

Site C Clean Energy Project
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Vancouver, BC. V7X 1V5

October 31, 2016

Canadian Environmental Assessment Agency
160 Elgin Street, 22nd Floor
Ottawa, ON K1A 0H3

Attention: Mr. Michel Vitou

Dear Mr. Vitou:

Re: Site C Clean Energy Project - Water Quality Management Plan 2015 Annual Update (CEMP Appendix E - Acid Rock Drainage and Metal Leachate Management Plan)

BC Hydro is pleased to provide an annual update on BC Hydro's Water Quality Management Plan for 2015. This update is being submitted in accordance with Condition 7.5 of the Site C Project's Decision Statement, issued to BC Hydro on October 14, 2014.

As per Condition 7.5 of the Decision Statement:

"The Proponent shall implement the plan and provide to the Agency an analysis and summary of the implementation of the plan, as well as any amendments made to the plan in response to the results, on an annual basis throughout construction and during operation until such time as the threshold values established in condition 7.2.2 have not been exceeded for five consecutive years."

As indicated in letters from the CEA Agency (July 28 2016, and September 21, 2016) the submission date for this annual update is October 31, 2016 (letter dated September 21, 2016). Submission of an annual update in 2016 and onwards, will be on March 31 (letter dated July 28, 2016).

This annual update covers the reporting period from January 1, 2015 to December 31, 2015.

Condition 7 of the Decision Statement, requires BC Hydro to:

"... develop, in consultation with Environment Canada and Natural Resources Canada, a water quality management plan to address environmental effects to the aquatic environment from the Designated Project, including acid rock drainage and metal leaching."

Appendix E - Acid Rock Drainage and Metal Leachate Management Plan, of Site C Project's Construction Environmental Management Plan (CEMP), was revised July 26, 2017 and fulfils the requirements of the water quality management plan.

In compliance with Condition 69 of Environmental Assessment Certificate E14-02, the draft CEMP was submitted to the CEA Agency, Environmental Assessment Office, Peace River Regional District, City of Fort St. John, District of Hudson's Hope and Aboriginal Groups, on October 17, 2014. The final was submitted on June 5, 2015. Three revisions were made, and submitted on February 4, 2016 (Rev 2), April 7, 2016 (Rev 3), and July 26, 2016 (Rev 4). Revision 4 of the CEMP is available on the Site C Project Website at:

<https://www.sitecproject.com/sites/default/files/CEMP-Appendices-1-20160726.pdf>

Background

Site C site preparation construction began July 27, 2015. Construction activities for 2015, included site clearing, worker camp construction, and earth moving activities (building roads and bridges and the first stage of the left bank stabilization excavation) in the dam site area. Based on the geochemical characterization program, the only potential acid generating (PAG) material that required management during site preparation activities were cuts along access roads. Specific construction activities and management of PAG materials are described below and locations are provided in Figure 1.

2015 Construction activities with PAG

River Road

Construction of River Road required cutting through PAG material. The PAG material that was excavated was relocated and stockpiled in Howe Pit. This stockpile was covered with a large tarp, and runoff from this pile was collected in a perimeter ditch. No surface water was discharged from this site. This PAG stockpile material will be relocated to RSEM L5 area for permanent disposal once these activities are permitted through the water licence and the area is constructed. The ditch along the road cut was lined with limestone rock.

BC Hydro engaged a professional geochemist to conduct a site survey in May 2016. The geochemist noted some oxidation and staining on both the PAG road cut and the PAG stockpile and no precipitates on the limestone rock. No water was present at either site; therefore, water quality samples could not be obtained.

South Bank Construction Bridge Road

PAG material was exposed during the construction of loop road along the South Bank Construction Bridge Road. The drainage ditch from this cut has been lined with limestone rock. The site survey

conducted in May 2016 reported that no precipitates were observed on the limestone rock. No water was observed in the ditches.

Moberly River Temporary Bridge Access

PAG material was exposed during the construction of the Moberly River bridge approach. The area below the cut has been hydro-seeded and silt fences have been installed. The site survey conducted in May 2016 reported some oxidation and staining on the road cut but no water was observed on-site.

Baseline Water Quality Monitoring

BC Hydro completed baseline water quality monitoring in the Peace River, in accordance with EAC Schedule B, Condition 3. Baseline water quality sampling was completed at two (2) locations upstream of the construction site and one (1) location downstream of the construction site, on June 17, September 17, and December 17, 2015. Refer to Figure 1 for the location of these sampling sites, and Table 1 for water quality results. Baseline water quality was assessed using the March 2015 Federal Guidelines for Canadian Drinking Water Quality (GCDWQ).

Closure

Please contact me at 604-528-1721 or greg.scarborough@bchydro.com if you have any questions.

Regards,

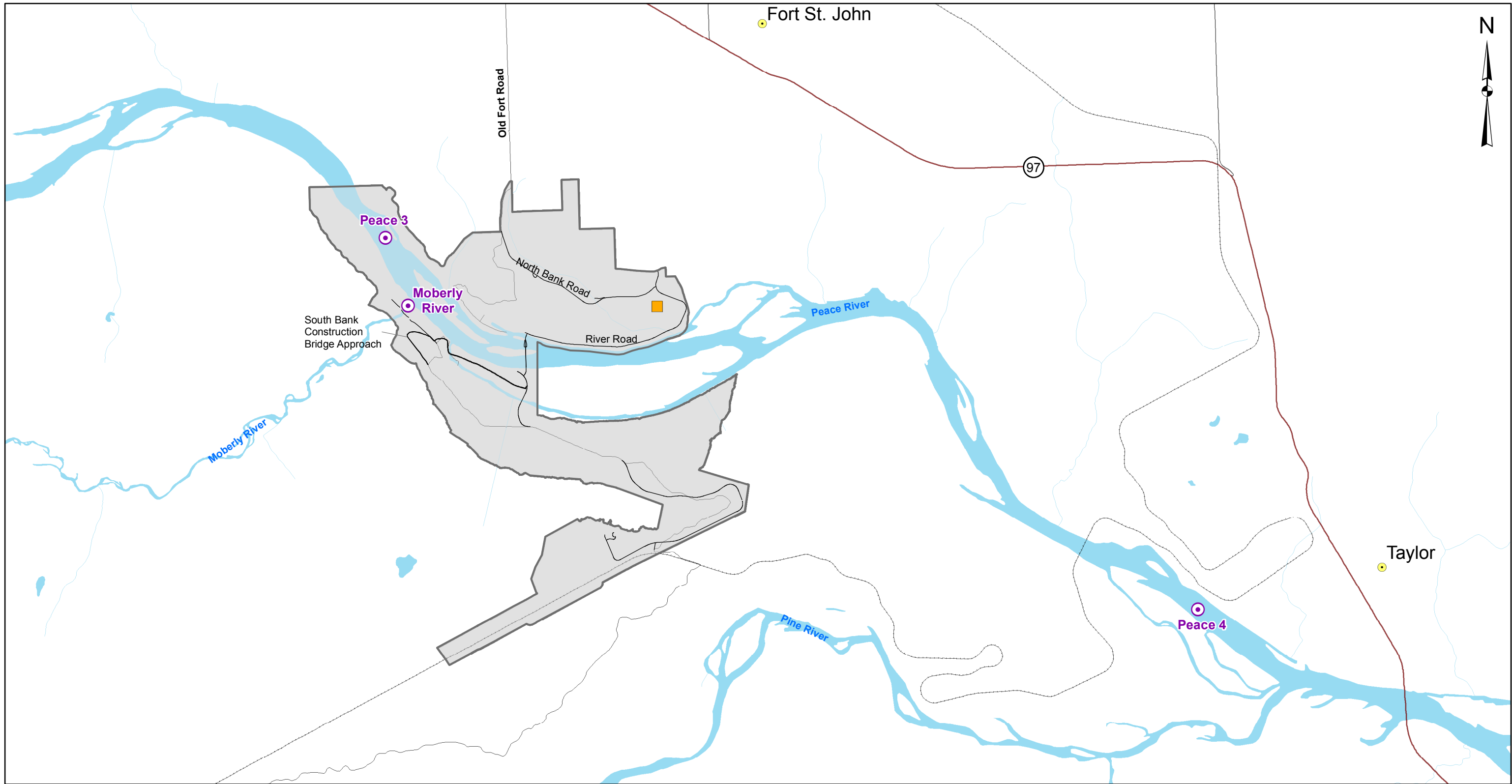


Greg Scarborough
Environmental Mitigation, Monitoring and Compliance
Site C Clean Energy Project

Attachments:

Figure 1 – Surface Water Sampling Locations

Table 1 – Baseline Water Quality Monitoring Results



Legend

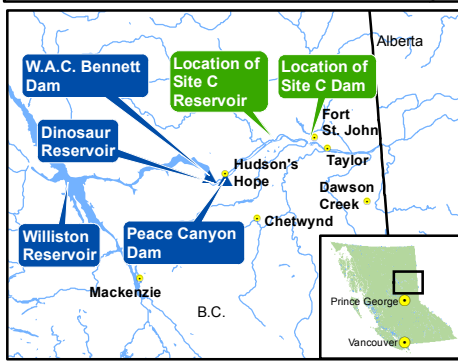
- ⊙ Surface Water Sampling Locations
- Howe Pit
- Dam Site Area
- Road
- Highway
- - - Railway

1:60,000 0 2.5 km



Figure 1
Surface Water Sampling Locations

Date	June 1, 2016	DWG NO	1016-C14-07285	R 0
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Map Notes:
 1. Datum: NAD83
 2. Projection: UTM Zone 10N
 3. Base Data: Province of B.C.

Path: X:\ArcGIS\Projects\Environment\Ground_Water\Water_Sampling_DamSite_EAO_Rpt_1016_C14_07285.mxd

Exceeds GCDWQ Guideline
 Within GCDWQ Guideline

Sample ID				PEACE 3	PEACE 3	PEACE 3	Moberly River	PEACE 4	PEACE 4	PEACE 4
Sample Location				Peace River - Upstream of Construction	Peace River - Upstream of Construction	Peace River - Upstream of Construction	Moberly River - Upstream of the Peace River	Peace River - Downstream of Construction	Peace River - Downstream of Construction	Peace River - Downstream of Construction
Date Sampled				17-Jun-15	17-Sep-15	10-Dec-15	17-Jun-15	17-Jun-15	17-Sep-15	10-Dec-15
Analyte	Units	Detection Limit	GCDWQ - Aesthetic	Water	Water	Water	Water	Water	Water	Water
Physical Tests (Water)										
Colour, True	CU	5	15	7.1	8.3	7.5	24.6	6.8	7.8	7.5
Conductivity	uS/cm	2	-	219	209	195	194	209	199	192
Hardness (as CaCO3)	mg/L	0.5	-	116	113	101	105	112	108	98.8
pH	pH	0.1	<6.5, 8.5<	8.18	8.22	8.07	8.21	8.2	8.21	8.07
Total Suspended Solids	mg/L	3	-	29.1	6.4	5.2	63.3	213	6	14.4
Total Dissolved Solids	mg/L	1	500	126	119	105	113	121	114	103
Turbidity	NTU	0.1	-	7.24	4.93	4.16	22.1	52	4.72	6.38
Anions and Nutrients (Water)										
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1	-	103	95.9	85.9	99	97.9	92.3	84.1
Alkalinity, Carbonate (as CaCO3)	mg/L	1	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	1	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	1	-	103	95.9	85.9	99	97.9	92.3	84.1
Bromide (Br)	mg/L	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	250	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.02	-	0.05	0.045	0.039	0.067	0.047	0.042	0.038
Nitrate and Nitrite (as N)	mg/L	0.0051	-	0.057	0.0516	0.0669	0.0749	0.0568	0.0497	0.0673
Nitrate (as N)	mg/L	0.005	-	0.057	0.0516	0.0669	0.0749	0.0568	0.0497	0.0673
Nitrite (as N)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	0.0015	<0.0010	<0.0010	0.0012
Silicate (as SiO2)	mg/L	0.5	-	4.2	4.1	4.07	3.06	4.12	3.95	4.13
Sulfate (SO4)	mg/L	0.3	500	20	18.4	14.6	9.16	18.4	16.4	14
Anion Sum	meq/L	n/a	-	2.48	2.3	2.03	2.18	2.35	2.19	1.98
Cation Sum	meq/L	n/a	-	2.33	2.25	2.02	2.09	2.24	2.17	1.97
Cation - Anion Balance	%	n/a	-	-3.2	-1.2	-0.3	-2	-2.3	-0.5	-0.1
Organic / Inorganic Carbon (Water)										
Dissolved Organic Carbon	mg/L	0.5	-	2.66	2.78	2.22	6.48	3.1	2.76	2.16
Total Organic Carbon	mg/L	0.5	-	2.75	2.59	2.22	7	2.84	2.52	2.48

Exceeds GCDWQ Guideline
 Within GCDWQ Guideline

Sample ID			PEACE 3	PEACE 3	PEACE 3	Moberly River	PEACE 4	PEACE 4	PEACE 4	
Sample Location			Peace River - Upstream of Construction	Peace River - Upstream of Construction	Peace River - Upstream of Construction	Moberly River - Upstream of the Peace River	Peace River - Downstream of Construction	Peace River - Downstream of Construction	Peace River - Downstream of Construction	
Date Sampled			17-Jun-15	17-Sep-15	10-Dec-15	17-Jun-15	17-Jun-15	17-Sep-15	10-Dec-15	
Analyte	Units	Detection Limit	GCDWQ - Aesthetic	Water	Water	Water	Water	Water	Water	
Total Metals (Water)										
Aluminum (Al)-Total	mg/L	0.01	0.1	0.474	0.178	0.089	1.15	1.08	0.154	0.258
Antimony (Sb)-Total	mg/L	0.0005	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010
Barium (Ba)-Total	mg/L	0.02	-	0.055	0.047	0.037	0.156	0.09	0.044	0.041
Beryllium (Be)-Total	mg/L	0.005	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Total	mg/L	0.2	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Total	mg/L	0.1	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.00005	-	0.000057	<0.000050	<0.000050	<0.000050	0.000105	<0.000050	<0.000050
Calcium (Ca)-Total	mg/L	0.1	-	34	34.5	31.2	30	35.2	31.9	31.1
Chromium (Cr)-Total	mg/L	0.0005	-	0.00095	<0.00050	<0.00050	0.00196	0.00196	<0.00050	0.00055
Cobalt (Co)-Total	mg/L	0.0005	-	<0.00050	<0.00050	<0.00050	0.00072	0.00094	<0.00050	<0.00050
Copper (Cu)-Total	mg/L	0.001	1	0.0015	<0.0010	0.001	0.0028	0.0027	<0.0010	0.0011
Iron (Fe)-Total	mg/L	0.03	0.3	0.732	0.243	0.136	1.68	1.99	0.197	0.38
Lead (Pb)-Total	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010
Lithium (Li)-Total	mg/L	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)-Total	mg/L	0.1	-	7.66	7.63	6.56	7.84	7.97	6.9	6.5
Manganese (Mn)-Total	mg/L	0.01	0.05	0.016	<0.010	<0.010	0.031	0.036	<0.010	<0.010
Mercury (Hg)-Total	mg/L	0.0002	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum (Mo)-Total	mg/L	0.001	-	0.0011	0.0013	<0.0010	<0.0010	0.0012	0.0013	<0.0010
Nickel (Ni)-Total	mg/L	0.005	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phosphorus (P)-Total	mg/L	0.3	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total	mg/L	2	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium (Se)-Total	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	0.05	-	2.65	2.38	2.3	3.52	3.56	2.25	2.62
Silver (Ag)-Total	mg/L	0.00005	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Total	mg/L	2	200	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)-Total	mg/L	0.005	-	0.133	0.137	0.117	0.0724	0.134	0.123	0.115
Thallium (Tl)-Total	mg/L	0.0002	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	0.03	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium (Ti)-Total	mg/L	0.05	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Uranium (U)-Total	mg/L	0.0002	-	0.00054	0.00052	0.00047	0.00027	0.00062	0.00055	0.00047
Vanadium (V)-Total	mg/L	0.03	-	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc (Zn)-Total	mg/L	0.005	5	<0.0050	<0.0050	<0.0050	0.0075	0.0101	<0.0050	<0.0050

