2.25	6.44	-39.0		
1130				15.5	1095	2.18	6.44	-40.3	9.87	Sample

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1140	40mL	VOA	3	No	HCl, 2 no	clear	9.87	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3			Dissolved Metals Ca, K, Na, Mg, Mn, FE
	500mL	HDPE	1	No	HNO3			total Metals FE, Mn
	Small	OS	1	No	No			Anions Cl, NO3, NO2, SO4
	1L	OS	1	No	No			Alk
	500mL	HDPE	1	No	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	No	Zn acetate			VC Headspace

Parameters measured with (instrument model & serial number): YSI Pro plus yellow
Purging Equipment: Peristaltic pump Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on site
Observations/Comments: _____

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Sample number SPL-GW-MW18-071713

GROUNDWATER SAMPLING RECORD | **WELL NUMBER:** MW-18 | Page: 1 of 1

Project Name: South Park | Project Number: 10016
Date: 7/17/17 | Starting Water Level (ft TOC): 15.94
Sampled by: SM/CM | Casing Stickup (ft):
Measuring Point of Well: | Total Depth (ft TOC):
Screened Interval (ft. TOC): | Casing Diameter (inches): 2
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
3/4"= 0.09 Lpf 2" = 0.82 Lpf 4" = 2.48 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1017	0	~300	15.94							
1022				14.6	970	5.66	6.57	30.5	clear	
1027				14.3	1031	3.78	6.60	-41.6		
1032				14.3	1059	3.21	6.61	-57.6		
1037				14.1	1079	2.59	6.60	-68.1		
1042				14.4	1089	2.51	6.61	-73.8		
1047				14.6	1093	2.51	6.61	-76.2	2.65	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____
Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1100	40mL	VOA	3	NO	HCl, 2 no	Clear	2.65	VOC 8260C
	40mL	VOA	3	NO	HCl, 2 no	/	/	VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO3	/	/	Dissolved Metals Na, K, Ca, Mg, Fe, Mn
	500mL	HDPE	1	NO	HNO3	/	/	total Metals Fe, Mn
	Small	OS	1	NO	NO	/	/	Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO	K	/	Alk
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO3 Headspace?

Parameters measured with (instrument model & serial number): YSI 12K-12H
Purging Equipment: QED Decon Equipment: Alconox + DI water
Disposal of Discharged Water: drum
Observations/Comments:

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Sample number SPL-GW-MW12-071713

GROUNDWATER SAMPLING RECORD | **WELL NUMBER:** MW-12 | Page: 1 of 1

Project Name: South Park | Project Number: 10016
Date: 7/17/13 | Starting Water Level (ft TOC): 8.33
Sampled by: SM/CM AET | Casing Stickup (ft):
Measuring Point of Well: | Total Depth (ft TOC):
Screened Interval (ft TOC): | Casing Diameter (inches): 2
Filter Pack Interval (ft. TOC):

Casing Volume _____ (ft Water) x _____ (Lpf/v)(gpf) = _____ (L)(gal)
Casing volumes 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpi 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.58 Lpf

Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1235	0	0.3								Start
1240				14.8	3802	2.67	6.71	-54.4		
1245				14.9	3757	2.29	6.68	-26.6		
1250				15.1	3841	2.32	6.70	-22.1		
1255				15.3	3846	2.29	6.71	-17.7	60.1	
1300										

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1315	40mL	VOA	3	No	HCl, 2 no			VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Ca, K, Ca, Mg, Fe, Mn
	500mL	HDPE	1	NO	HNO_3			total Metals Fe, Mn
	Small	OJ	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OJ	1	NO	NO			Alk
	500mL	HDPE	1	No	H_2SO_4			NH_3 (ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			NO3 Hardness

Parameters measured with (instrument model & serial number): _____

Purging Equipment: ⓘ Decon Equipment: _____

Disposal of Discharged Water _____

Observations/Comments: _____

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Aspect CONSULTING

Sample number SPL-GW-KMW03A-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW-03A Page: 1 of 1

Project Name: South Park
Project Number: 10011G
Date 7/18/13
Starting Water Level (ft TOC): 10.68
Sampled by SM/CM
Casing Stickup (ft)
Measuring Point of Well:
Total Depth (ft TOC):
Screened Interval (ft. TOC)
Casing Diameter (inches):
Filter Pack Interval (ft. TOC)

Casing Volume _____ (ft Water) x _____ (Lpf)(gpf) = _____ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): _____

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1101		.35								Start pump
1105				15.4	719	1.49	7.50	-151.6	Clear	
1110				15.5	715	1.48	7.54	-193.2		
1115				15.7	717	1.49	7.56	-203.9		
1120				15.6	719	1.44	7.60	-211.1	"	
1125				15.7	717	1.46	7.62	-216.6	12.7	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1130	40mL	VOA	3	No	HCl, 2 no	12.7	clear	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no	Clear	12.7	VOC 8260C-SIM (VC)
	500mL	HDPE	1	YES	HNO_3			Dissolved Metals Mn, K, Ca, Mg, Fe
	500mL	HDPE	1	NO	HNO_3			total Metals Fe, Mn
	Small	OJ	1	NO	NO			Anions Cl, NO_3, NO_2, SO_4
	1L	OJ	1	NO	NO			Alk
	500mL	HDPE	1	NO	H_2SO_4			NH_3 (Ammonia)
	500mL	HDPE	1	NO	[illegible]			NC Hardness

METHODS

Parameters measured with (instrument model & serial number): YSI ProPlus yellow
Purging Equipment: Dedicated tubing + peristaltic pump Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on Site
Observations/Comments:

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Aspect CONSULTING

Sample number SPL-GW-KMW05-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW05 Page: 1 of 1

Project Name: South Park
Project Number: 1D016
Date: 7/18/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft TOC):
Filter Pack Interval (ft TOC):
Starting Water Level (ft TOC): 5.93
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches): 2

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	ns	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
1218	0	035	5.93							
1220				17.2	29,152	1.21	12.81	-463.1	dark brn	
1225				17.2	29,147	1.15	12.83	-486.1		
1230				17.4	29,602	1.11	12.84	-498.9		
1235				17.5	31,146	1.08	12.88	-519.8		
1240				17.5	30,027	1.06	12.91	-526.5		
1245				17.5	31,928	1.05	12.91	-536.5	5.60	

Total Gallons Purged: _____ Total Casing Volumes Removed: _____

Ending Water Level (ft TOC): _____ Ending Total Depth (ft TOC): _____

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
1360	40mL	VOA	3	No	HCl, 2 no	Dark Brown	5.60	VOC 8260C
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C-SIM (VOC)
	250mL	HDPE	1	YES	HNO3			Dissolved Metals Na, K, Ca, Mg, Fe, Mn
	500 mL	HDPE	1	NO	HNO3			total metals Fe, Mn
	Small	OJ	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OJ	1	NO	NO			Alk
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
METHODS	500mL	HDPE	1	NO	Zn acetate			RSK Headspace

Parameters measured with (instrument model & serial number): YSI pro Plus yellow
Purging Equipment: peristaltic + dedicated tubing Decon Equipment: Alconox + DI
Disposal of Discharged Water:
Observations/Comments:

Aspect CONSULTING

Sample number: SPL-GW-KMW08-071813

GROUNDWATER SAMPLING RECORD

WELL NUMBER: KMW-08 Page: 1 of 1

Project Name: South Park
Project Number: 10016
Date: 7/18/13
Sampled by: SM/CM
Measuring Point of Well:
Screened Interval (ft. TOC):
Filter Pack Interval (ft. TOC):
Starting Water Level (ft TOC): 6.46
Casing Stickup (ft):
Total Depth (ft TOC):
Casing Diameter (inches):

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
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC):

PURGING MEASUREMENTS

Criteria:		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp (°C)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments
9:40		0.35	--							Start pump
9:45				15.1	545	2.63	6.83	85.5	clear	
9:50				15.0	436.2	2.27	6.56	83.7	clear	
9:55				15.00	426.9	1.88	6.70	79.8	clear	
10:00				15.1	426.0	1.60	6.70	74.6		
10:05				15.1	418.0	1.51	6.70	70.9		
10:10				15.2	404.0	1.42	6.69	65.5		
									1.22	

Total Gallons Purged:
Total Casing Volumes Removed:
Ending Water Level (ft TOC):
Ending Total Depth (ft TOC):

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
								collected field Dup Time: 10:30
1015	40mL	VOA	3	No	HCl, 2 no			SPL-GW-MW61-071813
	40mL	VOA	3	No	HCl, 2 no			VOC 8260C + BTEX
	250mL	HDPE	1	YES	HNO3			VOC 8260C-SIM (VC)
	500mL	HDPE	1	NO	HNO3			Dissolved Metals Na, K, Ca, Mg, FE, Mn
	500mL	HDPE	1	NO	HNO3			Total Metals FE, Mn
	Small	OS	1	NO	NO			Anions Cl, NO3, NO2, SO4
	1L	OS	1	NO	NO			ALK
	500mL	HDPE	1	NO	H2SO4			NH3 (Ammonia)
	500mL	HDPE	1	NO	Zn acetate			Na Hydroxide

METHODS

Parameters measured with (instrument model & serial number): YSI 556 Pig Yellow
Purging Equipment: dedicated tubing + peristaltic
Decon Equipment: Alconox + DI
Disposal of Discharged Water: Drum on site
Observations/Comments: collected Field Dup

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

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

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September 2013

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List of Appendices

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

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

[1]	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

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

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.

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

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

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

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*.

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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 If exceeded by > 3X HT: J/R (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	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 level
MS/MSD (recovery)	One per matrix per batch Use method acceptance criteria	Qualify parent only unless other QC indicates systematic problems: 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)
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%
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) Aqueous: RPD <35% OR absolute diff. < 1X RL (for results < 5X RL)	Narrate and qualify if required by project (Floyd|Snider PJ)
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 Ion relative intensity within 20% of standard All ions in std. at > 10% intensity must be present in sample	See Technical Director if outliers

Notes:

PJ[1] 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 Al, Ca, Fe, or Mg > 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.

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents the approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

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.

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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.

E 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.