

Appendix 49

Whale Tail Operation and Maintenance Manual Arsenic Water Treatment Plant Version 3

Operation & Maintenance Manual Arsenic Water Treatment Plant (AsWTP)

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Prepared by:
Agnico Eagle Mines Limited – Meadowbank Complex – Whale Tail Pit Project

EXECUTIVE SUMMARY

Agnico Eagle has prepared the following document which summarizes the operational and maintenance procedures to be followed at the Arsenic Water Treatment Plant (AsWTP).

This report documents the stand alone Operation & Maintenance Manual – Arsenic Water Treatment Plant, includes the following requirements:

- The manual was prepared in accordance with the “Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996”, and adapted for the use of a mechanical contact water treatment facility;
- The manual includes contingency measures in the event of a plant malfunction; and
- The manual includes sludge management procedures.

IMPLEMENTATION SCHEDULE

This Plan will be implemented upon Board approval and subject to any modifications proposed by the NWB as a result of the review and approval process.

DISTRIBUTION LIST

Agnico Eagle Internal:

- Environmental and Critical Infrastructures Superintendent
- E&I Superintendent
- Environmental General Supervisor
- Critical Infrastructures General Supervisor
- E&I General Supervisor
- Environmental Compliance Counselor
- Water Treatment Plant Operator

DOCUMENT CONTROL

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1 INTRODUCTION

1.1 PURPOSE

This Arsenic Water Treatment Plant (AsWTP) Operation and Maintenance Manual (OMM) for the Whale Tail Gold Project (the Project) has been prepared based on the “*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996, prepared by the Department of Municipal and Community Affairs, NWT*”. The OMM has been adapted for the use of a mechanical contact water treatment facility.

This manual is a component of the Whale Tail Environmental Management System. The objectives of this plan are summarized as follows:

1. To define the location, design and operating procedures to be used in the treatment of contact water generated at the Project; and
2. To provide monitoring requirements for the AsWTP.

The AsWTP purpose is to treat water from the attenuation pond.

1.2 BRIEF DESCRIPTION OF THE PROJECT

Agnico Eagle Mines Limited—Meadowbank Division (Agnico Eagle) is developing Whale Tail and IVR Pits, an Underground mine and Haul Road Project, on a satellite deposit located on the Amaruq property, to extend mine operations and milling at Meadowbank Mine.

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.

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). at Amaruq, it is expected to have arsenic (As) in the surface water due to the leachability of the rock. Therefore, the Actiflo® are integrated into a treatment chain able to remove As to acceptable levels.

Figures 1 and 2 illustrate the location and general arrangement of the AsWTP.

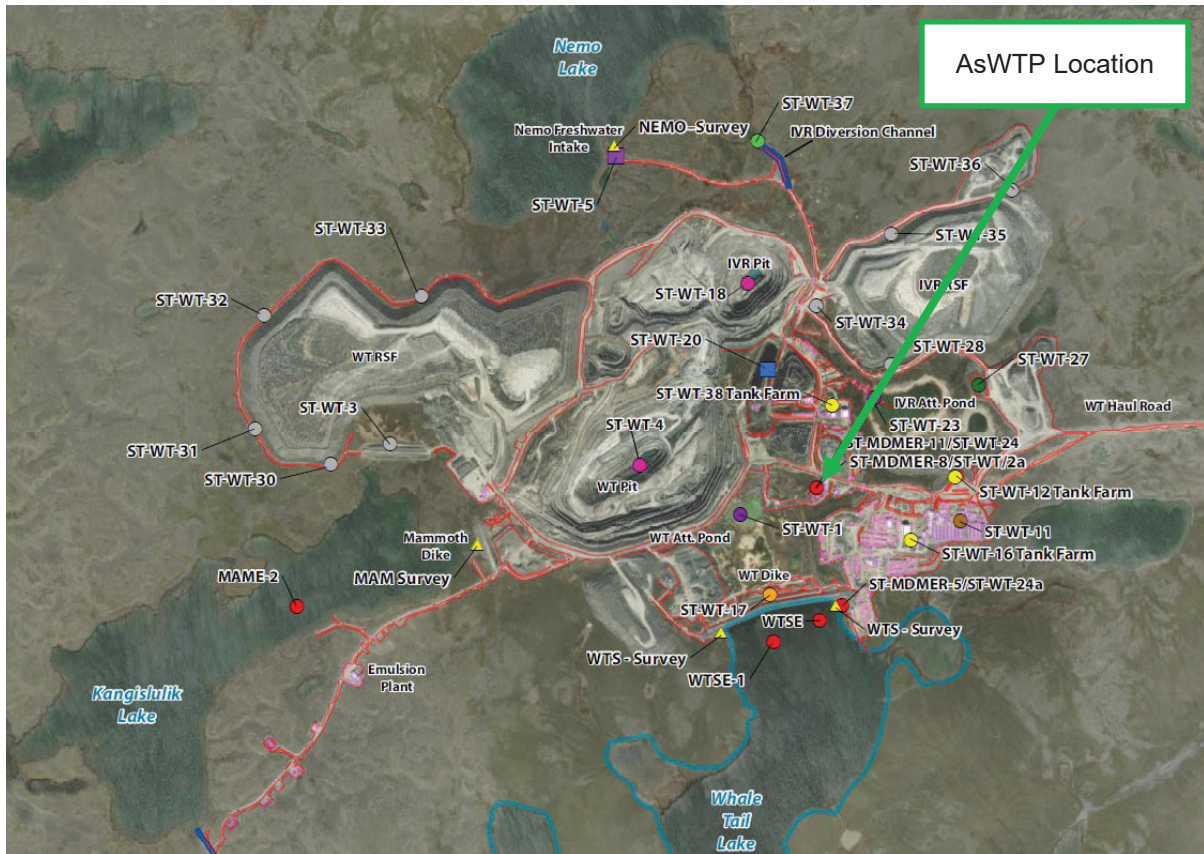


Figure 1 – Location of ASWTP

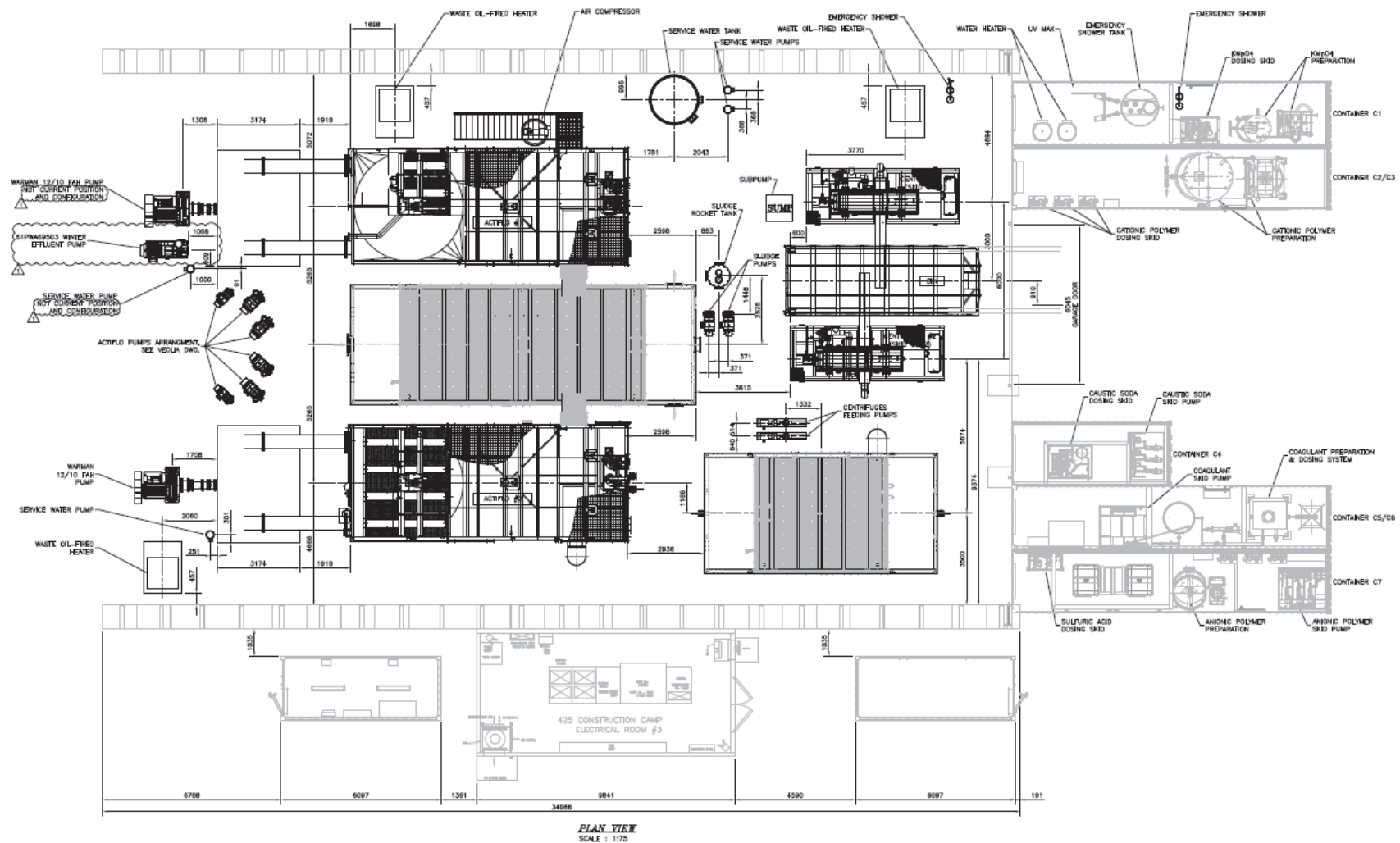


Figure 2 – General Arrangement of ASWTP

1.3 CONTACT INFORMATION

The individuals responsible for the operation of the AsWTP for the Project are the following:

E&I Superintendent	819-759-3555
E&I General Foreman	819-759-3555

2 DESCRIPTION

2.1 ARSENIC WATER TREATMENT PLANT (AsWTP)

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

- 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 AsWTP is designed to treat a maximum of 1,600 m³/h in summer. In winter, the modification will allow reaching a flow of 250 m³/h with the AsWTP (max design of 350 m³/h). The initial AsWTP design report was planning a discharge in winter of 84 m³/h. See design report 61-693-125-REP-001 for more detail.

2.1.1 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 the attenuation ponds. The equipment has an operational range of 6,250 to 38,400 m³/d.

AsWTP is composed mainly of two treatment lines:

- One As Removal Reactors used for pH adjustment, As oxidation, As precipitation.
- Two Actiflo® treating the exit of the As Removal Reactor, with sludge recirculation.
- A sludge dewatering chain with two 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 is monitored for pH and turbidity, which are monitored continuously. Flow rate is measured continuously.

The AsWTP general flow diagram is illustrated in Figure 3 and Figure 4 for summer operation. The following sections describe the AsWTP components.

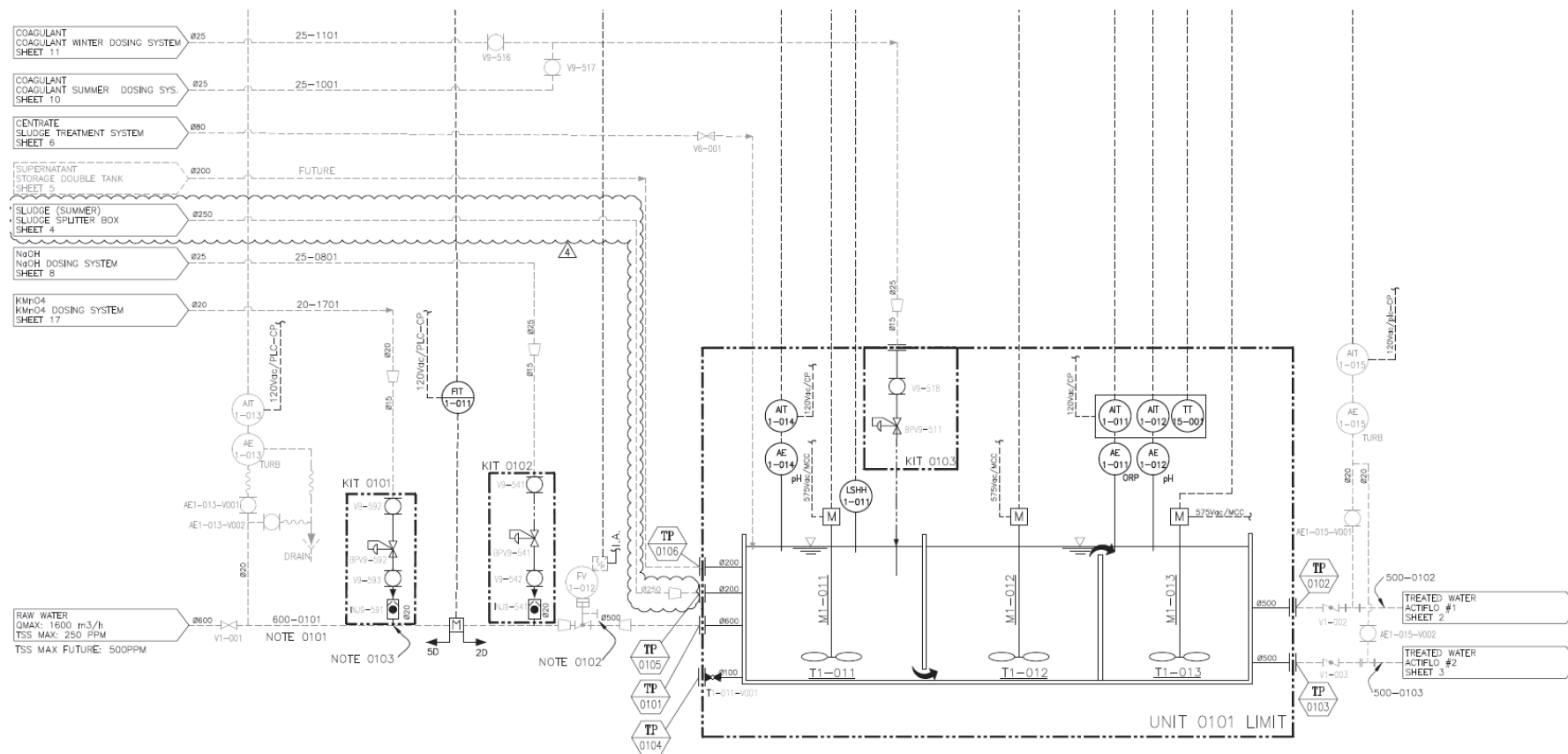


Figure 3 – Flowsheet of AsWTP – As Removal Reactor

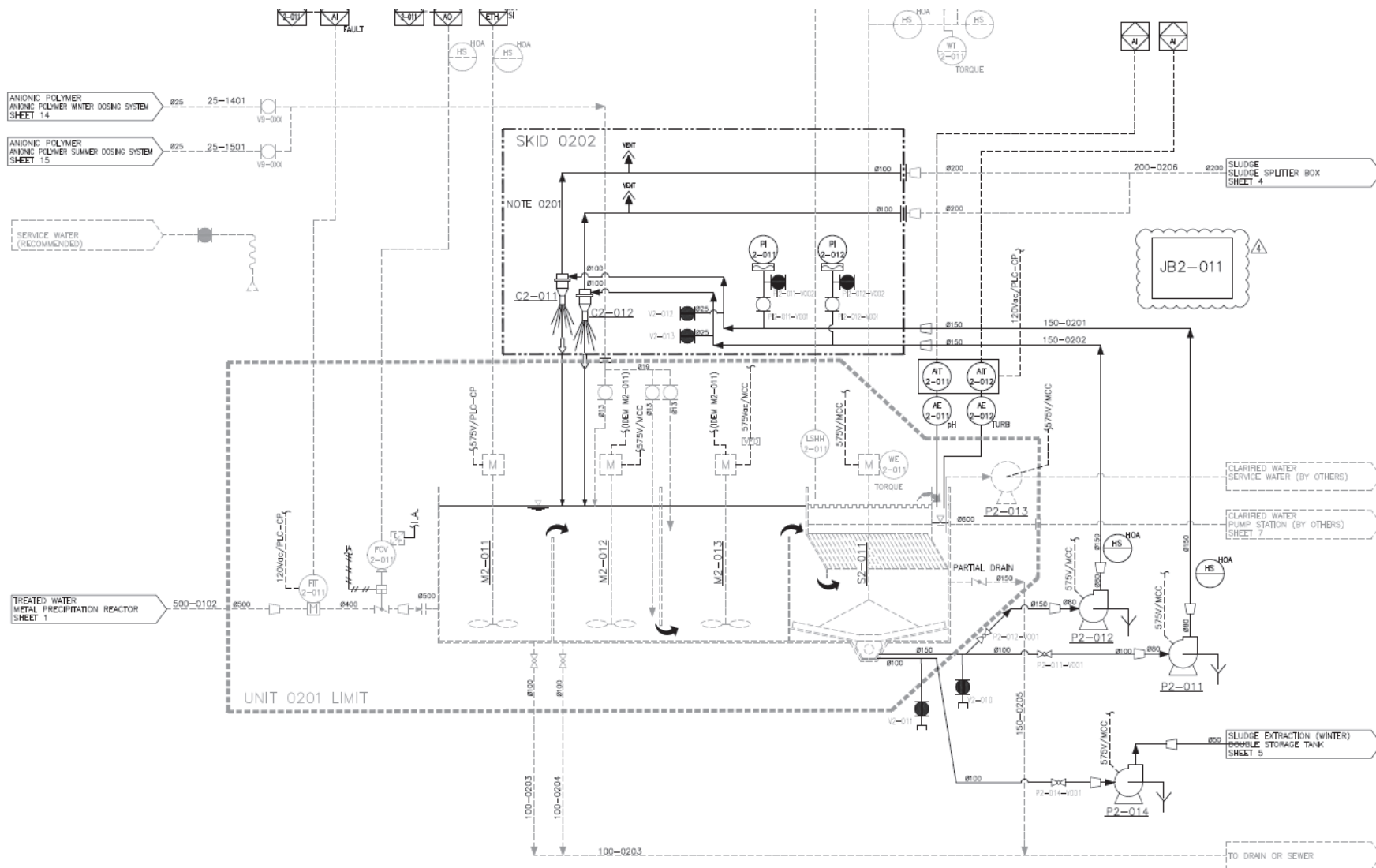


Figure 4 – Flowsheet of AsWTP – Actiflo

2.1.2 Process description

2.1.2.1 Arsenic Oxidation

Arsenic present in water can be found under two main speciations: As III (trivalent) and As V (pentavalent). Depending on the redox potential of water in the attenuation pond, As III could be oxidized into As V. Before entering the As Removal Reactor, a KMnO₄ (potassium permanganate) solution will need to be added to ensure oxidizing the trivalent As to a pentavalent form.

2.1.2.2 pH Adjustment

To precipitate As, ferric sulfate has to be added. However, this reagent acidifies water. If inlet water does not have enough alkalinity, caustic soda has to be added to prevent pH decrease in the As Removal Reactor. A pH of 7 is targeted for As uptake.

2.1.2.3 Arsenic Co-precipitation

The influent will be sent to the As Removal Reactor (RX75-3 from Veolia). In this reactor, the influent will be mixed with ferric sulfate (Fe₂(SO₄)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, including As. The ferric sulfate will also lower the pH in the vicinity of 7.0 where the surface complexation is optimal for As V.

A part of the sludge collected in Actiflo® is recycled in the As Removal Reactor to allow a longer contact time between As and iron (Fe) hydroxide sludge (ratio of sludge recycling 4:1).

2.1.2.4 TSS Removal

The slurry from the As Removal Reactor will flow to two Actiflo® units (ACP-700R). The proposed Actiflo® is designed to remove suspended solids and TSS from the raw. To allow a good clarification (settling rate of 60 m/h), the maximum flow for each Actiflo® should be 800 m³/h to respect the targeted 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 allows the unit to perform well under dramatically changing flow rates without impacting final effluent quality.

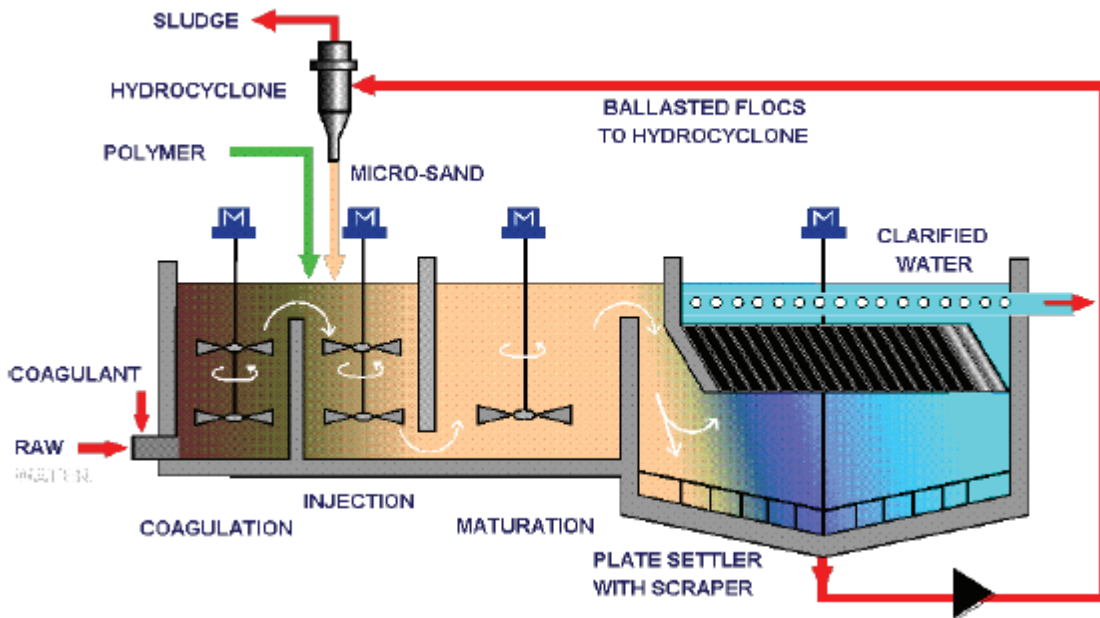


Figure 5 – Actiflo® Process

The slurry flows to the first tank section, 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 hydrocyclone where the sludge and microsand are separated by centrifugal force. After separation, the higher density microsand is discharged from the bottom of the hydrocyclone and reinjected into the process for reuse. The lighter density sludge is discharged from the top of the hydrocyclone 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® need to be upgraded. Indeed, the two pumps installed on each Actiflo® each have a pumping capacity of 34 m³/h which does not address recirculation requirements. To address the pumping needs, pumping rate for the extraction pumps needs are 70 m³/h each. This also means that the recirculation line and Hydrocyclone were changed (U10-gMAX-3037, Krebs).

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

2.1.3 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. Only one Actiflo lunit will be used.

2.1.4 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 As 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 inlet as shown on Figure 6.

The sludge from the sludge storage tank is pumped in two (2) centrifuges (Andritz D4L) in parallel, capable of producing a cake of about $25 \pm 5\%$ 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 and ferric hydroxides from the coagulant addition.

The centrifuge is 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 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 As Removal Reactor.

The volume of sludge will be 2–4 m³/h approximately (depending on the TSS concentration which can vary from 250 to 500 ppm).

The cakes will be disposed at the WRSF.

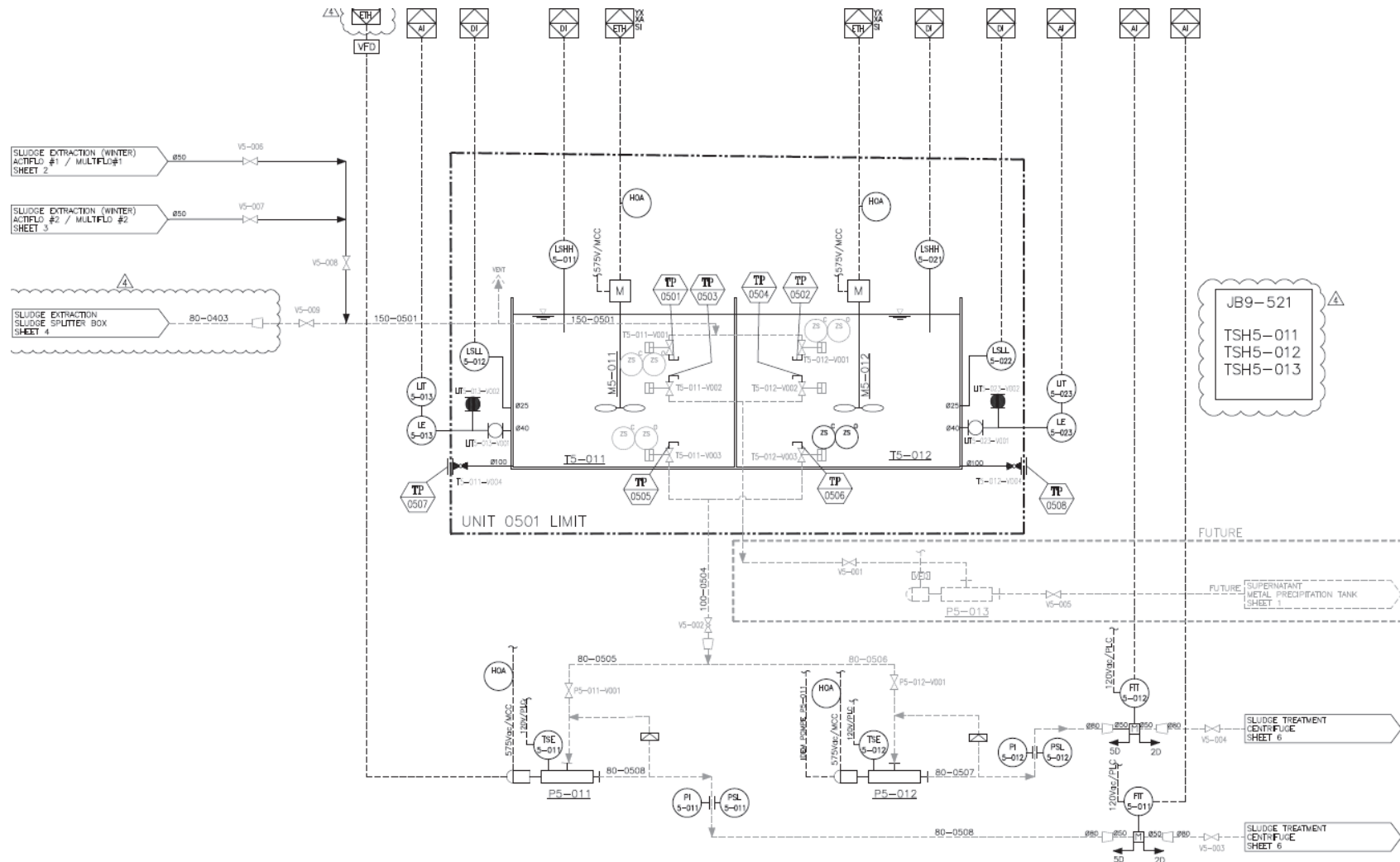
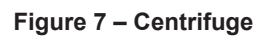


Figure 6 – AsWTP Sludge Tank



2.1.5 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 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.

2.1.6 Reagents

The main chemicals used in the AsWTP are presented below:

- KMnO4

The potassium permanganate will oxidize the trivalent As (As III) to produce pentavalent As (As V) that is easier to precipitate and separate from water. The selected oxidant to oxidize As is Hydrex 9571, it 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 be received in bulk bags. The dosage will be performed using a mechanical diaphragm metering pump. Sulfuric acid is required for the solution preparation. The dosage of coagulant would be 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 need to be filtered water 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 approximately 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 entailing great process. The microsand is recycled in the process but about 1 g/m³ of raw water need to be added, depending on initial turbidity. Actisand™, 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.

Every spring, to switch from Multiflo to Actiflo®, 5000 kg of actisand will need to be added.

- Sulphuric Acid

Sulphuric acid is used for ferric sulfate preparation. Sulphuric acid is a commodity and will be received in bulk containers of 1 m³ at 93 % concentration. Sulfuric acid has a freezing point of -30 °C. It is a hazardous product (class 8-corrosive) and needs to be handled accordingly. The product can be used as is and the dosage is done in using mechanical diaphragm metering pumps (7 mg/l approximately).

The MSDS sheets are provided at Appendix A.

2.1.7 Controls

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 m³/h with diesel pump. 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 m³/h with electrical pump. Both winter and summer pumps are working on an ON/OFF mode that allows the flow to be constant during ON mode.

The raw water TSS analyzer (turbidity sensor) is used to monitor the water quality. An alarm is triggered when a high-high turbidity is reached. The high-high turbidity alarm value is a setting that will be determined during the commissioning phase and will depend on the quality of the water to be treated.

TSS concentration (turbidity) and pH values in the effluent are monitored continuously with in-line instrumentation. If effluent concentrations reach a set point indicating that final effluent discharge criteria may be exceeded, an alarm is sent to the Operator, who will manage the system to meet effluent criteria. A second alarm is sent to the Operator if effluent concentrations reach a second set point that is just below the final effluent discharge criteria.

Addition of the required reagents is proportional to the influent water flow. Since this flow is constantly maintained, no manual adjustment is required. If the operator has to modify the influent water flow, adjustment of the reagent dosing system will be required to maintain the target dosage rate. The reagent dosing systems are equipped with pumps that maintain a constant flow rate when running at a constant frequency. The flow can be modified by changing the electric motor frequency.

The reagent dosing system is equipped with valves and graduated cylinders allowing the Operator to measure the addition rate of the reagent using a stop watch. The Operator will determine the required flow of a specific reagent by a formula based on influent flow rate. Based on this calculation, a manual adjustment to the reagent pump will be done in order to obtain the required dosage. Initially, the formula will be based on laboratory testing and will be adjusted accordingly to the treatment plant performance.

More information on instrumentation can be found in Appendix B on the PID Drawings.

3 OPERATION AND MAINTENANCE

3.1 PUMPING

The system includes mainly pumps for the operation of the AsWTP. Some of these pumps are equipped with a variable frequency drive (VFD) that could be adjusted by the Operator or by an automatic system. In all cases the pumps can only be started by the Operator.

All pumps are regularly inspected by the Operator who will ensure the pumps continue to operate efficiently and will address any deficiencies. If the pumps require maintenance, the Operator will report the situation and take appropriate action. Some of the pumps are installed with a standby unit that allows the Operator to switch from one pump to the other if necessary. In some situations, it may be necessary to temporarily shutdown the AsWTP for servicing of the equipment.

A preventative maintenance program, as recommended by the pump supplier, will be followed by the Maintenance Crew to ensure the pumps are always kept in good working order.

3.2 REAGENT MIXING

The reagent mixing system is fully automated system. The only requirement is to change the reagent bag when it is empty. Since one bag will last for many days, daily verification of the dry reagent level is sufficient to ensure stable operation of the process.

During the daily inspection, the Operator will monitor the different reagent systems and prepare additional reagent, as required, according to the reagent preparation procedures. The water levels in the mixing and distribution tanks are connected to the control system, which will ensure sufficient water is supplied to the reagent preparation systems. In the event of a lack of water supply, a low level alarm will occur to notify the Operator.

Preventive maintenance of the mechanical equipment will be performed according to the supplier operating manual specifications. Chemical dosage will be optimized to improve the AsWTP efficiency over the time.

3.3 CENTRIFUGES

Centrifuges will be operated when the sludge tank are full. In summer, the centrifuge will be operated in continuous. However, the frequency to use centrifuge will depend on the TSS concentration in the feed water.

3.4 EFFLUENT QUALITY CONTROL

The Operator will conduct regular inspections of the entire operating system to ensure it operates as intended. Any upset condition will be reported immediately by the Operator and corrective actions will be applied accordingly. The Operator will also record process key values that will allow the process to be optimized and any discrepancies between the process and expected performances to be detected.

The quality of the final effluent is monitored on a continuous basis by pH and turbidity (Nephelometric Turbidity Unit (NTU)) probes. The turbidity measurement is an indirect indication of the TSS in the water, and will be used to infer the effluent TSS. Agnico Eagle is committed to proactive and effective response to any potential TSS problems; the monitoring program has been designed to provide quick feedback. Based on experience at the Meadowbank Mine, this is not possible using TSS as a direct measure, because of the time required to analyze TSS in the field. Consequently, and consistent with the recommendations of the DFO (DFO, 2000), Agnico Eagle has developed a relationship between turbidity and TSS, allowing the use of turbidity as a surrogate for TSS and obtaining real time results.

The TSS-turbidity relationship was developed using paired data collected across a range of TSS sources and concentrations and previously approved in the Meadowbank Water Quality Monitoring and Management Plan for Dike Construction and Dewatering. The resulting linear regression was as follows:

$$\log_{10}(\text{turbidity}) = 0.62196 + (0.95619 * \log_{10}(\text{TSS})) \quad [p < 0.001; r^2\text{-adj} = 0.81]$$

The output of these instruments (turbidity and pH) will send an alarm indicating that the levels are higher than the set point, but lower than the maximum discharge criteria. This allows the Operator to act on the process before the limit is exceeded. In the event that the discharge limit is about to be reached, a second alarm will send a signal to the Operator. The system will be equipped with an uninterruptable power supply for instrumentation and controls.

The final effluent will be sampled for water quality following the frequency and parameters stipulated in the NWB Water License and the Metal and Diamond Mining Effluent Regulations (MDMER) and sent to a certified laboratory for analysis. The results generated by the laboratory will be compared with those obtained with the plant instrumentation to detect any deviations. All the probes and instrumentation within the plant will be calibrated and serviced as per the preventative maintenance program.

As stipulated in the Type A Water License and the Metal Mining Effluent Regulations (MDMER), the final effluent discharged shall not exceed a pH range between 6.0 and 9.5 and a maximum average concentration for TSS of 15 mg/L, and for As of 0.1 mg/L. The Table 1 presents the treatment requirement from Licence A. Note that only pH, TSS, As and Fe will be treated within the AsWTP.

Table 1: Water quality requirement

Parameters	Unit	Monthly Mean Concentration	Maximum Concentration in a Grab Sample
pH	-	6.0–9.5	6.0–9.5
Total Suspended Solids (TSS)	mg/l	15	30
Total Dissolved Solids (TDS)	mg/l	1400	1400
Total Ammonia (NH ₃ -N)	mg-N/l	16	32
Total Phosphorus (P)	mg-P/l	0.3	0.6
Aluminium (Al)	mg/L	0.5	1
Arsenic (As)	mg/L	0.1	0.2
Cadmium (Cd)	mg/L	0.002	0.004
Chromium (Cr)	mg/L	0.02	0.04
Iron (Fe)	mg/L	1	2
Lead (Pb)	mg/L	0.05	0.1
Mercury (Hg)	mg/L	0.004	0.008
Nickel (Ni)	mg/L	0.25	0.5
Zinc (Zn)	mg/L	0.1	0.2
Total Petroleum Hydrocarbons (TPH)	mg/L	3	6

3.5 MONITORING

To ensure efficiency of As-WTP, samples of water must be collected periodically. Table 2 presents sampling schedule to assess that performance comply with operational target values.

Table 2: Monitoring program for operational efficiency assessment.

Parameters	Frequency	Aim
Process follow-up		
Flow rate - volume	Daily	Process performance
TSS feed concentration	Daily	Process performance
Feed turbidity	Daily	Process performance
Feed pH	Daily	Process performance
Treated water turbidity and TSS	Daily	Process performance
Treated water pH	Daily	Process performance
Centrifuge cake solid percentage and volume	Daily	Process performance
Actiflo sludge solid percentage and volume	Daily	Process performance
Regulatory follow-up		
Attenuation Pond (feed of As-WTP) – Group 1*	4 time per year	Licence A
Treated water after As-WTP - Volume	Daily	Licence A
Treated water after As-WTP – Field measurement	Weekly	Licence A
Treated water after As-WTP – Group 1	Weekly	Licence A
Treated water after As-WTP – Group 1 MMER**	4 times per year	Licence A
Treated water after As-WTP - Group 3 MMER toxicity (Rainbow Trout and Daphnia magna)	1 before discharge the monthly	Licence A
Treated water after As-WTP - Group 3 Sub-lethal toxicity	2 times per year	Licence A
* Group 1- pH, turbidity, hardness, alkalinity, ammonia nitrogen, total metals (aluminum, arsenic, barium, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, nitrite, nitrate, selenium, silver, thallium, zinc) sulphate, TDS, TSS.		
** Group 1 MMER - Arsenic, copper, lead, nickel, zinc, total suspended solids, pH, effluent volumes and flow rate of discharge		

3.6 TROUBLESHOOTING AND MAINTENANCE PROCEDURES

The sections below outline the general operational and maintenance procedures at the plant; further details are available in the manufacturer' operating manuals in Appendix C.

The operation of the Actiflo® process is relatively simple and a visual inspection will determine whether the process is performing as expected. A critical component of the process for monitoring is the maturation tank. The agitator of this tank is equipped with a VFD and the speed is adjusted to obtain a gentle mixing in this tank. When the process is operated correctly, big flocs of about 5 mm are visible in the tank and moving slowly. The agitation must be adjusted in a way that the flocs are maintained in suspension and not broken down. The water between the flocs should look clear. If flocs are visible but the water is cloudy, it is an indication that the coagulant dosage is insufficient. If the water is clear but the flocs are small, it is an indication that the flocculant addition is insufficient.

The system must also contain enough micro-sand to obtain flocs that are heavy enough to sink in the clarifier section. If large flocs are visible but are present at the top of the clarifier, this is an indication of insufficient micro-sand. Usually, the micro-sand load is maintained by adding one bag at a time. The frequency of the addition of micro-sand is determined by trial and error. There is no environmental issue with an excessive addition since it would be compensated by an increased loss within the sludge.

The hydrocyclone is also an important part of the system since it allows the micro-sand to be recycled in the system. The underflow of the cyclone should never be blocked and the flow should have an umbrella shape.

Centrifuges have to be periodically inspected to evaluate the wear of rotating part. In case of premature wear, replacement of the part will be required to assure an efficient operation of the centrifuge.

3.7 DAY-TO-DAY OPERATION

The Table 3 presents the daily operation of the As-WTP that operator should performed.

Every day, the items 1 to 4 should be performed by the operator to ensure an optimal As-WTP operation.

Item 5 of the table 2, will be periodically performed according to the supplier recommendations. This preventive maintenance will allow keeping the As-WTP in good conditions.

Table 3: Routine Operation and Maintenance Checkups

Item	Item	Action	Comments
[1] Process parameter	Flow rate	Daily	-
	Flow rate totalizer	Daily	Volume discharge
	TSS feed concentration	Daily	For chemical adjustment
	Feed turbidity	Daily	For chemical adjustment
	Feed pH	Daily	For chemical adjustment
	Treated water turbidity and TSS	Daily	Quality control
	Treated water pH	Daily	Quality control
	Duration of the operation	Daily	-
	Actiflo sludge solid percentage	Daily	Dewatering performance
	Cake solid percentage	Daily	Dewatering performance
	Volume of sludge per day Actiflo	Daily	Dewatering performance
	Volume of cake per day	Daily	Dewatering performance
[2] Chemical	Security and PPI	Daily	Verify/use PPI and security procedure to manipulate chemical
	Coagulant set point	Daily	Chemical consumption
	Polymer anionic set point	Daily	Chemical consumption
	Polymer cationic set point	Daily	Chemical consumption
	Permanganate set point	Daily	Chemical consumption
	Caustic set point	Daily	Chemical consumption
	Microsand concentration	Daily	Chemical consumption – add micro sand if needed
	Coagulant bag used	Daily	Recharge make down system if required
	Polymer anionic bag used	Daily	Recharge make down system if required
	Polymer cationic bag used	Daily	Recharge make down system if required
	Microsand bag used	Daily	Add sand if concentration too low in the Actiflo
	Permanganate bag used	Daily	Recharge make down system if required
[3] Environnement	Weather	Daily	-
	Temperature of water	Daily	-
[4] Mechanical	Complete Visual Inspection before Start-Up	Daily	Complete a good inspection before operating. Ensure that no alarms are active on the PLC. Ensure equipment is in good order, with no leaks and all safety devices are in place.
	Complete Inspection after Start-Up	Daily	Complete a good inspection while in operation. Ensure that no strange noises are audible. Make sure auxiliary equipment (valves & level probe) and PLC operate correctly. Look, Listen, Smell, and Feel.
	Water Flow comparison	Daily	Compare flowmeter VS water level
	Pressure	Daily	Feed and discharge line
	Visual Leak On Piping	Daily	Ensure not water leaks are visible on the piping
	Sump Level	Daily	Empty sump if needed

[4] Mechanical	Pump and centrifuge Speed	Daily	Verify they are at the appropriate value
	Manual Valve at the pump discharge	Daily	Ensure manual valve is fully open at the pump discharge. Valve must be fully open to avoid premature wear.
	Building	Daily	Ensure the wall exhaust fans are operational. Excess of humidity must be evacuated outside.
	PLC functionality - alarm	Daily	No abnormal operation. Solve each alarm
	Centrifuge operation duration	Daily	-
[5] Maintenance	Lamella cleaning	As needed	Clean lamella when As-WTP is off line
	Hydrocyclone wear part replacement	As needed	According to supplier (approx. 1-2 per year)
	Dosing pump calibration	As needed, monthly approx.	Verify set point VS real flow rate
	Metering pumps, Scraper, mixer, Pump, centrifuge maintenance	Periodically, 2 per year approx.	According to supplier recommendations. Grease several time a year (approx. 3 per months). In case of major maintenance or malfunction, the use standby equipment. Critical spare part will be kept in inventory for process which are not redundant.
	Instrumentation calibration	Periodically – monthly approx.	Turbimeter, pH meter, According to supplier recommendations
	Instrument cleaning	Periodically – monthly approx.	Turbimeter, pH meter, According to supplier recommendations
	Pumps, Metering pumps, Scraper, mixer, centrifuge oil change	Every 3 months approx.	According to supplier recommendations
	Winterization	If As-WTP need to be shut down for long period of time.	Flush – drain – clean equipment, dosing skid cleaning, instrumentation (leaning, disconnecting and draining if needed), air network to be purged, shut down power.
	Motor bearing	Every year approx.	Change/reaper according to supplier recommendations

3.8 RECORD KEEPING

Records of the operational and maintenance and sampling procedures will be accessible to assist in the evaluation of the AsWTP performance. Details of any maintenance undertaken at the AsWTP will also be recorded.

The volume, pH, turbidity and temperature of effluent discharged to environment will be recorded on a continuous basis. The data will be saved on a network data base.

3.9 SAFETY PROCEDURES FOR OPERATORS

Operators working in the AsWTP facility must be trained prior to work so that they are aware of the health and safety risks as well as the operational procedures associated with the AsWTP. The following are important safety considerations:

- Working within the plant, especially with chemicals, requires adequate personal protective equipment (PPE) for Operators. This includes wearing steel toed boots, hard hat, rubber aprons, safety glasses with side shields and gloves.
- Operators are required to conduct good housekeeping of the working area to minimize the risk of incidents.
- Lock-out/tag-out procedures must applied when servicing equipment.
- The MSDS for reagents used in the AsWTP will be readily available for the Operator at all times.
- Eyewash stations are located within proximity of reagent systems in the AsWTP.

3.10 CONTROLLING ACCESS TO THE ASWTP

Access to the AsWTP will be restricted to authorized personnel only. Signs will be posted at the AsWTP entrance.

4 EMERGENCY RESPONSE

4.1 FIRE

In case of fire at the AsWTP, the on-site emergency response team (ERT) will be notified as per Agnico Eagle's protocol. Instructions from the on-site emergency response team will be followed by all personnel at the AsWTP. Further details of fire response are provided in the "*Risk Management & Emergency Response Plan*". The AsWTP will include the necessary fire safety protection measures in accordance with the Nunavut and North West Territories Mine Act.

4.2 SPILL

Spill kits and the necessary secondary containment will be provided within the building of the AsWTP. In the event of a spill at the AsWTP, the Environment Department will be notified immediately and provide support, as required. In the event of a large spill, the on-site ERT will be notified as per Agnico Eagle's protocol. Instructions from the ERT will be followed by all personnel at the AsWTP. A spill kit will be available at the AsWTP. All spill will be reported and treated according to the "*Spill Contingency Plan*".

4.3 PLANT MALFUNCTION

If there is a major problem or failure in the AsWTP, it will be likely due to a problem with the reagent addition systems caused by the malfunction of the pump or due to a cyclone blockage on the sludge reclaim system.

In the case of an operational upset, the most likely consequence could be an increase of TSS and As in the effluent. This would be managed by adjusting the feed flow rate, dosage of chemical. Once the problem is resolved and the water quality returns to concentrations within discharge criteria, the valves will be re-opened to allow discharge to environment.

In the case of a cyclone underflow blockage, the micro-sand will be completely lost to the rejected sludge. New sand will then need to be added.

Two centrifuges will be operated in parallel. In case of one centrifuge malfunction, the other one can continue to be operated during the maintenance of the other.

Appendix A : SDS

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, CO ₂ , 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/m ³ .

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		
<i>Dermal</i>		
LD50	Rabbit	> 10000 mg/kg
<i>Oral</i>		
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	2276 mg/l, 72 hr
Crustacea	EC50	> 100 mg/l, 48 hr
Other	LC50	> 120 mg/l, 96 hr
Aquatic		
Fish	LC50	> 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

Material name: Hydrex 6105

2414 Version #: 01 Issue date: 08-15-2014

MSDS Canada

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® ratings

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

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

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/m ³

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

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m ³

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/m ³
	TWA	1 mg/m ³

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

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m ³

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

Components	Type	Value
FERRIC SULFATE (CAS 10028-22-5)	TWA	1 mg/m ³

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		
<i>Dermal</i>		
LD50	Mouse	>= 200 mg/kg Calculation
<i>Oral</i>		
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		
<i>Acute</i>		
Algae	EC50 Green algae (<i>Scenedesmus acutus</i>)	> 13 mg/l, 7 day
Fish	LC50 Mosquitofish (<i>Gambusia affinis affinis</i>)	>= 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.

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).
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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/m ³
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		
<i>Dermal</i>		
Presumed Non-Toxic	Rabbit	> 2000 mg/kg
<i>Inhalation</i>		
LC50	Rat	> 20 mg/l, 4 hours
<i>Oral</i>		
LD50	Rat	> 5000 mg/kg

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

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

Signs and symptoms Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. 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/cm ³

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		
<i>Oral</i>		
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 (<i>Lepomis macrochirus</i>)	2.3 mg/l, 96 hr
	Milkfish, salmon-herring (<i>Chanos chanos</i>)	> 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
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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

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 classification 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/doctor/paramedic.

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.

Material name: NaOH 1N

4793 Version #: 01 Issue date: 02-February-2017

SDS France

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		
<i>Solid</i>		
LD50	Rabbit	1350 mg/kg
Oral		
<i>Solid</i>		
LD50	Rat	> 300 mg/kg
<i>Liquid</i>		
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.
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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

Material name: NaOH 1N

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SDS France

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 calculation 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.

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	vwcanada-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 silica		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 (CO ₂).
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/m ³	Respirable fraction.
Components	Type	Value	Form
Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m ³	Respirable fraction.

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

Material	Type	Value	Form
VEOLIA ACTISAND Components	TWA Type	0.025 mg/m3 Value	Respirable particles. Form
Crystalline silica (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 Components	TWA Type	0.025 mg/m3 Value	Respirable fraction. Form
Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

Material	Type	Value	Form
Crystalline silica (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 Components	TWA Type	0.1 mg/m3 Value	Respirable. Form
Crystalline silica (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 Components	TWA Type	0.1 mg/m3 Value	Respirable dust. Form
Crystalline silica (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.

Material name: VEOLIA ACTISAND

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SDS Canada

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 silica (CAS 14808-60-7)

A2 Suspected human carcinogen.

Canada - Alberta OELs: Carcinogen category

Crystalline silica (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 silica (CAS 14808-60-7)

Suspected carcinogenic effect in humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Crystalline silica (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

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		
<i>Liquid</i>		
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		
<i>Acute</i>		
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
------------------	--------

Material name: Sulphuric Acid 98%

4098 Version #: 01 Issue date: 12-06-2016

SDS Middle East

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-phrases(s)

R35 Causes severe burns.

S-phrases(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.

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

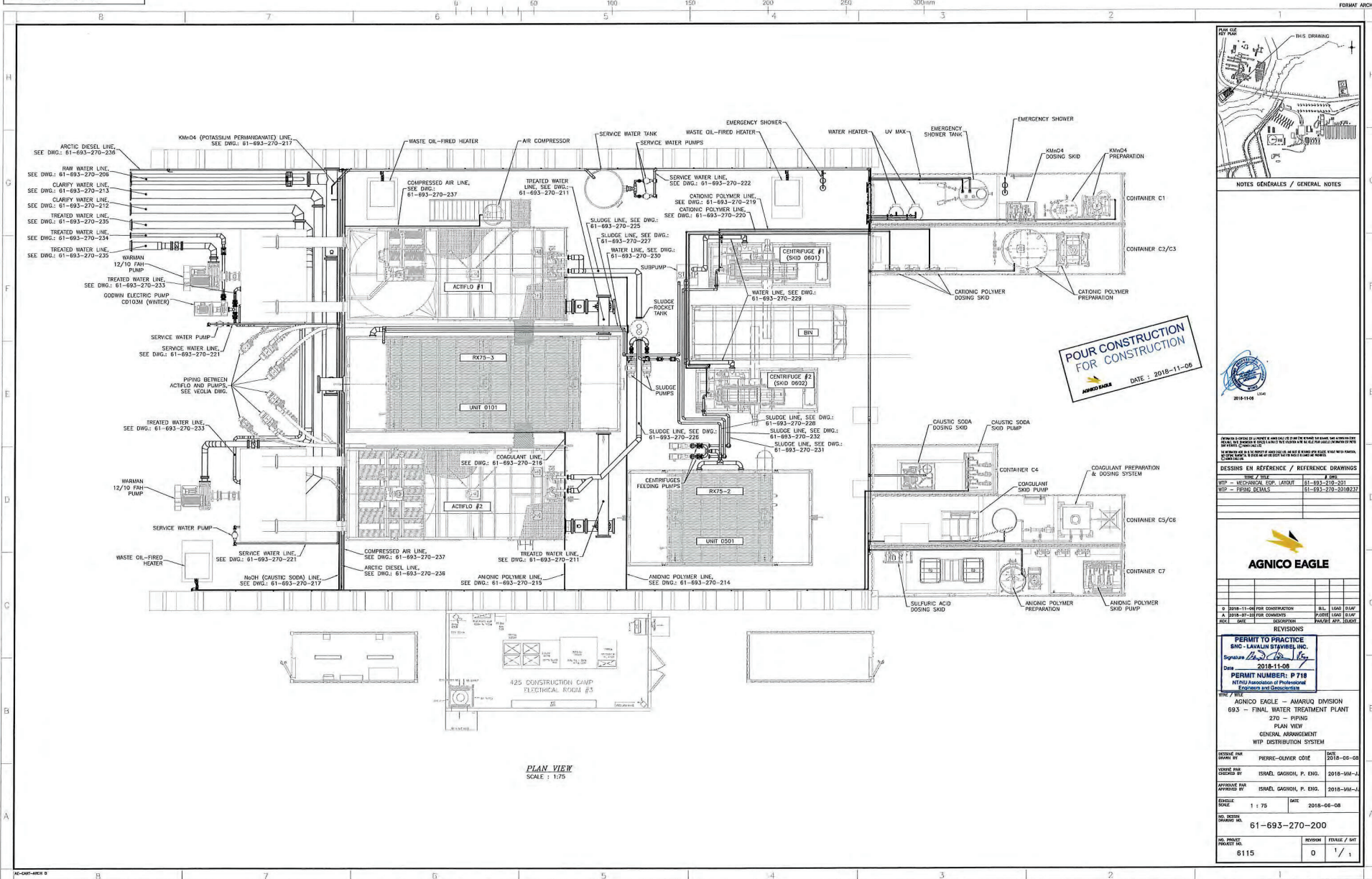
Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product,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

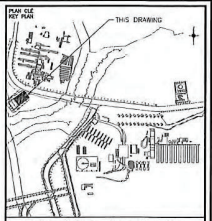
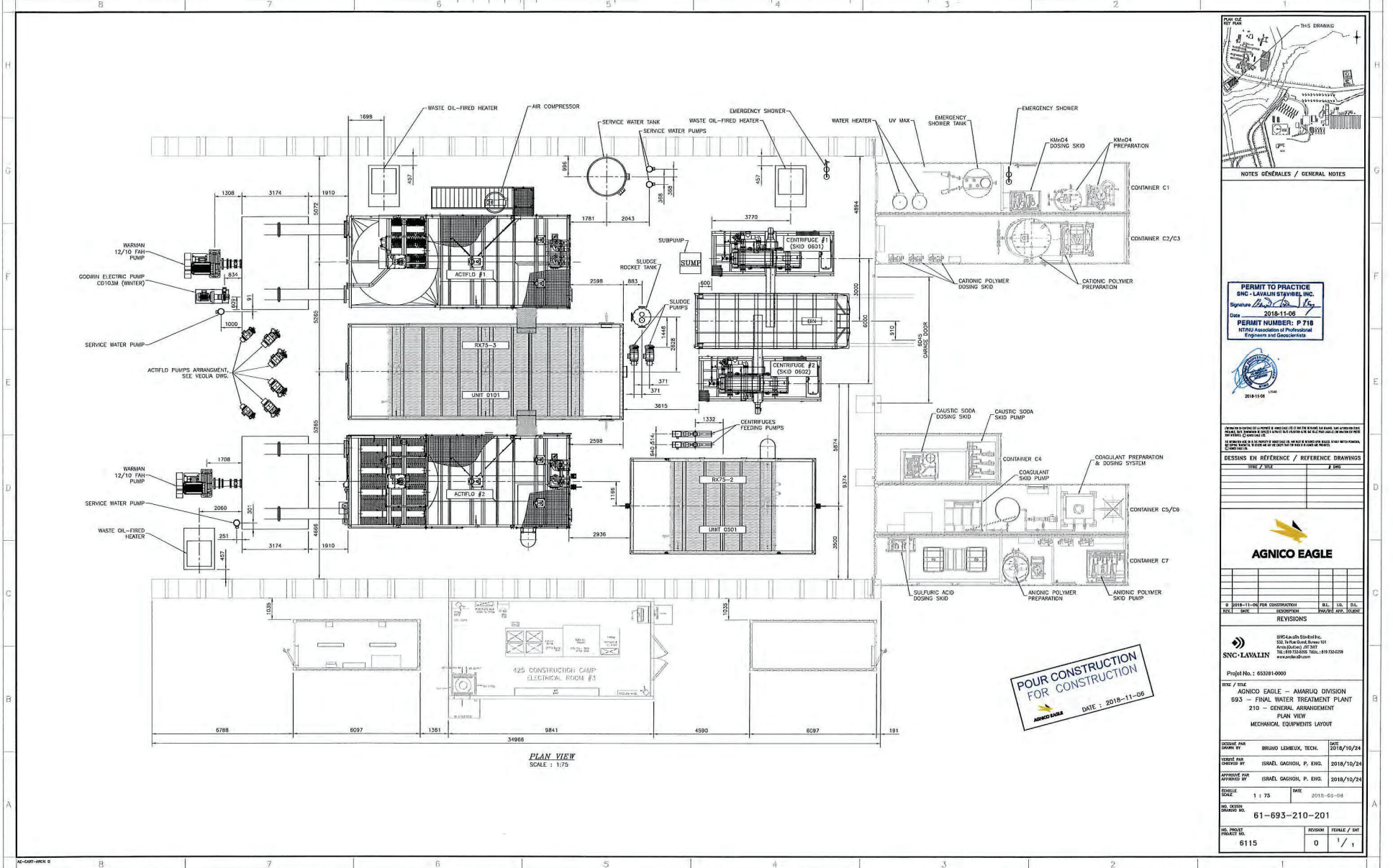
Revision information

This document has undergone significant changes and should be reviewed in its entirety.

Appendix B : Drawings

Drawings





NOTES GÉNÉRALES / GENERAL NOTES

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SNC-LAVALIN
Signature: [Signature]
Date: 2018-11-08
PERMIT NUMBER: P 718
NATAC Association of Professional Engineers and Geoscientists



DESIGNS EN RÉFÉRENCE / REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION
1	2018-11-08	PER CONSTRUCTION

REVISIONS

NO.	DATE	DESCRIPTION
1	2018-11-08	PER CONSTRUCTION

AGNICO EAGLE

AGNICO EAGLE - AMARUQ DIVISION
593 - FIVEL WATER TREATMENT PLANT
210 - GENERAL ARRANGEMENT
PLAN VIEW
MECHANICAL EQUIPMENTS LAYOUT

Project No.: 63391-0000

DATE / DATE: 2018/10/24

DESIGNED BY: BRUNO LEMUEUX, TECH.

CHECKED BY: ISRAËL GAGNON, P. ENG.

APPROVED BY: ISRAËL GAGNON, P. ENG.

SCALE: 1 : 75

DATE: 2018-11-08

NO. 61-693-210-201

NO. 6115

REVISION: 0

DATE / DATE: 2018-11-08

NO. 6115

REVISION: 0

DATE / DATE: 2018-11-08

NO. 6115

REVISION: 0

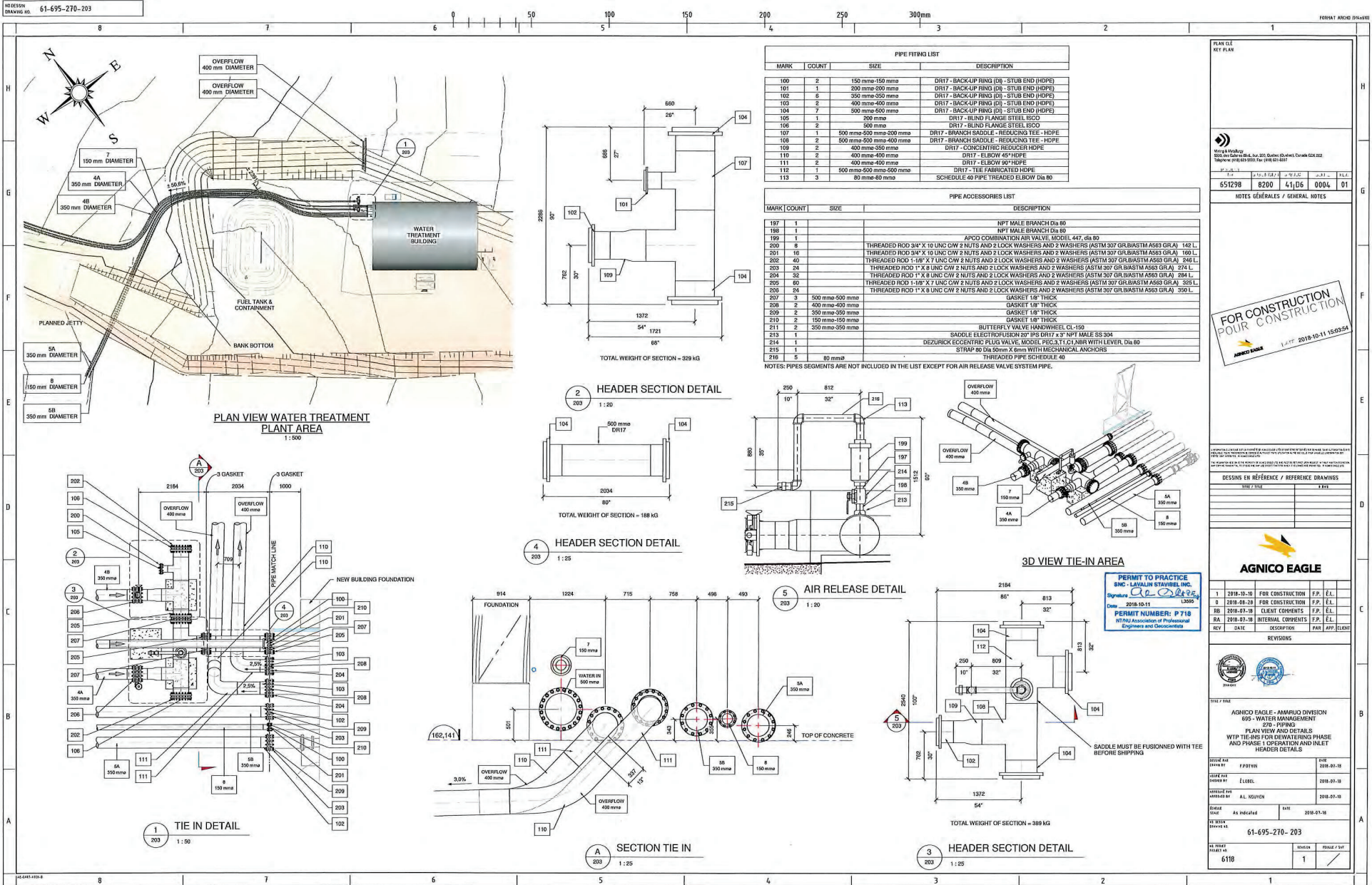
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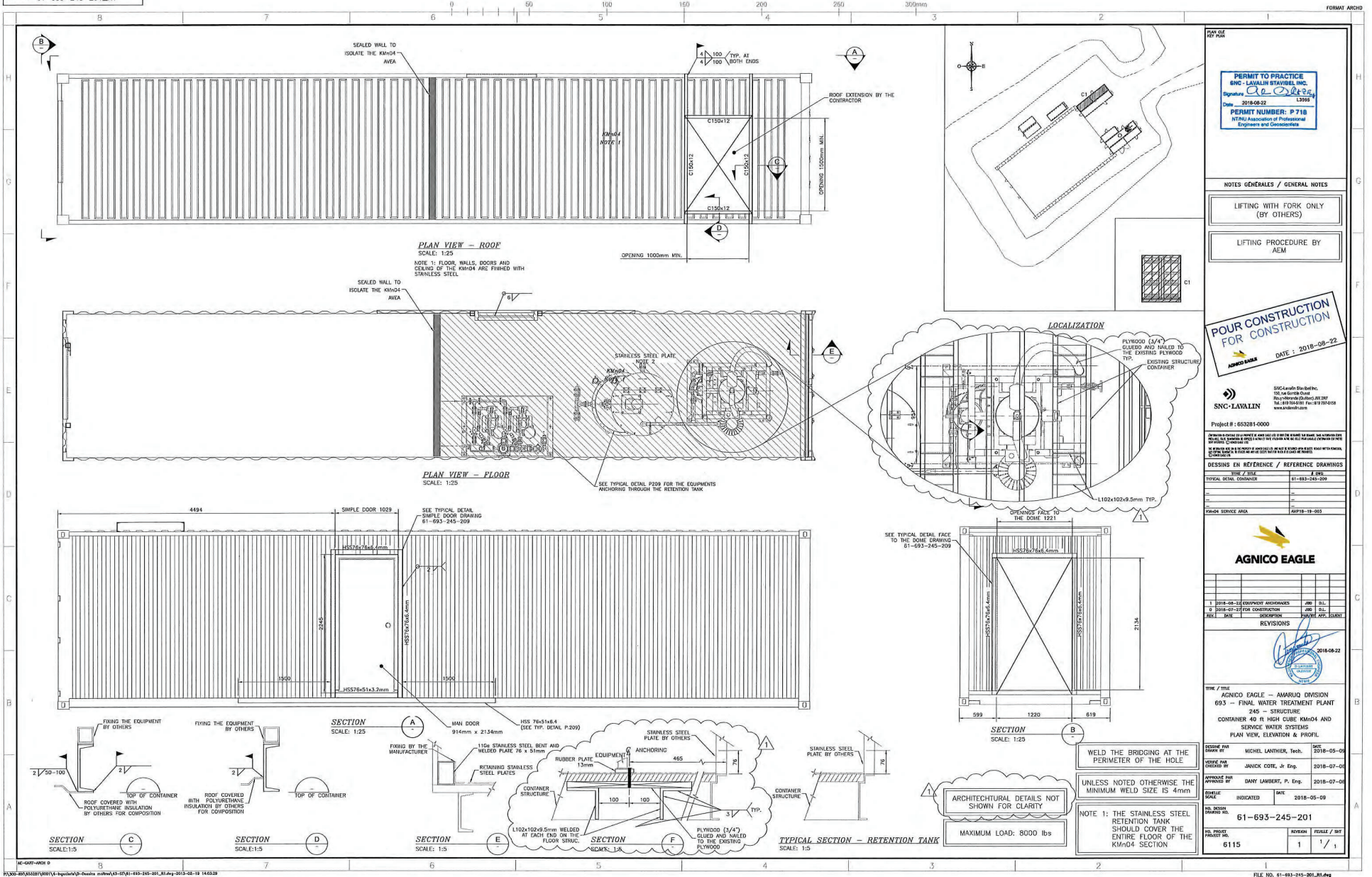
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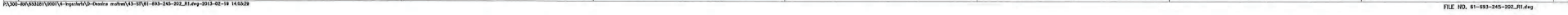
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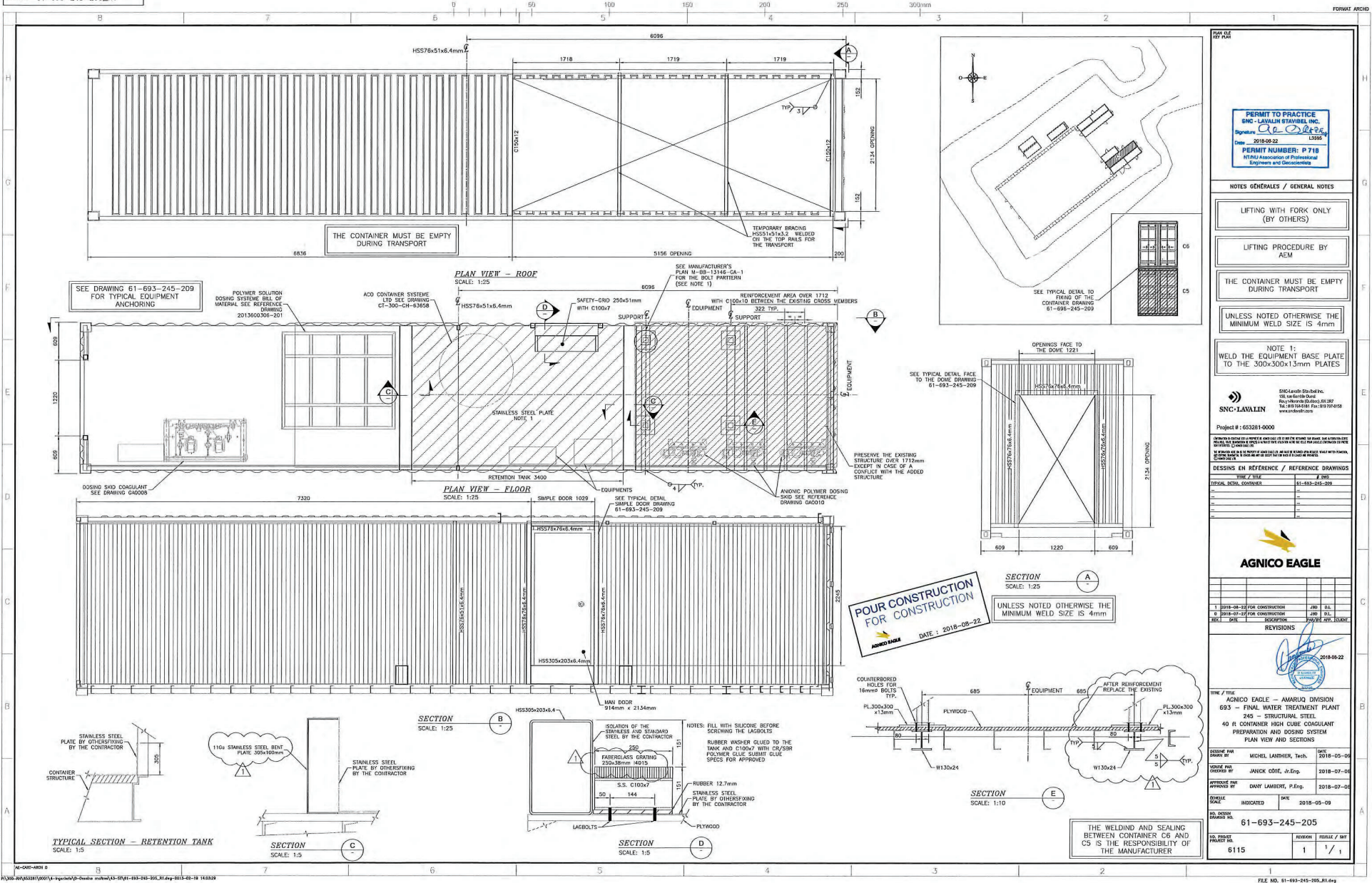
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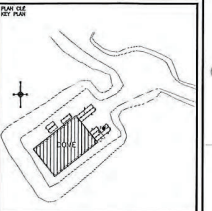
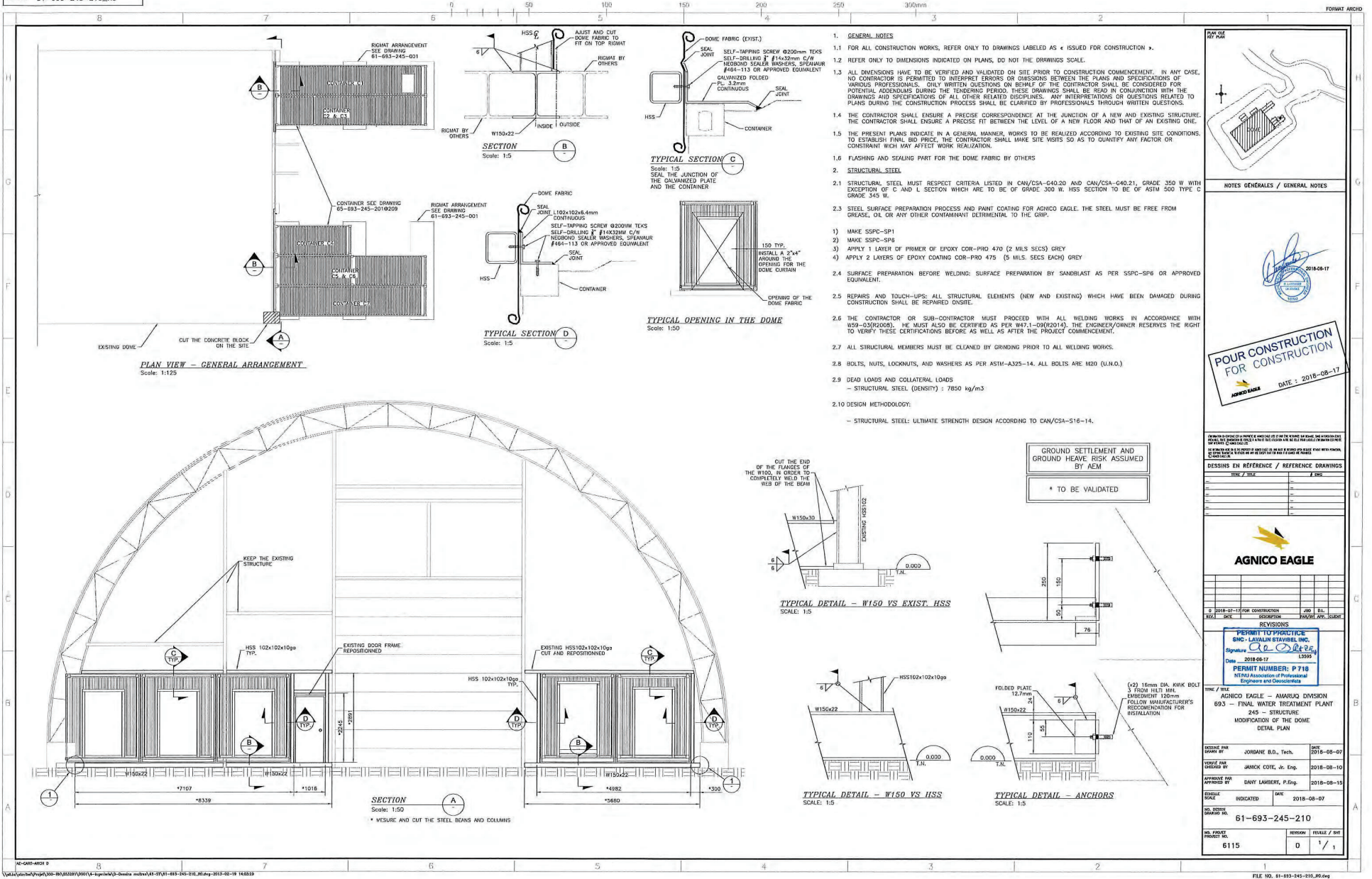
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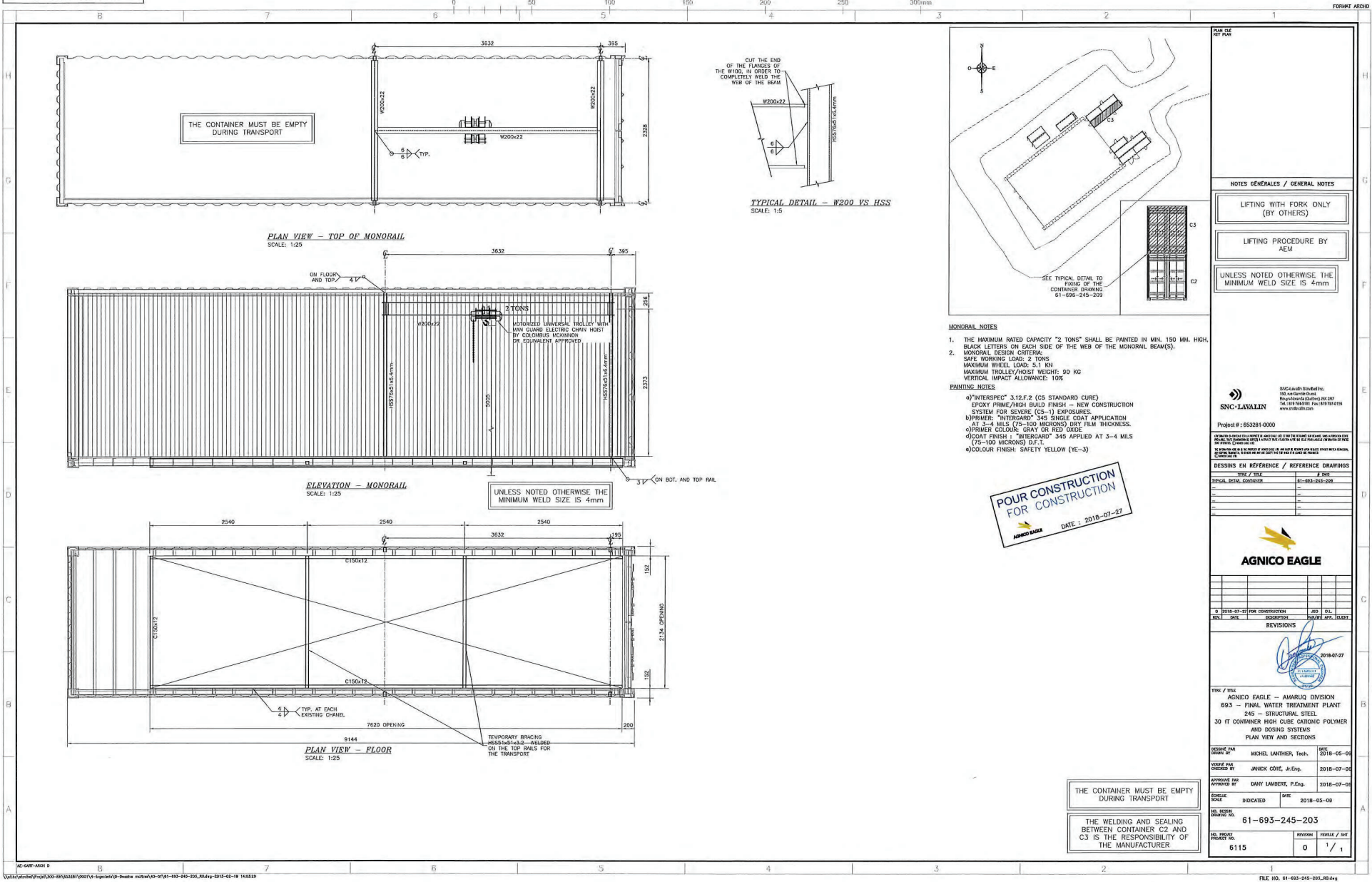


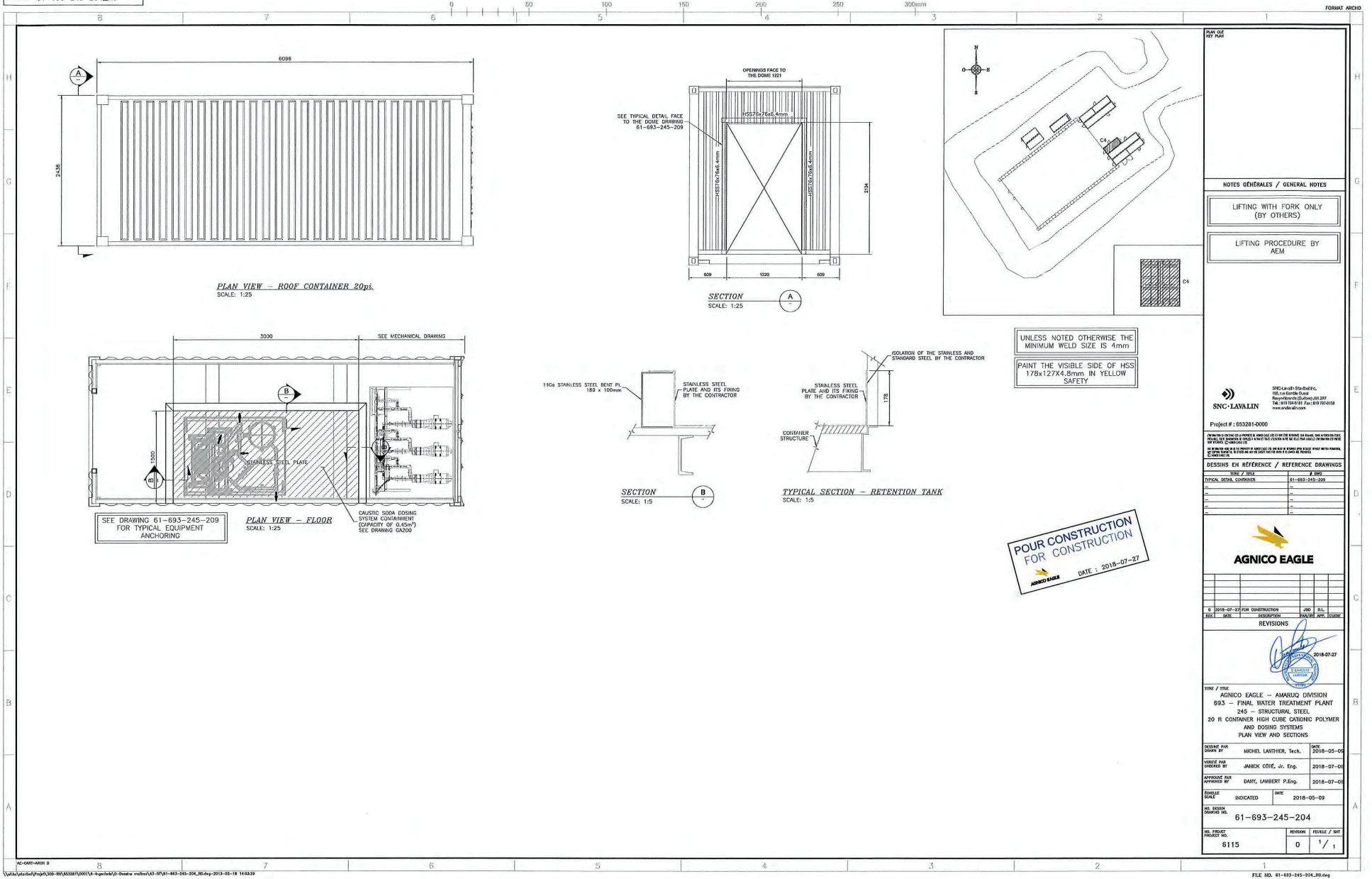


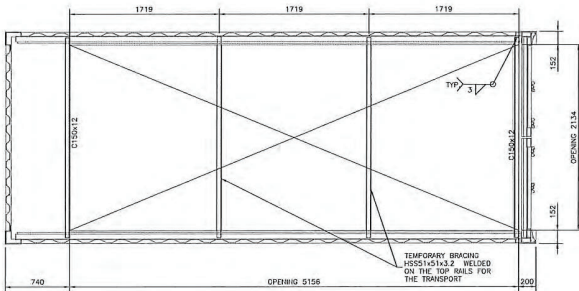
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DATE / DATE	2018-08-17
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693 - FIVIAL WATER TREATMENT PLANT	
245 - STRUCTURE	
MODIFICATION OF THE DOME	
DETAIL PLAN	
DESIGNER AND CHECKER	
DESIGNER: JORDANE B.O., Tech.	DATE: 2018-08-07
CHECKER: JAMON COLE, Jr. Eng.	DATE: 2018-08-10
APPROVED AND APPROVED BY: DANY LAURENT, P.Eng.	DATE: 2018-08-15
SCALE: INDICATED	DATE: 2018-08-07
NO. PROJECT / NO. DWT NO.	6115
REVISION / RIF	0 1/1

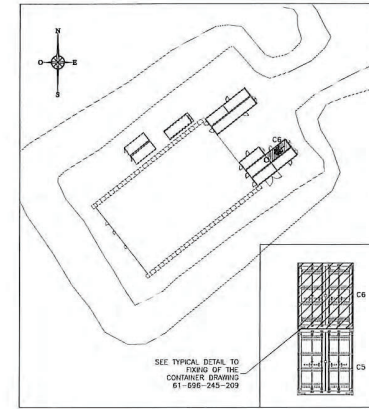






PLAN VIEW - FLOOR
SCALE: 1:25

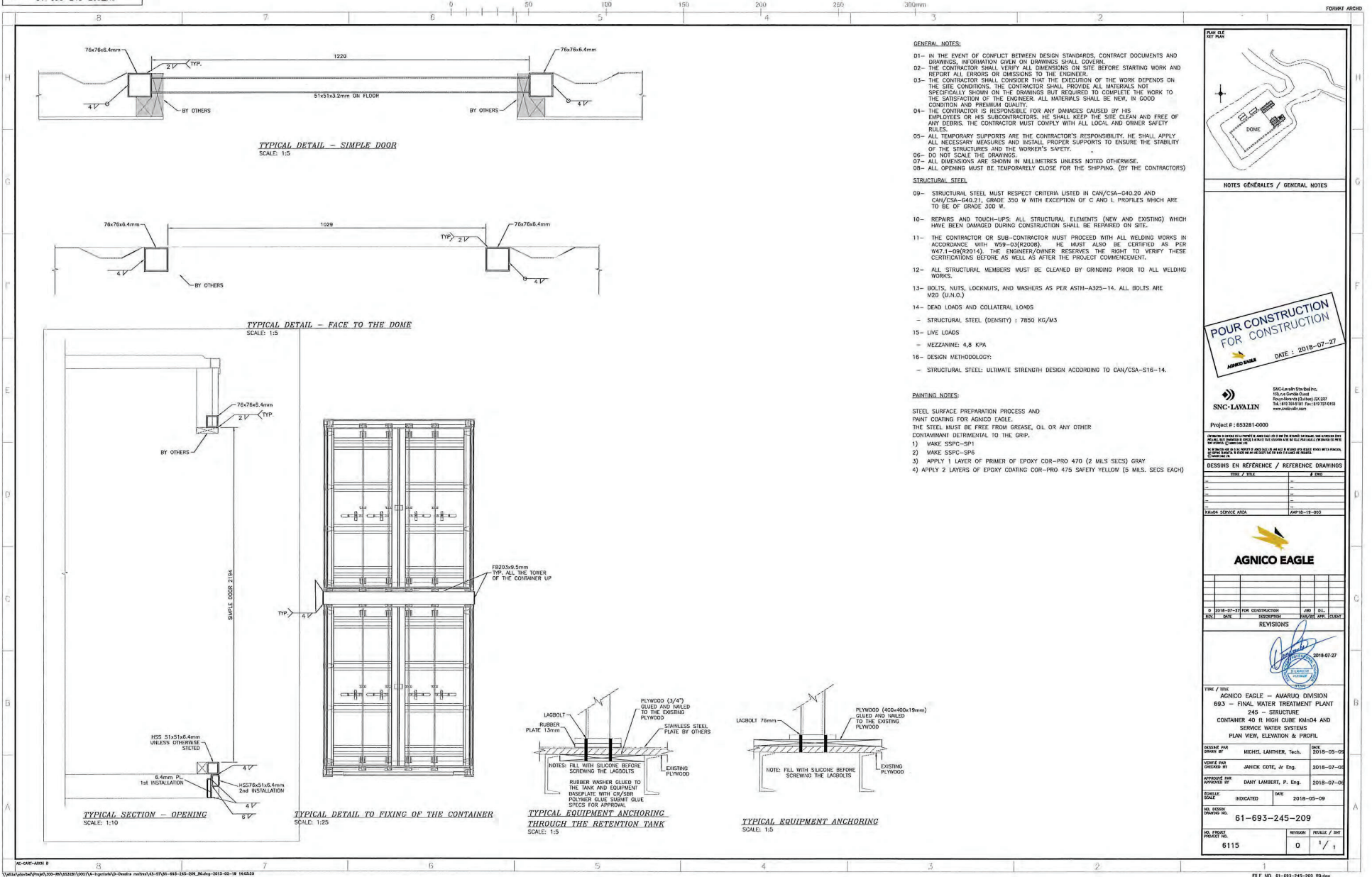
THE CONTAINER MUST BE EMPTY
DURING TRANSPORT



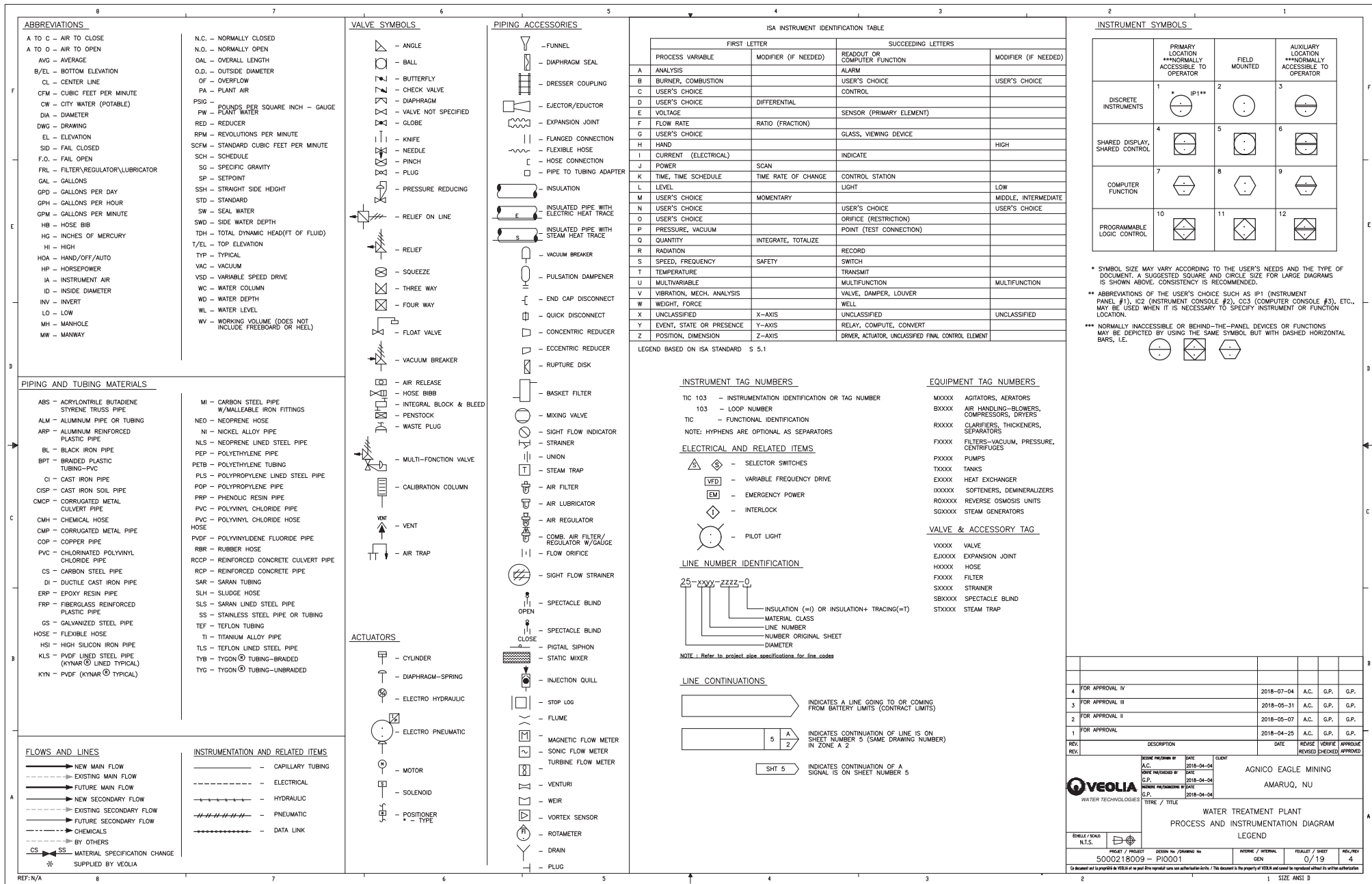
**POUR CONSTRUCTION
FOR CONSTRUCTION**
AGNICO EAGLE DATE: 2018-07-27

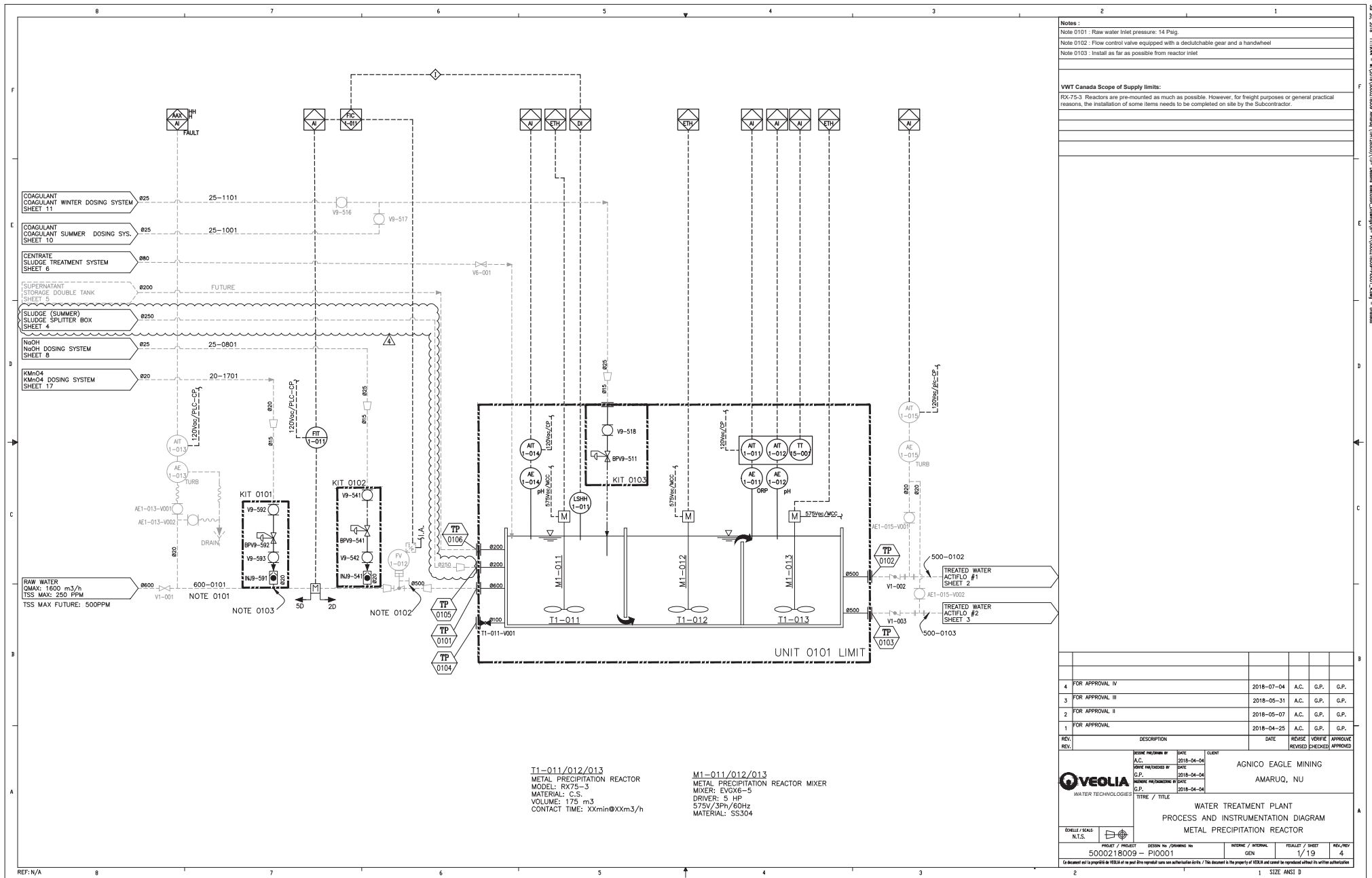
PLAN OF KEY PLAN											
NOTES GÉNÉRALES / GENERAL NOTES											
LIFTING WITH FORK ONLY (BY OTHERS)											
LIFTING PROCEDURE BY AEM											
THE CONTAINER MUST BE EMPTY DURING TRANSPORT											
UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm											
REVISIONS <table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> <th>CHKD</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2018-07-27</td> <td>FOR CONSTRUCTION</td> <td>JMO</td> <td>B.L.</td> </tr> </tbody> </table>		NO.	DATE	DESCRIPTION	BY	CHKD	1	2018-07-27	FOR CONSTRUCTION	JMO	B.L.
NO.	DATE	DESCRIPTION	BY	CHKD							
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TYPE / TYPE	NO.										
STRUCTURAL CONTAINER	61-693-245-209										
AGNICO EAGLE											
2018-07-27											
TIME / TIME AGNICO EAGLE - AMARUO DIVISION 693 - FIVEL WATER TREATMENT PLANT 245 - STRUCTURAL STEEL 20 FT CONTAINER HIGH CUBE COAGULANT PREPARATION AND DOSSING SYSTEMS PLAN VIEW AND ELEVATION											
DESIGNED BY	MICHEL LANTHER, Tech.										
CHECKED BY	JANICK COYE, Jr.Eng.										
APPROVED BY	DANY LAUBERT, P.Eng.										
DATE	2018-05-09										
DATE	2018-07-13										
DATE	2018-07-13										
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DATE / DATE	1 / 1										

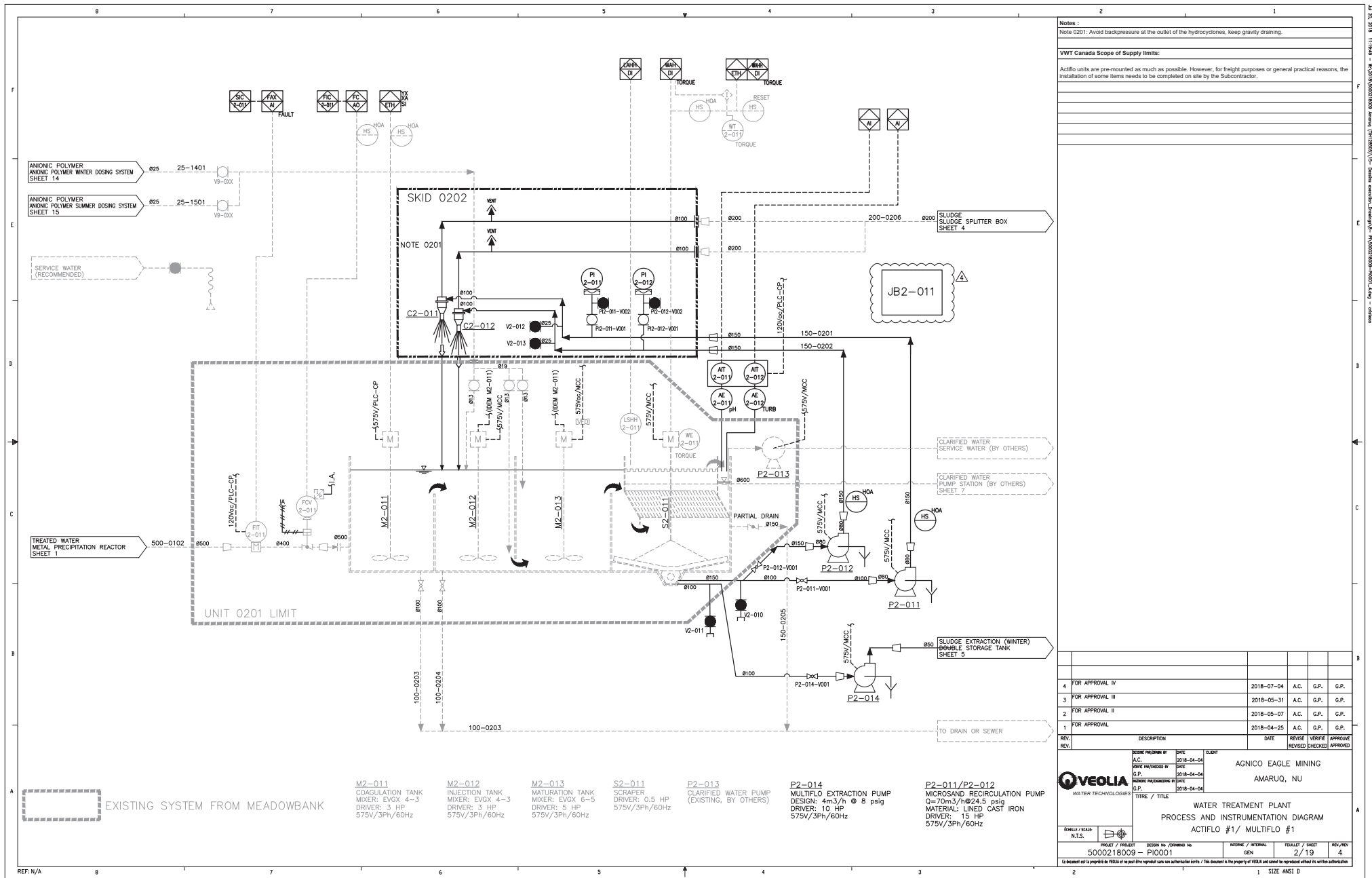
THE WELDING AND SEALING
BETWEEN CONTAINER C6 AND
C5 IS THE RESPONSIBILITY OF
THE MANUFACTURER



PID







Notes :

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

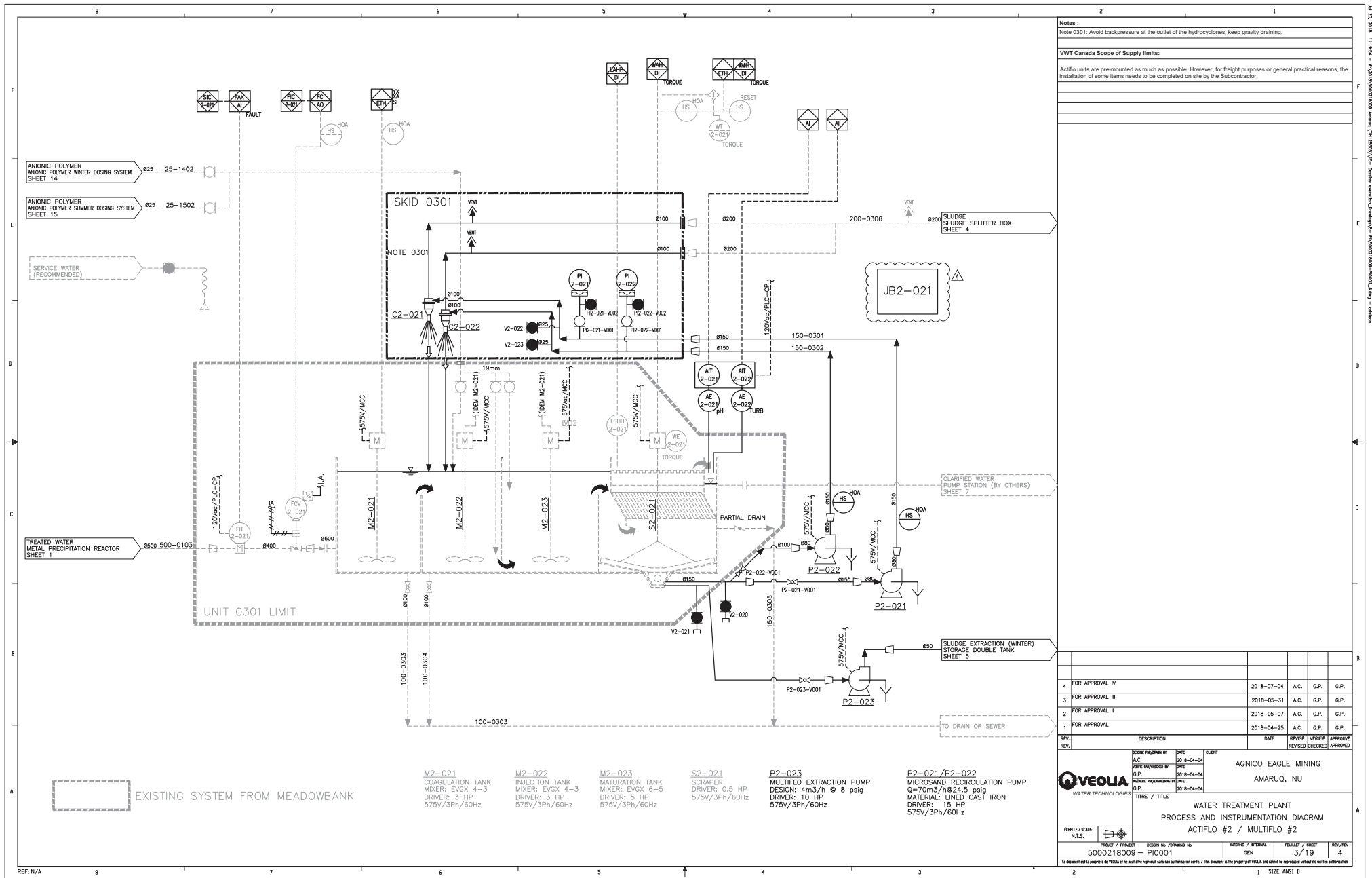
VWT Canada Scope of Supply limits:

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.

REV.	DESCRIPTION	DATE	REVISE	VERIFY	APPROVE
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		CLIENT AGNICO EAGLE MINING AMARUQ, NU	
TITLE / TITLE WATER TREATMENT PLANT PROCESS AND INSTRUMENTATION DIAGRAM ACTIFLO #1/ MULTIFLO #1		SHEET / SHEET 2/19	
DESIGN NO. / PROJECT NO. 5000218009 - P10001		DESIGNER / INTERNAL GEN	
CHECKED BY / PROJECT N.T.S.		REVIEWED BY / SHEET 4	

1 SIZE ANSI D



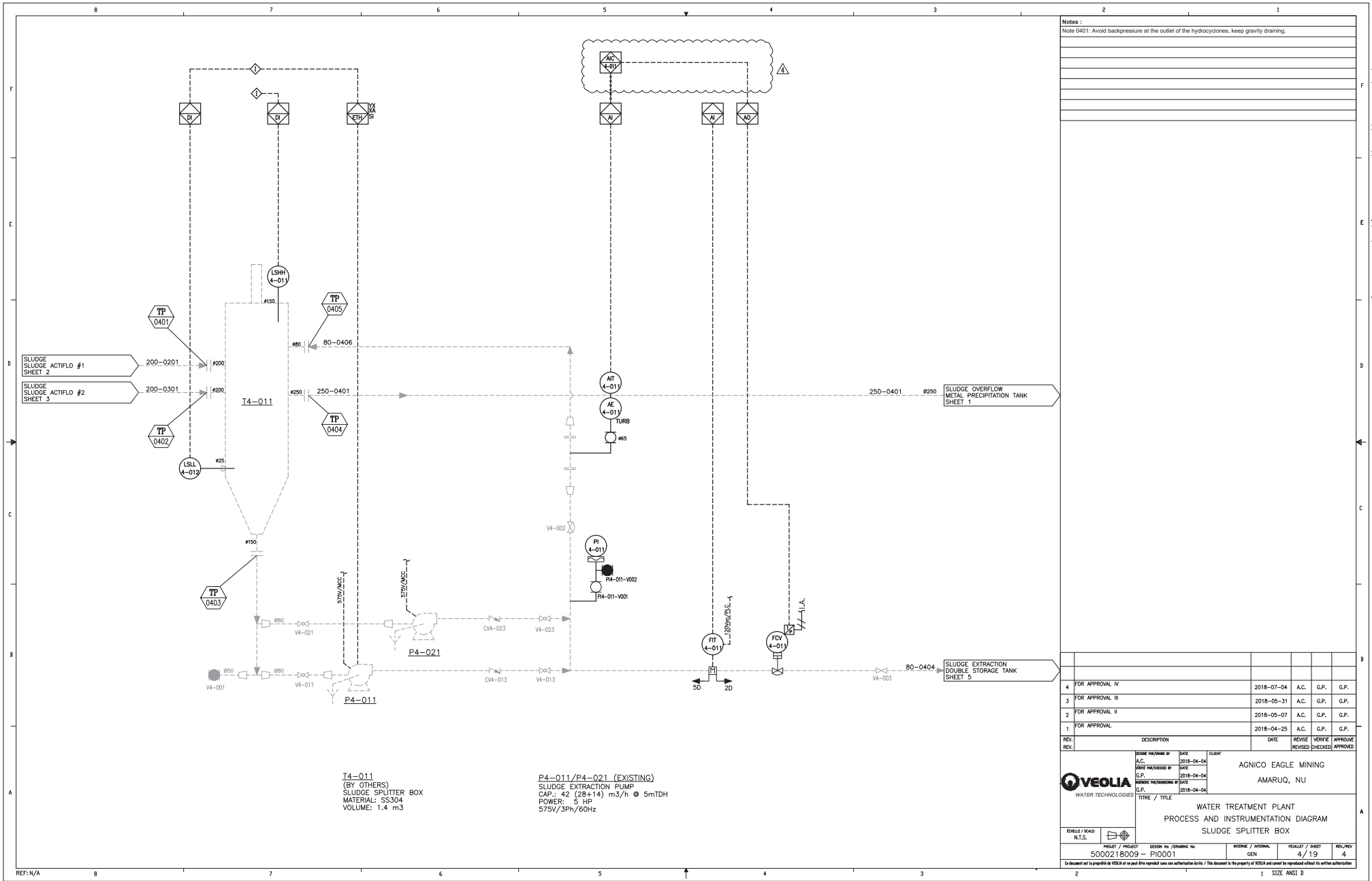
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3	FOR APPROVAL III	2018-05-31	A.C.	G.P.
2	FOR APPROVAL II	2018-05-07	A.C.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.

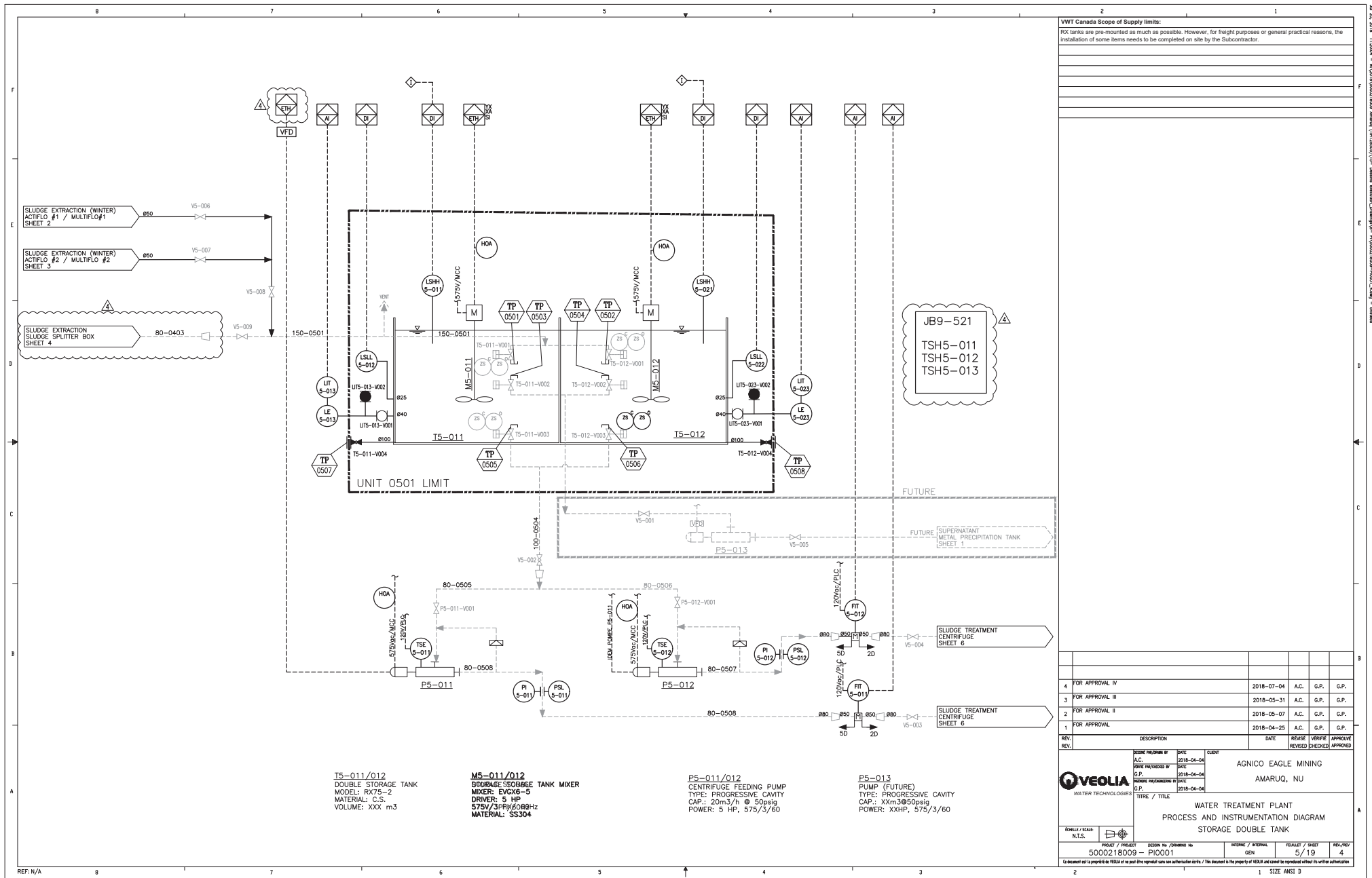
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DESIGN / PROJECT 5000218009 - P10001	DATE 2018-04-04	GEN GEN
DESIGN / PROJECT 5000218009 - P10001	DATE 2018-04-04	FEEDBACK / SHEET 3/19
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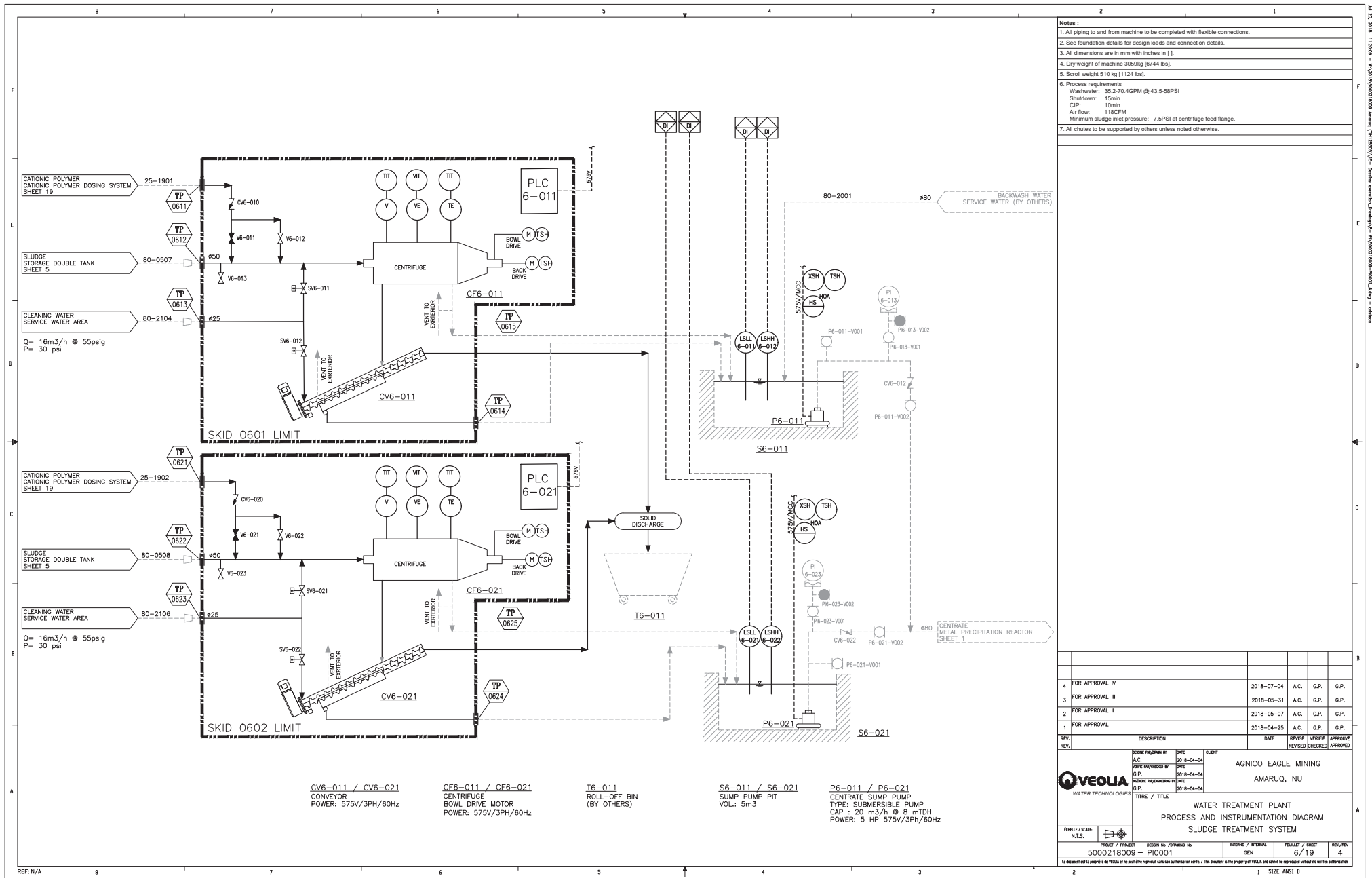
VEOLIA WATER TECHNOLOGIES

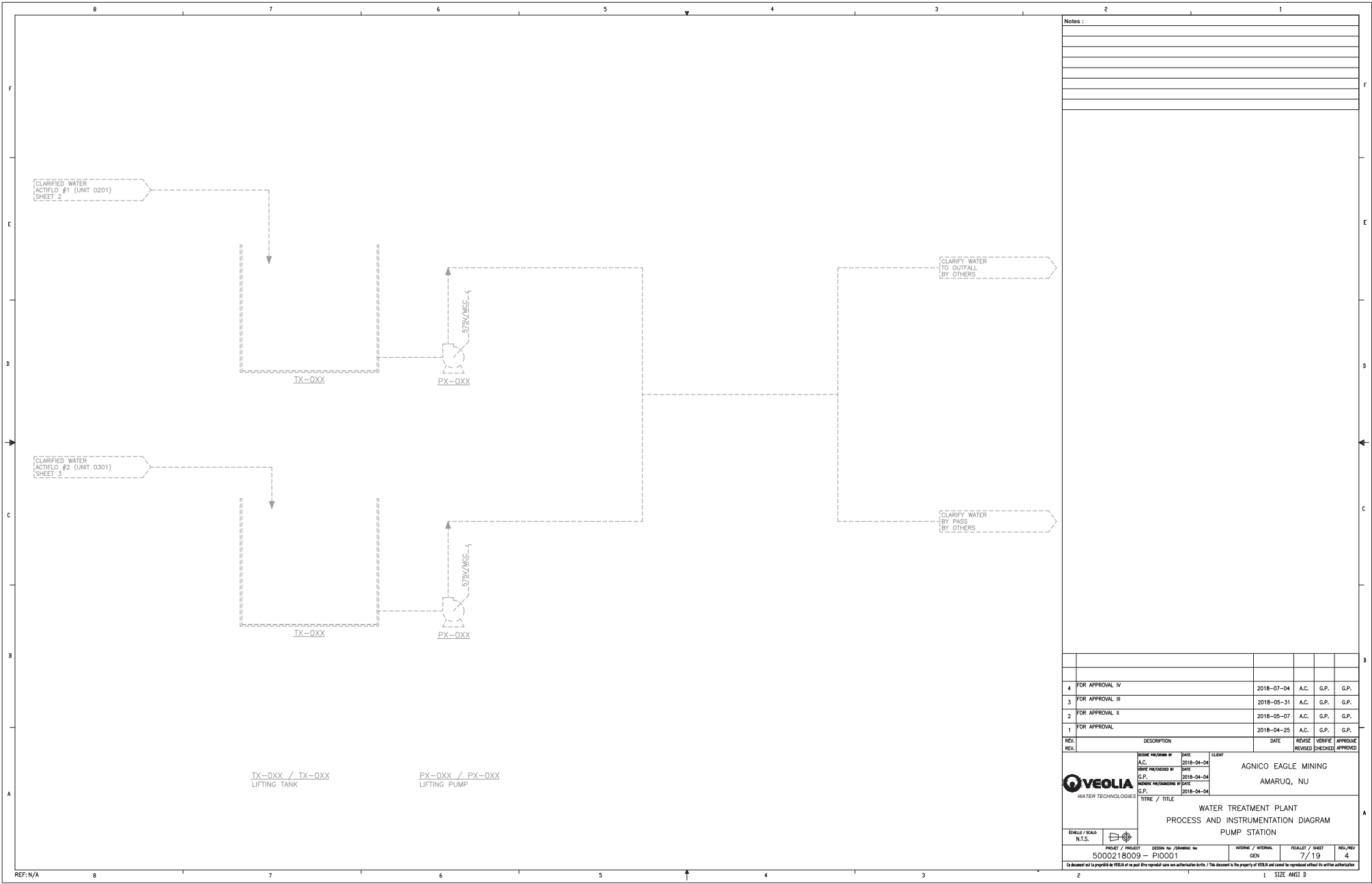
WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
ACTIFLO #2 / MULTIFLO #2

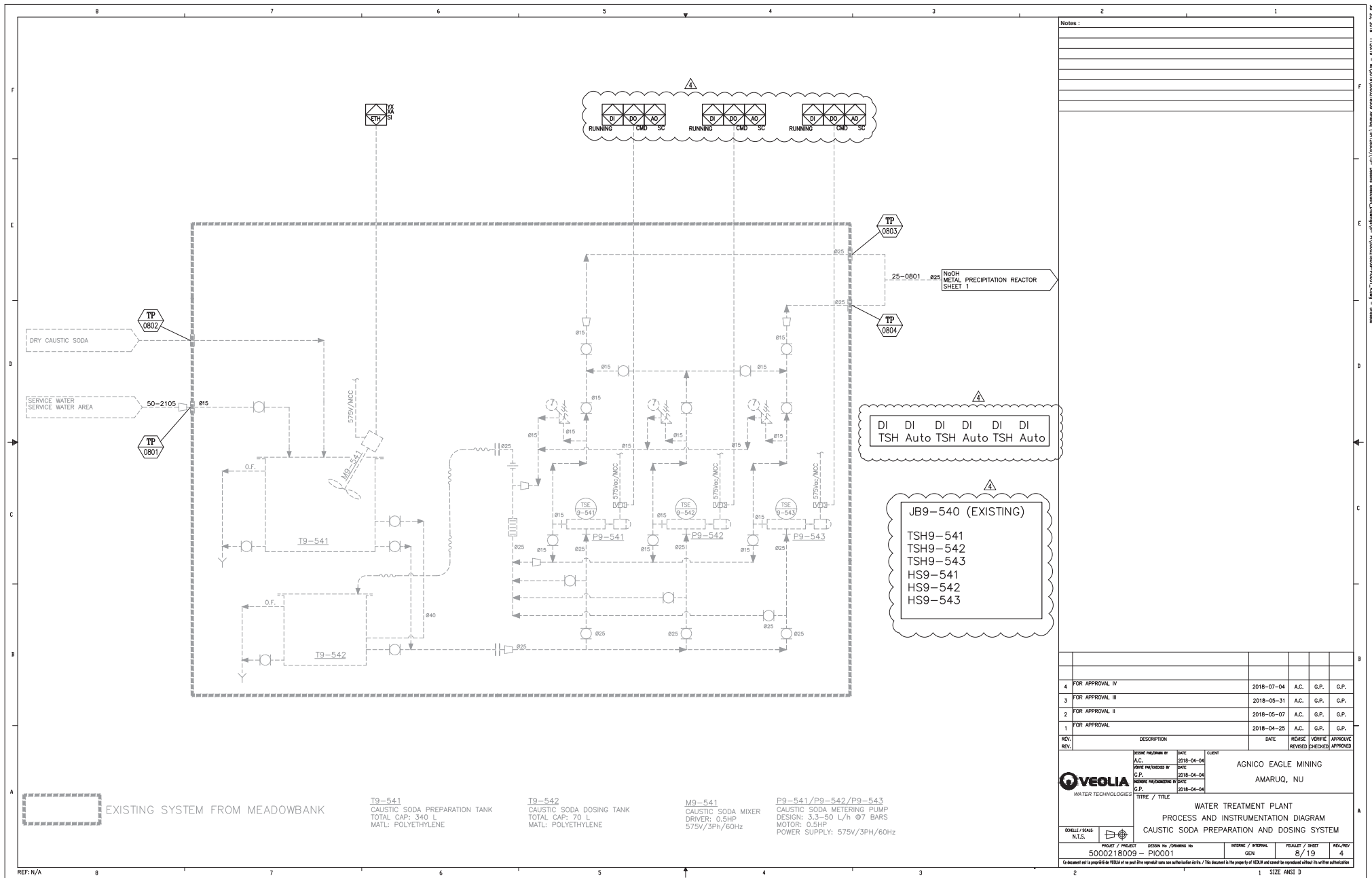
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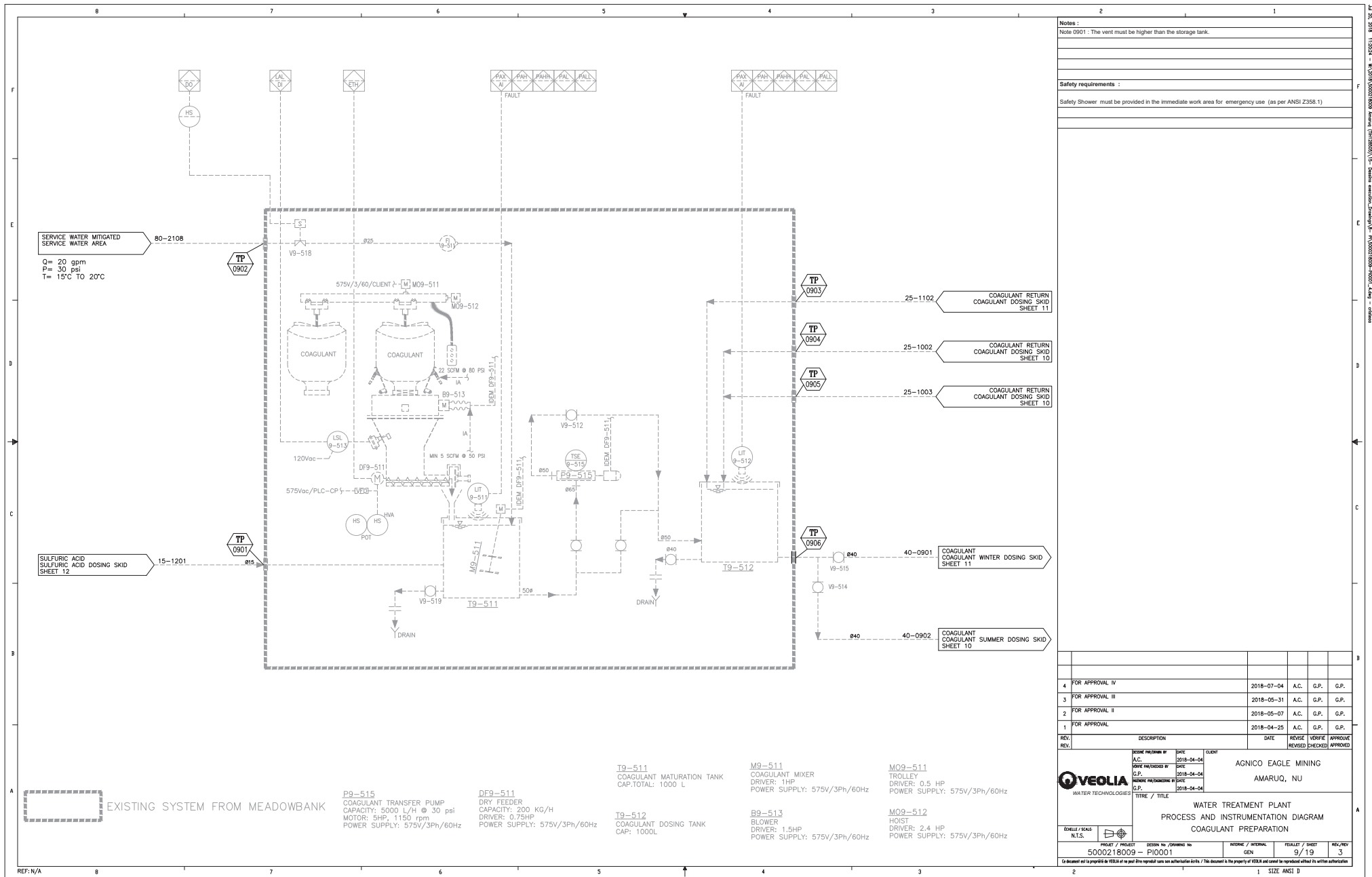


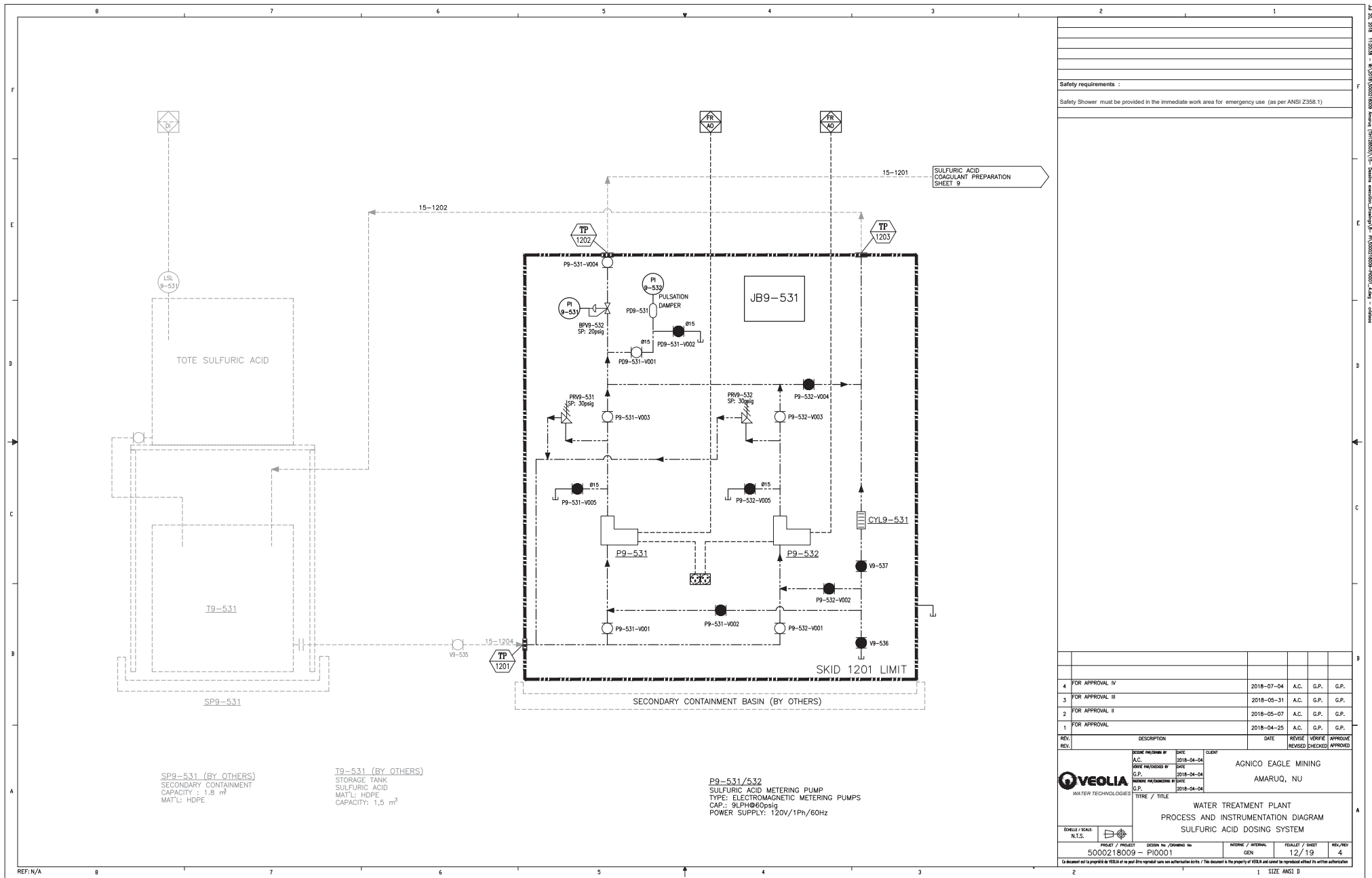


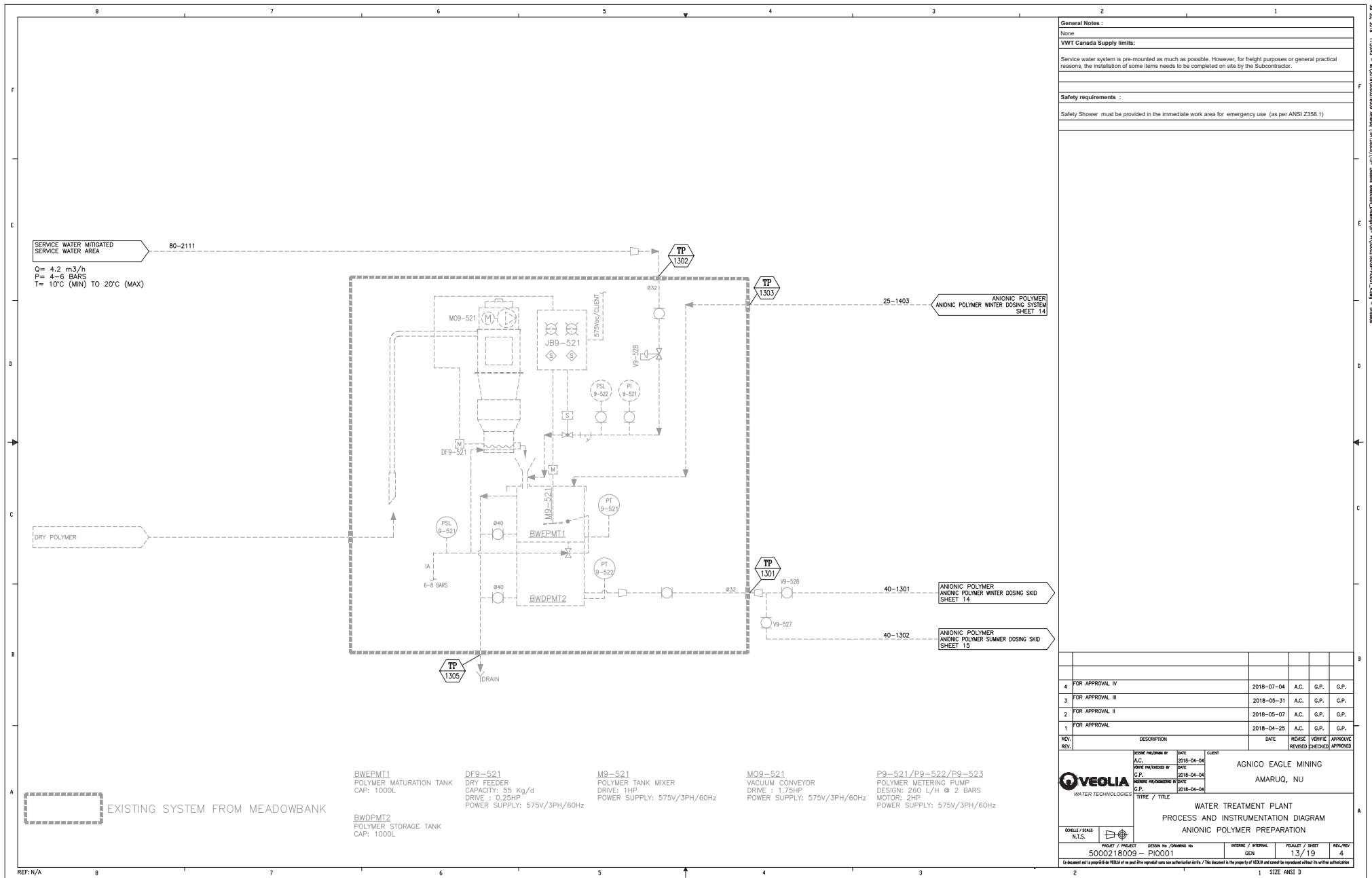


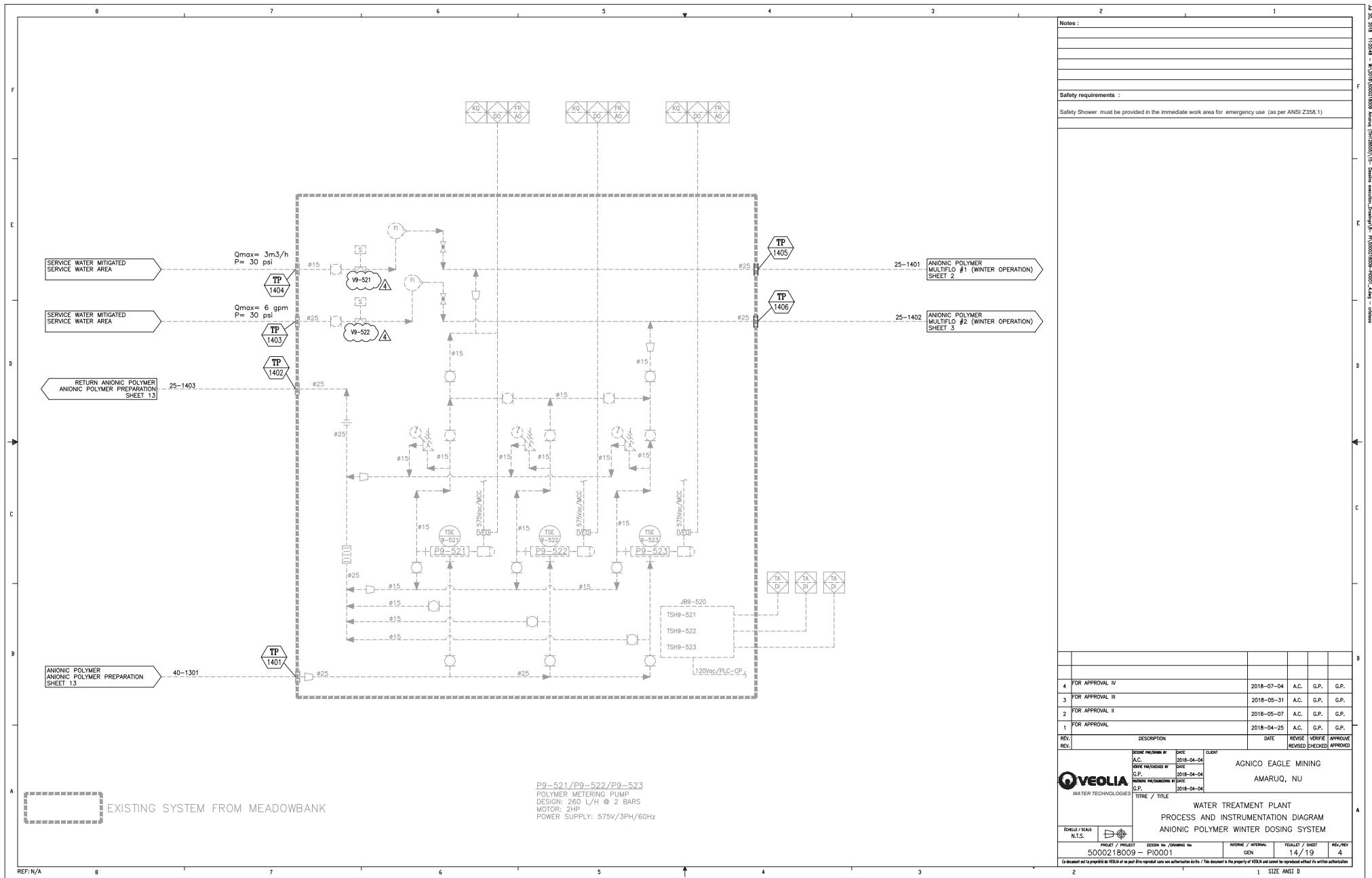


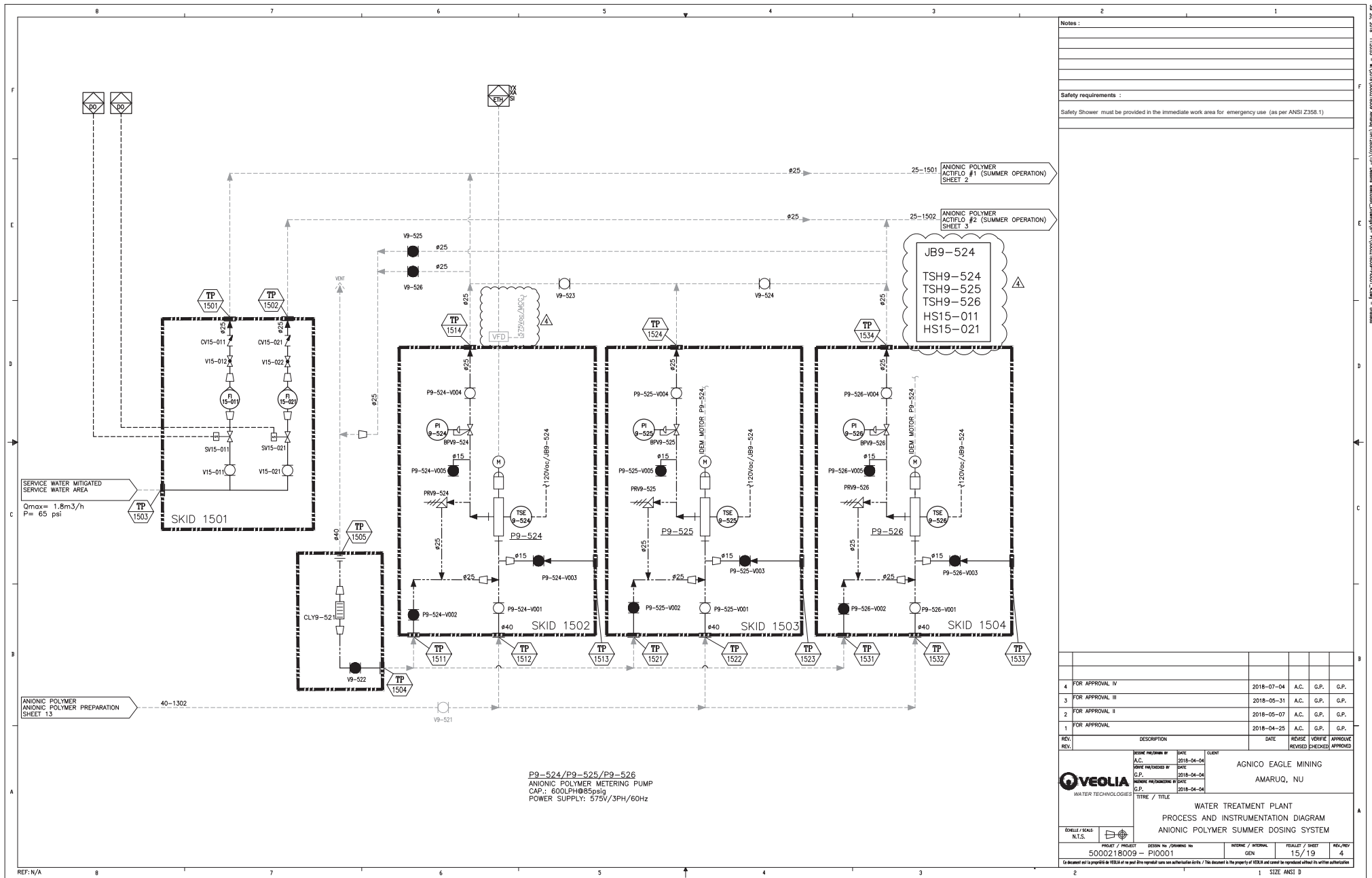


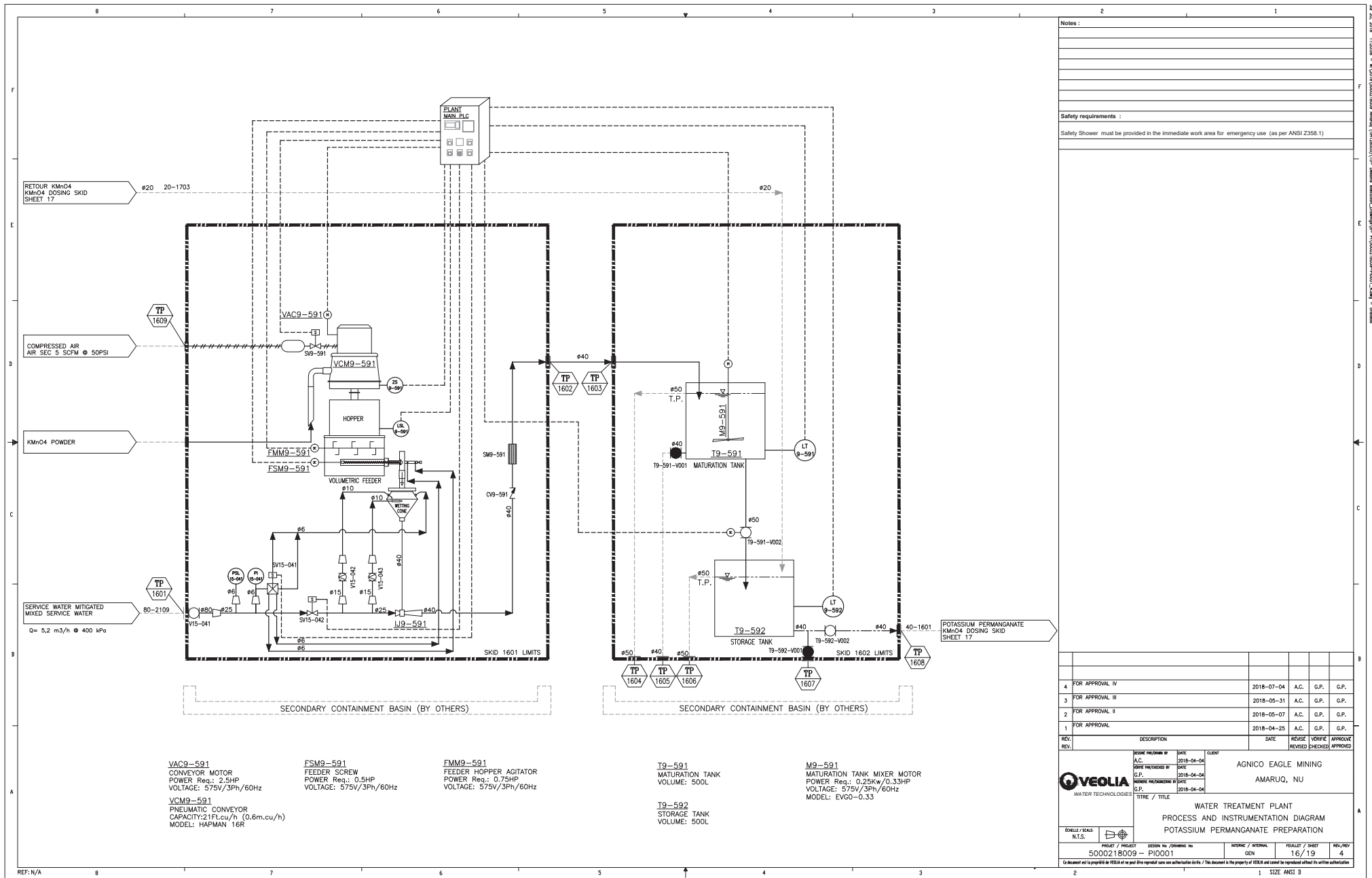


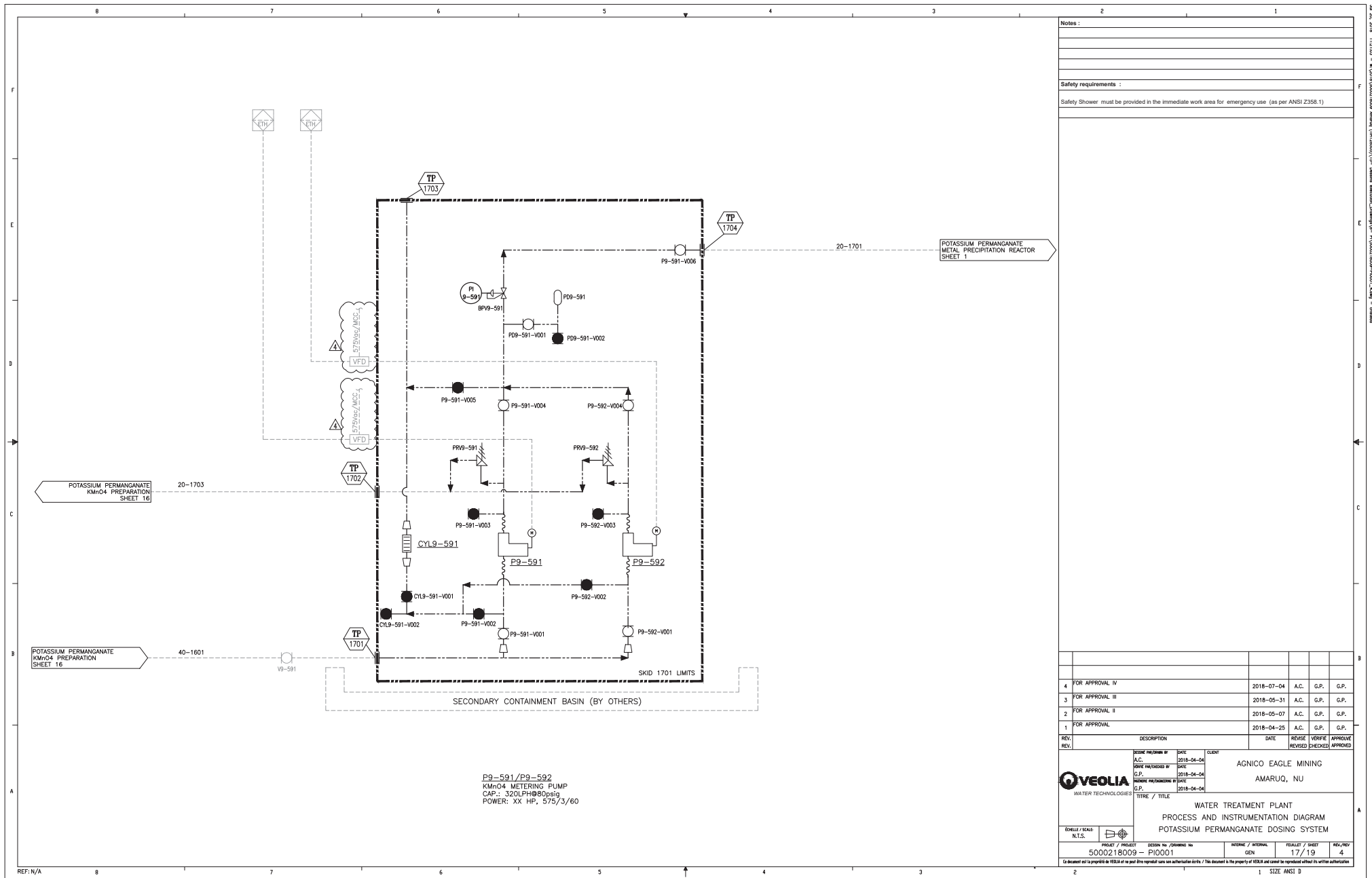


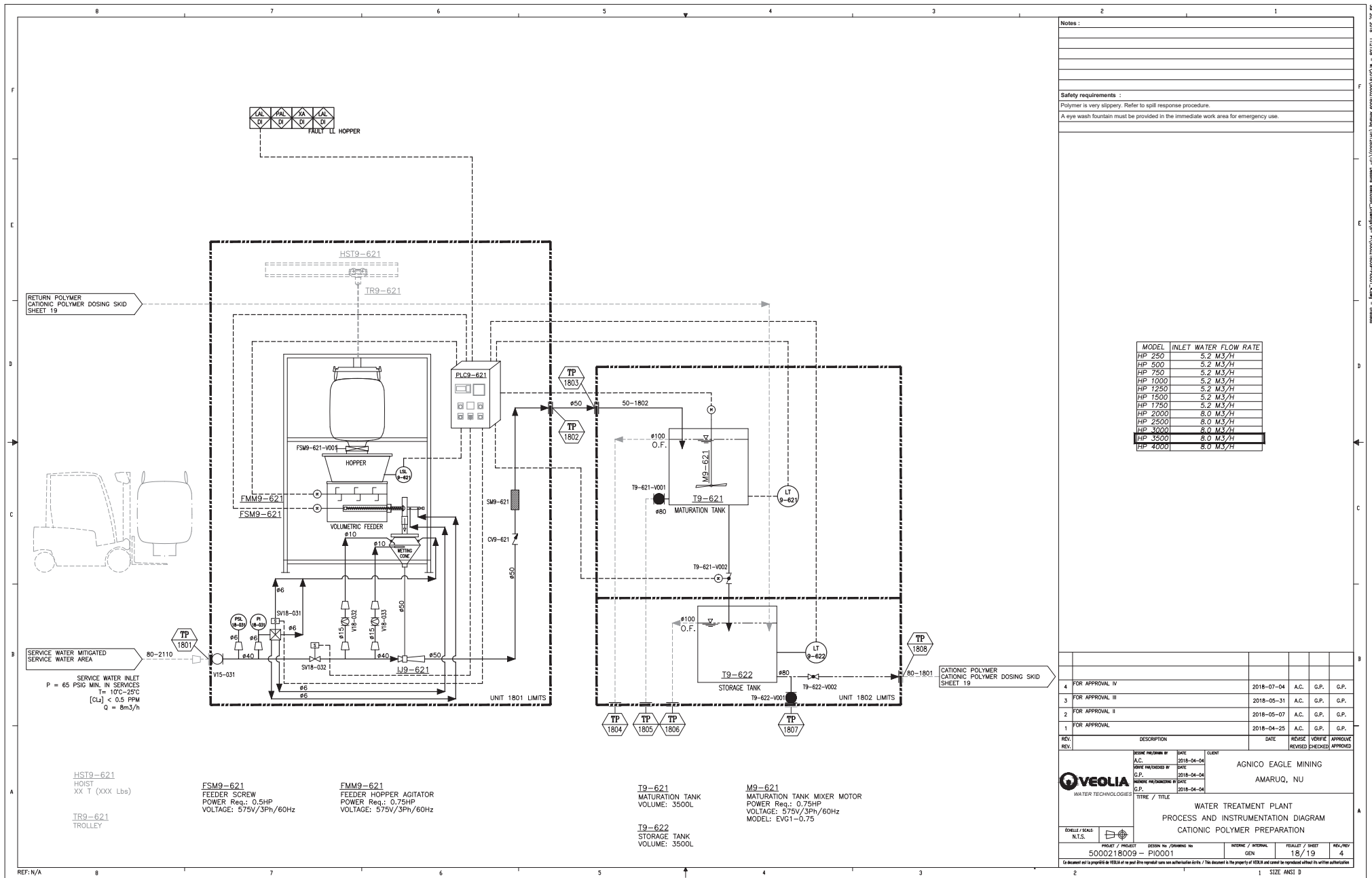


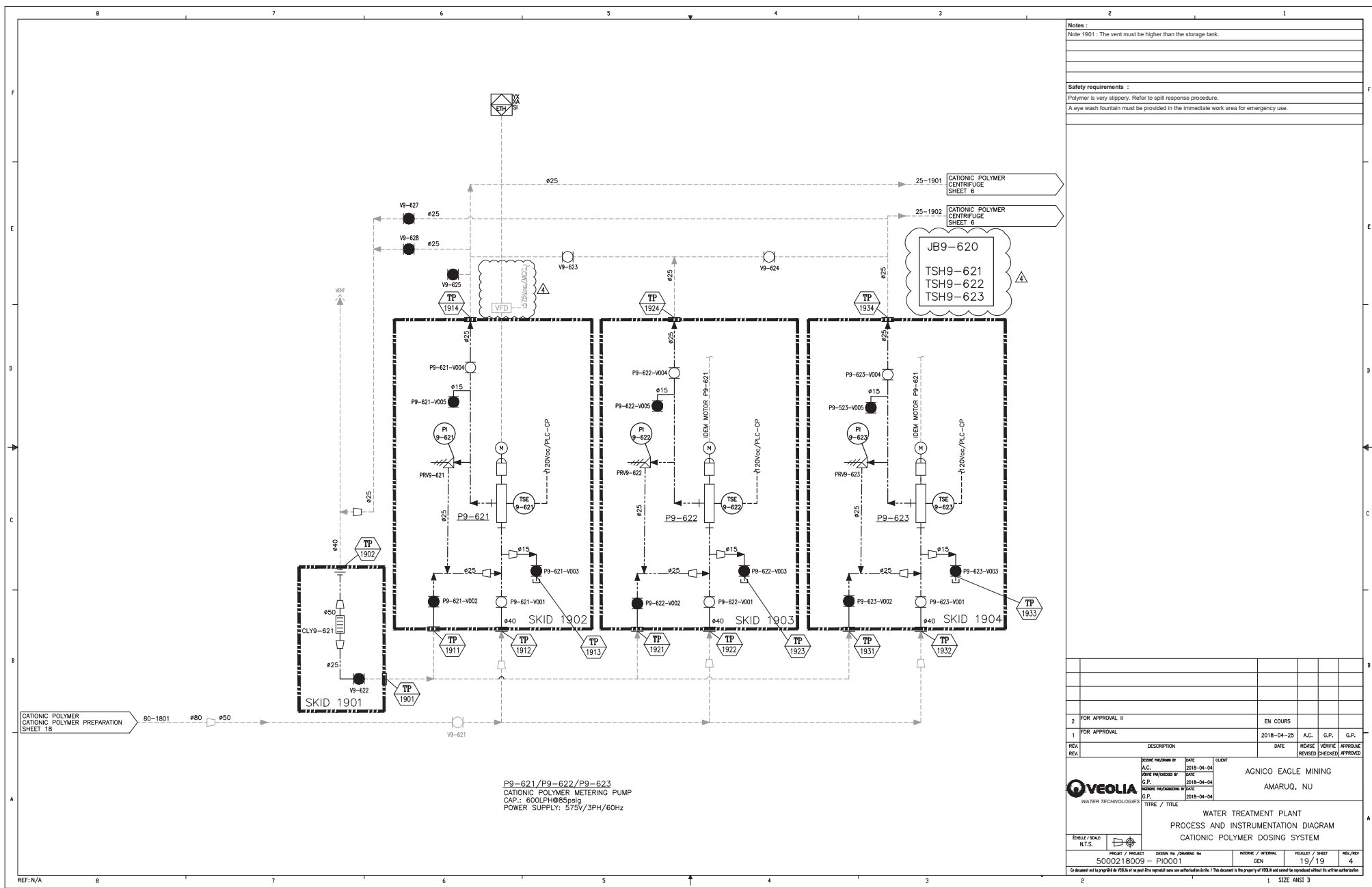




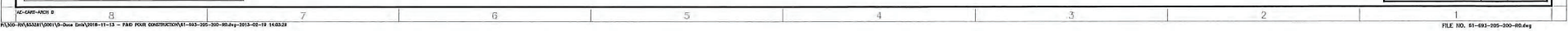




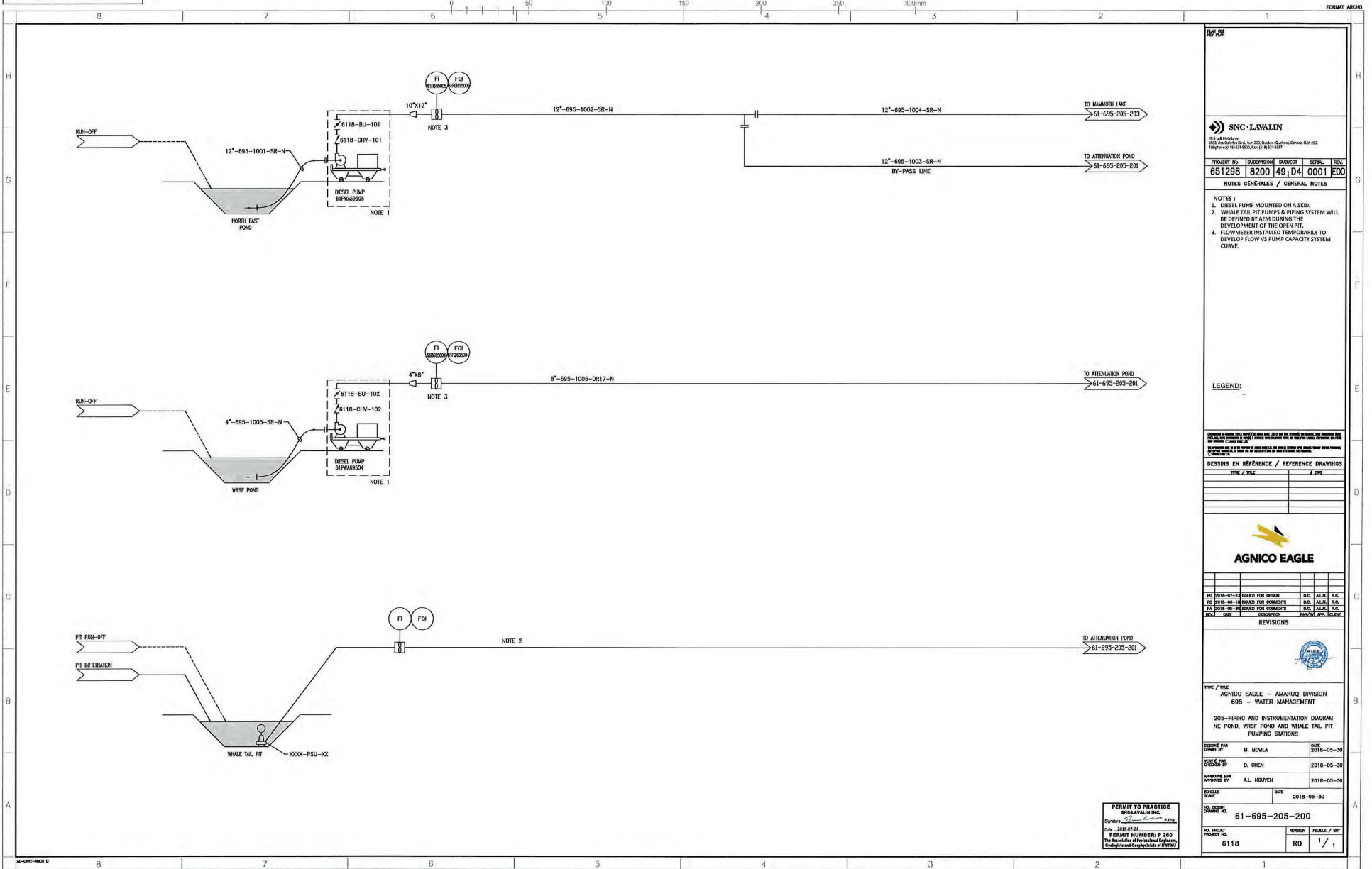




2 FOR APPROVAL II		EN COURS					
1 FOR APPROVAL		2018-04-25		A.C.	G.P.	G.P.	
REV.	DESCRIPTION	DATE	REVISE	VERIFIE	APPROUVE		
REV.			REVISED	CHECKED	APPROVED		
VEOLIA WATER TECHNOLOGIES		AGNICO EAGLE MINING AMARUQ, NU					
TITRE / TITLE		WATER TREATMENT PLANT PROCESS AND INSTRUMENTATION DIAGRAM CATIONIC POLYMER DOSING SYSTEM					
ÉCHELLE / SCALE N.T.S.		DESIGN NO. / PROJETING NO. 5000218009 - P10001		INTERIOR / INTERNAL GEN		REVISÉ / REV 19/19	
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NO. 61-695-205-200



FILE NO. 61-695-205-200

PROJECT NO. 651298 **SUBDIVISION 8200** **SUBJECT 49, D4** **SERIAL 0001** **REV. E00**

NOTES:

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

AGNICO EAGLE

AGNICO EAGLE - AMARUQ DIVISION
695 - WATER MANAGEMENT

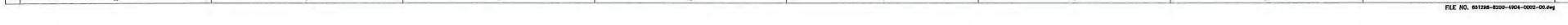
205-PIPING AND INSTRUMENTATION DIAGRAM
NE POND, WISC POND AND WHALE TAIL PIT PUMPING STATIONS

DATE 2018-05-30
DESIGNED BY M. NOYLA
CHECKED BY O. CHEN
APPROVED FOR APPROVAL BY A.L. NOUYEN

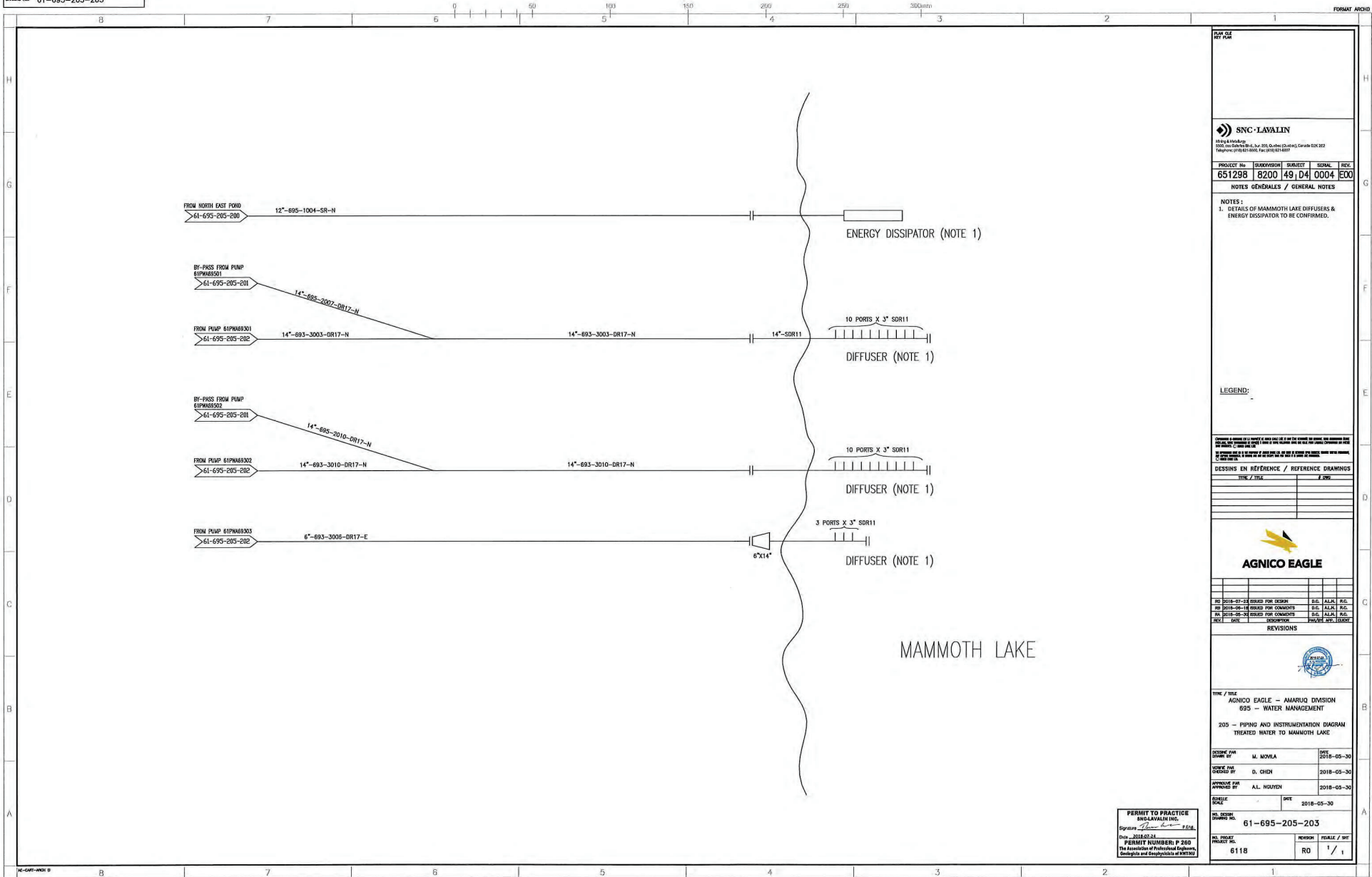
SCALE 2018-05-30

61-695-205-200

6118 **RO** **1/1**







SNC-LAVALIN

100 King Street West
 Suite 1000
 Toronto, Ontario M5X 1C5
 Canada
 Telephone: (416) 593-8000 Fax: (416) 593-8001

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

NOTES GÉNÉRALES / GENERAL NOTES

NOTES:

- DETAILS OF MAMMOTH LAKE DIFFUSERS & ENERGY DISSIPATOR TO BE CONFIRMED.

LEGEND:

DESIGNS EN RÉFÉRENCE / REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION	BY	CHKD
1	2018-05-30	ISSUED FOR DESIGN	A.L.	A.L.
2	2018-05-30	ISSUED FOR CONSTRUCTION	A.L.	A.L.
3	2018-05-30	ISSUED FOR CONSTRUCTION	A.L.	A.L.

REVISIONS

AGNICO EAGLE

AGNICO EAGLE - AMARUQ DIVISION
 695 - WATER MANAGEMENT

205 - PIPING AND INSTRUMENTATION DIAGRAM
 TREATED WATER TO MAMMOTH LAKE

DATE	BY	CHKD
2018-05-30	M. MOHRA	A.L.
2018-05-30	D. CHEN	A.L.
2018-05-30	A.L. NGUYEN	A.L.

61-695-205-203

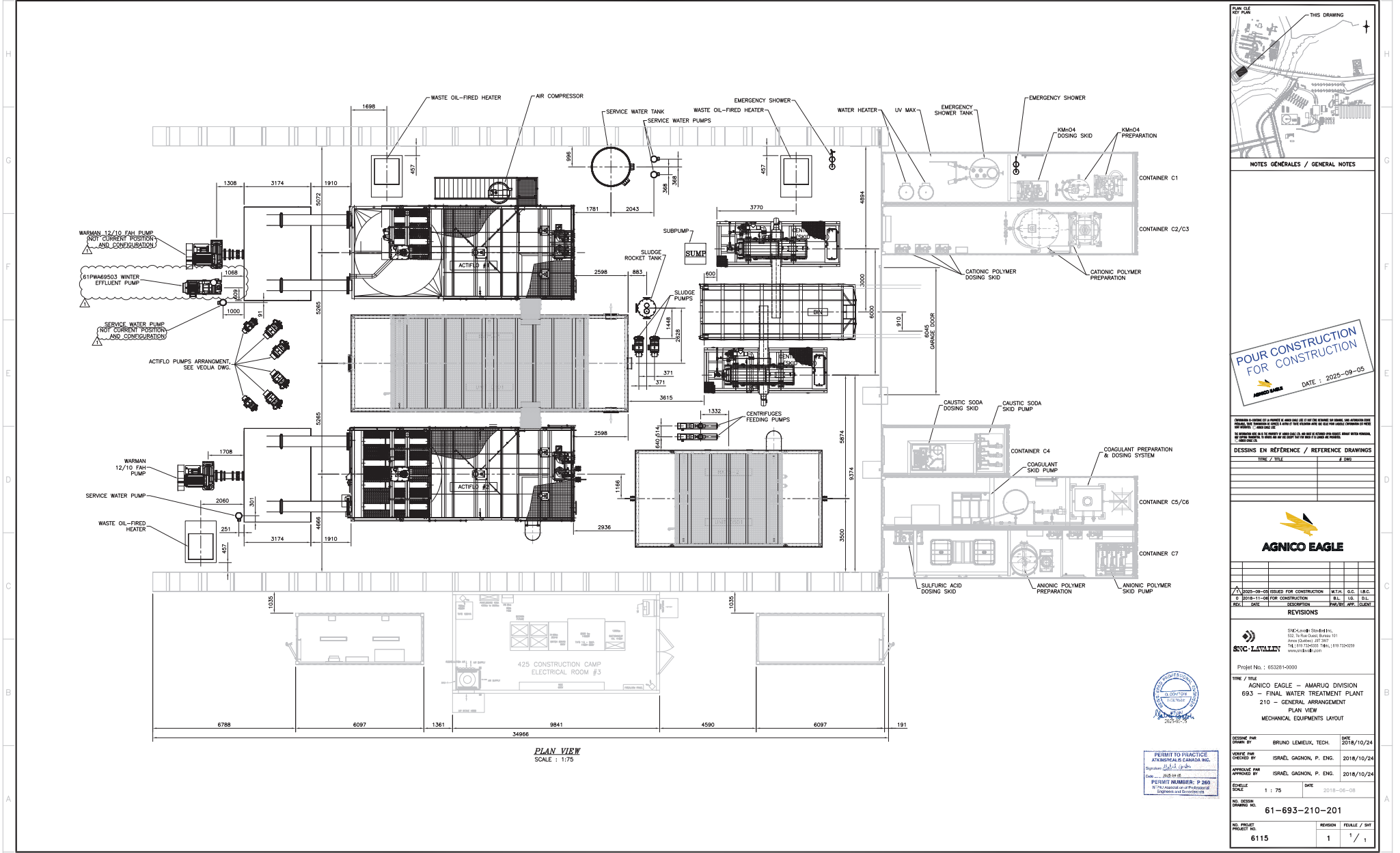
6118

RD

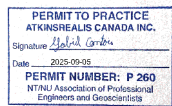
1 / 1

PERMIT TO PRACTICE
 SNC-LAVALIN INC.
 Date: 2018-05-30
 PERMIT NUMBER: P 260
 The Association of Professional Engineers
 and Geoscientists of Ontario

Winter Modification



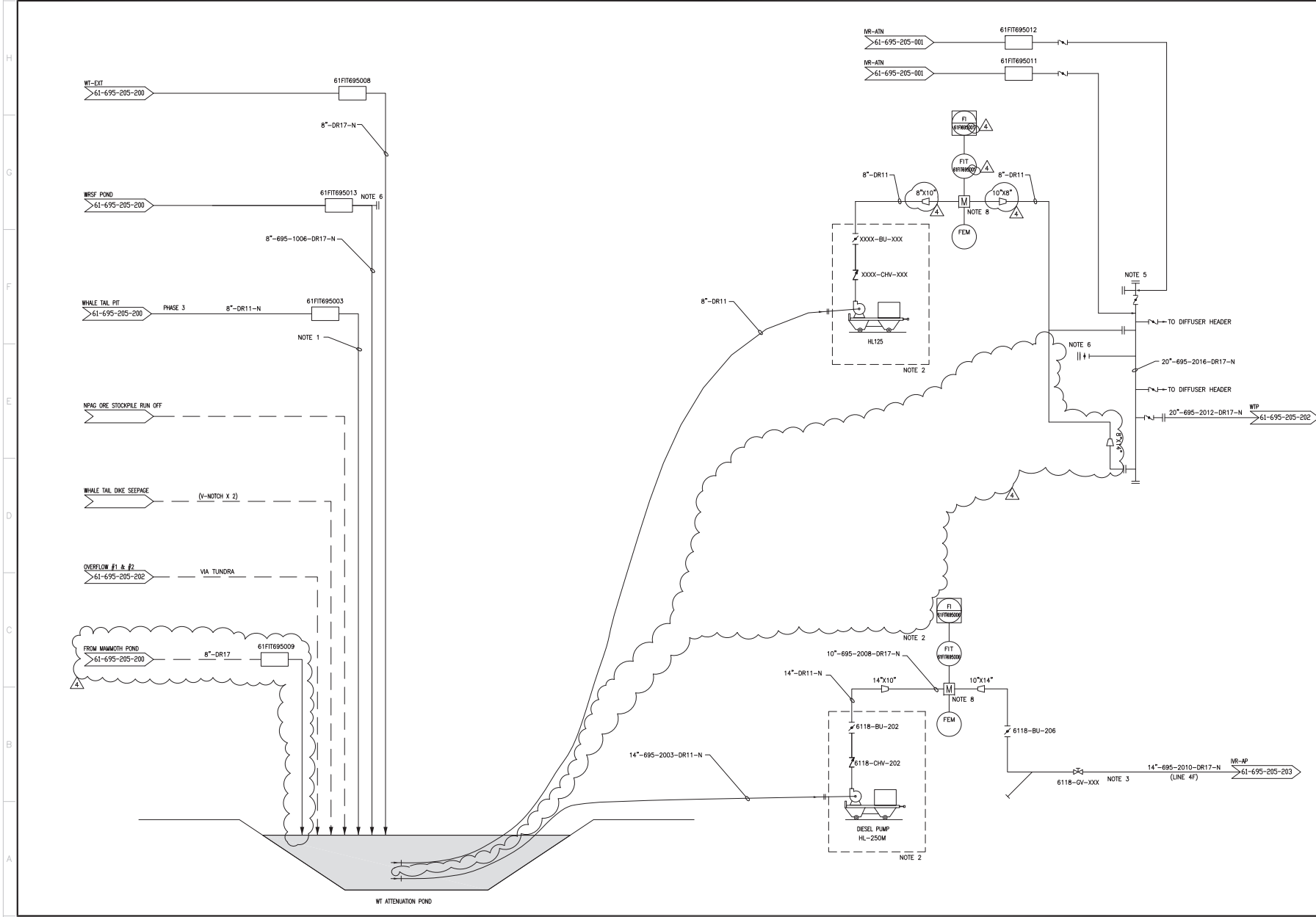




WHOLE LINE REVISED



AGNICO EAGLE



NOTES

1. WHALE TAIL PIT PIPING SYSTEM TO BE CONFIRMED.
2. DIESEL PUMP MOUNTED ON A SKID.
3. BY-PASS TO MAMMOTH LAKE ONLY WHEN THE WATER MEETS THE DISCHARGE CRITERIA.
4. COMMON HEADER.
5. 8-IN CONNECTION THAT CAN BE USED AS A BY-PASS TO SEND RUNOFF FROM WRSP POND DIRECTLY TO THE WTP. NORMALLY, THIS OPENING IS CLOSED WITH A BLIND FLANGE.
6. FLOWMETER COULD BE USED TO DEVELOP FLOW VS PUMP CAPACITY SYSTEM CURVE.
7. FLOWMETER TRANSMITTER ARE LOCATED INSIDE ELECTRICAL PUMP CONTAINER.

POUR CONSTRUCTION FOR CONSTRUCTION
DATE : 2025-08-27

DESIGNING IN REFERENCE / REFERENCE DRAWINGS

TIME / TITLE	DATE	BY	CHK

AGNICO EAGLE

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK
R3	2025-08-27	ISSUED AS-SURVEYED	MTA	IB.C
R2	2018-05-30	ISSUED FOR DESIGN	ALN	ALN
R1	2018-05-30	ISSUED FOR DESIGN	ALN	ALN
R0	2018-05-30	ISSUED FOR DESIGN	S.C	ALN
R0	2018-05-30	ISSUED FOR CONSTRUCTION	S.C	ALN
R0	2025-08-27	ISSUED FOR CONSTRUCTION	MTA	S.C

PERMIT TO PRACTICE
ATM (PROFESSIONAL) ENGINEER REG. NO. 10000
Date: 2025-08-27
P. 260
If This Agreement is a Professional Engineer's Agreement

TIME / TITLE
AGNICO EAGLE - AMARUQ DIVISION
695 - WATER MANAGEMENT
205 PIPING AND INSTRUMENTATION DIAGRAM
ATTENUATION POND AND PUMPING STATION

DESIGNED BY M. MOULA **DATE** 2018-05-30
CHECKED BY D. CHEN **DATE** 2018-05-30
APPROVED BY A.L. NGUYEN **DATE** 2018-05-30

SCHEDULE
DATE 2018-05-30

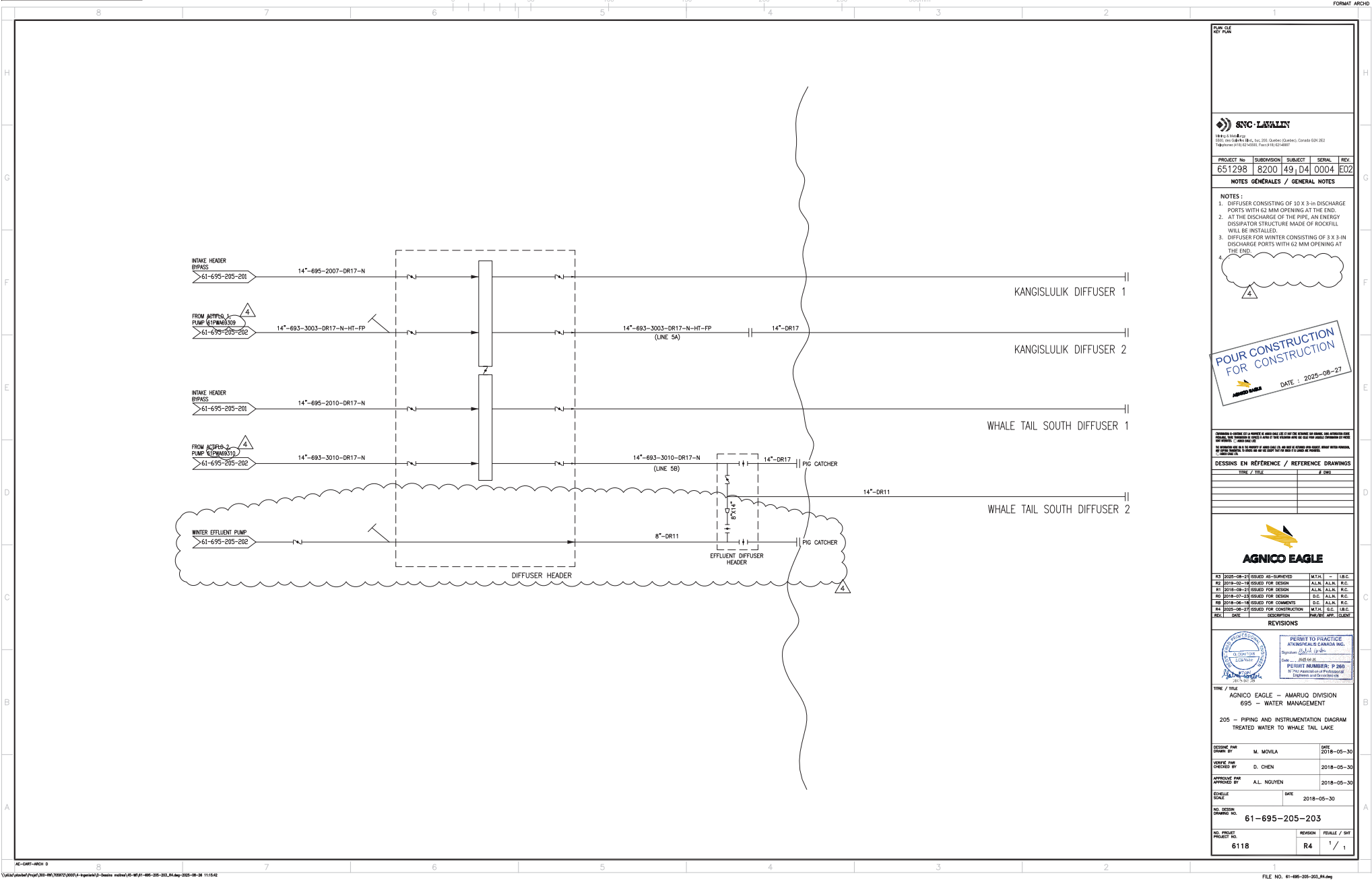
NO. DESIGN
DRAWING NO. 61-695-205-201

NO. PROJECT
PROJECT NO. 6118

REVISION
R4

PAGE
1 / 1





PROJECT No. 651298

SUBDIVISION 8200

SUBJECT 49

SERIAL D4

REV. 0004

REV. E02

NOTES :

- DIFFUSER CONSISTING OF 10 X 3-in DISCHARGE PORTS WITH 62 MM OPENING AT THE END.
- AT THE DISCHARGE OF THE PIPE, AN ENERGY DISSIPATOR STRUCTURE MADE OF ROCKFILL WILL BE INSTALLED.
- DIFFUSER FOR WINTER CONSISTING OF 3 X 3-IN DISCHARGE PORTS WITH 62 MM OPENING AT THE END.

POUR CONSTRUCTION FOR CONSTRUCTION

DATE : 2025-08-27

DESIGNS EN REFERENCE / REFERENCE DRAWINGS

TYPE / TYPE	N. O.

AGNICO EAGLE

REV.	DATE	DESCRIPTION	BY	CHK.
R3	2025-08-27	ISSUED AS-SURVEYED	M.T.A.	-
R2	2019-05-20	ISSUED FOR DESIGN	A.L.N.	A.L.N.
R1	2018-09-25	ISSUED FOR DESIGN	A.L.N.	A.L.N.
R0	2018-07-23	ISSUED FOR DESIGN	S.C.	A.L.N.
R0	2018-06-14	ISSUED FOR COMMENTS	S.C.	A.L.N.
R4	2025-08-27	ISSUED FOR CONSTRUCTION	M.T.A.	S.C.

REVISIONS

PERMIT TO PRACTICE
AGNICO EAGLE CANADA INC.
Date: 2025-08-27
PERMIT NUMBER: P 260
If You Are a Professional Engineer or Architect

TIME / TITLE

AGNICO EAGLE - AMARUQ DIVISION

695 - WATER MANAGEMENT

205 - PIPING AND INSTRUMENTATION DIAGRAM

TREATED WATER TO WHALE TAIL LAKE

DESIGNED BY M. MOVLA

CHECKED BY D. CHEN

APPROVED BY A.L. NGUYEN

DATE 2018-05-30

2018-05-30

2018-05-30

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

NO. PROJECT
PROJECT NO. 6118

REVISION
R4

FEUILLE / SHEET
1 / 1

Appendix C: Operation and Maintenance Manual

Can be provided on request