Operation & Maintenance Manual
Arsenic Water Treatment Plant (AsWTP)

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division – 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:

- Process Plant Superintendent
- Process Plant General Foreman
- Energy & Infrastructures Services Superintendent
- Energy & Infrastructures Services General Foreman
- Environmental Superintendent
- Environmental Senior Coordinator
- Environmental Compliance Counselor
- Water Treatment Plant Operator

DOCUMENT CONTROL

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1	2018/11/23			Operation and Maintenance Manual
2	201901/29	3	22	Monitoring, day-to-day and maintenance clarification

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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 Pit and Haul Road Project, on a satellite deposit located on the Amaruq property, to extend mine operations and milling at Meadowbank Mine.
The Amaruq Mineral Deposit is considered to be an extension of the currently operating Meadowbank mine. A conventional open pit mining operation is forecasted on the Whale Tail deposit. Access to the site is via a 64-kilometre road from Meadowbank mine. On-site facilities will include a power plant, maintenance facilities, tank farm for fuel storage, Arsenic water treatment plant (AsWTP), sewage treatment plant, drinking water treatment plant, as well as accommodation and kitchen facilities for approximately 400 people.

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

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

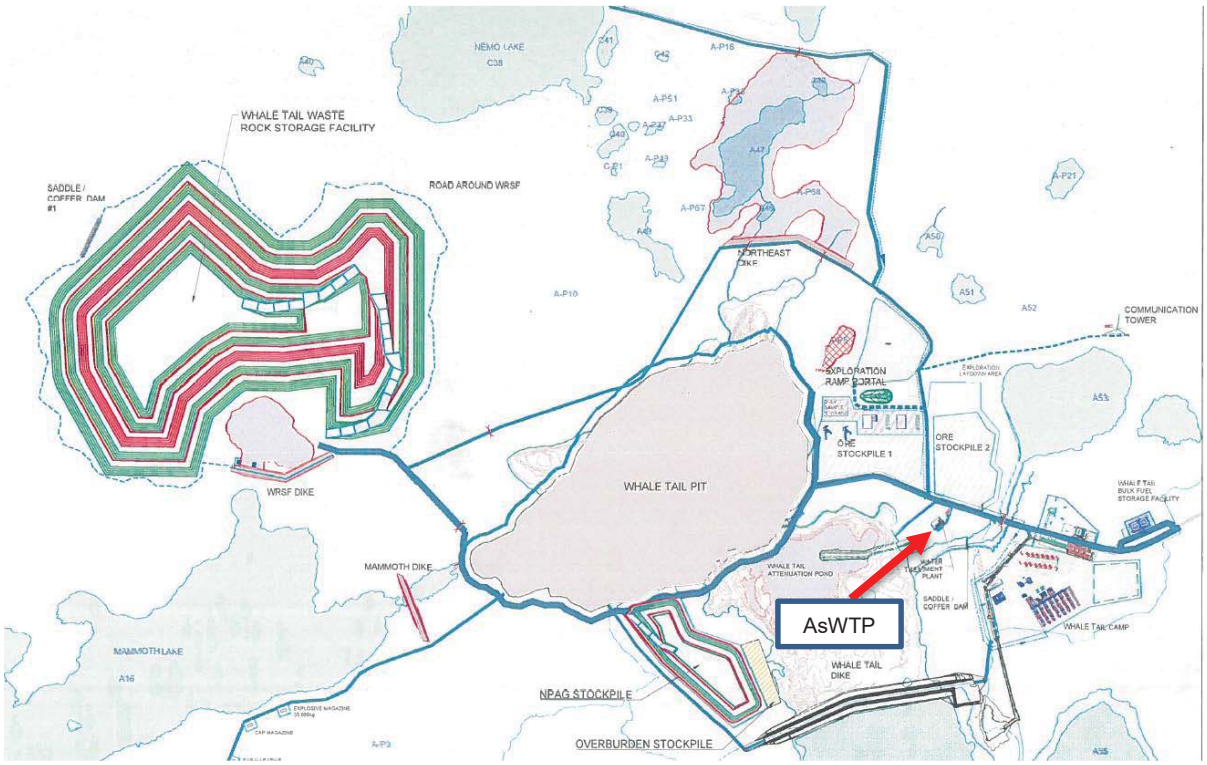

Figure 1 – Location of ASWTP

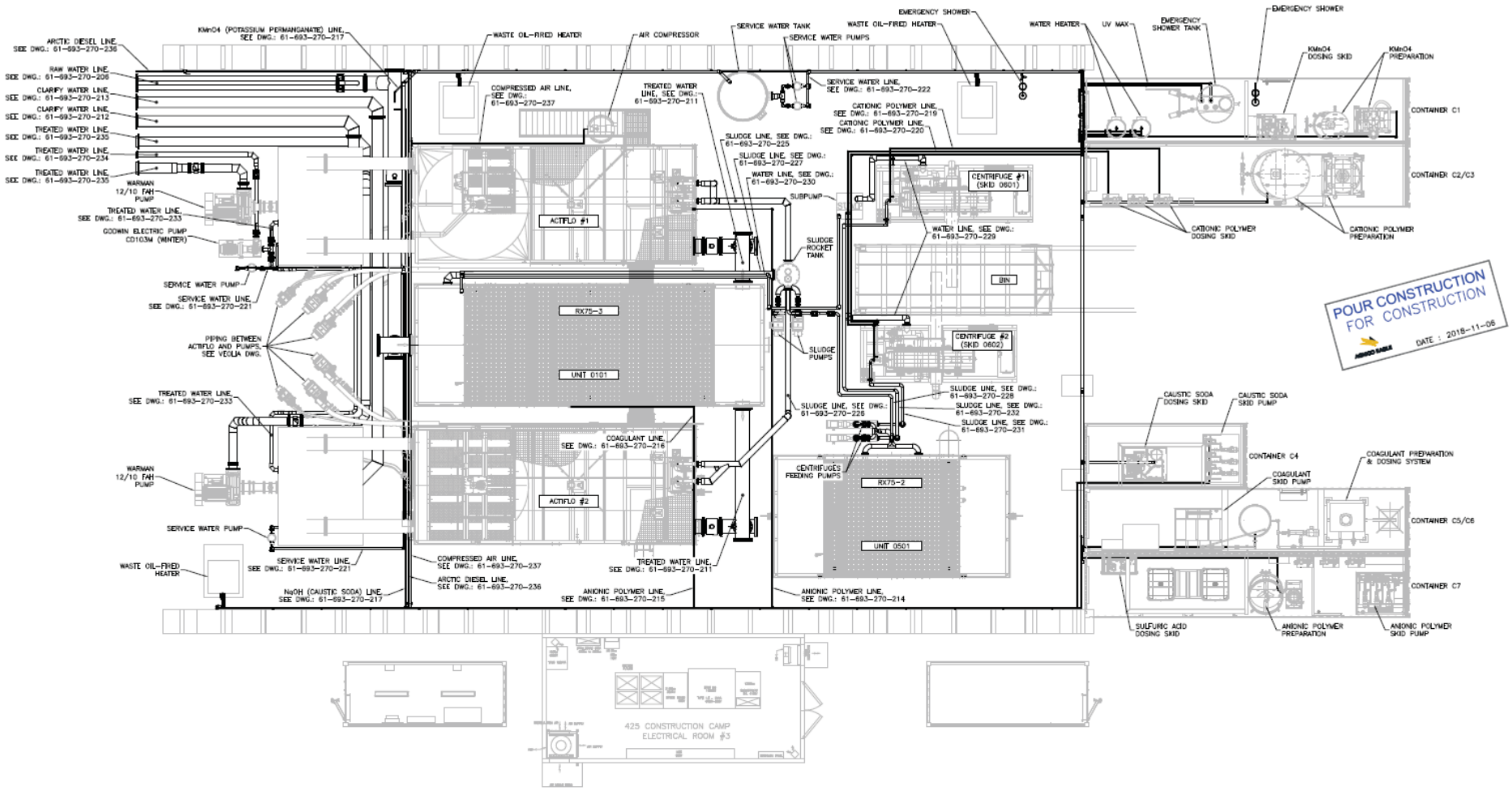

Figure 2 – General Arrangement of ASWTP

1.3 CONTACT INFORMATION

The individuals responsible for the operation of the As water treatment plant for the Project are the following:

Plant Superintendent:	819-759-3555 #4606814
E&I Superintendent:	819-759-3555 #4606632
E&I General Supervisor:	819-759-3555 #4606822

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

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 pond. The equipment has an operational range of 6,250 to 38,400 m^3/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.

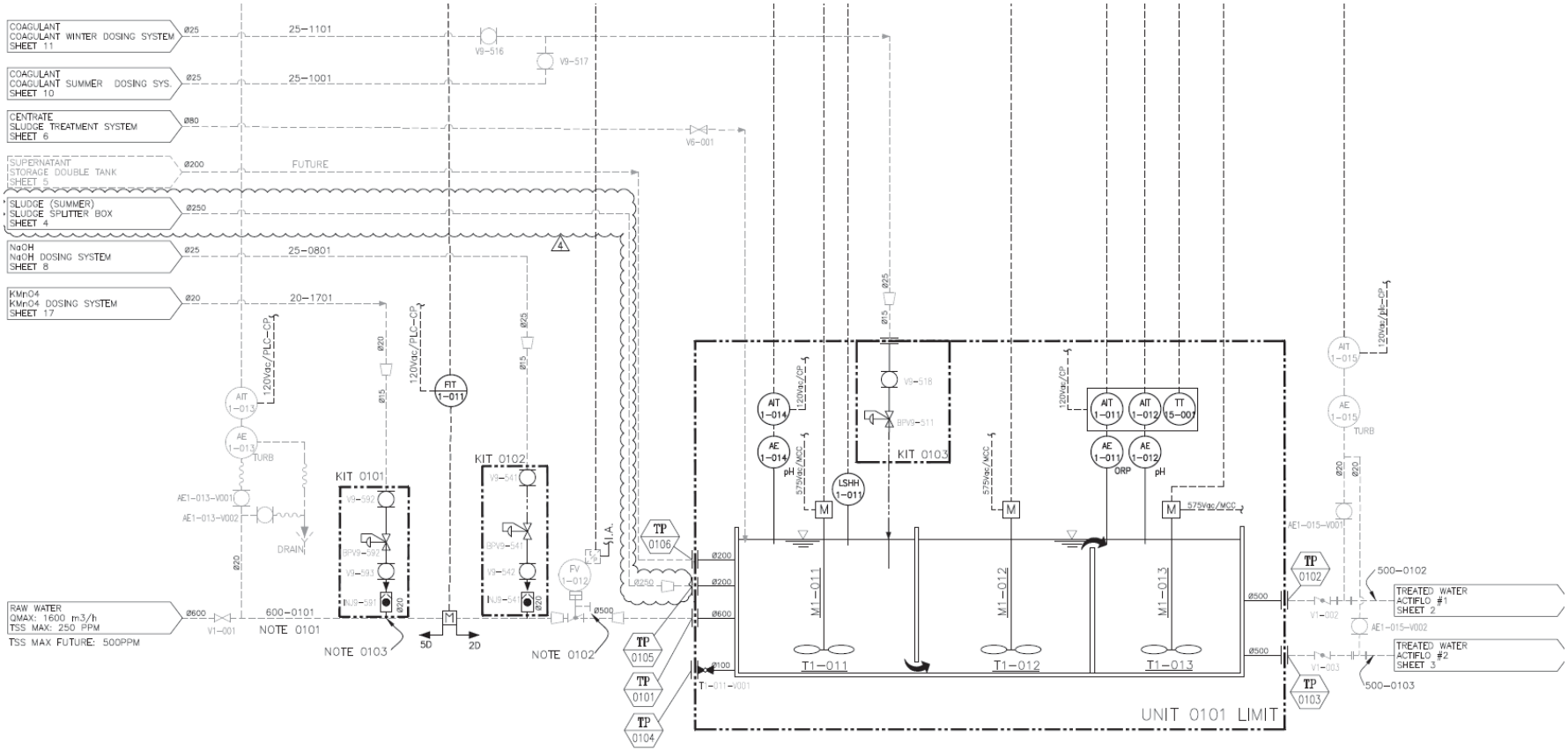

Figure 3 – Flowsheet of AsWTP – As Removal Reactor

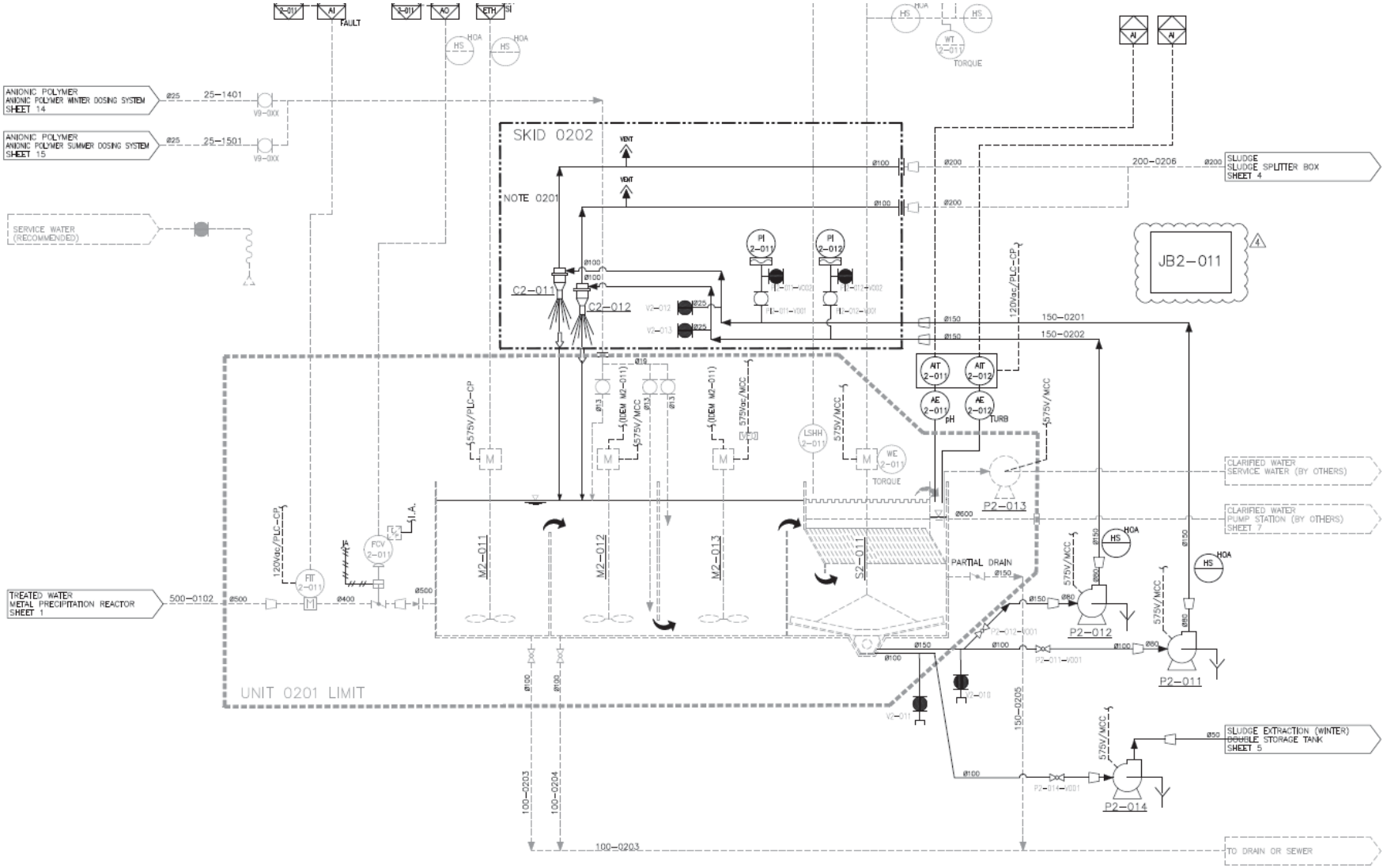

Figure 4 – Flowsheet of AsWTP – Actiflo

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 ($Fe_2 (SO_4)_3$) and recycled sludge to produce a slurry. The ferric sulfate forms a floc of ferric hydroxide ($Fe (OH)_3$) which acts both as a bridge to tie colloidal particles together and as an active surface which forms surface complexes with many metals, 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 m^3/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.

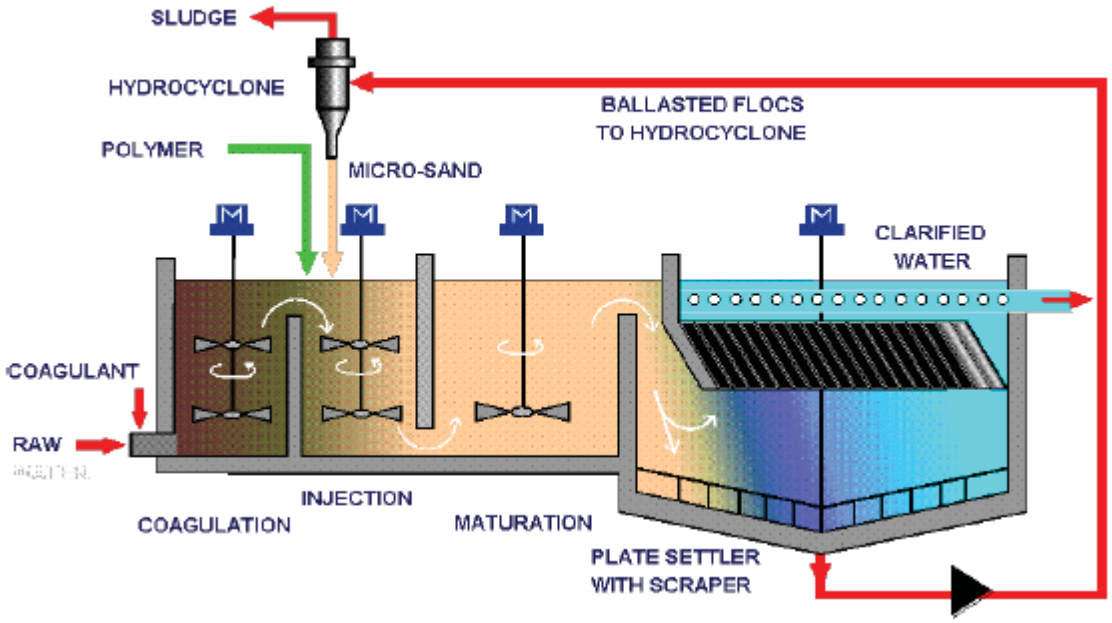

Figure 5 – Actiflo® Process

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 m^3/h which does not address recirculation requirements. To address the pumping needs, pumping rate for the extraction pumps needs are 70 m^3/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. These conditions require adjustments to the Actiflo® unit which is converted for the winter in a standard lamellar decanter also called Multiflo®. When in this mode, the system operates without microsand and without microsand recirculation.

To modify the Actiflo® unit into the Multiflo® mode, microsand needs to be purged from the system. This is done by a sludge extraction pump that is added to the system. Sludge treatment remains the same but centrifuge will operate less often than in the summer months. The sludge tank was designed to accept one day of water treatment at 84 m³/ h with a maximum concentration of 1000 ppm TSS (winter conditions, worse case TSS). Since the chemical dosage requirement is less (due to 10–15 times less flow to treat in the winter), different sets of skid/dosing pumps per chemical will be used to improve system robustness.

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 ± 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 m^3/h approximately (depending on the TSS concentration which can vary from 250 to 500 ppm).

The cakes will be disposed at the WRSF.

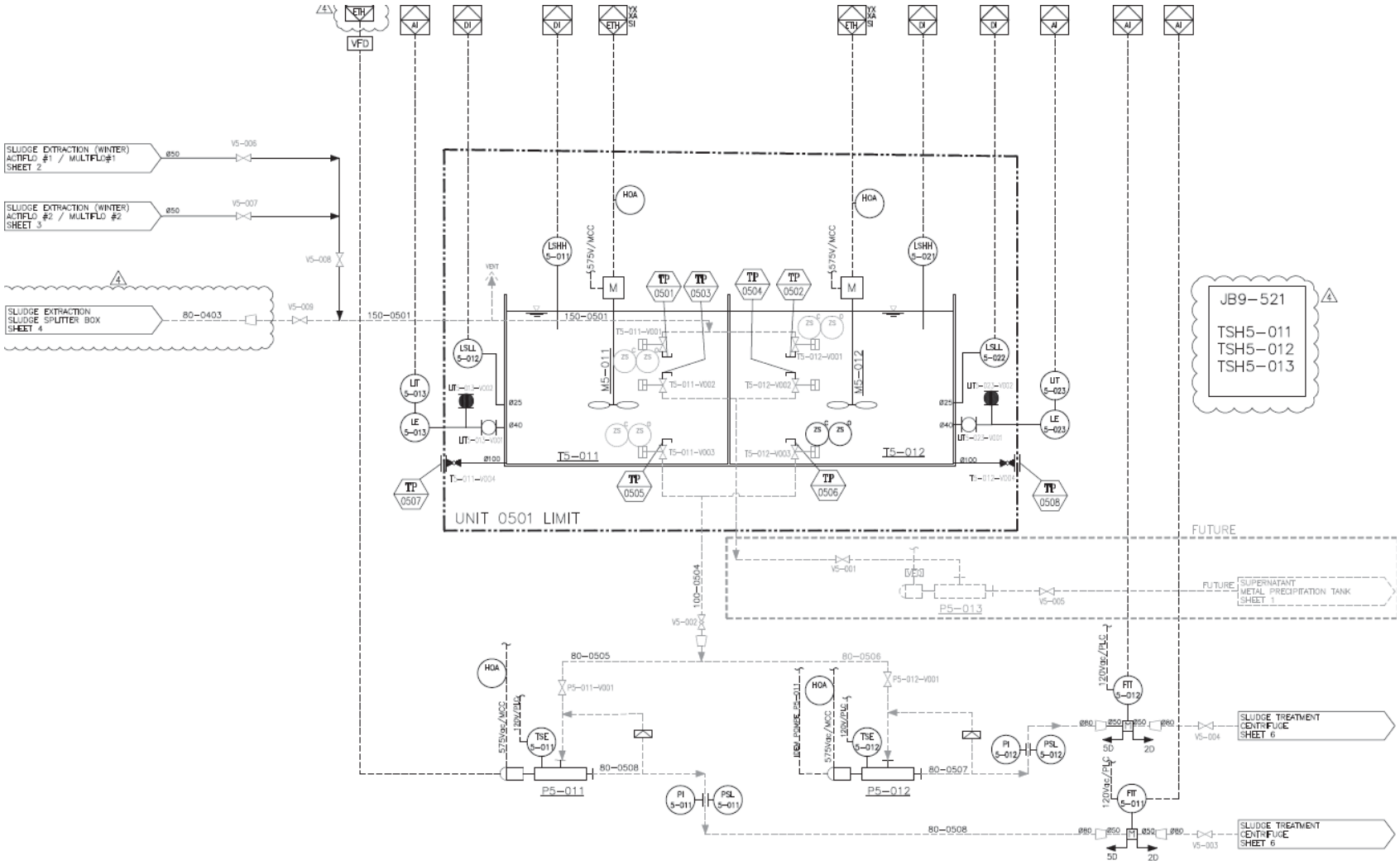

Figure 6 – AsWTP Sludge Tank

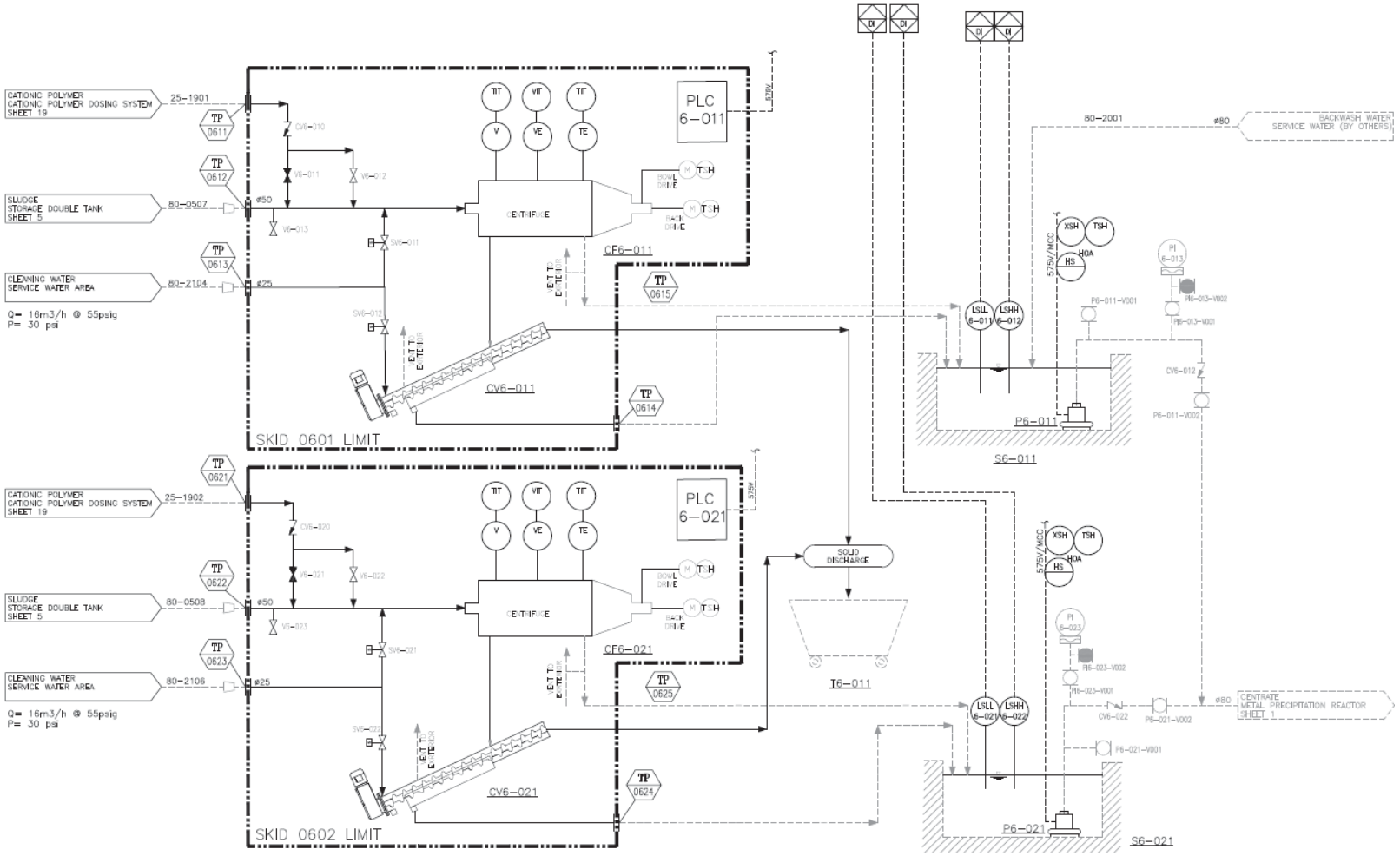

Figure 7 – Centrifuge

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 trivalent As (As III) to produce pentavalent As (As V) that is easier to precipitate and separate from water. The selected oxidant to oxide As is Hydrex 9571, it will delivered in a small bag of 25 kg (dosage 1 mg/L). A preparation system will be used to obtain the prescribed solution. The dosage will be 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. Content will be dissolved in water. Sulfuric acid is required for the solution preparation. The dosage of coagulant would be 30 mg/L. The dosage will be performed using a mechanical diaphragm metering pump.

- 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 and dissolved in water with a preparation system. 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/m^3 of raw water need to be added, depending on initial turbidity. Actisand^{TM}, 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 m^3 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 m^3/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 m^3/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 turbidity meter 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.
Turbidity level 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.

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:

log10(turbidity) = 0.62196 + (0.95619 * log10(TSS)) [p<0.001; r2-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] Environment	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.	Turbidity meter, pH meter, According to supplier recommendations
	Instrument cleaning	Periodically – monthly approx.	Turbidity meter, 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 be 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 spills 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.

- 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.

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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: Reagent MSDS Sheets

Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

5. Fire Fighting Measures

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

Explosion data

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

6. Accidental Release Measures

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

7. Handling and Storage

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

8. Exposure Controls / Personal Protection

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

Personal protective equipment

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

9. Physical & Chemical Properties

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

Chronic effects Not expected to be hazardous by WHMIS criteria.

12. Ecological Information

Ecotoxicological data

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

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

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

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

Persistence and degradability Not available.

13. Disposal Considerations

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

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

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

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

WHMIS status Non-controlled

Inventory status

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

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

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

16. Other Information

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

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

NFPA ratings
Health: 0
Flammability: 1
Instability: 0

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

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

Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Emergency overview WARNING

Harmful in contact with skin.

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

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

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

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

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

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

Explosion data

Sensitivity to static discharge Not available.

Sensitivity to mechanical impact Not available.

6. Accidental Release Measures

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

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

7. Handling and Storage

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

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

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

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

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

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

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

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

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

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

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

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

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

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

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

Personal protective equipment

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

Skin protection Wear suitable protective clothing. Chemical resistant gloves.

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

9. Physical & Chemical Properties

Appearance Granular

Physical state Solid.

Form Solid.

Color Yellowish or Tan or Grey.

Odor Slight

Odor threshold Not available.

pH Not available.

Vapor pressure Not available.

Vapor density Not available.

Boiling point Not available.

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

Solubility (water) Soluble

Specific gravity 3.1 estimated

Relative density Not available.

Flash point Not available.

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

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

Auto-ignition temperature Not available.

Other data

Density 3.10 g/cm3 estimated

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions.

Conditions to avoid Contact with incompatible materials.

Incompatible materials Not available.

Hazardous decomposition products Not available.

Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

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

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

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

12. Ecological Information

Ecotoxicological data

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

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

Persistence and degradability Not available.

13. Disposal Considerations

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

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

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

14. Transport Information

TDG

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

IATA

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

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

IMDG

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

IATA; IMDG; TDG

15. Regulatory Information

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

WHMIS labeling

Inventory status

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

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

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

16. Other Information

HMIS® ratings

Health: 2
Flammability: 0
Physical hazard: 0

NFPA ratings

Health: 2
Flammability: 0
Instability: 0

Disclaimer

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

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Potential health effects

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

3. Composition / Information on Ingredients

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

Composition comments None by WHMIS criteria.

4. First Aid Measures

First aid procedures

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

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

Suitable extinguishing media	Not available.

Unsuitable extinguishing media	Not available.

Protection of firefighters

Specific hazards arising from the chemical	Material can be slippery when wet.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.

Explosion data

Sensitivity to static discharge	Not available.
Sensitivity to mechanical impact	Not available.
Hazardous combustion products	Not available.

6. Accidental Release Measures

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

7. Handling and Storage

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

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

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

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

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

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

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

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

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

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

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

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

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

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

9. Physical & Chemical Properties

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

Acute effects

Sensitization Not available.

Chronic effects Not expected to be hazardous by WHMIS criteria.

Carcinogenicity Not available.

Skin corrosion/irritation Not available.

Serious eye damage/irritation Not available.

Mutagenicity Not available.

Reproductive effects Not available.

Teratogenicity Not available.

Synergistic materials Not available.

12. Ecological Information

Ecotoxicological data

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

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

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

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

Aquatic toxicity Not available.

Persistence and degradability Not available.

Partition coefficient

ADIPIC ACID 0.08

Mobility in environmental media This product is miscible in water.

13. Disposal Considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

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

International Inventories

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

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

16. Other Information

Recommended restrictions	PROFESSIONAL USE ONLY
HMIS® ratings	Health: 0 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 0 Flammability: 0 Instability: 0
Disclaimer	Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.
Prepared by	Hydrex Global Platform

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

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Emergency overview

DANGER

Oxidizing material.

Causes skin and eye burns.

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

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

5. Fire Fighting Measures

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

6. Accidental Release Measures

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

Methods for cleaning up

Should not be released into the environment.

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

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

Other information

Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling

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

Storage

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

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

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

Material	Type	Value
Hydrex 9571	Ceiling	5 mg/m3

Engineering controls

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

Personal protective equipment

Eye / face protection

Do not get in eyes. Chemical goggles are recommended.

Skin protection

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

Respiratory protection

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

9. Physical & Chemical Properties

Physical state

Solid.

Form

Solid.

Color

Dark purple

Odor

Odorless.

Other data

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

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

12. Ecological Information

Ecotoxicological data

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

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

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

13. Disposal Considerations

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

14. Transport Information

TDG

UN number	UN1490

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

IATA

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

IATA; TDG

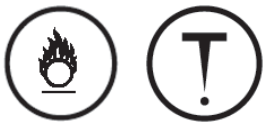
15. Regulatory Information

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

WHMIS status Controlled

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

WHMIS labeling



Inventory status

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

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

16. Other Information

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

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

SAFETY DATA SHEET

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

1.1. Product identifier

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

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

Identified uses	Not available.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

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

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

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

Health hazards

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

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

2.2. Label elements

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

Hazard pictograms

Signal word Danger

Hazard statements

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

Precautionary statements

Prevention

P260	Do not breathe mist or vapour.
P264	Wash hands thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Response

P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor/paramedic if you feel unwell.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P342 + P311	If experiencing respiratory symptoms: Call a poison center/doctorparamedic.
P363	Wash contaminated clothing before reuse.

Storage Not available.

Disposal

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

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

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

List of abbreviations and symbols that may be used above

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

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

SECTION 4: First aid measures

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

4.1. Description of first aid measures

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

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

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

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

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

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

SECTION 5: Firefighting measures

General fire hazards No unusual fire or explosion hazards noted.

5.1. Extinguishing media

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

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

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

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

SECTION 7: Handling and storage

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

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

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

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

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

8.2. Exposure controls

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

Individual protection measures, such as personal protective equipment

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

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

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

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

9.2. Other information

Density	1,00 g/cm³

SECTION 10: Stability and reactivity

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

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

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

SECTION 11: Toxicological information

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

Information on likely routes of exposure

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

Skin contact Causes severe skin burns.

Eye contact Causes serious eye damage.

Ingestion Causes digestive tract burns.

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

11.1. Information on toxicological effects

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

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

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

Serious eye damage/eye irritation Causes serious eye damage.

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

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

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

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

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

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

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

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

Mixture versus substance information No information available.

Other information Not available.

SECTION 12: Ecological information

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

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

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

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

SECTION 13: Disposal considerations

13.1. Waste treatment methods

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

SECTION 14: Transport information

ADR

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

RID

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

ADN

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

Subsidiary risk -
Label(s) 8

14.4. Packing group II

14.5. Environmental hazards No.

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

IATA

14.1. UN number UN3266

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

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards No.

ERG Code 8L

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

Other information

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

IMDG

14.1. UN number UN3266

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

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards

Marine pollutant No.

EmS F-A, S-B

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

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

ADN; ADR; IATA; IMDG; RID

SECTION 15: Regulatory information

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

EU regulations

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

Authorisations

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

Not listed.

Restrictions on use

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

Not listed.

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

Not listed.

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

Not listed.

Other EU regulations

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

Not listed.

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

Sodium hydroxide (CAS 1310-73-2)

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

Sodium hydroxide (CAS 1310-73-2)

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

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

Not listed.

15.2. Chemical safety assessment	No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations	Not available.
References	Not available.
Information on evaluation method leading to the classification of mixture	The classification for health and environmental hazards is derived by a combination of calculatior methods and test data, if available.
Full text of any H-statements not written out in full under Sections 2 to 15	H314 Causes severe skin burns and eye damage.
Revision information	None.
Training information	Follow training instructions when handling this material.
Disclaimer	Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

SAFETY DATA SHEET

1. Identification

Product identifier	**VEOLIA ACTISAND**
Other means of identification	None.
Recommended use	Wastewater Treatment
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations. PROFESSIONAL USE ONLY

Manufacturer/Importer/Supplier/Distributor information

Manufacturer	
Supplier	Veolia Water Technologies Canada Inc.
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwtcanada-hydrex@veolia.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)
Supplier	Not available.

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Carcinogenicity	Category 1A
Environmental hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May cause cancer.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
Response	IF exposed or concerned: Get medical advice/attention.
Storage	Not available.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Other hazards	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Crystalline sillica		14808-60-7	100

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

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

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed Coughing.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

General information IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

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

Unsuitable extinguishing media Not available.

Specific hazards arising from the chemical During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Use water spray to cool unopened containers.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up The product is immiscible with water and will spread on the water surface. Stop the flow of material, if this is without risk. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in cool, dry place.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable fraction.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

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

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

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

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

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable.
Components	**Type**	**Value**	**Form**
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable dust.
Components	**Type**	**Value**	**Form**
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable dust.

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

Exposure guidelines Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

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

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Other Use of an impervious apron is recommended. Chemical resistant gloves.

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

Thermal hazards Not available.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Solid.

Form Solid.

Color Not available.

Odor	Not available.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.0000001 kPa at 25 °C
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Heat of combustion (NFPA 30B)	0 kJ/g
Molecular formula	O2Si
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Powerful oxidizers. Chlorine.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics	Coughing.

Information on toxicological effects

Acute toxicity	Not available.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. May cause cancer. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.

ACGIH Carcinogens

Crystalline sillica (CAS 14808-60-7)	A2 Suspected human carcinogen.

Canada - Alberta OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Manitoba OELs: carcinogenicity

SILICA, CRYSTALLINE-.ALPHA.-QUARTZ, RESPIRABLE FRACTION (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Quebec OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected carcinogenic effect in humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Crystalline sillica (CAS 14808-60-7)	1 Carcinogenic to humans.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

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

14. Transport information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

Canadian regulations

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations

Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

16. Other Information

Issue date 08-16-2016

Version # 01

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

Revision information Product and Company Identification: Product Review

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Identification of the substance/preparation	**Sulphuric Acid 98%**
Use of the substance/preparation	Industrial Process Water Treatment; Water Treatment Chemical
Version #	01
Issue date	12-06-2016
CAS #	Mixture
Manufacturer	
Supplier	VWS, Saudi - Chemical Industries
Address	Prince Musaed Bin Abdul Aziz Street PO Box 58515, Riyadh 11515 Saudi Arabia
Contact Person	Product Manager
Telephone	+966 11 478 7721
Fax	+966 11 478 2560
e-mail	vwsme.hydrex@veolia.com
Global Emergency Contact	+1-760-476-3961 (Code:333239)

2. HAZARDS IDENTIFICATION

This preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification	C;R35
Physical hazards	Not classified as a physical hazard.
Health hazards	Causes severe burns.
Environmental hazards	Not classified as an environmental hazard.
Specific hazards	Very toxic by inhalation. Causes severe burns. Prolonged exposure may cause chronic effects.
Main symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS #	Percent	EC-No.	Classification
SULFURIC ACID	7664-93-9	50 - < 60	231-639-5	C;R35
Other components below reportable levels		40 - < 50		

Composition comments The full text for all R-phrases is displayed in Section 16 of the SDS.

4. FIRST AID MEASURES

Inhalation	Move to fresh air. For breathing difficulties, oxygen may be necessary. Get medical attention immediately.
Skin contact	Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash clothing separately before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
General advice	In case of shortness of breath, give oxygen. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Keep victim warm. Do not use mouth-to-mouth method if victim ingested the substance.
Notes to physician	In case of shortness of breath, give oxygen. Keep victim warm.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media Foam. Powder. Carbon dioxide (CO2).

Extinguishing media which must not be used for safety reasons	DO NOT USE WATER. Alcohol resistant foam.
Unusual fire & explosion hazards	The product is not flammable.
Specific hazards	During fire, gases hazardous to health may be formed.
Special protective equipment for fire-fighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
Hazardous combustion products	sulfur

6. ACCIDENTAL RELEASE MEASURES

Containment procedures	Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Personal precautions	Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. For personal protection, see section 8 of the SDS.
Environmental precautions	Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.
Methods for cleaning up	This product is miscible in water. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. This material and its container must be disposed of as hazardous waste. For waste disposal, see section 13 of the SDS. Neutralize with slaked lime (calcium hydroxide) or soda ash (sodium carbonate) and flush with plenty of water.

7. HANDLING AND STORAGE

Handling	Never add water to this product. Avoid forming spray/aerosol mists. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin.
Storage	Never allow product to get in contact with water during storage. Keep at temperature not exceeding 43 °C. Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation. Store in cool, dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

Bahrain. TLVs. Resolution No. 4 Regarding the Management of Hazardous Chemicals, Exposure Limits for Dangerous and Poisonous Chemicals, Annex. 3

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 ppm
	TWA	1 mg/m3

Egypt. OELs. Threshold limits of air pollutants in the workplace (Decree No. 388, Annex 8)

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

Kuwait. OELs. Maximum Limits Allowance for Occupational Exposure to Chemical Substances (TVLs) (Decision No. 210/2001 Appendix No. (3-1))

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. OELs. Maximum Allowable Limits for Air Pollutants in Working Areas [Law to Protect the Air from Pollution, Resolution of the Cabinet of Ministers No. 12 of 2006]

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. Abu Dhabi. TLVs. Maximum Allowable Limits for Air Pollutants in Working Areas (AD EHSMS RF - Occupational Standards and Guideline Values, Schedule A)

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

UAE. Dubai. OELs. Maximum Allowable Limits for Indoor Air Pollutants. Industrial Operation Regulation IO-11.0: Appendix, Tables 2 & 2A

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	1 mg/m3
	TWA	1 mg/m3

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

Recommended monitoring procedures

Additional exposure data Not available.

Engineering measures to reduce exposure General ventilation normally adequate. Ventilation should effectively remove and prevent buildup of any aerosols or mists generated from the handling of this product.

Personal protective equipment

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit. Avoid forming spray/aerosol mists. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Wear a disposable respiratory equipment against droplets or dust and which complies with NF EN 149, category FFP2.

Hand protection or Rubber (natural, latex). Polyvinyl chloride (PVC). Chemical resistant gloves. Nitrile rubber. Wear protective gloves which comply with the NF EN 374. Solvent-resistant gloves (butylrubber).

Eye protection Before any handling, wear protective glasses side-shields complying with the NF EN 166.

Skin and body protection Do not get this material in contact with skin. Wear suitable protective clothing. Chemical resistant gloves. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

General Avoid contact with skin. Avoid contact with eyes. Use personal protective equipment as required. Eye wash fountain is recommended. Keep working clothes separately. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

Environmental exposure controls Environmental manager must be informed of all major releases.

Hygiene measures Wash hands after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Liquid

Physical state Liquid.

Form Not available.

Color Colorless

Odor Not available.

pH < 1

Specific gravity Not available.

Boiling point 626 °F (330 °C)

Flash point Not available.

Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	0 hPa estimated
Solubility (water)	100 % Exothermic decomp causes a dangerously fast pressure increase.
Partition coefficient (n-octanol/water)	Not available.
Viscosity	26.9 mPa·s (20°C)
Vapor density	Not available.
Evaporation rate	Not available.
Melting point/Freezing point	5 °F (-15 °C)
Auto-ignition temperature	Not available.
VOC	Not available.
Other data	
Density	1.40 - 1.84 g/cm³
Miscible (water)	100 %

10. STABILITY AND REACTIVITY

Conditions to avoid	Exposure to moisture. Reacts violently with strong alkaline substances. None under normal conditions. Avoid exposing to heat and contact with strong oxidizing substances. Do not allow water to get into container because of reaction.
Hazardous decomposition products	Sulphur oxides.
Stability	Material is stable under normal conditions. Material reacts with water.
Materials to avoid	Organic compounds. Metals. Reducing agents. Bases.

11. TOXICOLOGICAL INFORMATION

Toxicological data

Product	Species	Test Results
Sulphuric Acid 98%		
Acute		
Inhalation		
Liquid		
LC50	Rat	0.51 mg/l, 2 hours
Oral		
LD50	Rat	> 2140 mg/kg

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

Acute toxicity	Very toxic by inhalation. Toxic by inhalation. Causes severe burns.
Routes of exposure	Inhalation. Skin contact. Eye contact.
Toxicological information	Occupational exposure to the substance or mixture may cause adverse effects.
Chronic toxicity	Prolonged exposure may cause chronic effects.
Carcinogenicity	Risk of cancer cannot be excluded with prolonged exposure.

Egypt OELs Carcinogen rating

SULFURIC ACID (CAS 7664-93-9)	C2 Suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

SULFURIC ACID (CAS 7664-93-9)	1 Carcinogenic to humans.

Kuwait OELs (Decision No. 210/): Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	A2 Suspected human carcinogen.

UAE - Abu Dhabi TLVs: Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	GROUP A2 Suspected human carcinogen.

Mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Reproductivity	Not classified.
Epidemiology	No epidemiological data is available for this product.
Local effects	Very toxic by inhalation. Causes severe burns. Irritating to respiratory system. May produce corrosive solutions on contact with water.

Symptoms and target organs Contact with this material will cause burns to the skin, eyes and mucous membranes.

12. ECOLOGICAL INFORMATION

Ecotoxicological data

Product		Species	Test Results
Sulphuric Acid 98%			
Aquatic			
Acute			
Fish	LC50	Fish	> 42 mg/l, 96 hours

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

Ecotoxicity Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems. Not expected to be harmful to aquatic organisms.

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

Persistence / degradability

Bioaccumulation No data available.

Aquatic toxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Mobility This product is miscible in water.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. DISPOSAL CONSIDERATIONS

Disposal instructions Consult authorities before disposal. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground. Dispose in accordance with all applicable regulations.

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

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

14. TRANSPORT INFORMATION

DOT

- **UN number** UN1830
- **UN proper shipping name** Sulfuric acid with more than 51 percent acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
  - **Label(s)** 8
- **Packing group** II
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Special provisions** A3, A7, B3, B83, B84, IB2, N34, T8, TP2, TP12
- **Packaging exceptions** 154
- **Packaging non bulk** 202
- **Packaging bulk** 242

IATA

- **UN number** UN1830
- **UN proper shipping name** Sulphuric acid with more than 51% acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
- **Packing group** II
- **Environmental hazards** No.
- **ERG Code** 8L
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Other information**
  - **Passenger and cargo aircraft** Allowed with restrictions.
  - **Cargo aircraft only** Allowed with restrictions.

IMDG

- **UN number** UN1830

UN proper shipping name	SULPHURIC ACID with more than 51% acid
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

DOT

IATA; IMDG

15. REGULATORY INFORMATION

Labeling

Contains	SULFURIC ACID
Symbol(s)	

Corrosive

R-phrase(s)	R35 Causes severe burns.
S-phrase(s)	S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30 Never add water to this product. S36/37/39 Wear suitable protective clothing, gloves and eye/face protection. S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60 This material and its container must be disposed of as hazardous waste.

Follow national regulation for work with chemical agents.

Bahrain. Chemicals Subject to the Prior Informed Consent Procedure under the Rotterdam Convention (Law No. 14 of 2012, Annex III)

Not listed.

Bahrain. CWC Chemical Substances (Decree No. 6 of 1997, Schedules 1, 2 and 3; Law No. 51 of 2009)

Not listed.

Bahrain. Prohibited Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 1)

Not listed.

Bahrain. Severely Restricted Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 2)

Not listed.

Regulatory information

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

16. OTHER INFORMATION

Wording of the R-phrases in sections 2 and 3

R35 Causes severe burns.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

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

Recommended use

Use in accordance with supplier's recommendations.

Recommended restrictions

PROFESSIONAL USE ONLY

Disclaimer

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

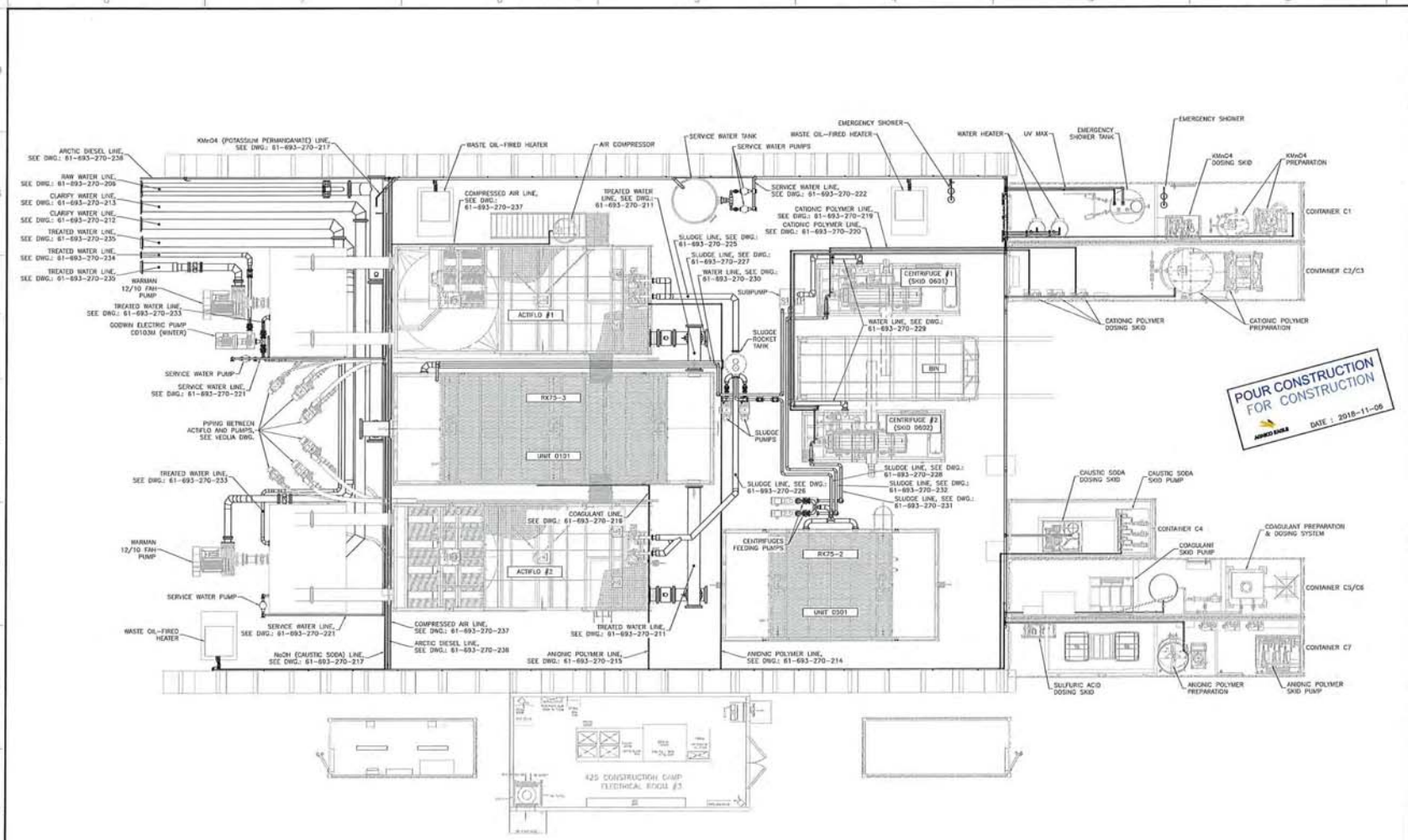
Revision information

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

Appendix B: Drawings

NO. DESSIN / DRAWING NO. 61-693-270-200

FORMAT ARCH D



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

PLAN VIEW
SCALE : 1:75

NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
WTP – MECHANICAL EQP. LAYOUT	61-693-210-201
WTP – PIPING DETAILS	61-693-270-2018237

AGNICO EAGLE

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

REVISIONS

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

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

DESSINÉ PAR / DRAWN BY	PIERRE-OLIVIER CÔTÉ	2018-09-05
VÉRIFIÉ PAR / CHECKED BY	ISRAËL SAGNIOR, P. ENG.	2018-MM-JJ
APPROUVÉ PAR / APPROVED BY	ISRAËL SAGNIOR, P. ENG.	2018-MM-JJ
ÉCHELLE / SCALE	1 : 75	DATE 2018-06-06

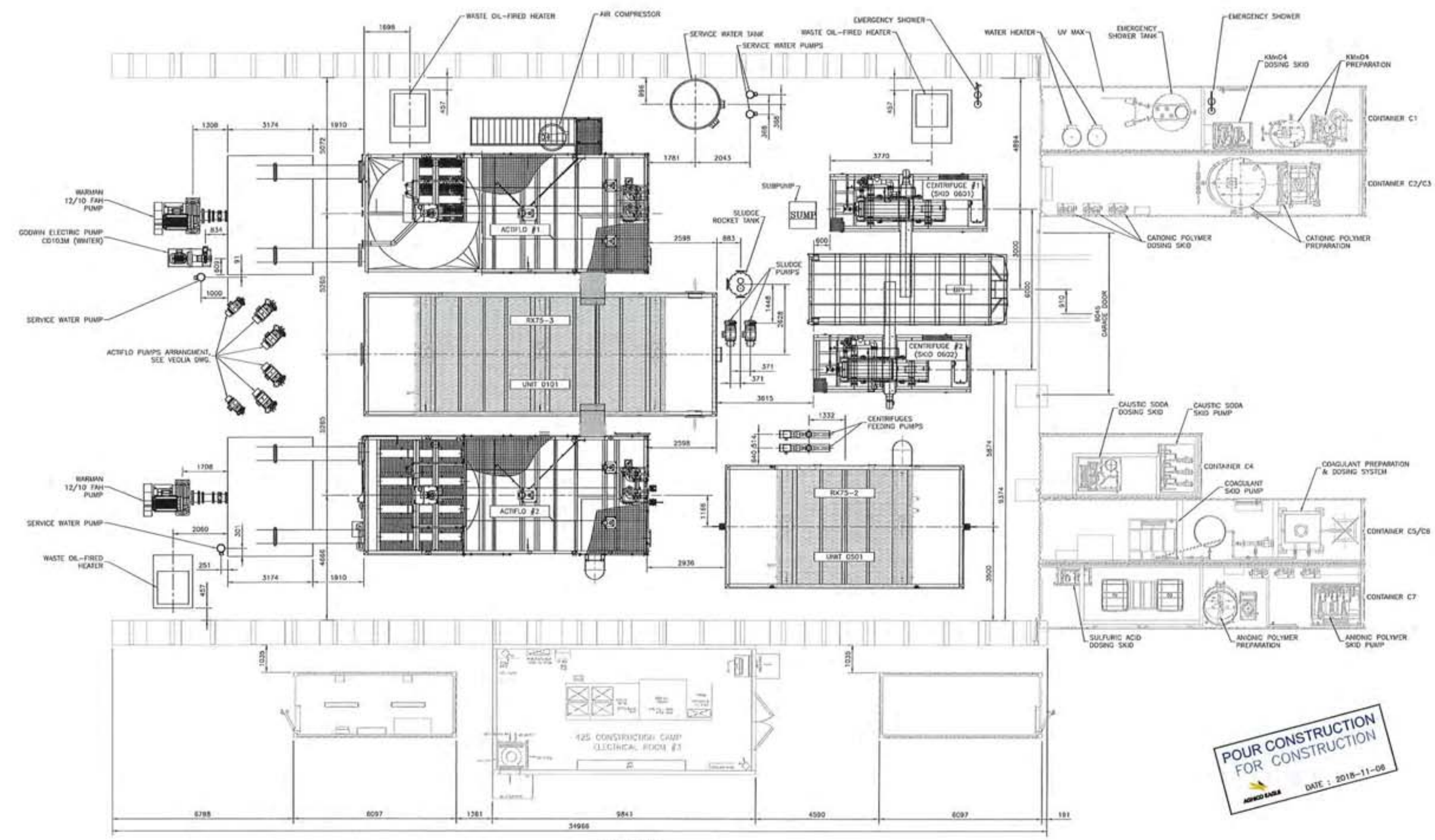
NO. DESSIN / DRAWING NO. 61-693-270-200

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

AC-CAM-ARCH B

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

FORMAT ARCHD



PLAN VIEW
SCALE : 1:75

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

PLAN CLÉ / KEY PLAN
THIS DRAWING

NOTES GÉNÉRALES / GENERAL NOTES

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

2018-11-06

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-11-06	FOR CONSTRUCTION	B.L.	I.G.	D.L.

REVISIONS

SNC·LAVALIN

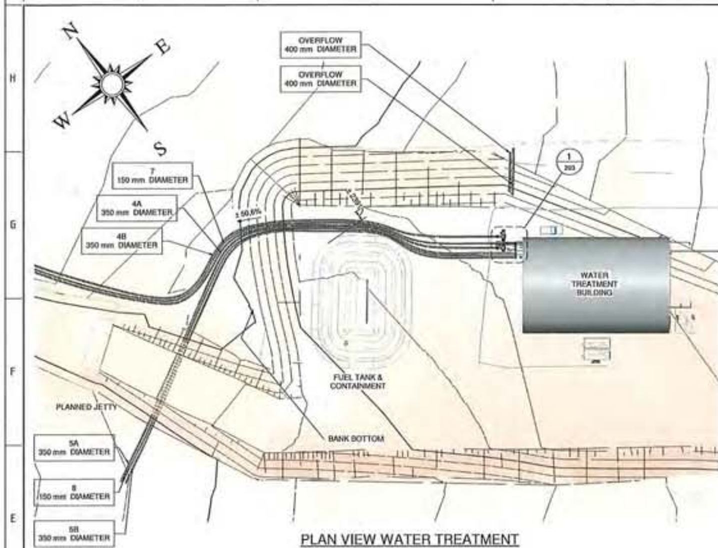
Projet No. : 653281-0000

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

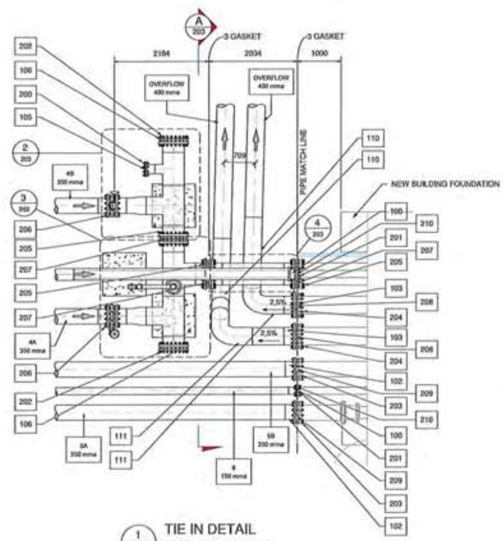
DESSINÉ PAR / DRAWN BY	BRUNO LEMIEUX, TECH.	2018/10/24
VÉRIFIÉ PAR / CHECKED BY	ISRAËL GAGNON, P. ENG.	2018/10/24
APPROUVÉ PAR / APPROVED BY	ISRAËL GAGNON, P. ENG.	2018/10/24
ÉCHELLE / SCALE	1 : 75	DATE 2018-04-08
NO. DESSIN / DRAWING NO.	61-693-210-201	
NO. PROJET / PROJECT NO. 6115	RÉVISION 0	FEUILLE / SHT 1/1

FILE NO.

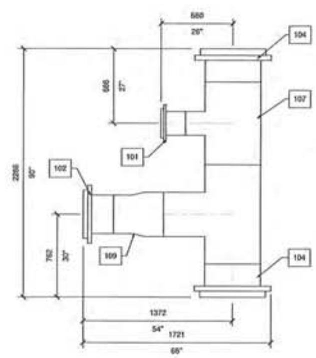
61-695-270-203



PLAN VIEW WATER TREATMENT PLANT AREA
1 : 500

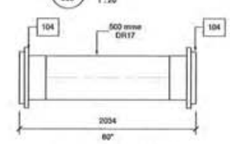


1 TIE IN DETAIL (203) 1 : 50



TOTAL WEIGHT OF SECTION = 329 kG

2 HEADER SECTION DETAIL (203) 1 : 20



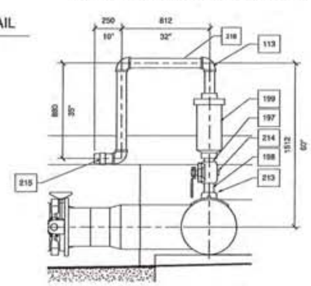
TOTAL WEIGHT OF SECTION = 188 kG

4 HEADER SECTION DETAIL (203) 1 : 25

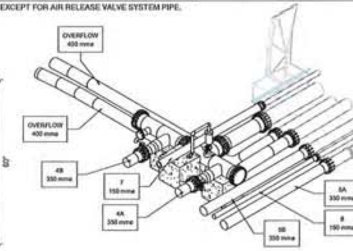
PIPE FITING LIST			
MARK	COUNT	SIZE	DESCRIPTION
100	2	150 mma-150 mma	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
101	1	200 mma-200 mma	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
102	8	350 mma-350 mma	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
103	2	400 mma-400 mma	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
104	7	500 mma-500 mma	DR17 - BACK-UP RING (DI) - STUB END (HDPE)
105	1	200 mma	DR17 - BLIND FLANGE STEEL ISCO
106	2	500 mma	DR17 - BLIND FLANGE STEEL ISCO
107	1	500 mma-500 mma-200 mma	DR17 - BRANCH SADDLE - REDUCING TEE - HDPE
108	2	500 mma-500 mma-400 mma	DR17 - BRANCH SADDLE - REDUCING TEE - HDPE
109	2	400 mma-350 mma	DR17 - CONCENTRIC REDUCER HDPE
110	2	400 mma-400 mma	DR17 - ELBOW 45° HDPE
111	2	400 mma-400 mma	DR17 - ELBOW 90° HDPE
112	1	500 mma-500 mma-500 mma	DR17 - TEE FABRICATED HDPE
113	3	80 mma-80 mma	SCHEDULE 40 PIPE TREADED ELBOW Dia 80

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

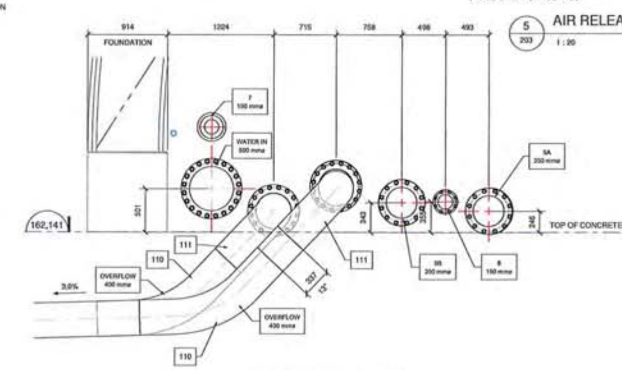
NOTES: PIPES SEGMENTS ARE NOT INCLUDED IN THE LIST EXCEPT FOR AIR RELEASE VALVE SYSTEM PIPE.



5 AIR RELEASE DETAIL (203) 1 : 20

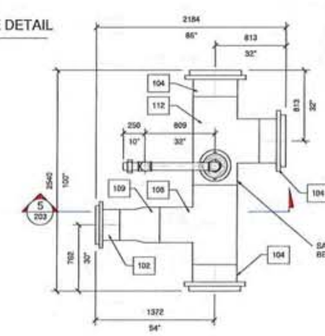


3D VIEW TIE-IN AREA



A SECTION TIE IN (203) 1 : 25

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



TOTAL WEIGHT OF SECTION = 309 kG

3 HEADER SECTION DETAIL (203) 1 : 25

FOR CONSTRUCTION
POUR CONSTRUCTION
2018-10-11 15:03:54

651298 | 8200 | 41,D6 | 0004 | 01

NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

AGNICO EAGLE

REV	DATE	DESCRIPTION	PAR	APP.	CLIENT
1	2018-10-10	FOR CONSTRUCTION	F.P.	É.L.	
0	2018-08-29	FOR CONSTRUCTION	F.P.	É.L.	
RB	2018-07-18	CLIENT COMMENTS	F.P.	É.L.	
RA	2018-07-18	INTERNAL COMMENTS	F.P.	É.L.	

REVISIONS

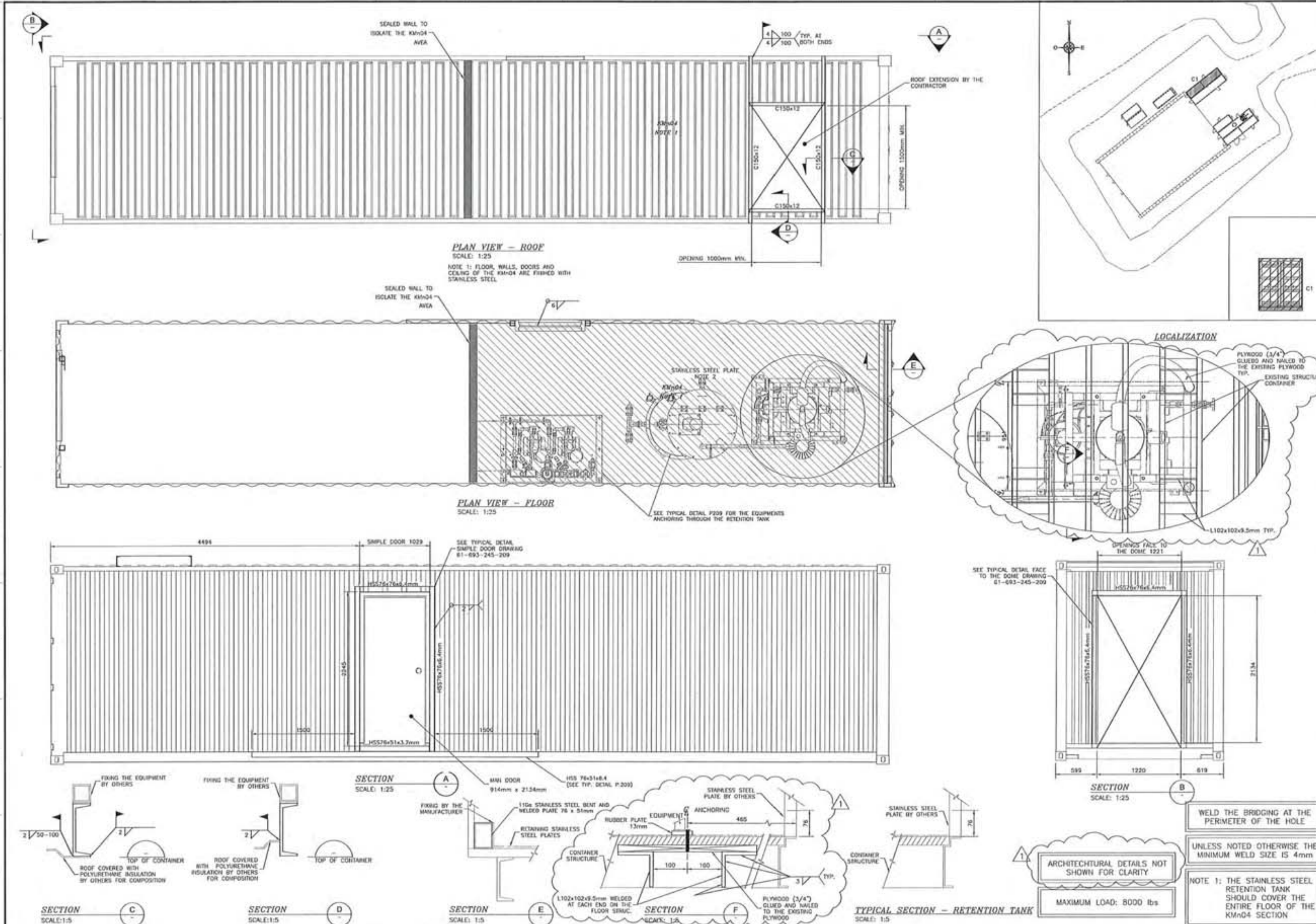
AGNICO EAGLE - AMARUQ DIVISION
695 - WATER MANAGEMENT
270 - PIPING
PLAN VIEW AND DETAILS
WTP TIE-INS FOR DEWATERING PHASE
AND PHASE 1 OPERATION AND INLET
HEADER DETAILS

DRAWN BY	F.POIVIN	2018-07-18
CHECKED BY	É.LEBEL	2018-07-18
APPROVED BY	A.L. NGUYEN	2018-07-18
SCALE	As indicated	2018-07-18

DRAWING NO. 61-695-270-203

PROJECT NO. 6118 | REVISION 1

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



NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2018-08-22

SNC-LAVALIN

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TYPICAL DETAIL CONTAINER	61-693-245-209
KMnO4 SERVICE AREA	MAP18-18-003

AGNICO EAGLE

REVISIONS

REV.	DATE	DESCRIPTION		
1	2018-08-22	EQUIPMENT ANCHORAGES	JMB	D.L.
0	2018-07-27	FOR CONSTRUCTION	JMB	D.L.

2018-08-22

WELD THE BRIDGING AT THE PERIMETER OF THE HOLE

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

NOTE 1: THE STAINLESS STEEL RETENTION TANK SHOULD COVER THE ENTIRE FLOOR OF THE KMnO4 SECTION

ARCHITECTURAL DETAILS NOT SHOWN FOR CLARITY

MAXIMUM LOAD: 8000 lbs

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

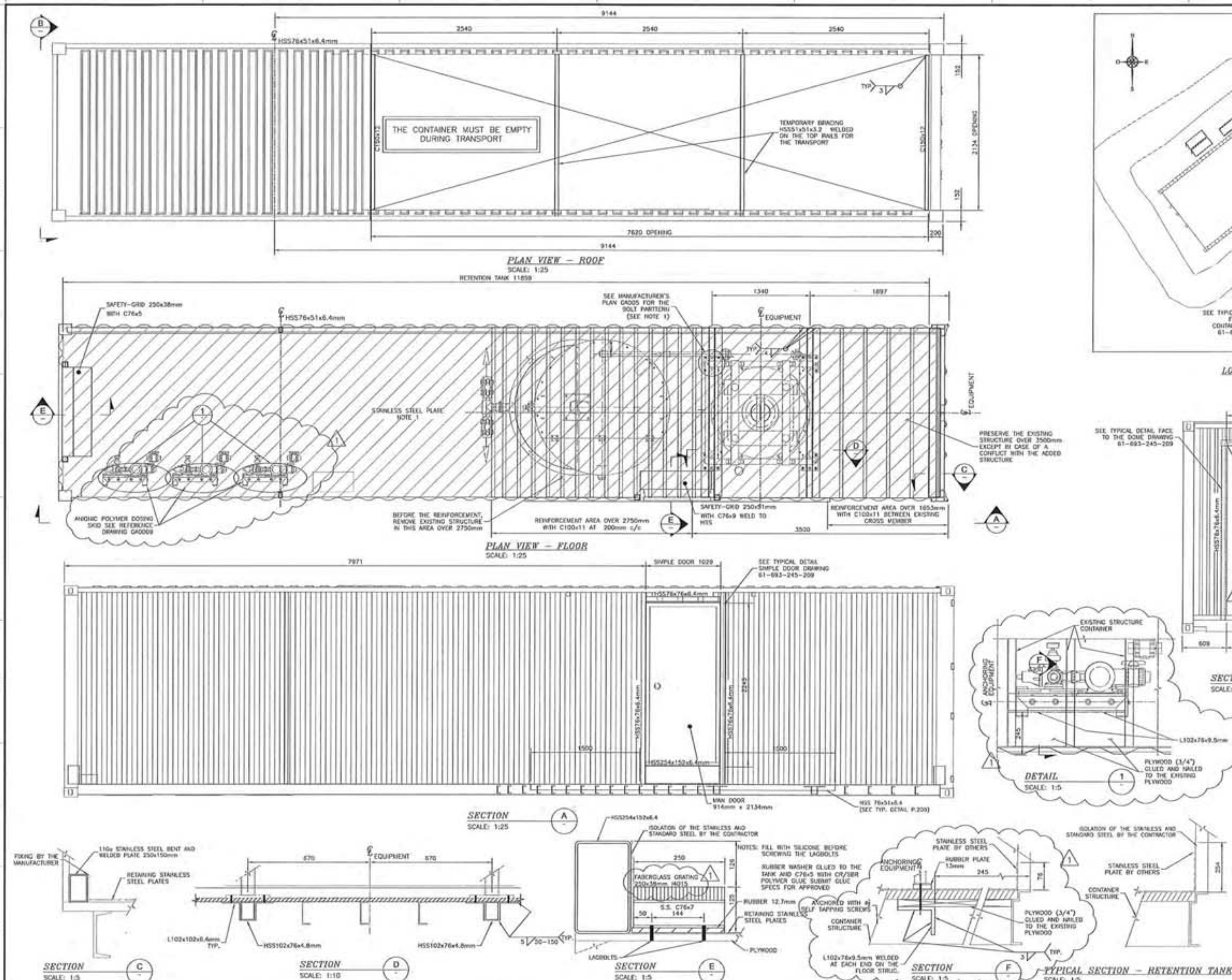
DESSINÉ PAR / DRAWN BY	MICHEL LANTHIER, Tech.	2018-05-09
VÉRIFIÉ PAR / CHECKED BY	JANICK COTE, Jr Eng.	2018-07-06
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P. Eng.	2018-07-06
ÉCHELLE / SCALE: INDICATED	DATE	2018-05-09

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

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

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

61-693-245-202_R1



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

NOTES GÉNÉRALES / GENERAL NOTES

- LIFTING WITH FORK ONLY (BY OTHERS)
- LIFTING PROCEDURE BY AEM
- THE CONTAINER MUST BE EMPTY DURING TRANSPORT

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2018-08-22

SNC·LAVALIN
Project #: 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

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

REVISIONS

ARCHITECHTURAL DETAILS NOT SHOWN FOR CLARITY

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

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

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

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

2018-08-22

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

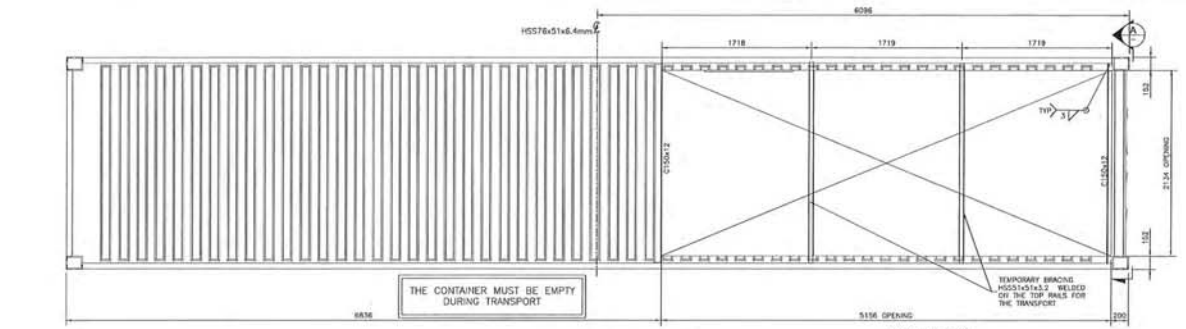
DESSINÉ PAR / DRAWN BY	MICHEL LANTHIER, Tech.	2018-05-09
VÉRIFIÉ PAR / CHECKED BY	JANICK CÔTÉ, Jr. Eng	2018-07-06
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P.Eng.	2018-05-09
ÉCHELLE / SCALE	INDICATED	2018-05-09

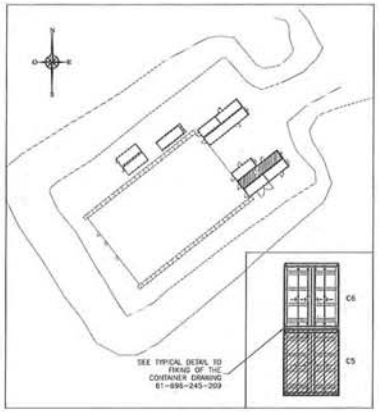
NO. DESSIN / DRAWING NO. 61-693-245-202
NO. PROJET / PROJECT NO. 6115 | RÉVISION 1 | FEUILLE / SHT 1/1

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

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

FORMAT ARCH D



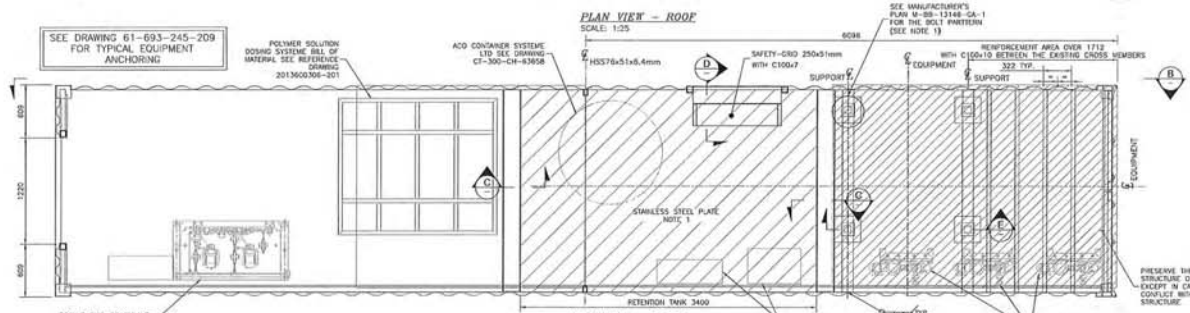


SEE DRAWING 61-693-245-209 FOR TYPICAL EQUIPMENT ANCHORING

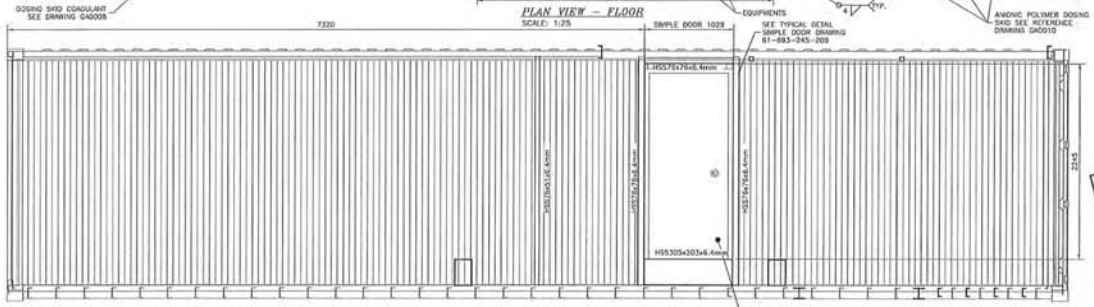
POLYMER SOLUTION DOSING SYSTEME BILL OF MATERIAL SEE REFERENCE DRAWING 2013600306-201

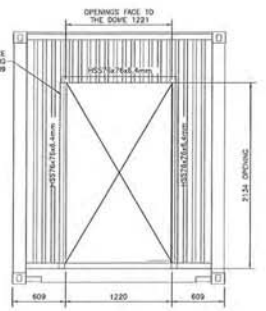
ACO CONTAINER SYSTEME LTD SEE DRAWING CF-300-CH-63858

PLAN VIEW – ROOF
SCALE: 1:25



PLAN VIEW – FLOOR
SCALE: 1:25

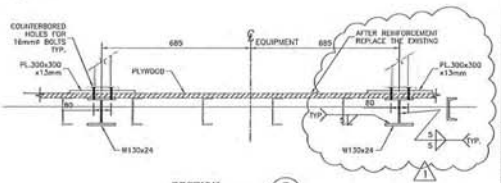




SECTION
SCALE: 1:25 (A)

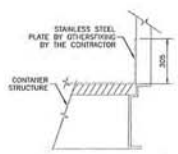
UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

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

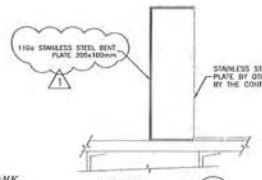


SECTION
SCALE: 1:10 (E)

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

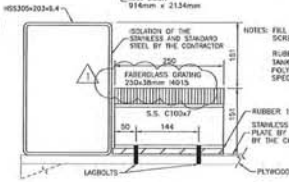


TYPICAL SECTION – RETENTION TANK
SCALE: 1:5



SECTION
SCALE: 1:5 (C)

SECTION
SCALE: 1:25 (B)



SECTION
SCALE: 1:5 (D)

PERMIT TO PRACTICE
SNC-LAVALIN STAVIBEL INC.
Signature
Date 2018-08-22
L3095
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

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

SNC-LAVALIN

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

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

REVISIONS

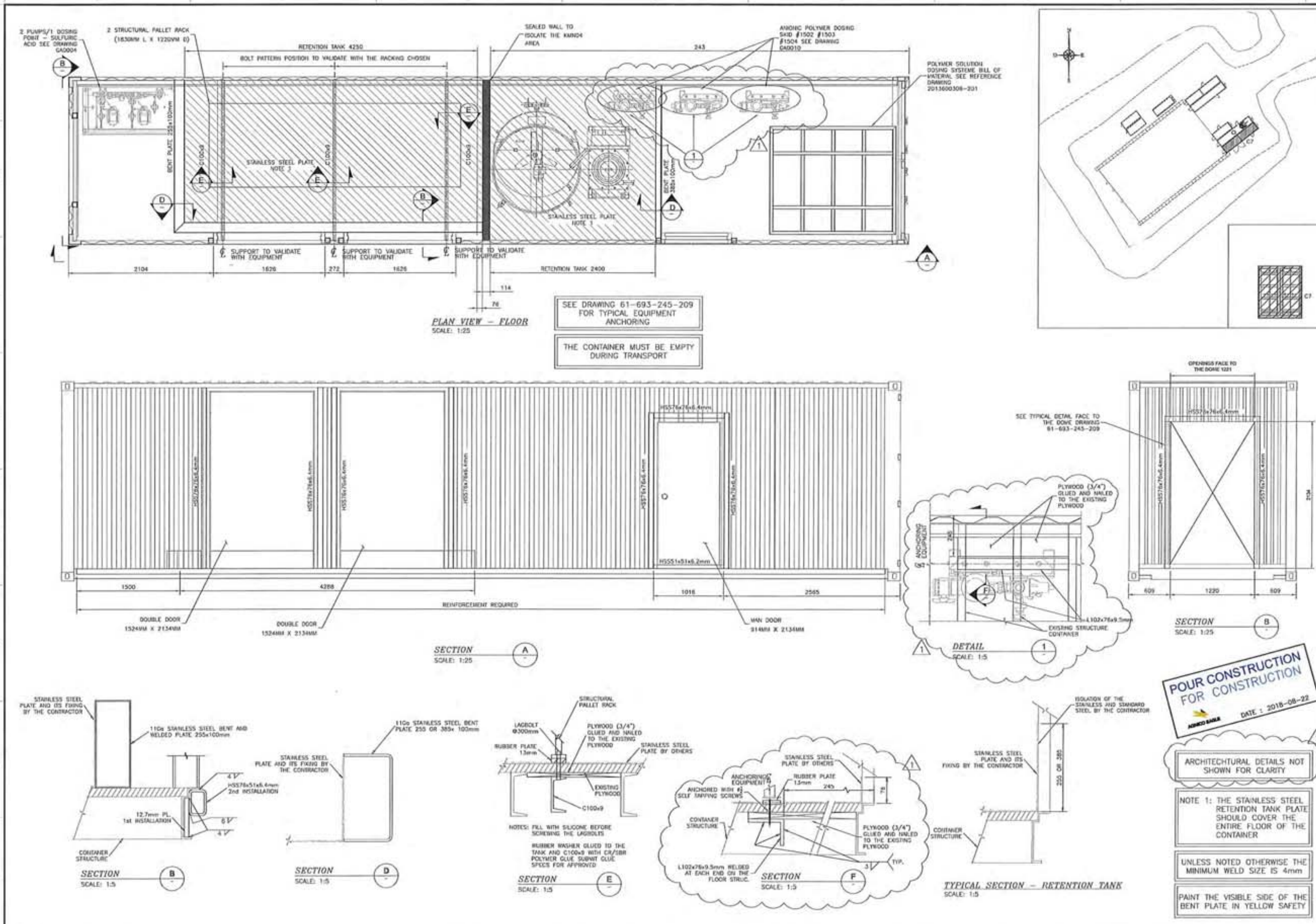
2018-08-22

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

DESSINÉ PAR DRAWN BY	MICHEL LANDRIER, Tech.	DATE 2018-05-09
VÉRIFIÉ PAR CHECKED BY	JANICK CÔTÉ, Jr.Eng.	2018-07-06
APPROUVÉ PAR APPROVED BY	DANY LAMBERT, P.Eng.	2018-07-06
ÉCHELLE SCALE	INDICATED	DATE 2018-05-09
NO. DESSIN DRAWING NO.	61-693-245-205	
NO. PROJET PROJECT NO.	6115	REVISION 1
FEUILLE / SHT	1/1	

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

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



POUR CONSTRUCTION
FOR CONSTRUCTION
DATE: 2018-08-22

ARCHITECHTURAL DETAILS NOT SHOWN FOR CLARITY

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

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

PAINT THE VISIBLE SIDE OF THE BENT PLATE IN YELLOW SAFETY

PLAN CLÉ / KEY PLAN

PERMIT TO PRACTICE
SNC-LAVALIN STAVIBEL INC.
Date 2018-08-22
PERMIT NUMBER: P 719
NT/NU Association of Professional Engineers and Geoscientists

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

SNC·LAVALIN

Project #: 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

REV.	DATE	DESCRIPTION		
1	2018-08-22	EQUIPMENT ANCHORAGES	JWD	D.L.
0	2018-07-27	FOR CONSTRUCTION	JWD	D.L.

REVISIONS

TITRE / TITLE
AGNICO EAGLE – AMARUQ DIVISION
693 – FINAL WATER TREATMENT PLANT
245 – STRUCTURAL STEEL
40 FT CONTAINER HIGH CUBE KMnO4 AND SERVICE WATER SYSTEM
PLAN VIEW AND SECTIONS

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

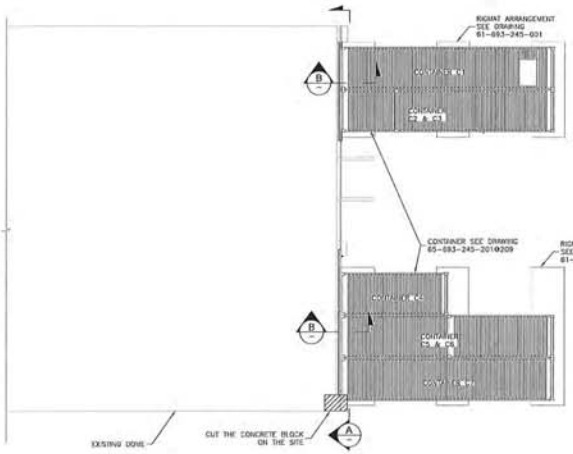
NO. DESSIN / DRAWING NO. 61-693-245-207

NO. PROJET / PROJECT NO.	RÉVISION	FEUILLE / SHEET
6115	1	1/1

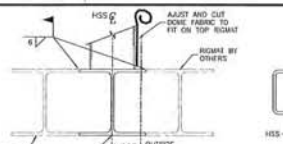
FILE NO. 61-693-245-207_R1.dwg

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

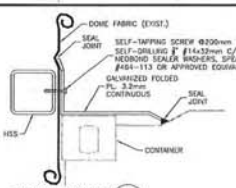
FORMAT ARCH D



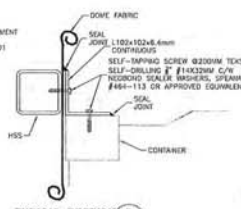
PLAN VIEW – GENERAL ARRANGEMENT
Scale: 1:125



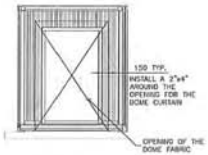
SECTION B
Scale: 1:5



TYPICAL SECTION C
Scale: 1:5
SEAL THE JUNCTION OF THE GALVANIZED PLATE AND THE CONTAINER



TYPICAL SECTION D
Scale: 1:5



TYPICAL OPENING IN THE DOME
Scale: 1:50

1. GENERAL NOTES

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

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

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

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

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

1.6 FLASHING AND SEALING PART FOR THE DOME FABRIC BY OTHERS

2. STRUCTURAL STEEL

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

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

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

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

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

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

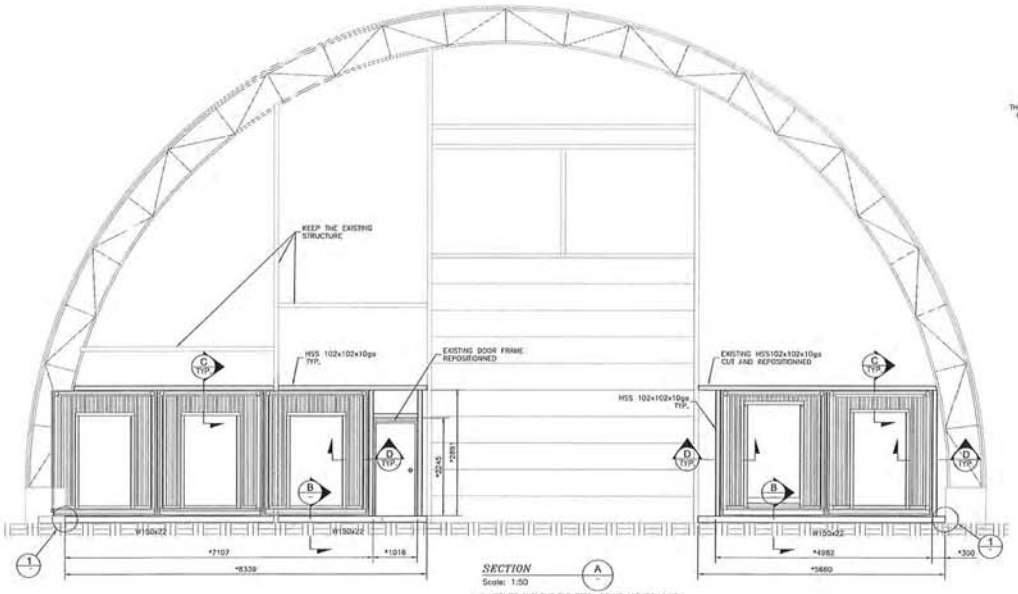
2.7 ALL STRUCTURAL MEMBERS MUST BE CLEANED BY GRINDING PRIOR TO ALL WELDING WORKS.

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

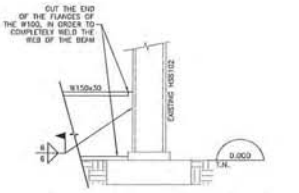
2.9 DEAD LOADS AND COLLATERAL LOADS
– STRUCTURAL STEEL (DENSITY) : 7850 kg/m3

2.10 DESIGN METHODOLOGY:

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



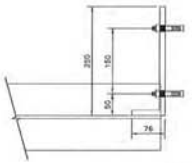
SECTION A
Scale: 1:50
* VESURE AND CUT THE STEEL BEANS AND COLUMNS

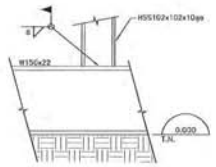


TYPICAL DETAIL – W150 VS EXIST. HSS
SCALE: 1:5

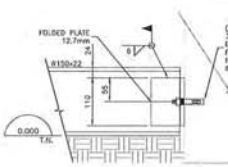
GROUND SETTLEMENT AND GROUND HEAVE RISK ASSUMED BY AEM

* TO BE VALIDATED

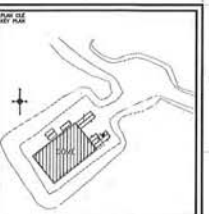




TYPICAL DETAIL – W150 VS HSS
SCALE: 1:5



TYPICAL DETAIL – ANCHORS
SCALE: 1:5



PLAN DE SITE
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

2018-08-17

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

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

SYMB. / TITLE	# DWG
–	–
–	–
–	–
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–	–

AGNICO EAGLE

NO.	DATE	DESCRIPTION	PAR/APP.	APP.
0	2018-07-17	FOR CONSTRUCTION	JDB	ELL

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN ETAVIBEL INC.
Signature
Date 2018-08-17
L3099
PERMIT NUMBER: P 718
NTAA Association of Professional Engineers and Geoscientists

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

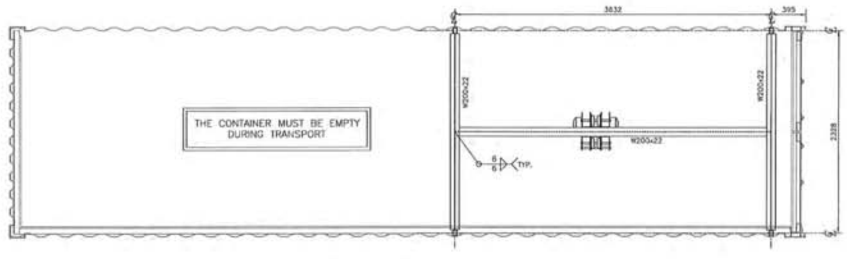
DESSINÉ PAR / DRAWN BY	JORDANE B.D., Tech.	2018-08-07
VÉRIFIÉ PAR / CHECKED BY	JANICK CÔTÉ, Jr. Eng.	2018-08-10
APPROUVÉ PAR / APPROVED BY	DANY LAMBERT, P.Eng.	2018-08-15
ÉCHELLE / SCALE	INDICATED	DATE 2018-08-07

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

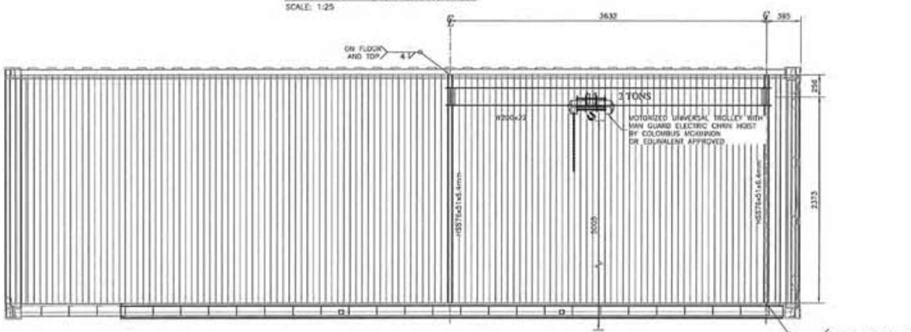
NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6115	0	1 / 1

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

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

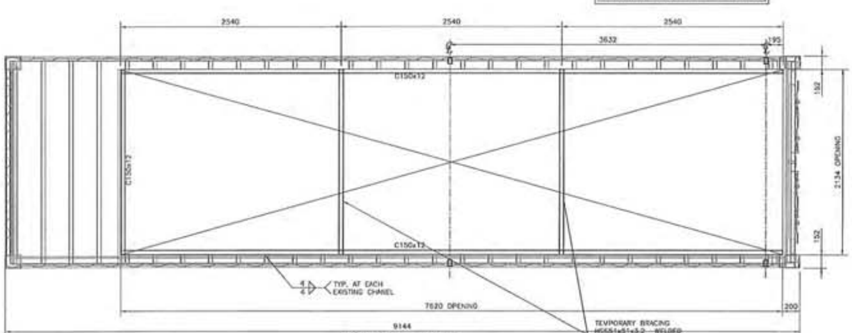


PLAN VIEW – TOP OF MONORAIL
SCALE: 1:25

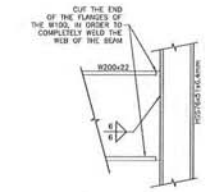


ELEVATION – MONORAIL
SCALE: 1:25

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

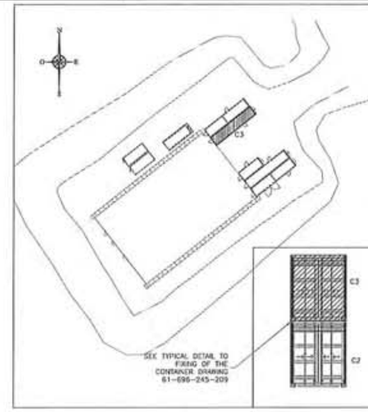


PLAN VIEW – FLOOR
SCALE: 1:25



TYPICAL DETAIL – W200 VS HSS
SCALE: 1:5

PLAN CLÉ / KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

MONORAIL NOTES

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

PAINTING NOTES

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

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

SNC·LAVALIN
Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

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

REVISIONS

2018-07-27

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

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

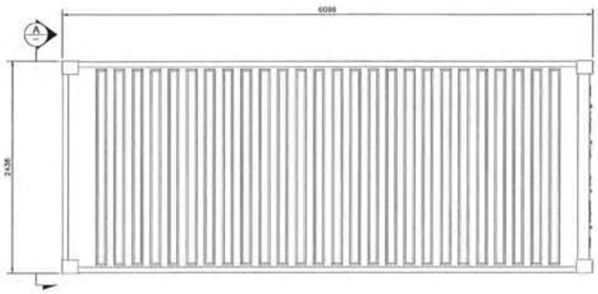
THE CONTAINER MUST BE EMPTY DURING TRANSPORT

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

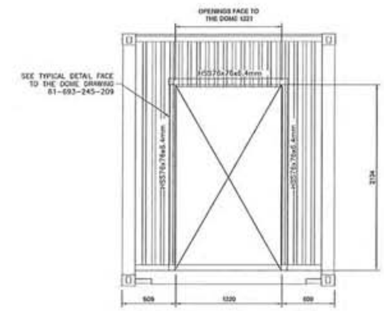
FILE NO. 61-693-245-203_R0.dwg

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

FORMAT ARCHD



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



SECTION (A)
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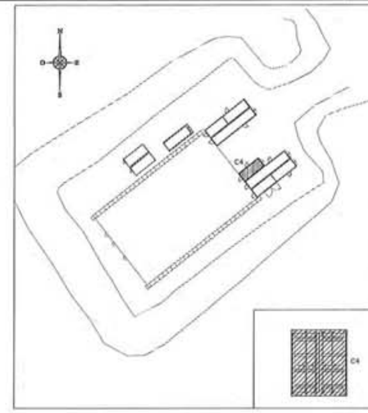
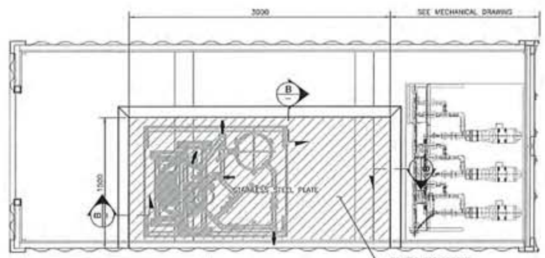
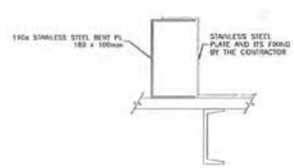




SEE DRAWING 61-693-245-209 FOR TYPICAL EQUIPMENT ANCHORING

PLAN VIEW - FLOOR
SCALE: 1:25



SECTION (B)
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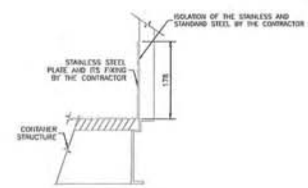


TYPICAL SECTION - RETENTION TANK
SCALE: 1:5

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

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

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

PLAN CLÉ / KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

SNC·LAVALIN

Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

REV	DATE	DESCRIPTION	DESS./DWN	APP.
0	2018-07-27	FOR CONSTRUCTION	JMD	D.L.

REVISIONS

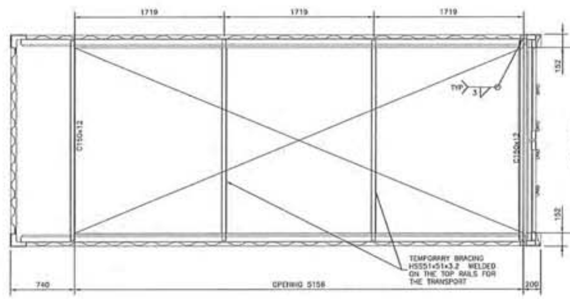
2018-07-27

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

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

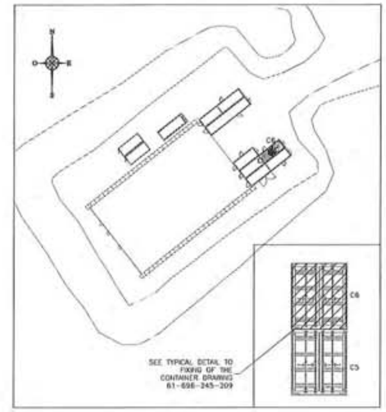
FILE NO. 61-693-245-204_R0.dwg

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



PLAN VIEW – FLOOR
SCALE: 1:25

THE CONTAINER MUST BE EMPTY DURING TRANSPORT



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

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

LIFTING WITH FORK ONLY (BY OTHERS)

LIFTING PROCEDURE BY AEM

THE CONTAINER MUST BE EMPTY DURING TRANSPORT

UNLESS NOTED OTHERWISE THE MINIMUM WELD SIZE IS 4mm

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

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

REVISIONS

2018-07-27

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

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

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

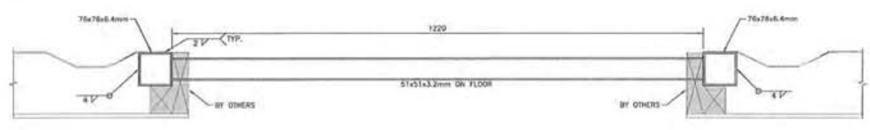
NO. PROJET PROJECT NO. 6115 | RÉVISION 0 | FEUILLE / SHT 1 / 1

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

FORMAT ARCHD

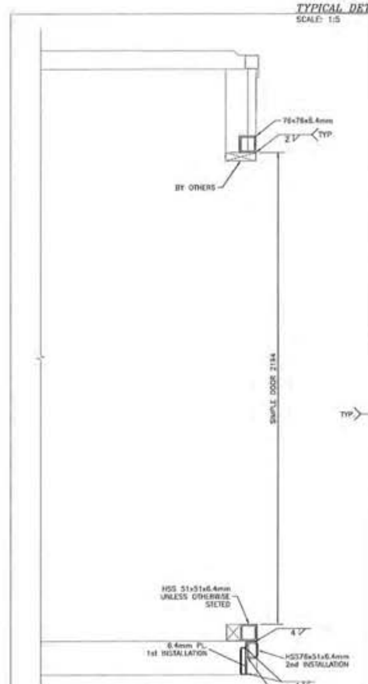
FILE NO. 61-693-245-206_RD.dwg

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

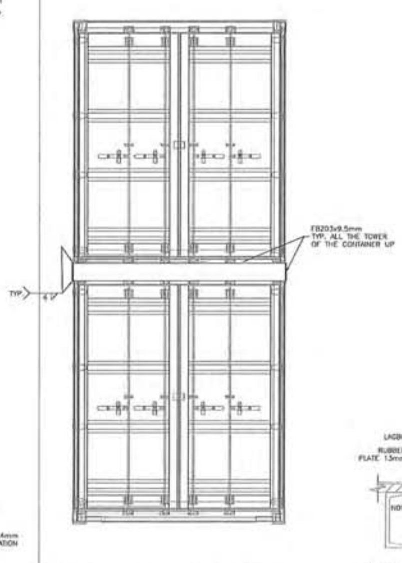


TYPICAL DETAIL – SIMPLE DOOR
SCALE: 1:5

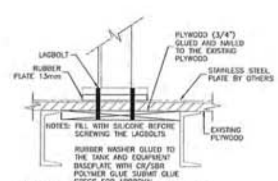
TYPICAL DETAIL – FACE TO THE DOME
SCALE: 1:5



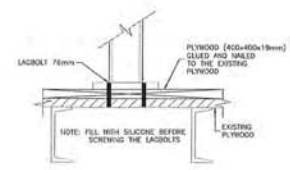
TYPICAL SECTION – OPENING
SCALE: 1:10



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



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



TYPICAL EQUIPMENT ANCHORING
SCALE: 1:5

GENERAL NOTES:

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

STRUCTURAL STEEL

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

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

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

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

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

14– DEAD LOADS AND COLLATERAL LOADS

– STRUCTURAL STEEL (DENSITY) : 7850 KG/M3

15– LIVE LOADS

– MEZZANINE: 4,8 KPA

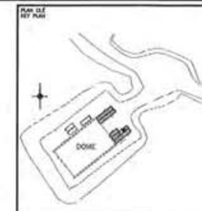
16– DESIGN METHODOLOGY:

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

PAINTING NOTES:

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

PLAN CLÉ / KEY PLAN



NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2018-07-27

SNC-LAVALIN
Project # : 653281-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

AGNICO EAGLE

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

REVISIONS

2018-07-27

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

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

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

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

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

ABBREVIATIONS

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

PIPING AND TUBING MATERIALS

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

FLOWS AND LINES

NEW MAIN FLOW
EXISTING MAIN FLOW
FUTURE MAIN FLOW
NEW SECONDARY FLOW
EXISTING SECONDARY FLOW
FUTURE SECONDARY FLOW
CHEMICALS
BY OTHERS
CS SS MATERIAL SPECIFICATION CHANGE
✲ SUPPLIED BY VEOLIA

INSTRUMENTATION AND RELATED ITEMS

– CAPILLARY TUBING
– ELECTRICAL
– HYDRAULIC
– PNEUMATIC
– DATA LINK

VALVE SYMBOLS

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

ACTUATORS

– CYLINDER
– DIAPHRAGM–SPRING
– ELECTRO HYDRAULIC
– ELECTRO PNEUMATIC
– MOTOR
– SOLENOID
– POSITIONER * – TYPE

PIPING ACCESSORIES

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

ISA INSTRUMENT IDENTIFICATION TABLE

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

LEGEND BASED ON ISA STANDARD S 5.1

INSTRUMENT TAG NUMBERS

TIC 103 – INSTRUMENTATION IDENTIFICATION OR TAG NUMBER
103 – LOOP NUMBER
TIC – FUNCTIONAL IDENTIFICATION
NOTE: HYPHENS ARE OPTIONAL AS SEPARATORS

ELECTRICAL AND RELATED ITEMS

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

LINE NUMBER IDENTIFICATION

25–xxyy–zzzz–0
- INSULATION (=I) OR INSULATION+ TRACING(=T)
- MATERIAL CLASS
- LINE NUMBER
- NUMBER ORIGINAL SHEET
- DIAMETER

NOTE : Refer to project pipe specifications for line codes

LINE CONTINUATIONS

INDICATES A LINE GOING TO OR COMING FROM BATTERY LIMITS (CONTRACT LIMITS)

5 A 2 — INDICATES CONTINUATION OF LINE IS ON SHEET NUMBER 5 (SAME DRAWING NUMBER) IN ZONE A 2

SHT 5 — INDICATES CONTINUATION OF A SIGNAL IS ON SHEET NUMBER 5

EQUIPMENT TAG NUMBERS

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

VALVE & ACCESSORY TAG

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

INSTRUMENT SYMBOLS

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

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

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

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING, AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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Notes :

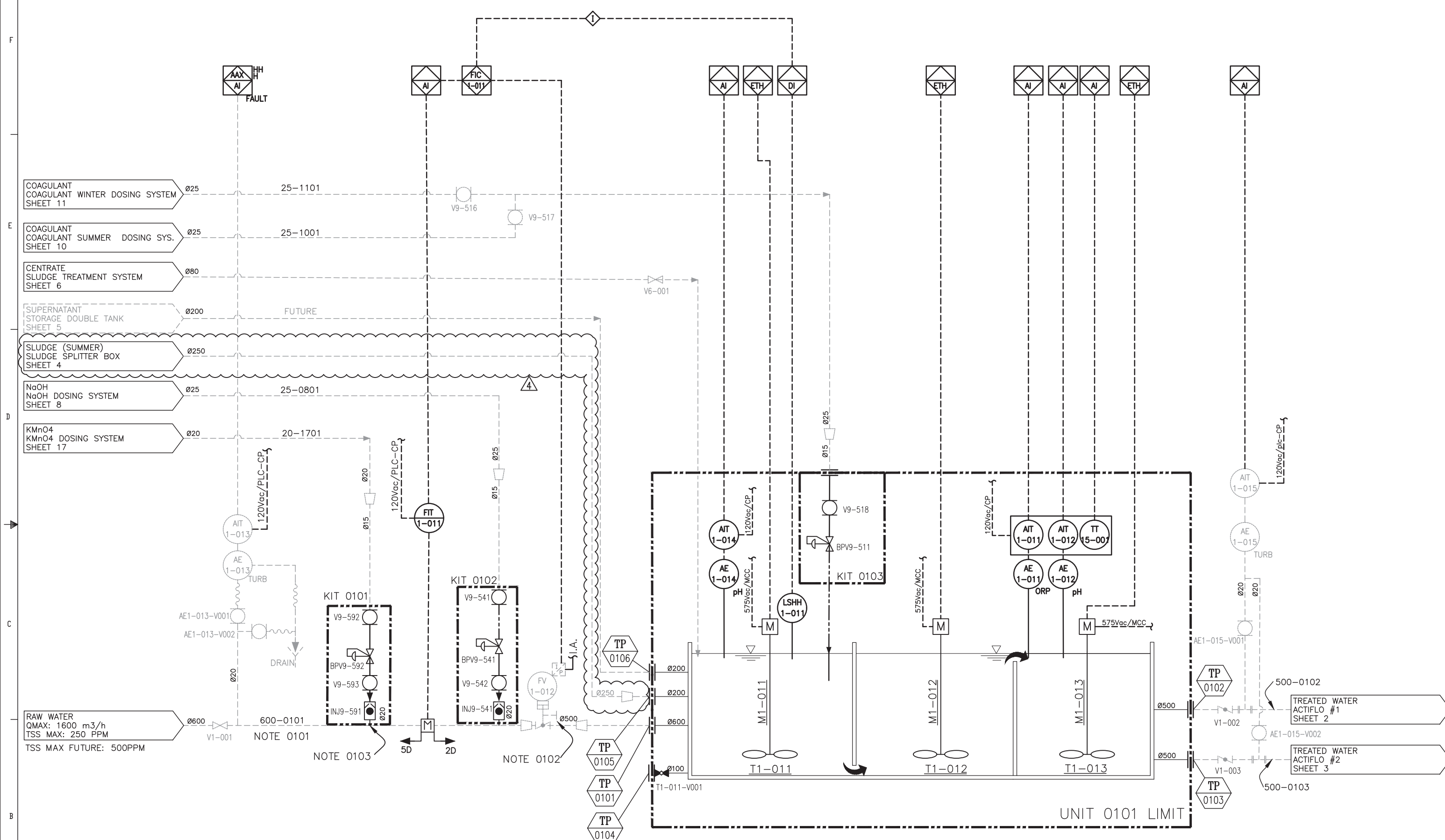
Note 0101 : Raw water Inlet pressure: 14 Psig.

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

Note 0103 : Install as far as possible from reactor inlet

VWT Canada Scope of Supply limits:

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



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

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

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE	PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
N.T.S.	5000218009	PI0001	GEN	1/19	4

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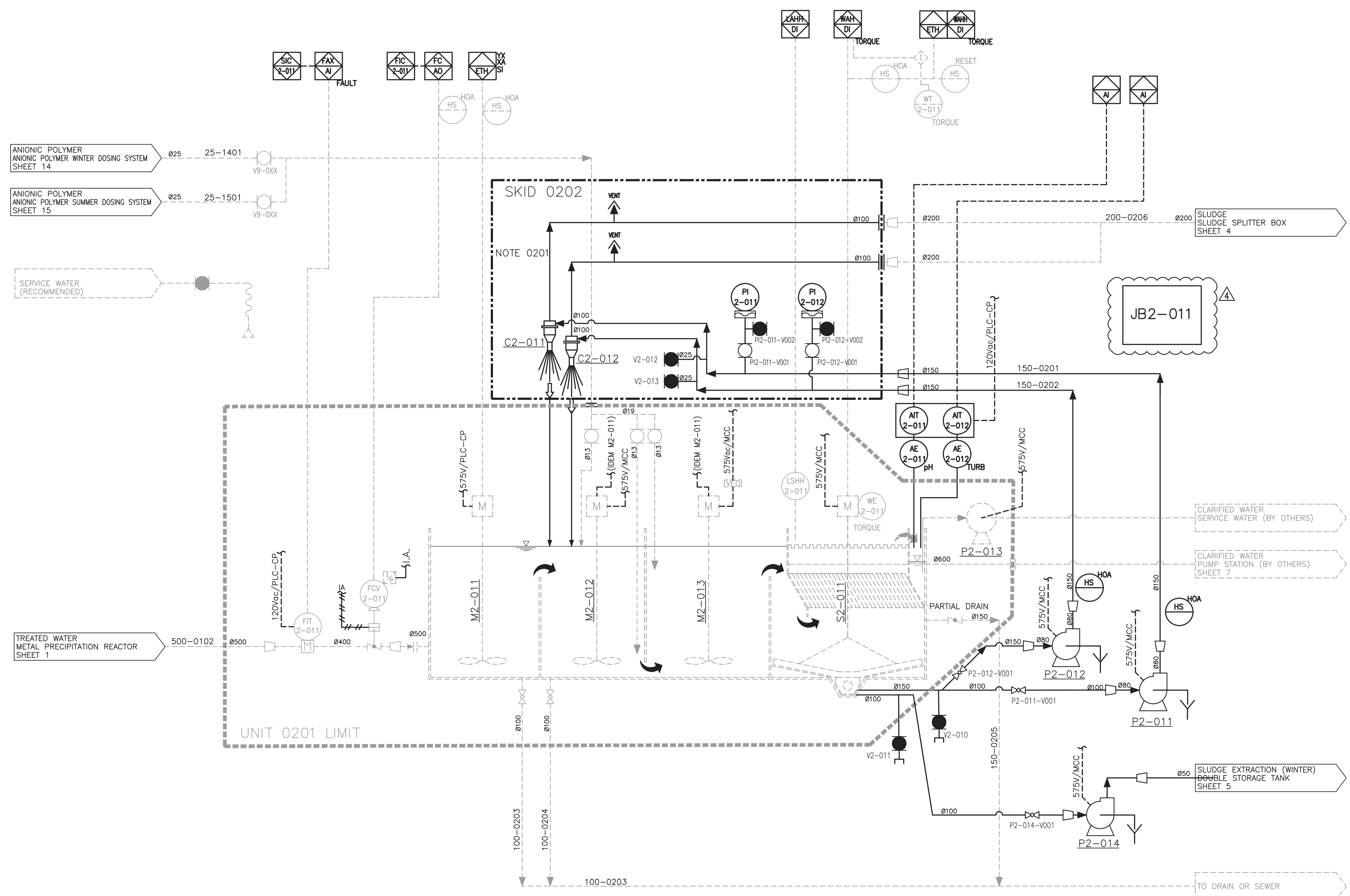
Notes :

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.



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

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

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

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

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

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

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

EXISTING SYSTEM FROM MEADOWBANK

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	PI0001	GEN	2/19	4

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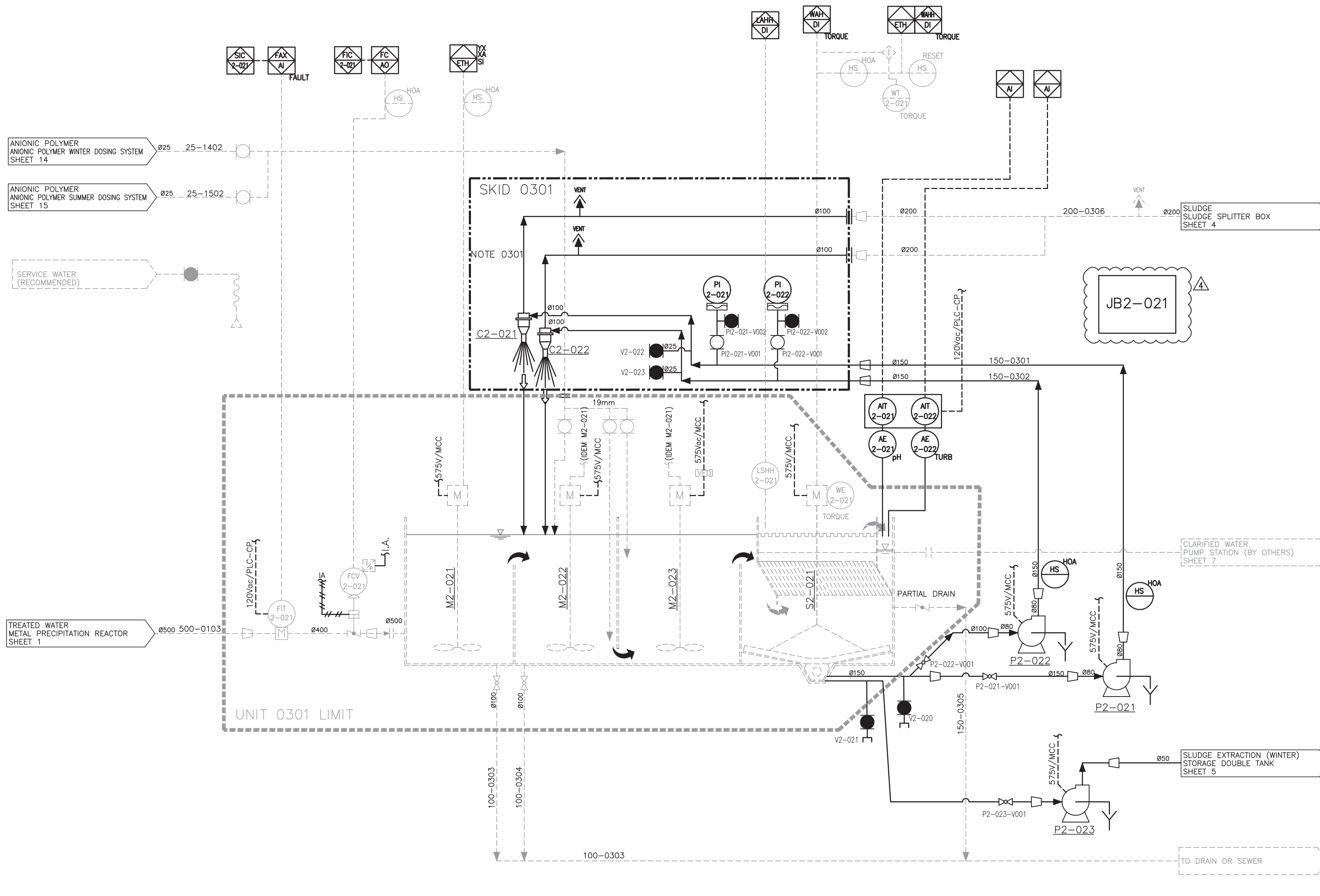
Notes :

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

VWT Canada Scope of Supply limits:

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



M2–021	M2–022	M2–023	S2–021	P2–023	P2–021/P2–022
COAGULATION TANK	INJECTION TANK	MATURATION TANK	SCRAPER	MULTIFLO EXTRACTION PUMP	MICROSAND RECIRCULATION PUMP
MIXER: EVGX 4–3	MIXER: EVGX 4–3	MIXER: EVGX 6–5	DRIVER: 0.5 HP	DESIGN: 4m3/h @ 8 psig	Q=70m3/h@24.5 psig
DRIVER: 3 HP	DRIVER: 3 HP	DRIVER: 5 HP	575V/3Ph/60Hz	DRIVER: 10 HP	MATERIAL: LINED CAST IRON
575V/3Ph/60Hz	575V/3Ph/60Hz	575V/3Ph/60Hz		575V/3Ph/60Hz	DRIVER: 15 HP
					575V/3Ph/60Hz

EXISTING SYSTEM FROM MEADOWBANK

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009	PI0001	GEN	3/19	4

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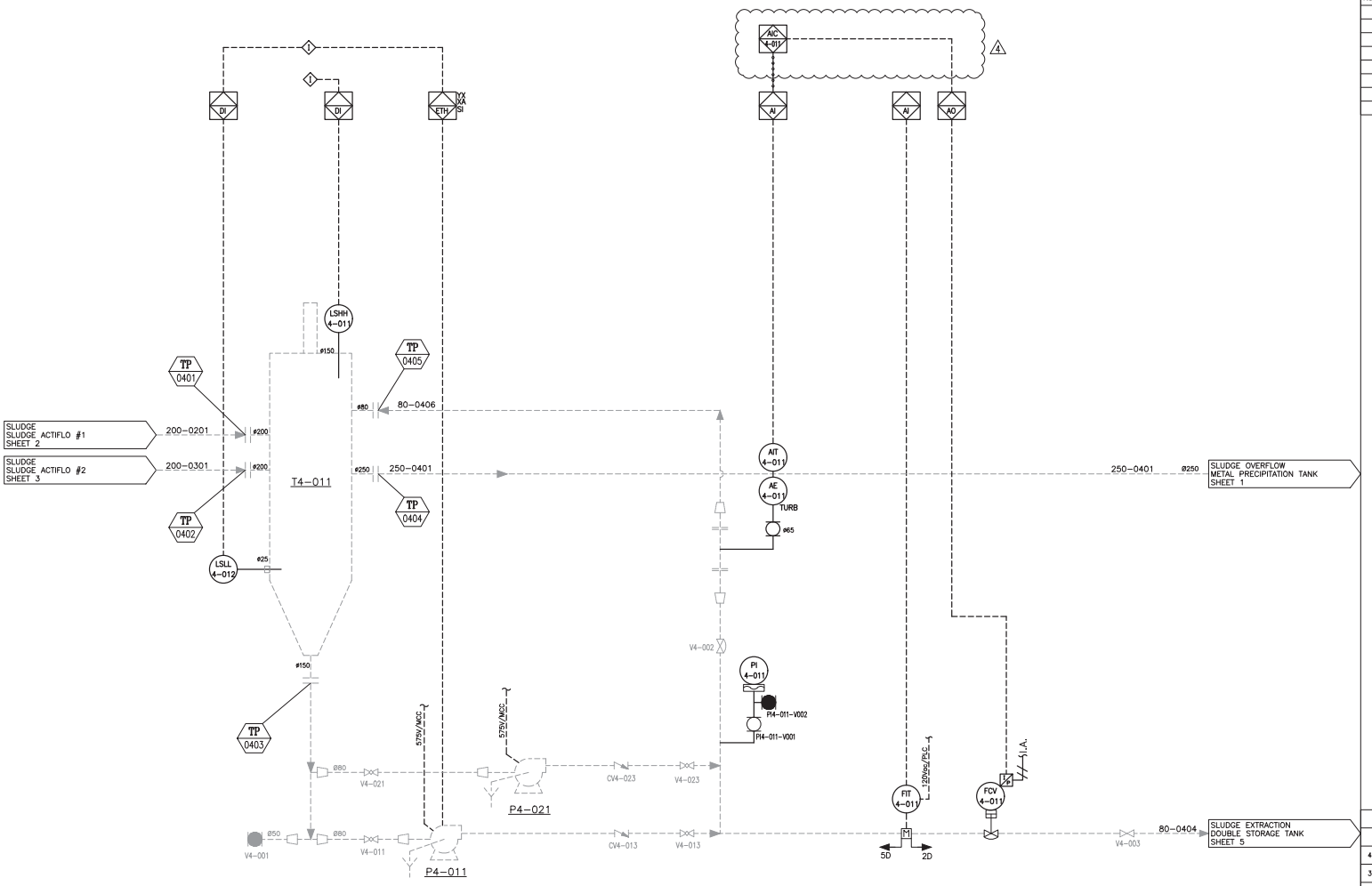

T4-011
(BY OTHERS)
SLUDGE SPLITTER BOX
MATERIAL: SS304
VOLUME: 1.4 m3

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

Notes :

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

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

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

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

VEOLIA WATER TECHNOLOGIES

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

ÉCHELLE / SCALE: N.T.S.

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

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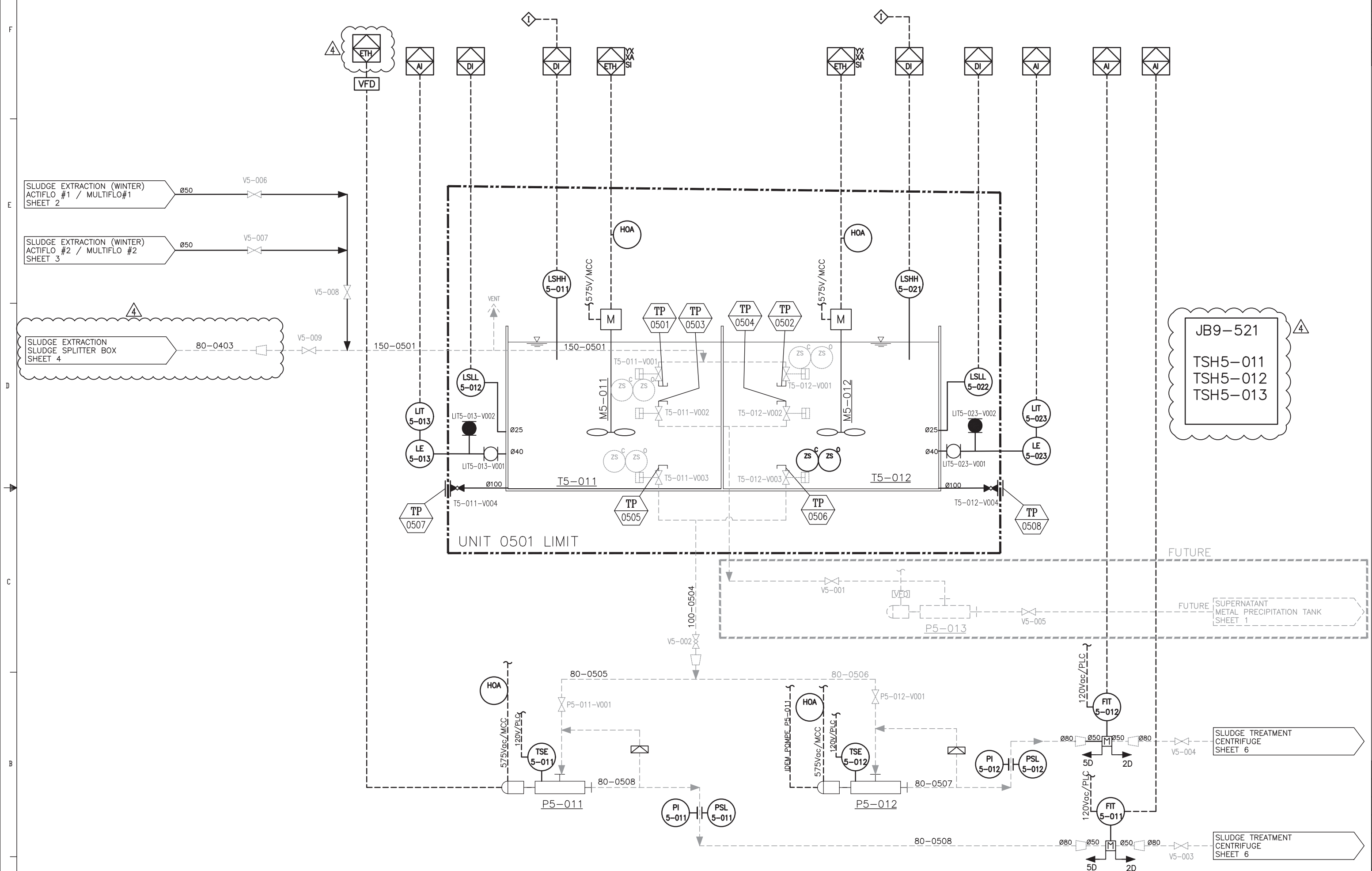
VWT Canada Scope of Supply limits:

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



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

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

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

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

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE	PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
N.T.S.	5000218009	PI0001	GEN	5/19	4

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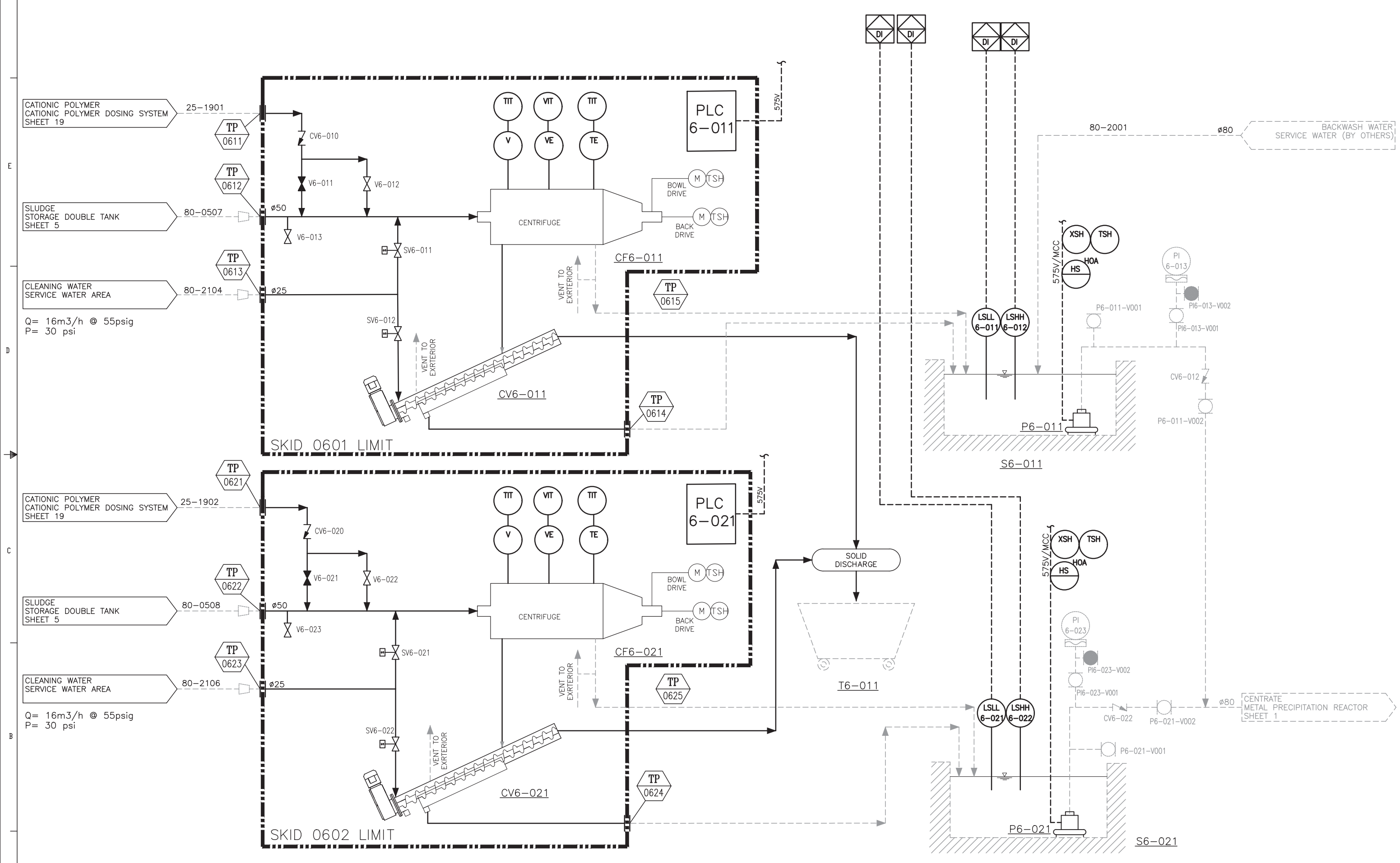

CV6–011 / CV6–021
CONVEYOR
POWER: 575V/3PH/60Hz

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

T6–011
ROLL–OFF BIN
(BY OTHERS)

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

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

Notes :

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

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1	FOR APPROVAL	2018–04–25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE: N.T.S.

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

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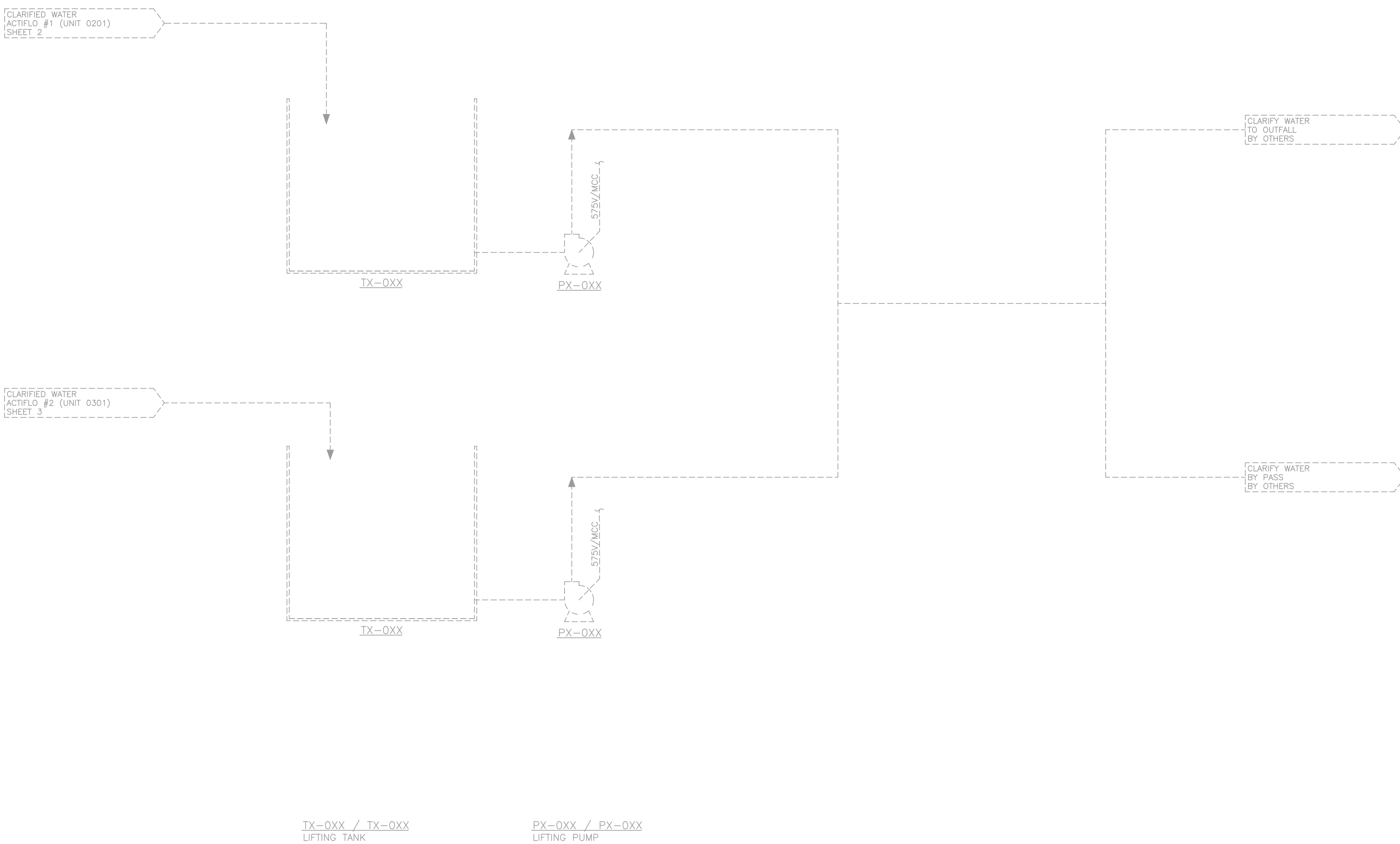

Notes :

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4	FOR APPROVAL IV	2018-07-04	A.C.	G.P.	G.P.
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2	FOR APPROVAL II	2018-05-07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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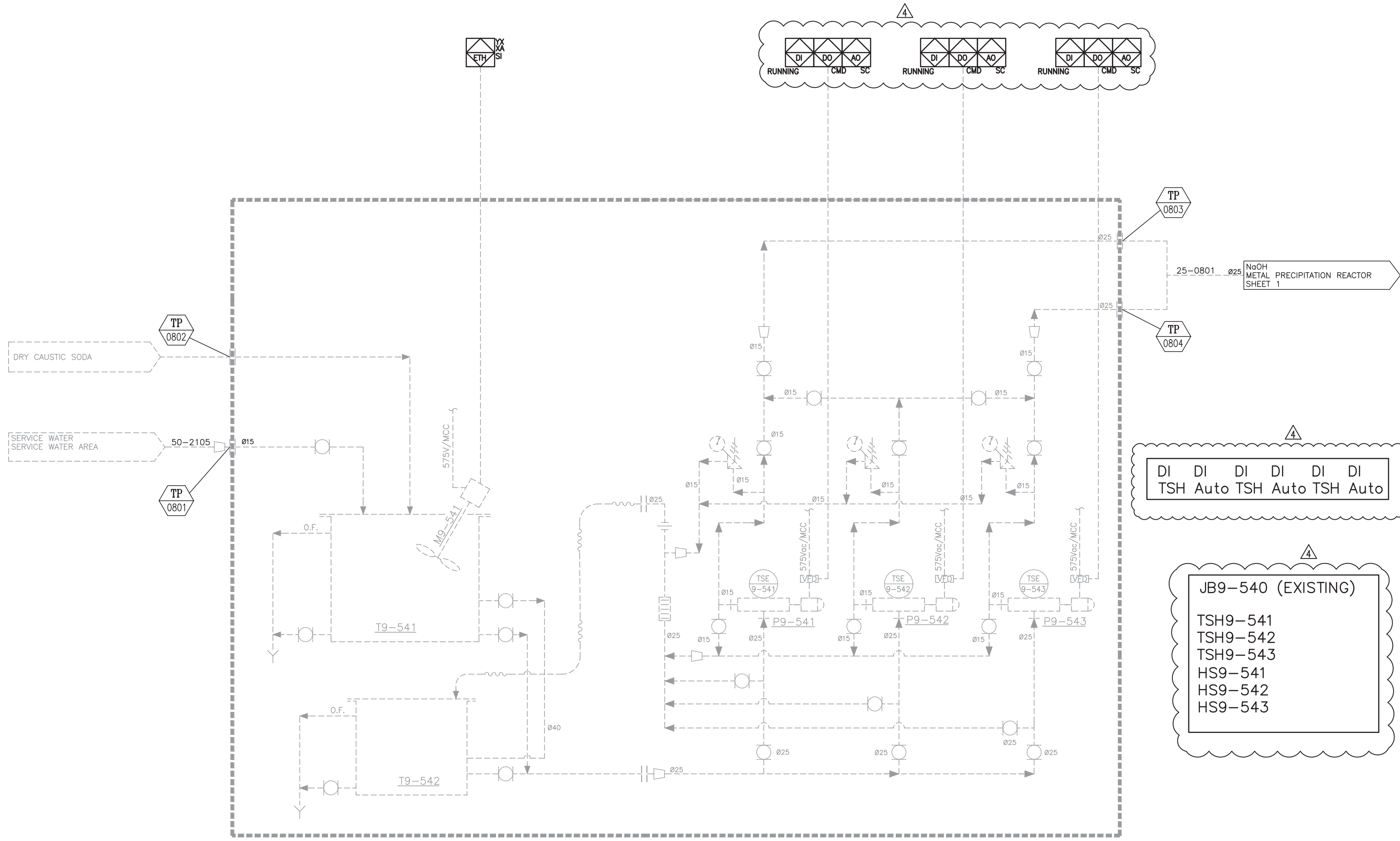

Notes :

EXISTING SYSTEM FROM MEADOWBANK

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

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

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

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

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

VEOLIA
WATER TECHNOLOGIES

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

CLIENT
AGNICO EAGLE MINING
AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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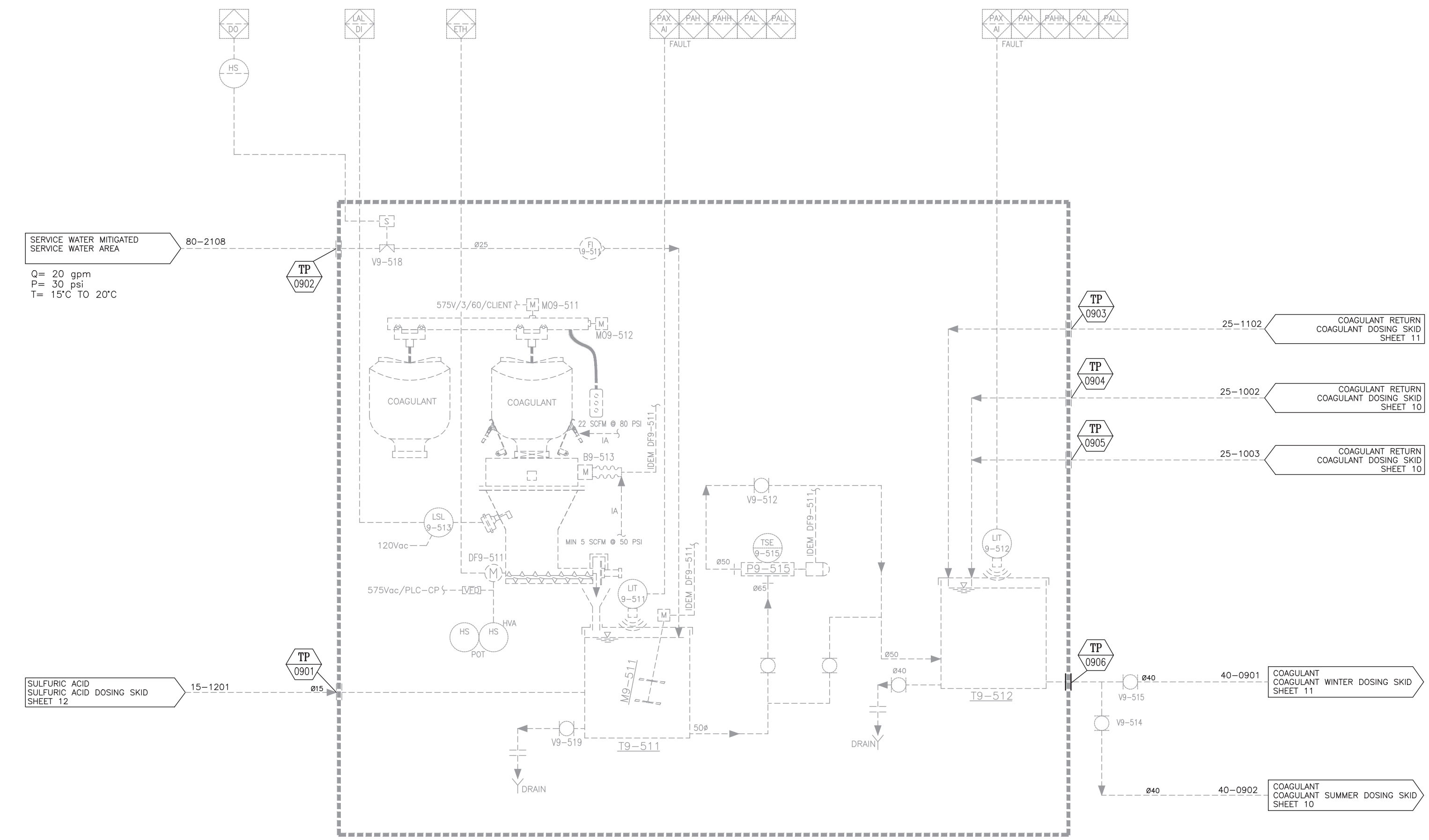
Notes :

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

Safety requirements :

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



EXISTING SYSTEM FROM MEADOWBANK

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

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

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

T9–512
COAGULANT DOSING TANK
CAP: 1000L

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

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

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

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING, AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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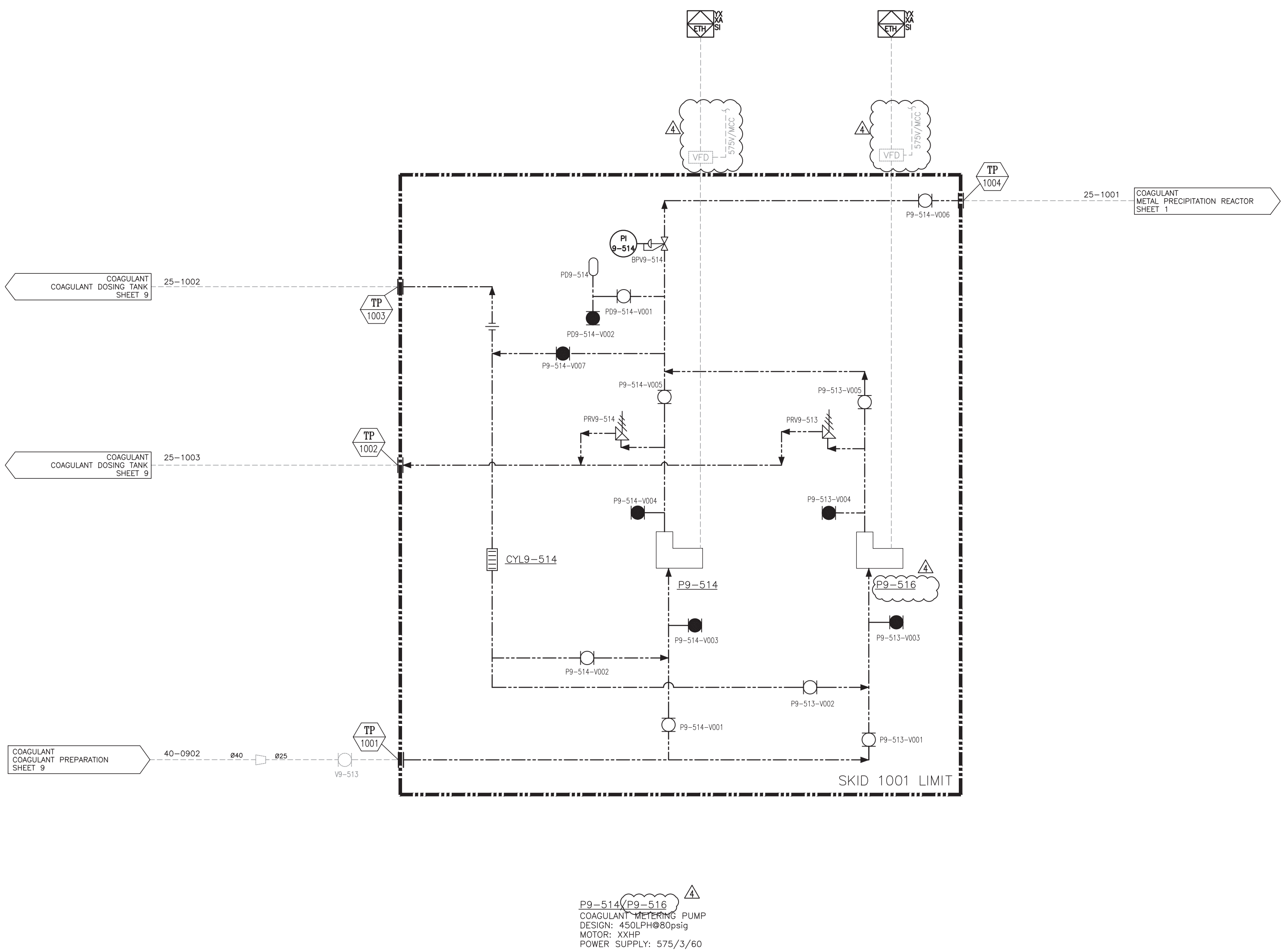

Notes :

Safety requirements :

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

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE: N.T.S.

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

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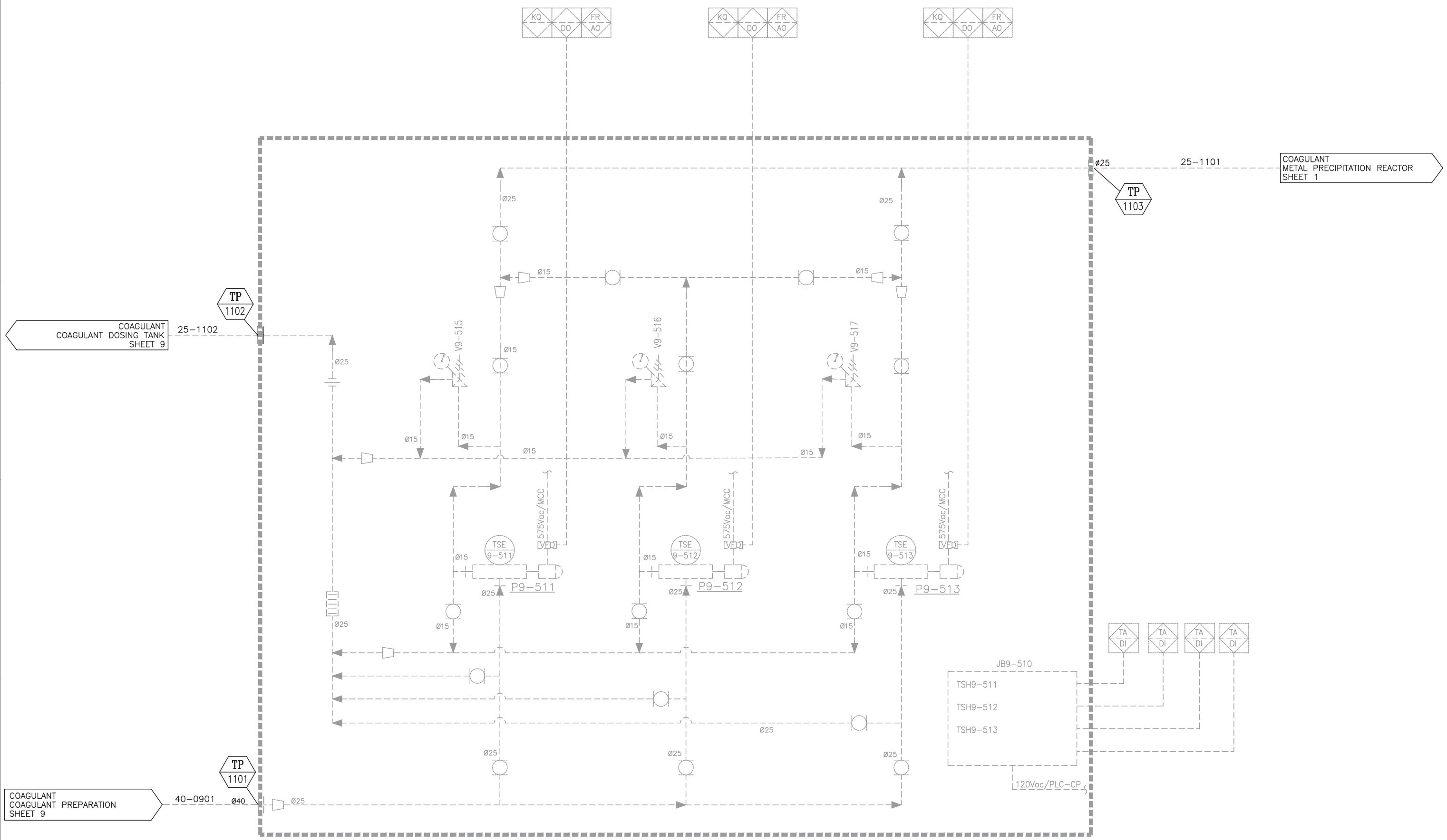
REF: N/A

SIZE ANSI D

Safety requirements :

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



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

EXISTING SYSTEM FROM MEADOWBANK

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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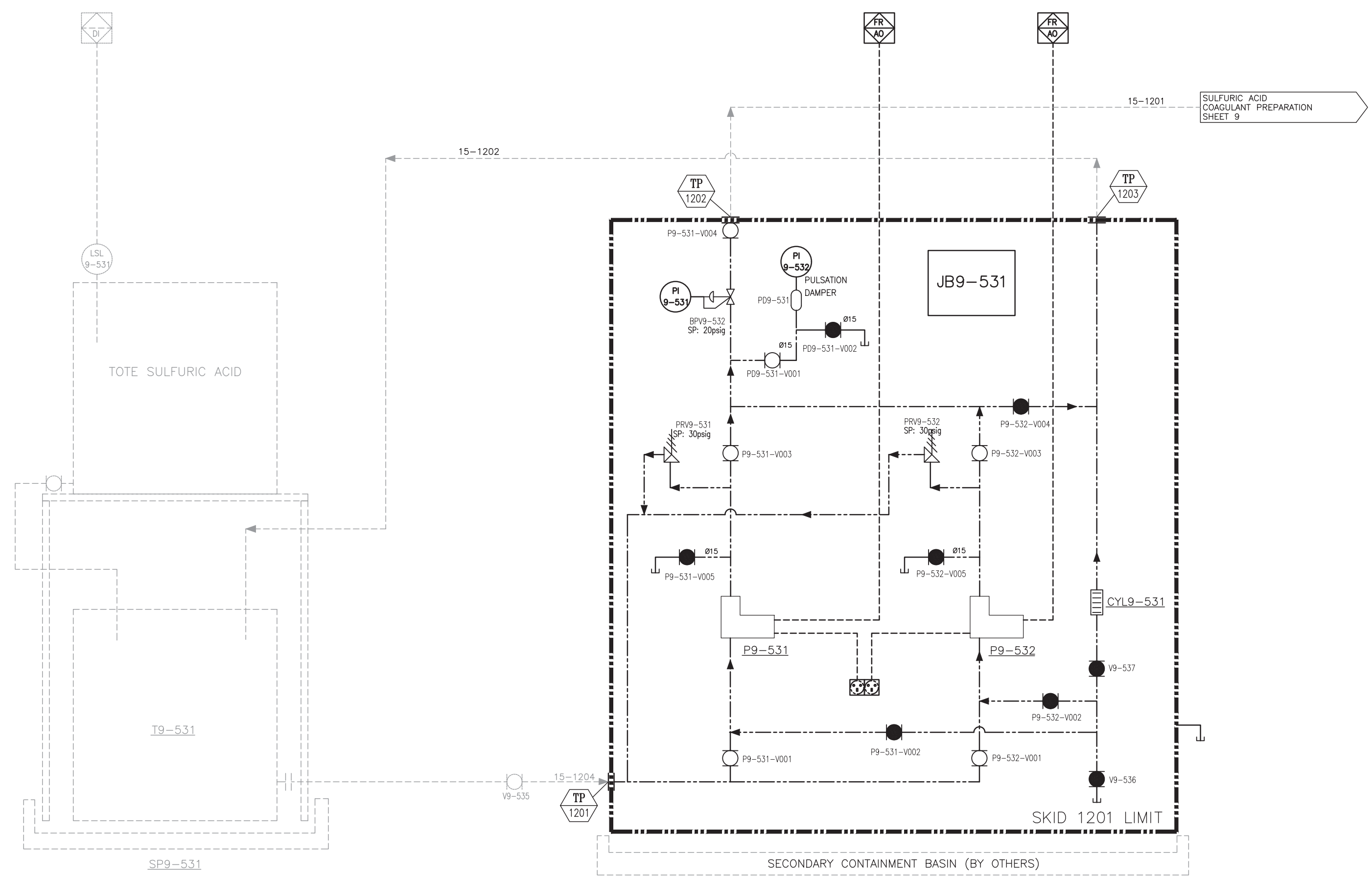
REF: N/A

Jul 20, 2018 11:20:38 – W:\2018\5000218009 Amaruq (TIH128505)\15– Dessins execution_Drawings\8– PI\5000218009–PI0001_4.dwg – cristeaa

Safety requirements :

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



SP9–531 (BY OTHERS)
SECONDARY CONTAINMENT
CAPACITY : 1.8 m^3
MAT'L: HDPE

T9–531 (BY OTHERS)
STORAGE TANK
SULFURIC ACID
MAT'L: HDPE
CAPACITY: 1,5 m^3

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

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

VEOLIA WATER TECHNOLOGIES

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

TITRE / TITLE: WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
SULFURIC ACID DOSING SYSTEM

ÉCHELLE / SCALE: N.T.S.

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

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SIZE ANSI D

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General Notes :

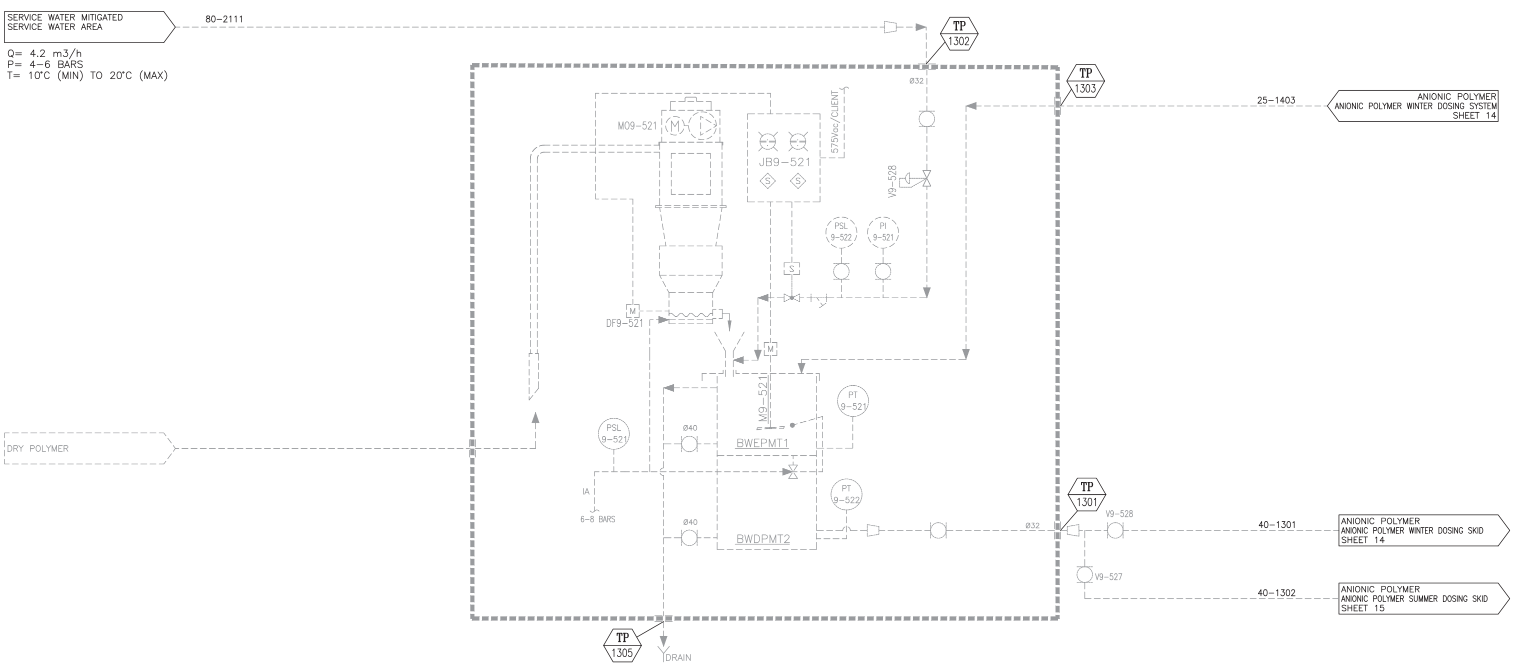
None

VWT Canada Supply limits:

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

Safety requirements :

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



EXISTING SYSTEM FROM MEADOWBANK

BWEPMT1
POLYMER MATURATION TANK
CAP: 1000L

BWDPMT2
POLYMER STORAGE TANK
CAP: 1000L

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

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

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

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING, AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT — DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009 – PI0001	GEN	13/19	4

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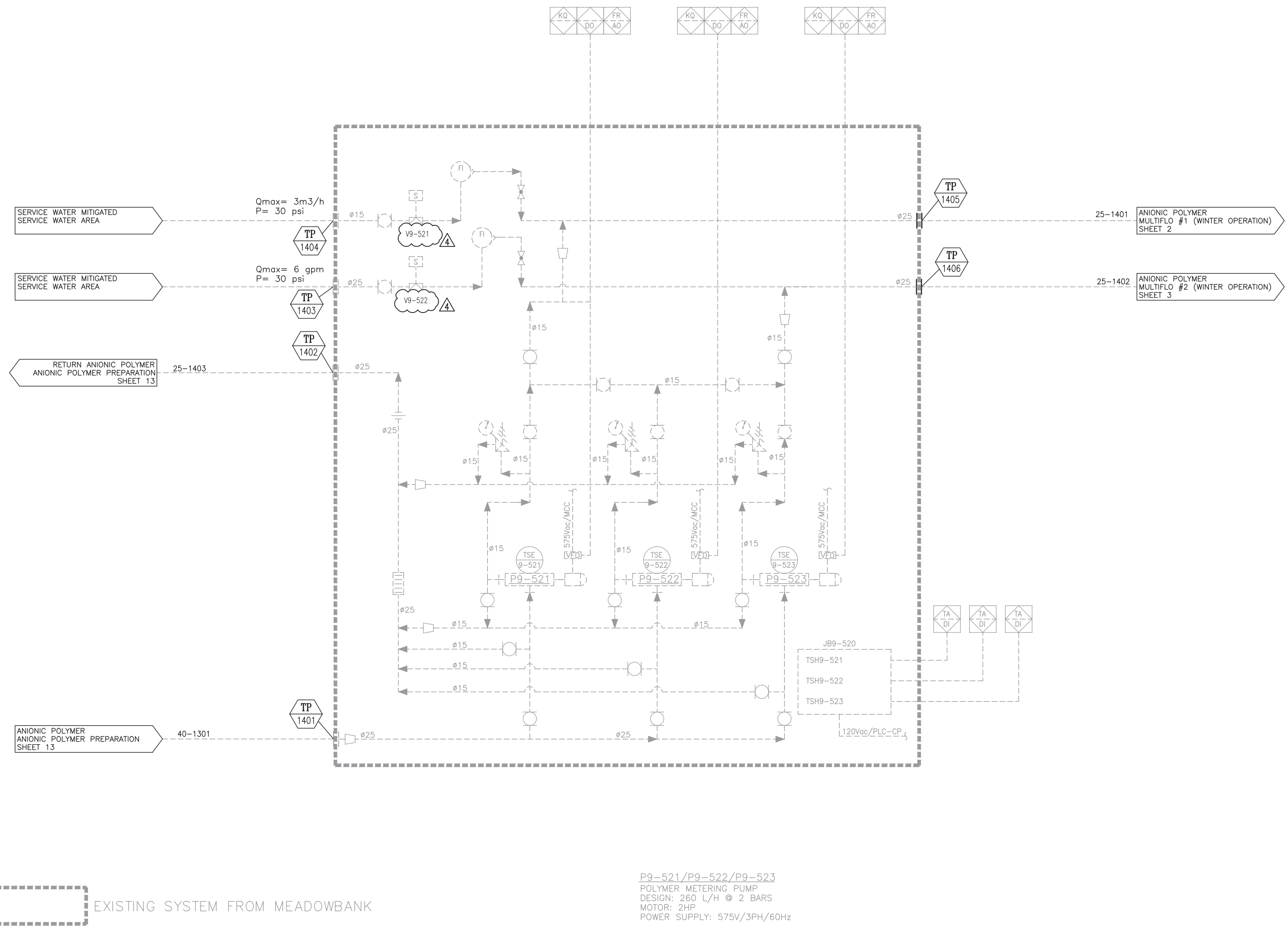

P9-521/P9-522/P9-523
POLYMER METERING PUMP
DESIGN: 260 L/H @ 2 BARS
MOTOR: 2HP
POWER SUPPLY: 575V/3PH/60Hz

Notes :

Safety requirements :

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

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

VEOLIA WATER TECHNOLOGIES

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

TITRE / TITLE

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

ÉCHELLE / SCALE: N.T.S.

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

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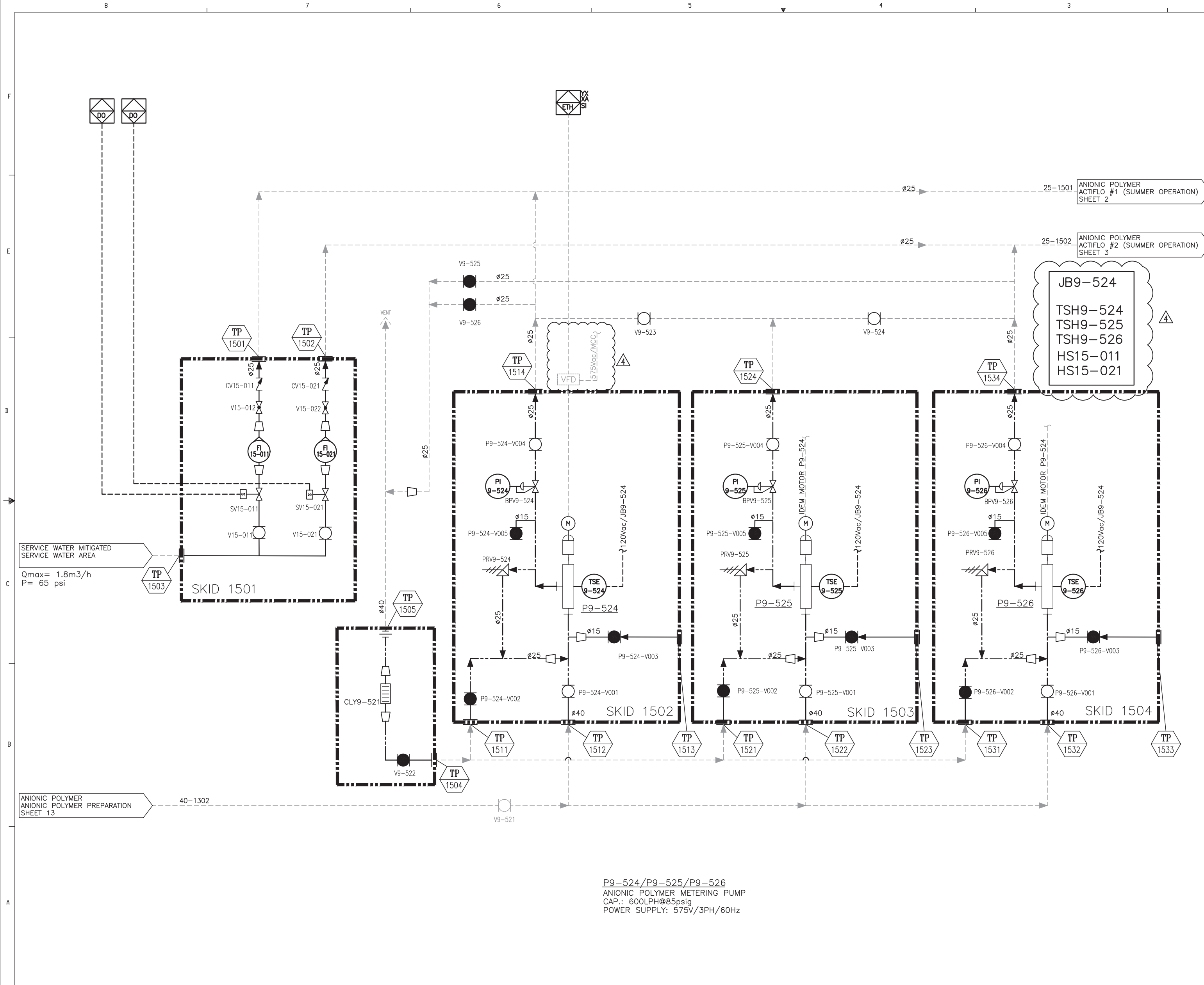

Notes :

Safety requirements :

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

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE	PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
N.T.S.	5000218009	PI0001	GEN	15/19	4

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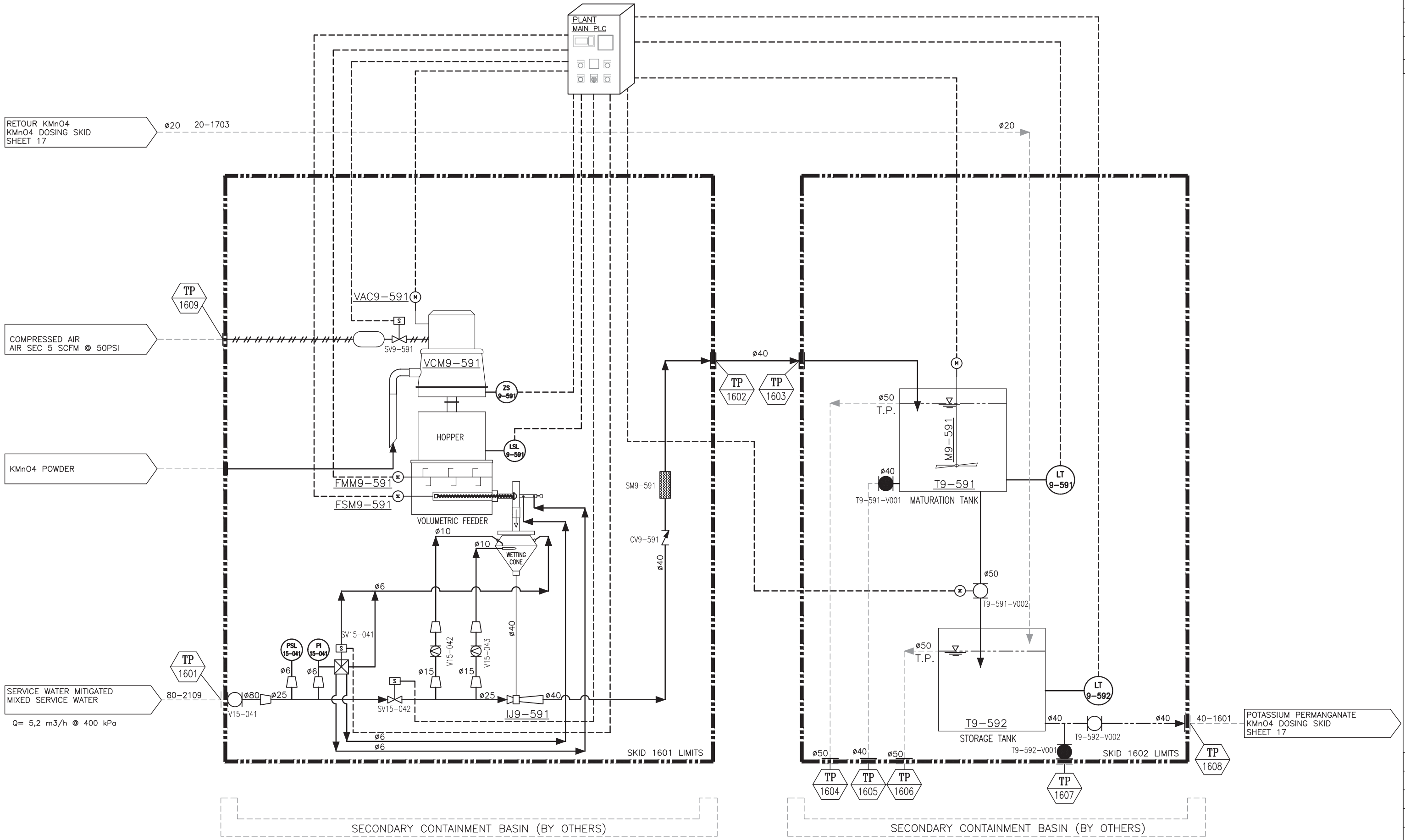

VAC9-591
CONVEYOR MOTOR
POWER Req.: 2.5HP
VOLTAGE: 575V/3Ph/60Hz

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

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

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

T9-591
MATURATION TANK
VOLUME: 500L

T9-592
STORAGE TANK
VOLUME: 500L

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

Notes :

Safety requirements :

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	RÉV./REV
5000218009 – PI0001	GEN	16/19	4

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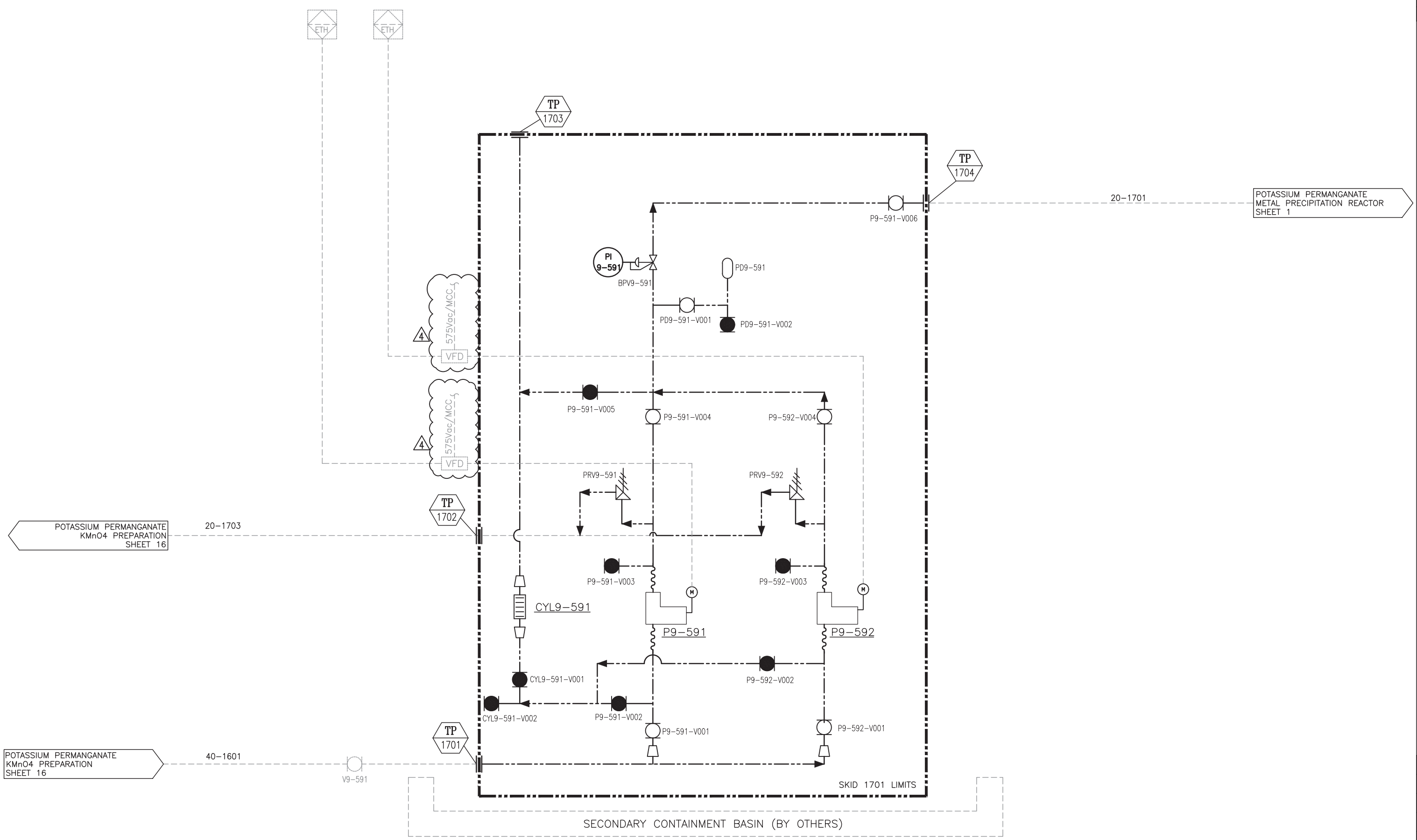

P9-591/P9-592
KMnO4 METERING PUMP
CAP.: 320LPH@80psig
POWER: XX HP, 575/3/60

Notes :

Safety requirements :

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

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

VEOLIA WATER TECHNOLOGIES

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

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

ÉCHELLE / SCALE	PROJET / PROJECT DESSIN No /DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
N.T.S.	5000218009 – PI0001	GEN	17/19	4

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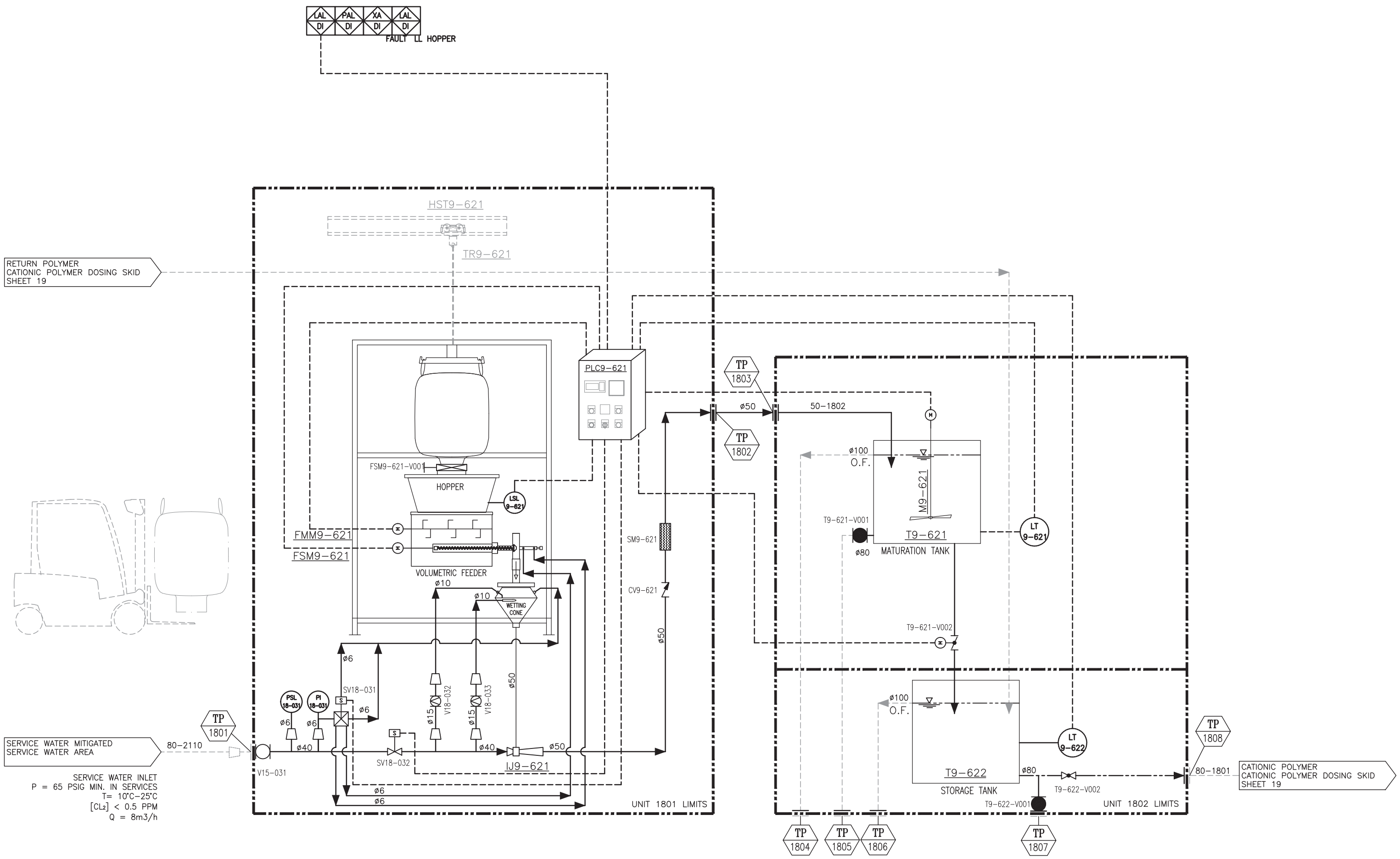
REF: N/A
SIZE ANSI D

Notes :

Safety requirements :

Polymer is very slippery. Refer to spill response procedure.

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



HST9-621
HOIST
XX T (XXX Lbs)

TR9-621
TROLLEY

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

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

T9-621
MATURATION TANK
VOLUME: 3500L

T9-622
STORAGE TANK
VOLUME: 3500L

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

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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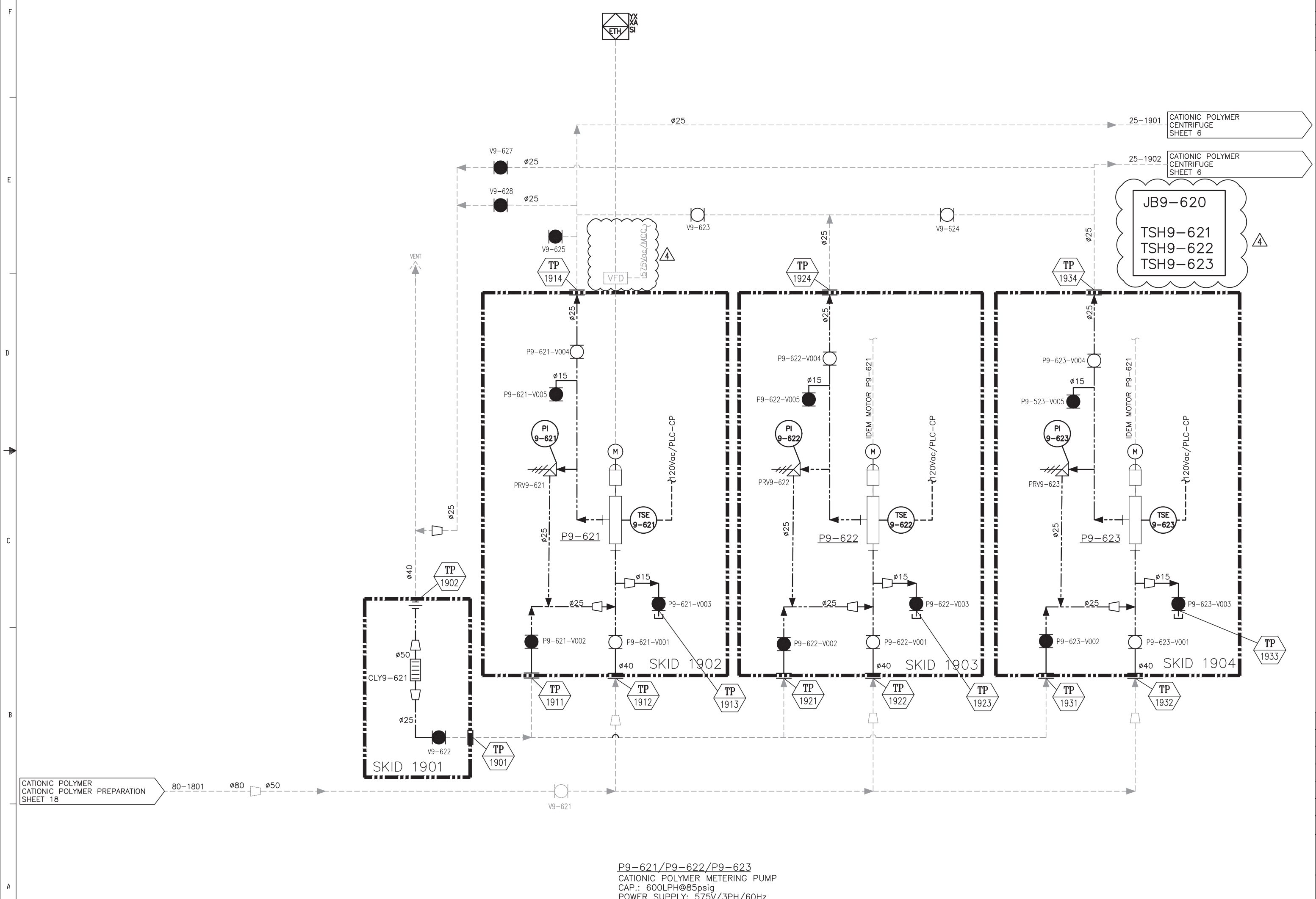

Notes :

Note 1901 : The vent must be higher than the storage tank.

Safety requirements :

Polymer is very slippery. Refer to spill response procedure.

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

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

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING, AMARUQ, NU

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

ÉCHELLE / SCALE: N.T.S.

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

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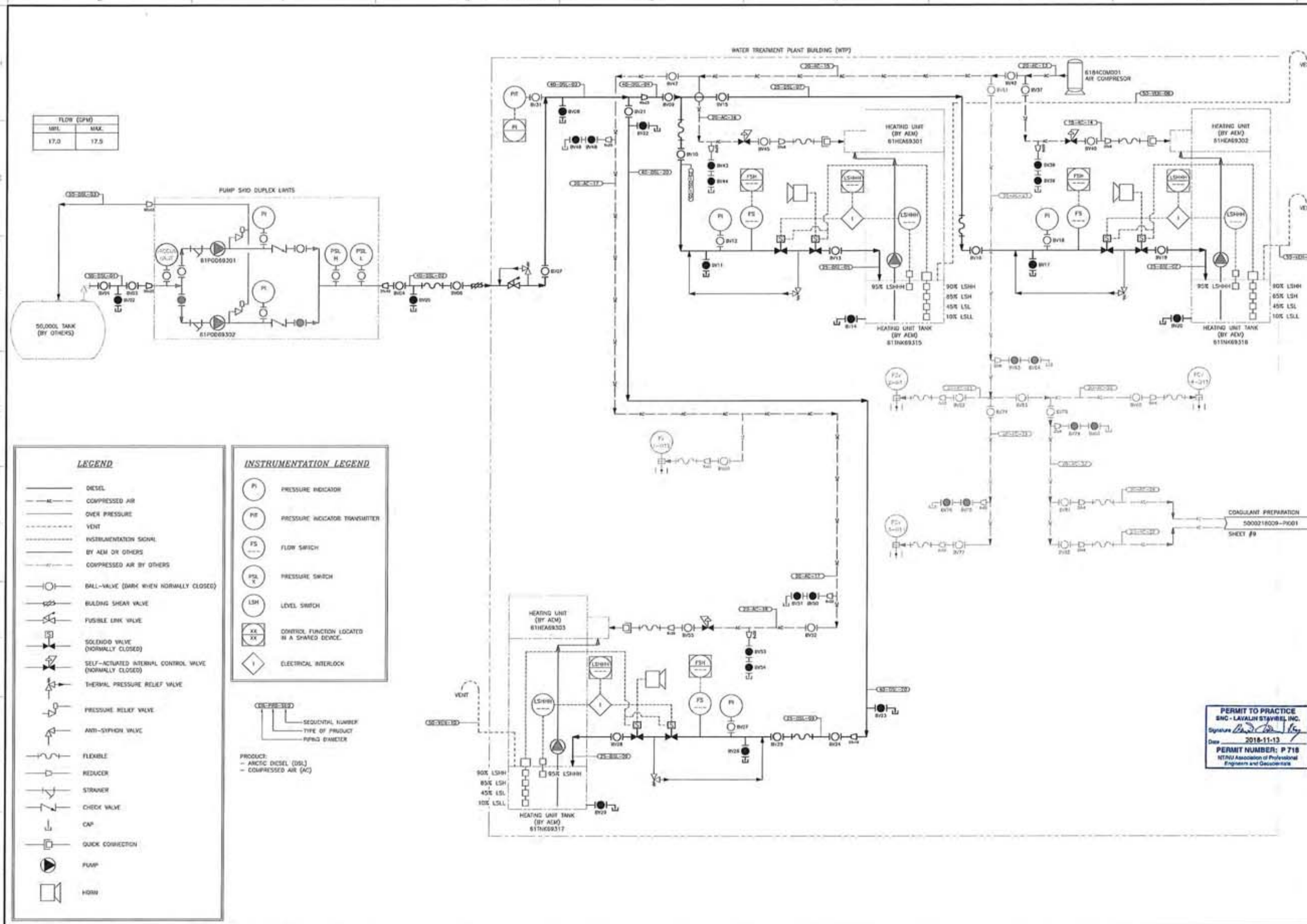
REF: N/A — SIZE ANSI D

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



PLAN CLÉ / KEY PLAN

THIS DRAWING

NOTES GÉNÉRALES / GENERAL NOTES

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

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

SNC·LAVALIN

Projet No.: 653281-0001

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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

AGNICO EAGLE

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

REVISIONS

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

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

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

FORMAT ARCHD

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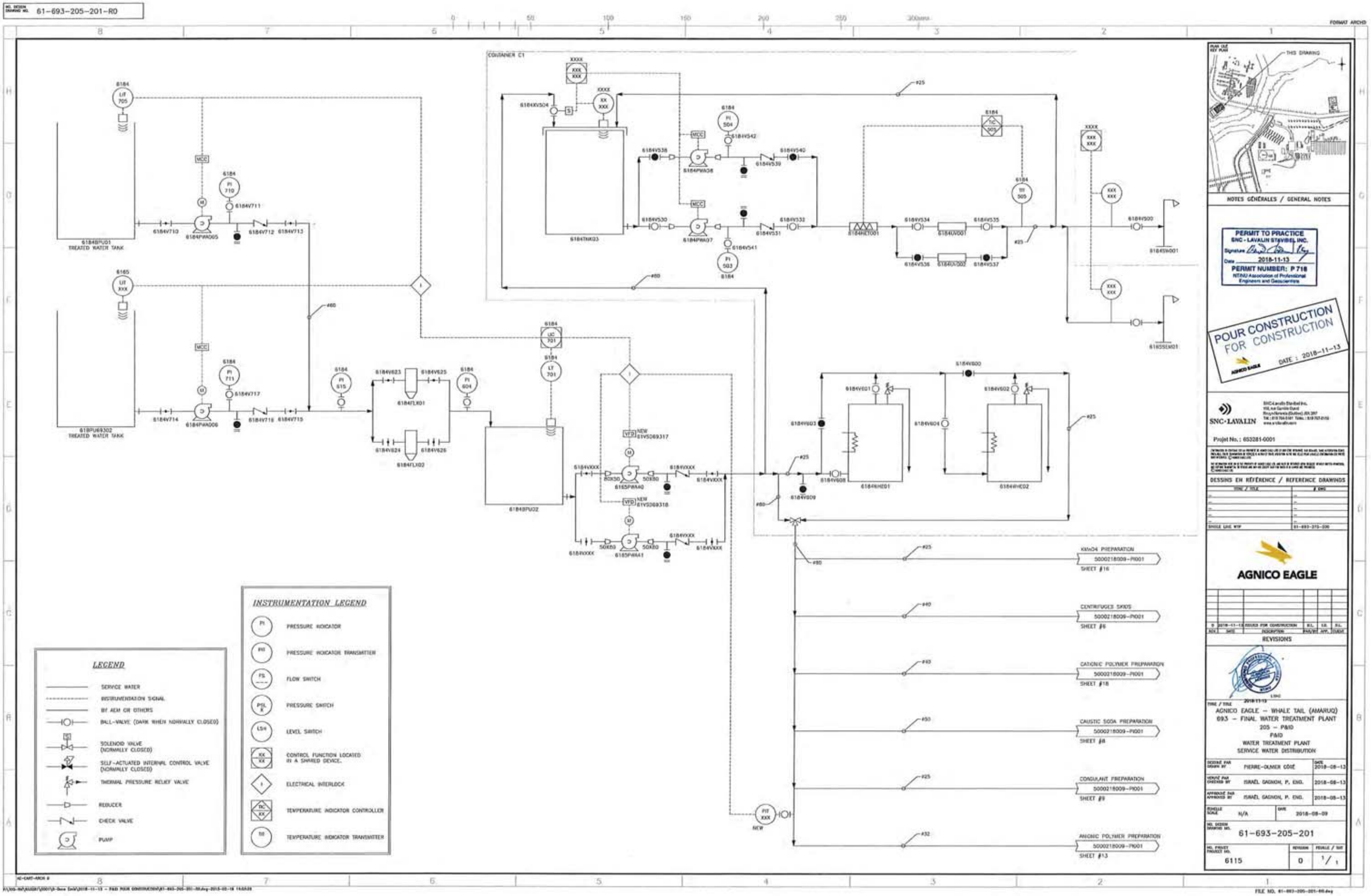

61-693-205-201-R0
CONTAINER C1
6184BPU01 TREATED WATER TANK
61BPU69302 TREATED WATER TANK
6184THK03
6184BPU02
6184HE01
6184HE02
6184FLX01
6184FLX02
6184PWA005
6184PWA006
6184PWA07
6184PWA38
6165PWA40
6165PWA41
KMnO4 PREPARATION
50002-18009-PI001
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TEMPERATURE INDICATOR TRANSMITTER
NOTES GÉNÉRALES / GENERAL NOTES
PERMIT TO PRACTICE
SNC-LAVALIN STAVIBEL INC.
Date 2018-11-13
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists
POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2018-11-13
SNC-LAVALIN
Projet No.: 653281-0001
DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS
AGNICO EAGLE
REVISIONS
AGNICO EAGLE - WHALE TAIL (AMARUQ)
693 - FINAL WATER TREATMENT PLANT
205 - P&ID
P&ID
WATER TREATMENT PLANT
SERVICE WATER DISTRIBUTION
PIERRE-OLIVIER CÔTÉ 2018-08-13
ISRAËL GAGNON, P. ENG. 2018-08-13
ISRAËL GAGNON, P. ENG. 2018-08-13
N/A 2018-08-09
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NO. DESSIN / DRAWING NO. 61-695-205-200

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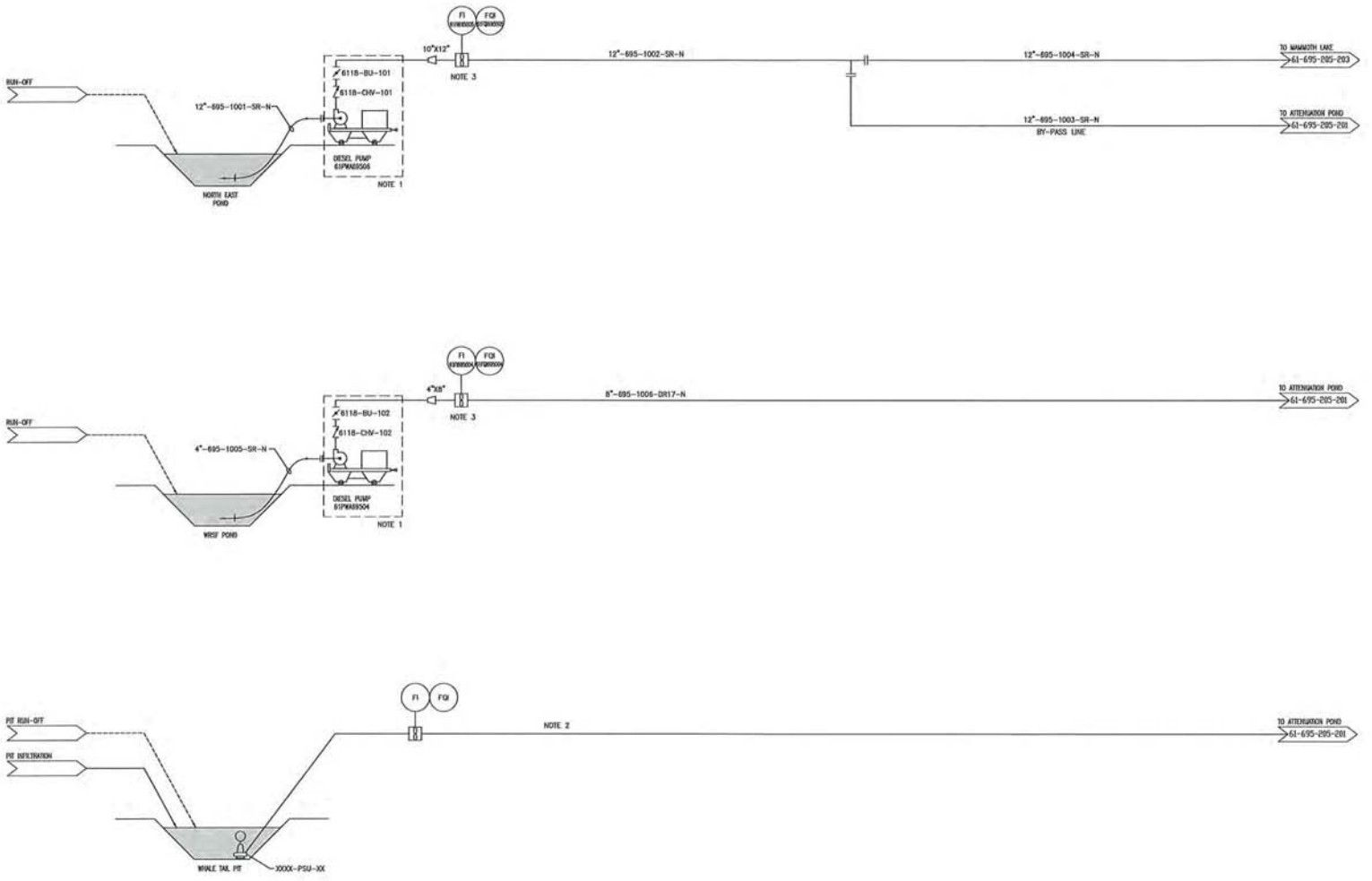

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature _____
Date 2018-07-24
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

SNC·LAVALIN

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

NOTES GÉNÉRALES / GENERAL NOTES

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

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TYPE / TITLE	# DWG

AGNICO EAGLE

NO	DATE	DESCRIPTION	DES.	VÉR.	APP.
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REVISIONS

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

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

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

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

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

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FILE NO. 651298-8200-49D4-0001-00.dwg

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

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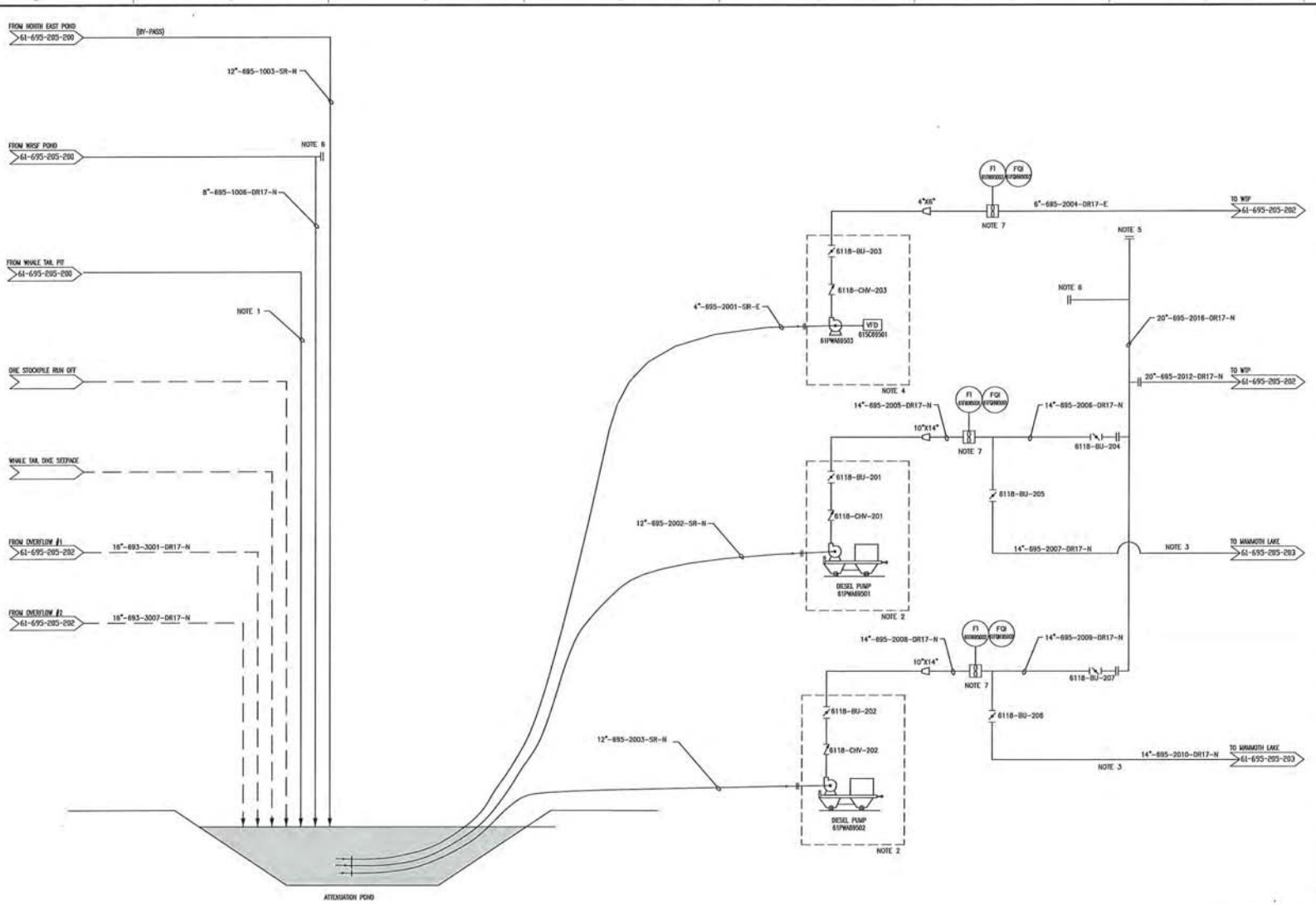

PLAN CLÉ
KEY PLAN

SNC·LAVALIN

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV
651298	8200	49 D4	0002	000

NOTES GÉNÉRALES / GENERAL NOTES

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

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TYPE / TITLE	# DWG

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REVISIONS

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

205 PIPING AND INSTRUMENTATION DIAGRAM
ATTENUATION POND AND PUMPING STATION

DESSINÉ PAR DRAWN BY	M. MOMLA	DATE 2018-05-30
VÉRIFIÉ PAR CHECKED BY	D. CHEN	2018-05-30
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SNC-LAVALIN INC.
Signature P.Eng.
Date 2018-05-30
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

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FILE NO. 651298-8200-49D4-0002-00.dwg

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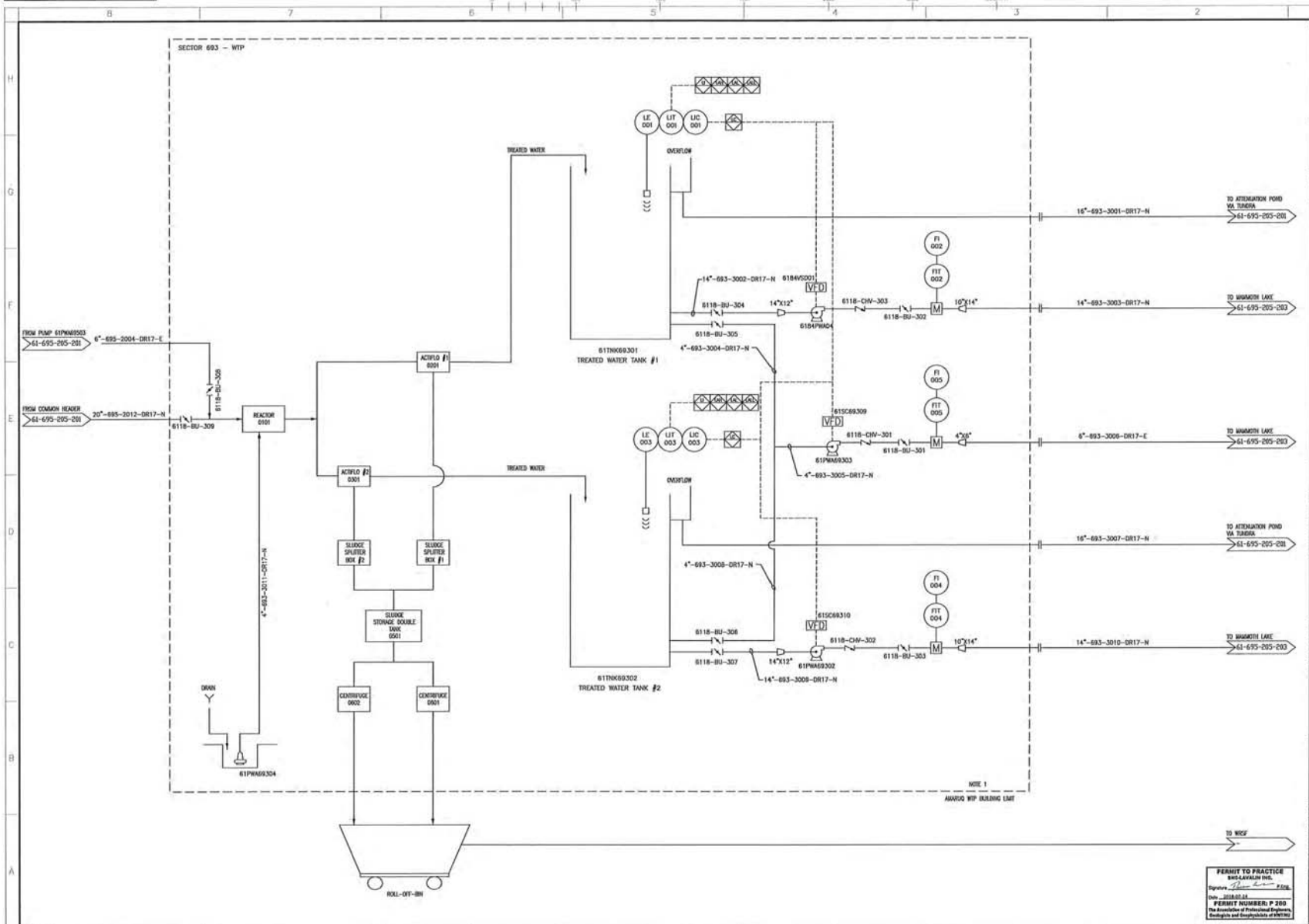

SNC·LAVALIN

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

NOTES GÉNÉRALES / GENERAL NOTES

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

LEGEND:

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REVISIONS

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

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

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VÉRIFIÉ PAR / CHECKED BY	D. CHEN	2018-05-30
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SNC-LAVALIN INC.
Signature ____ P.Eng.
Date 2018.07.24
PERMIT NUMBER: P 380
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

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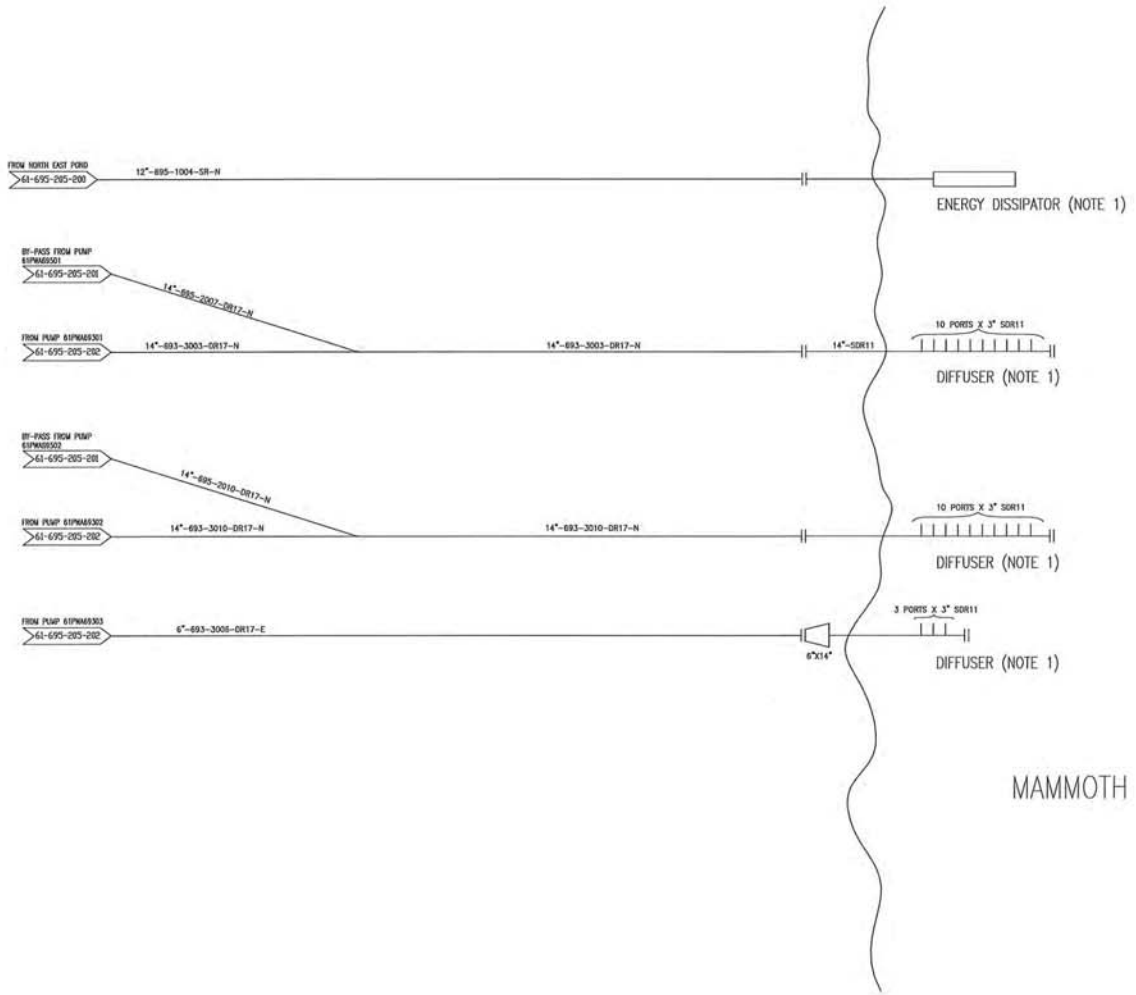

PLAN OLE
KEY PLAN

SNC-LAVALIN

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

NOTES GÉNÉRALES / GENERAL NOTES

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

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TYPE / TITLE	# (NO)

AGNICO EAGLE

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REVISIONS

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

205 – PIPING AND INSTRUMENTATION DIAGRAM TREATED WATER TO MAMMOTH LAKE

DESSINÉ PAR / DRAWN BY	M. MOMLA	DATE 2018-05-30
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6118	R0	1/1

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Appendix C: Veolia Operation and Maintenance Manual

PACKAGE NUMBER: 6115-S-265-001
PURCHASE ORDER NUMBER: OC-671670

AGNICO EAGLE MINES
AMARUQ WTP, NUNAVUT
VEOLIA Project 5000 218 009

Operation and Maintenance Manual
Volume 1

Prepared by:
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Tel.: 514-334-7230

Revision: 1
Date: August 2018

VEOLIA DOCUMENT NO: 5000218009_OMM_0001_GEN_VWT

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Amaruq WTP, Nunavut

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Operation & Maintenance Manual
Amaruq WTP, Nunavut

The system was manufactured in Canada by:

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4105, Sartelon
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For technical support or service needs, for spare parts or to get assistance during your warranty period, you may contact us at the following number during regular business hours or write us at:

Veolia Water Technologies Canada – After Sales Support
1-844-SER-VWT9 | 1-844-737-8989 | vwtservicecanada@veolia.com

Our business hours are from:
Monday to Friday
8:30am to 5pm (EST)

Have the following information on hand for each request or call:

Project Name:
VWTC Reference Number:

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OPERATION AND MAINTENANCE MANUAL

VOLUME 1

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1 – INTRODUCTION

1.1 – GENERAL DESCRIPTION

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GENERAL DESCRIPTION

AEM is currently developing the Amaruq Mine in Nunavut Canada as an open pit mine. With this new mine development AEM currently has a requirement to treat for TSS and Arsenic (As) concentration which is also expected to rise up. Therefore, an As and TSS treatment system is required before discharging the surface water to the environment.

The proposed treatment system includes:

- **A new metal precipitation reactor**. The purpose of this step is to precipitate the arsenic. The influent is sent to the Arsenic Removal Reactor. In this reactor, the influent water is mixed with ferric sulfate (Fe2(SO4)3). The ferric sulfate forms a floc of ferric hydroxide (Fe(OH)3) which acts both as a bridge to tie colloidal particles together and as an active surface which forms surface complexes with many metals, such as arsenic. The ferric sulfate also lowers the pH in the vicinity of 7.0 where the surface complexation is optimal for arsenate. In summer operation (ACTIFLO mode), some sludge from the sludge splitter box that collects the sludge from the ACTIFLO's is recycled to the metal precipitation reactor. This sludge recirculation makes it possible to increase the efficiency of the reactor and thereby reduce its size and especially prevent from having to use two units during the operation in ACTIFLO mode (high flow rate).

- **Two ACTIFLO's** (reused from the Meadowbank site). The water from the Metal Precipitation Reactor flows to the existing ACTIFLO's. The ACTIFLO is designed to remove suspended solids from the raw water. Sand-ballasted settling is 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 detention times. The use of microsand also permits the unit to perform well under dramatically changing flow rates without impacting final effluent quality. The water flows to the first basin, the coagulation chamber where the reaction is optimized. The coagulated water then overflows to a second tank section called the injection tank. There, the microsand and flocculant aid polymer are added. The microsand provides a large contact area for floc attachment and acts as a ballast, thereby accelerating the settling of the flocs. The flocculant 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 efficiency of settling is further increased by the use of the lamella tubes. The clarified water exits the system via a series of collection troughs or weirs. The clarified water is monitored for turbidity and is discharged by gravity to the clarified pump station. 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 hydrocyclones 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 management facilities. Also, to maintain a good extraction of sludge and good sand recirculation, the recirculation pumps on both existing ACTIFLO® units have been upgraded. The two 34 m^3/h each pumps installed on each ACTIFLO® from the Meadowbank project have been replaced by two new 70 m^3/h extraction pumps. This means that the recirculation line and hydrocyclones also had to be replaced.

- **A new sludge dewatering system.** The dewatering step aims to reduce sludge volume and produce a solid cake. In summer operation, the sludge from the two Actiflo's is sent to a sludge splitter box (existing tank reused). The sludge overflow of the splitter box flows back to the Metal Precipitation Reactor. The recycled sludge increases the reagent efficiency and promotes solid growth. It also helps to optimise the contact time between ferric hydroxide and arsenic to improve adsorption (this physical process is taking about an hour). It also thickens the sludge, so no thickener equipment is required before the dewatering stage. The remaining sludge is pumped to a storage double tank which is used as a feed tank to the centrifuges. In winter operation, the sludge from the Actiflo's (used as Multiflo's) is pumped directly to the storage double tank without going through the sludge splitter box and without being recirculated to the metal precipitation reactor. Then, both for summer and winter operation, the sludge from the storage double tank tank is pumped into two centrifuges capable of producing a cake of about 20±5 % dryness. 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, the sludge will contain adsorbed arsenic as well as ferric hydroxides from the coagulant addition. The lower the hydroxide fraction, the greater the dry solid content is achieved in the cake. The final cake dryness must be defined by carrying laboratory tests. The centrifuges are fed continuously with constant solid content slurry. A cationic polymer is injected in the feed pipe to increase the cake dryness. The separation between liquid and solid is achieved using centrifugal forces 500 to 3000 times the force of gravity. The thickened sludge produced by each centrifuge is carried away to a container for disposal through a screw conveyor. Centrate from the centrifuges and from the screw conveyors flows by gravity to sump pump pits. Centrate contains cationic polymer and can be recycled back upstream of the water treatment plant, in the metal precipitation reactor.

- **A new potassium permanganate ($KMnO_4$) preparation and dosing system**. $KMnO_4$ is used to oxidize the arsenic trivalent to produce arsenic pentavalent that is much easier to precipitate and separate from water. The selected oxidant to oxide As is Hydrex 9571. It is delivered dry in bags of 25 kg. The solution preparation is be made using a new manual make-up system. The dosage is performed using a new dosing skid equipped with mechanical diaphragm metering pumps. The $KMnO_4$ dosing point is located upstream from the precipitation reactor.

- **A coagulant dosing system.** The selected coagulant is Hydrex 6266, a ferric sulfate coagulant. It will be received in bulk bags. The existing coagulant preparation system from the Meadowbank site is reused. For summer operation, the dosage is performed using a new dosing skid equipped with mechanical diaphragm metering pumps. For winter operation, the existing dosing system with progressive cavity pumps from the Meadowbank site is reused. The coagulant dosing point is located in the metal precipitation reactor.

- **A sulphuric acid dosing system.** Sulphuric acid is used for ferric sulfate preparation (coagulant). Sulphuric acid is a commodity and will be received in bulk containers of 1 m3 at 93 % concentration. The product can be used as is and the dosage will be performed using a new dosing skid equipped with mechanical diaphragm metering pumps. The sulphuric acid dosing point is located in the maturation tank of the coagulant preparation system.

- **A caustic soda (NaOH) preparation and dosing system.** 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, will need to be added. The sodium hydroxide will be received dry in 25 kg bags. The existing preparation and dosing systems from the Meadowbank site are reused. The NaOH dosing point is located upstream from the precipitation reactor.

- **An anionic polymer preparation and dosing system.** 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 or equivalent. It is a solid anionic polymer used to enhance flocculation and will be received in 25 kg bags. The existing Hydra-Pol automatic preparation system from the Meadowbank site is reused to prepare a 0.25 % solution. The automatic polymer preparation/dilution system is an automatically controlled batching unit capable of preparing polymers. For winter operation, the anionic polymer dosing system from the Meadowbank site is reused. For summer operation, a new dosing system with 3 dosing skids is used. The existing polymer preparation from the Meadowbank site is also reused for summer operation. The anionic polymer liquid solution injection points are located in the injection and maturation tanks of the two ACTIFLO's.

- **A cationic polymer preparation and dosing system.** Cationic polymer is required for the sludge dewatering step. A new Hydra-Pol automatic preparation system is used to prepare a 0.3-0.5 % solution. The water used for the polymer preparation needs to be filtered water with temperature between 10- 20 °C. The automatic polymer preparation/dilution system is an automatically controlled batching unit capable of preparing polymers. A new dosing system with 3 dosing skids is used. The cationic polymer liquid solution injection points are located upstream from the two centrifuges.

2 – SAFETY

2.1 – GENERAL RECOMMENDATIONS

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SAFETY

VEOLIA WATER TECHNOLOGIES CANADA INC.

INDEX

SAFETY

1 GENERAL

It should be recognized that potential hazards exist in any processing system. By including this section in the operating manual, Veolia Water Technologies Canada Inc. is in no way attempting to override the plant safety rules laid out to the employees by their employer. However, because of our concern for good, efficient operation of the equipment furnished, we recognize our obligation to point out certain hazards. We also recognize that this section cannot cover every possible hazard; rather, it merely points out some of the most common and important ones.

In each plant, the hazards vary slightly because of the particular chemical or material that is being processed. However, there are some safety recommendations that apply to all operations. These hazards can be broken down into three general areas, namely utility hazards (compressed air, electrical, etc.), equipment hazards, and chemical hazards. These three areas will be covered separately in the following sections.

One of the most important ways to avoid hazards is to have a good understanding of the process. Familiarity with the system and good common sense will enable operators to run the system smoothly and safely.

WHMIS Safety Data Sheets (SDS) should be available for each chemical product.

2 OPERATION AND MAINTENANCE MANUAL

It is important that the operator has understood the instructions of use, security and maintenance before using the Veolia Water Technologies Canada Inc. system. The manufacturer can not be held responsible for use or improper maintenance resulting from a breach or non-compliance with instructions. The Operation and Maintenance manual contents must be kept permanently close to Veolia Water Technologies Canada Inc. system in a safe place.

3 PLANT SAFETY PROCEDURES

As stated earlier, the safety rules and guidelines issued to the employees are the primary precautions that are necessary for the prevention of accidents. The employee should be very familiar with these rules. The safety pictograms used in the plant are to be respected at all times.

Operators should always wear the safety equipment that is provided or required by their management. Such items as hard hats, safety shoes, safety glasses, gloves, breathing protection, protective clothing, protection harness and hearing protection are very basic and go a long way in preventing accidents.

Operators should be aware of the location of fire extinguishers, eye wash stations, safety showers, self-contained breathing apparatus, first aid stations, and other safety equipment furnished for the plant.

Good housekeeping will also eliminate safety hazards such as tripping or slipping. When spills happen, the floor should be washed as soon as possible. When construction or maintenance is finished, removing debris also eliminates a hazard. Proper housekeeping is a good indication of safety attitude in general.

Management provided training can always help in making employees more safety conscious. In these seminars, potential hazards can be pointed out. Veolia Water Technologies Canada Inc. will be glad to assist these efforts by furnishing details on its equipment relating to safety as well as on its operation.

Investigation of an accident to determine its cause will help to prevent the same accident from occurring again and will aid in finding a way of correcting or eliminating the hazard.

Remember, safety rules provided by your employer are designed to protect you and should be strictly adhered to. However, as an operator, safety is your responsibility and you should voice any concerns you have and follow through until corrective action is taken.

4 UTILITY HAZARDS

Utility hazards that may exist in the plant may include high-pressure/high-temperature steam, high-voltage electricity, high-pressure water, and high pressure air. Care should be taken when utilizing any of the utilities.

4.1 Steam

Any time steam is used the potential for burns exist. The recommended first aid for burns is to first apply ice or cold water directly to the burn and then cover the area with cool, moist application gauze or bandage material to minimize blistering. If burns are critical (second and third degree), transport the injured person to a medical facility promptly.

Hot surfaces in areas frequented by personnel should be covered with insulation for protection. When hot surfaces must be left exposed, such as steam valves or sight glasses, operators should be warned of the potential hazard displaying pictograms, training, and supervision.

Steam valve packing, steam traps, and pipe fittings that are leaking should be brought to the attention of supervision and repaired as soon as possible. Instrumentation connections and pipeline for steam should be piped with good connections. Valves should be tagged and locked out on equipment that is being worked on where steam is used to prevent someone from opening the valve. At times, steam is used for cleaning lines. Operators should make sure that if hoses are used, they are designed for steam service. Make sure the connections are tight and do not leak.

Drain and sample connections should be suitably identified and piped with proper fittings. Rupture discs, pressure relief valves, and steam trap discharges should be suitably identified and piped in such a way that they do not release steam in an area of access. These must also be periodically checked to make sure that they are in good working order. Precautions should be taken to prevent accidental release of pressurization, which could injure personnel. Water or steam hammering in steam lines should be investigated for the source and stopped as soon as possible to prevent rupture.

4.2 Electrical

As with steam, electrical equipment should never be worked on unless it is turned off and locked and tagged out. The lockout system key should belong to the person doing the repair or the on-site electrician. This will remove the potential danger for electrical shock or accidental start-up.

Electrical hazards fall into three categories: shock, burn, and fire. The severity of electrical shock is dependent on several items, such as the nature of the electrical impulse and the path that the shock takes through the body. Burns are those caused by contact with electrical current. Fire is where a chemical or gas burns or explodes when it comes in contact with an electrical spark.

General first aid for electrical burns is as follows:

- Remove the victim from contact with the electrical current without coming into contact with the current yourself.
- Check for cardiac arrest or respiratory failure.
- Check for points of entry and exit of current.
- Cover burned surface with a clean dressing.
- Splint all fractures.
- Treat for physical shock.
- Transport to a medical facility promptly.

Except for very low voltage exposure (below 24 V) and very low body current (below 0.2 mA), it is difficult to state safe limits for electrical exposure. Even these low energy exposures can be traumatic for people with heart diseases.

Even though most electrical motors and switch boxes are designed to be water tight, it must be recognized that the presence of water around electrical equipment always presents a hazard and therefore should be used with care.

4.3 High Pressure Water

In the case of some pumps, cooling devices, and heat exchanger, high pressure water is used. As with steam, high pressure water can be a hazard if a small leak is not repaired.

Only the proper pressure fittings should be used in the piping system. As stated earlier, leaks should be repaired as soon as possible. Isolation valves on piping that are being repaired should be shut tight and locked out. As with electrical repairs, the lockout system key should be in the possession of the individual working on the piping.

Plant Air

Care should be taken when using plant air to clean equipment, unblock lines, or blow dust off personnel. High pressure air can be very dangerous to personnel, especially in the area of the face. Pressure should be reduced before using the air to blow dust off clothing. Make sure all fittings have good connections and cannot blow loose.

5 EQUIPMENT HAZARDS

5.1 Rotating parts, Hazardous Areas and Confined Spaces

Rotating parts

Since the system includes equipment with rotating parts (eg pumps, mixers, etc.) Operators should avoid wearing loose clothing and jewellery. Loose clothing can present one of the biggest safety hazards that exist when working near equipment in process.

Sharp or protruding surfaces are normally eliminated at areas frequented by personnel. When present in an operating area, the surface should be covered for protection and clearly marked to minimize the danger of contact.

Equipment that is likely to generate high noise levels should be insulated and/or isolated for personal access. If personnel must enter a high noise area, they will wear hearing protection.

Confined Spaces

Before entering or breaking the plane of any vessel, be sure to check if it is a potential Confined Space and if a permit is required for entrance. Vessels that require a Confined Space Entry Permit may include but are not limited to flash tanks, heaters, condensers, and storage tanks.

5.2 Operation and Maintenance

The equipment in its normal use can present a hazard if not operated or repaired in a safe manner. Example of equipment: pumps, valves, instruments, hoses, etc.

All equipment should only be operated and repaired according to the recommended procedures of the manufacturer, and by qualified individuals. For further information on equipment maintenance procedures, proper maintenance tools, and/or the Personal Protective Equipment required, Section 3 - Equipment of this manual should be referenced.

Only recommended spare parts should be used. For instance, when replacing a gasket, verify the proper gasket is selected (pressure steam, corrosive, etc.).

In the repair or replacement of Veolia Water Technologies Canada Inc. furnished equipment, Veolia Water Technologies Canada Inc. specifications should be checked to make sure the correct pressure rating is used.

Maintenance on pumps, piping, etc. should be performed only after valves are locked and tagged or slip blanks are installed to completely isolate the equipment being worked on. Instrumentation and controls should always be kept in good working order to help assure the safe operation of equipment. Never remove instruments or controls out of service until having communicated with the operator and have established a plan to define the operation maintenance steps. If air operated valves are used for isolation, the air line should be removed to prevent inadvertent operation of the valves. When possible the valve can also be locked in position.

When maintenance is finished on equipment, the protective caps provided must be reinstalled. If a protection must be left off, unwary personnel should be notified by using safety pictograms or installing temporary protection. Equipment should never be inspected or maintenance attempted while the equipment is operating. All pumps and various automatic valves may cause harm to an operator if care is not taken.

Before starting the equipment, the operator must verify if the maintenance staff has completed the work, if the pumps are not locked or frozen and whether bare electrical wires are present. He must also check the pipes to ensure there are no leaks and should clean all debris

6 CHEMICAL HAZARDS

WHMIS Safety Data Sheets (SDS) should be available for each chemical product.

Since chemicals or chemical dosage are used during normal operation of treatment facility, the risks of fire, explosion and exposure to toxic chemicals or chemical burns are present. Chemicals that may be used regularly or, for instance, during cleaning including, without limitation, acids, caustics, polymers, ozone, coagulant and microsand. Operators should be made aware of the following:

- All chemicals which are used and any potentially dangerous reaction that could occur.
- Toxicity of all chemicals that are used or could be formed via reactions.
- Acidic or basic properties of all materials used.
- Potential fire or explosion hazards posed by the chemicals.
- Antidotes for exposure to toxic materials.
- Protective clothing that is recommended.
- Any other information that helps make the operators aware of a hazard.

6.1 Chemical Burns

Some treatment plant chemicals can be very acidic or basic and cause serious burns if coming in contact with the skin or eyes. Operators should be careful when opening valves and working on lines and pumps. Safety glasses with side shields are always recommended when working around chemicals. Operators should familiarize themselves with the location and operation of safety showers and eye wash stations. These stations should be inspected and tagged acceptably with a date and signature on a regular basis.

Whenever a leak or spill is sighted, corrective action should be taken immediately and the spill should be cleaned up. It should never be assumed that someone else is aware of the problem or will take care of the spill.

Accordingly, chemical lines should be clearly identified by color coding or other suitable means. Routing of these lines should be in open areas and should avoid major work/access areas wherever possible. This is critical if the vessels and piping are overhead.

Plant areas where these materials are handled should be restricted. A safety briefing for all visitors and/or new personnel is recommended before access is granted.

All plant personnel should be required to wear proper protective clothing when handling or working near these chemicals. A minimum wardrobe should include, but not be limited to, a plastic hard hat, coat, boots and gloves of a resistant material as well as a pair of safety glasses. Safety glasses, even with shields, are not adequate for use in areas where very acidic or basic materials are handled.

Accidental contact with these chemicals should be avoided. Remember, most liquid chemicals resemble water. Good housekeeping practices should be a requirement in areas where these materials are handled.

6.2 Fire and Explosion

A combustible material will spontaneously start to burn when its temperature is raised to its ignition point in the presence of air. The ignition point of all chemicals used in the process should be known and posted for operators. In some cases, the mixture of vapor and air can burn violently in the form of an explosion.

Accordingly, chemicals should not be added to other materials if the effects of the addition are unknown. This includes disposal, which should only be into suitable containers. Sinks and/or sewers are not suitable for disposal.

WARNING: In systems with Actiflo® clarifier, the lamella pack is pre-installed in the settling tank section of the Actiflo®. It is made of a very flammable material. Do not expose it to open flames or sparks. Do not allow any welding works nearby unless special precautions have been taken.

6.3 Toxic Exposure

Since we are dealing with the effects on individuals who may react to various toxic materials to different degrees, it is difficult to establish an absolute evaluation of toxicity. However, most toxic materials do not have particularly adverse effects when present in small amounts. Consequently, the concept of the “threshold limit value” (TLV) has been developed and is defined as a concentration of toxic material below which it is believed nearly all individuals may be repeatedly exposed over a long duration without adverse effects. The TLV for all chemicals used should be on record and easily accessible.

7 SAMPLING AND LINE UNBLOCKING PROCEDURES

7.1 Sampling Procedures

In the course of startup and operation of Veolia Water Technologies Canada Inc. supplied equipment, sampling of the process fluid is generally conducted in order to:

- Verify system instrumentation.
- Adjust system to maintain desired stability of operation.
- Troubleshoot upset conditions.
- Verify system performance meets contractual guarantees.






Regardless of the process fluid being sampled, care should always be taken to assure samples are collected without placing personnel at risk of injury. Personnel who are collecting samples should always practice good safety habits in their collection routine. Personal protective equipment (PPE) should be selected and worn with respect to the type of sample being collected and its means of collection.

PPE required for sampling is dependent on the material, the temperature and pressure, the sampling point, the surrounding conditions, etc. An example of the varying level of PPE required for each given sample is given below. However, the person responsible for sampling should determine for him or herself if his or her level of PPE is adequate for the task. **Remember, YOU are responsible for your safety.**

<u>PPE required for general field work</u>

- Steel-toed work boots, safety glasses, hard hat, leather gloves, hearing protection, respirator, long-sleeved shirt.

<u>Additional PPE required for handling hot, non-hazardous material</u>

- Insulated rubber gloves and face shield with goggles.

<u>Additional PPE required for handling hazardous material</u>

- Consult SDS
- Full body suit, respirator, rubber gloves, face shield with goggles, protective sampling container.

The collector should study the pertinent sampling station specific to his/her process until comfortable he/she can collect a sample from the station in a safe manner that is also representative of the process conditions. The collector should then develop his/her own sampling procedure.

7.2 Unblocking Procedures

The systems processing highly viscous or slurry solutions are prone to produce blocked drains, valves, and/or sampling stations. The operator should expect blocked connections in these systems. As such, the operator will eventually be required to unblock a connection to access a sample or drain a vessel or line. In doing so, the operator should:

- Review the need for proper personal protective equipment (PPE).
- Develop a plan for unblocking the connection
- Obtain the proper equipment to unblock the connection
- Safely implement the unblocking plan

Selecting the proper PPE for use in unblocking a connection is very similar to the PPE required for sampling noted in the previous section. However, unblocking a connection can result in an instantaneous release of fluid or material at velocities or forces much greater than seen during normal sampling methods. The operator should consider "what if" scenarios such as excessive splashing or large volume release after unblocking the connection and determine his/her PPE with these "worst case" conditions in mind.

Before attempting to unblock a connection, the operator should study the situation and develop a safe procedure to unblock the connection. He/she should observe the area around the connection problem in case a quick "get-a-way" should be required. He/she should inform any personnel in the area that may be affected by unblocking the connection. The operator should learn what the material behind the plug is operating at: what temperature, what pH, what pressure, etc. and modify his/her plan accordingly to develop the safest method of releasing the connection. It might be better for him/her to perform an exercise to test the method of unblocking to validate the proposed method.

Any equipment used in the unblocking process should be reviewed for adequacy of use. Is the hose rated for the material, temperature, and pressure expected to be seen by its use? Are the hose and fittings in good condition? If not, replace the unfit equipment with new or adequate equipment. Make sure all connections are tight and proper for the job. In addition, the hose assembly utilized in the unblocking process should be equipped with a bleed-off valve to depressurize the system prior to the dismantling of the connection. If a bleed-off valve does not exist, special care should be taken when dismantling a hose connection because it may still be subject to internal pressure after the release.

Once the plan and the equipment are in place, the operator must focus on the task to be sure the line is unblocked in the safest manner possible. He/she should especially be concerned not only with his/her own safety, but also of others in the area. Cordoning off the area surrounding the blocked connection is advisable. Remember, whatever means is used be it with water, steam, or air, or mechanical means, BE READY FOR ANY CONSEQUENCES when the drain pipe.

Finally, when working with a partner, take special precaution to communicate your plan to avoid harming anyone due to miscommunication.

APPENDIX

Forbidden

Subject	Pictogram
No swimming	
Not drinking water	

Danger

Subject	Pictogram
Electrical hazard	
Keep guard in place	
This machine start automatically	
Corrosive material	
Risk of falling	

Pressure Piping	
Risk of slippage	
Flammable or high temperature	
Rotating part	
High temperature	
Confined space	
Risk of explosion	
Toxic	

Obligatory

Subject	Pictogram
Safety glasses	
Respiratory protection	
Hardhat	
Safety shoes	
Safety gloves	
Coverage of hearing	
Personal protective against fall	
Consult the manual	
Mandatory use of padlocks	

2 – SAFETY

2.2 – SAFETY DATA SHEETS

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Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Emergency overview WARNING

Harmful in contact with skin.

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

Notes to physician Symptoms may be delayed.

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

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

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

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

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

Explosion data

Sensitivity to static discharge Not available.

Sensitivity to mechanical impact Not available.

6. Accidental Release Measures

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

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

7. Handling and Storage

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

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

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

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

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

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

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

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

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

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

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

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

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

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

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

Personal protective equipment

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

Skin protection Wear suitable protective clothing. Chemical resistant gloves.

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

9. Physical & Chemical Properties

Appearance Granular

Physical state Solid.

Form Solid.

Color Yellowish or Tan or Grey.

Odor Slight

Odor threshold Not available.

pH Not available.

Vapor pressure Not available.

Vapor density Not available.

Boiling point Not available.

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

Solubility (water) Soluble

Specific gravity 3.1 estimated

Relative density Not available.

Flash point Not available.

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

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

Auto-ignition temperature Not available.

Other data

Density 3.10 g/cm3 estimated

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions.

Conditions to avoid Contact with incompatible materials.

Incompatible materials Not available.

Hazardous decomposition products Not available.

Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

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

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

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

12. Ecological Information

Ecotoxicological data

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

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

Persistence and degradability Not available.

13. Disposal Considerations

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

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

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

14. Transport Information

TDG

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

IATA

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

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

IMDG

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

IATA; IMDG; TDG

15. Regulatory Information

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

WHMIS labeling

Inventory status

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

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

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

16. Other Information

HMIS® ratings

Health: 2
Flammability: 0
Physical hazard: 0

NFPA ratings

Health: 2
Flammability: 0
Instability: 0

Disclaimer

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

Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

5. Fire Fighting Measures

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

Explosion data

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

6. Accidental Release Measures

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

7. Handling and Storage

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

8. Exposure Controls / Personal Protection

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

Personal protective equipment

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

9. Physical & Chemical Properties

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

Chronic effects Not expected to be hazardous by WHMIS criteria.

12. Ecological Information

Ecotoxicological data

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

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

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

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

Persistence and degradability Not available.

13. Disposal Considerations

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

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

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

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

WHMIS status Non-controlled

Inventory status

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

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

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

16. Other Information

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

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

NFPA ratings
Health: 0
Flammability: 1
Instability: 0

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

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

Hydrex

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Emergency overview

DANGER

Oxidizing material.

Causes skin and eye burns.

Potential health effects

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

3. Composition / Information on Ingredients

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

4. First Aid Measures

First aid procedures

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

VEOLIA WATER Solutions & Technologies

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

5. Fire Fighting Measures

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

6. Accidental Release Measures

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

Methods for cleaning up

Should not be released into the environment.

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

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

Other information

Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling

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

Storage

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

Material	Type	Value
Hydrex 9571	TWA	0.2 mg/m3

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

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

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

Material	Type	Value
Hydrex 9571	Ceiling	5 mg/m3

Engineering controls

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

Personal protective equipment

Eye / face protection

Do not get in eyes. Chemical goggles are recommended.

Skin protection

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

Respiratory protection

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

9. Physical & Chemical Properties

Physical state

Solid.

Form

Solid.

Color

Dark purple

Odor

Odorless.

Other data

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

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

12. Ecological Information

Ecotoxicological data

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

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

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

13. Disposal Considerations

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

14. Transport Information

TDG

UN number	UN1490

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

IATA

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

IATA; TDG

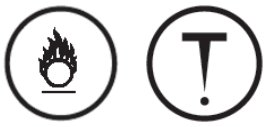
15. Regulatory Information

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

WHMIS status Controlled

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

WHMIS labeling



Inventory status

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

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

16. Other Information

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

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

SAFETY DATA SHEET

1. Identification

Product identifier	**VEOLIA ACTISAND**
Other means of identification	None.
Recommended use	Wastewater Treatment
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations. PROFESSIONAL USE ONLY

Manufacturer/Importer/Supplier/Distributor information

Manufacturer	
Supplier	Veolia Water Technologies Canada Inc.
Address	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Contact Person	Hydrex Product Specialist
Telephone	(905) 286-4846
Fax	(905) 286-0488
e-mail	vwtcanada-hydrex@veolia.com
24-Hour Emergency telephone	+1-760-476-3962 (Code:333239)
Supplier	Not available.

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Carcinogenicity	Category 1A
Environmental hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May cause cancer.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
Response	IF exposed or concerned: Get medical advice/attention.
Storage	Not available.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Other hazards	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Crystalline sillica		14808-60-7	100

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Coughing.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	The product is immiscible with water and will spread on the water surface. Stop the flow of material, if this is without risk. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in cool, dry place.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable fraction.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable particles.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable particles.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m3	Respirable fraction.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable.

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

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable dust.

Components	Type	Value	Form
Crystalline sillica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable dust.

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

Exposure guidelines Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

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

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Other Use of an impervious apron is recommended. Chemical resistant gloves.

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

Thermal hazards Not available.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Solid.

Form Solid.

Color Not available.

Odor	Not available.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.0000001 kPa at 25 °C
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Heat of combustion (NFPA 30B)	0 kJ/g
Molecular formula	O2Si
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Powerful oxidizers. Chlorine.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics	Coughing.

Information on toxicological effects

Acute toxicity	Not available.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. May cause cancer. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.

ACGIH Carcinogens

Crystalline sillica (CAS 14808-60-7)	A2 Suspected human carcinogen.

Canada - Alberta OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Manitoba OELs: carcinogenicity

SILICA, CRYSTALLINE-.ALPHA.-QUARTZ, RESPIRABLE FRACTION (CAS 14808-60-7)	Suspected human carcinogen.

Canada - Quebec OELs: Carcinogen category

Crystalline sillica (CAS 14808-60-7)	Suspected carcinogenic effect in humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Crystalline sillica (CAS 14808-60-7)	1 Carcinogenic to humans.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

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

14. Transport information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

Canadian regulations

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations

Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

16. Other Information

Issue date 08-16-2016

Version # 01

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

Revision information Product and Company Identification: Product Review

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MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

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

2. Hazards Identification

Potential health effects

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

3. Composition / Information on Ingredients

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

Composition comments None by WHMIS criteria.

4. First Aid Measures

First aid procedures

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

5. Fire Fighting Measures

Flammable properties Not flammable by WHMIS criteria.

Extinguishing media

Suitable extinguishing media	Not available.

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

6. Accidental Release Measures

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

7. Handling and Storage

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

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

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

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

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

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

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

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

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

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

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

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

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

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

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

9. Physical & Chemical Properties

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

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

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

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

Acute effects

Sensitization Not available.

Chronic effects Not expected to be hazardous by WHMIS criteria.

Carcinogenicity Not available.

Skin corrosion/irritation Not available.

Serious eye damage/irritation Not available.

Mutagenicity Not available.

Reproductive effects Not available.

Teratogenicity Not available.

Synergistic materials Not available.

12. Ecological Information

Ecotoxicological data

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

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

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

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

Aquatic toxicity Not available.

Persistence and degradability Not available.

Partition coefficient

ADIPIC ACID 0.08

Mobility in environmental media This product is miscible in water.

13. Disposal Considerations

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

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

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

14. Transport Information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

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

WHMIS status Non-controlled

International Inventories

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

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

16. Other Information

Recommended restrictions PROFESSIONAL USE ONLY

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

NFPA ratings
Health: 0
Flammability: 0
Instability: 0

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

Prepared by Hydrex Global Platform

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

SAFETY DATA SHEET

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

1.1. Product identifier

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

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

Identified uses	Not available.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

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

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

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

Health hazards

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

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

2.2. Label elements

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

Hazard pictograms

Signal word Danger

Hazard statements

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

Precautionary statements

Prevention

P260	Do not breathe mist or vapour.
P264	Wash hands thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Response

P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor/paramedic if you feel unwell.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P342 + P311	If experiencing respiratory symptoms: Call a poison center/doctorparamedic.
P363	Wash contaminated clothing before reuse.

Storage Not available.

Disposal

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

Supplemental label information None.

2.3. Other hazards None known.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

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

List of abbreviations and symbols that may be used above

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

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

SECTION 4: First aid measures

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

4.1. Description of first aid measures

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

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

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

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

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

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

SECTION 5: Firefighting measures

General fire hazards No unusual fire or explosion hazards noted.

5.1. Extinguishing media

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

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

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

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

SECTION 7: Handling and storage

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

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

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

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

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

8.2. Exposure controls

Appropriate engineering controls

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

Individual protection measures, such as personal protective equipment

General information

Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection

Wear safety glasses with side shields (or goggles). Before any handling, wear protective glasses side-shields complying with the NF EN 166.

Skin protection

- Hand protection

Chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

- Other

Wear appropriate chemical resistant clothing. Chemical resistant gloves.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment. Avoid forming spray/aerosol mists.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

Hygiene measures

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls

Environmental manager must be informed of all major releases.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state: Liquid.

Form: Liquid.

Colour: Colourless.

Odour: Odourless.

pH: 12

Melting point/freezing point: Not available.

Initial boiling point and boiling range: Not available.

Flash point: Not available.

Flammability (solid, gas): Not applicable.

Vapour pressure: Not available.

Solubility(ies)

Solubility (water): Not available.

Solubility (other): Not available.

Partition coefficient (n-octanol/water): Not available.

Viscosity: Not available.

Explosive properties: Not explosive.

Oxidising properties: Not oxidising.

9.2. Other information

Density: 1,00 g/cm³

SECTION 10: Stability and reactivity

10.1. Reactivity

Reacts violently with strong acids. This product may react with oxidizing agents.

10.2. Chemical stability

Material is stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

Contact with incompatible materials. Do not mix with other chemicals.

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

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

SECTION 11: Toxicological information

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

Information on likely routes of exposure

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

Skin contact Causes severe skin burns.

Eye contact Causes serious eye damage.

Ingestion Causes digestive tract burns.

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

11.1. Information on toxicological effects

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

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

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

Serious eye damage/eye irritation Causes serious eye damage.

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

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

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

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

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

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

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

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

Mixture versus substance information No information available.

Other information Not available.

SECTION 12: Ecological information

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

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

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

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

SECTION 13: Disposal considerations

13.1. Waste treatment methods

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

SECTION 14: Transport information

ADR

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

RID

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

ADN

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

Subsidiary risk -
Label(s) 8

14.4. Packing group II

14.5. Environmental hazards No.

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

IATA

14.1. UN number UN3266

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

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards No.

ERG Code 8L

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

Other information

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

IMDG

14.1. UN number UN3266

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

14.3. Transport hazard class(es)

Class 8
Subsidiary risk -

14.4. Packing group II

14.5. Environmental hazards

Marine pollutant No.

EmS F-A, S-B

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

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

ADN; ADR; IATA; IMDG; RID

SECTION 15: Regulatory information

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

EU regulations

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

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

Not listed.

Authorisations

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

Not listed.

Restrictions on use

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

Not listed.

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

Not listed.

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

Not listed.

Other EU regulations

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

Not listed.

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

Sodium hydroxide (CAS 1310-73-2)

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

Sodium hydroxide (CAS 1310-73-2)

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

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

Not listed.

15.2. Chemical safety assessment	No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations	Not available.
References	Not available.
Information on evaluation method leading to the classification of mixture	The classification for health and environmental hazards is derived by a combination of calculatior methods and test data, if available.
Full text of any H-statements not written out in full under Sections 2 to 15	H314 Causes severe skin burns and eye damage.
Revision information	None.
Training information	Follow training instructions when handling this material.
Disclaimer	Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Identification of the substance/preparation	**Sulphuric Acid 98%**
Use of the substance/preparation	Industrial Process Water Treatment; Water Treatment Chemical
Version #	01
Issue date	12-06-2016
CAS #	Mixture
Manufacturer	
Supplier	VWS, Saudi - Chemical Industries
Address	Prince Musaed Bin Abdul Aziz Street PO Box 58515, Riyadh 11515 Saudi Arabia
Contact Person	Product Manager
Telephone	+966 11 478 7721
Fax	+966 11 478 2560
e-mail	vwsme.hydrex@veolia.com
Global Emergency Contact	+1-760-476-3961 (Code:333239)

2. HAZARDS IDENTIFICATION

This preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification	C;R35
Physical hazards	Not classified as a physical hazard.
Health hazards	Causes severe burns.
Environmental hazards	Not classified as an environmental hazard.
Specific hazards	Very toxic by inhalation. Causes severe burns. Prolonged exposure may cause chronic effects.
Main symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS #	Percent	EC-No.	Classification
SULFURIC ACID	7664-93-9	50 - < 60	231-639-5	C;R35
Other components below reportable levels		40 - < 50		

Composition comments The full text for all R-phrases is displayed in Section 16 of the SDS.

4. FIRST AID MEASURES

Inhalation	Move to fresh air. For breathing difficulties, oxygen may be necessary. Get medical attention immediately.
Skin contact	Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash clothing separately before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Ingestion	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
General advice	In case of shortness of breath, give oxygen. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Keep victim warm. Do not use mouth-to-mouth method if victim ingested the substance.
Notes to physician	In case of shortness of breath, give oxygen. Keep victim warm.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media Foam. Powder. Carbon dioxide (CO2).

Extinguishing media which must not be used for safety reasons	DO NOT USE WATER. Alcohol resistant foam.
Unusual fire & explosion hazards	The product is not flammable.
Specific hazards	During fire, gases hazardous to health may be formed.
Special protective equipment for fire-fighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
Hazardous combustion products	sulfur

6. ACCIDENTAL RELEASE MEASURES

Containment procedures	Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Personal precautions	Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. For personal protection, see section 8 of the SDS.
Environmental precautions	Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.
Methods for cleaning up	This product is miscible in water. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. This material and its container must be disposed of as hazardous waste. For waste disposal, see section 13 of the SDS. Neutralize with slaked lime (calcium hydroxide) or soda ash (sodium carbonate) and flush with plenty of water.

7. HANDLING AND STORAGE

Handling	Never add water to this product. Avoid forming spray/aerosol mists. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin.
Storage	Never allow product to get in contact with water during storage. Keep at temperature not exceeding 43 °C. Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation. Store in cool, dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

Bahrain. TLVs. Resolution No. 4 Regarding the Management of Hazardous Chemicals, Exposure Limits for Dangerous and Poisonous Chemicals, Annex. 3

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 ppm
	TWA	1 mg/m3

Egypt. OELs. Threshold limits of air pollutants in the workplace (Decree No. 388, Annex 8)

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

Kuwait. OELs. Maximum Limits Allowance for Occupational Exposure to Chemical Substances (TVLs) (Decision No. 210/2001 Appendix No. (3-1))

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. OELs. Maximum Allowable Limits for Air Pollutants in Working Areas [Law to Protect the Air from Pollution, Resolution of the Cabinet of Ministers No. 12 of 2006]

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	3 mg/m3
	TWA	1 mg/m3

UAE. Abu Dhabi. TLVs. Maximum Allowable Limits for Air Pollutants in Working Areas (AD EHSMS RF - Occupational Standards and Guideline Values, Schedule A)

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

UAE. Dubai. OELs. Maximum Allowable Limits for Indoor Air Pollutants. Industrial Operation Regulation IO-11.0: Appendix, Tables 2 & 2A

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	STEL	1 mg/m3
	TWA	1 mg/m3

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

Recommended monitoring procedures

Additional exposure data Not available.

Engineering measures to reduce exposure General ventilation normally adequate. Ventilation should effectively remove and prevent buildup of any aerosols or mists generated from the handling of this product.

Personal protective equipment

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit. Avoid forming spray/aerosol mists. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Wear a disposable respiratory equipment against droplets or dust and which complies with NF EN 149, category FFP2.

Hand protection or Rubber (natural, latex). Polyvinyl chloride (PVC). Chemical resistant gloves. Nitrile rubber. Wear protective gloves which comply with the NF EN 374. Solvent-resistant gloves (butylrubber).

Eye protection Before any handling, wear protective glasses side-shields complying with the NF EN 166.

Skin and body protection Do not get this material in contact with skin. Wear suitable protective clothing. Chemical resistant gloves. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

General Avoid contact with skin. Avoid contact with eyes. Use personal protective equipment as required. Eye wash fountain is recommended. Keep working clothes separately. In case of splashing, wear protective chemical clothes (class 6) according to the NF EN 13034, in order to avoid any contact with skin.

Environmental exposure controls Environmental manager must be informed of all major releases.

Hygiene measures Wash hands after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Liquid

Physical state Liquid.

Form Not available.

Color Colorless

Odor Not available.

pH < 1

Specific gravity Not available.

Boiling point 626 °F (330 °C)

Flash point Not available.

Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	0 hPa estimated
Solubility (water)	100 % Exothermic decomp causes a dangerously fast pressure increase.
Partition coefficient (n-octanol/water)	Not available.
Viscosity	26.9 mPa·s (20°C)
Vapor density	Not available.
Evaporation rate	Not available.
Melting point/Freezing point	5 °F (-15 °C)
Auto-ignition temperature	Not available.
VOC	Not available.
Other data	
Density	1.40 - 1.84 g/cm³
Miscible (water)	100 %

10. STABILITY AND REACTIVITY

Conditions to avoid	Exposure to moisture. Reacts violently with strong alkaline substances. None under normal conditions. Avoid exposing to heat and contact with strong oxidizing substances. Do not allow water to get into container because of reaction.
Hazardous decomposition products	Sulphur oxides.
Stability	Material is stable under normal conditions. Material reacts with water.
Materials to avoid	Organic compounds. Metals. Reducing agents. Bases.

11. TOXICOLOGICAL INFORMATION

Toxicological data

Product	Species	Test Results
Sulphuric Acid 98%		
Acute		
Inhalation		
Liquid		
LC50	Rat	0.51 mg/l, 2 hours
Oral		
LD50	Rat	> 2140 mg/kg

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

Acute toxicity	Very toxic by inhalation. Toxic by inhalation. Causes severe burns.
Routes of exposure	Inhalation. Skin contact. Eye contact.
Toxicological information	Occupational exposure to the substance or mixture may cause adverse effects.
Chronic toxicity	Prolonged exposure may cause chronic effects.
Carcinogenicity	Risk of cancer cannot be excluded with prolonged exposure.

Egypt OELs Carcinogen rating

SULFURIC ACID (CAS 7664-93-9)	C2 Suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

SULFURIC ACID (CAS 7664-93-9)	1 Carcinogenic to humans.

Kuwait OELs (Decision No. 210/): Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	A2 Suspected human carcinogen.

UAE - Abu Dhabi TLVs: Carcinogen Category

SULFURIC ACID (CAS 7664-93-9)	GROUP A2 Suspected human carcinogen.

Mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Reproductivity	Not classified.
Epidemiology	No epidemiological data is available for this product.
Local effects	Very toxic by inhalation. Causes severe burns. Irritating to respiratory system. May produce corrosive solutions on contact with water.

Symptoms and target organs Contact with this material will cause burns to the skin, eyes and mucous membranes.

12. ECOLOGICAL INFORMATION

Ecotoxicological data

Product		Species	Test Results
Sulphuric Acid 98%			
Aquatic			
Acute			
Fish	LC50	Fish	> 42 mg/l, 96 hours

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

Ecotoxicity Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems. Not expected to be harmful to aquatic organisms.

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

Persistence / degradability

Bioaccumulation No data available.

Aquatic toxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Mobility This product is miscible in water.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. DISPOSAL CONSIDERATIONS

Disposal instructions Consult authorities before disposal. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground. Dispose in accordance with all applicable regulations.

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

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

14. TRANSPORT INFORMATION

DOT

- **UN number** UN1830
- **UN proper shipping name** Sulfuric acid with more than 51 percent acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
  - **Label(s)** 8
- **Packing group** II
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Special provisions** A3, A7, B3, B83, B84, IB2, N34, T8, TP2, TP12
- **Packaging exceptions** 154
- **Packaging non bulk** 202
- **Packaging bulk** 242

IATA

- **UN number** UN1830
- **UN proper shipping name** Sulphuric acid with more than 51% acid
- **Transport hazard class(es)**
  - **Class** 8
  - **Subsidiary risk** -
- **Packing group** II
- **Environmental hazards** No.
- **ERG Code** 8L
- **Special precautions for user** Read safety instructions, SDS and emergency procedures before handling.
- **Other information**
  - **Passenger and cargo aircraft** Allowed with restrictions.
  - **Cargo aircraft only** Allowed with restrictions.

IMDG

- **UN number** UN1830

UN proper shipping name	SULPHURIC ACID with more than 51% acid
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

DOT

IATA; IMDG

15. REGULATORY INFORMATION

Labeling

Contains	SULFURIC ACID
Symbol(s)	

Corrosive

R-phrase(s)	R35 Causes severe burns.
S-phrase(s)	S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30 Never add water to this product. S36/37/39 Wear suitable protective clothing, gloves and eye/face protection. S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60 This material and its container must be disposed of as hazardous waste.

Follow national regulation for work with chemical agents.

Bahrain. Chemicals Subject to the Prior Informed Consent Procedure under the Rotterdam Convention (Law No. 14 of 2012, Annex III)

Not listed.

Bahrain. CWC Chemical Substances (Decree No. 6 of 1997, Schedules 1, 2 and 3; Law No. 51 of 2009)

Not listed.

Bahrain. Prohibited Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 1)

Not listed.

Bahrain. Severely Restricted Chemicals (Ministry of State for Municipal & Environmental Affairs, Resolution No 7 of 2002, On Control of Importing & Use of Prohibited & Restricted Chemicals, Table 2)

Not listed.

Regulatory information

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

16. OTHER INFORMATION

Wording of the R-phrases in sections 2 and 3

R35 Causes severe burns.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

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

Recommended use

Use in accordance with supplier's recommendations.

Recommended restrictions

PROFESSIONAL USE ONLY

Disclaimer

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

Revision information

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

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3 – DRAWINGS

3.1 – PROCESS FLOW DIAGRAM

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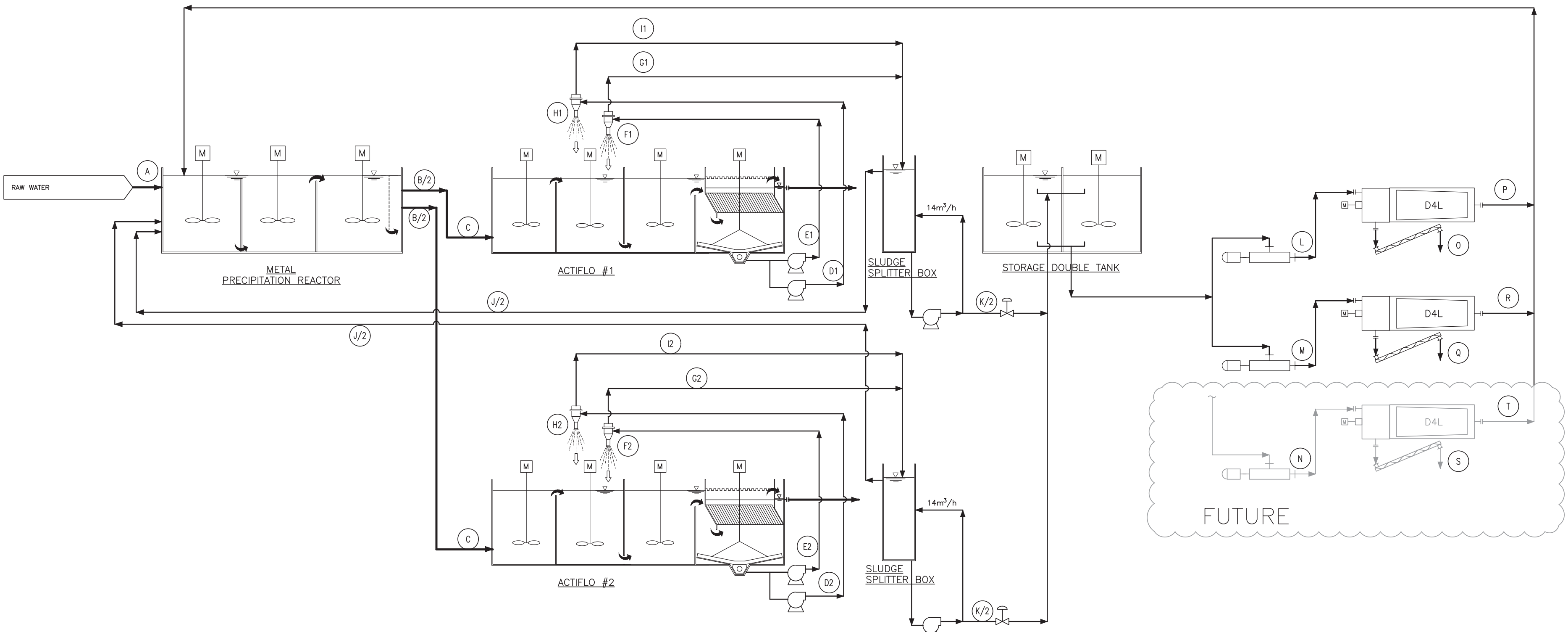

	<250 ppm			500 ppm		
	Flow (m3/h)	Conc (mg/L)	Solid (kgD/h)	Flow (m3/h)	Conc (mg/L)	Solid (kgD/h)
A	1600	250	400	1600	500	800
B	1710	984	1683	1820	1850	3367
C	855	984	841	910	1850	1683.5
D1 and D2	70	15000	1050	70	15000	1050
E1 and E2	**Just one sand recirculation pump/Actiflo**			70	15000	1050
F1 and F2	14	15000	210	14	15000	210
G1 and G2	56	15000	840	56	15000	840
H1 and H2	**Just one sand recirculation pump/Actiflo**			14	15000	210
I1 and I2	**Just one sand recirculation pump/Actiflo**			56	15000	840
J	84	15000	1260	168	15000	2520
K	28	15000	420	56	15000	840
L	14	15000	210	18.9	15000	283.5
M	14	15000	210	18.9	15000	283.5
N	**Only two centrifuges required**			18.9	15000	283.5
O	1	200000	200	1.33	200000	266.67
P	13	810	11	17.3	800	13.84
Q	1	200000	200	1.33	200000	266.67
R	13	810	11	17.3	800	13.84
S	**Only two centrifuges required**			1.33	200000	266.67
T	**Only two centrifuges required**			17.3	800	13.84

REF: N/A

RÉV. / REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
1	FOR APPROVAL	2018-05-02	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

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

CLIENT: AGNICO EAGLE MINING, AMARUQ, NU

TITRE / TITLE: WATER TREATMENT PLANT PROCESS FLOW DIAGRAM

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT DESSIN No /DRAWING No: 5000218009 – PF0001 | INTERNE / INTERNAL: GEN | FEUILLET / SHEET: 1/1 | RÉV./REV: 1

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3 – DRAWINGS

3.2 – PROCESS AND INSTRUMENTATION DIAGRAM

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ABBREVIATIONS

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

PIPING AND TUBING MATERIALS

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

FLOWS AND LINES

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

INSTRUMENTATION AND RELATED ITEMS

– CAPILLARY TUBING
– ELECTRICAL
– HYDRAULIC
– PNEUMATIC
– DATA LINK

VALVE SYMBOLS

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

ACTUATORS

– CYLINDER
– DIAPHRAGM–SPRING
– ELECTRO HYDRAULIC
– ELECTRO PNEUMATIC
– MOTOR
– SOLENOID
– POSITIONER * – TYPE

PIPING ACCESSORIES

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

ISA INSTRUMENT IDENTIFICATION TABLE

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

LEGEND BASED ON ISA STANDARD S 5.1

INSTRUMENT TAG NUMBERS

TIC 103 – INSTRUMENTATION IDENTIFICATION OR TAG NUMBER
103 – LOOP NUMBER
TIC – FUNCTIONAL IDENTIFICATION
NOTE: HYPHENS ARE OPTIONAL AS SEPARATORS

ELECTRICAL AND RELATED ITEMS

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

LINE NUMBER IDENTIFICATION

25–xxyy–zzzz–0

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

NOTE : Refer to project pipe specifications for line codes

LINE CONTINUATIONS

INDICATES A LINE GOING TO OR COMING FROM BATTERY LIMITS (CONTRACT LIMITS)

5 A/2 – INDICATES CONTINUATION OF LINE IS ON SHEET NUMBER 5 (SAME DRAWING NUMBER) IN ZONE A 2

SHT 5 – INDICATES CONTINUATION OF A SIGNAL IS ON SHEET NUMBER 5

EQUIPMENT TAG NUMBERS

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

VALVE & ACCESSORY TAG

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

INSTRUMENT SYMBOLS

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

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

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

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

REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
4	FOR APPROVAL IV	2018–07–04	A.C.	G.P.	G.P.
3	FOR APPROVAL III	2018–05–31	A.C.	G.P.	G.P.
2	FOR APPROVAL II	2018–05–07	A.C.	G.P.	G.P.
1	FOR APPROVAL	2018–04–25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY A.C. DATE 2018–04–04
VÉRIFIÉ PAR/CHECKED BY G.P. DATE 2018–04–04
INGÉNIERIE PAR/ENGINEERING BY G.P. DATE 2018–04–04

CLIENT: AGNICO EAGLE MINING
AMARUQ, NU

TITRE / TITLE: WATER TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM
LEGEND

ÉCHELLE / SCALE: N.T.S.
PROJET / PROJECT – DESSIN No /DRAWING No: 5000218009 – PI0001
INTERNE / INTERNAL: GEN
FEUILLET / SHEET: 0/19
REV./REV: 4

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REF: N/A
SIZE ANSI D

Notes :

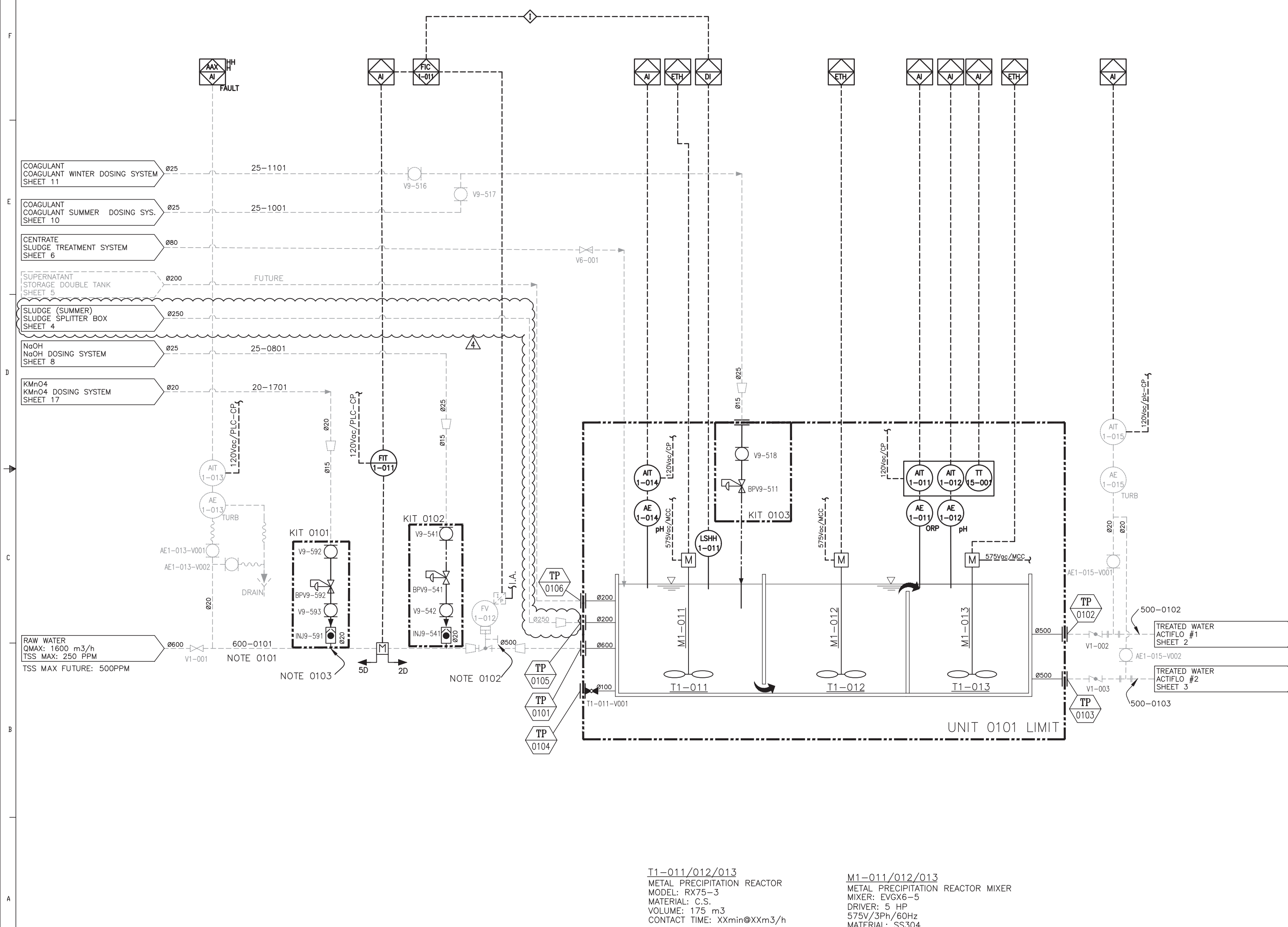
Note 0101 : Raw water Inlet pressure: 14 Psig.

Note 0102 : Flow control valve equipped with a declutchable gear and a handwheel

Note 0103 : Install as far as possible from reactor inlet

VWT Canada Scope of Supply limits:

RX-75-3 Reactors are pre-mounted as much as possible. However, for freight purposes or general practical reasons, the installation of some items needs to be completed on site by the Subcontractor.



REV.	DESCRIPTION	DATE	RÉVISÉ / REVISED	VÉRIFIÉ / CHECKED	APPROUVÉ / APPROVED
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1	FOR APPROVAL	2018-04-25	A.C.	G.P.	G.P.

VEOLIA WATER TECHNOLOGIES

DESSINÉ PAR/DRAWN BY: A.C.	DATE: 2018-04-04	CLIENT: AGNICO EAGLE MINING, AMARUQ, NU
VÉRIFIÉ PAR/CHECKED BY: G.P.	DATE: 2018-04-04	
INGÉNIERIE PAR/ENGINEERING BY: G.P.	DATE: 2018-04-04	

TITRE / TITLE: WATER TREATMENT PLANT — PROCESS AND INSTRUMENTATION DIAGRAM — METAL PRECIPITATION REACTOR

ÉCHELLE / SCALE: N.T.S.

PROJET / PROJECT	DESSIN No / DRAWING No	INTERNE / INTERNAL	FEUILLET / SHEET	REV./REV
5000218009	PI0001	GEN	1/19	4

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REF: N/A — SIZE ANSI D