Design Report
Potable Water Treatment Plant (PTP)

In Accordance with Licence 2AM DOH 1335, Part D, item 1

Prepared by:

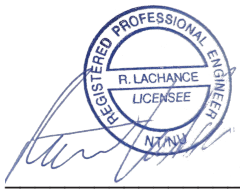
Agnico Eagle Mines Limited – Hope Bay Division

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
R0	08/07/2025			Design report

Prepared By: _____

Thomas Genty
Water Treatment Eng.
NAPEG L4751



Member No.L5013
07/29/2025

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Raphael Lachance
Mechanical Resident Engineer – Construction
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Approved by: _____

Cyril Jenkins
Environment Superintendent

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

1.1 SITE LOCATION AND ACCESS

The Hope Bay Mine is a gold mining and milling undertaking of Agnico Eagle. The Project is located 705 km northeast of Yellowknife and 153 km southwest of Cambridge Bay in Nunavut Territory and is situated east of Bathurst Inlet. Agnico Eagle is currently operating the Doris Project under an existing water license.

1.2 SITE FACILITIES

Current mining facilities to support the mine include a camp for accommodations, tailings storage facility, rock storage facilities, ore pads, process plant, power plant, maintenance facilities, water management treatment plants and supporting water management infrastructure. To accommodate the current site infrastructure, and due to aging of the current water potable treatment plant, a new potable water treatment plant (PTP) upgrade is required.

1.3 PURPOSE OF DOCUMENT

This report includes the final design and drawings for the Potable Water Treatment Plant (PTP) aiming to produce potable water to support several essential activities at site.

A general location plan for the project of PTP is shown in Figure 1.

1.4 SCOPE OF WORK

This report describes the PTP process. Construction drawings of the listed infrastructure are presented in appendices of this report.

Appendix A presents General arrangement and Appendix B the process P&ID & PFD.

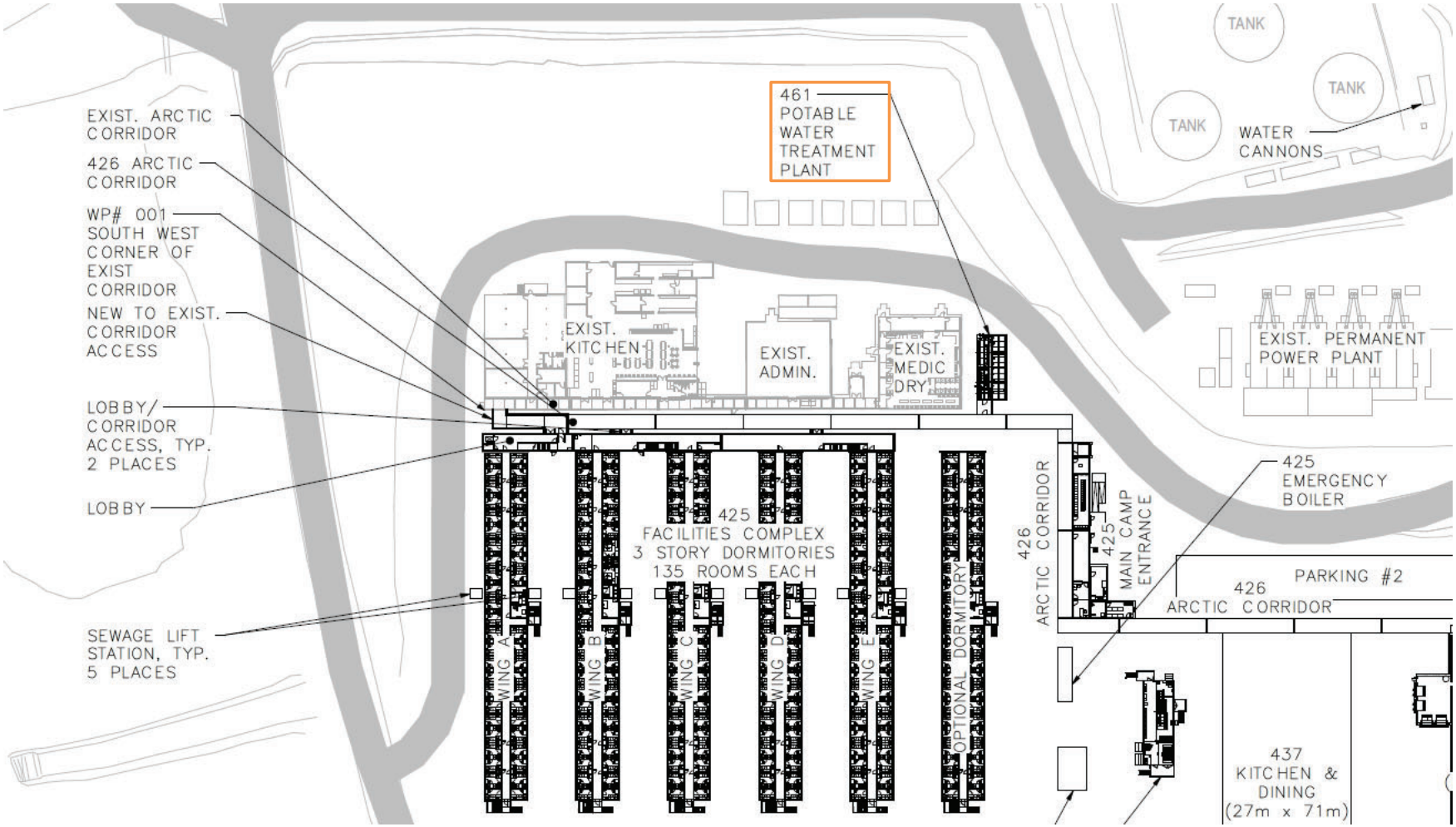


Figure 1 : General location plan

2 DESIGN METHODOLOGY

2.1 DESIGN RATIONALE

The design rationales are the following:

- PTP should treat efficiently water from the raw water source to meet the Canadian drinking water guideline.
- PTP is designed to be able to treat total suspended solid and provide adequate water disinfection.
- Respect of the requirement of license 2AM DOH 1335 in term of Raw water consumption for domestic use.

2.2 DESIGN METHODS, ASSUMPTIONS AND LIMITATIONS

Each component of the PTP was selected to achieve the requirement for the water quality of the potable water and to achieve the design treatment capacity. The selection of each of these components was based on a typical process used in the drinking water treatment sector. The robustness and redundancy of equipment were also taken into account during equipment/supplier selection.

Design criteria of the PTP are presented in Appendix C.

2.3 DOMESTIC WATER MANAGEMENT STRATEGY

Raw water is conveyed to PTP as per the operation license of the site. Water is then treated and distributed across the industrial area for domestic use. Sewage water is then collected to treated into the (sewage treatment plant) STP.

2.4 WATER CHARACTERISTICS

The PTP purpose is to treat TSS/turbidity and provide disinfection. Raw water quality from Windy Lake is presented in appendix C.

2.5 TREATMENT CAPACITY

The PTP is designed to treat a maximum of 209 m^3/d.

3 PROCESS DESCRIPTION

3.1 PTP PROCESS DESCRIPTION AND CONTROL SUMMARY

The PTP system is designed to provide safe, reliable, and continuous potable water for distribution. The system includes key components such as the raw water storage tank, water treatment equipment, treated water storage tanks, and distribution pumps. The water treatment equipment includes a clarifier, multimedia filters, cartridge filters, UV disinfection units, and chlorine disinfection. The water production rate is 8.7 m3h. The treated water is stored in two treated reservoir tanks. The water is distributed from the treated water reservoir via distribution pumps.

The treatment concept is presented in Figure 2. The P&ID can be found in Appendix B.

Raw Water Tank Fill
The Raw Water Tank level is monitored by a level transmitter and will send a signal to fill the tank. In case where the tank is manually filled, the operator will receive a Fill Required warning. For future operations, provisions are provided for automatic fill with strainers and a motorized valve.

Transfer Tank Fill and Clarifier
When the transfer tank level is low, it will call on the feed pumps to feed water through the clarifier. Due to the clarifier being at a lower elevation to the raw water tanks, a motorized valve is used to stop gravity flow when the fill is stopped. Coagulant (PAC or alternative) is dosed before the contact tank and flow to the clarifier. Periodically, sludge collected at the bottom of the clarifier is manually purged and send to the sewage network or at an appropriate location (such as TIA) as per the Hope Bay Waste Management Plan.

Treated Water Tank and Water Treatment
There are two treated water storage tanks. Each tank can be enabled or disabled for maintenance. When enabled, the tank levels are averaged. This average level is used to start filtration when the tank level gets low. On filtration start, the UVs are started and allowed to warm up before calling for water from the transfer tank. When filtration is stopped, the UVs stay on for an idle delay to prevent short cycling. There are two multimedia filters operating in parallel. They are automatically backwashed based on one of filtration time, pressure differential, filtration volume, or manual trigger. Only one filter will backwash at a time. When in backwash, a backwash pump is started. Cartridge filters will be monitored by pressure differential with a warning to change out the filters. Chlorine is dosed after the UVs.

Distribution
There are two distribution pumps running as duty / standby. The pump is VFD (variable frequency drive) controlled to maintain a set pressure, 345 kPa (80 psi) in the network. The pump will stop if flow drops below a minimum value. The pump will restart when pressure drops below a set point.

Recirculation
In the event that the free chlorine levels in the distribution system drop below a set point (0.3 mg/L for example), the recirculation system is activated to add a small amount of chlorine to gradually raise the chlorine level.

3.2 CHEMICAL USAGE

The following chemical are planned to be used in the PTP:

- Coagulant: PAC or alternative
- Sodium hypochlorite solution

SDS of typical chemical are presented in appendix D.

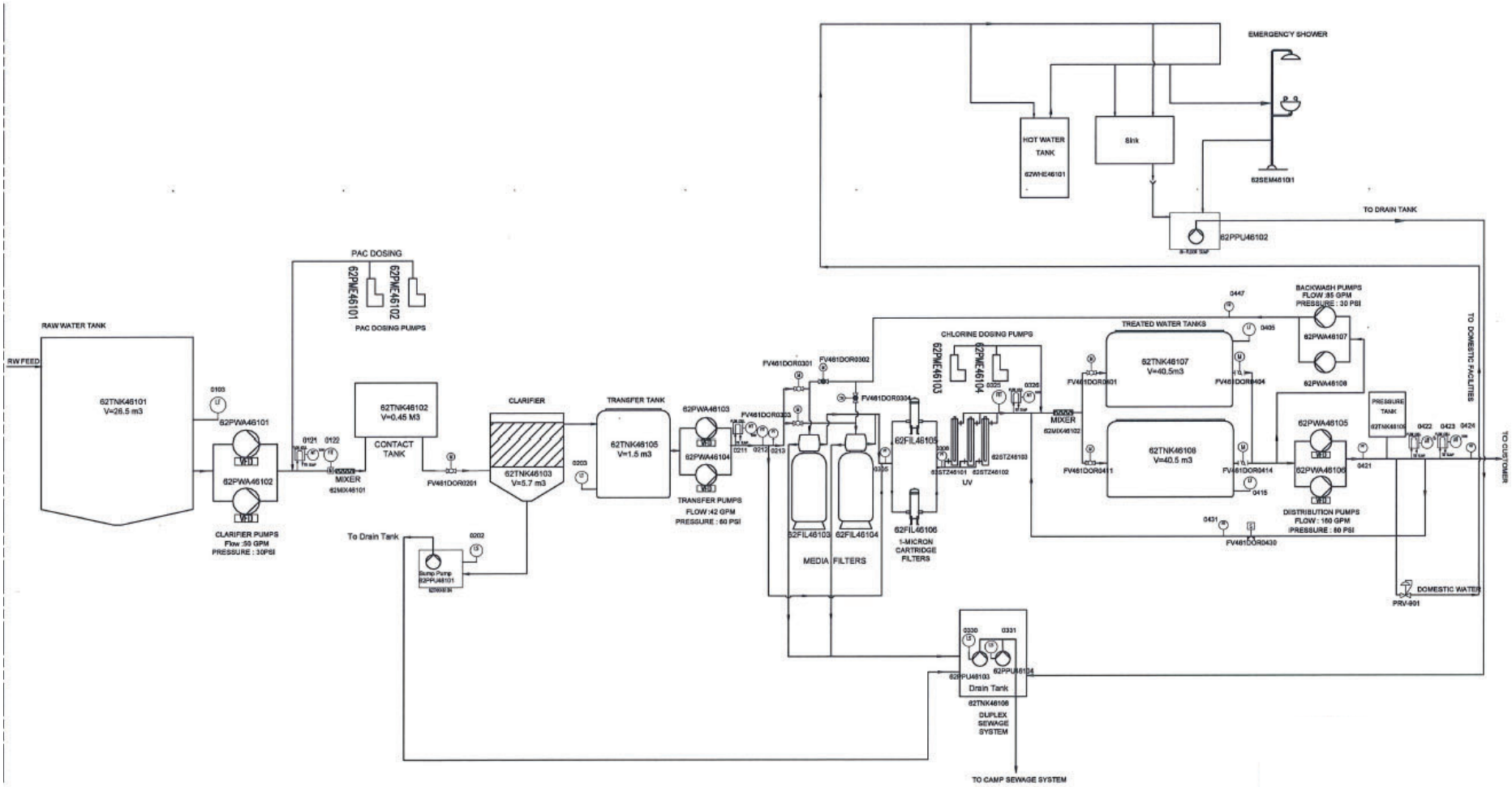


Figure 2 : PTP Flowsheet

4 CONSTRUCTION METHODS AND COMMISSIONING

4.1 RAW WATER FEED STRATEGY

For the operation of the PTP, the following strategy will be used to feed the plant

- Continue to truck water from Windy Lake to the Raw water tank (to the existing raw water tank plant and then transferred to the PTP proposed in this report)

4.2 CONSTRUCTION METHOD AND EQUIPMENT

The PTP equipment will be installed on the actual industrial pad close the camp infrastructure. Mobile equipment used for the modifications will operate into the footprint of existing pads.

The pad for the PTP treatment plant will occupy 88 m^2 (13.8 m x 6.4 m). The PTP will be housed in a modular building preassembled erected on the Pad (see appendix A for the plant drawing).

4.2 QUALITY CONTROL/ASSURANCE

A quality control/insurance program will be required during construction of each of the infrastructure components to ensure that construction-sensitive features of the design are achieved.

Upon the completion of the construction activities, an as-built construction report will be prepared and submitted to the regulators within 90 days after construction is completed. The construction report will provide all relevant supporting documentation.

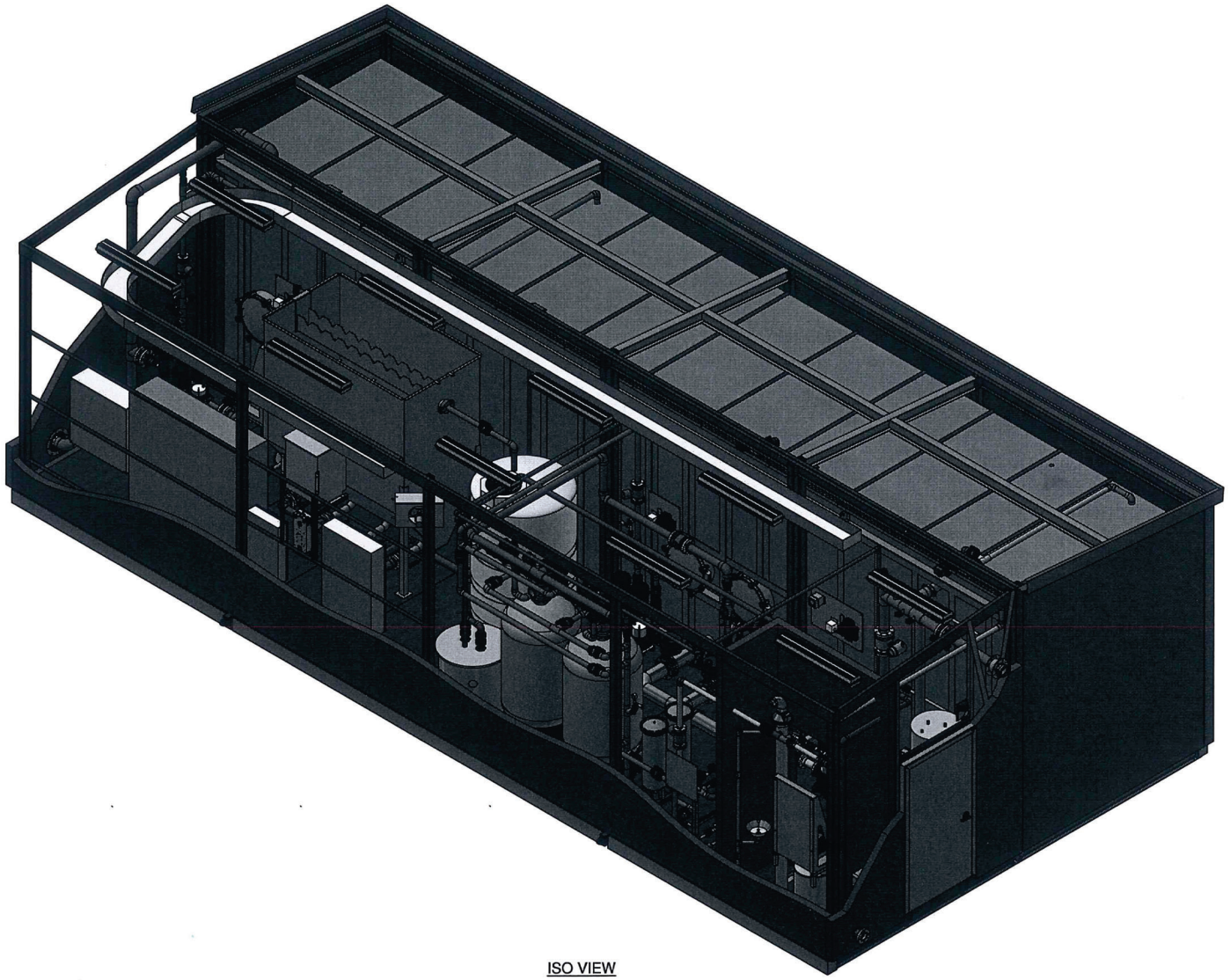
4.3 TESTING AND INSPECTION

Prior to start up, the indoor/outdoor pipe will be tested for leaks. If leaks are found, the joint will be re-welded or re-torqued. After start up, a periodic inspection, performed by Agnico Eagle personal, will be done to ensure piping integrity.

4.4 TIMELINE

The expected date of construction initiation is September 2025 and commissioning completion is planned to be end of 2025 (end of construction).

Appendix A



ISO VIEW

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Issue	Date	Drawn	Checked	Appd	Revision Description
00	2025-05-20	PM	AJ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: GENERAL ARRANGEMENT DRAWING

Project: HOPE BAY PWTP 6209-S-291-002

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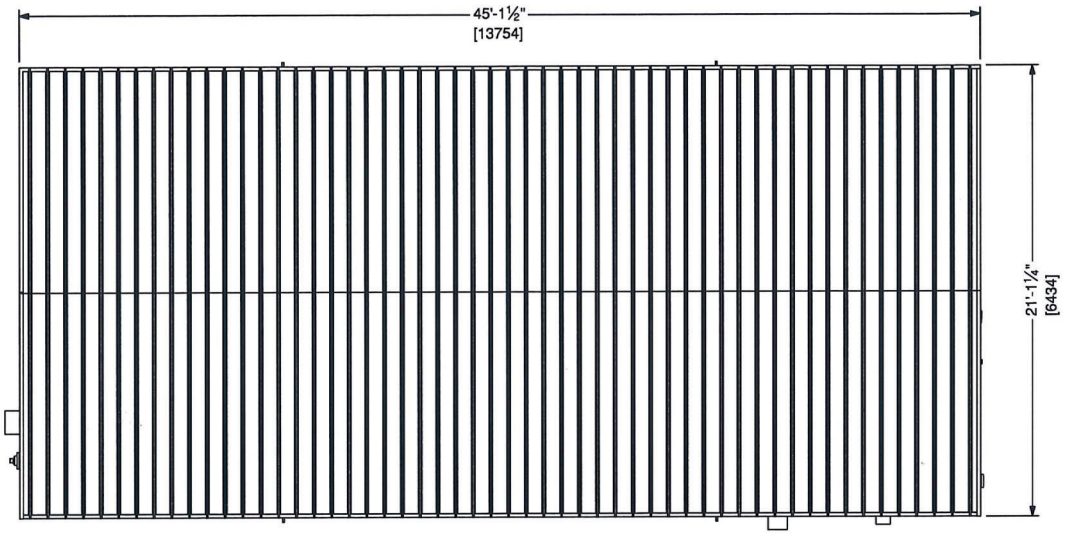
U.N.O.: ft-in [mm]

Sheet: 1 of 6

Projection:

Rev: 00



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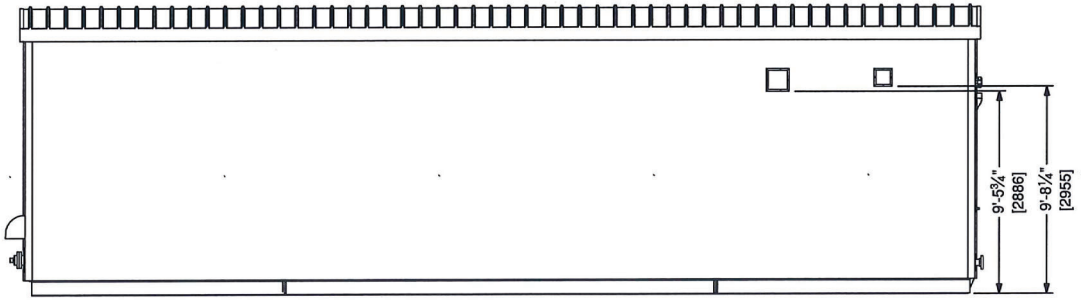

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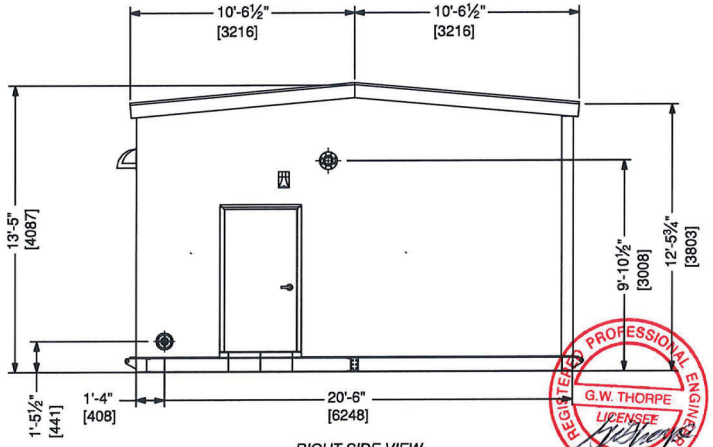

RIGHT SIDE VIEW

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6209-S-291-002

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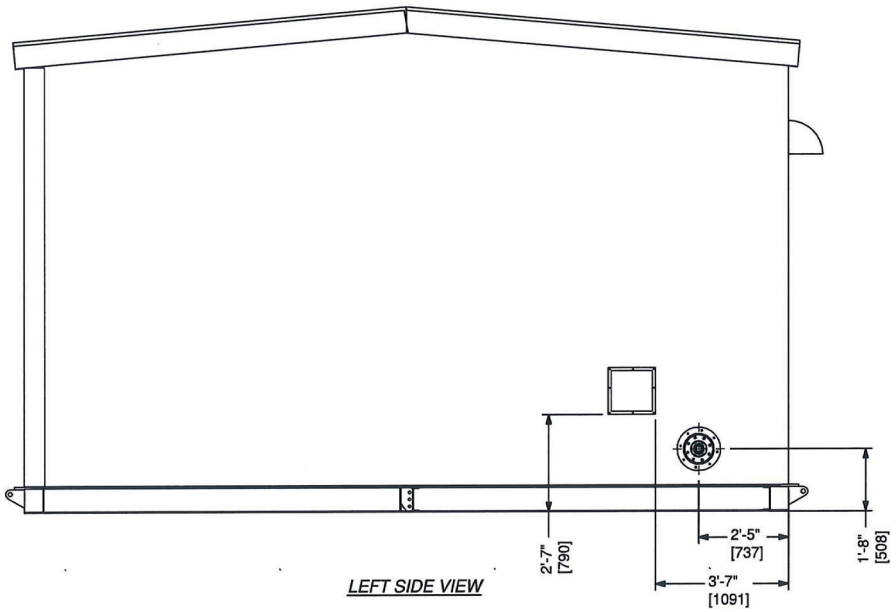
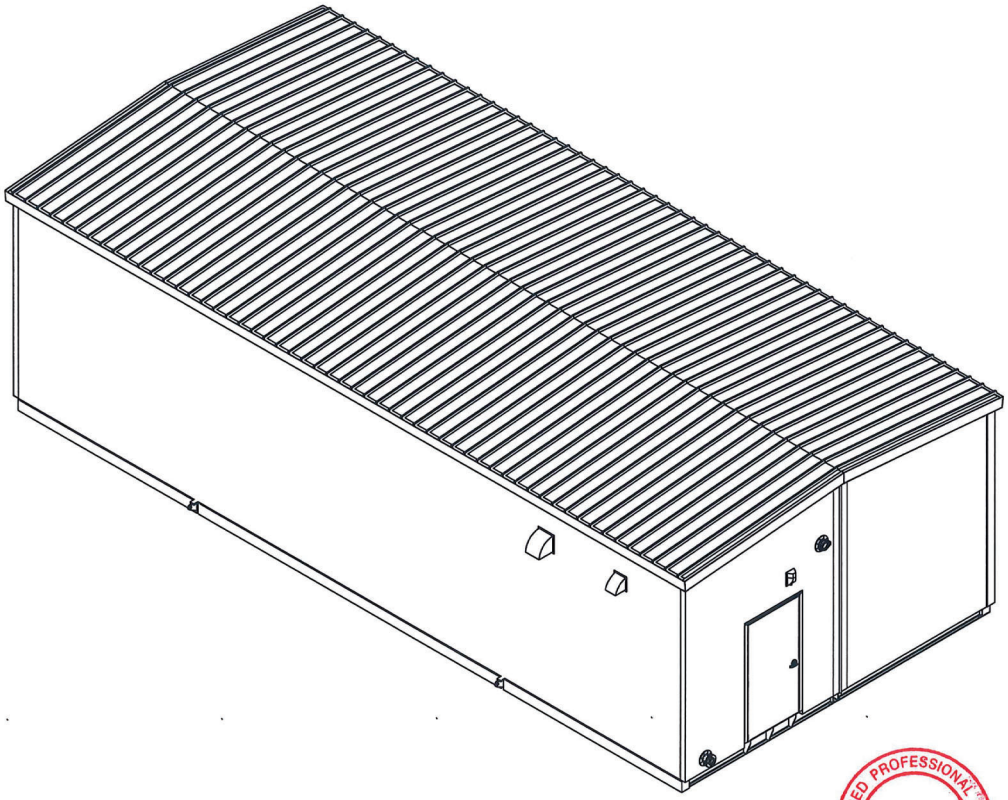


LEFT SIDE VIEW



ISO VIEW

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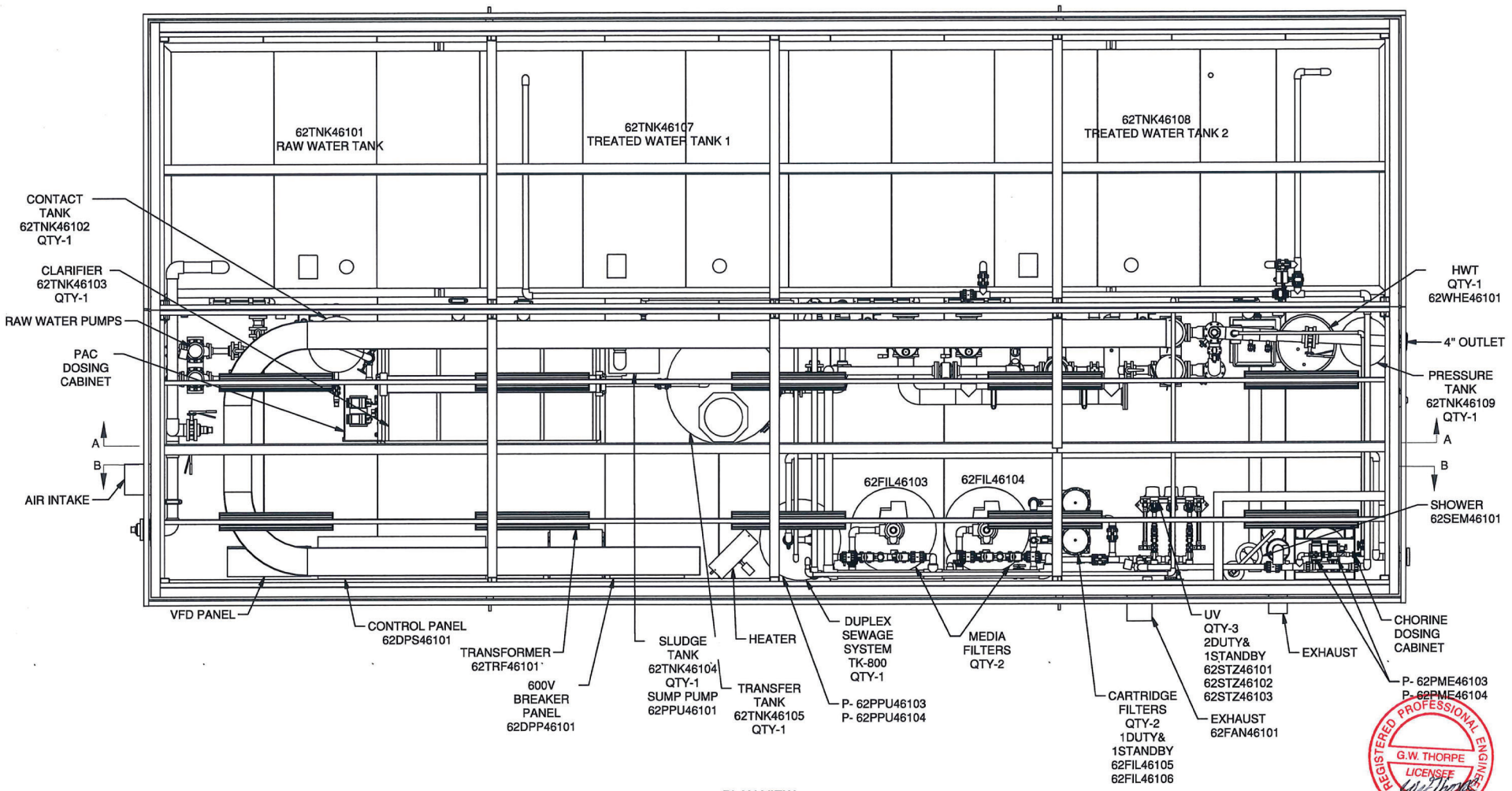

PLAN VIEW

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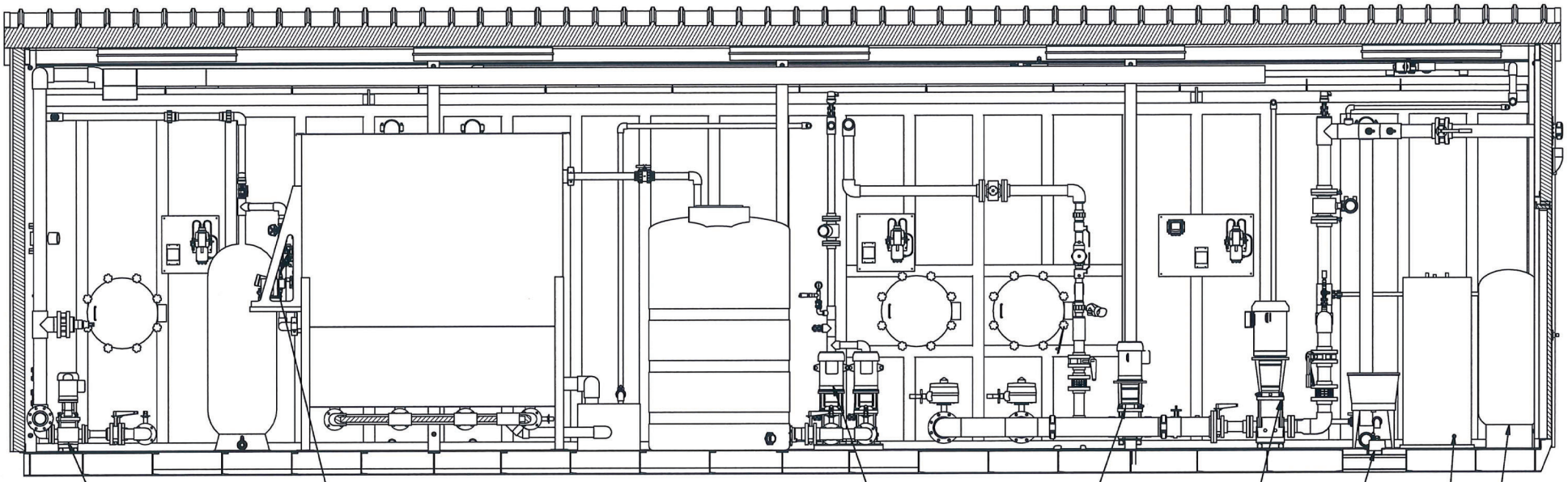

SECTION A-A

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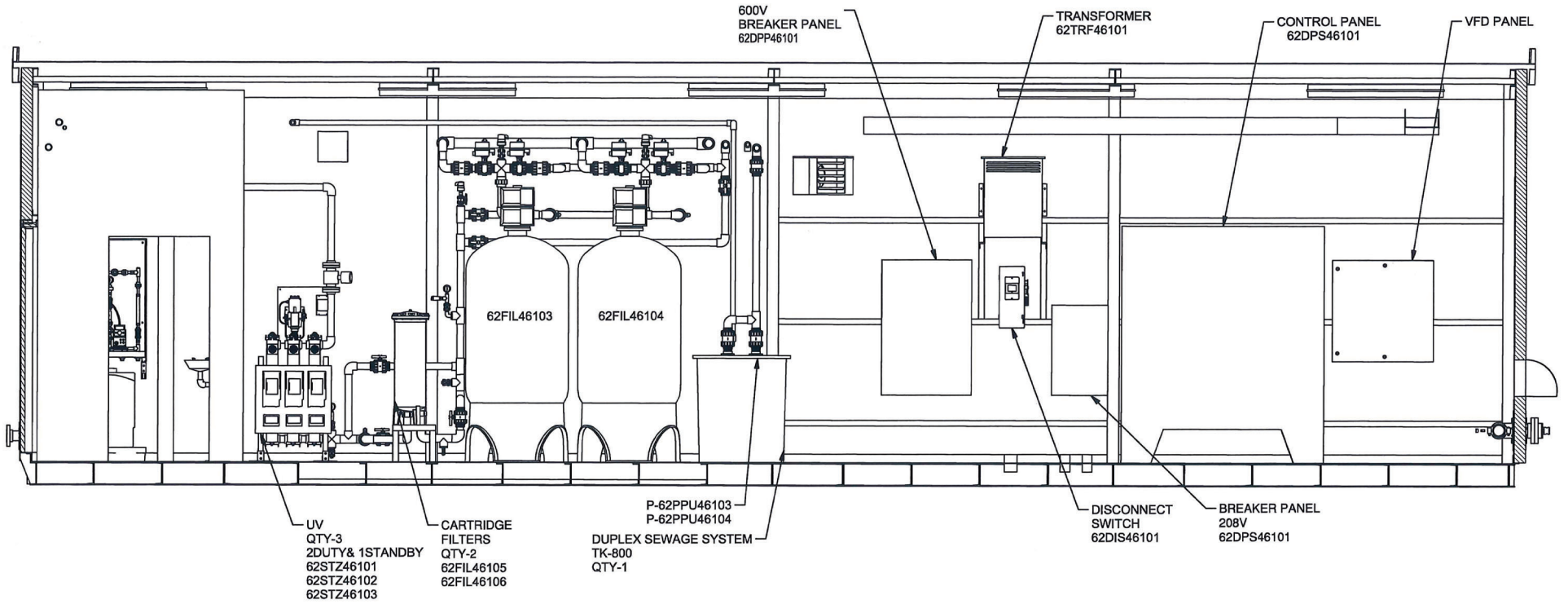

SECTION B-B

REGISTERED PROFESSIONAL ENGINEER
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July 3/25

00	2025-05-20	PM	AJ	CA	ISSUED FOR CONSTRUCTION	
Issue	Date	Drawn	Checked	Appd	Revision Description	

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Surrey, BC V4N 3M9
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Client: AGNICO EAGLE

Title: GENERAL ARRANGEMENT DRAWING

Project: HOPE BAY PWTP
6209-S-291-002

Drawing #: 4078-G-100-GA

Rev: 00

Size: ANSI B (11 x 17)

U.N.O. ft-in [mm]

Sheet 6 of 6

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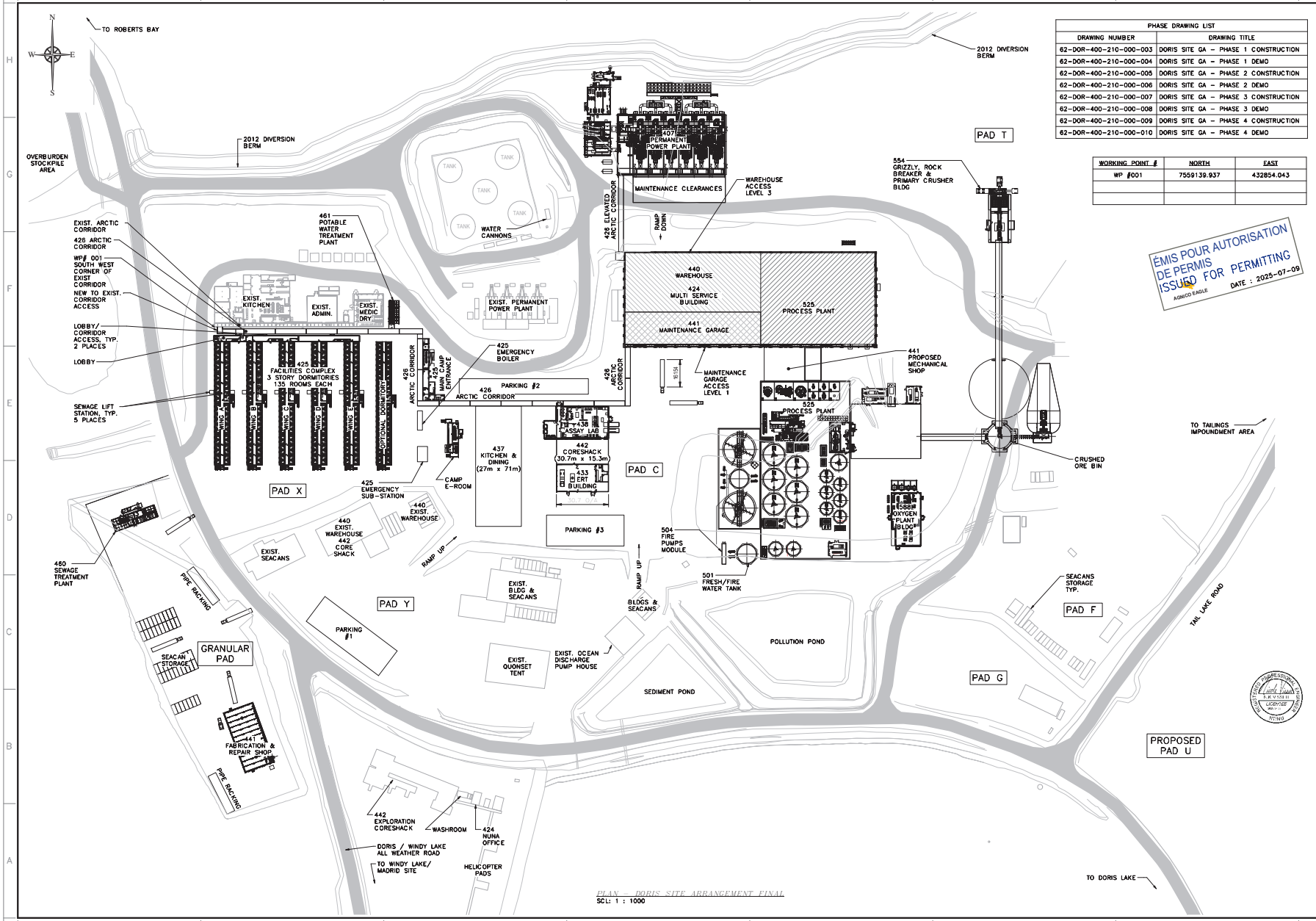

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62-DOR-400-210-000-004	DORIS SITE GA – PHASE 1 DEMO
62-DOR-400-210-000-005	DORIS SITE GA – PHASE 2 CONSTRUCTION
62-DOR-400-210-000-006	DORIS SITE GA – PHASE 2 DEMO
62-DOR-400-210-000-007	DORIS SITE GA – PHASE 3 CONSTRUCTION
62-DOR-400-210-000-008	DORIS SITE GA – PHASE 3 DEMO
62-DOR-400-210-000-009	DORIS SITE GA – PHASE 4 CONSTRUCTION
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WORKING POINT #	NORTH	EAST
WP #001	7559139.937	432854.043

ÉMIS POUR AUTORISATION DE PERMIS
ISSUED FOR PERMITTING
AGNICO EAGLE DATE : 2025-07-09

PLAN CLÉ
KEY PLAN

WSP Canada Inc.
1285 PREMIER WAY
THUNDER BAY (ONTARIO) CANADA P7B 0A3
TEL: 807 625-4700 | FAX: 807 623-4491 | WWW.WSP.COM

Ref. CA0047281.7022

NOTES GÉNÉRALES / GENERAL NOTES

NE PAS UTILISER POUR CONSTRUCTION
NOT FOR CONSTRUCTION
AGNICO EAGLE DATE : 2025-07-09

EN PROGRÈS
IN PROGRESS
AGNICO EAGLE DATE : 2025-07-09

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
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REVISIONS

PERMIT TO PRACTICE
WSP Canada, Inc.
Signature
Date 2025-07-09
PERMIT NUMBER: P407
NT/NU Association of Professional Engineers and Geoscientists

TITRE / TITLE
AGNICO EAGLE – HOPE BAY DIVISION
400 – GENERAL
210 – GENERAL ARRANGEMENT
DORIS – SITE PLAN
FINAL ARRANGEMENT

DESSINÉ PAR DRAWN BY	JESSE ROMANO	DATE 2025-07-09
REVU PAR REVIEWED BY	N. VISSER	2025-07-09
VÉRIFIÉ PAR VERIFIED BY	C. KUKKEE	2025-07-09
ÉCHELLE SCALE	INDICATED	DATE 2025-07-09

NO. DESSIN
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Autodesk Docs://AEM – Hope Bay Surface Infra/AEM HOPE BAY DORIS SITE GA.rvt

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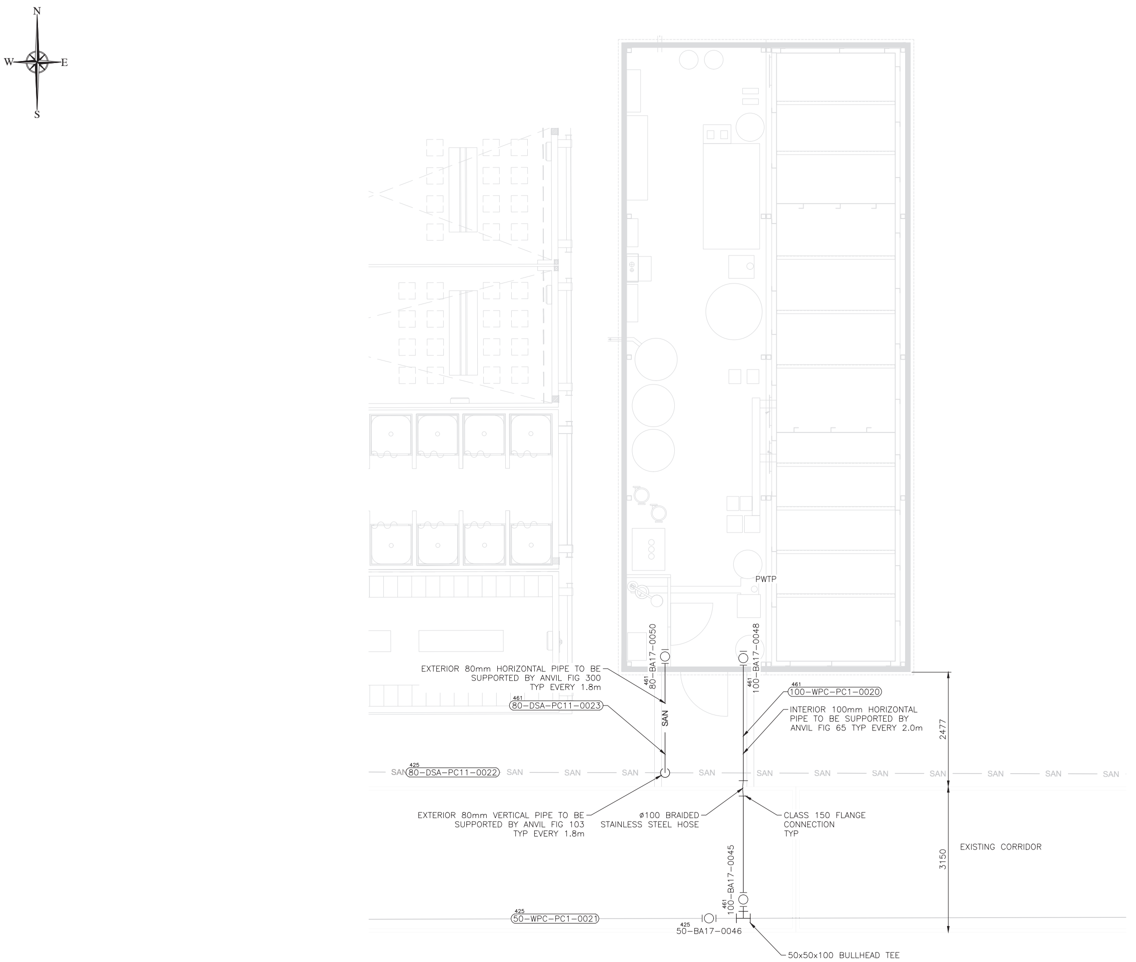

PLAN – DORIS POTABLE WATER TREATMENT PLANT SERVICE CONNECTION
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Signature
Date 2025 07 03
PERMIT NUMBER: P407
NT/NU Association of Professional Engineers and Geoscientists

PLAN CLÉ
KEY PLAN

WSP Canada Inc.
1269 PREMIER WAY
THUNDER BAY (ONTARIO) CANADA P7B 0A3
TEL: 807 625-6700 | FAX: 807 623-4491 | WWW.WSP.COM
Ref. CA0047291.7022

NOTES GÉNÉRALES / GENERAL NOTES

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W.G. HODGSON
LICENSEE
2025-07-03
NT/NU

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 03/07/2025

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
DORIS MAIN CAMP COMPLEX DORMITORY	62–DOR–425–210–000–001

AGNICO EAGLE

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0	2025–07–03	ISSUED FOR CONSTRUCTION	JDK	SDL	

REVISIONS

TITRE / TITLE
AGNICO EAGLE – HOPE BAY DIVISION
461 – POTABLE WATER TREATMENT PLANT
270 – PIPING
PLAN AND SECTION
DORIS POTABLE WATER TREATMENT PLANT
PIPING DETAILS

DESSINÉ PAR / DRAWN BY	J. KAUKINEN	DATE 2025–07–03
VERIFIÉ PAR / CHECKED BY	S. GAMOR	2025–07–03
APPROUVÉ PAR / APPROVED BY	S. LINTUNEN, P. Eng	2025–07–03
ÉCHELLE / SCALE: INDICATED	DATE	2025–05–15

NO. DESSIN
DRAWING NO.
62–DOR–461–270–000–002

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6209	0	1 / 1

AE–CART–ARCH D

Appendix B

LINE DATA IDENTIFICATION

SERVICE (ALPHA) | SIZE (NUMERIC) | MATERIAL (ALPHA) | LINE # (NUMERIC)

XXX-99-XXX-9999

PROCESS LINES
- LOW PRESSURE PROCESS LINES (TYPICALLY PVC)
- HIGH PRESSURE PROCESS LINES (TYPICALLY SS)
- AIR/GAS SERVICE LINES
- SIGNAL LINES

SERVICE CODES	
CODE	SERVICE
AC	ACID, GENERIC
AR	AIR
BA	BASE, GENERIC
BR	BRINE
CO	COAGULANT, GENERIC
CL	SODIUM HYPOCHLORITE
GA	GAS, GENERIC
OX	OXIDIZING AGENT, GENERIC
PM	POLYMER
WP	WATER, POTABLE
WR	WATER, RAW
WT	WATER, TREATED
WW	WATER, WASTE

MATERIAL CODES	
CODE	MATERIAL
ABS	ABS
CU	COPPER/BRASS
CS	CARBON STEEL/IRON
PE	POLYETHYLENE
(C)PVC	(C)POLYVINYL CHLORIDE
SS	STAINLESS STEEL

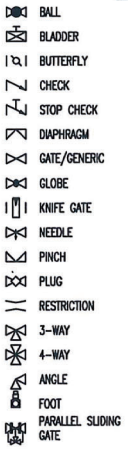
PAGE CONNECTORS

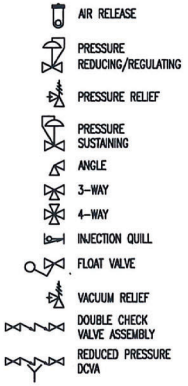
SHEET # | DWG # | CONNECTOR #

XX | XXXX-X-XXX | 0001

0001 | XXXX-X-XXX | XX

VALVES





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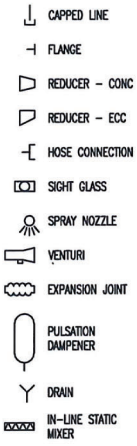

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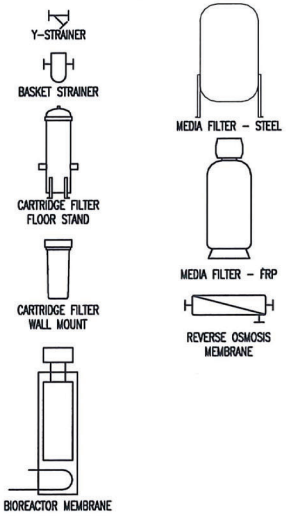
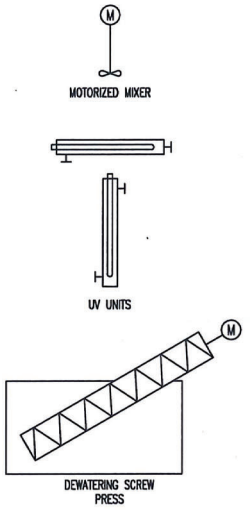


GENERAL EQUIPMENT



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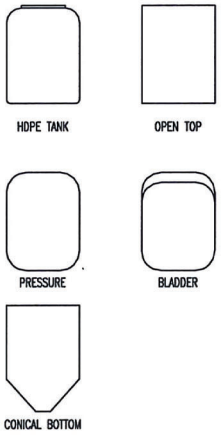
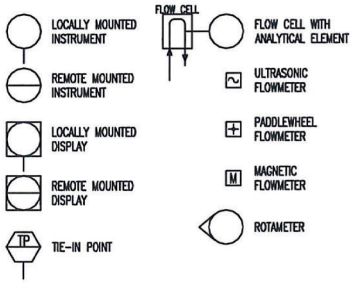


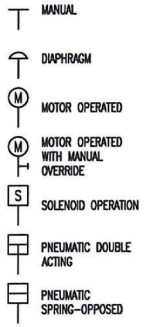
INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER: MEASURED OR INITIATING VARIABLE	FIRST LETTER: MODIFIER	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTERS: MODIFIER
A	ANALYSIS		ANALYZER	
B	BURNER, FLAME, COMBUSTION			
C	CONDUCTIVITY - ELECTRICAL			CLOSED
D	DENSITY/SPECIFIC GRAVITY	DIFFERENTIAL		
E	VOLTAGE		SENSOR	
F	FLOW RATE			
G	GAUGING (DIMENSIONAL)		GLASS/VIEWING DEVICE	
H	HAND			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		
L	LEVEL		LIGHT	LOW
M	MOISTURE OR HUMIDITY	MOMENTARY		MIDDLE
N				
O			ORIFICE/RESTRICTION	OPEN
P	PRESSURE/VACUUM		POINT (TEST) CONNECTION	
Q	QUANTITY	INTEGRATE/TOTALIZE		
R	RADIATION	RECORD		REFILL
S	SPEED/FREQUENCY	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMITTER	
U	MULTIVARIABLE		MULTIFUNCTION	
V	VIBRATION			
W	WEIGHT/FORCE		WELL	
X		X-AXIS		
Y	EVENT/STATE/PRESENCE	Y-AXIS		
Z	POSITION - DISPLACEMENT	Z-AXIS		

INSTRUMENTS



ACTUATORS



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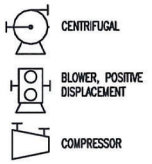

PUMPS

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU
July 3/25

BI Pure Water (Canada) Inc.
PTP : 1003436
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http://www.bipurewater.com

Rev	Date	Drawn	Checked	App'd	Revision Description
1	2025-06-20	AJ	AJ	CA	ISSUE FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: FLOW PROCESS DIAGRAM

Project: HOPE BAY PWTP 6209-S-291-002

Drawing #: 4078-P-102

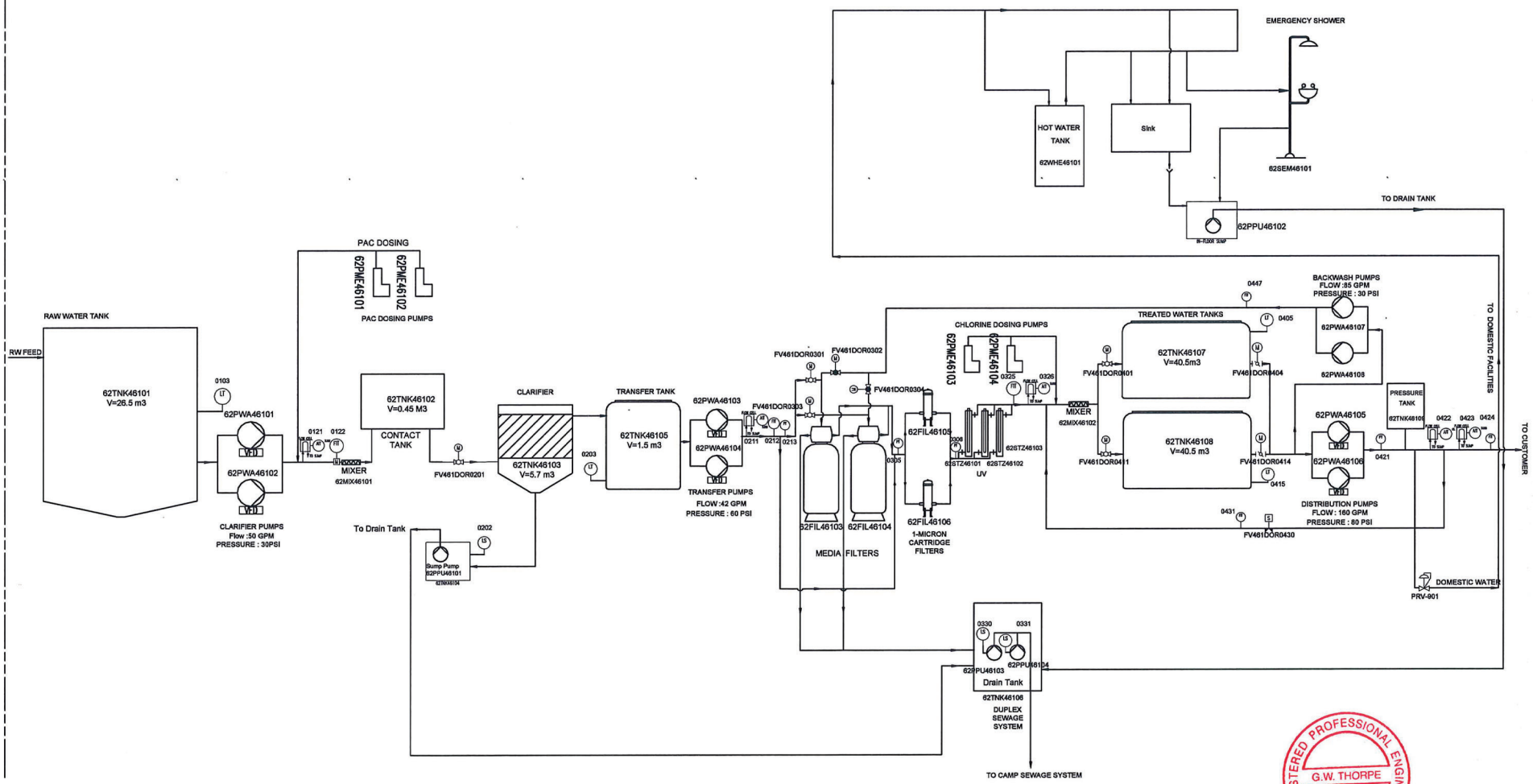
Size: ANSI B (11 x 17)

Units: ft-in [mm]

Sheet: 1 of 2

Projection:

Rev: 0



REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU
July 31/25

BI Pure Water (Canada) Inc. PTP : 1003436 #2, 9790 - 190th Street Surrey, BC V4N 3N9 Phone: (604) 882-6650 Fax: (604) 882-6659 http://www.bipurewater.com	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BI PURE WATER (CANADA) INC. ANY REPRODUCTION IN PART OR WHOLE OF THE INFORMATION HEREIN, WITHOUT THE WRITTEN PERMISSION OF BI PUREWATER (CANADA) INC., IS STRICTLY PROHIBITED.	Client: AGNICO EAGLE	Title: FLOW PROCESS DIAGRAM	Size: ANSI B (11 x 17)	
			Project: HOPE BAY PWTP 6209-S-291-002	Units: ft-in [mm]	
				Sheet: 2 of 2	
				Projection:	
			Drawing #: 4078-P-102	Rev: 0	

Rev	Date	Drawn	Checked	App'd	Revision Description
1	2025-06-20	AJ	AJ	CA	ISSUE FOR CONSTRUCTION

LINE DATA IDENTIFICATION

SERVICE (ALPHA) | SIZE (NUMERIC) | MATERIAL (ALPHA) | LINE # (NUMERIC)

XXX-99-XXX-9999

PROCESS LINES

- LOW PRESSURE PROCESS LINES (TYPICALLY PVC)
- HIGH PRESSURE PROCESS LINES (TYPICALLY SS)
- AIR/GAS SERVICE LINES
- SIGNAL LINES

SERVICE CODES	
CODE	SERVICE
AC	ACID, GENERIC
AR	AIR
BA	BASE, GENERIC
BR	BRINE
CO	COAGULANT, GENERIC
CL	SODIUM HYPOCHLORITE
GA	GAS, GENERIC
OX	OXIDIZING AGENT, GENERIC
PM	POLYMER
WP	WATER, POTABLE
WR	WATER, RAW
WT	WATER, TREATED
WW	WATER, WASTE

MATERIAL CODES	
CODE	MATERIAL
ABS	ABS
CU	COPPER/BRASS
CS	CARBON STEEL/IRON
PE	POLYETHYLENE
(C)PVC	(C)POLYVINYL CHLORIDE
SS	STAINLESS STEEL

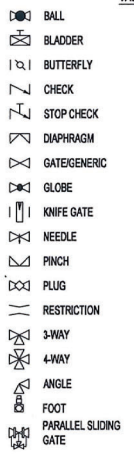
PAGE CONNECTORS

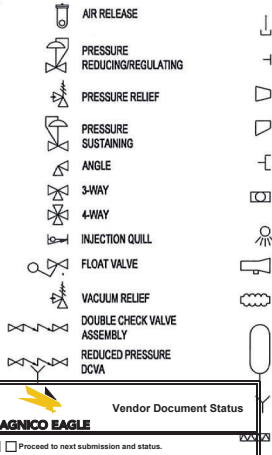
SHEET # | DWG # | CONNECTOR #

XX | XXXX-X-XXX | 0001

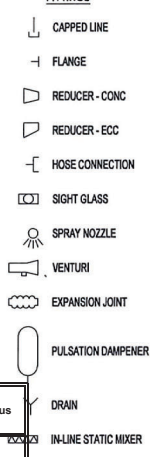
0001 | XXXX-X-XXX | XX

VALVES

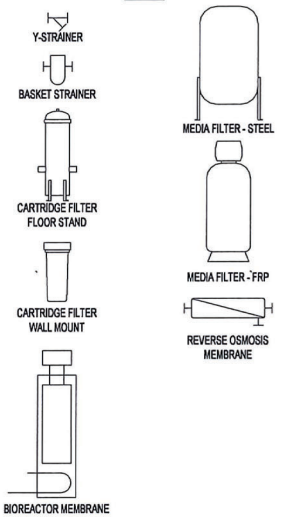




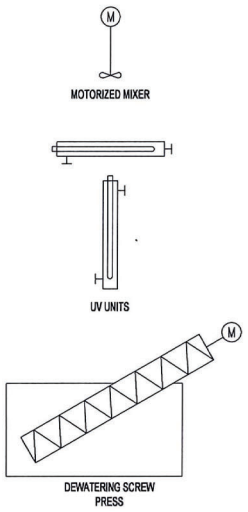
FITTINGS



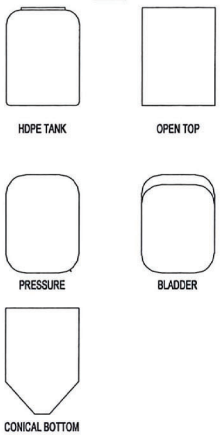
FILTERS



GENERAL EQUIPMENT



TANKS



Vendor Document Status

AGNICO EAGLE

1 ☐ Proceed to next submission and status.

2 ☐ Proceed with exceptions as noted to next submission and status.

3 ☐ Do not proceed. Revise as noted and resubmit next submission and status.

4 ☑ Complete, no further submission required.

By: Raphaël Lachance 06/26/2025 Date:

Review and authorization to fabricate are only for general conformance with the design concept of the Project as expressed in the Contract Documents. Sole responsibility for the accuracy and completeness of this document, including but not limited to dimensions and quantities, remains with the Supplier/Contractor. Agnico Eagle does not warrant the accuracy or completeness of any of the information contained herein, nor does Agnico Eagle authorize or approve any construction means, methods, techniques, sequences or any safety precautions or procedures.

Agnico Eagle No. 5.11 6209-S-291-002 rev C P&ID_AB_Commentaire R: AB_Commentaire_2025-06-26

DOCUMENT FOR INFORMATION

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F	FLOW RATE			
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H	HAND			HIGH
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J	POWER			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		
L	LEVEL		LIGHT	LOW
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N				
O			ORIFICE/RESTRICTION	OPEN
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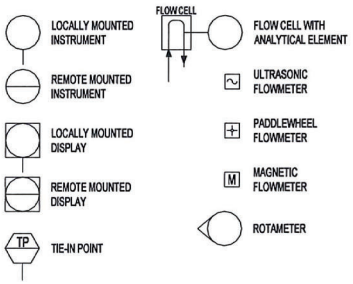
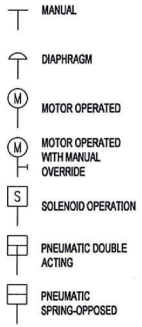
S	SPEED/FREQUENCY	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMITTER	
U	MULTIVARIABLE		MULTIFUNCTION	
V	VIBRATION			
W	WEIGHT/FORCE		WELL	
X		X-AXIS		
Y	EVENT/STATE/PRESENCE	Y-AXIS		
Z	POSITION - DISPLACEMENT	Z-AXIS		

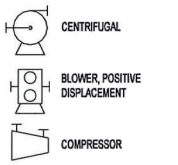
INSTRUMENTS



ACTUATORS



BLOWERS/COMPRESSORS



PUMPS

REGISTERED PROFESSIONAL ENGINEER
F.P.J. TAM
LICENSEE
NT/NU
2025-06-17

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9780 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

Rev	Date	Drawn	Checked	Appd	Revision Description
C	2025-06-17	AJ	AJ	CA	ISSUED FOR CONSTRUCTION - REVISED WITH AEM TAG NUMBERS
B	2025-06-06	SS	AJ	CA	ISSUED FOR CONSTRUCTION - REVISED WITH AEM TAG NUMBERS
A	2025-05-20	HZ	HZ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: PIPING AND INSTRUMENTATION DIAGRAM

Project: HOPE BAY PWTP 6209-S-291-002

Drawing #: 4078-P-101

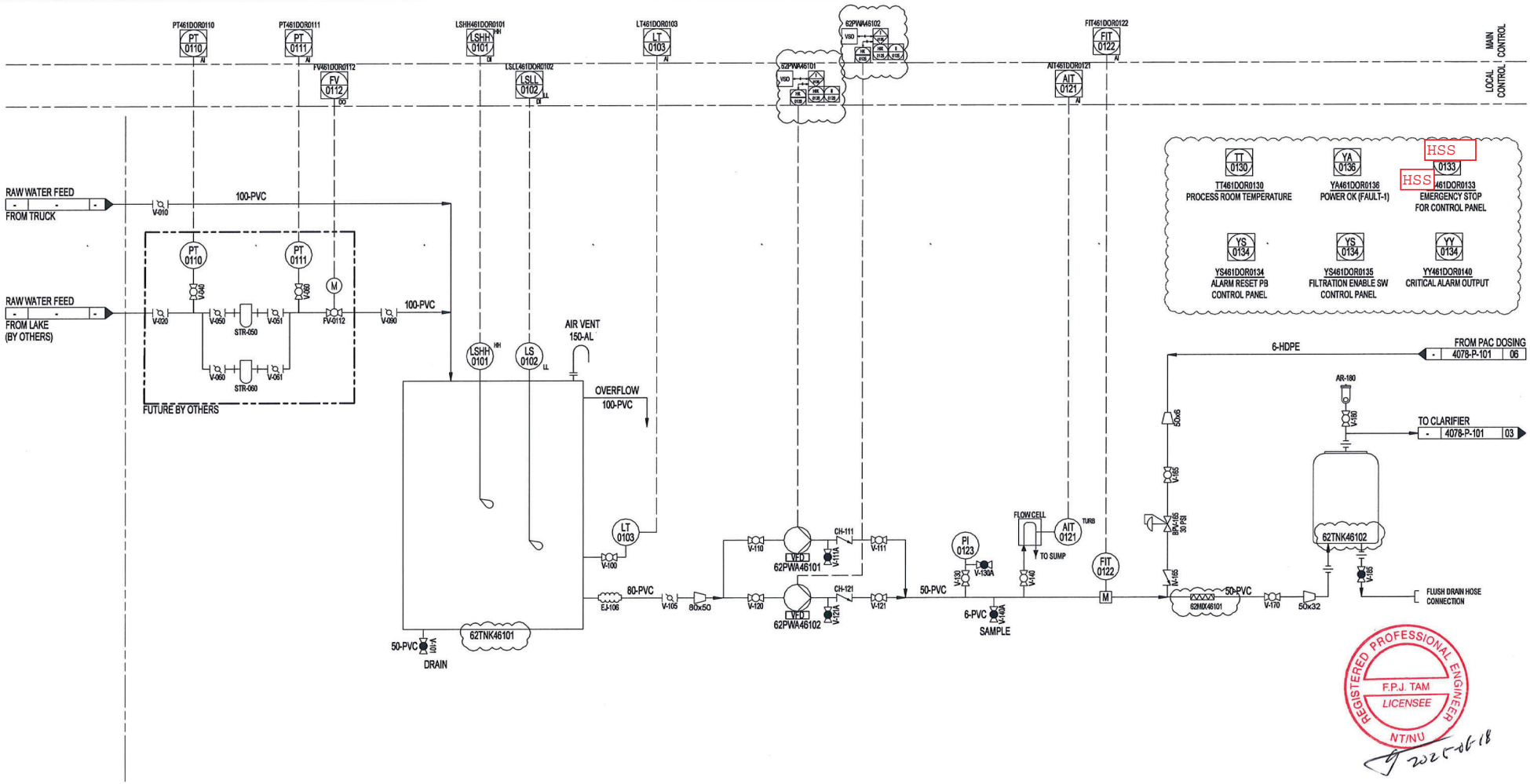
Size: ANSI B (11 x 17)

Units: ft-in [mm]

Sheet 1 of 7

Projection:

Rev C



REGISTERED PROFESSIONAL ENGINEER
F.P.J. TAM
LICENSEE
NT/NU
2025-06-18

LS461DOR0101, LS461DOR0102
LEVEL SWITCH
MODEL: MDI-SNF-S426R-15

LT461DOR0103
MODEL: VEGABAR 28
PRESSURE: 0-5PSI

62TNK46101
RAW WATER TANK
WORKING VOLUME: 26.5m³ (7047USG)

62PWA46101, 62PWA46102
RAW WATER PUMP
PUMP STYLE: VERTICAL CENTRIFUGAL
MODEL: GRUNDFOS CR10-2
FLOW: 11m³/h (50GPM)
PRESSURE: 30PSI
POWER:575/3/60 1.12kW (1.5HP)

PI461DOR0123
MODEL: WINTERS PFQ120
PRESSURE: 0-60PSI

AIT461DOR0121
RAW WATER TURBIDITY METER
HF SCIENTIFIC
MODEL: HF 28053

FIT461DOR0122
RAW WATER FLOW METER
MODEL: ROSEMOUNT 8750W

62TNK46102
CONTACT TANK
MODEL: BAF120
CAPACITY: 0.45m³ (120USG)

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http://www.bipurewater.com

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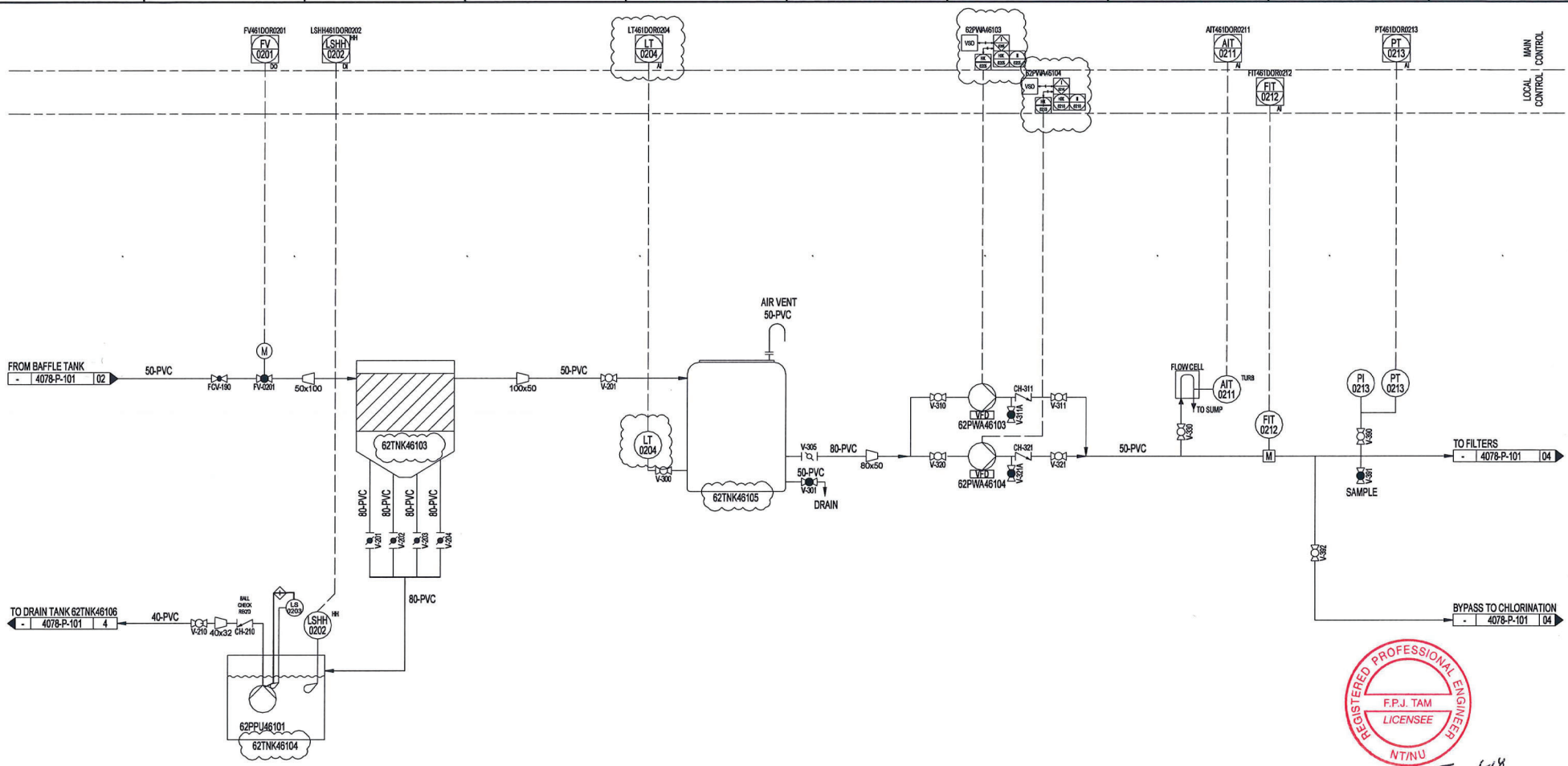
Project: HOPE BAY PWTP 6209-S-291-002
Drawing #: 4078-P-101
Size: ANSI B (11 x 17)
Units: ft-in [mm]
Sheet: 2 of 7
Projection:
Rev: C



REGISTERED PROFESSIONAL ENGINEER
F.P.J. TAM
LICENSEE
NT/NU
2025-06-18

62PPU46101
SUMP PUMP
MODEL: GRUNDFOS KP350

LS461DOR0203
LEVEL SWITCH
MODEL: GEMS LS-3 173250

LS461DOR0202
FLOAT LEVEL SWITCH
SJE VERTICALMASTER® 3 PLUS

62TNK46104
SLUDGE TANK
CAPACITY: 0.11m³ (30USG)

62TNK46103
CLARIFIER TANK
CAPACITY: 5.7m³ (1505USG)

LT461DOR0203
MODEL: VEGABAR 28
PRESSURE: 0-5PSI

62TNK46105
TRANSFER TANK
CAPACITY: 1.5m³ (400USG)

62PWA46103, 62PWA46104
TRANSFER PUMP
MODEL: GRUNDFOS CR 10-4
FLOW: 9.5m³/h (42GPM)
PRESSURE: 60PSI
POWER: 575/3/60 2.24kW (3HP)

AIT461DOR0211
TURBIDITY METER
HF SCIENTIFIC
MODEL: HF 28053

FIT461DOR0212
ROSEMOUNT 8750W

PT461DOR0213
MODEL: VEGABAR 28

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Size: ANSI B (11 x 17)
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Sheet: 3 of 7
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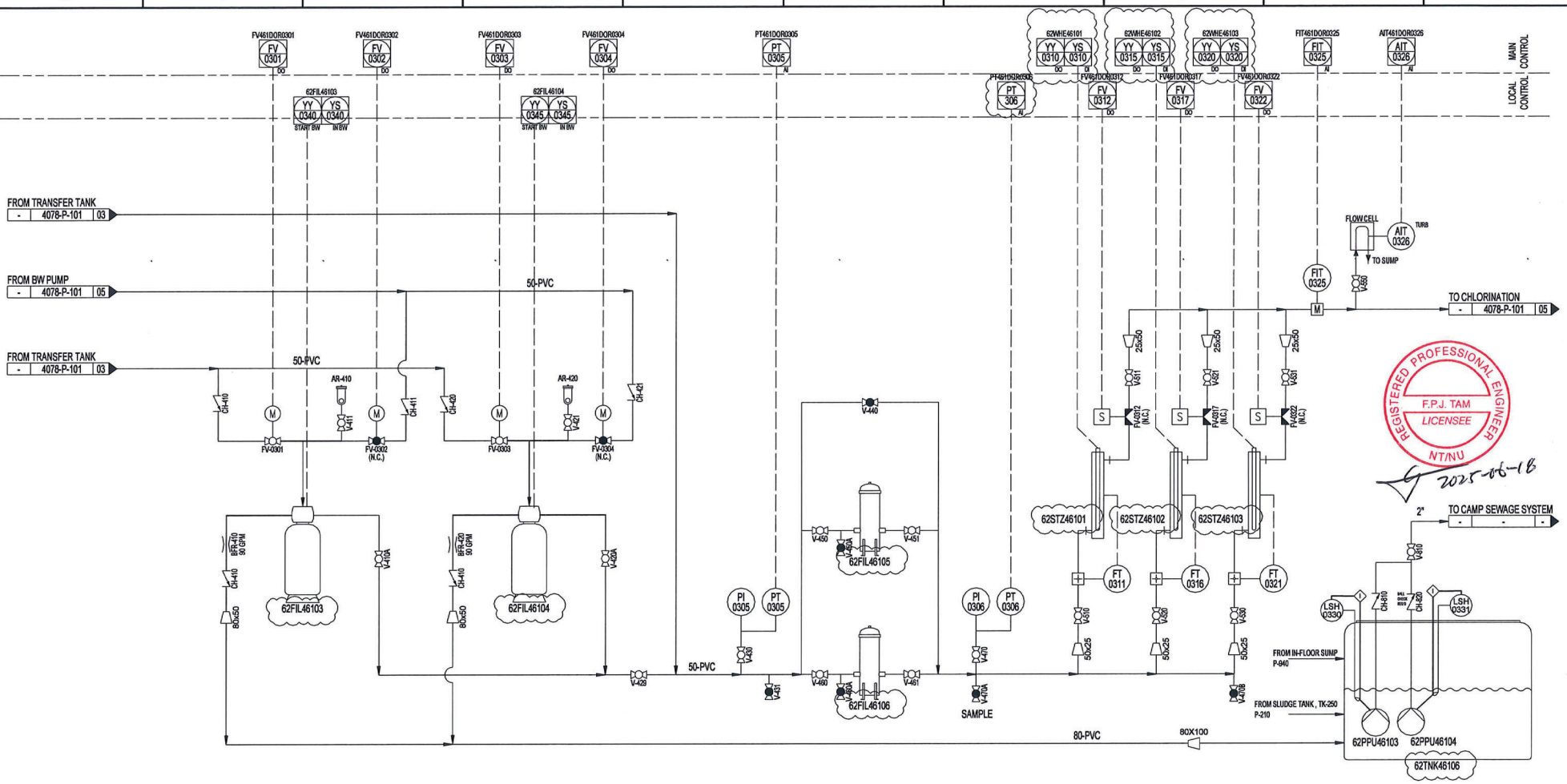

REGISTERED PROFESSIONAL ENGINEER
F.P.J. TAM
LICENSEE
NT/NU
2025-06-18

PI461DOR0305, PI461DOR0306
WINTERS PFQ120
PRESSURE: 0-60PSI

PT461DOR0305, PT461DOR0306
MODEL: VEGABAR 28

62FIL46103, 62FIL46104
MEDIA FILTER 36"
BACKWASH FLOW: 20m³/h (85GPM)
NEXTSAND
CONTROL HEAD MODEL: FLECK 3150

62FIL46105, 62FIL46106
CARTRIDGE FILTER
MODEL: HARMSCO WB 170SC-2
CARTRIDGE: 1-MICRON, NOMINAL

62STZ46101,62STZ46102, 62STZ46103
ULTRAVIOLET DISINFECTION
MODEL: VIQUA PRO 30

FV461DOR0312, FV461DOR0317, FV461DOR0322
GRANZOW W6B19-00E-09

FIT461DOR0325
ROSEMOUNT 8750W

AIT461DOR0326
TURBIDITY METER
HF SCIENTIFIC
MODEL: HF 28053

62TNK46106
DRAIN TANK
DUPLEX SEWAGE SYSTEM
1100 SERIES
1102/LEH102M

62PPU46103, 62PPU46104
DRAIN PUMP
FlOW RATE:100GPM
LIBERTY PUMPS

LSH461DOR0330, LSH461DOR0331
FLOAT LEVEL SWITCH
LIBERTY PUMPS

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Client: AGNICO EAGLE

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Project: HOPE BAY PWTP 6209-S-291-002
Drawing #: 4078-P-101
Size: ANSI B (11 x 17)
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Sheet: 4 of 7
Projection:
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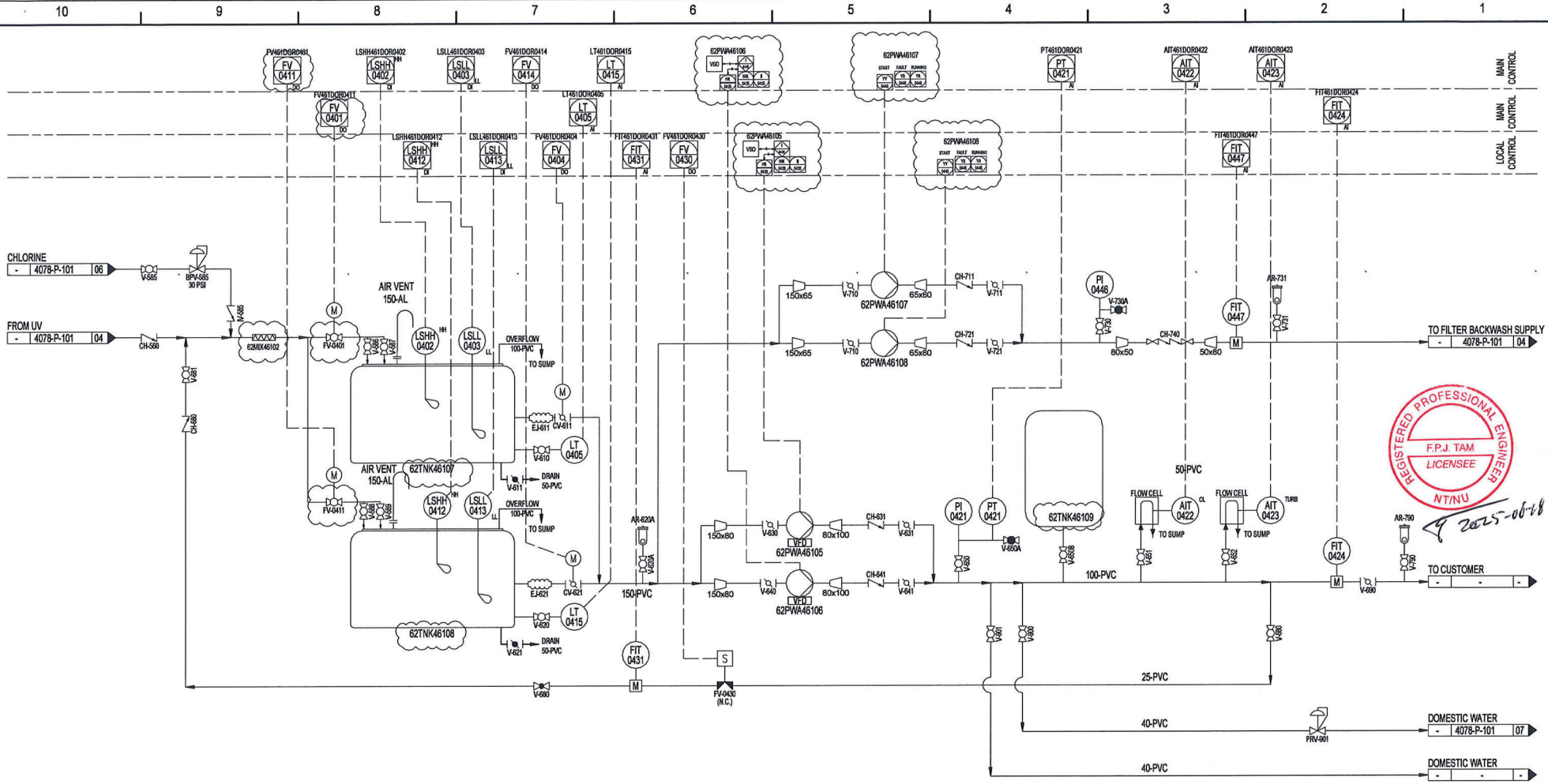

62TNK46107, 62TNK46108
TREATED WATER TANK
CAPACITY:40.5m³ (10,722USG)

LSHH461DOR0402, LSLL461DOR0403, LSHH461DOR0412, LSLL461DOR0413,
LEVEL SWITCH
MODEL: MDI-SNF-S426R-15

LT461DOR0405, LT461DOR0415
MODEL: VEGABAR 28
PRESSURE: 0-5PSI

FIT461DOR0415
ROSEMOUNT 8750W

FV461DOR0430
GRANZOW W6B19-00E-09

62PWA46105, 62PWA46106
DISTRIBUTION PUMP
MODEL: CR 45-2
FLOW: 38m³/h (160GPM)
PRESSURE: 80PSI
POWER: 575/3/60 11.19kW (15HP)

62PWA46107, 62PWA46108
BACK WASH PUMP
MODEL: CR 32-1
FLOW: 85GPM
PRESSURE: 30PSI
POWER: 574/3/60 3.73kW (5HP)

62TNK46109
BLADDER TANK
MODEL: FLEXCON WR240

AIT461DOR0422
CHLORINE ANALYZER
ATI MODEL: Q46H-62-1-1-2-1-1-1

AIT461DOR0423
TURBIDITY METER
HF SCIENTIFIC
MODEL: HF 28053

PT461DOR0421
VEGABAR 28

FIT461DOR0447, FIT461DOR0424
ROSEMOUNT 8750W

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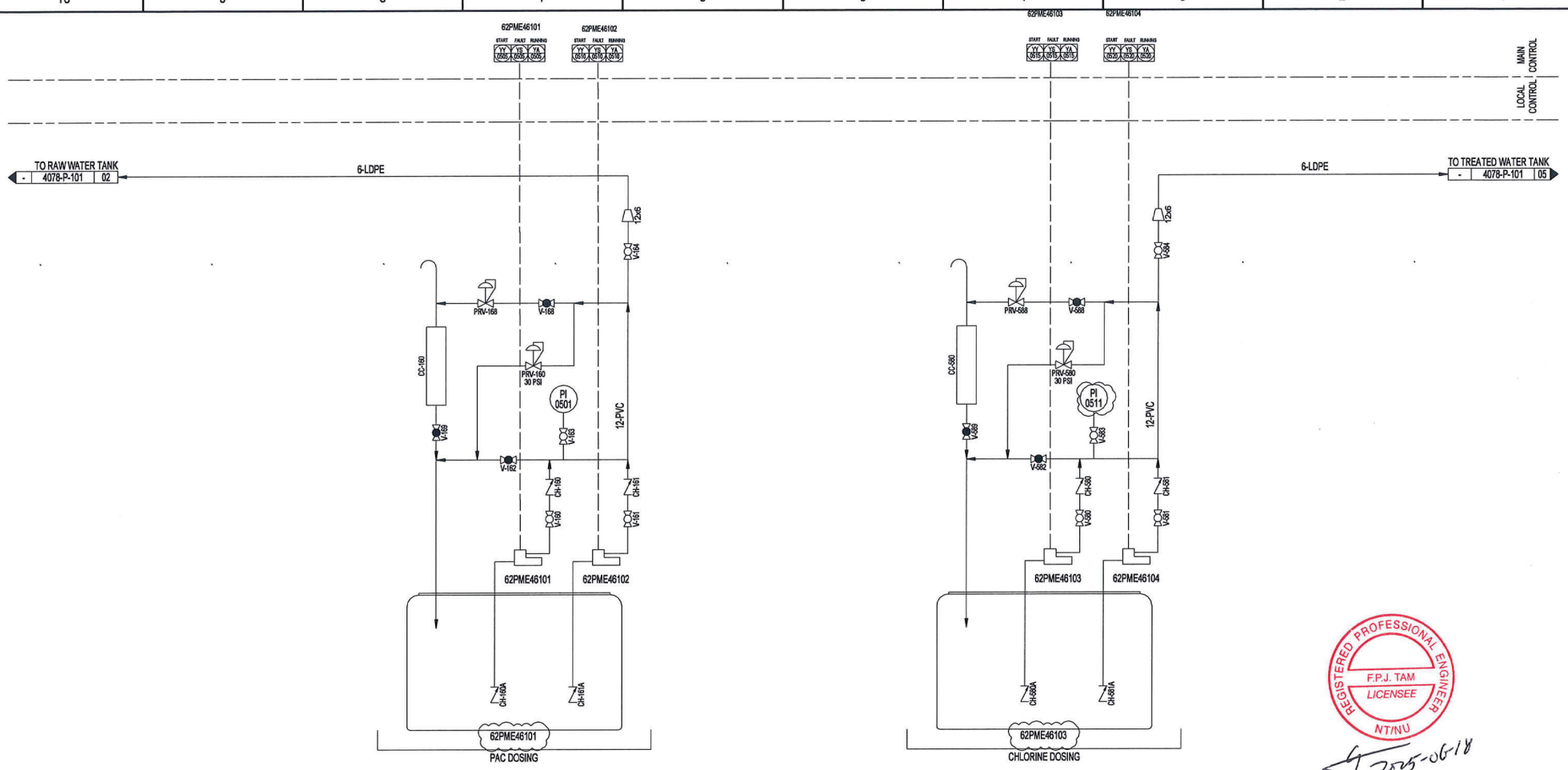

62PME46101
PAC RESERVOIR
CAPACITY: 20L

62PME46101, 62PME46102
PAC DOSING PUMP
MODEL: GRUNDFOS DDA 7.5-16
PRESSURE: 150kPa
POWER 120/1/60 24W

PI461DOR0501, PI460DOR0511
ISOLATED PRESSURE GAUGE
MODEL: GRIFFCO GG050P22

62PME46103
CHLORINE RESERVOIR
CAPACITY: 20L

62PME46103, 62PME46104
CHLORINE DOSING PUMP
MODEL: GRUNDFOS DDA 7.5-16
PRESSURE: 150kPa
POWER 120/1/60 24W

REGISTERED PROFESSIONAL ENGINEER
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LICENSEE
NT/NU
2025-06-18

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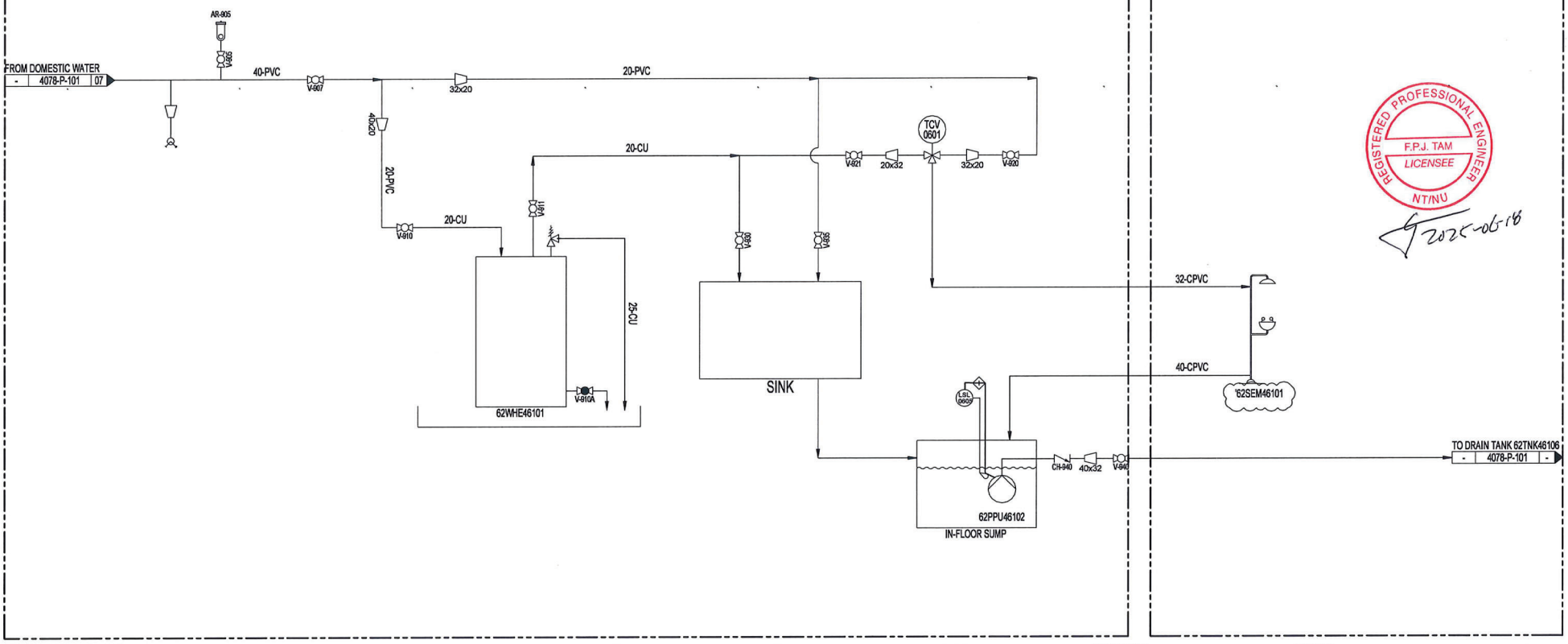
Client: AGNICO EAGLE

Title: PIPING AND INSTRUMENTATION DIAGRAM
Project: HOPE BAY PWTP 6209-S-291-002
Drawing #: 4078-P-101
Size: ANSI B (11 x 17)
Units: ft-in [mm]
Sheet 6 of 7
Projection:
Rev C



REGISTERED PROFESSIONAL ENGINEER
F.P.J. TAM
LICENSEE
NT/NU
2025-06-18

62WHE46101
HOT WATER TANK
CAPACITY: 80USG
MODEL: BRADFORD WHITE 280T6

TCV461DOR0601
THERMOSTATIC MIXING VALVE
MODEL: HAWS 9201E

62PPU46102
SUMP PUMP
MODEL: GRUNDFOS KP350

LSL461DOR0605
FLOAT LEVEL SWITCH
SJE VERTICALMASTER® 3 PLUS

62SEM46101
EMERGENCY SHOWER/EYEWASH
MODEL: H-10735

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-9650
Fax: (604) 882-9659
http://www.bipurewater.com

Rev	Date	Drawn	Checked	App'd	Revision Description
C	2025-06-17	AJ	AJ	CA	ISSUED FOR CONSTRUCTION - REVISED WITH AEM TAG NUMBERS
B	2025-06-06	SS	AJ	CA	ISSUED FOR CONSTRUCTION - REVISED WITH AEM TAG NUMBERS
A	2025-05-20	HZ	HZ	CA	ISSUED FOR CONSTRUCTION

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Sheet 7 of 7
Projection:
Rev C

Appendix C

BI Pure Water
#2-9790 190th Street
Surrey, BC, Canada V4N 3M9
604-882-6650

DESIGN CRITERIA

Document	**4078 Design Criteria**
Project	4078 Agnico Hope Bay PWTP
Client	Agnico Eagle Mines Limited Hope Bay Division
Purchase Order	OC-1535763
	6209-S-291-002
Revision	2
Date	July 15, 2025

Design Criteria	Units	Value
Raw Water		
Source	-	Windy Lake surface water: Attached 1
Feed Water Temperature	Celsius	0-20
Contaminants of Concern	-	TSS, pathogens (bacteria, protozoa and viruses)
Target		Meeting Health Canada CDWQG drinking water requirements: turbidity < 1 NTU, pH between 6.5 and 8.5, and residual chlorine at 0.6 mg/L.
Discharge Location	-	Camp potable water distribution
Treatment Technologies		
Description	-	Clarification, multimedia filtration, cartridge filtration, UV disinfection and chlorination
Plant Design		
Design Availability	%	90%
Design Operation Window	Days/year	365
Design Operation Intensity	hh/dd	24/7
Safety factor	_	1.5
Plant Design – Flowrates and Volumes		
Per capita design flow	m^3/p/d	0.24
Number of persons in camp	People/d	580
Safety factor	-	1.5
Noininal daily flow	m3/h	5.8
Nominal daily flow	m3/h	139
Maximum daily flow (used for design)	m^3/h	209
Nominal treatment rate	m^3/h	5.8
Maximum treatment rate	m^3/h	8.7
Distribution rate -peak flow (used for design)	m3/h	35
Raw water tank volume	m^3	26.5
Raw water pump flow rate	m^3/h	11 (50 GPM @ 30 PSI)
Raw Water Pumps	comment	1+1 pumps & flowmeter / totalizer, variable drive
Contact tank volume	m^3	0.45

BI Pure Water
#2-9790 190th Street
Surrey, BC, Canada V4N 3M9
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Design Criteria	Units	Value
Retention Time of the contact tank	sec	90 for 11 m3/h
CT factor	minutes	1.07 if one tank is in operation
	minutes	2.13 if two thanks are in operation
Coagulant dosing rate	L/h	2.9
Coagulant consumption per day	L/day	1.4
Clarifier volume	m^3	5.7
Clarifier	Tube settler (lamella system) is used. Effective area 16 m2. Rising rate 4.0 m/h. Estimated sludge production 0.09 m3/d (for typical raw water TSS) and 0.33 m3/d (for max TSS raw water), estimated 2% DS The NTU largely depends upon the raw water quality. The clarifier could reduce the turbidity to around 3 NTU, depending upon the raw water, however with the Next sand media and cartridge filters reducing it further to 0.3 or less.	
Transfer tank volume	m^3	1.5
Media Filter transfer flow rate	m^3/h	9.5 (42 GPM @ 60 PSI) for two duty media filters
Media Filter Transfer Pumps	comment	1+1 pumps & flowmeter / totalizer, variable drive
Media Filter Service Loading	gpm/ft2	2.97
Media Filter Service Loading	$L/h/m^2$	716.1
Media Filter Filtration	micron	3-5 micron
Backwash flow rate	m^3/h	19.3 (85 GPM @ 30 PSI)
Backwash frequency		Dependent on water quality, changes with the seasons too. 1-4 times per week, Per filter
Backwash duration	minutes	15
Backwash pumps	comment	1+1 pumps & flowmeter / totalizer
Backwash waste	m^3/d	2.2
Cartridge filtration	micron	1 micron nominal
Sodium hypochlorite dosing rate	l/hr	0.04
Sodium hypochlorite daily consumption	L/day	0.95
Treated Water Tank 1 volume	m^3	40.5
Treated Water Tank 2 volume	m^3	40.5
Treated water tank configuration	comment	parallel
Distribution flow rate	m^3/h	36 (160 GPM @ 80 PSI)
Distribution pumps	comment	1+1 pumps & flowmeter / totalizer, recirculation line to the treated tank, variable drive
Distribution Bladder tank volume	m^3	0.31
Treated water quality		Turbidity < 1 NTU, pH 6.5 to 8.5, residual chlorine 0.6

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Attached 1: Plant Influent Water Quality (Windy Lake)

			Sample Date	2024-01-10	2024-04-03	2024-04-09	2024-04-09	2024-08-21	2024-08-21	2024-10-22	2024-10-22	2024-11-19	2024-11-19	2024-12-10
			Sample Name	ST-7A	ST7a+PDC10	ST7A	ST7A	ST7A	ST7A+PDC10	ST7A	ST7-A	ST7A	ST7A	ST7A
Chemical Name	Unit	Fraction												
Aluminum	mg/L	T					0.0059	0.462		0.360			0.240	
Ammonia	mg/L	T												
Ammonia Nitrogen	mg/L	T					0.0108	<0.0050		<0.0050			<0.0050	
Antimony	mg/L	T					<0.00010	<0.00010		<0.00010			<0.00010	
Arsenic	mg/L	T					0.00028	0.00043		0.00032			0.00029	
Barium	mg/L	T					0.00277	0.00541		0.00564			0.00482	
Beryllium	mg/L	T					<0.000100	<0.000100		<0.000100			<0.000100	
Biochemical Oxygen Demand	mg/L	N					<2.0	<2.0		<2.0			<2.0	
Bismuth	mg/L	T					<0.000050	<0.000050		<0.000050			<0.000050	
Boron	mg/L	T					0.053	0.047		0.046			0.055	
Cadmium	mg/L	T					<0.0000050	0.0000071		<0.0000050			<0.0000050	
Calcium	mg/L	T					14.8	13.6		12.9			14.3	
Cesium	mg/L	T					<0.000010	0.000030		0.000026			0.000015	
Chloride	mg/L	D					115	97.3		102			103	
Chloride	mg/L	N												
Chromium	mg/L	T					<0.00050	0.00140		0.00095			0.00055	
Cobalt	mg/L	T					<0.00010	0.00045		0.00014			<0.00010	
Color	C.U.	N					<5.0	<5.0		<5.0			<5.0	
Conductivity, field measured	uS/cm	N		526	562	562			358.54		470	477.33		446.76
Copper	mg/L	T					0.00164	0.00368		0.00152			0.00136	
Cyanide	mg/L	T					<0.0050	<0.0050		<0.0050			<0.0050	
Cyanide (free)	mg/L	N					<0.0050	<0.0050		<0.0050			<0.0050	
CYANOBACTERIA_Aphanizomenon	cells/m	N					20	50						
CYANOBACTERIA_Aphanocapsa	cells/m	N												
CYANOBACTERIA_COUNT	cells/m	N					30	50		405			485	
CYANOBACTERIA_FILAMENTOUS	cells/m	N								135				
CYANOBACTERIA_Planktothrix	cells/m	N								270			220	
CYANOBACTERIA_Pseudanabaena	cells/m	N					10						265	
Escherichia coli	mpn/10	N					<1	29.2		<1			<1	
Fecal Coliform	CFU/10	N						13.0						
Fecal Coliform	mpn/10	N					<1			<1			<1	
Fecal Coliforms	CFU/10	N												
Field Salinity	PSU	N		0.2	0.2	0.2			0.17		0.22	0.23		0.25
Hardness, Calcium and Magnesium	mg/L	T					90.9	76.8		73.8			78.9	
Hardness, Calcium Carbonate	mg/L	N												
Iron	mg/L	T					0.049	0.699		0.354			0.216	
Lead	mg/L	T					<0.000050	0.000260		0.000154			0.000080	
Lithium	mg/L	T					0.0033	0.0036		0.0033			0.0033	
Magnesium	mg/L	T					13.1	10.4		10.1			10.5	
Manganese	mg/L	T					0.00089	0.0176		0.00549			0.00335	
Mercury	mg/L	T					<0.0000050	<0.0000050		<0.0000050			<0.0000050	
MICROCYSTIN, TOTAL	ug/L	N					<0.20	<0.20		<0.20			<0.20	
Molybdenum	mg/L	T					0.000710	0.000661		0.000730			0.000693	
Nickel	mg/L	T					<0.00050	0.00118		0.00067			<0.00050	
Nitrate as N	mg/L	N					<0.0050	0.0377		0.0354			<0.0050	
Nitrite as N	mg/L	N					<0.0010	<0.0010		0.0164			<0.0010	
Oil & Grease, Total	mg/L	N												
Oil & Grease, Total Rec	mg/L	N					<5.0	<5.0		15.1			<5.0	
Oil & Grease, visible sheen	none	N					Absent	Absent		Absent			Absent	
Oxidation Reduction Potential, field measured	RmV	N		227	234	234			166.4		246.6	240.2		210.6
pH	pH unit	N					7.78	7.91		7.91			7.93	
pH, field measured	pH unit	N		7.74	7.87	7.87			8.53		6.96	8.18		7.54
Phosphorus	mg/L	T					0.0060 <0.050	0.0225 <0.050		0.0172 0.082			0.0068 <0.050	
Phosphorus, Total Orthophosphate	mg/L	D					0.0025	<0.0010		<0.0010			0.0013	
Potassium	mg/L	T					4.55	4.04		3.87			4.10	
Rubidium	mg/L	T					0.00220	0.00273		0.00261			0.00236	
Selenium	mg/L	T					0.000051	<0.000050		<0.000050			<0.000050	
Silicon	mg/L	T					0.36	1.11		1.15			0.94	
Silver	mg/L	T					<0.000010	<0.000010		<0.000010			<0.000010	
Sodium	mg/L	T					64.5	57.3		51.7			52.3	
Strontium	mg/L	T					0.0642	0.0645		0.0614			0.0618	
Sulfur	mg/L	T					3.74	3.29		3.44			3.38	
Tellurium	mg/L	T					<0.00020	<0.00020		<0.00020			<0.00020	
Temperature, field measured	deg c	N		8.4	5.5	5.5			10.16		2.98	12.12		1.99
Thallium	mg/L	T					<0.000010	<0.000010		<0.000010			<0.000010	
Thorium	mg/L	T					<0.00010	0.00011		0.00015			<0.00010	
Tin	mg/L	T					<0.00010	<0.00010		<0.00010			<0.00010	
Titanium	mg/L	T					<0.00030	0.0225		0.0178			0.00998	
Total Coliform	mpn/10	N					<1	770		1			1	
Total Coliform	mpn/10	T												
Total Dissolved Solids	mg/L	N					244	243		221			215	
Total Suspended Solids	mg/L	N					<3.0	11.0		13.9			3.8	
Total Suspended Solids, field measured	mg/L	N												
Tungsten	mg/L	T					<0.00010	<0.00010		<0.00010			<0.00010	
Turbidity	NTU	N					0.34	6.07		11.9			4.53	
Uranium	mg/L	T					0.000189	0.000228		0.000237			0.000202	
Vanadium	mg/L	T					<0.00050	0.00150		0.00086			0.00100	
Zinc	mg/L	T					<0.0030	<0.0030		0.0060			<0.0030	
Zirconium	mg/L	T					<0.00020	<0.00020		0.00031			<0.00020	

Project Name: 4078 Agnico Hope Bay PWTP
Document Number : 3.10 6209-S-291-002
Submittal Description:Calculation Sheet
Submittal Date/ Rev: Rev 2, 2025-06-20

Item	Symbol	Description	Source /Calculation	Item No. relationship	Value	Unit
1	V	Available Storage	Given		18,230	gallons
2	Q	Flow Rate - Distribution	Given		154	gpm
3	HRT	Hydraulic Retention Time	(V/Q)	1 divided by 2	118	minutes
4	T_{10}/T	T 10 Correction Factor (Baffling)	From Tables 5.6	note 1	0.30	value
5	ERT	Effective Retention Time	HRT * T_{10}/T	3 times 4	36	minutes
6	C	Residual Chlorine	Given		0.60	mg/L
7	CT_{cal}	Calculated CT Value	ERT * C	5 times 6	21.31	(mg/L) min
8	$CT_{99.9}$	3 log CT value for Giardia	From Tables 5.8	note 2	163.00	(mg/L) min
9	$CT_{99.99}$	4 log CT value for virus	From Tables 5.10	note 3	10.00	(mg/L) min
10	IRV_1	Inactivation Ratio Virus	Ctcal / $CT_{99.99}$	7 divided by 9	2.13	value
11	IRV_2	UV Credit	Given		0.00	value
12	IRV_3	Pipe Credit	Calculated		0.00	value
				TOTAL (10 + 11 + 12)	**2.13**	

Note 1 0.25 Baffled outlet with sparger at inlet (per BC Health)
Note 2 pH 6.5, 0.5 deg. C, 0.4 mg/l free Chlorine
Note 3 pH 6 to 9, ≤1 deg. C, 4 log inactivation (10 per BC Health, instead of 12)

Table 5.8 CT Values [(mg/l)min] for Achieving 99.9% (3 log) Inactivation of Glardia lamblla

Disinfectant, mg/l	Tempereture °C						
	Ph	0.5 or <1	5	10	15	20	25
Free chlorine							
≤0.4	6	137	97	73	49	36	24
	7	195	139	104	70	52	35
	8	277	198	149	99	74	50
	9	390	279	209	140	105	70
1	6	148	105	79	53	39	26
	7	210	149	112	75	56	37
	8	306	216	162	108	81	56
	9	437	312	236	156	117	78
1.6	6	157	109	83	56	42	28
	7	226	155	119	79	59	40
	8	321	227	170	116	87	58
	9	466	329	236	169	126	82
2	6	165	116	87	58	44	29
	7	236	165	126	83	62	41
	8	346	263	182	122	91	61
	9	500	253	265	177	132	88
3	6	181	126	95	63	47	32
	7	261	182	137	91	68	46
	8	382	268	201	136	101	67
	9	552	389	292	195	146	97
ClO2	6_9	63	26	23	19	15	11
Ozone	6_9	2.9	1.9	1.43	0.95	0.72	0.48
Chloramine	6_9	3800	2200	1850	1500	1100	750

Table 5.10 CT Values [(mg/l)min] for Achieving Inactivation of Viruses at Ph 6 through 9

Disinfectant, mg/l	Log Inactivation	Tempereture °C					
		≤1	5	10	15	20	25
Free chlorine	2	6	4	3	2	1	1
	3	9	6	4	3	2	1
	4	12	8	6	4	3	2
Chlorine	2	8.4	6	4.2	2.8	2.1	1.4
dioxide	3	25-Jan	17	12.8	8.6	6.4	4.3
	4	50.1	33	25.1	16.7	12.5	8.4
Ozone	2	0.9	1	0.5	0.3	0.25	0.15
	3	1.4	1	0.8	0.5	0.4	0.25
	4	1.8	1	1	0.6	0.5	0.3
Chloramine	2	1243	857	643	428	321	214
	3	2063	1,423	1067	712	534	365
	4	2883	1,988	1491	994	746	497

Table 5.6 Selectivity Scale for Cations on Eight Percent Cross-Linked Strong-Acid Resin and for the Anions on Strong -Base Resins

Cation	Selectivity	Anion	Selectivity
Li^+	1.0	HPO_4^{2-}	0.01
H^+	1.3	CO_3^{2-}	0.03
Na^+	2.0	OH^-(type I)	0.06
UO^{2+}	2.5	F^-	0.1
NH^+_4	2.6	SO_4^{2-}	0.15
K^+	2.9	CH_3COO^-	0.2
Rb^+	3.2	HCO_3^-	0.4
Cs^+	3.3	OH^-(type II)	0.65
Mg^{2+}	3.3	BrO_3^-	1
Zn^{2+}	3.5	Cl^-	1
Co^{2+}	3.7	CN^-	1.3
Cu^{2+}	3.8	NO_2^-	1.3
Cd^{2+}	3.9	HSO_4^-	1.6
Ni^{2+}	3.9	Br^-	3
Be^{2+}	4.0	NO_3^-	4
Mn^{2+}	4.1	I^-	8
Pb^{2+}	5.0	SO_4^{2-}	9.1
Ca^{2+}	5.2	SeO_4^{2-}	17
Sr^{2+}	6.5	CrO_4^{2-}	100
Ag^+	8.5		
Pb^{2+}	9.9		
Ba^{2+}	11.5		
Ra^{2+}	13.0		

Sources: James M.Montgomery Consulting Engineering (1985,Clifford (1990)

Appendix D

Safety Data Sheet

Section 01 Identification

Product Identifier	CTI 4900 Series CTI 4900 Coagulant NSF® - 60 CTI 4910 Coagulant NSF® - 60 CTI 4912 Coagulant NSF® - 60
Other Means of Identification	Not available
Product Use and Restrictions on Use	Liquid coagulant designed for potable or wastewater treatment applications This product is NSF certified for use in drinking water, see section 15 and the NSF website for further information.
Initial Supplier Identifier	ClearTech Industries Inc. 1500 Quebec Avenue Saskatoon, SK. Canada S7K 1V7 Phone: 800.387.7503 Fax: 888.281.8109 www.cleartech.ca
Prepared By	ClearTech Industries Inc. technical writer
24-Hour Emergency Phone	306.664.2522

Section 02 Hazard Identification

Physical Hazards

This product does not qualify for any physical hazard class under WHMIS 2015

Health Hazards

Serious eye damage / eye irritation	Category 2

Signal Word

Warning

Hazard Statements

H319 Causes serious eye irritation.

Pictograms

Precautionary Statements

Prevention

P264 Wash affected body parts thoroughly after handling.

P280 Wear protective gloveseye protection, face protection.

Response

P305 P351 P338 P337 P313 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.

Hazards Not Otherwise Classified

Not available

Supplemental Information

Not available

Section 03 Composition / Information on Ingredients

Hazardous Ingredients:

Chemical name	Common name(s)	CAS number	Concentration (w/w%)
Aluminum chloride, basic	ACH; Aluminum chlorohydrate	1327-41-9	30-60%*

*Exact concentration withheld as a trade secret.

Section 04 First-Aid Measures

Description of necessary first-aid measures

Inhalation Get medical advice / attention if you feel unwell or are concerned.

Ingestion Get medical advice / attention if you feel unwell or are concerned.

Skin contact Rinse skin with lukewarm, gently flowing water / shower for 5 minutes or until product is removed. If skin irritation occurs or if you feel unwell: Get medical advice / attention.

Eye contact Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for 15 to 20 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. If eye irritation persists: Get medical advice / attention.

Most important symptoms and effects, both acute and delayed

Inhalation May cause respiratory irritation.

Ingestion May cause discomfort or nausea.

Skin contact Not available

Eye contact Causes serious eye irritation.

Further information For further information see Section 11 Toxicological Information.

Section 05 Fire Fighting Measures

Suitable extinguishing media Extinguish fire using extinguishing agents suitable for the surrounding fire.

Unsuitable extinguishing media Water jets are not recommended in fires involving chemicals.

Specific hazards arising from the chemical In the event of a fire oxides of aluminum and hydrogen chloride may be released.

Special protective equipment for fire-fighters Wear NIOSH-approved self-contained breathing apparatus and chemical-protective clothing.

Section 06 Accidental Release Measures

Personal Precautions / Protective Equipment / Emergency Procedures	Wear appropriate personal protective equipment (See Section 08 Exposure Controls and Personal Protection). Stay upwind, ventilate area.
Environmental Precautions	Prevent material from entering waterways, sewers or confined spaces. Notify local health and wildlife officials. Notify operators of nearby water intakes.
Methods and Materials for Containment and Cleaning Up	SMALL SPILLS: Stop or reduce leak if safe to do so. Clean up spill with non-reactive absorbent and place in suitable, covered, labeled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product. LARGE SPILLS: Contact fire and emergency services and supplier for advice.

Section 07 Handling and Storage

Precautions for Safe Handling	Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Inspect containers for damage or leaks before handling. If the original label is damaged or missing replace with a workplace label. Have suitable emergency equipment for fires, spills and leaks readily available.
Conditions for Safe Storage	Store in a cool, dry, well-ventilated area, away from heat sources and incompatible materials. Always store in original labeled container. Keep containers tightly closed when not in use and when empty. Empty containers may contain hazardous residues. Protect label and keep it visible.
Incompatibilities	Strong acids, such as sulphuric, nitric, and hydrochloric. Strong bases, such as potassium hydroxide, and sodium hydroxide. Strong oxidizing agents, such as oxygen, hydrogen peroxide, hypochlorites and permanganates.

Section 08 Exposure Controls and Personal Protection

Exposure limits

There are no known exposure limits for this product.

Engineering controls

Ventilation Requirements	Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems.
Other	An eye wash bottle or eye wash station should be available, tested, and be in close proximity to the product being handled in accordance with provincial regulations.

Protective equipment

The following are recommendations only. It is the responsibility of the employer / user to conduct a hazard assessment of the process in which this product being used and determine the proper engineering controls and PPE for their process. Additional regulatory and safety information should be sought from local authorities and, if needed, a professional industrial hygienist.

Eye and face protection	Where there is potential eye or face exposure, tightly fitting chemical goggles are recommended. Contact lenses are not recommended; they may contribute to severe eye injury.
Hand and body protection	Where handling this product it is recommended that skin contact is avoided.
Respiratory protection	In case of insufficient ventilation wear suitable respiratory equipment.

Thermal hazards	Not available

Section 09 Physical and Chemical Properties

Appearance

Physical state	Liquid
Colour	Pale yellow
Odour	Odourless
Odour threshold	Not applicable

Property

pH	3.0-4.5
Melting point / freezing point	-15 °C to -1 °C
Initial boiling point and boiling range	Not available
Flash point	Not applicable
Evaporation rate	Not available
Flammability	Not applicable
Upper flammable limit	Not available
Lower flammable limit	Not available
Vapour pressure	Not available
Vapour density	Not available
Relative density	Not applicable
Solubility	Soluble in water
Partition coefficient: n-octanol/water	Not available
Auto-ignition temperature	Not applicable
Decomposition temperature	Not available
Viscosity	Not available
Specific gravity	1.25-1.35 g/ml
Particle characteristics	Not applicable

Section 10 Stability and Reactivity

Reactivity	Not available
Stability	This product is stable if stored according to the recommendations in Section 07.
Possibility of hazardous reactions	Hazardous polymerization is not known to occur.
Conditions to avoid	Avoid contact with incompatible materials. Do not freeze.
Incompatible materials	Strong acids, such as sulphuric, nitric, and hydrochloric. Strong bases, such as potassium hydroxide, and sodium hydroxide. Strong oxidizing agents, such as oxygen, hydrogen peroxide, hypochlorites and permanganates.
Hazardous decomposition products	Thermal decomposition may produce oxides of aluminum and hydrogen chloride.

Section 11 Toxicological Information

Acute Toxicity (LD50 / LC50 values)

Component	Route	Species	Value	Exposure time
Aluminum chloride, basic	Oral	Rat	>2000 mg/kg bw	
	Dermal	Rat	>2000 mg/kg bw	

Toxic Health Effect Summary

Chemical characteristics	Aluminum chlorhydrate compounds are not redily absorbed by biological processes as they precipitate at neutral pH.
Skin	Not available
Ingestion	May cause discomfort or nausea.
Inhalation	May cause respiratory irritation.
Eye contact	Causes serious eye irritation.
Sensitization	This product and its components at their listed concentration have no known sensitizing effects.
Mutagenicity	This product and its components at their listed concentration have no known mutagenic effects.
Carcinogenicity	This product and its components at their listed concentration have no known carcinogenic effects.
Reproductive toxicity	This product and its components at their listed concentration have no known reproductive effects.
Specific organ toxicity	This product and its components at their listed concentration have no known effects on specific organs.
Aspiration hazard	Not available
Synergistic materials	Not available

Section 12 Ecological Information

Ecotoxicity

there is no available toxicity data for this product.

Percentage of product with unknown environmental toxicity: 30-60%

Biodegradability	The domestic substance list categorizes aluminum chloride, basic as persistent.
Bioaccumulation	The domestic substance list categorizes aluminum chloride, basic as non-bioaccumulative.
Mobility	This product is water soluble, but is expected to adsorb to soil and is not expected to contaminate ground water.
Other adverse effects	The domestic substance list categorizes aluminum chloride, basic as inherently toxic to aquatic organisms.

Section 13 Disposal Considerations

Waste From Residues / Unused Products	Dispose in accordance with all federal, provincial, and local regulations including the Canadian Environmental Protection Act.
Contaminated Packaging	Do not remove label, follow label warnings even after the container is empty. Empty containers should be recycled or disposed of at an approved waste handling facility.

Section 14 Transport Information

UN number	This product does not meet the definition of dangerous goods per Part 2 of Transport of Dangerous Goods Regulations
UN proper shipping name and description	Not available
Transport hazard class(es)	Not available
Packing group	Not available
Excepted quantities	Not available
Environmental hazards	Not listed as a marine pollutant under Canadian TDG Regulations, schedule III.
Special precautions	No special precautions
Transport in bulk	ERAP index: not available MARPOL 73/78 and IBC Code: This product is not listed in Chapter 17 of the IBC Code.
Additional information	Secure containers (full or empty) during shipment and ensure all caps, valves, or closures are secured in the closed position.

TDG PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and published test data regarding the classification of this product are listed in the references at section 16 of this SDS.

Section 15 Regulatory Information.

NOTE: THE PRODUCT LISTED ON THIS SAFETY DATA SHEET HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN HAZARDOUS PRODUCTS REGULATIONS. THIS SAFETY DATA SHEET CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.

All components of this product appear on the domestic substance list.

NSF Certification: These products are certified under NSF / ANSI Standard 60 for coagulation & flocculation at a maximum dosage of: CTI 4900: 250 mg/L, CTI 4910: 278 mg/L, CTI 4912: 100 mg/L. NSF product use restrictions based on requirements obtained from the NSF website; consult NSF website for current requirements.

Section 16 Other Information

Date of latest revision: March 08, 2024

Note: The responsibility to provide a safe workplace remains with the buyer / user. The buyer / user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the buyer / user to comply with all applicable laws and regulations regarding handling, using, reselling and shipping this product.

Attention: Receiver of the chemical goods / SDS coordinator

As part of our commitment to the RDC Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.

If you have any questions or concerns please call our customer service center.

References:

1) *NIOSH Pocket Guide to Chemical Hazards;* U.S. Department of Health and Human Services, https://www.cdc.gov/niosh/npg/default.html
2) *WorkSafe BC E-Limit;* Workers' Compensation Foard of British Columbia, https://elimit.online.worksafebc.com/
3) *ECHA - Registered Substance Dossier;* European Chemicals Agency, https://echa.europa.eu/registration-dossier/-/registered-dossier/16009
4) *Transportation of Dangerous Goods Regulations;* Transport Canada, https://laws-lois.justice.gc.ca/eng/regulations/SOR-2001-286/index.html
5) Globally Harmonized System of Classification and Labeling of Chemicals (GHS) *Seventh revised edition*
6) International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) 2007 Edition
7) The ACS Style Guide

Safety Data Sheet

Section 01 Identification

Product Identifier	Sodium Hypochlorite 12-16% Hypochlor-12, PCP Hypochlor 12, NSF® - 60 Hypochlor 15, NSF® - 60 Hypochlor 16, NSF® - 60 Sodium Hypochlorite 12%, NSF® - 60 Sodium Hypochlorite 12.5% With 1% Alkalinity Sodium Hypochlorite 15%, NSF® - 60 Sodium Hypochlorite 16%, NSF® - 60
Other Means of Identification	Sodium hypochlorite, Bleach, Chlorox, Hypochlorous acid, sodium salt, Javel water, liquid bleach, CAS: 7681-52-9
Product Use and Restrictions on Use	Bleaching agent, source of available chlorine, deodorizer. This product is NSF certified for use in drinking water, see section 15 and the NSF website for further information.
Initial Supplier Identifier	ClearTech Industries Inc. 1500 Quebec Avenue Saskatoon, SK. Canada S7K 1V7 Phone: 800.387.7503 Fax: 888.281.8109 www.cleartech.ca
Prepared By	ClearTech Industries Inc. technical writer
24-Hour Emergency Phone	306.664.2522

Section 02 Hazard Identification

Physical Hazards

Corrosive to metals	Category 1

Health Hazards

Skin corrosion / irritation	Category 1B
Serious eye damage / eye irritation	Category 1

Signal Word

Danger

Hazard Statements

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

Pictograms

Precautionary Statements

Prevention

P234 Keep only in original packaging.

P260 Do not breathe vapours, fumes, or mists.

P264 Wash affected body parts thoroughly after handling.

P273 Avoid release to the environment.

P280 Wear protective gloves, protective clothing, eye protection, face protection.

Response

P301 P330 P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 P361 P353 P363 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse.

P304 P340 P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor.

P305 P351 P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P390 Absorb spillage to prevent material damage.

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents / container in accordance with all federal, provincial and / or local regulations including the Canadian Environmental Protection Act.

Hazards Not Otherwise Classified

Contact with acids liberates toxic gas.

Supplemental Information

Not available

Section 03 Composition / Information on Ingredients

Hazardous Ingredients:

Chemical name	Common name(s)	CAS number	Concentration (w/w%)
Hypochlorous acid, sodium salt	Sodium hypochlorite	7681-52-9	10-16%

Section 04 First-Aid Measures

Description of necessary first-aid measures

Inhalation	Remove source of exposure or move person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor. If breathing has stopped, trained personnel should begin rescue breathing or if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Avoid mouth to mouth contact by using a barrier device. May release toxic chlorine gas.
Ingestion	Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor. If vomiting occurs naturally, lie on your side, in the recovery position.
Skin contact	Avoid direct contact. Wear chemical protective clothing, if necessary. Take off immediately contaminated clothing, shoes and leather goods. Rinse skin with lukewarm, gently flowing water / shower for 30 minutes. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before re-use, or discard.
Eye contact	Avoid direct contact. Wear chemical protective gloves, if necessary. Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for 30 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER or doctor.

Most important symptoms and effects, both acute and delayed

Inhalation	Causes severe burns to the mouth and throat (mist). May release toxic and irritating chlorine gas.
Ingestion	Causes burns to the mouth and throat.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Further information	For further information see Section 11 Toxicological Information.

Section 05 Fire Fighting Measures

Suitable extinguishing media	Extinguish fire using extinguishing agents suitable for the surrounding fire.
Unsuitable extinguishing media	Do NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed. Water jets are not recommended in fires involving chemicals.
Specific hazards arising from the chemical	Explosive decomposition may occur under fire conditions and closed containers may rupture violently due to a rapid decomposition, if exposed to fire or excessive heat for a sufficient period of time.
Special protective equipment for fire-fighters	Wear NIOSH-approved self-contained breathing apparatus and chemical-protective clothing.

Section 06 Accidental Release Measures

Personal Precautions / Protective Equipment / Emergency Procedures	Wear appropriate personal protective equipment (See Section 08 Exposure Controls and Personal Protection). Stay upwind, ventilate area. Do not breathe vapours, fumes, or mists. Do not use material handling equipment with exposed metal surfaces. Sodium hypochlorite solutions release chlorine when in contact with acids or oxidizable materials, such as oganic material or most metals. Chlorine is a respiratory irritant, so respiratory protection is advised.
Environmental Precautions	Do NOT let this chemical enter the environment. Prevent material from entering waterways, sewers or confined spaces. Notify local health and wildlife officials. Notify operators of nearby water intakes.
Methods and Materials for Containment and Cleaning Up	SMALL SPILLS: Stop or reduce leak if safe to do so. Clean up spill with non-reactive absorbent and place in suitable, covered, labeled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product. Use vented containers to avoid pressure buildup. LARGE SPILLS: Contact fire and emergency services and supplier for advice.

Section 07 Handling and Storage

Precautions for Safe Handling

Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Prevent the release of vapours, fumes, or mists into the workplace air.

Inspect containers for damage or leaks before handling. If the original label is damaged or missing replace with a workplace label. Have suitable emergency equipment for fires, spills and leaks readily available.

Never return contaminated material to its original container.

Conditions for Safe Storage

Store in a cool, dry, well-ventilated area, away from heat sources and incompatible materials. Always store in original labeled container. Keep containers tightly closed when not in use and when empty. Empty containers may contain hazardous residues. Protect label and keep it visible. Do not transfer to metal containers. Sodium hypochlorite solutions may slowly give off oxygen during storage. Vent caps are required to prevent a build-up of pressure that could cause containers to burst.

Incompatibilities

Acids, such as sulphuric, nitric, hydrochloric, phosphoric, flurosilicic (HFSA), sulphonic, acetic, citric, oxalic, and formic.

Oxidizing agents, such as oxygen, hydrogen peroxide, sulphuric and nitric acids and permanganates.

Reducing agents, such as hydrogen, sodium borohydride, sulphur dioxide, thiosulphates, hydrazine, phosphites, carbon, and oxalic, formic and ascorbic acid.

Organic material, such as wood, paper, gasoline, diesel, solvents and some glycol based heat transfer fluids

Metals, such as aluminum, steel, and brass.

Section 08 Exposure Controls and Personal Protection

Exposure limits

Component	Regulation	Type of listing	Value
Sodium Hypochlorite	NIOSH	REL	2 mg/m³
	OSHA	PEL	2 mg/m³
Chlorine	ACGIH	TWA	0.1 ppm

Engineering controls

Ventilation Requirements

Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems.

Other

An emergency shower and eyewash station should be available, tested, and be in close proximity to the product being handled in accordance with provincial regulations.

Protective equipment

The following are recommendations only. It is the responsibility of the employer / user to conduct a hazard assessment of the process in which this product being used and determine the proper engineering controls and PPE for their process. Additional regulatory and safety information should be sought from local authorities and, if needed, a professional industrial hygienist.

Eye and face protection

Where there is potential eye or face exposure, tightly fitting safety goggles and a face shield or a full face respirator or similar protective equipment which protects the wearer's face and eyes are recommended. Contact lenses are not recommended; they may contribute to severe eye injury.

Hand and body protection	Disposable latex or nitrile gloves are recommended to prevent incidental contact. Butyl rubber, neoprene, or PVC skin protection is recommended for extended contact. Leather gloves are not recommended for chemical protection. Refer to manufacturer's specifications for breakthrough times and permeability information; note that breakthrough times and permeability vary with temperature, application and age of material. Continued use of contaminated safety gear or clothing is not recommended; wash before reuse or discard.
Respiratory protection	In case of insufficient ventilation wear suitable respiratory equipment. **NIOSH respirator recommendations for: Chlorine** **Up to: 5 ppm** (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against Chlorine (APF = 10) Any supplied-air respirator **Up to: 10 ppm** (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against Chlorine (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against Chlorine (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Chlorine (APF = 50) Any self-contained breathing apparatus with a full facepiece. (APF = 50) Any supplied-air respirator with a full facepiece **Emergency or planned entry into unknown concentrations or IDLH conditions:** (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus **Escape:** (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Chlorine Any appropriate escape-type, self-contained breathing apparatus
Thermal hazards	Not available

Section 09 Physical and Chemical Properties

Appearance

Physical state	Liquid
Colour	Clear, greenish-yellow solution
Odour	Strong chlorine odour
Odour threshold	Not available

Property

pH	10.8-11.2
Melting point / freezing point	Not available

Initial boiling point and boiling range	Not available
Flash point	Not available
Evaporation rate	Not available
Flammability	Not applicable
Upper flammable limit	Not available
Lower flammable limit	Not available
Vapour pressure	Negligible
Vapour density	Not available
Relative density	Not applicable
Solubility	Completely soluble in water
Partition coefficient: n-octanol/water	Log POW = ~ -3.42
Auto-ignition temperature	Not available
Decomposition temperature	Sodium hypochlorite's decomposition rate is an exponential function of temperature. Each increase of 10 °C will increase the degredation rate by a factor of 2 to 4 (there is disagreement in the literature).
Viscosity	Not available
Specific gravity	1.1-1.2 g/mL
Particle characteristics	Not applicable
Formula	NaOCl
Molecular weight	74.44 g/mol

Section 10 Stability and Reactivity

Reactivity	May be corrosive to metals. Reacts violently with acids.
Stability	Sodium hypochlorite solutions are unstable and will decompose over time. Sodium hypochlorite's decomposition rate is an exponential function of temperature. Each increase of 10 °C will increase the degredation rate by a factor of 2 to 4 (there is disagreement in the literature). Exposure to ultraviolet light (sunlight) will accelerate the degredation of sodium hypochlorite.
Possibility of hazardous reactions	Hazardous polymerization is not known to occur. Reacts with acids to form hypochlorous acid, a powerful oxidizing agent, which degrades into toxic chlorine gas.
Conditions to avoid	Do not heat. Do not freeze.
Incompatible materials	Acids, such as sulphuric, nitric, hydrochloric, phosphoric, flurosilicic (HFSA), sulphonic, acetic, citric, oxalic, and formic. Oxidizing agents, such as oxygen, hydrogen peroxide, sulphuric and nitric acids and permanganates. Reducing agents, such as hydrogen, sodium borohydride, sulphur dioxide, thiosulphates, hydrazine, phosphites, carbon, and oxalic, formic and ascorbic acid. Organic material, such as wood, paper, gasoline, diesel, solvents and some glycol based heat transfer fluids Metals, such as aluminum, steel, and brass.
Hazardous decomposition products	Chlorine, sodium chlorate.

Section 11 Toxicological Information

Acute Toxicity (LD50 / LC50 values)

Component	Route	Species	Value	Exposure time
Sodium Hypochlorite	Oral	Rat	>5000 mg/kg bw	
Chlorine	Inhalation	Mouse	137 ppm	1 hour

Toxic Health Effect Summary

Chemical characteristics	Toxicity caused primarily by high pH and oxidative potential. Hypochlorites may react with organic molecules to form organochlorides which have unknown toxicology.
Skin	Very dilute solutions have caused negligible irritation, while more concentrated solutions have caused acute corrosive injury to skin. Prolonged exposure may lead to permanent scarring of skin.
Ingestion	Acute exposure may lead to burning of the mouth and throat, abdominal cramps, nausea, vomiting, diarrhea, shock. May lead to convulsions, coma, and even death.
Inhalation	Causes severe burns to the mouth and throat (mist). May release toxic and irritating chlorine gas. Chlorine, one of the primary decomposition products of sodium hypochlorite, is an irritant of the nose and throat, causing coughing, difficulty breathing, and pulmonary edema.
Eye contact	Causes irritation, redness, and pain. May cause burns and possible damage to vision.
Sensitization	This product and its components at their listed concentration have no known sensitizing effects.
Mutagenicity	This product and its components at their listed concentration have no known mutagenic effects.
Carcinogenicity	IARC has classified hypochlorite salts as group 3, not classifiable as to its carcinogenicity to humans.
Reproductive toxicity	This product and its components at their listed concentration have no known reproductive effects.
Specific organ toxicity	This product and its components at their listed concentration have no known effects on specific organs.
Aspiration hazard	Prolonged or repeated overexposure may cause lung damage.
Synergistic materials	Not available

Section 12 Ecological Information

Ecotoxicity

Component	Type	Species	Value	Exposure Time
Sodium Hypochlorite 12%	LC50	Marine fish	0.27 mg/L	96 hours
	EC50	Marine invertabrates	0.22 mg/L	48 hours
	EC50	Freshwater algea	0.42 mg/L	72 hours

Biodegradability	The domestic substance list categorizes sodium hypochlorite as non-persistent.
Bioaccumulation	The domestic substance list categorizes sodium hypochlorite as non-bioaccumulative.
Mobility	This product is water soluble, is not predicted to adsorb to soil and may contaminate ground water.
Other adverse effects	The domestic substance list categorizes sodium hypochlorite as inherently toxic to aquatic organisms.

Section 13 Disposal Considerations

Waste From Residues / Unused Products	Dispose in accordance with all federal, provincial, and local regulations including the Canadian Environmental Protection Act.
Contaminated Packaging	Do not remove label, follow label warnings even after the container is empty. Empty containers should be recycled or disposed of at an approved waste handling facility.

Section 14 Transport Information

UN number	UN 1791
UN proper shipping name and description	HYPOCHLORITE SOLUTION with more than 7% available chlorine
Transport hazard class(es)	8
Packing group	III
Excepted quantities	5 L
Environmental hazards	Listed as a marine pollutant under Canadian TDG Regulations, schedule III.
Special precautions	No special precautions
Transport in bulk	ERAP index: not required

MARPOL 73/78 and IBC Code:

Product name:	Sodium hypochlorite solution (15% or less)	
Pollution category:	Y	
Hazards:	the product is included in the Code because of both its safety and pollution hazards.	
Ship type:	ship type 2	
Tank type:	integral gravity tank	
Tank vents:	controlled venting	
Tank environmental control:	no special requirements under this Code	
Electrical equipment:	Temperature classes	no requirements
	Apparatus group	no requirements
	Flash point	non-flammable product
Gauging:	restricted gauging	
Vapour detection:	no special requirements under this Code	
Fire protection:	no special requirements under this Code	
Emergency equipment	no special requirements under this Code	
Specific and operational requirements	15.19.6	

Additional information Secure containers (full or empty) during shipment and ensure all caps, valves, or closures are secured in the closed position.

TDG PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and published test data regarding the classification of this product are listed in the references at section 16 of this SDS.

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All components of this product appear on the domestic substance list.

NSF Certification: Hypochlor 12 is certified under NSF / ANSI Standard 60 for disinfection & oxidation at a maximum dosage of: 103 mg/L. NSF product use restrictions based on requirements obtained from the NSF website; consult NSF website for current requirements.

Section 16 Other Information

Date of latest revision: July 19, 2023

Note: The responsibility to provide a safe workplace remains with the buyer / user. The buyer / user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the buyer / user to comply with all applicable laws and regulations regarding handling, using, reselling and shipping this product.

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If you have any questions or concerns please call our customer service center.

References:

1) *NIOSH Pocket Guide to Chemical Hazards;* U.S. Department of Health and Human Services, https://www.cdc.gov/niosh/npg/default.html
2) *WorkSafe BC E-Limit;* Workers' Compensation Foard of British Columbia, https://elimit.online.worksafebc.com/
3) *ECHA - Registered Substance Dossier;* European Chemicals Agency, https://echa.europa.eu/registration-dossier/-/registered-dossier/15516
4) *Transportation of Dangerous Goods Regulations;* Transport Canada, https://laws-lois.justice.gc.ca/eng/regulations/SOR-2001-286/index.html
5) Globally Harmonized System of Classification and Labeling of Chemicals (GHS) *Seventh revised edition*
6) International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) 2007 Edition
7) The ACS Style Guide