Design Report
Sewage Water Treatment Plant (STP)

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	14/07/2025			Design report

Prepared By:

Thomas Genty
Water Treatment Eng.
NAPEG L4751

Prepared By:

Member No.L5013
07/28/2025

Raphael Lachance
Mechanical Resident Engineer – Construction
NAPEG L5013

Approved by:

Cyril Jenkins
Environment Superintendent

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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 sewage treatment plant, a Sewage treatment plant (STP) upgrade is required.

1.3 PURPOSE OF DOCUMENT

This report includes the final design and drawings for the Sewage Treatment Plant (STP) aiming to treat domestic sewage prior discharging it to the environment.

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

1.4 SCOPE OF WORK

This report describes the STP 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.

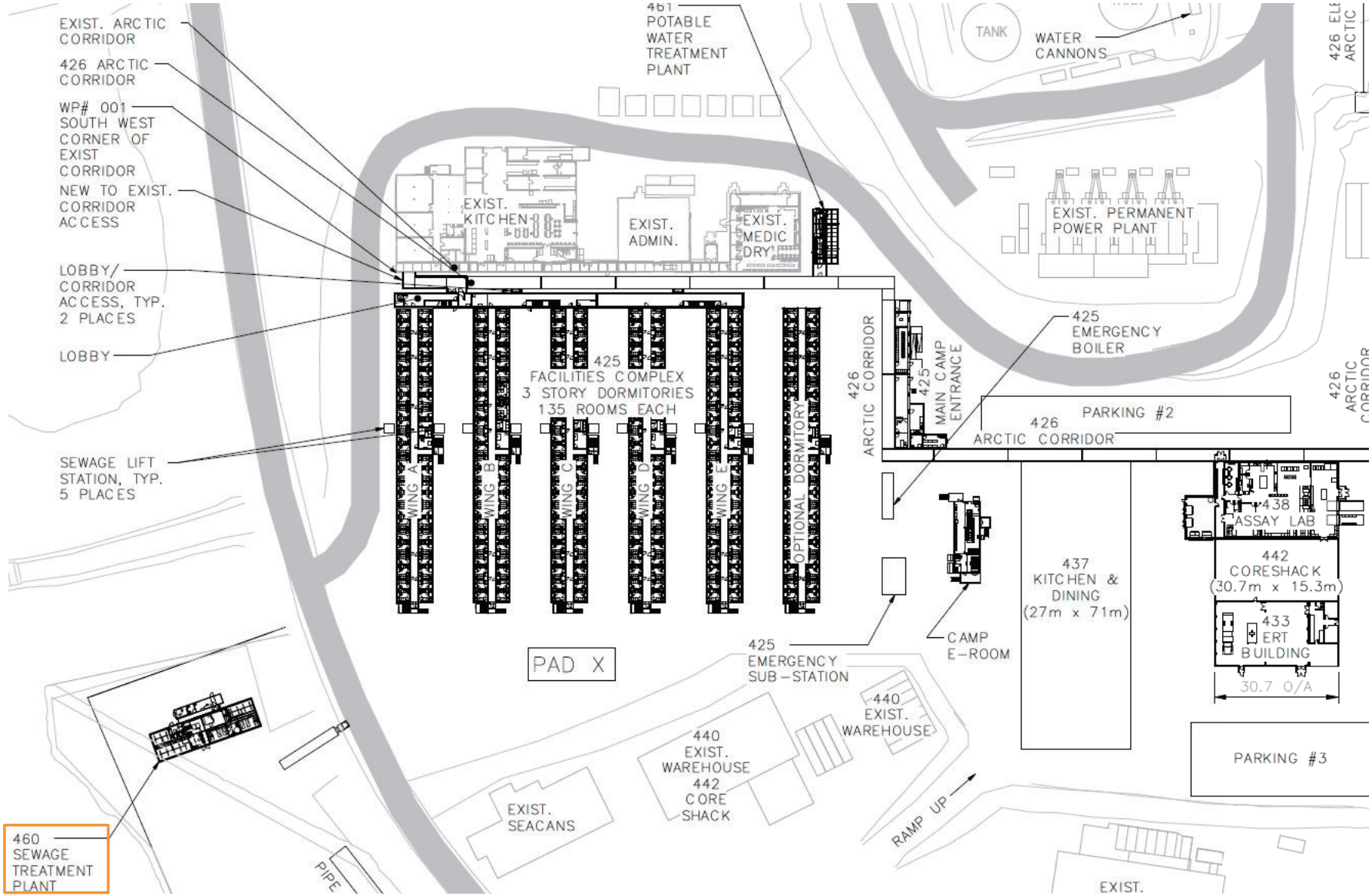


Figure 1 : General location plan

2 DESIGN METHODOLOGY

2.1 DESIGN RATIONALE

The design rationales are the following:

- Provide more sewage treatment capacity for the camp and more reliability.
- Respect requirement of License 2AM DOH 1335.
- Ensure the system is containerized for simplicity.

Table 1 presents the effluent concentration at the exit of the STP. As per the license, all sewage needs to be treated and effluent needs to be discharged to the Tailing impoundment area (TIA) or the Tundra to an approved location by an inspector.

Table 1: STP effluent operational limits (station ST-8)

Parameter	Unit	Maximum average concentration	Maximum Grab concentration
BOD_5	mg/L	80	160
TSS	mg/L	100	100
pH	units	6-9.5	6-9.5
Fecal Coliforms	CFU/100 mL	10 000	10 000
Oils & Grease	mg/L	5, no visible sheen	10, no visible sheen

2.2 DESIGN METHODS, ASSUMPTIONS AND LIMITATIONS

STP equipment were selected to store and manage an equivalent of approximately 580 to 870 people in the camp. The selection of each of these components was based on a typical process used in the sewage water treatment sector. The robustness and redundancy of equipment were also taken into account during equipment/supplier selection.

Design criteria of the STP are presented in Appendix C.

Biological process selection

Membrane bioreactor (MBR) is an advanced wastewater treatment technology that combines the conventional suspended growth activated sludge process with membrane filtration, performing the critical solids/liquid separation function that is traditionally accomplished by gravity using secondary clarifiers. The MBR system has the following advantages:

- High Efficiency and Smaller Footprint

MBR systems operate at much higher biomass concentrations (i.e., MLSS – mixed liquor suspended solids) than most other treatment processes. The MLSS concentration in an MBR system is three to six times higher than a conventional activated sludge system (such as extended aeration, sequencing batch reactors (SBR), contact stabilization, etc.). Under typical operating conditions, MLSS concentrations for the MBR process will range between 8,000 and 16,000 mg/L (0.8% to 1.6%). This difference in biomass concentration leads to much smaller reactor basins for the biological process. When combined with the elimination of secondary clarifiers, the overall footprint of the MBR treatment plant is significantly reduced.

- High Effluent Quality and Operational Stability

The membrane portion is the device which separates MLSS from the treated effluent. It is the clarification part of a biological treatment system and replaces other gravity separation processes such as chain/scraper type

rectangular clarifiers, circular clarifiers, or the settling phase of a SBR (sequence batch reactor). Most distinctly, because of the innate characteristic of the membrane separation, it will not be impacted by potential filamentous bulking problems (very common and challenging for other traditional treatment/separation processes) or other upsetting situations; therefore, the operational stability of the entire treatment system will be significantly enhanced, and the effluent quality can be assured. The Membrane filtration process itself is an effective bacteria barrier and MBR permeate (effluent) is free of Suspended Solids. Under normal circumstances, fecal coliforms can't pass through the membrane.

- Less Sludge Production

A MBR treatment system has lower sludge yields as well as more stabilized sludge than most other wastewater treatment systems due to its much higher Solids Retention Time. In addition, the excess activated sludge diverted directly from the MBR process typically has higher concentration (thus lower volume) than sludge from other treatment processes. All these features are beneficial for sludge handling and final sludge disposal.

2.3 WATER MANAGEMENT STRATEGY

Sewage will be collected from the facilities and pumped to the STP. The objective of the STP is to treat sewage to an acceptable level in order to discharge permeat water to the tundra at the approved location through a treated water discharge pipeline (heat traced insulated). The STP is housed in a prefabricated (modular) structure, located on the west side of the industrial pad (Figure 1).

The composition of the sewage and grey water entering the plant and the composition water exiting the units will be monitored on a regular basis to determine plant efficiency.

2.4 WATER CHARACTERISTICS

Table 2 presents the raw sewage water characteristic used for the design.

Table 2: Raw Water

Parameter	Unit	Raw water
BOD_5	mg/L	500
TSS	mg/L	50-350
pH	unit	6-9.5
Ammonia Nitrogen (N-NH3)	mg/L	100
Fats, Oils and Grease	mg/L	20-50
TKN	mg/L	100
Ptotal	mg/L	5-12
Alkalinity	mg/L	250-500

2.5 TREATMENT CAPACITY

The STP is designed to treat a maximum of 209 m^3/d of sewage water.

3 PROCESS DESCRIPTION

3.1 STP PROCESS DESCRIPTION AND CONTROL SUMMARY

Water from the external lift station enters the STP and is screened at the screening system. The screened water gravity drains to a collection tank under the screen system and is pumped to the Eqaulization (EQ) tanks.

When the EQ tanks reach a set level, the EQ pumps send water to the aerobic tank. This water is processed by the membrane bioreactor system (MBR), disinfected by UV units, and gone through a reuse water tank before discharge.

A minimum amount of treated water must be retained as reused water to assist the operation of the screening and sludge systems. Excess water is pumped to the discharge outlet.

Waste activated Sludge (WAS) from the aerobic tank will be pumped to sludge processing unit to be dewatered, compacted, and prepped for disposal.

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

Fine Screening

In order to protect the downstream equipment especially the MBR membranes, fine screen is used to remove large solids and fibrous materials from the raw sewage. Two screens are used for redundancy so that no unscreened influent enters the EQ tank. Redundant pumps are used to pump the screened influent into the equalization (EQ) tank.

Equalization Tank

The flow and strength of the sewage will vary throughout the day. To accommodate this, an equalization tank will buffer the flow and homogenize the loading. The equalization tank is aerated to maintain an aerobic environment to minimize odors and to prevent solids settling. From the EQ tank the wastewater will be transferred via two pumps to the biological treatment system.

MBR Biological Treatment System

Aerobic activated biological treatment system is the core process of the STP to remove BOD5 and ammonia, which consist of an aerobic tank and a MBR tank. Fine/coarse bubble diffusers are used for aeration in the aerobic tank, which have high oxygen transfer efficiency thus less energy consumption for the blowers. The biological blowers flow rate is controlled via VFD to maintain DO concentration in the aerobic tanks in the range of 2-3 mg/L.

Membrane modules will be installed in MBR tanks to separate TSS of the mixed liquor (MLSS) and extract clean water as the treated effluent. Intermittent air scour will maintain the membrane permeability and minimize membrane fouling.

UV Disinfection

Under normal operation, the MBR permeate should be able to meet low fecal coliform requirement. However, UV disinfection is used to guarantee the final effluent meeting the bacteriological requirement.

Chemicals Dosing

Considering the strict requirements for efficient biological phosphorus removal and the relatively small flow rate of the STP, chemical phosphorus removal (via alum dosing) is used for this specific application. Nitrification process

(biological ammonia removal) will consume alkalinity in the sewage and lower wastewater pH. To ensure the required effluent pH and alkalinity, caustic (NaOH) is dosed into the treatment process.

Sludge Management System

Sludge will be produced from STP. A sludge dewatering system is installed in the plant. The sludge (MLSS) from biological treatment system will be transferred into a sludge holding tank which is also designed with decanting capability. The sludge holding tank is aerated to maintain aerobic condition and minimize odors. The thickened sludge from the sludge holding tank will be pumped to the sludge dewatering unit. The screw (volute) press type sludge dewatering system is used. Sludge cake with 10% to 20% dry solids (DS) is expected.

3.2 SLUDGE PRODUCTION AND STORAGE

Sludge produced in the STP will be disposed of in the TIA or an appropriate location in accordance with the Hope Bay Hazardous Waste Management Plan.

It is estimated that approximately 0.23 m3/d sludge cake (based on 20% DS) after dewatering will be produced for maximum design flow.

3.3 CHEMICAL USAGE

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

- Coagulant: Alum or alternative
- Alkalinity: Caustic solution or alternative
- MBR Clean In Place: Sodium hypochlorite solution and citric acid or alternative
- Sludge dewatering polymer: ClearFloc CE Series or alternative

SDS of typical chemical are presented in appendix D.

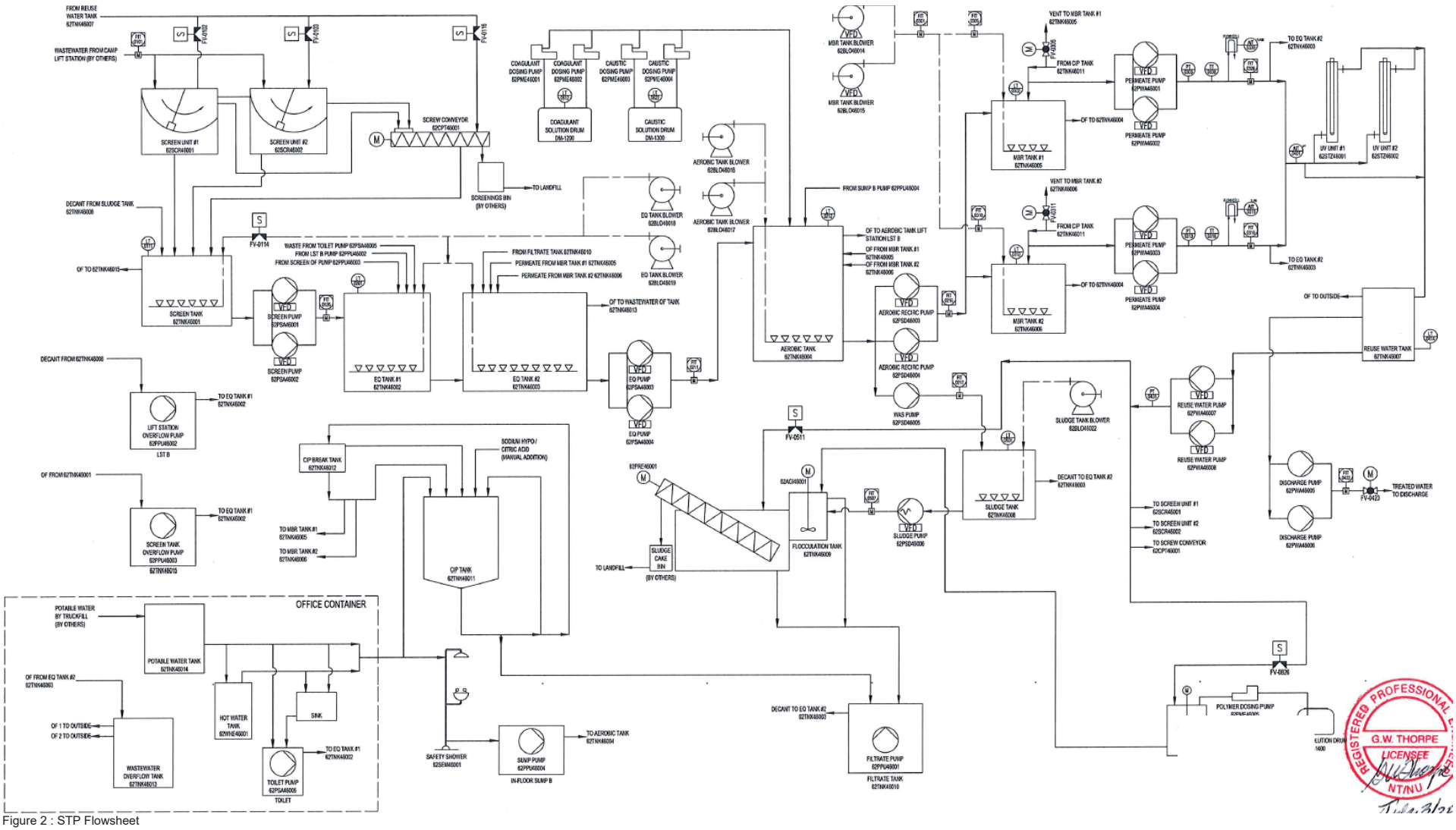


Figure 2 : STP Flowsheet

4 CONSTRUCTION METHODS AND COMMISSIONING

4.1 RAW WATER FEED STRATEGY

For the operation of the STP, the following strategy will be used to feed the plant and dispose treated water:

- Feed: pipeline from the main camp lift station to the STP
- Discharge: pipeline from the treated water tank pumps in the STP to the Tundra (current approved discharge location; 432933, 7559057)

4.2 CONSTRUCTION METHOD AND EQUIPMENT

The STP equipment will be installed at the west side of the industrial pad. Mobile equipment used for the modifications will operate into the footprint of industrial pads.

The footprint for the STP treatment plant will occupy 242 m^2 (approx. 27 m x 11 m). The STP 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 applicable documentation.

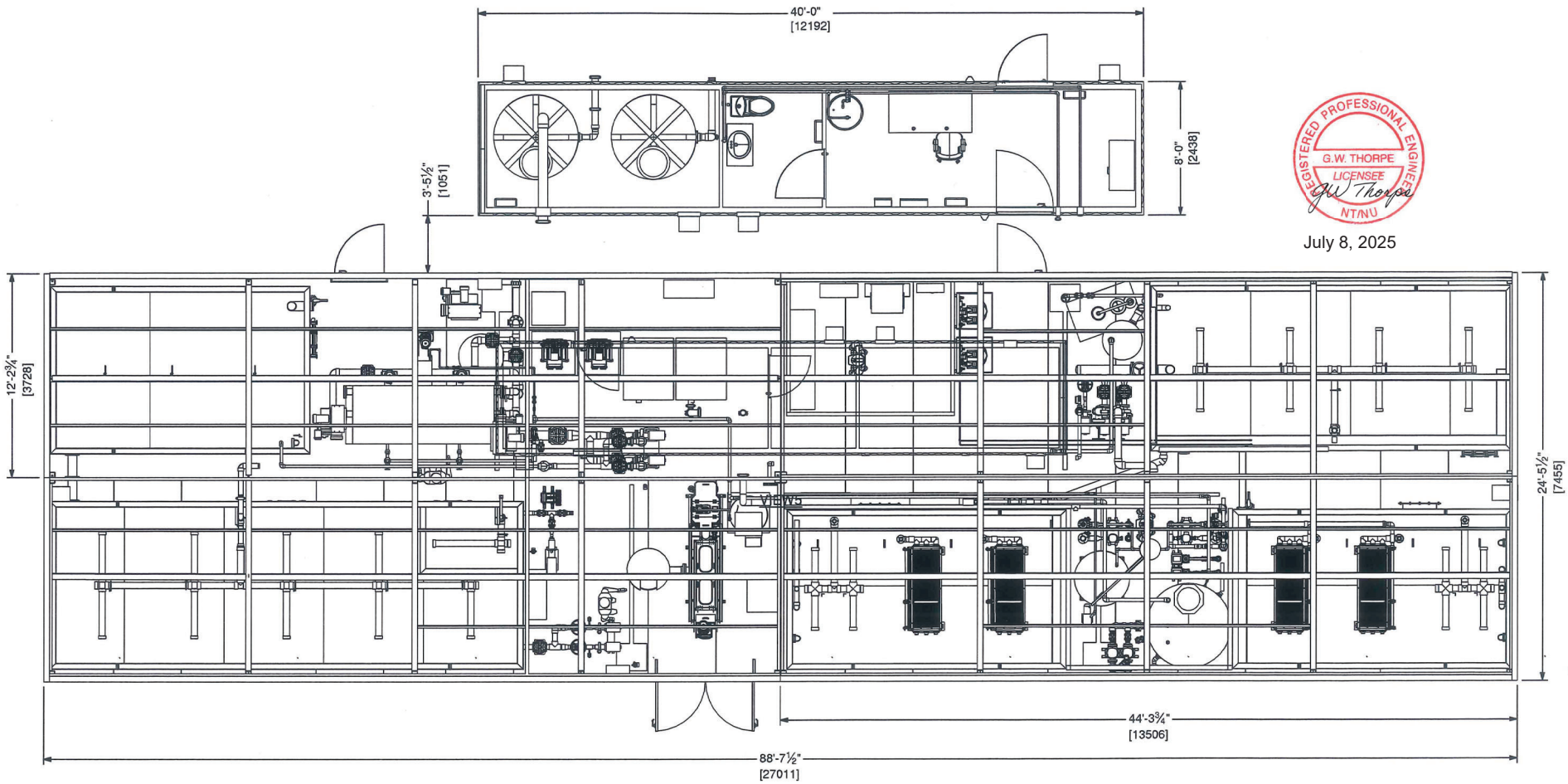
4.3 TESTING AND INSPECTION

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



PLAN

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU

July 8, 2025

BI Pure Water (Canada) Inc.
PTP : WDM36
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

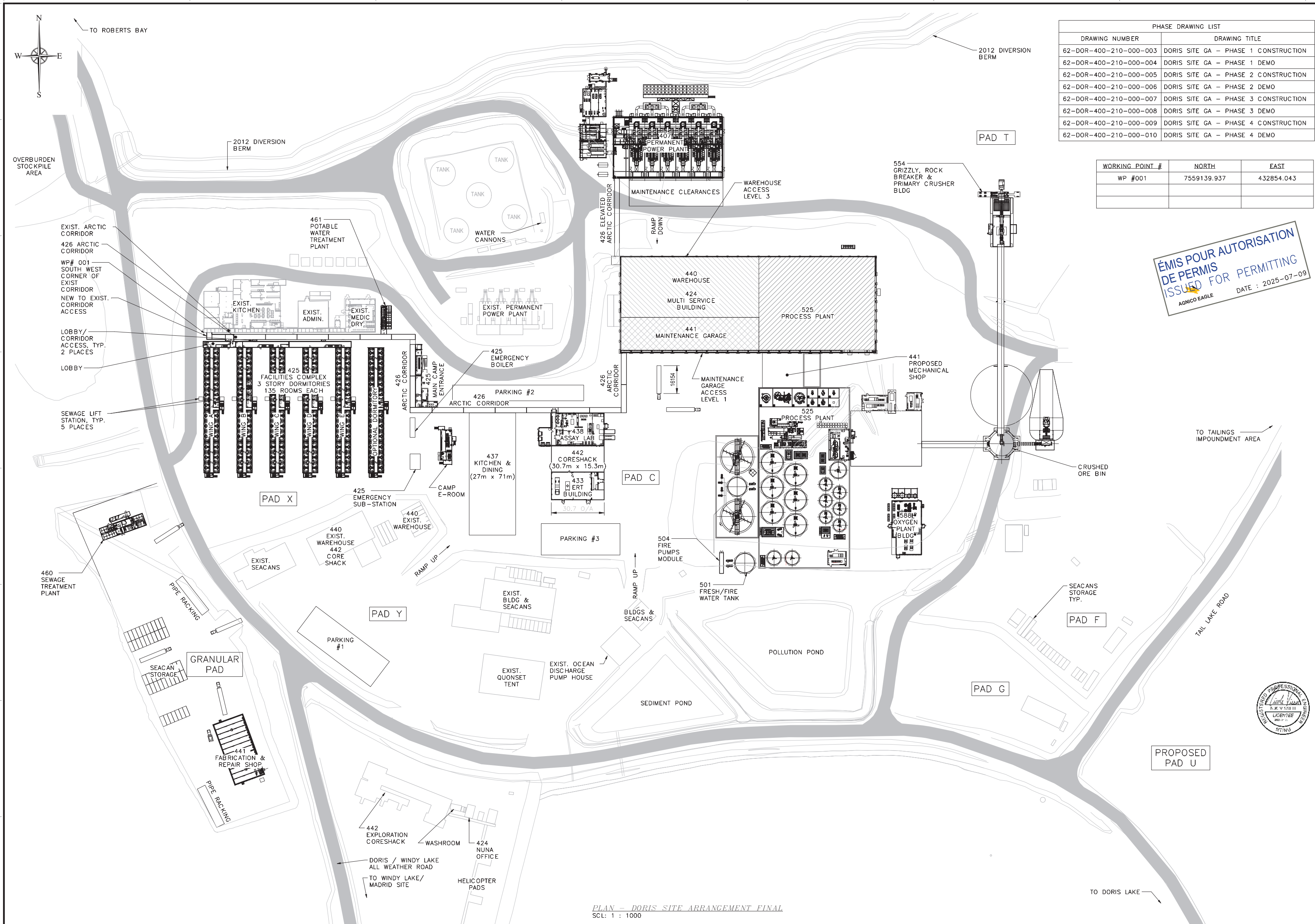
Issue	Date	Drawn	Checked	Appd	Revision Description
A	2025-07-04	JL	JJ	CA	ISSUED FOR REVIEW

Client: AGNICO EAGLE

Title: GENERAL ARRANGEMENT
Project: HOPE BAY WWTP
Drawing #: 4077-G-100
Size: ANSI B (11 x 17)
U.N.O.: ft-in [mm]
Sheet: 1 of 1
Projection:
Rev: A

NO. DESSIN DRAWING NO. 62-DOR-400-210-000-002

FORMAT ARCH D



PLAN - DORIS SITE ARRANGEMENT FINAL
SCL: 1 : 1000

PHASE DRAWING LIST	
DRAWING NUMBER	DRAWING TITLE
62-DOR-400-210-000-003	DORIS SITE GA - PHASE 1 CONSTRUCTION
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
62-DOR-400-210-000-010	DORIS SITE GA - PHASE 4 DEMO

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.
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

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
0	2025-07-09	ISSUED FOR PERMITTING	AB	CK	

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 DRAWING NO. 62-DOR-400-210-000-002

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

AE-CART-ARCH D

Autodesk Docs://AEM - Hope Bay Surface Infra/AEM HOPE BAY DORIS SITE GA.rvt

62-DOR-400-210-000-002_R0.DWG

NO. DESSIN
DRAWING NO. 62–DOR–460–210–000–001

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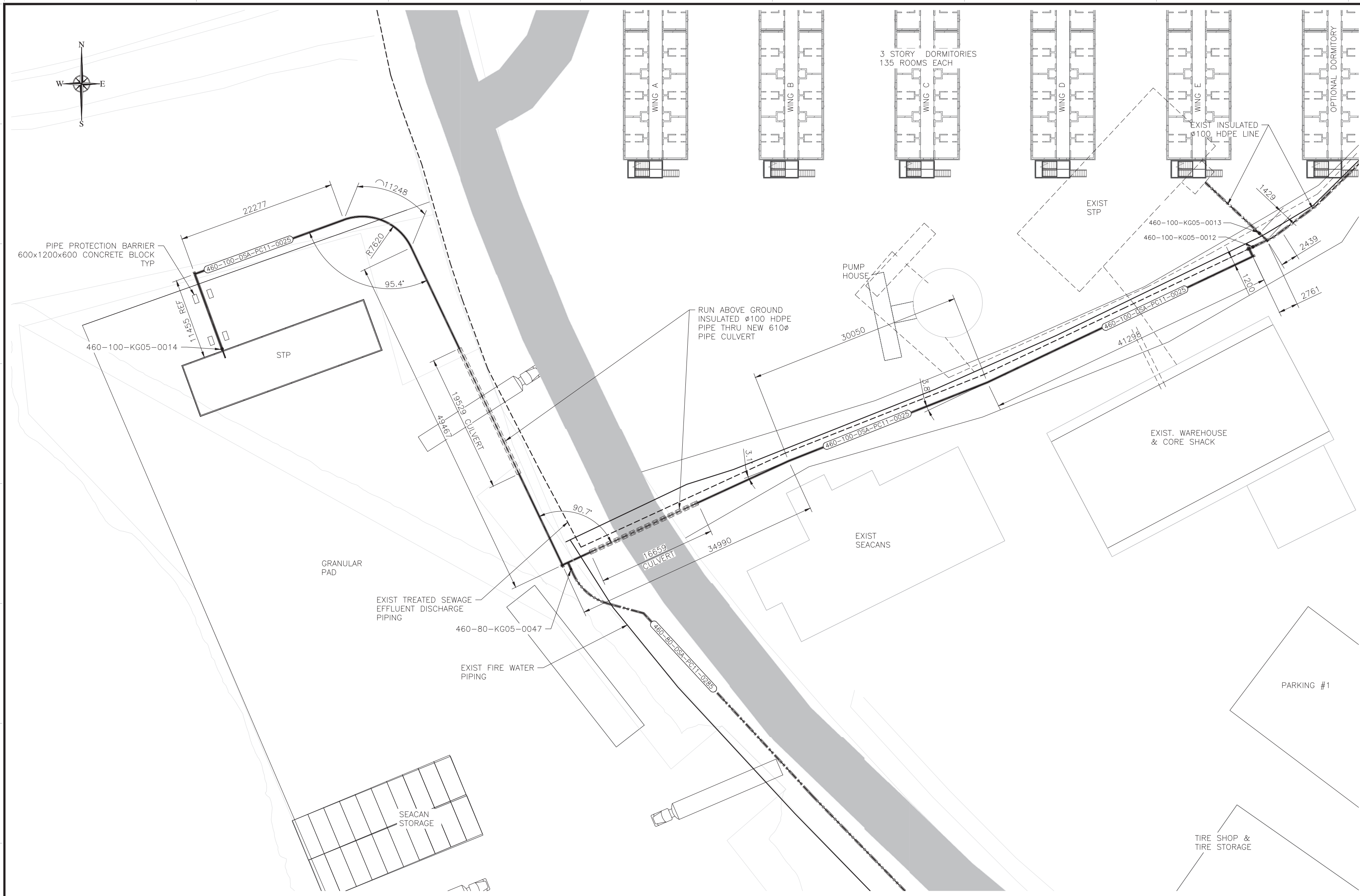


PLAN – STP PIPING GENERAL ARRANGEMENT
SCL: 1:250

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

W.G. HODGSON
LICENSEE
2025-07-03

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

1. ALL SANITARY DRAINAGE PIPE, VALVES FITTINGS, AND INSTALLATION SHALL CONFORM TO ASME B31.3; AND AGNICO EAGLE SPECIFICATION 60–000–270–GGD–001_R4.
2. ALL WORK SHALL BE DONE IN ACCORDANCE TO AGNICO EAGLE SPECIFICATION 60–000–270–GGD–002_R0.
3. ALL PIPE SUPPORTS AND INSTALLATION WHERE PIPE IS NOT INSTALLED DIRECTLY ON GRADE SHALL CONFORM TO AGNICO EAGLE SPECIFICATION 60–000–270–GGD–004_R0.
4. PROVIDE BENCHING AS REQUIRED AT ENTRANCES AND EXITS OF PIPE CULVERTS, BUILDING TIE–POINTS AND EXISTING PIPE TIE–POINTS.
5. PAINT PIPE SUPPORTS IN ACCORDANCE WITH AEM FIELD PAINTING SPECIFICATIONS.

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2025–06–16

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
–	–
–	–
–	–
–	–
–	–

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	VER.	CLIENT
1	2027–07–03	REVISE PIPING, ADD BARRIERS	JDK	SDL	
0	2025–06–16	ISSUED FOR CONSTRUCTION	JGH	SDL	

REVISIONS

TITRE / TITLE
AGNICO EAGLE – HOPE BAY DIVISION
460 – DORIS SEWAGE TREATMENT PLANT
210 – PIPING GENERAL ARRANGEMENT
SEWAGE TREATMENT PLANT
PIPING PLAN

DESSINÉ PAR / DRAWN BY	J. HARTVIKSEN	DATE 2025–06–16
REVU PAR / REVIEWED BY	S. LINTUNEN, P. ENG.	2025–07–03
VÉRIFIÉ PAR / VERIFIED BY	S. LINTUNEN, P. ENG.	2025–07–03
ÉCHELLE / SCALE	INDICATED	DATE 2025–06–02

NO. DESSIN / DRAWING NO. 62–DOR–460–210–000–001

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

AE–CART–ARCH D

FILE NO. 62–DOR–460–210–000–001.dwg

Appendix B

LINE DATA IDENTIFICATION

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

XXX-99-XXX-9999

PROCESS LINES — LOW PRESSURE PROCESS LINES

PROCESS LINES — HIGH PRESSURE PROCESS LINES (TYPICALLY 250 PSI)

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

COMMON VALVES

- BALL
- BLADDER
- BUTTERFLY
- CHECK
- STOP CHECK
- DIAPHRAGM
- GATE/GENERIC
- GLOBE
- KNIFE GATE
- NEEDLE
- PINCH
- PLUG
- RESTRICTION
- 3-WAY
- 4-WAY
- ANGLE
- FOOT PARALLEL SLIDING GATE

SPECIALTY VALVES

- AIR RELEASE
- PRESSURE REDUCING/REGULATING
- PRESSURE RELIEF
- PRESSURE SUSTAINING
- ANGLE
- 3-WAY
- 4-WAY
- INJECTION QUILL
- FLOAT VALVE
- VACUUM RELIEF
- DOUBLE CHECK VALVE ASSEMBLY
- REDUCED PRESSURE DCVA

FITTINGS

- CAPPED LINE
- FLANGE
- REDUCER - CONC
- REDUCER - ECC
- HOSE CONNECTION
- SIGHT GLASS
- SPRAY NOZZLE
- VENTURI
- EXPANSION JOINT
- PULSATION DAMPENER
- DRAIN

FILTERS

- Y-STRAINER
- BASKET STRAINER
- CARTRIDGE FILTER FLOOR STAND
- CARTRIDGE FILTER WALL MOUNT
- BIOREACTOR MEMBRANE
- MEDIA FILTER - STEEL
- MEDIA FILTER - FRP
- REVERSE OSMOSIS MEMBRANE
- SCREEN UNIT - ROTARY BRUSH

GENERAL EQUIPMENT

- MOTORIZED MIXER
- UV UNITS
- DEWATERING SCREW PRESS
- SCREW CONVEYOR

TANKS

- HDPE TANK
- OPEN TOP
- PRESSURE
- BLADDER
- CONICAL BOTTOM

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

- LOCALLY MOUNTED INSTRUMENT
- REMOTE MOUNTED INSTRUMENT
- LOCALLY MOUNTED DISPLAY
- REMOTE MOUNTED DISPLAY
- TIE-IN POINT
- FLOW CELL WITH ANALYTICAL ELEMENT
- ULTRASONIC FLOWMETER
- PADDLEWHEEL FLOWMETER
- MAGNETIC FLOWMETER
- ROTAMETER
- IN-LINE STATIC MIXER

ACTUATORS

- MANUAL
- DIAPHRAGM
- MOTOR OPERATED
- MOTOR OPERATED WITH MANUAL OVERRIDE
- SOLENOID OPERATION
- PNEUMATIC DOUBLE ACTING
- PNEUMATIC SPRING-OPPOSED

BLOWERS/COMPRESSORS

- CENTRIFUGAL
- BLOWER, POSITIVE DISPLACEMENT
- COMPRESSOR

PUMPS

- GENERIC
- PUMP WITH VFD
- CENTRIFUGAL
- DIAPHRAGM
- DOSING PUMP
- GEAR
- POSITIVE DISPLACEMENT
- PROGRESSING CAVITY
- SCREW

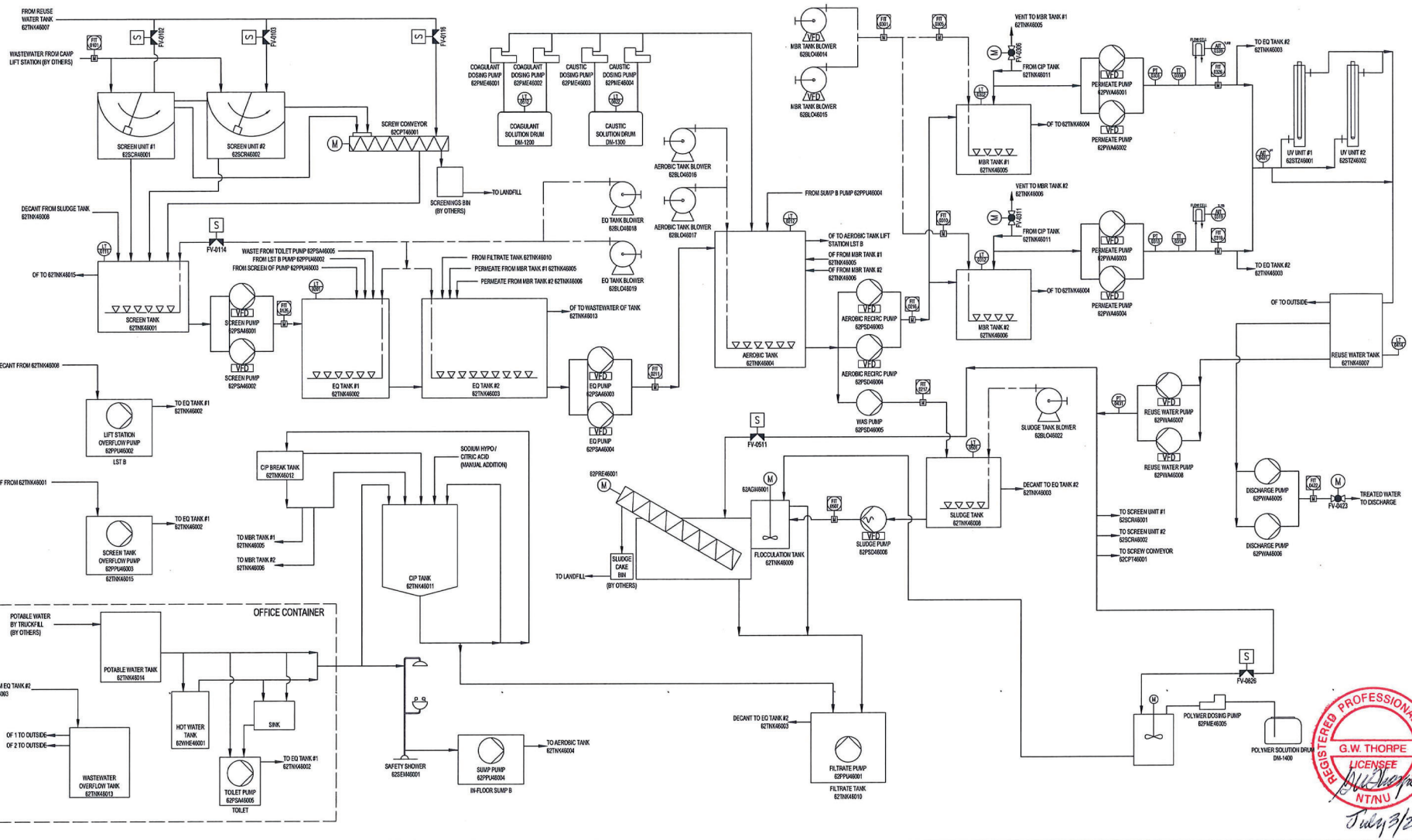
REGISTERED PROFESSIONAL ENGINEER — G.W. THORPE — LICENSEE — NT/NU — July 3/25

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

Rev	Date	Drawn	Checked	Appr'd	Revision Description
00	2024-07-03	SS	JJ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: PROCESS FLOW DIAGRAM
Project: HOPE BAY STP (6209-S-291-001)
Drawing #: 4077-P-100
Size: ANSI B (11 x 17)
Units: ft-in [mm]
Sheet: 1 of 3
Projection:
Rev: 00



BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
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00	2024-07-03	SS	JJ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: PROCESS FLOW DIAGRAM
Project: HOPE BAY STP (6209-S-291-001)
Drawing #: 4077-P-100

Size: ANSI B (11 x 17)
Units: ft-in [mm]
Sheet: 2 of 3
Projection:
Rev: 00

TAG	DESCRIPTION	TAG	DESCRIPTION	TAG	DESCRIPTION
TANKS / MECHANICAL EQUIPMENT		PUMPS		MOTORIZED VALVES / MAJOR INSTRUMENTATION	
62TNK46001	SCREEN TANK	62PSA46001	SCREENINGS TRANSFER PUMP #1	FIT460DOR0101	FLOW METER
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62TNK46003	EQ TANK #2	62PSA46003	EQ PUMP #1	FIT460DOR0211	FLOW METER
62TNK46004	AEROBIC TANK	62PSA46004	EQ PUMP #2	FIT460DOR0216	FLOW METER
62TNK46005	MBR TANK #1	62PSA46005	MACERATING TOILET PUMP	FIT460DOR0217	FLOW METER
62TNK46006	MBR TANK #2	62PSD46003	AEROBIC TANK RECIRC PUMP #1	FIT460DOR0301	FLOW METER
62TNK46007	REUSE WATER TANK	62PSD46004	AEROBIC TANK RECIRC PUMP #2	FIT460DOR0305	FLOW METER
62TNK46008	SLUDGE TANK	62PSD46005	WASTE ACTIVATED SLUDGE PUMP	FIT460DOR0310	FLOW METER
62TNK46009	FLOCCULATION TANK	62PSD46006	SLUDGE PUMP	FIT460DOR0316	FLOW METER
62TNK46010	FILTRATE TANK	62PWA46001	PERMEATE PUMP #1	FIT460DOR0326	FLOW METER
62TNK46011	CIP TANK	62PWA46002	PERMEATE PUMP #2	FIT460DOR0422	FLOW METER
62TNK46012	CIP BREAK TANK	62PWA46003	PERMEATE PUMP #3	FIT460DOR0507	FLOW METER
62TNK46013	WASTEWATER OVERFLOW TANK	62PWA46004	PERMEATE PUMP #4	FV460DOR0102	MOTORIZED VALVE
62TNK46014	POTABLE WATER TANK	62PWA46005	DISCHARGE PUMP #1	FV460DOR0103	MOTORIZED VALVE
62WHE46001	HOT WATER TANK	62PWA46006	DISCHARGE PUMP #2	FV460DOR0114	MOTORIZED VALVE
62SCR46001	SCREEN UNIT #1	62PWA46007	REUSE WATER PUMP #1	FV460DOR0116	MOTORIZED VALVE
62SCR46002	SCREEN UNIT #2	62PWA46008	REUSE WATER PUMP#2	FV460DOR0306	MOTORIZED VALVE
62CPT46001	SCREENINGS COMPACTOR	62PWA46009	DOMESTIC BOOSTER PUMP	FV460DOR0311	MOTORIZED VALVE
62STZ46001	UV UNIT #1	62PSO46001	CIP MAGNETIC DRIVE PUMP	FV460DOR0423	MOTORIZED VALVE
62STZ46002	UV UNIT #2	62PPU46001	FILTRATE TANK SUBMERSIBLE PUMP	FV460DOR0511	MOTORIZED VALVE
62AGI46001	FLOCCULATION TANK MIXER	62PPU46002	OVERFLOW LIFT STATION PUMP	FV460DOR0826	MOTORIZED VALVE
62PRE46001	DEWATERING SCREW PRESS	62PPU46003	SCREEN TANK OVERFLOW PUMP	LT460DOR0111	LEVEL TRANSMITTER
DM-1200	COAGULANT SOLUTION DRUM	62PPU46004	SUMP PUMP	LT460DOR0201	LEVEL TRANSMITTER
DM-1300	CAUSTIC SOLUTION DRUM	62PME46001	COAGULANT DOSING PUMP #1	LT460DOR0212	LEVEL TRANSMITTER
DM-1400	POLYMER SOLUTION DRUM	62PME46002	COAGULANT DOSING PUMP #2	LT460DOR0302	LEVEL TRANSMITTER
62SEM146001	SAFETY SHOWER	62PME46003	CAUSTIC DOSING PUMP #1	LT460DOR0312	LEVEL TRANSMITTER
LST B	LIFT STATION IN MODULE B	62PME46004	CAUSTIC DOSING PUMP #2	LT460DOR0414	LEVEL TRANSMITTER
OVERFLOW TANK	SCREEN TANK OVERFLOW TANK	62PME46005	POLYMER DOSING PUMP	LT460DOR0501	LEVEL TRANSMITTER
IN-FLOOR SUMP B	SUMP (IN-FLOOR) IN MODULE B			LT460DOR0812	LEVEL TRANSMITTER
SINK	OFFICE SINK			LT460DOR0822	LEVEL TRANSMITTER
TOILET	OFFICE MACERATING TOILET			PT460DOR0303	PRESSURE TRANSMITTER
62BLO46014	MBR TANK BLOWER #1			PT460DOR0313	PRESSURE TRANSMITTER
62BLO46015	MBR TANK BLOWER #2			PT460DOR0431.	PRESSURE TRANSMITTER
62BLO46016	AEROBIC TANK BLOWER #1			TT460DOR0318	TEMPERATURE TRANSMITTER
62BLO46017	AEROBIC TANK BLOWER #2			TT460DOR0338	TEMPERATURE TRANSMITTER
62BLO46018	EQ TANK BLOWER #1			AIT460DOR0319	TURBIDITY METER
62BLO46019	EQ TANK BLOWER #2			AIT460DOR0339	TURBIDITY METER
62BLO46022	SLUDGE TANK BLOWER			AIT460DOR0401	pH METER

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU
Oct 03/25

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

Rev	Date	Drawn	Checked	Appr'd	Revision Description
00	2024-07-03	SS	JJ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: PROCESS FLOW DIAGRAM
Project: HOPE BAY STP (6209-S-291-001)
Drawing #: 4077-P-100

Size: ANSI B (11 x 17)
Units: ft-in [mm]
Sheet: 3 of 3
Projection:
Rev: 00

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
CQ	COAGULANT, GENERIC
CL	SODIUM HYPOCHLORITE
GA	GAS, GENERIC
OF	OVERFLOW
OX	OXIDIZING AGENT, GENERIC
PM	POLYMER
WP	WATER, POTABLE
WR	WATER, RAW
WT	WATER, TREATED
WW	WATER, WASTE

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

LINE SIZE CODES	
IMPERIAL	METRIC
1/8"	3mm
1/4"	6mm
3/8"	9mm
1/2"	15mm
3/4"	20mm
1"	25mm
1 1/4"	32mm
1 1/2"	40mm
2"	50mm
2 1/2"	64mm
3"	75mm
4"	100mm
6"	150mm
8"	200mm
10"	250mm
12"	300mm

PAGE CONNECTORS

SHEET # | DWG # | CONNECTOR #

XX | XXXX-X-XXX | 0001

0001 | XXXX-X-XXX | XX

LINE DATA IDENTIFICATION

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

XXX-99-XXX-9999

COMMON VALVES

- BALL
- BLADDER
- BUTTERFLY
- CHECK
- STOP CHECK
- DIAPHRAGM
- GATE/GENERIC
- GLOBE
- KNIFE GATE
- NEEDLE
- PINCH
- PLUG
- RESTRICTION
- 3-WAY
- 4-WAY
- ANGLE
- FOOT PARALLEL SLIDING GATE

SPECIALTY VALVES

- AIR RELEASE
- PRESSURE REDUCING/REGULATING
- PRESSURE RELIEF
- PRESSURE SUSTAINING
- ANGLE
- 3-WAY
- 4-WAY
- INJECTION QUILL
- FLOAT VALVE
- VACUUM RELIEF
- DOUBLE CHECK VALVE ASSEMBLY
- REDUCED PRESSURE DCVA

FILTERS

- Y-STRAINER
- BASKET STRAINER
- CARTRIDGE FILTER FLOOR STAND
- CARTRIDGE FILTER WALL MOUNT
- BIOREACTOR MEMBRANE
- MEDIA FILTER - STEEL
- MEDIA FILTER - FRP
- REVERSE OSMOSIS MEMBRANE
- SCREEN UNIT - ROTARY BRUSH

GENERAL EQUIPMENT

- MOTORIZED MIXER
- UV UNITS
- DEWATERING SCREW PRESS
- SCREW CONVEYOR

TANKS

- HDPE TANK
- OPEN TOP
- PRESSURE
- BLADDER
- CONICAL BOTTOM

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

- LOCALLY MOUNTED INSTRUMENT
- REMOTE MOUNTED INSTRUMENT
- LOCALLY MOUNTED DISPLAY
- REMOTE MOUNTED DISPLAY
- TIE-IN POINT
- FLOW CELL WITH ANALYTICAL ELEMENT
- ULTRASONIC FLOWMETER
- PADDLEWHEEL FLOWMETER
- MAGNETIC FLOWMETER
- ROTAMETER
- IN-LINE STATIC MIXER

ACTUATORS

- MANUAL
- DIAPHRAGM
- MOTOR OPERATED
- MOTOR OPERATED WITH MANUAL OVERRIDE
- SOLENOID OPERATION
- PNEUMATIC DOUBLE ACTING
- PNEUMATIC SPRING-OPPOSED

FITTINGS

- CAPPED LINE
- FLANGE
- REDUCER - CONC
- REDUCER - ECC
- HOSE CONNECTION
- SIGHT GLASS
- SPRAY NOZZLE
- VENTURI
- EXPANSION JOINT
- PULSATION DAMPENER
- DRAIN

BLOWERS/COMPRESSORS

- CENTRIFUGAL
- BLOWER, POSITIVE DISPLACEMENT
- COMPRESSOR

PUMPS

- GENERIC
- PUMP WITH VFD
- CENTRIFUGAL
- DIAPHRAGM
- DOSING PUMP
- GEAR
- POSITIVE DISPLACEMENT
- PROGRESSING CAVITY
- SCREW

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

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Client: AGNICO EAGLE

Title: PROCESS AND INSTRUMENTATION DIAGRAM

Project: HOPE BAY STP (6209-S-291-001)

Drawing #: 4077-P-101

Size: ANSI B (11 x 17)
Date: 2025-07-03
Sheet: 1 of 12
Job #: 4077
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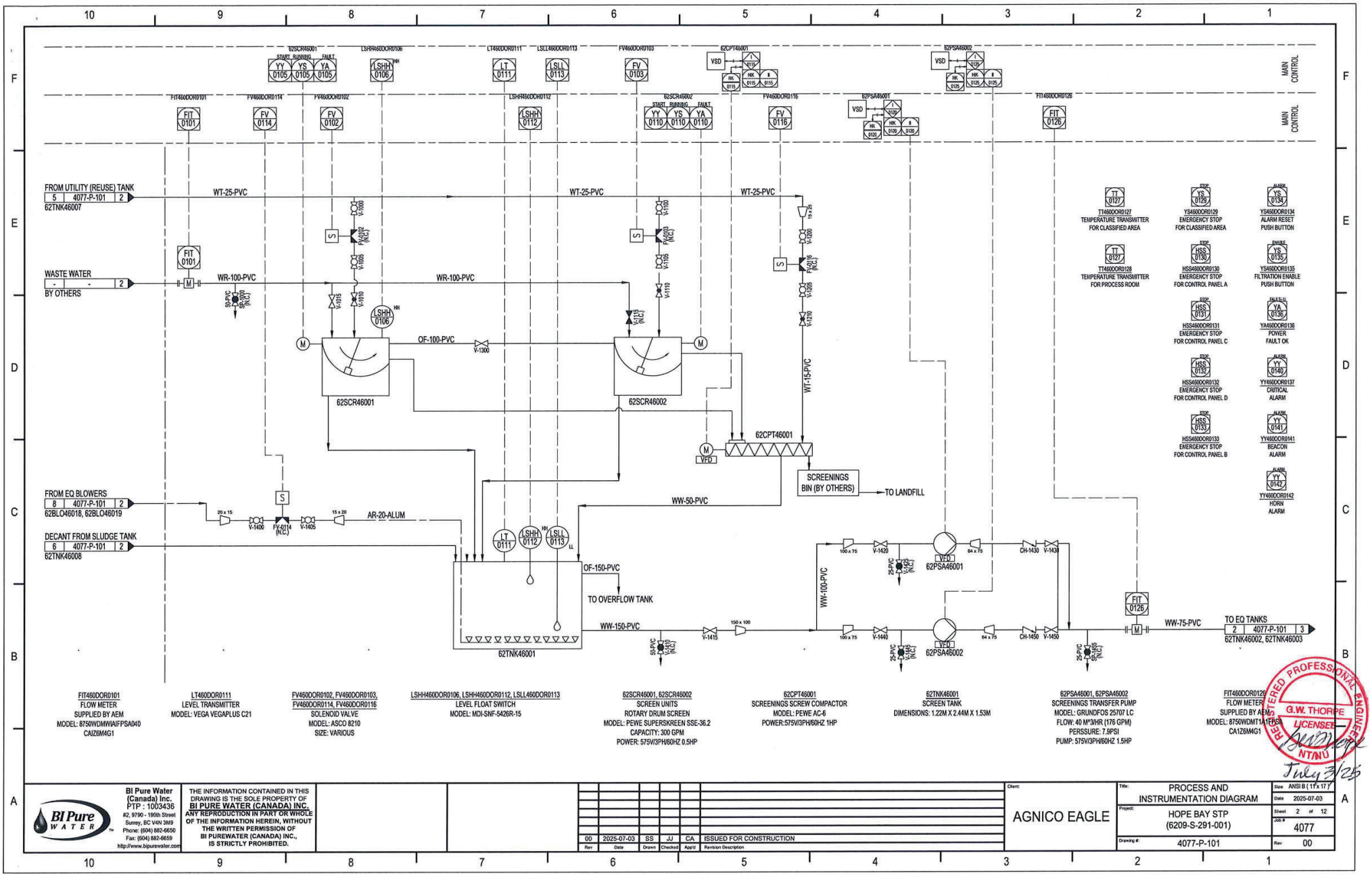

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU
July 3/25

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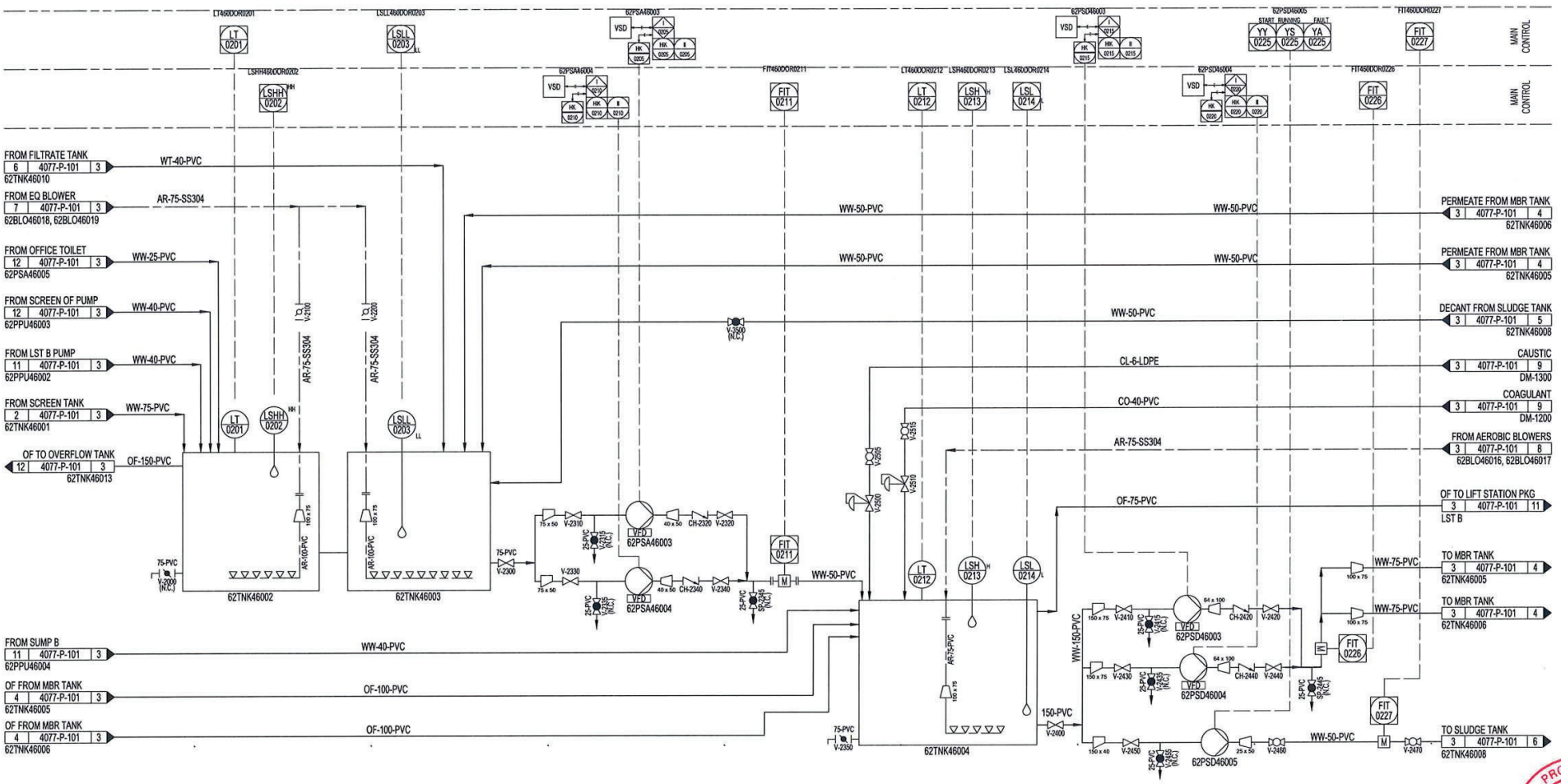

62TNK46002
EQ TANK #1
DIMENSIONS: 4.55M X 2.87M X 3.2M
STRUCTURE: SS304

62TNK46003
EQ TANK #2
DIMENSIONS: 2.87M X 8.46M X 3.2M
STRUCTURE: SS304

LT460DOR0201
LEVEL TRANSMITTER
MODEL: VEGA VEGAPLUS C21

LSHH460DOR0202, LSLL460DOR0203
LEVEL FLOAT SWITCH
MODEL: MDI-SNF-5426R-15

62PSA46003,62PSA46004
EQ PUMPS
MODEL: GRUNDFOS 10-15507 LC
FLOW: 10.5 M^3/HR (46GPM)
PRESSURE: 7.9PSI
POWER: 575V/3PH/60HZ 1HP

FIT460DOR02011, FIT460DOR0226, FIT460DOR0227
FLOW METER
SUPPLIED BY AEM
MODEL: 8750WDMT1A1FPSA XXX
CA1Z6M4G1

LT460DOR0212
LEVEL TRANSMITTER
MODEL: VEGA VEGAPLUS C11

LSH460DOR0213, LSL460DOR0214
LEVEL FLOAT SWITCH
MODEL: MDI-SNF-5426R-15

62TNK46004
AEROBIC TANK
DIMENSIONS: 2.9M X 6.4M X 3.2M
STRUCTURE: SS304

62PSD46003, 62PSD46004
AEROBIC TANK RECIRCULATION PUMP
MODEL: GRUNDFOS 25707 LC
FLOW: 44M^3/HR (194 USGPM)
PRESSURE: 5PSI
POWER: 575V/3PH/60HZ 1.5HP

62PSD46005
WAS PUMP
MODEL: GRUNDFOS 10707 LC
FLOW: 7 M^3/HR (31 USGPM)
PRESSURE: 8.00PSI
POWER: 575V/3PH/60HZ 1HP

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU

Jul 3/25

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
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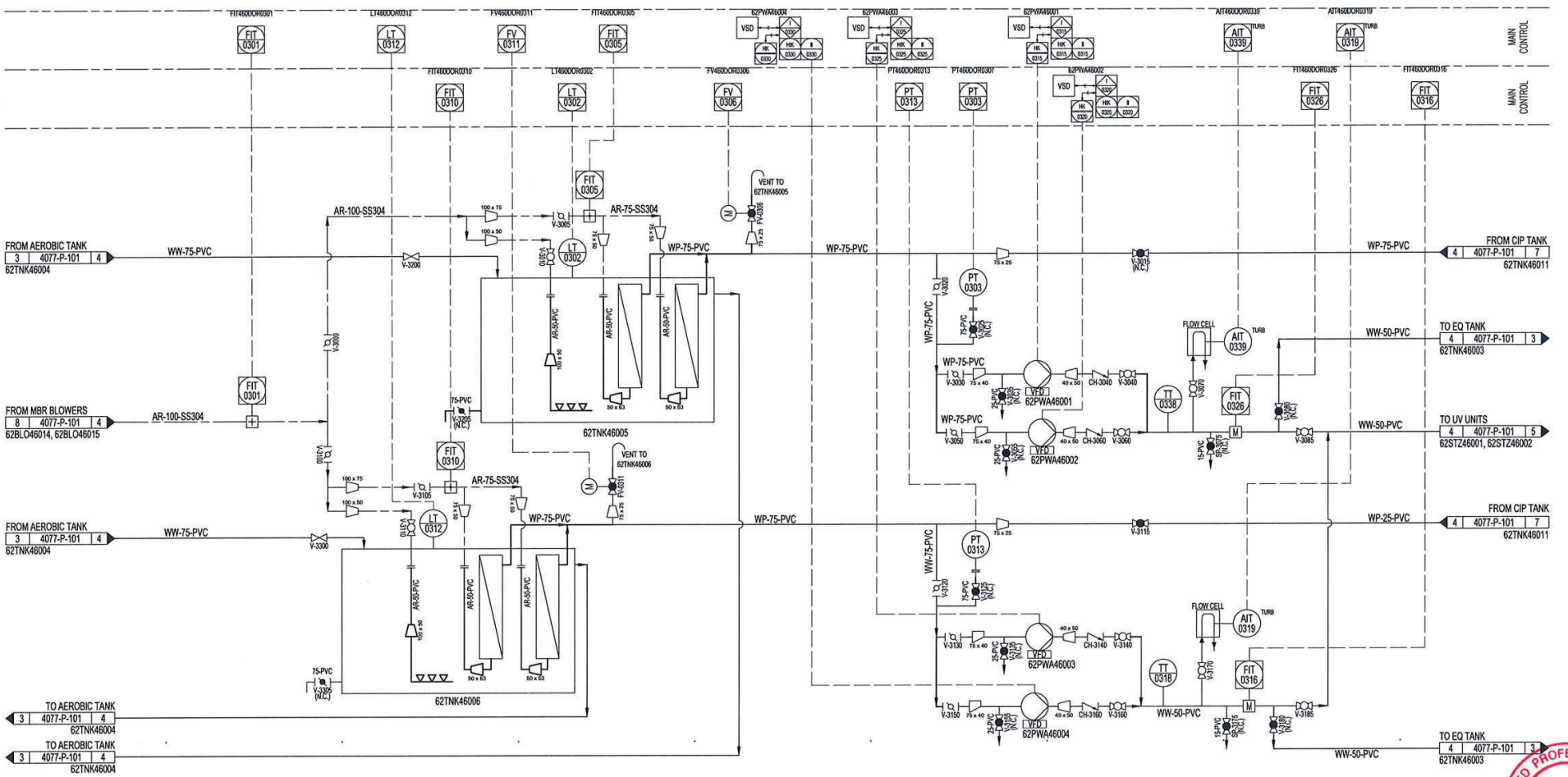

LT460DOR0302, LT460DOR0312
LEVEL TRANSMITTER
MODEL: VEGA VEGAPLUS C11

FIT460DOR0301,FIT460DOR0305,FIT460DOR0310
THERMAL MASS FLOW METER
ENDRESS + HAUSER
MODEL: T-MASS B150, 6BABL1

FIT460DOR0316, FIT460DOR0326
FLOW METER
SUPPLIED BY AEM
MODEL: 8750WDMT1A1FPSA
CA1Z6M4G1

62TNK46005, 62TNK46006
MBR TANK
DIMENSIONS: 2.74M X 4.9M X 3.2M
STRUCTURE: SS304

62PWA46001, 62PWA46002, 62PWA46003, 62PWA46004
PERMEATE PUMP
MODEL: GRUNDFOS TP 32-160/2 A-G-A-BUBE-EY2
FLOW: 8.5 M^3/HR
PRESSURE: 11PSI
POWER: 575V/3PH/60HZ 0.75HP

TT460DOR0318, TT460DOR0338
TEMPERATURE TRANSMITTER
MODEL: IFM TA2333

PT460DOR0303, PT460DOR0313
PRESSURE TRANSMITTER
MODEL: VEGA VEGABAR 28

AIT460DOR0321, AIT460DOR0339
TURBIDITY METER
MODEL: HF SCIENTIFIC MTOL + 28053

FV460DOR0306, FV460DOR0311
PRAHER 1" M1 2-WAY PVC BALL VALVE
WITH ON/OFF 120 V ACTUATOR

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU

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Surrey, BC V4N 3M9
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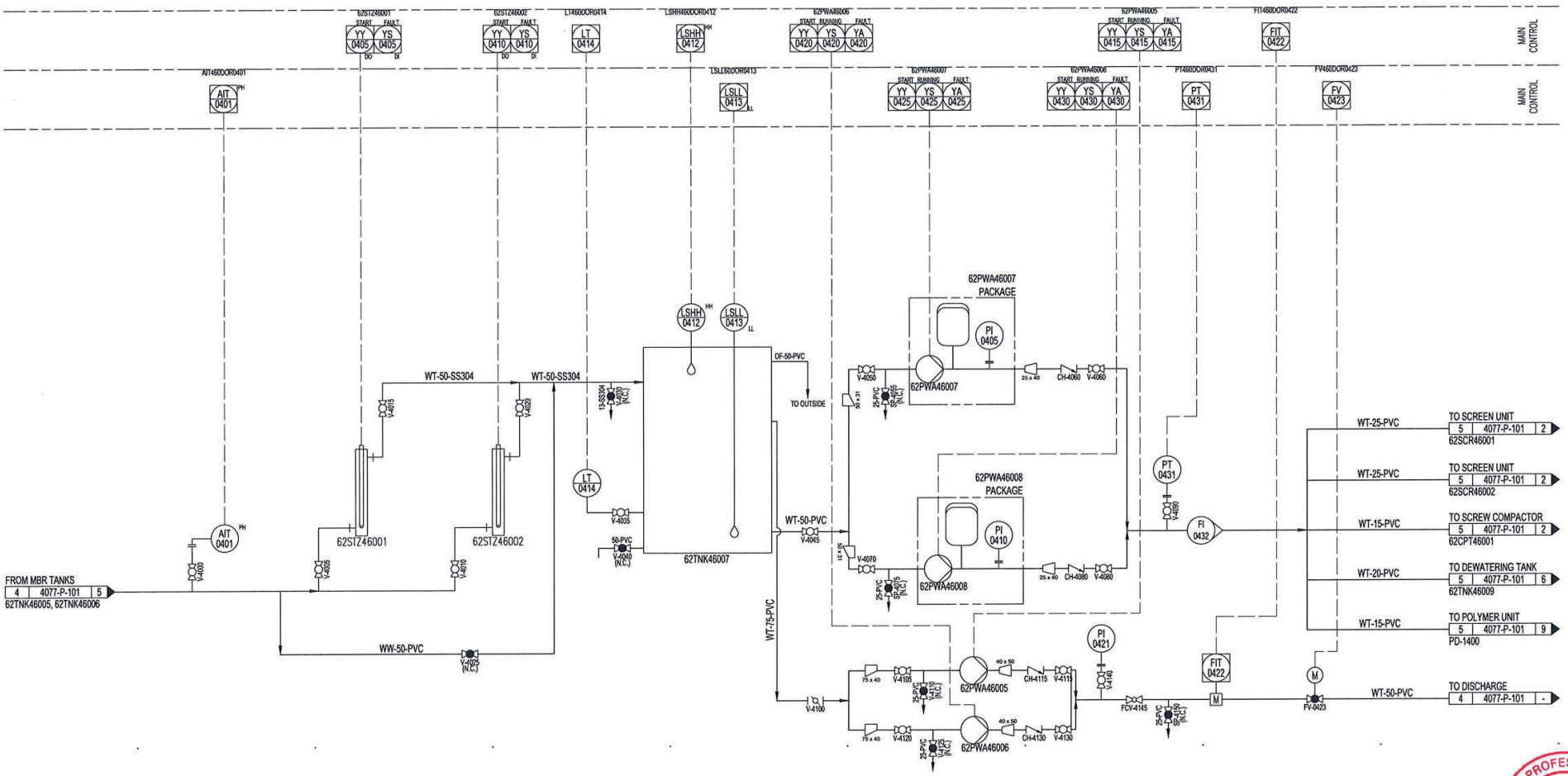

62STZ46001, 62STZ46002
UV UNIT
MODEL: HALLETT 1000W
CAPACITY: 13 M^3/HR (57GPM)
POWER: 120V/1PH/60HZ 403W

LSHH460DOR0412, LSLL460DOR0413
LEVEL FLOAT SWITCH
MODEL: MDI-SNF-5426R-15

AIT460DOR0401
PH SENSOR
SUPPLIED BY AEM
ROSEMOUNT #396P-01-10-55

62TNK46007
REUSE WATER TANK
PE TANK CAPACITY: 960 USG
61" DIA, 83" HIGHT

LT460DOR0414
LEVEL TRANSMITTER
MODEL: VEGABAR 28
-14.5PSI - 21.75PSI

62PWA46005, 62PWA46006
DISCHARGE PUMP
MODEL: GRUNDFOS CR 10-3 A-GJ-A-E-HQQE
CAPACITY: 10M^3/HR
PRESSURE: 42.8PSI
POWER: 575V/3PH/60HZ 3.0HP

62PWA46007, 62PWA46008
REUSE WATER PUMP
MODEL: GRUNDFOS CMBE 5-62 I-U-C-E-D-F
FLOW RATE: 4.54M^3/HR
PRESSURE: 50PSI
POWER: 200-240V/1PH/60HZ 2HP

FI460DOR0432
REUSE WATER FLOW INDICATOR
BLUEWHITE
MODEL: F-42040LN
8-40 USGPM

FIT460DOR0422
FLOW METER
SUPPLIED BY AEM
MODEL: 8750WDMT1A1FPSA 020
CA1Z6M4G1

PT460DOR0431
PRESSURE TRANSMITTER
MODEL: VEGA VEGABAR 28
0-145PSI

PI460DOR0421
PRESSURE GAUGE
FOR DISCHARGE (0-100PSI)
MODEL: WINTERS PFQ 121

FV460DOR0423
PRAHER 2" M1 2-WAY PVC BALL VALVE
WITH ON/OFF 120 V ACTUATOR

REGISTERED PROFESSIONAL ENGINEER
J.W. THOPPE
LICENSEE
NT/NU
July 3/25

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PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
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Client: AGNICO EAGLE

Title: PROCESS AND INSTRUMENTATION DIAGRAM
Project: HOPE BAY STP (6209-S-291-001)
Drawing #: 4077-P-101

Size: ANSI B (11 x 17)
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Sheet: 5 of 12
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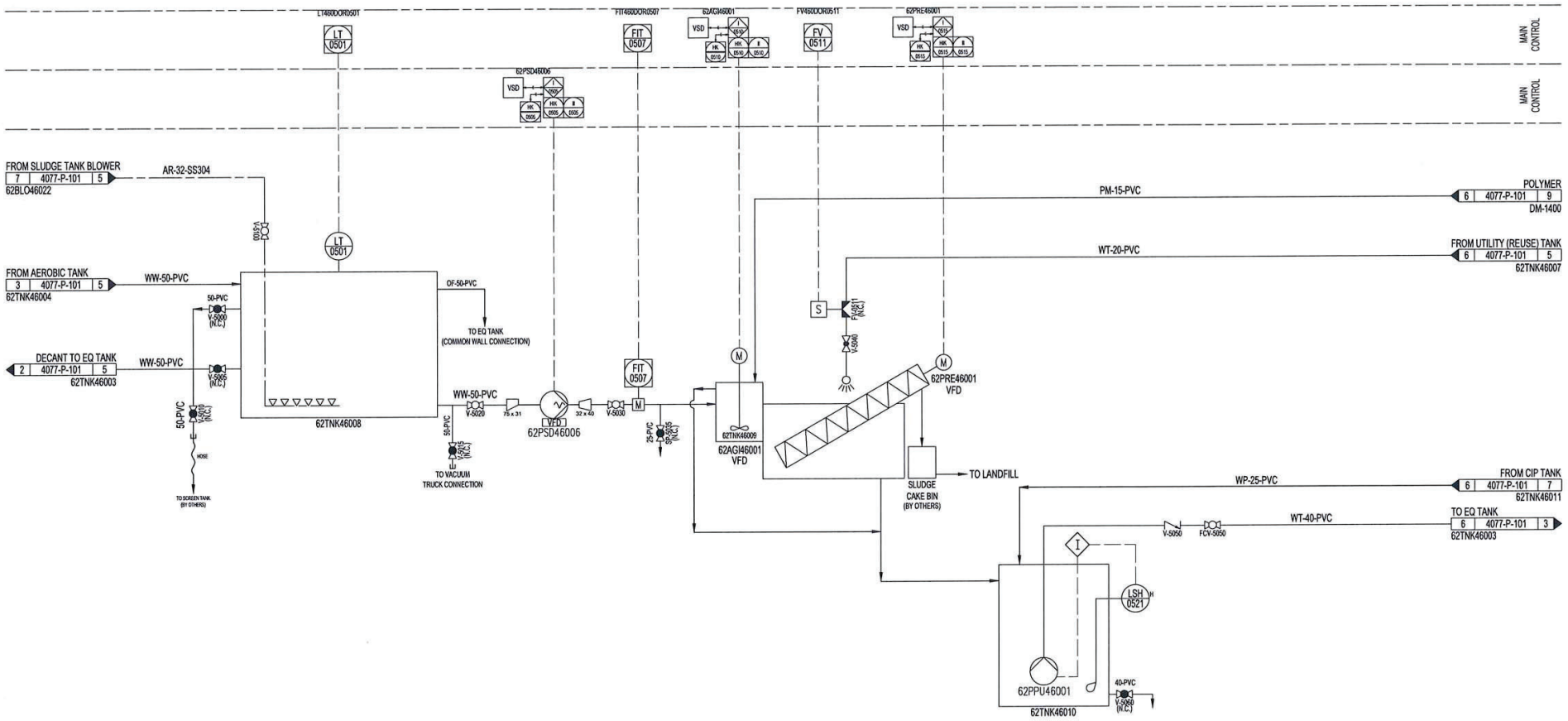

LT460DOR0501
LEVEL TRANSMITTER
MODEL: VEGA VEGAPLUS C21

62TNK46008
SLUDGE TANK
DIMENSIONS: 1.12 X 1.68 X 3.2
STRUCTURE: SS304

62PSD46006
SLUDGE PUMP
MODEL: LIBERTY PROCESS APM56
FLOW: 4 M^3/HR (17.6GPM)
PRESSURE: 7.5PSI
POWER: 575V/3PH/60HZ 1.0HP

FIT460DOR0507
FLOW METER
SUPPLIED BY AEM
MODEL: 8750WDMT1A1FPSA 015
CA1Z6M4G1

62MIX46001
FLOC TANK MIXER
MIXER POWER: 575V/1PH/60HZ 0.25HP VFD
CONTROL

FV460DOR0511
SOLENOID VALVE
MODEL: ASCO 8210
SIZE: 20 MM

62PRE46001
DEWATERING SCREW PRESS
SCREW POWER: 575V/3PH/60HZ 0.75HP VFD
CONTROL (REVERSE)

62TNK46010
FILTRATE TANK
CAPACITY: 100 USG

LSH460DOR0521
LEVEL FLOAT SWITCH
MODEL: MDI-SNF-5426R-15

62PPU46001
SUBMERSIBLE PUMP
MODEL: GOULDS LSP0311
FLOW: 5.4 M^3/HR (24GPM)
PRESSURE: 6 PSI
POWER: 120V/1PH/60HZ 0.33HP

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G.W. THORPE
LICENSEE
NT/NU
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Surrey, BC V4N 3M9
Phone: (604) 882-6650
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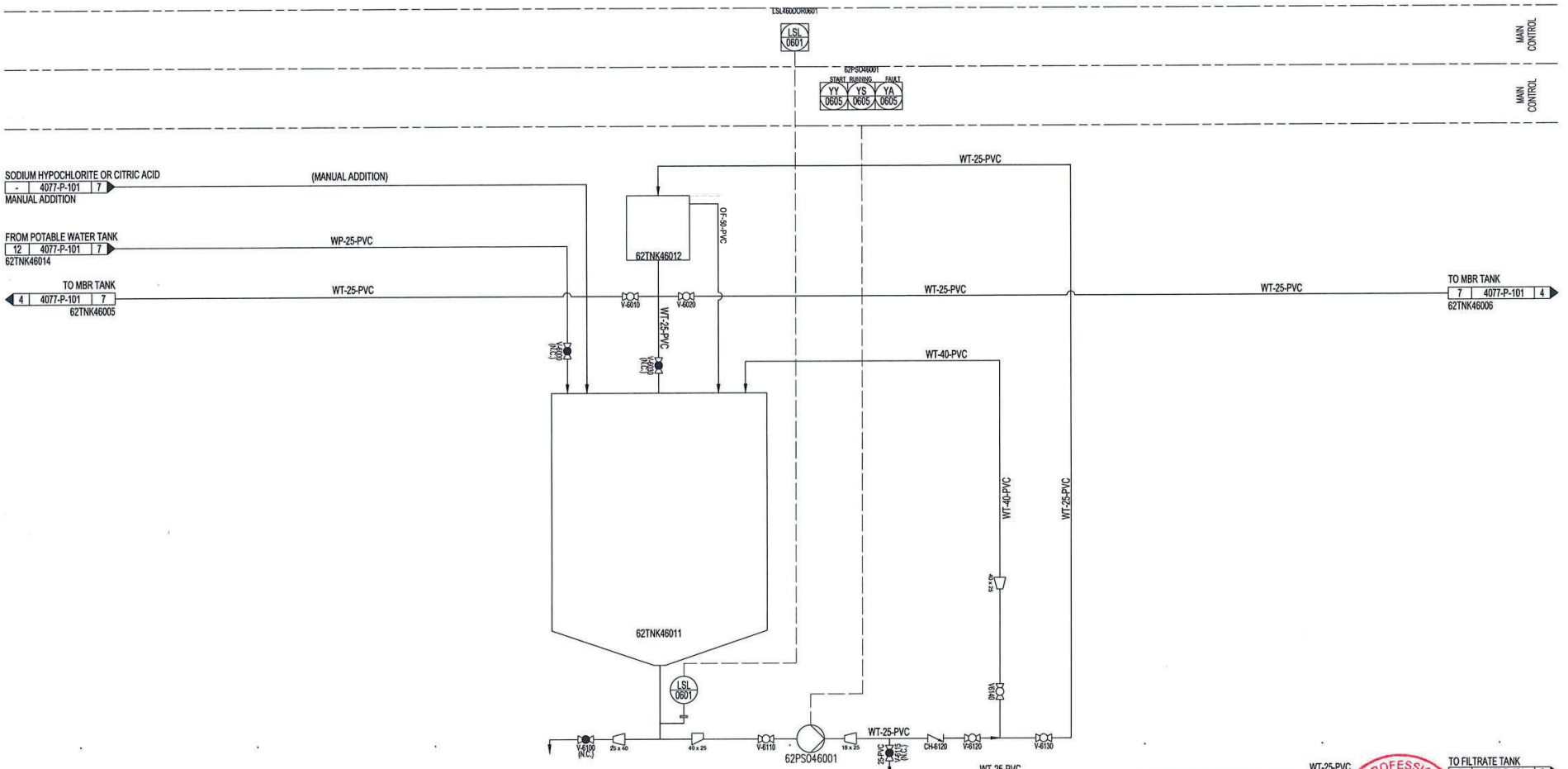

LSL460DOR0601
INLINE LEVEL SENSOR
SWITCH-TEK LU10-2305

62TNK46012
CIP BREAK TANK
PE TANK: 18 USG

62PSO46001
MAGNETIC DRIVE PUMP
MODEL: LITTLE GIANT TE-5.5-MD-SC
CAPACITY: 6.4M^3/HR
PRESSURE: 4.6M
POWER: 115V/1PH/60HZ 1/3HP

62TNK46011
CIP SOLUTION CONE BOTTOM TANK
PE TANK: 200 USG

REGISTERED PROFESSIONAL ENGINEER
G.W. THORPE
LICENSEE
NT/NU
July 3/23

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PTP : 1003436
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Surrey, BC V4N 3M9
Phone: (604) 882-6650
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Date: 2025-07-03
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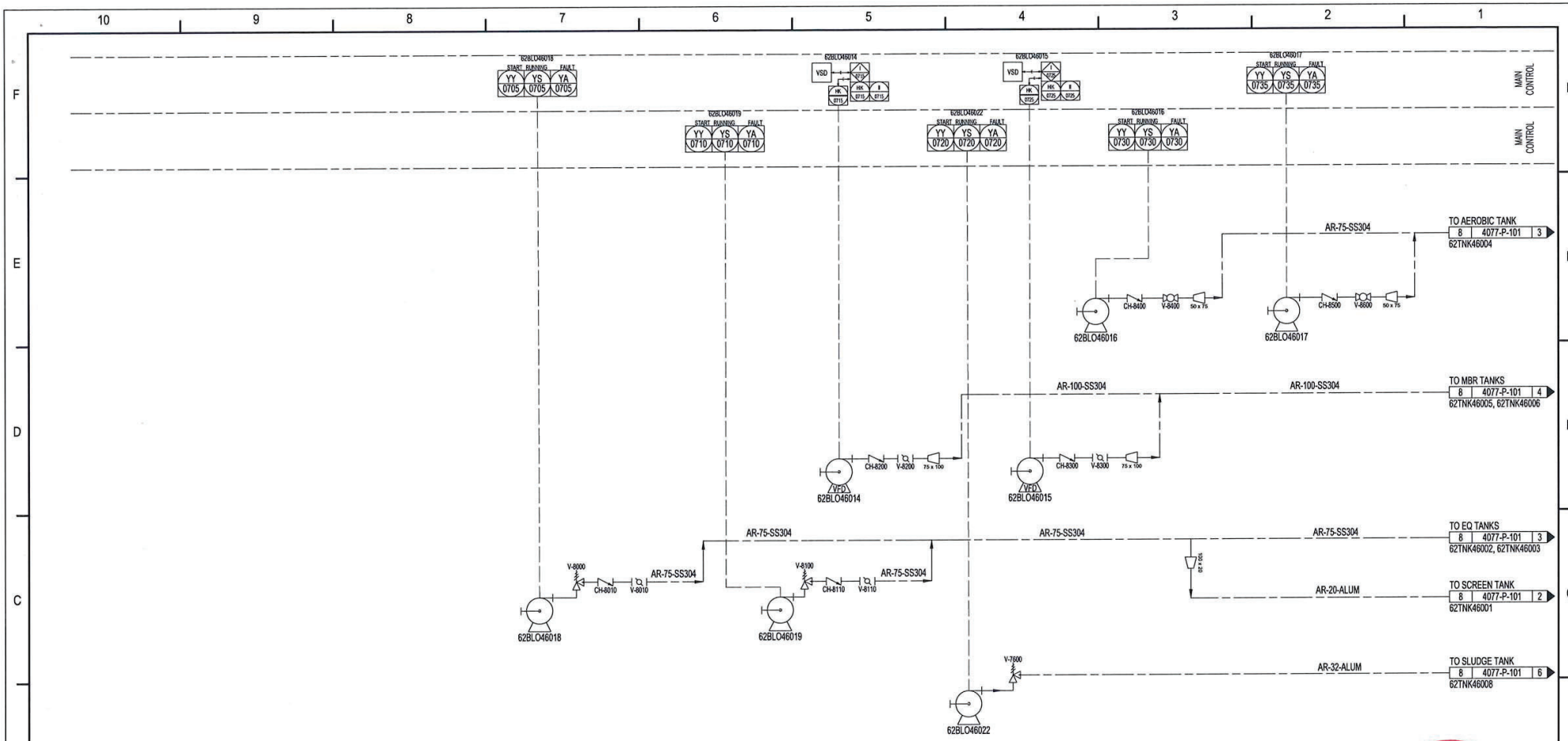

62BLO46018, 62BLO46019
EQ BLOWER
MODEL: FPZ SCL E07-M5-10-3-575
FLOW: 160 SCFM
PRESSURE: 4.3PSI
POWER: 575V/3PH/60HZ 10HP

62BLO46014, 62BLO46015
MBR BLOWER
MODEL: AERZEN GM10S
FLOW: 330 SCFM
PRESSURE: 5.5PSI
POWER: 575V/3PH/60HZ 15HP C/W VFD

62BLO46022
SLUDGE TANK BLOWER
MODEL: FPZ SCL R20-MD-1.5-3-575
FLOW: 20 SCFM
PRESSURE: 4.3 PSI
POWER: 575V/3PH/60HZ 1.5PH

62BLO46016, 62BLO46017
AEROBIC TANK BLOWER
MODEL: AERZEN GM3S
FLOW: 95 SCFM
PRESSURE:4.6PSI
POWER: 575V/3PH/60HZ 5HP

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

BI Pure Water (Canada) Inc.
PTP : 1003436
#2, 9790 - 190th Street
Surrey, BC V4N 3M9
Phone: (604) 882-6650
Fax: (604) 882-6659
http://www.bipurewater.com

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00	2025-07-03	SS	JJ	CA	ISSUED FOR CONSTRUCTION

Client: AGNICO EAGLE

Title: PROCESS AND INSTRUMENTATION DIAGRAM
Project: HOPE BAY STP (6209-S-291-001)
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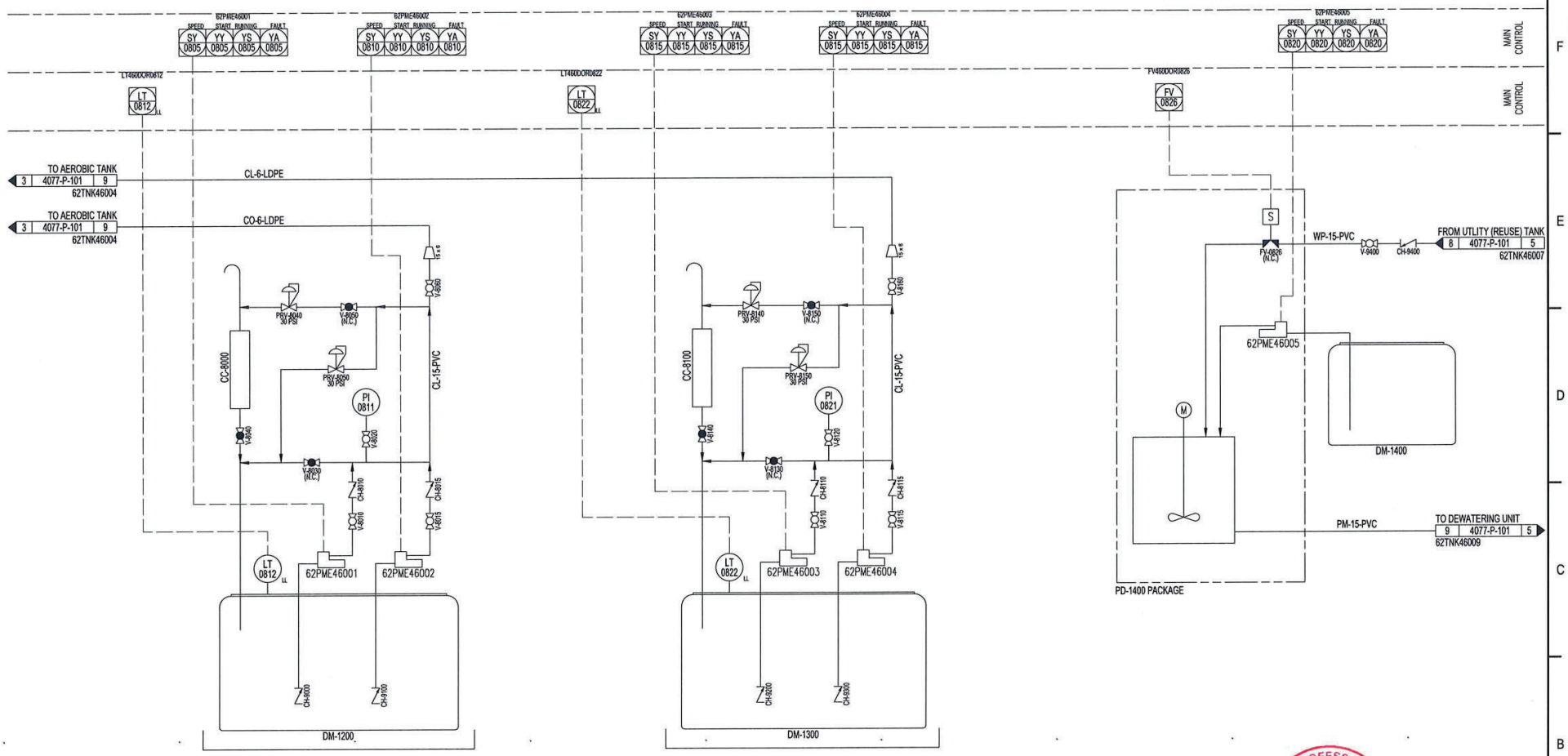

DM-1200
COAGULANT SOLUTION DRUM
(BY OTHERS)

62PME46001, 62PME46002
COAGULANT DOSING PUMP
MODEL: GRUNDFOS DDA 7.5-16
CAPACITY: 7.5L/HR

PI460DOR0811, PI460DOR0821
PRESSURE GAUGE FOR DOSING CABINET
0-160PSI
MODEL: WINTERS PFQ 122

LT460DOR0812, LT460DOR0822
LEVEL TRANSMITTER
MODEL: VEGA VEGAPLUS C11

DM-1300
CAUSTIC SOLUTION DRUM
(BY OTHERS)

62PME46003, 62PME46004
CAUSTIC DOSING PUMP
MODEL: GRUNDFOS DDA 7.5-16
CAPACITY: 7.5 L/HR

DM-1400
POLYMER DRUM
(BY OTHERS)

PD-1400 W/ 62PME46005
POLYMER DOSING PACKAGE
MODEL: POLYMORE MINI 5 5LPM
POWER: 120V/1PH/60HZ 90W

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MAIN CONTROL

MAIN CONTROL

FROM POTABLE WATER TANK
12 | 4077-P-101 | 10
62TNK46014

WP-25-PVC

V-9000

WP-25-PVC

62SEM46001

TO SUMP
10 | 4077-P-101 | 11
SUMP B

62SEM46001
EMERGENCY SHOWER/EYEWASH
MODEL: H-6697

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G.W. THORPE
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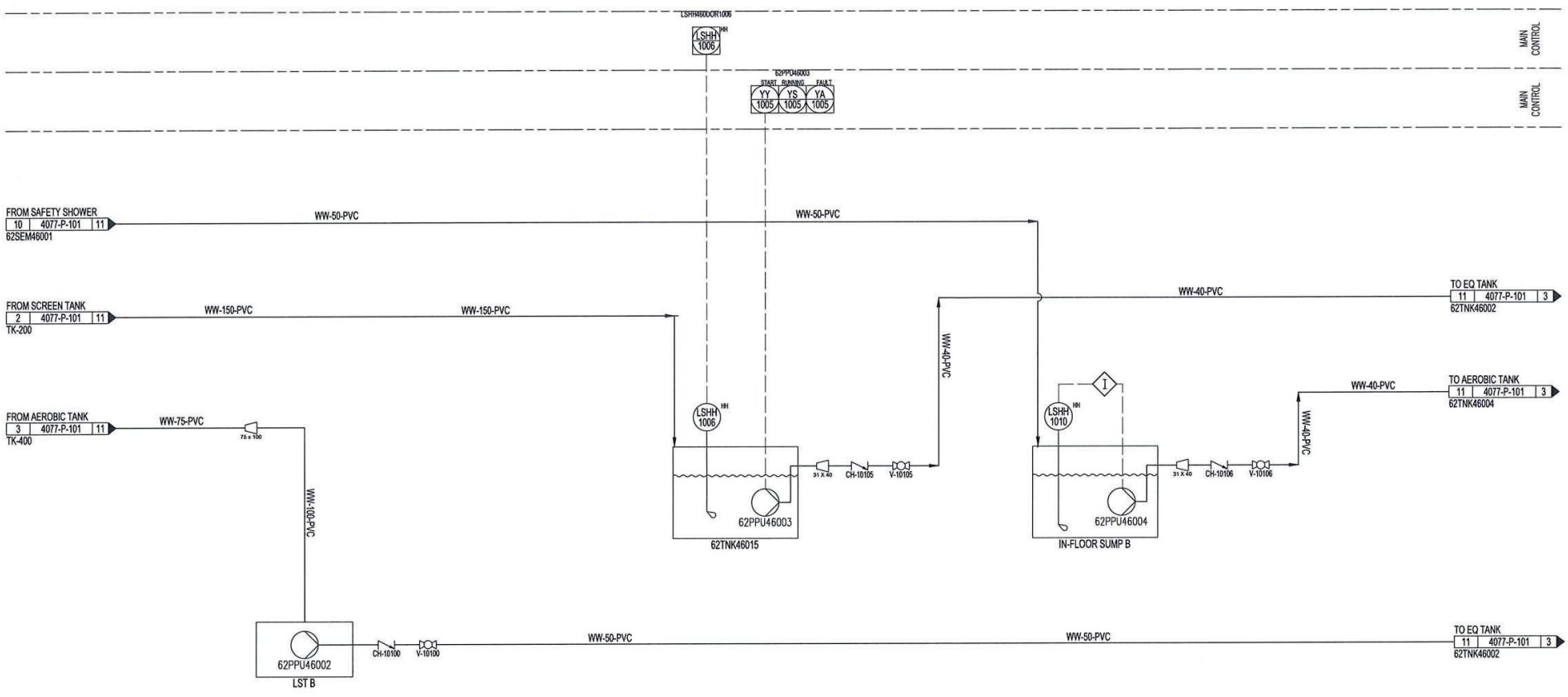

62PPU46002
LIFT STATION PKG PUMP
MODEL: LIBERTY 702/LE41A
SIMPLEX 700 SERIES BASIN
4/10 HP / 115 V / 1 PH

62PPU46003
SCREEN TANK OVERFLOW PUMP
MODEL: XYLE55M-5
1/2 HP 575/3/60

LSHH460DOR1006
LEVEL SWTICH
MODEL: MODEL: MDI-SNF-5426R-15

LSHH460DOR1010
FLOAT LEVEL SWITCH
MODEL: SJE VERTICALMASTER® 3 PLUS

62PPU46004
SUMP PUMP
MODEL: GRUNDOS KP350

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G.W. THORPE
LICENSEE
NT/NU
July 3/25

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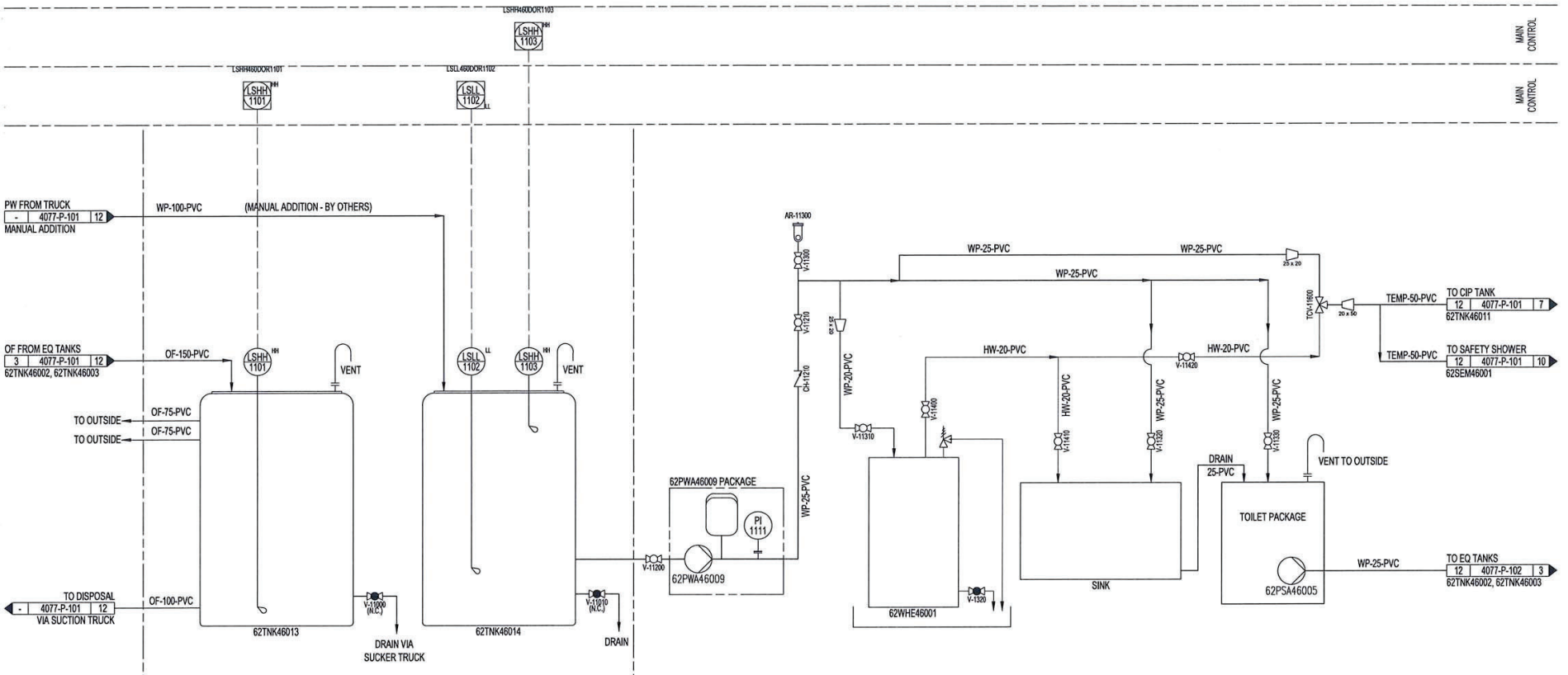

LSHH460DOR1101, LSLL460DOR1102, LSHH460DOR1103
LEVEL SWTICH
MODEL: GEMS173250

62TANK46013
WASTEWATER OVERFLOW TANK
MODEL: BARR PLASTICS 41067
CAPACITY: 960 US GAL

62TNK46014
POTABLE WATER TANK
MODEL: BARR PLASTICS 41067
CAPACITY: 960 US GAL

62PWA46009
BOOSTER PUMP
MODEL: GRUNDFOS CMBE 5-62 I-U-A-E-D-F
CAPACITY: 26.4 US GPM

62WHE46001
HOT WATER TANK
MODEL: BRADFORD WHITE RE280T6-1NCWW
CAPACITY: 76 US GALLON

TOILET PACKAGE W/ 62PSA46005
MACERATING TOILET
MODEL: LIBERTY PUMPS ASCENTII-RSW

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Appendix C

PROCESS DESIGN

CALCULATION

6209-S-291-001

Agnico Hope Bay STP

Table 1: Influent Flow Rate

Influent Flow Rate	Design Value	Metric Unit	Design Value	US Unit
Number of persons in camp	580			
Average Daily Flow (ADF)	139	m^3/d	36,777	gpd
Maximum Month Flow (MMF)	139	m^3/d	36,777	gpd
Maximum Daily Flow (MDF)	209	m^3/d	55,165	gpd
Peak Hourly Flow (PHF)	209	m^3/d	54,947	gpd
Duration of Peak Hourly Flow	2	hours		
Peak Instantaneous Flow (PIF)	35	m^3/h	154.12	gpm
Selected Design Flow, Q_D	5.80	m^3/h	25.54	gpm
Selected Peak Flow, Q_P	8.70	m^3/h	38.31	gpm

Table 2: Influent Wastewater Characterization

Influent Wastewater Characteristics	Design Value	Metric Unit	Design Value	US Unit
Chemical Oxygen Demand, COD, assumed	1000	mg/L		
Biochemical Oxygen Demand, BOD	500	mg/L		
Total Suspended Solids,TSS	350	mg/L		
Volatile Suspended Solids, VSS	280	mg/L		
Total Kjeldahl Nitrogen, TKN	100	mg/L		
Ammonia nitrogen, NH_4-N	100	mg/L		
Total Phosphorus, TP	5-12	mg/L		
Fat, Oil and Grease, FOG	20-50	mg/L		
Minimum water temperature	10	˚C	50	˚F
Maximum water temperature	25	˚C	77	˚F
Alkalinity (as CaCO3)	250-500	mg/L		
Site elevation	100	m	328	ft

System Mass Loading	Design Value	Metric Unit	Design Value	US Unit
COD loading	139	kg/d	308.8	lb/d
BOD loading	69.50	kg/d	152.9	lb/d
TKN loading	13.92	kg/d	30.7	lb/d
TP loading	1.67	kg/d	3.7	lb/d

Table 3: Treated Effluent Specification

Effluent Water Specification	Effluent Limit	Design Value	Metric Unit
$cBOD_5$	< 25	< 5	mg/L
TSS	< 25	< 1	mg/L
unionized NH_3-N	< 1	< 0.5	mg/L
TP	< 0.5	< 0.5	mg/L
Oil and Grease	< 5	< 1	mg/L
Total residual chlorine	< 0.02	< 0.02	mg/L
Fecal Coliform	< 200	< 2.2	CFU/100 mL

Table 4: Design of Receiving Tank (screen effluent tank)

Design of Receiving tank	Design Value	Metric Unit	Design Value	US Unit
Length, L	2.74	m	9.0	ft
Width, W	1.0	m	3.3	ft
Tank height	1.52	m	5.0	ft
Operating depth (level H – level L)	0.81	m	2.7	ft
Effective volume	2.2	m3	581	gal
HRT	3.8	min		

Table 5: Design of Equalization tank

Design of Equalization tank	Design Value	Metric Unit	Design Value	US Unit
EQ Tank #1				
Length, L	4.55	m	15	ft
Width, W	2.87	m	9.4	ft
Height, H	3.2	m	10.5	ft
Side Water Depth, SWD	2.7	m	8.9	ft
Operating depth (max level - min level)	2.35	m	7.7	ft
Effective volume	30.7	m^3	8,177	gal
EQ Tank #2				
Length, L	8.46	m	15	ft
Width, W	2.87	m	9.4	ft
Height, H	3.2	m	10.5	ft
Side Water Depth, SWD	2.7	m	8.9	ft
Operating depth (max level - min level)	2.35	m	7.7	ft
Effective volume	57.1	m^3	8,177	gal
Total effective volume (EQ #1 + EQ #2)	87.8	m^3	23,197	gal
HRT	15.2	h		
Aeration	0.05	$m^3/m^3.min$	0.05	$ft^3/ft^3.min$
Blower Capacity (max)	263	m^3/h	155	cfm

Table 6: MBR Tank Design

Design of MBR Tank	Design Value	Metric Unit	Design Value	US Unit
1) Capacity				
Selection of membrane module	TORAY NHP210-300S			
Number of membrane cassette per membrane	6			
Surface area per membrane cassette	35	m^2	377	ft^2
Surface area per membrane module	210	m^2	2,259	ft^2
Number of membrane module per MBR train (tank)	2			
Total membrane surface area per MBR train	420	m^2	4,518	ft^2
Number of membrane train	2			
Total installed membrane module of STP	4			
Total membrane area of STP	820	m^2	9036	ft^2

Design of MBR Tank	Design Value	Design Value	Design Value	Design Value	Units
2) Flux Analysis	**ADF**	**MMF**	**MDF**	ADF (N-1)	
Influent flow rate per MBR tank/train	69.50	69.50	104.50	139	m^3/d
Instantaneous flux	8.6	8.6	13	17.2	LMH
Net flux	6.9	6.9	10.4	13.8	LMH
Reference net flux at 10°C (Toray)	18	18.9	22.5	22.5	LMH

Design of MBR Tank	Design Value	Metric Unit	Design Value	US Unit
3) Scouring Aeration				
Air flow per membrane module	98.6	N m^3/h	58	scfm
Air flow per MBR tank	197	N m^3/h	116	scfm
Total membrane air flow of STP	395	N m^3/h	232	scfm

Design of MBR Tank	Design Value	Metric Unit	Design Value	US Unit
4) MBR Tank Design				
Length, L	4.9	m	16	ft
Width, W	2.7	m	8.9	ft
Height, H	3.2	m	10.5	ft
Side Water Depth, SWD	2.7	m	8.9	ft
Volume per tank	35.7	m^3	9,432	gal
Volume displaced per tank by membranes	1.4	m^3	370	gal
Effective volume per MBR tank	34.3	m^3	9,062	gal
Total effective volume for two MBR tanks	68.6	m^3	18,124	gal
HRT	11.84	h		

Table 7: Aerobic Tank Design

Design of Aerobic Tank	Design Value	Metric Unit	Design Value	US Unit
Length, L	6.4	m	16	ft
Width, W	2.86	m	8.9	ft
Height, H	3.2	m	10.5	ft
Side Water Depth, SWD	2.3	m	7.6	ft
Volume of aerobic tank	42.1	m^3	11,123	gal
HRT	7.3	h		

Table 8: Biological Operating Parameters

Biological Operating Parameters	Design Value	Metric Unit
MLSS in aerobic tank	8,000	mg/L
MLSS in membrane tank	10,000	mg/L
Recirculation Ratio (from MBR tanks to aerobic tank)	4	-

Table 8: Biological Design Parameters

Parameters	Design Value	Metric Unit
MLVSS/MLSS	65	%
F:M ratio-aerobic	0.068	kg BOD/kg MLSS.d
F:M ratio-aerobic	0.105	kg BOD/kg MLVSS.d
Organic Loading rate - Aerobic	0.63	kg BOD/m3-d
HRT_{total} (ADF)	19.1	hour
HRT_{total} (MDF)	12.7	hour
Sludge yield	0.42	g VSS/g BOD
Sludge yield	0.65	gTSS/g BOD
Sludge Retention Time, SRT	22.7	day

Table 9: Sludge Production and Sludge Handling

Sludge Yield	Design Value	Metric Unit	Design Value	US Unit
Projected sludge production from biological process	38	kg DS/day	83.6	lb DS/d
Projected sludge production from Alum P removal process	7	kg DS/day	15.4	lb DS/d
Estimated total sludge produced	45	kg DS/d	99	lb DS/d
Total sludge produced (at 0.8% DS)	5.6	m3/d	1480	USG
Total sludge produced (at 2% DS after decanting)	2.25	m3//d	595	USG
Sludge tank width	1.2	m	4.0	ft
Sludge tank length	1.7	m	5.5	ft
Sludge tank height	3.2	m	10.5	ft
Sludge tank SWD	2.7	m	9.0	ft
Sludge tank volume	5.1	m3	1,347	USG
Sludge tank storage (at 2% DS)	2.3	day		
Selected sludge dewatering screw press	Model: BI-MSP301			

Screw press capacity	60	Kg DS/hr	132	lb/hr
Screw press capacity	3	m3 /hr (at 2% DS)	13.2	gpm
Estimated polymer consumption	0.36	kg /d	0.79	lb /d
Estimated polymer consumption (45% liquid polymer)	0.8	L /d	0.21	gallon/d
Estimated total sludge produced (at 20% DS sludge cake)	0.23	m3//d	0.3	yd^3/d
Capacity of sludge bin (provide by others)	0.38	m3//d	0.5	yd^3/d
Dimension of sludge bin (recommended)			57.5" x 26.75" x 33.75" H	

Table 10: Coagulant for Phosphorus Removal

Coagulant Addition for TP Removal	Design Value	Metric Unit	Design Value	US Unit
Chemical Selection	Cleartech CTI 4900 (50% aluminum chlorohydrate, 23% Al_2O_3)			
Phosphorus to be removed (Estimated)	7.3	mg/L		
Dosing rate (estimated)	104	mg/L		
Specific gravity	1.34	kg/L		lb/gal
Daily dosing rate (based on average flow or 139 m3/d)	10.8	L/d	2.85	gpd
Hourly dosing rate	0.45	L/h	0.12	gph

Table 11: Alkalinity (NaOH Adding)

Check Alkalinity	Design Value	Metric Unit	Design Value	US Unit
Alkalinity in the feed water	250	mg/L as $CaCO_3$		
Amount of NH_4-N converted to NO_3-N (assumed)	50	mg/L		
Residual alkalinity needed to maintain pH	80	mg/L as $CaCO_3$		
Alkalinity used for nitrification	357	mg/L as $CaCO_3$		
Alkalinity consumed by coagulant	18	mg/L as $CaCO_3$		
Alkalinity produced	0.00	mg/L as $CaCO_3$		
Alkalinity needed	205	mg/L as $CaCO_3$		
Alkalinity needed (based on ADF)	28.5	kg/day as $CaCO_3$	62.7	lb/d as $CaCO_3$
Chemical Selection	Sodium Hydroxide			
% by weight	50	%		
Specific gravity	1.52	kg/L		
Daily caustic dosage (50%)	37.5	L/d	9.9	gpd
Caustic dosage (50%)	1.56	L/h	0.41	gph

Table 12: Aeration Requirement

Aeration Requirement	Design Value	Metric Unit	Design Value	US Unit
BOD loading (based on max day)	104.5	kg/d	229.9	lb/d
TKN loading (based on 60% nitrification)	12.5	kg/d	27.5	lb/d
Unit BOD oxygen demand	1.30	kg O_2/kg BOD	1.30	lb/lb
Unit nitrification oxygen demand	4.60	kg O_2/kg N	4.60	lb/lb
Total Oxygen demand (design AOR)	196	kg O_2/d	431.2	lb O_2/d
Alpha for coarse bubble	0.75	-		
Alpha for medium fine bubble	0.6	-		
Beta	0.95	-		
Site elevation	148	m		
Wastewater temperature	25	°C	77	°F
Water depth in aerobic tank	2.0	m	6.56	ft
Water depth in MBR tanks	2.7	m	8.86	ft
O2 transfer efficiency for aerobic tank (coarse bubble)	4.9%			
O2 transfer efficiency for MBR tanks (fine bubble)	9.4%			
Target min operating DO	2.00	mg/L		
SOR for aerobic tank	48.5	kg O_2/d	106.7	lb O_2/d
SOR for MBR tanks	351.6	kg O_2/d	773.5	lb O_2/d
Total SOR	400	kg O_2/d	880	lb O_2/d
Standard air flow rate for aerobic tank	148.3	m3/h	87.2	scfm
Standard air flow rate for MBR tanks	560.7	m3/h	330	sfcm

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 Hydroxide Solution

Sodium Hydroxide Solution 2%
Sodium Hydroxide Solution 4%
Sodium Hydroxide Solution 5%
Sodium Hydroxide Solution 6%
Sodium Hydroxide Solution 8%
Sodium Hydroxide Solution 10% NSF® - 60
Sodium Hydroxide Solution 15% NSF® - 60
Sodium Hydroxide Solution 20% NSF® - 60
Sodium Hydroxide Solution 25% NSF® - 60
Sodium Hydroxide Solution 30% NSF® - 60
Sodium Hydroxide Solution 40% NSF® - 60
Sodium Hydroxide Solution 50% NSF® - 60

Other Means of Identification

Caustic soda, sodium hydrate, lye, liquid caustic, caustic

Product Use and Restrictions on Use

Acid neutralization, petroleum refining, manufacture of paper products, metal cleaning, regeneration of ion exchange resins.

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 1A

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.

P280 Wear protective gloves, 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

Not available

Supplemental Information

Not available

Section 03 Composition / Information on Ingredients

Hazardous Ingredients:

Chemical name	Common name(s)	CAS number	Concentration (w/w%)
Sodium Hydroxide	Caustic Soda	1310-73-2	0.5-50%

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.

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 60 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 60 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).
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	Water jets are not recommended in fires involving chemicals.
Specific hazards arising from the chemical	Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. May release toxic or irritating fumes at high temperatures.
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.
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. 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 add water to a corrosive. Always add corrosives to water. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation. 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.
Incompatibilities	Acids, such as sulphuric, nitric, hydrochloric, phosphoric, flurosilicic (HFSA), sulphonic, acetic, citric, oxalic, and formic. Metals, such as aluminum and brass. Chlorinated hydrocarbons, flammable liquids, and nitrous compounds.

Section 08 Exposure Controls and Personal Protection

Exposure limits

Component	Regulation	Type of listing	Value
Sodium Hydroxide	ACGIH	STEL/Ceiling	2 mg/m³
	NIOSH	IDLH	10 mg/m³

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: Sodium hydroxide** **Up to: 10 mg/m³** (APF = 25) Any supplied-air respirator operated in a continuous-flow mode (APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

	(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted N100, R100, or P100 filter. (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 with an N100, R100, or P100 filter. Any appropriate escape-type, self-contained breathing apparatus
Thermal hazards	Not available

Section 09 Physical and Chemical Properties

Appearance

Physical state	Liquid
Colour	Clear to slightly turbid
Odour	Odourless
Odour threshold	Not applicable

Property

pH	>14
Melting point / freezing point	~14 °C (50%)
Initial boiling point and boiling range	~140 °C (50%)
Flash point	Does not flash
Evaporation rate	Not available
Flammability	Not applicable
Upper flammable limit	Not applicable
Lower flammable limit	Not applicable
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	36 cP (40%)
Specific gravity	~1.53 g/mL @ 15 °C (50%)
Particle characteristics	Not applicable
Formula	NaOH

Molecular weight	39.997 g/mol

Section 10 Stability and Reactivity

Reactivity	May be corrosive to metals. Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. Reacts with water to generate heat. Reacts violently with acids.
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 heat.
Incompatible materials	Acids, such as sulphuric, nitric, hydrochloric, phosphoric, flurosilicic (HFSA), sulphonic, acetic, citric, oxalic, and formic. Metals, such as aluminum and brass. Chlorinated hydrocarbons, flammable liquids, and nitrous compounds.
Hazardous decomposition products	Hydrogen

Section 11 Toxicological Information

Acute Toxicity (LD50 / LC50 values)

Component	Route	Species	Value	Exposure time
Sodium hydroxide	Oral	Rat	140-340 mg/kg	
	Dermal	Rabbit	1350 mg/kg	

Toxic Health Effect Summary

Chemical characteristics	Sodium hydroxide dissociates in aqueous conditions, and thus is not bioavailable. All of it's toxic effects are assumed to be related to it's effect on pH.
Skin	Causes severe skin burns.
Ingestion	Causes burns to the mouth and throat.
Inhalation	Causes severe burns to the mouth and throat (mist).
Eye contact	Causes serious eye damage.
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

Component	Type	Species	Value	Exposure Time
Sodium Hydroxide	EC50	Water Flea	40.38 mg/L	48 hours
	LC50	Guppy	196 mg/L	96 Hours

Biodegradability	The domestic substance list categorizes sodium hydroxide as persistent.
Bioaccumulation	The domestic substance list categorizes sodium hydroxide as non-bioaccumulative.
Mobility	This product is water soluble, is not predicted to adsorb to soil and may contaminate ground water.
Other adverse effects	Aquatic toxicity of sodium hydroxide will be highly dependant on the buffering capacity of the body of water it is released into.

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	UN1824
UN proper shipping name and description	SODIUM HYDROXIDE SOLUTION
Transport hazard class(es)	8
Packing group	II
Excepted quantities	1 L
Environmental hazards	Not listed as a marine pollutant under Canadian TDG Regulations, schedule III.
Special precautions	No special provisions
Transport in bulk	ERAP index: not available

MARPOL 73/78 and IBC Code:

Product name:	Sodium hydroxide solution
Pollution category:	Y
Hazards:	the product is included in the Code because of both its safety and pollution hazards.
Ship type:	ship type 3
Tank type:	integral gravity tank
Tank vents:	open venting
Tank environmental control:	no special requirements under this Code
Electrical equipment:	Temperature classes Apparatus group Flash point non-flammable product
Gauging:	open 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, 16.2.6, 16.2.9

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: Sodium Hydroxide Solution 50% NSF® - 60 is certified under NSF / ANSI Standard 60 for corrosion & scale control, and pH adjustment at a maximum dosage of: 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: December 19, 2022

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) CHEMINFO
2) TOXNET
3) eChemPortal
4) ECHA
5) Transportation of Dangerous Goods Canada
6) HSDB
7) PAN

Safety Data Sheet

Section 01 Identification

Product Identifier	ClearFloc CE Series ClearFloc CE1055 ClearFloc CE2055 ClearFloc CE4050 ClearFloc CE4055 ClearFloc CE4558 ClearFloc CE5050 ClearFloc CE5057 ClearFloc CE6055 ClearFloc CE6067 ClearFloc CE8050 ClearFloc CE8055 ClearFloc CE8056 ClearFloc CE8057
Other Means of Identification	Not available
Product Use and Restrictions on Use	Cationic flocculant or coagulant aid in mining, municipal, wastewater and industrial water treatment.
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

GHS-Classification

This product has been assessed in accordance with the Hazardous Products Regulations and is not classified as a hazardous substance or mixture.

Hazards Not Otherwise Classified

Extremely slippery when wet.

Supplemental Information

Not available

Section 03 Composition / Information on Ingredients

Ingredients:

The ingredients in this product are not classified as hazardous under the Hazardous Products Regulations

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	If skin irritation occurs or if you feel unwell: Get medical advice / attention.
Eye contact	Gently brush product off face. Do not rub eyes. Let the eyes water naturally for a few minutes. Look right and left, then up and down. If particle / dust does not come out, cautiously rinse eye with lukewarm gently flowing water for 5 minutes or until particle / dust is removed, while holding the eyelids open. If eye irritation persists: Get medical advice / attention. Do not attempt to manually remove anything from the eyes.

Most important symptoms and effects, both acute and delayed

Inhalation	May cause respiratory irritation.
Ingestion	May cause discomfort or nausea.
Skin contact	May cause transient irritation or dryness.
Eye contact	May cause eye irritation and redness.
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 carbon and nitrogen, and hydrogen chloride may be released. Contact with water will render surfaces extremely slippery.
Special protective equipment for fire-fighters	Wear NIOSH-approved self-contained breathing apparatus and 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. 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. Protect label and keep it visible.
Incompatibilities	Oxidizing agents, such as oxygen, hydrogen peroxide, sulphuric and nitric acids, 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	No specific recommendations beyond the required hygiene facilities at the place of work.

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, safety glasses 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	White
Odour	Aliphatic
Odour threshold	Not applicable

Property

pH	Not availabe
Melting point / freezing point	<5 °C
Initial boiling point and boiling range	>100 °C

Flash point	Not available
Evaporation rate	Not available
Flammability	Not applicable
Upper flammable limit	Not available
Lower flammable limit	Not available
Vapour pressure	2.3 kPa @ 20 °C
Vapour density	0.804 g/L @ 20 °C
Relative density	Not applicable
Solubility	Soluble in water
Partition coefficient: n-octanol/water	Not available
Auto-ignition temperature	Not available
Decomposition temperature	>150 °C
Viscosity	Not available
Specific gravity	Not available
Particle characteristics	Not applicable
Formula	Not available
Molecular weight	Not available

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 heat.
Incompatible materials	Oxidizing agents, such as oxygen, hydrogen peroxide, sulphuric and nitric acids, hypochlorites and permanganates.
Hazardous decomposition products	Thermal decomposition may produce oxides of carbon and nitrogen, and hydrogen chloride .

Section 11 Toxicological Information

Acute Toxicity (LD50 / LC50 values)

Component	Route	Species	Value	Exposure time
Acute toxicity estimate	Oral	Rat	>5,000 mg/kg bw	
	Dermal	Rat	>5,000 mg/kg bw	

Toxic Health Effect Summary

Chemical characteristics	No known effects
Skin	May cause transient irritation or dryness.
Ingestion	May cause discomfort or nausea.
Inhalation	May cause respiratory irritation.

Eye contact	Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjuctival affects similar to those with all granular materials have on conjuctivae.
Sensitization	The results of testing on guinea pigs showed this material to be non-sensitizing.
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

Component	Type	Species	Value	Exposure Time
Acute toxicity estimate	LC50	Fish	10-100 mg/L	96 hours
	EC50	Daphnia magna	10-100 mg/L	48 hours

Biodegradability	The domestic substance list categorizes all of the components of this product as non-persistent.
Bioaccumulation	The domestic substance list categorizes all of the components of this product 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	Not available

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	Not available
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 provisions
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.

Section 16 Other Information

Date of latest revision: October 27, 2021

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) CHEMINFO
2) TOXNET
3) eChemPortal
4) ECHA
5) Transportation of Dangerous Goods Canada
6) HSDB
7) PAN

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.

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: 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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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/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

Citric Acid,Anhydrous,

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Citric Acid,Anhydrous,**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25255**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Irritant
Eye irritation, category 2A

Eye Irritation 2

Signal word :Warning

Hazard statements:
Causes serious eye irritation
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Wash ... thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Do not eat, drink or smoke when using this product
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/attention

Combustible Dust Hazard: :
May form combustible dust concentrations in air (during processing).

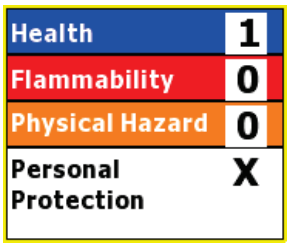
Other Non-GHS Classification:

WHMIS

E 

NFPA/HMIS

NFPA SCALE (0-4)



HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 77-92-9	Citric Acid, Anhydrous, ACS	100 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Seek medical advice if discomfort or irritation persists.If breathing difficult, give oxygen.

After skin contact: Wash affected area with soap and water. Rinse thoroughly. Seek medical attention if irritation, discomfort or vomiting persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: If in laboratory setting, follow laboratory fire suppression procedures. Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Transfer to a disposal or recovery container.Use spark-proof tools and explosion-proof equipment.Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

Methods and material for containment and cleaning up:

If in a laboratory setting, follow Chemical Hygiene Plan procedures.Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Wash hands after handling. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Avoid generation of dust or fine particulate.Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs. Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.

SECTION 8 : Exposure controls/personal protection

Control Parameters: No applicable occupational exposure limits

Appropriate Engineering controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.Use under a fume hood. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).

Respiratory protection: Not required under normal conditions of use. Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.

Protection of skin: The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled.Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

Eye protection: Safety glasses with side shields or goggles.

General hygienic measures: The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	White solid	**Explosion limit lower**: **Explosion limit upper**:	Not determined Not determined
Odor:	Odorless	**Vapor pressure**:	Not determined
Odor threshold:	Not determined	**Vapor density**:	Not determined
pH-value:	Not determined	**Relative density**:	Not determined
Melting/Freezing point:	Not determined	**Solubilities**:	Soluble in water
Boiling point/Boiling range:	Not determined	**Partition coefficient (n-octanol/water)**:	Not determined
Flash point (closed cup):	Not determined	**Auto/Self-ignition temperature**:	Not determined
Evaporation rate:	Not determined	**Decomposition temperature**:	Not determined
Flammability (solid,gaseous):	Not determined	**Viscosity**:	a. Kinematic:Not determined b. Dynamic: Not determined
Density: Not determined			

SECTION 10 : Stability and reactivity

Reactivity:
Chemical stability: No decomposition if used and stored according to specifications.
Possible hazardous reactions:
Conditions to avoid: Store away from oxidizing agents, strong acids or bases.
Incompatible materials: Oxidizers, sulfuric and nitric acid. Strong acids.Strong bases.
Hazardous decomposition products: Oxides of carbon and irritating and toxic gases/fumes. Carbon oxides (CO, CO2).

SECTION 11 : Toxicological information

Acute Toxicity:		
Oral:	6730 mg/kg	LD50 orl-rat:
Chronic Toxicity: No additional information.		
Corrosion Irritation:		
Ocular:	Section 2	Classified as an eye irritant
Sensitization:		No additional information.
Single Target Organ (STOT):		No additional information.
Numerical Measures:		No additional information.
Carcinogenicity:		No additional information.
Mutagenicity:		No additional information.
Reproductive Toxicity:		No additional information.

SECTION 12 : Ecological information

Ecotoxicity

Fish: LC50 (96h) L. macrochius: 1516 mg/L

Persistence and degradability: Readily degradable in the environment.
Bioaccumulative potential:
Mobility in soil:
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Product/containers must not be disposed together with household garbage. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Consult federal state/ provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.

SECTION 14 : Transport information

UN-Number

Not Regulated.

UN proper shipping name

Not Regulated.

Transport hazard class(es)
Packing group:Not Regulated
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Acute

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

77-92-9 Citric acid, anhydrous

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The 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 user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

Effective date : 12.14.2014
Last updated : 03.19.2015