

From: [Bilawchuk, Maureen ENV:EX](#)
To: [Bilawchuk, Maureen ENV:EX](#)
Subject: SPO MO1701-Status Update December 15, 2017
Date: Monday, January 15, 2018 2:25:41 PM
Attachments: [CHH SUBMITTAL-2017 Ground Water Quality DATA-CLOSURE PLAN.pdf](#)
[CHH SUBMITTAL-2017 Surface Water Quality DATA-CLOSURE PLAN.pdf](#)
[COC_CHH_NOVEMBER 2017.pdf](#)
[Dec 15, 2017 CHH Progress Report.pdf](#)

From: spomo1701@outlook.com [<mailto:spomo1701@outlook.com>]
Sent: Friday, December 15, 2017 5:39 PM
To: Environmental Compliance ENV:EX; marty@chholdings.ca
Subject: SPO MO1701-Status Update December 15, 2017

- ***Please find information regarding the Leachate reporting requirements for the December 15, 2017 reporting period as per SPILL PREVENTION ORDER : MO1701 Section 1d***

Total Leachate Collected= 5.79 m³

Total Leachate Stored= 49.28 m³

Total Leachate Transported= 0 m³

- ***Sampling was conducted November 27, 2017 as per Section 6biii of File 311372 August 11, 2017 letter. COA's and tabulated results are attached.***

Sampling Summary-Samples were taken on November 27, 2017:

1. *SHA-SW1*
2. *SHA-SW2*
3. *MW6*
4. *MW3*
5. *MW2*
6. *SHA-LE-1*
7. *SHA-LD-1 (Dry Conditions)*
8. *SB-1*
9. *SB-2*
10. *SB-3*

- ***Attached is the QP Progress Report for Dec 15, 2017 as per File 311372 August 11, 2017 letter.***

Thank you

Table GW1: Analytical Results for Nutrients in Groundwater

Sample Location	CSR Standards ⁽¹⁾		MW-6	MW-3S	MW-3D	MW-2	SB-1	SB-2	SB-3	FIELD BLANK
As-built Well Depths			47m	23m	46m	43m	4.01m	3.28m	3.53m	-
Sample ID			7112374-02	7112374-03	7112374-04	7112374-05	7112374-06	7112374-07	7112374-08	7112374-01
Date Sampled	Aquatic Life	Drinking Water	MW6	MW3S	MW3D	MW2	SB1	SB2	SB3	FB
			2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27
Physical Tests										
Colour, True (TCU)	-	-	6.6	<5.0	5.8	6.5	<5.0	<5.0	<5.0	<5.0
Conductivity (uS/cm)	-	-	1290	334	244	276	320	483	336	<2.0
Hardness (as CaCO ₃) mg/L	-	-	555	139	97.3	125	143	184	139	<0.500
pH (pH Units)	-	-	7.44	7.78	7.79	7.79	7.17	7.19	7.29	5.57
Total Suspended Solids mg/L	-	-	8.4	14.4	16.3	49.3	43	68	350	<2.0
Total Dissolved Solids mg/L	-	-	-	-	-	-	-	-	-	-
Turbidity (NTU)	-	-	5.07	5.56	6.45	34.9	27.3	71.6	309	<0.10
Anions and Nutrients mg/L										
Alkalinity, Total (as CaCO ₃)	-	-	624	126	103	122	88.9	158	54.2	<1.0
Chloride (Cl)	1500	250	39.3	6.38	2.14	7.15	10.4	26.4	6.79	<0.10
Fluoride (F)	2 (H < 50) 3 (H ≥ 50)	1.5								<0.10
Nitrate (as N)	400	10	0.14	<0.10	0.11	0.25	<0.10	0.11	0.27	
Nitrite (as N) ⁽³⁾ Cl <2 mg/L	0.2		<0.100	0.029	<0.010	<0.010	0.402	0.207	0.462	<0.010
Cl 2 - <4 mg/L	0.4	3.2			<0.010					<0.010
Cl 4 - <6 mg/L	0.6									
Cl 6 - <8 mg/L	0.8									
Cl 8 - <10 mg/L	1			<0.010		<0.010			<0.010	
Cl ≥ 10 mg/L	2									
Sulfate (SO ₄)	1000	500	<0.010				<0.010	<0.010		
			98.1	44	23	19.1	60.8	57.9	90.2	<1.0

Notes: Refer to Table Endnotes (attached)

Table GW2: Analytical Results for Total Metals in Groundwater

Sample Location	CSR Standards ⁽¹⁾		MW-6	MW-3S	MW-3D	MW-2	SB-1	SB-2	SB-3	FIELD BLANK
As-built Well Depths			47m	23m	46m	43m	4.01m	3.28m	3.53m	
Sample ID			7112374-02	7112374-03	7112374-04	7112374-05	7112374-06	7112374-07	7112374-08	7112374-01
Date Sampled	Aquatic Life	Drinking Water	MW6	MW3S	MW3D	MW2	SB1	SB2	SB3	FB
2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27
Physical Tests mg/L										
Hardness (as CaCO3)			-	-	-	-	-	-	-	-
Total Metals mg/L										
Aluminum (Al)-Total	-	-	0.394	0.18	0.134	1.63	1.81	4.03	15.3	<0.0050
Antimony (Sb)-Total	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00029	<0.00020
Arsenic (As)-Total	-	-	0.00382	0.00087	0.00126	0.00189	<0.00050	0.00057	0.00196	<0.00050
Barium (Ba)-Total	-	-	0.1	0.0358	0.024	0.0378	0.018	0.0264	0.0632	<0.0050
Beryllium (Be)-Total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00028	<0.00010
Bismuth (Bi)-Total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	-	-	0.0918	0.0256	0.0259	0.0245	0.0121	0.0245	0.0173	<0.0050
Cadmium (Cd)-Total	-	-	0.000127	0.000263	0.000075	0.00005	0.000024	0.000014	0.000061	<0.000010
Calcium (Ca)-Total	-	-	186	45.5	30.8	38.6	47.2	63.5	51.7	<0.20
Chromium (Cr)-Total	-	-	0.00071	<0.00050	<0.00050	0.00234	0.00217	0.0044	0.0304	<0.00050
Cobalt (Co)-Total	-	-	0.00238	0.00126	0.00042	0.00136	0.0019	0.00286	0.0148	<0.00010
Copper (Cu)-Total	-	-	0.00282	0.00055	<0.00040	0.00164	0.00547	0.0117	0.0483	<0.00040
Iron (Fe)-Total	-	-	1.74	0.229	0.186	2.52	2.03	4.54	18.4	<0.010
Lead (Pb)-Total	-	-	0.00083	0.00025	<0.00020	0.00051	0.00193	0.00126	0.00735	<0.00020
Lithium (Li)-Total	-	-	0.0156	0.00027	0.00018	0.0004	0.00076	0.00165	0.00649	<0.00010
Magnesium (Mg)-Total	-	-	38.3	7.1	5.45	7.88	5.58	9.99	12.9	<0.010
Manganese (Mn)-Total	-	-	2.32	0.332	0.295	0.489	0.0566	0.156	0.338	<0.00020
Mercury (Hg)-Total	-	-	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000024	<0.000010
Molybdenum (Mo)-Total	-	-	0.00091	0.00559	0.0062	0.00393	0.00041	0.00069	0.00083	<0.00010
Nickel (Ni)-Total	-	-	0.0049	0.00177	0.00135	0.0021	0.00655	0.00443	0.0252	<0.00040
Phosphorus (P)-Total	-	-	<0.050	0.072	0.107	0.257	0.052	0.128	0.426	<0.050
Potassium (K)-Total	-	-	4.61	0.93	0.61	0.78	0.63	1.84	1.6	<0.10
Selenium (Se)-Total	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00059	<0.00050
Silicon (Si)-Total	-	-	12.7	6.6	6.3	9.1	6.6	12	25.4	<1.0
Silver (Ag)-Total	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Total	-	-	81	13.6	11	9.35	7.06	21.1	7.04	<0.10
Strontium (Sr)-Total	-	-	0.631	0.228	0.189	0.165	0.127	0.299	0.135	<0.0010
Sulfur (S)-Total	-	-	29.9	13.5	7.3	6.3	18.4	17.7	22.2	<3.0
Tellurium (Te)-Total	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Thallium (Tl)-Total	-	-	0.000067	0.000031	<0.000020	0.000032	<0.000020	<0.000020	0.000042	<0.000020
Thorium (Th)-Total	-	-	0.0001	0.00024	0.00026	0.00015	<0.00010	0.00015	0.00043	<0.00010
Tin (Sn)-Total	-	-	0.00059	<0.00020	<0.00020	<0.00020	0.0005	0.00032	0.00067	<0.00020
Titanium (Ti)-Total	-	-	0.0181	0.0056	<0.0050	0.106	0.0908	0.22	0.757	<0.0050
Uranium (U)-Total	-	-	0.00897	0.00111	0.00073	0.00088	0.000475	0.00109	0.000731	<0.000020
Vanadium (V)-Total	-	-	<0.0010	<0.0010	<0.0010	0.0061	0.0051	0.0095	0.0419	<0.0010
Zinc (Zn)-Total	-	-	0.0053	<0.0040	<0.0040	0.0042	0.0074	0.011	0.0441	<0.0040
Zirconium (Zr)-Total	-	-	0.00024	0.00018	0.00014	0.00024	0.00013	0.00056	0.00061	<0.00010

Notes: Refer to Table Endnotes (attached)

Table GW3: Analytical Results for Dissolved Metals in Groundwater

Sample Location	CSR Standards ⁽¹⁾		MW-6	MW-35	MW-3D	MW-2	SB-1	SB-2	SB-3	FIELD BLANK
As-built Well Depths			47m	23m	46m	43m	4.01m	3.28m	3.53m	
Sample ID			7112374-02	7112374-03	7112374-04	7112374-05	7112374-06	7112374-07	7112374-08	7112374-01
			MW6	MW3S	MW3D	MW2	SB1	SB2	SB3	FB
Date Sampled	Aquatic Life	Drinking Water	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27
Physical Tests mg/L										
Hardness (as CaCO3)	-	-	555	139	97.3	125	143	184	139	<0.500
Dissolved Metals mg/L										
Aluminum (Al)-Dissolved	-	9.5	<0.0050	<0.0050	<0.0050	0.0094	<0.0050	<0.0050	<0.0050	<0.0050
Antimony (Sb)-Dissolved	0.2	0.006	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic (As)-Dissolved	0.05	0.01	0.00312	0.00078	0.00126	0.00193	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Dissolved	10	1	0.0851	0.0219	0.0224	0.022	0.0088	0.0074	<0.0050	<0.0050
Beryllium (Be)-Dissolved	0.053	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Dissolved	50	5	0.0773	0.0214	0.022	0.022	0.0101	0.021	0.013	<0.0050
Cadmium (Cd)-Dissolved	0.0001 (H<30)	0.005								<0.000010
	0.0003 (H=30 -<90)									
	0.0005 (H=90-<150)									
	0.0006 (H=150-<210)									
Calcium (Ca)-Dissolved	-	-	166	44.4	30.4	38	48.8	60	45	<0.20
Chromium (Cr)-Dissolved	0.01	0.05	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Colbalt (Co)-Dissolved	0.04	-	0.00182	0.00069	0.00035	0.00036	0.0001	<0.00010	0.00017	<0.00010
Copper (Cu)-Dissolved	0.02 (H=50)	1								<0.00040
	0.03 (H=50-<75)									
	0.04 (H=75-<100)				<0.00040					
	0.05 (H=100-<125)									
	0.06 (H=125-<150)									
	0.07 (H=150-<175)									
	0.08 (H=175-<200)									
	0.09 (H=200)									
Iron (Fe)-Dissolved		6.5	<0.00040					0.00099		
Lead (Pb)-Dissolved	0.04 (H=50)	0.01	1.06	0.043	0.102	0.242	<0.010	<0.010	<0.010	<0.010
	0.05 (H=50-<100)				<0.00020					<0.00020
	0.06 (H=100-<200)				<0.00020	<0.00020	<0.00020	<0.00020		
	0.11 (H=200-<300)									
	0.15 (H=300)									
Lithium (Li)-Dissolved	-	-	0.0147	0.00015	<0.00010	<0.00010	0.00013	0.00015	0.00014	<0.00010
Magnesium (Mg)-Dissolved	-	100	34.3	6.79	5.19	7.21	5.16	8.32	6.46	<0.010
Manganese (Mn)-Dissolved	-	0.55	2.08	0.305	0.291	0.473	0.00113	0.00232	0.00512	<0.00020
Mercury (Hg)-Dissolved	0.001	0.001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	10	0.25	0.00068	0.00537	0.00626	0.00416	0.00043	0.00059	0.00059	<0.00010
Nickel (Ni)-Dissolved	0.25 (H=60)	-								<0.00040
	0.65 (H=60-<120)									
	1.1 (H=120-<180)				0.00126					
	1.5 (H=180)									
Phosphorus(P)-Dissolved	-	-	0.00379	0.00131		0.00088	0.00484		0.00097	
Potassium (K)-Dissolved	-	-	<0.050	0.062	0.092	0.15	<0.050	<0.050	<0.050	<0.050
Selenium (Se)-Dissolved	-	-	4.17	0.88	0.59	0.7	0.52	1.27	0.49	<0.10
Silicon (Si)-Dissolved	0.01	0.01	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Silver (Ag)-Dissolved	0.0005 (H<=100)	-	11	6.1	6	6.9	4.3	5.4	4	<1.0
Silver (Ag)-Dissolved	0.015 (H>100)	-			<0.000050					<0.000050
Sodium (Na)-Dissolved	-	200	<0.000050	<0.000050		<0.000050	<0.000050	<0.000050	<0.000050	
Strontium (Sr)-Dissolved	-	-	71.7	13.1	10.6	9.24	7.07	19.9	5.97	<0.10
Sulfur (S)-Dissolved	-	-	0.582	0.222	0.188	0.172	0.128	0.197	0.105	<0.0010
Tellurium (Te)-Dissolved	-	-	27.1	12.5	7.5	6.7	19.1	17.6	32.5	<3.0
Thallium (Tl)-Dissolved	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Thallium (Tl)-Dissolved	0.003	-	<0.000020	0.000022	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Thorium (Th)-Dissolved	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium (Ti)-Dissolved	1	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Uranium (U)-Dissolved	3	0.02	0.00806	0.000992	0.000619	0.00083	0.000402	0.000877	0.000254	<0.000020
Vanadium (V)-Dissolved	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved	0.075 (H=90)	5								<0.0040
	0.150 (H=90-<100)				<0.0040					
	0.900 (H=100-<200)					<0.0040	<0.0040	<0.0040	<0.0040	
	1.650 (H=200-<300)									
	2.4 (H=300-<400)									
Zirconium (Zr)-Dissolved	-	-	<0.0040							
			0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Notes: Refer to Table Endnotes (attached)

Table GW4: Analytical Results for Hydrocarbons and PAHs in Groundwater

Sample Location	CSR Standards ⁽¹⁾		MW-6	MW-3S	MW-3D	MW-2	SB-1	SB-2	SB-3	FIELD BLANK
	As-built Well Depths		47m	23m	46m	43m	4.01m	3.28m	3.53m	
Sample ID			7112374-02	7112374-03	7112374-04	7112374-05	7112374-06	7112374-07	7112374-08	7112374-01
			MW6	MW3S	MW3D	MW2	SB1	SB2	SB3	FB
Date Sampled	Aquatic Life	Drinking Water	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27	2017-11-27
Hydrocarbons ug/L										
EPH10-19	5000	5000	<250	<250	<250	<250	<250	<250	<250	<250
EPH10-19 (SG)	5000	5000								
EPH19-32	-	-	<250	<250	<250	<250	<250	<250	<250	<250
EPH19-32 (SG)	-	-								
LEPH	500	-	<250	<250	<250	<250	<250	<250	<250	<250
HEPH	-	-	<250	<250	<250	<250	<250	<250	<250	<250
Polycyclic Aromatic Hydrocarbons ug/L										
Acenaphthene	60	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	-	-	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Acridine	0.5	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	1	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	1	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010
Benzo(a)pyrene	0.1	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	-	-
Benzo(b+ j)fluoranthene	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
2-Chloronaphthalene			<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Chrysene	1	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibenz(a,h)anthracene	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	2	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Fluorene	120	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-c,d)pyrene	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1-Methylnaphthalene			<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
2-Methylnaphthalene			<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Naphthalene	10	-	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Phenanthrene	3	-	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pyrene	0.2	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.023	<0.020
Quinoline	34	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes: Refer to Table Endnotes (attached)

Analytical Table Footnotes: Analytical Results for Groundwater

All concentrations in mg/L, except pH or as indicated.

"<" less than the laboratory detection limit indicated.

"_" means not analyzed or no standard or guideline applies.

* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

(1) A compendium of CSR Schedules 6 and 10 guidelines with respect to Drinking Water (DW) and Freshwater Aquatic Life (AW).

(2) Standard is dissolved Chloride-dependent.

BOLD, UNDERLINE

Laboratory Detection Limit exceeds one or more applicable Standard

BLUE SHADING

Concentration greater than CSR Aquatic Life (AW) Standard

BOLD, BEIGE TEXT

Concentration greater than CSR Drinking Water (DW) Standard

Table 1: Analytical Results for Nutrients in Surface Water			SHA-LE-1	SHA-SW-2	SHA-SW-1	SHA-SW-1	RPD
Laboratory ID	BC DRINKING WATER QUALITY GUIDELINES	BC FRESHWATER AQUATIC LIFE WATER QUALITY GUIDELINES	7112374-09	7112374-10	7112374-11	7112374-12	
Sample ID			LE-1	SW2	SW1	SW1 DUP	
Date Sampled/Time			2017-11-27	2017-11-27	2017-11-27	2017-11-27	
Physical Tests							
Colour, True (Colour Units)	15 TCU	15 ⁽¹⁾ units absolute, or 5 units above background (30-day average)	7.8	8.6	<5.0	<5.0	*
Total Dissolved Solids (mg/L)	-	-	-	-	-	-	-
Total Suspended Solids (mg/L)	-	25 mg/L above background (24-hr during	4	11.6	<4.0	<2.0	*
pH	7-10.5	6.5-9	7.49	6.22	7.41	7.51	1.34%
Conductivity (uS/cm)	-	-	12000	19.8	268	267	0.37%
Hardness (as CaCO3)	-	-	3110	5.73	111	107	3.67%
Turbidity (NTU)	Δ1 NTU	8 NTU above background (24-hr during clear flow	0.29	1.38	1.42	1.37	3.58%
	5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters	Change from background of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters					
Anions and Nutrients mg/L							
Alkalinity Total (as CaCO3)	<10 high sensitivity to acid inputs	10-20	90.9	4	61	58.9	3.50%
Acid Sensitivity	moderate sensitivity to acid inputs	>20	Low	High	Low	Low	
	low sensitivity to acid inputs						
Chloride (Cl)	250 mg/L	600 mg/L (instant max), 150 mg/L (30-day average)	3210	1.5	7.2	7.39	2.60%
Fluoride (F)	1.5 mg/L (instant max) 1.0 mg/L (30-day average)	0.4 (Hardness <10mg/L)	<0.10	<0.10	<0.10	<0.10	*
		Hardness-Dependent AW (Hardness is <10mg/L)	0.29	0.22	0.29	0.29	
Nitrate (as N)	45 mg/L	32.8 mg/L (instant maximum) 3.0 mg/L (30-day average)	1.42	<0.010	0.378	0.4	5.66%
Nitrite (as N) ⁽²⁾	3 mg/L	Cl > 10 mg/L 0.6 mg/L (MAX), 0.2 mg/L (30-day average)	<0.010	<0.010	<0.010	<0.010	*
Sulfate (SO4) H 0-30 mg/L	500 mg/L	128 mg/L 30-day average)		1.8			
H 31 - 75 mg/L		218 mg/L (30-day average)					
H 76 - 180 mg/L		309 mg/L (30-day average)			60	59.8	0.33%
H 181 - 250 mg/L		429 mg/L (30-day average)					
H > 250 mg/L		TBD	1890				

Notes: Refer to Table Endnotes (attached)

Table 2: Analytical Results for Total Metals in Surface Water			SHA-LE-1	SHA-SW-2	SHA-SW-1	SHA-SW-1	RPD
Laboratory ID	BC DRINKING WATER QUALITY GUIDELINES	BC FRESHWATER AQUATIC LIFE WATER QUALITY GUIDELINES	7112374-09	7112374-10	7112374-11	7112374-12	
Sample ID			LE-1	SW2	SW1	SW1 DUP	
Date Sampled/Time			2017-11-27	2017-11-27	2017-11-27	2017-11-27	
Physical Tests							
Hardness (as CaCO3) (mg/L)	-	-	3110	5.73	111	107	3.67%
pH	7-10.5	6.5-9	7.49	6.22	7.41	7.51	1.34%
Total Metals (mg/L)							
Aluminum (Al)-Total	0.2	-	0.0341	0.157	0.0556	0.0591	6.10%
Antimony (Sb)-Total	-	-	0.00034	<0.00020	<0.00020	<0.00020	*
Arsenic (As)-Total	0.01	0.005	<0.00050	<0.00050	<0.00050	<0.00050	*
Barium (Ba)-Total	-	-	0.0793	<0.0050	0.0062	0.0064	*
Beryllium (Be)-Total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Bismuth, total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Boron (B)-Total	5	1.2	0.367	0.0153	0.0167	0.016	*
Cadmium (Cd)-Total	-	-	0.000698	<0.000010	<0.000010	<0.000010	*
Calcium (Ca)-Total	-	-	916	1.67	35.8	36.5	1.94%
Chromium (Cr)-Total Chromium	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Chromium (Cr(III))	-	-	-	-	<0.00100	<0.00100	*
Chromium (Cr(VI))	-	-	-	-	<0.0010	<0.0010	*
Cobalt (Co)-Total	-	0.110 (Short Term), 0.004 (Long Term Average)	0.00775	0.00016	<0.00010	<0.00010	*
Copper (Cu)-Total	0.5	Hardness-Dependent ⁽¹⁾	0.00507	0.00061	0.00113	0.00115	*
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (instant max)	0.2943	0.0025	0.0124	0.0121	
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (30-d average)	0.1244	0.0020	0.0044	0.0043	
Iron (Fe)-Total	-	1	0.034	0.092	0.054	0.056	3.64%
Lead (Pb)-Total	0.01	Hardness-Dependent ⁽¹⁾	<0.00020	<0.00020	<0.00020	<0.00020	*
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (instant max)	6.4895	0.0030	0.0932	0.0890	
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (30-d average)	0.2565	Hardness is less than 8 mg/L	0.0069	0.0068	
Lithium (Li)-Total	-	-	0.00063	0.00016	0.0002	0.00019	*
Magnesium (Mg)-Total	-	-	261	0.386	5.2	5.28	1.53%
Manganese (Mn)-Total	-	Hardness-Dependent ⁽¹⁾	28.8	0.0139	0.00235	0.0022	6.99%
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (instant max)	34.8	0.6	1.8	1.7	
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (30-d average)	14.3	0.6	1.1	1.1	
Mercury (Hg)-Total	0.001	0.00002	<0.000010	<0.000010	<0.000010	<0.000010	*
Molybdenum (Mo)-Total	0.25	51 (instant max) 2 (30-d average)	0.00194	<0.00010	0.00049	0.00073	5.63%
Nickel (Ni)-Total	-	0.025 (Hardness-Dependent ⁽¹⁸⁾ BCAWQG to protect AW (i.e. 60mg/L)	0.00736	<0.00040	0.00068	0.00043	*
		Calculated Hardness-Dependent ⁽¹⁸⁾ BCAWQG to protect AW (0.001x180 mg/L CaCO3)	1.302	0.025	0.103	0.101	
Phosphorus(P)-Total	-	-	<0.050	<0.050	<0.050	<0.050	*
Potassium (K)-Total	-	-	23.3	0.13	0.62	0.64	3.17%
Selenium (Se)-Total	0.01	0.002	<0.00050	<0.00050	<0.00050	<0.00050	*
Silicon (Si)-Total	-	-	7.2	2.1	4	3.9	*
Silver (Ag)-Total	-	HARDNESS <100mg/L 0.0001 (SHORT TERM), 0.00005 (LONG TERM), HARDNESS >100mg/L 0.003 (SHORT TERM), 0.0015 (LONG TERM)	0.000052	<0.000050	<0.000050	<0.000050	*
Sodium (Na)-Total	-	-	1640	1.37	7.32	7.54	2.96%
Strontium (Sr)-Total	-	-	4.63	0.0077	0.0972	0.101	3.83%
Sulfur (S)-Total	-	-	657	<3.0	19.2	19.1	0.52%
Tellurium (Te)-Total	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Thallium (Tl)-Total	-	-	0.000058	<0.000020	<0.000020	<0.000020	*
Thorium (Th)-Total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Tin (Sn)-Total	-	-	<0.00020	<0.00020	<0.00020	<0.00020	*
Titanium (Ti)-Total	-	-	<0.0050	<0.0050	<0.0050	<0.0050	*
Uranium (U)-Total	-	-	0.000813	<0.000020	0.000337	0.000354	4.92%
Vanadium (V)-Total	-	-	<0.0010	<0.0010	<0.0010	<0.0010	*
Zinc (Zn)-Total	5.0	Hardness >90 mg/L	0.0585	<0.0040	<0.0040	<0.0040	*
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (instant max)	2.298	0.033	0.049	0.046	
		Hardness-Dependent BCAWQG to protect AW ⁽¹⁸⁾ (30-d average)	2.273	0.008	0.023	0.020	
Zirconium (Zr)-Total	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*

Table 3: Analytical Results for Dissolved Metals in Surface Water

Laboratory ID	BC DRINKING WATER QUALITY GUIDELINES	BC FRESHWATER AQUATIC LIFE WATER QUALITY GUIDELINES	SHA-LE-1	SHA-SW-2	SHA-SW-1	SHA-SW-1	RPD
Sample ID			7112374-09	7112374-10	7112374-11	7112374-12	
Date Sampled/Time			LE-1	SW2	SW1	SW1 DUP	
			2017-11-27	2017-11-27	2017-11-27	2017-11-27	
Physical Tests							
Hardness (as CaCO ₃) (mg/L)	-	-	3110	5.73	111	107	3.67%
pH	7-10.5	6.5-9	7.49	6.22	7.41	7.51	1.34%
Dissolved Metals (mg/L)							
Aluminum (Al)-Dissolved	-	0.05 (30-day average where median pH > 6.5) 0.1 (maximum where instantaneous pH > 6.5) *** indicates pH-dependent maximum where instant pH ≤ 6.5	0.0181	0.074**	<0.0050	<0.0050	*
		pH/Hardness Dependent BCAWQG to protect AW ⁽⁴⁾ (instant max)	0.400	0.060	0.345	0.415	
		pH/Hardness Dependent BCAWQG to protect AW ⁽⁴⁾ (30- d Mean)	0.464	0.029	0.375	0.490	
			0.0003	<0.00020	<0.00020	<0.00020	*
Antimony (Sb)-Dissolved	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Arsenic (As)-Dissolved	-	-	0.0745	<0.0050	0.0057	0.0056	*
Barium (Ba)-Dissolved	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Beryllium (Be)-Dissolved	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Bismuth (Bi)-Dissolved	-	-	0.346	0.0142	0.0154	0.0144	*
Boron (B)-Dissolved	-	-	0.000705	<0.000010	<0.000010	<0.000010	*
Cadmium (Cd)-Dissolved	-	Hardness-Dependent⁽³⁾	Hardness exceeds 455mg/L	0.00003	0.00065	0.00063	
	-	Calculated Hardness-Dependent (a) BCAWQG to protect AW (short-term max) $e[1.03 * \ln(Hss) - 5.274]$ ug/L H<455mg/L	Hardness exceeds 285mg/L	0.00003	0.00023	0.00022	
	-	Calculated Hardness-Dependent BCAWQG to protect AW ⁽³⁾ (long-term max) $e[0.736 * \ln(Hss) - 4.943]$ ug/L H<285mg/L					
Calcium (Ca)-Dissolved	-	up to 4, highly sensitive to acid inputs 4 to 8, moderately sensitive over 8 low sensitivity	831	1.67	36.2	34.8	3.94%
Chromium (Cr)-Dissolved	-	-	Low	High	Low	Low	
Cobalt (Co)-Dissolved	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Copper (Cu)-Dissolved	-	-	0.00767	0.00012	<0.00010	<0.00010	*
Iron (Fe)-Dissolved	-	0.35	0.00485	0.00049	0.00092	0.00092	*
Lead (Pb)-Dissolved	-	-	<0.010	0.016	<0.010	<0.010	*
Lithium, dissolved	-	-	<0.00020	<0.00020	<0.00020	<0.00020	*
Magnesium (Mg)-Dissolved	-	-	0.00058	<0.00010	0.00012	0.00012	*
Manganese (Mn)-Dissolved	-	-	251	0.377	5.07	4.96	2.19%
Mercury (Hg)-Dissolved	-	-	26.3	0.0133	0.00039	0.00034	*
Molybdenum (Mo)-Dissolved	-	-	<0.000010	<0.000010	<0.000010	<0.000010	*
Nickel (Ni)-Dissolved	-	-	0.00194	<0.00010	0.0007	0.00071	1.42%
Phosphorus (P)-Dissolved	-	-	0.00698	<0.00040	<0.00040	<0.00040	*
Potassium (K)-Dissolved	-	-	<0.050	<0.050	<0.050	<0.050	*
Selenium (Se)-Dissolved	-	-	23	0.13	0.63	0.61	3.23%
Silicon (Si)-Dissolved	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Silver (Ag)-Dissolved	-	-	7.2	2.1	3.9	3.7	*
Sodium (Na)-Dissolved	-	-	0.000088	<0.000050	<0.000050	<0.000050	*
Strontium (Sr)-dissolved	-	-	1570	1.4	7.21	6.98	3.24%
Sulfur (S)-Dissolved	-	-	4.63	0.0081	0.0995	0.0974	2.13%
Tellurium (Te)-Dissolved	-	-	615	<3.0	19	18.6	2.13%
Thallium (Tl)-Dissolved	-	-	<0.00050	<0.00050	<0.00050	<0.00050	*
Thorium (Th)-Dissolved	-	-	0.000053	<0.000020	<0.000020	<0.000020	*
Tin (Sn)-Dissolved	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*
Titanium (Ti)-Dissolved	-	-	<0.00020	<0.00020	<0.00020	<0.00020	*
Uranium (U)-Dissolved	-	-	<0.0050	<0.0050	<0.0050	<0.0050	*
Vanadium (V)-Dissolved	-	-	0.000784	<0.000020	0.000334	0.000327	2.12%
Zinc (Zn)-Dissolved	-	-	<0.0010	<0.0010	<0.0010	<0.0010	*
Zirconium (Zr)-Dissolved	-	-	0.0568	<0.0040	<0.0040	<0.0040	*
	-	-	<0.00010	<0.00010	<0.00010	<0.00010	*

Notes: Refer to Table Endnotes (attached)

Table 4: Analytical Results for Hydrocarbons and PAHs in			SHA-LE-1	SHA-SW-2	SHA-SW-1	SHA-SW-1	RPD
Laboratory ID	BC DRINKING	BC FRESHWATER AQUATIC LIFE WATER QUALITY GUIDELINES	7112374-09	7112374-10	7112374-11	7112374-12	
Sample ID			LE-1	SW2	SW1	SW1 DUP	
Date Sampled/ Time			2017-11-27	2017-11-27	2017-11-27	2017-11-27	
Hydrocarbons ug/L							
LEPH	-	-	<250	<250	<250	<250	*
HEPH	-	-	<250	<250	<250	<250	*
Polycyclic Aromatic							
Acenaphthene	-	6 (LONG TERM)	<0.050	<0.050	<0.050	<0.050	*
Acenaphthylene	-	-	<0.200	<0.200	<0.200	<0.200	*
Acridine	-	3 (LONG TERM), 0.05 (PHOTOTOXIC)	<0.050	<0.050	<0.050	<0.050	*
Anthracene	-	4 (LONG TERM), 0.1 (PHOTOTOXIC)	<0.010	<0.010	<0.010	<0.010	*
Benz(a)anthracene	0.01	0.1 (LONG TERM), 0.1 (PHOTOTOXIC)	<0.010	<0.010	<0.010	<0.010	*
Benzo(a)pyrene	-	0.01 (LONG TERM)	<0.010	<0.010	<0.010	<0.010	*
Benzo(b)fluoranthene	-	-	-	-	-	-	*
Benzo(b+)fluoranthene	-	-	<0.050	<0.050	<0.050	<0.050	*
Benzo(g,h,i)perylene	-	-	<0.050	<0.050	<0.050	<0.050	*
Benzo(k)fluoranthene	-	-	<0.050	<0.050	<0.050	<0.050	*
2-Chloronaphthalene			<0.100	<0.100	<0.100	<0.100	*
Chrysene	-	-	<0.050	<0.050	<0.050	<0.050	*
Dibenz(a,h)anthracene	-	-	<0.010	<0.010	<0.010	<0.010	*
Fluoranthene	-	4 (LONG TERM), 0.2 (PHOTOTOXIC)	<0.030	<0.030	<0.030	<0.030	*
Fluorene	-	12 (LONG TERM)	<0.050	<0.050	<0.050	<0.050	*
Indeno(1,2,3-c,d)pyrene	-	-	<0.050	<0.050	<0.050	<0.050	*
1-Methylnaphthalene			<0.100	<0.100	0.203	0.259	24.24%
2-Methylnaphthalene			<0.100	<0.100	0.33	0.433	27.00%
Naphthalene	-	1 (LONG TERM)	<0.200	<0.200	<0.200	0.209	*
Phenanthrene	-	0.3 (LONG TERM)	<0.100	<0.100	<0.100	<0.100	*
Pyrene	-	0.02 (PHOTOTOXIC)	<0.020	<0.020	<0.020	<0.020	*
Quinoline	-	-	<0.050	<0.050	<0.050	<0.050	*

Notes: Refer to Table Endnotes (attached)

Analytical Table Footnotes: Analytical Results for Surface Water

- All concentrations in mg/L, except pH or as indicated.
- "<" less than the laboratory detection limit indicated.
- "-" means not analyzed or no standard or guideline applies.
- * RPDs are not normally calculated where one or more concentrations are less than five times RDL.
- (1) Guideline of 15 mg/L Pt for Drinking Water. Once background levels are established, colour should also not exceed 5 mg/L above background, to protect for Aquatic Life. This is considered a clearwater system (background less than 20 mg/L Pt.)
- (2) Nitrite BCAWWQG Guideline is Chloride dependent
- (3) Standard is calculated based on the hardness dependent BCAWWQG formula, and has been calculated and shown for each individual result
- (4) pH-dependent maximum where instant pH < 6.5

BOLD, UNDERLINE

Laboratory Detection Limit exceeds one or more applicable Standard

BOLD, BLUE SHADING

Concentration greater than BCAWWQG Guideline

BOLD, BEIGE SHADING

Concentration greater than BCAWWQG Chronic Guideline

BOLD, GREEN SHADING

Concentration greater than BC Ministry of Environment Drinking Water Sources

RED FONT

Concentration less than laboratory detection limit (Formula 0.5MRL utilized for statistical analysis)

Client Information	Project Information	Laboratory Information	COC Information
Allterra Construction 2158 Millstream Road Victoria BC V9B 6H4 Phone: (250) 508-0726	P17-932 Number: [none] Sample count: 12 TAT: 5	CARO Analytical Services #110 - 4011 Viking Way Richmond BC V6V 2K9 Phone: (604) 279-1499 Fax: (604) 279-1599	Number: CHH NOV 2017 Shipped via: Harbour Air

#	Sample Information	Analyses	Containers
#1	FB 11/27/2017 08:25 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#2	MW6 11/27/2017 08:15 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#3	MW3S 11/27/2017 09:10 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#4	MW3D 11/27/2017 09:30 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#5	MW2 11/27/2017 10:15 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#6	SB1	Analyses	Containers

	11/27/2017 13:00 Grab / Water	Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#7	SB2 11/27/2017 12:30 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#8	SB3 11/27/2017 11:45 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#9	LE-1 11/27/2017 13:30 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#10	SW2 11/27/2017 13:45 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1)
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS		
#11	SW1 11/27/2017 10:45 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low +Cr6 (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1) C09_125 mL Plastic (CN/Cr6) (1)

#12	Turbidity (KEL) TAT: 5		
	Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS + Cr Speciation		
	SW1 DUP 11/27/2017 10:50 Grab / Water	Analyses Alkalinity, all (KEL) TAT: 5 Anions in Water by IC, 5 Analytes (KEL) TAT: 5 Conductivity in Water (RMD) TAT: 5 L/HEPH in Water (RMD) TAT: 5 Metals, dissolved, All, Low (RMD) TAT: 5 Metals, total, All, Low +Cr6 (RMD) TAT: 5 pH in Water (RMD) TAT: 5 Solids, Total Suspended (RMD) TAT: 5 Turbidity (KEL) TAT: 5	Containers C05_125 mL Plastic (Metals) (1) C06_40 mL Vial (Mercury) (1) S05_125 mL Plastic (Metals-F) (1) S06_40 mL Vial (Mercury-F) (1) C11_1 L Plastic (General) (1) C10_125 mL Plastic (H2SO4) (1) C03_250 mL Glass (EPH/PAH) (1) C09_125 mL Plastic (CN/Cr6) (1)
Comments: PLEASE RUN OUR NORMAL SUITE OF WATER ANALYSIS + Cr Speciation			

Relinquished by	Date/Time	Accepted by	Date/Time



ISLANDER ENGINEERING

FIELD REVIEW REPORT		DATE: Dec 13 2017	ISLANDER PROJECT No.: 2087
REPORT No: 10	STAGE OF CONSTRUCTION: Landfill Closure	WEATHER: Sunny 7 deg	PAGE: 1 of 3
PROJECT: Cobble Hill Landfill 2017 Minor Construction Works			
TO: CHH	ATTENTION: Marty Block		
CC:			

The field review included the inspection of the following items included in the detailed summary of works section of the *Cobble Hill Landfill — 2017 Minor Construction Works, Detailed Construction Plan (Sperling Hansen Associates, September 13, 2017)*:

- **PEA**
 - *Liner appears to be in good condition and is shedding water effectively. Continued rains have not compromised the liner coverage and all repairs are continuing to hold up and are in good condition.*
- **Leachate and Leak Detention facility**
 - Leachate collected = 5.79 m³; Total Leachate Stored = 49.28 m³; leachate transported 0 m³
 - **No leachate has migrated off-site**
- **Soil Management Area (SMA)**
 - All works are in good condition and no noticeable changes since the date of our last inspection
- **Contact Water Containment Pond**
 - All works are in good condition and no noticeable changes since the date of our last inspection
- **cut-off ditch upland of PEA**
 - This ditch continues to perform well.

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Mike Achtem, P.Eng



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FIELD REVIEW REPORT		DATE: Dec 13 2017	ISLANDER PROJECT No.: 2087
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SMA - liner – looking south



SMA – looking north



Contact water containment Pond



Pipe trenching and Leachate and Leak Detention facility



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FIELD REVIEW REPORT		DATE: Dec 13 2017	ISLANDER PROJECT No.: 2087
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PEA – liner near NW corner



PEA– NE corner



Cut-off ditch upland of PEA



PEA north face