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Arsenic Water Treatment Plant

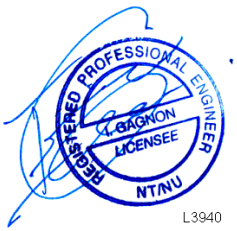
Agnico Eagle Mines Limited Whale Tail

Design Report

653281-0001-40ER-0002_1

January 11, 2019

Prepared by:



2019-01-11

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LIST OF REVISIONS

Revision				Revised Pages	Remarks
No.	By	Rev.	Date		
A	IG	TG, BA, MG, ALN	2018-09-12		Issued for client comments
B	IG	TG, BA, MG, ALN	2018-09-18		Issued for client final comments
C	IG	TG, BA, MPM	2018-11-20		
0	IG	TG, ALN	2018-11-22		Final emission
1	IG	MPM	2019-01-11		Revision 1 – CIRNAC comments

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1. Introduction

1.1 Site Location and Access

Agnico Eagle is developing the Whale Tail Project in the Kivalliq Region of Nunavut (65°24’25” N, 96°41’50” W). The 99,878-hectare Amaruq property is located on Inuit-owned and federal crown land, approximately 55 km north of the Meadowbank mine. The Meadowbank mine is accessible from Baker Lake, located 70 kilometres to the south.

1.2 Site Facilities

Agnico Eagle Mines Limited—Meadowbank Division (Agnico Eagle) is developing Whale Tail Pit and Haul Road Project, on a satellite deposit located on the Amaruq property, to extend mine operations and milling at Meadowbank Mine. The proposed open-pit mine, mined by the truck-and-shovel operation, will produce 19 M tons of ore grading at 3.68 g/t for a total of 2.1 M ounces from 2019 to 2025.

The Amaruq Mineral Deposit is considered to be an extension of the currently operating Meadowbank mine and most positions will be filled by Meadowbank employees. A conventional open pit mining operation is forecasted on the Whale Tail deposit. Access to the site is via a 64-kilometre road from Meadowbank mine. On-site facilities will include a power plant, maintenance facilities, tank farm for fuel storage, Arsenic water treatment plant (AsWTP), sewage treatment plant, drinking water treatment plant, as well as accommodation and kitchen facilities for approximately 400 people.

The global concept for water treatment at Amaruq is based on the reuse of the two Actiflo® from Meadowbank. Actiflo® is designed to treat mainly suspended solids (TSS). In Amaruq, it is expected to have arsenic (As) in the surface water due to the leachability of the rock. Therefore, the Actiflo® will be integrated into a treatment chain able to remove As to acceptable levels.

Figure 1 presents the AsWTP location.

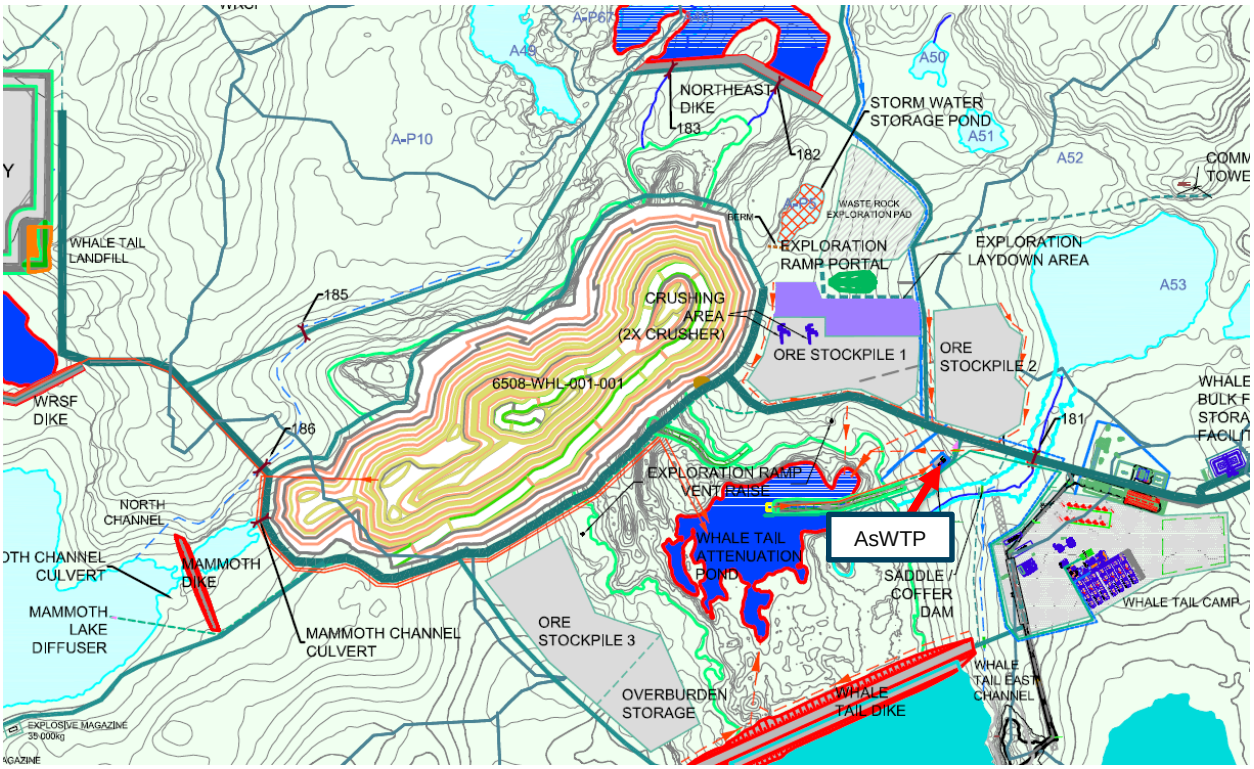

Figure 1: Location of the AsWTP

1.3 Purpose of Document

This report includes the final design and construction drawings for the AsWTP. The water to be treated will be sourced from Whale Tail Attenuation Pond. The effluent water generated by the AsWTP will be pumped through a pipeline and discharged to Mammoth Lake. . The design report was written according to Water License 2AM-WTP1826 Part D Item 1 (b) and 2.

1.4 Scope of Work

SNC Lavalin was retained by Agnico Eagle to design the feed pump, pipelines, and effluent water outfall to the discharge location. Veolia was in charge of the AsWTP design and SNC Lavalin and AEM for the construction. This report describes the AsWTP, pumps and pipelines design. Construction drawings of the listed infrastructure are presented in Appendix A of this report.

2. Design Methodology

2.1 Water Management Strategy

During the operational phase of the project, all of the contact water originating from affected areas on the mine site will be intercepted, diverted and collected within the various collection ponds and eventually pumped and stored in the Whale Tail Attenuation Pond. The contact water will be treated by an AsWTP

prior to discharge to the receiving environment (i.e. Mammoth Lake) or reused in operations when possible. The sludge generated by the AsWTP will be dewatered with centrifuges and stored into the waste rock storage facility.

The composition of the sludge will depend mainly on the composition of TSS present in the attenuation pond water. The TSS is mainly sediment coming from surface runoff (soil particle) and small size particle coming from ore and waste rock extraction. The proportion of each and their concentrations in water are not easy to model. The sludge will also contain a portion of iron hydroxide use to precipitate As.

Sludge stability from coprecipitation with iron hydroxides are often tested with the TCLP technique (toxicity characteristic leaching procedure, EPA, 2003). Liquid waste streams must have lower concentrations than the Toxicity Characteristic (TC) in order for the waste to be classified as non-hazardous. The arsenic TC is 5.0 mg/L in the United States (US) and also in Québec (Directive 019, MDDELCC, 2017).

The typical sludge produced by the process of As coprecipitation with ferric sulfate, is typically classified as non-hazardous. For example, a TCLP made by Lakshmanan et al. (2008) with ferric chloride sludge to treat 0.5 ppm of As at pH 7.5 passed the TC. Twidwell et al. (1999) reported As treatment with ferric precipitation that passed TCLP criteria and were classified as non-hazardous. For example, a filter cake from Twidwell et al. (1999) study was transported to a tailing storage area and the outfall from the storage pond showed As concentration typically below 0.05 mg/L. One of the most important conclusions from the studies was that the higher the ratio of Fe/As, the higher the stability of the treatment sludge, resulting in diminished arsenic leaching. Pantuzzo and Ciminelli (2010), evaluate the stability of arsenic residues (coming from the coprecipitation of As with lime end iron) disposed in pits. It appears that the stability of the sludge is higher for a ratio Fe/As of 4.5 than for a ration Fe/As of 1.3.

The Fe/As ratio for this project is planned to be 7.5 (for average As concentration of 1.5 mg/l, see table 1 below, Sulfate ferric dosage of 30 mg/L), based on experience for typical dosage used for As removal. As leaching is predicted to be low from the water treatment sludge (iron hydroxide part of the sludge) based on the previous reference presented.

The expected production rate of sludge will depend mainly on TSS in the feed water. Based on an average of 250 mg/L of TSS, the expected quantity of sludge produced will be approximately 3500 m3/year. The sludge will be co-disposed into the waste rock storage facility (projected waste rock and overburden stored in WRSF of 65.2 M tons – information coming from Whale Tail Pit Waste Rock Management Plan, Agnico, 2018a). The development of permafrost in the waste rock pile is being used to inhibit acid rock drainage (ARD) and metal leaching (ML) for of the majority of rock on site (Agnico, 2018b). By blending the sludge with the rock that will remain permanently frozen, the sludge will also freeze and not be able to leach. During closure, water treated on site will be directed into the open pits and the north basin to fill them. Finally, water will be treated as long as it is required to respect the discharge criteria.

2.2 Methodology

Volume and water quality information used for design are based on water balance and water quality Model. Based on the information available to date, the AsWTP will be designed to treat the contact water for As and TSS. To do so, the ASWTP will include the following treatment steps that are detailed in section 4:

1. Oxidation to oxidize the arsenic from As (III) to As (V).
2. pH adjustment.
3. Coagulation using ferric sulfate in order to co-precipitate the As (V) as ferric-arsenate precipitate.
4. Flocculation to enhance the settling of the precipitate formed in the coagulation step.
5. Clarification to separate the treated water from the precipitate. High-rate ballasted floc clarifiers will be used for this step of the treatment process.
6. Sludge thickening process to decrease storage requirements.

3. General Site Conditions and Other Data Input for Design

3.1 Environmental Data

The Amaruq Mineral Deposit is located in the tundra region of the central sub-Arctic (the Barrenlands) at the lower end of the Northern Arctic Ecozone, and within the Wager Bay Plateau Ecoregion. The physical features of the region have largely been determined by glaciation. The terrain consists predominantly of broadly rolling uplands and lowlands with little topographical relief (very few hills). Strung out across the landscape is long, sinuous eskers. This undulating landscape is studded with innumerable lakes, ponds, and wetlands. Cryosols are the dominant soils, and are underlain by continuous permafrost with active layers that are usually moist or wet throughout the summer. Large boulder field areas are encountered.

The topography in the immediate area of the project is generally flat, with relief in the order of 10 to 12 m near the main deposit areas, and as high as 50 m locally. Elevations vary from about 150 metres above sea level (masl) along the shoreline of Whale Lake to about 200 masl. Much of the limited topographic relief in the area can be attributed to land features typical of glaciated and permafrost terrain.

Throughout the Nunavut Territory, the vegetation is composed of dwarf shrubs, sedges and grasses, mosses, and lichens. A short but intense summer produces many small but brilliant flowers, including purple saxifrage, sedge, lousewort, fireweed and wintergreen. Other common flowers in the south of the Amaruq region include dandelions, chamomile daisies, harebells and buttercups. About 200 species of flowers grow in the Barrenlands.

The animal population in the Amaruq region includes mammals such as caribou, muskox, barren-ground grizzly bear, wolf, wolverine, fox, ermine, lemming and hare. Caribou alone outnumber Nunavut's human population 25 to 1. Bird species include gyrfalcon, snowy and short-eared owl, rough-legged hawk, golden eagle, ptarmigan, jaeger, snow goose, pintail and long-tailed duck, goldeneye duck, lesser scaup and green-winged teal. Fish include lake trout, arctic grayling, arctic char, walleye, whitefish and northern pike. Mosquitoes breed in the shallow tundra lakes.

Arctic winter conditions occur from October through May, with temperatures ranging from +5 to -40º C. Light to moderate snowfall is accompanied by variable winds up to 70 km/h, creating large, deep drifts and occasional whiteout conditions. Summer temperatures can range from -5 to +25º C, with isolated rainfall increasing through September. In the area of the Amaruq Mineral Deposit, ice is present on lakes from mid-September to mid-July.

3.2 Characteristics of the Effluent

Amaruq ore contains Arsenopyrite and other minor phase containing As. Arsenopyrite mineral is well known to produce As leachate when in presence of oxygen and water.

Depending on the redox condition and pH, As could be found under arsenate (As (V)—AsO_4^{3-}) and arsenite (As (III)—AsO_3^{3-}). In reductive condition, As III could be predominant and in oxidative condition As V will be the major phase. This As speciation will have an important impact on the water treatment strategy because As III and V will not be treated at the same pH. The best approach will be to oxidize As III into V form in order to treat all As in the same step.

AsWTP is designed for an average As concentration of 1.5 mg/l (3.2 maximum mg/L)[1]. TSS used for design (line recirculation, pump) are at 500 ppm in average (max 1000 ppm). It is assumed that other metal will not be problematic on site.

Table 1[2] presents the discharge water quality based on Licence A for the treated water. The AsWTP will treat TSS and As which will ensure compliance for those elements as well as iron (Fe) and pH. Other constituents are not expected to require treatment during the treatment period[3].

[1] 6115-S-265-001-QUO-001
[2] License A: 2AM-WTO1826
[3] Golder, 2018. File excel: WQ Prelim_Results_Dissolved_Concs_1Aug2018

Table 1: Water Discharge Criteria

Parameters	Unit	Monthly Concentration Mean	Maximum Concentration in a Grab Sample
pH	-	6–9.5	6–9.5
Total Suspended Solids	mg/l	15	30
Total Dissolved Solids	mg/l	1400	1400
Total Ammonia	mg-N/l	16	32
Total Phosphorus	mg-P/l	0.3	0.6
Aluminum	mg/L	0.5	1
Arsenic	mg/L	0.1	0.2
Cadmium	mg/L	0.002	0.004
Chromium	mg/L	0.02	0.04
Cupper	mg/L	0.1	0.2
Iron	mg/L	1	2
Lead	mg/L	0.05	0.1
Mercury	mg/L	0.004	0.008
Nickel	mg/L	0.25	0.5
Zinc	mg/L	0.1	0.2
Total petroleum hydrocarbons	mg/L	3	6

3.3 Effluent Flow Rates

The expected flow rates in the Whale Tail attenuation pond are presented in table 2[4].

Table 2: Treatment flow rate requirement

Month	Volume to be treated m^3	Month	Volume to be treated m^3
2019 Apr	345 600	2021 Apr	30 000
2019 May	804 720	2021 May	29 762
2019 Jun	453 499	2021 Jun	519 270
2019 Jul	108 040	2021 Jul	86 097
2019 Aug	125 117	2021 Aug	108 355
2019 Sep	181 336	2021 Sep	183 380
2020 Jun	507 141	2021 Oct	29 659
2020 Jul	91 941	2021 Nov	28 812
2020 Aug	115 489	2021 Dec	29 659
2020 Sep	194 912	2022 Jan	29 194
2020 Oct	31 000	2022 Feb	26 675
2020 Nov	30 000	2022 Mar	29 194
2020 Dec	31 000	2022 Jun	683 172
2021 Jan	31 000	2022 Jul	115 024
2021 Feb	28 000	2022 Aug	128 886
2021 Mar	31 000	2022 Sep	222 991

The design flow rate in summer is set at 1600 m^3/h and 84 m^3/h in winter.

4. Design of the As Water Treatment Plant (AsWTP)

As presented herein, the global strategy is based on the following steps:

1. Oxidation to oxidize the arsenic from As (III) to As (V).
2. pH adjustment.
3. Coagulation using ferric sulfate in order to co-precipitate the As (V) as ferric-arsenate precipitate.
4. Flocculation to enhance the settling of the precipitate formed in the coagulation step.
5. Clarification to separate the treated water from the precipitate. High-rate ballasted floc clarifiers will be used for this step of the treatment process.
6. Sludge thickening process to decrease storage requirements.

[4] 1789310_204_Phase2_WaterBalance_RevA

4.1 Design rational

The design rational is based on the state of the art for As treatment. Based on literature review, Adsorption on ferrous oxyhydroxides is one of the most used and proven technology to remove As (MSE, 1998, Twidwell et al., 1999, EPA, 2002, 2003, Garelick et al., 2005, Johnston et Heijnen, MEND, 2014). According to MSE (1998), Twidwell et al. (1999) and MEND (2014), it is the best demonstrated available technology for As removal. Based on EPA (2002), the plant should contain the following step:

- Mixing of chemicals,
- Formation of solid matrix to coprecipitate As,
- A solid liquid-separation.

4.1.1 Requirements

To achieve the treatment of As, the following step are required:

- Oxidation to oxidize the arsenic from As (III) to As (V).
- pH adjustment.
- Coagulation using ferric sulfate in order to co-precipitate the As (V) as ferric-arsenate precipitate.
- Flocculation to enhance the settling of the precipitate formed in the coagulation step.
- Clarification to separate the treated water from the precipitate. High-rate ballasted floc clarifiers will be used for this step of the treatment process.
- Sludge thickening process to decrease storage requirements.

The water quality in the attenuation pond was modelled by Golder (2016), to estimate the potential deleterious elements in the water. The table 3 presents the result of the modelling. It appears that only As would be problematic. The maximum As concentration expected would be 3.2 mg/L. The AsWTP is designed to treat 1.5 mg/L in average (with a maximum at 3.2 mg/L). Note that higher As concentration can be treated by adjusting chemical dosage within the plant.

The proposed treatment chain is often used for the treatment of As. The expected discharge criterion of 0.1 mg/L as per the licence is expected to be reached all the time. For example, this technology was reported able to reach value as low as 0.05 mg/L (EPA, 2002) and <0.1 mg/L (MEND, 2014).

Table 3: Estimated water quality in the attenuation pond (Golder, 2016)

LOCATION	Time Period	Month	TDS mg/L	Cl mg/L	F mg/L	SO4 mg/L	NH3 (as N) mg N/L	NO3 mg N/L	P_total[5] mg/L	Al[4] mg/L	Sb mg/L	As[7] mg/L	Ba mg/L	Be mg/L	Bi mg/L	B mg/L	Cd[8] mg/L	Ca mg/L	Cr[9] mg/L	Co mg/L	Cu[6] mg/L
Attenuation Pond	*Operations Water Quality (maximum mine footprint)*	October	387	36	0.78	110	0.14	5.6	0.36	0.0001	0.025	1.7	0.071	0.00012	0.000062	0.49	0.000063	39	0.0082	0.0046	0.012
		November	356	44	0.69	94	0.14	5.8	0.51	0.0001	0.021	1.5	0.066	0.00011	0.000076	0.42	0.000059	37	0.007	0.0039	0.011
		December	335	51	0.62	83	0.14	6.0	0.6	0.0001	0.018	1.3	0.063	0.0001	0.000071	0.38	0.000056	35	0.0061	0.0034	0.0095
		January	319	56	0.56	74	0.14	6.1	0.67	0.0001	0.016	1.2	0.061	0.000096	0.000068	0.35	0.000054	34	0.0054	0.0031	0.0085
		February	308	60	0.51	68	0.15	6.2	0.72	0.0001	0.014	1.0	0.059	0.00009	0.000066	0.33	0.000053	33	0.0048	0.0028	0.0077
		March	299	64	0.48	63	0.15	6.3	0.75	0.0001	0.013	0.93	0.058	0.000085	0.000064	0.31	0.000052	33	0.0044	0.0026	0.0071
		April	292	67	0.45	58	0.15	6.3	0.78	0.0001	0.012	0.84	0.057	0.000081	0.000062	0.3	0.000052	32	0.004	0.0024	0.0066
		May	286	69	0.42	55	0.15	6.4	0.81	0.0001	0.011	0.77	0.056	0.000078	0.000061	0.29	0.000051	32	0.0037	0.0022	0.0061
		June	238	47	0.37	51	0.14	5.8	0.5	0.0001	0.0095	0.67	0.052	0.000064	0.000051	0.29	0.000049	25	0.0036	0.0027	0.0061
		July	414	38	0.75	120	0.14	5.5	0.32	0.0001	0.023	1.6	0.074	0.00012	0.000086	0.58	0.000068	43	0.0085	0.0048	0.012
		August	751	57	1.4	228	0.14	5.7	0.44	0.0001	0.047	3.2	0.12	0.00022	0.00015	1.0	0.00011	78	0.016	0.0079	0.022
		September	622	47	1.2	187	0.14	5.6	0.36	0.0001	0.041	2.8	0.11	0.00019	0.00013	0.81	0.000092	64	0.014	0.007	0.019
		MAXIMUM	751	69	1.4	228	0.15	6.4	0.81	0.0001	0.047	3.2	0.12	0.00022	0.00015	1.0	0.00011	78	0.016	0.0079	0.022
		AVERAGE	384	53	0.69	99	0.14	5.9	0.57	0.0001	0.021	1.5	0.07	0.00011	0.000081	0.46	0.000063	40	0.0071	0.0039	0.011

LOCATION	Time Period	Month	Fe mg/L	Pb[9] mg/L	Li mg/L	Mg mg/L	Mn mg/L	Hg mg/L	Mo mg/L	Ni[9] mg/L	K mg/L	Se mg/L	Ag mg/L	Na mg/L	Sr mg/L	Tl mg/L	Sn mg/L	U mg/L	V mg/L	Zn mg/L
Attenuation Pond	*Operations Water Quality (maximum mine footprint)*	October	0.3	0.0027	0.01	11	0.62	0.000054	0.011	0.041	29	0.0029	0.000098	43	0.28	0.00015	0.00044	0.0052	0.026	0.011
		November	0.3	0.0023	0.0095	11	0.52	0.000046	0.01	0.034	25	0.0024	0.000082	40	0.27	0.00012	0.00038	0.0048	0.022	0.01
		December	0.3	0.002	0.009	11	0.45	0.000041	0.01	0.029	22	0.0021	0.000071	37	0.26	0.0001	0.00033	0.0045	0.02	0.0093
		January	0.3	0.0018	0.0087	11	0.4	0.000036	0.01	0.026	19	0.0019	0.000063	35	0.26	0.00009	0.0003	0.0043	0.017	0.0087
		February	0.3	0.0016	0.0085	11	0.37	0.000032	0.01	0.023	17	0.0017	0.000057	33	0.26	0.00008	0.00027	0.0042	0.015	0.0082
		March	0.3	0.0015	0.0083	11	0.34	0.000029	0.01	0.021	16	0.0015	0.000052	32	0.26	0.000073	0.00025	0.004	0.014	0.0079
		April	0.3	0.0014	0.0081	11	0.32	0.000027	0.01	0.019	15	0.0014	0.000048	31	0.25	0.000066	0.00023	0.0039	0.013	0.0076
		May	0.3	0.0013	0.008	11	0.3	0.000025	0.01	0.018	14	0.0013	0.000045	30	0.25	0.000061	0.00022	0.0038	0.012	0.0073
		June	0.3	0.0014	0.0065	8.3	0.48	0.000023	0.0077	0.025	12	0.0013	0.000047	26	0.19	0.000063	0.00021	0.0031	0.0098	0.0064
		July	0.3	0.0028	0.011	12	0.68	0.000056	0.012	0.044	32	0.0032	0.00012	43	0.28	0.00019	0.00048	0.0055	0.023	0.012
		August	0.3	0.0049	0.019	21	0.87	0.00011	0.022	0.059	62	0.0061	0.00022	78	0.51	0.00036	0.00088	0.01	0.046	0.022
		September	0.3	0.0042	0.016	17	0.84	0.000091	0.018	0.062	51	0.005	0.00017	67	0.43	0.00028	0.00073	0.0085	0.041	0.018
		MAXIMUM	0.3	0.0049	0.019	21	0.87	0.00011	0.022	0.059	62	0.0061	0.00022	78	0.51	0.00036	0.00088	0.01	0.046	0.022
		AVERAGE	0.3	0.0023	0.01	12	0.52	0.000047	0.012	0.034	26	0.0026	0.000089	41	0.29	0.00014	0.00039	0.0052	0.022	0.011

4.2 Process summary for summer operation

The purpose of the AsWTP (using Actiflo ACP-700R) is to remove Total Suspended Solids (TSS) and As from the influent water pumped from Whale Tail Attenuation Pond. The equipment has an operational range of 6,250 m^3/d. to 38,400 m^3/d.

AsWTP is composed mainly of two treatment lines:

- One (1) As removal reactors used for pH adjustment, As oxidation, As precipitation.
- Two (2) Actiflo® treating the exit of the As removal reactor, with sludge recirculation.
- A sludge dewatering chain with two (2) centrifuges (centrate is recirculating into the Actiflo®).

The AsWTP overflow is designed to meet the Type A Licence final effluent discharge criteria for TSS concentrations and As. The final effluent will be monitored for pH and turbidity, which will be monitored continuously. Flow rate will be measured continuously. The Whale Tail Attenuation Pond effluent from the AsWTP will be monitored and will respect the discharge limits stipulated in Water License 2AM-WTP1826 Part F Item 4 and 5 and will, as well, comply with the MDMER regulation. Pre-discharge Whale Tail Attenuation Pond sampling will be done to analyse it as per Water License Part F Item 4. A pre-discharge Acute Lethality is already required under Part D Item 5 (refer to Schedule 1). Also, as per the Water License Schedule 1, the Whale Tail Attenuation Pond is to be sampled four (4) time per calendar year for Group 1 during operation.

The AsWTP general flow diagram is illustrated in Figure 2. The following sections describe the AsWTP components.

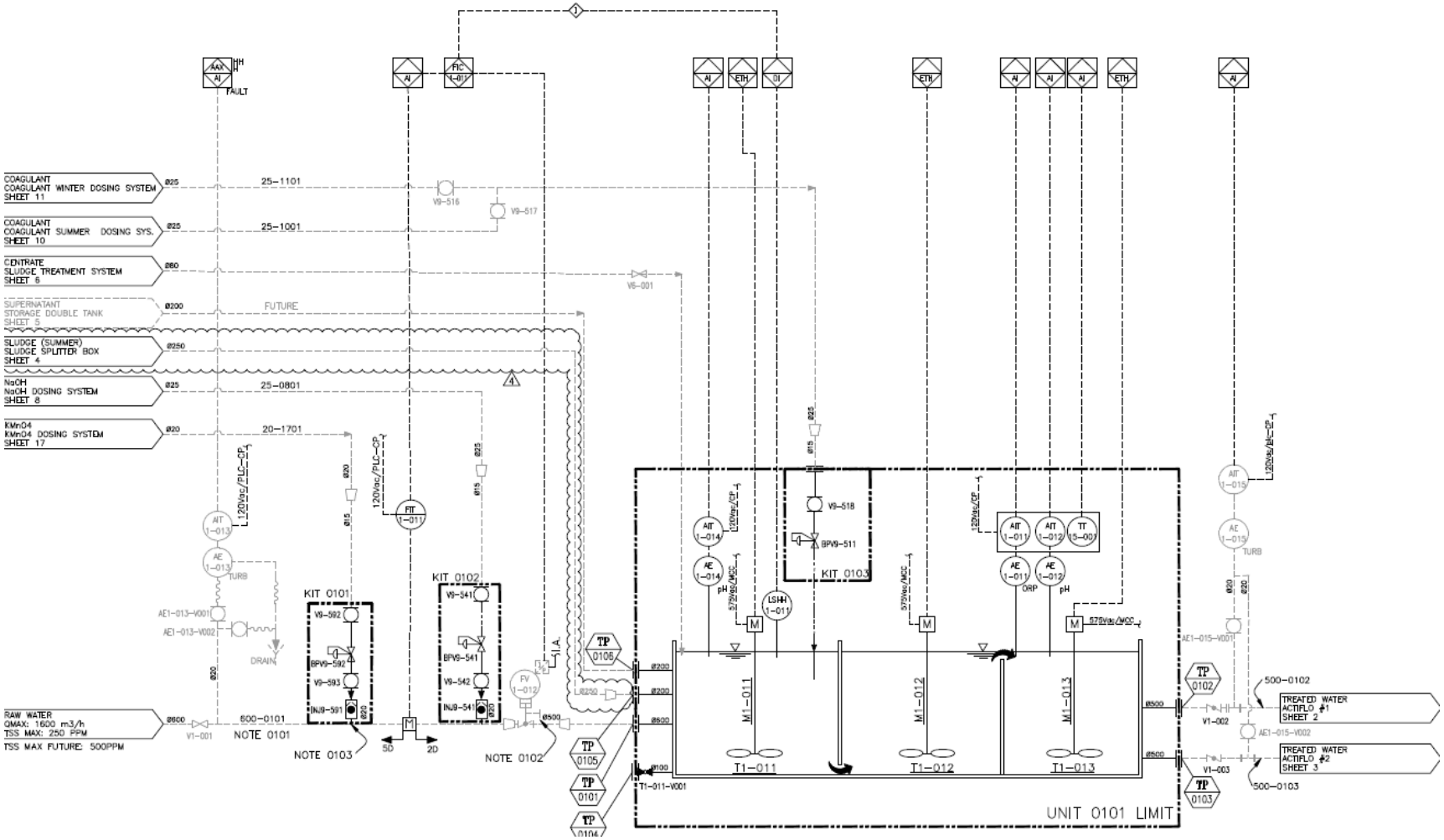

Figure 2a—AsWTP Flowsheet (summer operation)—As removal reactor

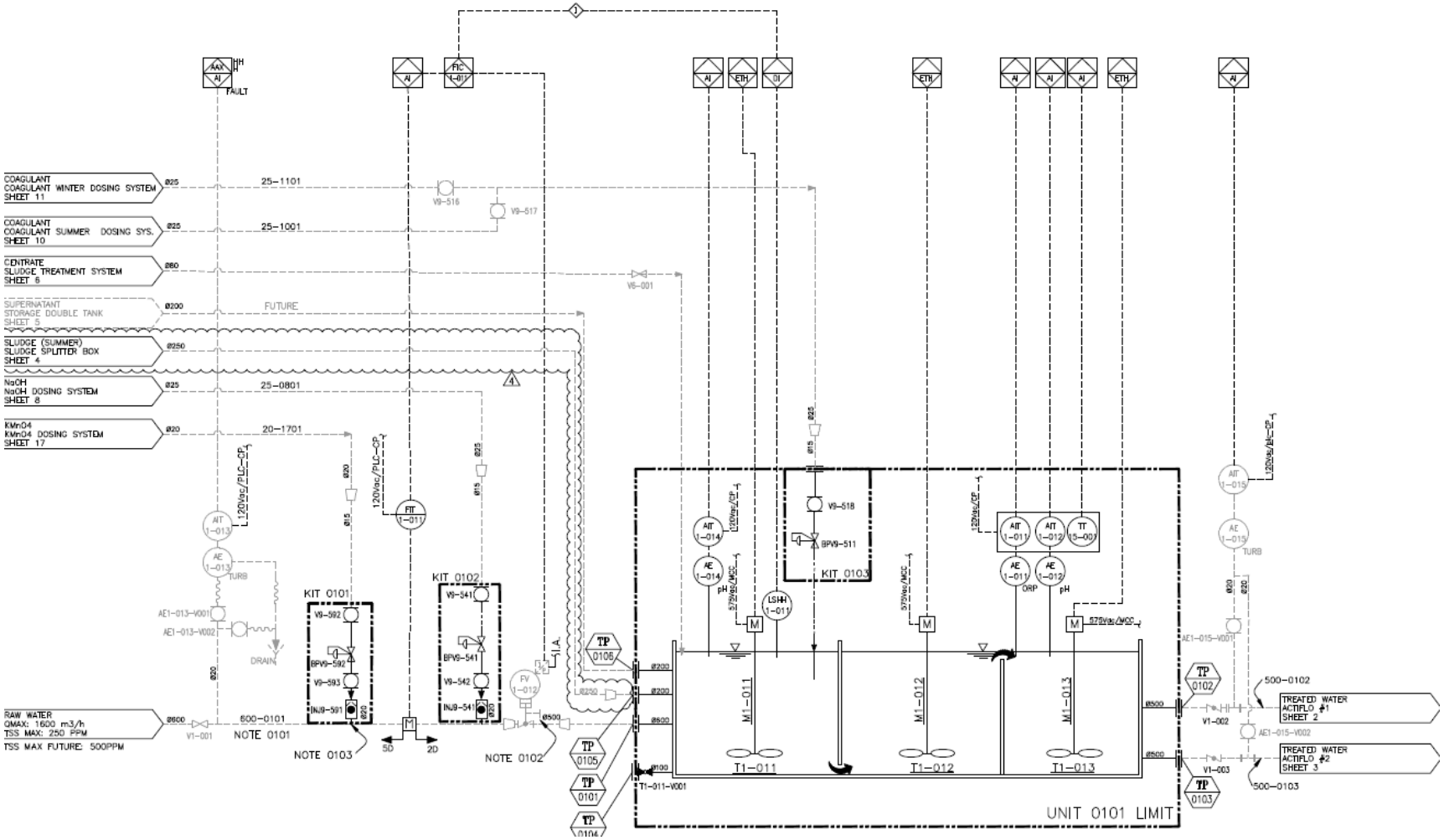

Figure 2b—AsWTP Flowsheet (summer operation)—Actiflo

4.2.1 Arsenic Oxidation

The As present in water can be found under two main forms: As (III) and As (V). Depending on the redox potential of water in the Whale Tail Attenuation Pond, As (III) will be oxidized into As (V). Before entering the Arsenic Removal Reactor, a $KMnO_4$ (potassium permanganate) solution will be added to oxidize the As (III) to As (V).

4.2.2 pH Adjustment

To precipitate As, ferric sulfate will be added. This reagent acidifies water and if the feed water has insufficient alkalinity, caustic soda will be added to adjust the pH before the water enters the Arsenic Removal Reactor. A pH of 7 is targeted for As uptake.

4.2.3 Arsenic Co-precipitation

The influent will be sent to the Arsenic Removal Reactor. In this reactor (RX75-3 from Veolia), the influent will be mixed with ferric sulfate ($Fe_2(SO_4)_3$) and recycled sludge to produce a slurry. The ferric sulfate forms a floc of ferric hydroxide ($Fe(OH)_3$) which acts both as a bridge to tie colloidal particles together and as an active surface which forms surface complexes with many metals, such as As. The ferric sulfate will also lower the pH in the vicinity of 7.0 where the surface complexation is optimal for As (V).

The volume of the reactor is 176 m^3.

A portion of the sludge collected in the Actiflo® are recycled in the Arsenic Removal Reactor to allow a longer contact time between As and iron hydroxide sludge (rate of 4:1).

According to Veolia estimation, the retention time into the Arsenic removal reactor will be approximately 3.5 min which will allow for As uptake on ferric hydroxides.

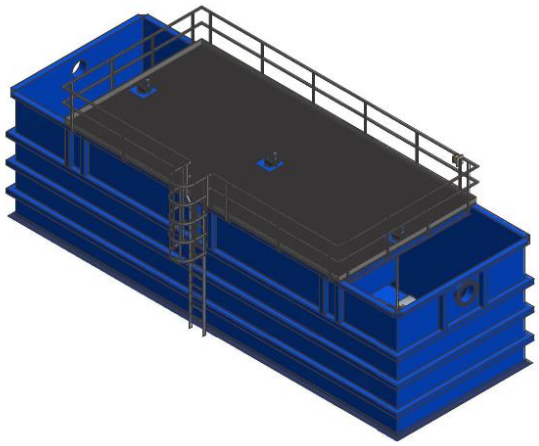

Figure 3: As Removal Reactor

4.2.4 TSS Removal

The slurry from the Arsenic Removal Reactor will flow to the two (2) Actiflo® (ACP-700R).The proposed Actiflo® is designed to remove TSS from the raw water (assumption is that raw water has 500 ppm TSS). To optimize the clarification step (settling rate of 60 m/h), the maximum flow for each Actiflo® should be 800 m^3/h to respect the settling rate (60 m/h).

Actiflo® are sand-ballasted settling units with a high-rate coagulation/flocculation/sedimentation process that utilizes microsand as a seed for floc formation. The microsand provides a surface area that enhances flocculation and acts as a ballast or weight. The resulting floc settles very fast, allowing for compact clarifier designs with high overflow rates and short retention times. The use of microsand also permits the unit to perform well under dramatically changing flow rates without impacting final effluent quality.

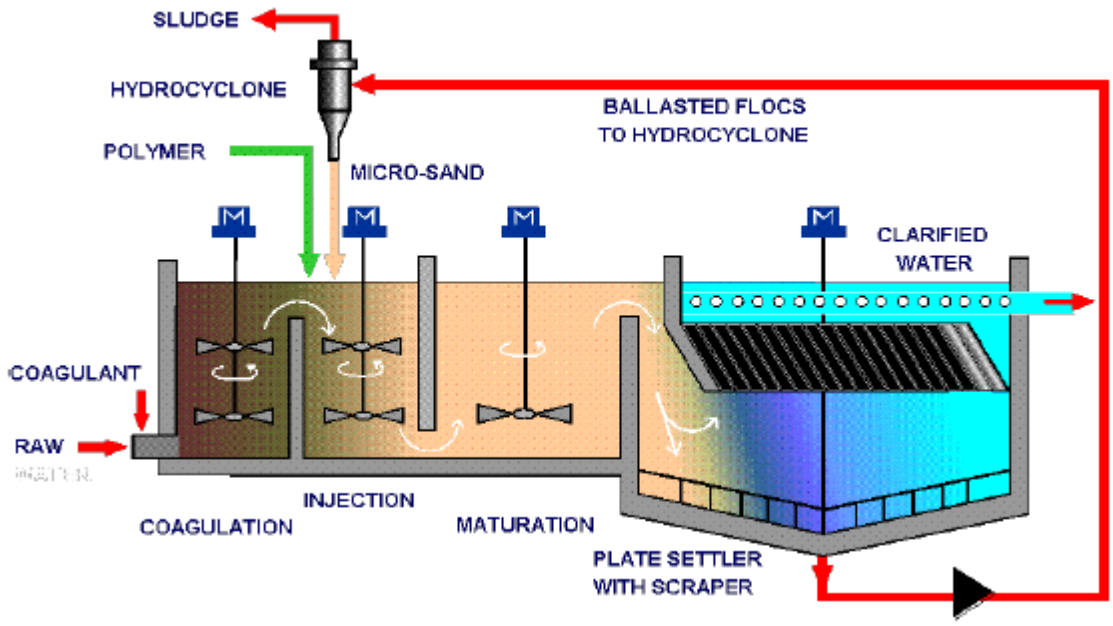

Figure 4—Actiflo® Process

The slurry flows to the first basin, the coagulation chamber, where the reaction is optimized. The coagulated water then overflows to a second tank section called the injection tank. There, the microsand and flocculent aid polymer are added. The microsand provides a large contact area for floc attachment and acts as ballast, thereby accelerating the settling of the flocs. The flocculent aid polymer binds the destabilized suspended solids to the microsand particles by forming polymer bridges. From the injection tank, the water underflows to a third tank section called the maturation tank. In this section, the microsand and sludge flocs agglomerate and grow into high-density flocs known as microsand ballasted flocs.

From the maturation zone, the water overflows to the settling section of the tank. In the settling zone, the microsand ballasted flocs settle quickly to the bottom of the unit. In the settling zone, the settling efficiency is further increased by the use of the lamella tubes. The clarified water exits the system via a series of collection troughs or wires. The clarified water is monitored for turbidity.

The sand-sludge mixture settles to the bottom of the clarifier. Scrapers force the sludge collected at the bottom of the clarifier into a centre cone from which it is continuously withdrawn and pumped to a hydro cyclone where the sludge and microsand are separated by centrifugal force. After separation, the higher density microsand is discharged from the bottom of the hydro cyclone and reinjected into the process for reuse. The lighter density sludge is discharged from the top of the hydro cyclone and directed to the sludge storage tank and recirculated into the As removal reactor or to the sludge management facilities.

Also, to maintain a good extraction of sludge and good sand recirculation, the recirculation pumps that are existing on both Actiflo® will be upgraded to provide a sufficient recirculation pumping rate. For this project, extraction pumps need to be 70 m^3/h each, resulting in an upgrade of the recirculation line and Hydro cyclone (U10-gMAX-3037, Krebs).

The excess of sludge will then be sent to the centrifuges (expected solid content 3%).

4.3 Process summary for winter operation

During the winter months, the flow rate of the water to treat is significantly lower than in the summer months. These conditions require adjustments to the Actiflo® unit which is converted for the winter in a standard lamellar decanter also called Multiflo®. When in this mode, the system operates without microsand thus without microsand recirculation.

To modify the Actiflo® unit into the Multiflo® mode, microsand needs to be purged from the system. This is done by a sludge extraction pump that is added to the system. Sludge treatment remains the same; centrifuge will just work less often than in summer. The sludge tank was designed to accept one day of water treatment at 84 m^3/ h with a maximum concentration of 1000 ppm TSS (winter conditions, worse case TSS). Since the chemical dosage requirement is less (due to 10–15 times less flow to treat in the winter), different sets of skid/dosing pumps per chemical will be used to improve system robustness.

4.4 Sludge Management Strategy

The last step of the AsWTP system is the sludge dewatering, which aims to reduce sludge volume and produce a solid cake. The sludge from the Actiflo® is sent to a holding tank. As presented previously, a recirculation pump is added to recycle a portion of the sludge in the Arsenic Removal Reactor. The recycled sludge increases the reagent efficiency and promotes solid growth and thickens the sludge therefore avoiding the need to add a thickener equipment before the dewatering stage. The remaining sludge is pumped to a sludge storage Tank which will feed the centrifuges Feed as shown on Figure 5a.

The sludge from the sludge storage Tank is pumped in two (2) centrifuges (Andritz D4L) in parallel, capable of producing a cake of about 25 ± 5% solid content. The sludge dryness is dependent on the dewatering method, TSS content in the influent, flow rate and nature of the solid particles. In addition to the solids included in raw water that enters the AsWTP, the sludge will contain adsorbed As as well as ferric hydroxides from the coagulant addition.

The centrifuges (Figure 5b) are fed continuously with constant solid content slurry. A cationic polymer is injected in the feed pipe to increase the cake dryness. The separation between liquid and solid is achieved using centrifugal forces 500 to 3000 times the force of gravity. Centrate contains cationic polymer and can be recycled back upstream of the water treatment plant. The centrifuge is automatic such that minor manual operation is required.

The cake produced by the Centrifuges will go into a container trailer, while the centrifuge filtrate is returned to the Arsenic Removal Reactor.

The volume of sludge will be 2–4 m^3/h approximately (depending on the TSS concentration which can vary from 250 to 500 ppm).

The cakes will be disposed at the WRSF.

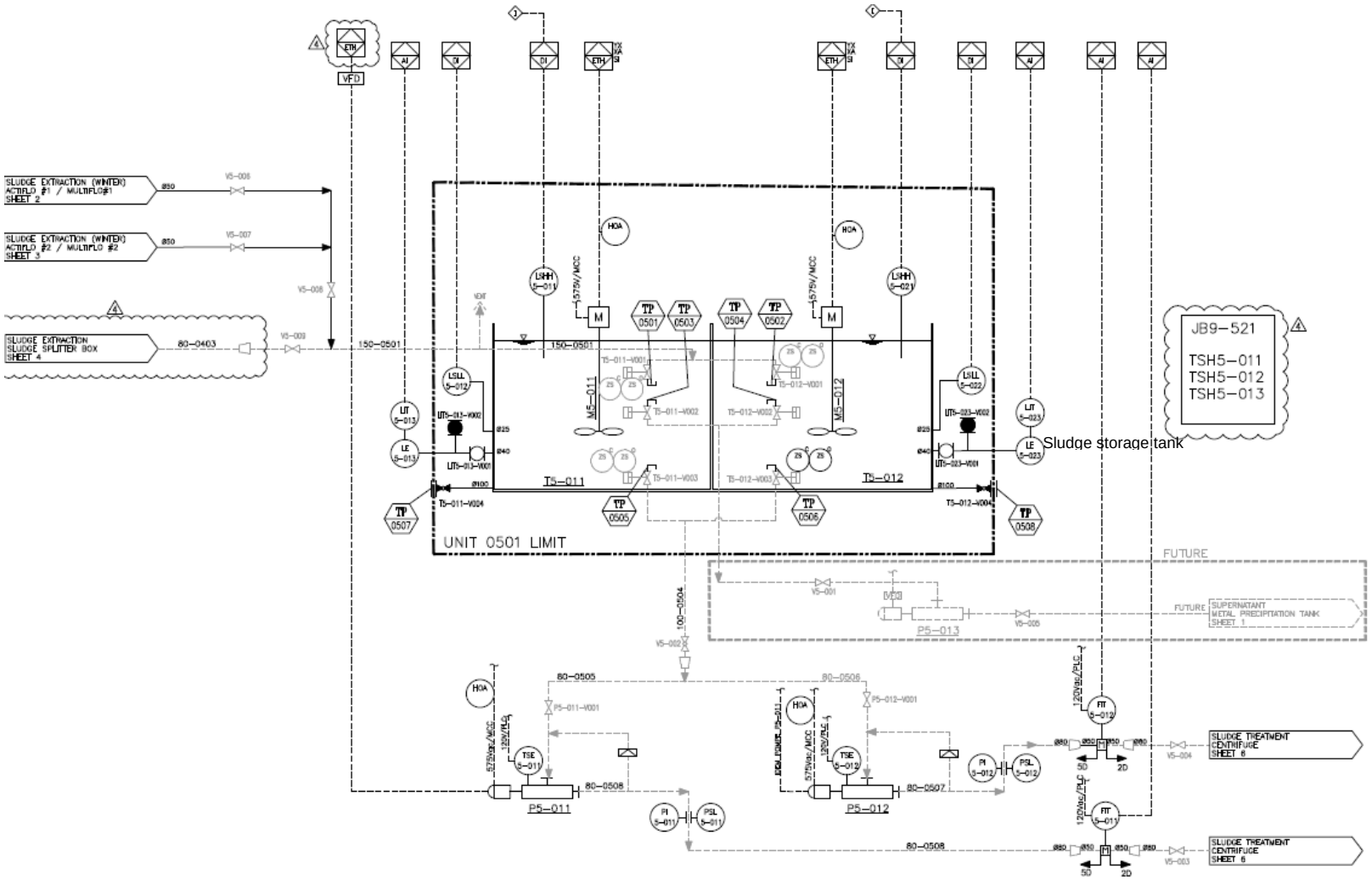

Figure 6a—AsWTP Sludge dewatering Flowsheet—sludge storage tank

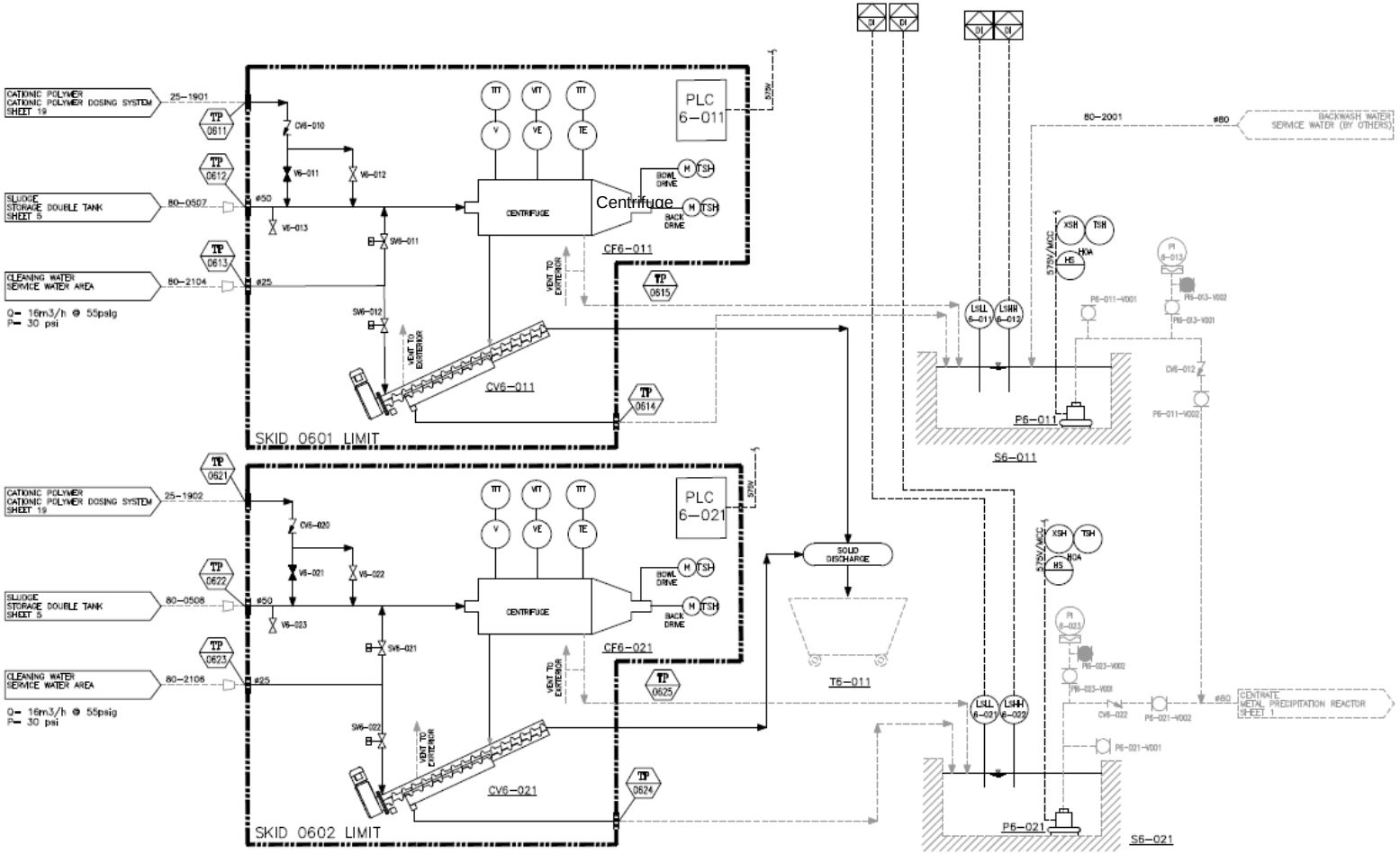

Figure 6b—AsWTP Sludge dewatering Flowsheet showing both centrifuge

4.5 Service Water System

The service water system consists of two (2) multimedia filters, two (2) heaters, one (1) filtered water tank and two (2) service water pumps. Service water is used in the preparation of reagent solutions made of dry chemicals, and for polymer makeup systems. Coagulant and polymer require filtered heated water. Treated water from the AsWTP is used to produce service water.

4.6 Reagents

The main chemicals used in the AsWTP are presented below (MSDS sheets are available in Appendix D):

- **$KMnO_4$**

The potassium permanganate will oxidize the arsenic trivalent (As (III)) to produce arsenic pentavalent (As (V)) that is simpler to precipitate and separate from water. The selected oxidant to oxide As is Hydrex 9571 which will be delivered in a small bag of 25 kg (dosage 1 mg/l). The dosage is performed using a mechanical diaphragm metering pump.

- **Coagulant**

The selected coagulant is Hydrex 6266, a ferric sulfate coagulant. It will act as a sorbent for As. It will be received in bulk bags (approximately 600 kg). The dosage will be performed using a mechanical diaphragm metering pump. Sulfuric acid is required for the solution preparation. The dosage of coagulant will be set at 30 mg/l.

- **Sodium Hydroxide**

The coagulant consumes alkalinity from the water. In the event that the water doesn't contain enough alkalinity, an alkali source, such as sodium hydroxide, is added. The sodium hydroxide will be received in 25 kg bags. The expected dosage is 10–15 mg/l.

- **Polymer**

The use of a flocculation agent is essential for a metal removal process. Polymer enables the attachment of the floc onto the microsand and as such is required in order to obtain good process performance. The polymer will be Hydrex 6105 at a dosage rate of 1 mg/L. It is a solid, anionic polymer used to enhance flocculation and will be received in 25 kg bags. One existing Hydra-Pol automatic preparation system will be supplied to prepare a 0.2% solution. The water used for the polymer preparation is filtered at 10–20 °C. The automatic polymer preparation/dilution system is an automatically controlled batching unit capable of preparing polymers. The system utilizes sequential batching from a high shear first stage wetting system into a mix tank with a low shear mixer.

A second automatic polymer preparation system is required for the sludge dewatering step. The polymer type (cationic type Hydrex 3613/6324) dosage will be approx. 8 g/kg TSS.

› **Microsand**

The presence of microsand allows:

- An increase in the probability of encounters between particles;
- An increase in the exchange surface and consequently in the adsorption capacity compared to conventional flocculation;
- The formation of solid and dense ballasted flocs which will resist an energetic stirring followed by rapid settling.

These properties lead to very short residence times for flocculation as well as settling thus optimizing the process. The microsand is recycled in the process and the equivalent of approximately. During operation, it is estimated that 1gof microsand per cubic metre of raw water will be lost in the sludge. Therefore, 1 g of microsand per cubic metre of raw water will be added. The microsand will be supplied in 25 kg bags and will be added manually to the Actiflo® as required, approximately once or twice a week (the dosage of sand is not continuous but by batch).

Every spring, to convert the Multiflo® back to Actiflo®, 5000 kg of Actisand™ will need to be added.

› **Sulphuric Acid**

Sulphuric acid is used for ferric sulfate preparation. Sulphuric acid will be received in bulk containers of 1 m^3 capacity at 93% concentration. The product will be used as is and the dosage is done in using mechanical diaphragm metering pumps (7 mg/l approximately).

5. CONSTRUCTION TIMELINE

5.1 Timeline

The AsWTP construction will start November 5th 2018 and commissioning is planned for the end of February 2019. The duration of the work and the schedule of the project requires to start the construction work before the approval of the water treatment unit. The arsenic water treatment plan may be required, depending of the water quality, during the dewatering phase of the Whale Tail North Basin (refer to 60 day notice for Whale Tail North Basin Dewatering). On the other hand, the work in progress is only an addition to the water treatment unit (called construction WTP in the 60 day notice sent on June 26, 2018) already approved by the NWB. The significant part of the work to be complete before the NWB approval is the installation of Actiflo. Those Actiflo are the same that have already been approved during the operation at Meadowbank, for the water treatment of the Portage and Vault Attenuation Pond. Ongoing construction work has a non-significant impact on the project's already approved footprint. In addition, construction work is by no means irreversible. If changes are required to the system, as part of this approval process, they will be completed. The operation of the water treatment unit will be done only after the approval.

6. DESIGN OF PUMPING STATION AND PIPELINE

6.1 General

The following section provides a description and information on the pumping and pipeline installation required to pump the raw water collected in the Whale Tail Attenuation Pond to the AsWTP, and the treated water from the AsWTP to Mammoth Lake.

Description and information on the other pumping and pipeline installations required to manage the water in other areas of the Amaruq site is detailed in the Amaruq Water Management Infrastructure Design Report (651298-8200-40ER-0001).

6.2 Pump narrative and pipelines

6.2.1 Raw water

Surface water and pit seepages collected at the Whale Tail site will be transferred to the Whale Tail Attenuation Pond. The untreated water (raw water) stored in the Whale Tail Attenuation Pond will then be pumped to the Amaruq AsWTP for treatment. Figure 6 presents the location of the Whale Tail Attenuation Pond pump stations and pipelines to the AsWTP.

Pumping to the AsWTP will be required year round:

- In the summer months (July to September), the AsWTP will treat a higher volume of water resulting from the snow and ice melts. The raw water pumping station is designed to provide a total flow rate of up to 1600 m^3/h;
- In the winter months (October to June), the AsWTP will treat a much lower flow coming primarily from pit seepages. The pumping station is designed to provide a maximum flow of 105 m^3/h.

In the summer months, the pumping installation consists of the following:

- Two (2) Godwin HL250 diesel pumps will be installed on the Whale Tail Attenuation Pond access ramp, close to the water;
- For each pump, a suction cage and suction hose will be installed in the pond and a 385 m long 14-in HDPE DR17 non-insulated pipeline will be connected from the discharge of the HL250 to the inlet of the AsWTP;
- As the water level changes, the diesel pumps and its suction line will be moved down the access ramp into the pond while the discharge pipeline will be lengthened;
- At the end of the summer pumping season, the two (2) pumps and its associated hoses and pipelines will be removed and stored for the winter;

- Each pump can provide a maximum pumping capacity of 800 m^3/h, for a total of 1600 m^3/h. The operating speed of the pump will be manually adjusted by the Operator based on the desired treatment flow.
- Flow and cumulative volume pumped will be measured using a portable magnetic flowmeter installed at the discharge of each pump and using the flowmeter located on the raw water inlet heater of the AsWTP.
- The local control panel and communication wireless hardware will be installed in the winter pump station. The winter months pump station will also be installed close to the HL250 diesel pumps to allow remote start/stop of the diesel pumps.

In the winter months, the pumping installation consists of the following:

- One (1) Godwin CD103 electrically powered pump installed inside a heated container will be installed on the Whale Tail Attenuation Pond access ramp, close to the water.
- A suction strainer and hoses will be installed in the pond and a 385 m long 6-in HDPE DR17, insulated and heat-traced pipeline will be installed from the discharge of the pump to the AsWTP.
- During the winter months, the water level in the Whale Tail Attenuation Pond will be kept more or less constant. Thus, it is not expected that winter pump station will need to be moved.
- At the end of the winter pumping season, the winter pump stations and associated hoses and pipeline will be moved up the pond access ramp. Once the snow melts, the water level in the Whale Tail Attenuation Pond is expected to rise.
- The pump will provide a maximum pumping capacity of 125 m^3/h. The operating speed of the pump will be manually adjusted by the Operator based on the desired treatment flow.
- Flow and cumulative volume pumped will be measured using a portable magnetic flowmeter installed at the discharge of the pump and using the flowmeter located on the raw water inlet heater of the AsWTP.
- The local control panel and communication wireless hardware are installed in the winter pump station. The control panel will allow remote start/stop of the pump and remote adjustment of the pump operating speed based on a flow control set-point.

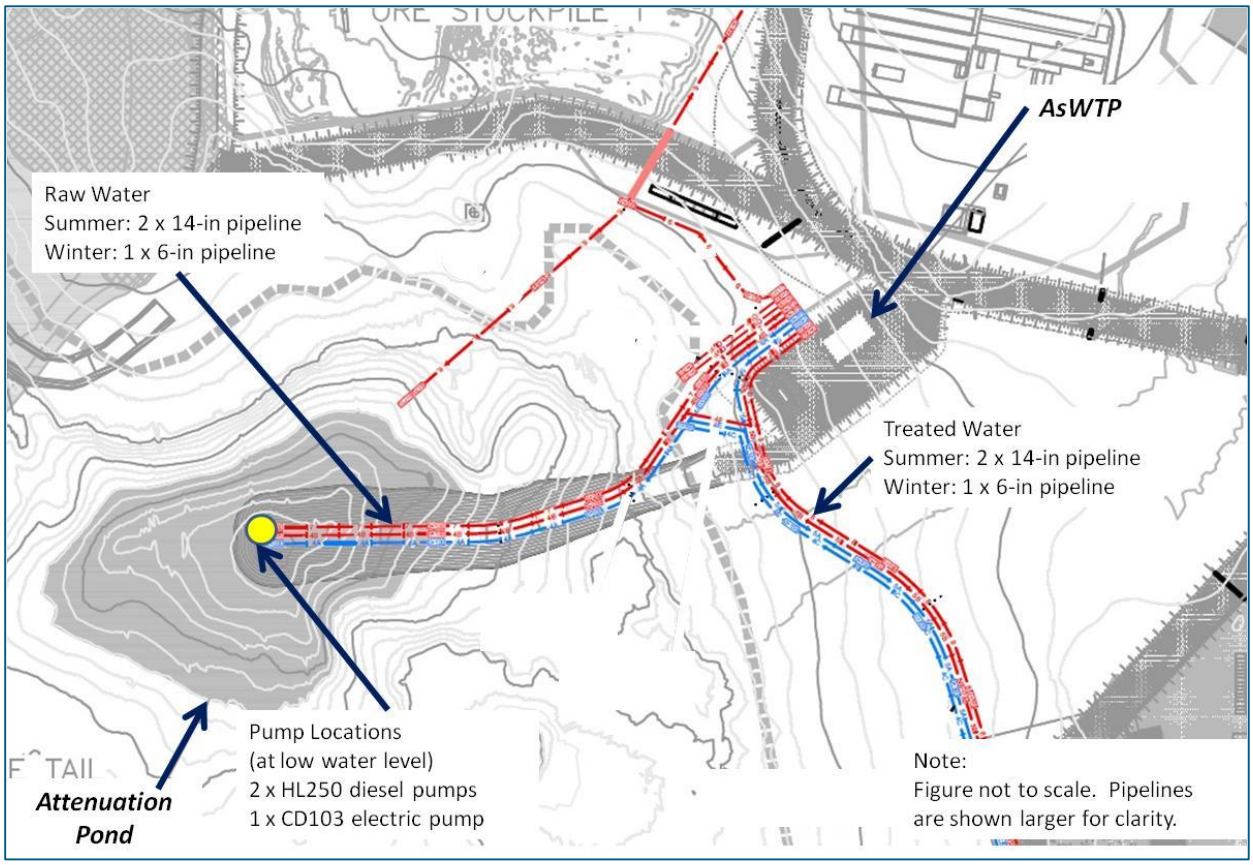

Figure 6: Location of the Whale Tail Attenuation Pond Pump Stations and Pipelines to the AsWTP

Table 3 provides a summary description of the raw water pumping station and pipelines required to pump raw water from the Whale Tail Attenuation Pond to the AsWTP in the summer and winter months.

Table 4: Summary Description of Raw Water Pump Station and Pipelines

Parameter	Units	Summer	Winter
Pump Model		Godwin HL250 12x10	Godwin CD103 4x4
Description		Diesel pump installed in a container	Electric powered pump, installed in a heated container
Quantity		2	1
Pump Tag No.		61PWA69501 / 69502	61PWA69503
Flow Capacity Available[1]	m^3/h	up to 800 m3/h (total 1600 m^3/h)	84 to 105
Estimated Total Dynamic Head (TDH) required at design flow[1]	m	31 to 42	33 to 39
Suction hose diameter	in	14	4
Discharge pipeline diameter	in	14	6
Discharge pipeline material		HDPE DR17	HDPE DR17
Insulated and Heat-Traced		un-insulated	insulated and heat traced
Flow Control		Manually adjusted by the Operator	Manually adjusted by the Operator using the variable frequency drive (VFD) located inside the container

Notes:

1) The flow capacity available and estimated head reflects the maximum pumping capacity the existing pump can provide based on the expected system curve (i.e. pipeline length, routing and profile and water elevation)

The summer and winter pump stations generally consist of a pump installed inside a container to facilitate its movement and placement during the pumping season.

Only the HDPE pipeline required for winter operations are heat-traced and insulated.

At the inlet of the AsWTP, the two (2) 14-in pipeline from the Whale Tail Attenuation Pond will connect to a common 20-in HDPE DR17 un-insulated header, as shown in Figure 7. A 20-in HDPE line will then connect the common header to the inlet of the AsWTP. The 6-in insulated and heat-traced pipeline used in the winter months will be connected directly to the 20-in HDPE pipeline located inside the AsWTP.

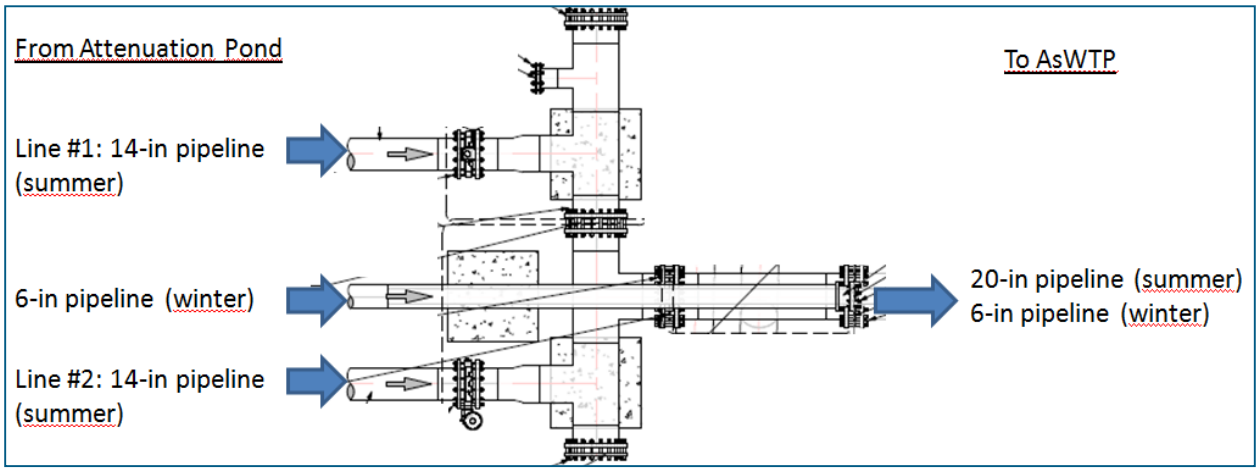

Figure 7: Inlet Header at the AsWTP

6.2.2 Treated Water

The raw water collected in the Whale Tail Attenuation Pond in the summer and winter months will be pumped to the AsWTP where it will be treated. The treated water is collected in two (2) pump boxes (61TNK69301/69302) and then pumped to Mammoth Lake for final discharge.

In the summer months:

- Two (2) Warman FAH 12x10 electric pumps will be used to transfer the treated water from the AsWTP to Mammoth Lake.
- Each pump will be installed inside the AsWTP building, connected to a pump box. The discharge of each pump will be connected to a 3600 to 3700 m long 14-in HDPE DR17 non-insulated pipeline that will be used to transfer the treated water to Mammoth Lake. A total of two (2) 14-in treated water pipelines will be used to discharge the treated water to the receiving environment (Mammoth Lake).
- Each pump can provide a maximum pumping capacity of 800 m^3/h, for a total of 1600 m^3/h.
- The operating speed of the pump will be automatically adjusted in order to maintain a constant level in the pump box.
- Flow and cumulative volume pumped to Mammoth Lake will be measured using a magnetic flowmeter installed at the discharge of each pump.
- The treated water is discharged into Mammoth Lake using a diffuser. Each line will be equipped with a diffuser that will be installed in the lake (refer to design report 651298-8200-40ER-0001 for more details).

In the winter months:

- One (1) CD103 electric pump will be used to transfer the treated water from the AsWTP to Mammoth Lake.
- The pump will be installed inside the AsWTP building and its suction will be connected to both pump boxes. The Operator will be able to select which pump boxes to use during the winter months.

- A 3300 m long 6-in HDPE DR17 insulated and heat-traced pipeline will be used to discharge the treated water to Mammoth Lake.
- The pump can provide a maximum pumping capacity of 125 m^3/h.
- The operating speed of the pump will be automatically adjusted in order to maintain a constant level in the pump box.
- Flow and cumulative volume pumped to Mammoth Lake will be measured using a magnetic flowmeter installed at the discharge of each pump.

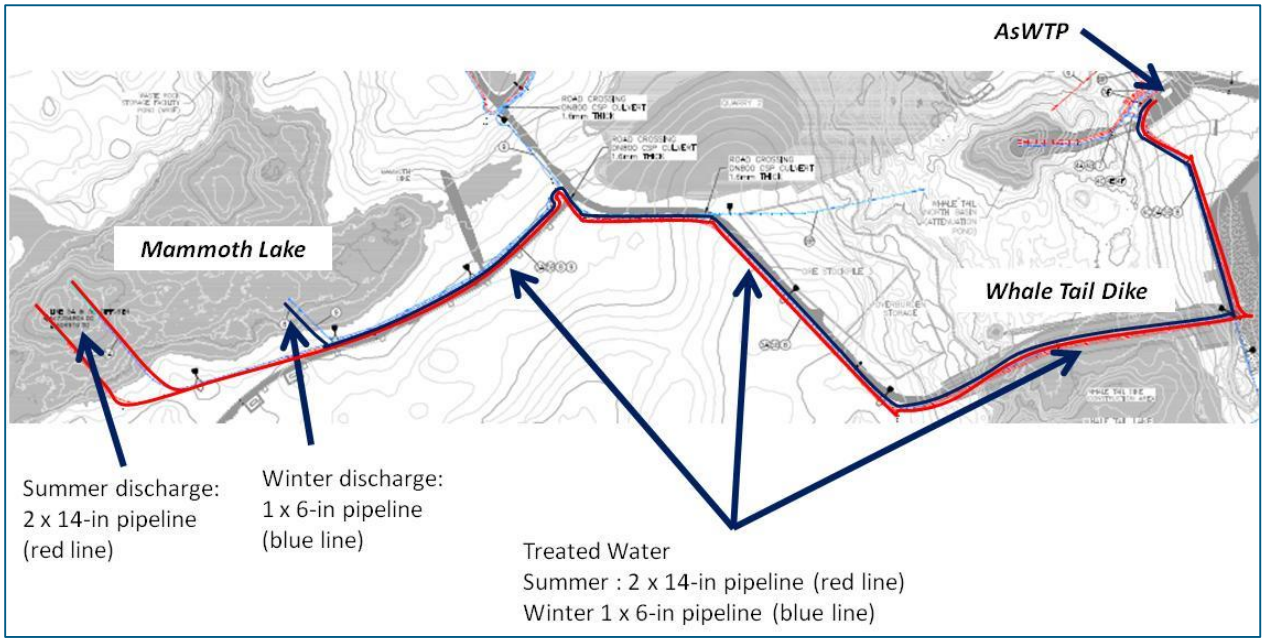

Figure 8: Location of the Treated Water Pipelines from AsWTP to Mammoth Lake

Table 4 provides a summary description of the treated water pumping station and pipelines required to pump the treated water from the AsWTP to Mammoth Lake in the summer and winter months.

Table 5: Summary Description of Raw Water Pump Station and Pipelines

Parameter	Units	Summer	Winter
Pump Model		Warman FAH 12x10	Godwin CD103 4x4
Description		Electrical powered pump equipped with a variable frequency drive	Electrical powered pump equipped with a variable frequency drive
Quantity		2	1
Pump Tag No.		61PWA69301 / 69302	61PWA69303
Flow Capacity Available[1]	m3/h	up to 725 m3/h (total 1600 1450 m3/h)[2]	84 to 100
Estimated Total Dynamic Head (TDH) required at design flow[1]	m	49 to 51	40
Suction hose diameter	in	10	4
Discharge pipeline diameter	in	14	6
Discharge pipeline material		HDPE DR17	HDPE DR17
Insulated and Heat-Traced		un-insulated	insulated and heat traced
Flow Control		Automatically adjusted based on the water level in the pump box or By flow control based on an Operator set-point.	Automatically adjusted based on the water level in the pump box or By flow control based on an Operator set-point.

Notes:

1) The flow capacity available and estimated head reflects the maximum pumping capacity the existing pump can provide based on the expected system curve (i.e. pipeline length, routing and profile and water elevation).
2) The existing Warman FAH 12x10 pump, equipped with a 250 HP motor, is used to transfer the treated water from the WTP to Mammoth Lake. Based on the system curve, including the aboveground pipeline length of 3.2 km, a submerged pipeline length of about 400 m and 10 discharge port of 3-in diffusers, the maximum flow that can be pumped is estimated at 725 m^3/h. The pump capacity is limited by the motor size installed on the pump. However, to manage a design flood event, the required total treatment flow rate is 950 m^3/h). Thus, with a maximum pumping capacity of 725 m^3/h/pump, it will be possible to treat a total flow rate of 1450 m^3/h which is greater than the capacity required to manage a design flood event.

6.3 Controls

6.3.1 Raw Water

It will be possible to control the raw water pumps locally and remote during the winter season. The winter pump station (i.e. CD103 containerized pump station) will be equipped with a new local control panel that will communicate with the AsWTP via a wireless link. The local control panel will allow the remote operation of the raw water pumps from the AsWTP, specifically:

- Start or stop the winter electric pump (CD103) based on an Operator input and when an alarm is triggered.
- Adjust the operating speed of the winter pump CD103 using the new variable frequency drive (VFD) installed in the container; and Stop the diesel pumps HL250 based on the Operator input and when an alarm is triggered. It will also be possible to start the pump remotely.

To implement the remote shutdown of the diesel pump, the winter pump station will have to be installed next to the diesel pumps. A control cable will be installed between the local control panel and the diesel pump's control panels.

In the summer months, the Operator can either remotely or manually start the diesel pump. He will have to locally adjust the operating speed of the pump until the desired flow rate is obtained. If an alarm is triggered at the AsWTP that causes a plant shutdown, the AsWTP control panel will send a shutdown signal to the winter pump station control panel which will transfer the command to the summer diesel pumps.

In the winter months, from the AsWTP, the Operator will manually start the electric pump and adjust the operating speed until the desired flow rate is obtained. If an alarm is triggered at the AsWTP that causes a plant shutdown, the AsWTP control panel will send a shutdown signal to the winter pump station control panel.

Magnetic flowmeters installed at the discharge of the pumps will be used to measure the instantaneous flow rate and cumulative volume pumped from the Whale Tail Attenuation Pond to the AsWTP:

- 61FIT695001: Discharge of pump 61PWA69501 (summer operation);
- 61FIT695002: Discharge of pump 61PWA69502 (summer operation);
- 61FIT695003: Discharge of pump 61PWA69503 (winter operation).

6.3.2 Treated Water

The treated water pumps are controlled by the AsWTP control panel.

During the summer months, only pumps 61PWA69301 and 61PWA69302 (i.e. Warman FAH 12x1) will be in operation. Each pump's operating speed will be automatically adjusted to maintain a constant level (control loop 61LIC695001 and 695003) in their respective pump boxes (61TNK69301 and 69302).

During the winter months, pump 61PWA69303 will be in service (i.e. CD103). The Operator will select the pump box that will be in service. Based on this selection, the appropriate level control loop will be used to control the speed of the pump.

Magnetic flowmeters installed at the discharge of the pumps will be used to measure the instantaneous flow rate and cumulative volume pumped to Mammoth Lake:

- 61FIT695002: Discharge of 61PWA301 (summer operation)
- 61FIT695004: Discharge of 61PWA69302 (summer operation)
- 61FIT695005: Discharge of 61PWA69303 (summer operation)

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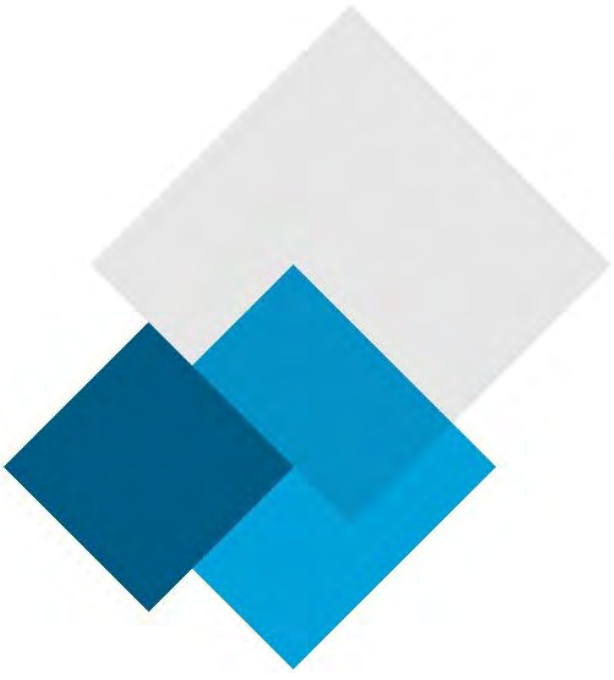
Appendix A

Construction drawings



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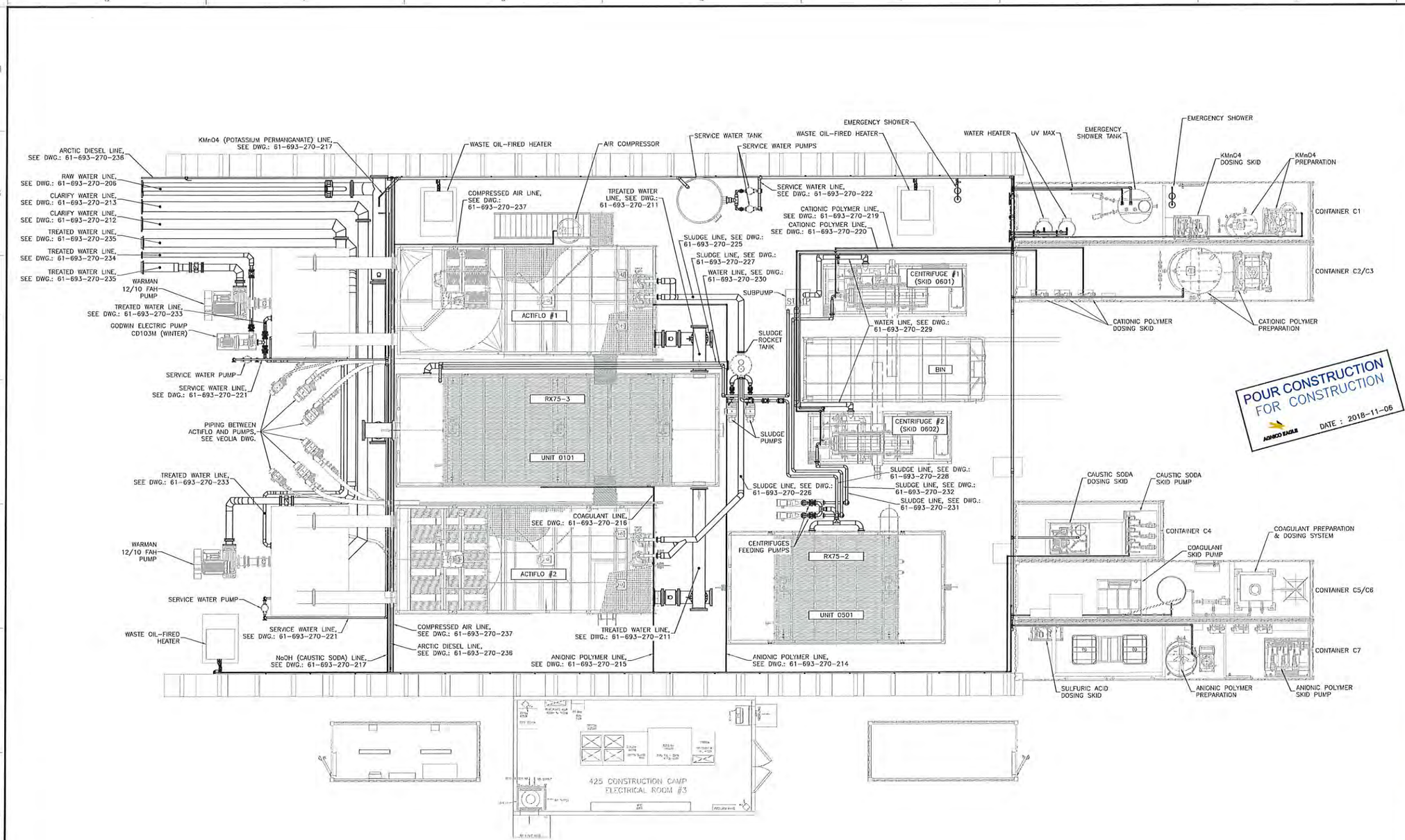
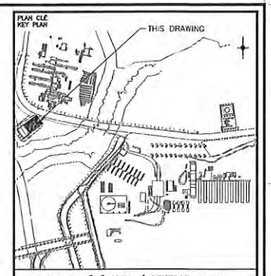


PLAN VIEW
SCALE : 1:75

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE DATE : 2018-11-06

PLAN CLE
KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
WTP – MECHANICAL EQP. LAYOUT	61-693-210-201
WTP – PIPING DETAILS	61-693-270-2010237

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
D	2018-11-06	FOR CONSTRUCTION	B.L.	LGAG	D.LAF
A	2018-07-20	FOR COMMENTS	P.COTE	LGAG	D.LAF

REVISIONS

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-11-06
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
270 – PIPING
PLAN VIEW
GENERAL ARRANGEMENT
WTP DISTRIBUTION SYSTEM

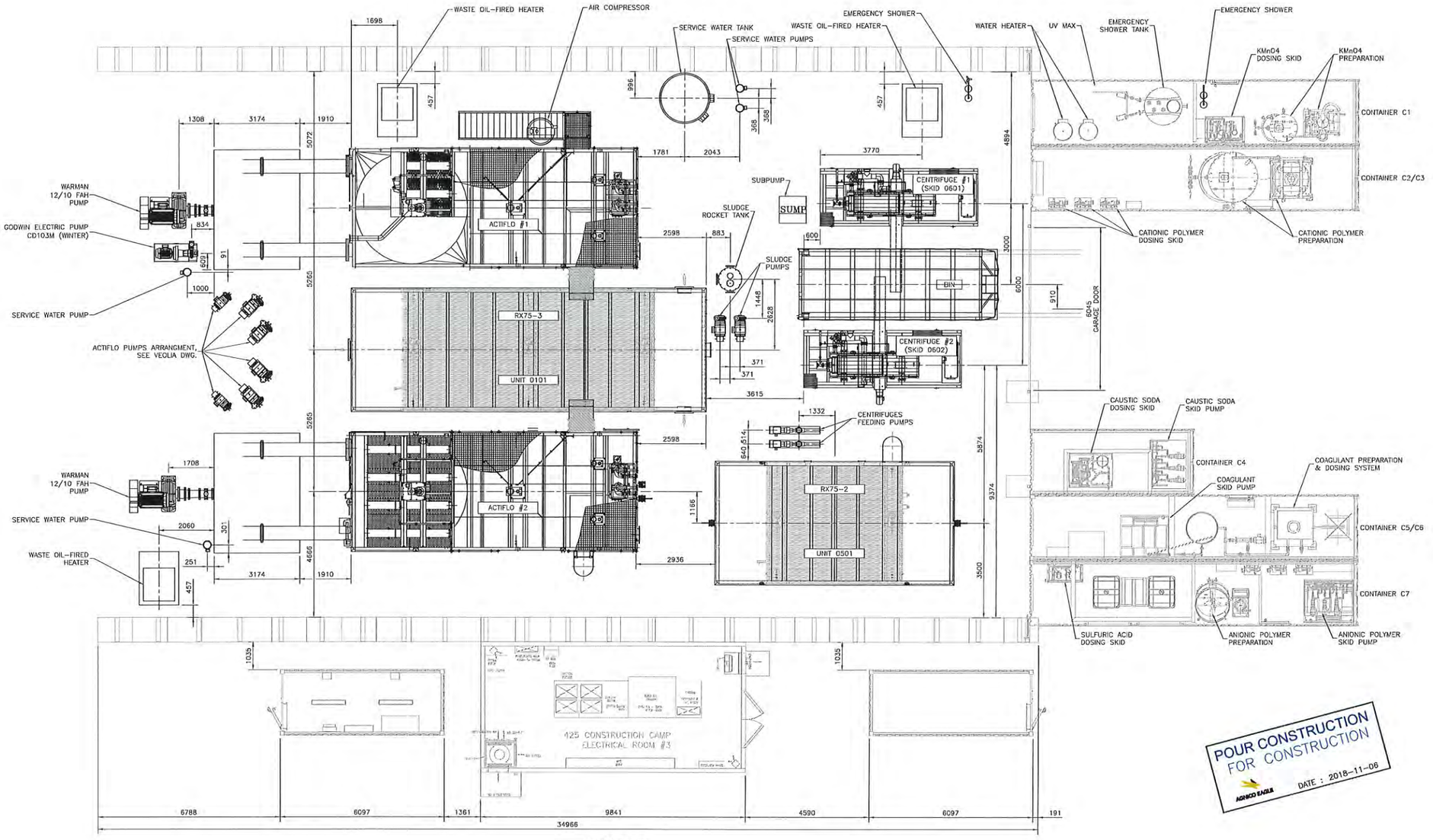
DESSINÉ PAR DRAWN BY	PIERRE-OLIVIER CÔTÉ	DATE 2018-06-08
VERIFIÉ PAR CHECKED BY	ISRAËL GAGNON, P. ENG.	2018-MM-J.
APPROUVÉ PAR APPROVED BY	ISRAËL GAGNON, P. ENG.	2018-MM-J.
ÉCHELLE SCALE	1 : 75	DATE 2018-06-08
NO. DESSIN DRAWING NO.	61-693-270-200	
NO. PROJET PROJECT NO.	6115	REVISION 0 / FEUILLE / SHT 1 / 1

AC-CART-ANCH D

FILE NO. 61-693-270-200-R0.dwg

NO. DESSIN DRAWING NO. 61-693-210-201

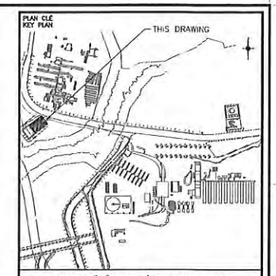
FORMAT ARCHD



PLAN VIEW
SCALE : 1:75

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-11-06

PLAN CLÉ
KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-11-06
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

2018-11-06

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	B.L. / MD / DD	I.G. / AFP.	D.L. / CLIENT
0	2018-11-06	FOR CONSTRUCTION			

REVISIONS

SNC·LAVALIN

SNC-Lavalin Stavibel Inc.
532, 7e Rue Ouest, Bureau 101
Amos (Québec) J9T 3W7
Tél.: 819 732-8255 Téléc.: 819 732-0259
www.snclavalin.com

Projet No. : 653281-0000

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
210 – GENERAL ARRANGEMENT
PLAN VIEW
MECHANICAL EQUIPMENTS LAYOUT

DESSINÉ PAR / DRAWN BY	BRUNO LEMIEUX, TECH.	DATE 2018/10/24
VERIFIÉ PAR / CHECKED BY	ISRAËL GAGNON, P. ENG.	2018/10/24
APPROUVÉ PAR / APPROVED BY	ISRAËL GAGNON, P. ENG.	2018/10/24
ÉCHELLE / SCALE	1 : 75	DATE 2018-06-08

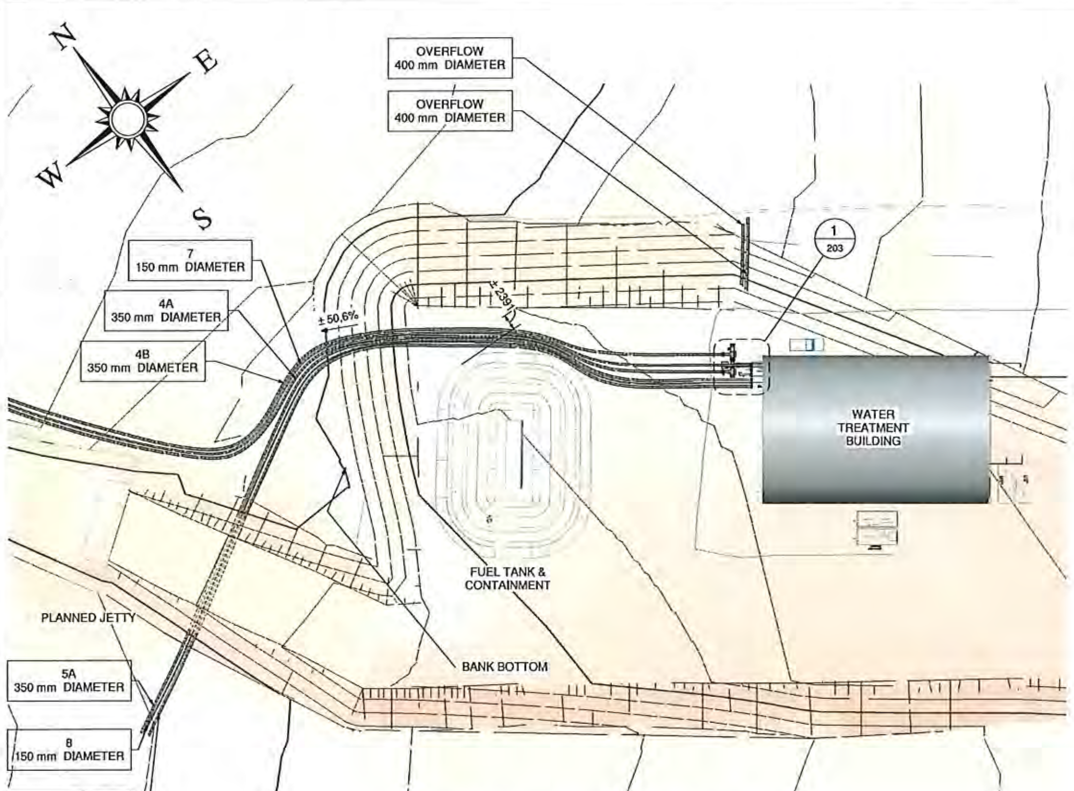
NO. DESSIN / DRAWING NO. 61-693-210-201

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6115	0	1 / 1

AE-CART-ARCH D

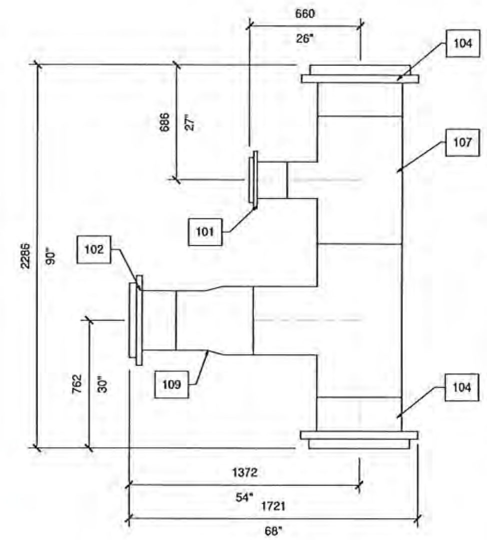
FILE NO. 61-693-210-201-00.dwg

NO DESSIN DRAWING NO. 61-695-270-203



PLAN VIEW WATER TREATMENT PLANT AREA

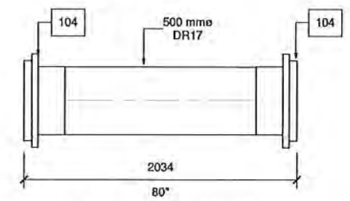
1 : 500



TOTAL WEIGHT OF SECTION = 329 kG

2 / 203 HEADER SECTION DETAIL

1 : 20



TOTAL WEIGHT OF SECTION = 188 kG

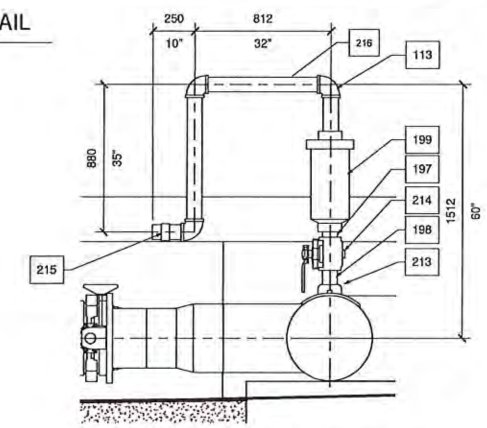
4 / 203 HEADER SECTION DETAIL

1 : 25

PIPE FITING LIST			
MARK	COUNT	SIZE	DESCRIPTION
100	2	150 mmø-150 mmø	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
101	1	200 mmø-200 mmø	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
102	6	350 mmø-350 mmø	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
103	2	400 mmø-400 mmø	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
104	7	500 mmø-500 mmø	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
105	1	200 mmø	DR17 - BLIND FLANGE STEEL ISCO
106	2	500 mmø	DR17 - BLIND FLANGE STEEL ISCO
107	1	500 mmø-500 mmø-200 mmø	DR17 - BRANCH SADDLE - REDUCING TEE - HDPE
108	2	500 mmø-500 mmø-400 mmø	DR17 - BRANCH SADDLE - REDUCING TEE - HDPE
109	2	400 mmø-350 mmø	DR17 - CONCENTRIC REDUCER HDPE
110	2	400 mmø-400 mmø	DR17 - ELBOW 45° HDPE
111	2	400 mmø-400 mmø	DR17 - ELBOW 90° HDPE
112	1	500 mmø-500 mmø-500 mmø	DR17 - TEE FABRICATED HDPE
113	3	80 mmø-80 mmø	SCHEDULE 40 PIPE TREADED ELBOW Dia 80

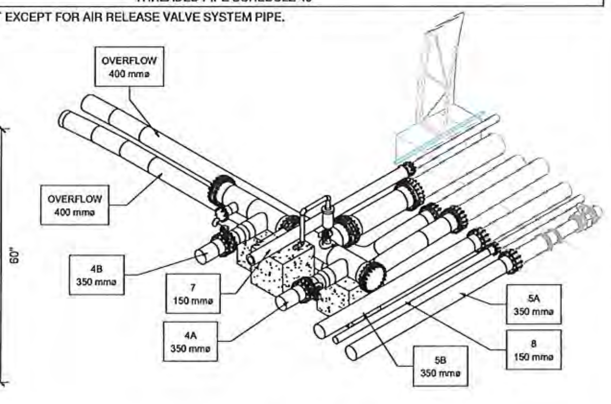
PIPE ACCESSORIES LIST			
MARK	COUNT	SIZE	DESCRIPTION
197	1		NPT MALE BRANCH Dia 80
198	1		NPT MALE BRANCH Dia 80
199	1		APCO COMBINATION AIR VALVE, MODEL 447, dia 80
200	8		THREADED ROD 3/4" X 10 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 142 L.
201	16		THREADED ROD 3/4" X 10 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 160 L.
202	40		THREADED ROD 1-1/8" X 7 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 246 L.
203	24		THREADED ROD 1" X 8 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 274 L.
204	32		THREADED ROD 1" X 8 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 284 L.
205	60		THREADED ROD 1-1/8" X 7 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 325 L.
206	24		THREADED ROD 1" X 8 UNC C/W 2 NUTS AND 2 LOCK WASHERS AND 2 WASHERS (ASTM 307 GR.B/ASTM A563 GR.A) 350 L.
207	3	500 mmø-500 mmø	GASKET 1/8" THICK
208	2	400 mmø-400 mmø	GASKET 1/8" THICK
209	2	350 mmø-350 mmø	GASKET 1/8" THICK
210	2	150 mmø-150 mmø	GASKET 1/8" THICK
211	2	350 mmø-350 mmø	BUTTERFLY VALVE HANDWHEEL CL-150
213	1		SADDLE ELECTROFUSION 20" IPS DR17 x 3" NPT MALE SS 304
214	1		DEZURICK ECCENTRIC PLUG VALVE, MODEL PEC,3,T1,C1,NBR WITH LEVER, Dia 80
215	1		STRAP 80 Dia 50mm X 6mm WITH MECHANICAL ANCHORS
216	5	80 mmØ	THREADED PIPE SCHEDULE 40

NOTES: PIPES SEGMENTS ARE NOT INCLUDED IN THE LIST EXCEPT FOR AIR RELEASE VALVE SYSTEM PIPE.

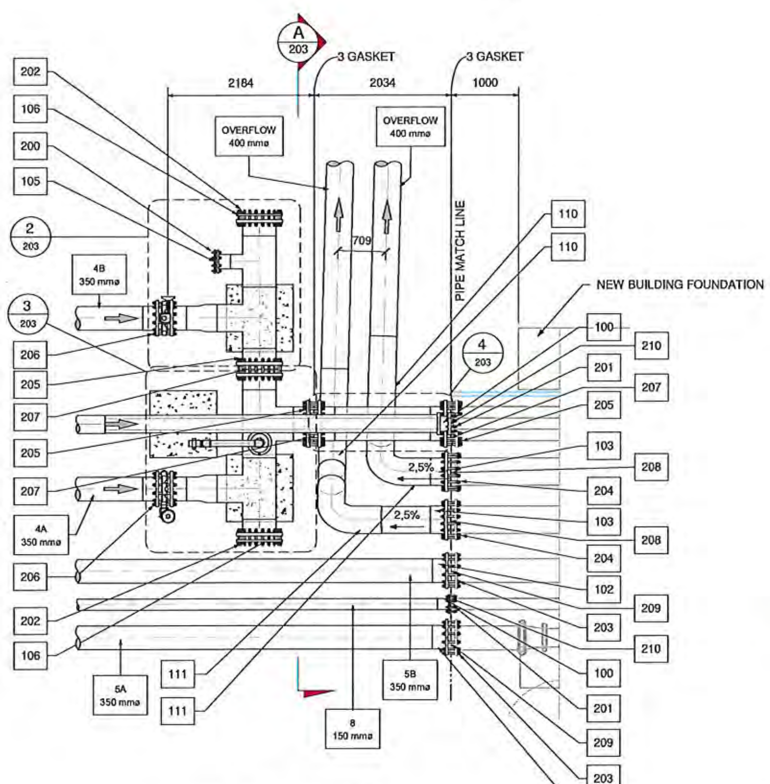


5 / 203 AIR RELEASE DETAIL

1 : 20

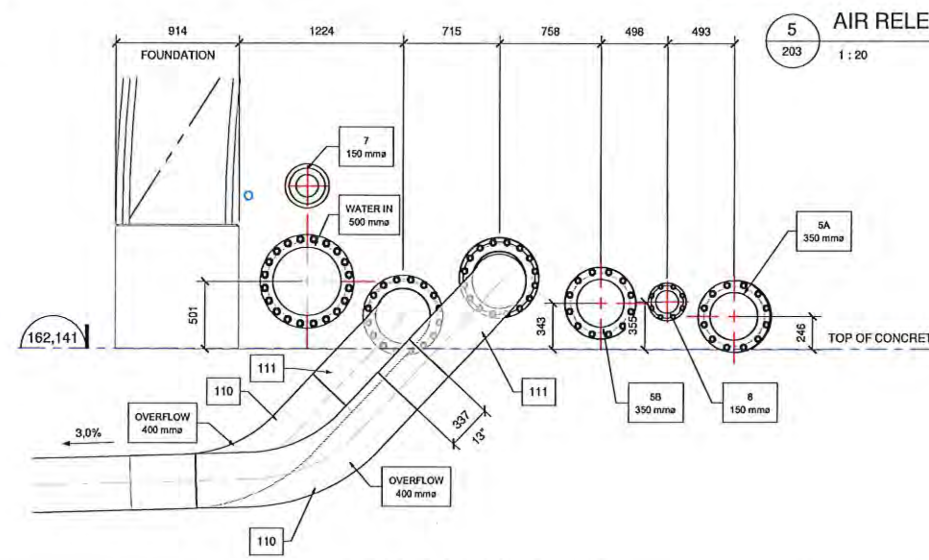


3D VIEW TIE-IN AREA



1 / 203 TIE IN DETAIL

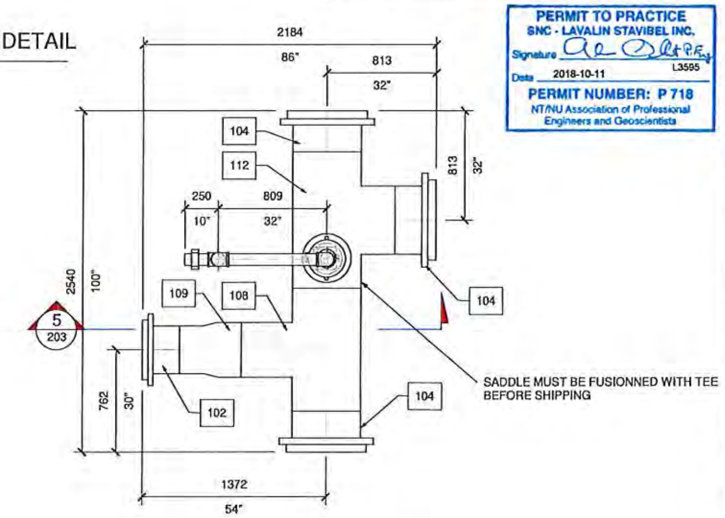
1 : 50



A / 203 SECTION TIE IN

1 : 25

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
L3595
Date 2018-10-11
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists



TOTAL WEIGHT OF SECTION = 389 kG

3 / 203 HEADER SECTION DETAIL

1 : 25

PLAN CLÉ / KEY PLAN

Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Quebec (Quebec), Canada G2K 2E2

651298	8200	41D6	0004	01

NOTES GÉNÉRALES / GENERAL NOTES

FOR CONSTRUCTION
POUR CONSTRUCTION
AGNICO EAGLE
DATE 2018-10-11 15:03:54

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

AGNICO EAGLE

REV	DATE	DESCRIPTION	PAR	APP.	CLIENT
1	2018-10-10	FOR CONSTRUCTION	F.P.	É.L.	
0	2018-08-28	FOR CONSTRUCTION	F.P.	É.L.	
RB	2018-07-18	CLIENT COMMENTS	F.P.	É.L.	
RA	2018-07-18	INTERNAL COMMENTS	F.P.	É.L.	

REVISIONS

TITRE / TITLE

AGNICO EAGLE - AMARUQ DIVISION
695 - WATER MANAGEMENT
270 - PIPING
PLAN VIEW AND DETAILS
WTP TIE-INS FOR DEWATERING PHASE AND PHASE 1 OPERATION AND INLET HEADER DETAILS

DESSINÉ PAR / DRAWN BY	F.POTVIN	DATE 2018-07-18
VÉRIFIÉ PAR / CHECKED BY	É.LEBEL	2018-07-18
APPROUVÉ PAR / APPROVED BY	A.L. NGUYEN	2018-07-18
ÉCHELLE / SCALE	As indicated	DATE 2018-07-18

NO DESSIN / DRAWING NO. 61-695-270- 203

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6118	1	/

FORMAT ARCH D (914x610)

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NO. DESSIN DRAWING NO. 61-693-245-201_R1

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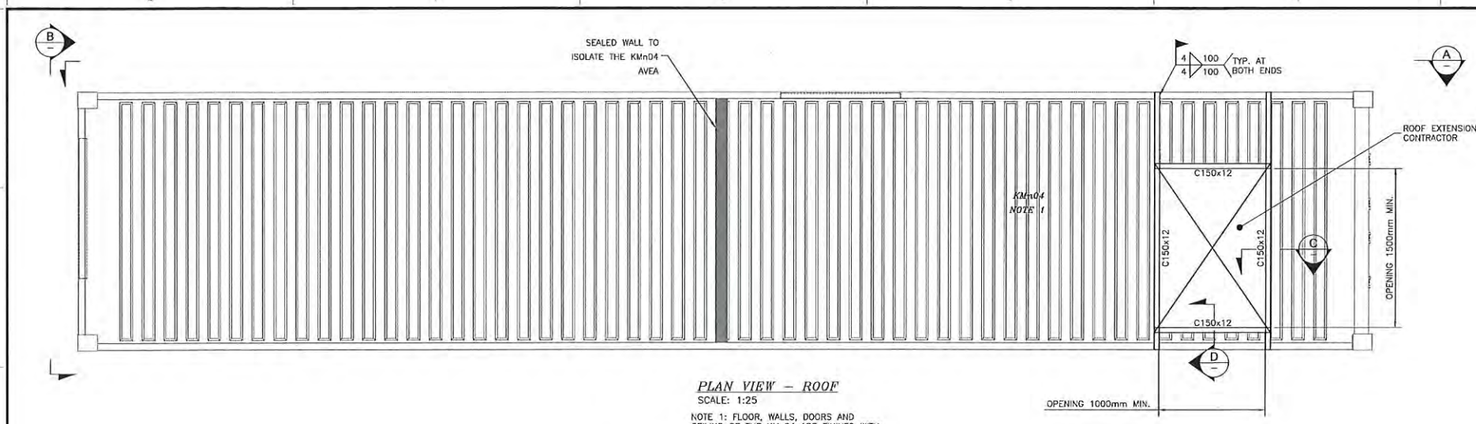
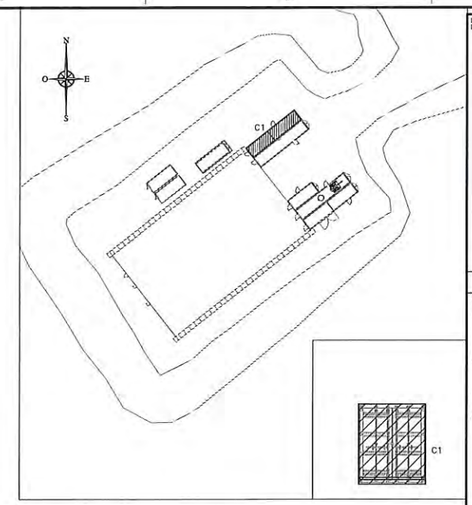
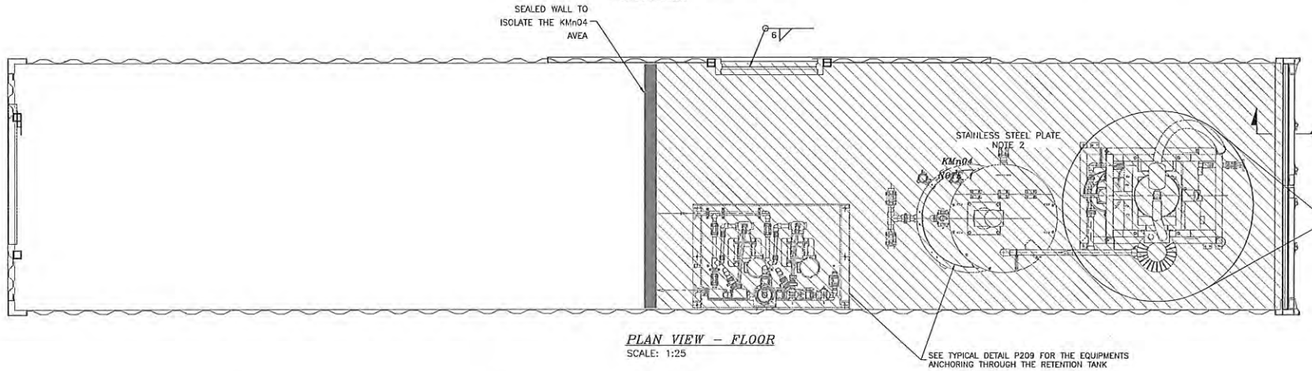


PLAN VIEW – ROOF
SCALE: 1:25

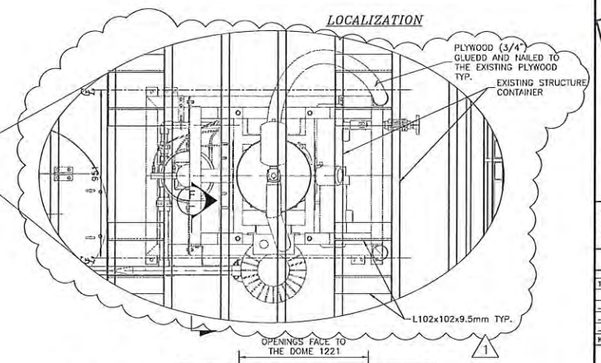
NOTE 1: FLOOR, WALLS, DOORS AND CEILING OF THE KMn04 ARE FINIHED WITH STAINLESS STEEL

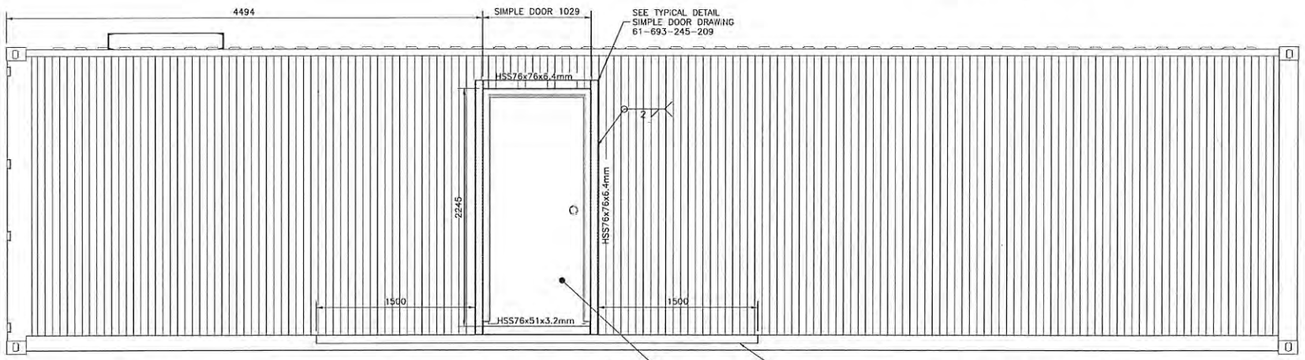


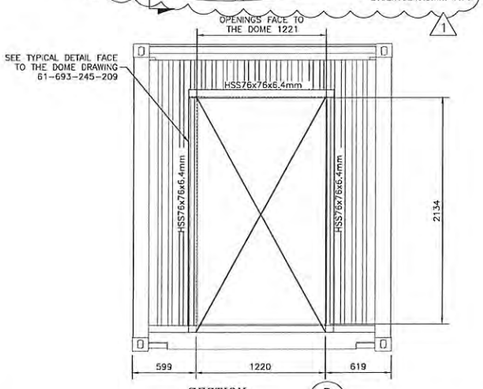


PLAN VIEW – FLOOR
SCALE: 1:25

LOCALIZATION

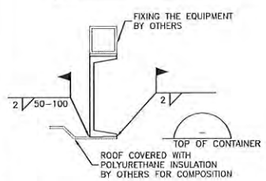




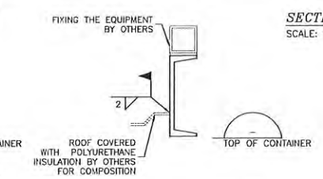


SECTION A SCALE: 1:25

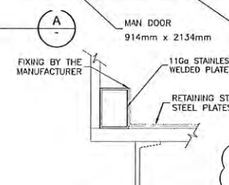
SECTION B SCALE: 1:25



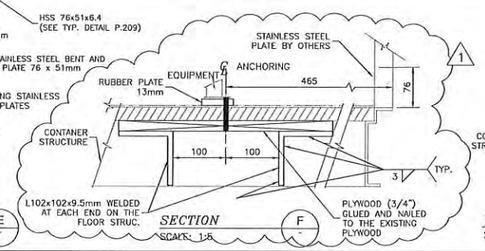
SECTION C SCALE:1:5



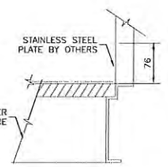
SECTION D SCALE:1:5



SECTION E SCALE: 1:5



SECTION F SCALE: 1:5



TYPICAL SECTION – RETENTION TANK
SCALE: 1:5

1 ARCHITECHTURAL DETAILS NOT SHOWN FOR CLARITY

MAXIMUM LOAD: 8000 lbs

WELD THE BRIDGING AT THE PERIMETER OF THE HOLE

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

NOTE 1: THE STAINLESS STEEL RETENTION TANK SHOULD COVER THE ENTIRE FLOOR OF THE KMn04 SECTION

PLAN CLÉ
KEY PLAN

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-08-22 L3595
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-22

SNC·LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tél.: 819 764-5151 Fax: 819 797-0158
www.snclavalin.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
–	–
–	–
–	–
–	–
KMn04 SERVICE AREA	AMP18-19-003

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2018-08-22	EQUIPMENT ANCHORAGES	JBD	D.L.	
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-08-22

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURE
CONTAINER 40 ft HIGH CUBE KMn04 AND SERVICE WATER SYSTEMS
PLAN VIEW, ELEVATION & PROFIL

DESSINÉ PAR DRAWN BY	MICHEL LANTHIER, Tech.	DATE: 2018-05-09
VERIFIÉ PAR CHECKED BY	JANICK COTE, Jr Eng.	2018-07-06
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P. Eng.	2018-07-06
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN DRAWING NO.	61-693-245-201	
NO. PROJET PROJECT NO.	6115	REVISION 1
		FEUILLE / SHT 1 / 1

AE-CART-ARCH D

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FILE NO. 61-693-245-201_R1.dwg

NO. DESSIN DRAWING NO. 61-693-245-202_R1

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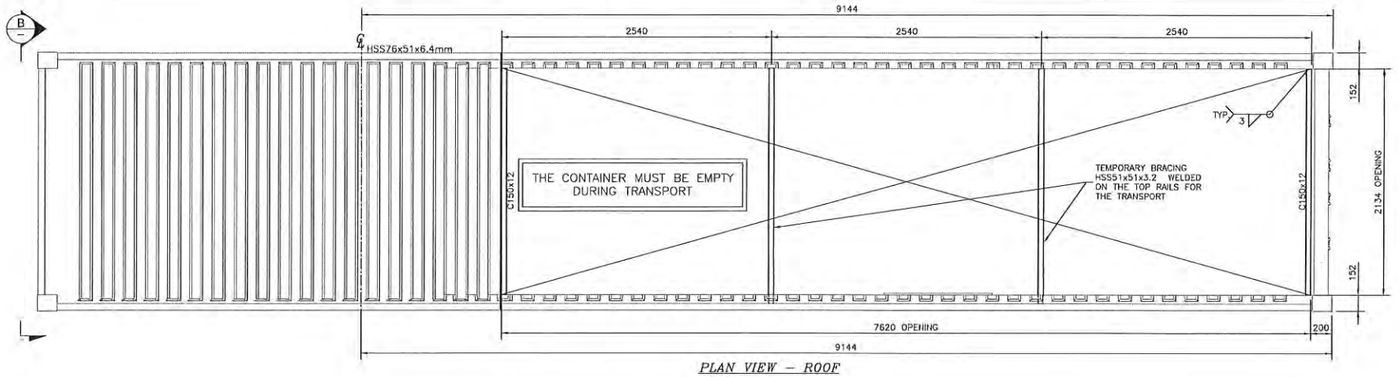
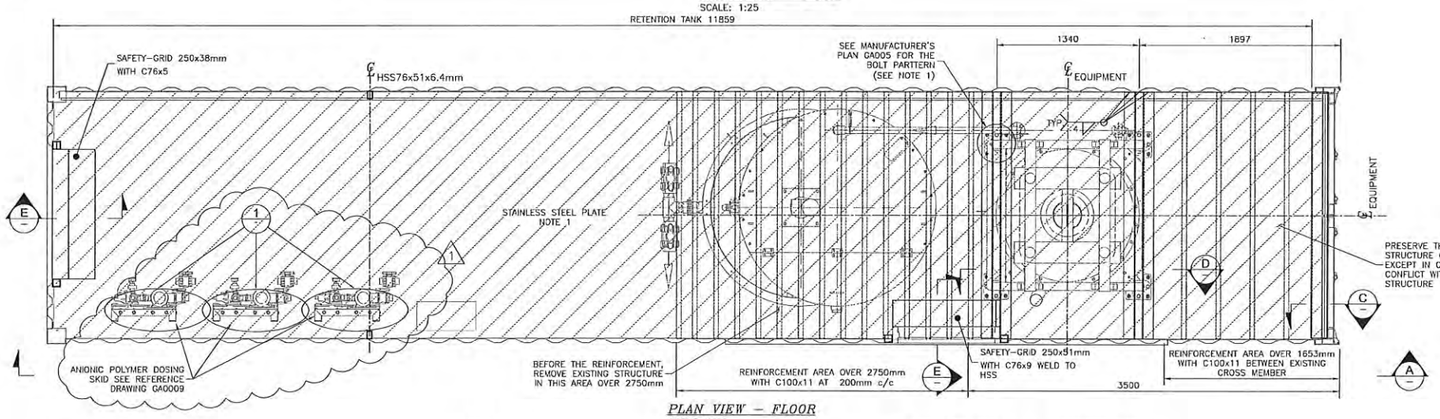
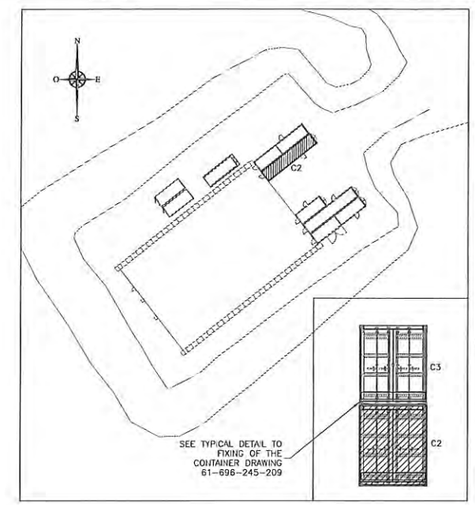


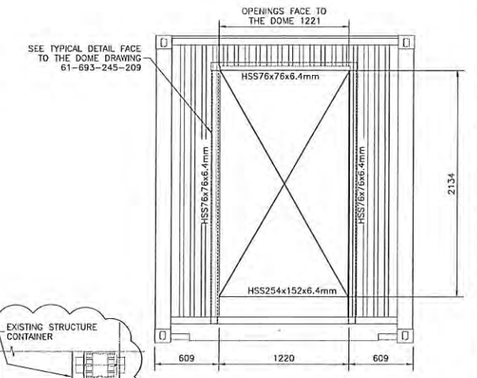
PLAN VIEW – ROOF
SCALE: 1:25



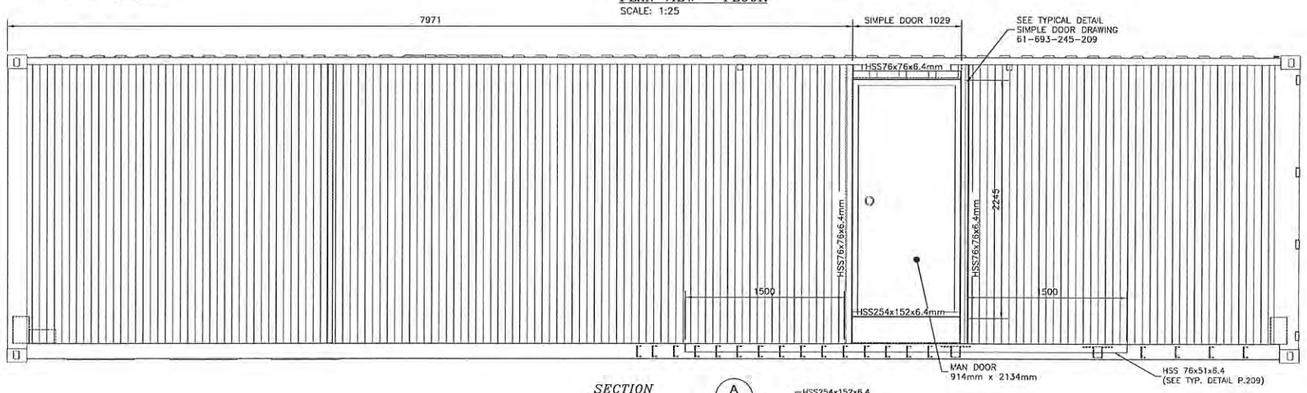
PLAN VIEW – FLOOR
SCALE: 1:25



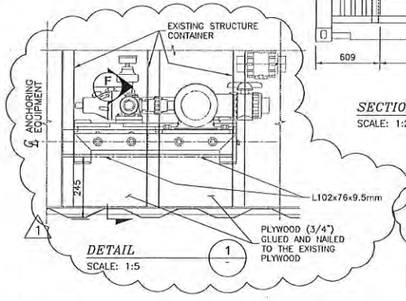
LOCALIZATION



SECTION B
SCALE: 1:25



SECTION A
SCALE: 1:25



DETAIL 1
SCALE: 1:5

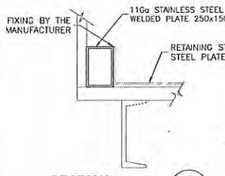
ARCHITECHTURAL DETAILS NOT SHOWN FOR CLARITY

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

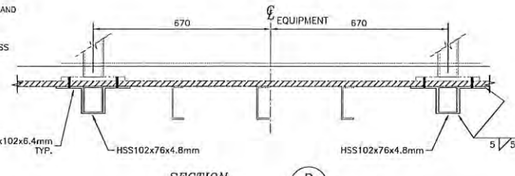
NOTE 1:
BOLT MUST BE POSITIONNED AND SPOT WELDED IN PLACE BEFORE THE SHIPPING

NOTE 1: THE STAINLESS STEEL RETENTION TANK SHOULD COVER THE ENTIRE FLOOR OF THE CONTAINER

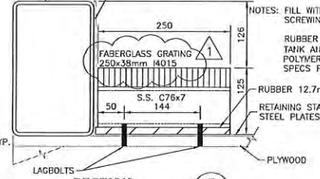
THE WELDING AND SEALING BETWEEN CONTAINER C2 AND C3 IS THE RESPONSIBILITY OF THE MANUFACTURER



SECTION C
SCALE: 1:5

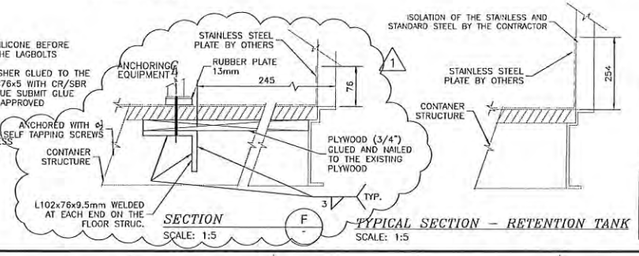


SECTION D
SCALE: 1:10



NOTES: FILL WITH SILICONE BEFORE SCREWING THE LAGBOLTS
RUBBER WASHER GLUED TO THE TANK AND C76x5 WITH CR/SBR POLYMER GLUE SUBMIT GLUE SPECS FOR APPROVED

SECTION E
SCALE: 1:5



SECTION F
SCALE: 1:5

TYPICAL SECTION – RETENTION TANK
SCALE: 1:5

PLAN CLÉ
KEY PLAN

PERMIT TO PRACTICE
SNC-LAVALIN STAVIBEL INC.
Signature
Date 2018-08-22
L3595
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-22

SNC·LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tél.: 819 764-5181 Fax: 819 797-0158
www.snclavalin.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2018-08-22	FOR CONSTRUCTION	JSD	D.L.	
0	2018-07-27	FOR CONSTRUCTION	JSD	D.L.	

REVISIONS

2018-08-22

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
40 ft CONTAINER HIGH CUBE CATIONIC POLYMER AND DOSING SYSTEMS
PLAN VIEW AND SECTION

DESSINÉ PAR DRAWN BY	MICHEL LANTHIER, Tech.	DATE 2018-05-09
VERIFIÉ PAR CHECKED BY	JANICK CÔTÉ, Jr. Eng	2018-07-06
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P.Eng.	2018-05-09
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09

NO. DESSIN DRAWING NO. 61-693-245-202

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6115	1	1 / 1

AE-CART-ARCH D

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FILE NO. 61-693-245-202_R1.dwg

NO. DESSIN DRAWING NO. 61-693-245-205_R1

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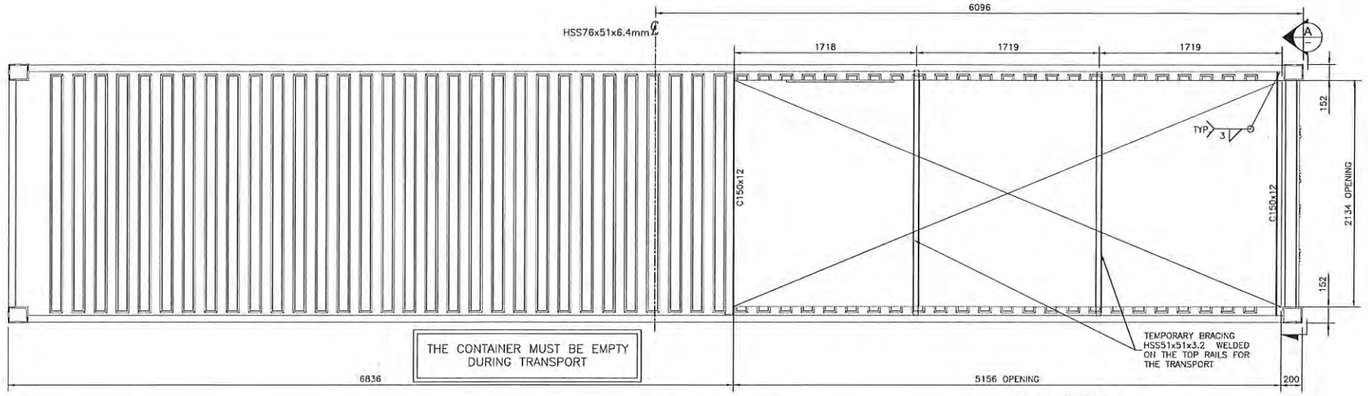
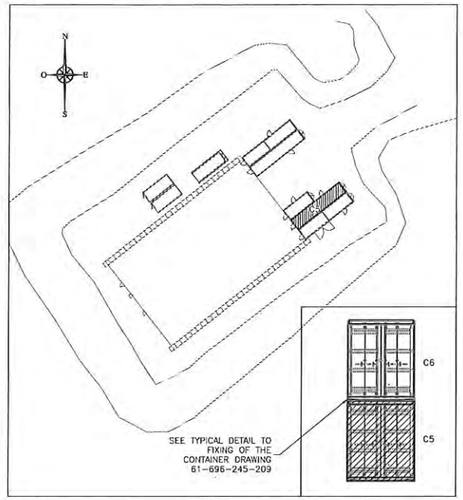
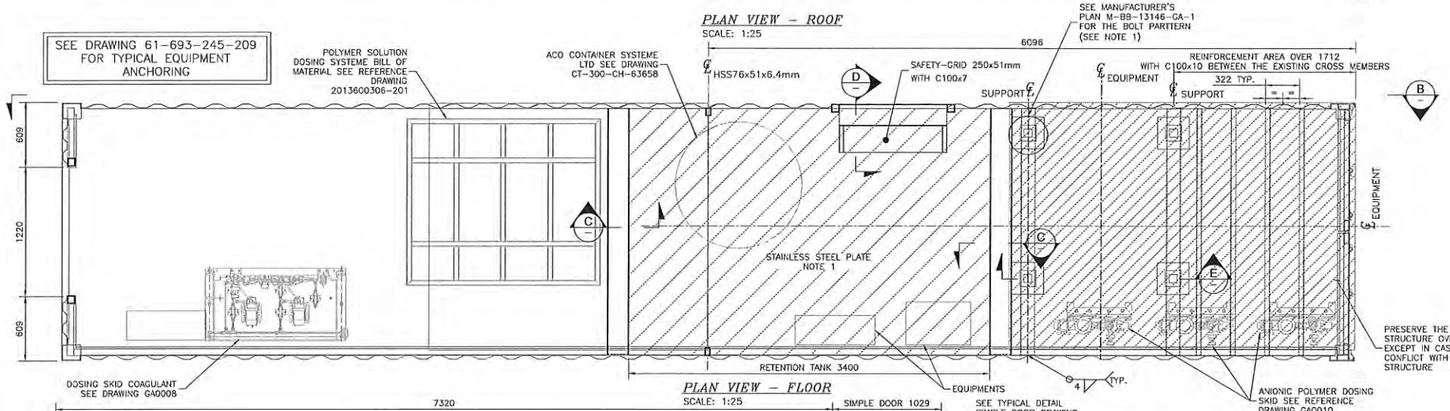
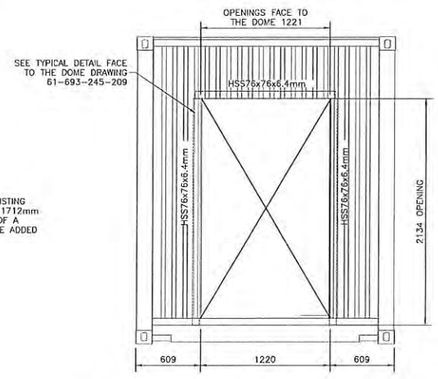
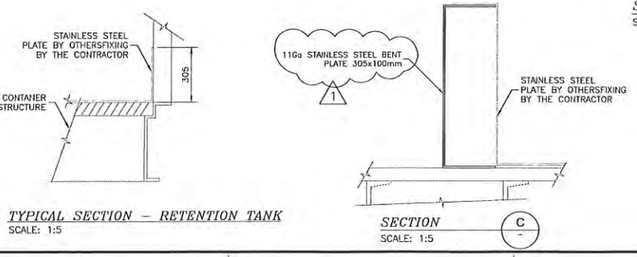
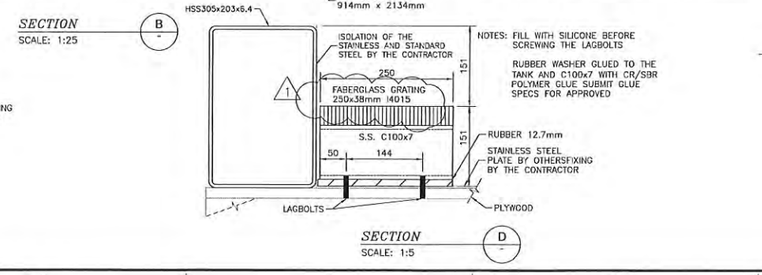








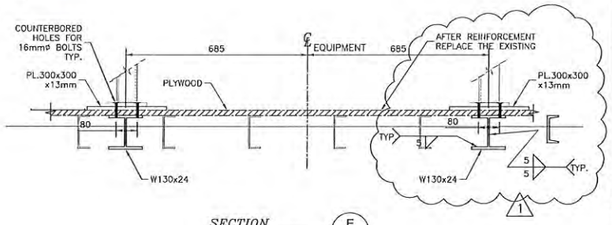




POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-22

SECTION
SCALE: 1:25
A

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm



THE WELDIND AND SEALING BETWEEN CONTAINER C6 AND C5 IS THE RESPONSIBILITY OF THE MANUFACTURER

PLAN CLÉ
KEY PLAN

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-08-22 L3595
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

NOTE 1:
WELD THE EQUIPMENT BASE PLATE TO THE 300x300x13mm PLATES

SNC·LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tel.: 819 764-3181 Fax: 819 797-0158
www.sncstavibel.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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–	–
–	–
–	–
–	–
–	–

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2018-08-22	FOR CONSTRUCTION	JBD	D.L.	
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-08-22

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
40 ft CONTAINER HIGH CUBE COAGULANT PREPARATION AND DOSING SYSTEM
PLAN VIEW AND SECTIONS

DESSINÉ PAR DRAWN BY	MICHEL LANTHIER, Tech.	DATE 2018-05-09
VÉRIFIÉ PAR CHECKED BY	JANICK CÔTÉ, Jr.Eng.	2018-07-06
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P.Eng.	2018-07-06
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09

NO. DESSIN DRAWING NO. 61-693-245-205

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6115	1	1 / 1

AE-CART-ARCH D

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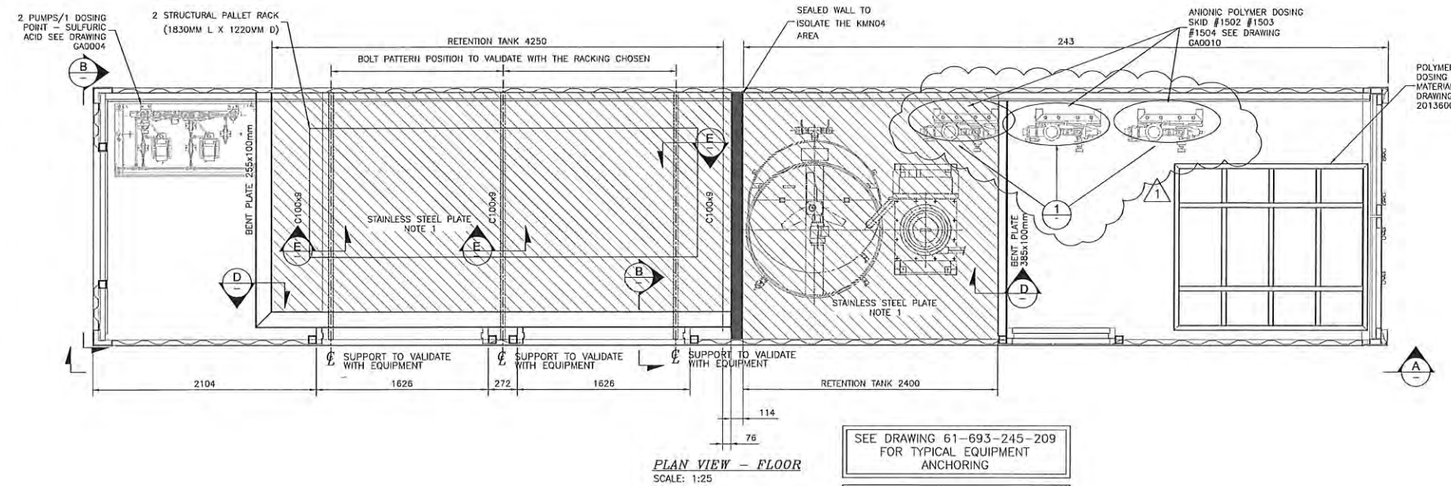
FILE NO. 61-693-245-205_R1.dwg

NO. DESSIN DRAWING NO. 61-693-245-207_R1

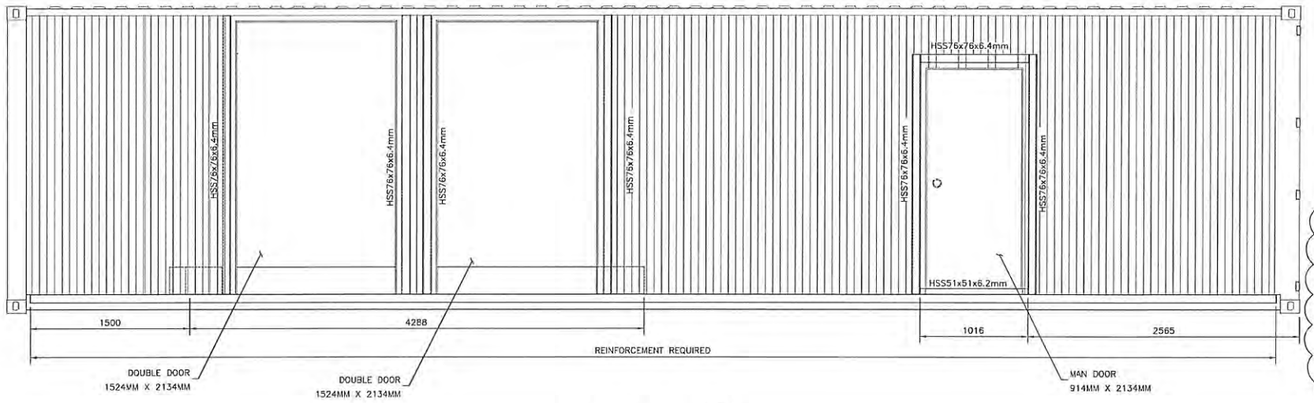
FORMAT ARCH D



PLAN VIEW – FLOOR
SCALE: 1:25

SEE DRAWING 61-693-245-209 FOR TYPICAL EQUIPMENT ANCHORING

THE CONTAINER MUST BE EMPTY DURING TRANSPORT



SECTION A
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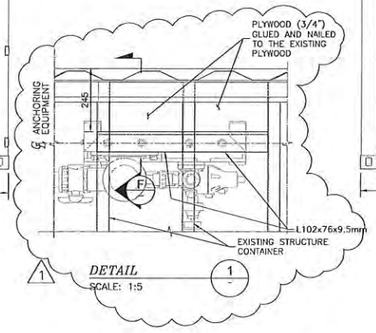
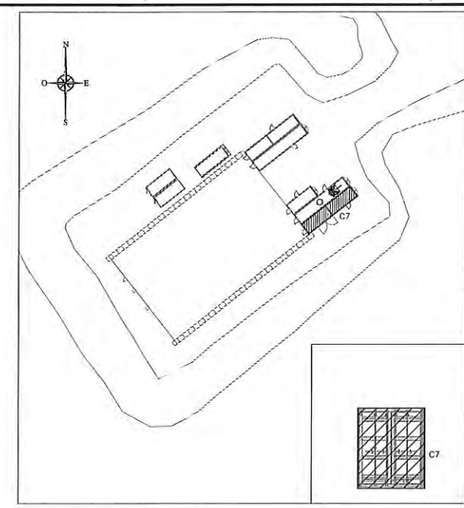
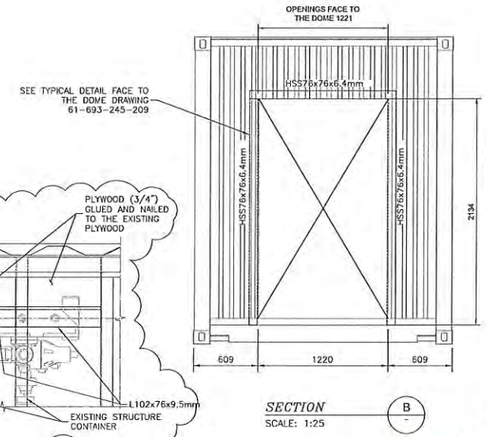


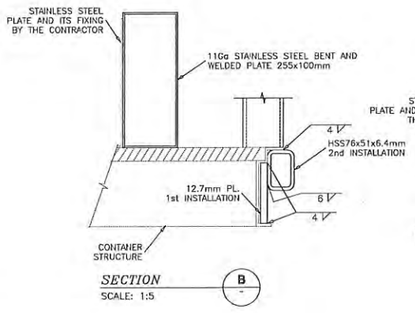
DETAIL 1
SCALE: 1:5





SECTION B
SCALE: 1:25

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-22



SECTION B
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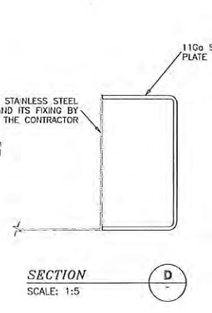

SECTION D
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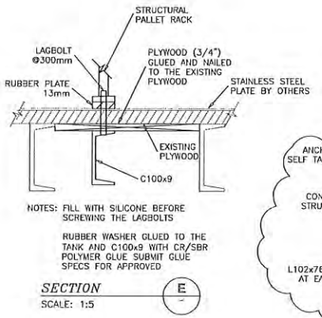
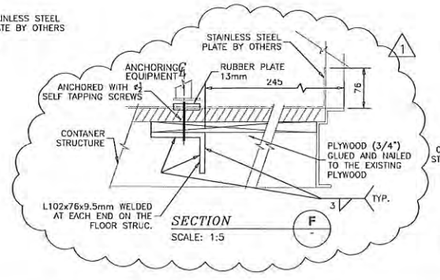


NOTES: FILL WITH SILICONE BEFORE SCREWING THE LAGBOLTS

RUBBER WASHER GLUED TO THE TANK AND C100x9 WITH CR/SBR POLYMER GLUE SUBMIT GLUE SPECS FOR APPROVED

SECTION E
SCALE: 1:5



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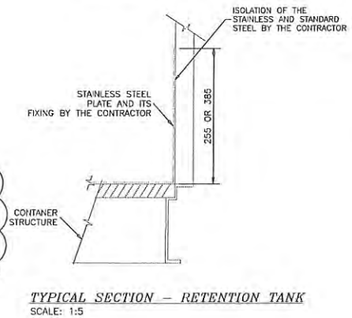

TYPICAL SECTION – RETENTION TANK
SCALE: 1:5

ARCHITECHTURAL DETAILS NOT SHOWN FOR CLARITY

NOTE 1: THE STAINLESS STEEL RETENTION TANK PLATE SHOULD COVER THE ENTIRE FLOOR OF THE CONTAINER

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

PAINT THE VISIBLE SIDE OF THE BENT PLATE IN YELLOW SAFETY

PLAN CLÉ
KEY PLAN

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-08-22 L3595
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

SNC·LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tel.: 819 764-5161 Fax.: 819 797-0158
www.snclavalin.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2018-08-22	EQUIPMENT ANCHORAGES	JBD	D.L.	
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-08-22

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
40 fT CONTAINER HIGH CUBE KMn04 AND SERVICE WATER SYSTEM
PLAN VIEW AND SECTIONS

DESSINÉ PAR DRAWN BY	MICHEL LANTHIER, Tech.	DATE 2018-05-09
VERIFIÉ PAR CHECKED BY	JANICK CÔTÉ, Jr.Eng.	2018-07-09
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P.Eng.	2018-07-09
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN DRAWING NO.	61-693-245-207	
NO. PROJET PROJECT NO.	6115	REVISION 1 / FEUILLE / SHT 1/1

AE-CART-ARCH D

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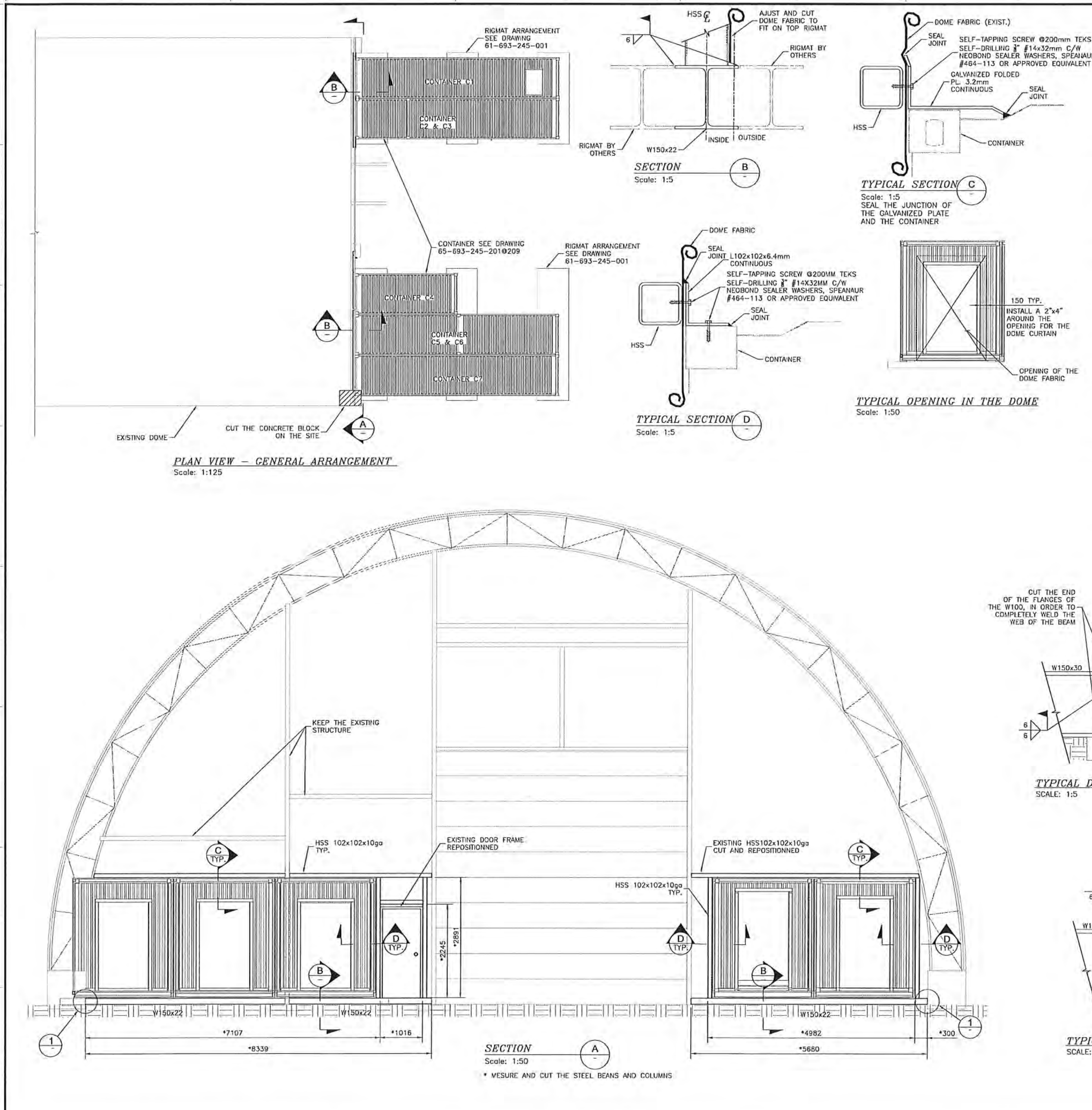
FILE NO. 61-693-245-207_R1.dwg

NO. DESSIN / DRAWING NO. 61-693-245-210_R0



1. GENERAL NOTES

1.1 FOR ALL CONSTRUCTION WORKS, REFER ONLY TO DRAWINGS LABELED AS « ISSUED FOR CONSTRUCTION ».

1.2 REFER ONLY TO DIMENSIONS INDICATED ON PLANS, DO NOT THE DRAWINGS SCALE.

1.3 ALL DIMENSIONS HAVE TO BE VERIFIED AND VALIDATED ON SITE PRIOR TO CONSTRUCTION COMMENCEMENT. IN ANY CASE, NO CONTRACTOR IS PERMITTED TO INTERPRET ERRORS OR OMISSIONS BETWEEN THE PLANS AND SPECIFICATIONS OF VARIOUS PROFESSIONALS. ONLY WRITTEN QUESTIONS ON BEHALF OF THE CONTRACTOR SHALL BE CONSIDERED FOR POTENTIAL ADDENDUMS DURING THE TENDERING PERIOD. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS OF ALL OTHER RELATED DISCIPLINES. ANY INTERPRETATIONS OR QUESTIONS RELATED TO PLANS DURING THE CONSTRUCTION PROCESS SHALL BE CLARIFIED BY PROFESSIONALS THROUGH WRITTEN QUESTIONS.

1.4 THE CONTRACTOR SHALL ENSURE A PRECISE CORRESPONDENCE AT THE JUNCTION OF A NEW AND EXISTING STRUCTURE. THE CONTRACTOR SHALL ENSURE A PRECISE FIT BETWEEN THE LEVEL OF A NEW FLOOR AND THAT OF AN EXISTING ONE.

1.5 THE PRESENT PLANS INDICATE IN A GENERAL MANNER, WORKS TO BE REALIZED ACCORDING TO EXISTING SITE CONDITIONS. TO ESTABLISH FINAL BID PRICE, THE CONTRACTOR SHALL MAKE SITE VISITS SO AS TO QUANTIFY ANY FACTOR OR CONSTRAINT WICH MAY AFFECT WORK REALIZATION.

1.6 FLASHING AND SEALING PART FOR THE DOME FABRIC BY OTHERS

2. STRUCTURAL STEEL

2.1 STRUCTURAL STEEL MUST RESPECT CRITERIA LISTED IN CAN/CSA-G40.20 AND CAN/CSA-G40.21, GRADE 350 W WITH EXCEPTION OF C AND L SECTION WHICH ARE TO BE OF GRADE 300 W. HSS SECTION TO BE OF ASTM 500 TYPE C GRADE 345 W.

2.3 STEEL SURFACE PREPARATION PROCESS AND PAINT COATING FOR AGNICO EAGLE. THE STEEL MUST BE FREE FROM GREASE, OIL OR ANY OTHER CONTAMINANT DETRIMENTAL TO THE GRIP.

1) MAKE SSPC-SP1
2) MAKE SSPC-SP6
3) APPLY 1 LAYER OF PRIMER OF EPOXY COR-PRO 470 (2 MILS SECS) GREY
4) APPLY 2 LAYERS OF EPOXY COATING COR-PRO 475 (5 MILS. SECS EACH) GREY

2.4 SURFACE PREPARATION BEFORE WELDING: SURFACE PREPARATION BY SANDBLAST AS PER SSPC-SP6 OR APPROVED EQUIVALENT.

2.5 REPAIRS AND TOUCH-UPS: ALL STRUCTURAL ELEMENTS (NEW AND EXISTING) WHICH HAVE BEEN DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED ONSITE.

2.6 THE CONTRACTOR OR SUB-CONTRACTOR MUST PROCEED WITH ALL WELDING WORKS IN ACCORDANCE WITH W59-03(R2008). HE MUST ALSO BE CERTIFIED AS PER W47.1-09(R2014). THE ENGINEER/OWNER RESERVES THE RIGHT TO VERIFY THESE CERTIFICATIONS BEFORE AS WELL AS AFTER THE PROJECT COMMENCEMENT.

2.7 ALL STRUCTURAL MEMBERS MUST BE CLEANED BY GRINDING PRIOR TO ALL WELDING WORKS.

2.8 BOLTS, NUTS, LOCKNUTS, AND WASHERS AS PER ASTM-A325-14. ALL BOLTS ARE M20 (U.N.O.)

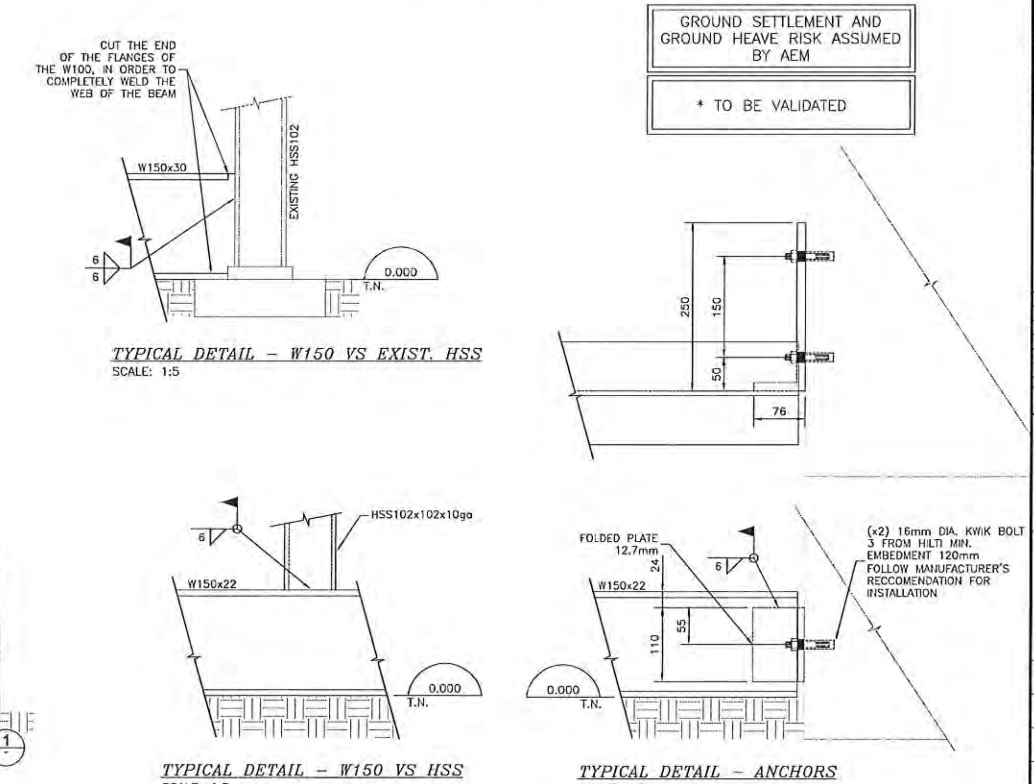
2.9 DEAD LOADS AND COLLATERAL LOADS
- STRUCTURAL STEEL (DENSITY) : 7850 kg/m3

2.10 DESIGN METHODOLOGY:

- STRUCTURAL STEEL: ULTIMATE STRENGTH DESIGN ACCORDING TO CAN/CSA-S16-14.

GROUND SETTLEMENT AND GROUND HEAVE RISK ASSUMED BY AEM

* TO BE VALIDATED



PLAN CLÉ / KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

2018-08-17

POUR CONSTRUCTION / FOR CONSTRUCTION
AGNICO EAGLE DATE : 2018-08-17

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-17	FOR CONSTRUCTION	JBO	D.L.	

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN STAVIBEL INC.
Signature
Date 2018-08-17
L3595
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURE
MODIFICATION OF THE DOME
DETAIL PLAN

DESSINÉ PAR / DRAWN BY	JORDANE B.D., Tech.	DATE	2018-08-07
VÉRIFIÉ PAR / CHECKED BY	JANICK COTE, Jr. Eng.		2018-08-10
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P.Eng.		2018-08-15
ÉCHELLE / SCALE	INDICATED	DATE	2018-08-07

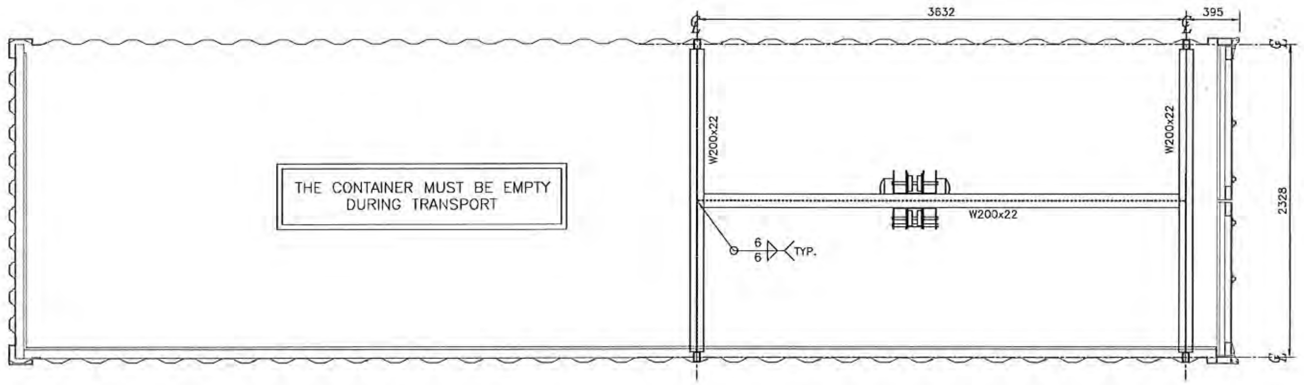
NO. DESSIN / DRAWING NO. 61-693-245-210

NO. PROJET / PROJECT NO. 6115 — RÉVISION / REVISION 0 — FEUILLE / SHT 1/1

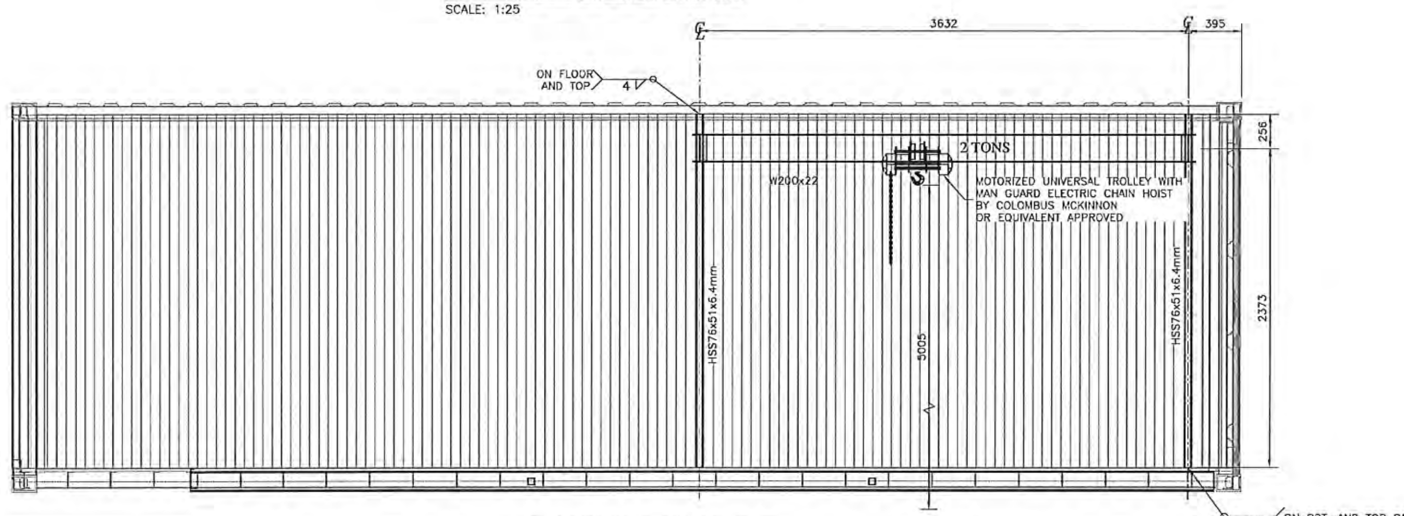
FORMAT ARCHD

FILE NO. 61-693-245-210_R0.dwg

NO. DESSIN / DRAWING NO. 61-693-245-203_R0

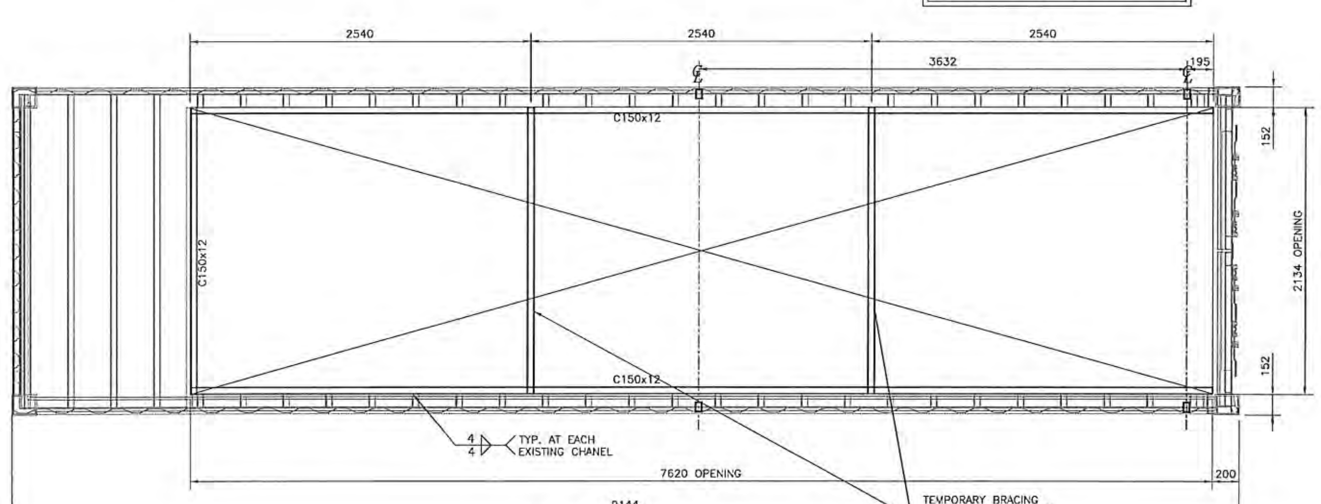


PLAN VIEW – TOP OF MONORAIL
SCALE: 1:25

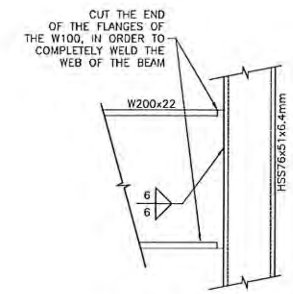


ELEVATION – MONORAIL
SCALE: 1:25

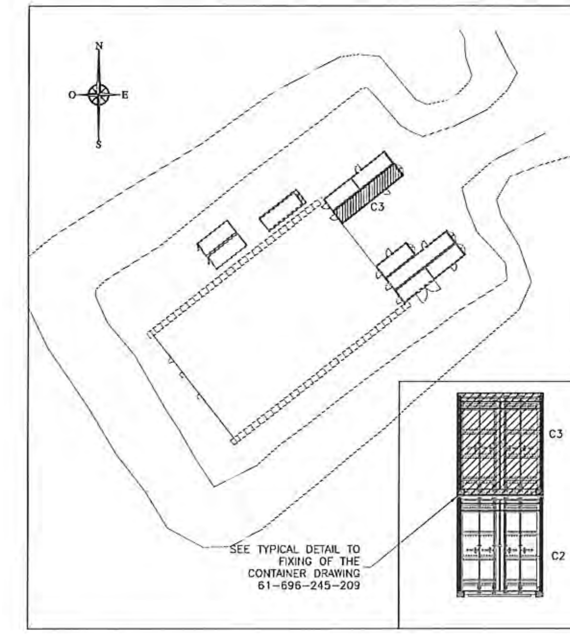
UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm



PLAN VIEW – FLOOR
SCALE: 1:25



TYPICAL DETAIL – W200 VS HSS
SCALE: 1:5



MONORAIL NOTES

1. THE MAXIMUM RATED CAPACITY "2 TONS" SHALL BE PAINTED IN MIN. 150 MM. HIGH, BLACK LETTERS ON EACH SIDE OF THE WEB OF THE MONORAIL BEAM(S).
2. MONORAIL DESIGN CRITERIA:
   SAFE WORKING LOAD: 2 TONS
   MAXIMUM WHEEL LOAD: 5.1 KN
   MAXIMUM TROLLEY/HOIST WEIGHT: 90 KG
   VERTICAL IMPACT ALLOWANCE: 10%

PAINTING NOTES

a)"INTERSPEC" 3.12.F.2 (C5 STANDARD CURE)
EPOXY PRIME/HIGH BUILD FINISH – NEW CONSTRUCTION SYSTEM FOR SEVERE (C5-1) EXPOSURES.
b)PRIMER: "INTERGARD" 345 SINGLE COAT APPLICATION AT 3-4 MILS (75-100 MICRONS) DRY FILM THICKNESS.
c)PRIMER COLOUR: GRAY OR RED OXIDE
d)COAT FINISH : "INTERGARD" 345 APPLIED AT 3-4 MILS (75-100 MICRONS) D.F.T.
e)COLOUR FINISH: SAFETY YELLOW (YE-3)

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE DATE : 2018-07-27

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

THE WELDING AND SEALING BETWEEN CONTAINER C2 AND C3 IS THE RESPONSIBILITY OF THE MANUFACTURER

PLAN CLÉ / KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

SNC·LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tel.: 819 764-5181 Fax: 819 797-0156
www.snclavalin.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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–	–

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-07-27

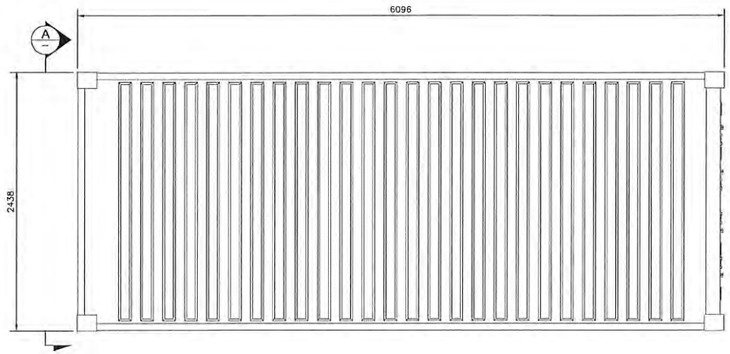
TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
30 fT CONTAINER HIGH CUBE CATIONIC POLYMER AND DOSING SYSTEMS
PLAN VIEW AND SECTIONS

DESSINÉ PAR / DRAWN BY	MICHEL LANTHIER, Tech.	2018-05-09
VÉRIFIÉ PAR / CHECKED BY	JANICK CÔTÉ, Jr.Eng.	2018-07-06
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P.Eng.	2018-07-06
ÉCHELLE / SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN / DRAWING NO.	61-693-245-203	
NO. PROJET / PROJECT NO. 6115	REVISION 0	FEUILLE / SHT 1/1

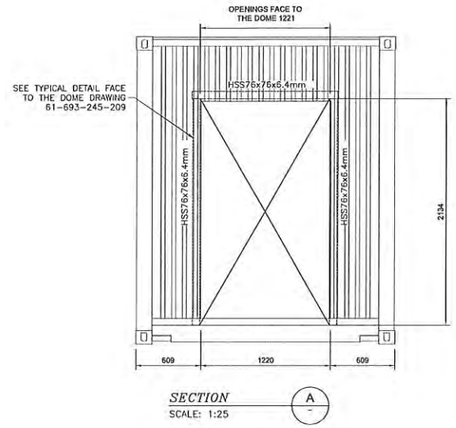
FILE NO. 61-693-245-203_R0.dwg

NO. DESSIN DRAWING NO. 61-693-245-204_R0

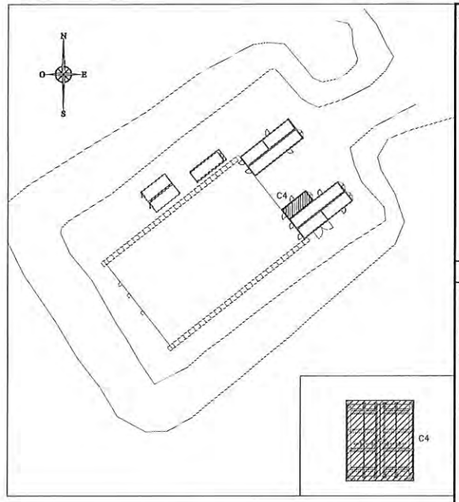
FORMAT ARCHD



PLAN VIEW – ROOF CONTAINER 20pi.
SCALE: 1:25

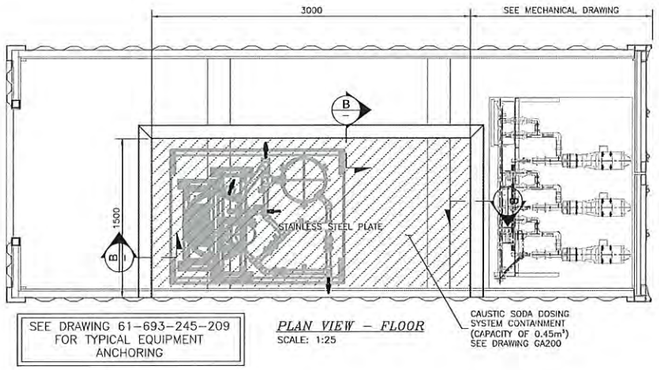


SECTION A
SCALE: 1:25



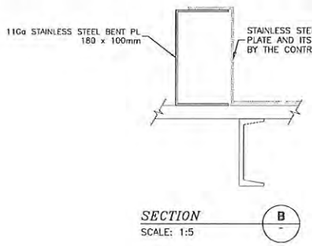
UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

PAINT THE VISIBLE SIDE OF HSS 178x127X4.8mm IN YELLOW SAFETY

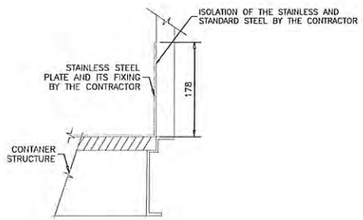


SEE DRAWING 61-693-245-209 FOR TYPICAL EQUIPMENT ANCHORING

PLAN VIEW – FLOOR
SCALE: 1:25



SECTION B
SCALE: 1:5



TYPICAL SECTION – RETENTION TANK
SCALE: 1:5

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-07-27

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

SNC-LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Royn-Noranda (Québec) J9X 2R7
Tél.: 819 764-5181 Fax: 819 797-0158
www.snclavalin.com

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-07-27

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
20 ft CONTAINER HIGH CUBE CATIONIC POLYMER AND DOSING SYSTEMS
PLAN VIEW AND SECTIONS

DESSINÉ PAR / DRAWN BY	MICHEL LANTHIER, Tech.	DATE 2018-05-09
VERIFIÉ PAR / CHECKED BY	JANICK CÔTÉ, Jr. Eng.	2018-07-05
APPROUVÉ PAR / APPROVED BY	DANY, LAMBERT P.Eng.	2018-07-05
ÉCHELLE / SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN / DRAWING NO.	61-693-245-204	
NO. PROJET / PROJECT NO.	6115	REVISION 0 / FEUILLE / SHT 1/1

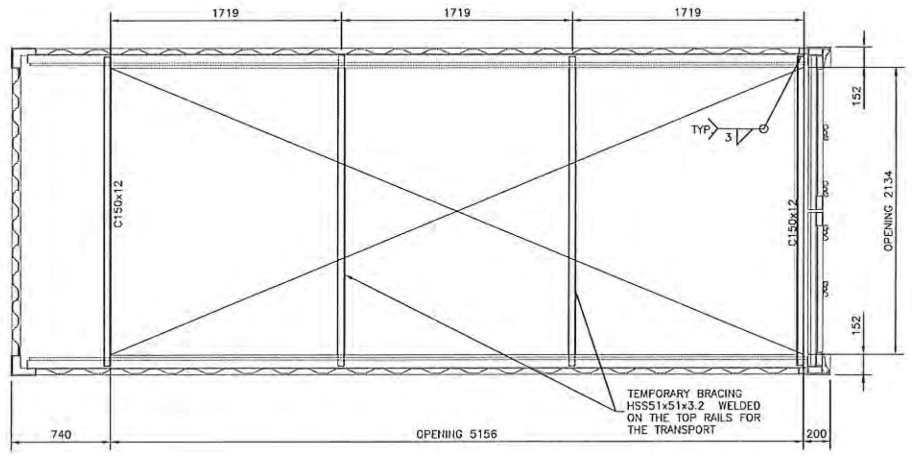
AC-CART-ARCH D

\\ad.ca\qlo\dfs\Projet\300-RN\653281\0001\4-ingenierie\D-Dessins maitres\43-ST\61-693-245-204_R0.dwg-2018-05-09 14:03:29

FILE NO. 61-693-245-204_R0.dwg

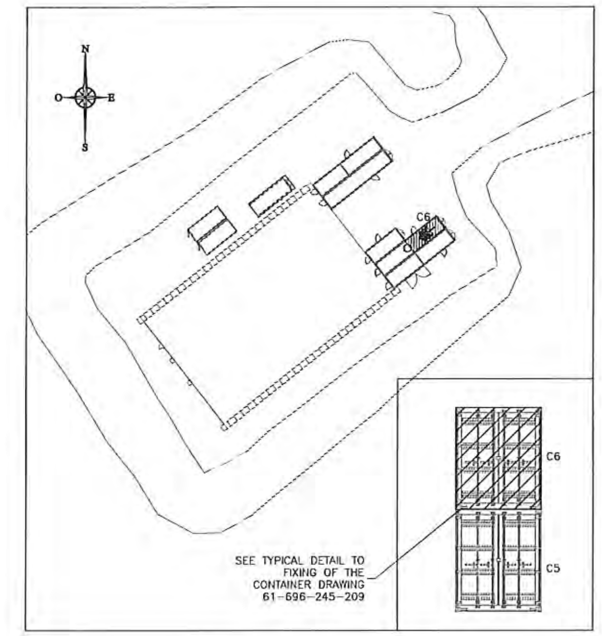
NO. DESSIN DRAWING NO. 61-693-245-206_R0

FORMAT ARCHD



PLAN VIEW – FLOOR
SCALE: 1:25

THE CONTAINER MUST BE EMPTY DURING TRANSPORT



POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-07-27

THE WELDING AND SEALING BETWEEN CONTAINER C6 AND C5 IS THE RESPONSIBILITY OF THE MANUFACTURER

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
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–	–
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-27	FOR CONSTRUCTION	JSO	D.L.	

REVISIONS

2018-07-27

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
20 ft CONTAINER HIGH CUBE COAGULANT PREPARATION AND DOSING SYSTEMS
PLAN VIEW AND ELEVATION

DESSINÉ PAR DRAWN BY	MICHEL LANTHIER, Tech.	2018-05-09
VÉRIFIÉ PAR CHECKED BY	JANICK CÔTÉ, Jr.Eng	2018-07-13
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P.Eng.	2018-07-13
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09

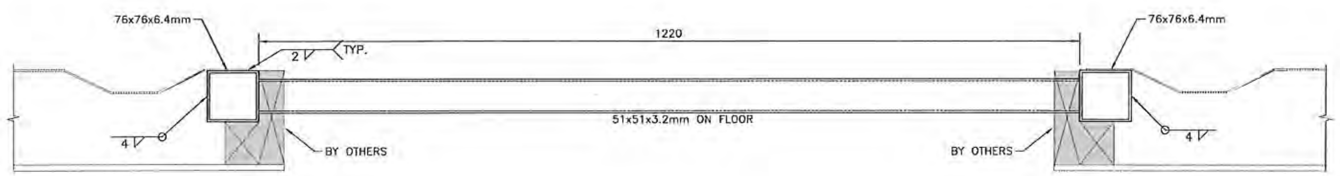
NO. DESSIN DRAWING NO. 61-693-245-206

NO. PROJET PROJECT NO. 6115 | RÉVISION 0 | FEUILLE / SHT 1/1

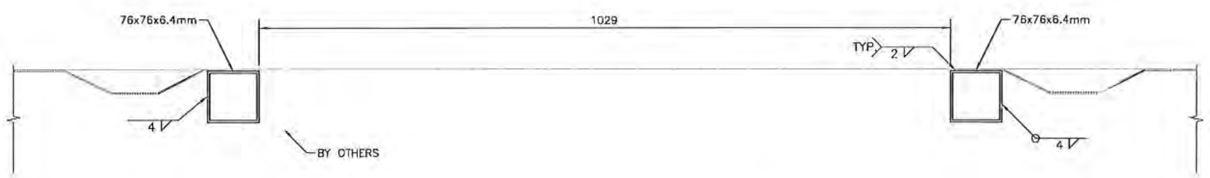
AE-CART-ARCH D

FILE NO. 61-693-245-206_R0.dwg

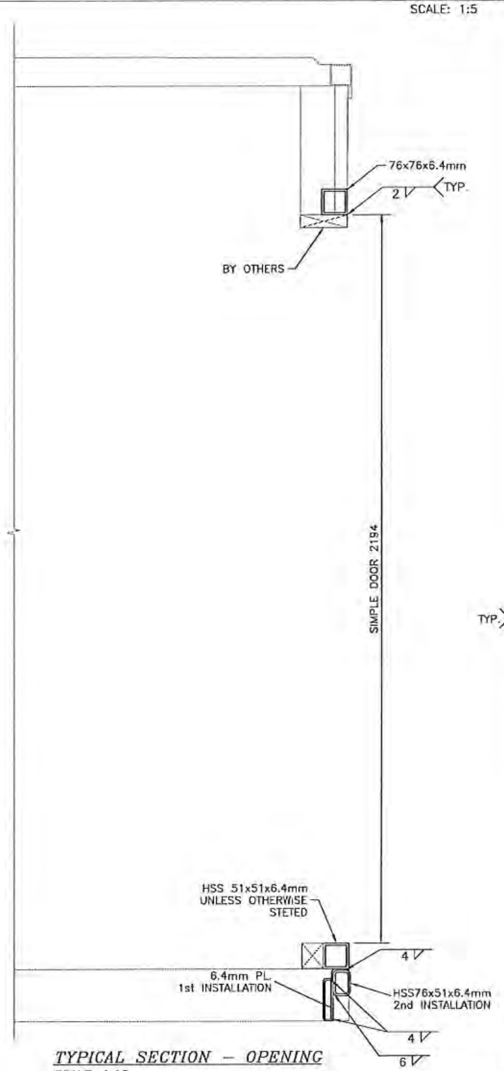
NO. DESSIN DRAWING NO. 61-693-245-209_R0



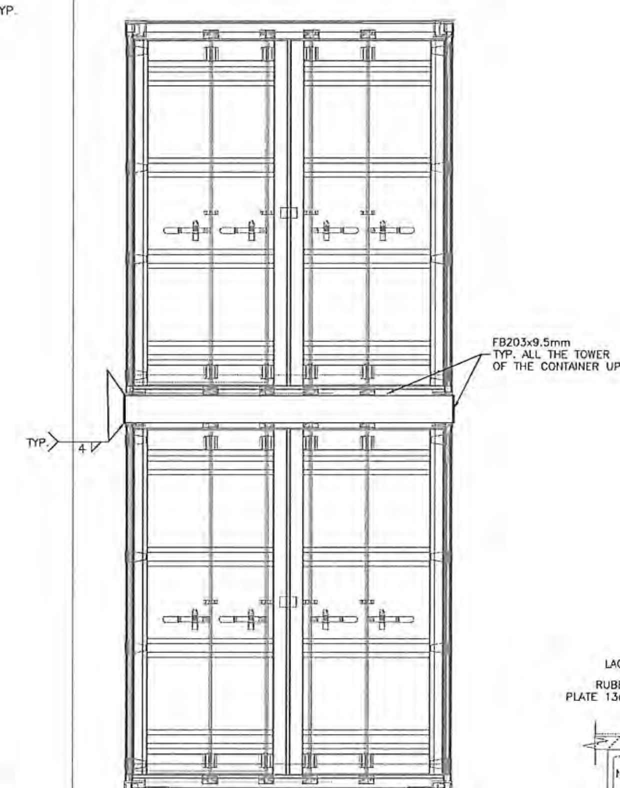
TYPICAL DETAIL – SIMPLE DOOR
SCALE: 1:5



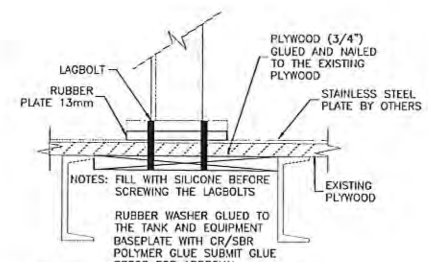
TYPICAL DETAIL – FACE TO THE DOME
SCALE: 1:5



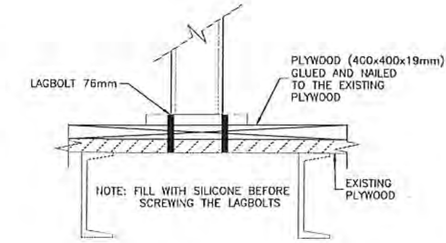
TYPICAL SECTION – OPENING
SCALE: 1:10



TYPICAL DETAIL TO FIXING OF THE CONTAINER
SCALE: 1:25



TYPICAL EQUIPMENT ANCHORING THROUGH THE RETENTION TANK
SCALE: 1:5



TYPICAL EQUIPMENT ANCHORING
SCALE: 1:5

GENERAL NOTES:

01– IN THE EVENT OF CONFLICT BETWEEN DESIGN STANDARDS, CONTRACT DOCUMENTS AND DRAWINGS, INFORMATION GIVEN ON DRAWINGS SHALL GOVERN.
02– THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE STARTING WORK AND REPORT ALL ERRORS OR OMISSIONS TO THE ENGINEER.
03– THE CONTRACTOR SHALL CONSIDER THAT THE EXECUTION OF THE WORK DEPENDS ON THE SITE CONDITIONS. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS NOT SPECIFICALLY SHOWN ON THE DRAWINGS BUT REQUIRED TO COMPLETE THE WORK TO THE SATISFACTION OF THE ENGINEER. ALL MATERIALS SHALL BE NEW, IN GOOD CONDITION AND PREMIIUM QUALITY.
04– THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS EMPLOYEES OR HIS SUBCONTRACTORS. HE SHALL KEEP THE SITE CLEAN AND FREE OF ANY DEBRIS. THE CONTRACTOR MUST COMPLY WITH ALL LOCAL AND OWNER SAFETY RULES.
05– ALL TEMPORARY SUPPORTS ARE THE CONTRACTOR'S RESPONSIBILITY. HE SHALL APPLY ALL NECESSARY MEASURES AND INSTALL PROPER SUPPORTS TO ENSURE THE STABILITY OF THE STRUCTURES AND THE WORKER'S SAFETY.
06– DO NOT SCALE THE DRAWINGS.
07– ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
08– ALL OPENING MUST BE TEMPORARELY CLOSE FOR THE SHIPPING. (BY THE CONTRACTORS)

STRUCTURAL STEEL

09– STRUCTURAL STEEL MUST RESPECT CRITERIA LISTED IN CAN/CSA-G40.20 AND CAN/CSA-G40.21, GRADE 350 W WITH EXCEPTION OF C AND L PROFILES WHICH ARE TO BE OF GRADE 300 W.

10– REPAIRS AND TOUCH-UPS: ALL STRUCTURAL ELEMENTS (NEW AND EXISTING) WHICH HAVE BEEN DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED ON SITE.

11– THE CONTRACTOR OR SUB-CONTRACTOR MUST PROCEED WITH ALL WELDING WORKS IN ACCORDANCE WITH W59-03(R2008). HE MUST ALSO BE CERTIFIED AS PER W47.1-09(R2014). THE ENGINEER/OWNER RESERVES THE RIGHT TO VERIFY THESE CERTIFICATIONS BEFORE AS WELL AS AFTER THE PROJECT COMMENCEMENT.

12– ALL STRUCTURAL MEMBERS MUST BE CLEANED BY GRINDING PRIOR TO ALL WELDING WORKS.

13– BOLTS, NUTS, LOCKNUTS, AND WASHERS AS PER ASTM-A325-14. ALL BOLTS ARE M20 (U.N.O.)

14– DEAD LOADS AND COLLATERAL LOADS

– STRUCTURAL STEEL (DENSITY) : 7850 KG/M3

15– LIVE LOADS

– MEZZANINE: 4,8 KPA

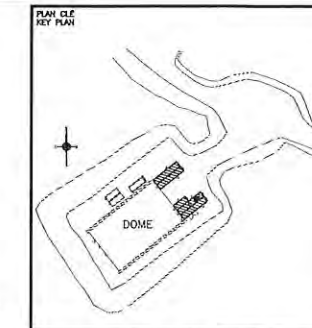
16– DESIGN METHODOLOGY:

– STRUCTURAL STEEL: ULTIMATE STRENGTH DESIGN ACCORDING TO CAN/CSA-S16-14.

PAINTING NOTES:

STEEL SURFACE PREPARATION PROCESS AND
PAINT COATING FOR AGNICO EAGLE.
THE STEEL MUST BE FREE FROM GREASE, OIL OR ANY OTHER
CONTAMINANT DETRIMENTAL TO THE GRIP.
1) MAKE SSPC-SP1
2) MAKE SSPC-SP6
3) APPLY 1 LAYER OF PRIMER OF EPOXY COR-PRO 470 (2 MILS SECS) GRAY
4) APPLY 2 LAYERS OF EPOXY COATING COR-PRO 475 SAFETY YELLOW (5 MILS. SECS EACH)

PLAN CLÉ / KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2018-07-27
AGNICO EAGLE

SNC·LAVALIN

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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–	–
–	–
–	–
KMnO4 SERVICE AREA	AMP18-19-003

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-07-27	FOR CONSTRUCTION	JBD	D.L.	

REVISIONS

2018-07-27

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURE
CONTAINER 40 ft HIGH CUBE KMnO4 AND SERVICE WATER SYSTEMS
PLAN VIEW, ELEVATION & PROFIL

DESSINÉ PAR / DRAWN BY	MICHEL LANTHIER, Tech.	DATE 2018-05-09
VÉRIFIÉ PAR / CHECKED BY	JANICK COTE, Jr Eng.	2018-07-06
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P. Eng.	2018-07-06
ÉCHELLE / SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN / DRAWING NO.	61-693-245-209	
NO. PROJET / PROJECT NO. 6115	REVISION 0	FEUILLE / SHT 1/1

FILE NO. 61-693-245-209_R0.dwg

Appendix B

P&ID AsWTP

ABBREVIATIONS

- A TO C – AIR TO CLOSE
- A TO O – AIR TO OPEN
- AVG – AVERAGE
- B/EL – BOTTOM ELEVATION
- CL – CENTER LINE
- CFM – CUBIC FEET PER MINUTE
- CW – CITY WATER (POTABLE)
- DIA – DIAMETER
- DWG – DRAWING
- EL – ELEVATION
- SID – FAIL CLOSED
- F.O. – FAIL OPEN
- FRL – FILTER\REGULATOR\LUBRICATOR
- GAL – GALLONS
- GPD – GALLONS PER DAY
- GPH – GALLONS PER HOUR
- GPM – GALLONS PER MINUTE
- HB – HOSE BIB
- HG – INCHES OF MERCURY
- HI – HIGH
- HOA – HAND/OFF/AUTO
- HP – HORSEPOWER
- IA – INSTRUMENT AIR
- ID – INSIDE DIAMETER
- INV – INVERT
- LO – LOW
- MH – MANHOLE
- MW – MANWAY
- N.C. – NORMALLY CLOSED
- N.O. – NORMALLY OPEN
- OAL – OVERALL LENGTH
- O.D. – OUTSIDE DIAMETER
- OF – OVERFLOW
- PA – PLANT AIR
- PSIG – POUNDS PER SQUARE INCH – GAUGE
- PW – PLANT WATER
- RED – REDUCER
- RPM – REVOLUTIONS PER MINUTE
- SCFM – STANDARD CUBIC FEET PER MINUTE
- SCH – SCHEDULE
- SG – SPECIFIC GRAVITY
- SP – SETPOINT
- SSH – STRAIGHT SIDE HEIGHT
- STD – STANDARD
- SW – SEAL WATER
- SWD – SIDE WATER DEPTH
- TDH – TOTAL DYNAMIC HEAD(FT OF FLUID)
- T/EL – TOP ELEVATION
- TYP – TYPICAL
- VAC – VACUUM
- VSD – VARIABLE SPEED DRIVE
- WC – WATER COLUMN
- WD – WATER DEPTH
- WL – WATER LEVEL
- WV – WORKING VOLUME (DOES NOT INCLUDE FREEBOARD OR HEEL)

PIPING AND TUBING MATERIALS

- ABS – ACRYLONTRILE BUTADIENE STYRENE TRUSS PIPE
- ALM – ALUMINUM PIPE OR TUBING
- ARP – ALUMINUM REINFORCED PLASTIC PIPE
- BL – BLACK IRON PIPE
- BPT – BRAIDED PLASTIC TUBING–PVC
- CI – CAST IRON PIPE
- CISP – CAST IRON SOIL PIPE
- CMCP – CORRUGATED METAL CULVERT PIPE
- CMH – CHEMICAL HOSE
- CMP – CORRUGATED METAL PIPE
- COP – COPPER PIPE
- PVC – CHLORINATED POLYVINYL CHLORIDE PIPE
- CS – CARBON STEEL PIPE
- DI – DUCTILE CAST IRON PIPE
- ERP – EPOXY RESIN PIPE
- FRP – FIBERGLASS REINFORCED PLASTIC PIPE
- GS – GALVANIZED STEEL PIPE
- HOSE – FLEXIBLE HOSE
- HSI – HIGH SILICON IRON PIPE
- KLS – PVDF LINED STEEL PIPE (KYNAR® LINED TYPICAL)
- KYN – PVDF (KYNAR® TYPICAL)
- MI – CARBON STEEL PIPE W/MALLEABLE IRON FITTINGS
- NEO – NEOPRENE HOSE
- NI – NICKEL ALLOY PIPE
- NLS – NEOPRENE LINED STEEL PIPE
- PEP – POLYETHYLENE PIPE
- PETB – POLYETHYLENE TUBING
- PLS – POLYPROPYLENE LINED STEEL PIPE
- POP – POLYPROPYLENE PIPE
- PRP – PHENOLIC RESIN PIPE
- PVC – POLYVINYL CHLORIDE PIPE
- PVC HOSE – POLYVINYL CHLORIDE HOSE
- PVDF – POLYVINYLIDENE FLUORIDE PIPE
- RBR – RUBBER HOSE
- RCCP – REINFORCED CONCRETE CULVERT PIPE
- RCP – REINFORCED CONCRETE PIPE
- SAR – SARAN TUBING
- SLH – SLUDGE HOSE
- SLS – SARAN LINED STEEL PIPE
- SS – STAINLESS STEEL PIPE OR TUBING
- TEF – TEFLON TUBING
- TI – TITANIUM ALLOY PIPE
- TLS – TEFLON LINED STEEL PIPE
- TYB – TYGON® TUBING–BRAIDED
- TYG – TYGON® TUBING–UNBRAIDED

FLOWS AND LINES

- NEW MAIN FLOW
- EXISTING MAIN FLOW
- FUTURE MAIN FLOW
- NEW SECONDARY FLOW
- EXISTING SECONDARY FLOW
- FUTURE SECONDARY FLOW
- CHEMICALS
- BY OTHERS
- CS / SS – MATERIAL SPECIFICATION CHANGE
- * – SUPPLIED BY VEOLIA

INSTRUMENTATION AND RELATED ITEMS

- CAPILLARY TUBING
- ELECTRICAL
- HYDRAULIC
- PNEUMATIC
- DATA LINK

VALVE SYMBOLS

- ANGLE
- BALL
- BUTTERFLY
- CHECK VALVE
- DIAPHRAGM
- VALVE NOT SPECIFIED
- GLOBE
- KNIFE
- NEEDLE
- PINCH
- PLUG
- PRESSURE REDUCING
- RELIEF ON LINE
- RELIEF
- SQUEEZE
- THREE WAY
- FOUR WAY
- FLOAT VALVE
- VACUUM BREAKER
- AIR RELEASE
- HOSE BIBB
- INTEGRAL BLOCK & BLEED
- PENSTOCK
- WASTE PLUG
- MULTI–FONCTION VALVE
- CALIBRATION COLUMN
- VENT (VENT)
- AIR TRAP

ACTUATORS

- CYLINDER
- DIAPHRAGM–SPRING
- ELECTRO HYDRAULIC
- ELECTRO PNEUMATIC
- MOTOR (M)
- SOLENOID (S)
- POSITIONER (* – TYPE)

PIPING ACCESSORIES

- FUNNEL
- DIAPHRAGM SEAL
- DRESSER COUPLING
- EJECTOR/EDUCTOR
- EXPANSION JOINT
- FLANGED CONNECTION
- FLEXIBLE HOSE
- HOSE CONNECTION
- PIPE TO TUBING ADAPTER
- INSULATION
- INSULATED PIPE WITH ELECTRIC HEAT TRACE (E)
- INSULATED PIPE WITH STEAM HEAT TRACE (S)
- VACUUM BREAKER
- PULSATION DAMPENER
- END CAP DISCONNECT
- QUICK DISCONNECT
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- RUPTURE DISK
- BASKET FILTER
- MIXING VALVE
- SIGHT FLOW INDICATOR
- STRAINER
- UNION
- STEAM TRAP (T)
- AIR FILTER
- AIR LUBRICATOR
- AIR REGULATOR
- COMB. AIR FILTER/ REGULATOR W/GAUGE
- FLOW ORIFICE
- SIGHT FLOW STRAINER
- SPECTACLE BLIND (OPEN)
- SPECTACLE BLIND (CLOSE)
- PIGTAIL SIPHON
- STATIC MIXER
- INJECTION QUILL
- STOP LOG
- FLUME
- MAGNETIC FLOW METER (M)
- SONIC FLOW METER
- TURBINE FLOW METER
- VENTURI
- WEIR
- VORTEX SENSOR
- ROTAMETER
- DRAIN
- PLUG

ISA INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS	
	PROCESS VARIABLE	MODIFIER (IF NEEDED)	READOUT OR COMPUTER FUNCTION	MODIFIER (IF NEEDED)
A	ANALYSIS		ALARM	
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE		CONTROL	
D	USER'S CHOICE	DIFFERENTIAL		
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)	
F	FLOW RATE	RATIO (FRACTION)		
G	USER'S CHOICE		GLASS, VIEWING DEVICE	
H	HAND			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER	SCAN		
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE	CONTROL STATION	
L	LEVEL		LIGHT	LOW
M	USER'S CHOICE	MOMENTARY		MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)	
P	PRESSURE, VACUUM		POINT (TEST CONNECTION)	
Q	QUANTITY	INTEGRATE, TOTALIZE		
R	RADIATION		RECORD	
S	SPEED, FREQUENCY	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECH. ANALYSIS		VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL	
X	UNCLASSIFIED	X–AXIS	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y–AXIS	RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z–AXIS	DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

LEGEND BASED ON ISA STANDARD S 5.1

INSTRUMENT TAG NUMBERS

- TIC 103 – INSTRUMENTATION IDENTIFICATION OR TAG NUMBER
- 103 – LOOP NUMBER
- TIC – FUNCTIONAL IDENTIFICATION

NOTE: HYPHENS ARE OPTIONAL AS SEPARATORS

ELECTRICAL AND RELATED ITEMS

- (S) (S) – SELECTOR SWITCHES
- VFD – VARIABLE FREQUENCY DRIVE
- EM – EMERGENCY POWER
- (I) – INTERLOCK
- PILOT LIGHT

LINE NUMBER IDENTIFICATION

25–xxyy–zzzz–0

- INSULATION (=I) OR INSULATION+ TRACING(=T)
- MATERIAL CLASS
- LINE NUMBER
- NUMBER ORIGINAL SHEET
- DIAMETER

NOTE : Refer to project pipe specifications for line codes

LINE CONTINUATIONS

- INDICATES A LINE GOING TO OR COMING FROM BATTERY LIMITS (CONTRACT LIMITS)
- 5 / A 2 – INDICATES CONTINUATION OF LINE IS ON SHEET NUMBER 5 (SAME DRAWING NUMBER) IN ZONE A 2
- SHT 5 – INDICATES CONTINUATION OF A SIGNAL IS ON SHEET NUMBER 5

EQUIPMENT TAG NUMBERS

- MXXXX – AGITATORS, AERATORS
- BXXXX – AIR HANDLING–BLOWERS, COMPRESSORS, DRYERS
- RXXXX – CLARIFIERS, THICKENERS, SEPARATORS
- FXXXX – FILTERS–VACUUM, PRESSURE, CENTRIFUGES
- PXXXX – PUMPS
- TXXXX – TANKS
- EXXXX – HEAT EXCHANGER
- IXXXXX – SOFTENERS, DEMINERALIZERS
- ROXXXX – REVERSE OSMOSIS UNITS
- SGXXXX – STEAM GENERATORS

VALVE & ACCESSORY TAG

- VXXXX – VALVE
- EJXXXX – EXPANSION JOINT
- HXXXX – HOSE
- FXXXX – FILTER
- SXXXX – STRAINER
- SBXXXX – SPECTACLE BLIND
- STXXXX – STEAM TRAP

INSTRUMENT SYMBOLS

	PRIMARY LOCATION ***NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY LOCATION ***NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	1 (* IP1**)	2	3
SHARED DISPLAY, SHARED CONTROL	4	5	6
COMPUTER FUNCTION	7	8	9
PROGRAMMABLE LOGIC CONTROL	10	11	12

* SYMBOL SIZE MAY VARY ACCORDING TO THE USER'S NEEDS AND THE TYPE OF DOCUMENT. A SUGGESTED SQUARE AND CIRCLE SIZE FOR LARGE DIAGRAMS IS SHOWN ABOVE. CONSISTENCY IS RECOMMENDED.

** ABBREVIATIONS OF THE USER'S CHOICE SUCH AS IP1 (INSTRUMENT PANEL #1), IC2 (INSTRUMENT CONSOLE #2), CC3 (COMPUTER CONSOLE #3), ETC., MAY BE USED WHEN IT IS NECESSARY TO SPECIFY INSTRUMENT OR FUNCTION LOCATION.

*** NORMALLY INACCESSIBLE OR BEHIND–THE–PANEL DEVICES OR FUNCTIONS MAY BE DEPICTED BY USING THE SAME SYMBOL BUT WITH DASHED HORIZONTAL BARS, I.E.

RÉV. / REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
4	FOR APPROVAL IV	2018–07–04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018–05–31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018–05–07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018–04–25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY: A.C.	DATE: 2018–04–04	CLIENT: AGNICO EAGLE MINING, AMARUQ, NU
VÉRIFIÉ PAR/CHECKED BY: G.P.	DATE: 2018–04–04	
INGÉNIERIE PAR/ENGINEERING BY: G.P.	DATE: 2018–04–04	

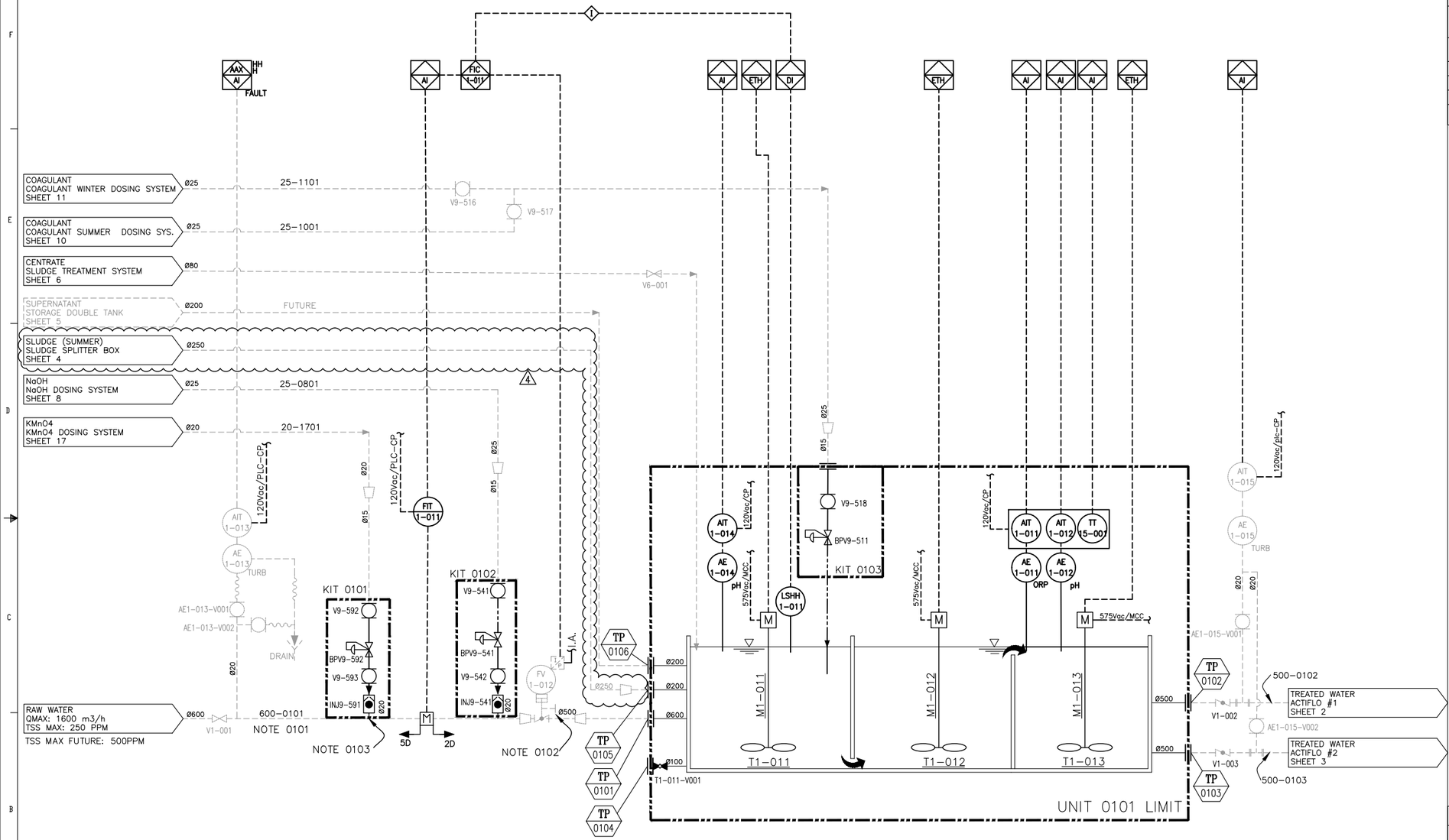
TITRE / TITLE: WATER TREATMENT PLANT PROCESS AND INSTRUMENTATION DIAGRAM LEGEND

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009 – PI0001	GEN	0/19	4

REF: N/A

SIZE ANSI D



T1-011/012/013
METAL PRECIPITATION REACTOR
MODEL: RX75-3
MATERIAL: C.S.
VOLUME: 175 m3
CONTACT TIME: XXmin@XXm3/h

M1-011/012/013
METAL PRECIPITATION REACTOR MIXER
MIXER: EVGX6-5
DRIVER: 5 HP
575V/3Ph/60Hz
MATERIAL: SS304

Notes :

Note 0101 : Raw water Inlet pressure: 14 Psig.

Note 0102 : Flow control valve equipped with a declutchable gear and a handwheel

Note 0103 : Install as far as possible from reactor inlet

VWT Canada Scope of Supply limits:

RX-75-3 Reactors are pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.

REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	2018-04-04

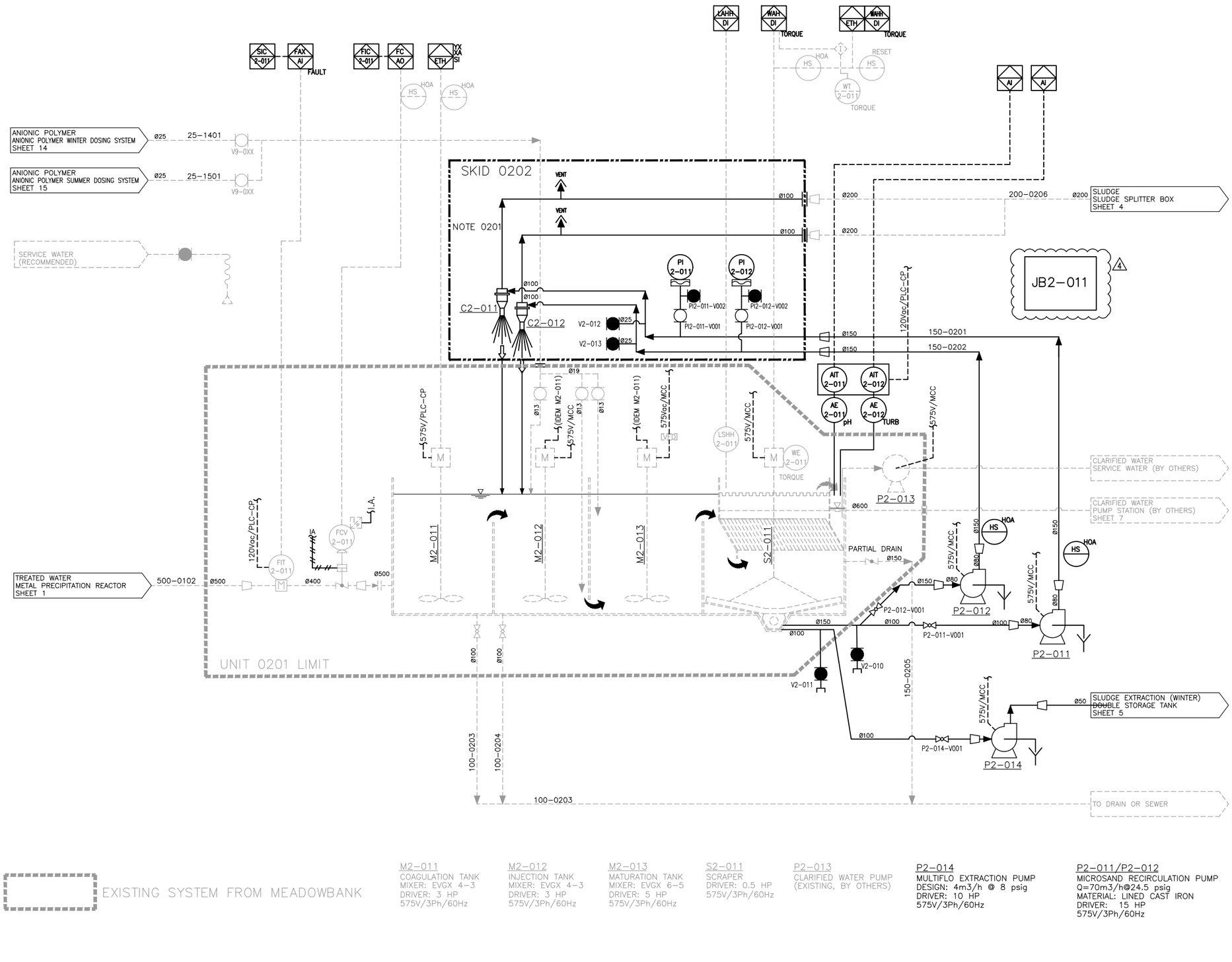
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
METAL PRECIPITATION REACTOR

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	1/19	4

REF: N/A SIZE ANSI D



EXISTING SYSTEM FROM MEADOWBANK

M2-011
COAGULATION TANK
MIXER: EVGX 4-3
DRIVER: 3 HP
575V/3Ph/60Hz

M2-012
INJECTION TANK
MIXER: EVGX 4-3
DRIVER: 3 HP
575V/3Ph/60Hz

M2-013
MATURATION TANK
MIXER: EVGX 6-5
DRIVER: 5 HP
575V/3Ph/60Hz

S2-011
SCRAPER
DRIVER: 0.5 HP
575V/3Ph/60Hz

P2-013
CLARIFIED WATER PUMP
(EXISTING, BY OTHERS)

P2-014
MULTIFLO EXTRACTION PUMP
DESIGN: 4m3/h @ 8 psig
DRIVER: 10 HP
575V/3Ph/60Hz

P2-011/P2-012
MICROSAND RECIRCULATION PUMP
Q=70m3/h@24.5 psig
MATERIAL: LINED CAST IRON
DRIVER: 15 HP
575V/3Ph/60Hz

Notes :

Note 0201: Avoid backpressure at the outlet of the hydrocyclones, keep gravity draining.

VWT Canada Scope of Supply limits:

Actiflo units are pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	DATE
A.C.	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	DATE
G.P.	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	DATE
G.P.	2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

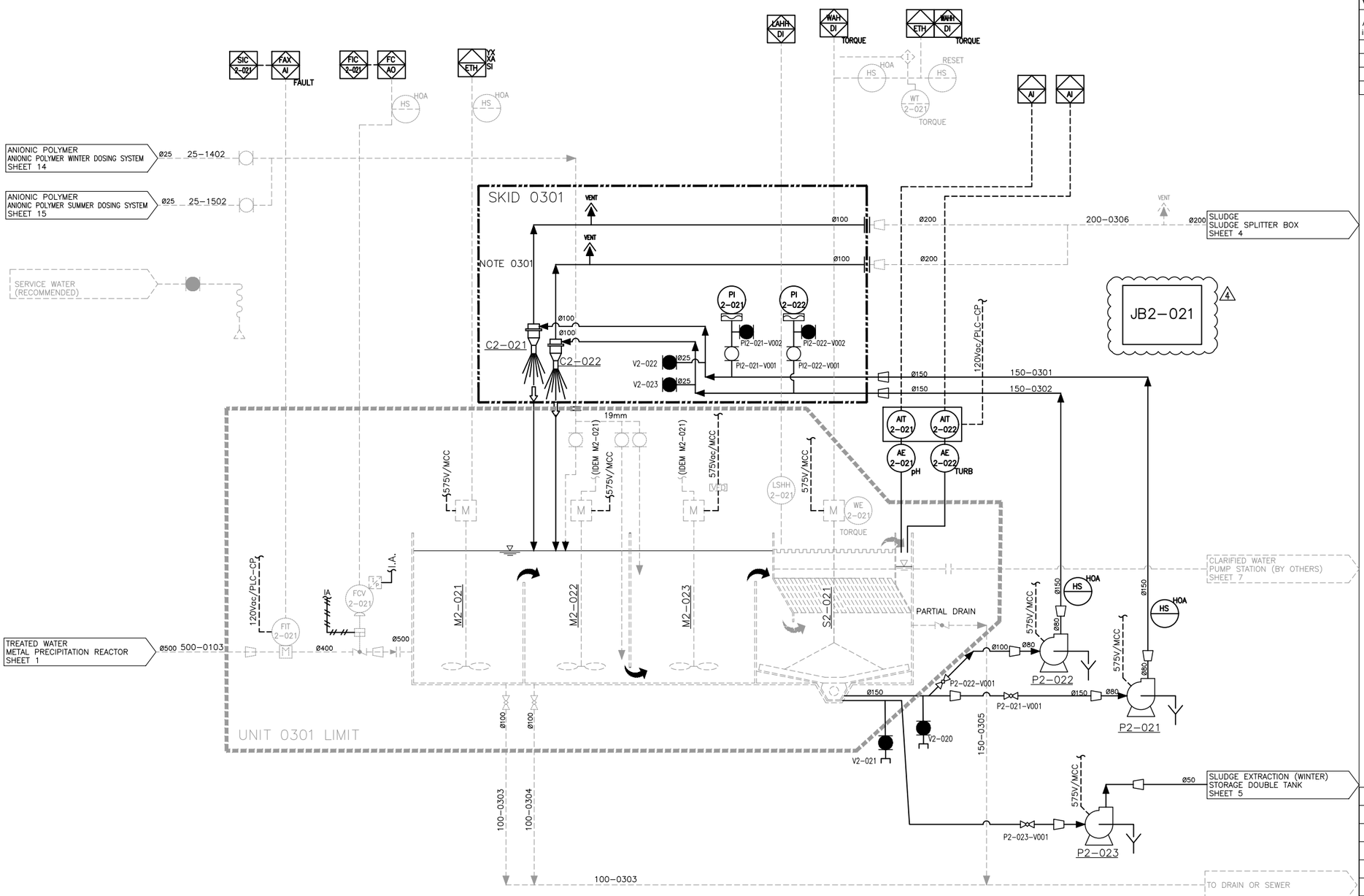
TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ACTIFLO #1/ MULTIFLO #1

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	P10001	GEN	2/19	4

REF: N/A

SIZE ANSI D



Notes :

Note 0301: Avoid backpressure at the outlet of the hydrocyclones, keep gravity draining.

VWT Canada Scope of Supply limits:

Actiflo units are pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.

EXISTING SYSTEM FROM MEADOWBANK

M2-021
COAGULATION TANK
MIXER: EVGX 4-3
DRIVER: 3 HP
575V/3Ph/60Hz

M2-022
INJECTION TANK
MIXER: EVGX 4-3
DRIVER: 3 HP
575V/3Ph/60Hz

M2-023
MATURATION TANK
MIXER: EVGX 6-5
DRIVER: 5 HP
575V/3Ph/60Hz

S2-021
SCRAPER
DRIVER: 0.5 HP
575V/3Ph/60Hz

P2-023
MULTIFLO EXTRACTION PUMP
DESIGN: 4m3/h @ 8 psig
DRIVER: 10 HP
575V/3Ph/60Hz

P2-021/P2-022
MICROSAND RECIRCULATION PUMP
Q=70m3/h@24.5 psig
MATERIAL: LINED CAST IRON
DRIVER: 15 HP
575V/3Ph/60Hz

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	DATE 2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE 2018-04-04

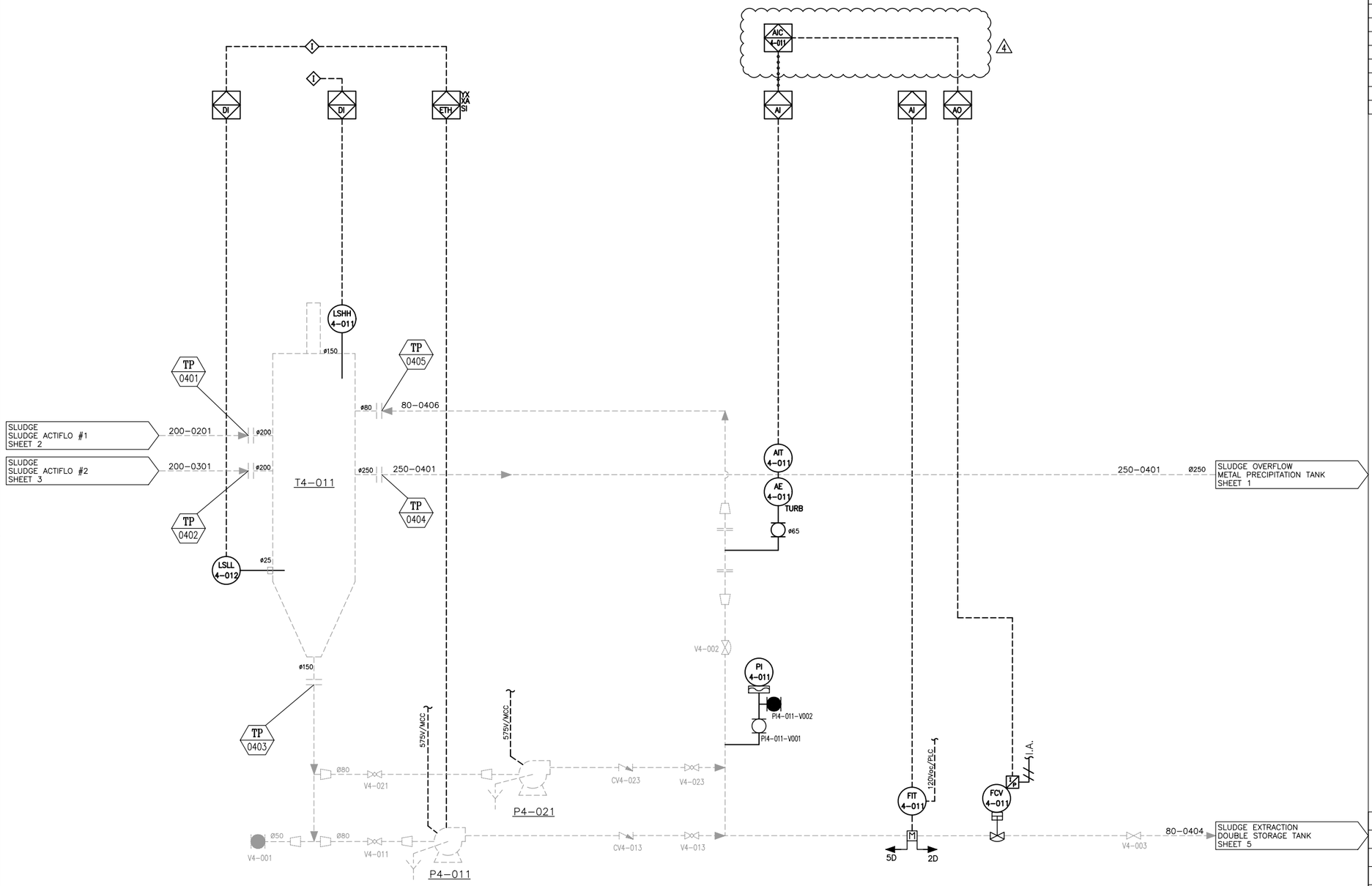
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ACTIFLO #2 / MULTIFLO #2

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	P10001	GEN	3/19	4

REF: N/A SIZE ANSI D



T4-011
(BY OTHERS)
SLUDGE SPLITTER BOX
MATERIAL: SS304
VOLUME: 1.4 m3

P4-011/P4-021 (EXISTING)
SLUDGE EXTRACTION PUMP
CAP.: 42 (28+14) m3/h @ 5mTDH
POWER: 5 HP
575V/3Ph/60Hz

Notes :

Note 0401: Avoid backpressure at the outlet of the hydrocyclones, keep gravity draining.

RÉV. / REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR / DRAWN BY	A.C.	2018-04-04
VÉRIFIÉ PAR / CHECKED BY	G.P.	2018-04-04
INGÉNIERIE PAR / ENGINEERING BY	G.P.	2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

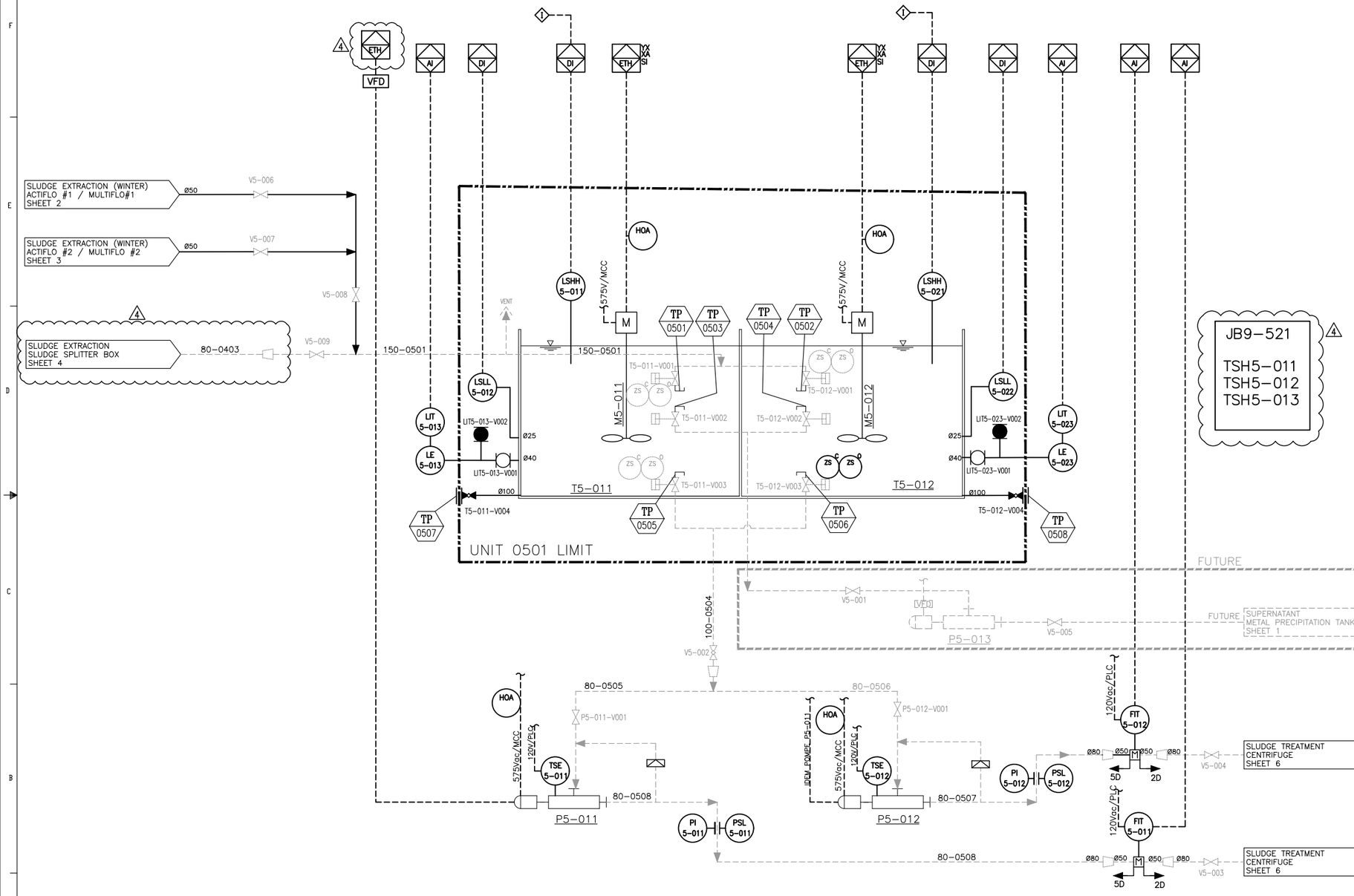
TITRE / TITLE:
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
SLUDGE SPLITTER BOX

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009 – PI0001		GEN	4/19	4

REF: N/A

SIZE ANSI D



T5-011/012
DOUBLE STORAGE TANK
MODEL: RX75-2
MATERIAL: C.S.
VOLUME: XXX m3

M5-011/012
~~DOUBLE STORAGE~~ STORAGE TANK MIXER
MIXER: EVGX6-5
DRIVER: 5 HP
575V/3PH/60Hz
MATERIAL: SS304

P5-011/012
CENTRIFUGE FEEDING PUMP
TYPE: PROGRESSIVE CAVITY
CAP.: 20m3/h @ 50psig
POWER: 5 HP, 575/3/60

P5-013
PUMP (FUTURE)
TYPE: PROGRESSIVE CAVITY
CAP.: XXm3@50psig
POWER: XXHP, 575/3/60

VWT Canada Scope of Supply limits:
RX tanks are pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	DATE
A.C.	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	DATE
G.P.	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	DATE
G.P.	2018-04-04

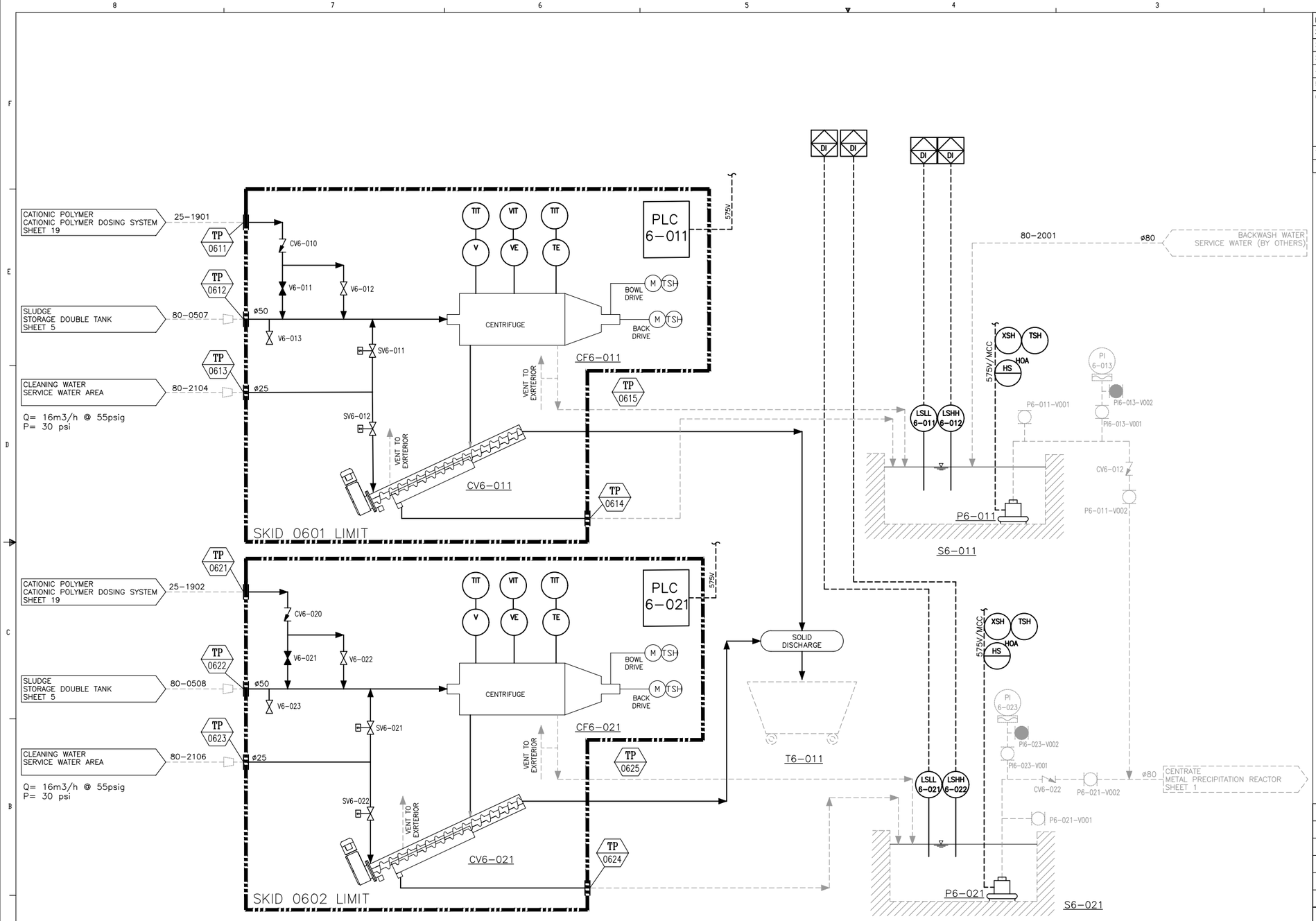
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
STORAGE DOUBLE TANK

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 –	PI0001	GEN	5/19	4

REF: N/A SIZE ANSI D



CV6-011 / CV6-021
CONVEYOR
POWER: 575V/3PH/60Hz

CF6-011 / CF6-021
CENTRIFUGE
BOWL DRIVE MOTOR
POWER: 575V/3PH/60Hz

T6-011
ROLL-OFF BIN
(BY OTHERS)

S6-011 / S6-021
SUMP PUMP PIT
VOL.: 5m3

P6-011 / P6-021
CENTRATE SUMP PUMP
TYPE: SUBMERSIBLE PUMP
CAP : 20 m3/h @ 8 mTDH
POWER: 5 HP 575V/3Ph/60Hz

Notes :

1. All piping to and from machine to be completed with flexible connections.
2. See foundation details for design loads and connection details.
3. All dimensions are in mm with inches in [ ].
4. Dry weight of machine 3059kg [6744 lbs].
5. Scroll weight 510 kg [1124 lbs].
6. Process requirements
   Washwater: 35.2-70.4GPM @ 43.5-58PSI
   Shutdown: 15min
   CIP: 10min
   Air flow: 118CFM
   Minimum sludge inlet pressure: 7.5PSI at centrifuge feed flange.
7. All chutes to be supported by others unless noted otherwise.

REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
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2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

DESSINÉ PAR/DRAWN BY: A.C. 2018-04-04
VÉRIFIÉ PAR/CHECKED BY: G.P. 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY: G.P. 2018-04-04

VEOLIA WATER TECHNOLOGIES

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
SLUDGE TREATMENT SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 –	PI0001	GEN	6/19	4

REF: N/A
SIZE ANSI D

CLARIFIED WATER
ACTIFLO #1 (UNIT 0201)
SHEET 2

TX-0XX

575V/MCC

PX-0XX

CLARIFY WATER
TO OUTFALL
BY OTHERS

CLARIFIED WATER
ACTIFLO #2 (UNIT 0301)
SHEET 3

TX-0XX

575V/MCC

PX-0XX

CLARIFY WATER
BY PASS
BY OTHERS

TX-0XX / TX-0XX
LIFTING TANK

PX-0XX / PX-0XX
LIFTING PUMP

Notes :

REV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C. 2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P. 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P. 2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

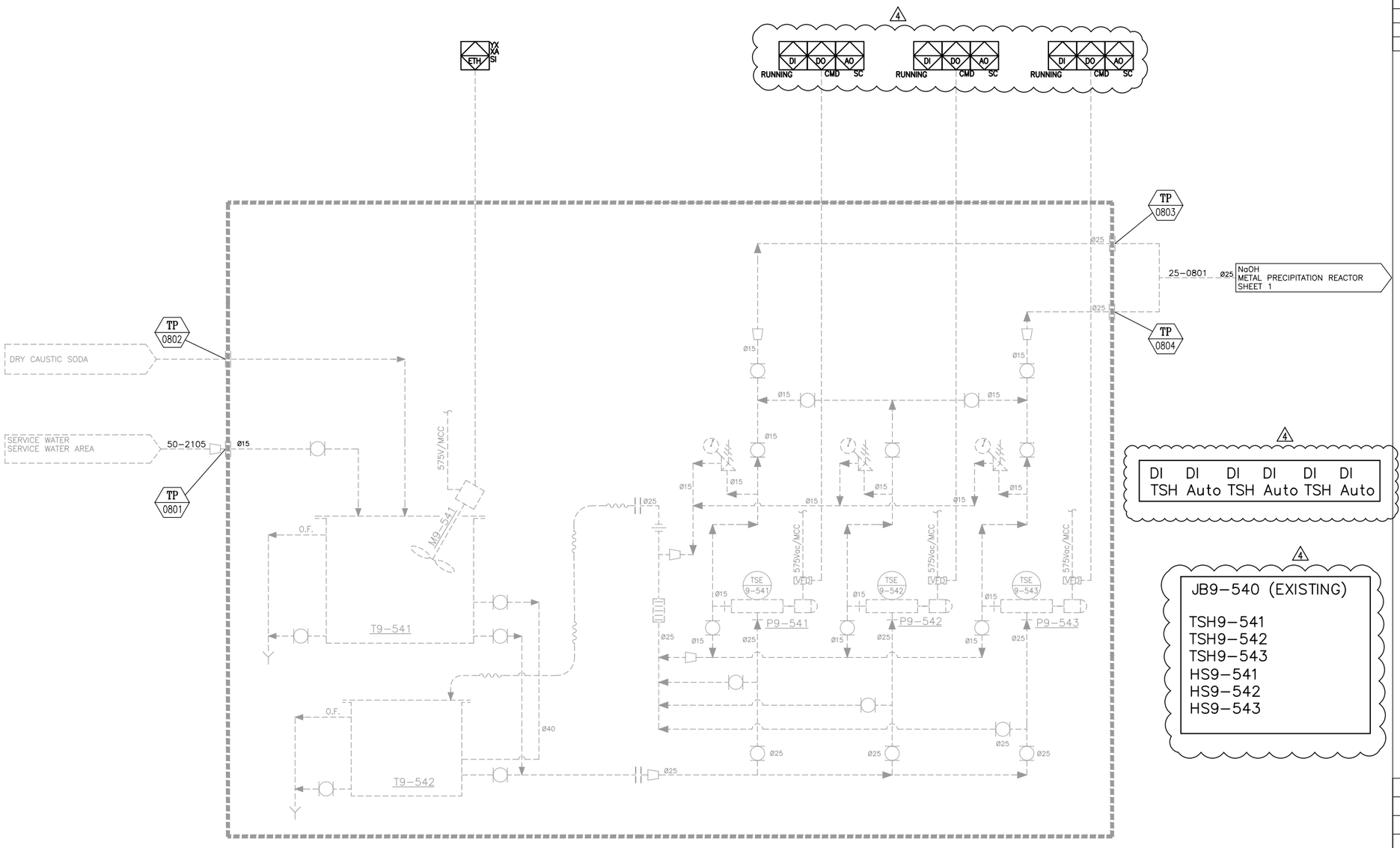
TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
PUMP STATION

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	PI0001	GEN	7/19	4

REF: N/A

SIZE ANSI D



EXISTING SYSTEM FROM MEADOWBANK

T9–541
CAUSTIC SODA PREPARATION TANK
TOTAL CAP: 340 L
MATL: POLYETHYLENE

T9–542
CAUSTIC SODA DOSING TANK
TOTAL CAP: 70 L
MATL: POLYETHYLENE

M9–541
CAUSTIC SODA MIXER
DRIVER: 0.5HP
575V/3Ph/60Hz

P9–541/P9–542/P9–543
CAUSTIC SODA METERING PUMP
DESIGN: 3.3–50 L/h @7 BARS
MOTOR: 0.5HP
POWER SUPPLY: 575V/3PH/60Hz

Notes :

RÉV. REV.	DESCRIPTION	DATE	REVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018–07–04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018–05–31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018–05–07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018–04–25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	DATE 2018–04–04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE 2018–04–04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE 2018–04–04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
CAUSTIC SODA PREPARATION AND DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	8/19	4

REF: N/A SIZE ANSI D

Notes :

Note 0901 : The vent must be higher than the storage tank.

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

DO
HS
LAL 9-513
DI
ETH
PAX AI
PAH
PAHH
PAL
PALL
FAULT
PAX AI
PAH
PAHH
PAL
PALL
FAULT

SERVICE WATER MITIGATED
SERVICE WATER AREA
80-2108

Q= 20 gpm
P= 30 psi
T= 15°C TO 20°C

TP 0902
S
V9-518
Ø25
FI 9-511
575V/3/60/CLIENT
M
M09-511
M09-512
COAGULANT
COAGULANT
SOL
22 SCFM @ 80 PSI
IA
DEM DF9-511
B9-513
M
IA
MIN 5 SCFM @ 50 PSI
LSL 9-513
120Vac
DF9-511
575Vac/PLC-CP
VFD
HS
HS
HVA
POT
LIT 9-511
M
M9-511
IDEM DF9-511
V9-512
TSE 9-515
Ø50
P9-515
Ø65
IDEM DF9-511
LIT 9-512
Ø50
Ø40
T9-512
V9-519
T9-511
50ø
DRAIN
DRAIN

TP 0903
25-1102
COAGULANT RETURN
COAGULANT DOSING SKID
SHEET 11

TP 0904
25-1002
COAGULANT RETURN
COAGULANT DOSING SKID
SHEET 10

TP 0905
25-1003
COAGULANT RETURN
COAGULANT DOSING SKID
SHEET 10

TP 0906
Ø40
V9-515
40-0901
COAGULANT
COAGULANT WINTER DOSING SKID
SHEET 11

V9-514

Ø40
40-0902
COAGULANT
COAGULANT SUMMER DOSING SKID
SHEET 10

SULFURIC ACID
SULFURIC ACID DOSING SKID
SHEET 12
15-1201
Ø15
TP 0901

EXISTING SYSTEM FROM MEADOWBANK

P9-515
COAGULANT TRANSFER PUMP
CAPACITY: 5000 L/H @ 30 psi
MOTOR: 5HP, 1150 rpm
POWER SUPPLY: 575V/3Ph/60Hz

DF9-511
DRY FEEDER
CAPACITY: 200 KG/H
DRIVER: 0.75HP
POWER SUPPLY: 575V/3Ph/60Hz

T9-511
COAGULANT MATURATION TANK
CAP.TOTAL: 1000 L

T9-512
COAGULANT DOSING TANK
CAP: 1000L

M9-511
COAGULANT MIXER
DRIVER: 1HP
POWER SUPPLY: 575V/3Ph/60Hz

B9-513
BLOWER
DRIVER: 1.5HP
POWER SUPPLY: 575V/3Ph/60Hz

M09-511
TROLLEY
DRIVER: 0.5 HP
POWER SUPPLY: 575V/3Ph/60Hz

M09-512
HOIST
DRIVER: 2.4 HP
POWER SUPPLY: 575V/3Ph/60Hz

REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	2018-04-04

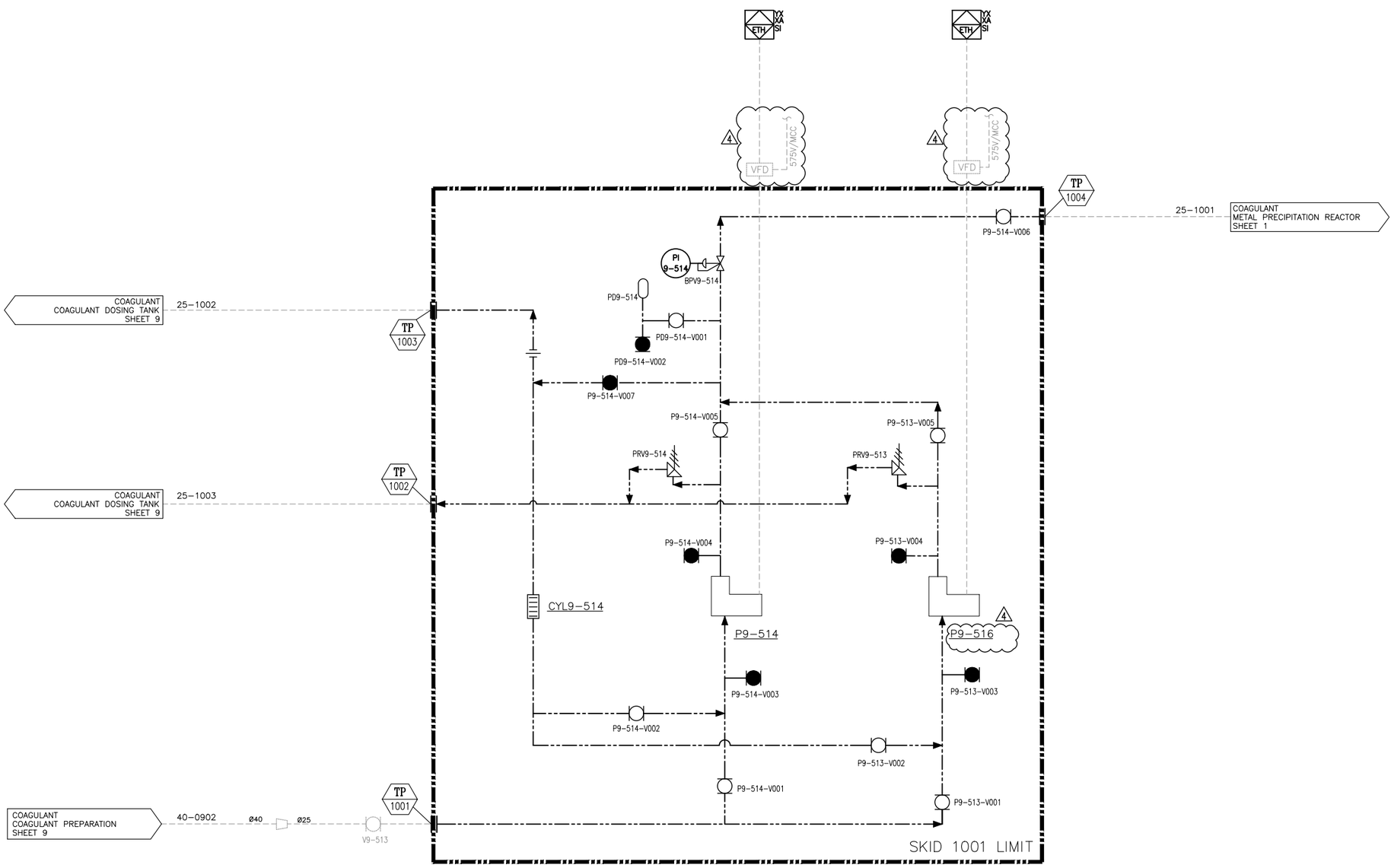
CLIENT
AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
COAGULANT PREPARATION

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 –	PI0001	GEN	9/19	3

REF: N/A
SIZE ANSI D



P9–514 (P9–516)
COAGULANT METERING PUMP
DESIGN: 450LPH@80psig
MOTOR: XXHP
POWER SUPPLY: 575/3/60

Notes :

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018–07–04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018–05–31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018–05–07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018–04–25	A.C.	G.P.	G.P.

DESSINÉ PAR/DRAWN BY	A.C.	DATE	2018–04–04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE	2018–04–04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE	2018–04–04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

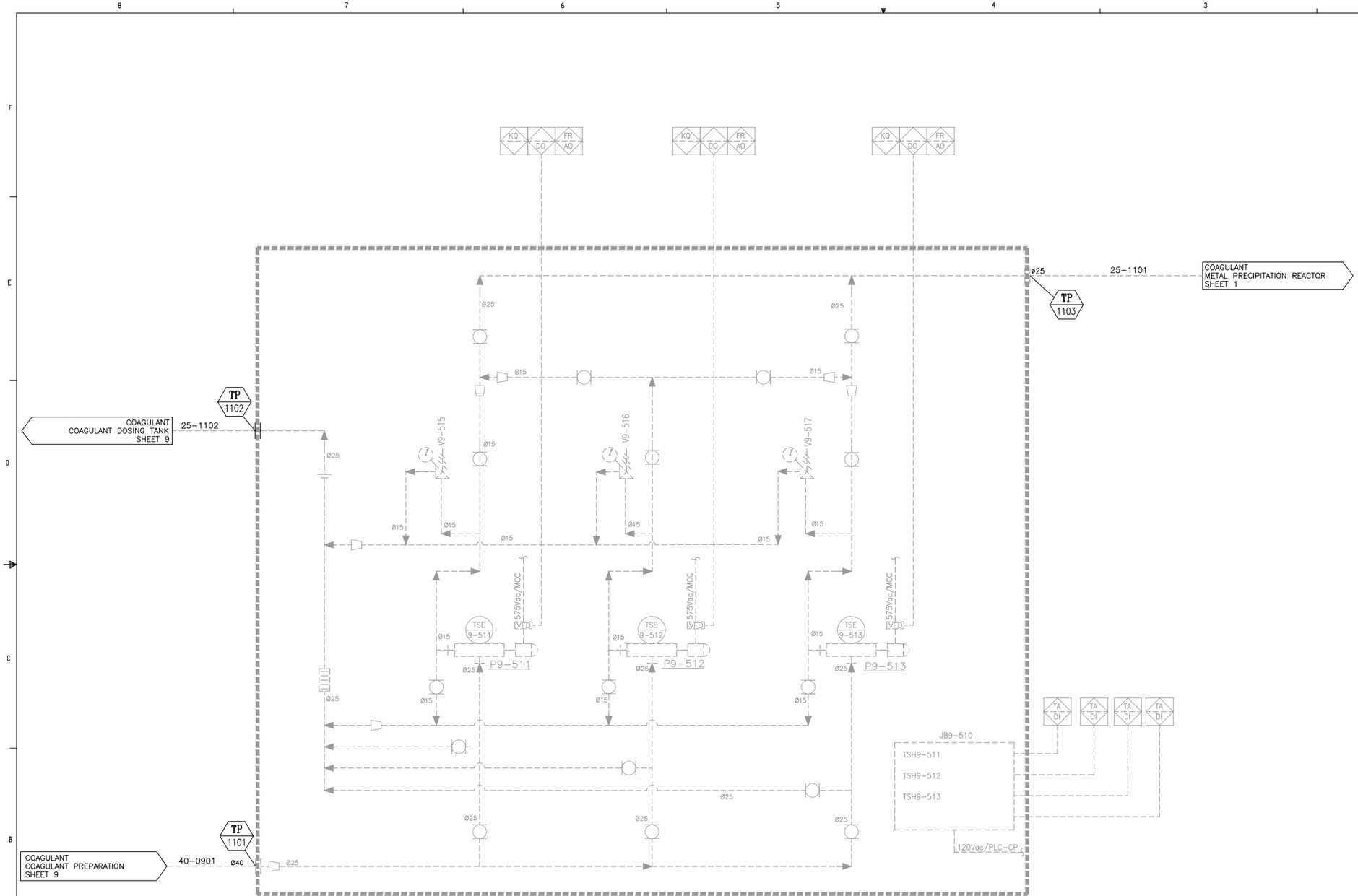
VEOLIA WATER TECHNOLOGIES

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
COAGULANT SUMMER DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	10/19	4

REF: N/A
SIZE ANSI D



EXISTING SYSTEM FROM MEADOWBANK

P9-511/P9-512/P9-513
COAGULANT METERING PUMP
DESIGN: 87 L/h @2 BARS
MOTOR: 0.5HP
POWER SUPPLY: 575V/3PH/60Hz

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

REV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	DATE 2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE 2018-04-04

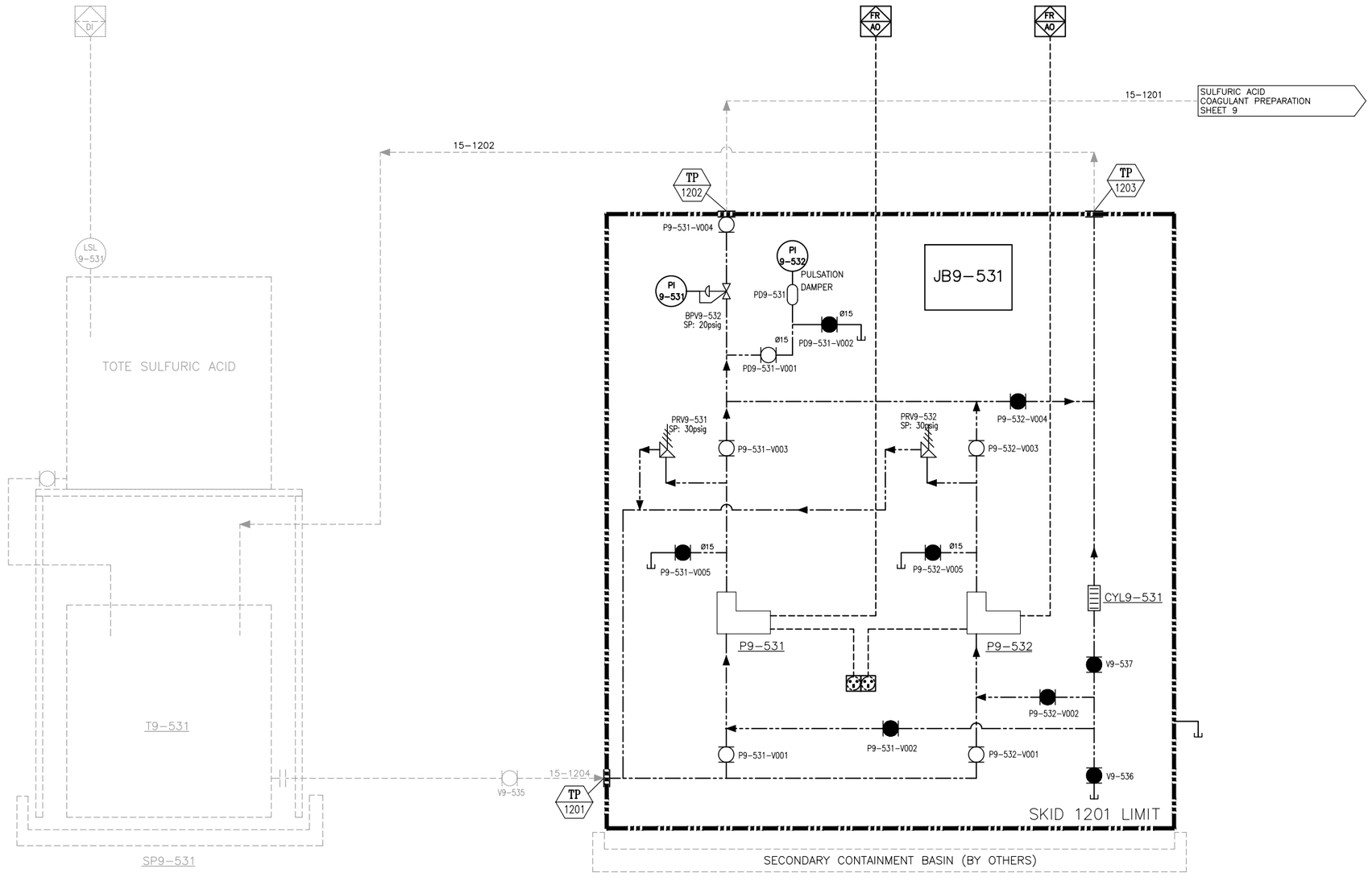
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
COAGULANT WINTER DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	11/19	4

REF: N/A
SIZE ANSI D



Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

SP9-531 (BY OTHERS)
SECONDARY CONTAINMENT
CAPACITY : 1.8 m³
MAT'L: HDPE

T9-531 (BY OTHERS)
STORAGE TANK
SULFURIC ACID
MAT'L: HDPE
CAPACITY: 1,5 m³

P9-531/532
SULFURIC ACID METERING PUMP
TYPE: ELECTROMAGNETIC METERING PUMPS
CAP.: 9LPH@60psig
POWER SUPPLY: 120V/1Ph/60Hz

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	DATE	CLIENT
A.C.	2018-04-04	AGNICO EAGLE MINING
VÉRIFIÉ PAR/CHECKED BY	DATE	AMARUQ, NU
G.P.	2018-04-04	
INGÉNIERIE PAR/ENGINEERING BY	DATE	
G.P.	2018-04-04	

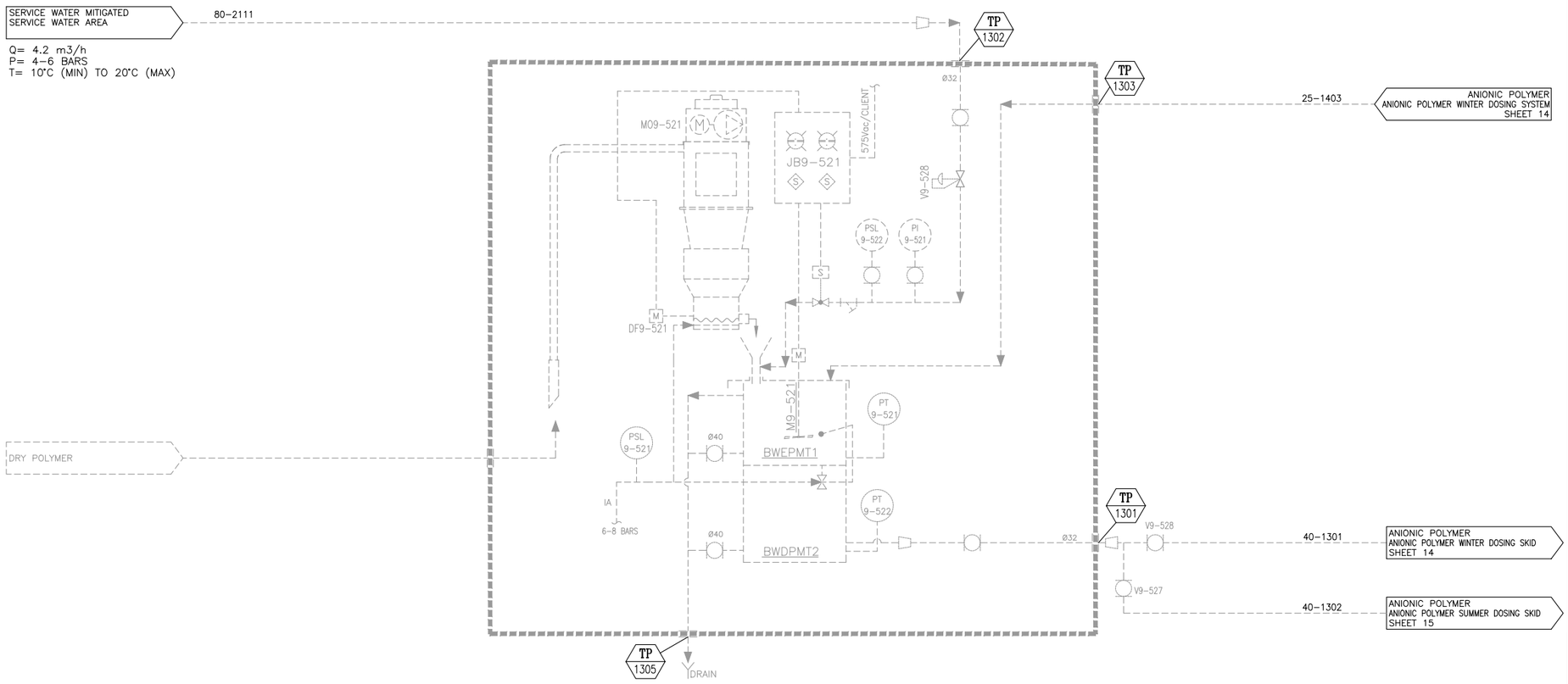
TITRE / TITLE

WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
SULFURIC ACID DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	12/19	4

REF: N/A SIZE ANSI D



General Notes :

None

VWT Canada Supply limits:

Service water system is pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

EXISTING SYSTEM FROM MEADOWBANK

BWEPMT1
POLYMER MATURATION TANK
CAP: 1000L

BWDPMT2
POLYMER STORAGE TANK
CAP: 1000L

DF9-521
DRY FEEDER
CAPACITY: 55 Kg/d
DRIVE : 0.25HP
POWER SUPPLY: 575V/3PH/60Hz

M9-521
POLYMER TANK MIXER
DRIVE: 1HP
POWER SUPPLY: 575V/3PH/60Hz

M09-521
VACUUM CONVEYOR
DRIVE : 1.75HP
POWER SUPPLY: 575V/3PH/60Hz

P9-521/P9-522/P9-523
POLYMER METERING PUMP
DESIGN: 260 L/H @ 2 BARS
MOTOR: 2HP
POWER SUPPLY: 575V/3PH/60Hz

REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

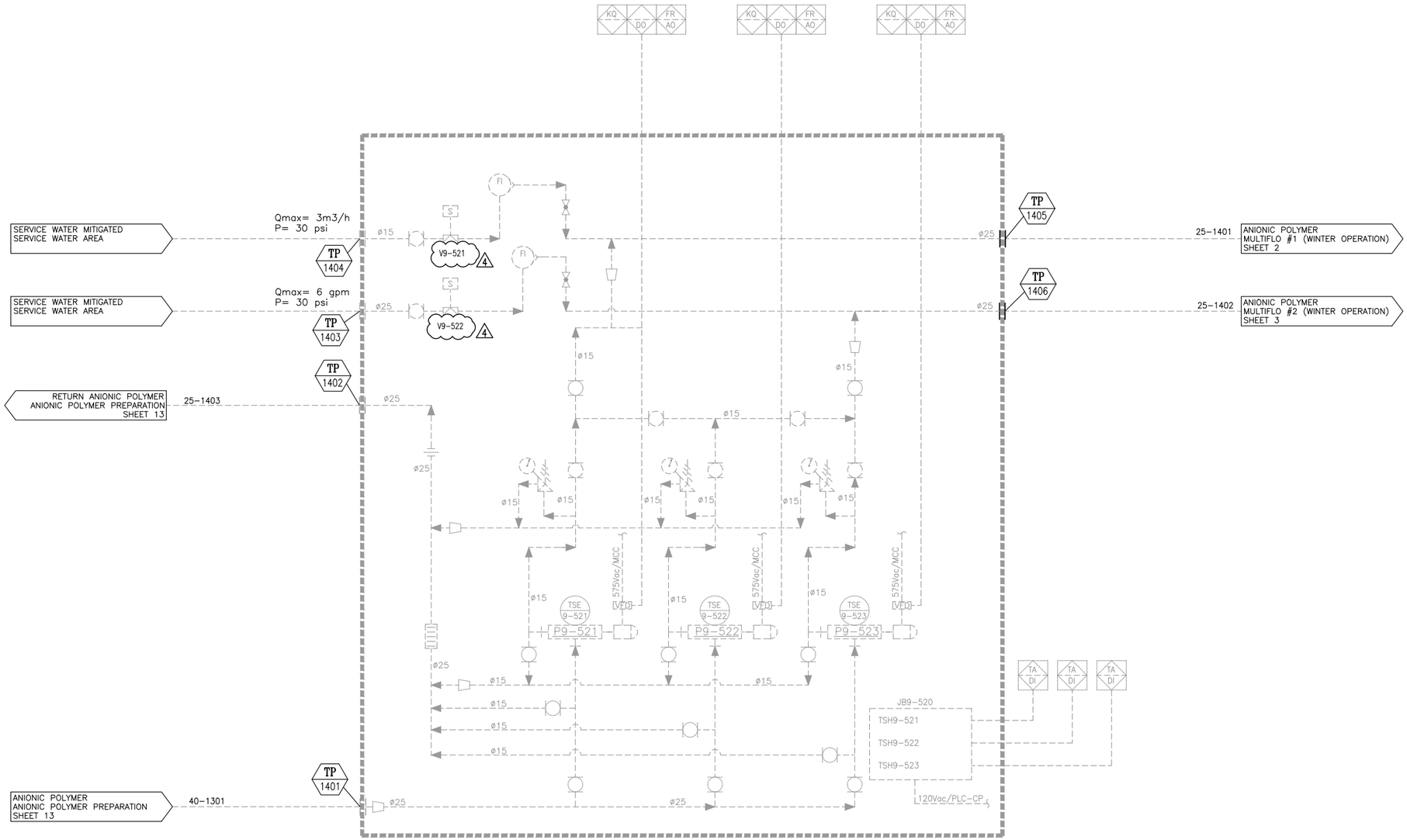
TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ANIONIC POLYMER PREPARATION

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	P10001	GEN	13/19	4

REF: N/A

SIZE ANSI D



EXISTING SYSTEM FROM MEADOWBANK

P9-521/P9-522/P9-523
POLYMER METERING PUMP
DESIGN: 260 L/H @ 2 BARS
MOTOR: 2HP
POWER SUPPLY: 575V/3PH/60Hz

Notes :

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

REV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.	DATE 2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE 2018-04-04

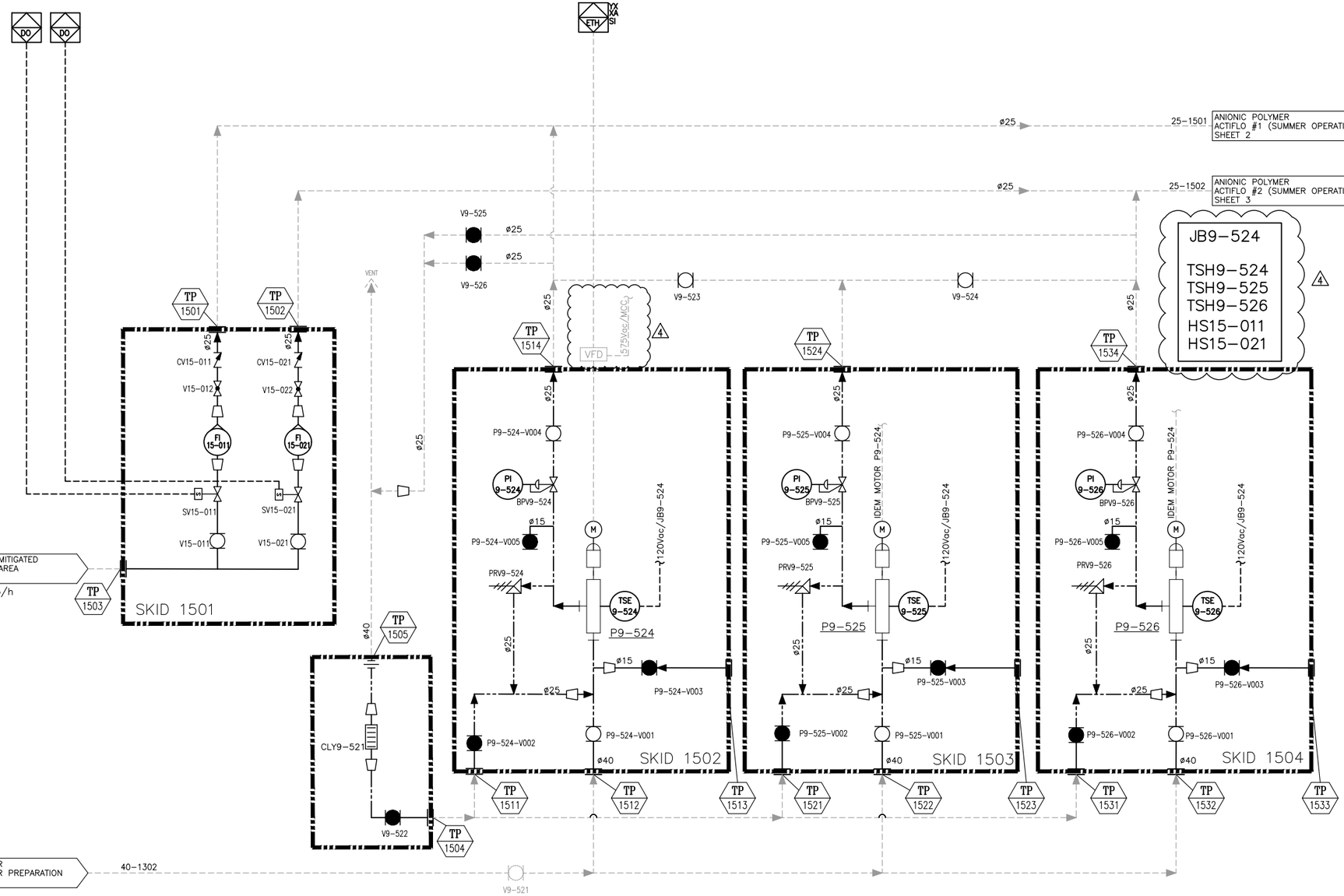
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ANIONIC POLYMER WINTER DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	14/19	4

REF: N/A SIZE ANSI D



P9-524/P9-525/P9-526
ANIONIC POLYMER METERING PUMP
CAP.: 600LPH@85psig
POWER SUPPLY: 575V/3PH/60Hz

Notes :

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	DATE	CLIENT
A.C.	2018-04-04	AGNICO EAGLE MINING
VÉRIFIÉ PAR/CHECKED BY	DATE	AMARUQ, NU
G.P.	2018-04-04	
INGÉNIERIE PAR/ENGINEERING BY	DATE	
G.P.	2018-04-04	

TITRE / TITLE

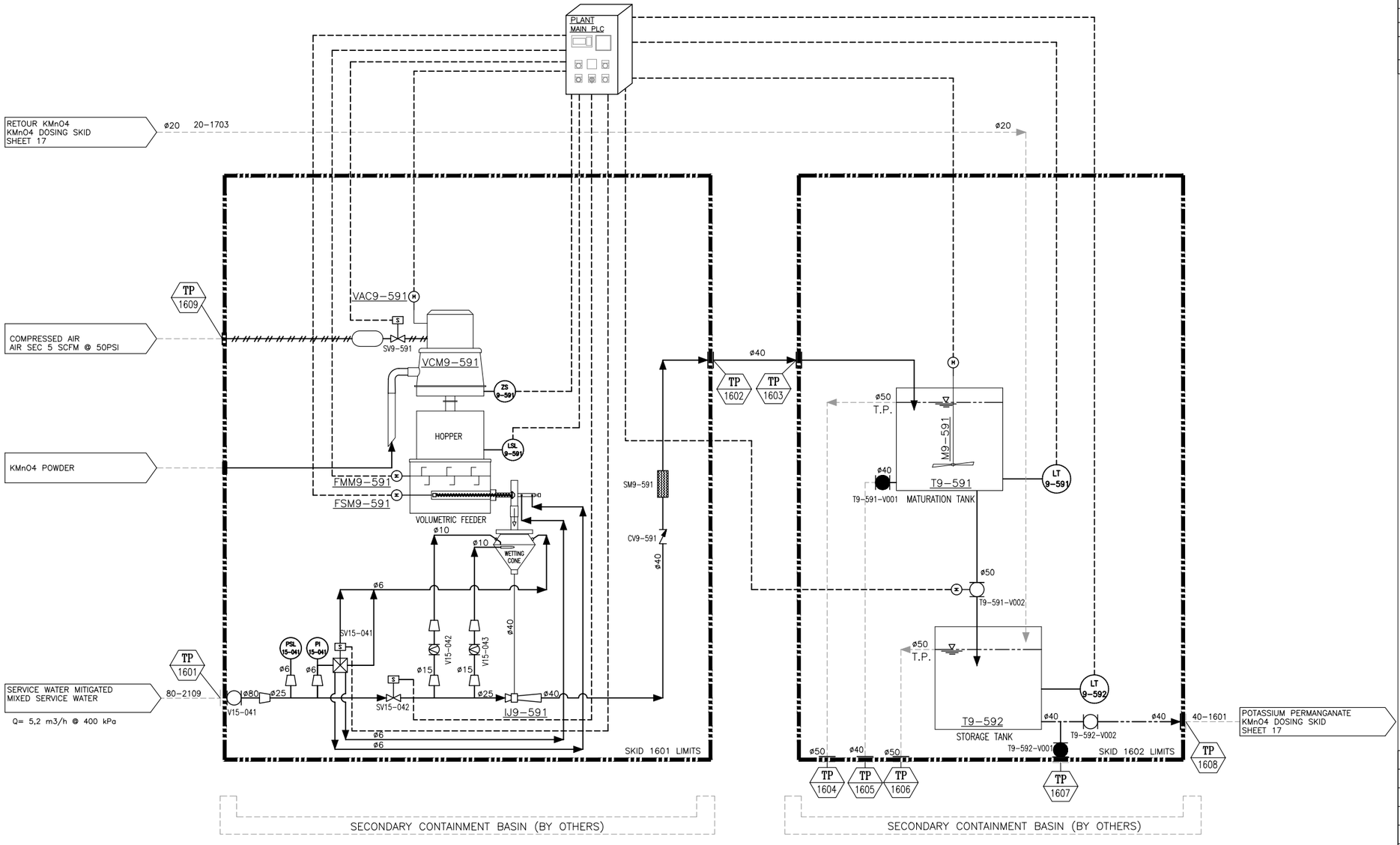
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ANIONIC POLYMER SUMMER DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	P10001	GEN	15/19	4

REF: N/A

SIZE ANSI D



VAC9-591
CONVEYOR MOTOR
POWER Req.: 2.5HP
VOLTAGE: 575V/3Ph/60Hz

VCM9-591
PNEUMATIC CONVEYOR
CAPACITY:21Ft.cu/h (0.6m.cu/h)
MODEL: HAPMAN 16R

FSM9-591
FEEDER SCREW
POWER Req.: 0.5HP
VOLTAGE: 575V/3Ph/60Hz

FMM9-591
FEEDER HOPPER AGITATOR
POWER Req.: 0.75HP
VOLTAGE: 575V/3Ph/60Hz

T9-591
MATURATION TANK
VOLUME: 500L

T9-592
STORAGE TANK
VOLUME: 500L

M9-591
MATURATION TANK MIXER MOTOR
POWER Req.: 0.25Kw/0.33HP
VOLTAGE: 575V/3Ph/60Hz
MODEL: EVG0-0.33

Notes :

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C.
DATE	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.
DATE	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.
DATE	2018-04-04

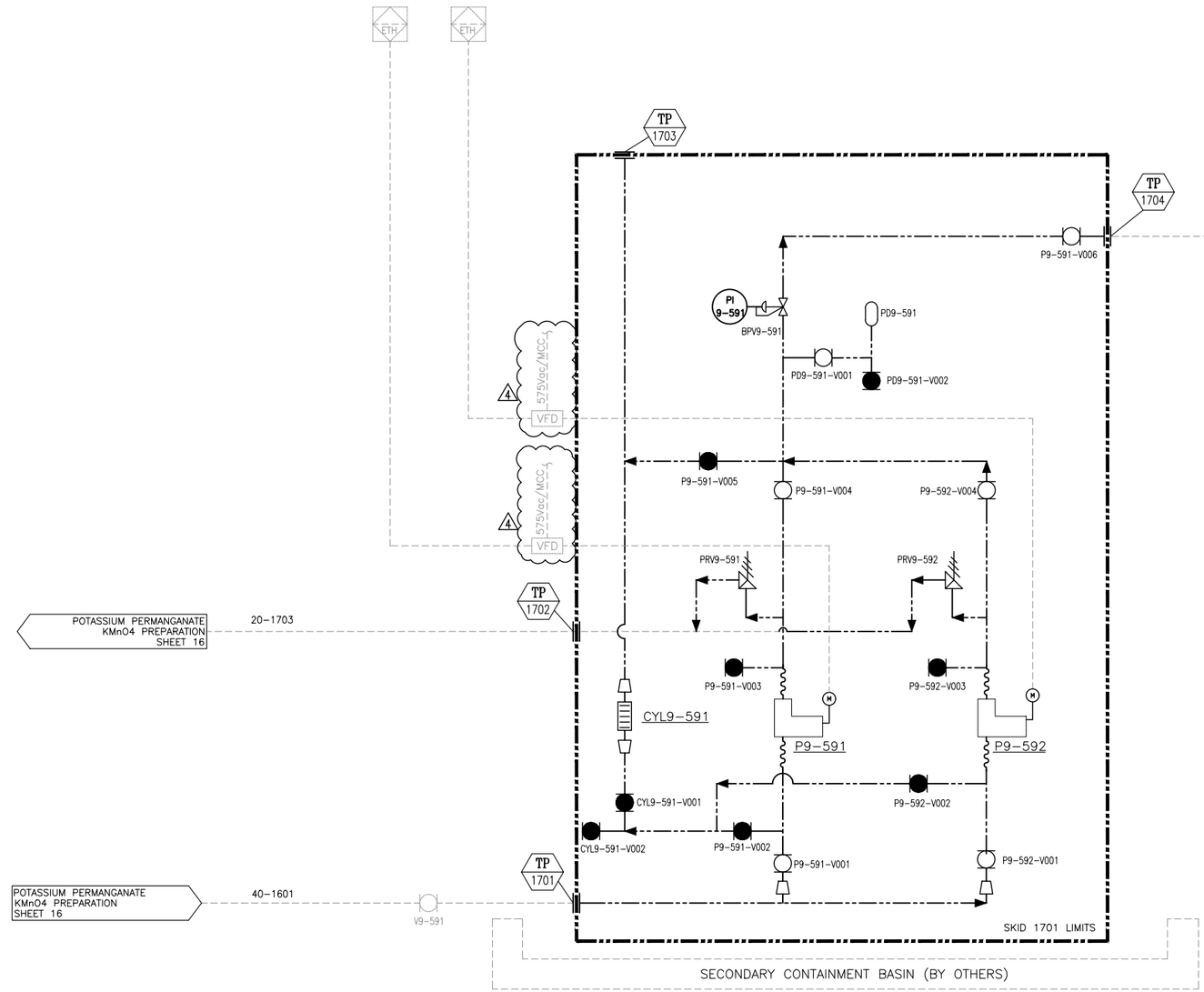
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
POTASSIUM PERMANGANATE PREPARATION

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009	P10001	GEN	16/19	4

REF: N/A SIZE ANSI D



P9-591/P9-592
KMnO4 METERING PUMP
CAP.: 320LPH@80psig
POWER: XX HP, 575/3/60

Notes :

Safety requirements :

Safety Shower must be provided in the immediate work area for emergency use (as per ANSI Z358.1)

REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

DESSINÉ PAR/DRAWN BY	A.C.	DATE	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE	2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

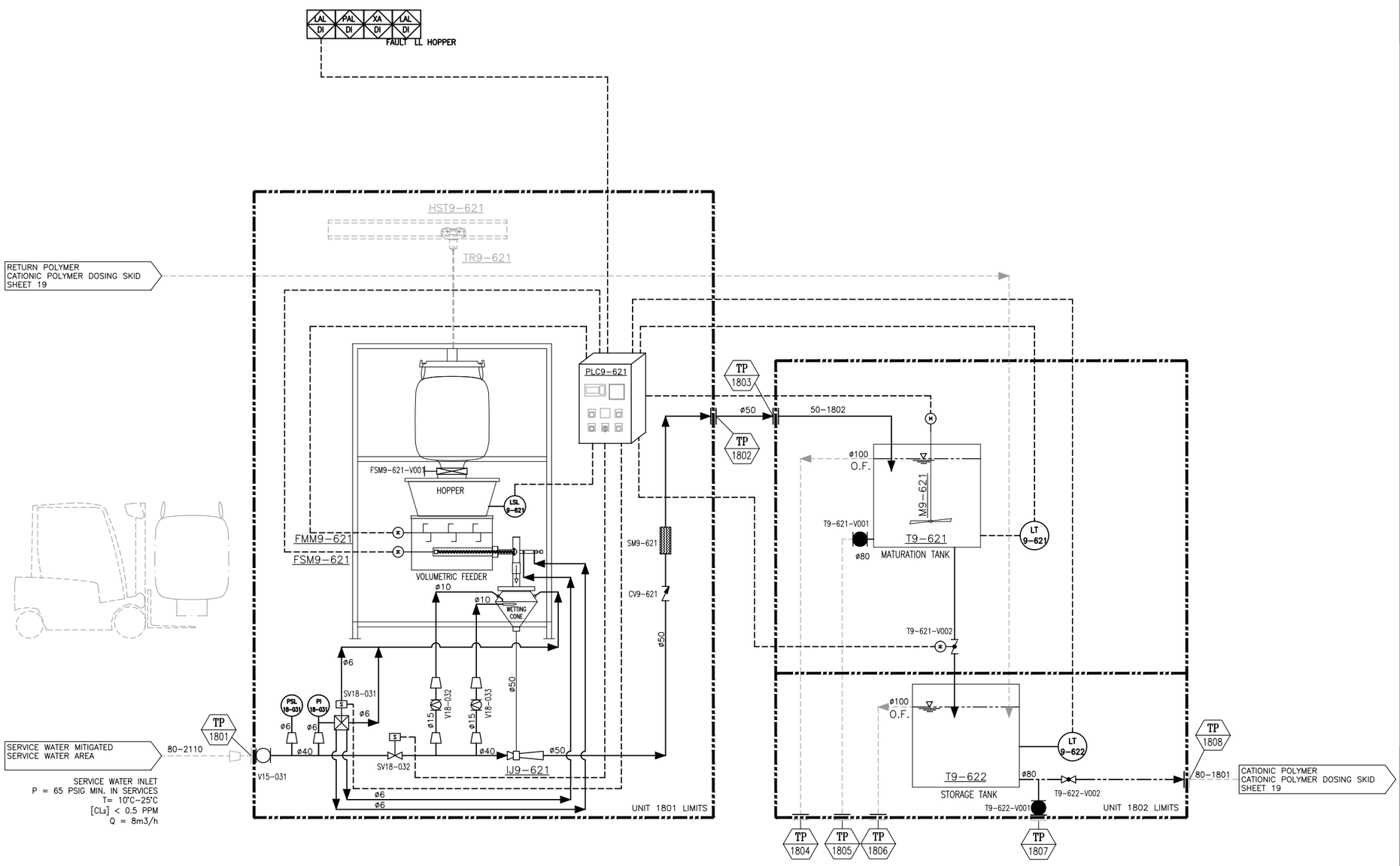
VEOLIA WATER TECHNOLOGIES

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
POTASSIUM PERMANGANATE DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT — DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001	GEN	17/19	4

REF: N/A — SIZE ANSI D



Notes :

Safety requirements :

Polymer is very slippery. Refer to spill response procedure.

A eye wash fountain must be provided in the immediate work area for emergency use.

MODEL	INLET WATER FLOW RATE
HP 250	5.2 M3/H
HP 500	5.2 M3/H
HP 750	5.2 M3/H
HP 1000	5.2 M3/H
HP 1250	5.2 M3/H
HP 1500	5.2 M3/H
HP 1750	5.2 M3/H
HP 2000	8.0 M3/H
HP 2500	8.0 M3/H
HP 3000	8.0 M3/H
HP 3500	8.0 M3/H
HP 4000	8.0 M3/H

HST9-621
HOIST
XX T (XXX Lbs)

TR9-621
TROLLEY

FSM9-621
FEEDER SCREW
POWER Req.: 0.5HP
VOLTAGE: 575V/3Ph/60Hz

FMM9-621
FEEDER HOPPER AGITATOR
POWER Req.: 0.75HP
VOLTAGE: 575V/3Ph/60Hz

T9-621
MATURATION TANK
VOLUME: 3500L

T9-622
STORAGE TANK
VOLUME: 3500L

M9-621
MATURATION TANK MIXER MOTOR
POWER Req.: 0.75HP
VOLTAGE: 575V/3Ph/60Hz
MODEL: EVG1-0.75

RÉV. REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018-05-31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY	A.C. 2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P. 2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P. 2018-04-04

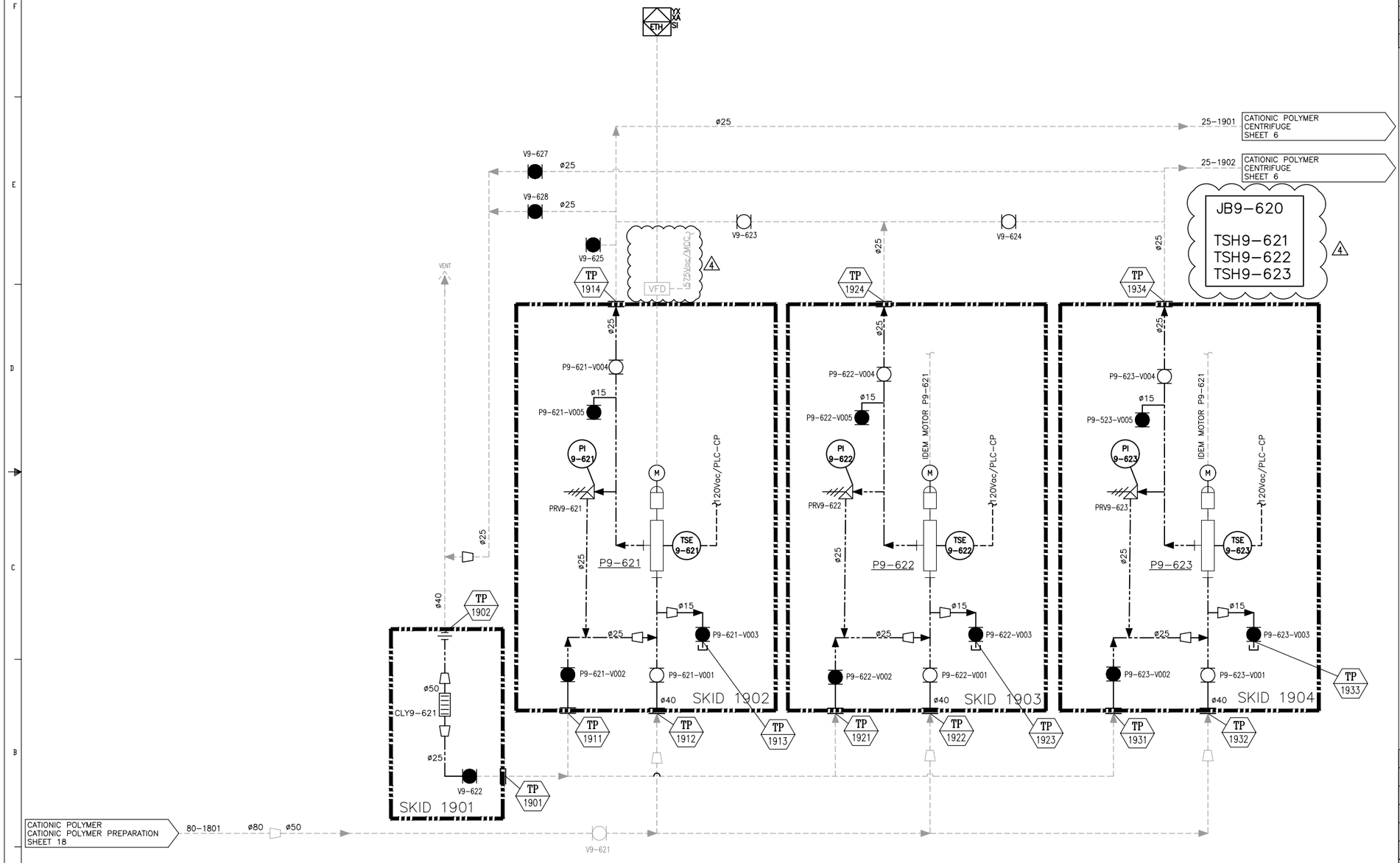
CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
CATIONIC POLYMER PREPARATION

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009 – PI0001		GEN	18/19	4

REF: N/A SIZE ANSI D



P9-621/P9-622/P9-623
CATIONIC POLYMER METERING PUMP
CAP.: 600LPH@85psig
POWER SUPPLY: 575V/3PH/60Hz

Notes :
Note 1901 : The vent must be higher than the storage tank.
Safety requirements :
Polymer is very slippery. Refer to spill response procedure.
A eye wash fountain must be provided in the immediate work area for emergency use.

REV.	DESCRIPTION	DATE	RÉVISÉ REVISED	VÉRIFIÉ CHECKED	APPROUVÉ APPROVED
2	FOR APPROVAL II	EN COURS			
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

DESSINÉ PAR/DRAWN BY	A.C.	DATE	2018-04-04
VÉRIFIÉ PAR/CHECKED BY	G.P.	DATE	2018-04-04
INGÉNIERIE PAR/ENGINEERING BY	G.P.	DATE	2018-04-04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

VEOLIA WATER TECHNOLOGIES

TITRE / TITLE
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
CATIONIC POLYMER DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	P10001	GEN	19/19	4

REF: N/A SIZE ANSI D

NO. DESSIN / DRAWING NO. 61-693-205-200-R0

FORMAT ARCHD

FLOW (GPM)	
MIN.	MAX.
17.0	17.5

WATER TREATMENT PLANT BUILDING (WTP)

PUMP SKID DUPLEX LIMITS

50,000L TANK (BY OTHERS)

61POD69301

61POD69302

6184COMD01 AIR COMPRESOR

HEATING UNIT (BY AEM) 61HEA69301

HEATING UNIT (BY AEM) 61HEA69302

HEATING UNIT TANK (BY AEM) 61TNK69315

HEATING UNIT TANK (BY AEM) 61TNK69316

HEATING UNIT (BY AEM) 61HEA69303

HEATING UNIT TANK (BY AEM) 61TNK69317

95% LSHHH
90% LSHH
85% LSH
45% LSL
10% LSLL

COAGULANT PREPARATION
5000218009-PI001
SHEET #9

LEGEND

- DIESEL
- COMPRESSED AIR
- OVER PRESSURE
- VENT
- INSTRUMENTATION SIGNAL
- BY AEM OR OTHERS
- COMPRESSED AIR BY OTHERS
- BALL-VALVE (DARK WHEN NORMALLY CLOSED)
- BULDING SHEAR VALVE
- FUSIBLE LINK VALVE
- SOLENOID VALVE (NORMALLY CLOSED)
- SELF-ACTUATED INTERNAL CONTROL VALVE (NORMALLY CLOSED)
- THERMAL PRESSURE RELIEF VALVE
- PRESSURE RELIEF VALVE
- ANTI-SYPHON VALVE
- FLEXIBLE
- REDUCER
- STRAINER
- CHECK VALVE
- CAP
- QUICK CONNECTION
- PUMP
- HORN

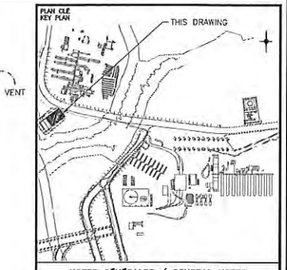
INSTRUMENTATION LEGEND

- PI — PRESSURE INDICATOR
- PIT — PRESSURE INDICATOR TRANSMITTER
- FS — FLOW SWITCH
- PSL X — PRESSURE SWITCH
- LSH — LEVEL SWITCH
- XX / XX — CONTROL FUNCTION LOCATED IN A SHARED DEVICE.
- I — ELECTRICAL INTERLOCK

DA-PRO-SEQ
- SEQUENTIAL NUMBER
- TYPE OF PRODUCT
- PIPING DIAMETER

PRODUCT:
- ARCTIC DIESEL (DSL)
- COMPRESSED AIR (AC)

PLAN CLÉ / KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

ANY FUEL TANKS CONNECTED TO THE DISTRIBUTION SYSTEM MUST COMPLY WITH CAN/ULC STANDARDS FOR DIESEL STORAGE AND ARCTIC DIESEL. CONNECTIONS COMPLIES WITH THE CODE B139-09, BUT NOT THE HEATING UNIT TANKS.

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-11-13

SNC-LAVALIN
SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
TEL.: 819 764-5161 TÉLÉC.: 819 797-0158
www.snclavalin.com

Projet No. : 653281-0001

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/INT	APP.	CUDIT
0	2018-11-13	ISSUED FOR CONSTRUCTION	B.L.	I.G.	D.L.

REVISIONS

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-11-13
PERMIT NUMBER: P 718
NTNU Association of Professional Engineers and Geoscientists

TITRE / TITLE
AGNICO EAGLE – WHALE TAIL (AMARUQ)
693 – FINAL WATER TREATMENT PLANT
205 – P&ID
P&ID
WATER TREATMENT PLANT
HEATER UNTIS

DESSINÉ PAR / DRAWN BY	STÉPHANE MARCOTTE, TECH.	2018-07-11
VERIFIÉ PAR / CHECKED BY	MICHAEL BOYER	2018-07-23
APPROUVÉ PAR / APPROVED BY	ISRAEL GAGNON, P. ENG.	2018-07-23
ÉCHELLE / SCALE	N/A	DATE 2018-07-11
NO. DESSIN / DRAWING NO.	61-693-205-200	
NO. PROJET / PROJECT NO.	6115	REVISION 0 / FEUILLE / SHT 1 / 1

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FILE NO. 61-693-205-200-R0.dwg

NO. DESSIN DRAWING NO. 61-693-205-201-R0

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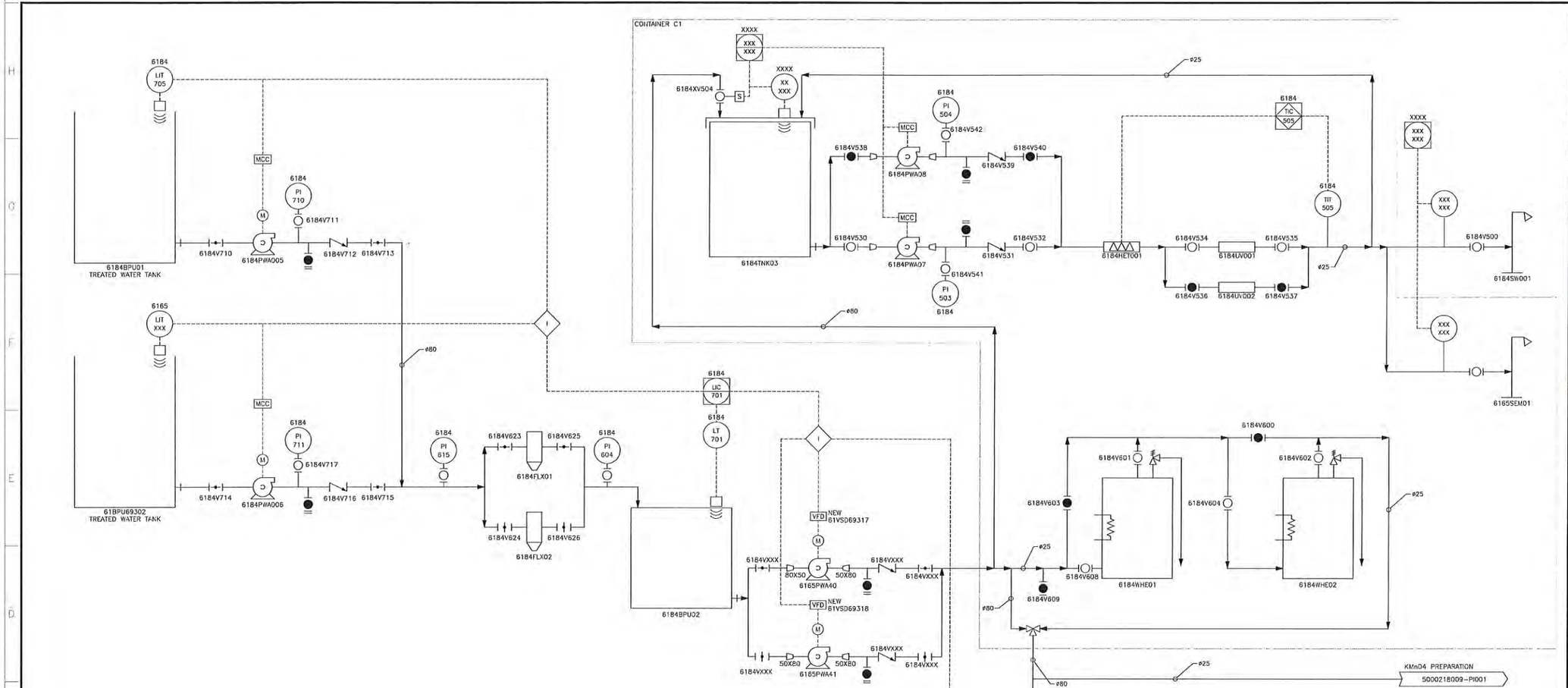


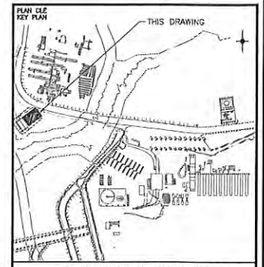
LEGEND

- SERVICE WATER
- INSTRUMENTATION SIGNAL
- BY AEM OR OTHERS
- BALL-VALVE (DARK WHEN NORMALLY CLOSED)
- SOLENOID VALVE (NORMALLY CLOSED)
- SELF-ACTUATED INTERNAL CONTROL VALVE (NORMALLY CLOSED)
- THERMAL PRESSURE RELIEF VALVE
- REDUCER
- CHECK VALVE
- PUMP

INSTRUMENTATION LEGEND

- PI — PRESSURE INDICATOR
- PIT — PRESSURE INDICATOR TRANSMITTER
- FS — FLOW SWITCH
- PSL X — PRESSURE SWITCH
- LSH — LEVEL SWITCH
- XX / XX — CONTROL FUNCTION LOCATED IN A SHARED DEVICE.
- I — ELECTRICAL INTERLOCK
- TIC / XX — TEMPERATURE INDICATOR CONTROLLER
- TIT — TEMPERATURE INDICATOR TRANSMITTER

PLAN CLÉ
KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-11-13
PERMIT NUMBER: P 718
NTANU Association of Professional Engineers and Geoscientists

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-11-13

SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tél.: (819) 764-5181 Téléc.: (819) 797-0158
www.snclavalin.com

Projet No. : 653281-0001

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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SINGLE LINE WTP	61-693-275-200

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	D.L. CLIENT
0	2018-11-13	ISSUED FOR CONSTRUCTION	B.L.	I.G.	D.L.

REVISIONS

2018-11-13

TITRE / TITLE
AGNICO EAGLE – WHALE TAIL (AMARUQ)
693 – FINAL WATER TREATMENT PLANT
205 – P&ID
P&ID
WATER TREATMENT PLANT
SERVICE WATER DISTRIBUTION

DESSINÉ PAR DRAWN BY	PIERRE-OLIVIER CÔTÉ	DATE 2018-08-13
VÉRIFIÉ PAR CHECKED BY	ISRAËL GAGNON, P. ENG.	2018-08-13
APPROUVÉ PAR APPROVED BY	ISRAËL GAGNON, P. ENG.	2018-08-13
ÉCHELLE SCALE	N/A	DATE 2018-08-09

NO. DESSIN DRAWING NO. 61-693-205-201

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6115	0	1 / 1

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FILE NO. 61-693-205-201-R0.dwg

NO. DESSIN / DRAWING NO. 61-695-205-200

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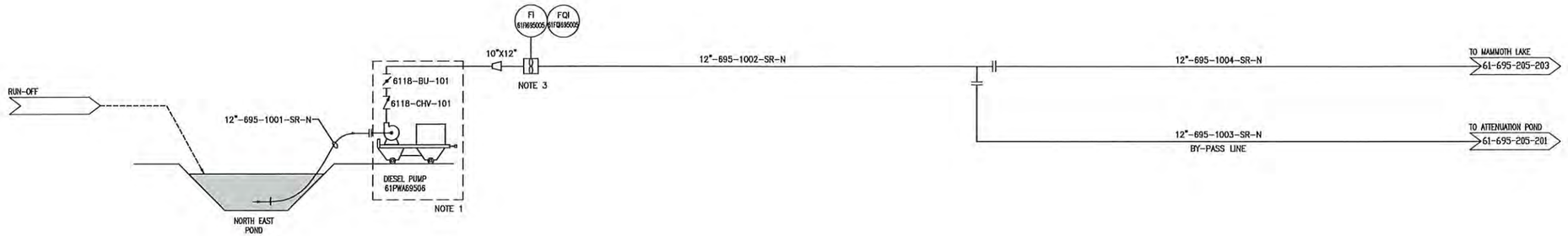

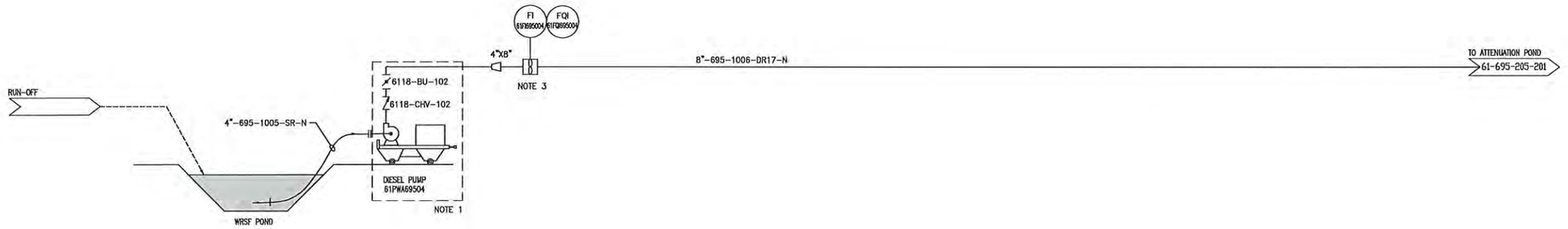

PLAN CLÉ
KEY PLAN

SNC·LAVALIN

Mining & Metallurgy
5600, des Galeries Blvd., bur. 200, Québec (Québec), Canada G2K 2E2
Telephone: (418) 621-6500, Fax: (418) 621-6537

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
651298	8200	49 | D4	0001	E00

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :
1. DIESEL PUMP MOUNTED ON A SKID.
2. WHALE TAIL PIT PUMPS & PIPING SYSTEM WILL BE DEFINED BY AEM DURING THE DEVELOPMENT OF THE OPEN PIT.
3. FLOWMETER INSTALLED TEMPORARILY TO DEVELOP FLOW VS PUMP CAPACITY SYSTEM CURVE.

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R0	2018-07-25	ISSUED FOR DESIGN	D.C.	A.L.N.	R.C.
P3	2018-06-18	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.
P4	2018-05-30	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature _____ P.Eng.
Date 2018.07.24
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

205–PIPING AND INSTRUMENTATION DIAGRAM
NE POND, WRSF POND AND WHALE TAIL PIT
PUMPING STATIONS

DESSINÉ PAR / DRAWN BY	M. MOVILA	DATE 2018-05-30
VÉRIFIÉ PAR / CHECKED BY	D. CHEN	2018-05-30
APPROUVÉ PAR / APPROVED BY	A.L. NGUYEN	2018-05-30

ÉCHELLE / SCALE	DATE
	2018-05-30

NO. DESSIN / DRAWING NO.
61-695-205-200

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6118	R0	1 / 1

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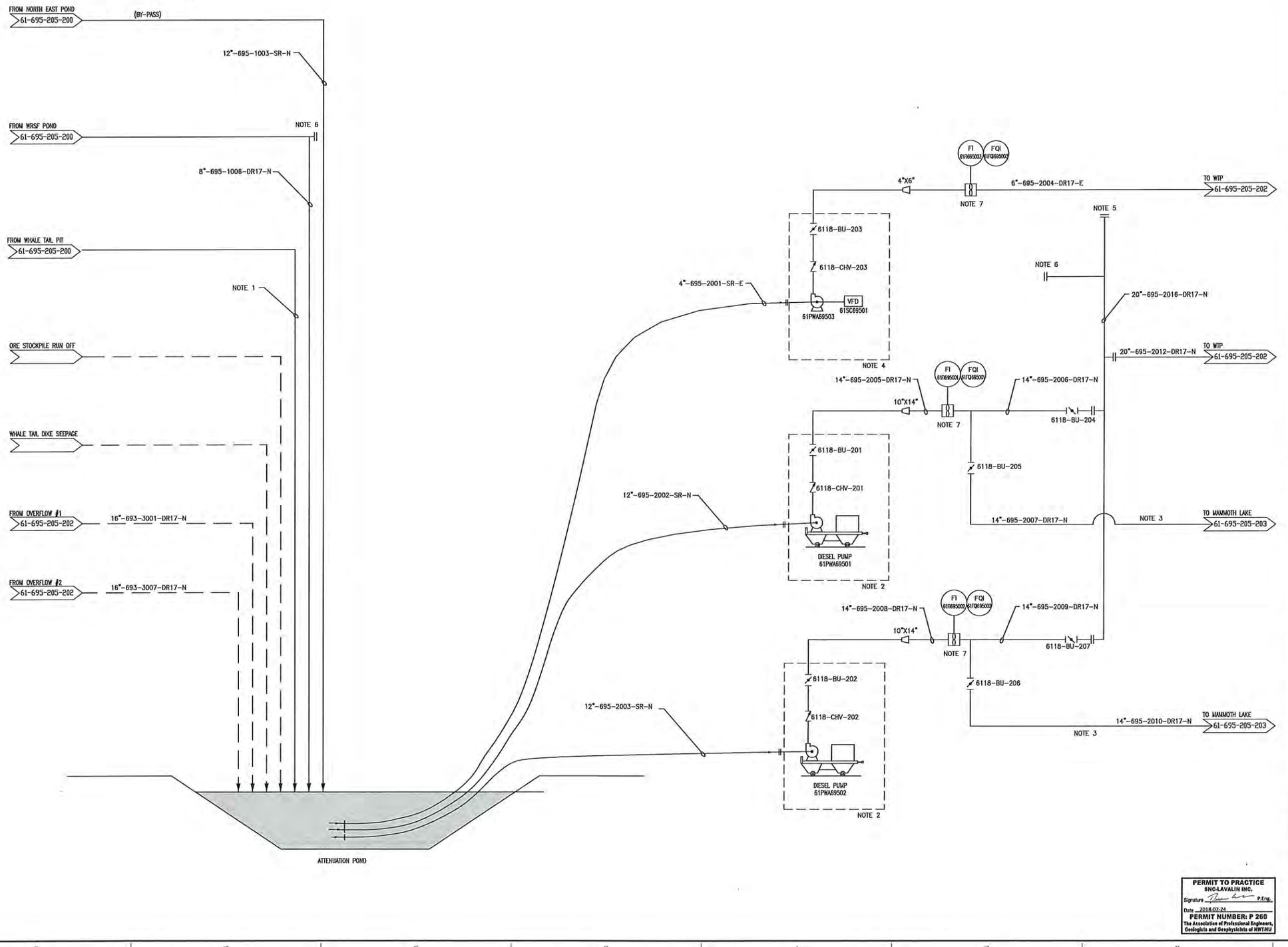
FILE NO. 651298-8200-4904-0001-00.dwg

NO. DESSIN / DRAWING NO. 61-695-205-201

FORMAT ARCH D



PLAN CLÉ
KEY PLAN

SNC·LAVALIN

Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Quebec (Quebec), Canada G2K 2E2
Telephone: (418) 621-5500, Fax: (418) 621-5587

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
651298	8200	49 | D4	0002	E00

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :
1. WHALE TAIL PIT PIPING SYSTEM TO BE CONFIRMED.
2. DIESEL PUMP MONTED ON A SKID.
3. BY-PASS TO MAMMOTH LAKE ONLY WHEN THE WATER MEETS THE DISCHARGE CRITERIA.
4. ELECTRIC PUMP ONLY USED DURING THE WINTER.
5. COMMON HEADER.
6. 8-IN CONNECTION THAT CAN BE USED AS A BY-PASS TO SEND RUNOFF FROM WRSF POND DIRECTLY TO THE WTP. NORMALLY, THIS OPENING IS CLOSED WITH A BLIND FLANGE.
7. FLOWMETER INSTALLED TEMPORARILY TO DEVELOP FLOW VS PUMP CAPACITY SYSTEM CURVE.

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	DWN/DY	APP.	CLIENT
R0	205-07-23	ISSUED FOR DESIGN	D.C.	A.L.N.	R.C.
R0	2018-05-18	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.
RA	2018-05-30	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature _____ P.Eng.
Date 2018-07-24
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

205 PIPING AND INSTRUMENTATION DIAGRAM
ATTENUATION POND AND PUMPING STATION

DESSINÉ PAR / DRAWN BY	M. MOVILA	DATE 2018-05-30
VÉRIFIÉ PAR / CHECKED BY	D. CHEN	2018-05-30
APPROUVÉ PAR / APPROVED BY	A.L. NGUYEN	2018-05-30
ÉCHELLE / SCALE		DATE 2018-05-30

NO. DESSIN / DRAWING NO. 61-695-205-201

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6118	R0	1 / 1

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FILE NO. 651298-8200-4904-0002-00.dwg

NO. DESSIN DRAWING NO. 61-695-205-202

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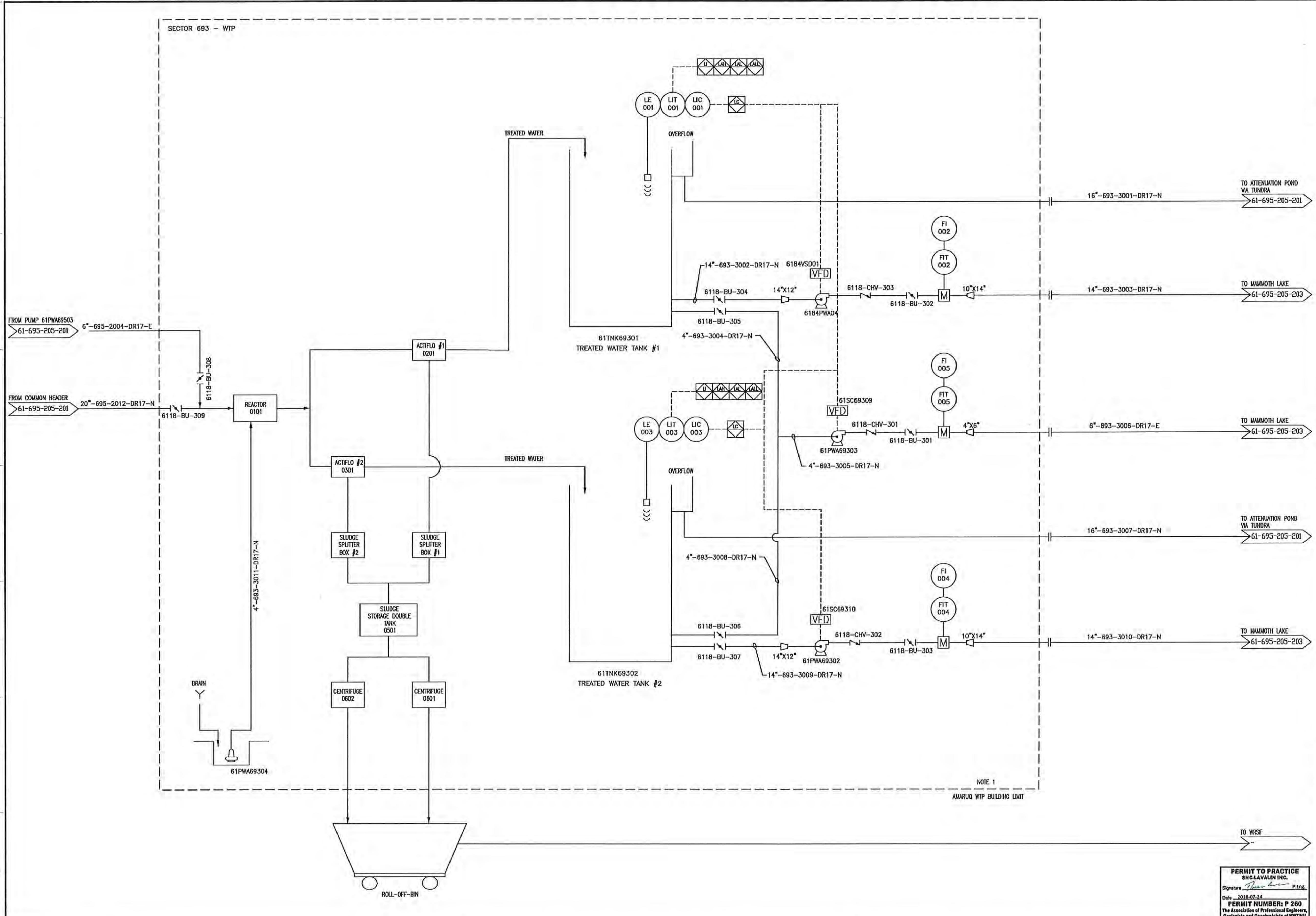

PLAN CLÉ KEY PLAN

SNC·LAVALIN
Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Quebec (Quebec), Canada G2K 2E2
Telephone: (418) 621-5500, Fax: (418) 621-8387

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
651298	8200	49 D4	0003	E00

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :
1. REFER TO VEOLIA P&ID FOR DETAILS OF THE WTP PLANT.

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R0	2018-07-23	ISSUED FOR DESIGN	D.C.	A.L.N.	R.C.
RB	2018-06-18	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.
RA	2018-05-30	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.C.

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature P.Eng.
Date 2018-07-24
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

205 – PIPING AND INSTRUMENTATION DIAGRAM
TIE – INS TO AMARUQ WATER TREATMENT PLANT

DESSINÉ PAR DRAWN BY	M. MOVILA	DATE 2018-05-30
VÉRIFIÉ PAR CHECKED BY	D. CHEN	2018-05-30
APPROUVÉ PAR APPROVED BY	A.L. NGUYEN	2018-05-30
ÉCHELLE SCALE	DATE	2018-05-30

NO. DESSIN DRAWING NO. 61-695-205-202

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6118	R0	1 / 1

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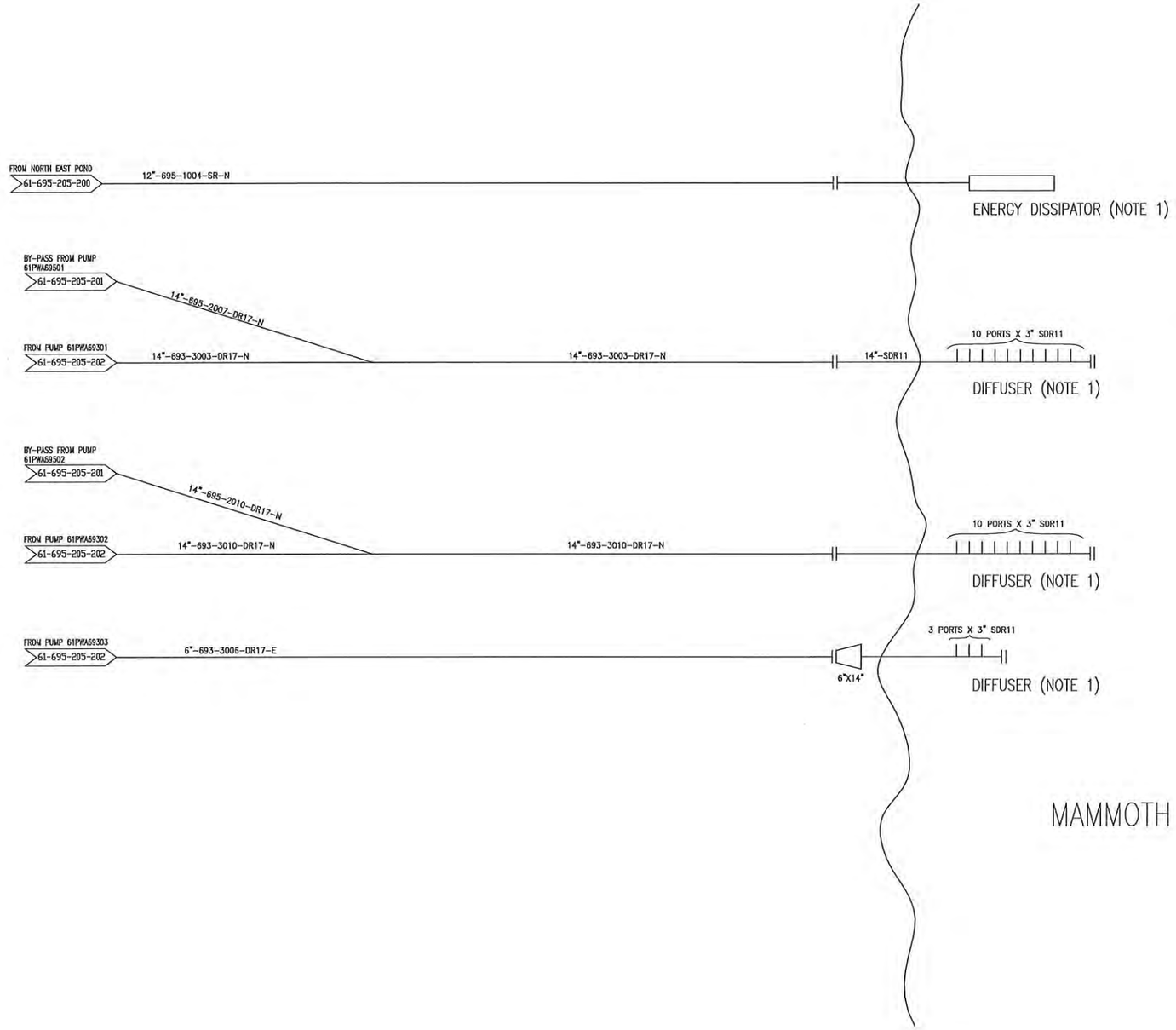

PLAN CLÉ
KEY PLAN

SNC·LAVALIN

Mining & Metallurgy
5500, des Galeries Blvd., bur. 200, Québec (Québec), Canada G2K 2E2
Telephone: (418) 621-5500, Fax: (418) 621-5537

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
651298	8200	49 D4	0004	E00

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :
1. DETAILS OF MAMMOTH LAKE DIFFUSERS & ENERGY DISSIPATOR TO BE CONFIRMED.

LEGEND:
-

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	DWN/DR	APP.	CLIENT
R0	2018-07-23	ISSUED FOR DESIGN	D.C.	A.L.N.	R.G.
R0	2018-06-18	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.G.
RA	2018-05-30	ISSUED FOR COMMENTS	D.C.	A.L.N.	R.G.

REVISIONS

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

205 – PIPING AND INSTRUMENTATION DIAGRAM
TREATED WATER TO MAMMOTH LAKE

DESSINÉ PAR DRAWN BY	M. NOVILA	DATE 2018-05-30
VÉRIFIÉ PAR CHECKED BY	D. CHEN	2018-05-30
APPROUVÉ PAR APPROVED BY	A.L. NGUYEN	2018-05-30
ÉCHELLE SCALE		DATE 2018-05-30

NO. DESSIN DRAWING NO. 61-695-205-203

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6118	R0	1 / 1

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SNC-LAVALIN INC.
Signature _____ P.Eng.
Date 2018-07-24
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

AE-CART-ARCH D

FILE NO. 651298-8200-4904-0004-00.dwg

Appendix C

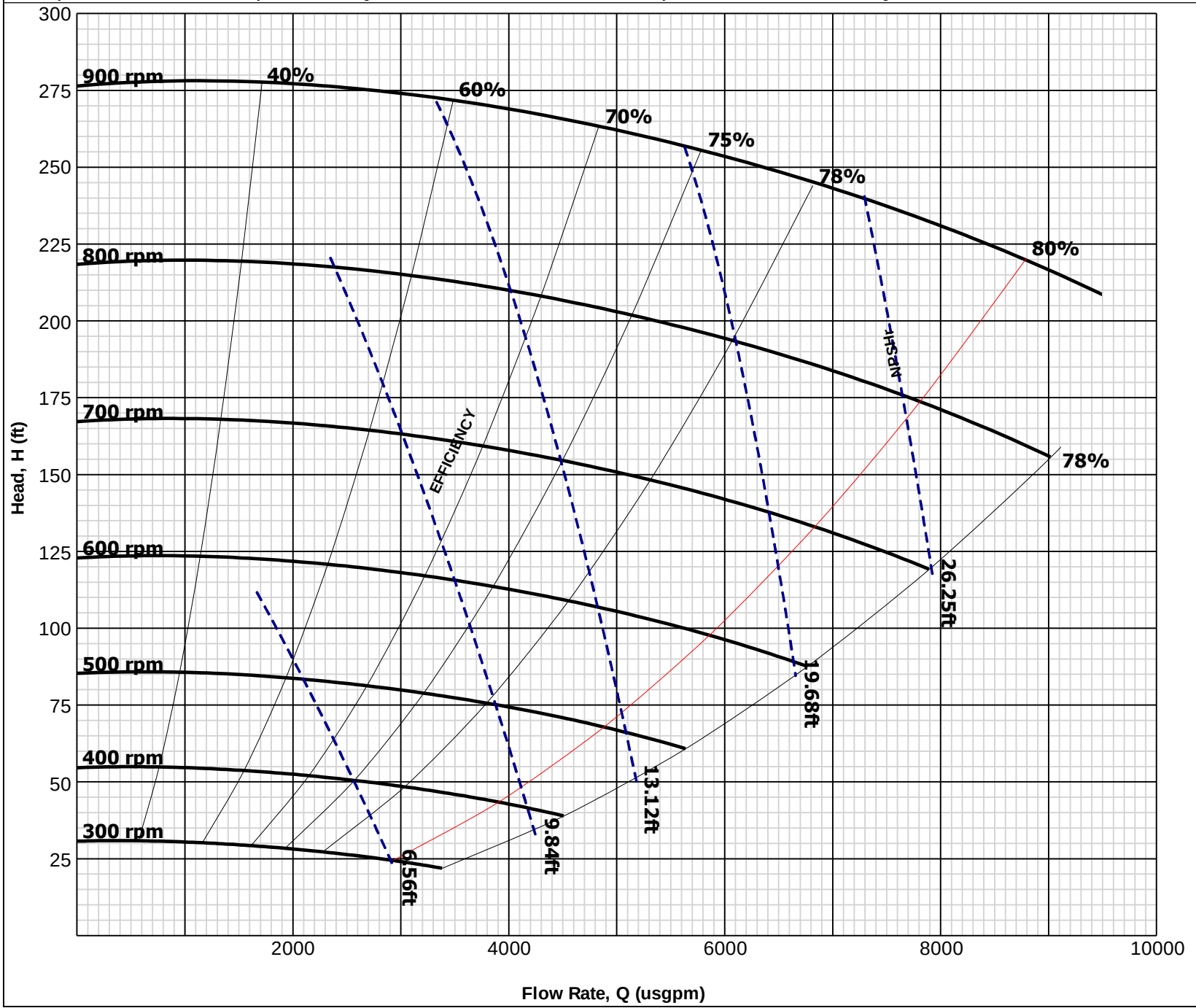
Pumps and Piping technical Specifications

WARMAN®
Centrifugal Slurry Pumps

Horizontal Pump
12/10 AH

Excellent Minerals Solutions
WEIR MINERALS

CURVE SHOWS APPROXIMATE PERFORMANCE FOR CLEAR WATER (International Test Standard ISO9906:1999 - Grade 2 unless otherwise specified). For media other than water, corrections must be made for density, viscosity and/or other effects of solids. WEIR MINERALS reserves the right to change pump performance and/or delete impellers without notice. Frame suitability must be checked for each duty and drive arrangement. Not all frame alternatives are necessarily available from each manufacturing centre.



Pump	
Discharge	10"
Suction	12"

Impeller	
Vanes	5
Vane ø	30"
Type	Closed
Part No	**Material**
G10147	Metal
FAM10147	Metal

Frame (Rating - HP)	
F	349
FFX	570
FF	570
STX	751
ST	751
G	805
GG	1207
T	1609

Seal

Gland Sealed Pump

Liner (Norm Max r/min)	
Polymer	650
Metal	900

Min Passage Size

3.39"

Curve	
Revision	1
Revision Notes	
MAX. r/min. WAS 800	
Reference	TEST 25
Issued	Feb 88

TYPICAL PUMP PERFORMANCE CURVE
WPA1210A01/1

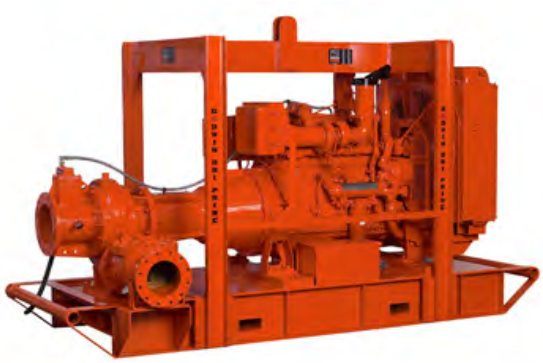
HL250M Dri-Prime Pump

HL250M

The Godwin Dri-Prime HL250M pump offers flow rates to 5,389 USGPM and discharge heads to 389' (119 m). Also it has the capability of handling solids up to 3" (65mm) in diameter.

The HL250M is able to prime to 28' (8.5 m) of suction lift from dry.

Indefinite dry-running is no problem due to the unique Godwin oil bath mechanical seal design. Solids handling, dry-running and portability make the HL250M the perfect choice for dewatering and bypass applications. The standard model is mounted on a skid, with a highway trailer option.



Features

- Simple maintenance normally limited to checking fluid levels.
- Close coupled centfrigual pump with vacuum priming compressor mounted to a diesel engine. Also available in electric drive or as a bare shaft pumpend.
- Extensive application flexibility. It will handle sewage, slurries and liquids with solids up to 3" in diameter.
- Continuously operated Godwin venturi air ejector priming device requiring no form of periodic adjustment or control.
- Dry-running heavy duty mechanical seal with abrasion resistant interfaces.
- Also availabe as a Critically Silenced unit which drastically reduces noise levels of the pump.
- Standard engine Caterpillar C15. .
- The volute & suction cover are made from cast iron bs1452:1990 grade 220 and the impeller is made from cast steel bs3100 a5 hardness to 200 hb brinell.

Specifications

Suction connection	12" 125# ANSI B16.1
Delivery connection	10" 125# ANSI B16.1
Max capacity	5389 USGPM
Max head	389' (119 m)
Max solids handling	3" (65mm)
Max Impeller diameter	17" (440mm)
Max operating temp	176°F (80°C)
Max working pressure	188.5 psi (13.0 bar)
Max suction pressure	87.0 psi (6.0 bar)
Max casing pressure	282.8 psi (19.5 bar)
Max operating speed	2000 rpm

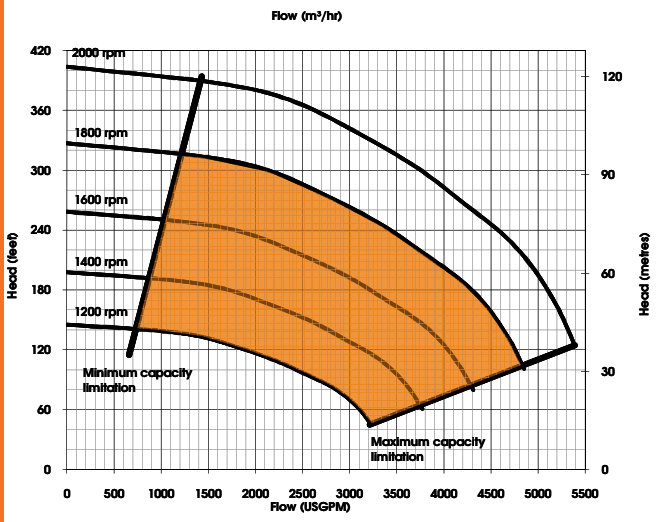
godwin
a xylem brand

Reference number : 95-1114-3000
Date of issue : Auaust 25. 2011
Issue : 1

Please contact Godwin for further details.
A typical picture of the pump is shown.
All information is approximate and for general guidance only.

HL250M

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS1452:1990 Grade 220
Wearplates	Cast Iron - Chrome 1.0/1.5% Nickle 2%
Pump Shaft	Nickel Chrome Steel to BS970-1:1991 Grade 817M40T EN24T
Impeller	Cast Steel BS3100 A5 Hardness to 200 HB Brinell
Non-return valve body	Cast Iron
Mechanical seal faces	Silicon carbide vs silicon carbide

Engine option 1

Caterpillar, C15, 474.4 HP @ 1800 rpm

Impeller diameter 17" (440mm)

Suction Lift Table

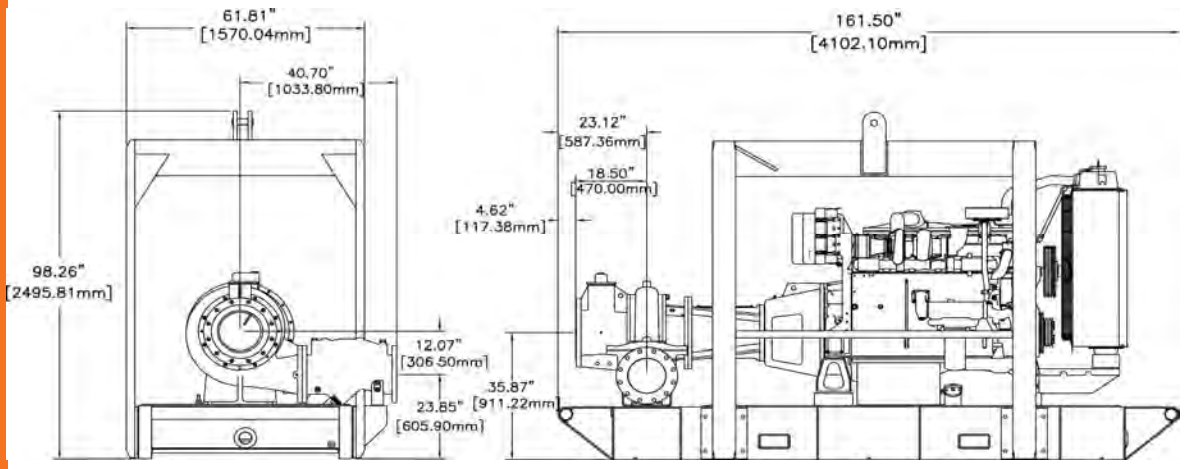
Total Suction Head (')	Total Delivery Head (')				
	93	133	194	247	295
	Output (USGPM)				
8.0	4815	4557	3864	3012	1783
12.2	4755	4526	3764	2972	1486
16.2	4359	4161	3772	2853	1308
20.2	3467	3368	3170	2708	-

Fuel capacity (Full) 215 US Gal, (Usable) 215 US Gal

Fuel consumption @ 1800 rpm BEP 17 US Gal/hr

Weight: (Dry) 11,464 lbs, (Wet) 13,250 lbs

Dimensions: (L) 161" x (W) 61" x (H) 100"



Performance data provided in tables is based on water tests at sea level and 68°F ambient.

All information is approximate and for general guidance only.

Please contact Godwin Pumps for further details.

Reference number : 95-1114-3000

Date of issue : August 25, 2011

Issue : 1

godwin a xylem brand

84 Floodgate Road | Bridgeport, NJ 08014

P:(856) 467-3636 | F:(856) 467-4841

sales@godwinpumps.com | godwinpumps.com

CD103M Dri-Prime® Pump

The Godwin Dri-Prime CD103M pump offers flow rates to 1020 USGPM and has the capability of handling solids up to 3.0" in diameter.

The CD103M is able to automatically prime to 28' of suction lift from dry. Automatic or manual starting/stopping available through integral mounted control panel or optional wireless-remote access.

Indefinite dry-running is no problem due to the unique Godwin liquid bath mechanical seal design. Solids handling, dry-running, and portability make the CD103M the perfect choice for dewatering and bypass applications.

Features and Benefits

- Simple maintenance normally limited to checking fluid levels and filters.
- Dri-Prime (continuously operated Venturi air ejector priming device) requiring no periodic adjustment. Optional compressor clutch available.
- Extensive application flexibility handling sewage, slurries, and liquids with solids up to 3.0" in diameter.
- Dry-running high pressure liquid bath mechanical seal with high abrasion resistant solid silicon carbide faces.
- Close-coupled centrifugal pump with Dri-Prime system coupled to a diesel engine or electric motor.
- All cast iron construction (stainless steel construction option available) with cast steel impeller.
- Also available in a critically silenced unit which reduces noise levels to less than 70 dBA at 30'.
- Standard engine Caterpillar C2.2T (IT4 Flex). Also available with John Deere 4024TF281 (IT4 Flex).

Specifications

Suction connection	4" 150# ANSI B16.5
Delivery connection	4" 150# ANSI B16.5
Max capacity	1020 USGPM †
Max solids handling	3.0"
Max impeller diameter	10.1"
Max operating temp	176°F*
Max pressure	75 psi
Max suction pressure	58 psi
Max casing pressure	113 psi
Max operating speed	2200 rpm

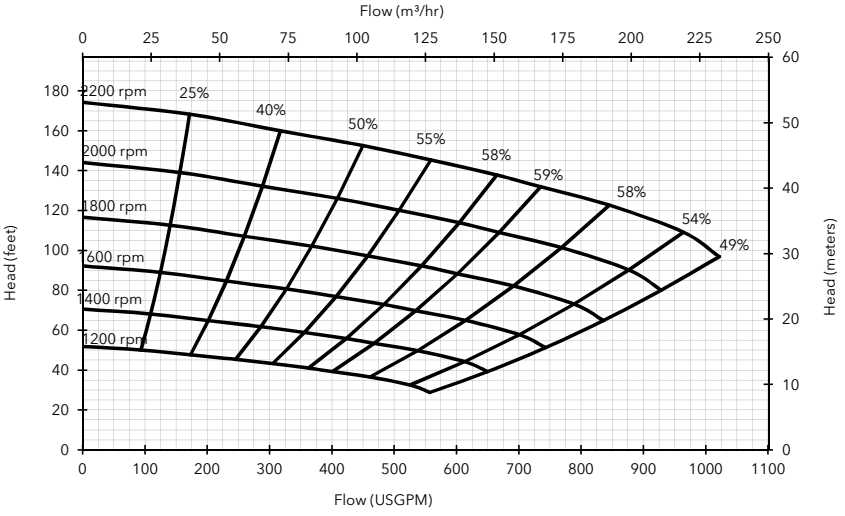
* Please contact our office for applications in excess of 176°F.

† Larger diameter pipes may be required for maximum flows.

Please contact the factory or office for further details. A typical picture of the pump is shown. All information is approximate and for general guidance only.

godwin
a xylem brand

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS EN 1561 - 1997
Wearplates	Cast iron BS EN 1561 - 1997
Pump Shaft	Carbon steel BS 970 - 1991 817M40T
Impeller	Cast Steel BS3100 A5 Hardness to 200 HB Brinell
Non-return valve body	Cast iron BS EN 1561 - 1997
Mechanical seal	Silicon carbide face; Viton elastomers; Stainless steel body

Engine option 1

Caterpillar C2.2T (IT4 Flex), 41 HP @ 2200 rpm

Impeller diameter 10.1"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	78	103	127	152	176
	Output (USGPM)				
10	1022	915	646	350	-
15	996	834	538	215	-
20	888	753	431	-	-
25	807	646	269	-	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 2.4 US Gal/hr

Max Fuel consumption @ 1800 rpm: 2.0 US Gal/hr

Weight (Dry): 2,240 lbs

Weight (Wet): 2,650 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.

Engine option 2

John Deere 4024TF281 (IT4 Flex), 46 HP @ 2200 rpm

Impeller diameter 10.1"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	78	103	127	152	176
	Output (USGPM)				
10	1022	915	646	350	-
15	996	834	538	215	-
20	888	753	431	-	-
25	807	646	269	-	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 2.6 US Gal/hr

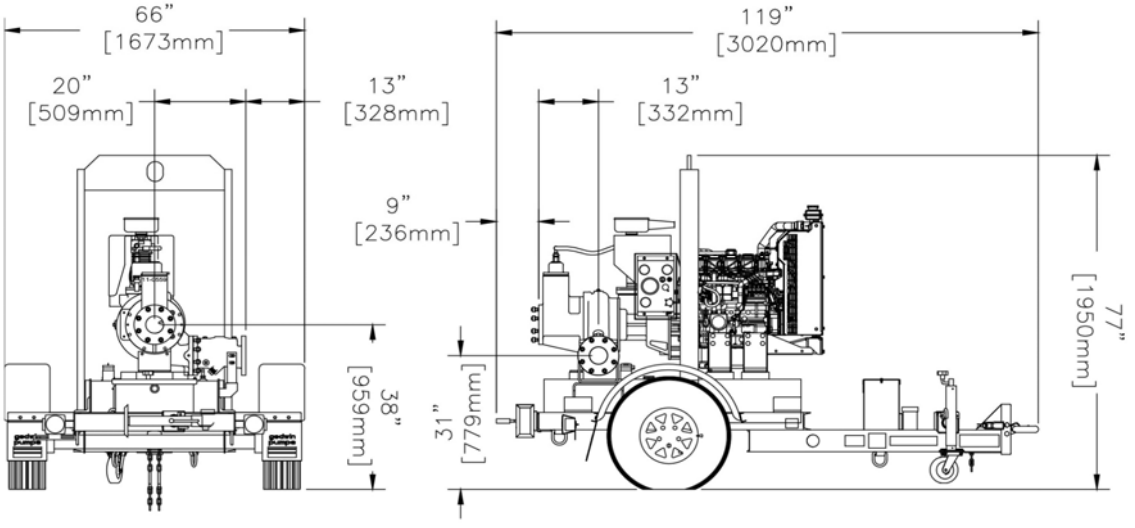
Max Fuel consumption @ 1800 rpm: 2.3 US Gal/hr

Weight (Dry): 2,400 lbs

Weight (Wet): 2,800 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.



xylem
Let's Solve Water

84 Floodgate Road
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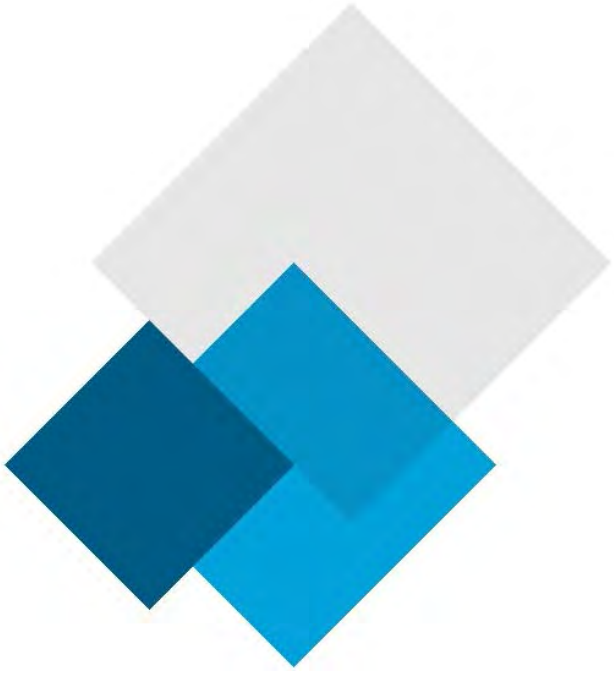
Reference number : 95-1008-3000
Date of issue : February 26, 2014
Issue : 5

www.godwinpumps.com

Appendix D

Chemical MSDS



Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Hydrex 6105**
Version #	01
Issue date	08-15-2014
CAS #	Mixture
Product use	Wastewater Flocculant
Manufacturer	
Supplier	VWS Canada
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwscanada.hydrex@veoliawater.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)

2. Hazards Identification

Potential health effects

Eyes	Health injuries are not known or expected under normal use.
Skin	Health injuries are not known or expected under normal use.
Inhalation	Health injuries are not known or expected under normal use.
Ingestion	Health injuries are not known or expected under normal use.

3. Composition / Information on Ingredients

The components are not hazardous or are below required disclosure limits.

4. First Aid Measures

First aid procedures

Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Skin contact	Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Inhalation	If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.
Ingestion	Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
General advice	If you feel unwell, seek medical advice (show the label where possible). Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties	Dust accumulation from this product may present an explosion hazard in the presence of an ignition source.
Extinguishing media	
Suitable extinguishing media	Water spray, fog, CO2, dry chemical, or alcohol resistant foam.
Protection of firefighters	
Protective equipment for firefighters	In the event of fire, wear self-contained breathing apparatus.
Fire fighting equipment/instructions	Use water spray to cool unopened containers. Dust may form an explosive mixture in the atmosphere.
Specific methods	Use water spray to cool unopened containers.

Explosion data

Sensitivity to static discharge	Not available.
Sensitivity to mechanical impact	Not available.

6. Accidental Release Measures

Personal precautions	Slippery when wet.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.
Methods for cleaning up	Should not be released into the environment. Following product recovery, flush area with water. For waste disposal, see section 13 of the MSDS.

7. Handling and Storage

Handling	Avoid release to the environment. Material can be slippery when wet.
Storage	Store in a dry area. Store in closed original container at temperatures between 5°C and 30°C.

8. Exposure Controls / Personal Protection

Biological limit values	No biological exposure limits noted for the ingredient(s).

Personal protective equipment

Eye / face protection	Chemical goggles are recommended.
Skin protection	Normal work clothing (long sleeved shirts and long pants) is recommended.
Respiratory protection	No specific recommendation made, but protection against nuisance dust must be used when the general level exceeds 10 mg/m3.

9. Physical & Chemical Properties

Appearance	Not available.
Physical state	Solid.
Form	Not available.
Color	White
Odor	Not available.
pH	Not available.
Vapor pressure	0 hPa estimated
Vapor density	Not available.
Boiling point	Not available.
Melting point/Freezing point	Not available.
Solubility (water)	Not available.
Specific gravity	0.65 - 0.9
Flash point	Not available.
Auto-ignition temperature	Not available.
Ph Of 1% Solution	5 - 7

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	None under normal conditions.
Incompatible materials	Not available.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.

11. Toxicological Information

Toxicological data

Product	Species	Test Results
Hydrex 6105 (CAS Mixture)		
Acute		
Dermal		
LD50	Rabbit	> 10000 mg/kg
Oral		
LD50	Rat	> 5000 mg/kg

* Estimates for product may be based on additional component data not shown.

Chronic effects Not expected to be hazardous by WHMIS criteria.

12. Ecological Information

Ecotoxicological data

Product		Species	Test Results
Hydrex 6105 (CAS Mixture)			
Algae	IC50	Algae	2276 mg/l, 72 hr
Crustacea	EC50	Daphnia	> 100 mg/l, 48 hr
Other	LC50	Rainbow Trout	> 120 mg/l, 96 hr
Aquatic			
Fish	LC50	Zebra danio (Danio rerio)	> 100 mg/l, 96 hr

* Estimates for product may be based on additional component data not shown.

Ecotoxicity Contains a substance which causes risk of hazardous effects to the environment.

Environmental effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence and degradability Not available.

13. Disposal Considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. Dispose in accordance with all applicable regulations.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

Canadian regulations This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status Non-controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other Information

Further information
HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 0
Flammability: 1
Physical hazard: 0

NFPA ratings
Health: 0
Flammability: 1
Instability: 0

Disclaimer
Veolia Water Solutions & Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Solutions & Technologies' requirement.

This data sheet contains changes from the previous version in section(s):
Product and Company Identification: Product and Company Identification

Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Hydrex 6266**
Version #	01
Issue date	11-12-2013
CAS #	Mixture
Product use	Wastewater Coagulant
Manufacturer	
Supplier	VWS Canada
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwscanada.hydrex@veoliawater.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)

2. Hazards Identification

Emergency overview WARNING

Harmful in contact with skin.

Potential health effects

Routes of exposure	Inhalation. Ingestion. Skin contact. Eye contact.
Eyes	Harmful in contact with eyes. Do not get this material in contact with eyes.
Skin	Harmful in contact with skin. Do not get this material in contact with skin.
Inhalation	Prolonged inhalation may be harmful. Do not breathe dust/fume/gas/mist/vapors/spray.
Ingestion	Do not ingest.

3. Composition / Information on Ingredients

Non-hazardous components	CAS #	Percent
IRON, WATER-SOLUBLE SALTS, N.O.S.	10028-22-5	60 - 100
Other components below reportable levels		15 - 40

4. First Aid Measures

First aid procedures

Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Continue rinsing. Get medical attention immediately.
Skin contact	Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. For minor skin contact, avoid spreading material on unaffected skin. Wash clothing separately before reuse.
Inhalation	Move to fresh air. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.
Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to physician	Symptoms may be delayed.

General advice Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Dry chemical, CO2, sand, earth, water spray or regular foam.

Fire fighting equipment/instructions In the event of fire, cool tanks with water spray.

Specific methods Cool containers exposed to flames with water until well after the fire is out.

Explosion data

Sensitivity to static discharge Not available.

Sensitivity to mechanical impact Not available.

6. Accidental Release Measures

Personal precautions Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering them. For personal protection, see section 8 of the MSDS.

Methods for cleaning up Following product recovery, flush area with water. For waste disposal, see section 13 of the MSDS.

7. Handling and Storage

Handling Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin. Avoid prolonged exposure. Do not get this material on clothing. Do not use in areas without adequate ventilation. Wear personal protective equipment. Wash thoroughly after handling.

Storage Store in a closed container away from incompatible materials. Store in a well-ventilated place. Keep container dry. Store away from incompatible materials (see Section 10 of the MSDS).

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m3

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m3

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	STEL	2 mg/m3
	TWA	1 mg/m3

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m3

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m3

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye / face protection Wear safety glasses with side shields (or goggles) and a face shield. Chemical goggles and face shield are recommended.

Skin protection Wear suitable protective clothing. Chemical resistant gloves.

Respiratory protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

9. Physical & Chemical Properties

Appearance Granular

Physical state Solid.

Form Solid.

Color Yellowish or Tan or Grey.

Odor Slight

Odor threshold Not available.

pH Not available.

Vapor pressure Not available.

Vapor density Not available.

Boiling point Not available.

Melting point/Freezing point > 572 °F (> 300 °C)

Solubility (water) Soluble

Specific gravity 3.1 estimated

Relative density Not available.

Flash point Not available.

Flammability limits in air, upper, % by volume Not available.

Flammability limits in air, lower, % by volume Not available.

Auto-ignition temperature Not available.

Other data

Density 3.10 g/cm3 estimated

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions.

Conditions to avoid Contact with incompatible materials.

Incompatible materials Not available.

Hazardous decomposition products Not available.

Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Product	Species	Test Results
Hydrex 6266 (CAS Mixture)		
Acute		
Dermal		
LD50	Mouse	>= 200 mg/kg Calculation
Oral		
LD50	Rat	>= 650 mg/kg Calculation

* Estimates for product may be based on additional component data not shown.

Chronic effects Prolonged inhalation may be harmful. Not expected to be hazardous by WHMIS criteria.

12. Ecological Information

Ecotoxicological data

Product		Species	Test Results
Hydrex 6266 (CAS Mixture)			
Aquatic			
Acute			
Algae	EC50	Green algae (Scenedesmus acutus)	> 13 mg/l, 7 day
Fish	LC50	Mosquitofish (Gambusia affinis affinis)	>= 50 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability Not available.

13. Disposal Considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose in accordance with all applicable regulations.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

TDG

- **UN number** UN3077
- **UN proper shipping name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (IRON, WATER-SOLUBLE SALTS, N.O.S.)
- **Transport hazard class(es)**
  - **Class** 9
  - **Subsidiary risk** -
- **Packing group** III
- **Environmental hazards** D
- **Special precautions for user** Read safety instructions, MSDS and emergency procedures before handling.

IATA

- **UN number** UN3077
- **UN proper shipping name** Environmentally hazardous substance, solid, n.o.s. (IRON, WATER-SOLUBLE SALTS, N.O.S.)
- **Transport hazard class(es)**
  - **Class** 9
  - **Subsidiary risk** -
- **Packing group** III
- **Environmental hazards** No.
- **ERG Code** 9L

Special precautions for user	Read safety instructions, MSDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Allowed.
Cargo aircraft only	Allowed.

IMDG

UN number	UN3077
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Transport hazard class(es)	
Class	9
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-F
Special precautions for user	Read safety instructions, MSDS and emergency procedures before handling.

IATA; IMDG; TDG

15. Regulatory Information

Canadian regulations	This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
WHMIS status	Controlled
WHMIS classification	D2B - Other Toxic Effects-TOXIC

WHMIS labeling

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other Information

HMIS® ratings

Health: 2
Flammability: 0
Physical hazard: 0

NFPA ratings

Health: 2
Flammability: 0
Instability: 0

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available. Veolia Water Solutions & Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Solutions & Technologies' requirement.

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product identifier	**Hydrex 6324**
Version #	01
Issue date	03-31-2016
CAS #	Mixture
Product use	Wastewater Flocculant
Manufacturer information	
Supplier	Veolia Water Technologies Canada Inc.
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwtcanada-hydrex@veolia.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)
Supplier	Not available.

2. Hazards Identification

Potential health effects

Routes of exposure	Eye contact. Ingestion. Inhalation. Skin contact.
Eyes	Health injuries are not known or expected under normal use.
Skin	Health injuries are not known or expected under normal use.
Inhalation	Health injuries are not known or expected under normal use.
Ingestion	Health injuries are not known or expected under normal use.
Potential environmental effects	May cause long-term adverse effects in the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
ADIPIC ACID	124-04-9	1 - 5
Other components below reportable levels		60 - 100

Composition comments None by WHMIS criteria.

4. First Aid Measures

First aid procedures

Inhalation	If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.
Skin contact	Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
General advice	If you feel unwell, seek medical advice (show the label where possible). Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

Suitable extinguishing media	Not available.

Unsuitable extinguishing media	Not available.
Protection of firefighters	
Specific hazards arising from the chemical	Material can be slippery when wet.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Explosion data	
Sensitivity to static discharge	Not available.
Sensitivity to mechanical impact	Not available.
Hazardous combustion products	Not available.

6. Accidental Release Measures

Personal precautions	Keep unnecessary personnel away. For personal protection, see section 8 of the MSDS. Slippery when wet.
Environmental precautions	Do not contaminate water.
Methods for cleaning up	Should not be released into the environment. This product is miscible in water. Following product recovery, flush area with water. For waste disposal, see section 13 of the MSDS.

7. Handling and Storage

Handling	Material can be slippery when wet. Avoid release to the environment.
Storage	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the MSDS).

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value
ADIPIC ACID (CAS 124-04-9)	TWA	5 mg/m3

Biological limit values	No biological exposure limits noted for the ingredient(s).

Engineering controls	Not available.
Personal protective equipment	
Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	Wear suitable protective clothing. Chemical resistant gloves.
Respiratory protection	No personal respiratory protective equipment normally required. In case of insufficient ventilation, wear suitable respiratory equipment.
Hand protection	Chemical resistant gloves.

9. Physical & Chemical Properties

Appearance	Granular or Powder.
Physical state	Solid.
Form	Solid.
Color	White.
Odor	Odorless.
pH	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Boiling point	Not available.
Melting point/Freezing point	Not available.
Solubility (water)	Limited by viscosity
Specific gravity	Not available.
Flash point	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	Not available.
Bulk density	650 - 850 kg/m³
Other data	
pH in aqueous solution	7 - 9 in a 0.5% aq. sol.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Not available.
Hazardous decomposition products	Not available.
Possibility of hazardous reactions	Not available.

11. Toxicological Information

Toxicological data

Product	Species	Test Results
Hydrex 6324		
Acute		
Dermal		
Presumed Non-Toxic	Rabbit	> 2000 mg/kg
Inhalation		
LC50	Rat	> 20 mg/l, 4 hours
Oral		
LD50	Rat	> 5000 mg/kg

Components	Species	Test Results
ADIPIC ACID (CAS 124-04-9)		
Acute		
Dermal		
LD50	Rabbit	> 5000 mg/kg
Inhalation		
NOEL	Rat	0.126 mg/l, 6 Hours
Oral		
LD50	Mouse	1900 mg/kg
	Rabbit	> 11000 mg/kg
	Rat	> 11000 mg/kg

Acute effects

Sensitization Not available.

Chronic effects Not expected to be hazardous by WHMIS criteria.

Carcinogenicity Not available.

Skin corrosion/irritation Not available.

Serious eye damage/irritation Not available.

Mutagenicity Not available.

Reproductive effects Not available.

Teratogenicity Not available.

Synergistic materials Not available.

12. Ecological Information

Ecotoxicological data

Product		Species	Test Results
Hydrex 6324			
Aquatic			
Acute			
Crustacea	EC50	Daphnia magna	> 100 mg/l, 48 hours
Fish	LC50	Danio rerio	> 100 mg/l, 96 hours

Components		Species	Test Results
ADIPIC ACID (CAS 124-04-9)			
Aquatic			
Algae	EC50	Algae	31.3 mg/l, 72 hours
Crustacea	EC50	Daphnia	85.6 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	97 mg/l, 96 hours
Acute			
Fish	EC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	> 100 mg/l, 48 hours

Ecotoxicity Contains a substance which causes risk of hazardous effects to the environment.

Environmental effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Aquatic toxicity Not available.

Persistence and degradability Not available.

Partition coefficient

ADIPIC ACID 0.08

Mobility in environmental media This product is miscible in water.

13. Disposal Considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

Canadian regulations This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status Non-controlled

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other Information

Recommended restrictions PROFESSIONAL USE ONLY

HMIS® ratings
Health: 0
Flammability: 0
Physical hazard: 0

NFPA ratings
Health: 0
Flammability: 0
Instability: 0

Disclaimer Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

Prepared by Hydrex Global Platform

This data sheet contains changes from the previous version in section(s):	This document has undergone significant changes and should be reviewed in its entirety.

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**Hydrex 9571**
Version #	01
Issue date	08-27-2013
Chemical name	POTASSIUM PERMANGANATE
Product use	Wastewater Metal Precipitant
Manufacturer	
Supplier	VWS Canada
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwscanada.hydrex@veoliawater.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)

2. Hazards Identification

Emergency overview

DANGER

Oxidizing material.

Causes skin and eye burns.

Potential health effects

Routes of exposure	Inhalation. Ingestion. Skin contact. Eye contact.
Eyes	Corrosive to the eyes and may cause severe damage including blindness. Causes chemical burns. Do not get this material in contact with eyes.
Skin	Causes chemical burns. Do not get this material in contact with skin.
Inhalation	Dust extremely irritating to the respiratory tract. Inhalation of dusts may cause respiratory irritation. Prolonged inhalation may be harmful. Do not breathe dust.
Ingestion	Harmful if swallowed. Ingestion causes burns of the upper digestive and respiratory tracts. Irritating. May cause nausea, stomach pain and vomiting. Do not ingest.
Chronic effects	Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.
Signs and symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes. Symptoms may include redness, edema, drying, defatting and cracking of the skin.
Potential environmental effects	Components of this product are hazardous to aquatic life. May cause long-term adverse effects in the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
POTASSIUM PERMANGANATE	7722-64-7	60 - 100
Other components below reportable levels		1 - 5

4. First Aid Measures

First aid procedures

Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Continue rinsing. Get medical attention immediately.

Skin contact	Before washing use a dry brush to remove dust from skin. Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. For minor skin contact, avoid spreading material on unaffected skin. Wash clothing separately before reuse.
Inhalation	Move to fresh air. If symptoms are experienced, remove source of contamination or move victim to fresh air. Get medical attention if symptoms persist.
Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Never give anything by mouth to a victim who is unconscious or is having convulsions. Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
General advice	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Do not use mouth-to-mouth method if victim ingested the substance.

5. Fire Fighting Measures

Flammable properties	Contact with combustible material may cause fire. These substances will accelerate burning when involved in a fire. Some will react explosively with hydrocarbons (fuels). Runoff may create fire or explosion hazard.
Extinguishing media	
Suitable extinguishing media	Water.
Unsuitable extinguishing media	Dry chemicals or foams.
Protection of firefighters	
Specific hazards arising from the chemical	Fire may produce irritating, corrosive and/or toxic gases. Some may decompose explosively when heated or involved in a fire.
Protective equipment for firefighters	Firefighters should wear full protective clothing including self contained breathing apparatus.
Fire fighting equipment/instructions	Do not move cargo or vehicle if cargo has been exposed to heat. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Move containers from fire area if you can do so without risk. In the event of fire, cool tanks with water spray. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.
Specific methods	Cool containers exposed to flames with water until well after the fire is out.
Explosion data	
Sensitivity to static discharge	Not available.
Sensitivity to mechanical impact	Not available.

6. Accidental Release Measures

Personal precautions	Keep unnecessary personnel away. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep people away from and upwind of spill/leak. Keep upwind. Ventilate closed spaces before entering them.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Runoff from fire control or dilution water may cause pollution. Do not contaminate water.
Methods for containment	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways.

Methods for cleaning up

Should not be released into the environment.

Large Spills: Do not get water inside container. Use clean non-sparking tools to collect absorbed material. Following product recovery, flush area with water.

Small Spills: Clean surface thoroughly to remove residual contamination. Clean up in accordance with all applicable regulations. For waste disposal, see section 13 of the MSDS.

Other information

Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling

DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. When using do not smoke. Do not get this material in contact with eyes. Do not get this material in contact with skin. Do not get this material on clothing. Avoid prolonged exposure. Avoid release to the environment.

Storage

Keep away from heat and sources of ignition. Store in a closed container away from incompatible materials. Keep out of the reach of children.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Material	Type	Value	Form
Hydrex 9571	TWA	5 mg/m3	Dust.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Material	Type	Value
Hydrex 9571	Ceiling	5 mg/m3

Engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Eye / face protection

Do not get in eyes. Chemical goggles are recommended.

Skin protection

Do not get this material in contact with skin. Chemical resistant gloves.

Respiratory protection

Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. If ventilation is not sufficient to effectively prevent buildup of aerosols or mists, appropriate NIOSH/MSHA respiratory protection must be provided.

9. Physical & Chemical Properties

Physical state Solid.

Form Solid.

Color Dark purple

Odor Odorless.

Other data

Decomposition temperature	464 °F (240 °C) Decomp at about 240°C with evolution of oxygen; decomp by alcohol and many other org solvents, also by concn acids with liberation of oxygen; with hydrochloric acid, chlorine liberated; readily decomp by many reducing substances, such as ferrous salts, io
Density	1.45 - 1.60 g/cm³

10. Chemical Stability & Reactivity Information

Chemical stability	Decomposes on heating.
Conditions to avoid	Avoid temperatures exceeding the decomposition temperature.
Incompatible materials	Peroxides. Acids. Glycol. Avoid contact with oxidizers or reducing agents. Powdered metal.
Hazardous decomposition products	Irritating and/or toxic fumes and gases may be emitted upon the products decomposition.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Product	Species	Test Results
Hydrex 9571		
Acute		
Oral		
LD50	Guinea pig	>= 800 mg/kg, Calculated
	Mouse	>= 700 mg/kg, Calculated
	Rat	525 - 780 mg/kg, 14 days, Calculated

* Estimates for product may be based on additional component data not shown.

Acute effects	Causes burns.
Chronic effects	Prolonged inhalation may be harmful. Not expected to be hazardous by WHMIS criteria.

12. Ecological Information

Ecotoxicological data

Product		Species	Test Results
Hydrex 9571			
Other	LC50	Rainbow Trout	1.8 mg/l, 96 hr
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.3 mg/l, 96 hr
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Ecotoxicity	Components of this product are hazardous to aquatic life.
Environmental effects	Harmful to aquatic organisms.
Persistence and degradability	Not available.

13. Disposal Considerations

Disposal instructions	Consult authorities before disposal. Incinerate the material under controlled conditions in an approved incinerator. Do not incinerate sealed containers. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

TDG

UN number	UN1490

UN proper shipping name	Potassium Permanganate
Hazard class	5.1
Packing group	II
Special provisions	16

IATA

UN number	UN1479
UN proper shipping name	Oxidizing solid, n.o.s. (POTASSIUM PERMANGANATE)
Transport hazard class(es)	5.1
Packing group	III
ERG code	5L

IATA; TDG

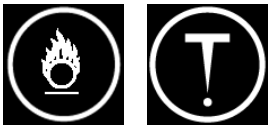
15. Regulatory Information

Canadian regulations This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status Controlled

WHMIS classification C - Oxidizing
D2B - Other Toxic Effects-TOXIC

WHMIS labeling



Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings	Health: 1 Flammability: 0 Physical hazard: 0 Personal protection: E
NFPA ratings	Health: 1 Flammability: 0 Instability: 0 Special hazards: OX
Disclaimer	Veolia Water Solutions & Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Solutions & Technologies' requirement.
This data sheet contains changes from the previous version in section(s):	Product and Company Identification: Product Review Toxicological Information: Toxicological Data Transport Information: Material Transportation Information

SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name or designation of the mixture	NaOH 1N
Registration number	-
Synonyms	None.
Issue date	02-February-2017
Version number	01

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Not available.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

Supplier	Veolia Water STI
Address	Z.A.C. du Haut de Wissous - 3, avenue Le Concorde 91325 Wissous Cedex - FRANCE www.veoliawatersti.fr
Contact person	Hydrex Product Manager
Telephone	+33 (0)1 69 75 25 75
Fax	+33 (0)1 69 75 27 01
e-mail	hydrex.vwtfr@veolia.com
1.4. Emergency telephone number	+1-760-476-3961 (Code: 333239)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classificatior applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards

Skin corrosion/irritation	Category 1B	H314 - Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Category 2	H319 - Causes serious eye irritation.

Hazard summary Causes severe skin burns and eye damage. Causes serious eye irritation. Occupational exposure to the substance or mixture may cause adverse health effects.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms

Signal word Danger

Hazard statements

H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H319	Causes serious eye irritation.

Precautionary statements

Prevention

P260	Do not breathe mist or vapour.
P264	Wash hands thoroughly after handling.
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	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor/paramedic if you feel unwell.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P342 + P311	If experiencing respiratory symptoms: Call a poison center/doctorparamedic.
P363	Wash contaminated clothing before reuse.

Storage Not available.

Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Sodium hydroxide	1 - < 5	1310-73-2 215-185-5	01-2119457892-27-xxxx	011-002-00-6	
Classification:	Skin Corr. 1A;H314				
Other components below reportable levels	90 - 100				

List of abbreviations and symbols that may be used above

#: This substance has been assigned Union workplace exposure limit(s).
M: M-factor
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.
All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Composition comments The full text for all H-statements is displayed in section 16.

SECTION 4: First aid measures

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control centre immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control centre immediately.

Ingestion Call a physician or poison control centre immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

4.2. Most important symptoms and effects, both acute and delayed Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

4.3. Indication of any immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards No unusual fire or explosion hazards noted.

5.1. Extinguishing media

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media	Not available.
5.2. Special hazards arising from the substance or mixture	During fire, gases hazardous to health may be formed.
5.3. Advice for firefighters	
Special protective equipment for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Special fire fighting procedures	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapour. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8.
For emergency responders	Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.
6.2. Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
6.3. Methods and material for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use.
6.4. Reference to other sections	For personal protection, see section 8. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling	Avoid forming spray/aerosol mists. Do not breathe mist or vapour. Do not get in eyes, on skin, or on clothing. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
7.2. Conditions for safe storage, including any incompatibilities	Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in cool, dry place.
7.3. Specific end use(s)	Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

France. Threshold Limit Values (VLEP) for Occupational Exposure to Chemicals in France, INRS ED 984

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	VME	2 mg/m3

Biological limit values	No biological exposure limits noted for the ingredient(s).
Recommended monitoring procedures	Follow standard monitoring procedures.
Derived no-effect level (DNEL)	Not available.
Predicted no effect concentrations (PNECs)	Not available.

8.2. Exposure controls

Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

General information	Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection	Wear safety glasses with side shields (or goggles). Before any handling, wear protective glasses side-shields complying with the NF EN 166.
Skin protection	
- Hand protection	Chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
- Other	Wear appropriate chemical resistant clothing. Chemical resistant gloves.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment. Avoid forming spray/aerosol mists.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.

Hygiene measures	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.
Environmental exposure controls	Environmental manager must be informed of all major releases.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Colour	Colourless.
Odour	Odourless.
pH	12
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Flammability (solid, gas)	Not applicable.
Vapour pressure	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Solubility (other)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Viscosity	Not available.
Explosive properties	Not explosive.
Oxidising properties	Not oxidising.

9.2. Other information

Density	1,00 g/cm³

SECTION 10: Stability and reactivity

10.1. Reactivity	Reacts violently with strong acids. This product may react with oxidizing agents.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid	Contact with incompatible materials. Do not mix with other chemicals.

10.5. Incompatible materials Strong acids. Acids. Oxidizing agents.

10.6. Hazardous decomposition products No hazardous decomposition products are known.

SECTION 11: Toxicological information

General information Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Inhalation May cause irritation to the respiratory system. Prolonged inhalation may be harmful.

Skin contact Causes severe skin burns.

Eye contact Causes serious eye damage.

Ingestion Causes digestive tract burns.

Symptoms Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

11.1. Information on toxicological effects

Components	Species	Test results
Sodium hydroxide (CAS 1310-73-2)		
Acute		
Dermal		
Solid		
LD50	Rabbit	1350 mg/kg
Oral		
Solid		
LD50	Rat	> 300 mg/kg
Liquid		
LD50	Rat	> 300 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory sensitisation Due to partial or complete lack of data the classification is not possible.

Skin sensitisation Due to partial or complete lack of data the classification is not possible.

Germ cell mutagenicity Due to partial or complete lack of data the classification is not possible.

Carcinogenicity Due to partial or complete lack of data the classification is not possible.

Reproductive toxicity Due to partial or complete lack of data the classification is not possible.

Specific target organ toxicity - single exposure Due to partial or complete lack of data the classification is not possible.

Specific target organ toxicity - repeated exposure Due to partial or complete lack of data the classification is not possible.

Aspiration hazard Due to partial or complete lack of data the classification is not possible.

Mixture versus substance information No information available.

Other information Not available.

SECTION 12: Ecological information

12.1. Toxicity Based on available data, the classification criteria are not met for hazardous to the aquatic environment.

Components		Species	Test results
Sodium hydroxide (CAS 1310-73-2)			
Aquatic			
Acute			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	34,59 - 47,13 mg/l, 48 hours
Fish	LC50	Western mosquitofish (Gambusia affinis)	125 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

12.2. Persistence and degradability	No data is available on the degradability of this product.
12.3. Bioaccumulative potential	No data available.
Partition coefficient n-octanol/water (log Kow)	Not available.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	No data available.
12.5. Results of PBT and vPvB assessment	Not available.
12.6. Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.
EU waste code	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. UN number	UN3266
14.2. UN proper shipping name	Corrosive liquid, basic, inorganic, n.o.s.
14.3. Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Hazard No. (ADR)	80
Tunnel restriction code	E
14.4. Packing group	II
14.5. Environmental hazards	No.
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number	UN3266
14.2. UN proper shipping name	Corrosive liquid, basic, inorganic, n.o.s.
14.3. Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
14.4. Packing group	II
14.5. Environmental hazards	No.
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number	UN3266
14.2. UN proper shipping name	Corrosive Liquid, Inorganic, N.o.s.
14.3. Transport hazard class(es)	
Class	8

Subsidiary risk -
Label(s) 8

14.4. Packing group II

14.5. Environmental hazards No.

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number UN3266

14.2. UN proper shipping name Corrosive liquid, basic, inorganic, n.o.s.

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards No.

ERG Code 8L

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft Allowed with restrictions.
Cargo aircraft only Allowed with restrictions.

IMDG

14.1. UN number UN3266

14.2. UN proper shipping name CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards

Marine pollutant No.

EmS F-A, S-B

14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code Not established.

ADN; ADR; IATA; IMDG; RID

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not listed.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding

Not listed.

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances

Not listed.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Sodium hydroxide (CAS 1310-73-2)

Directive 94/33/EC on the protection of young people at work

Sodium hydroxide (CAS 1310-73-2)

Other regulations	The product is classified and labelled in accordance with EC directives or respective national laws This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.
National regulations	Follow national regulation for work with chemical agents. Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work, as amended.

France Classified Installations (ICPE): Listed substance/ICPE Number

Not listed.

15.2. Chemical safety assessment	No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations	Not available.
References	Not available.
Information on evaluation method leading to the classification of mixture	The classification for health and environmental hazards is derived by a combination of calculatior methods and test data, if available.
Full text of any H-statements not written out in full under Sections 2 to 15	H314 Causes severe skin burns and eye damage.
Revision information	None.
Training information	Follow training instructions when handling this material.
Disclaimer	Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

SAFETY DATA SHEET

1. Identification

Product identifier	**VEOLIA ACTISAND**
Other means of identification	None.
Recommended use	Wastewater Treatment
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations. PROFESSIONAL USE ONLY

Manufacturer/Importer/Supplier/Distributor information

Manufacturer	
Supplier	Veolia Water Technologies Canada Inc.
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwtcanada-hydrex@veolia.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)
Supplier	Not available.

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Carcinogenicity	Category 1A
Environmental hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May cause cancer.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
Response	IF exposed or concerned: Get medical advice/attention.
Storage	Not available.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Other hazards	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Crystalline sillica		14808-60-7	100

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed Coughing.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

General information IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media Not available.

Specific hazards arising from the chemical During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Use water spray to cool unopened containers.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up The product is immiscible with water and will spread on the water surface. Stop the flow of material, if this is without risk. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in cool, dry place.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable fraction.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable particles.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable particles.

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable fraction.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable.

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable dust.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable dust.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Other Use of an impervious apron is recommended. Chemical resistant gloves.

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

Thermal hazards Not available.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Solid.

Form Solid.

Color Not available.

Odor	Not available.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.0000001 kPa at 25 °C
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Heat of combustion (NFPA 30B)	0 kJ/g
Molecular formula	O2Si
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Powerful oxidizers. Chlorine.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics Coughing.

Information on toxicological effects

Acute toxicity Not available.

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. May cause cancer. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.

ACGIH Carcinogens

Crystalline sillica (CAS 14808-60-7)	A2 Suspected human carcinogen.

Canada - Alberta OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Manitoba OELs: carcinogenicity

SILICA, CRYSTALLINE-.ALPHA.-QUARTZ, RESPIRABLE FRACTION (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Quebec OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected carcinogenic effect in humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Crystalline sillica (CAS 14808-60-7)	1 Carcinogenic to humans.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

Canadian regulations

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations

Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other Information

Issue date 08-16-2016

Version # 01

Disclaimer Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

Revision information Product and Company Identification: Product Review

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Identification of the substance/preparation	**Sulphuric Acid 98%**
Use of the substance/preparation	Industrial Process Water Treatment; Water Treatment Chemical
Version #	01
Issue date	12-06-2016
CAS #	Mixture
Manufacturer	
Supplier	VWS, Saudi - Chemical Industries
Address	Prince Musaed Bin Abdul Aziz Street PO Box 58515, Riyadh 11515 Saudi Arabia
Contact Person	Product Manager
Telephone	+966 11 478 7721
Fax	+966 11 478 2560
e-mail	vwsme.hydrex@veolia.com
Global Emergency Contact	+1-760-476-3961 (Code:333239)

2. HAZARDS IDENTIFICATION

This preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification	C;R35
Physical hazards	Not classified as a physical hazard.
Health hazards	Causes severe burns.
Environmental hazards	Not classified as an environmental hazard.
Specific hazards	Very toxic by inhalation. Causes severe burns. Prolonged exposure may cause chronic effects.
Main symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS #	Percent	EC-No.	Classification
SULFURIC ACID	7664-93-9	50 - < 60	231-639-5	C;R35
Other components below reportable levels		40 - < 50		

Composition comments The full text for all R-phrases is displayed in Section 16 of the SDS.

4. FIRST AID MEASURES

Inhalation	Move to fresh air. For breathing difficulties, oxygen may be necessary. Get medical attention immediately.
Skin contact	Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash clothing separately before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
General advice	In case of shortness of breath, give oxygen. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Keep victim warm. Do not use mouth-to-mouth method if victim ingested the substance.
Notes to physician	In case of shortness of breath, give oxygen. Keep victim warm.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media Foam. Powder. Carbon dioxide (CO2).

Extinguishing media which must not be used for safety reasons	DO NOT USE WATER. Alcohol resistant foam.
Unusual fire & explosion hazards	The product is not flammable.
Specific hazards	During fire, gases hazardous to health may be formed.
Special protective equipment for fire-fighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
Hazardous combustion products	sulfur

6. ACCIDENTAL RELEASE MEASURES

Containment procedures	Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Personal precautions	Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. For personal protection, see section 8 of the SDS.
Environmental precautions	Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.
Methods for cleaning up	This product is miscible in water. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. This material and its container must be disposed of as hazardous waste. For waste disposal, see section 13 of the SDS. Neutralize with slaked lime (calcium hydroxide) or soda ash (sodium carbonate) and flush with plenty of water.

7. HANDLING AND STORAGE

Handling	Never add water to this product. Avoid forming spray/aerosol mists. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin.
Storage	Never allow product to get in contact with water during storage. Keep at temperature not exceeding 43 °C. Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation. Store in cool, dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

Bahrain. TLVs. Resolution No. 4 Regarding the Management of Hazardous Chemicals, Exposure Limits for Dangerous and Poisonous Chemicals, Annex. 3

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 ppm
	TWA	1 mg/m3

Egypt. OELs. Threshold limits of air pollutants in the workplace (Decree No. 388, Annex 8)

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

Kuwait. OELs. Maximum Limits Allowance for Occupational Exposure to Chemical Substances (TVLs) (Decision No. 210/2001 Appendix No. (3-1))

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. OELs. Maximum Allowable Limits for Air Pollutants in Working Areas [Law to Protect the Air from Pollution, Resolution of the Cabinet of Ministers No. 12 of 2006]

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. Abu Dhabi. TLVs. Maximum Allowable Limits for Air Pollutants in Working Areas (AD EHSMS RF - Occupational Standards and Guideline Values, Schedule A)

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

UAE. Dubai. OELs. Maximum Allowable Limits for Indoor Air Pollutants. Industrial Operation Regulation IO-11.0: Appendix, Tables 2 & 2A

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	1 mg/m3
	TWA	1 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures

Additional exposure data Not available.

Engineering measures to reduce exposure General ventilation normally adequate. Ventilation should effectively remove and prevent buildup of any aerosols or mists generated from the handling of this product.

Personal protective equipment

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit. Avoid forming spray/aerosol mists. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Wear a disposable respiratory equipment against droplets or dust and which complies with NF EN 149, category FFP2.

Hand protection or Rubber (natural, latex). Polyvinyl chloride (PVC). Chemical resistant gloves. Nitrile rubber. Wear protective gloves which comply with the NF EN 374. Solvent-resistant gloves (butylrubber).

Eye protection Before any handling, wear protective glasses side-shields complying with the NF EN 166.

Skin and body protection Do not get this material in contact with skin. Wear suitable protective clothing. Chemical resistant gloves. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

General Avoid contact with skin. Avoid contact with eyes. Use personal protective equipment as required. Eye wash fountain is recommended. Keep working clothes separately. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

Environmental exposure controls Environmental manager must be informed of all major releases.

Hygiene measures Wash hands after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Liquid

Physical state Liquid.

Form Not available.

Color Colorless

Odor Not available.

pH < 1

Specific gravity Not available.

Boiling point 626 °F (330 °C)

Flash point Not available.

Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	0 hPa estimated
Solubility (water)	100 % Exothermic decomp causes a dangerously fast pressure increase.
Partition coefficient (n-octanol/water)	Not available.
Viscosity	26.9 mPa·s (20°C)
Vapor density	Not available.
Evaporation rate	Not available.
Melting point/Freezing point	5 °F (-15 °C)
Auto-ignition temperature	Not available.
VOC	Not available.
Other data	
Density	1.40 - 1.84 g/cm³
Miscible (water)	100 %

10. STABILITY AND REACTIVITY

Conditions to avoid	Exposure to moisture. Reacts violently with strong alkaline substances. None under normal conditions. Avoid exposing to heat and contact with strong oxidizing substances. Do not allow water to get into container because of reaction.
Hazardous decomposition products	Sulphur oxides.
Stability	Material is stable under normal conditions. Material reacts with water.
Materials to avoid	Organic compounds. Metals. Reducing agents. Bases.

11. TOXICOLOGICAL INFORMATION

Toxicological data

Product	Species	Test Results
Sulphuric Acid 98%		
Acute		
Inhalation		
Liquid		
LC50	Rat	0.51 mg/l, 2 hours
Oral		
LD50	Rat	> 2140 mg/kg

* Estimates for product may be based on additional component data not shown.

Acute toxicity	Very toxic by inhalation. Toxic by inhalation. Causes severe burns.
Routes of exposure	Inhalation. Skin contact. Eye contact.
Toxicological information	Occupational exposure to the substance or mixture may cause adverse effects.
Chronic toxicity	Prolonged exposure may cause chronic effects.
Carcinogenicity	Risk of cancer cannot be excluded with prolonged exposure.

Egypt OELs Carcinogen rating

SULFURIC ACID (CAS 7664-93-9)	C2 Suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

SULFURIC ACID (CAS 7664-93-9)	1 Carcinogenic to humans.

Kuwait OELs (Decision No. 210/): Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	A2 Suspected human carcinogen.

UAE - Abu Dhabi TLVs: Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	GROUP A2 Suspected human carcinogen.

Mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Reproductivity	Not classified.
Epidemiology	No epidemiological data is available for this product.
Local effects	Very toxic by inhalation. Causes severe burns. Irritating to respiratory system. May produce corrosive solutions on contact with water.

Symptoms and target organs Contact with this material will cause burns to the skin, eyes and mucous membranes.

12. ECOLOGICAL INFORMATION

Ecotoxicological data

Product		Species	Test Results
Sulphuric Acid 98%			
Aquatic			
Acute			
Fish	LC50	Fish	> 42 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Ecotoxicity Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems. Not expected to be harmful to aquatic organisms.

Environmental effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence / degradability

Bioaccumulation No data available.

Aquatic toxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Mobility This product is miscible in water.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. DISPOSAL CONSIDERATIONS

Disposal instructions Consult authorities before disposal. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground. Dispose in accordance with all applicable regulations.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions). Avoid discharge into water courses or onto the ground.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

DOT

- **UN number** UN1830
- **UN proper shipping name** Sulfuric acid with more than 51 percent acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
  - **Label(s)** 8
- **Packing group** II
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Special provisions** A3, A7, B3, B83, B84, IB2, N34, T8, TP2, TP12
- **Packaging exceptions** 154
- **Packaging non bulk** 202
- **Packaging bulk** 242

IATA

- **UN number** UN1830
- **UN proper shipping name** Sulphuric acid with more than 51% acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
- **Packing group** II
- **Environmental hazards** No.
- **ERG Code** 8L
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Other information**
  - **Passenger and cargo aircraft** Allowed with restrictions.
  - **Cargo aircraft only** Allowed with restrictions.

IMDG

- **UN number** UN1830

UN proper shipping name	SULPHURIC ACID with more than 51% acid
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

DOT

IATA; IMDG

15. REGULATORY INFORMATION

Labeling

Contains	SULFURIC ACID
Symbol(s)	

Corrosive

R-phrase(s)	R35 Causes severe burns.
S-phrase(s)	S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30 Never add water to this product. S36/37/39 Wear suitable protective clothing, gloves and eye/face protection. S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60 This material and its container must be disposed of as hazardous waste.

Follow national regulation for work with chemical agents.

Bahrain. Chemicals Subject to the Prior Informed Consent Procedure under the Rotterdam Convention (Law No. 14 of 2012, Annex III)

Not listed.

Bahrain. CWC Chemical Substances (Decree No. 6 of 1997, Schedules 1, 2 and 3; Law No. 51 of 2009)

Not listed.

Bahrain. Prohibited Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 1)

Not listed.

Bahrain. Severely Restricted Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 2)

Not listed.

Regulatory information

The product is classified and labelled in accordance with EC directives or respective national laws. Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended. Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work, as amended.

16. OTHER INFORMATION

Wording of the R-phrases in sections 2 and 3

R35 Causes severe burns.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

Recommended use

Use in accordance with supplier's recommendations.

Recommended restrictions

PROFESSIONAL USE ONLY

Disclaimer

Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

Revision information

This document has undergone significant changes and should be reviewed in its entirety.