Table 1-1
Field Activities
North Pole Refinery
Flint Hills Resources Alaska, LLC

Activity	Frequency during First Quarter 2013
Groundwater Elevation Check	Once during Q1
Data Loggers	Once during Q1, measuring hourly
LNAPL Migration Well Network Check	Monthly
LNAPL Thickness Well Network Check	Monthly
Bail-down testing	Once during Q1 (March)
LNAPL sampling	Once during Q1, extending into Q2
Residential Sulfolane Initial Sampling (call-ins)	Throughout quarter
POE Maintenance Sampling	Throughout quarter
Deep (sub-permafrost) residential-well sampling	Once during Q1 (March), extended into Q2 (April)
Sulfolane Network Sampling	Once during Q1
Quarterly BTEX Network Sampling	Once during Q1
Sulfolane First Quarter Second Sampling Event[1]	Once during Q1 (March)
Sampling for UAF stable-isotope analysis	Once during Q1 (March), extending into Q2 (April)
Groundwater Treatment System (including GAC filters) and Recovery Well Sampling	Monthly
Wells Installed	One well (MW-174-15) installed
Wells Developed	
Initial Sulfolane Sampling	
Air-sparge system pilot study sampling	Once during Q1

Notes:

[1] A second sampling event was conducted on select wells during the quarter as requested by the Alaska Department of Environmental Conservation
Q1 First Quarter 2013
Q2 Second Quarter 2013
LNAPL Light Non-Aqueous Phase Liquid
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
GAC Granular Activated Carbon
POE point-of-entry
UAF University of Alaska - Fairbanks

Table 3-1
Well Construction Parameters
North Pole Refinery
Flint Hills Resources Alaska, LLC

												Well Screen								Filter Pack		WATER TABLE			ALASKA STATE PLANE	
																									NAD83, ZONE 3	
Well Type	Well	Proximity	Boring Completion Date	Survey Date	Riser Elevation (feet MSL)	Riser Stickup* (feet)	Ground Surface Elevation (feet MSL)	Well Depth (feet BGS)	Well Bottom Elevation (feet MSL)	Depth to Top of Permafrost (feet BGS)	Well Diameter (inches)	Depth to Top (feet BGS)	Top Elevation (feet MSL)	Depth to Bottom (feet BGS)	Bottom Elevation (feet MSL)	Length (feet)	Screen Slot Size (inches)	Material	Riser Material	Depth to Top (feet BGS)	Depth to Bottom (feet BGS)	Approx Depth (ft BGS)	In Screen	Feet above top of Screen	NORTHING	EASTING
Monitoring	MW-101	On-site	3/19/1987	Nov-2012	494.59	3.45	491.1	61.00	430.14	--	2.00	56.00	435.14	61.00	430.14	5.00	0.02	ss	ss	--	--	8.0	N	48.0	3927588.78	1428199.67
	MW-101A	On-site	3/28/1987	Nov-2012	495.01	4.00	491.0	23.00	468.01	--	2.00	17.80	473.21	22.80	468.21	5.00	0.02	ss	ss	--	--	8.0	N	9.8	3927590.29	1428209.63
	MW-102	On-site	4/4/1987	Nov-2012	496.02	3.46	492.6	71.50	421.06	--	2.50	61.50	431.06	71.50	421.06	10.00	0.01	PVC	PVC	--	--	9.0	N	52.5	3927955.12	1429113.91
	MW-104	On-site	4/2/1987	Nov-2012	496.02	2.99	493.0	67.00	426.03	--	2.50	63.00	430.03	67.00	426.03	4.00	0.02	PVC	PVC	--	--	7.0	N	56.0	3927958.82	1429747.75
	MW-105	On-site	3/21/1987	Nov-2012	497.66	2.46	495.2	63.00	432.20	--	2.00	58.00	437.20	63.00	432.20	5.00	0.02	ss	ss	--	--	8.0	N	50.0	3924919.0	1430402.4
	MW-105A	On-site	3/21/1987	Nov-2012	499.21	3.58	495.6	23.00	472.63	--	2.00	18.00	477.63	23.00	472.63	5.00	0.02	ss	ss	--	--	8.0	N	10.0	3924910.02	1430404.24
	MW-106	On-site	9/14/1987	Nov-2012	499.28	1.51	497.8	23.00	474.77	--	2.00	18.50	479.27	23.00	474.77	4.50	0.02	PVC	PVC	--	--	12.4	N	6.1	3926112.10	1428065.05
	MW-109	On-site	8/9/1988	Nov-2012	495.20	1.43	493.8	14.00	479.77	--	2.00	9.50	484.27	14.00	479.77	4.50	0.02	PVC	PVC	--	--	4.5	N	5.0	3925855.20	1428674.99
	MW-110	On-site	8/10/1988	Nov-2012	496.73	3.26	493.5	18.00	475.47	--	2.00	13.50	479.97	18.00	475.47	4.50	0.02	PVC	PVC	--	--	5.0	N	8.5	3925975.36	1428873.06
	MW-113	On-site	9/19/1988	Nov-2012	494.51	3.32	491.2	16.00	475.19	--	2.00	11.50	479.69	16.00	475.19	4.50	0.02	PVC	PVC	--	--	8.3	N	3.2	3926957.71	1428777.98
	MW-115	On-site	9/20/1988	Nov-2012	495.84	2.55	493.3	17.00	476.29	--	2.00	12.50	480.79	17.00	476.29	4.50	0.02	ss	ss	--	--	9.0	N	3.5	3925758.76	1429540.81
	MW-116	On-site	9/22/1988	Nov-2012	496.17	2.91	493.3	17.00	476.26	--	2.00	12.00	481.26	17.00	476.26	5.00	0.02	ss	ss	--	--	9.0	N	3.0	3925670.10	1429332.64
	MW-118	On-site	3/9/1990	Nov-2012	496.90	4.26	492.6	43.00	449.64	--	2.00	38.50	454.14	43.00	449.64	4.50	0.02	ss	ss	--	--	7.0	N	31.5	3927467.01	1429638.43
	MW-124	On-site	6/6/1990	Nov-2012	497.39	3.36	494.0	24.50	469.53	--	2.00	20.00	474.03	24.50	469.53	4.50	0.02	PVC	PVC	--	--	8.0	N	12.0	3927015.09	1429816.83
	MW-125	On-site	6/6/1990	Nov-2012	496.16	3.02	493.1	24.00	469.14	--	2.00	19.50	473.64	24.00	469.14	4.50	0.02	PVC	PVC	--	--	8.0	N	11.5	3927032.49	1429569.75
	MW-126	On-site	6/4/1991	Nov-2012	495.53	3.72	491.8	24.50	467.31	--	2.00	20.00	471.81	24.50	467.31	4.50	0.02	PVC	PVC	--	--	7.0	N	13.0	3927426.37	1429419.17
	MW-127	On-site	6/4/1991	Nov-2012	496.53	3.68	492.9	24.50	468.35	--	2.00	20.00	472.85	24.50	468.35	4.50	0.02	PVC	PVC	--	--	8.5	N	11.5	3927476.29	1429065.47
	MW-129	On-site	10/21/1996	Nov-2012	496.05	3.12	492.9	41.50	451.43	--	2.00	37.00	455.93	41.50	451.43	4.50	0.02	PVC	PVC	--	--	8.2	N	28.8	3927205.45	1429720.22
	MW-130	On-site	4/22/1997	Nov-2012	496.88	2.72	494.2	23.00	471.16	--	2.00	19.00	475.16	23.00	471.16	4.00	0.02	PVC	PVC	--	--	9.0	N	10.0	3926825.66	1429354.64
	MW-131	On-site	8/5/1988	Nov-2012	495.75	2.00	493.8	24.50	469.25	--	2.00	20.00	473.75	24.50	469.25	4.50	0.02	PVC	PVC	--	--	9.0	N	11.0	3927936.24	1429024.82
	MW-132	On-site	9/1/1999	Nov-2012	499.41	2.69	496.7	22.00	474.72	--	2.00	17.50	479.22	22.00	474.72	4.50	0.02	PVC	PVC	--	--	9.0	N	8.5	3926600.34	1429997.01
	MW-133	On-site	9/1/1999	Nov-2012	498.34	2.59	495.8	22.00	473.75	--	2.00	17.50	478.25	22.00	473.75	4.50	0.02	PVC	PVC	--	--	9.0	N	8.5	3926597.42	1430160.18
	MW-134	On-site	9/2/1999	Nov-2012	497.76	2.56	495.2	21.50	473.70	--	2.00	17.00	478.20	21.50	473.70	4.50	0.02	PVC	PVC	--	--	8.6	N	8.4	3926000.91	1430170.26
	MW-135	On-site	3/8/2001	Nov-2012	496.94	3.38	493.6	19.50	474.06	--	2.00	10.60	482.96	19.50	474.06	8.90	0.02	PVC	PVC	--	--	9.0	N	1.6	3927024.53	1429730.91
	MW-136	On-site	3/8/2001	Nov-2012	496.93	3.06	493.9	19.10	474.77	--	2.00	10.10	483.77	19.10	474.77	9.00	0.02	PVC	PVC	--	--	9.0	N	1.1	3927024.41	1429778.02
	MW-137	On-site	3/8/2001	Nov-2012	497.26	3.40	493.9	19.30	474.56	--	2.00	10.40	483.46	19.30	474.56	8.90	0.02	PVC	PVC	--	--	9.0	N	1.4	3927083.81	1429737.46
	MW-138	On-site	4/12/2001	Nov-2012	496.34	3.14	493.2	18.10	475.10	--	2.00	3.90	489.30	18.10	475.10	14.20	0.02	PVC	PVC	--	--	9.0	Y	-5.1	3925738.32	1429686.77
	MW-139	On-site	5/29/2001	Nov-2012	497.25	1.96	495.3	25.00	470.29	--	2.00	5.70	489.59	25.00	470.29	19.30	0.02	PVC	PVC	--	--	9.0	Y	-3.3	3927427.97	1428848.56
	MW-140	On-site	5/30/2001	Nov-2012	494.90	2.83	492.1	23.50	468.57	--	2.00	4.20	487.87	23.50	468.57	19.30	0.02	PVC	PVC	--	--	8.0	Y	-3.8	3927683.10	1429244.57
	MW-141	On-site	10/5/2001	Nov-2012	492.38	2.17	490.2	22.40	467.81	--	2.00	7.90	482.31	22.40	467.81	14.50	0.02	PVC	PVC	--	--	5.4	N	2.5	3927598.03	1427540.67
	MW-142	On-site	8/10/2001	Nov-2012	496.17	3.14	493.0	19.40	473.63	--	2.00	5.40	487.63	19.40	473.63	14.00	0.02	PVC	PVC	--	--	9.1	Y	-3.7	3927602.87	1428813.48
	MW-143	On-site	8/15/2005	Nov-2012	495.37	3.36	492.0	19.50	472.51	--	2.00	4.70	487.31	19.50	472.51	14.80	0.02	PVC	PVC	--	--	7.5	Y	-2.8	3927688.65	1428487.50
	MW-144A	On-site	9/15/2005	Nov-2012	495.35	2.95	492.4	24.70	467.70	--	2.00	5.70	486.70	24.70	467.70	19.00	0.02	PVC	PVC	--	--	6.8	Y	-1.1	3927485.68	1429623.04
	MW-144BR	On-site	9/21/2011	Nov-2012	494.98	2.88	492.1	90.52	401.58	--	2.00	85.44	406.66	89.91	402.19	4.47	0.01	PVC	PVC	80.0	92.0	6.5	N	78.9	3927483.2	1429632.1
	MW-145	On-site	8/15/2005	Nov-2012	495.61	2.76	492.9	19.00	473.85	--	2.00	4.70	488.15	19.00	473.85	14.30	0.02	PVC	PVC	--	--	8.0	Y	-3.3	3927212.61	1429712.57
	MW-146A	On-site	9/29/2008	Nov-2012	495.09	2.52	492.6	16.00	476.57	--	2.00	6.00	486.57	16.00	476.57	10.00	0.02	PVC	PVC	4.5	16.0	7.0	Y	-1.0	3927201.05	1427049.42
	MW-146B	On-site	9/29/2008	Nov-2012	494.98	2.39	492.6	28.00	464.59	--	2.00	22.00	470.59	27.00	465.59	5.00	0.02	PVC	PVC	16.0	27.0	7.0	N	15.0	3927193.28	1427048.17
	MW-147A	On-site	10/1/2001	Nov-2012	491.93	2.26	489.7	13.00	476.67	--	2.00	3.00	486.67	13.00	476.67	10.00	0.02	PVC	PVC	2.4	13.0	5.5	Y	-2.5	3927723.21	1427288.46
	MW-147B	On-site	9/30/2008	Nov-2012	492.59	2.90	489.7	26.00	463.69	--	2.00	20.50	469.19	25.50	464.19	5.00	0.02	PVC	PVC	17.5	25.0	5.5	N	15.0	3927729.22	1427290.37
	MW-148A	Off-site	10/2/2008	Nov-2012	493.69	2.84	490.9	15.00	475.85	--	2.00	5.00	485.85	15.00	475.85	10.00	0.02	PVC	PVC	4.0	15.0	6.9	Y	-1.9	3928675.03	1428153.49
	MW-148B	Off-site	10/2/2008	Nov-2012	492.83	2.57	490.3	29.00	461.26	--	2.00	22.00	468.26	27.00	463.26	5.00	0.02	PVC	PVC	17.0	27.0	6.9	N	15.1	3928677.21	1428158.65
	MW-148C	Off-site	9/27/2011	Nov-2012	493.64	3.37	490.3	55.74	434.53	--	2.00	50.72	439.55	55.15	435.12	4.43	0.01	PVC	PVC	45.0	56.0	9	N	41.7	3928670.73	1428140.18
	MW-148D	Off-site	9/26/2011	Nov-2012	493.37	3.05	490.3	150.96	339.36	151.5	2.00	145.92	344.40	150.36	339.96	4.44	0.01	PVC	PVC	140.0	152.0	9.0	N	136.9	3928673.10	1428146.93
	MW-149A	On-site	10/3/2008	Nov-2012	493.68	2.77	490.9	14.00	476.91	--	2.00	4.00	486.91	14.00	476.91	10.00	0.02	PVC	PVC	3.0	14.0	7.2	Y	-3.2	3928676.81	1428953.13
	MW-149B	On-site	10/3/2008	Nov-2012	493.38	2.32	491.1	21.00	470.06	19.0	2.00	14.00	477.06	19.00	472.06	5.00	0.02	PVC	PVC	12.5	19.0	7.2	N	6.8	3928677.69	1428959.56
	MW-150A	Off-site	10/2/2009	Nov-2012	487.14	-0.43	487.6	11.58	475.99	--	2.00	6.70	480.87	11.10	476.47	4.40	0.01	PVC	PVC	5.5	17.0	8.0	Y	-1.3	3930163.44	1426522.55
	MW-150B	Off-site	10/2/2009	Nov-2012	486.95	-0.57	487.5	24.64	462.88	--	2.00	20.60	466.92	24.50	463.02	3.90	0.01	PVC	PVC	18.0	26.5	8.0	N	12.6	3930162.06	1426527.97
	MW-150C	Off-site	5/12/2012	Nov-2012	486.41	-0.56	487.0	60.51	426.46	63.5	2.00	55.43	431.54	60.08	426.89	4.65	0.01	PVC	PVC	Natural pack		8.0	N	47.4	3930159.85	1426535.91
	MW-151A	Off-site	10/7/2009	Nov-2012	487.19	-0.35	487.5	15.50	472.04	--	2.00	10.00	477.54	15.00	472.54	5.00	0.01	PVC	PVC	4.0	17.0	8.0	N	2.0	3930152.81	1427042.16
	MW-151B	Off-site	10/2/2009	Nov-2012	487.14	-0.48	487.6	23.60	464.02	--	2.00	18.50	469.12	23.10	464.52	4.60	0.01	PVC	PVC	17.0	26.5	8.0	N	10.5	3930154.30	1427034.87
	MW-151C	Off-site	2/18/2010	Nov-2012	491.07	3.39	487.7	57.70	429.98	65.0	2.00	52.55	435.13	57.15	430.53	4.60	0.01	PVC	PVC	50.0	63.3	8.0	N	44.6	3930151.93	1427038.65
	MW-152A	Off-site	10/7/2009	Nov-2012	488.44	-0.19	488.6	16.00	472.63	--	2.00	10.60	478.03	15.00	473.63	4.40	0.01	PVC	PVC	8.0	17.0	8.0	N	2.6	3930112.63	1427987.59
	MW-152B	Off-site	10/7/2009	Nov-2012	488.02	-0.46	488.5	25.40	463.08	--	2.00	19.90	468.58	24.40	464.08	4.50	0.01	PVC	PVC	19.0	27.0	8.0	N	11.9	3930112.89	1427983.05
	MW-152C	Off-site	9/28/2011	Nov-2012	488.10	-0.60	488.7	65.17	423.53	67.5	2.00	60.13	428.57	64.57	424.13	4.44	0.01	PVC	PVC	55.0	65.5	11.3	N	48.8	3930113.17	1427992.07
	MW-153A	Off-site	10/7/2009	Nov-2012	490.20	-0.31	490.5	16.00	474.51	--	2.00	10.60	479.91	14.50	476.01	3.90	0.01	PVC	PVC	8.5	17.0	8.0	N	2.6	3928749.86	1427720.55
	MW-153B	Off-site	4/20/2010	Nov-2012	489.72	-0.56	490.3	56.65	433.63	59.0	2.00	51.60	438.68	56.10	434.18	4.50	0.01	PVC	PVC	45.0	59.0	9.0	N	42.6	3928741.21	1427721.08
	MW-154A	On-site	10/5/2009	Nov-2012	498.04	2.56	495.5	75.50	419.98	--	2.00	71.00	424.48	75.00	420.48	4.00	0.01	PVC	PVC	68.0	76.5	12.5	N	58.5	3927391.51	1428835.89
	MW-154B	On-site	2/20/2010	Nov-2012	497.76	2.70	495.1	95.00	400.06	102.0	2.00	90.15	404.91	94.75	400.31	4.60	0.01	PVC	PVC	80.0	103.5	7.0	N	83.2	3927410.23	1428845.45
	MW-155A	Off-site	11/11/2009	Nov-2012	488.19	-0.40	488.6	15.50	473.09	--	2.00	5.35	483.24	15.08	473.51	9.73	0.01	PVC	PVC	3.5	15.5	7.5	Y	-2.2	3930320.08	1425509.58
	MW-155B	Off-site	9/11/2010	Nov-2012	488.25	-0.45	488.7	65.80	422.90	67.0	2.00	60.78	427.92	65.20	423.50	4.42	0.02	PVC	PVC	45.0	70.0	9	N	51.8	3930314.75	1425510.07
	MW-156A	Off-site	11/11/2009	Nov-2012	485.78	-0.42	486.2	15.50	470.70	--	2.00	5.35	480.85	15.09	471.11	9.74	0.01	PVC	PVC	3.5	15.5	7.0	Y	-1.7	3931955.04	1425536.52
	MW-156B	Off-site	2/17/2010	Nov-2012	489.36	2.87	486.5	50.40	436.09	51.5	2.00	45.20	441.29	50.00	436.49	4.80	0.01	PVC	PVC	35.0	51.5	8.0	N	37.2	3931949.92	1425537.02
	MW-157A	Off-site	11/13/2009	Nov-2012	484.96	-0.27	485.2	15.50	469.73	--	2.00	5.36	479.87	15.09	470.14	9.73	0.01	PVC	PVC	3.5	15.5	7.0	Y	-1.6	3932561.84	1426870.93
	MW-157B	Off-site	9/30/2011	Nov-2012	485.08	-0.18	485.3	30.73	454.53	40.0	2.00	25.71	459.55	30.14	455.12	4.43	0.01	PVC	PVC	20.0	31.0	10.3	N	15.4	3932567.15	1426874.11
	MW-158A	Off-site	11/13/2009	Nov-2012	488.04	-0.12	488.2	15.60	472.56	--	2.00	5.50	482.66	15.20	472.96	9.70	0.02	PVC	PVC	3.0	16.5	8.5	Y	-3.0	3931120.65	1426869.14
	MW-158B	Off-site	9/23/2010	Nov-2012	487.46	-0.49	488.0	60.61	427.34	65.0	2.00	55.62	432.33	60.14	427.81	4.52	0.02	PVC	PVC	43.0	67.0	10.0	N	45.6	3931119.26	1426874.85
	MW-159A	Off-site	11/13/2009	Nov-2012	488.52	-0.37	488.9	15.60	473.29	--	2.00	5.50	483.39	15.20	473.69	9.70	0.02	PVC	PVC	3.0	16.5	8.0	Y	-2.5	3931101.34	1427690.57
	MW-159B	Off-site	10/12/2011	Nov-2012	488.22	-0.77	489.0	46.20	442.79	--	2.00	41.16	447.83	45.60	443.39	4.44	0.01	PVC	PVC	35.0	46.5	8.0	N	33.2	3931101.12	1427679.28
	MW-159C	Off-site	9/29/2011	Nov-2012	488.70	-0.38	489.1	72.30	416.78	72.5	2.00	67.13	421.95	71.84	417.24	4.71	0.01	PVC	PVC	60.0	72.5	8.0	N	59.1	3931100.83	1427684.86
	MW-160A	Off-site	11/13/2009	Nov-2012	485.51	-0.31	485.8	15.50	470.32	--	2.00	5.35	480.47	15.08	470.74	9.73	0.01	PVC	PVC	3.5	15.5	7.0	Y	-1.7	3932566.91	1427463.18
	MW-160B	Off-site	2/19/2010	Nov-2012	485.58	-0.19	485.8	90.73	395.04	91.0	2.00	85.58	400.19	90.18	395.59	4.60	0.01	PVC	PVC	80.0	91.5	8.0	N	77.6	3932566.90	1427459.68
	MW-161A	Off-site	12/9/2009	Nov-2012	479.51	-0.29	479.8	15.60	464.20	--	2.00	5.50	474.30	15.20	464.60	9.70	0.02	PVC	PVC	3.8	16.5	8.0	Y	-2.5	3935554.06	1421680.78
	MW-161B	Off-site	9/10/2010	Nov-2012	479.60	-0.34	479.9	50.44	429.50	54.0	2.00	46.02	433.92	50.44	429.50	4.42	0.02	PVC	PVC	35.0	51.5	6.5	N	39.5	3935553.83	1421678.29
	MW-162A	Off-site	11/25/2009	Nov-2012	483.98	-0.55	484.5	15.60	468.93	--	2.00	5.50	479.03	15.20	469.33	9.70	0.02	PVC	PVC	3.8	16.5	7.5	Y	-2.0	3934831.10	1425571.90

Table 3-1
Well Construction Parameters
North Pole Refinery
Flint Hills Resources Alaska, LLC

												Well Screen								Filter Pack		WATER TABLE			ALASKA STATE PLANE	
																									NAD83, ZONE 3	
Well Type	Well	Proximity	Boring Completion Date	Survey Date	Riser Elevation (feet MSL)	Riser Stickup* (feet)	Ground Surface Elevation (feet MSL)	Well Depth (feet BGS)	Well Bottom Elevation (feet MSL)	Depth to Top of Permafrost (feet BGS)	Well Diameter (inches)	Depth to Top (feet BGS)	Top Elevation (feet MSL)	Depth to Bottom (feet BGS)	Bottom Elevation (feet MSL)	Length (feet)	Screen Slot Size (inches)	Material	Riser Material	Depth to Top (feet BGS)	Depth to Bottom (feet BGS)	Approx Depth (ft BGS)	In Screen	Feet above top of Screen	NORTHING	EASTING
Monitoring	MW-162B	Off-site	11/25/2009	Nov-2012	484.16	-0.18	484.3	65.38	418.96	67.5	2.00	60.18	424.16	64.73	419.61	4.55	0.01	PVC	PVC	50.0	66.5	7.5	Y	52.7	3934825.07	1425574.08
	MW-163A	Off-site	12/9/2009	Nov-2012	485.02	-0.78	485.8	15.60	470.20	--	2.00	5.50	480.30	15.20	470.60	9.70	0.02	PVC	PVC	3.6	16.5	9.0	Y	-3.5	3935430.75	1426901.11
	MW-163B	Off-site	9/13/2010	Nov-2012	484.80	-0.93	485.7	39.55	446.18	40.0	2.00	34.53	451.20	38.96	446.77	4.43	0.02	PVC	PVC	30.0	41.5	9.5	N	25.0	3935430.72	1426906.78
	MW-164A	Off-site	12/10/2009	Nov-2012	480.75	0.35	480.4	15.60	464.80	--	2.00	5.50	474.90	15.20	465.20	9.70	0.02	PVC	PVC	3.8	16.5	9.0	Y	-3.5	3938026.16	1425651.07
	MW-164B	Off-site	9/9/2010	Nov-2012	479.47	-0.37	479.8	50.67	429.17	--	2.00	45.62	434.22	50.06	429.78	4.44	0.02	PVC	PVC	35.0	51.5	9.0	N	36.6	3938027.01	1425654.08
	MW-164C	Off-site	8/17/2011	Nov-2012	479.88	0.05	479.8	62.44	417.39	63.0	2.00	57.34	422.49	61.99	417.84	4.65	0.01	PVC	PVC	52.0	63.5	8.0	N	49.3	3938023.06	1425652.19
	MW-165A	Off-site	1/18/2010	Nov-2012	474.79	-0.46	475.3	15.40	459.85	--	2.00	5.19	470.06	14.90	460.35	9.71	0.01	PVC	PVC	4.0	15.5	7.5	Y	-2.3	3938692.18	1416849.70
	MW-165B	Off-site	9/28/2010	Nov-2012	474.64	-0.62	475.3	50.88	424.38	--	2.00	45.87	429.39	50.35	424.91	4.48	0.02	PVC	PVC	35.0	51.5	8.0	N	37.9	3938690.33	1416854.17
	MW-166A	Off-site	1/8/2010	Nov-2012	475.43	3.16	472.3	15.60	456.67	--	2.00	5.44	466.83	15.15	457.12	9.71	0.01	PVC	PVC	4.0	16.0	7.5	Y	-2.1	3940972.27	1419512.27
	MW-166B	Off-site	3/15/2010	Nov-2012	475.43	3.16	472.3	32.10	440.17	33.0	2.00	27.15	445.12	31.35	440.92	4.20	0.01	PVC	PVC	21.0	33.5	7.0	N	20.2	3940967.37	1419509.53
	MW-167A	Off-site	1/7/2010	Nov-2012	475.71	-0.45	476.2	15.80	460.36	--	2.00	5.65	470.51	15.35	460.81	9.70	0.01	PVC	PVC	4.0	16.0	9.0	Y	-3.4	3942809.92	1423092.52
	MW-167B	Off-site	3/23/2010	Nov-2012	475.57	-0.52	476.1	33.27	442.82	33.5	2.00	28.17	447.92	33.15	442.94	4.98	0.01	PVC	PVC	25.0	34.0	6.5	N	21.7	3942813.73	1423092.51
	MW-168A	Off-site	1/8/2010	Nov-2012	478.25	-0.41	478.7	15.50	463.16	--	2.00	5.36	473.30	15.06	463.60	9.70	0.01	PVC	PVC	4.0	16.0	9.0	Y	-3.6	3941284.64	1425723.88
	MW-168B	Off-site	10/1/2011	Nov-2012	478.34	-0.28	478.6	51.45	427.17	55.0	2.00	46.29	432.33	51.00	427.62	4.71	0.01	PVC	PVC	40.0	52.0	10.9	N	35.4	3941289.40	1425724.13
	MW-169A	Off-site	2/25/2010	Nov-2012	485.92	2.76	483.2	15.15	468.01	--	2.00	5.27	477.89	15.06	468.10	9.79	0.01	PVC	PVC	4.0	15.5	8.0	Y	-2.7	3931955.69	1423035.08
	MW-169B	Off-site	10/21/2010	Nov-2012	485.95	3.05	482.9	49.20	433.70	--	2.00	44.09	438.81	48.72	434.18	4.63	0.02	PVC	PVC	35.0	51.5	10.0	N	34.1	3931960.39	1423037.49
	MW-169C	Off-site	9/1/2011	Nov-2012	482.56	-0.65	483.2	59.94	423.27	69.0	2.00	54.82	428.39	59.47	423.74	4.65	0.02	PVC	PVC	50.0	60.0	8.0	N	46.8	3931966.50	1423042.84
	MW-170A	Off-site	2/24/2010	Nov-2012	490.67	-0.50	491.2	14.90	476.27	--	2.00	4.60	486.57	14.40	476.77	9.80	0.01	PVC	PVC	4.6	16.0	8.0	Y	-3.4	3930005.65	1429184.98
	MW-170B	Off-site	3/6/2010	Nov-2012	490.74	-0.27	491.0	74.79	416.22	--	4.00	69.70	421.31	74.06	416.95	4.36	0.01	PVC	PVC	65.0	75.6	8.0	N	61.7	3930000.43	1429187.53
	MW-170C	Off-site	3/4/2010	Nov-2012	490.83	-0.30	491.1	130.90	360.23	135.0	2.00	125.90	365.23	130.20	360.93	4.30	0.01	PVC	PVC	120.0	135.0	8.0	N	117.9	3929995.96	1429188.84
	MW-170D	Off-site	10/13/2010	Nov-2012	490.41	-0.55	491.0	50.62	440.34	--	2.00	45.52	445.44	50.14	440.82	4.62	0.02	PVC	PVC	35.0	51.5	8.0	N	37.5	3929991.96	1429189.27
	MW-171A	Off-site	2/25/2010	Nov-2012	485.28	0.08	485.2	15.20	470.00	--	2.00	4.96	480.24	14.77	470.43	9.81	0.01	PVC	PVC	4.0	16.0	9.0	Y	-4.0	3935401.97	1428945.84
	MW-171B	Off-site	3/16/2010	Nov-2012	484.83	-0.40	485.2	40.28	444.95	42.0	2.00	35.26	449.97	39.70	445.53	4.44	0.01	PVC	PVC	30.0	44.5	10.0	N	25.3	3935402.47	1428941.37
	MW-172A	Off-site	3/24/2010	Nov-2012	475.67	-0.25	475.9	15.47	460.45	--	2.00	5.33	470.59	15.04	460.88	9.71	0.01	PVC	PVC	3.5	16.0	8.0	Y	-2.7	3942632.06	1427431.58
	MW-172B	Off-site	3/27/2010	Nov-2012	475.74	-0.39	476.1	150.37	325.76	150.5	2.00	145.35	330.78	149.78	326.35	4.43	0.01	PVC	PVC	135.0	151.5	8.0	N	137.4	3942631.33	1427425.63
	MW-173A	On-site	3/3/2010	Nov-2012	496.28	3.30	493.0	14.60	478.38	--	2.00	4.54	488.44	14.24	478.74	9.70	0.01	PVC	PVC	4.0	16.0	8.0	Y	-3.5	3927534.58	1430223.98
	MW-173B	On-site	3/30/2010	Nov-2012	496.40	3.33	493.1	150.82	342.25	--	2.00	145.80	347.27	150.20	342.87	4.40	0.01	PVC	PVC	135.0	151.5	8.0	N	137.8	3927527.38	1430222.41
	MW-174A	On-site	9/16/2010	Nov-2012	494.25	2.91	491.3	50.17	441.17	--	2.00	44.96	446.38	49.68	441.66	4.72	0.02	PVC	PVC	30.0	51.5	7.5	N	37.5	3926454.50	1428665.44
	MW-174B	On-site	9/15/2010	Nov-2012	493.37	2.12	491.3	90.37	400.88	--	2.00	85.16	406.09	89.88	401.37	4.72	0.02	PVC	PVC	70.0	91.5	7.5	N	77.7	3926461.30	1428664.22
	MW-174-15	On-site	3/16/2013	Apr-2013	494.65	2.91	491.74	13.62	478.12	--	2.00	3.22	488.52	13.02	478.72	9.80	0.01	PVC	PVC	3.2	13.6	8.5	Y	-5.3	3926469.65	1428666.66
	MW-175	On-site	9/30/2010	Nov-2012	497.04	3.10	493.9	90.82	403.12	--	2.00	85.81	408.13	90.30	403.64	4.49	0.02	PVC	PVC	75.0	91.5	8.0	N	77.8	3926774.40	1429593.36
	MW-176A	On-site	10/4/2010	Nov-2012	497.02	3.20	493.8	14.83	478.99	--	2.00	4.67	489.15	14.42	479.40	9.75	0.02	PVC	PVC	4.0	16.5	9.5	Y	-4.8	3926055.80	1429416.30
	MW-176B	On-site	10/4/2010	Nov-2012	496.93	3.21	493.7	50.61	443.11	--	2.00	45.56	448.16	50.06	443.66	4.50	0.02	PVC	PVC	35.0	51.5	9.5	N	36.1	3926056.30	1429412.03
	MW-176C	On-site	10/1/2010	Nov-2012	496.86	3.15	493.7	90.49	403.22	--	2.00	85.43	408.28	89.93	403.78	4.50	0.02	PVC	PVC	75.0	91.5	9.5	N	75.9	3926056.80	1429407.76
	MW-177	On-site	9/22/2010	Nov-2012	497.92	3.01	494.9	89.71	405.20	--	2.00	84.71	410.20	89.19	405.72	4.48	0.02	PVC	PVC	70.0	91.5	7.5	N	77.2	3925072.46	1430037.88
	MW-178A	On-site	9/18/2010	Nov-2012	496.48	2.32	494.2	16.06	478.10	--	2.00	5.90	488.26	15.64	478.52	9.74	0.02	PVC	PVC	3.0	16.5	7.0	Y	-1.1	3926117.29	1429586.63
	MW-178B	On-site	9/18/2010	Nov-2012	496.10	2.19	493.9	51.17	442.74	--	2.00	46.01	447.90	50.73	443.18	4.72	0.02	PVC	PVC	40.0	51.5	7.5	N	38.5	3926117.08	1429579.97
	MW-178C	On-site	9/17/2010	Nov-2012	497.27	3.03	494.2	90.15	404.09	--	2.00	85.16	409.08	89.93	404.31	4.77	0.02	PVC	PVC	75.0	91.5	7.5	N	77.7	3926117.30	1429573.58
	MW-179A	On-site	9/21/2010	Nov-2012	496.96	3.02	493.9	15.61	478.33	--	2.00	5.56	488.38	15.20	478.74	9.64	0.02	PVC	PVC	5.0	16.5	8.0	Y	-2.4	3926050.54	1429676.64
	MW-179B	On-site	9/21/2010	Nov-2012	496.75	2.78	494.0	50.82	443.15	--	2.00	45.80	448.17	50.29	443.68	4.49	0.02	PVC	PVC	40.0	51.5	8.0	N	37.8	3926047.16	1429680.75
	MW-179C	On-site	9/20/2010	Nov-2012	497.27	3.48	493.8	90.43	403.36	--	2.00	85.41	408.38	89.90	403.89	4.49	0.02	PVC	PVC	75.0	91.5	8.5	N	76.9	3926045.58	1429674.43
	MW-179D	On-site	8/12/2011	Nov-2012	497.07	3.27	493.8	134.05	359.75	140.5	2.00	128.95	364.85	133.65	360.15	4.70	0.02	PVC	PVC	115.0	140.5	8.0	N	121.0	3926048.88	1429668.63
	MW-180A	On-site	9/27/2010	Nov-2012	497.42	3.09	494.3	15.39	478.94	--	2.00	5.25	489.08	14.97	479.36	9.72	0.02	PVC	PVC	3.0	16.5	7.5	Y	-2.3	3925874.85	1429928.62
	MW-180B	On-site	9/27/2010	Nov-2012	496.87	2.65	494.2	50.72	443.50	--	2.00	45.71	448.51	50.19	444.03	4.48	0.02	PVC	PVC	35.0	51.5	7.5	N	38.2	3925879.52	1429922.58
	MW-180C	On-site	9/25/2010	Nov-2012	497.05	2.85	494.2	90.42	403.78	--	2.00	85.33	408.87	89.87	404.33	4.54	0.02	PVC	PVC	75.0	91.5	7.5	N	77.8	3925873.80	1429924.19
	MW-181A	Off-site	10/6/2010	Nov-2012	475.92	-0.51	476.4	15.16	461.27	--	2.00	5.05	471.38	14.75	461.68	9.70	0.02	PVC	PVC	4.0	16.5	10.0	Y	-5.0	3944095.46	1425755.04
	MW-181B	Off-site	10/6/2010	Nov-2012	475.86	-0.50	476.4	50.78	425.58	--	2.00	45.77	430.59	50.30	426.06	4.53	0.02	PVC	PVC	35.0	51.5	10.0	N	35.8	3944099.95	1425752.10
	MW-181C	Off-site	10/3/2011	Nov-2012	475.99	-0.41	476.4	150.45	325.95	--	2.00	145.43	330.97	149.86	326.54	4.43	0.01	PVC	PVC	140.0	150.5	10.3	N	135.1	3944089.21	1425759.17
	MW-182A	Off-site	10/8/2010	Nov-2012	476.51	0.51	476.0	15.83	460.17	--	2.00	5.70	470.30	15.42	460.58	9.72	0.02	PVC	PVC	4.0	16.5	7.0	Y	-1.3	3941132.12	1423038.13
	MW-182B	Off-site	8/22/2011	Nov-2012	475.40	-0.46	475.9	44.67	431.19	46.0	2.00	39.57	436.29	44.27	431.59	4.70	0.02	PVC	PVC	30.0	50.5	7.0	N	32.6	3941136.42	1423037.29
	MW-183A	Off-site	10/8/2010	Nov-2012	478.03	-0.59	478.6	15.88	462.74	--	2.00	5.77	472.85	15.47	463.15	9.70	0.02	PVC	PVC	4.0	16.5	7.0	Y	-1.2	3937529.71	1420159.70
	MW-183B	Off-site	8/29/2011	Nov-2012	478.06	-0.58	478.6	59.74	418.90	59.0	2.00	54.64	424.00	59.34	419.30	4.70	0.02	PVC	PVC	45.0	60.0	7.0	N	47.6	3937532.14	1420157.14
	MW-184	Off-site	10/1/2010	Nov-2012	486.64	-0.65	487.3	45.23	442.06	45.0	2.00	40.12	447.17	44.75	442.54	4.63	0.02	PVC	PVC	30.0	45.5	7.0	N	33.1	3932560.61	1428756.36
	MW-185A	Off-site	10/12/2010	Nov-2012	478.06	-0.56	478.6	15.57	463.05	--	2.00	5.48	473.14	15.10	463.52	9.62	0.02	PVC	PVC	4.0	16.5	7.0	Y	-1.5	3940802.50	1428251.19
	MW-185B	Off-site	10/12/2010	Nov-2012	478.09	-0.41	478.5	51.41	427.09	--	2.00	46.30	432.20	50.93	427.57	4.63	0.02	PVC	PVC	35.0	51.5	7.0	N	39.3	3940797.61	1428251.05
	MW-185C	Off-site	10/2/2011	Nov-2012	478.48	-0.21	478.7	120.99	357.70	121.0	2.00	115.96	362.73	120.40	358.29	4.44	0.01	PVC	PVC	110.0	121.0	9.5	N	106.5	3940806.68	1428250.19
	MW-186A	On-site	10/19/2010	Nov-2012	495.95	3.29	492.7	15.22	477.44	--	2.00	5.11	487.55	14.79	477.87	9.68	0.02	PVC	PVC	4.0	16.5	7.0	Y	-1.9	3927025.87	1429092.83
	MW-186B	On-site	10/16/2010	Nov-2012	495.88	3.20	492.7	60.80	431.88	--	2.00	50.69	441.99	60.37	432.31	9.68	0.02	PVC	PVC	40.0	61.5	7.0	N	43.7	3927021.15	1429092.67
	MW-186C	On-site	10/15/2010	Nov-2012	495.80	3.19	492.6	100.79	391.82	--	2.00	90.69	401.92	100.32	392.29	9.63	0.02	PVC	PVC	80.0	101.5	7.0	N	83.7	3927017.05	1429092.45
	MW-186D	On-site	12/4/2011	Nov-2012	495.81	3.12	492.7	134.99	357.70	--	2.00	129.83	362.86	134.62	358.07	4.79	0.01	PVC	PVC	124.0	136.5	7.0	N	122.8	3927010.35	1429093.23
	MW-186E	On-site	4/25/2012	Nov-2012	495.80	3.06	492.7	75.90	416.84	--	2.00	70.76	421.98	75.42	417.32	4.66	0.01	PVC	PVC	Natural pack		7.0	N	63.8	3927030.39	1429093.30
	MW-187	Off-site	10/21/2010	Nov-2012	485.39	2.82	482.6	17.38	465.19	--	2.00	7.28	475.29	16.91	465.66	9.63	0.02	PVC	PVC	4.0	16.5	10.5	Y	-3.2	3934464.24	1420335.62
	MW-188A	Off-site	4/28/2012	Nov-2012	461.84	-0.15	462.0	15.33	446.66	--	2.00	5.20	456.79	14.98	447.01	9.78	0.01	PVC	PVC	3.0	15.3	10.0	Y	-4.8	3951510.80	1410365.41
	MW-188B	Off-site	11/24/2010	Nov-2012	461.53	-0.37	461.9	40.90	421.00	45.5	2.00	35.40	426.50	40.40	421.50	5.00	0.02	PVC	PVC	35.5	42.5	4.5	N	30.9	3951521.8	1410365.5
	MW-189A	Off-site	8/19/2011	Nov-2012	470.18	-0.68	470.9	16.54	454.32	--	2.00	6.49	464.37	16.16	454.70	9.67	0.01	PVC	PVC	4.0	17.5	7.0	Y	-0.5	3945399.36	1424696.44
	MW-189B	Off-site	8/19/2011	Nov-2012	470.25	-0.74	471.0	60.52	410.47	--	2.00	55.42	415.57	60.07	410.92	4.65	0.01	PVC	PVC	45.0	61.5	7.0	N	48.4	3945396.24	1424692.19
	MW-190A	Off-site	8/23/2011	Nov-2012	481.89	-0.07	482.0	15.59	466.37	--	2.00	5.49	476.47	15.20	466.76	9.71	0.01	PVC	PVC	4.0	16.0	7.0	Y	-1.5	3938370.06	1429592.42
	MW-190B	Off-site	8/23/2011	Nov-2012	481.56	-0.30	481.9	60.71	421.15	--	2.00	55.62	426.24	60.28	421.58	4.66	0.01	PVC	PVC	45.0	61.5	7.0	N	48.6	3938370.16	1429596.16
	MW-191A	Off-site	8/24/2011	Nov-2012	475.65	-0.73	476.4	15.28	461.10	--	2.00	5.18	471.20	14.90	461.48	9.72	0.01	PVC	PVC	4.0	16.0	8.0	Y	-2.8	3937781.57	1417713.87
	MW-191B	Off-site	8/24/2011	Nov-2012	475.51	-0.78	476.3	60.29	416.00	--	2.00	55.22	421.07	59.84	416.45	4.62	0.01	PVC	PVC	45.0	61.5	8.0	N	47.2	3937777.89	1417714.18
	MW-192A	On-site	8/25/2011	Nov-2012	495.90	2.44	493.5	14.64	478.82	--	2.00	4.54	488.92	14.24	479.22	9.70	0.02	PVC	PVC	5.0	15.0	4.5	Y	0.0	3924992.22	1428889.36
	MW-192B	On-site	8/26/2011	Nov-2012	495.47	2.22	493.3	55.51	437.74	--	2.00	50.41	442.84	55.11	438.14	4.70	0.02	PVC	PVC	54.0	60.0	4.0	N	46.4	3924992.57	1428887.11
	MW-193A	Off-site	8/30/2011	Nov-2012	487.70	-0.43	488.1	15.68	472.45	--	2.00	5.00	483.13	15.50	472.63	10.50	0.02	PVC	PVC	5.0	15.5	6.8	Y	-1.8	3930483.21	1424590.71
	MW-193B	Off-site	8/30/2011	Nov-2012	487.40	-0.61	488.0	59.88	428.13	61.0	2.00	54.72	433.29	59.41	428.60	4.69	0.02	PVC	PVC	45.0	60.0	6.5	N	48.2	3930481.25	1424593.75

Table 3-1
Well Construction Parameters
North Pole Refinery
Flint Hills Resources Alaska, LLC

												Well Screen								Filter Pack		WATER TABLE			ALASKA STATE PLANE	
																									NAD83, ZONE 3	
Well Type	Well	Proximity	Boring Completion Date	Survey Date	Riser Elevation (feet MSL)	Riser Stickup* (feet)	Ground Surface Elevation (feet MSL)	Well Depth (feet BGS)	Well Bottom Elevation (feet MSL)	Depth to Top of Permafrost (feet BGS)	Well Diameter (inches)	Depth to Top (feet BGS)	Top Elevation (feet MSL)	Depth to Bottom (feet BGS)	Bottom Elevation (feet MSL)	Length (feet)	Screen Slot Size (inches)	Material	Riser Material	Depth to Top (feet BGS)	Depth to Bottom (feet BGS)	Approx Depth (ft BGS)	In Screen	Feet above top of Screen	NORTHING	EASTING
Monitoring	MW-194A	Off-site	8/31/2011	Nov-2012	475.57	-0.73	476.3	15.76	460.54	--	2.00	6.00	470.30	15.36	460.94	9.36	0.02	PVC	PVC	4.0	15.0	6.5	Y	-0.5	3939634.55	1418923.90
	MW-194B	Off-site	8/31/2011	Nov-2012	475.88	-0.42	476.3	39.45	436.85	39.0	2.00	34.38	441.92	38.96	437.34	4.58	0.02	PVC	PVC	24.0	40.0	6.5	N	27.9	3939630.80	1418924.87
	MW-195A	On-site	10/11/2011	Nov-2012	496.10	2.76	493.3	15.35	477.99	--	2.00	5.15	488.19	14.95	478.39	9.80	0.01	PVC	PVC	4.0	16.0	8.0	Y	-2.9	3926110.91	1428572.63
	MW-195B	On-site	12/5/2011	Nov-2012	496.12	2.66	493.5	149.90	343.56	--	2.00	144.80	348.66	149.50	343.96	4.70	0.01	PVC	PVC	130.0	149.9	8.0	N	136.8	3926110.92	1428566.32
	MW-196	On-site	10/11/2011	Nov-2012	497.37	3.31	494.1	15.20	478.86	--	2.00	5.01	489.05	14.73	479.33	9.72	0.01	PVC	PVC	4.0	16.5	7.5	Y	-2.5	3925033.44	1429646.49
	MW-197A	On-site	6/6/2012	Nov-2012	495.17	2.35	492.8	66.06	426.76	--	2.00	61.09	431.73	65.74	427.08	4.65	0.01	PVC	PVC	Natural pack		7.0	N	54.1	3926959.84	1429490.28
	MW-197B	On-site	10/16/2011	Nov-2012	495.28	2.54	492.7	149.69	343.05	--	2.00	144.61	348.13	149.08	343.66	4.47	0.01	PVC	PVC	135.0	152.0	9.0	N	135.6	3926950.83	1429491.74
	MW-198	On-site	12/10/2011	Nov-2012	493.32	-0.28	493.6	149.81	343.79	--	2.00	144.73	348.87	149.38	344.22	4.65	0.01	PVC	PVC	135.0	150.0	8.0	N	136.7	3925820.02	1429027.70
	MW-199	On-site	12/2/2011	Nov-2012	495.90	2.51	493.4	149.83	343.56	--	2.00	144.65	348.74	149.44	343.95	4.79	0.01	PVC	PVC	140.0	151.5	9.0	N	135.7	3926959.18	1428830.82
	MW-300	On-site	12/6/2011	Nov-2012	496.00	1.94	494.1	150.30	343.76	--	2.00	145.00	349.06	149.70	344.36	4.65	0.01	PVC	PVC	130.0	150.3	9.0	N	136.0	3926139.62	1429895.14
	MW-301-CMT-10	On-site	10/26/2011	Nov-2012	492.88	3.44	489.4	10.00	479.44	--	2.00	9.87	479.57	10.13	479.31	0.25	CMT	PVC	PVC	8.0	12.0	5.0	N	4.9	3927444.5	1427850.4
	MW-301-CMT-20	On-site	10/26/2011	Nov-2012	492.88	3.44	489.4	20.00	469.44	--	2.00	19.87	469.57	20.13	469.31	0.25	CMT	PVC	PVC	18.0	22.0	5.0	N	14.9	3927444.5	1427850.4
	MW-301-CMT-30	On-site	10/26/2011	Nov-2012	492.88	3.44	489.4	30.00	459.44	--	2.00	29.87	459.57	30.13	459.31	0.25	CMT	PVC	PVC	28.0	32.0	5.0	N	24.9	3927444.5	1427850.4
	MW-301-CMT-40	On-site	10/26/2011	Nov-2012	492.88	3.44	489.4	40.00	449.44	--	2.00	39.87	449.57	40.13	449.31	0.25	CMT	PVC	PVC	38.0	42.0	5.0	N	34.9	3927444.5	1427850.4
	MW-301-CMT-50	On-site	10/26/2011	Nov-2012	492.88	3.44	489.4	50.00	439.44	--	2.00	49.87	439.57	50.13	439.31	0.25	CMT	PVC	PVC	48.0	52.0	5.0	N	44.9	3927444.5	1427850.4
	MW-301-60	On-site	10/26/2011	Nov-2012	492.85	3.36	489.5	60.85	428.64	--	2.00	55.61	433.88	60.26	429.23	4.65	0.01	PVC	PVC	50.0	62.0	5.0	N	50.6	3927435.06	1427867.56
	MW-301-70	On-site	10/9/2011	Nov-2012	492.46	2.86	489.6	70.75	418.85	71.5	2.00	65.70	423.90	70.14	419.46	4.44	0.01	PVC	PVC	60.0	70.0	5.0	N	60.7	3927422.66	1427894.40
	MW-302-CMT-10	On-site	10/25/2011	Nov-2012	494.32	3.58	490.7	10.00	480.74	--	2.00	9.87	480.87	10.13	480.61	0.25	CMT	PVC	PVC	8.0	12.0	5.0	N	4.9	3927605.7	1428194.2
	MW-302-CMT-20	On-site	10/25/2011	Nov-2012	494.32	3.58	490.7	20.00	470.74	--	2.00	19.87	470.87	20.13	470.61	0.25	CMT	PVC	PVC	18.0	22.0	5.0	N	14.9	3927605.7	1428194.2
	MW-302-CMT-30	On-site	10/25/2011	Nov-2012	494.32	3.58	490.7	30.00	460.74	--	2.00	29.87	460.87	30.13	460.61	0.25	CMT	PVC	PVC	28.0	32.0	5.0	N	24.9	3927605.7	1428194.2
	MW-302-CMT-40	On-site	10/25/2011	Nov-2012	494.32	3.58	490.7	40.00	450.74	--	2.00	39.87	450.87	40.13	450.61	0.25	CMT	PVC	PVC	38.0	41.5	5.0	N	34.9	3927605.7	1428194.2
	MW-302-CMT-50	On-site	10/25/2011	Nov-2012	494.32	3.58	490.7	50.00	440.74	--	2.00	49.87	440.87	50.13	440.61	0.25	CMT	PVC	PVC	47.0	50.5	5.0	N	44.9	3927605.7	1428194.2
	MW-302-70	On-site	11/5/2011	Nov-2012	493.29	3.02	490.3	70.87	419.40	--	2.00	65.75	424.52	70.40	419.87	4.65	0.01	PVC	PVC	60.0	71.0	9.0	N	56.8	3927612.39	1428219.37
	MW-302-80	On-site	11/3/2011	Nov-2012	493.49	3.04	490.5	81.45	409.00	--	2.00	76.33	414.12	80.98	409.47	4.65	0.01	PVC	PVC	70.0	81.5	9.0	N	67.3	3927614.39	1428208.27
	MW-302-95	On-site	10/25/2011	Nov-2012	493.00	2.72	490.3	95.20	395.08	--	2.00	90.15	400.13	94.81	395.47	4.66	0.01	PVC	PVC	Natural pack		9.0	N	81.2	3927608.27	1428231.29
	MW-302-110	On-site	10/17/2011	Nov-2012	493.65	2.96	490.7	110.18	380.51	110.0	2.00	105.11	385.58	109.58	381.11	4.47	0.01	PVC	PVC	95.0	110.5	9.0	N	96.1	3927616.89	1428196.81
	MW-303-CMT-9	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	9.00	483.30	--	2.00	8.87	483.43	9.13	483.17	0.25	CMT	PVC	PVC	7.0	11.0	4.0	N	4.9	3927676.0	1428481.8
	MW-303-CMT-19	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	19.00	473.30	--	2.00	18.87	473.43	19.13	473.17	0.25	CMT	PVC	PVC	17.0	21.0	4.0	N	14.9	3927676.0	1428481.8
	MW-303-CMT-29	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	29.00	463.30	--	2.00	28.87	463.43	29.13	463.17	0.25	CMT	PVC	PVC	27.0	31.0	4.0	N	24.9	3927676.0	1428481.8
	MW-303-CMT-39	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	39.00	453.30	--	2.00	38.87	453.43	39.13	453.17	0.25	CMT	PVC	PVC	37.0	41.0	4.0	N	34.9	3927676.0	1428481.8
	MW-303-CMT-49	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	49.00	443.30	--	2.00	48.87	443.43	49.13	443.17	0.25	CMT	PVC	PVC	47.0	51.0	4.0	N	44.9	3927676.0	1428481.8
	MW-303-CMT-59	On-site	10/20/2011	Nov-2012	495.85	3.55	492.3	59.00	433.30	--	2.00	58.87	433.43	59.13	433.17	0.25	CMT	PVC	PVC	57.0	59.5	4.0	N	54.9	3927676.0	1428481.8
	MW-303-70	On-site	11/1/2011	Nov-2012	495.06	2.87	492.2	70.44	421.75	--	2.00	65.24	426.95	70.04	422.15	4.80	0.01	PVC	PVC	60.0	70.5	9.0	N	56.2	3927668.05	1428484.37
	MW-303-80	On-site	11/2/2011	Nov-2012	495.12	2.92	492.2	80.73	411.47	--	2.00	75.54	416.66	80.33	411.87	4.79	0.01	PVC	PVC	70.0	81.0	9.0	N	66.5	3927660.37	1428485.11
	MW-303-95	On-site	4/17/2012	Nov-2012	495.12	3.12	492.0	95.18	396.82	--	2.00	90.13	401.87	94.78	397.22	4.65	0.01	PVC	PVC	Natural pack		9.0	N	81.1	3927651.67	1428487.31
	MW-303-130	On-site	10/18/2011	Nov-2012	495.15	3.16	492.0	130.70	361.29	130.0	2.00	125.60	366.39	130.23	361.76	4.63	0.01	PVC	PVC	115.0	131.0	9.0	N	116.6	3927682.57	1428479.64
	MW-304-CMT-10	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	10.00	484.16	--	2.00	9.87	484.29	10.13	484.03	0.25	CMT	PVC	PVC	8.0	12.0	9.5	N	0.4	3927758.3	1428860.6
	MW-304-15	On-site	4/18/2012	Nov-2012	496.98	3.28	493.7	18.17	475.53	--	2.00	8.02	485.68	17.83	475.87	9.81	0.01	PVC	PVC	3.4	18.7	10.5	Y	-2.5	3927723.82	1428828.03
	MW-304-CMT-20	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	20.00	474.16	--	2.00	19.87	474.29	20.13	474.03	0.25	CMT	PVC	PVC	18.0	22.0	9.5	N	10.4	3927758.3	1428860.6
	MW-304-CMT-30	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	30.00	464.16	--	2.00	29.87	464.29	30.13	464.03	0.25	CMT	PVC	PVC	28.0	32.0	9.5	N	20.4	3927758.3	1428860.6
	MW-304-CMT-40	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	40.00	454.16	--	2.00	39.87	454.29	40.13	454.03	0.25	CMT	PVC	PVC	36.0	41.5	9.5	N	30.4	3927758.3	1428860.6
	MW-304-CMT-50	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	50.00	444.16	--	2.00	49.87	444.29	50.13	444.03	0.25	CMT	PVC	PVC	48.0	52.0	9.5	N	40.4	3927758.3	1428860.6
	MW-304-CMT-60	On-site	10/18/2011	Nov-2012	497.63	3.47	494.2	60.00	434.16	--	2.00	59.87	434.29	60.13	434.03	0.25	CMT	PVC	PVC	58.0	61.0	9.5	N	50.4	3927758.3	1428860.6
	MW-304-70	On-site	10/20/2011	Nov-2012	496.99	2.75	494.2	70.66	423.58	--	2.00	65.54	428.70	70.20	424.04	4.66	0.01	PVC	PVC	58.0	71.0	10.5	N	55.1	3927751.83	1428854.08
	MW-304-80	On-site	10/31/2011	Nov-2012	496.73	2.70	494.0	81.14	412.89	--	2.00	76.02	418.01	80.67	413.36	4.65	0.01	PVC	PVC	71.5	81.5	10.5	N	65.6	3927740.60	1428843.75
	MW-304-96	On-site	4/18/2012	Nov-2012	496.95	2.86	494.1	95.71	398.38	--	2.00	90.57	403.52	95.22	398.87	4.65	0.01	PVC	PVC	Natural pack		10.5	N	80.1	3927746.17	1428848.56
	MW-304-125	On-site	10/14/2011	Nov-2012	497.31	3.60	493.7	125.92	367.79	--	2.00	120.89	372.82	125.32	368.39	4.43	0.01	PVC	PVC	115.0	126.0	10.5	N	110.4	3927730.33	1428833.79
	MW-304-150	On-site	10/14/2011	Nov-2012	497.18	2.97	494.2	150.65	343.56	--	2.00	145.53	348.68	150.18	344.03	4.65	0.01	PVC	PVC	135.0	150.0	10.5	N	135.1	3927769.24	1428870.53
	MW-305-CMT-8	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	7.50	485.64	--	2.00	7.37	485.77	7.63	485.51	0.25	CMT	PVC	PVC	5.5	9.5	4.0	N	3.4	3927940.7	1429049.0
	MW-305-CMT-18	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	17.50	475.64	--	2.00	17.37	475.77	17.63	475.51	0.25	CMT	PVC	PVC	15.0	19.5	4.0	N	13.4	3927940.7	1429049.0
	MW-305-CMT-28	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	27.50	465.64	--	2.00	27.37	465.77	27.63	465.51	0.25	CMT	PVC	PVC	25.0	29.5	4.0	N	23.4	3927940.7	1429049.0
	MW-305-CMT-38	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	37.50	455.64	--	2.00	37.37	455.77	37.63	455.51	0.25	CMT	PVC	PVC	34.5	39.5	4.0	N	33.4	3927940.7	1429049.0
	MW-305-CMT-48	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	47.50	445.64	--	2.00	47.37	445.77	47.63	445.51	0.25	CMT	PVC	PVC	44.5	49.5	4.0	N	43.4	3927940.7	1429049.0
	MW-305-CMT-58	On-site	10/24/2011	Nov-2012	496.39	3.25	493.1	57.50	435.64	--	2.00	57.37	435.77	57.63	435.51	0.25	CMT	PVC	PVC	54.8	57.5	4.0	N	53.4	3927940.7	1429049.0
	MW-305-70	On-site	10/22/2011	Nov-2012	495.67	2.91	492.8	70.37	422.39	--	2.00	65.00	427.76	69.90	422.86	4.90	0.01	PVC	PVC	2.5	72.0	10.0	N	55.0	3927953.08	1429040.73
	MW-305-80	On-site	10/30/2011	Nov-2012	495.38	2.69	492.7	81.22	411.47	--	2.00	76.10	416.59	80.75	411.94	4.65	0.01	PVC	PVC	70.0	81.5	10.0	N	66.1	3927959.70	1429046.56
	MW-305-100	On-site	10/8/2011	Nov-2012	495.71	2.74	493.0	99.92	393.05	110.0	2.00	94.88	398.09	99.32	393.65	4.44	0.01	PVC	PVC	85.0	100.0	10.0	N	84.9	3927946.36	1429034.54
	MW-306-CMT-10	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	10.00	483.49	--	2.00	9.87	483.62	10.13	483.36	0.25	CMT	PVC	PVC	8.3	12.0	5.0	N	4.9	3928108.3	1429306.7
	MW-306-15	On-site	4/16/2012	Nov-2012	496.77	3.11	493.7	15.40	478.26	--	2.00	5.20	488.46	15.01	478.65	9.81	0.01	PVC	PVC	3.2	15.4	11.0	Y	-5.8	3928103.64	1429299.52
	MW-306-CMT-20	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	20.00	473.49	--	2.00	19.87	473.62	20.13	473.36	0.25	CMT	PVC	PVC	17.3	22.0	5.0	N	14.9	3928108.3	1429306.7
	MW-306-CMT-30	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	30.00	463.49	--	2.00	29.87	463.62	30.13	463.36	0.25	CMT	PVC	PVC	27.7	32.0	5.0	N	24.9	3928108.3	1429306.7
	MW-306-CMT-40	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	40.00	453.49	--	2.00	39.87	453.62	40.13	453.36	0.25	CMT	PVC	PVC	37.3	41.5	5.0	N	34.9	3928108.3	1429306.7
	MW-306-CMT-50	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	50.00	443.49	--	2.00	49.87	443.62	50.13	443.36	0.25	CMT	PVC	PVC	47.8	52.0	5.0	N	44.9	3928108.3	1429306.7
	MW-306-CMT-60	On-site	10/27/2011	Nov-2012	496.95	3.46	493.5	60.00	433.49	--	2.00	59.87	433.62	60.13	433.36	0.25	CMT	PVC	PVC	57.7	62.0	5.0	N	54.9	3928108.3	1429306.7
	MW-306-70	On-site	11/6/2011	Nov-2012	496.70	3.39	493.3	70.71	422.60	--	2.00	65.51	427.80	70.31	423.00	4.80	0.01	PVC	PVC	60.0	71.0	9.0	N	56.5	3928115.77	1429309.12
	MW-306-80	On-site	11/7/2011	Nov-2012	496.53	3.23	493.3	80.50	412.80	--	2.00	75.31	417.99	80.10	413.20	4.79	0.01	PVC	PVC	70.0	81.0	9.0	N	66.3	3928108.87	1429292.74
	MW-306-100	On-site	10/13/2011	Nov-2012	495.55	2.46	493.1	100.60	392.49	--	2.00	95.40	397.69	100.16	392.93	4.76	0.01	PVC	PVC	90.0	101.0	9.0	N	86.4	3928121.97	1429302.41
	MW-306-150	On-site	10/7/2011	Nov-2012	496.03	2.95	493.1	150.06	343.02	--	2.00	144.86	348.22	149.63	343.45	4.77	0.01	PVC	PVC	133.0	150.5	9.0	N	135.9	3928118.47	1429293.75
	MW-307	On-site	12/3/2011	Nov-2012	495.49	2.57	492.9	149.90	343.02	--	2.00	144.76	348.16	149.56	343.36	4.80	0.01	PVC	PVC	140.0	151.5	9.0	N	135.8	3926951.83	1429734.66
	MW-308-15	Off-site	4/13/2012	Nov-2012	476.90	3.94	473.0	14.95	458.01	--	2.00	4.91	468.05	14.36	458.60	9.45	0.01	PVC	PVC	3.5	15.0	9.0	Y	-4.1	3943105.50	1420578.30
	MW-308-30	Off-site	4/12/2012	Nov-2012	475.35	3.67	471.7	30.42	441.26	41.0	2.00	25.21	446.47	30.02	441.66	4.81	0.01	PVC	PVC	Natural pack		10.0	N	15.2	3943026.01	1420453.62
	MW-309-15	On-site	4/19/2012	Nov-2012	495.22	3.23	492.0	15.06	476.93	--	2.00	4.92	487.07	14.72	477.27	9.80	0.01	PVC	PVC	3.2	15.0	7.0	Y	-2.1	3927042.65	1428539.04
	MW-309-66	On-site	4/23/2012	Nov-2012	495.05	3.12	491.9	65.85	426.08	--	2.00	59.43	432.50	64.10	427.83	4.67	0.01	PVC	PVC	Natural pack		7.0	N	52.4	3927043.2	1428532.4
	MW-309-150	On-site	4/19/2012	Nov-2012	494.74	2.69	492.1	149.75	342.30	--	2.00	144.61	347.44	149.27	342.78	4.66	0.01	PVC	PVC	Natural pack		7.0	N	137.6	3927043.93	1428525.49

Table 3-1
Well Construction Parameters
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well Type	Well	Proximity	Boring Completion Date	Survey Date	Riser Elevation (feet MSL)	Riser Stickup* (feet)	Ground Surface Elevation (feet MSL)	Well Depth (feet BGS)	Well Bottom Elevation (feet MSL)	Depth to Top of Permafrost (feet BGS)	Well Diameter (inches)	Well Screen: Depth to Top (feet BGS)	Well Screen: Top Elevation (feet MSL)	Well Screen: Depth to Bottom (feet BGS)	Well Screen: Bottom Elevation (feet MSL)	Well Screen: Length (feet)	Well Screen: Screen Slot Size (inches)	Well Screen: Material	Riser Material	Filter Pack: Depth to Top (feet BGS)	Filter Pack: Depth to Bottom (feet BGS)	WATER TABLE: Approx Depth (ft BGS)	WATER TABLE: In Screen	WATER TABLE: Feet above top of Screen	ALASKA STATE PLANE NAD83, ZONE 3: NORTHING	ALASKA STATE PLANE NAD83, ZONE 3: EASTING
Monitoring	MW-310-15	On-site	4/26/2012	Nov-2012	494.59	3.47	491.1	14.72	476.40	--	2.00	4.58	486.54	14.38	476.74	9.80	0.01	PVC	PVC	3.2	14.7	6.0	Y	-1.4	3926810.88	1428028.92
	MW-310-65	On-site	4/20/2012	Nov-2012	494.48	3.23	491.3	65.53	425.72	--	2.00	60.47	430.78	65.13	426.12	4.66	0.01	PVC	PVC	Natural pack		6.0	N	54.5	3926805.71	1428036.73
	MW-310-110	On-site	5/29/2012	Nov-2012	494.40	3.33	491.1	110.42	380.65	--	2.00	105.28	385.79	109.94	381.13	4.66	0.01	PVC	PVC	Natural pack		6.0	N	99.3	3926802.76	1428044.57
	MW-311-15	Off-site	4/26/2012	Nov-2012	467.00	-0.28	467.3	15.43	451.85	--	2.00	5.24	462.04	15.04	452.24	9.80	0.01	PVC	PVC	3.2	15.4	4.5	N	0.7	3946536.13	1415602.20
	MW-311-46	Off-site	4/28/2012	Nov-2012	466.86	-0.48	467.3	45.74	421.60	48.0	2.00	40.60	426.74	45.26	422.08	4.66	0.01	PVC	PVC	Natural pack		4.5	N	36.1	3946534.99	1415612.86
	MW-312-15	Off-site	4/26/2012	Nov-2012	464.12	-0.46	464.6	15.52	449.06	--	2.00	5.34	459.24	15.13	449.45	9.79	0.01	PVC	PVC	2.7	15.5	5.7	Y	-0.4	3951394.25	1415642.38
	MW-312-50	Off-site	5/2/2012	Nov-2012	464.30	-0.34	464.6	50.36	414.28	50.0	2.00	44.90	419.74	49.56	415.08	4.66	0.01	PVC	PVC	Natural pack		7.0	N	37.9	3951399.72	1415642.19
	MW-313-15	Off-site	4/30/2012	Nov-2012	465.79	-0.43	466.2	15.18	451.04	--	2.00	4.99	461.23	14.79	451.43	9.80	0.01	PVC	PVC	3.0	15.2	9.5	Y	-4.5	3951374.78	1423235.06
	MW-313-150	Off-site	5/8/2012	Nov-2012	465.88	-0.29	466.2	149.94	316.23	--	2.00	144.69	321.48	149.34	316.83	4.65	0.01	PVC	PVC	Natural pack		9.5	N	135.2	3951370.40	1423237.65
	MW-314-15	Off-site	4/30/2012	Nov-2012	476.29	-0.29	476.6	15.56	461.02	--	2.00	5.38	471.20	15.16	461.42	9.78	0.01	PVC	PVC	3.0	15.6	7.0	Y	-1.6	3943869.90	1427115.02
	MW-314-150	Off-site	5/11/2012	Nov-2012	476.12	-0.33	476.5	150.51	325.94	--	2.00	145.31	331.14	150.13	326.32	4.82	0.01	PVC	PVC	Natural pack		7.0	N	138.3	3943874.84	1427119.27
	MW-315-15	Off-site	5/1/2012	Nov-2012	458.44	-0.74	459.2	15.83	443.35	--	2.00	5.70	453.48	15.49	443.69	9.79	0.01	PVC	PVC	3.0	15.8	7.0	Y	-1.3	3949804.15	1403467.06
	MW-315-150	Off-site	5/2/2012	Nov-2012	458.96	-0.41	459.4	150.63	308.74	--	2.00	145.58	313.79	150.23	309.14	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.6	3949809.75	1403467.06
	MW-316-15	Off-site	5/1/2012	Nov-2012	486.34	-0.29	486.6	15.67	470.96	--	2.00	5.46	481.17	15.26	471.37	9.80	0.01	PVC	PVC	3.0	15.0	7.0	Y	-1.5	3932950.20	1428372.65
	MW-316-56	Off-site	5/16/2012	Nov-2012	486.15	-0.48	486.6	56.00	430.63	57.0	2.00	50.95	435.68	55.59	431.04	4.64	0.01	PVC	PVC	Natural pack		7.0	N	44.0	3932950.03	1428377.41
	MW-317-15	Off-site	5/3/2012	Nov-2012	488.86	-0.44	489.3	15.66	473.64	--	2.00	5.46	483.84	15.25	474.05	9.79	0.01	PVC	PVC	3.0	15.7	9.0	Y	-3.5	3930184.86	1428701.63
	MW-317-71	Off-site	5/21/2012	Nov-2012	488.79	-0.56	489.4	71.23	418.12	--	2.00	66.10	423.25	70.73	418.62	4.63	0.01	PVC	PVC	Natural pack		9.0	N	57.1	3930185.90	1428666.62
	MW-318-20	Off-site	5/3/2012	Nov-2012	492.93	2.84	490.1	20.48	469.61	--	2.00	10.29	479.80	20.08	470.01	9.79	0.01	PVC	PVC	8.0	20.5	10.0	Y	0.3	3928866.23	1424726.43
	MW-318-135	Off-site	5/10/2012	Nov-2012	493.00	3.11	489.9	135.29	354.60	--	2.00	130.15	359.74	134.80	355.09	4.65	0.01	PVC	PVC	Natural pack		7.0	N	123.2	3928883.99	1424703.15
	MW-319-15	Off-site	5/4/2012	Nov-2012	456.10	-0.35	456.5	15.28	441.17	--	2.00	5.08	451.37	14.89	441.56	9.81	0.01	PVC	PVC	3.0	15.3	7.0	Y	-1.9	3953109.18	1404197.93
	MW-319-45	Off-site	5/7/2012	Nov-2012	455.96	-0.69	456.7	45.52	411.13	45.5	2.00	40.44	416.21	45.10	411.55	4.66	0.01	PVC	PVC	Natural pack		7.0	N	33.4	3953109.18	1404192.73
	MW-320-20	Off-site	5/4/2012	Nov-2012	450.89	-0.40	451.3	20.15	431.14	--	2.00	9.96	441.33	19.76	431.53	9.80	0.01	PVC	PVC	7.9	20.2	10.2	Y	-0.2	3963542.54	1402682.33
	MW-320-130	Off-site	5/9/2012	Nov-2012	450.96	-0.53	451.5	131.38	320.11	--	2.00	126.32	325.17	130.97	320.52	4.65	0.01	PVC	PVC	Natural pack		10.0	N	116.3	3963539.90	1402678.14
	MW-321-15	On-site	5/5/2012	Nov-2012	495.59	2.74	492.9	15.77	477.08	--	2.00	5.62	487.23	15.41	477.44	9.79	0.01	PVC	PVC	3.9	15.8	7.0	Y	-1.4	3926256.76	1428855.78
	MW-321-65	On-site	5/5/112	Nov-2012	495.26	2.44	492.8	66.04	426.78	--	2.00	60.89	431.93	65.55	427.27	4.66	0.01	PVC	PVC	Natural pack		7.0	N	53.9	3926265.14	1428856.30
	MW-321-151	On-site	5/26/2012	Nov-2012	495.13	2.20	492.9	150.54	342.39	--	2.00	145.41	347.52	150.06	342.87	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.4	3926273.73	1428856.06
	MW-322-15	Off-site	5/8/2012	Nov-2012	472.47	3.07	469.4	15.73	453.67	--	2.00	5.55	463.85	15.34	454.06	9.79	0.01	PVC	PVC	3.0	15.7	7.0	Y	-1.5	3940670.73	1410082.02
	MW-322-150	Off-site	10/9/2012	Nov-2012	472.11	2.70	469.4	151.07	318.34	--	2.00	145.94	323.47	150.59	318.82	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.9	3940646.94	1410074.03
	MW-323-15	Off-site	5/7/2012	Nov-2012	485.27	3.01	482.3	15.55	466.71	--	2.00	5.42	476.84	15.21	467.05	9.79	0.01	PVC	PVC	3.0	15.6	7.0	Y	-1.6	3931840.58	1422094.72
	MW-323-50	Off-site	10/8/2012	Nov-2012	484.78	2.58	482.2	60.80	421.40	64.0	2.00	55.70	426.50	60.35	421.85	4.65	0.01	PVC	PVC	Natural pack		7.0	N	48.7	3931823.38	1422078.80
	MW-324-15	Off-site	5/8/2012	Nov-2012	463.41	-0.37	463.8	15.35	448.43	--	2.00	5.17	458.61	14.96	448.82	9.79	0.01	PVC	PVC	3.0	15.4	7.0	Y	-1.8	3945444.19	1404965.19
	MW-324-151	Off-site	5/23/2012	Nov-2012	462.90	-0.70	463.6	150.92	312.68	--	2.00	145.78	317.82	150.44	313.16	4.66	0.01	PVC	PVC	Natural pack		7.0	N	138.8	3945446.0	1404958.6
	MW-325-18	Off-site	5/18/2012	Nov-2012	486.13	-0.78	486.9	18.68	468.23	--	2.00	8.53	478.38	18.33	468.58	9.80	0.01	PVC	PVC	6.5	18.7	12.0	Y	-3.5	3937079.28	1430639.29
	MW-325-150	Off-site	5/14/2012	Nov-2012	486.85	-0.60	487.5	150.54	336.91	--	2.00	145.48	341.97	150.13	337.32	4.65	0.01	PVC	PVC	Natural pack		12.0	N	133.5	3937085.15	1430633.64
	MW-326-20	Off-site	6/8/2012	Nov-2012	500.53	3.00	497.5	20.75	476.78	--	2.00	10.61	486.92	20.40	477.13	9.79	0.01	PVC	PVC	7.0	20.8	7.0	N	3.6	3921150.73	1430277.63
	MW-326-150	Off-site	5/15/2012	Nov-2012	500.49	2.99	497.5	150.51	346.99	--	2.00	145.45	352.05	150.10	347.40	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.5	3921145.09	1430276.63
	MW-327-15	Off-site	5/21/2012	Nov-2012	467.82	-0.25	468.1	15.40	452.67	--	2.00	5.21	462.86	15.01	453.06	9.80	0.01	PVC	PVC	2.8	15.4	7.0	Y	-1.8	3951301.83	1420336.90
	MW-327-150	Off-site	5/19/2012	Nov-2012	467.61	-0.44	468.1	150.92	317.13	--	2.00	145.79	322.26	150.44	317.61	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.8	3951297.90	1420342.92
	MW-328-15	Off-site	5/21/2012	Nov-2012	472.35	-0.63	473.0	15.77	457.21	--	2.00	5.83	467.15	15.33	457.65	9.50	0.01	PVC	PVC	2.8	15.8	8.5	Y	-2.7	3945516.60	1422877.24
	MW-329-15	Off-site	4/10/2001	Nov-2012	482.91	2.93	480.0	14.82	465.16	--	2.00	5.40	474.58	14.34	465.64	8.94	0.01	PVC	PVC	3.5	14.8	7.0	Y	-1.6	3937284.38	1421278.22
	MW-329-66	Off-site	5/22/2012	Nov-2012	479.23	-0.47	479.7	65.67	414.03	67.0	2.00	60.53	419.17	65.19	414.51	4.66	0.01	PVC	PVC	Natural pack		7.0	N	53.5	3937283.6	1421283.4
	MW-328-151	Off-site	5/24/2012	Nov-2012	472.67	-0.52	473.2	150.66	322.53	--	2.00	145.58	327.61	150.25	322.94	4.67	0.01	PVC	PVC	Natural pack		8.5	N	137.1	3945525.83	1422876.28
	MW-330-20	On-site	6/4/2012	Nov-2012	500.03	2.73	497.3	19.62	477.68	--	2.00	9.46	487.84	19.21	478.09	9.75	0.01	PVC	PVC	7.7	9.5	12.0	Y	-2.5	3926218.84	1428281.49
	MW-330-65	On-site	6/4/2012	Nov-2012	499.83	2.55	497.3	65.39	431.89	--	2.00	60.26	437.02	64.91	432.37	4.65	0.01	PVC	PVC	Natural pack		12.0	N	48.3	3926212.39	1428284.78
	MW-330-150	On-site	6/2/2012	Nov-2012	499.65	2.40	497.3	150.42	346.83	--	2.00	145.36	351.89	150.02	347.23	4.66	0.01	PVC	PVC	Natural pack		12.0	N	133.4	3926206.19	1428288.44
	MW-331-150	On-site	6/5/2012	Nov-2012	495.62	2.67	493.0	150.24	342.71	--	2.00	145.10	347.85	149.75	343.20	4.65	0.01	PVC	PVC	Natural pack		8.6	N	136.5	3927767.73	1429695.15
	MW-332-15	Off-site	6/8/2012	Nov-2012	481.80	-0.22	482.0	15.67	466.35	--	2.00	5.53	476.49	15.32	466.70	9.79	0.01	PVC	PVC	3.0	15.7	7.0	y	-1.5	3937270.16	1428736.01
	MW-332-150	Off-site	6/7/2012	Nov-2012	481.35	-1.09	482.4	150.87	331.57	--	2.00	145.74	336.70	150.39	332.05	4.65	0.01	PVC	PVC	Natural pack		7.0	N	138.7	3937270.37	1428731.02
	MW-333-16	Off-site	6/12/2012	Nov-2012	497.16	2.18	495.0	16.22	478.76	--	2.00	6.09	488.89	15.83	479.15	9.74	0.01	PVC	PVC	2.8	16.2	6.0	N	0.1	3922961.12	1430188.05
	MW-333-150	Off-site	6/11/2012	Nov-2012	497.10	2.11	495.0	150.47	344.52	--	2.00	145.32	349.67	149.98	345.01	4.66	0.01	PVC	PVC	Natural pack		6.0	N	139.3	3922968.19	1430186.58
	MW-334-15	On-site	8/21/2012	Nov-2012	495.82	2.28	493.5	15.53	478.01	--	2.00	5.43	488.11	14.92	478.62	9.49	0.01	PVC	PVC	3.1	15.5	7.2	Y	-1.8	3927035.89	1429327.86
	MW-334-65	On-site	8/20/2012	Nov-2012	495.76	2.51	493.3	65.41	427.84	--	2.00	60.57	432.68	65.23	428.02	4.66	0.01	PVC	PVC	Natural pack		7.2	N	53.4	3927036.11	1429323.29
	MW-335-41	Off-site	8/23/2012	Nov-2012	469.34	-1.16	470.5	41.11	429.39	43.0	2.00	36.01	434.49	40.56	429.94	4.55	0.01	PVC	PVC	Natural pack		5.5	N	30.5	3946145.2	1419928.0
Observation	O-1	On-site	9/23/2010	Nov-2012	497.14	2.60	494.5	15.09	479.45	--	2.00	4.94	489.60	14.67	479.87	9.73	0.02	PVC	PVC	4.0	16.5	8.0	Y	-3.1	3925973.83	1429619.47
	O-2	On-site	9/23/2010	Nov-2012	497.54	3.80	493.7	15.03	478.71	--	2.00	4.88	488.86	14.61	479.13	9.73	0.02	PVC	PVC	4.0	16.5	7.5	Y	-2.6	3927114.04	1429130.05
	O-3	On-site	9/23/2010	Nov-2012	497.76	3.29	494.5	14.57	479.90	--	2.00	4.43	490.04	14.16	480.31	9.73	0.02	PVC	PVC	4.0	16.5	8.0	Y	-3.6	3927090.75	1429551.50
	O-4	On-site	9/16/2010	Nov-2012	496.50	2.48	494.0	15.11	478.91	--	2.00	4.98	489.04	14.64	479.38	9.66	0.02	PVC	PVC	4.5	16.5	7.5	Y	-2.5	3927159.11	1428795.47
	O-5	On-site	9/13/2011	Nov-2012	496.11	2.88	493.2	15.08	478.15	--	2.00	4.97	488.26	14.68	478.55	9.71	0.01	PVC	PVC	3.5	16.0	8.0	Y	-3.0	3926951.41	1428829.08
	O-6	On-site	9/14/2011	Nov-2012	494.73	2.49	492.2	15.58	476.66	--	2.00	5.47	486.77	15.17	477.07	9.70	0.01	PVC	PVC	3.5	16.0	6.0	Y	-0.5	3926744.06	1428769.81
	O-7	On-site	9/14/2011	Nov-2012	496.01	2.52	493.5	15.33	478.16	--	2.00	5.22	488.27	14.92	478.57	9.70	0.01	PVC	PVC	3.5	16.0	8.0	Y	-2.8	3926757.84	1429941.88
	O-8	On-site	9/15/2011	Nov-2012	496.72	2.74	494.0	15.86	478.12	--	2.00	5.75	488.23	15.45	478.53	9.70	0.01	PVC	PVC	4.0	16.0	8.5	Y	-2.8	3926131.00	1429895.90
	O-9	On-site	9/15/2011	Nov-2012	496.95	3.11	493.8	15.14	478.70	--	2.00	5.03	488.81	14.73	479.11	9.70	0.01	PVC	PVC	4.0	18.0	8.0	Y	-3.0	3926505.32	1429912.51
	O-10	On-site	9/16/2011	Nov-2012	496.36	2.76	493.6	16.37	477.23	--	4.00	6.38	487.22	16.03	477.57	9.65	0.01	PVC	PVC	4.0	18.0	8.5	Y	-2.1	3926386.30	1429760.78
	O-11	On-site	9/20/2011	Nov-2012	497.87	2.79	495.1	16.40	478.68	--	2.00	6.41	488.67	15.90	479.18	9.49	0.01	PVC	PVC	4.0	17.0	11.0	Y	-4.6	3927247.94	1429025.71
	O-12	On-site	9/21/2011	Nov-2012	496.26	3.34	492.9	16.99	475.93	--	2.00	6.79	486.13	16.60	476.32	9.81	0.01	PVC	PVC	4.0	17.0	9.2	Y	-2.4	3927268.21	1429161.41
	O-13	On-site	9/21/2011	Nov-2012	495.37	2.92	492.5	15.88	476.57	--	2.00	5.68	486.77	15.49	476.96	9.81	0.01	PVC	PVC	4.0	16.0	6.1	Y	-0.4	3927268.35	1429254.10
	O-14	On-site	10/1/2011	Nov-2012	494.90	-0.36	495.3	15.30	479.96	--	2.00	5.12	490.14	14.91	480.35	9.79	0.01	PVC	PVC	3.6	15.5	7.8	Y	-2.7	3925995.33	1430224.22
	O-15	On-site	10/6/2011	Nov-2012	498.70	3.15	495.6	15.37	480.18	--	2.00	5.19	490.36	14.97	480.58	9.78	0.01	PVC	PVC	3.0	15.5	9.0	Y	-3.8	3925553.75	1430177.50
	O-16	On-site	10/7/2011	Nov-2012	493.09	-0.50	493.6	14.60	478.99	--	2.00	4.41	489.18	14.20	479.39	9.79	0.01	PVC	PVC	3.0	14.7	8.0	Y	-3.6	3925819.74	1429033.87
	O-17	On-site	10/13/2011	Nov-2012	493.26	-0.34	493.6	15.04	478.56	--	2.00	4.87	488.73	14.56	479.04	9.69	0.01	PVC	PVC	4.0	16.0	8.0	Y	-3.1	3926546.15	1429036.74
	O-18	On-site	10/12/2011	Nov-2012	492.70	-0.39	493.1	15.32	477.77	--	2.00	5.15	487.94	14.85	478.24	9.70	0.01	PVC	PVC	4.0	16.0	8.0	Y	-2.9	3926309.43	1429007.34
	O-19	On-site	10/15/2011	Nov-2012	496.48	3.19	493.3	15.34	477.95	--	2.00	5.15	488.14	14.87	478.42	9.72	0.01	PVC	PVC	4.0	16.0	9.0	Y	-3.9	3926814.98	1429229.93
	O-20	On-site	10/13/2011	Nov-2012	497.41	3.12	494.3	15.84	478.45	--	2.00	5.64	488.65	15.44	478.85	9.80	0.01	PVC	PVC	4.0	16.0	9.0	Y	-3.4	3925863.81	1429729.04
	O-21	On-site	10/14/2011	Nov-2012	493.12	-0.46	493.6	15.69	477.89	--	2.00	5.49	488.09	15.29	478.29	9.80	0.01	PVC	PVC	4.0	16.0	8.0	Y	-2.5	3925656.97	1429631.77
	O-22	On-site	11/14/2011	Nov-2012	496.76	1.92	494.8	18.59	476.25	--	2.00	8.30	486.54	18.05	476.79	9.75	0.01	PVC	PVC	3.0	18.6	11.3	Y	-3.0	3926789.25	1430139.00

Table 3-1
Well Construction Parameters
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well Type	Well	Proximity	Boring Completion Date	Survey Date	Riser Elevation (feet MSL)	Riser Stickup* (feet)	Ground Surface Elevation (feet MSL)	Well Depth (feet BGS)	Well Bottom Elevation (feet MSL)	Depth to Top of Permafrost (feet BGS)	Well Diameter (inches)	Well Screen: Depth to Top (feet BGS)	Well Screen: Top Elevation (feet MSL)	Well Screen: Depth to Bottom (feet BGS)	Well Screen: Bottom Elevation (feet MSL)	Well Screen: Length (feet)	Well Screen: Screen Slot Size (inches)	Well Screen: Material	Riser Material	Filter Pack: Depth to Top (feet BGS)	Filter Pack: Depth to Bottom (feet BGS)	WATER TABLE: Approx Depth (ft BGS)	WATER TABLE: In Screen	WATER TABLE: Feet above top of Screen	ALASKA STATE PLANE NAD83, ZONE 3: NORTHING	ALASKA STATE PLANE NAD83, ZONE 3: EASTING
Observation	O-23	On-site	12/5/2011	Nov-2012	495.83	2.37	493.5	16.32	477.14	--	2.00	6.03	487.43	15.78	477.68	9.75	0.01	PVC	PVC	3.0	18.0	8.5	Y	-2.5	3927110.81	1429926.50
	O-24	On-site	9/16/2011	Nov-2012	496.87	2.52	494.4	15.24	479.11	--	2.00	4.95	489.40	14.70	479.65	9.75	0.01	PVC	PVC	3.0	15.5	10.3	Y	-5.4	3927281.16	1429428.42
	O-25	On-site	11/10/2011	Nov-2012	497.75	2.59	495.2	16.41	478.75	--	2.00	6.12	489.04	15.87	479.29	9.75	0.01	PVC	PVC	3.0	16.5	12.4	Y	-6.3	3927402.44	1429242.45
	O-26	On-site	11/9/2011	Nov-2012	496.82	2.89	493.9	14.96	478.97	--	2.00	4.67	489.26	14.42	479.51	9.75	0.01	PVC	PVC	3.0	15.0	8.6	Y	-3.9	3927363.19	1429037.48
	O-27	On-site	11/10/2011	Nov-2012	496.86	1.86	495.0	17.37	477.63	--	2.00	7.08	487.92	16.83	478.17	9.75	0.01	PVC	PVC	5.0	17.4	10.8	Y	-3.7	3927278.05	1428804.68
	O-28	On-site	11/14/2011	Nov-2012	494.65	2.16	492.5	14.84	477.65	--	2.00	4.55	487.94	14.30	478.19	9.75	0.01	PVC	PVC	3.0	16.0	6.0	Y	-1.5	3925637.58	1428886.20
	O-29	On-site	11/12/2011	Nov-2012	498.61	2.37	496.2	18.16	478.08	--	2.00	7.87	488.37	17.62	478.62	9.75	0.01	PVC	PVC	3.0	18.2	10.9	Y	-3.0	3926600.52	1430083.48
	O-30	On-site	8/14/2012	Nov-2012	497.97	2.97	495.0	15.82	479.18	--	2.00	6.71	488.29	15.36	479.64	9.75	0.01	PVC	PVC	4.0	15.8	9.0	Y	-2.3	3926425.9	1430292.8
	S-9	On-site	8/15/2001	Nov-2012	495.12	2.89	492.2	19.80	472.43	--	2.00	4.88	487.35	18.88	473.35	14.00	0.01	PVC	PVC	--	--	7.5	Y	-2.6	3927494.32	1429112.46
	S-21	On-site	5/15/1987	Nov-2012	497.19	2.84	494.4	13.40	480.95	--	2.00	2.92	491.43	12.67	481.68	9.75	0.02	PVC	PVC	--	--	9.0	Y	-6.1	3926670.65	1429597.64
	S-22	On-site	5/15/1987	Nov-2012	496.70	1.90	494.8	14.70	480.10	--	2.00	4.50	490.30	14.20	480.60	9.70	0.02	PVC	PVC	--	--	9.0	Y	-4.5	3926430.46	1429717.90
	S-32	On-site	11/15/1987	Nov-2012	495.82	2.93	492.9	11.30	481.59	--	4.00	1.30	491.59	11.30	481.59	10.00	0.02	ABS	ABS	--	--	9.0	Y	-7.7	3926946.66	1429732.57
	S-39	On-site	12/15/1989	Nov-2012	494.07	1.02	493.1	13.00	480.05	--	--	7.53	485.52	12.53	480.52	5.00	--	--	--	--	--	9.0	Y	-1.5	3927009.82	1429395.60
	S-43	On-site	6/15/1991	Nov-2012	496.20	2.05	494.2	13.00	481.15	--	--	3.37	490.78	12.70	481.45	9.33	--	--	--	--	--	9.0	Y	-5.6	3926779.68	1429530.33
	S-44	On-site	6/15/1991	Nov-2012	495.02	2.16	492.9	13.00	479.86	--	--	3.16	489.70	12.64	480.22	9.48	--	--	--	--	--	9.0	Y	-5.8	3926922.12	1429493.51
	S-50	On-site	7/15/1997	Nov-2012	496.68	2.97	493.7	15.00	478.71	--	4.00	3.88	489.83	13.56	480.15	9.68	0.02	PVC	PVC	--	--	9.0	Y	-5.1	3926779.29	1429065.48
	S-51	On-site	6/15/1997	Nov-2012	495.90	2.90	493.0	15.00	478.00	--	2.00	4.75	488.25	14.43	478.57	9.68	0.02	PVC	PVC	--	--	9.0	Y	-4.3	3926824.07	1429045.61
	S-54	On-site	7/15/1998	Nov-2012	497.01	3.03	494.0	15.00	478.98	--	2.00	10.00	483.98	15.00	478.98	5.00	0.02	PVC	PVC	--	--	12.0	Y	-2.0	3928055.37	1429680.65
Recovery	R-4	On-site	11/15/1987	Nov-2012	494.92	0.82	494.1	8.56	485.54	--	50.00	--	--	--	--	--	NA	culvert	--	--	--	9.0	--	--	3925501.58	1429377.63
	R-5	On-site	6/15/1986	Nov-2012	495.33	1.83	493.5	7.23	486.27	--	38.00	--	--	--	--	--	NA	culvert	--	--	--	9.0	--	--	3925824.93	1429309.40
	R-14	On-site	6/10/1986	Nov-2012	493.99	1.43	492.6	6.06	486.50	--	20.00	--	--	--	--	--	NA	culvert	--	--	--	8.0	--	--	3927108.36	1429010.00
	R-14A	On-site	6/10/1987	Nov-2012	494.09	1.37	492.7	10.73	481.99	--	4.00	4.00	488.72	10.73	481.99	6.73	--	ABS	ABS	--	--	8.0	Y	-4.0	3927100.21	1429016.07
	R-18	On-site	6/10/1987	Nov-2012	499.76	3.82	495.9	32.77	463.17	--	10.00	7.65	488.29	32.77	463.17	25.12	--	steel	steel	--	--	9.0	Y	-1.4	3926667.15	1429608.07
	R-20R	On-site	2/20/2011	Nov-2012	498.74	3.80	494.9	19.70	475.24	--	6.00	3.80	491.14	19.70	475.24	15.90	0.03	ss	ss	2.5	19.7	9.0	Y	-5.2	3926382.77	1429577.80
	R-21	On-site	10/15/2011	Nov-2012	495.52	2.76	492.8	24.17	468.59	--	12.00	4.17	488.59	24.17	468.59	20.00	--	steel	steel	--	--	8.5	Y	-4.3	3926960.05	1429035.68
	R-22	On-site	10/15/1987	Nov-2012	495.56	2.46	493.1	24.65	468.45	--	12.00	4.65	--	24.65	--	20.00	--	steel	steel	--	--	--	--	--	3927061.93	1429008.20
	R-3	On-site	11/15/1987	Nov-2012	494.08	0.54	493.5	6.92	486.62	--	38.00	--	--	--	--	--	NA	culvert	--	--	--	9.0	--	--	3925550.08	1429397.48
	R-32	On-site	11/15/1987	Nov-2012	494.33	0.58	493.8	10.97	482.78	--	24.00	--	--	--	--	--	NA	culvert	--	--	--	9.0	--	--	3926473.43	1429438.03
	R-33	On-site	8/15/1988	Nov-2012	495.82	2.62	493.2	24.60	468.60	--	12.00	7.40	485.80	24.60	468.60	17.20	--	steel	steel	--	--	9.0	Y	-1.6	3925827.95	1429332.73
	R-34	On-site	8/15/1988	Nov-2012	495.20	1.95	493.3	20.83	472.42	--	12.00	0.50	492.75	20.83	472.42	20.33	--	ss	steel	--	--	9.0	Y	-8.5	3926500.01	1429393.41
	R-35R	On-site	2/16/2011	Nov-2012	494.72	1.74	493.0	39.00	453.98	--	8.00	4.00	488.98	39.00	453.98	35.00	0.01	ss	steel	Natural pack		9.0	Y	-5.0	3926840.14	1429455.05
	R-38	On-site	8/15/1988	Nov-2012	498.64	2.72	495.9	9.80	486.12	--	24.00	--	--	--	--	--	NA	culvert	--	--	--	9.0	--	--	3925496.45	1429474.75
	R-39	On-site	8/15/1988	Nov-2012	495.05	1.55	493.5	25.50	468.00	--	10.00	6.25	487.25	25.50	468.00	19.25	--	steel	steel	--	--	9.0	Y	-2.8	3927030.22	1429648.72
	R-40	On-site	6/15/1989	Nov-2012	494.46	1.70	492.8	25.17	467.59	--	10.00	6.00	486.76	25.17	467.59	19.17	--	steel	steel	--	--	9.0	Y	-3.0	3927004.81	1429396.89
	R-42	On-site	5/15/2011	Nov-2012	493.31	1.49	491.8	35.00	456.82	--	8.00	15.00	476.82	35.00	456.82	20.00	0.04	ss	steel	Natural pack		9.0	N	6.0	3926974.24	1428686.38
	R-43	On-site	11/28/2012	--	--	--	--	40.98	--	--	12.00	5.84	--	40.98	--	35.14	0.008	ss	ss	Natural pack		12.0	Y	6.2	--	--
	R-44	On-site	3/2/2013	--	--	--	--	40.78	--	--	12.00	6.00	--	40.78	--	34.78	0.008	ss	ss	Natural pack		13.0	Y	7.0	--	--
	R-45	On-site	3/8/2013	--	--	--	--	32.25	--	--	12.00	7.26	--	32.25	--	24.99	0.008	ss	ss	Natural pack		12.0	Y	4.7	--	--
	R-46	On-site	3/15/2013	--	--	--	--	30.88	--	--	12.00	6.00	--	30.88	--	24.88	0.008	ss	ss	Natural pack		13.0	Y	7.0	--	--
PF Boring	PF-1	Off-site	10/21/2010	Permafrost encountered at ground surface to 15 feet; NO WELL																						
	PF-2	Off-site	10/21/2010	Permafrost encountered at ground surface to 15 feet; NO WELL																						
	PF-3	Off-site	4/14/2012	Permafrost encountered at ground surface to 28.5 feet; NO WELL																						
	PF-4	Off-site	4/30/2012	Permafrost encountered at 1.50 to 20.0 feet; NO WELL																						

Notes:

This table will be revised after proposed site characterization activities are completed in 2013.

BGS	below ground surface
CMT	continuous multi-channel tubing
MSL	mean sea level
ss	stainless steel
PVC	polyvinyl chloride
ABS	acrylonitrile butadiene styrene
NS	not surveyed
NA	not applicable
PF	permafrost

Table 3-2
Groundwater Elevation Monitoring Well Network
North Pole Refinery
Flint Hills Resources Alaska, LLC

Priority Level	**1**		**2**		**3**			**4**	**5**	**6**	**7**
Location	**Water Table**		**Water Table**		**10'-55'**			**55'-90'**	**Vertical gradient**	**90'-160'**	
Duration	**1-2 days**		**1-2 days**		**1-2 days**			**1 day**	**1-2 days**	**1 day**	**Surface Water**
	On-site		**Off-site**		**On-site**	**Off-site**		**On-site**	**On-site**	**On-site**	**On-site**
Monitoring Well	MW-105A	O-2	MW-148A	MW-191A	MW-101	MW-148B	MW-188B	MW-102	MW-179A/B/C/D	MW-173B	North Gravel Pit
	MW-106	O-22	MW-150A	MW-192A	MW-104	MW-148C	MW-189B	MW-144BR	MW-186A/C	MW-179D	South Gravel Pit
	MW-109	O-23	MW-151A	MW-193A	MW-105	MW-150B	MW-190B	MW-154A	MW-301-CMT cluster	MW-186D	
	MW-110	O-24	MW-152A	MW-194A	MW-129	MW-151C	MW-191B	MW-174B	MW-302-CMT cluster	MW-195B	
	MW-113	O-26	MW-153A	MW-195A	MW-146B	MW-152B	MW-193B	MW-175	MW-303-CMT cluster	MW-198	
	MW-125	O-27	MW-155A	MW-311-15	MW-147B	MW-152C	MW-194B	MW-176C	MW-304-CMT cluster	MW-199	
	MW-130	O-28	MW-156A	MW-312-15	MW-174A	MW-153B	MW-311-46	MW-177	MW-305-CMT cluster	MW-300	
	MW-133	O-29	MW-157A	MW-313-15	MW-176B	MW-156B	MW-312-50	MW-178C	MW-306-CMT cluster	MW-302-110	
	MW-135	O-3	MW-158A	MW-315-15	MW-179B	MW-157B	MW-319-45	MW-179C	**Off-site**	MW-303-130	
	MW-140	O-30	MW-159A	MW-318-20	MW-180B	MW-158B		MW-180C	MW-148A/B/C/D	MW-304-125	
	MW-141	O-4	MW-161A	MW-319-15	MW-186B	MW-159B		MW-186E	MW-181A/B/C	MW-304-150	
	MW-144A	O-5	MW-162A	MW-322-15	MW-192B	MW-161B		MW-301-70	MW-185A/B/C	MW-305-100	
	MW-145	O-6	MW-163A	MW-324-15	MW-197A	MW-162B		MW-302-70		MW-306-150	
	MW-146A	O-8	MW-164A	MW-326-20	MW-301-60	MW-163B		MW-302-80		MW-307	
	MW-149A	R-14A	MW-165A	MW-327-15	MW-310-65	MW-164B		MW-302-95		MW-310-110	
	MW-173A	R-21	MW-166A	MW-328-15	MW-321-65	MW-164C		MW-303-70		**Off-site**	
	MW-179A	R-35R	MW-167A	MW-332-15	MW-330-65	MW-165B		MW-303-80		MW-148D	
	MW-186A	R-39	MW-168A	MW-333-16	MW-334-65	MW-166B		MW-303-95		MW-170C	
	MW-192A	R-40	MW-169A		MW-309-66	MW-167B		MW-304-70		MW-172B	
	MW-195A	R-42	MW-170A			MW-168B		MW-304-80		MW-181C	
	MW-309-15	S-32	MW-171A			MW-169B		MW-304-96		MW-185C	
	MW-310-15	S-39	MW-172A			MW-169C		Mw-305-70		MW-315-150	
	MW-321-15	S-43	MW-173A			MW-170D		MW-305-80		MW-318-135	
	MW-334-15	S-44	MW-181A			MW-171B		MW-306-100		MW-322-150	
	O-1	S-50	MW-182A			MW-181B		MW-306-70		MW-324-151	
	O-12	S-54	MW-183A			MW-182B		MW-306-80		MW-326-150	
	O-14		MW-185A			MW-183B		**Off-site**		MW-327-150	
	O-15		MW-187			MW-184		MW-159C		MW-328-151	
	O-17		MW-188A			MW-185B		MW-160B		MW-332-150	
	O-18		MW-189A					MW-170B		MW-333-150	
			MW-190A					MW-317-71			

Notes:

The groundwater monitoring network is under development and will be updated as wells are installed.
Well prioritization will inform wells selected for sampling during cold weather months which limits available time for sampling.
Groundwater elevation data are also measured quarterly at wells included in the LNAPL Thickness Network (Table 3-3).
Vertical gradient clusters (e.g., MW-301-CMT cluster) will provide data from each well within that cluster.

Table 3-3
LNAPL Thickness Monitoring Network
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Frequency	Priority	Rationale	Notes
MW-186A	monthly	1	Monitor fluctuation in LNAPL thickness	-
O-7	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q3
O-9	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q3
O-10	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q4
O-11	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q3
O-13	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q3
O-19	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q4
O-21	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q4
O-27	monthly	1	Monitor fluctuation in LNAPL thickness	installed 2011 Q4
R-14A	monthly	1	Monitor fluctuation in LNAPL thickness	-
S-21	monthly	1	Monitor fluctuation in LNAPL thickness	-
S-22	monthly	1	Monitor fluctuation in LNAPL thickness	-
S-39	monthly	1	Monitor fluctuation in LNAPL thickness	-
S-44	monthly	1	Monitor fluctuation in LNAPL thickness	-
S-51	monthly	1	Monitor fluctuation in LNAPL thickness	-
MW-138	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
MW-334-15	monthly	2	Monitor fluctuation in LNAPL thickness	installed 2012 Q3
O-2	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-20R	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-21	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-32	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-33	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-35R	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-39	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
R-40	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
S-32	monthly	2	Monitor fluctuation in LNAPL thickness	-
S-43	monthly	2	Monitor fluctuation in LNAPL thickness	-
S-50	monthly	2	Monitor fluctuation in LNAPL thickness	pumping well
MW-176A	quarterly	3	Monitor fluctuation in LNAPL thickness	-
R-18	quarterly	3	Monitor fluctuation in LNAPL thickness	-
R-34	quarterly	3	Monitor fluctuation in LNAPL thickness	-

Notes:

The groundwater monitoring network is under development and will be updated as wells are installed.
LNAPL appropriate observation wells (O-series) were installed to monitor product boundary and replace MW-111, MW-113, MW-115, MW-116, MW-132, MW-134, MW-135, MW-136, and MW-137.

LNAPL	Light Non-Aqueous Phase Liquid
Q3	Third Quarter
Q4	Fourth Quarter

Table 3-4
LNAPL Migration Monitoring Network
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Frequency	Priority	Rationale	Notes
MW-139	monthly	1	Monitor NW LNAPL boundary	-
MW-145	monthly	1	Monitor NE LNAPL boundary	-
O-3	monthly	1	Monitor LNAPL boundary	-
O-4	monthly	1	Monitor LNAPL boundary	-
O-12	monthly	1	Monitor LNAPL boundary	installed 2011 Q3
O-23	monthly	1	Monitor LNAPL boundary	installed 2011 Q4
O-24	monthly	1	Monitor LNAPL boundary	installed 2011 Q4
O-25	monthly	1	Monitor LNAPL boundary	installed 2011 Q4
O-26	monthly	1	Monitor LNAPL boundary	installed 2011 Q4
S-9	monthly	1	Monitor LNAPL boundary	down gradient of known LNAPL, nearby wells ND for contaminants.
O-1	monthly	2	Monitor LNAPL boundary	-
O-5	monthly	2	Monitor LNAPL boundary	installed 2011 Q3
O-6	monthly	2	Monitor LNAPL boundary	installed 2011 Q3
O-8	monthly	2	Monitor LNAPL boundary	installed 2011 Q3
O-14	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-15	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-16	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-17	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-18	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-20	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-22	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-28	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
O-29	monthly	2	Monitor LNAPL boundary	installed 2011 Q4
R-42	monthly	2	Monitor LNAPL boundary	pumping well
MW-140	quarterly	3	Monitor LNAPL boundary	-
MW-142	quarterly	3	Monitor LNAPL boundary	-
MW-144A	quarterly	3	Monitor LNAPL boundary	-
MW-178A	quarterly	3	Monitor LNAPL boundary	-
MW-179A	quarterly	3	Monitor LNAPL boundary	-
MW-180A	quarterly	3	Monitor LNAPL boundary	-
MW-195A	quarterly	3	Monitor LNAPL boundary	installed 2011 Q4
MW-196	quarterly	3	Monitor LNAPL boundary	installed 2011 Q4
O-30	quarterly	3	Monitor LNAPL boundary	installed 2012 Q3
R-3	quarterly	3	Monitor LNAPL boundary	Suitablity as observation well should be assessed; well dry for several quarters
R-38	quarterly	3	Monitor LNAPL boundary	Suitablity as observation well should be assessed

Notes:

The groundwater monitoring network is under development and will be updated as wells are installed.
LNAPL appropriate observation wells (O-series) were installed to monitor product boundary and replace.
MW-111, MW-113, MW-115, MW-116, MW-132, MW-134, MW-135, MW-136, and MW-137.

LNAPL	Light Non-Aqueous Phase Liquid
Q3	Third Quarter
Q4	Fourth Quarter

Table 3-5
BTEX Monitoring Network
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
R-21	Monthly	2	Recovery System	GAC sampling
R-35R	Monthly	2	Recovery System	GAC sampling
R-39	Monthly	2	Recovery System	GAC sampling
R-40	Monthly	2	Recovery System	GAC sampling
R-42	Monthly	2	Recovery System	GAC sampling
O-12	Quarterly	1	Plume delineation	
S-9	Quarterly	1	Plume delineation	
MW-126	Quarterly	2	Plume leading edge	
MW-137	Quarterly	2	Plume	
MW-145	Quarterly	2	Plume leading edge	
MW-134	Quarterly	2	Upgradient	Used to monitor for any potential changes as a result of the leak in sump 5002
MW-334-15	Quarterly	2	Plume boundary	
O-14	Quarterly	2	Upgradient	Used to monitor for any potential changes as a result of the leak in sump 5002
MW-127	Semiannually	1	Plume leading edge	
MW-139	Semiannually	1	Plume	
MW-142	Semiannually	1	Plume leading edge	
MW-106	Semiannually	2	Near gravel pit	
MW-109	Semiannually	2	Plume leading edge	
MW-110	Semiannually	2	Plume	
MW-113	Semiannually	2	Plume leading edge	
MW-115	Semiannually	2	Plume	
MW-116	Semiannually	2	Plume	
MW-124	Semiannually	2	Plume	
MW-125	Semiannually	2	Plume	
MW-132	Semiannually	2	Plume	
MW-133	Semiannually	2	Plume	
MW-135	Semiannually	2	Plume	
MW-136	Semiannually	2	Plume	
MW-140	Semiannually	2	Plume leading edge	
MW-141	Semiannually	2	Near gravel pit	
MW-143	Semiannually	2	Plume leading edge	
MW-144A	Semiannually	2	Plume leading edge	
MW-148A	Semiannually	2	Downgradient property boundary	
MW-148B	Semiannually	2	Downgradient property boundary	
MW-149A	Semiannually	2	Downgradient property boundary	
MW-149B	Semiannually	2	Downgradient property boundary	
MW-153A	Semiannually	2	Downgradient property boundary	
MW-153B	Semiannually	2	Downgradient property boundary	
MW-176A	Semiannually	2	Plume	
MW-179A	Semiannually	2	Plume	
MW-180A	Semiannually	2	Plume	
MW-309-15	Semiannually	2	West edge of plume	
MW-321-15	Semiannually	2	West edge of plume	
O-2	Semiannually	2	Plume	
O-6	Semiannually	2	West edge of plume	
O-16	Semiannually	2	Plume	
O-17	Semiannually	2	Plume	
O-18	Semiannually	2	Plume	
S-44	Semiannually	2	Plume	
S-50	Semiannually	2	Plume	
MW-101A	Annually	2	Downgradient	
MW-105A	Annually	2	Upgradient	
MW-131	Annually	2	Downgradient	
MW-138	Annually	2	Source	
MW-192A	Annually	2	Upgradient	Southwest property boundary
MW-196	Annually	2	Upgradient	Replaces S-19

Notes:

The groundwater monitoring network is under development and will be updated as wells are installed.

BTEX Benzene, Toluene, Ethylbenzene, and total Xylenes
GAC Granular Activated Carbon

Table 3-6a
Sulfolane Monitoring Network - Onsite
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
MW-105A	Annual	4	Upgradient	Dedicated pump present in well
MW-192A	Annual	4	Upgradient	Southwest property boundary
MW-192B	Annual	4	Upgradient	Southwest property boundary
R-21	Monthly	1	Plume	With GAC Sampling
R-35R	Monthly	1	Plume	With GAC Sampling
R-39	Monthly	1	Plume	With GAC Sampling
R-40	Monthly	1	Plume	With GAC Sampling
R-42	Monthly	1	Plume	With GAC Sampling
MW-101	Quarterly	4	Downgradient of remediation	
MW-101A	Quarterly	4	Downgradient of remediation	Dedicated pump present in well
MW-105	Quarterly	4	Upgradient	Dedicated pump present in well
MW-110	Quarterly	1	Plume	Dedicated pump present in well
MW-113	Quarterly	4	Plume	
MW-125	Quarterly	4	Plume Delineation	
MW-127	Quarterly	1	Downgradient of remediation	Dedicated pump present in well
MW-129	Quarterly	4	Plume	Dedicated pump present in well
MW-130	Quarterly	1	Plume	
MW-131	Quarterly	1	Downgradient of remediation	
MW-133	Quarterly	4	Plume Delineation	
MW-134	Quarterly	4	Upgradient	Used to monitor for any potential changes as a result of the leak in sump 5002; Dedicated pump present in well
MW-135	Quarterly	4	Plume	
MW-138	Quarterly	1	Plume	
MW-139	Quarterly	1	Downgradient of remediation	
MW-141	Quarterly	4	Plume (downgradient property boundary)	Dedicated pump present in well
MW-142	Quarterly	1*	Downgradient of remediation	Dedicated pump present in well
MW-143	Quarterly	1	Downgradient of remediation	
MW-144BR	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-145	Quarterly	4	Plume	Dedicated pump present in well
MW-147B	Quarterly	4	Plume (downgradient property boundary)	
MW-149A	Quarterly	3	Plume (downgradient property boundary)	
MW-149B	Quarterly	3	Plume (downgradient property boundary)	Dedicated pump present in well
MW-154A	Quarterly	4^	Plume Delineation	Dedicated pump present in well
MW-154B	Quarterly	4^	Plume Delineation	
MW-173A	Quarterly	4	Property boundary (east)	Dedicated pump present in well
MW-173B	Quarterly	4	Property boundary (east)	Dedicated pump present in well
MW-174A	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-174B	Quarterly	4	Plume Delineation	
MW-175	Quarterly	4	Plume Delineation	
MW-176A	Quarterly	1	Plume Delineation	
MW-176B	Quarterly	1	Plume Delineation	
MW-176C	Quarterly	1	Plume Delineation	Dedicated pump present in well
MW-177	Quarterly	1	Upgradient	Dedicated pump present in well
MW-178A	Quarterly	1	Plume Delineation	
MW-178B	Quarterly	1	Plume Delineation	
MW-178C	Quarterly	1	Plume Delineation	Dedicated pump present in well
MW-179A	Quarterly	4	Plume Delineation	
MW-179B	Quarterly	4	Plume Delineation	
MW-179C	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-179D	Quarterly	4	Plume Delineation	
MW-180A	Quarterly	4	Plume Delineation	
MW-180B	Quarterly	4	Plume Delineation	
MW-180C	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-186A	Quarterly	1	Monitor R-42 Effects	
MW-186B	Quarterly	1	Monitor R-42 Effects	
MW-186C	Quarterly	4	Monitor R-42 Effects	
MW-186D	Quarterly	4	Monitor R-42 Effects	
MW-186E	Quarterly	1	Monitor R-42 Effects	
MW-195A	Quarterly	4	Plume	
MW-195B	Quarterly	4	Plume	
MW-196	Quarterly	4	Plume	
MW-197A	Quarterly	4	Plume	
MW-197B	Quarterly	4	Plume	
MW-198	Quarterly	4	Plume	
MW-199	Quarterly	4	Plume	
MW-300	Quarterly	4	Plume	
MW-301-CMT-10	Quarterly	2	Vertical Profiling Transect	
MW-301-CMT-20	Quarterly	2	Vertical Profiling Transect	
MW-301-CMT-30	Quarterly	2	Vertical Profiling Transect	
MW-301-CMT-40	Quarterly	2	Vertical Profiling Transect	
MW-301-CMT-50	Quarterly	2	Vertical Profiling Transect	
MW-301-60	Quarterly	2	Vertical Profiling Transect	
MW-301-70	Quarterly	2	Vertical Profiling Transect	
MW-302-CMT-10	Quarterly	2	Vertical Profiling Transect	

Table 3-6a
Sulfolane Monitoring Network - Onsite
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
MW-302-CMT-20	Quarterly	2	Vertical Profiling Transect	
MW-302-CMT-30	Quarterly	2	Vertical Profiling Transect	
MW-302-CMT-40	Quarterly	2	Vertical Profiling Transect	
MW-302-CMT-50	Quarterly	2	Vertical Profiling Transect	
MW-302-70	Quarterly	2	Vertical Profiling Transect	
MW-302-80	Quarterly	2	Vertical Profiling Transect	
MW-302-95	Quarterly	2	Vertical Profiling Transect	
MW-302-110	Quarterly	2^	Vertical Profiling Transect	
MW-303-CMT-9	Quarterly	2	Vertical Profiling Transect	
MW-303-CMT-19	Quarterly	2	Vertical Profiling Transect	
MW-303-CMT-29	Quarterly	2	Vertical Profiling Transect	
MW-303-CMT-39	Quarterly	2	Vertical Profiling Transect	
MW-303-CMT-49	Quarterly	2	Vertical Profiling Transect	
MW-303-CMT-59	Quarterly	2	Vertical Profiling Transect	
MW-303-70	Quarterly	2	Vertical Profiling Transect	
MW-303-80	Quarterly	2	Vertical Profiling Transect	
MW-303-95	Quarterly	2	Vertical Profiling Transect	
MW-303-130	Quarterly	2^	Vertical Profiling Transect	
MW-304-CMT-10	Quarterly	2	Vertical Profiling Transect	
MW-304-15	Quarterly	2	Vertical Profiling Transect	
MW-304-CMT-20	Quarterly	2	Vertical Profiling Transect	
MW-304-CMT-30	Quarterly	2	Vertical Profiling Transect	
MW-304-CMT-40	Quarterly	2	Vertical Profiling Transect	
MW-304-CMT-50	Quarterly	2	Vertical Profiling Transect	
MW-304-CMT-60	Quarterly	2	Vertical Profiling Transect	
MW-304-70	Quarterly	2	Vertical Profiling Transect	
MW-304-80	Quarterly	2	Vertical Profiling Transect	
MW-304-96	Quarterly	2	Vertical Profiling Transect	
MW-304-125	Quarterly	2	Vertical Profiling Transect	
MW-304-150	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-8	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-18	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-28	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-38	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-48	Quarterly	2	Vertical Profiling Transect	
MW-305-CMT-58	Quarterly	2	Vertical Profiling Transect	
MW-305-70	Quarterly	2	Vertical Profiling Transect	
MW-305-80	Quarterly	2	Vertical Profiling Transect	
MW-305-100	Quarterly	2^	Vertical Profiling Transect	
MW-306-CMT-10	Quarterly	4	Vertical Profiling Transect	
MW-306-15	Quarterly	4	Vertical Profiling Transect	
MW-306-CMT-20	Quarterly	4	Vertical Profiling Transect	
MW-306-CMT-30	Quarterly	4	Vertical Profiling Transect	
MW-306-CMT-40	Quarterly	4	Vertical Profiling Transect	
MW-306-CMT-50	Quarterly	4	Vertical Profiling Transect	
MW-306-CMT-60	Quarterly	4	Vertical Profiling Transect	
MW-306-70	Quarterly	4	Vertical Profiling Transect	
MW-306-80	Quarterly	4	Vertical Profiling Transect	
MW-306-100	Quarterly	4	Vertical Profiling Transect	
MW-306-150	Quarterly	4	Vertical Profiling Transect	
MW-307	Quarterly	4	Plume	
MW-309-15	Quarterly	3	Plume	
MW-309-66	Quarterly	3	Plume	
MW-309-150	Quarterly	3	Plume Delineation	
MW-310-15	Quarterly	4	Plume	
MW-310-65	Quarterly	4	Plume	
MW-310-110	Quarterly	4	Plume Delineation	
MW-321-15	Quarterly	1	Plume	
MW-321-65	Quarterly	4	Plume Delineation	
MW-321-151	Quarterly	1	Plume Delineation	
MW-330-20	Quarterly	3	Plume	
MW-330-65	Quarterly	3	Plume Delineation	
MW-330-150	Quarterly	3	Plume Delineation	
MW-334-15	Quarterly	2	Plume Delineation	
MW-334-65	Quarterly	2	Plume Delineation	
MW-331-150	Quarterly	4	Plume Delineation	

Table 3-6a
Sulfolane Monitoring Network - Onsite
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
O-1	Quarterly	1	Plume	
O-2	Quarterly	4	Plume	
O-3	Quarterly	4	Plume	
O-4	Quarterly	4	Plume	
O-6	Quarterly	4	Plume	
O-12	Quarterly	1	Plume	
O-14	Quarterly	4	Crossgradient	Used to monitor for any potential changes as a result of the leak in sump 5002
O-19	Quarterly	4	Plume	
O-24	Quarterly	4	Plume	
O-26	Quarterly	1	Plume	
S-39	Quarterly	4	Monitor recovery well R-36	
S-43	Quarterly	4	Plume	
S-51	Quarterly	4	Monitor recovery well R-38	
MW-104	Semiannual	4	Plume	Dedicated pump present in well
MW-106	Semiannual	4	Plume	
MW-109	Semiannual	4	Plume	
MW-115	Semiannual	4	Plume	
MW-116	Semiannual	4	Plume	
MW-132	Semiannual	4	Plume	Dedicated pump present in well
MW-144A	Semiannual	4	Plume	
S-21	Semiannual	4	Plume	
S-50	Semiannual	4	Plume	

Notes:

* = Wells received sampling priority early during the first quarter 2013 to allow for a second sample to be collected near the end of the quarter.
^ = Wells were sampled for University of Alaska Fairbanks isotope sampling.
The groundwater monitoring network is under development and will be updated as wells are installed.
Sampling Priority - wells are assigned priority for sampling during cold weather.

GAC Granular activated carbon

Table 3-6b
Sulfolane Monitoring Network - Offsite
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
MW-148A	Quarterly	1*^	Plume (downgradient property boundary)	Dedicated pump present in well
MW-148B	Quarterly	1	Plume (downgradient property boundary)	
MW-148C	Quarterly	2	Plume (downgradient property boundary)	
MW-148D	Quarterly	2^	Plume (downgradient property boundary)	
MW-150A	Quarterly	3	Plume Delineation	
MW-150B	Quarterly	4	Plume Delineation	
MW-150C	Quarterly	4	Plume Delineation	
MW-151A	Quarterly	4^	Plume Delineation	
MW-151B	Quarterly	4	Plume Delineation	
MW-151C	Quarterly	4^	Plume Delineation	
MW-152A	Quarterly	4	Plume Delineation	
MW-152B	Quarterly	4	Plume Delineation	
MW-152C	Quarterly	4	Plume Delineation	
MW-153A	Quarterly	2	Plume Delineation	
MW-153B	Quarterly	1*	Plume Delineation	Dedicated pump present in well
MW-155A	Quarterly	4	Plume Delineation	
MW-155B	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-156A	Quarterly	4^	Plume Delineation	
MW-156B	Quarterly	4^	Plume Delineation	
MW-157A	Quarterly	4	Plume Delineation	
MW-157B	Quarterly	4	Plume Delineation	
MW-158A	Quarterly	4	Plume Delineation	
MW-158B	Quarterly	3	Plume Delineation	Dedicated pump present in well
MW-159A	Quarterly	4	Plume Delineation	
MW-159B	Quarterly	4	Plume Delineation	
MW-159C	Quarterly	4	Plume Delineation	
MW-160B	Quarterly	2	Plume Delineation	Dedicated pump present in well
MW-161A	Quarterly	1*^	Plume Delineation	
MW-161B	Quarterly	1*^	Plume Delineation	Dedicated pump present in well
MW-162A	Quarterly	3*^	Plume Delineation	
MW-162B	Quarterly	3*^	Plume Delineation	
MW-163A	Quarterly	3*	Plume Delineation	
MW-163B	Quarterly	3*	Plume Delineation	Dedicated pump present in well
MW-164A	Quarterly	1*^	Plume Delineation	
MW-164B	Quarterly	1	Plume Delineation	Dedicated pump present in well
MW-164C	Quarterly	1*^	Plume Delineation	
MW-165A	Quarterly	4	Plume Delineation	
MW-165B	Quarterly	4	Plume Delineation	
MW-166A	Quarterly	1*^	Plume Delineation	
MW-166B	Quarterly	1*^	Plume Delineation	
MW-167A	Quarterly	1*^	Plume Delineation	
MW-167B	Quarterly	1*	Plume Delineation	
MW-168A	Quarterly	2	Plume Delineation	
MW-168B	Quarterly	2	Plume Delineation	
MW-169A	Quarterly	4^	Plume Delineation	
MW-169C	Quarterly	4^	Plume Delineation	
MW-170A	Quarterly	4^	Plume Delineation	
MW-170B	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-170C	Quarterly	4^	Plume Delineation	
MW-170D	Quarterly	4	Plume Delineation	Dedicated pump present in well
MW-171A	Quarterly	4^	Plume Delineation	
MW-171B	Quarterly	4^	Plume Delineation	Dedicated pump present in well
MW-172A	Quarterly	4^	Plume Delineation	
MW-172B	Quarterly	4^	Plume Delineation	
MW-181A	Quarterly	4^	Plume Delineation	
MW-181B	Quarterly	4	Plume Delineation	
MW-181C	Quarterly	4^	Plume Delineation	
MW-182A	Quarterly	1*^	Plume Delineation	
MW-182B	Quarterly	1*	Plume Delineation	
MW-183A	Quarterly	3*	Plume Delineation	
MW-183B	Quarterly	3*	Plume Delineation	
MW-184	Quarterly	4	Plume Delineation	
MW-185A	Quarterly	2^	Plume Delineation	
MW-185B	Quarterly	2	Plume Delineation	
MW-185C	Quarterly	2^	Plume Delineation	
MW-187	Quarterly	2*^	Plume Delineation	
MW-189A	Quarterly	2	Plume Delineation	
MW-189B	Quarterly	2	Plume Delineation	
MW-190A	Quarterly	4^	Plume Delineation	
MW-191A	Quarterly	4^	Plume Delineation	
MW-191B	Quarterly	4^	Plume Delineation	
MW-193A	Quarterly	4	Plume Delineation	
MW-193B	Quarterly	4	Plume Delineation	
MW-194A	Quarterly	1*	Plume Delineation	
MW-194B	Quarterly	1*	Plume	
MW-308-15	Quarterly	1*	Plume Delineation	

Table 3-6b
Sulfolane Monitoring Network - Offsite
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Sampling Frequency	Cold Weather Priority	Category	Notes
MW-308-30	Quarterly	1*	Plume Delineation	
MW-311-15	Quarterly	4	Plume Delineation	
MW-311-46	Quarterly	4	Plume Delineation	
MW-314-15	Quarterly	4	Plume Delineation	
MW-314-150	Quarterly	4	Plume Delineation	
MW-316-15	Quarterly	4	Plume Delineation	
MW-316-56	Quarterly	4	Plume Delineation	
MW-317-15	Quarterly	4^	Plume	
MW-317-71	Quarterly	4^	Plume	
MW-318-20	Quarterly	4	Plume Delineation	
MW-318-135	Quarterly	4	Plume Delineation	
MW-322-15	Quarterly	4	Plume Delineation	
MW-322-150	Quarterly	4	Plume Delineation	
MW-323-15	Quarterly	4	Plume Delineation	
MW-323-61	Quarterly	4	Plume Delineation	
MW-325-18	Quarterly	4	Plume Delineation	
MW-325-150	Quarterly	4	Plume Delineation	
MW-328-15	Quarterly	4	Plume Delineation	
MW-328-151	Quarterly	4	Plume Delineation	
MW-329-15	Quarterly	3*	Plume	
MW-329-66	Quarterly	3*	Plume	
MW-332-15	Quarterly	1^	Plume Delineation	
MW-332-150	Quarterly	1*^	Plume Delineation	
MW-335-41	Quarterly	1^	Plume Delineation	

Notes:

* = Wells received sampling priority early during the first quarter 2013 to allow for a second sample to be collected near the end of the quarter.
^ = Wells were sampled for University of Alaska Fairbanks isotope sampling.
The groundwater monitoring network is under development and will be updated as wells are installed.
Sampling Priority - wells are assigned priority for sampling during cold weather.

GAC Granular activated carbon

Table 4-1
Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/21/2013	On-site	MW-101	MW-101	S	--	--	--	--	--	--	--	Obstructed (likely frozen) at 10.58'
1/21/2013	On-site	MW-101A	MW-101A	S	11.68	2.34	3.10	202.0	6.63	66.9	Clear	>3 well volumes purged. DO reading questionable
1/21/2013	On-site	MW-101A	MW-201A	S	--	--	--	--	--	--	--	Duplicate of MW-101A
1/14/2013	On-site	MW-105	EB-105	S	--	--	--	--	--	--	--	Equipment blank collected after MW-105
1/14/2013	On-site	MW-105	MW-105	S	10.58	3.32	0.20	197.0	7.35	-77.5	Clear	Parameters stabilized
1/11/2013	On-site	MW-110	MW-110	S	11.45	3.10	0.31	276.3	7.16	-125.1	Clear	Parameters stabilized.
1/14/2013	On-site	MW-113	MW-113	S	10.15	3.13	0.15	313.0	7.06	-66.9	Clear	>3 well volumes purged.
1/14/2013	On-site	MW-113	MW-213	S	--	--	--	--	--	--	--	Duplicate of MW-113
2/2/2013	On-site	MW-125	MW-125	S	11.87	4.04	0.31	226.0	7.75	-193.4	Clear	>3 well volumes purged
2/2/2013	On-site	MW-125	MW-225	S	--	--	--	--	--	--	--	Duplicate of MW-125
1/31/2013	On-site	MW-126	MW-126	B	11.38	3.40	0.20	208.7	6.92	-63.0	Clear	Parameters stabilized
1/11/2013	On-site	MW-127	MW-127	S	12.45	5.30	0.14	245.3	7.38	-91.1	--	>3 well volumes purged.
1/31/2013	On-site	MW-129	MW-129	S	11.59	3.70	0.13	212.2	7.10	-67.8	Clear	Parameters stabilized
1/11/2013	On-site	MW-130	MW-130	S	13.26	4.20	0.31	283.1	7.24	-110.8	Clear	Parameters stabilized.
1/11/2013	On-site	MW-131	MW-131	S	11.88	3.70	0.31	245.4	7.15	-44.4	Clear	Parameters stabilized
1/11/2013	On-site	MW-131	MW-231	S	--	--	--	--	--	--	--	Duplicate of MW-131
2/2/2013	On-site	MW-133	MW-133	S	13.20	3.72	0.20	217.0	7.67	-152.2	Clear	Parameters stabilized
2/2/2013	On-site	MW-133	MW-233	S	--	--	--	--	--	--	--	Duplicate of MW-133
2/28/2013	On-site	MW-134	MW-134	S, B	--	--	--	--	--	--	--	Obstruction (likely frozen) at 11.93'
1/31/2013	On-site	MW-135	MW-135	S	12.55	2.60	0.25	311.9	7.00	-133.9	Clear	Parameters stabilized.
1/31/2013	On-site	MW-137	MW-137	B	12.88	3.40	0.17	268.7	6.91	-115.5	Clear	Parameters stabilized
1/31/2013	On-site	MW-137	MW-237	B	--	--	--	--	--	--	--	Duplicate of MW-137
1/12/2013	On-site	MW-138	MW-138	S	10.50	5.10	0.68	389.5	6.71	-121.5	Clear	Parameters stabilized
1/11/2013	On-site	MW-139	MW-139	S	13.08	4.10	0.31	246.1	7.17	-131.4	Clear	Parameters stabilized. Sampler could not get pump to go past approximately 16'.
2/2/2013	On-site	MW-141	MW-141	S	8.54	7.94	0.22	255.0	7.51	-243.1	Clear	Parameters stabilized.
1/6/2013	On-site	MW-142	MW-142	S	12.05	3.90	0.13	266.2	7.49	-110.0	Clear	Parameters stabilized
1/21/2013	On-site	MW-143	MW-143	S	--	2.90	0.14	250.1	7.25	-73.6	Clear	Parameters stabilized.
1/21/2013	On-site	MW-143	MW-243	S	--	--	--	--	--	--	--	Duplicate of MW-143
2/4/2013	On-site	MW-144BR	EB-144BR	S	--	--	--	--	--	--	--	Equipment blank collected after MW-144BR
2/4/2013	On-site	MW-144BR	MW-144BR	S	10.76	4.09	0.29	302.0	7.39	-89.4	Clear	Parameters stabilized.
1/31/2013	On-site	MW-145	MW-145	S, B	11.18	3.40	0.21	289.1	6.80	-32.0	Clear	Parameters stabilized
2/1/2013	On-site	MW-147B	EB-147B	S	--	--	--	--	--	--	--	Equipment blank collected after MW-147B
2/1/2013	On-site	MW-147B	MW-147B	S	8.87	6.59	0.21	231.0	7.68	-290.0	Clear	Parameters stabilized
1/10/2013	on-site	MW-149A	MW-149A	S	10.75	-0.20	3.31	40.4	7.00	64.9	Clear	>3 well volumes purged. DO and conductivity reading questionable
1/10/2013	on-site	MW-149B	EB-149B	S	--	--	--	--	--	--	--	Equipment blank collected after MW-149B
1/10/2013	on-site	MW-149B	MW-149B	S	10.45	-0.20	0.40	39.8	7.23	26.7	Clear	>3 well volumes purged questionable conductivity reading
2/1/2013	On-site	MW-154A	MW-154A	S, B	13.91	4.70	0.62	267.0	6.98	-30.6	Clear	Parameters stabilized.
2/1/2013	On-site	MW-154B	EB-154B	S	--	--	--	--	--	--	--	Equipment blank collected after MW-154B
2/1/2013	On-site	MW-154B	MW-154B	S, B	14.64	4.70	0.19	368.0	7.45	-107.1	Clear	Parameters stabilized.
2/1/2013	On-site	MW-173A	MW-173A	S	12.12	2.58	0.20	215.0	7.67	-260.4	Clear	Parameters stabilized.
3/6/2013	On-site	MW-173B	MW-173B	S	12.24	3.95	0.29	322.0	7.42	-27.5	Clear	Parameters stabilized.
2/2/2013	On-site	MW-174A	MW-174A	S	9.68	5.19	0.21	373.0	7.52	-164.5	Clear	Parameters stabilized.
2/2/2013	On-site	MW-174A	MW-274A	S	--	--	--	--	--	--	--	Duplicate of MW-174A
2/2/2013	On-site	MW-174B	MW-174B	S	8.64	5.02	0.14	342.0	7.51	-126.5	Clear	Parameters stabilized.
2/5/2013	On-site	MW-175	MW-175	S, B	12.32	4.65	2.90	325.0	7.33	-103.5	--	Parameters stabilized.
1/12/2013	On-site	MW-176A	MW-176A	S	13.81	2.20	0.68	560.0	7.10	-178.4	Clear	Parameters stabilized
1/12/2013	On-site	MW-176B	MW-176B	S, B	11.42	4.40	0.31	178.3	7.55	-54.1	Clear	Parameters stabilized.

Table 4-1
Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/14/2013	On-site	MW-176C	MW-176C	S, B	11.29	4.49	0.10	200.0	7.47	-136.7	Clear	Parameters stabilized
2/4/2013	On-site	MW-177	MW-177	S	--	--	--	--	--	--	--	Obstruction (likely frozen) at 11.05'
1/11/2013	On-site	MW-178A	MW-178A	S	--	--	--	--	--	--	--	Frozen at 10.82'
1/11/2013	On-site	MW-178B	MW-178B	S, B	--	--	--	--	--	--	--	Frozen at 10.46'
1/11/2013	On-site	MW-178C	MW-178C	S, B	--	--	--	--	--	--	--	Frozen with dedicated pump.
1/24/2013	On-site	MW-179A	MW-179A	S	--	--	--	--	--	--	--	Frozen with datalogger.
1/24/2013	On-site	MW-179B	MW-179B	S, B	--	--	--	--	--	--	--	Frozen with datalogger.
1/24/2013	On-site	MW-179C	MW-179C	S, B	--	--	--	--	--	--	--	Frozen with datalogger.
1/24/2013	On-site	MW-179D	MW-179D	S	--	--	--	--	--	--	--	Frozen with datalogger.
1/24/2013	On-site	MW-180A	MW-180A	S	--	--	--	--	--	--	--	Frozen at 11.53'
1/24/2013	On-site	MW-180B	MW-180B	S, B	--	--	--	--	--	--	--	Frozen at 11.09'
1/24/2013	On-site	MW-180C	MW-180C	S, B	--	--	--	--	--	--	--	Frozen with dedicated pump.
1/12/2013	On-site	MW-186A	MW-186A	S	11.95	3.60	0.42	194.9	7.27	-200.6	Clear	Parameters stabilized.
1/12/2013	On-site	MW-186B	MW-186B	S, B	11.47	4.60	0.17	232.7	7.47	-21.1	Clear	Parameters stabilized.
1/12/2013	On-site	MW-186B	MW-286B	S	--	--	--	--	--	--	--	Duplicate of MW-186B
2/28/2013	On-site	MW-186C	MW-186C	S, B	11.36	4.80	0.49	191.5	7.22	34.4	Clear	Parameters stabilized.
3/6/2013	On-site	MW-186D	MW-186D	S	11.36	4.24	0.29	321.0	7.43	29.0	Clear	Parameters stabilized.
1/12/2013	On-site	MW-186E	EB-186E	S	--	--	--	--	--	--	--	Equipment blank collected after MW-186E
1/12/2013	On-site	MW-186E	MW-186E	S	11.31	4.20	0.26	58.4	7.38	46.3	--	Parameters stabilized. questionable conductivity readings.
2/4/2013	On-site	MW-195A	MW-195A	S	11.03	2.93	0.21	430.0	6.88	-35.7	Clear	Parameters stabilized.
3/11/2013	On-site	MW-195B	MW-195B	S	11.10	5.10	0.13	207.7	7.29	145.8	Clear	Parameters stabilized.
2/2/2013	On-site	MW-196	MW-196	S	10.94	3.83	0.92	229.0	7.48	-153.7	Clear	>3 well volumes purged
2/4/2013	On-site	MW-197A	MW-197A	S	10.65	4.09	0.10	311.0	7.31	-22.6	Clear	Parameters stabilized.
3/8/2013	On-site	MW-197B	MW-197B	S	10.80	4.80	0.12	193.5	7.26	128.8	Clear	Parameters stabilized.
3/11/2013	On-site	MW-198	MW-198	S	--	--	--	--	--	--	--	Obstruction (likely frozen) at 7.65'
3/8/2013	On-site	MW-199	MW-199	S	11.56	4.60	0.12	194.3	7.28	124.0	Clear	Parameters stabilized.
3/11/2013	On-site	MW-300	MW-300	S	10.55	4.90	0.20	213.3	7.08	93.0	Clear	Parameters stabilized.
1/22/2013	On-site	MW-301-CMT-10	MW-301-CMT-10	S	8.97	2.30	0.11	234.7	6.81	-80.0	Clear	Parameters stabilized
1/22/2013	On-site	MW-301-CMT-20	MW-301-CMT-20	S	8.95	5.23	0.25	233.0	3.74	-454.2	Clear	>3 well volumes purged. Questionable pH readings.
1/22/2013	On-site	MW-301-CMT-30	MW-301-CMT-30	S	8.97	5.90	0.27	229.7	7.28	-37.8	--	>3 well volumes purged
1/22/2013	On-site	MW-301-CMT-40	MW-301-CMT-40	S	8.95	5.89	0.16	233.0	-9.99	-458.4	Clear	>3 well volumes purged. Questionable pH readings.
1/22/2013	On-site	MW-301-CMT-50	MW-301-CMT-50	S	8.96	5.10	0.12	231.1	7.28	-84.0	Clear	Parameters stabilized
1/14/2013	On-site	MW-301-60	EB-301-60	S	--	--	--	--	--	--	--	Equipment blank collected after MW-301-60
1/14/2013	On-site	MW-301-60	MW-301-60	S	9.02	6.10	0.17	248.4	7.45	-69.7	Clear	Parameters stabilized
1/15/2013	On-site	MW-301-70	MW-301-70	S	8.66	6.20	0.21	246.8	7.30	1.9	Clear	Parameters stabilized
1/22/2013	On-site	MW-302-CMT-10	MW-302-CMT-10	S	10.35	1.66	1.64	202.0	7.16	-33.0	Clear	>3 well volumes purged. Questionable pH readings.
1/22/2013	On-site	MW-302-CMT-20	MW-302-CMT-20	S	10.34	2.47	1.77	206.0	7.19	-24.4	Clear	>3 well volumes purged
1/22/2013	On-site	MW-302-CMT-30	MW-302-CMT-30	S	10.54	3.20	0.13	237.5	7.16	-63.7	Clear	Parameters stabilized
1/22/2013	On-site	MW-302-CMT-40	MW-302-CMT-40	S	10.31	3.18	0.29	214.0	-3.18	-414.3	Clear	>3 well volumes purged. Questionable pH readings. Litmus paper reads approximately 6.2 for pH.
1/22/2013	On-site	MW-302-CMT-50	MW-302-CMT-50	S	10.29	3.60	0.14	221.6	7.26	-91.6	Clear	Parameters stabilized
1/22/2013	On-site	MW-302-70	MW-302-70	S	9.25	4.80	0.15	205.7	7.07	82.1	--	>3 well volumes purged
1/22/2013	On-site	MW-302-70	MW-402-70	S	--	--	--	--	--	--	--	Duplicate of MW-302-70
1/21/2013	On-site	MW-302-80	MW-302-80	S	9.52	3.50	0.20	231.3	7.46	6.1	Clear	Parameters stabilized
1/21/2013	On-site	MW-302-80	MW-402-80	S	--	--	--	--	--	--	--	Duplicate of MW-302-80
1/21/2013	On-site	MW-302-95	MW-302-95	S	8.99	2.93	0.41	158.0	7.49	-466.5	Clear	Parameters stabilized
1/21/2013	On-site	MW-302-110	MW-302-110	S	9.70	5.10	0.21	165.2	7.47	198.1	--	Parameters stabilized
1/21/2013	On-site	MW-303-CMT-9	MW-303-CMT-9	S	12.00	1.27	0.99	186.0	6.10	-148.0	Clear	>3 well volumes purged. Questionable pH readings.
1/21/2013	On-site	MW-303-CMT-19	MW-303-CMT-19	S	12.00	2.01	0.89	189.0	7.20	-355.9	Clear	>3 well volumes purged

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Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/21/2013	On-site	MW-303-CMT-29	MW-303-CMT-29	S	11.59	2.73	0.29	180.0	7.96	-383.6	Clear	Parameters stabilized
1/21/2013	On-site	MW-303-CMT-39	MW-303-CMT-39	S	11.97	3.02	1.60	235.0	7.48	-72.9	Clear	Parameters stabilized
1/21/2013	On-site	MW-303-CMT-49	MW-303-CMT-49	S	12.00	2.86	2.10	229.0	7.44	-81.4	Clear	Parameters stabilized
1/21/2013	On-site	MW-303-CMT-59	MW-303-CMT-59	S	11.59	2.92	2.60	227.0	7.28	-96.7	Clear	>3 well volumes purged, questionable DO readings.
1/21/2013	On-site	MW-303-130	MW-303-130	S	11.15	3.60	0.44	204.8	7.09	94.6	Clear	Parameters stabilized
1/21/2013	On-site	MW-303-70	MW-303-70	S	11.13	4.46	0.74	196.0	6.29	33.5	Clear	Parameters stabilized
1/21/2013	On-site	MW-303-80	MW-303-80	S	11.18	4.90	0.21	165.4	7.40	128.7	--	>3 well volumes purged
1/21/2013	On-site	MW-303-95	MW-303-95	S	11.13	4.90	0.21	163.4	7.23	204.9	--	Parameters stabilized
1/24/2013	On-site	MW-304-CMT-10	MW-304-CMT-10	S	--	--	--	--	--	--	--	Obstructed at 2.6'
1/14/2013	On-site	MW-304-15	EB-304-15	S	--	--	--	--	--	--	--	Equipment blank collected after MW-304-15
1/14/2013	On-site	MW-304-15	MW-304-15	S	13.08	3.30	0.55	294.8	6.60	-62.9	Slightly turbid	>3 well volumes purged.
1/31/2013	On-site	MW-304-CMT-10	MW-304-CMT-10	S	--	--	--	--	--	--	--	Obstruction at 2.80'
1/31/2013	On-site	MW-304-CMT-20	MW-304-CMT-20	S	13.71	2.56	0.38	531.0	7.45	-353.0	Clear	>3 well volumes purged
1/31/2013	On-site	MW-304-CMT-30	MW-304-CMT-30	S	13.71	2.94	0.35	226.0	7.72	-317.5	Clear	Parameters stabilized
1/31/2013	On-site	MW-304-CMT-40	MW-304-CMT-40	S	13.73	3.16	0.29	216.0	7.95	-292.3	Clear	Parameters stabilized
1/31/2013	On-site	MW-304-CMT-50	MW-304-CMT-50	S	13.76	3.06	0.73	244.0	7.36	-67.2	Clear	Parameters stabilized
1/31/2013	On-site	MW-304-CMT-60	MW-304-CMT-60	S	13.72	3.17	0.90	242.0	7.36	95.4	Clear	Parameters stabilized
1/22/2013	On-site	MW-304-70	MW-304-70	S	10.95	4.05	0.26	364.0	7.36	-3.2	Clear	Parameters stabilized
1/14/2013	On-site	MW-304-80	MW-304-80	S	12.78	4.40	0.16	172.2	7.39	76.0	Clear	Parameters stabilized
1/14/2013	On-site	MW-304-96	MW-304-96	S	12.99	4.70	0.09	170.4	7.39	77.0	Clear	Parameters stabilized
1/14/2013	On-site	MW-304-125	MW-304-125	S	13.32	4.90	0.11	165.7	7.42	27.1	Clear	Parameters stabilized.
1/22/2013	On-site	MW-304-150	MW-304-150	S	13.16	4.54	1.46	170.0	7.40	48.6	Clear	Parameters stabilized.
1/17/2013	On-site	MW-305-CMT-8	MW-305-CMT-8	S	--	--	--	--	--	--	--	Obstructed at 2.36'
1/17/2013	On-site	MW-305-CMT-18	MW-305-CMT-18	S	12.54	2.66	0.35	206.0	7.19	-27.6	Clear	Parameters stabilized
1/17/2013	On-site	MW-305-CMT-28	MW-305-CMT-28	S	12.51	2.80	1.52	227.3	7.15	8.7	Clear	>3 well volumes purged. Questionable DO readings
1/17/2013	On-site	MW-305-CMT-38	MW-305-CMT-38	S	12.50	2.70	0.58	214.2	7.36	-11.6	Clear	Parameters stabilized
1/17/2013	On-site	MW-305-CMT-48	MW-305-CMT-48	S	12.50	2.14	0.29	154.0	7.46	-20.5	Clear	>3 well volumes purged
1/17/2013	On-site	MW-305-CMT-58	MW-305-CMT-58	S	12.51	2.70	0.54	207.9	7.36	-16.9	Clear	>3 well volumes purged
1/15/2013	On-site	MW-305-70	MW-305-70	S	11.88	4.50	0.13	213.7	7.30	58.5	Clear	Parameters stabilized
1/15/2013	On-site	MW-305-80	MW-305-80	S	11.56	4.70	0.14	214.7	7.48	60.1	Clear	Parameters stabilized
2/1/2013	On-site	MW-305-100	MW-305-100	S	11.85	4.29	0.12	323.0	7.39	48.8	Clear	Parameters stabilized.
2/11/2013	On-site	MW-306-CMT-10	MW-306-CMT-10	S	13.13	2.20	0.80	264.6	6.64	59.8	Clear	Parameters stabilized.
2/2/2013	On-site	MW-306-15	MW-306-15	S	12.97	2.60	0.45	473.0	6.94	-38.6	Clear	Parameters stabilized.
2/11/2013	On-site	MW-306-CMT-20	MW-306-CMT-20	S	13.12	3.20	0.30	251.2	7.05	6.6	Clear	Parameters stabilized.
2/11/2013	On-site	MW-306-CMT-30	MW-306-CMT-30	S	13.12	3.40	0.60	242.0	7.16	-8.3	Clear	Parameters stabilized.
2/11/2013	On-site	MW-306-CMT-40	MW-306-CMT-40	S	13.13	3.50	0.99	234.8	7.17	12.9	Clear	Parameters stabilized.
2/11/2013	On-site	MW-306-CMT-50	MW-306-CMT-50	S	13.13	3.40	14.76	202.8	7.27	4.7	Clear	Parameters stabilized. DO reading questionable
2/11/2013	On-site	MW-306-CMT-60	MW-306-CMT-60	S	13.14	3.30	0.29	204.3	7.05	-7.4	Clear	Parameters stabilized.
2/2/2013	On-site	MW-306-70	MW-306-70	S	12.95	3.52	0.10	345.0	7.42	-68.5	Clear	Parameters stabilized.
2/2/2013	On-site	MW-306-80	MW-306-80	S	12.78	3.69	0.10	338.0	7.44	-68.2	Clear	Parameters stabilized.
2/2/2013	On-site	MW-306-100	MW-306-100	S	11.81	4.00	0.08	332.0	7.49	-76.3	Clear	Parameters stabilized.
3/8/2013	On-site	MW-306-150	MW-306-150	S	12.42	4.20	0.11	193.2	7.19	166.0	Clear	Parameters stabilized.
3/8/2013	On-site	MW-307	MW-307	S	--	--	--	--	--	--	--	Obstruction (likely frozen) at 10.44'
1/31/2013	On-site	MW-309-15	MW-309-15	S	10.92	1.97	0.28	418.0	7.62	-150.1	Clear	>3 well volumes purged.
1/31/2013	On-site	MW-309-150	MW-309-150	S	10.49	4.92	0.70	242.0	7.40	15.3	Clear	Parameters stabilized
1/31/2013	On-site	MW-309-65	MW-309-65	S	10.08	4.86	0.16	355.0	7.27	-20.7	Clear	Parameters stabilized.
1/31/2013	On-site	MW-309-65	MW-409-65	S	--	--	--	--	--	--	--	Duplicate of MW-309-65
2/1/2013	On-site	MW-310-15	MW-310-15	S	10.09	3.53	0.32	502.0	6.81	-79.7	Clear	Parameters stabilized.
2/1/2013	On-site	MW-310-65	MW-310-65	S	10.20	5.98	0.14	347.0	7.31	-7.9	Clear	Parameters stabilized.

Table 4-1
Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
2/1/2013	On-site	MW-310-110	MW-310-110	S	9.89	5.56	0.61	260.0	6.54	106.0	Clear	Parameters stabilized.
1/12/2013	On-site	MW-321-15	MW-321-15	S	10.56	3.20	0.33	413.1	6.87	-71.7	Clear	Parameters stabilized
1/12/2013	On-site	MW-321-65	MW-321-65	S	10.33	5.00	0.26	59.9	7.45	-78.7	Clear	Parameters stabilized. Questionable conductivity readings.
1/12/2013	On-site	MW-321-151	MW-321-151	S	10.16	4.20	0.26	194.3	7.45	22.9	Clear	Parameters stabilized.
2/1/2013	On-site	MW-330-20	MW-330-20	S	15.00	4.89	0.30	276.0	7.12	-341.4	Clear	Parameters stabilized.
2/1/2013	On-site	MW-330-65	MW-330-65	S	14.83	7.78	0.17	235.0	7.51	-351.3	Clear	Parameters stabilized
2/1/2013	On-site	MW-330-150	MW-330-150	S	14.62	5.30	0.31	201.0	7.71	-277.5	Clear	Parameters stabilized. DTW measured after sample.
3/8/2013	On-site	MW-331-150	MW-331-150	S	11.72	4.30	0.10	193.1	6.90	193.8	Clear	Parameters stabilized.
1/31/2013	On-site	MW-334-15	MW-334-15	S, B	12.71	3.30	0.30	221.8	7.05	-131.3	Clear	Parameters stabilized.
1/31/2013	On-site	MW-334-15	MW-434-15	B	--	--	--	--	--	--	--	Duplicate of MW-334-15
1/31/2013	On-site	MW-334-65	MW-334-65	S, B	11.36	4.40	0.14	201.1	7.27	-1.4	Clear	Parameters stabilized.
1/31/2013	On-site	MW-334-65	MW-434-65	B	--	--	--	--	--	--	--	Duplicate of MW-334-65
1/14/2013	On-site	O-1	O-1	S	11.53	2.00	0.13	372.1	7.30	-104.3	Clear	Parameters stabilized
2/12/2013	On-site	O-2	O-2	S	13.60	3.00	1.77	75.6	6.62	-70.8	Clear	Parameters stabilized. questionable conductivity readings.
2/2/2013	On-site	O-3	O-3	S	13.47	3.29	1.79	543.0	7.44	-131.5	Clear	>3 well volumes purged, questionable DO reading
2/28/2013	On-site	O-4	O-4	S	12.32	2.60	0.91	1767.0	6.81	-43.8	Clear	>3 well volumes purged questionable conductivity reading
2/11/2013	On-site	O-6	O-6	S	10.37	3.10	0.31	265.0	6.99	-20.4	Turbid	Parameters stabilized.
1/14/2013	On-site	O-12	O-12	S, B	11.92	0.47	0.25	241.4	7.44	-113.6	Clear	>3 well volumes purged.
2/5/2013	On-site	O-14	O-14	S, B	9.11	0.46	1.60	405.0	6.76	-27.4	--	>3 well volumes purged
2/12/2013	On-site	O-19	O-19	S	12.03	1.80	12.60	77.5	6.82	-81.3	Clear	>3 well volumes purged. DO and conductivity reading questionable
2/2/2013	On-site	O-24	O-24	S	12.60	3.17	0.38	275.0	7.30	-179.9	Clear	Parameters stabilized.
1/14/2013	On-site	O-26	O-26	S	12.68	4.20	0.35	365.2	7.20	-121.3	Clear	>3 well volumes purged
1/11/2013	On-site	S-9	S-9	B	10.97	5.40	0.30	257.1	7.02	-61.3	--	>3 well volumes purged.
2/4/2013	On-site	S-39	S-39	S	11.29	0.40	13.88	403.4	6.05	16.8	Slightly turbid	Well did not recover sufficient water to sample. DO reading questionable
2/12/2013	On-site	S-43	S-43	S	11.68	3.20	1.44	76.0	6.69	-73.2	Clear	Parameters stabilized. Questionable conductivity readings.
2/12/2013	On-site	S-51	S-51	S	11.81	1.40	2.11	80.8	6.47	69.6	Slightly turbid	>3 well volumes purged, questionable conductivity reading
1/2/2013	Off-site	MW-148A	MW-148A	S	10.51	2.20	0.37	198.1	6.95	-41.9	Clear	Parameters stabilized.
1/12/2013	Off-site	MW-148B	MW-148B	S	9.69	2.20	0.23	61.1	7.16	-118.2	Clear	Parameters stabilized. Questionable conductivity readings
1/10/2013	Off-site	MW-148C	MW-148C	S	10.25	3.30	0.31	221.5	7.40	-32.5	Clear	Parameters stabilized
1/10/2013	Off-site	MW-148D	MW-148D	S	10.17	4.30	0.27	188.8	7.42	65.8	Clear	>3 well volumes purged
1/10/2013	Off-site	MW-150A	MW-150A	S	5.45	1.30	0.62	41.7	7.20	-68.5	Clear	>3 well volumes purged
2/13/2013	Off-site	MW-150B	MW-150B	S	5.39	1.35	0.24	428.0	7.20	-36.1	Clear	Parameters stabilized
2/13/2013	Off-site	MW-150B	MW-250B	S	--	--	--	--	--	--	--	Duplicate of MW-150B
2/13/2013	Off-site	MW-150C	MW-150C	S	4.73	0.45	0.07	373.0	7.40	-7.7	Clear	Parameters stabilized
1/10/2013	Off-site	MW-151A	MW-151A	S	5.24	1.40	0.18	226.8	7.08	35.0	Clear	>3 well volumes purged
1/10/2013	Off-site	MW-151B	MW-151B	S	5.20	1.50	0.18	217.9	7.26	-39.7	Clear	Parameters stabilized
1/10/2013	Off-site	MW-151B	MW-251B	S	--	--	--	--	--	--	--	Duplicate of MW-151B
1/10/2013	Off-site	MW-151C	MW-151C	S	9.00	0.30	0.16	188.3	7.26	50.1	Clear	Parameters stabilized
2/14/2013	Off-site	MW-152A	MW-152A	S	--	--	--	--	--	--	--	Obstructed (likely frozen) at 6.45'
2/14/2013	Off-site	MW-152B	MW-152B	S	6.00	2.65	0.12	394.0	7.22	-36.8	Clear	>3 well volumes purged
2/14/2013	Off-site	MW-152B	MW-252B	S	--	--	--	--	--	--	--	Duplicate of MW-152B
2/14/2013	Off-site	MW-152C	MW-152C	S	6.09	0.89	0.17	355.0	7.32	96.3	Clear	Parameters stabilized
1/10/2013	Off-site	MW-153A	MW-153A	S	7.19	3.20	0.20	240.0	7.05	115.8	Clear	Parameters stabilized
1/3/2013	Off-site	MW-153B	MW-153B	S	6.63	3.70	0.12	225.0	7.37	83.0	Clear	>3 well volumes purged
1/10/2013	Off-site	MW-155A	MW-155A	S	6.99	2.80	0.14	243.0	7.24	-44.6	Clear	>3 well volumes purged
1/10/2013	Off-site	MW-155B	MW-155B	S	7.00	1.70	0.11	190.7	7.38	-0.1	Clear	Parameters stabilized
1/10/2013	Off-site	MW-156A	MW-156A	S	7.40	0.70	1.44	41.8	7.13	-112.5	Clear	>3 well volumes purged. Conductivity readings questionable

Table 4-1
Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/10/2013	Off-site	MW-156A	MW-256A	S	--	--	--	--	--	--	--	Duplicate of MW-156A
1/10/2013	Off-site	MW-156B	MW-156B	S	9.80	-0.40	0.58	39.2	7.32	9.1	Clear	>3 well volumes purged. Conductivity readings questionable
2/12/2013	Off-site	MW-157A	MW-157A	S	~6.8	0.70	1.20	232.7	7.16	-15.3	Clear	>3 well volumes purged
2/12/2013	Off-site	MW-157A	MW-257A	S	--	--	--	--	--	--	--	Duplicate of MW-157A
2/12/2013	Off-site	MW-157B	MW-157B	S	6.83	0.40	0.32	218.8	7.09	-17.0	Clear	>3 well volumes purged
2/12/2013	Off-site	MW-158A	MW-158A	S	7.22	1.20	0.34	327.0	6.83	-20.8	Clear	Parameters stabilized
1/10/2013	Off-site	MW-158B	MW-158B	S	6.71	0.10	0.54	40.4	7.37	-20.8	Clear	Parameters stabilized. Conductivity readings questionable
2/12/2013	Off-site	MW-159A	MW-159A	S	7.68	1.10	1.44	317.5	6.56	56.2	Clear	>3 well volumes purged
2/12/2013	Off-site	MW-159B	MW-159B	S	7.26	1.30	0.21	205.2	7.28	51.1	Clear	Parameters stabilized
2/12/2013	Off-site	MW-159C	MW-159C	S	7.23	0.40	0.23	194.6	7.30	17.9	Clear	>3 well volumes purged
2/12/2013	Off-site	MW-159C	MW-259C	S	--	--	--	--	--	--	--	Duplicate of MW-159C
1/4/2013	Off-site	MW-160B	MW-160B	S	6.70	1.20	0.20	199.9	7.34	-28.9	clear	Parameters stabilized
1/2/2013	Off-site	MW-161A	MW-161A	S	6.01	0.90	0.29	255.5	7.05	-87.1	Clear	Parameters stabilized.
1/2/2013	Off-site	MW-161A	MW-261A	S	--	--	--	--	--	--	--	Duplicate of MW-161A
1/2/2013	Off-site	MW-161B	MW-161B	S	6.18	0.00	0.16	226.3	7.22	-10.9	Clear	Parameters stabilized.
1/4/2013	Off-site	MW-162A	MW-162A	S	7.97	1.00	0.41	286.4	7.07	-45.3	Clear	Parameters stabilized
1/4/2013	Off-site	MW-162B	EB-162B	S	--	--	--	--	--	--	--	Equipment blank
1/4/2013	Off-site	MW-162B	MW-162B	S	8.19	0.10	0.23	204.0	7.22	320.0	clear	Parameters stabilized
1/4/2013	Off-site	MW-163A	MW-163A	S	9.19	1.20	0.60	219.1	6.89	246.1	clear	>3 well volumes purged
1/4/2013	Off-site	MW-163B	MW-163B	S	9.42	0.20	0.14	188.7	7.22	-36.3	Slightly turbid	Parameters stabilized
1/4/2013	Off-site	MW-163B	MW-263B	S	--	--	--	--	--	--	--	Duplicate of MW-163B
1/2/2013	Off-site	MW-164A	MW-164A	S	7.33	1.20	0.28	283.3	7.07	-48.7	Clear	>3 well volumes purged
1/2/2013	Off-site	MW-164B	MW-164B	S	6.40	0.20	0.21	223.5	7.14	-45.4	Clear	Parameters stabilized.
1/2/2013	Off-site	MW-164C	MW-164C	S	6.42	0.10	0.14	223.5	7.09	-15.2	Clear	Parameters stabilized.
2/13/2013	Off-site	MW-165A	MW-165A	S	6.10	0.49	0.71	363.0	6.69	-11.0	Clear	>3 well volumes purged
2/13/2013	Off-site	MW-165B	MW-165B	S	--	--	--	--	--	--	--	Monument full of ice, sample not collected
1/31/2013	Off-site	MW-166A	MW-166A	S	--	--	--	--	--	--	--	Obstruction (likely frozen) 6.65'.
1/31/2013	Off-site	MW-166B	MW-166B	S	7.48	0.00	0.22	255.5	7.18	-21.5	Clear	Parameters stabilized
1/31/2013	Off-site	MW-166B	MW-266B	S	--	--	--	--	--	--	--	Duplicate of MW-166B
1/2/2013	Off-site	MW-167A	MW-167A	S	9.43	0.30	0.48	477.0	6.76	50.5	Clear	>3 well volumes purged
1/2/2013	Off-site	MW-167B	MW-167B	S	9.28	0.20	0.22	446.3	6.97	31.2	Clear	Parameters stabilized.
1/2/2013	Off-site	MW-168A	MW-168A	S	8.45	0.40	1.03	1520.0	7.17	-98.7	Clear	>3 well volumes purged. Questionable conductivity reading.
1/2/2013	Off-site	MW-168B	MW-168B	S	8.50	-0.40	0.43	1396.0	7.41	-104.4	Clear	Parameters stabilized. Questionable conductivity reading
2/1/2013	Off-site	MW-169A	MW-169A	S	~8.7	0.40	0.29	179.5	7.13	-31.3	Clear	>3 well volumes purged
2/1/2013	Off-site	MW-169A	MW-269A	S	--	--	--	--	--	--	--	Duplicate of MW-169A
2/1/2013	Off-site	MW-169C	MW-169C	S	5.25	0.10	0.51	181.7	7.35	-63.5	Clear	Parameters stabilized
2/14/2013	Off-site	MW-170A	MW-170A	S	8.57	4.96	12.80	440.0	5.51	79.0	Clear	>3 well volumes purged, DO and pH readings questionable
2/13/2013	Off-site	MW-170B	MW-170B	S	8.94	3.90	0.14	200.0	6.91	-90.0	Clear	Parameters stabilized
2/14/2013	Off-site	MW-170C	MW-170C	S	8.65	4.29	1.09	197.0	6.76	44.9	Clear	Parameters stabilized
2/13/2013	Off-site	MW-170D	MW-170D	S	8.25	4.40	0.24	271.3	7.19	-52.3	Clear	>3 well volumes purged
2/13/2013	Off-site	MW-171A	MW-171A	S	9.03	0.57	0.41	441.0	6.95	73.0	Clear	Parameters stabilized
2/13/2013	Off-site	MW-171B	MW-171B	S	9.56	0.10	0.13	453.0	7.11	-71.4	Clear	Parameters stabilized
2/15/2013	Off-site	MW-172A	MW-172A	S	5.50	1.20	0.19	223.2	7.03	-98.7	Clear	Parameters stabilized
2/15/2013	Off-site	MW-172B	MW-172B	S	5.52	3.01	10.10	303.1	6.94	-29.1	Clear	Parameters stabilized, DO reading questionable
2/14/2013	Off-site	MW-181A	MW-181A	S	8.69	1.10	0.63	198.5	7.10	125.2	Clear	Parameters stabilized
2/14/2013	Off-site	MW-181B	MW-181B	S	8.35	2.60	0.25	180.5	7.44	109.6	Clear	Parameters stabilized
3/2/2013	Off-site	MW-181C	MW-181C	S, isotope	8.43	2.45	0.30	305.0	7.45	-97.2	Clear	Parameters stabilized
1/2/2013	Off-site	MW-182A	MW-182A	S	7.11	0.12	0.27	251.0	6.81	8.5	Clear	Parameters stabilized.

Table 4-1
Groundwater Well Field Parameter Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/2/2013	Off-site	MW-182B	MW-182B	S	6.18	0.10	0.32	247.3	7.14	-19.8	Clear	Parameters stabilized.
1/10/2013	Off-site	MW-183A	MW-183A	S	--	--	--	--	--	--	--	Frozen with datalogger
1/24/2013	Off-site	MW-183A	MW-183A	S	--	--	--	--	--	--	--	Frozen with datalogger
1/6/2013	Off-site	MW-183B	MW-183B	S	--	--	--	--	--	--	--	Obstruction (likely frozen) at 5.98'.
1/24/2013	Off-site	MW-183B	MW-183B	S	--	--	--	--	--	--	--	Obstruction (likely frozen) at 6.23'
2/28/2013	Off-site	MW-184	MW-184	S	7.84	0.20	0.46	174.6	7.12	189.4	Clear	>3 well volumes purged
1/3/2013	Off-site	MW-185A	MW-185A	S	5.94	1.20	0.44	311.1	7.20	86.9	Clear	Parameters stabilized
1/3/2013	Off-site	MW-185B	MW-185B	S	6.01	3.30	0.06	207.1	7.67	-101.6	Clear	Parameters stabilized
1/3/2013	Off-site	MW-185C	MW-185C	S	6.38	3.40	0.12	161.4	7.68	-64.6	Clear	Parameters stabilized
2/1/2013	Off-site	MW-187	MW-187	S	11.71	1.10	0.69	206.1	6.91	125.1	Clear	>3 well volumes purged
2/1/2013	Off-site	MW-187	MW-287	S	--	--	--	--	--	--	--	Duplicate of MW-187
1/2/2013	Off-site	MW-189A	MW-189A	S	--	--	--	--	--	--	--	obstruction, likely frozen
1/2/2013	Off-site	MW-189B	MW-189B	S	--	--	--	--	--	--	--	obstruction (likely frozen) at 4.24'
2/14/2013	Off-site	MW-190A	EB-190A	S	--	--	--	--	--	--	--	Equipment blank collected after MW-190A
2/14/2013	Off-site	MW-190A	MW-190A	S	7.35	2.30	0.32	205.3	6.61	73.2	Clear	>3 well volumes purged
2/14/2013	Off-site	MW-191A	MW-191A	S	5.44	1.20	0.99	192.5	6.96	110.0	Clear	>3 well volumes purged
2/14/2013	Off-site	MW-191B	MW-191B	S	5.35	3.30	0.25	207.2	7.23	98.0	Clear	Parameters stabilized
2/1/2013	Off-site	MW-193A	MW-193A	S	7.97	0.70	0.32	382.1	6.57	8.9	Clear	Parameters stabilized
2/1/2013	Off-site	MW-193B	MW-193B	S	7.73	0.10	0.27	187.0	7.17	10.2	Clear	Parameters stabilized
1/31/2013	Off-site	MW-194A	MW-194A	S	5.88	0.30	1.06	227.2	7.06	9.7	Clear	Parameters stabilized
1/31/2013	Off-site	MW-194A	MW-294A	S	--	--	--	--	--	--	--	Duplicate of MW-194A
1/31/2013	Off-site	MW-194B	MW-194B	S	6.04	0.10	0.42	236.5	7.22	-1.8	Clear	>3 well volumes purged
1/31/2013	Off-site	MW-194B	MW-294B	S	--	--	--	--	--	--	--	Duplicate of MW-194B
1/31/2013	Off-site	MW-308-15	MW-308-15	S	11.88	1.20	0.15	273.7	6.68	52.7	Clear	>3 well volumes purged
1/31/2013	Off-site	MW-308-15	MW-408-15	S	--	--	--	--	--	--	--	Duplicate of MW-308-15
1/31/2013	Off-site	MW-308-30	MW-308-30	S	--	--	--	--	--	--	--	Obstruction (likely frozen) 9.77'.
2/28/2013	Off-site	MW-311-15	MW-311-15	S	5.92	0.40	0.37	185.3	7.20	-48.0	Clear	Parameters stabilized
2/28/2013	Off-site	MW-311-46	MW-311-46	S	--	--	--	--	--	--	--	monument full of ice, sample not possible
2/15/2013	Off-site	MW-314-15	EB-314-15	S	--	--	--	--	--	--	--	Equipment blank collected after MW-314-15
2/15/2013	Off-site	MW-314-15	MW-314-15	S	7.39	0.39	44.30	271.0	6.15	219.4	Clear	>3 well volumes purged, DO reading questionable
2/15/2013	Off-site	MW-314-150	MW-314-150	S	7.15	2.20	0.13	186.2	7.23	-79.0	Clear	Parameters stabilized
2/14/2013	Off-site	MW-316-15	MW-316-15	S	7.78	0.78	0.05	401.0	7.08	-61.4	Clear	>3 well volumes purged
2/14/2013	Off-site	MW-316-56	MW-316-56	S	6.47	0.14	0.01	349.0	7.37	13.7	Clear	Parameters stabilized
2/15/2013	Off-site	MW-317-15	MW-317-15	S	--	--	--	--	--	--	--	obstructed (likely frozen) at 6.59'
2/15/2013	Off-site	MW-317-71	MW-317-71	S	--	--	--	--	--	--	--	obstructed (likely frozen) at 3.59'
2/15/2013	Off-site	MW-318-20	MW-318-20	S	10.94	0.16	0.35	369.0	7.20	-63.2	Clear	Parameters stabilized
2/15/2013	Off-site	MW-318-135	MW-318-135	S	11.11	2.40	0.18	199.7	7.11	78.5	Clear	Parameters stabilized
2/28/2013	Off-site	MW-322-15	MW-322-15	S	10.19	3.60	0.37	215.1	6.59	25.5	Clear	>3 well volumes purged
3/1/2013	Off-site	MW-322-150	EB-322-150	S	--	--	--	--	--	--	--	Equipment blank collected after MW-322-150
3/1/2013	Off-site	MW-322-150	MW-322-150	S	9.86	3.50	0.15	170.6	7.08	-9.2	Clear	Parameters stabilized
2/1/2013	Off-site	MW-323-15	MW-323-15	S	7.68	0.20	0.22	202.2	6.97	-10.8	Clear	Parameters stabilized
2/1/2013	Off-site	MW-323-50	MW-323-50	S	7.13	0.50	0.25	213.5	7.12	-21.5	Clear	Parameters stabilized
2/28/2013	Off-site	MW-325-18	MW-325-18	S	10.58	2.30	0.86	182.9	6.88	-34.5	Clear	Parameters stabilized
2/28/2013	Off-site	MW-325-150	MW-325-150	S	11.42	3.70	0.33	163.4	7.61	-94.1	Clear	Parameters stabilized
2/28/2013	Off-site	MW-328-15	MW-328-15	S	7.03	1.30	0.44	352.7	7.18	-55.8	Clear	Parameters stabilized
3/1/2013	Off-site	MW-328-151	MW-328-151	S	--	1.80	0.17	155.4	7.30	-54.2	Clear	Parameters stabilized
1/6/2013	Off-site	MW-329-15	MW-329-15	S	10.16	2.00	0.35	272.8	6.91	65.0	clear	>3 well volumes purged
1/6/2013	Off-site	MW-329-66	MW-329-66	S	6.57	0.50	0.15	220.2	7.29	93.8	clear	Parameters stabilized
1/2/2013	Off-site	MW-332-15	MW-332-15	S	7.81	1.30	0.39	1526.0	7.17	-72.4	Clear	Parameters stabilized. Questionable conductivity reading

Table 4-1
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North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Proximity	Location	Sample	Analysis	Depth to Water (ft.)	Temperature (°C)	DO (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Notes
1/2/2013	Off-site	MW-332-150	MW-332-150	S	6.72	0.90	0.40	350.1	7.57	-111.8	Clear	Parameters stabilized.
1/2/2013	Off-site	MW-335-41	MW-335-41	S	5.33	-0.70	1.75	1735.0	7.34	-96.9	Clear	Parameters stabilized. Questionable conductivity reading

Notes:

µS/cm	microsiemens per centimeter
mg/L	milligrams per liter
°C	degrees Celsius
ft	feet
mV	millivolts
S	sulfolane
B	benzene, toluene, ethylbenzene, and xylenes
DO	Dissolved Oxygen
ORP	Oxidation-Reduction Potential
isotope	University of Alaska - Fairbanks isotope study
~	depth to water is approximate (water-sounder failure)
DTW	depth to water
>	greater than
'	feet

Table 4-2
Groundwater Elevation and Depth to LNAPL
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	Date Measured	Riser Elevation (MSL ft)	Depth to Water (ft)	Depth to LNAPL (ft)	Corrected Water Table Elevation (MSL ft)	Proximity	Zone	Notes
MW-101	1/24/2013	494.59	10.37	--	484.22	On-site	10-55	
MW-101A	1/24/2013	495.01	11.02	--	483.99	On-site	Water Table	
MW-102	1/24/2013	496.02	12.12	--	483.90	On-site	55-90	
MW-104	1/24/2013	496.02	12.11	No LNAPL	483.91	On-site	10-55	
MW-105	1/24/2013	497.66	10.56	--	487.10	On-site	10-55	
MW-105A	1/24/2013	499.21	12.30	--	486.91	On-site	Water Table	
MW-106	1/24/2013	499.28	14.16	No LNAPL	485.12	On-site	Water Table	
MW-110	1/24/2013	496.73	11.36	No LNAPL	485.37	On-site	Water Table	
MW-113	1/24/2013	494.44	10.11	No LNAPL	484.33	On-site	Water Table	
MW-125	1/24/2013	496.16	11.79	--	484.37	On-site	Water Table	
MW-129	1/24/2013	496.05	11.53	--	484.52	On-site	10-55	
MW-130	1/24/2013	496.88	12.25	--	484.63	On-site	Water Table	
MW-131	1/24/2013	495.75	11.84	--	483.91	On-site	Water Table	
MW-133	1/24/2013	498.34	13.13	--	485.21	On-site	Water Table	
MW-135	1/24/2013	496.94	12.48	12.42	484.51	On-site	Water Table	
MW-140	1/24/2013	494.90	10.76	No LNAPL	484.14	On-site	Water Table	
MW-141	1/24/2013	492.38	8.45	No LNAPL	483.93	On-site	Water Table	
MW-143	1/24/2013	495.37	11.52	--	483.85	On-site	Water Table	
MW-144A	1/24/2013	495.35	11.13	No LNAPL	484.22	On-site	Water Table	
MW-144BR	1/24/2013	494.98	10.69	No LNAPL	484.29	On-site	55-90	
MW-145	1/24/2013	495.61	11.11	No LNAPL	484.50	On-site	Water Table	
MW-146A	1/24/2013	495.09	10.96	No LNAPL	484.13	On-site	Water Table	
MW-146B	1/24/2013	494.98	10.82	No LNAPL	484.16	On-site	10-55	
MW-147B	1/24/2013	492.59	8.77	No LNAPL	483.82	On-site	10-55	
MW-148A	1/24/2013	493.33	10.47	--	482.86	On-site	Water Table	
MW-148B	1/24/2013	492.78	9.63	--	483.15	On-site	10-55	
MW-148C	1/24/2013	493.29	10.26	--	483.03	On-site	10-55	
MW-148D	1/24/2013	493.02	10.14	--	482.88	On-site	90-160	
MW-149A	1/24/2013	493.68	10.85	--	482.83	On-site	Water Table	
MW-150A	1/24/2013	487.14	6.46	--	480.68	Off-site	Water Table	
MW-150B	1/24/2013	486.95	6.29	--	480.66	Off-site	10-55	
MW-151A	1/24/2013	487.22	5.19	--	482.03	Off-site	Water Table	
MW-151C	1/24/2013	491.11	8.96	--	482.15	Off-site	10-55	
MW-152A	1/24/2013	488.44	6.46	--	481.98	Off-site	Water Table	
MW-152B	1/24/2013	488.02	6.01	--	482.01	Off-site	10-55	
MW-152C	1/24/2013	488.10	6.10	--	482.00	Off-site	10-55	
MW-153A	1/24/2013	490.20	6.61	--	483.59	Off-site	Water Table	
MW-153B	1/24/2013	489.72	6.15	--	483.57	Off-site	10-55	
MW-154A	1/24/2013	498.04	13.82	No LNAPL	484.22	On-site	55-90	
MW-155A	1/24/2013	488.19	6.95	--	481.24	Off-site	Water Table	
MW-156A	1/24/2013	485.88	6.37	--	479.51	Off-site	Water Table	
MW-156B	1/24/2013	489.36	9.77	--	479.59	Off-site	10-55	
MW-157A	1/24/2013	484.82	6.59	--	478.23	Off-site	Water Table	
MW-157B	1/24/2013	485.08	6.79	--	478.29	Off-site	10-55	
MW-158A	1/24/2013	487.90	7.08	--	480.82	Off-site	Water Table	
MW-158B	1/24/2013	487.46	6.65	--	480.81	Off-site	10-55	
MW-159A	1/24/2013	488.52	7.62	--	480.90	Off-site	Water Table	
MW-159B	1/24/2013	488.22	7.21	--	481.01	Off-site	10-55	
MW-159C	1/24/2013	488.70	7.75	--	480.95	Off-site	55-90	
MW-160B	1/24/2013	485.53	6.62	--	478.91	Off-site	55-90	
MW-161A	1/24/2013	479.46	5.95	--	473.51	Off-site	Water Table	
MW-161B	1/24/2013	479.60	6.12	--	473.48	Off-site	10-55	
MW-162A	1/24/2013	483.92	7.83	--	476.09	Off-site	Water Table	
MW-162B	1/24/2013	484.11	8.03	--	476.08	Off-site	10-55	
MW-163A	1/24/2013	485.02	9.11	--	475.91	Off-site	Water Table	
MW-163B	1/24/2013	484.80	9.30	--	475.50	Off-site	10-55	
MW-164A	1/24/2013	480.22	7.22	--	473.00	Off-site	Water Table	
MW-164B	1/24/2013	479.47	6.26	--	473.21	Off-site	10-55	
MW-164C	1/24/2013	479.45	6.29	--	473.16	Off-site	10-55	
MW-165A	1/24/2013	474.79	6.03	--	468.76	Off-site	Water Table	
MW-165B	1/24/2013	474.64	--	--	--	Off-site	10-55	The monument cap was missing, and the well filled with ice, no measurement taken.
MW-166A	1/24/2013	474.93	--	--	--	Off-site	Water Table	The well was inaccessible due to weather conditions.
MW-166B	1/24/2013	475.43	--	--	--	Off-site	10-55	The well was inaccessible due to weather conditions.
MW-167A	1/24/2013	475.70	9.15	--	466.55	Off-site	Water Table	
MW-167B	1/24/2013	475.57	9.10	--	466.47	Off-site	10-55	
MW-168A	1/24/2013	478.27	8.31	--	469.96	Off-site	Water Table	
MW-168B	1/24/2013	478.34	8.34	--	470.00	Off-site	10-55	
MW-169A	1/25/2013	485.90	8.59	--	477.31	Off-site	Water Table	
MW-169C	1/25/2013	482.56	5.20	--	477.36	Off-site	10-55	
MW-170A	1/24/2013	490.66	8.66	--	482.00	Off-site	Water Table	
MW-170B	1/24/2013	490.74	8.65	--	482.09	Off-site	55-90	
MW-170C	1/24/2013	490.87	8.66	--	482.21	Off-site	90-160	
MW-170D	1/24/2013	490.41	8.25	--	482.16	Off-site	10-55	
MW-171A	1/24/2013	484.77	9.07	--	475.70	Off-site	Water Table	
MW-171B	1/24/2013	484.83	9.14	--	475.69	Off-site	10-55	
MW-172A	1/24/2013	475.72	5.54	--	470.18	Off-site	Water Table	
MW-172B	1/24/2013	475.73	5.62	--	470.11	Off-site	90-160	
MW-173A	1/24/2013	496.28	12.06	No LNAPL	484.22	On-site	Water Table	
MW-173B	1/24/2013	496.40	12.04	No LNAPL	484.36	On-site	90-160	
MW-174A	1/24/2013	494.25	9.60	No LNAPL	484.65	On-site	10-55	
MW-174B	1/24/2013	493.37	8.56	No LNAPL	484.81	On-site	55-90	
MW-175	1/24/2013	497.06	12.26	--	484.80	On-site	55-90	
MW-176B	1/24/2013	496.93	11.37	--	485.56	On-site	10-55	

Table 4-2
Groundwater Elevation and Depth to LNAPL
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	Date Measured	Riser Elevation (MSL ft)	Depth to Water (ft)	Depth to LNAPL (ft)	Corrected Water Table Elevation (MSL ft)	Proximity	Zone	Notes
MW-176C	1/24/2013	496.86	11.25	--	485.61	On-site	55-90	
MW-177	1/24/2013	497.92	11.10	--	486.82	On-site	55-90	
MW-178C	1/24/2013	497.27	--	--	--	On-site	55-90	The well was frozen with a dedicated pump installed-- no measurement possible.
MW-179A	1/24/2013	496.96	--	--	--	On-site	Water Table	The well was frozen with a data logger installed-- no measurement possible.
MW-179B	1/24/2013	496.75	--	--	--	On-site	10-55	The well was frozen with a data logger installed-- no measurement possible.
MW-179C	1/24/2013	497.27	--	--	--	On-site	55-90	The well was frozen with a data logger installed-- no measurement possible.
MW-179D	1/24/2013	497.06	--	--	--	On-site	90-160	The well was frozen with a data logger installed-- no measurement possible.
MW-180B	1/24/2013	496.87	--	--	--	On-site	10-55	The well was frozen/dry at 11.09 feet below the measuring point.
MW-180C	1/24/2013	497.05	--	--	--	On-site	55-90	The well was frozen with a dedicated pump installed-- no measurement possible.
MW-181A	1/24/2013	475.90	8.70	--	467.20	Off-site	Water Table	
MW-181B	1/24/2013	475.83	8.45	--	467.38	Off-site	10-55	
MW-181C	1/24/2013	475.96	8.35	--	467.61	Off-site	90-160	
MW-182A	1/24/2013	475.65	6.00	--	469.65	Off-site	Water Table	
MW-182B	1/24/2013	475.40	7.05	--	468.35	Off-site	10-55	
MW-183A	1/24/2013	478.06	--	--	--	Off-site	Water Table	The well was frozen with a data logger installed-- no measurement possible.
MW-183B	1/24/2013	478.06	--	--	--	Off-site	10-55	The well was frozen/dry at 6.23 feet below the measuring point.
MW-184	1/24/2013	486.64	7.84	--	478.80	Off-site	10-55	
MW-185A	1/24/2013	478.08	5.81	--	472.27	Off-site	Water Table	
MW-185B	1/24/2013	478.09	5.86	--	472.23	Off-site	10-55	
MW-185C	1/24/2013	478.48	6.23	--	472.25	Off-site	90-160	
MW-186A	1/24/2013	495.95	11.93	11.45	484.41	On-site	Water Table	
MW-186B	1/24/2013	495.80	11.35	--	484.45	On-site	10-55	
MW-186D	1/24/2013	495.72	11.17	--	484.55	On-site	90-160	
MW-186E	1/24/2013	495.71	11.25	--	484.46	On-site	55-90	
MW-187	1/24/2013	485.52	--	--	--	Off-site	Water Table	The well was inaccessible due to weather conditions.
MW-188A	1/24/2013	461.84	--	--	--	Off-site	Water Table	The well was frozen-- a depth to ice measurement was not taken.
MW-188B	1/24/2013	461.53	--	--	--	Off-site	10-55	The well was frozen-- a depth to ice measurement was not taken.
MW-189A	1/24/2013	470.21	--	--	--	Off-site	Water Table	The well was frozen with a data logger installed-- no measurement possible.
MW-189B	1/24/2013	470.25	--	--	--	Off-site	10-55	The well was frozen-- a depth to ice measurement was not taken.
MW-190A	1/24/2013	481.67	7.49	--	474.18	Off-site	Water Table	
MW-190B	1/24/2013	481.56	7.39*	--	474.17	Off-site	10-55	
MW-191A	1/24/2013	475.62	5.39	--	470.23	Off-site	Water Table	
MW-191B	1/24/2013	475.51	5.31	--	470.20	Off-site	10-55	
MW-192A	1/24/2013	495.90	9.60	No LNAPL	486.30	On-site	Water Table	
MW-192B	1/24/2013	495.47	9.13	No LNAPL	486.34	On-site	10-55	
MW-193A	1/25/2013	487.70	7.92	--	479.78	Off-site	Water Table	
MW-193B	1/25/2013	487.40	7.09	--	480.31	Off-site	10-55	
MW-194A	1/24/2013	475.68	--	--	--	Off-site	Water Table	The well was inaccessible due to weather conditions.
MW-194B	1/24/2013	475.88	--	--	--	Off-site	10-55	The well was inaccessible due to weather conditions.
MW-195A	1/24/2013	496.10	10.94	No LNAPL	485.16	On-site	Water Table	
MW-195B	1/24/2013	496.12	10.86	No LNAPL	485.26	On-site	90-160	
MW-197A	1/24/2013	495.17	10.57	--	484.60	On-site	10-55	
MW-198	1/24/2013	493.32	7.61	--	485.71	On-site	90-160	
MW-199	1/24/2013	495.90	11.37	No LNAPL	484.53	On-site	90-160	
MW-300	1/24/2013	496.00	10.34	--	485.66	On-site	90-160	
MW-301-CMT-10	1/24/2013	492.88	8.98	--	483.90	On-site	Water Table	
MW-301-CMT-20	1/24/2013	492.88	8.97	--	483.91	On-site	10-55	
MW-301-CMT-30	1/24/2013	492.88	8.97	--	483.91	On-site	10-55	
MW-301-CMT-40	1/24/2013	492.88	8.98	--	483.90	On-site	10-55	
MW-301-CMT-50	1/24/2013	492.88	8.98	--	483.90	On-site	10-55	
MW-301-60	1/24/2013	492.85	8.72	--	484.13	On-site	10-55	
MW-301-70	1/24/2013	492.46	8.59	--	483.87	On-site	55-90	
MW-302-CMT-10	1/24/2013	494.32	10.36	--	483.96	On-site	Water Table	
MW-302-CMT-20	1/24/2013	494.32	10.35	--	483.97	On-site	10-55	
MW-302-CMT-30	1/24/2013	494.32	10.35	--	483.97	On-site	10-55	
MW-302-CMT-40	1/24/2013	494.32	10.37	--	483.95	On-site	10-55	
MW-302-CMT-50	1/24/2013	494.32	10.36	--	483.96	On-site	10-55	
MW-302-70	1/24/2013	493.29	9.26	--	484.03	On-site	55-90	
MW-302-80	1/24/2013	493.49	9.51	--	483.98	On-site	55-90	
MW-302-95	1/24/2013	493.00	8.96	--	484.04	On-site	55-90	
MW-302-110	1/24/2013	493.65	9.68	--	483.97	On-site	90-160	
MW-303-CMT-9	1/24/2013	495.85	12.00	--	483.85	On-site	Water Table	
MW-303-CMT-19	1/24/2013	495.85	11.59	--	484.26	On-site	10-55	
MW-303-CMT-29	1/24/2013	495.85	11.59	--	484.26	On-site	10-55	
MW-303-CMT-39	1/24/2013	495.85	12.01	--	483.84	On-site	10-55	
MW-303-CMT-49	1/24/2013	495.85	11.59	--	484.26	On-site	10-55	
MW-303-CMT-59	1/24/2013	495.85	12.00	--	483.85	On-site	10-55	
MW-303-70	1/24/2013	495.06	11.14	--	483.92	On-site	55-90	
MW-303-80	1/24/2013	495.12	11.17	--	483.95	On-site	55-90	
MW-303-95	1/24/2013	495.12	11.15	--	483.97	On-site	55-90	

Table 4-2
Groundwater Elevation and Depth to LNAPL
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	Date Measured	Riser Elevation (MSL ft)	Depth to Water (ft)	Depth to LNAPL (ft)	Corrected Water Table Elevation (MSL ft)	Proximity	Zone	Notes
MW-303-130	1/24/2013	495.15	11.13	--	484.02	On-site	90-160	
MW-304-CMT-10	1/24/2013	497.63	--	--	--	On-site	Water Table	The well was frozen/dry at 2.60 feet below the measuring point.
MW-304-15	1/24/2013	496.97	13.00	--	483.97	On-site	Water Table	
MW-304-CMT-20	1/24/2013	497.63	13.65	--	483.98	On-site	10-55	
MW-304-CMT-30	1/24/2013	497.63	13.65	--	483.98	On-site	10-55	
MW-304-CMT-40	1/24/2013	497.63	13.65	--	483.98	On-site	10-55	
MW-304-CMT-50	1/24/2013	497.63	13.66	--	483.97	On-site	10-55	
MW-304-CMT-60	1/24/2013	497.63	13.66	--	483.97	On-site	10-55	
MW-304-70	1/24/2013	496.99	12.97	--	484.02	On-site	55-90	
MW-304-80	1/24/2013	496.75	12.73	--	484.02	On-site	55-90	
MW-304-96	1/24/2013	496.95	12.99	--	483.96	On-site	55-90	
MW-304-125	1/24/2013	497.32	13.27	--	484.05	On-site	90-160	
MW-304-150	1/24/2013	497.21	12.96	--	484.25	On-site	90-160	
MW-305-CMT-8	1/24/2013	496.39	—	—	—	On-site	Water Table	The well was frozen/dry at 2.40 feet below the measuring point.
MW-305-CMT-18	1/24/2013	496.39	12.48	—	483.91	On-site	10-55	
MW-305-CMT-28	1/24/2013	496.39	12.49	—	483.90	On-site	10-55	
MW-305-CMT-38	1/24/2013	496.39	12.47	—	483.92	On-site	10-55	
MW-305-CMT-48	1/24/2013	496.39	12.47	—	483.92	On-site	10-55	
MW-305-CMT-58	1/24/2013	496.39	12.48	—	483.91	On-site	10-55	
MW-305-70	1/24/2013	495.67	11.83	--	483.84	On-site	55-90	
MW-305-80	1/24/2013	495.38	11.47	—	483.91	On-site	55-90	The depth to water measurement was recorded as 10.47 feet on the field form.
MW-305-100	1/24/2013	495.71	11.78	--	483.93	On-site	90-160	
MW-306-CMT-10	1/24/2013	496.95	13.14	—	483.81	On-site	Water Table	
MW-306-15	1/24/2013	496.78	12.95	—	483.83	On-site	Water Table	
MW-306-CMT-20	1/24/2013	496.95	13.13	—	483.82	On-site	10-55	
MW-306-CMT-30	1/24/2013	496.95	13.12	—	483.83	On-site	10-55	
MW-306-CMT-40	1/24/2013	496.95	13.13	—	483.82	On-site	10-55	
MW-306-CMT-50	1/24/2013	496.95	13.13	—	483.82	On-site	10-55	
MW-306-CMT-60	1/24/2013	496.95	13.14	—	483.81	On-site	10-55	
MW-306-70	1/24/2013	496.70	—	—	—	On-site	55-90	The depth to water measurement was not recorded on the field form.
MW-306-80	1/24/2013	496.52	12.75	—	483.77	On-site	55-90	
MW-306-100	1/24/2013	495.55	11.79	—	483.76	On-site	55-90	
MW-306-150	1/24/2013	495.98	12.26	—	483.72	On-site	90-160	
MW-307	1/24/2013	495.49	10.68	—	484.81	On-site	90-160	
MW-309-15	1/24/2013	495.08	10.83	No LNAPL	484.25	On-site	Water Table	
MW-309-66	1/24/2013	495.05	10.71	No LNAPL	484.34	On-site	10-55	
MW-310-15	1/24/2013	494.32	9.75	No LNAPL	484.57	On-site	Water Table	
MW-310-65	1/24/2013	494.48	10.09	No LNAPL	484.39	On-site	10-55	
MW-310-110	1/24/2013	494.26	9.79	No LNAPL	484.47	On-site	90-160	
MW-311-15	1/24/2013	467.00	5.60	—	461.40	Off-site	Water Table	
MW-311-46	1/24/2013	467.06	5.85	—	461.21	Off-site	10-55	
MW-312-15	1/24/2013	464.12	5.80	—	458.32	Off-site	Water Table	
MW-312-50	1/24/2013	464.30	6.85	—	457.45	Off-site	10-55	
MW-313-15	1/24/2013	465.79	—	—	—	Off-site	Water Table	The well was frozen-- a depth to ice measurement was not taken.
MW-315-15	1/24/2013	458.44	6.10	—	452.34	Off-site	Water Table	
MW-315-150	1/24/2013	458.96	6.60	—	452.36	Off-site	90-160	
MW-317-71	1/24/2013	488.79	6.85	—	481.94	Off-site	55-90	
MW-318-20	1/25/2013	492.86	10.76	—	482.10	Off-site	Water Table	
MW-318-135	1/25/2013	493.10	10.96	—	482.14	Off-site	90-160	
MW-319-15	1/24/2013	456.10	6.50	—	449.60	Off-site	Water Table	
MW-319-45	1/24/2013	455.96	6.35	—	449.61	Off-site	10-55	
MW-321-15	1/24/2013	495.59	10.51	No LNAPL	485.08	On-site	Water Table	
MW-321-65	1/24/2013	495.26	10.26	No LNAPL	485.00	On-site	10-55	
MW-322-15	1/24/2013	472.01	9.90	—	462.11	Off-site	Water Table	
MW-322-150	1/24/2013	472.12	9.63	—	462.49	Off-site	90-160	
MW-324-15	1/24/2013	463.41	7.95	—	455.46	Off-site	Water Table	
MW-324-151	1/24/2013	462.90	7.15	—	455.75	Off-site	90-160	
MW-326-20	1/24/2013	500.55	—	—	—	Off-site	Water Table	The well was inaccessible due to weather conditions.
MW-326-150	1/24/2013	500.47	—	—	—	Off-site	90-160	The well was inaccessible due to weather conditions.
MW-327-15	1/24/2013	467.82	6.55	—	461.27	Off-site	Water Table	
MW-327-150	1/24/2013	467.61	6.95	—	460.66	Off-site	90-160	
MW-328-15	1/24/2013	472.36	7.10	—	465.26	Off-site	Water Table	
MW-328-151	1/24/2013	472.68	7.40	—	465.28	Off-site	90-160	
MW-330-65	1/24/2013	499.83	14.75	No LNAPL	485.08	On-site	10-55	
MW-332-15	1/24/2013	481.80	7.72	—	474.08	Off-site	Water Table	
MW-332-150	1/24/2013	481.35	—	—	—	Off-site	90-160	The well casing sunk and was inaccessible. Depth to water from monument was 8.17 feet.
MW-333-16	1/24/2013	497.67	—	—	—	Off-site	Water Table	The well was inaccessible due to weather conditions.
MW-333-150	1/24/2013	497.62	—	—	—	Off-site	90-160	The well was inaccessible due to weather conditions.
MW-334-65	1/24/2013	495.82	11.30	—	484.52	On-site	10-55	
O-1	1/24/2013	497.14	11.48	No LNAPL	485.66	On-site	Water Table	
O-2	1/24/2013	497.54	12.78	12.39	485.08	On-site	Water Table	
O-3	1/24/2013	497.76	13.38	No LNAPL	484.38	On-site	Water Table	
O-4	1/24/2013	496.50	12.16	No LNAPL	484.34	On-site	Water Table	
O-5	1/24/2013	496.11	11.72	No LNAPL	484.39	On-site	Water Table	
O-6	1/24/2013	494.73	10.28	No LNAPL	484.45	On-site	Water Table	
O-8	1/24/2013	496.72	11.11	No LNAPL	485.61	On-site	Water Table	

Table 4-2
Groundwater Elevation and Depth to LNAPL
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	Date Measured	Riser Elevation (MSL ft)	Depth to Water (ft)	Depth to LNAPL (ft)	Corrected Water Table Elevation (MSL ft)	Proximity	Zone	Notes
O-12	1/24/2013	496.17	11.86	No LNAPL	484.31	On-site	Water Table	
O-14	1/24/2013	494.90	9.03	No LNAPL	485.87	On-site	Water Table	
O-15	1/24/2013	498.70	12.51	No LNAPL	486.19	On-site	Water Table	
O-17	1/24/2013	493.26	8.31	No LNAPL	484.95	On-site	Water Table	
O-18	1/24/2013	492.70	7.54	No LNAPL	485.16	On-site	Water Table	
O-22	1/24/2013	496.76	11.79	No LNAPL	484.97	On-site	Water Table	
O-23	1/24/2013	495.83	11.15	No LNAPL	484.68	On-site	Water Table	
O-24	1/24/2013	496.87	12.51	No LNAPL	484.36	On-site	Water Table	
O-26	1/24/2013	496.82	12.58	No LNAPL	484.24	On-site	Water Table	
O-27	1/24/2013	496.86	12.88	12.50	484.30	On-site	Water Table	
O-28	1/24/2013	494.65	8.81	No LNAPL	485.84	On-site	Water Table	
O-29	1/24/2013	498.61	13.39	No LNAPL	485.22	On-site	Water Table	
R-14A	1/24/2013	494.09	10.00	9.66	484.37	On-site	Water Table	
R-21	1/24/2013	495.52	12.89	12.63	482.84	On-site	Water Table	
R-35R	1/24/2013	494.72	19.95	sheen	474.77	On-site	Water Table	
R-39	1/24/2013	495.05	18.52	sheen	476.53	On-site	Water Table	
R-40	1/24/2013	494.46	21.25	21.02	473.40	On-site	Water Table	
R-42	1/24/2013	493.31	10.87	No LNAPL	482.44	On-site	Water Table	
S-32	1/24/2013	495.82	11.21	No LNAPL	484.61	On-site	Water Table	
S-39	1/24/2013	494.07	11.24	11.02	483.01	On-site	Water Table	
S-43	1/24/2013	496.21	11.60	sheen	484.61	On-site	Water Table	
S-44	1/24/2013	495.02	10.39	10.37	484.65	On-site	Water Table	
S-50	1/24/2013	496.68	12.43	11.90	484.70	On-site	Water Table	
S-54	1/24/2013	497.01	13.23	No LNAPL	483.78	On-site	Water Table	
North Gravel Pit	1/24/2013	492.81	8.29	—	484.52	On-site	Surface Water	
South Gravel Pit**	1/24/2013	493.51	8.56 (depth of water)	—	490.07	On-site	Surface Water	

Notes:

MSL	Mean sea level
LNAPL	Light Non-Aqueous Phase Liquid
--	A water sounder was used to measure the depth to water; the well was not checked with an interface probe for the presence of LNAPL.
No LNAPL	An interface probe was used, but LNAPL was not measured or observed.
sheen	An interface probe was used. A measurable thickness of LNAPL was not present, but LNAPL was observed visually.
*	Well MW-190B was replaced; future data will be reported as MW-190BR.
**	The South Gravel Pit measurement is taken from a 12 foot staff gauge in the pond. The 12 foot mark on the gauge is at an elevation of 498.10 MSL ft.

Table 4-3
LNAPL Thickness Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	Top of Riser Elevation (MSL ft.)	Frequency	January 2013					February 2013					March 2013[2]				
			Date Measured	LNAPL Thickness (ft.)	Depth to LNAPL (ft.)	Depth to Water (ft.)	Corrected Water Table Elevation (MSL ft.)	Date Measured	LNAPL Thickness (ft.)	Depth to LNAPL (ft.)	Depth to Water (ft.)	Corrected Water Table Elevation (MSL ft.)	Date Measured	LNAPL Thickness (ft.)	Depth to LNAPL (ft.)	Depth to Water (ft.)	Corrected Water Table Elevation (MSL ft.)
MW-138	496.34	monthly	1/24/2013	0.07	10.40	10.47	485.93	2/26/2013	0.18	10.53	10.71	485.78	3/28/2013	0.11	10.69	10.80	485.63
MW-176A	497.02	quarterly	1/24/2013	3.46	10.95	14.41	485.43	2/26/2013	4.07	10.99	15.06	485.27	3/28/2013	3.71	11.19	14.90	485.14
MW-186A	495.95	monthly	1/23/2012	0.48	11.45	11.93	484.41	2/26/2013	0.48	11.59	12.07	484.27	3/29/2013	0.42	11.74	12.16	484.13
MW-334-15[1]	495.87	monthly	1/23/2012	1.34	11.30	12.64	484.30	2/26/2013	1.44	11.40	12.84	484.18	3/29/2013	1.47	11.52	12.99	484.06
O-2	497.54	monthly	1/23/2012	0.39	12.39	12.78	485.08	2/26/2013	0.40	12.53	12.93	484.93	3/29/2013	0.32	12.71	13.03	484.77
O-7	496.01	monthly	1/23/2012	0.01	13.13	13.14	482.88	2/26/2013	sheen	11.27	11.28	484.73	3/28/2013	0.02	11.36	11.38	484.65
O-9	496.95	monthly	1/23/2012	0.02	11.71	11.73	485.24	2/26/2013	sheen	11.85	11.87	485.08	3/28/2013	0.34	11.91	12.25	484.98
O-10	496.36	monthly	1/23/2012	0.27	11.15	11.42	485.16	2/26/2013	1.39	11.09	12.48	485.02	3/28/2013	1.54	11.20	12.74	484.88
O-11	497.87	monthly	1/23/2012	0.83	13.40	14.23	484.33	2/26/2013	0.87	13.54	14.41	484.18	3/29/2013	0.77	13.71	14.48	484.03
O-13	495.37	monthly	1/23/2012	0.13	10.98	11.11	484.37	2/26/2013	0.10	11.12	11.22	484.23	3/29/2013	0.22	11.25	11.47	484.08
O-19	496.48	monthly	1/24/2013	0.16	11.76	11.92	484.69	2/26/2013	0.37	11.87	12.24	484.54	3/28/2013	0.49	11.92	12.41	484.47
O-21	493.12	monthly	1/24/2013	--	--	7.16*	ice	2/26/2013	--	--	7.14*	ice	3/28/2013	--	--	7.12*	ice
O-27	496.86	monthly	1/23/2012	0.38	12.50	12.88	484.30	2/26/2013	0.54	12.62	13.16	484.15	3/28/2013	0.49	12.76	13.25	484.02
R-5	495.33	quarterly	1/24/2013	sheen	sheen	8.97*	ice	2/26/2013	sheen	sheen	9.01*	ice	3/28/2013	sheen	sheen	8.96*	ice
R-14A	494.09	monthly	1/23/2012	0.34	9.66	10.00	484.37	2/26/2013	1.17	9.25	10.42	484.62	3/29/2013	0.55	9.93	10.48	484.06
R-18	499.76	quarterly	1/23/2012	0.21	14.79	15.00	484.93	2/26/2013	0.29	14.94	15.23	484.76	3/28/2013	0.41	14.99	15.40	484.68
R-20R	498.74	monthly	1/24/2013	0.40	13.40	13.80	485.26	2/26/2013	0.06	13.62	13.68	485.11	3/28/2013	0.30	13.71	14.01	484.97
R-21	495.52	monthly	1/23/2012	0.26	12.63	12.89	482.84	2/26/2013	0.09	12.78	12.87	482.72	3/29/2013	0.69	12.66	13.35	482.73
R-32	494.33	monthly	1/23/2012	0.08	9.12	9.20	485.20	2/26/2013	0.10	9.26	9.36	485.05	3/28/2013	0.89	9.23	10.12	484.93
R-33	495.82	monthly	1/24/2013	0.07	10.05	10.12*	ice	2/26/2013	sheen	sheen	10.12*	ice	3/28/2013	sheen	sheen	10.12*	ice
R-34	495.20	quarterly	1/23/2012	0.02	10.08	10.10	485.12	2/26/2013	0.08	10.23	10.31	484.96	3/28/2013	0.59	10.22	10.81	484.87
R-35R	494.72	monthly	1/23/2012	sheen	sheen	19.95	474.77	2/26/2013	sheen	sheen	20.40	474.32	3/28/2013	sheen	sheen	10.15	484.57
R-39	495.05	monthly	1/23/2012	sheen	sheen	18.52	476.53	2/26/2013	sheen	sheen	18.44	476.61	3/28/2013	sheen	sheen	10.67	484.38
R-40	494.46	monthly	1/23/2012	0.23	21.02	21.25	473.40	2/26/2013	0.32	20.44	20.76	473.96	3/28/2013	0.01	10.12	10.13	484.34
S-21	497.19	monthly	1/23/2012	0.20	12.33	12.53	484.82	2/26/2013	0.33	12.46	12.79	484.66	3/28/2013	0.33	12.50	12.83	484.62
S-22	496.70	monthly	1/23/2012	0.96	11.30	12.26	485.23	2/26/2013	0.94	11.45	12.39	485.08	3/28/2013	0.86	11.60	12.46	484.95
S-32	495.82	monthly	1/24/2013	--	--	11.21	484.61	2/26/2013	--	--	11.34	484.48	3/28/2013	--	--	11.36*	ice
S-39	494.07	monthly	1/23/2012	0.22	11.02	11.24	483.01	2/26/2013	0.05	11.09	11.14	482.97	3/28/2013	0.05	9.76	9.81	484.30
S-43	496.21	monthly	1/24/2013	sheen	sheen	11.60	484.61	2/26/2013	sheen	sheen	11.72	484.49	3/29/2013	sheen	sheen	11.88	484.33
S-44	495.02	monthly	1/24/2013	0.98	10.39	11.37	484.41	2/26/2013	1.13	10.46	11.59	484.31	3/28/2013	0.96	10.38	11.34	484.43
S-50	496.68	monthly	1/24/2013	0.53	11.90	12.43	484.70	2/26/2013	0.85	12.04	12.89	484.51	3/28/2013	1.91	12.07	13.98	484.31
S-51	495.90	monthly	1/24/2013	0.35	11.25	11.60	484.59	2/26/2013	0.71	11.32	12.03	484.46	3/28/2013	1.55	11.29	12.84	484.34

Notes:

MSL Mean Sea Level
LNAPL Light Non-Aqueous Phase Liquid
ft feet
-- LNAPL was not detected.
sheen LNAPL thickness was less than 0.01' and was not detected with an air/LNAPL/water interface probe; LNAPL was observed visually.
[1] The corrected groundwater elevation for MW-334-15 is an approximation based on a LNAPL specific gravity of 0.8.
[2] Recovery wells R-35R, R-39, and R-40 were offline during the March 2013 LNAPL gauging events. The March groundwater elevations and LNAPL thicknesses measured in recovery wells and nearby wells may differ from those normally observed.
* Water was not measured. The measurement is to ice.

Table 4-4
LNAPL Migration Monitoring Well Network Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

		January 2013			February 2013			March 2013		
Location	Frequency	Date Measured	LNAPL Present (yes/no)	Notes	Date Measured	LNAPL Present (yes/no)	Notes	Date Measured	LNAPL Present (yes/no)	Notes
MW-139	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
MW-140	quarterly	1/23/2013	N		2/26/2013	N		--	--	Measured quarterly
MW-142	quarterly	1/23/2013	N		2/26/2013	N		--	--	Measured quarterly
MW-144A	quarterly	1/23/2013	N		2/26/2013	N		--	--	Measured quarterly
MW-145	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
MW-178A	quarterly	1/24/2013	N	frozen at 10.91' below MP	2/26/2013	N	frozen at 10.91' below MP	--	--	Measured quarterly
MW-179A	quarterly	1/24/2013	--	frozen with datalogger in well	2/26/2013	--	frozen with datalogger in well	--	--	Measured quarterly
MW-180A	quarterly	1/24/2013	N	frozen at 11.53' below MP	2/26/2013	N	frozen at 11.48' below MP	--	--	Measured quarterly
MW-195A	quarterly	1/23/2013	N		2/26/2013	N		--	--	Measured quarterly
MW-196	quarterly	1/24/2013	N		2/26/2013	N		--	--	Measured quarterly
O-1	monthly	1/24/2013	N		2/26/2013	N	frozen at 11.53' below MP	3/28/2013	N	frozen at 11.53' below MP
O-3	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
O-4	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-5	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-6	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-8	monthly	1/24/2013	N		2/26/2013	N		3/28/2013	N	
O-12	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
O-14	monthly	1/24/2013	N		2/26/2013	N	frozen at 9.09' below MP	3/28/2013	N	frozen at 9.09' below MP
O-15	monthly	1/24/2013	N		2/26/2013	N		3/28/2013	N	
O-16	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	frozen at 7.61' below MP
O-17	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-18	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-20	monthly	1/24/2013	N		2/26/2013	N		3/28/2013	N	
O-22	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-23	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-24	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
O-25	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
O-26	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	
O-28	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-29	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
O-30	quarterly	--	--	not measured in January 2013	2/26/2013	N		3/28/2013	N	frozen at 12.65' below MP
R-3	quarterly	1/24/2013	N	frozen at 7.52' below MP	2/26/2013	N	frozen at 7.40' below MP	--	--	Measured quarterly
R-38	quarterly	1/24/2013	N	frozen at 10.77' below MP	2/26/2013	N	frozen at 10.74' below MP	--	--	Measured quarterly
R-42	monthly	1/23/2013	N		2/26/2013	N		3/28/2013	N	
S-9	monthly	1/23/2013	N		2/26/2013	N		3/29/2013	N	

Notes:

LNAPL	Light Non-Aqueous Phase Liquid
MP	Measuring Point
--	not available
'	feet

Table 4-5
LNAPL Baildown Testing and Analysis Results
North Pole Refinery
Flint Hills Resources - Alaska, LLC

Well ID	Test	Date	Initial LNAPL Thickness (ft)	Test Duration (min)	Final LNAPL Thickness (ft)	LNAPL Transmissivity, T_n
						Bouwer & Rice
MW-176A	1	3/6/2013	4.14	1493	1.82	0.2
O-10	1	3/6/2013	1.58	266	0.30	**1.4**
O-11	1	3/11/2013	0.76	1546	0.43	0.3
O-27	1	3/7/2013	0.56	1547	0.24	**2.6**
R-14A	1	3/11/2013	0.75	1594	0.27	0.1
S-22	1	3/6/2013	0.90	300	0.15	0.2
S-44	1	3/6/2013	1.19	1463	0.18	0.1
S-50	1	3/7/2013	1.30	235	0.30	**1.7**
S-51	1	3/7/2013	1.06	312	0.88	0.4
MW-334-15	1	3/7/2013	1.46	30	1.43	NA

Notes:

Bold	Exceeds 0.1 to 0.8 ft^2/day lower criterion range to produce sufficient LNAPL recoverability (ITRC 2009).
LNAPL	Light Non-Aqueous Phase Liquid
ft	feet
min	minutes
NA	Not Analyzed

Table 4-6
BTEX Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

BTEX						SW8260B					
						Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Xylenes (total)
Location	Comments	Sample	Dup	Work Order	Collect Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ADEC Groundwater Cleanup Level						5 µg/L	1,000 µg/L	700 µg/L	-	-	10,000 µg/L
Onsite Wells											
Water Table Groundwater Monitoring Zone											
MW-126		MW-126		1137535	01/31/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-134	Frozen/obstruction	-		-	02/28/13	-	-	-	-	-	-
MW-137		MW-137		1137535	01/31/13	0.740J*	<0.620	<0.620	<0.620	<1.24	<1.86
MW-137		MW-237	DUP	1137535	01/31/13	0.500J*	<0.620	<0.620	<0.620	<1.24	<1.86
MW-145		MW-145		1137535	01/31/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-334-15		MW-334-15		1137535	01/31/13	2,350	4,420	610	1,090	2,350	3,440
MW-334-15		MW-434-15	DUP	1137535	01/31/13	2,430	4,360	594	1,110	2,370	3,480
O-12		O-12		1137519	01/14/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
O-14		O-14		1137543	02/05/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
S-9		S-9		1137519	01/11/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
10-55' Groundwater Monitoring Zone											
MW-176B		MW-176B		1137519	01/12/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-178B	Frozen/obstruction	-		-	01/11/13	-	-	-	-	-	-
MW-179B	Frozen with datalogger	-		-	01/24/13	-	-	-	-	-	-
MW-180B	Frozen/obstruction	-		-	01/24/13	-	-	-	-	-	-
MW-186B		MW-186B		1137519	01/12/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-334-65		MW-334-65		1137535	01/31/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-334-65		MW-434-65	DUP	1137535	01/31/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
55-90' Groundwater Monitoring Zone											
MW-154A		MW-154A		1137535	02/01/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-154B		MW-154B		1137535	02/01/13	0.150J	<1.00B*	<0.620	<0.620	<1.24	<1.86
MW-175		MW-175		1137543	02/05/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-176C		MW-176C		1137519	01/14/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86
MW-178C	Frozen/obstruction	-		-	01/11/13	-	-	-	-	-	-
MW-179C	Frozen with datalogger	-		-	01/24/13	-	-	-	-	-	-
MW-180C	Frozen with dedicated pump	-		-	01/24/13	-	-	-	-	-	-
90-160' Groundwater Monitoring Zone											
MW-186C		MW-186C		1137572	02/28/13	<0.240	<0.620	<0.620	<0.620	<1.24	<1.86

Notes:

µg/L	micrograms per liter
DUP	Field-duplicate sample
ADEC	Alaska Department of Environmental Conservation
BTEX	benzene, toluene, ethylbenzene and total xylenes
J	Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)
J*	Result is considered estimated (no direction of bias), due to QC failures (flag applied by SWI)
<	Not detected; limit of detection (LOD) listed
B*	Result is considered not detected due to contamination identified in the trip blank
--	not sampled

Table 4-7
Sulfolane Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
Onsite Wells						
Water table groundwater monitoring zone						
MW-101A		MW-101A		1137527	01/21/13	52.3
MW-101A		MW-201A	DUP	1137527	01/21/13	52.2
MW-110		MW-110		1137514	01/11/13	398
MW-113		MW-113		1137519	01/14/13	283
MW-113		MW-213	DUP	1137519	01/14/13	280
MW-125		MW-125		1137535	02/02/13	<6.40
MW-125		MW-225	DUP	1137535	02/02/13	<6.20
MW-127		MW-127		1137514	01/11/13	51.0
MW-130		MW-130		1137514	01/11/13	899
MW-131		MW-131		1137514	01/11/13	21.1
MW-131		MW-231	DUP	1137514	01/11/13	21.3
MW-133		MW-133		1137535	02/02/13	<6.46
MW-133		MW-233	DUP	1137535	02/02/13	<6.46
MW-134	Frozen/obstructed	-		-	02/28/13	-
MW-135		MW-135		1137535	01/31/13	<6.74
MW-138		MW-138		1137514	01/12/13	1,680JL*
MW-139		MW-139		1137514	01/11/13	150
MW-141		MW-141		1137535	02/02/13	<6.20
MW-142		MW-142		1137508	01/06/13	248
MW-143		MW-143		1137527	01/21/13	66.6
MW-143		MW-243	DUP	1137527	01/21/13	64.6
MW-145		MW-145		1137535	01/31/13	<6.20
MW-149A		MW-149A		1137513	01/10/13	<6.46
MW-173A		MW-173A		1137535	02/01/13	<6.66
MW-176A		MW-176A		1137514	01/12/13	1,800JL*
MW-178A	Frozen/obstructed	-		-	01/11/13	-
MW-179A	Frozen with datalogger	-		-	01/24/13	-
MW-180A	Frozen/obstructed	-		-	01/24/13	-
MW-186A		MW-186A		1137514	01/12/13	284
MW-195A		MW-195A		1137543	02/04/13	162
MW-196		MW-196		1137535	02/02/13	<6.40
MW-301-CMT-10		MW-301-CMT-10		1137527	01/22/13	<6.66
MW-302-CMT-10		MW-302-CMT-10		1137527	01/22/13	56.6
MW-303-CMT-9		MW-303-CMT-9		1137528	01/21/13	9.56J
MW-304-15		MW-304-15		1137519	01/14/13	337
MW-304-CMT-10	Frozen/obstructed	-		-	01/31/13	-
MW-305-CMT-8	Frozen/obstructed	-		-	01/17/13	-
MW-306-15		MW-306-15		1137535	02/02/13	<6.46
MW-306-CMT-10		MW-306-CMT-10		1137550	02/11/13	<6.66
MW-309-15		MW-309-15		1137534	01/31/13	74.3
MW-310-15		MW-310-15		1137535	02/01/13	242
MW-321-15		MW-321-15		1137514	01/12/13	170
MW-330-20		MW-330-20		1137535	02/01/13	191
MW-334-15		MW-334-15		1137535	01/31/13	189
O-1		O-1		1137519	01/14/13	6,520JL*
O-2		O-2		1137556	02/12/13	374
O-3		O-3		1137535	02/02/13	9.98J
O-4		O-4		1137572	02/28/13	210
O-6		O-6		1137550	02/11/13	28.8
O-12		O-12		1137519	01/14/13	75.0
O-14		O-14		1137543	02/05/13	<6.40
O-19		O-19		1137556	02/12/13	683
O-24		O-24		1137535	02/02/13	<6.40
O-26		O-26		1137519	01/14/13	488
S-39	Could not sample - did not recover water				02/04/13	
S-43		S-43		1137556	02/12/13	<6.66
S-51		S-51		1137556	02/12/13	847
10-55 feet below water table groundwater monitoring zone						
MW-101	Frozen/obstructed	-		-	01/21/13	-

Table 4-7
Sulfolane Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-105		MW-105		1137519	01/14/13	<6.88
MW-129		MW-129		1137535	01/31/13	<6.60
MW-147B		MW-147B		1137535	02/01/13	<6.60
MW-149B		MW-149B		1137513	01/10/13	<6.52
MW-174A		MW-174A		1137535	02/02/13	18.4
MW-174A		MW-274A	DUP	1137535	02/02/13	16.1
MW-176B		MW-176B		1137514	01/12/13	<6.74
MW-178B	Frozen/obstructed	-		-	01/11/13	-
MW-179B	Frozen with datalogger	-		-	01/24/13	-
MW-180B	Frozen/obstructed	-		-	01/24/13	-
MW-186B		MW-186B		1137514	01/12/13	26.9
MW-186B		MW-286B	DUP	1137514	01/12/13	26.4
MW-197A		MW-197A		1137543	02/04/13	<6.60
MW-301-60		MW-301-60		1137519	01/14/13	4.64J
MW-301-CMT-20		MW-301-CMT-20		1137527	01/22/13	<6.46
MW-301-CMT-30		MW-301-CMT-30		1137527	01/22/13	<6.52
MW-301-CMT-40		MW-301-CMT-40		1137528	01/22/13	<6.46
MW-301-CMT-50		MW-301-CMT-50		1137528	01/22/13	3.89J
MW-302-CMT-20		MW-302-CMT-20		1137528	01/22/13	61.0
MW-302-CMT-30		MW-302-CMT-30		1137528	01/22/13	52.3
MW-302-CMT-40		MW-302-CMT-40		1137528	01/22/13	17.4
MW-302-CMT-50		MW-302-CMT-50		1137528	01/22/13	20.5
MW-303-CMT-19		MW-303-CMT-19		1137528	01/21/13	69.9
MW-303-CMT-29		MW-303-CMT-29		1137528	01/21/13	37.6
MW-303-CMT-39		MW-303-CMT-39		1137528	01/21/13	21.9
MW-303-CMT-49		MW-303-CMT-49		1137528	01/21/13	17.1
MW-303-CMT-59		MW-303-CMT-59		1137528	01/21/13	12.2
MW-304-CMT-20		MW-304-CMT-20		1137534	01/31/13	3.45J
MW-304-CMT-30		MW-304-CMT-30		1137534	01/31/13	81.9
MW-304-CMT-40		MW-304-CMT-40		1137534	01/31/13	67.1
MW-304-CMT-50		MW-304-CMT-50		1137534	01/31/13	10.8
MW-304-CMT-60		MW-304-CMT-60		1137534	01/31/13	5.43J
MW-305-CMT-18		MW-305-CMT-18		1137522	01/17/13	8.98J
MW-305-CMT-28		MW-305-CMT-28		1137522	01/17/13	14.0
MW-305-CMT-38		MW-305-CMT-38		1137522	01/17/13	<6.40
MW-305-CMT-48		MW-305-CMT-48		1137522	01/17/13	<6.52
MW-305-CMT-58		MW-305-CMT-58		1137522	01/17/13	<6.40
MW-306-CMT-20		MW-306-CMT-20		1137550	02/11/13	<6.66
MW-306-CMT-30		MW-306-CMT-30		1137550	02/11/13	<6.66
MW-306-CMT-40		MW-306-CMT-40		1137550	02/11/13	<6.20
MW-306-CMT-50		MW-306-CMT-50		1137550	02/11/13	<6.66
MW-306-CMT-60		MW-306-CMT-60		1137550	02/11/13	<6.74
MW-309-66		MW-309-65		1137534	01/31/13	13.6
MW-309-66		MW-409-65	DUP	1137534	01/31/13	14.3
MW-310-65		MW-310-65		1137535	02/01/13	<6.40
MW-321-65		MW-321-65		1137514	01/12/13	<6.60
MW-330-65		MW-330-65		1137535	02/01/13	<6.88
MW-334-65		MW-334-65		1137535	01/31/13	4.42J
55-90 feet below water table groundwater monitoring zone						
MW-144BR		MW-144BR		1137543	02/04/13	<6.74
MW-154A		MW-154A		1137535	02/01/13	15.3
MW-154B		MW-154B		1137535	02/01/13	79.3
MW-174B		MW-174B		1137535	02/02/13	<6.74
MW-175		MW-175		1137543	02/05/13	<6.20
MW-176C		MW-176C		1137519	01/14/13	<6.74
MW-177	Frozen/obstructed	-		-	02/04/13	-
MW-178C	Frozen/obstructed	-		-	01/11/13	-
MW-179C	Frozen with datalogger	-		-	01/24/13	-
MW-180C	Frozen with dedicated pump	-		-	01/24/13	-
MW-186E		MW-186E		1137514	01/12/13	15.4
MW-301-70		MW-301-70		1137519	01/15/13	4.31JL*

Table 4-7
Sulfolane Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-302-70		MW-302-70		1137527	01/22/13	20.7
MW-302-70		MW-402-70	DUP	1137528	01/22/13	21.6
MW-302-80		MW-302-80		1137528	01/21/13	18.0
MW-302-80		MW-402-80	DUP	1137528	01/21/13	18.0
MW-302-95		MW-302-95		1137528	01/21/13	<6.46
MW-303-70		MW-303-70		1137527	01/21/13	6.64J
MW-303-80		MW-303-80		1137527	01/21/13	<6.20
MW-303-95		MW-303-95		1137528	01/21/13	<6.20
MW-304-70		MW-304-70		1137527	01/22/13	4.47J
MW-304-80		MW-304-80		1137519	01/14/13	4.68J
MW-304-96		MW-304-96		1137519	01/14/13	5.05J
MW-305-70		MW-305-70		1137519	01/15/13	<6.20
MW-305-80		MW-305-80		1137519	01/15/13	<6.20
MW-306-100		MW-306-100		1137535	02/02/13	<6.74
MW-306-70		MW-306-70		1137535	02/02/13	<6.60
MW-306-80		MW-306-80		1137535	02/02/13	<6.88
90-160 feet below water table groundwater monitoring zone						
MW-173B		MW-173B		1137580	03/06/13	<6.20
MW-179D	Frozen with datalogger	-		-	01/24/13	-
MW-186C		MW-186C		1137572	02/28/13	<6.66
MW-186D		MW-186D		1137580	03/06/13	<6.20
MW-195B		MW-195B		1137602	03/11/13	<6.20
MW-197B		MW-197B		1137596	03/08/13	<6.46
MW-198	Frozen/obstructed	-		-	03/11/13	-
MW-199		MW-199		1137596	03/08/13	<6.66
MW-300		MW-300		1137602	03/11/13	<6.40
MW-302-110		MW-302-110		1137528	01/21/13	<6.32
MW-303-130		MW-303-130		1137528	01/21/13	<7.04
MW-304-125		MW-304-125		1137519	01/14/13	<6.74
MW-304-150		MW-304-150		1137527	01/22/13	<6.52
MW-305-100		MW-305-100		1137535	02/01/13	<6.20
MW-306-150		MW-306-150		1137596	03/08/13	<6.52
MW-307	Frozen/obstructed	-		-	03/08/13	-
MW-309-150		MW-309-150		1137534	01/31/13	<6.46
MW-310-110		MW-310-110		1137535	02/01/13	<6.66
MW-321-151		MW-321-151		1137514	01/12/13	<6.20
MW-330-150		MW-330-150		1137535	02/01/13	<6.66J*
MW-331-150		MW-331-150		1137596	03/08/13	<6.74
Offsite Wells						
Water table groundwater monitoring zone						
MW-148A		MW-148A		1137505	01/02/13	194
MW-150A		MW-150A		1137513	01/10/13	82.9
MW-151A		MW-151A		1137513	01/10/13	57.0
MW-152A	Frozen/obstructed	-		-	02/14/13	-
MW-153A		MW-153A		1137513	01/10/13	30.8
MW-155A		MW-155A		1137513	01/10/13	13.2
MW-156A		MW-156A		1137513	01/10/13	51.3
MW-156A		MW-256A	DUP	1137513	01/10/13	51.4
MW-157A		MW-157A		1137552	02/12/13	65.5
MW-157A		MW-257A	DUP	1137552	02/12/13	68.8
MW-158A		MW-158A		1137552	02/12/13	87.4
MW-159A		MW-159A		1137552	02/12/13	29.3
MW-161A		MW-161A		1137505	01/02/13	210
MW-161A		MW-261A	DUP	1137505	01/02/13	224
MW-162A		MW-162A		1137507	01/04/13	56.9
MW-163A		MW-163A		1137507	01/04/13	36.5
MW-164A		MW-164A		1137505	01/02/13	78.2
MW-165A		MW-165A		1137556	02/13/13	<6.60
MW-166A	Frozen/obstructed	-		-	01/31/13	-
MW-167A		MW-167A		1137505	01/02/13	4.24J
MW-168A		MW-168A		1137505	01/02/13	11.1
MW-169A		MW-169A		1137536	02/01/13	<6.20

Table 4-7
Sulfolane Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-169A		MW-269A	DUP	1137536	02/01/13	<6.40
MW-170A		MW-170A		1137557	02/14/13	<6.20
MW-171A		MW-171A		1137556	02/13/13	<6.74
MW-172A		MW-172A		1137558	02/15/13	<6.20
MW-181A		MW-181A		1137558	02/14/13	<6.40
MW-182A		MW-182A		1137505	01/02/13	22.3
MW-183A	Frozen with datalogger	-		-	01/24/13	-
MW-185A		MW-185A		1137505	01/03/13	3.37J
MW-187		MW-187		1137536	02/01/13	4.89J
MW-187		MW-287	DUP	1137536	02/01/13	5.11J
MW-189A	Frozen/obstructed	-		-	01/02/13	-
MW-190A		MW-190A		1137558	02/14/13	<6.52
MW-191A		MW-191A		1137558	02/14/13	<6.46
MW-193A		MW-193A		1137536	02/01/13	5.30J
MW-194A		MW-194A		1137533	01/31/13	16.0
MW-194A		MW-294A	DUP	1137533	01/31/13	15.8
MW-308-15		MW-308-15		1137533	01/31/13	8.96J
MW-308-15		MW-408-15	DUP	1137533	01/31/13	9.61J
MW-311-15		MW-311-15		1137573	02/28/13	<6.46
MW-314-15		MW-314-15		1137558	02/15/13	<6.20
MW-316-15		MW-316-15		1137557	02/14/13	4.39J
MW-317-15	Frozen/obstructed	-		-	02/15/13	-
MW-318-20		MW-318-20		1137558	02/15/13	<6.66
MW-322-15		MW-322-15		1137573	02/28/13	<6.52
MW-323-15		MW-323-15		1137536	02/01/13	<6.40
MW-325-18		MW-325-18		1137573	02/28/13	<6.20
MW-328-15		MW-328-15		1137573	02/28/13	<6.20
MW-329-15		MW-329-15		1137507	01/06/13	86.2
MW-332-15		MW-332-15		1137505	01/02/13	<6.60
10-55 feet below water table groundwater monitoring zone						
MW-148B		MW-148B		1137514	01/12/13	174
MW-148C		MW-148C		1137513	01/10/13	102
MW-150B		MW-150B		1137556	02/13/13	46.9
MW-150B		MW-250B	DUP	1137556	02/13/13	40.6
MW-150C		MW-150C		1137556	02/13/13	12.9
MW-151B		MW-151B		1137513	01/10/13	43.7
MW-151B		MW-251B	DUP	1137513	01/10/13	45.1
MW-151C		MW-151C		1137513	01/10/13	27.7
MW-152B		MW-152B		1137557	02/14/13	77.0
MW-152B		MW-252B	DUP	1137557	02/14/13	78.0
MW-152C		MW-152C		1137557	02/14/13	31.5
MW-153B		MW-153B		1137505	01/03/13	28.5
MW-155B		MW-155B		1137513	01/10/13	<6.20
MW-156B		MW-156B		1137513	01/10/13	34.7
MW-157B		MW-157B		1137552	02/12/13	65.5
MW-158B		MW-158B		1137513	01/10/13	86.3
MW-159B		MW-159B		1137552	02/12/13	71.5
MW-161B		MW-161B		1137505	01/02/13	276
MW-162B		MW-162B		1137507	01/04/13	74.1
MW-163B		MW-163B		1137507	01/04/13	32.8
MW-163B		MW-263B	DUP	1137507	01/04/13	32.3
MW-164B		MW-164B		1137505	01/02/13	98.1
MW-164C		MW-164C		1137505	01/02/13	101
MW-165B	Monument full of ice	-		-	02/13/13	-
MW-166B		MW-166B		1137533	01/31/13	35.5
MW-166B		MW-266B	DUP	1137533	01/31/13	34.1
MW-167B		MW-167B		1137505	01/02/13	10.5
MW-168B		MW-168B		1137505	01/02/13	14.8
MW-169C		MW-169C		1137536	02/01/13	3.64J
MW-170D		MW-170D		1137557	02/13/13	<6.20
MW-171B		MW-171B		1137556	02/13/13	<6.66
MW-181B		MW-181B		1137558	02/14/13	<6.20

Table 4-7
Sulfolane Analytical Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-182B		MW-182B		1137505	01/02/13	25.5
MW-183B	Frozen/obstructed	-		-	03/05/13	-
MW-184		MW-184		1137573	02/28/13	<6.52
MW-185B		MW-185B		1137505	01/03/13	8.89J
MW-189B	Frozen/obstructed	-		-	01/02/13	-
MW-191B		MW-191B		1137558	02/14/13	<6.20
MW-193B		MW-193B		1137536	02/01/13	<6.20
MW-194B		MW-194B		1137533	01/31/13	68.4
MW-194B		MW-294B	DUP	1137533	01/31/13	67.4
MW-308-30	Frozen/obstructed	-		-	01/31/13	-
MW-311-46	Monument full of ice	-		-	02/28/13	-
MW-316-56		MW-316-56		1137557	02/14/13	<6.20
MW-323-61		MW-323-61		1137536	02/01/13	<6.20
MW-329-66		MW-329-66		1137507	01/06/13	102
MW-335-41		MW-335-41		1137505	01/02/13	<6.74
55-90 feet below water table groundwater monitoring zone						
MW-159C		MW-159C		1137552	02/12/13	70.3
MW-159C		MW-259C	DUP	1137552	02/12/13	70.6
MW-160B		MW-160B		1137507	01/04/13	82.0
MW-170B		MW-170B		1137557	02/13/13	<6.52
MW-317-71	Frozen/obstructed	-		-	02/15/13	-
90-160 feet below water table groundwater monitoring zone						
MW-148D		MW-148D		1137513	01/10/13	<6.52
MW-170C		MW-170C		1137557	02/14/13	<6.46
MW-172B		MW-172B		1137558	02/15/13	<6.20
MW-181C		MW-181C		1137572	03/02/13	<6.74
MW-185C		MW-185C		1137505	01/03/13	<6.46
MW-314-150		MW-314-150		1137558	02/15/13	<6.52
MW-318-135		MW-318-135		1137558	02/15/13	<6.20
MW-322-150		MW-322-150		1137573	03/01/13	<6.20
MW-325-150		MW-325-150		1137573	02/28/13	<6.20
MW-328-151		MW-328-151		1137573	03/01/13	<6.20
MW-332-150		MW-332-150		1137505	01/02/13	208

Notes:

**For purposes of this First Quarter 2013 Groundwater Monitoring Report (Report), FHRA has used the 14 µg/L alternative cleanup level (ACL) referenced by the ADEC in its July 19, 2012 letter (ADEC 2012). This Report is submitted subject to the positions and reservations expressed by FHRA in its August 20, 2012 letter (FHRA 2012).

USEPA	United States Environmental Protection Agency
FHRA	Flint Hills Resources Alaska, LLC
ADEC	Alaska Department of Environmental Conservation
SWI	Shannon & Wilson, Inc.
µg/L	micrograms per liter
DUP	Field-duplicate sample
J	Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)
J*	Result is considered estimated (no direction of bias), due to QC failures (flag applied by SWI)
JL*	Result is considered estimated, biased low, due to QC failures (flag applied by SWI)
<	Not detected; limit of detection (LOD) listed

Comments:

Frozen/Obstructed	Well was frozen or had obstruction in casing; no sample collected

Table 4-8
Sulfolane Analytical Results - Vertical Profiling Transect
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-301-CMT-10		MW-301-CMT-10		1137527	01/22/13	<6.66
MW-301-CMT-20		MW-301-CMT-20		1137527	01/22/13	<6.46
MW-301-CMT-30		MW-301-CMT-30		1137527	01/22/13	<6.52
MW-301-CMT-40		MW-301-CMT-40		1137528	01/22/13	<6.46
MW-301-CMT-50		MW-301-CMT-50		1137528	01/22/13	3.89J
MW-301-60		MW-301-60		1137519	01/14/13	4.64J
MW-301-70		MW-301-70		1137519	01/15/13	4.31JL*
MW-302-CMT-10		MW-302-CMT-10		1137527	01/22/13	56.6
MW-302-CMT-20		MW-302-CMT-20		1137528	01/22/13	61.0
MW-302-CMT-30		MW-302-CMT-30		1137528	01/22/13	52.3
MW-302-CMT-40		MW-302-CMT-40		1137528	01/22/13	17.4
MW-302-CMT-50		MW-302-CMT-50		1137528	01/22/13	20.5
MW-302-70		MW-302-70		1137527	01/22/13	20.7
MW-302-70		MW-402-70	DUP	1137528	01/22/13	21.6
MW-302-80		MW-302-80		1137528	01/21/13	18.0
MW-302-80		MW-402-80	DUP	1137528	01/21/13	18.0
MW-302-95		MW-302-95		1137528	01/21/13	<6.46
MW-302-110		MW-302-110		1137528	01/21/13	<6.32
MW-303-CMT-9		MW-303-CMT-9		1137528	01/21/13	9.56J
MW-303-CMT-19		MW-303-CMT-19		1137528	01/21/13	69.9
MW-303-CMT-29		MW-303-CMT-29		1137528	01/21/13	37.6
MW-303-CMT-39		MW-303-CMT-39		1137528	01/21/13	21.9
MW-303-CMT-49		MW-303-CMT-49		1137528	01/21/13	17.1
MW-303-CMT-59		MW-303-CMT-59		1137528	01/21/13	12.2
MW-303-70		MW-303-70		1137527	01/21/13	6.64J
MW-303-80		MW-303-80		1137527	01/21/13	<6.20
MW-303-95		MW-303-95		1137528	01/21/13	<6.20
MW-303-130		MW-303-130		1137528	01/21/13	<7.04
MW-304-CMT-10	Frozen/obstructed	-		-	01/31/13	-
MW-304-15		MW-304-15		1137519	01/14/13	337
MW-304-CMT-20		MW-304-CMT-20		1137534	01/31/13	3.45J
MW-304-CMT-30		MW-304-CMT-30		1137534	01/31/13	81.9
MW-304-CMT-40		MW-304-CMT-40		1137534	01/31/13	67.1
MW-304-CMT-50		MW-304-CMT-50		1137534	01/31/13	10.8
MW-304-CMT-60		MW-304-CMT-60		1137534	01/31/13	5.43J
MW-304-70		MW-304-70		1137527	01/22/13	4.47J
MW-304-80		MW-304-80		1137519	01/14/13	4.68J
MW-304-96		MW-304-96		1137519	01/14/13	5.05J
MW-304-125		MW-304-125		1137519	01/14/13	<6.74
MW-304-150		MW-304-150		1137527	01/22/13	<6.52
MW-305-CMT-8	Frozen/obstructed	-		-	01/17/13	-
MW-305-CMT-18		MW-305-CMT-18		1137522	01/17/13	8.98J
MW-305-CMT-28		MW-305-CMT-28		1137522	01/17/13	14.0
MW-305-CMT-38		MW-305-CMT-38		1137522	01/17/13	<6.40
MW-305-CMT-48		MW-305-CMT-48		1137522	01/17/13	<6.52
MW-305-CMT-58		MW-305-CMT-58		1137522	01/17/13	<6.40
MW-305-70		MW-305-70		1137519	01/15/13	<6.20

Table 4-8
Sulfolane Analytical Results - Vertical Profiling Transect
North Pole Refinery
Flint Hills Resources Alaska, LLC

Analysis Method						Sulfolane-USEPA1625B with Isotope Dilution
Location	**Comments**	**Sample**	**Dup**	**Work Order**	**Collect Date**	**Sulfolane Result µg/L**
ADEC ACL**						**14 µg/L**
MW-305-80		MW-305-80		1137519	01/15/13	<6.20
MW-305-100		MW-305-100		1137535	02/01/13	<6.20
MW-306-CMT-10		MW-306-CMT-10		1137550	02/11/13	<6.66
MW-306-15		MW-306-15		1137535	02/02/13	<6.46
MW-306-CMT-20		MW-306-CMT-20		1137550	02/11/13	<6.66
MW-306-CMT-30		MW-306-CMT-30		1137550	02/11/13	<6.66
MW-306-CMT-40		MW-306-CMT-40		1137550	02/11/13	<6.20
MW-306-CMT-50		MW-306-CMT-50		1137550	02/11/13	<6.66
MW-306-CMT-60		MW-306-CMT-60		1137550	02/11/13	<6.74
MW-306-70		MW-306-70		1137535	02/02/13	<6.60
MW-306-80		MW-306-80		1137535	02/02/13	<6.88
MW-306-100		MW-306-100		1137535	02/02/13	<6.74
MW-306-150		MW-306-150		1137596	03/08/13	<6.52

Notes:

**For purposes of this First Quarter 2013 Groundwater Monitoring Report (Report), FHRA has used the 14 µg/L alternative cleanup level (ACL) referenced by the ADEC in its July 19, 2012 letter (ADEC 2012). This Report is submitted subject to the positions and reservations expressed by FHRA in its August 20, 2012 letter (FHRA 2012).

USEPA	United States Environmental Protection Agency
FHRA	Flint Hills Resources Alaska, LLC
ADEC	Alaska Department of Environmental Conservation
SWI	Shannon & Wilson, Inc.
µg/L	micrograms per liter
DUP	Field-duplicate sample
J	Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)
JL*	Result is considered estimated, biased low, due to QC failures (flag applied by SWI)
<	Not detected; limit of detection (LOD) listed

Comments:

Frozen/obstructed	Well was frozen or had obstruction in casing; no sample collected

Table 4-9
Sulfolane Mass Flux Results
North Pole Refinery
Flint Hills Resources Alaska, LLC

VPT Well Cluster	Approximate Depth (feet BGS / feet BWT)	Mass Flux (g/day)	Approximate Percent of Total Mass Flux
November 2011 Total Mass Flux = 86 g/day			
MW-302	8 (Water table) to 60 / 0 to 52	16.8	20%
MW-303	22 to 35 / 13 to 26	7.39	9%
MW-304	11 (Water table) to 60 / 0 to 49	40.63	47%
MW-305	9 (Water table) to 34 / 0 to 25	9.30	11%
First Quarter 2012 Total Mass Flux = 62 g/day			
MW-302	11 (Water table) to 90 / 0 to 79	22.54	36%
MW-303	22 to 35 / 13 to 26	5.29	9%
MW-304	14 (Water table) to 35 / 0 to 11	18.17	29%
MW-305	13 (Water table) to 34 / 0 to 21	5.48	9%
Second Quarter 2012 Total Mass Flux = 83 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	16.36	20%
MW-303	22 to 35 / 13 to 26	5.34	6%
MW-304	13 (Water table) to 60 / 0 to 47	46.99	57%
MW-305	12 (Water table) to 22 / 0 to 10	4.63	6%
Third Quarter 2012 Total Mass Flux = 73 g/day			
MW-302	9 (Water table) to 90 / 0 to 81	22.11	30%
MW-303	22 to 35 / 13 to 26	3.55	5%
MW-304	12 (Water table) to 60 / 0 to 48	37.21	51%
MW-305	11 (Water table) to 34 / 0 to 23	3.75	5%
First Quarter 2013 Total Mass Flux = 43 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	16.70	39%
MW-303	18 to 42 / 7 to 31	4.53	11%
MW-304	13 (Water table) to 42 / 0 to 29	14.32	33%

Notes:

VPT	Vertical Profiling Transect
BGS	below ground surface
BWT	below water table
g/day	grams per day

Table 4-10
Residential Well Sulfolane Results
Initial Sampling Event
North Pole Refinery
Flint Hills Resources Alaska, LLC

Collection Date	Sulfolane Results µg/L	Sample Type	Laboratory WO #
2/12/2013	<6.74	PS	1137549
3/18/2013	<6.52	PS	1137611
3/18/2013	<6.20	DUP	1137611
2/5/2013	<6.60	PS	1137538
2/26/2013	<6.46	PS	1137569
3/4/2013	<6.60	PS	1137574
2/1/2013	<6.66	PS	1137537

Notes:

The samples tabulated above were collected per FHRA direction.
Wells listed in this table were analyzed using USEPA Method 1625 with isotope dilution.

FHRA	Flint Hills Resources Alaska, LLC
USEPA	United States Environmental Protection Agency
< LOD	Non-detect results are presented as < LOD (Limit of Detection)
µg/L	Micrograms per liter
WO #	Work order number
PS	Project Sample
DUP	Duplicate

Table 4-11
Groundwater Analytical Results - Deep Residential Wells
North Pole Refinery
Flint Hills Resources Alaska, LLC

Deep Residential Monitoring Location	Well Depth (ft bgs)	Sample Date	Sample Type	Sulfolane	Alkalinity	CO_3 Alkalinity	HCO_3 Alkalinity	OH Alkalinity	Ammonia as N	Calcium	Chloride	Dissolved Iron	Total Iron
				µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
217	238	03/11/2013		173	157	<6.20	157	<6.20	<0.0620	46.5	11.0	4.96	12.7
259	287	04/04/2013		<6.74	132	<6.20	132	<6.20	0.245	37.2	1.47	5.41	5.57
296	220	03/21/2013		11.9	155	<6.20	155	<6.20	0.0951J	44.8	3.12	6.44	6.59
297	24	03/21/2013		9.12J	172	<6.20	172	<6.20	0.217	52.3	7.20	2.52	2.46
332	266	04/19/2013		<6.66J§	150J§	<6.20J§	150J§	<6.20J§	0.0994J§	<0.300J§	1.05J§	<0.156J§	0.192J§
358	105	03/25/2013		73.8	113	<6.20	113	<6.20	0.181	39.5	3.90	4.22	8.00
463	89	04/04/2013		27.9	124	<6.20	124	<6.20	0.207	41.6	3.57	1.70	1.77
464	98	03/28/2013		40.3	126	<6.20	126	<6.20	0.0459J	41.4	4.07	1.16	2.17
466	122	04/18/2013	DUP	23.9	162	<6.20	162	<6.20	0.176	51.6	6.13	2.86	2.97
466	122	04/18/2013		23.1	159	<6.20	159	<6.20	0.186	51.0	6.28	2.84	3.00
658	196	03/18/2013		48.4	169	<6.20	169	<6.20	0.139	48.4	7.40	6.92	9.25
932	255	03/20/2013		5.09J	139	<6.20	139	<6.20	<0.124B*	46.1	2.93	5.54	7.01
943	120	03/12/2013		25.7	167	<6.20	167	<6.20	0.157	47.8	6.62	12.3	15.6
972	236	03/17/2013		<6.74	121	<6.20	121	<6.20	0.0724J	36.5	2.67	4.10	4.06
1099	140	03/12/2013	DUP	105	124	<6.20	124	<6.20	0.105	39.6	3.18	3.01	3.52
1099	140	03/12/2013		107	123	<6.20	123	<6.20	0.0997J	38.6	3.20	3.14	3.42
1109	305	03/13/2013		24.6	266	<6.20	266	<6.20	0.243	69.8	55.9	6.43	6.57
1155	215	03/18/2013		162	155	<6.20	155	<6.20	0.144	48.0	6.89	8.27	8.74
1230	231	03/11/2013		558	134	<6.20	134	<6.20	0.289	41.8	12.4	3.88	37.2
1230†	231	03/28/2013	DUP	497	--	--	--	--	--	--	--	--	--
1230†	231	03/28/2013		517	--	--	--	--	--	--	--	--	--
1343	94	03/20/2013		<6.66	202	<6.20	202	<6.20	<0.100B*	66.3	23.7	1.62	2.08

Notes:

DUP	Duplicate
ft	feet
bgs	below ground surface
J	Result is estimated; analyte was detected below the limit of quantitation (LOQ).
J*	Result is considered an estimate; flag applied by SWI based on sample-handling or analytical QC issues, see data-review checklist for details
JL*	Result is considered an estimate, bias-low; flag applied by SWI based on sample-handling or analytical QC issues. See data-review checklist for details
B*	Result is considered non-detect and flagged due to a method blank detection. See data-review checklist for details
J§	Result potentially biased; pending flag. Sample results indicate sample location may have been downstream of a water-treatment system. The sample location will be examined during the second quarter sampling and the flag finalized, if applicable.
µg/L	micrograms per liter
mg/L	milligrams per liter
CO_3	carbonate
HCO_3	bicarbonate
OH	hydroxide
N	nitrogen
†	Location was resampled to verify sulfolane results from the sample collected on 3/11/2013.
<	analyte not detected; limit of detection listed
--	Analysis not requested

Table 4-11
Groundwater Analytical Results - Deep Residential Wells
North Pole Refinery
Flint Hills Resources Alaska, LLC

Deep Residential Monitoring Location	Well Depth (ft bgs)	Sample Date	Sample Type	Dissolved Manganese	Total Manganese	Magnesium	Methane	Nitrate	Nitrite	Potassium	Sodium	Sulfate	Total Organic Carbon
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
217	238	03/11/2013		0.830	0.862	11.0	0.11	<0.0620	0.0930J	4.10	10.2	23.7	2.65
259	287	04/04/2013		0.815	0.849	8.86	0.025	0.0620JL*	0.0595JL*	2.90	4.18	16.9	2.33
296	220	03/21/2013		0.624	0.620	9.95	0.059	0.0590J	<0.0620	3.08	4.17	22.2	2.39
297	24	03/21/2013		1.47	1.43	12.7	0.069	0.0620J	<0.0620	3.95	7.77	24.3	3.41
332	266	04/19/2013		0.000477J§	0.000949J§	<0.0300J§	0.080§	<0.0620J§	0.0645J§	<0.300J§	77.7J§	15.8J§	1.18J§
358	105	03/25/2013		0.433	0.610	8.88	0.019	0.0570J	0.0530J	3.05	4.17	23.3	3.70
463	89	04/04/2013		0.647	0.638	9.09	0.020	<0.0620	0.0510J	3.09	4.52	29.4	1.41
464	98	03/28/2013		0.581	0.592	9.17	0.031	0.0560J	0.0520J	3.02	4.41	28.5	1.57
466	122	04/18/2013	DUP	0.749	0.765	11.5	0.061	<0.0620	<0.0620	3.41	4.69	26.0	2.85
466	122	04/18/2013		0.738	0.753	11.0	0.078	0.0440J	<0.0620	3.34	4.43	26.4	2.95
658	196	03/18/2013		0.673	0.693	12.1	0.089	0.0610J	<0.0620	3.65	4.49	15.2	3.43
932	255	03/20/2013		0.543	0.554	9.95	0.044	0.0560J	<0.0620	3.37	4.48	23.0	1.90
943	120	03/12/2013		1.08	1.06	13.2	0.0090	0.0750J	<0.100B*	3.33	4.86	20.6	4.13
972	236	03/17/2013		0.880	0.838	10.6	0.011	0.0600J	<0.0620	2.97	4.25	30.9	1.51
1099	140	03/12/2013	DUP	0.737	0.762	11.2	0.010J*	0.0630J	<0.0620	2.98	4.24	31.6	1.75
1099	140	03/12/2013		0.740	0.734	11.0	0.074J*	0.0670J	<0.0620	2.92	4.16	31.7	1.73
1109	305	03/13/2013		1.80	1.82	22.7	0.30	<0.110B*	0.314J*	5.70	30.0	13.4	5.39
1155	215	03/18/2013		0.651	0.660	11.4	0.15	0.0610J	<0.0620	3.66	6.18	28.7	2.68
1230	231	03/11/2013		0.862	1.06	11.8	1.4	<0.0620	0.122	3.10	4.73	18.2	1.81
1230†	231	03/28/2013	DUP	--	--	--	--	--	--	--	--	--	--
1230†	231	03/28/2013		--	--	--	--	--	--	--	--	--	--
1343	94	03/20/2013		0.272	0.301	14.9	0.049	<0.100J*	0.0890J*	3.94	10.6	17.7	2.51

Notes:

DUP	Duplicate
ft	feet
bgs	below ground surface
J	Result is estimated; analyte was detected below the limit of quantitation (LOQ).
J*	Result is considered an estimate; flag applied by SWI based on sample-handling or analytical QC issues, see data-review checklist for details
JL*	Result is considered an estimate, bias-low; flag applied by SWI based on sample-handling or analytical QC issues. See data-review checklist for details
B*	Result is considered non-detect and flagged due to a method blank detection. See data-review checklist for details
J§	Result potentially biased; pending flag. Sample results indicate sample location may have been downstream of a water-treatment system. The sample location will be examined during the second quarter sampling and the flag finalized, if applicable.
µg/L	micrograms per liter
mg/L	milligrams per liter
CO_3	carbonate
HCO_3	bicarbonate
OH	hydroxide
N	nitrogen
†	Location was resampled to verify sulfolane results from the sample collected on 3/11/2013.
<	analyte not detected; limit of detection listed
--	Analysis not requested

Table 4-12
Sulfolane Analytical Results - Second Sampling Event
North Pole Refinery
Flint Hills Resources Alaska, LLC

			Initial Sampling Event				*Second Sampling Event*			
Location Name	**Comments**	**Sample Name**	**Dup**	**Work Order**	**Sample Date**	**Sulfolane-USEPA1625B w/Iso Dil-W µg/L**	**Dup**	**Work Order**	**Sample Date**	**Sulfolane-USEPA1625B w/Iso Dil-W µg/L**
ADEC ACL**						**14 µg/L**				**14 µg/L**
Onsite Wells										
Water table groundwater monitoring zone										
MW-142		MW-142		1137508	01/06/13	248		1137581	03/06/13	235
MW-142		MW-242		--	--	--	DUP	1137581	03/06/13	227
Offsite Wells										
Water table groundwater monitoring zone										
MW-148A		MW-148A		1137505	01/02/13	194		1137571	03/02/13	180
MW-161A		MW-161A		1137505	01/02/13	210		1137571	03/02/13	225
MW-161A		MW-261A	DUP	1137505	01/02/13	224		--	--	--
MW-162A		MW-162A		1137507	01/04/13	56.9		1137571	03/01/13	44.2
MW-163A		MW-163A		1137507	01/04/13	36.5		1137579	03/05/13	19.9
MW-164A		MW-164A		1137505	01/02/13	78.2		1137571	03/01/13	88.8
MW-166A	Frozen/obstructed	-		--	01/31/13	--		-	3/21/2013	-
MW-167A		MW-167A		1137505	01/02/13	4.24J		1137571	03/01/13	5.87J
MW-182A		MW-182A		1137505	01/02/13	22.3		1137575	03/04/13	25.5
MW-183A	Frozen with datalogger	-		--	01/24/13	--		-	3/5/2013	-
MW-187		MW-187		1137536	02/01/13	4.89J		1137628	03/21/13	4.95J
MW-187		MW-287	DUP	1137536	02/01/13	5.11J		--	--	--
MW-194A		MW-194A		1137533	01/31/13	16.0		1137628	3/20/2013	25.3
MW-194A		MW-294A	DUP	1137533	01/31/13	15.8		--	--	--
MW-308-15		MW-308-15		1137533	01/31/13	8.96J		1137628	03/21/13	8.23J
MW-308-15		MW-408-15	DUP	1137533	01/31/13	9.61J		--	--	--
MW-329-15		MW-329-15		1137507	01/06/13	86.2		1137575	03/04/13	89.1
10-55 feet below water table groundwater monitoring zone										
MW-153B		MW-153B		1137505	01/03/13	28.5		1137571	03/01/13	29.4
MW-153B		MW-253B		--	--	--	DUP	1137571	03/01/13	29.1
MW-161B		MW-161B		1137505	01/02/13	276		1137571	03/02/13	282
MW-162B		MW-162B		1137507	01/04/13	74.1		1137571	03/01/13	70.8
MW-162B		MW-262B		--	--	--	DUP	1137571	03/01/13	66.4
MW-163B		MW-163B		1137507	01/04/13	32.8		1137579	03/05/13	27.4
MW-163B			DUP	1137507	01/04/13	32.3		--	--	--
MW-164B		MW-164B		1137505	01/02/13	98.1		1137571	03/01/13	93.1
MW-164C		MW-164C		1137505	01/02/13	101		1137571	03/01/13	94.3
MW-166B	Frozen/obstructed during March sampling event	-		1137533	01/31/13	35.5		-	3/21/2013	-
MW-166B		MW-266B	DUP	1137533	01/31/13	34.1				
MW-167B		MW-167B		1137505	01/02/13	10.5		1137571	03/01/13	11.1
MW-182B		MW-182B		1137505	01/02/13	25.5		1137575	03/04/13	24.1
MW-183B	Frozen/obstructed	-		--	--	--		-	3/5/2013	-
MW-194B		MW-194B		1137533	01/31/13	68.4		1137628	3/20/2013	79.0
MW-194B		MW-294B	DUP	1137533	01/31/13	67.4		--	--	--
MW-308-30	Frozen/obstructed	-		--	01/31/13	--		-	03/21/13	-
MW-329-66		MW-329-66		1137507	01/06/13	102		1137575	03/04/13	94.0
90-160 feet below water table groundwater monitoring zone										
MW-332-150		MW-332-150		1137505	01/02/13	208		1137581	03/06/13	202

Notes:

**For purposes of this First Quarter 2013 Groundwater Monitoring Report (Report), FHRA has used the 14 µg/L alternative cleanup level (ACL) referenced by the ADEC in its July 19, 2012 letter (ADEC 2012). This Report is submitted subject to the positions and reservations expressed by FHRA in its August 20, 2012 letter (FHRA 2012).

USEPA	United States Environmental Protection Agency
FHRA	Flint Hills Resources Alaska, LLC
ADEC	Alaska Department of Environmental Conservation
µg/L	milligrams per liter
DUP	Field-duplicate sample
J	Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)
<	Not detected; limit of detection (LOD) listed
*	The second sampling event was requested by the Alaska Department of Environmental Conservation

Comments:

Frozen/obstructed	Well was frozen or had obstruction in casing; no sample collected

Table 4-13
COPC Analytical Results - Iron
North Pole Refinery
Flint Hills Resources Alaska, LLC

Location Name	Comments	Sample Name	Work Order	Sample Date	USEPA 200.8 Iron
					mg/L
ADEC Groundwater Cleanup Level					**11 mg/L[a]**
Onsite Wells					
Water table groundwater monitoring zone					
MW-149A	see notes	MW-149A	1137513	01/10/13	1.16
Offsite Wells					
Water table groundwater monitoring zone					
MW-148A	see notes	MW-148A	1137507	01/02/13	9.99
MW-153A	see notes	MW-153A	1137513	01/10/13	0.0957J

Notes:

These wells were inadvertently sampled for iron during the reporting period. Moving forward, COPC sampling will consist of iron, GRO, and DRO analysis and samples will be collected annually, during the second quarter.

COPC	Constituent of potential concern
USEPA	United States Environmental Protection Agency
ADEC	Alaska Department of Environmental Conservation
mg/L	milligrams per liter
J	Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)
a	USEPA Regions 3, 6, and 9. (Updated November 2011). Regional Screening Levels for Chemical Contaminants at Superfund Sites.

Table 4-14
Analytical Data and Field Data Summary
Air Sparge Pilot System
North Pole Refinery
Flint Hills Resources Alaska, LLC

		Lab Data						Field Data					
		Sulfolane (µg/L)	Fe (µg/L)	Mn (µg/L)	TOC (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	DO (mg/L)	Temp. (°C)	ORP (mV)	pH	Conductivity (µS/cm)	Water Elevation (ft)
AS-MW-1	Week 46 (1/24/13)	<6.20 J*	<156 J*	0.995 J*	2.18 J*	<0.620	0.455	6.62	3.6	186.4	6.77	234.4	485.12
AS-MW-2	Week 46 (1/24/13)	<6.60	289	2.55	3.06	0.492 J	<0.0100B*	9.97	3.9	190.4	7.21	272.5	484.63
AS-MW-3	Week 46 (1/24/13)	<6.20	305 J*	490 J*	2.85	0.428 J	0.0355	0.78	3.1	95.2	6.61	431.0	484.76
AS-MW-4	Week 46 (1/24/13)	<6.20J*	<156	31.5	4.40	0.405 J	<0.00620	5.76	3.8	206.7	6.76	366.8	485
AS-MW-5	Week 46 (1/24/13)	<6.74	156	0.848 J	2.76	0.340 J	<0.00620	13.56	4.2	233.7	7.42	319.4	485.07
AS-MW-6	Week 46 (1/24/13)	<6.20	<156	0.676 J	3.37	0.530 J	0.337	13.84	4.0	85.1	7.74	318.0	485.15
AS-MW-7	Week 46 (1/24/13)	<6.52	<156	0.803 J	2.74	0.474 J	<0.00620	12.73	3.8	249.9	7.79	230	484.95
AS-MW-8	Week 46 (1/24/13)	26.4	<156	395	2.36	0.333 J	<0.00620	0.57	3.7	274.1	7.07	273.2	Not measured
AS-MW-8	Week 46 (1/24/13) - Duplicate	28.4	<156	369	2.34	<0.620	<0.00620	0.57	3.7	274.1	7.07	273.2	Not measured

Notes:

Fe	Iron
Mn	Manganese
TOC	Total Organic Carbon
TKN	Total Kjeldahl Nitrogen
DO	Dissolved oxygen
Temp.	Temperature
ORP	Oxidation-Reduction Potential
µg/L	micrograms per liter
mg/L	milligrams per liter
µS/cm	microSiemens per centimeter
mV	millivolts
°C	degrees Celsius
ft	feet

Not measured	Water level could not be measured at AS-MW-8 due to an ice obstruction in the well casing.
J	Estimated concentration below the limit of quantitation
J*	Estimated concentration, qualified due to elevated field-duplicate
B*, B	Analyte considered not detected at listed reporting level due to method-blank contamination
<	Analyte not detected; limit of detection listed

Table 5-1
Remediation System Operation-Groundwater Recovery
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Monthly Total (gallons)	Monthly Average (gallons / day)	Monthly Average (gallons / minute)	Highest Daily Flow (gallons)	Lowest Daily Flow (gallons)
January 2009	5,637,292	181,848	126	223,719	160,077
February 2009	4,965,414	177,336	123	193,239	156,219
March 2009	5,673,504	183,016	127	197,544	161,158
April 2009	5,845,823	194,861	135	211,585	165,629
May 2009	6,430,915	207,449	144	213,643	195,151
June 2009	6,229,883	207,663	144	232,475	191,543
July 2009	6,316,965	203,773	142	243,049	176,412
August 2009	6,243,319	201,397	140	358,591	24,712
September 2009	10,634,423	354,481	246	376,819	291,904
October 2009	5,114,811	164,994	115	374,175	0
November 2009	0	0	0	0	0
December 2009	6,153,173	198,489	138	285,246	0
January 2010	8,676,601	279,890	194	310,005	238,342
February 2010	9,185,582	328,057	228	349,341	280,463
March 2010	9,424,363	304,012	211	338,199	241,764
April 2010	9,914,262	330,475	229	375,313	283,315
May 2010	9,812,735	316,540	220	352,672	277,754
June 2010	9,282,464	309,415	215	380,474	223,718
July 2010	9,325,475	300,822	209	351,204	93,133
August 2010	9,872,250	318,460	221	356,560	212,790
September 2010	9,122,386	304,080	211	348,426	276,194
October 2010	7,700,526	248,404	173	322,996	731
November 2010	7,489,601	249,653	173	322,261	203,597
December 2010	7,279,463	234,821	163	290,275	206,455
January 2011	8,605,402	277,594	193	321,282	234,410
February 2011	7,409,928	264,640	184	291,111	196,712
March 2011	7,144,062	230,454	160	275,500	68,270
April 2011	8,034,008	267,800	186	286,026	227,154
May 2011	8,076,367	260,528	181	346,116	0
June 2011	9,735,245	324,508	225	405,251	223,585
July 2011	11,838,286	381,880	265	419,943	323,687
August 2011	12,119,042	390,937	271	553,937	0
September 2011	15,458,620	515,287	358	616,457	449,816
October 2011	15,492,362	499,754	347	575,331	406,852
November 2011	16,279,722	542,657	377	609,830	497,588
December 2011	16,711,381	539,077	374	566,868	515,920
January 2012	15,645,486	504,381	350	537,854	468,103
February 2012	15,936,577	515,987	358	551,895	486,254
March 2012	16,390,112	530,180	368	553,633	498,110
April 2012	16,010,934	514,711	357	538,278	477,932
May 2012	14,639,653	472,247	328	500,690	418,914
June 2012	14,109,044	451,769	314	527,289	409,056
July 2012	16,721,808	540,994	376	567,123	494,073
August 2012	16,256,379	523,831	364	560,732	476,469
September 2012	15,402,121	515,527	358	558,100	438,897
October 2012	16,377,507	527,101	366	558,528	502,787
November 2012	15,069,768	503,018	349	537,145	348,636
December 2012	15,740,566	507,135	352	539,894	470,343
January 2013	15,663,097	505,261	357	780,314	0
February 2013	14,380,130	513,576	323	557,487	370,088
March 2013	14,398,601	464,471	352	529,499	230,633

Table 5-2
Groundwater Recovery System
Sulfolane Mass Recovery
North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/6/2012	365.8	97.2	0.43
1/18/2012	354.0	104	0.44
2/1/2012	368.7	99	0.44
2/16/2012	373.4	101	0.45
3/5/2012	368.0	93.3	0.41
3/20/2012	373.6	92	0.41
4/5/2012	373.8	96.6	0.43
4/18/2012	343.6	80.5	0.33
5/4/2012	332.7	95.9	0.38
5/16/2012	337.4	102	0.41
6/5/2012	321.2	102	0.39
6/19/2012	284.1	117	0.40
7/17/2012	372.4	102	0.46
8/9/2012	371.5	103	0.46
9/13/2012	368.0	103	0.46
10/16/2012	362.6	90.2	0.39
11/13/2012	330.6	100	0.40
12/12/2012	361.7	94.7	0.41
1/15/2013	495.0	94.9	0.56
2/18/2013	361.7	85.4	0.37
3/12/2013	307.8	50.1	0.19
		2012 Average	0.42
		1Q 2013 Average	0.37

Notes:

*	As measured at the combined air stripper influent
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-3a
Groundwater Recovery System
Sulfolane Mass Recovery R-42

North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/17/2012	109	59.1	0.08
2/15/2012	117	69.8	0.10
3/19/2012	121	60.4	0.09
4/18/2012	119	65.6	0.09
5/16/2012	122	70.8	0.10
6/19/2012	119	61.8	0.09
7/17/2012	121	50.2	0.07
8/9/2012	120	57.4	0.08
9/13/2012	120	54.2	0.08
10/16/2012	120	52.6	0.08
11/13/2012	111	52.5	0.07
12/11/2012	120	50.4	0.07
1/15/2013	113†	47	0.06
2/18/2013	115	39.7	0.05
3/12/2013	114	43.5	0.06
		2012 Average	0.08
		1Q 2013 Average	0.06

Notes:

*	As measured at the combined air stripper influent
†	Flow estimated due to meter malfunction
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-3b
Groundwater Recovery System
Sulfolane Mass Recovery R-40

North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/17/2012	49	68.4	0.04
2/15/2012	50	69.2	0.04
3/19/2012	53	54.9	0.03
4/18/2012	52	48.6	0.03
5/16/2012	53	38.7	0.02
6/19/2012	50	39.4	0.02
7/17/2012	61	49.8	0.04
8/9/2012	60	47.8	0.03
9/13/2012	40	48.3	0.02
10/16/2012	49	50.9	0.03
11/13/2012	43	44.2	0.02
12/11/2012	53	40.7	0.03
1/15/2013	52	41.6	0.03
2/18/2013	50	39.1	0.02
3/12/2013	49	39.5	0.02
		2012 Average	0.03
		1Q 2013 Average	0.02

Notes:

*	As measured at the combined air stripper influent
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-3c
Groundwater Recovery System
Sulfolane Mass Recovery R-39

North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/17/2012	84	<6.2	0.00
2/15/2012	88	<6.52	0.00
3/19/2012	87	<6.2	0.00
4/18/2012	79	<6.2	0.00
5/16/2012	59	<6.2	0.00
6/19/2012	83	<6.2	0.00
7/17/2012	91	<6.46	0.00
8/9/2012	91	<6.2	0.00
9/13/2012	92	<6.60	0.00
10/16/2012	90	<6.20	0.00
11/13/2012	83	<6.20	0.00
12/11/2012	90	<6.40	0.00
1/15/2013	84	<6.52	0.00
2/18/2013	87	<6.40	0.00
3/12/2013	86	<6.52	0.00
		2012 Average	0.00
		1Q 2013 Average	0.00

Notes:

*	As measured at the combined air stripper influent
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-3d
Groundwater Recovery System
Sulfolane Mass Recovery R-35R

North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/17/2012	83	123	0.12
2/15/2012	87	127	0.13
3/19/2012	91	118	0.13
4/18/2012	89	110	0.12
5/16/2012	92	113	0.12
6/19/2012	87	112	0.12
7/17/2012	91	131	0.14
8/9/2012	92	131	0.14
9/13/2012	92	147	0.16
10/16/2012	89	121	0.13
11/13/2012	83	139	0.14
12/11/2012	89	125	0.13
1/15/2013	85	124	0.13
2/18/2013	86	124	0.13
3/12/2013	80	124	0.12
		2012 Average	0.13
		1Q 2013 Average	0.12

Notes:

*	As measured at the combined air stripper influent
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-3e
Groundwater Recovery System
Sulfolane Mass Recovery R-21

North Pole Refinery
Flint Hills Resources Alaska, LLC

Date	Groundwater Recovery (gpm)	Recovered Sulfolane Concentration (µg/L)*	Sulfolane Mass Recovery (lb/day)
1/17/2012	45	355	0.19
2/15/2012	42	413	0.21
3/19/2012	44	304	0.16
4/18/2012	41	315	0.16
5/16/2012	44	302	0.16
6/19/2012	46	268	0.15
7/17/2012	47	399	0.23
8/9/2012	45	441	0.24
9/13/2012	51	356	0.22
10/16/2012	48	344	0.20
11/13/2012	43	336	0.17
12/11/2012	46	314	0.17
1/15/2013	52	293	0.18
2/18/2013	55	267	0.18
3/12/2013	43	369	0.19
		2012 Average	0.19
		1Q 2013 Average	0.18

Notes:

*	As measured at the combined air stripper influent
gpm	gallons per minute
µg/L	micrograms per liter
lb/day	pounds per day

Table 5-4
First Quarter 2013 LNAPL Recovery
North Pole Refinery
Flint Hills Resources Alaska, LLC

All units in gallons

2013	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
MW-138	0	0	0										0
MW-176-A	2	0	2										4
MW-186-A	0	0	0										0
MW-334-15	0	0	9										9
O-wells	0.1	0	2										2.1
S-wells	0	0	2										2
R-14A	0	0	1										1
R-18	1	0	0										1
R-20-R	0	0	6										6
R-21	10	0	16										26
R-22	0	0	0										0
R-32	3	0	23										26
R-33	0	0	0										0
R-34	0	0	0										0
R-35-R	0	0	0										0
R-39	0	0	0										0
R-40	8	0	17										25
Coalescer	0	0	0										0
TOTAL	25	0	77	0	0	0	0	0	0	0	0	0	102

Note: This summary includes only product that has been recovered for recycling. Product that has been recovered but has not yet been removed from the storage tank for recycling is not included in the table.

Table 5-5
Annual LNAPL Recovery
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well ID	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 (through First Quarter)	Well Total (gallons)
R-1	3,243	1,165	340	218	60	35	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Removed July 2008						**5,086**
R-2	1,538	1,546	175	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3,299**
R-3	39	313	0	42	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**419**
R-4	412	430	110	148	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1,140**
R-5&5A	4,170	3,606	978	1,464	1,115	447	316	209	141	321	175	236	222	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**13,425**
R-6	25	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Removed October 2009					**80**
R-7 & 8	14,216	17,108	67	809	1,438	575	1,793	1,693	385	250	0	Removed																	**38,334**
R-9	11,011	22,378	744	479	385	510	1,036	565	106	71	23	25	29	12	0	0	0	0	0	0	0	0	0	5	2	0	0	0	**37,381**
R-10&10A	2,558	5,271	200	352	280	127	0	20	0	0	0	0	0	0	0	0	0	0	0	Removed May 2005									**8,808**
R-11	15,796	14,920	724	241	190	5	0	317	444	117	0	0	0	11	0	0	0	0	0	Removed May 2005									**32,765**
R-12	4,099	0	80	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4,230**
R-13	1,044	3,563	79	177	55	0	27	15	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5,022**
R-14&14A	4,664	773	125	341	344	48	116	182	96	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**6,813**
R-18	0	1,955	5,128	13	0	10	17	0	151	30	0	25	0	0	1	2	0	0	0	0	0	0	0	7	29	5	101	1	**7,474**
R-19	0	6,106	1,623	106	90	30	138	496	205	9	0	0	0	0	2	0	0	0	0	0	0	0	0	12	14	Removed August 2010			**8,831**
R-20/R-20R	0	5,165	28,603	46	281	2,443	2,193	1,131	296	69	123	112	88	115	33	56	16	0	94	46	100	87	49	50	48	34	144	6	**41,422**
R-21	0	4,859	46,028	767	422	175	370	5,993	6,621	1,441	2,154	1,118	3,364	737	314	207	112	303	786	1,225	157	6,489	2,799	92	2,403	2,254	629	26	**91,844**
R-22	0	0	411	136	45	101	775	34	0	64	26	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	**1,598**
R-23	0	210	147	0	0	15	7	183	71	33	12	5	0	0	0	0	0	0	0	Removed May 2005									**683**
R-24	0	1,070	109	30	0	30	18	254	156	5	40	0	0	0	0	0	0	0	0	Removed May 2005									**1,712**
R-25	0	435	44	20	30	70	91	227	177	62	40	62	5	0	21	0	0	0	0	Removed May 2005									**1,284**
R-26	0	0	26	73	157	149	79	57	47	13	12	2	0	0	0	0	0	0	0	Removed May 2005									**615**
R-27	0	460	477	120	305	124	68	25	55	26	0	9	54	11	3	0	0	0	0	Removed May 2005									**1,737**
R-28	0	35	14	10	78	0	48	40	0	7	0	0	0	0	0	0	0	0	0	Removed May 2005									**232**
R-29	0	0	6	0	0	0	0	40	21	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	0	**75**
R-30	0	0	10	0	0	0	0	0	26	21	0	14	5	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	**82**
R-31	0	2,255	3,452	269	110	350	316	340	343	20	52	85	110	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	**7,708**
R-32	0	7,360	5,498	394	543	1,089	1,242	1,074	1,642	555	118	315	602	141	18	56	0	0	0	0	0	0	0	55	318	25	453	26	**21,498**
R-33	0	0	162	47	290	685	19	112	50	0	25	22	0	0	0	0	0	0	0	0	0	0	0	12	0	10	0	0	**1,434**
R-34	0	0	201	1,216	4,922	2,734	4,208	3,177	5,923	3,077	508	193	200	407	190	5	155	110	502	327	913	201	0	11	43	4	46	0	**29,271**
R-35/R-35R	0	0	22	37	1,042	2,659	740	468	26	0	0	0	0	0	4	5	0	0	13	0	0	0	0	18	234	201	358	0	**5,827**
R-36	0	0	20	23	0	0	191	261	491	0	26	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1,016**
R-37	0	0	8	15	65	1,147	297	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1,532**
R-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
R-39	0	0	0	0	50	336	40	68	27	0	0	1,261	1,090	6	61	7	4	9	1	4	21	0	58	2	33	46	17	0	**3,141**
R-40	0	0	0	0	0	141	128	27	0	0	0	0	0	0	28	173	85	85	106	27	211	58	253	46	19	350	512	25	**2,248**
MW-138													Installed April 2001			0	0	76	352	469	365	367	187	321	216	144	286	0	**2,783**
MW-176-A																							Installed October 2010		0	0	4	4	**8**
MW-186-A																							Installed October 2010		0	0	1	0	**1**
MW-334-15																									Installed August 2012		11	9	**11**
S-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
S-27	0	0	0	0	0	0	0	0	0	0	340	0	0	2	1	0	4	0	0	Removed May 2005									**347**
S-28	0	0	0	0	0	0	0	0	0	0	44	0	0	0	1	3	1	0	0	Removed May 2005									**49**
S-33	0	0	0	0	0	4	0	0	0	28	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	**37**
S-34	0	0	0	0	0	0	0	0	0	0	38	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**43**
S-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	**53**
S-42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	**6**
S-43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
S-44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	**4**
S-45	0	0	0	0	0	0	0	0	0	0	0	Removed 1997																	**0**
S-46	0	0	0	0	0	0	0	0	0	0	50	21	0	Removed May 1999															**71**
S-47	0	0	0	0	0	0	0	0	0	0	92	9	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	**104**
S-48	0	0	0	0	0	0	0	0	0	0	225	44	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	**272**
S-49	0	0	0	0	0	0	0	0	0	0	450	401	181	38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1,071**
S-50	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	4	4	0	0	0	0	0	0	1	4	0	3	3	**27**
S-51	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	1	4	0	0	0	0	0	0	1	0	0	1	0	**72**
S-52	0	0	0	0	0	0	0	0	0	0	0	70	22	0	3	6	6	0	0	0	0	0	0	0	1	0	0	0	**108**
O-2																							Installed September 2010			176	0.1	0	**176**
O-10																								Installed September 2011			12	4	**12**
O-11																								Installed September 2011			0.6	0.1	**1**
O-13																								Installed September 2011			2	0	**2**
O-19																								Installed October 2011			0.3	0	**0**
O-27																								Installed November 2011			0.2	0.1	**0**
Coalescer																						Installed December 2009			264	355	38	0	**657**
Annual Total	**62,815**	**101,038**	**95,611**	**7,684**	**12,342**	**14,059**	**14,298**	**17,008**	**17,562**	**6,342**	**4,573**	**4,111**	**5,972**	**1,505**	**703**	**537**	**393**	**583**	**1,854**	**2,150**	**1,767**	**7,201**	**3,345**	**635**	**3,634**	**3,603**	**2,625**	**105**	**393,980**

Table 5-6
Remediation System Operation-Treatment System Performance
North Pole Refinery
Flint Hills Resources Alaska, LLC

Method / Analyte	Units	January 15, 2013																
		R-21	R-21 Duplicate	R-35R	R-39	R-40	R-42	Combined Influent	Air Stripper Effluent (A-Tower)	Air Stripper Effluent (A-Tower Duplicate)	Air Stripper Effluent (B-Tower)	Air Stripper Effluent (C-Tower)	Air Stripper Effluent (D-Tower)	Sand Filter Influent	GAC Vessel (A-Inlet)	GAC Vessel (A-Outlet)	Final Effluent	Percent Removal (%)
EPA 624 - Benzene, Toluene, Ethylbenzene, Xylenes																		
Benzene	µg/L	**59.9**	**60.4**	**18.9**	**21.7**	**187**	**5.88**	**34.7**	**0.360J**	**0.330J**	**0.720**	**0.340J**	**1.20J**	0.270J	<0.240	<0.240J*	<0.240J*	>99.3
Toluene	µg/L	**9.89**	**9.76**	**3.98**	**8.32**	**243**	**0.380J**	**4.51**	<0.620	<0.620	<0.620	<0.620	**3.90J**	<0.620	<0.620	<0.620J*	<0.620J*	>86.2
Ethylbenzene	µg/L	**22.9**	**23.2**	**17.1**	**7.07**	**43.6**	<0.620	**13.2**	<0.620	<0.620	<0.620	<0.620	<6.20	<0.620	<0.620	<0.620J*	<0.620J*	>95.3
P & M -Xylene	µg/L	**130**	**129**	**40.3**	**34.2**	**275**	<1.24	**47.8**	**0.710J**	**0.620J**	**1.25J**	**0.620J**	<12.4	<1.24	<1.24	<1.24J*	<1.24J*	>97.4
o-Xylene	µg/L	**16.1**	**16.2**	**6.63**	**11.1**	**57.6**	<0.620	**10.4**	**0.350J**	**0.330J**	**0.540J**	<0.620	<6.20	<0.620	<0.620	<0.620J*	<0.620J*	>94.0
Total Xylenes	µg/L	**146***	**145***	**46.9***	**45.3***	**333***	<1.86*	**58.2***	**1.06J***	**0.950J***	**1.79J***	<1.24J*	<18.6*	<1.86*	<1.86*	<1.86J**	<1.86J**	>96.8
EPA 200.8 - Metals																		
Dissolved Iron	mg/L	3.45	3.46	2.08	2.06	3.33	2.47	3.49	0.189J	0.150J	0.182J	0.223J	0.434	0.345	0.177J	<0.156	<0.156	>95.5
Total Iron	mg/L	-	-	-	-	-	-	3.56	0.979	1.11	0.633	1.11	0.952	7.27	1.33	0.252	0.0806J	>97.7
Dissolved Manganese	mg/L	-	-	-	-	-	-	2.69	2.63	2.59	2.28	2.44	2.29	1.11	1.13	0.0190	-	-
SM21 2540D - TSS																		
Total Suspended Solids	mg/L	7.17	7.65	3.88	3.50	6.53	4.85	5.20	2.37	3.09	4.95	2.02	3.23	11.1	3.20	1.17	0.294J	>94.3
EPA 625M-SIMS - Polyaromatic Hydrocarbons																		
Naphthalene	µg/L	-	-	-	-	-	-	**2.69**	<0.0646	<0.0666	<0.0682	**0.0366J**	<0.282J*	-	-	-	<0.0704	>97.3
Acenaphthylene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316J*	-	-	-	<0.0340	ND
Acenaphthene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316J*	-	-	-	<0.0340	ND
Fluorene	µg/L	-	-	-	-	-	-	**0.0566**	<0.0312	<0.0322	<0.0330	<0.0320	<0.0171J*	-	-	-	<0.0340	>39.9
Phenanthrene	µg/L	-	-	-	-	-	-	**0.0251J**	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316J*	-	-	-	<0.0340	ND
Anthracene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316J*	-	-	-	<0.0340	ND
Fluoranthene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Pyrene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Chrysene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	<0.0310	<0.0312	<0.0322	<0.0330	<0.0320	<0.0316	-	-	-	<0.0340	ND
EPA 1625B w/ Iso Dil-W - Sulfolane																		
Sulfolane	µg/L	**303**	**293**	**124**	<6.52	**41.6**	**47.0**	**94.9**	**32.2J***	**16.0J***	**18.0**	**24.0**	**33.5**	<6.88	<6.60	<6.20	<6.40	>93.2

Notes:

GAC Vessels A & B were in series, followed by C & D in parallel
J Result is estimated; analyte was detected below the limit of quantitation (LOQ).
J* Result is considered an estimate; flag applied by SWI based on sample-handling or analytical QC issues, see data-review checklist for details
* Total xylenes calculated by SWI from database
µg/L micrograms per liter
mg/L milligrams per liter
< analyte not detected; limit of detection listed
- analysis not requested/performed
Bold Result or LOQ exceeds ADEC interim remediation goal (sulfolane), or wastewater disposal permit limit (benzene and total aromatic hydrocarbons).

Table 5-6
Remediation System Operation-Treatment System Performance
North Pole Refinery
Flint Hills Resources Alaska, LLC

Method / Analyte	Units	February 18, 2013																
		R-21	R-21 Duplicate	R-35R	R-39	R-40	R-42	Combined Influent	Air Stripper Effluent (A-Tower)	Air Stripper Effluent (A-Tower Duplicate)	Air Stripper Effluent (B-Tower)	Air Stripper Effluent (C-Tower)	Air Stripper Effluent (D-Tower)	Sand Filter Influent	GAC Vessel (A-Inlet)	GAC Vessel (A-Outlet)	Final Effluent	Percent Removal (%)
EPA 624 - Benzene, Toluene, Ethylbenzene, Xylenes																		
Benzene	µg/L	**58.1**	**59.8**	**17.3**	**19.0**	**635**	**5.81**	**32.5**	**8.91**	**8.71**	**9.53**	**2.44**	<0.240	**5.08**	**1.44**	<0.240	0.220J	>99.3
Toluene	µg/L	**11.5**	**11.9**	**7.19**	**7.93**	**866**	<0.620	**4.28**	**1.40**	**1.33**	**1.33**	**0.450J**	<0.620	**0.810J**	<0.620	<0.620	<0.620	>85.5
Ethylbenzene	µg/L	**23.6**	**24.4**	**15.8**	**6.78**	**195**	<0.620	**13.4**	**3.19**	**3.09**	**3.42**	**0.830J**	**0.320J**	**1.80**	**0.450J**	<0.620	0.330J	>97.5
P & M -Xylene	µg/L	**114**	**117**	**37.9**	**30.7**	**678**	<1.24	**47.8**	**13.8**	**13.3**	**14.8**	**3.50**	<1.24	**8.07**	**1.88J**	<1.24	0.660J	>98.6
o-Xylene	µg/L	**16.4**	**16.7**	**6.73**	**9.34**	**280**	<0.620	**11.7**	**4.46**	**4.17**	**4.33**	**1.23**	<0.620	**2.78**	**0.690J**	<0.620	<0.620	>94.7
Total Xylenes	µg/L	**130***	**134***	**44.6***	**40.0***	**958***	<1.86*	**59.5***	**18.3***	**17.5***	**19.1***	**4.73***	<1.86*	**10.9***	**2.57J***	<1.86*	<1.28J*	>97.8
EPA 200.8 - Metals																		
Iron	mg/L	3.36	3.32	2.06	1.90	2.91	3.76	2.99	0.237J	0.832	0.406	1.05	1.54	0.101J	<0.156	<0.156	<0.156	>94.7
Manganese	mg/L	-	-	-	-	-	-	2.35	2.15	2.19	2.06	2.17	2.15	2.16	1.92	0.0203	-	-
SM21 2540D - TSS																		
Total Suspended Solids	mg/L	7.30	7.45	4.08	4.21	7.00	5.64	7.45J*	3.37J*	1.44*	2.55	5.67	1.55	27.4	0.426J	0.769	0.500	>93.2
EPA 625M-SIMS - Polyaromatic Hydrocarbons																		
Naphthalene	µg/L	-	-	-	-	-	-	**2.53**	**1.11**	**1.06**	**0.870**	**0.815**	**0.727**	-	-	-	<0.0652	>97.4
Acenaphthylene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Acenaphthene	µg/L	-	-	-	-	-	-	**0.0236J**	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Fluorene	µg/L	-	-	-	-	-	-	**0.0607**	**0.0359J**	**0.0316J**	**0.0294J**	**0.0330J**	**0.0260J**	-	-	-	<0.0316	>47.9
Phenanthrene	µg/L	-	-	-	-	-	-	**0.0235J**	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Anthracene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Fluoranthene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Pyrene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Chrysene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	<0.0316	<0.0300	<0.0300	<0.0300	<0.0300	<0.0300	-	-	-	<0.0316	ND
EPA 1625B w/ Iso Dil-W - Sulfolane																		
Sulfolane	µg/L	**267**	**279**	**124**	<6.40	**39.1**	**39.7**	**85.4**	**44.3J***	**28.3J***	**44.9**	**36.0**	**44.1**	**41.0**	**16.7J***	<6.20	<6.46	>92.4

Notes:

	GAC Vessels A & B were in series, followed by C & D in parallel
J	Result is estimated; analyte was detected below the limit of quantitation (LOQ).
J*	Result is considered an estimate; flag applied by SWI based on sample-handling or analytical QC issues, see data-review checklist for details
*	Total xylenes calculated by SWI from database
µg/L	micrograms per liter
mg/L	milligrams per liter
<	analyte not detected; limit of detection listed
-	analysis not requested/performed
Bold	Result or LOQ exceeds ADEC interim remediation goal (sulfolane), or wastewater disposal permit limit (benzene and total aromatic hydrocarbons).

Table 5-6
Remediation System Operation-Treatment System Performance
North Pole Refinery
Flint Hills Resources Alaska, LLC

Method / Analyte	Units	March 12, 2013															
		R-21	R-35R	R-39	R-40	R-42	R-42 Duplicate	Combined Influent	Air Stripper Effluent (A-Tower)	Air Stripper Effluent (A-Tower Duplicate)	Air Stripper Effluent (C-Tower)	Air Stripper Effluent (D-Tower)	Sand Filter Influent	GAC Vessel (A-Inlet)	GAC Vessel (A-Outlet)	Final Effluent	Percent Removal (%)
EPA 624 - Benzene, Toluene, Ethylbenzene, Xylenes																	
Benzene	µg/L	**97.1**	**16.2**	**13.1**	**154**	**6.32**	**6.04**	**26.3**	**11.3**	**11.0**	**4.89**	**8.05**	**5.03**	0.740	0.180J	<0.240	>99.0
Toluene	µg/L	**108**	**7.45**	**4.01**	**198**	<0.620	<0.620	**4.27**	**1.94**	**1.91**	**0.990J**	**1.52**	**0.990J**	<0.620	<0.620	<0.620	>85.4
Ethylbenzene	µg/L	**47.1**	**12.3**	**3.74**	**44.2**	<0.620	<0.620	**9.16**	**3.67**	**3.70**	**1.67**	**2.57**	**1.54**	<0.620	<0.620	<0.620	>93.2
P & M -Xylene	µg/L	**234**	**30.2**	**16.2**	**154**	<1.24	**0.710J**	**28.8**	**12.6**	**12.3**	**5.72**	**9.33**	**5.57**	0.760J	<1.24	<1.24	>95.6
o-Xylene	µg/L	**93.0**	**5.37**	**4.35**	**60.1**	<0.620	**0.310J**	**8.32**	**4.35**	**4.31**	**2.08**	**3.47**	**2.37**	0.390J	<0.620	<0.620	>92.5
Total Xylenes	µg/L	**327***	**35.6***	**20.6***	**214***	<1.86*	**1.02J***	**37.1***	**17.0***	**16.6***	**7.80***	**12.8***	**7.94***	1.15J*	<1.86*	<1.86*	>94.9
EPA 200.8 - Metals																	
Dissolved Iron	mg/L	3.92	2.11	2.01	2.94	2.47	2.45	3.19	0.702	0.707	0.627	0.593	0.238J	0.132J	<0.156	<0.156	>95.1
Total Iron	mg/L	5.16	2.08	1.90	2.92	2.65	2.62	3.08	2.14	1.74	15.7	1.22	6.01	3.65	0.135J	<0.156	>94.9
Dissolved Manganese	mg/L	-	-	-	-	-	-	2.40	-	2.15	2.13	2.09	2.09	1.92	0.00480	-	-
SM21 2540D - TSS																	
Total Suspended Solids	mg/L	9.33	4.71	4.26	6.63	6.18	6.19	8.42	9.80	9.61	17.8	3.75	16.8	9.38	0.800	0.194J	>97.6
EPA 625M-SIMS - Polyaromatic Hydrocarbons																	
Naphthalene	µg/L	-	-	-	-	-	-	**1.10**	**0.0509J**	<0.0640	<0.0640	<0.0640	-	-	-	<0.0640	>94.1
Acenaphthylene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Acenaphthene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Fluorene	µg/L	-	-	-	-	-	-	**0.0309J**	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Phenanthrene	µg/L	-	-	-	-	-	-	**0.0174J**	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Anthracene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Fluoranthene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Pyrene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Chrysene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	<0.0312	<0.0320	<0.0310	<0.0310	<0.0310	-	-	-	<0.0310	ND
EPA 1625B w/ Iso Dil-W - Sulfolane																	
Sulfolane	µg/L	**369**	**124**	<6.52	**39.5**	**43.5**	**42.6**	**50.1**	**21.8**	**17.7**	**17.3**	**18.6**	<6.20	<6.20	<6.52	<6.20	>87.6

Notes:

GAC Vessels A & B were in series, followed by C & D in parallel
GAC vessel B was unable to be sampled; Tower B maintenance ongoing
J Result is estimated; analyte was detected below the limit of quantitation (LOQ).
* Total xylenes calculated by SWI from database
µg/L micrograms per liter
mg/L milligrams per liter
< analyte not detected; limit of detection listed
\- analysis not requested/performed
Bold Result or LOQ exceeds ADEC interim remediation goal (sulfolane), or wastewater disposal permit limit (benzene and total aromatic hydrocarbons).

Table 6-1
Analytical Data Quality Flags
North Pole Refinery
Flint Hills Resources Alaska, LLC

Work Order	Sample Name	Analyte	Method	Display	Result	Result Flag	LOD	FinalValue	Units	QC Flag	Bias	Flag Definition
1137514	MW-138	Sulfolane	Sulfolane-EPA1625B with Isotope Dilution	1.68JL*	1.68	JL*	0.124	1.68	mg/L	JL	Low	Hold Time Exceedance
1137514	MW-176A	Sulfolane	Sulfolane-EPA1625B with Isotope Dilution	1.80JL*	1.80	JL*	0.124	1.80	mg/L	JL	Low	Hold Time Exceedance
1137519	MW-301-70	Sulfolane	Sulfolane-EPA1625B with Isotope Dilution	0.00431JL*	0.00431	JL*	0.0062	0.00431	mg/L	JL	Low	Hold Time Exceedance
1137519	O-1	Sulfolane	Sulfolane-EPA1625B with Isotope Dilution	6.52JL*	6.52	JL*	0.62	6.52	mg/L	JL	Low	Hold Time Exceedance
1137535	MW-137	Benzene	SW8260B	0.000740J*	0.00074	J*	0.00024	0.00074	mg/L	J	None	Field duplicate RPD above DQO
1137535	MW-154B	Toluene	SW8260B	<0.00100B*	0.001	UB*	0.00062	0.001	mg/L	UB	None	Trip blank detection
1137535	MW-237	Benzene	SW8260B	0.000500J*	0.0005	J*	0.00024	0.0005	mg/L	J	None	Field duplicate RPD above DQO
1137535	MW-330-150	Sulfolane	Sulfolane-EPA1625B with Isotope Dilution	<0.00666J*	0.00666	UJ*	0.00666	0.00666	mg/L	UJ	None	Sulfolane-d8 recovery failure
1137603	1109	Nitrate-N	SM21 4500NO3-F	<0.110B*	0.11	UB*	0.062	0.11	mg/L	UB	None	Method blank
1137603	1109	Nitrite-N	SM21 4500NO3-F	0.314J*	0.314	J*	0.062	0.314	mg/L	J	None	Holding time
1137621	1343	Ammonia-N	SM21 4500-NH3 G	<0.100B*	0.1	UB*	0.062	0.1	mg/L	UB	None	Method blank detection
1137621	1343	Nitrate-N	SM21 4500NO3-F	<0.100B*	0.1	UB*	0.062	0.1	mg/L	UB	None	Method blank detection and hold-time exceedance
1137621	1343	Nitrite-N	SM21 4500NO3-F	0.0890J*	0.089	J*	0.062	0.089	mg/L	J	None	Hold time exceedance
1137622	0932	Ammonia-N	SM21 4500-NH3 G	<0.124B*	0.124	UB*	0.062	0.124	mg/L	UB	None	Method blank detection
1137657	0259	Nitrite-N	SM21 4500NO3-F	0.0595JL*	0.0595	JL*	0.062	0.0595	mg/L	JL	Low	Analyzed outside of holding time
1137657	0259	Nitrate-N	SM21 4500NO3-F	0.0620JL*	0.062	JL*	0.062	0.062	mg/L	JL	Low	Analyzed outside of holding time
1137601	1099	Methane	RSK 175	0.010J*	0.01	J*	0.01	0.010	µg/L	J	None	Field duplicate RPD failure
1137601	1099D	Methane	RSK 175	0.074J*	0.074	J*	0.074	0.074	µg/L	J	None	Field duplicate RPD failure

Notes:

All results from work order 1137683, location 0332 have been temporarily flagged 'J' due to suspicion that the samples were collected after a water-treatment system. This table will be re-issued to include those flags if they become permanent.

mg/L	milligrams per liter
µg/L	micrograms per liter
LOD	Limit of Detection
RPD	Relative Percent Difference
DQO	Data Quality Objective
QC	Quality Control
D	Duplicate

Table 7-1
Analytical Data Quality Flags
Point-of-Entry Treatment System Data
North Pole Refinery
Flint Hills Resources Alaska, LLC

Work Order	Sample Name	Analyte	Sample Date	Original Result	Units	Final Reporting Value	Final QC Flag	Bias	Flag Definition
10170687	A	Sulfolane	9/22/2011	211	µg/L	211	J	estimated	Internal standard recovery failure
10174819	A	Sulfolane	10/31/2011	ND	µg/L	ND	J	estimated	MS/MSD RPD failure
10174819	C	Sulfolane	10/31/2011	ND	µg/L	ND	J	estimated	MS/MSD RPD failure
10174819	D	Sulfolane	10/31/2011	ND	µg/L	ND	UJ	estimated	MS/MSD RPD failure
10179293	C1	Sulfolane	12/21/2011	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10193237	C	Sulfolane	5/21/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10193243	C1	Sulfolane	5/22/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10193243	D	Sulfolane	5/22/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10197969	D	Sulfolane	7/2/2012	ND	µg/L	ND	UJ	estimated	Out of temperature upon receipt at laboratory
10197969	C1	Sulfolane	7/2/2012	ND	µg/L	ND	UJ	estimated	Out of temperature upon receipt at laboratory
10197969	A	Sulfolane	7/2/2012	110	µg/L	110	JL	low	Out of temperature upon receipt at laboratory
10197969	C2	Sulfolane	7/2/2012	ND	µg/L	ND	UJ	estimated	Out of temperature upon receipt at laboratory
10197970	C	Sulfolane	7/3/2012	ND	µg/L	ND	UJ	estimated	Out of temperature upon receipt at laboratory
10197970	A	Sulfolane	7/3/2012	241	µg/L	241	JL	low	Out of temperature upon receipt at laboratory
10202827	D	Sulfolane	8/14/2012	ND	µg/L	ND	J	estimated	MS/MSD RPD failure
10202827	C1	Sulfolane	8/14/2012	ND	µg/L	ND	J	estimated	MS/MSD RPD failure
10202827	A	Sulfolane	8/14/2012	8.4J	µg/L	8.4J	J	estimated	MS/MSD RPD failure
10202827	C2	Sulfolane	8/14/2012	ND	µg/L	ND	J	estimated	MS/MSD RPD failure
10214275	C1	Sulfolane	12/3/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10214275	D	Sulfolane	12/3/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10214275	A	Sulfolane	12/3/2012	6.4J	µg/L	6.4J	JH	high	Sulfolane recovery in LCS
10214278	A	Sulfolane	12/3/2012	5.1J	µg/L	5.1J	JH	high	Sulfolane recovery in LCS
10214279	A	Sulfolane	12/3/2012	7.7J	µg/L	7.7J	JH	high	LCS recovery failure
10214279	C2	Sulfolane	12/3/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10214279	D	Sulfolane	12/3/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10214280	A	Sulfolane	11/30/2012	37	µg/L	37	JH	high	LCS recovery failure
10214283	C	Sulfolane	11/30/2012	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10214283	A	Sulfolane	11/30/2012	9.3J	µg/L	9.3J	JH	high	Sulfolane recovery failure in LCS/MSD
10214586	A	Sulfolane	12/4/2012	20.8	µg/L	20.8	JH	high	Sulfolane recovery failure in LCS/MSD
10215915	A	Sulfolane	12/14/2012	35.1	µg/L	35.1	J	estimated	Internal standard recovery failure
10216199	C1	Sulfolane	12/19/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216199	A	Sulfolane	12/19/2012	103	µg/L	103	JH	high	Sulfolane recovery failure in LCS/LCSD
10216200	A	Sulfolane	12/18/2012	124	µg/L	124	JH	high	Sulfolane recovery failure in LCS/LCSD
10216200	C1	Sulfolane	12/18/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216201	C1	Sulfolane	12/19/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216201	A	Sulfolane	12/19/2012	176	µg/L	176	JH	high	Sulfolane recovery failure in LCS/LCSD
10216202	A	Sulfolane	12/18/2012	16.8	µg/L	16.8	JH	high	Sulfolane recovery failure in LCS/LCSD
10216202	D	Sulfolane	12/18/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216202	C2	Sulfolane	12/18/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216203	C1	Sulfolane	12/18/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216203	C2	Sulfolane	12/18/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216203	A	Sulfolane	12/18/2012	16.4	µg/L	16.4	JH	high	Sulfolane recovery failure in LCS/LCSD
10216204	C1	Sulfolane	12/19/2012	ND	µg/L	ND	UJ	estimated	Internal standard recovery failure
10216204	A	Sulfolane	12/19/2012	87.2	µg/L	87.2	JH	high	Sulfolane recovery failure in LCSD

Table 7-1
Analytical Data Quality Flags
Point-of-Entry Treatment System Data
North Pole Refinery
Flint Hills Resources Alaska, LLC

Work Order	Sample Name	Analyte	Sample Date	Original Result	Units	Final Reporting Value	Final QC Flag	Bias	Flag Definition
10218268	A	Sulfolane	1/21/2013	31.4	µg/L	31.4	J	estimated	Internal standard recovery failure
10219043	A	Sulfolane	1/29/2013	7.6J	µg/L	7.6J	J	estimated	Internal standard recovery failure
10222843	C2	Sulfolane	3/15/2013	ND	µg/L	ND	J	estimated	Internal standard recovery failure
10225607	C2	Sulfolane	4/12/2013	ND	µg/L	ND	J	estimated	Internal standard recovery failure

Note: This table does not include J-flags added to the database for samples collected during routine maintenance events.

ND	Not Detected
µg/L	micrograms per liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
RPD	Relative Percent Difference
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate