

March 27, 2023

Siobhan Burland Ross
A/Director - Environmental Approvals Branch
Manitoba Environment and Climate
Box 35 – 14 Fultz Boulevard
Winnipeg, MB R3Y 0L6

Dear Siobhan Burland Ross:

RE: Bipole III Transmission Project - Notice of Alteration to Discharge Backwash Water from Keewatinohk Converter Station Water Treatment Plant Directly to the Environment Environment Act Licence No. 3055, Client File 5433.00

Manitoba Hydro is requesting an alteration to EAL No. 3055 to discharge backwash water from the Keewatinohk Converter Station Water Treatment Plant (WTP) directly to the environment.

The Keewatinohk Converter Station is northeast of Gillam and is the northern end point of the Bipole III transmission line. The WTP is a greensand filter system and supplies water to the Converter Station and housing located at the site. The backwash is programmed to occur every 3 days and results in approximately 6 m³ of backwash. In addition to this, when producing the average 29 m³ of potable water, 11.4 m³ of process reject water and 5.3 m³ of foam ball reject water will be produced and discharged daily. The Environmental Impact Statement for the Bipole III Transmission Project, Chapter 3: Project Description, page 3-122 states:

Wastewater from the [Keewatinohk Converter Station] water treatment plant will consist mainly of process filter backwash and settling chamber sludge, and will be discharged to the sewage collection system for further treatment.

Wastewater treatment at the site is provided via a drain field. Manitoba Hydro previously obtained temporary approval to direct the backwash water from the WTP directly to the environment rather than the drain field. A request is being made to make this a permanent arrangement to avoid the risk of oversaturating the drain field.

Water is discharged from the WTP reject water tank to the converter station drainage ditch which then flows into the ditch located along the access road, refer to Figure 1. This ditch flows northward for approximately 1.4 km to Goose Creek, which is fish bearing. The discharge water typically dissipates along the drainage path prior to reaching the creek. Icing

issues have not been identified during the winter months.

Water samples have been taken from the well, foamball, and backwash water with analysis for M79D package (lab results attached). Clean in Place (CIP) water is also produced on a quarterly basis, this will continue to be discharged to the drain field.

The proposed alteration does not increase effects to any valued components and, therefore, does not change the conclusions in the Bipole III Transmission Project Environmental Impact Statement.

If there are any questions or concerns with this request, please contact Jodine MacDuff at 204-250-1017.

Regards,

Original Signed by

James Matthewson

Manager

Transmission & Distribution Environment and Engagement

Project Management Division

Asset Planning and Delivery

Att.

Bipole III Transmission Project

Drainage Route

Drainage Route

Infrastructure

BPIII Route

Landbase

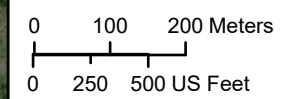
Access Road

Watercourse



Imagery Source: Maxar

Coordinate System: UTM Zone 14N NAD83
 Data Source: MBHydro, ProvMB, NRCAN
 Date Created: March 16, 2023



1:10,000

Keewatinohk Converter Station WTP Backwash Water Drainage Route

Draft: For Discussion Purposes Only

File Location: \\prodsta1\T\en1\GIS\Orientes\Analysis\022\023\16_Keewatinohk\DischargeRoute\DischargeRoute.aprx



Your P.O. #: 4700004537
 Your C.O.C. #: 635849-01-01

Attention: MEGAN ANGER

MANITOBA HYDRO
 16 STATION ROAD
 THOMPSON, MB
 CANADA R8N 1N5

Report Date: 2021/06/09
 Report #: R3030696
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C135456

Received: 2021/05/26, 14:46

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity @25C (pp, total), CO3,HCO3,OH (1)	3	N/A	2021/06/01	AB SOP-00005	SM 23 2320 B m
Bromide by IC (1)	3	N/A	2021/05/29	AB SOP-00052	SM 23 4110 B m
Cadmium - low level CCME - Dissolved (1)	3	N/A	2021/05/29		Auto Calc
Cadmium - low level CCME (Total) (1)	3	N/A	2021/06/08		Auto Calc
Chloride/Sulphate by Auto Colourimetry (1)	3	N/A	2021/06/06	AB SOP-00020	SM23-4500-Cl/SO4-E m
True Colour (1)	3	N/A	2021/05/28	CAL SOP-00049	SM 23 2120 C m
Conductivity @25C (1)	3	N/A	2021/06/01	AB SOP-00005	SM 23 2510 B m
Fluoride (1)	3	N/A	2021/06/01	AB SOP-00005	SM 23 4500-F C m
Hardness (1)	3	N/A	2021/06/02		Auto Calc
Mercury (Dissolved) by CV-Lab Filtered (1)	3	2021/06/07	2021/06/08	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	1	2021/06/07	2021/06/08	AB SOP-00084	BCMOE BCLM Oct2013 m
Mercury (Total) by CV (1)	2	2021/06/07	2021/06/09	AB SOP-00084	BCMOE BCLM Oct2013 m
Elements by ICP-Dissolved-Lab Filtered (1, 3)	2	N/A	2021/06/01	AB SOP-00042	EPA 6010d R5 m
Elements by ICP-Dissolved-Lab Filtered (1, 3)	1	N/A	2021/06/08	AB SOP-00042	EPA 6010d R5 m
Elements by ICP - Total (1)	3	2021/06/07	2021/06/08	AB SOP-00014 / AB SOP-00042	EPA 6010d R5 m
Elements by ICPMS-Dissolved-Lab Filtered (1, 4)	3	N/A	2021/05/28	AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	1	2021/06/07	2021/06/07	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Total (1)	2	2021/06/07	2021/06/08	AB SOP-00014 / AB SOP-00043	EPA 6020b R2 m
Ion Balance (1)	3	N/A	2021/06/06		Auto Calc
Ammonia-N (Total) (1)	2	N/A	2021/06/05	AB SOP-00007	SM 23 4500 NH3 A G m
Ammonia-N (Total) (1)	1	N/A	2021/06/09	AB SOP-00007	SM 23 4500 NH3 A G m
Nitrate and Nitrite (1)	3	N/A	2021/05/29		Auto Calc
NO2 - NO2 + NO3 (N) in Water (1)	3	N/A	2021/05/28	AB SOP-00091	SM 23 4500 NO3m
Nitrate (as N) (1)	3	2021/05/27	2021/05/29		Auto Calc
pH @25°C (1, 5)	3	N/A	2021/06/01	AB SOP-00005	SM 23 4500-H+B m
Sat. pH and Langelier Index (@ 4.4C) (2)	3	N/A	2021/06/02	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C) (2)	3	N/A	2021/06/02	BBY WI-00033	Auto Calc
Carbon (total) (Calc. - Org. + Inorg.) (1)	3	N/A	2021/06/09		Auto Calc
Total Dissolved Solids (Filt. Residue) (1)	3	2021/05/31	2021/05/31	AB SOP-00065	SM 23 2540 C m



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CANADA R8N 1N5

Report Date: 2021/06/09
Report #: R3030696
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C135456

Received: 2021/05/26, 14:46

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Carbon (Inorganic) (1)	3	N/A	2021/06/01	CAL SOP-00076	Modified AE 2411
Carbon (Total Organic) (1, 6)	3	N/A	2021/06/08	AB SOP-00087	MMCW 119 1996 m
Turbidity (1)	3	N/A	2021/05/28	CAL SOP-00081	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary Environmental
- (2) This test was performed by Bureau Veritas Vancouver
- (3) Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (4) Samples were filtered and preserved at the lab. Values may not reflect concentrations at the time of sampling. Dissolved > Total Imbalance: When applicable, Dissolved and Total results were reviewed and data quality meets acceptable levels unless otherwise noted.
- (5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.
- (6) TOC present in the sample should be considered as non-purgeable TOC.



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Received: 2021/05/26, 14:46

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Janelle Kochan, B.Sc., Key Account Specialist
Email: Janelle.KOCHAN@bureauveritas.com
Phone# (204)259-0231

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This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZW1439		ZW1440		ZW1441		
Sampling Date		2021/05/25 10:30		2021/05/25 10:15		2021/05/25 10:50		
COC Number		635849-01-01		635849-01-01		635849-01-01		
	UNITS	RAW WATER	QC Batch	BACKWASH WATER	QC Batch	FOAMBALL WATER	RDL	QC Batch
Calculated Parameters								
Hardness (CaCO ₃)	mg/L	360	A237434	290	A237434	320	0.50	A237434
Ion Balance (% Difference)	%	5.1	A237448	0.52	A237448	0.96	N/A	A237448
Dissolved Nitrate (N)	mg/L	<0.010	A237445	0.068	A237445	0.017	0.010	A237445
Dissolved Nitrate (NO ₃)	mg/L	<0.044	A237435	0.30	A237435	0.075	0.044	A237435
Dissolved Nitrite (NO ₂)	mg/L	<0.033	A237435	0.039	A237435	<0.033	0.033	A237435
Elements								
Dissolved Cadmium (Cd)	ug/L	<0.020	A236987	<0.020	A236987	<0.020	0.020	A236987
Total Cadmium (Cd)	ug/L	<0.020	A237177	<0.020	A237177	<0.020	0.020	A237177
Misc. Inorganics								
Conductivity	uS/cm	740	A241008	790	A241008	840	2.0	A241008
pH	pH	7.81	A241007	8.00	A241007	7.80	N/A	A241007
Total Organic Carbon (C)	mg/L	7.3	A247382	9.7	A247382	7.8	0.50	A247382
Total Dissolved Solids	mg/L	410	A239417	460	A239417	560	10	A240365
Anions								
Alkalinity (PP as CaCO ₃)	mg/L	<1.0	A241006	<1.0	A241006	<1.0	1.0	A241006
Alkalinity (Total as CaCO ₃)	mg/L	330	A241006	290	A241006	320	1.0	A241006
Bicarbonate (HCO ₃)	mg/L	400	A241006	360	A241006	390	1.0	A241006
Dissolved Bromide (Br)	mg/L	0.30	A238749	0.14	A238749	0.23	0.010	A238749
Carbonate (CO ₃)	mg/L	<1.0	A241006	<1.0	A241006	<1.0	1.0	A241006
Dissolved Fluoride (F)	mg/L	0.54	A241009	0.53	A241009	0.56	0.050	A241009
Hydroxide (OH)	mg/L	<1.0	A241006	<1.0	A241006	<1.0	1.0	A241006
Dissolved Chloride (Cl)	mg/L	43	A246364	76	A246364	68	1.0	A246364
Dissolved Sulphate (SO ₄)	mg/L	<1.0	A246364	14	A246364	34	1.0	A246364
Nutrients								
Total Ammonia (N)	mg/L	1.3	A246089	0.48	A246087	0.68	0.015	A249910
Total Carbon (C)	mg/L	94	A237454	85	A237454	88	0.50	A237454
Total Inorganic Carbon (C)	mg/L	86	A240281	75	A240281	80	1.0	A240281
Dissolved Nitrite (N)	mg/L	<0.010	A238172	0.012	A238172	<0.010	0.010	A238172
Dissolved Nitrate plus Nitrite (N)	mg/L	<0.010	A238172	0.080	A238172	0.017	0.010	A238172
Physical Properties								
True Colour	PtCo units	6.2	A238420	12	A238420	8.2	2.0	A238420
RDL = Reportable Detection Limit N/A = Not Applicable								



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BV Labs Job #: C135456

Report Date: 2021/06/09

MANITOBA HYDRO

Your P.O. #: 4700004537

RESULTS OF CHEMICAL ANALYSES OF WATER

BV Labs ID		ZW1439		ZW1440		ZW1441		
Sampling Date		2021/05/25 10:30		2021/05/25 10:15		2021/05/25 10:50		
COC Number		635849-01-01		635849-01-01		635849-01-01		
	UNITS	RAW WATER	QC Batch	BACKWASH WATER	QC Batch	FOAMBALL WATER	RDL	QC Batch
Physical Properties								
Turbidity	NTU	32	A238421	310	A238421	0.17	0.10	A238421
RDL = Reportable Detection Limit								



MERCURY BY COLD VAPOR (WATER)

BV Labs ID		ZW1439	ZW1440	ZW1441		
Sampling Date		2021/05/25 10:30	2021/05/25 10:15	2021/05/25 10:50		
COC Number		635849-01-01	635849-01-01	635849-01-01		
	UNITS	RAW WATER	BACKWASH WATER	FOAMBALL WATER	RDL	QC Batch
Elements						
Total Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	A247177
Lab Filtered Elements						
Dissolved Mercury (Hg)	ug/L	<0.0019	<0.0019	<0.0019	0.0019	A247174
RDL = Reportable Detection Limit						



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MANITOBA HYDRO
Your P.O. #: 4700004537

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		ZW1439	ZW1440		ZW1441		
Sampling Date		2021/05/25 10:30	2021/05/25 10:15		2021/05/25 10:50		
COC Number		635849-01-01	635849-01-01		635849-01-01		
	UNITS	RAW WATER	BACKWASH WATER	QC Batch	FOAMBALL WATER	RDL	QC Batch
Elements							
Total Aluminum (Al)	mg/L	<0.0030	0.014	A247227	0.0059	0.0030	A247227
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	A247227	<0.00060	0.00060	A247227
Total Arsenic (As)	mg/L	<0.00020	0.0011	A247227	<0.00020	0.00020	A247227
Total Barium (Ba)	mg/L	0.14	0.35	A247240	0.12	0.010	A247240
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	A247227	<0.0010	0.0010	A247227
Total Boron (B)	mg/L	0.070	0.071	A247240	0.071	0.020	A247240
Total Calcium (Ca)	mg/L	85	79	A247240	86	0.30	A247240
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	A247227	<0.0010	0.0010	A247227
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	A247227	<0.00030	0.00030	A247227
Total Copper (Cu)	mg/L	<0.00020	0.0049	A247227	0.0048	0.00020	A247227
Total Iron (Fe)	mg/L	3.3	40	A247240	<0.060	0.060	A247240
Total Lead (Pb)	mg/L	<0.00020	<0.00020	A247227	<0.00020	0.00020	A247227
Total Lithium (Li)	mg/L	<0.020	<0.020	A247240	<0.020	0.020	A247240
Total Magnesium (Mg)	mg/L	24	21	A247240	24	0.20	A247240
Total Manganese (Mn)	mg/L	0.048	0.46	A247240	0.040	0.0040	A247240
Total Molybdenum (Mo)	mg/L	<0.00020	<0.00020	A247227	0.00022	0.00020	A247227
Total Nickel (Ni)	mg/L	<0.00050	<0.00050	A247227	<0.00050	0.00050	A247227
Total Phosphorus (P)	mg/L	0.23	3.1	A247240	1.7	0.10	A247240
Total Potassium (K)	mg/L	2.1	2.0	A247240	2.2	0.30	A247240
Total Selenium (Se)	mg/L	<0.00020	<0.00020	A247227	<0.00020	0.00020	A247227
Total Silicon (Si)	mg/L	7.5	8.7	A247240	7.5	0.10	A247240
Total Silver (Ag)	mg/L	<0.00010	<0.00010	A247227	<0.00010	0.00010	A247227
Total Sodium (Na)	mg/L	30	53	A247240	58	0.50	A247240
Total Strontium (Sr)	mg/L	0.42	0.42	A247240	0.43	0.020	A247240
Total Sulphur (S)	mg/L	<0.20	5.0	A247240	13	0.20	A247240
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	A247227	<0.00020	0.00020	A247227
Total Tin (Sn)	mg/L	<0.0010	<0.0010	A247227	<0.0010	0.0010	A247227
Total Titanium (Ti)	mg/L	<0.0010	0.0017	A247227	<0.0010	0.0010	A247227
Total Uranium (U)	mg/L	<0.00010	<0.00010	A247227	<0.00010	0.00010	A247227
Total Vanadium (V)	mg/L	<0.0010	0.0013	A247227	<0.0010	0.0010	A247227
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	A247227	<0.0030	0.0030	A247227
Lab Filtered Elements							
Dissolved Aluminum (Al)	mg/L	0.0031	<0.0030	A238528	<0.0030	0.0030	A238528
RDL = Reportable Detection Limit							



BUREAU
VERITAS

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MANITOBA HYDRO
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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		ZW1439	ZW1440		ZW1441		
Sampling Date		2021/05/25 10:30	2021/05/25 10:15		2021/05/25 10:50		
COC Number		635849-01-01	635849-01-01		635849-01-01		
	UNITS	RAW WATER	BACKWASH WATER	QC Batch	FOAMBALL WATER	RDL	QC Batch
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	A238528	<0.00060	0.00060	A238528
Dissolved Arsenic (As)	mg/L	<0.00020	<0.00020	A238528	<0.00020	0.00020	A238528
Dissolved Barium (Ba)	mg/L	0.14	0.12	A239355	0.11	0.010	A247542
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	A238528	<0.0010	0.0010	A238528
Dissolved Boron (B)	mg/L	0.080	0.081	A239355	0.069	0.020	A247542
Dissolved Calcium (Ca)	mg/L	96	80	A239355	87	0.30	A247542
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	A238528	<0.0010	0.0010	A238528
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	A238528	<0.00030	0.00030	A238528
Dissolved Copper (Cu)	mg/L	<0.00020	0.0010	A238528	0.0025	0.00020	A238528
Dissolved Iron (Fe)	mg/L	<0.060	0.22	A239355	<0.060	0.060	A247542
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	A238528	<0.00020	0.00020	A238528
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	A239355	<0.020	0.020	A247542
Dissolved Magnesium (Mg)	mg/L	28	23	A239355	26	0.20	A247542
Dissolved Manganese (Mn)	mg/L	0.048	0.048	A239355	0.024	0.0040	A247542
Dissolved Molybdenum (Mo)	mg/L	<0.00020	<0.00020	A238528	<0.00020	0.00020	A238528
Dissolved Nickel (Ni)	mg/L	<0.00050	<0.00050	A238528	<0.00050	0.00050	A238528
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	A239355	1.2	0.10	A247542
Dissolved Potassium (K)	mg/L	2.5	2.1	A239355	2.5	0.30	A247542
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	A238528	<0.00020	0.00020	A238528
Dissolved Silicon (Si)	mg/L	7.1	7.1	A239355	6.6	0.10	A247542
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	A238528	<0.00010	0.00010	A238528
Dissolved Sodium (Na)	mg/L	32	56	A239355	60	0.50	A247542
Dissolved Strontium (Sr)	mg/L	0.46	0.39	A239355	0.40	0.020	A247542
Dissolved Sulphur (S)	mg/L	<0.20	5.4	A239355	10	0.20	A247542
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	A238528	<0.00020	0.00020	A238528
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	A238528	<0.0010	0.0010	A238528
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	A238528	<0.0010	0.0010	A238528
Dissolved Uranium (U)	mg/L	<0.00010	<0.00010	A238528	<0.00010	0.00010	A238528
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	A238528	<0.0010	0.0010	A238528
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	A238528	0.0039	0.0030	A238528
RDL = Reportable Detection Limit							



CALCULATED PARAMETERS (WATER)

BV Labs ID		ZW1439	ZW1440	ZW1441	
Sampling Date		2021/05/25 10:30	2021/05/25 10:15	2021/05/25 10:50	
COC Number		635849-01-01	635849-01-01	635849-01-01	
	UNITS	RAW WATER	BACKWASH WATER	FOAMBALL WATER	QC Batch
Calculated Parameters					
Langelier Index (@ 4.4C)	N/A	0.354	0.401	0.265	A237476
Langelier Index (@ 60C)	N/A	1.40	1.44	1.31	A237477
Saturation pH (@ 4.4C)	N/A	7.46	7.60	7.53	A237476
Saturation pH (@ 60C)	N/A	6.42	6.56	6.49	A237477



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MANITOBA HYDRO

Your P.O. #: 4700004537

GENERAL COMMENTS

Results relate only to the items tested.



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BV Labs Job #: C135456

Report Date: 2021/06/09

QUALITY ASSURANCE REPORT

MANITOBA HYDRO

Your P.O. #: 4700004537

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A238172	Dissolved Nitrate plus Nitrite (N)	2021/05/28	NC	80 - 120	103	80 - 120	<0.010	mg/L		
A238172	Dissolved Nitrite (N)	2021/05/28	96	80 - 120	102	80 - 120	<0.010	mg/L		
A238420	True Colour	2021/05/28	66 (1)	80 - 120	98	80 - 120	<2.0	PtCo units	1.2	20
A238421	Turbidity	2021/05/28			102	80 - 120	<0.10	NTU	1.9	20
A238528	Dissolved Aluminum (Al)	2021/05/28	103	80 - 120	106	80 - 120	<0.0030	mg/L	NC	20
A238528	Dissolved Antimony (Sb)	2021/05/28	103	80 - 120	104	80 - 120	<0.00060	mg/L	NC	20
A238528	Dissolved Arsenic (As)	2021/05/28	104	80 - 120	101	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Beryllium (Be)	2021/05/28	102	80 - 120	105	80 - 120	<0.0010	mg/L	NC	20
A238528	Dissolved Chromium (Cr)	2021/05/28	106	80 - 120	104	80 - 120	<0.0010	mg/L	3.7	20
A238528	Dissolved Cobalt (Co)	2021/05/28	104	80 - 120	105	80 - 120	<0.00030	mg/L	NC	20
A238528	Dissolved Copper (Cu)	2021/05/28	103	80 - 120	103	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Lead (Pb)	2021/05/28	98	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Molybdenum (Mo)	2021/05/28	108	80 - 120	104	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Nickel (Ni)	2021/05/28	104	80 - 120	103	80 - 120	<0.00050	mg/L	NC	20
A238528	Dissolved Selenium (Se)	2021/05/28	110	80 - 120	111	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Silver (Ag)	2021/05/28	98	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20
A238528	Dissolved Thallium (Tl)	2021/05/28	99	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20
A238528	Dissolved Tin (Sn)	2021/05/28	95	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20
A238528	Dissolved Titanium (Ti)	2021/05/28	110	80 - 120	105	80 - 120	<0.0010	mg/L	NC	20
A238528	Dissolved Uranium (U)	2021/05/28	98	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20
A238528	Dissolved Vanadium (V)	2021/05/28	107	80 - 120	105	80 - 120	<0.0010	mg/L	NC	20
A238528	Dissolved Zinc (Zn)	2021/05/28	107	80 - 120	109	80 - 120	<0.0030	mg/L	NC	20
A238749	Dissolved Bromide (Br)	2021/05/29	110	80 - 120	101	80 - 120	<0.010	mg/L	0.17	20
A239355	Dissolved Barium (Ba)	2021/06/01	88	80 - 120	98	80 - 120	<0.010	mg/L		
A239355	Dissolved Boron (B)	2021/06/01	95	80 - 120	100	80 - 120	<0.020	mg/L		
A239355	Dissolved Calcium (Ca)	2021/06/02	NC	80 - 120	101	80 - 120	<0.30	mg/L	0.98	20
A239355	Dissolved Iron (Fe)	2021/06/02	105	80 - 120	105	80 - 120	<0.060	mg/L	NC	20
A239355	Dissolved Lithium (Li)	2021/06/01	96	80 - 120	100	80 - 120	<0.020	mg/L		
A239355	Dissolved Magnesium (Mg)	2021/06/02	97	80 - 120	101	80 - 120	<0.20	mg/L	0.87	20
A239355	Dissolved Manganese (Mn)	2021/06/02	102	80 - 120	102	80 - 120	<0.0040	mg/L	1.1	20
A239355	Dissolved Phosphorus (P)	2021/06/01	97	80 - 120	103	80 - 120	<0.10	mg/L		
A239355	Dissolved Potassium (K)	2021/06/02	99	80 - 120	101	80 - 120	<0.30	mg/L	0.27	20
A239355	Dissolved Silicon (Si)	2021/06/01	88	80 - 120	99	80 - 120	<0.10	mg/L		



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QUALITY ASSURANCE REPORT(CONT'D)

MANITOBA HYDRO

Your P.O. #: 4700004537

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A239355	Dissolved Sodium (Na)	2021/06/02	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.56	20
A239355	Dissolved Strontium (Sr)	2021/06/01	NC	80 - 120	97	80 - 120	<0.020	mg/L		
A239355	Dissolved Sulphur (S)	2021/06/01	99	80 - 120	105	80 - 120	<0.20	mg/L		
A239417	Total Dissolved Solids	2021/05/31	NC	80 - 120	102	80 - 120	<10	mg/L	2.6	20
A240281	Total Inorganic Carbon (C)	2021/06/01	NC	80 - 120	112	80 - 120	<1.0	mg/L	0.027	20
A240365	Total Dissolved Solids	2021/05/31	NC	80 - 120	89	80 - 120	<10	mg/L	6.6	20
A241006	Alkalinity (PP as CaCO3)	2021/06/01					<1.0	mg/L	NC	20
A241006	Alkalinity (Total as CaCO3)	2021/06/01			95	80 - 120	<1.0	mg/L	5.8	20
A241006	Bicarbonate (HCO3)	2021/06/01					<1.0	mg/L	5.8	20
A241006	Carbonate (CO3)	2021/06/01					<1.0	mg/L	NC	20
A241006	Hydroxide (OH)	2021/06/01					<1.0	mg/L	NC	20
A241007	pH	2021/06/01			100	97 - 103			0.062	N/A
A241008	Conductivity	2021/06/01			103	90 - 110	<2.0	uS/cm	0.61	10
A241009	Dissolved Fluoride (F)	2021/06/01	91	80 - 120	98	80 - 120	<0.050	mg/L	2.9	20
A246087	Total Ammonia (N)	2021/06/05	NC	80 - 120	99	80 - 120	<0.015	mg/L	0.27	20
A246089	Total Ammonia (N)	2021/06/05	95	80 - 120	90	80 - 120	<0.015	mg/L	0.52	20
A246364	Dissolved Chloride (Cl)	2021/06/06	NC	80 - 120	104	80 - 120	<1.0	mg/L	0.22	20
A246364	Dissolved Sulphate (SO4)	2021/06/06	111	80 - 120	103	80 - 120	<1.0	mg/L	NC	20
A247174	Dissolved Mercury (Hg)	2021/06/08	90	80 - 120	89	80 - 120	<0.0019	ug/L	NC	20
A247177	Total Mercury (Hg)	2021/06/08	97	80 - 120	96	80 - 120	<0.0019	ug/L	NC	20
A247227	Total Aluminum (Al)	2021/06/08	NC	80 - 120	108	80 - 120	<0.0030	mg/L	5.7	20
A247227	Total Antimony (Sb)	2021/06/08	94	80 - 120	102	80 - 120	<0.00060	mg/L	NC	20
A247227	Total Arsenic (As)	2021/06/08	86	80 - 120	93	80 - 120	<0.00020	mg/L	3.4	20
A247227	Total Beryllium (Be)	2021/06/08	94	80 - 120	108	80 - 120	<0.0010	mg/L	4.5	20
A247227	Total Chromium (Cr)	2021/06/08	88	80 - 120	101	80 - 120	<0.0010	mg/L	2.6	20
A247227	Total Cobalt (Co)	2021/06/08	NC	80 - 120	99	80 - 120	<0.00030	mg/L	2.7	20
A247227	Total Copper (Cu)	2021/06/08	81	80 - 120	100	80 - 120	<0.00020	mg/L	2.1	20
A247227	Total Lead (Pb)	2021/06/08	99	80 - 120	106	80 - 120	<0.00020	mg/L	NC	20
A247227	Total Molybdenum (Mo)	2021/06/08	100	80 - 120	109	80 - 120	<0.00020	mg/L	NC	20
A247227	Total Nickel (Ni)	2021/06/08	NC	80 - 120	101	80 - 120	<0.00050	mg/L	1.9	20
A247227	Total Selenium (Se)	2021/06/07	94	80 - 120	101	80 - 120	<0.00020	mg/L		
A247227	Total Silver (Ag)	2021/06/08	98	80 - 120	104	80 - 120	<0.00010	mg/L	NC	20
A247227	Total Thallium (Tl)	2021/06/08	94	80 - 120	109	80 - 120	<0.00020	mg/L	NC	20



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QUALITY ASSURANCE REPORT(CONT'D)

MANITOBA HYDRO

Your P.O. #: 4700004537

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A247227	Total Tin (Sn)	2021/06/08	97	80 - 120	104	80 - 120	<0.0010	mg/L	4.6	20
A247227	Total Titanium (Ti)	2021/06/08	96	80 - 120	100	80 - 120	<0.0010	mg/L	17	20
A247227	Total Uranium (U)	2021/06/08	99	80 - 120	108	80 - 120	<0.00010	mg/L	1.3	20
A247227	Total Vanadium (V)	2021/06/08	85	80 - 120	102	80 - 120	<0.0010	mg/L	3.5	20
A247227	Total Zinc (Zn)	2021/06/08	NC	80 - 120	96	80 - 120	<0.0030	mg/L	1.9	20
A247240	Total Barium (Ba)	2021/06/08	98	80 - 120	102	80 - 120	<0.010	mg/L	NC	20
A247240	Total Boron (B)	2021/06/08	100	80 - 120	103	80 - 120	<0.020	mg/L	4.6	20
A247240	Total Calcium (Ca)	2021/06/08	NC	80 - 120	101	80 - 120	<0.30	mg/L	5.2	20
A247240	Total Iron (Fe)	2021/06/08	NC	80 - 120	118	80 - 120	<0.060	mg/L	0.61	20
A247240	Total Lithium (Li)	2021/06/08	99	80 - 120	100	80 - 120	<0.020	mg/L	2.2	20
A247240	Total Magnesium (Mg)	2021/06/08	NC	80 - 120	98	80 - 120	<0.20	mg/L	4.8	20
A247240	Total Manganese (Mn)	2021/06/08	NC	80 - 120	109	80 - 120	<0.0040	mg/L	0.75	20
A247240	Total Phosphorus (P)	2021/06/08	107	80 - 120	111	80 - 120	<0.10	mg/L	3.3	20
A247240	Total Potassium (K)	2021/06/08	101	80 - 120	103	80 - 120	<0.30	mg/L	5.4	20
A247240	Total Silicon (Si)	2021/06/08	NC	80 - 120	116	80 - 120	<0.10	mg/L	5.1	20
A247240	Total Sodium (Na)	2021/06/08	98	80 - 120	100	80 - 120	<0.50	mg/L	4.6	20
A247240	Total Strontium (Sr)	2021/06/08	93	80 - 120	100	80 - 120	<0.020	mg/L	4.6	20
A247240	Total Sulphur (S)	2021/06/08	NC	80 - 120	114	80 - 120	<0.20	mg/L	5.0	20
A247382	Total Organic Carbon (C)	2021/06/08	106	80 - 120	117	80 - 120	<0.50	mg/L	15	20
A247542	Dissolved Barium (Ba)	2021/06/07	98	80 - 120	100	80 - 120	<0.010	mg/L		
A247542	Dissolved Boron (B)	2021/06/07	96	80 - 120	99	80 - 120	<0.020	mg/L		
A247542	Dissolved Calcium (Ca)	2021/06/07	103	80 - 120	102	80 - 120	<0.30	mg/L	0.23	20
A247542	Dissolved Iron (Fe)	2021/06/07	92	80 - 120	100	80 - 120	<0.060	mg/L	17	20
A247542	Dissolved Lithium (Li)	2021/06/07	100	80 - 120	100	80 - 120	<0.020	mg/L		
A247542	Dissolved Magnesium (Mg)	2021/06/07	103	80 - 120	103	80 - 120	<0.20	mg/L	0.42	20
A247542	Dissolved Manganese (Mn)	2021/06/07	95	80 - 120	98	80 - 120	<0.0040	mg/L	7.4	20
A247542	Dissolved Phosphorus (P)	2021/06/07	89	80 - 120	94	80 - 120	<0.10	mg/L		
A247542	Dissolved Potassium (K)	2021/06/07	101	80 - 120	100	80 - 120	<0.30	mg/L	1.1	20
A247542	Dissolved Silicon (Si)	2021/06/07	85	80 - 120	93	80 - 120	<0.10	mg/L		
A247542	Dissolved Sodium (Na)	2021/06/07	99	80 - 120	99	80 - 120	<0.50	mg/L	0.036	20
A247542	Dissolved Strontium (Sr)	2021/06/07	97	80 - 120	99	80 - 120	<0.020	mg/L		
A247542	Dissolved Sulphur (S)	2021/06/07	91	80 - 120	97	80 - 120	<0.20	mg/L		



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QUALITY ASSURANCE REPORT(CONT'D)

MANITOBA HYDRO

Your P.O. #: 4700004537

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A249910	Total Ammonia (N)	2021/06/09	101	80 - 120	99	80 - 120	<0.015	mg/L	4.2	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Manager

Sandy Yuan, M.Sc., QP, Scientific Specialist

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