



May 26th 2017

Karén Kharatyan
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Re: Water License 2AM-MEL1631 Part F, Item 9 - Submission of Operation and Maintenance Manual for the Effluent Water Treatment Plant

Mr. Kharatyan,

In accordance with Part F Item 9 of Water License 2AM-MEL1631,

"The Licensee shall submit to the Board for approval in writing an Operation and Maintenance Manual(s) for the Wastewater Treatment Plant(s), including the Sewage Treatment Plant, at least ninety (90) days prior to the construction/installation of facilities, 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". The Manual(s) shall include sludge management and disposal information and contingency measures in the event of plant malfunction."

please find enclosed with this letter, the Operation and Maintenance Manual for the Effluent Water Treatment Plant. Agnico Eagle is planning to commission this infrastructure upon Board's approval.

As per Part D Items 1&2, a 30 day notice including the final design and construction drawings will be submitted prior to commissioning the effluent water treatment plant.

Should you have any questions regarding this submission, please contact me.

Regards,

Agnico Eagle Mines Limited – Meliadine Division

A handwritten signature in blue ink, appearing to read "Manon Turmel", with a long horizontal stroke extending to the right.

Manon Turmel
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819-759-3555 x8136
Environmental Compliance Counselor

Operation & Maintenance Manual Final Effluent Treatment Plant

In Accordance with Water License 2AM-MEL1631

Prepared by:
Agnico Eagle Mines Limited – Meliadine Division

EXECUTIVE SUMMARY

The Nunavut Water Board (NWB) has issued Type A Water License 2AM-MEL1631 to Agnico Eagle Mines Limited (Agnico Eagle) for the Meliadine Gold Project site authorizing the use of water and the disposal of waste required by mining, milling, and associated uses.

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

This report documents the stand alone Operation & Maintenance Manual – Effluent Water Treatment Plant, as specified under Water License 2AM-MEL1631 Part F, Item 9 and 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

As required by Water License 2AM-MEL1631, Part D, Item 10, the proposed implementation schedule for this Plan is outlined below.

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:

- Mill Superintendent
- Site Services Superintendent
- Site Services General Foreman
- Environmental Superintendent
- Senior Environmental Coordinator
- Environmental Compliance Counselor
- Effluent Water Treatment Plant Operator

May 2017

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	24/05/2016			Operation and Maintenance Manual

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Jessica Huza
Senior Environmental Coordinator



Martin Gaumont
Mill Superintendent

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1 INTRODUCTION

1.1 PURPOSE

This Effluent Water Treatment Plant (EWTP) Operation and Maintenance Manual (OMM) for the Meliadine Gold Project (the Project) has been prepared in accordance with the Nunavut Water Board (NWB) Type A Water License 2AM-MEL1631 (Type A Licence), Part F, item 9, and is 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 manual has been adapted for the use of a mechanical contact water treatment facility.

This manual is a component of the Meliadine 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 EWTP.

1.2 BRIEF DESCRIPTION OF THE PROJECT

Agnico Eagle is developing the Project, located approximately 25 kilometres (km) north of Rankin Inlet, and 80 km southwest of the Hamlet of Chesterfield Inlet in the Kivalliq Region of Nunavut. Situated on the western shore of Hudson Bay, the Project site is located on a peninsula between the east, south, and west basins of Meliadine Lake (63°1'23.8" N, 92°13'6.42"W) on Inuit Owned Land.

Gold will be extracted using traditional open-pit and underground mining methods during the mine life. Access to the site is via an all-weather access road from the Hamlet of Rankin Inlet. On-site facilities will include a mill, power plant, maintenance facilities, tank farm for fuel storage, EWTP, sewage treatment plant, as well as accommodation and kitchen facilities for 520 people.

During mine construction and operation, contact water originating from affected areas on surface will be intercepted, diverted and collected within the various collection ponds. The collected water at the mine site will be eventually pumped and stored in the Collection Pond 1 (CP1), where the contact water will be treated by the EWTP prior to discharge to the receiving environment, or used as make-up water at the mill. Figures 1 and 2 illustrate the location and general arrangement of the EWTP.

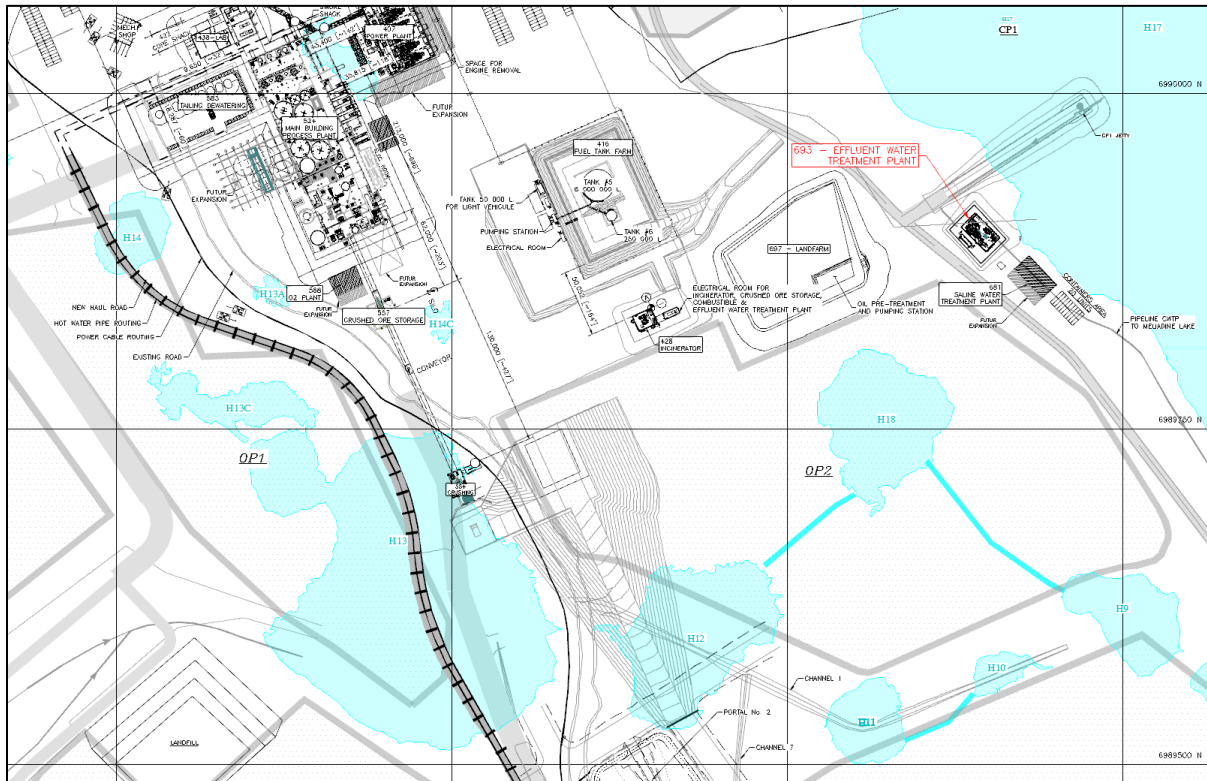


Figure 1 – Location of Meliadine EWTP

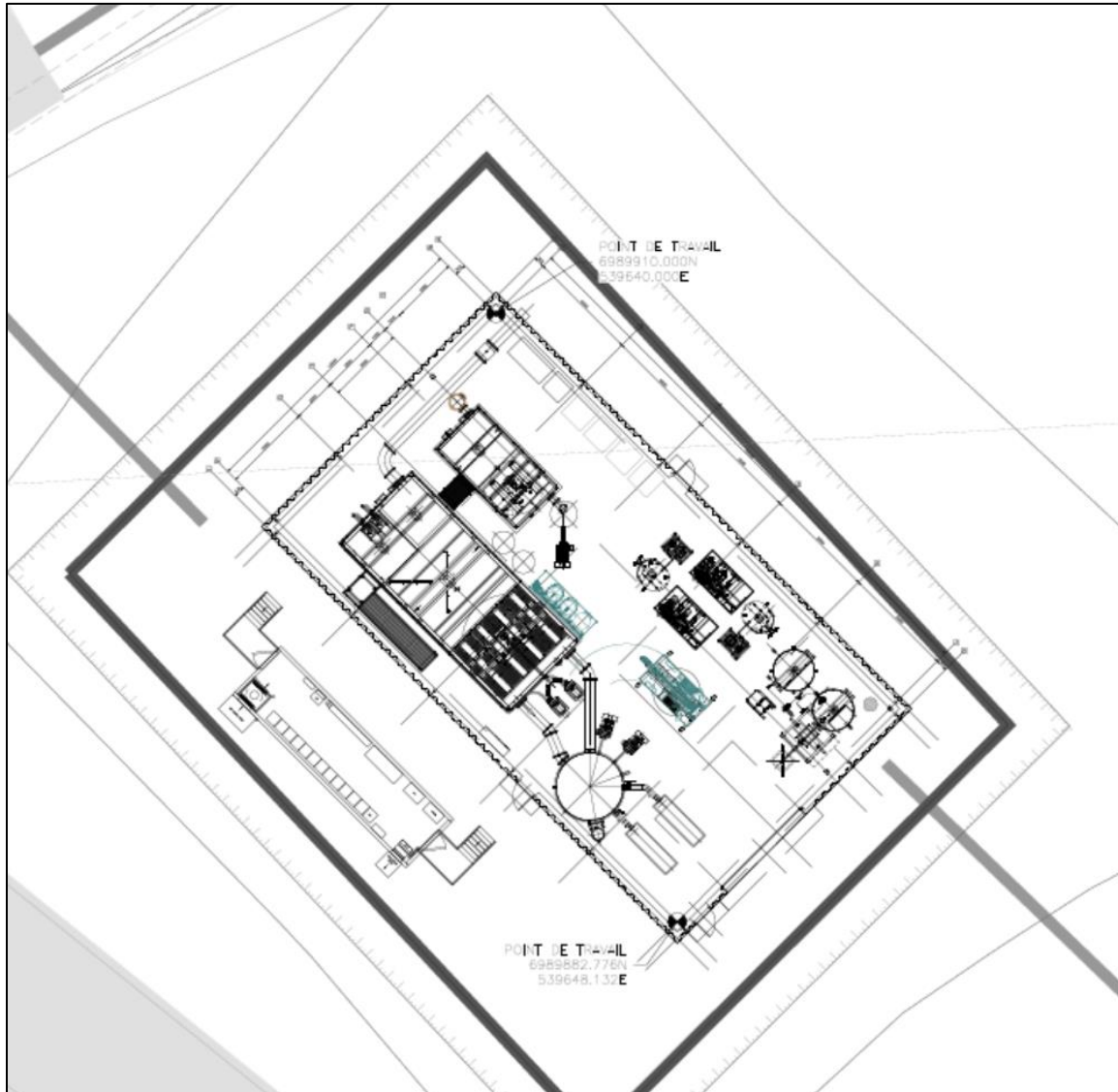


Figure 2 – General Arrangement of Meliadine EWTP

1.3 CONTACT INFORMATION

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

Mill Superintendent	819-759-3555 ext 8116
Site Services Superintendent	819-759-3555 ext 3910
Site Services General Foreman	819-759-3555 ext 3980

2 DESCRIPTION

2.1 EFFLUENT WATER TREATMENT PLANT (EWTP)

2.1.1 *Process summary*

The purpose of the EWTP (ACP-700R) is to remove Total Suspended Solids (TSS) from the influent water pumped from CP1. The equipment has an operational range of 6,250 to 28,000 m³/d. It is expected that the EWTP will be in use only during the open water season, approximately four (4) months in the year (June to October).

The first treatment component consists of one Actiflo[®] clarifier with two (2) recirculation lines and two (2) hydrocyclones. The Actiflo[®] can be operated with one (1) or two (2) lines, depending on the influent flow rate and TSS content. The hydrocyclone overflow is sent to the Multiflo for sludge thickening. The Multiflo overflows by gravity into a break tank which is then pumped into the raw water Actiflo[®] inlet pipe for recirculation. The principal purpose of the Multiflo is to decrease the amount of water sent to the mill since the total water content volume within the sludge cannot be managed at the mill. This unit does not contribute to the efficiency of the system to reduce dissolved chemical parameters within the water effluent. The Actiflo[®] overflow is designed to meet the Type A License final effluent discharge criteria for TSS concentrations. The final effluent is monitored for pH, turbidity and flow rate, which are monitored continuously.

The Multiflo will be installed in 2018, prior to the start-up of the mill.

The EWTP general flow diagram is illustrated in Figure 3. The following sections describe the EWTP components.

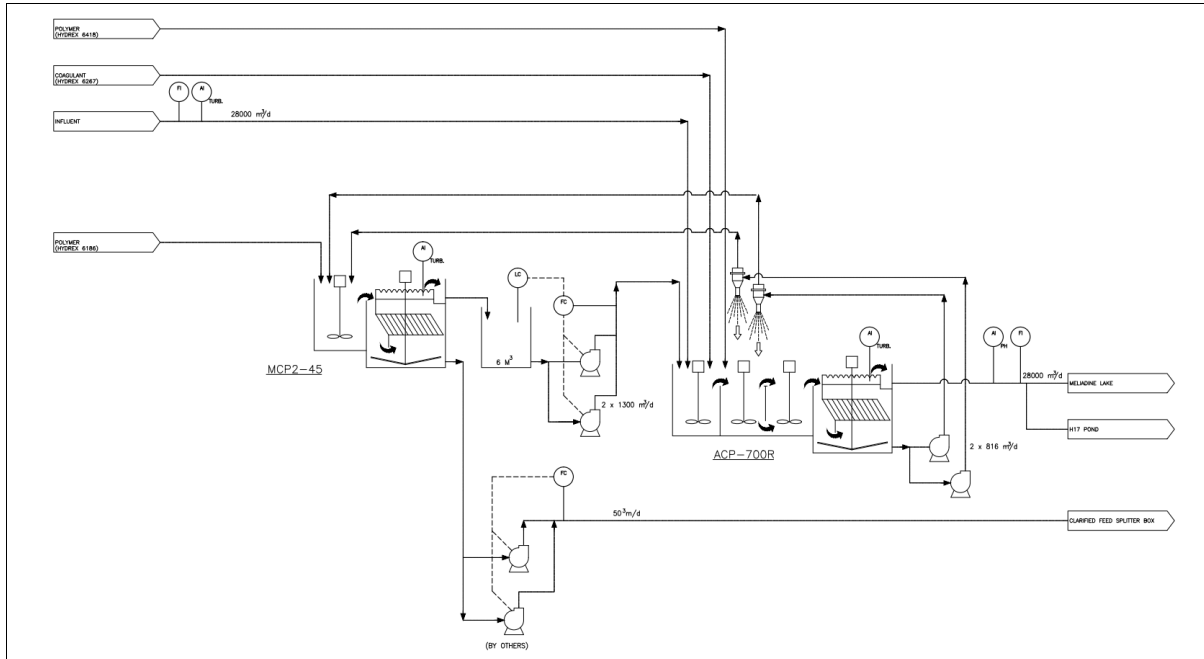


Figure 3 – Meliadine EWTP Overall Process Flow Diagram

2.1.2 Actiflo®

The Actiflo® clarifier uses sand ballasted settling, a high rate coagulation/flocculation/sedimentation process. In the coagulation basin, TSS are destabilised under the action of the coagulant and start to form small aggregates (also called flocs). The coagulant is a trivalent soluble metal compound, usually iron or aluminium, which will cause coagulation when it reaches a certain concentration. Once the coagulant has performed the destabilising effect, it will precipitate as a metal hydroxide and will participate in the formation of the aggregates. Water then flows into a second tank called the injection tank. There, micro-sand and polymer are added. The polymer acts as a flocculant aid, binding the destabilised solids together with the micro-sand particles by forming polymer bridges. The micro-sand provides a large contact area for floc attachment and acts as a ballast, thereby accelerating the settling of the flocs. From the injection tank, water flows into the maturation tank where flocs formed in the previous stage agglomerate and grow into high density flocs known as micro-sand ballasted flocs. Water then overflows to the settling section of the tank, and with the help of the lamella system, a solid-liquid separation is achieved resulting in clarified water exiting from the system via a collection trough or weirs. The clarified water is monitored for pH, turbidity and flow rate prior to final discharge. The flow rate signal is also connected to a flow totalizer.

The flocs settle in a portion of the system where they are collected by a rake mechanism. A proportion of the unit's design raw water flow is continuously withdrawn from the clarifier and pumped to a hydrocyclone system which separates the micro-sand from the sludge. The recovered micro-sand is reused in the process. A small quantity of the micro-sand is not recovered by the hydrocyclones and remains within the sludge discharged to CP1. The lost micro-sand needs to be

replaced periodically by adding more to the process. After micro-sand separation, the sludge is sent to the Multiflo clarifier, from which the supernatant water is recirculated to the head of the Actiflo® unit. This step results in densification of the sludge, which is then sent to the mill in which the water is recovered and the solids are blended with the filtered tailings.

During the first season of water treatment, the mill will not be in operation and the sludge from the Actiflo® will be managed differently. During this first treatment year, the Multiflo unit is not required as sufficient capacity exists within CP1 to manage the water contained within the sludge. As such, the sludge from the overflow of the hydrocyclone will be returned to CP1 where the coagulated solids will settle in the pond. Any solids that do not settle will be returned to the treatment system and will not be discharged to the environment. The amount of solids flushed to CP1 (estimated at 1% solids) within the sludge is determined to be sufficiently low and will not lead to a significant solids or sediment accumulation in CP1 prior to commissioning of the Multiflo.

2.1.3 Multiflo

The Multiflo will be installed and in operation in 2018, prior to the mill start-up.

The sludge extracted from the Actiflo® is transferred to the Multiflo to increase the sludge solid content to 5-8% w/w solids. The Multiflo is a compact clarification system using a flocculation reactor and enhanced lamella settling. The sludge enters the first tank section called the flocculation tank, where an anionic polymer is added. The polymer binds the suspended solids by forming polymer bridges and the flocs agglomerate and grow into high-density flocs settle quickly to the bottom of the unit. In the settling zone, the efficiency of the settling is further increased by the use of the lamella tubes. The sludge is collected at the bottom of the settling tank, under the lamella tubes. The sludge produced will be pumped to the mill, while the supernatant water will flow to a transfer tank and pumped to the Actiflo®.

2.1.4 Service Water System

The service water system consists of two (2) multimedia filters, two (2) heaters, one (1) filtered water tank and four (4) 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.

2.1.5 Reagents

Two (2) types of polymers as well as a coagulant are used to treat the water that flows through the Actiflo®, each is supplied by a dosing system that is adjusted according to the influent flow rate. One cationic and one anionic polymer are used. Treated water from the Actiflo® is used for the mixing of the reagents. The MSDS sheets are provided at Appendix A.

2.1.6 Controls

The Actiflo® Feed Pump is equipped with a variable frequency drive (VFD) that allows the flow to be modulated. A controller uses the raw water flow meter (65FIT6930001) signal and adjusts the frequency of the pump to obtain the flow specified by the Operator and to maintain a constant flow rate to the system.

The raw water TSS analyzer is used to monitor the raw water quality. An alarm is triggered when a high-high turbidity is reached and if only one recirculation pump is running.

The effluent water TSS concentration and pH values 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. This will trigger the two (2) outflow valves to automatically divert the final effluent to CP1, preventing discharge to the environment.

Addition of the two (2) required reagents is proportional to the influent water flow. Since this flow is maintained constantly by a control loop, 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.

3 OPERATION AND MAINTENANCE

3.1 PUMPING

The system includes mainly pumps for the operation of the EWTP. Some of these pumps are equipped with a 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 EWTP 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 in place. 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.

3.3 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 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. The output of these instruments 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 actuated valves allowing an automatic diversion of the effluent to CP1.

The final effluent will be sampled for water quality following the frequency and parameters stipulated in the Type A License 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 License and the Metal Mining Effluent Regulations (MMER), the final effluent discharged to Meliadine Lake shall not exceed a pH range between 6.0 and 9.5 or a maximum average concentration for TSS of 15 mg/L, and a maximum of 30 mg/L for a grab sample.

3.4 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 B.

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.

3.5 RECORD KEEPING

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

As per the Type A License Part I Item 9d and e, the following will be recorded on a daily basis:

- Volume of effluent discharged to Meliadine Lake
- Volume of reclaim water obtained from CP1

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.

3.6 SAFETY PROCEDURES FOR OPERATORS

Operators working in the EWTP 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 EWTP. The following are important safety considerations:

- Working with non-treated water 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 EWTP will be readily available for the Operator at all times.
- Eyewash stations are located within proximity of reagent systems in the EWTP.

3.7 CONTROLLING ACCESS TO THE EWTP

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

4 EMERGENCY RESPONSE

4.1 FIRE

In case of fire at the EWTP, 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 EWTP. Further details of fire response are provided in the "*Risk Management & Emergency Response Plan*". The EWTP 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 EWTP. In the event of a spill at the EWTP, 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 EWTP. A spill kit will be available at the EWTP. Further details regarding the site spill response procedure are provided in the "*Spill Contingency Plan*".

4.3 PLANT MALFUNCTION

If there is a major problem or failure in the EWTP, 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 will be an increase of TSS in the effluent. This would be managed by the process control systems in place, which will automatically divert the flow to CP1. In such an event, the problem will be investigated while the system is operated in closed circuit with CP1. 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.

Appendix A: Reagent MSDS Sheets

1. Identification

Product identifier	HYDREX 3267
Other means of identification	None.
Recommended use	Potable Water Treatment
Recommended restrictions	PROFESSIONAL USE ONLY
Manufacturer/Importer/Supplier/Distributor 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	vwatcanada-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	Not classified.
Environmental hazards	Hazardous to the aquatic environment, acute Category 3 hazard
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	Harmful to aquatic life.
Precautionary statement	
Prevention	Avoid release to the environment.
Response	Wash hands after handling.
Storage	Store in cool place. Protect from sunlight. Store away from incompatible materials.
Disposal	Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.
Other hazards	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
ALUMINUM, WATER SOLUBLE SALTS, N.O.S.		39290-78-3	95
Other components below reportable levels			5

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	Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.

Material name: HYDREX 3267

2960 Version #: 01 Issue date: 04-20-2017

SDS Canada

Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Dusts may irritate the respiratory tract, skin and eyes.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO ₂).
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. Prevent product from entering drains. Large Spills: Stop the flow of material, if this is without risk. Shovel the material into waste container. Following product recovery, flush area with water. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value	Form
HYDREX 3267	TWA	1 mg/m ³	Respirable fraction.

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

Material	Type	Value
HYDREX 3267	TWA	2 mg/m ³

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

Material	Type	Value	Form
HYDREX 3267	TWA	1 mg/m3	Respirable.

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

Material	Type	Value	Form
HYDREX 3267	TWA	1 mg/m3	Respirable fraction.

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

Material	Type	Value
HYDREX 3267	TWA	2 mg/m3

Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits.
Individual protection measures, such as 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. Before any handling, wear protective glasses side-shields complying with the NF EN 166.
Skin protection	
Hand protection	Chemical resistant gloves.
Other	Wear suitable protective clothing. Chemical resistant gloves.
Respiratory protection	Wear respirator with dust filter.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	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	Powder.
Physical state	Solid.
Form	Powder.
Color	Pale yellow
Odor	Slight
Odor threshold	Not available.
pH	3 - 5 (0.3% solution)
Melting point/freezing point	10.4 °F (-12 °C) (33% solution)
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	Not available.
Vapor density	Not available.
Relative density	Not available.

Material name: HYDREX 3267

2960 Version #: 01 Issue date: 04-20-2017

SDS Canada

Solubility(ies)	
Solubility (water)	Easily soluble in cold water.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	800.00 - 900.00 kg/m3
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Specific gravity	0.8 - 0.9

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. None under normal conditions.
Incompatible materials	Ammonia. Chlorine. Do not mix with other chemicals. Alkalies.
Hazardous decomposition products	Aluminum and Sulfur oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Dust may irritate the eyes.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics	Dusts may irritate the respiratory tract, skin and eyes.
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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.
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Carcinogenicity	Not available.
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Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
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Specific target organ toxicity - single exposure	Not classified.
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Specific target organ toxicity - repeated exposure	Not classified.
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Aspiration hazard	Not an aspiration hazard.
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12. Ecological information

Ecotoxicity	Harmful to aquatic life.
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Product	Species		Test Results
HYDREX 3267			
Aquatic			
Crustacea	EC50	Daphnia	91.5789 mg/l, 48 hours estimated
<i>Acute</i>			
Algae	EC50	Algae	14 mg/l, 72 hours OCDE TG 201

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

Persistence and degradability

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. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. 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 This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

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 Additional information is given in the Safety Data Sheet.

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)	No
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)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	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

Issue date	04-20-2017
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 Composition / Information on Ingredients: Ingredients Physical & Chemical Properties: Multiple Properties Toxicological Information: Toxicological Data Ecological Information: Ecotoxicity Regulatory Information: United States GHS: Classification

1. Identification

Identificateur de produit	HYDREX 3267
Autres moyens d'identification	Aucune.
Usage recommandé	Traitement de l'eau potable
Restrictions d'utilisation	USAGE PROFESSIONNEL
Renseignements sur le fabricant/importateur/fournisseur/distributeur	
Fournisseur	Veolia Water Technologies Canada Inc.
Adresse	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Personne à contacter	Hydrex Product Specialist
Téléphone	(905) 286-4846
Télécopieur	(905) 286-0488
courriel	vwatcanada-hydrex@veolia.com
24 Hr Numéro de téléphone d'appel d'urgence	+1-760-476-3962 (Code:333239)
Fournisseur	Non disponible.

2. Identification des dangers

Dangers physiques	Non classé.
Dangers pour la santé	Non classé.
Dangers environnementaux	Dangereux pour le milieu aquatique, danger aigu Catégorie 3
Éléments d'étiquetage	
Symbole de danger	Aucune.
Mention d'avertissement	Aucune.
Mention de danger	Nocif pour les organismes aquatiques.
Conseil de prudence	
Prévention	Éviter le rejet dans l'environnement.
Intervention	Se laver les mains après utilisation.
Stockage	Stocker dans un endroit frais. Protéger du rayonnement solaire. Conserver à l'écart de matières incompatibles.
Élimination	Éliminer le contenu/contenant dans une installation appropriée de traitement et d'élimination conformément aux lois et règlements applicables, ainsi qu'en fonction des caractéristiques du produit au moment de l'élimination.
Autres dangers	Aucun(e) connu(e).
Renseignements supplémentaires	Aucune.

3. Composition/information sur les ingrédients

Mélanges

Dénomination chimique	Nom commun et synonymes	Numéro d'enregistrement CAS	%
ALUMINIUM , WATER SOLUBLE SALTS, n.s.a.		39290-78-3	95
Autres composant sous les niveaux à déclarer			5

Toutes les concentrations sont en pourcentage en poids, sauf si l'ingrédient est un gaz. Les concentrations des gaz sont en pourcentage en volume.

Nom de la matière : HYDREX 3267

2960 Version n°: 01 Date d'émission : 20-Avril-2017

SDS Canada

4. Premiers soins

Inhalation	Transporter à l'extérieur. Appeler un médecin si des symptômes se développent ou persistent
Contact avec la peau	Laver avec de l'eau et du savon. Consulter un médecin si une irritation se développe et persiste.
Contact avec les yeux	Ne pas se frotter les yeux. Rincer avec de l'eau. Consulter un médecin si une irritation se développe et persiste.
Ingestion	Rincer la bouche. Consulter un médecin si des symptômes apparaissent.
Symptômes et effets les plus importants, qu'ils soient aigus ou retardés	La poussière peut irriter les voies respiratoires, la peau et les yeux.
Mention de la nécessité d'une prise en charge médicale immédiate ou d'un traitement spécial, si nécessaire	Traiter de manière symptomatique.
Informations générales	S'assurer que le personnel médical est averti du (des) produits(s) en cause et qu'il prend des mesures pour se protéger.

5. Mesures à prendre en cas d'incendie

Agents extincteurs appropriés	Brouillard d'eau. Mousse. Poudre chimique. Dioxyde de carbone (CO2).
Agents extincteurs inappropriés	Non disponible.
Dangers spécifiques du produit dangereux	Des gaz dangereux pour la santé peuvent se former pendant un incendie.
Équipements de protection spéciaux et précautions spéciales pour les pompiers	Porter un appareil respiratoire autonome et un vêtement de protection complet en cas d'incendie.
Équipement/directives de lutte contre les incendies	Utiliser une pulvérisation d'eau pour refroidir les récipients fermés.
Méthodes particulières d'intervention	Utiliser des procédures standard en cas d'incendie et tenir compte des dangers des autres substances en cause.
Risques d'incendie généraux	Aucun risque inhabituel d'incendie ou d'explosion observé.

6. Mesures à prendre en cas de déversement accidentel

Précautions individuelles, équipements de protection et mesures d'urgence	Tenir à l'écart le personnel non requis. Tenir les gens à l'écart de l'endroit du déversement/de la fuite et en amont du vent. Porter un équipement et des vêtements de protection appropriés durant le nettoyage. S'assurer une ventilation adéquate. Prévenir les autorités locales si des fuites significatives ne peuvent pas être contenues. Pour la protection individuelle, voir la section 8 de la FDS.
Méthodes et matériaux pour le confinement et le nettoyage	Éviter la formation de poussières pendant le nettoyage. Récupérer la poussière en utilisant un aspirateur muni d'un filtre HEPA. Empêcher le produit de pénétrer dans les égouts. Déversements importants : Arrêter l'écoulement de la substance, si cela peut se faire sans risque. Peller le matériau dans un conteneur à déchets. Après avoir récupéré le produit, rincer la zone à l'eau. Déversements peu importants : Balayer ou aspirer le déversement et mettre dans un récipient approprié pour élimination. Pour l'élimination des déchets, voir la section 13 de la FDS.
Précautions relatives à l'environnement	Éviter le rejet dans l'environnement. Informer le personnel de direction et de supervision de tous les rejets dans l'environnement. Empêcher d'autres fuites ou déversements lorsqu'il est possible de le faire en toute sécurité. Éviter le rejet dans les égouts, les cours d'eau ou sur le sol.

7. Manutention et stockage

Précautions relatives à la sûreté en matière de manutention	Minimiser la formation et l'accumulation de poussière. Assurer une ventilation aspirante adéquate aux endroits où la poussière se forme. Porter un équipement de protection individuelle approprié. Éviter le rejet dans l'environnement. Observer de bonnes pratiques d'hygiène industrielle.
Conditions de sûreté en matière de stockage, y compris les incompatibilités	Stocker dans des récipients d'origine fermés de manière étanche. Stocker dans un endroit bien ventilé. Stocker à l'écart des matériaux incompatibles (Consulter la section 10 de la FDS).

8. Contrôle de l'exposition/protection individuelle

Limites d'exposition professionnelle

ÉTATS-UNIS. Valeurs limites d'exposition de l'ACGIH

Substance	Type	Valeur	Forme
HYDREX 3267	TWA	1 mg/m3	Fraction respirable.

Canada. LEMT pour l'Alberta (Code de l'hygiène et de la sécurité au travail, Annexe 1, Tableau 2)

Substance	Type	Valeur
HYDREX 3267	TWA	2 mg/m3

Canada. LEMT pour la Colombie-Britannique. (Valeurs limites d'exposition en milieu de travail pour les substances chimiques, Réglementation sur la santé et sécurité au travail 296/97, ainsi modifiée)

Substance	Type	Valeur	Forme
HYDREX 3267	TWA	1 mg/m3	Respirable.

Canada. LEMT pour l'Ontario. (Contrôle de l'exposition à des agents biologiques et chimiques)

Substance	Type	Valeur	Forme
HYDREX 3267	TWA	1 mg/m3	Fraction respirable.

Canada. LEMT du Québec, (Ministère du Travail. Règlement sur la qualité du milieu de travail)

Substance	Type	Valeur
HYDREX 3267	TWA	2 mg/m3

Valeurs biologiques limites

Aucune limite d'exposition biologique observée pour les ingrédients.

Contrôles d'ingénierie appropriés

Si le matériau est moulu, coupé ou utilisé dans toute opération susceptible de créer des poussières, utiliser une ventilation locale par aspiration appropriée pour maintenir les expositions sous les limites d'exposition recommandées.

Mesures de protection individuelle, telles que les équipements de protection individuelle

Protection du visage/des yeux

Porter des lunettes de sécurité à écrans latéraux (ou des lunettes à coques) et un écran facial. Il est recommandé de porter des lunettes de protection chimique et un écran facial. Avant toute manipulation, il est nécessaire de porter des lunettes à protection latérale conformes à la norme NF EN 166.

Protection de la peau

Protection des mains

Gants résistants aux produits chimiques.

Autre

Porter un vêtement de protection approprié. Gants résistants aux produits chimiques.

Protection respiratoire

Porter un appareil respiratoire muni de filtres antipoussière.

Dangers thermiques

Porter des vêtements de protection thermique appropriés, au besoin.

Considérations d'hygiène générale

Toujours adopter de bonnes pratiques d'hygiène personnelle, comme se laver après avoir manipulé la substance et avant de manger, de boire ou de fumer. Laver régulièrement les vêtements de travail et l'équipement de protection pour éliminer les contaminants

9. Propriétés physiques et chimiques

Apparence

Poudre.

État physique

Solide.

Forme

Poudre.

Couleur

Jaune pâle

Odeur

Léger

Seuil olfactif

Non disponible.

pH

3 - 5 (0.3% solution)

Point de fusion et point de congélation

-12 °C (10.4 °F) (33% solution)

Point initial d'ébullition et domaine d'ébullition

Non disponible.

Point d'éclair

Non disponible.

Taux d'évaporation

Non disponible.

Inflammabilité (solides et gaz)	Non disponible.
Limites supérieures et inférieures d'inflammabilité ou d'explosibilité	
Limites d'inflammabilité - inférieure (%)	Non disponible.
Limites d'inflammabilité - supérieure (%)	Non disponible.
Limite d'explosibilité - inférieure (%)	Non disponible.
Limite d'explosibilité - supérieure (%)	Non disponible.
Tension de vapeur	Non disponible.
Densité de vapeur	Non disponible.
Densité relative	Non disponible.
Solubilité	
Solubilité (eau)	Facilement soluble dans l'eau froide.
Coefficient de partage n-octanol/eau	Non disponible.
Température d'auto-inflammation	Non disponible.
Température de décomposition	Non disponible.
Viscosité	Non disponible.
Autres informations	
Densité	800.00 - 900.00 kg/m3
Propriétés explosives	Non explosif.
Propriétés comburantes	Non oxydant.
Densité	0.8 - 0.9

10. Stabilité et réactivité

Réactivité	Le produit est stable et non réactif dans des conditions normales d'utilisation, d'entreposage et de transport.
Stabilité chimique	La substance est stable dans des conditions normales.
Risque de réactions dangereuses	Aucune réaction dangereuse connue dans des conditions normales d'utilisation.
Conditions à éviter	Contact avec des matériaux incompatibles. Aucun(e) dans des conditions normales.
Matériaux incompatibles	Ammoniac. Chlore Ne pas mélanger avec d'autres produits chimiques. Alcalis.
Produits de décomposition dangereux	Aluminium et Oxydes de soufre.

11. Données toxicologiques

Renseignements sur les voies d'exposition probables

Inhalation	La poussière peut irriter l'appareil respiratoire.
Contact avec la peau	La poussière ou la poudre peut irriter la peau.
Contact avec les yeux	La poussière peut irriter les yeux.
Ingestion	Faible danger présumé en cas d'ingestion.
Les symptômes correspondant aux caractéristiques physiques, chimiques et toxicologiques	La poussière peut irriter les voies respiratoires, la peau et les yeux.

Renseignements sur les effets toxicologiques

Toxicité aiguë	Non disponible.
Corrosion cutanée/irritation cutanée	Un contact prolongé avec la peau peut causer une irritation temporaire.

Lésions oculaires graves/irritation oculaire	Le contact direct avec les yeux peut causer une irritation temporaire.
Sensibilisation respiratoire ou cutanée	
Sensibilisation respiratoire	Pas un sensibilisant respiratoire.
Sensibilisation cutanée	On ne s'attend pas à ce que ce produit provoque une sensibilisation cutanée.
Mutagenicité sur les cellules germinales	Il n'existe pas de données qui indiquent que ce produit, ou tout composant présent à des taux de plus de 0,1 %, soit mutagène ou génétoxique.
Cancérogénicité	Non disponible.
Toxicité pour la reproduction	On ne s'attend pas à ce que ce produit présente des effets sur la reproduction ou le développement.
Toxicité pour certains organes cibles - exposition unique	Non classé.
Toxicité pour certains organes cibles - expositions répétées	Non classé.
Danger par aspiration	Pas un danger par aspiration.

12. Données écologiques

Écotoxicité	Nocif pour les organismes aquatiques.		
Produit	Espèces		Résultats d'épreuves
HYDREX 3267			
Aquatique			
Crustacés	CE50	Daphnia	91.5789 mg/l, 48 heures estimation
<i>Aiguë</i>			
Algues	CE50	Algues	14 mg/l, 72 heures OCDE TG 201

* Les estimations pour le produit peuvent être basées sur d'autres données de composants non montrées.

Persistence et dégradation

Potentiel de bioaccumulation	Aucune donnée disponible.
Mobilité dans le sol	Aucune donnée disponible.
Autres effets nocifs	On ne s'attend pas à ce que ce composant ait des effets néfastes sur l'environnement (par ex., appauvrissement de la couche d'ozone, potentiel de formation photochimique d'ozone, perturbation endocrinienne, potentiel de réchauffement de la planète).

13. Données sur l'élimination

Instructions pour l'élimination	Recueillir et réutiliser ou éliminer dans des récipients scellés dans un site d'élimination des déchets autorisé. Ne pas laisser la substance s'infiltrer dans les égouts/les conduits d'alimentation en eau. Ne pas contaminer les étangs, les voies navigables ou les fossés avec le produit ou le récipient utilisés. Éliminer le contenu/récipient conformément à la réglementation locale/régionale/nationale/internationale.
Règlements locaux d'élimination	Détruire conformément à toutes les réglementations applicables.
Code des déchets dangereux	Les codes de déchets doivent être attribués dans le cadre d'une consultation entre l'utilisateur, le fabricant et l'entreprise de décharge.
Déchets des résidus / produits non utilisés	Éliminer conformément à la réglementation locale. Les récipients ou pochettes vides peuvent conserver certains résidus de produit. Éliminer ce produit et son récipient d'une manière sûre (voir : instructions d'élimination).
Emballages contaminés	Comme les récipients vides peuvent contenir un résidu du produit, suivre les avertissements de l'étiquette, même une fois le récipient vide. Les contenants vides doivent être acheminés vers une installation certifiée de traitement des déchets en vue de leur élimination ou recyclage.

14. Informations relatives au transport

TMD

N'entre pas dans la réglementation des marchandises dangereuses.

IATA

N'entre pas dans la réglementation des marchandises dangereuses.

IMDG

N'entre pas dans la réglementation des marchandises dangereuses.

**Transport en vrac selon
l'Annexe II de MARPOL 73/78
et le recueil IBC**

Sans objet.

15. Informations sur la réglementation

Réglementation canadienne Ce produit a été classé conformément aux critères de danger énoncés dans le Règlement sur les produits dangereux et la FDS contient tous les renseignements exigés par le Règlement sur les produits dangereux.

Loi réglementant certaines drogues et autres substances

Non réglementé.

Liste des marchandises d'exportation contrôlée (LCPE 1999, Annexe 3)

Non inscrit.

Gaz à effet de serre

Non inscrit.

Règlements sur les précurseurs

Non réglementé.

Règlements internationaux Renseignements supplémentaires fournis sur la fiche de données de sécurité.

Convention de Stockholm

Sans objet.

Convention de Rotterdam

Sans objet.

Protocole de Kyoto

Sans objet.

Protocole de Montréal

Sans objet.

Convention de Bâle

Sans objet.

Inventaires Internationaux

Pays ou région	Nom de l'inventaire	En stock (Oui/Non)*
Australie	Inventaire australien des substances chimiques (AICS)	Non
Canada	Liste intérieure des substances (LIS)	Oui
Canada	Liste extérieure des substances (LES)	Non
Chine	Inventaire des substances chimiques existantes en Chine (IECSC)	Oui
Europe	Inventaire européen des substances chimiques commerciales existantes (EINECS)	Oui
Europe	Liste européenne des substances chimiques notifiées (ELINCS)	Non
Japon	Inventaire des substances chimiques existantes et nouvelles (ENCS)	Non
Corée	Liste des produits chimiques existants (ECL)	Oui
Nouvelle-Zélande	Inventaire de la Nouvelle-Zélande	Non
Philippines	Inventaire philippin des produits et substances chimiques (PICCS)	Non
États-Unis et Porto Rico	Inventaire du TSCA (Toxic Substances Controls Act - Loi réglementant les substances toxiques)	Oui

*La réponse « Oui » indique que tous les composants du produit sont conformes aux exigences d'entreposage du pays ayant compétence. Un « Non » indique qu'un ou plusieurs composant(s) du produit n'est/ne sont pas inscrit(s) ou exempt(s) d'une inscription sur l'inventaire administré par le(s) pays ayant compétence.

16. Autres informations

Date de publication 20-Avril-2017

Version n° 01

Nom de la matière : HYDREX 3267

2960 Version n°: 01 Date d'émission : 20-Avril-2017

SDS Canada

Avis de non-responsabilité

Veolia Water Solutions & Technologies ne peut prévoir toutes les conditions d'utilisation des présents renseignements et de son produit, ou des produits d'autres fabricants en association avec son produit. L'utilisateur est responsable d'assurer des conditions sécuritaires de manutention, d'entreposage et d'élimination du produit, et il assume toute responsabilité quant à des pertes, des blessures, des dommages ou des dépenses liés à une utilisation incorrecte ou au non-respect des exigences de Veolia Solutions & Technologies.

Informations relatives à la révision

Identification du produit et de l'entreprise : Identification du produit et de l'entreprise
Composition / renseignements sur les ingrédients : Sommaire des composants
Propriétés physiques et chimiques : Propriétés multiples
Données toxicologiques : Données toxicologiques
Données écologiques: Effets écotoxicologiques
Données réglementaires: États-Unis
GHS: Classification

Coagulant

Water Clarification - Polyaluminum Chloride

Description and Use

Hydrex 3267 is a highly effective polyaluminum chloride based coagulant, supplied in solid form. This product provides a most concentrated form of active aluminum and is a cost-efficient approach where bulk delivery of liquid product is not an option.

Advantages

Hydrex 3267 provides the performance well associated with polyaluminum chloride coagulant chemistry in a most concentrated form. Reduced transportation costs, the elimination of bulk storage footprint or the elimination of tote IBC management issues are benefits associated with this form of polyaluminum chloride.

Application Information

Hydrex 3267 is rehydrated to a 33 percent (by weight) solution, prior to dosing to the system. Contact your Hydrex representative to provide verification of the active aluminum concentration of this solution.

Rehydration of Hydrex 3267 to a 33% solution should be performed with the highest quality water available. Dissolution is best achieved through use of warm water to a temperature limit of 70 degrees celsius. While complete dissolution is attainable at lower temperature, additional mixing time may be required. Take care to add the dry Hydrex 3267 in a controlled flow of the powder. Avoid "dumping" large mass of Hydrex 3267 that is disproportionately greater to the mass of dilution water.

Hydrex 3267 is to be stored in a cool, dry location. Keep shipping containers unopened until required for use. For best results, Hydrex 3267 should be stored in conditions in which relative humidity does not exceed 30%. Storage temperature should not exceed 30 degrees celsius. Environmental control systems are recommended for optimal product performance.

Coagulant

Water Clarification - Polyaluminum Chloride

Specifications

Physical Form :	Solid (powder)
Bulk Density :	800 to 900 kg/m ³
Specific Gravity (g/cm ³) @ 25°C :	1.1 to 1.3 (as 33% solution)
Product pH :	3.0 to 5.0 (as 33% solution)
Color :	Pale Yellow
Freezing Point (°C/°F) :	Not Applicable
Solubility :	Complete (30 minutes in most cases)

Materials Compatibility

Solution tanks, piping and all wetted components should be constructed from a selection including teflon or cross-linked polyethylene. Hydrex 3267 is mildly corrosive. Avoid use of mild steel, copper, aluminum and stainless steel in contact with the solution.

Storage of the the dry Hydrex 3267 in stainless steel is acceptable.

Packaging

Hydrex 3267 is available in 25 kags or 800 kilogram supersacs.

Safety Information

Refer to the product Material Safety Data Sheet before use.

Polychlorure d'aluminium en poudre

Applications

L'HYDREX 3267 est un polychlorure d'aluminium parmi les plus performant.

Ce coagulant de haute pureté, partiellement neutralisé et polymérisé, permet d'obtenir d'excellentes performances dans le traitement des eaux potables, usées et industrielles.

Avantages

L'HYDREX 3267 amène une réduction du volume de boues, une diminution des produits correcteurs de pH, une meilleure qualité d'eau finie et des performances accrues en eaux froides.

L'HYDREX 3267 réagit particulièrement bien dans les procédés ou applications de filtration directe, de maturation des filtres, de décantation lestée, ou sur des eaux à très faibles ou très fortes turbidités.

L'utilisation du L'HYDREX 3267 en poudre permet de réduire les coûts de transport et de faciliter l'entreposage dans des conditions froides.

Mise en œuvre

DOSAGE

L'HYDREX 3267 peut être remis en solution. Afin d'obtenir une concentration de 5,3% Al (solution originale), ajouter en rapport massique 1 partie de HYDREX 3267 à 2 parties d'eau. Ajouter graduellement la poudre à l'eau tout en mélangeant.

Polychlorure d'aluminium en poudre

Spécifications

SPÉCIFICATIONS – CANADA

Apparence :	Poudre jaune pâle,hygroscopique
Aluminium (Al) :	>15,9%
Al ₂ O ₃ (%) :	>30%
Basicité :	51 ± 4%
Sulfates (SO ₄) :	9,0 ± 0,5%
Densité de vrac :	0, 85 ± 0,05
Humidité (%) :	4,50 ± 2,0%

TYPIQUEMENT pour une solution de 33%

pH (0,3% massique)	4,3 ± 0,7
Basicité (%)	50%
Densité relative	1,23 kg/L
Point de congélation	-12° C / 10° F

Compatibilité Matériels

Le Kemira STERNPAC DRY devrait être entreposé dans un endroit sec.

Protéger de l'humidité

Conditionnement

Sur demande

Sécurité

La manipulation de tous produits chimiques demande de la précaution.

Quiconque est responsable de l'utilisation et de la manipulation de L'HYDREX 3267 devrait se familiariser avec les consignes de sécurité détaillées dans notre fiche signalétique.

1. Identification

Product identifier	Hydrex 3613
Other means of identification	None.
Recommended use	Potable Water Flocculant
Recommended restrictions	PROFESSIONAL USE ONLY
Manufacturer/Importer/Supplier/Distributor 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	vwatcanada-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	Not classified.
Environmental hazards	Not classified.
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	The mixture does not meet the criteria for classification.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store in cool place. Protect from sunlight. Store away from incompatible materials.
Disposal	Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.
Other hazards	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
ADIPIC ACID		124-04-9	1 - < 3
Other components below reportable levels			90 - 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	Do not rub eyes. 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	Dusts may irritate the respiratory tract, skin and eyes.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO ₂).
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	Material can be slippery when wet. 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. Wear appropriate protective equipment and clothing during clean-up. For personal protection, see section 8 of the SDS. Slippery when wet.
Methods and materials for containment and cleaning up	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. Stop the flow of material, if this is without risk. Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. 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	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Material can be slippery when wet. Practice good housekeeping.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits.
Individual protection measures, such as 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. Before any handling, wear protective glasses side-shields complying with the NF EN 166.
Skin protection	
Hand protection	Chemical resistant gloves.
Other	Wear suitable protective clothing. Chemical resistant gloves.
Respiratory protection	Wear respirator with dust filter.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

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	Granular or Powder.
Physical state	Solid.
Form	Powder.
Color	Off-white.
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	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	0.70 - 0.80 g/cm3
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
pH of 1% Solution	3 - 5

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. Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Contact with incompatible materials. None under normal conditions.
Incompatible materials	Oxygen.
Hazardous decomposition products	No dangerous reaction known under conditions of normal use. At thermal decomposition temperatures, carbon monoxide and carbon dioxide. Ammonia. Nitrogen oxides (NOx). Hydrogen chloride.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Dust may irritate the eyes.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics Dusts may irritate the respiratory tract, skin and eyes.

Information on toxicological effects

Acute toxicity Not known.

Product	Species	Test Results
Hydrex 3613		
Acute		
Oral		
LD50	Rat	> 5000 mg/kg

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

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 Not available.

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.

Further information This product has no known adverse effect on human health.

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.

Product	Species		Test Results
Hydrex 3613			
Aquatic			
Crustacea	EC50	Daphnia	> 10 mg/l, 48 hr
Fish	LC50	Fish	3880 mg/l, 96 hours estimated

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

Persistence and degradability

Bioaccumulative potential

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.
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 Not applicable.

**Annex II of MARPOL 73/78
and the IBC Code**

15. Regulatory information

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

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 Additional information is given in the Safety Data Sheet.

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)	No
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	04-20-2017
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 Hazards Identification: US Hazardous Composition / Information on Ingredients: Ingredients Toxicological Information: Toxicological Data Regulatory Information: United States GHS: Classification

1. Identification

Identificateur de produit	Hydrex 3613
Autres moyens d'identification	Aucune.
Usage recommandé	Floculant pour eau potable
Restrictions d'utilisation	USAGE PROFESSIONNEL
Renseignements sur le fabricant/importateur/fournisseur/distributeur	
Fournisseur	Veolia Water Technologies Canada Inc.
Adresse	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Personne à contacter	Hydrex Product Specialist
Téléphone	(905) 286-4846
Télécopieur	(905) 286-0488
courriel	vwatcanada-hydrex@veolia.com
24 Hr Numéro de téléphone d'appel d'urgence	+1-760-476-3962 (Code:333239)
Fournisseur	Non disponible.

2. Identification des dangers

Dangers physiques	Non classé.
Dangers pour la santé	Non classé.
Dangers environnementaux	Non classé.
Éléments d'étiquetage	
Symbole de danger	Aucune.
Mention d'avertissement	Aucune.
Mention de danger	Le mélange ne satisfait pas les critères de classification.
Conseil de prudence	
Prévention	Observer de bonnes pratiques d'hygiène industrielle.
Intervention	Se laver les mains après utilisation.
Stockage	Stocker dans un endroit frais. Protéger du rayonnement solaire. Conserver à l'écart de matières incompatibles.
Élimination	Éliminer le contenu/contenant dans une installation appropriée de traitement et d'élimination conformément aux lois et règlements applicables, ainsi qu'en fonction des caractéristiques du produit au moment de l'élimination.
Autres dangers	Aucun(e) connu(e).
Renseignements supplémentaires	Aucune.

3. Composition/information sur les ingrédients

Mélanges

Dénomination chimique	Nom commun et synonymes	Numéro d'enregistrement CAS	%
ACIDE ADIPIQUE		124-04-9	1 - < 3
Autres composant sous les niveaux à déclarer			90 - 100

Toutes les concentrations sont en pourcentage en poids, sauf si l'ingrédient est un gaz. Les concentrations des gaz sont en pourcentage en volume.

4. Premiers soins

Inhalation	Transporter à l'extérieur. Appeler un médecin si des symptômes se développent ou persistent
Contact avec la peau	Laver avec de l'eau et du savon. Consulter un médecin si une irritation se développe et persiste.
Contact avec les yeux	Ne pas se frotter les yeux. Rincer avec de l'eau. Consulter un médecin si une irritation se développe et persiste.
Ingestion	Rincer la bouche. Consulter un médecin si des symptômes apparaissent.
Symptômes et effets les plus importants, qu'ils soient aigus ou retardés	La poussière peut irriter les voies respiratoires, la peau et les yeux.
Mention de la nécessité d'une prise en charge médicale immédiate ou d'un traitement spécial, si nécessaire	Traiter de manière symptomatique.
Informations générales	S'assurer que le personnel médical est averti du (des) produits(s) en cause et qu'il prend des mesures pour se protéger.

5. Mesures à prendre en cas d'incendie

Agents extincteurs appropriés	Brouillard d'eau. Mousse. Poudre chimique. Dioxyde de carbone (CO2).
Agents extincteurs inappropriés	Non disponible.
Dangers spécifiques du produit dangereux	Le matériau peut être glissant lorsque mouillé. Des gaz dangereux pour la santé peuvent se former pendant un incendie.
Équipements de protection spéciaux et précautions spéciales pour les pompiers	Porter un appareil respiratoire autonome et un vêtement de protection complet en cas d'incendie.
Équipement/directives de lutte contre les incendies	Utiliser une pulvérisation d'eau pour refroidir les récipients fermés.
Méthodes particulières d'intervention	Utiliser des procédures standard en cas d'incendie et tenir compte des dangers des autres substances en cause.
Risques d'incendie généraux	Aucun risque inhabituel d'incendie ou d'explosion observé.

6. Mesures à prendre en cas de déversement accidentel

Précautions individuelles, équipements de protection et mesures d'urgence	Tenir à l'écart le personnel non requis. Porter un équipement et des vêtements de protection appropriés durant le nettoyage. Pour la protection individuelle, voir la section 8 de la FDS. Glissant lorsque mouillé.
Méthodes et matériaux pour le confinement et le nettoyage	Éviter la formation de poussières pendant le nettoyage. Récupérer la poussière en utilisant un aspirateur muni d'un filtre HEPA. Arrêter l'écoulement de la substance, si cela peut se faire sans risque. Déversements importants : Mouiller avec de l'eau et endiguer pour une élimination ultérieure. Pelleter le matériau dans un conteneur à déchets. Après avoir récupéré le produit, rincer la zone à l'eau. Déversements peu importants : Balayer ou aspirer le déversement et mettre dans un récipient approprié pour élimination. Pour l'élimination des déchets, voir la section 13 de la FDS.
Précautions relatives à l'environnement	Éviter le rejet dans les égouts, les cours d'eau ou sur le sol.

7. Manutention et stockage

Précautions relatives à la sûreté en matière de manutention	Minimiser la formation et l'accumulation de poussière. Assurer une ventilation aspirante adéquate aux endroits où la poussière se forme. Le matériau peut être glissant lorsque mouillé. Assurer un bon entretien ménager.
Conditions de sûreté en matière de stockage, y compris les incompatibilités	Stocker dans des récipients d'origine fermés de manière étanche. Stocker dans un endroit bien ventilé. Stocker à l'écart des matériaux incompatibles (Consulter la section 10 de la FDS).

8. Contrôle de l'exposition/protection individuelle

Limites d'exposition professionnelle	Il n'y a pas de limites d'exposition pour ce ou ces ingrédients.
Valeurs biologiques limites	Aucune limite d'exposition biologique observée pour les ingrédients.
Contrôles d'ingénierie appropriés	Si le matériau est moulu, coupé ou utilisé dans toute opération susceptible de créer des poussières, utiliser une ventilation locale par aspiration appropriée pour maintenir les expositions sous les limites d'exposition recommandées.
Mesures de protection individuelle, telles que les équipements de protection individuelle	
Protection du visage/des yeux	Porter des lunettes de sécurité à écrans latéraux (ou des lunettes à coques) et un écran facial. Il est recommandé de porter des lunettes de protection chimique et un écran facial. Avant toute manipulation, il est nécessaire de porter des lunettes à protection latérale conformes à la norme NF EN 166.
Protection de la peau	
Protection des mains	Gants résistants aux produits chimiques.
Autre	Porter un vêtement de protection approprié. Gants résistants aux produits chimiques.
Protection respiratoire	Porter un appareil respiratoire muni de filtres antipoussière.
Dangers thermiques	Porter des vêtements de protection thermique appropriés, au besoin.
Considérations d'hygiène générale	Toujours adopter de bonnes pratiques d'hygiène personnelle, comme se laver après avoir manipulé la substance et avant de manger, de boire ou de fumer. Laver régulièrement les vêtements de travail et l'équipement de protection pour éliminer les contaminants

9. Propriétés physiques et chimiques

Apparence	Granuleux. ou Poudre.
État physique	Solide.
Forme	Poudre.
Couleur	Blanc cassé.
Odeur	Non disponible.
Seuil olfactif	Non disponible.
pH	Non disponible.
Point de fusion et point de congélation	Non disponible.
Point initial d'ébullition et domaine d'ébullition	Non disponible.
Point d'éclair	Non disponible.
Taux d'évaporation	Non disponible.
Inflammabilité (solides et gaz)	Non disponible.
Limites supérieures et inférieures d'inflammabilité ou d'explosibilité	
Limites d'inflammabilité - inférieure (%)	Non disponible.
Limites d'inflammabilité - supérieure (%)	Non disponible.
Limite d'explosibilité - inférieure (%)	Non disponible.
Limite d'explosibilité - supérieure (%)	Non disponible.
Tension de vapeur	Non disponible.
Densité de vapeur	Non disponible.
Densité relative	Non disponible.
Solubilité	
Solubilité (eau)	Non disponible.

Coefficient de partage n-octanol/eau	Non disponible.
Température d'auto-inflammation	Non disponible.
Température de décomposition	Non disponible.
Viscosité	Non disponible.
Autres informations	
Densité	0.70 - 0.80 g/cm3
Propriétés explosives	Non explosif.
Propriétés comburantes	Non oxydant.
pH (solution à 1%)	3 - 5

10. Stabilité et réactivité

Réactivité	Le produit est stable et non réactif dans des conditions normales d'utilisation, d'entreposage et de transport.
Stabilité chimique	La substance est stable dans des conditions normales. La substance est stable dans des conditions normales.
Risque de réactions dangereuses	Une polymérisation dangereuse ne se produit pas.
Conditions à éviter	Contact avec des matériaux incompatibles. Aucun(e) dans des conditions normales.
Matériaux incompatibles	Oxygène.
Produits de décomposition dangereux	Aucune réaction dangereuse connue dans des conditions normales d'utilisation. Aux températures de décomposition thermique, du monoxyde et du dioxyde de carbone. Ammoniac. Oxydes d'azote (NOx). Chlorure d'hydrogène.

11. Données toxicologiques

Renseignements sur les voies d'exposition probables

Inhalation	La poussière peut irriter l'appareil respiratoire.
Contact avec la peau	La poussière ou la poudre peut irriter la peau.
Contact avec les yeux	La poussière peut irriter les yeux.
Ingestion	Faible danger présumé en cas d'ingestion.
Les symptômes correspondant aux caractéristiques physiques, chimiques et toxicologiques	La poussière peut irriter les voies respiratoires, la peau et les yeux.

Renseignements sur les effets toxicologiques

Toxicité aiguë Inconnu(e).

Produit	Espèces	Résultats d'épreuves
Hydrex 3613		
Aiguë		
Orale		
DL50	Rat	> 5000 mg/kg

* Les estimations pour le produit peuvent être basées sur d'autres données de composants non montrées.

Corrosion cutanée/irritation cutanée Un contact prolongé avec la peau peut causer une irritation temporaire.

Lésions oculaires graves/irritation oculaire Le contact direct avec les yeux peut causer une irritation temporaire.

Sensibilisation respiratoire ou cutanée

Sensibilisation respiratoire Pas un sensibilisant respiratoire.

Sensibilisation cutanée On ne s'attend pas à ce que ce produit provoque une sensibilisation cutanée.

Mutagenicité sur les cellules germinales Il n'existe pas de données qui indiquent que ce produit, ou tout composant présent à des taux de plus de 0,1 %, soit mutagène ou génotoxique.

Cancérogénicité	Non disponible.
Toxicité pour la reproduction	On ne s'attend pas à ce que ce produit présente des effets sur la reproduction ou le développement.
Toxicité pour certains organes cibles - exposition unique	Non classé.
Toxicité pour certains organes cibles - expositions répétées	Non classé.
Danger par aspiration	Pas un danger par aspiration.
Autres informations	Ce produit n'est associé à aucun effet néfaste connu pour la santé humaine.

12. Données écologiques

Écotoxicité	Le produit n'est pas classé comme dangereux pour l'environnement. Toutefois, ceci n'exclut pas la possibilité que des déversements importants ou fréquents puissent avoir un effet nocif ou nuisible sur l'environnement.
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Produit	Espèces	Résultats d'épreuves
Hydrex 3613		
Aquatique		
Crustacés	CE50	Daphnia > 10 mg/l, 48 hr
Poisson	CL50	Poisson 3880 mg/l, 96 heures estimation

* Les estimations pour le produit peuvent être basées sur d'autres données de composants non montrées.

Persistance et dégradation

Potentiel de bioaccumulation

Mobilité dans le sol Aucune donnée disponible.

Autres effets nocifs On ne s'attend pas à ce que ce composant ait des effets néfastes sur l'environnement (par ex., appauvrissement de la couche d'ozone, potentiel de formation photochimique d'ozone, perturbation endocrinienne, potentiel de réchauffement de la planète).

13. Données sur l'élimination

Instructions pour l'élimination	Recueillir et réutiliser ou éliminer dans des récipients scellés dans un site d'élimination des déchets autorisé.
Règlements locaux d'élimination	Détruire conformément à toutes les réglementations applicables.
Code des déchets dangereux	Les codes de déchets doivent être attribués dans le cadre d'une consultation entre l'utilisateur, le fabricant et l'entreprise de décharge.
Déchets des résidus / produits non utilisés	Éliminer conformément à la réglementation locale. Les récipients ou pochettes vides peuvent conserver certains résidus de produit. Éliminer ce produit et son récipient d'une manière sûre (voir : instructions d'élimination).
Emballages contaminés	Comme les récipients vides peuvent contenir un résidu du produit, suivre les avertissements de l'étiquette, même une fois le récipient vide. Les contenants vides doivent être acheminés vers une installation certifiée de traitement des déchets en vue de leur élimination ou recyclage.

14. Informations relatives au transport

TMD

N'entre pas dans la réglementation des marchandises dangereuses.

IATA

N'entre pas dans la réglementation des marchandises dangereuses.

IMDG

N'entre pas dans la réglementation des marchandises dangereuses.

Transport en vrac selon l'Annexe II de MARPOL 73/78 et le recueil IBC Sans objet.

15. Informations sur la réglementation

Réglementation canadienne Ce produit a été classé conformément aux critères de danger énoncés dans le Règlement sur les produits dangereux et la FDS contient tous les renseignements exigés par le Règlement sur les produits dangereux.

Loi réglementant certaines drogues et autres substances

Non réglementé.

Liste des marchandises d'exportation contrôlée (LCPE 1999, Annexe 3)

Non inscrit.

Gaz à effet de serre

Non inscrit.

Règlements sur les précurseurs

Non réglementé.

Règlements internationaux Renseignements supplémentaires fournis sur la fiche de données de sécurité.

Convention de Stockholm

Sans objet.

Convention de Rotterdam

Sans objet.

Protocole de Kyoto

Sans objet.

Protocole de Montréal

Sans objet.

Convention de Bâle

Sans objet.

Inventaires Internationaux

Pays ou région	Nom de l'inventaire	En stock (Oui/Non)*
Australie	Inventaire australien des substances chimiques (AICS)	Oui
Canada	Liste intérieure des substances (LIS)	Oui
Canada	Liste extérieure des substances (LES)	Non
Chine	Inventaire des substances chimiques existantes en Chine (IECSC)	Oui
Europe	Inventaire européen des substances chimiques commerciales existantes (EINECS)	Non
Europe	Liste européenne des substances chimiques notifiées (ELINCS)	Non
Japon	Inventaire des substances chimiques existantes et nouvelles (ENCS)	Oui
Corée	Liste des produits chimiques existants (ECL)	Oui
Nouvelle-Zélande	Inventaire de la Nouvelle-Zélande	Oui
Philippines	Inventaire philippin des produits et substances chimiques (PICCS)	Oui
États-Unis et Porto Rico	Inventaire du TSCA (Toxic Substances Controls Act - Loi réglementant les substances toxiques)	Oui

*La réponse « Oui » indique que tous les composants du produit sont conformes aux exigences d'entreposage du pays ayant compétence. Un « Non » indique qu'un ou plusieurs composant(s) du produit n'est/ne sont pas inscrit(s) ou exempt(s) d'une inscription sur l'inventaire administré par le(s) pays ayant compétence.

16. Autres informations

Date de publication 20-Avril-2017

Version n° 01

Avis de non-responsabilité Veolia Water Solutions & Technologies ne peut prévoir toutes les conditions d'utilisation des présents renseignements et de son produit, ou des produits d'autres fabricants en association avec son produit. L'utilisateur est responsable d'assurer des conditions sécuritaires de manutention, d'entreposage et d'élimination du produit, et il assume toute responsabilité quant à des pertes, des blessures, des dommages ou des dépenses liés à une utilisation incorrecte ou au non-respect des exigences de Veolia Solutions & Technologies.

**Informations relatives à la
révision**

Identification du produit et de l'entreprise : Identification du produit et de l'entreprise
Identification des dangers : Danger aux États-Unis
Composition / renseignements sur les ingrédients : Ingrédients
Données toxicologiques : Données toxicologiques
Données réglementaires: États-Unis
GHS: Classification

Solids conditioning for dewatering operations and water clarification aid in various industries

Description and Use

HYDREX 3613 is a highly effective cationic flocculant of high molecular weight.

HYDREX 3613 conditions solids for dewatering operations and aids water clarification processes in various industries.

HYDREX 3613 shows exceptional performance in liquid-solid separations in a wide range of shear conditions.

HYDREX 3613 may be beneficial in any liquid-solid separation process. It is especially recommended for:

- Belt filter, centrifuge and screw press dewatering
- Dissolved air floatation
- Filtration
- Thickening
- Water clarification

Advantages

- Dry product minimizes storage requirements
- Economical to use – effective at low dosage levels
- Effective high solids removal
- Effective over a wide pH range; does not alter the system pH
- Improves production and cake solids

Application Information

Stock solutions can be prepared up to 0.5 % concentration via an automated make down unit or on a batch basis. Solutions should be aged 30-60 minutes for maximum effectiveness. High quality make up water should be used. Secondary dilution water should be added to the stock solution prior to the addition point at a ratio of at least 10:1.

Centrifugal pumps should be avoided for polymer transfer.

More information on the back

Solids conditioning for dewatering operations and water clarification aid in various industries

Specifications

Appearance:	Off White, granular powder
Degree of Charge :	Low
Relative Molecular Weight:	High
Bulk Density, kg/m ³ :	750 +/- 50
pH of 0.5 % solution, at 25°C:	3.0 - 5.0
Standard Viscosity, cps :	3.0 - 3.8
Viscosity at 25°C, Cps:	
0.10 %:	80
0.25 %:	200
0.50 %:	400
1.00 %:	800

Product Sales Specification:

Insolubles, % w/w :	0.5 max
Residual Acrylamide, %:	0.020 max

The shelf life of HYDREX 3613 is 24 months when stored in unopened packages in a dry atmosphere at temperatures no higher than 40°C.

Materials Compatibility

Solutions are no more corrosive than water and recommended materials of construction include stainless steel, fiber glass, plastic, and glass or epoxy-lined vessels. Do not use iron, copper or aluminium.

Packaging

Supplied in bags. Other packaging : please consult us.

Safety Information

Spilled polymer is very slippery and should be collected prior to flushing with water. Whoever is responsible for the use and the manipulation of HYDREX 3613 should be familiar with the safety detailed in our MSDS.

Regulatory Approvals : see MSDS

Conditionnement de solides pour la déshydratation et les opérations de clarification de l'eau

Applications

HYDREX 3613 est un floculant cationique très efficace, de haut poids moléculaire.

HYDREX 3613 montre des performances exceptionnelles en séparation solide/liquide sur un large éventail de conditions.

HYDREX 3613 est bénéfique à tout processus de séparation solide liquide-. Il est particulièrement recommandé pour:

- Les deshydratation surfiltres à bande, centrifugeuses et filtres presses
- Les opérations de flottation à air dissous
- La filtration
- L'épaississement
- La clarification de l'eau.

Avantages

- Produit sec : minimise les besoins en stockage
- Économique à l'utilisation : efficace à faible doses
- Efficace, même sur effluents fortement chargés en solides
- Efficace sur une large gamme de pH : ne modifie pas le pH
- Améliore la production et la qualité des gâteaux de filtration.

Mise en oeuvre

HYDREX 3613 ne peut être utilisé tel quel. Il faut au préalable préparer une solution stock.
Utiliser pour ce faire une installation de dispersion et de maturation de la poudre prévue à cet effet.

Concentration maxi de la solution stock (g/l) : 5

Utiliser pour ce faire une eau de bonne qualité

Temps de maturation nécessaire : de 30-60 minutes

Une dilution secondaire est préférable avant le point d'injection à un ratio d'au moins 10:1.
Les Pompes centrifuges sont à proscrire pour le transfert des polymères

Conditionnement de solides pour la déshydratation et les opérations de clarification de l'eau

Spécifications

Aspect :	Blanc cassé, sous forme de poudre granuleuse
Degré de Charge:	Basse
Masse moléculaire relative:	Haute
Densité:	750+ / - 50
pH de solution à 0,5%, à 25°C:	3.0 - 5.0
Viscosité standard, Cps:	3.0-3.8
Viscosité à 25°C, Cps:	
@0,10%:	80
@0,25%:	200
@0,50%:	400
@1.00 %:	800

Spécifications de ventes du produit :

Insolubles, % w / w: 0.5 max

Acrylamide résiduel, %: 0,020 max.

HYDREX 3613 se conserve jusqu'à 24 mois dans son emballage d'origine non entamé, au sec et à une température ne dépassant pas 40°C.

Compatibilité Matériels

Les solutions ne sont plus corrosives que l'eau. Les matériaux recommandés sont : l'acier inoxydable, la fibre de verre, le plastique et de verre ou matériaux enduits époxy ou fibre de verre.

Ne pas utiliser de fer, cuivre ou aluminium.

Conditionnement

Livraison par sacs. Pour toute autre demande d'emballage : veuillez nous consulter.

Sécurité

Le déversement de polymère rend les surfaces très glissantes.

La manipulation de tous produits chimiques demande de la précaution. Quiconque est responsable de l'utilisation et de la manipulation de l'hydrex 3613 devrait se familiariser avec les consignes de sécurité détaillées dans notre MSDS.

Agréments: voir la msds

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 silica		14808-60-7	100

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

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Coughing.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO ₂).
Unsuitable extinguishing media	Not available.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	The product is immiscible with water and will spread on the water surface. Stop the flow of material, if this is without risk. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Avoid prolonged exposure. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Protect from sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in cool, dry place.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Material	Type	Value	Form
VEOLIA ACTISAND	TWA	0.025 mg/m ³	Respirable fraction.
Components	Type	Value	Form
Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m ³	Respirable fraction.

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

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

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

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

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

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

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

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

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

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

Biological limit values

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

Exposure guidelines

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

Appropriate engineering controls

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

Individual protection measures, such as personal protective equipment

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

Skin protection

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

Other

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

Respiratory protection

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

Thermal hazards

Not available.

General hygiene considerations

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

9. Physical and chemical properties**Appearance**

Physical state	Solid.
Form	Solid.
Color	Not available.

Material name: VEOLIA ACTISAND

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SDS Canada

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

10. Stability and reactivity

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

11. Toxicological information

Information on likely routes of exposure

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

Symptoms related to the physical, chemical and toxicological characteristics	Coughing.
Information on toxicological effects	
Acute toxicity	Not available.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. May cause cancer. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.
ACGIH Carcinogens	
Crystalline silica (CAS 14808-60-7)	A2 Suspected human carcinogen.
Canada - Alberta OELs: Carcinogen category	
Crystalline silica (CAS 14808-60-7)	Suspected human carcinogen.
Canada - Manitoba OELs: carcinogenicity	
SILICA, CRYSTALLINE-.ALPHA-.QUARTZ, RESPIRABLE FRACTION (CAS 14808-60-7)	Suspected human carcinogen.
Canada - Quebec OELs: Carcinogen category	
Crystalline silica (CAS 14808-60-7)	Suspected carcinogenic effect in humans.
IARC Monographs. Overall Evaluation of Carcinogenicity	
Crystalline silica (CAS 14808-60-7)	1 Carcinogenic to humans.
Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

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

13. Disposal considerations

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

14. Transport information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

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

15. Regulatory information

Canadian regulations

Controlled Drugs and Substances Act

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations

Stockholm Convention

Not applicable.

Rotterdam Convention

Not applicable.

Kyoto protocol

Not applicable.

Montreal Protocol

Not applicable.

Basel Convention

Not applicable.

International Inventories

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

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

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

16. Other Information

Issue date	08-16-2016
Version #	01
Disclaimer	Veolia Water Technologies is not able to anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use and or non respect of Veolia Water Technologies' requirement.
Revision information	Product and Company Identification: Product Review

1. Identification

Identificateur de produit	VEOLIA ACTISAND
Autres moyens d'identification	Aucune.
Usage recommandé	Traitement des eaux usées
Restrictions d'utilisation	Les travailleurs (et vos clients et utilisateurs dans le cas d'une revente) doivent être informés de la présence possible de poussière respirable et de silice cristalline respirable ainsi que de leurs dangers possibles. Une formation appropriée dans la bonne utilisation et la bonne manipulation de cette matière doit être fournie selon la réglementation applicable. USAGE PROFESSIONNEL
Renseignements sur le fabricant/importateur/fournisseur/distributeur	
Fabricant	
Fournisseur	Veolia Water Technologies Canada Inc.
Adresse	2000 Argentia Road, Plaza IV, Suite 430 Mississauga, ON L5N 1W1 Canada
Personne à contacter	Hydrex Product Specialist
Téléphone	(905) 286-4846
Télécopieur	(905) 286-0488
courriel	vwtcanada-hydrex@veolia.com
24 Hr Numéro de téléphone d'appel d'urgence	+1-760-476-3962 (Code:333239)
Fournisseur	Non disponible.

2. Identification des dangers

Dangers physiques	Non classé.	
Dangers pour la santé	Cancérogénicité	Catégorie 1A
Dangers environnementaux	Non classé.	

Éléments d'étiquetage



Mention d'avertissement	Danger
Mention de danger	Peut provoquer le cancer.
Conseil de prudence	
Prévention	Se procurer les instructions avant utilisation. Ne pas manipuler avant d'avoir lu et compris toutes les mesures de sécurité. Porter des gants/vêtements de protection/ équipement de protection des yeux/du visage.
Intervention	Si exposé(e) ou préoccupé(e) : Obtenir une consultation médicale ou des soins médicaux.
Stockage	Non disponible.
Élimination	Éliminer le contenu/les conteneurs selon la loi internationale/nationale/régionale/locale.
Autres dangers	Aucuns connus.
Renseignements supplémentaires	Aucune.

3. Composition/information sur les ingrédients

Mélanges

Dénomination chimique	Nom commun et synonymes	Numéro d'enregistrement CAS	%
Crystalline silica		14808-60-7	100

Toutes les concentrations sont en pourcentage en poids, sauf si l'ingrédient est un gaz. Les concentrations des gaz sont en pourcentage en volume.

4. Premiers soins

Inhalation	Sortir au grand air. Appeler un médecin si les symptômes se développent ou s'ils persistent.
Contact avec la peau	Laver avec de l'eau et du savon. Consulter un médecin si une irritation se développe et persiste.
Contact avec les yeux	Rincer avec de l'eau. Consulter un médecin si une irritation se développe et persiste.
Ingestion	Rincer la bouche. Faire appel à une assistance médicale si des symptômes apparaissent.
Symptômes et effets les plus importants, qu'ils soient aigus ou retardés	Toux.
Mention de la nécessité d'une prise en charge médicale immédiate ou d'un traitement spécial, si nécessaire	Donner des soins généraux et traiter en fonction des symptômes. Garder la victime en observation. Les symptômes peuvent se manifester à retardement.
Informations générales	Si exposé(e) ou préoccupé(e) : Obtenir une consultation médicale ou des soins médicaux. S'assurer que le personnel médical est averti des substances impliquées et prend les précautions pour se protéger.

5. Mesures à prendre en cas d'incendie

Agents extincteurs appropriés	Brouillard d'eau. Mousse. Poudre chimique sèche. Dioxyde de carbone (CO2).
Agents extincteurs inappropriés	Non disponible.
Dangers spécifiques du produit dangereux	Des gaz dangereux pour la santé peuvent se former pendant l'incendie.
Équipements de protection spéciaux et précautions spéciales pour les pompiers	Porter un appareil respiratoire autonome et un vêtement de protection complet en cas d'incendie.
Équipement/directives de lutte contre les incendies	Les récipients fermés peuvent être refroidis par eau pulvérisée.
Méthodes particulières d'intervention	Employer des méthodes normales de lutte contre l'incendie et tenir compte des dangers associés aux autres substances présentes.
Risques d'incendie généraux	Aucun risque exceptionnel d'incendie et d'explosion.

6. Mesures à prendre en cas de déversement accidentel

Précautions individuelles, équipements de protection et mesures d'urgence	Tenir à l'écart le personnel dont la présence sur les lieux n'est pas indispensable. Garder les personnes à l'écart de l'endroit du déversement/de la fuite et en amont du vent. Porter un équipement et des vêtements de protection appropriés durant le nettoyage. S'assurer une ventilation adéquate. Prévenir les autorités locales si des fuites significatives ne peuvent pas être contenues. Pour s'informer sur la protection individuelle, voir la rubrique 8.
Méthodes et matériaux pour le confinement et le nettoyage	Le produit n'est pas miscible avec l'eau et se dispersera sur la surface de l'eau. Arrêter l'écoulement de la substance, si cela peut se faire sans risque. Après avoir récupéré le produit, rincer la zone à l'eau. Pour se renseigner sur l'élimination, voir la rubrique 13.
Précautions relatives à l'environnement	Éviter le rejet dans les égouts, les cours d'eau ou sur le sol.

7. Manutention et stockage

Précautions relatives à la sûreté en matière de manutention	Se procurer les instructions avant utilisation. Ne pas manipuler avant d'avoir lu et compris toutes les mesures de sécurité. Minimiser la formation de poussières en suspension dans l'air. Fournir une ventilation aspirante adéquate aux endroits où la poussière se forme. Ne pas respirer les poussières. Éviter l'exposition prolongée. Si possible, manipuler dans un système clos. Porter un équipement de protection individuelle approprié. Observer de bonnes pratiques d'hygiène industrielle.
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8. Contrôle de l'exposition/protection individuelle

Limites d'exposition professionnelle

ÉTATS-UNIS. Valeurs limites d'exposition de l'ACGIH

Substance	Type	Valeur	Forme
VEOLIA ACTISAND	TWA	0.025 mg/m3	Fraction respirable.
Composants	Type	Valeur	Forme

Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Fraction respirable.
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Canada. LEMT pour l'Alberta (Code de l'hygiène et de la sécurité au travail, Annexe 1, Tableau 2)

Substance	Type	Valeur	Forme
VEOLIA ACTISAND	TWA	0.025 mg/m3	Particules inhalables.
Composants	Type	Valeur	Forme

Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Particules inhalables.
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Canada. LEMT pour la Colombie-Britannique. (Valeurs limites d'exposition en milieu de travail pour les substances chimiques, Réglementation sur la santé et sécurité au travail 296/97, ainsi modifiée)

Substance	Type	Valeur	Forme
VEOLIA ACTISAND	TWA	0.025 mg/m3	Fraction respirable.
Composants	Type	Valeur	Forme

Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Fraction respirable.
-------------------------------------	-----	-------------	----------------------

Canada. LEMT de Manitoba (Règlement 217/2006, Loi sur la sécurité et l'hygiène du travail)

Composants	Type	Valeur	Forme
Crystalline silica (CAS 14808-60-7)	TWA	0.025 mg/m3	Fraction respirable.

Canada. LEMT pour l'Ontario. (Contrôle de l'exposition à des agents biologiques et chimiques)

Substance	Type	Valeur	Forme
VEOLIA ACTISAND	TWA	0.1 mg/m3	Respirable.
Composants	Type	Valeur	Forme

Crystalline silica (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable.
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Canada. LEMT du Québec, (Ministère du Travail. Règlement sur la qualité du milieu de travail)

Substance	Type	Valeur	Forme
VEOLIA ACTISAND	TWA	0.1 mg/m3	Poussière respirable.
Composants	Type	Valeur	Forme

Crystalline silica (CAS 14808-60-7)	TWA	0.1 mg/m3	Poussière respirable.
-------------------------------------	-----	-----------	-----------------------

Valeurs biologiques limites

Aucune limite d'exposition biologique observée pour les ingrédients.

Directives au sujet de l'exposition

Une exposition professionnelle à de la poussière nuisible (totale et respirable) et à de la silice cristalline respirable doit être suivie et contrôlée.

Contrôles d'ingénierie appropriés

Il faut utiliser une bonne ventilation générale (habituellement dix changements d'air l'heure). Les débits de ventilation doivent être adaptés aux conditions. S'il y a lieu, utiliser des enceintes d'isolement, une ventilation locale ou d'autres mesures d'ingénierie pour maintenir les concentrations atmosphériques sous les limites d'exposition recommandées. Si des limites d'exposition n'ont pas été établies, maintenir les concentrations atmosphériques à un niveau acceptable.

Mesures de protection individuelle, telles que les équipements de protection individuelle

Protection du visage/des yeux

Porter des lunettes de sécurité à écrans latéraux (ou des lunettes à coques).

Protection de la peau	
Protection des mains	Gants résistants aux produits chimiques. Les gants appropriés peuvent être indiqués par le fournisseur de gants.
Autre	L'emploi d'un tablier imperméable est recommandé. Gants résistants aux produits chimiques.
Protection respiratoire	Utiliser un respirateur avec filtre particulaire lorsque les concentrations particulières sont supérieures à la limite d'exposition professionnelle.
Dangers thermiques	Non disponible.
Considérations d'hygiène générale	Suivre toutes les exigences de surveillance médicale. Toujours adopter de bonnes pratiques d'hygiène personnelle, telles que se laver après avoir manipulé la substance et avant de manger, de boire ou de fumer. Nettoyer régulièrement la tenue de travail et l'équipement de protection pour éliminer les contaminants.

9. Propriétés physiques et chimiques

Apparence	
État physique	Solide.
Forme	Solide.
Couleur	Non disponible.
Odeur	Non disponible.
Seuil olfactif	Non disponible.
pH	Non disponible.
Point de fusion et point de congélation	Non disponible.
Point initial d'ébullition et domaine d'ébullition	Non disponible.
Point d'éclair	Non disponible.
Taux d'évaporation	Non disponible.
Inflammabilité (solides et gaz)	Non disponible.
Limites supérieures et inférieures d'inflammabilité ou d'explosibilité	
Limites d'inflammabilité - inférieure (%)	Non disponible.
Limites d'inflammabilité - supérieure (%)	Non disponible.
Limite d'explosibilité - inférieure (%)	Non disponible.
Limite d'explosibilité - supérieure (%)	Non disponible.
Tension de vapeur	< 0.0000001 kPa à 25 °C
Densité de vapeur	Non disponible.
Densité relative	Non disponible.
Solubilité	
Solubilité (eau)	Insoluble
Coefficient de partage n-octanol/eau	Non disponible.
Température d'auto-inflammation	Non disponible.
Température de décomposition	Non disponible.
Viscosité	Non disponible.
Autres informations	
Propriétés explosives	Non explosif.

Chaleur de combustion (NFPA 30B)	0 kJ/g
Formule moléculaire	O ₂ Si
Propriétés comburantes	Non oxydant.

10. Stabilité et réactivité

Réactivité	Le produit est stable et non réactif dans des conditions normales d'utilisation, d'entreposage et de transport.
Stabilité chimique	La substance est stable dans des conditions normales.
Risque de réactions dangereuses	Pas de réactions dangereuses connues dans les conditions normales d'utilisation.
Conditions à éviter	Contact avec des matériaux incompatibles.
Matériaux incompatibles	Oxydants puissants. Chlore
Produits de décomposition dangereux	Aucun produit dangereux de décomposition n'est connu.

11. Données toxicologiques

Renseignements sur les voies d'exposition probables

Inhalation	Toute inhalation prolongée peut être nocive.
Contact avec la peau	Aucun effet indésirable par contact avec la peau n'est attendu.
Contact avec les yeux	Le contact direct avec les yeux peut causer une irritation temporaire.
Ingestion	Faible danger présumé en cas d'ingestion.

Les symptômes correspondant aux caractéristiques physiques, chimiques et toxicologiques

Toux.

Renseignements sur les effets toxicologiques

Toxicité aiguë	Non disponible.
Corrosion cutanée/irritation cutanée	Un contact prolongé avec la peau peut entraîner une irritation temporaire.
Lésions oculaires graves/irritation oculaire	Le contact direct avec les yeux peut causer une irritation temporaire.

Sensibilisation respiratoire ou cutanée

Sensibilisation respiratoire	N'est pas un sensibilisant respiratoire.
-------------------------------------	--

Sensibilisation cutanée	Ce produit ne devrait pas causer une sensibilisation de la peau.
--------------------------------	--

Mutagenicité sur les cellules germinales	Il n'existe pas de données indiquant que ce produit, ou tout composant présent à des taux de plus de 0,1 %, soit mutagène ou génétoxique.
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Cancérogénicité	En 1997, le CIRC (Centre international de recherche sur le cancer) a conclu que la silice cristalline inhalée de sources professionnelles pouvait provoquer un cancer du poumon chez l'homme. Toutefois, lors de son évaluation globale, le CIRC a observé que « le pouvoir cancérogène n'était pas détecté dans toutes les conditions industrielles examinées. Le pouvoir cancérogène peut dépendre de caractéristiques intrinsèques de la silice cristalline ou de facteurs externes qui touchent son activité biologique ou la distribution de ses polymorphes. » (Monographies du CIRC sur l'évaluation des risques cancérogènes de substances chimiques pour l'être humain, Silice, poussière de silicates et fibres organiques, 1997, vol. 68, CIRC, Lyon, France.) En juin 2003, le CSLEP (Comité scientifique en matière de limites d'exposition professionnelle à des agents chimiques) a conclu que le principal effet chez l'être humain de l'inhalation de la poussière de silice cristalline respirable est la silicose. « Les données disponibles sont suffisantes pour conclure que le risque de cancer du poumon est accru chez les personnes atteintes de silicose (et non, semble-t-il, chez les employés exempts de silicose exposés à la poussière de silice dans les carrières et dans le secteur industriel des céramiques). Dès lors, la prévention de l'apparition de la silicose réduira également le risque de cancer... » (SCOEL SUM Doc 94-final, juin 2003) Selon l'état de la technique actuel, la protection des travailleurs contre la silicose peut être assurée de manière systématique en respectant les limites d'exposition professionnelle réglementaires existantes. Peut provoquer le cancer. Une exposition professionnelle à de la poussière respirable et à de la silice cristalline respirable doit être suivie et contrôlée.
------------------------	---

Carcinogènes selon l'ACGIH

Crystalline silica (CAS 14808-60-7)

A2 Probablement cancérogène pour l'homme.

Canada - LEMT pour l'Alberta : Catégorie de carcinogène

Crystalline silica (CAS 14808-60-7)

Probablement cancérogène pour l'homme.

Canada - LEMT pour le Manitoba : cancérogénicité

SILICE, CRISTALLINE-.ALPHA.-QUARTZ, FRACTION
RESPIRABLE (CAS 14808-60-7)

Probablement cancérogène pour l'homme.

Canada - LEMT pour le Québec : Catégorie de carcinogène

Crystalline silica (CAS 14808-60-7)

Effet cancérogène suspecté chez les humains.

Monographies du CIRC. Évaluation globale de la cancérogénicité

Crystalline silica (CAS 14808-60-7)

1 Cancérogène pour l'homme.

Toxicité pour la reproduction	On ne s'attend pas à ce que ce produit présente des effets sur la reproduction ou le développement.
Toxicité pour certains organes cibles - exposition unique	Non classé.
Toxicité pour certains organes cibles - expositions répétées	Non classé.
Danger par aspiration	N'est pas un danger d'aspiration.
Effets chroniques	Toute inhalation prolongée peut être nocive. Une exposition prolongée peut causer des effets chroniques.

12. Données écologiques

Écotoxicité	Le produit n'est pas classé comme dangereux pour l'environnement. Toutefois, ceci n'exclut pas la possibilité que des déversements importants ou fréquents puissent avoir un effet nocif ou nuisible sur l'environnement.
Persistance et dégradation	Aucune donnée n'est disponible sur la biodégradabilité du produit.
Potentiel de bioaccumulation	Aucune donnée disponible.
Mobilité dans le sol	Aucune donnée disponible.
Autres effets nocifs	On ne prévoit aucun autre effet environnemental négatif (par ex., appauvrissement de la couche d'ozone, potentiel de formation photochimique d'ozone, perturbation endocrinienne, potentiel de réchauffement de la planète) causé par ce composant.

13. Données sur l'élimination

Instructions pour l'élimination	Recueillir et réutiliser ou éliminer dans des récipients scellés dans un site d'élimination des déchets autorisé. Éliminer le contenu/les conteneurs selon la loi internationale/nationale/régionale/locale.
Règlements locaux d'élimination	Détruire conformément à toutes les réglementations applicables.
Code des déchets dangereux	Les codes de déchets doivent être attribués dans le cadre d'une consultation entre l'utilisateur, le fabricant et l'entreprise de décharge.
Déchets des résidus / produits non utilisés	Éliminer le produit conformément avec la réglementation locale en vigueur. Des résidus de produit peuvent demeurer dans les contenants vides et sur les toiles d'emballage. Ce produit et son contenant doivent être éliminés de façon sécuritaire (voir les instructions d'élimination).
Emballages contaminés	Comme les récipients vides peuvent contenir des résidus de produit, respecter les avertissements sur l'étiquette même après avoir vidé le récipient. Les contenants vides doivent être acheminés vers une installation certifiée de traitement des déchets en vue de leur élimination ou recyclage.

14. Informations relatives au transport

TMD

N'entre pas dans la réglementation des marchandises dangereuses.

IATA

N'entre pas dans la réglementation des marchandises dangereuses.

IMDG

N'entre pas dans la réglementation des marchandises dangereuses.

15. Informations sur la réglementation

Réglementation canadienne

Loi réglementant certaines drogues et autres substances

Non réglementé.

Liste des marchandises d'exportation contrôlée (LCPE 1999, Annexe 3)

Non inscrit.

Gaz à effet de serre

Non inscrit.

Règlements sur les précurseurs

Non réglementé.

Règlements internationaux

Convention de Stockholm

Sans objet.

Convention de Rotterdam

Sans objet.

Protocole de Kyoto

Sans objet.

Montreal Protocol

Sans objet.

Convention de Bâle

Sans objet.

Inventaires Internationaux

Pays ou région	Nom de l'inventaire	En stock (Oui/Non)*
Australie	Inventaire australien des substances chimiques (AICS)	Oui
Canada	Liste intérieure des substances (LIS)	Oui
Canada	Liste extérieure des substances (LES)	Non
Chine	Inventaire des substances chimiques existantes en Chine (IECSC)	Oui
Europe	Inventaire européen des substances chimiques commerciales existantes (EINECS)	Oui
Europe	Liste européenne des substances chimiques notifiées (ELINCS)	Non
Japon	Inventaire des substances chimiques existantes et nouvelles (ENCS)	Oui
Corée	Liste des produits chimiques existants (ECL)	Oui
Nouvelle-Zélande	Inventaire de la Nouvelle-Zélande	Oui
Philippines	Inventaire philippin des produits et substances chimiques (PICCS)	Oui
États-Unis et Porto Rico	Inventaire du TSCA (Toxic Substances Controls Act - Loi réglementant les substances toxiques)	Oui

*La réponse « Oui » indique que tous les composants du produit sont conformes aux exigences d'entreposage du pays ayant compétence
Un « Non » indique qu'un ou plusieurs composant(s) du produit n'est/ne sont pas inscrit(s) ou exempt(s) d'une inscription sur l'inventaire administré par le(s) pays ayant compétence.

16. Renseignements divers

Date de publication	16-Août-2016
Version n°	01
Avis de non-responsabilité	Veolia Water Solutions & Technologies ne peut prévoir toutes les conditions d'utilisation des présents renseignements et de son produit, ou des produits d'autres fabricants en association avec son produit. L'utilisateur est responsable d'assurer des conditions sécuritaires de manutention, d'entreposage et d'élimination du produit, et il assume toute responsabilité quant à des pertes, des blessures, des dommages ou des dépenses liés à une utilisation incorrecte ou au non-respect des exigences de Veolia Solutions & Technologies.

Appendix B: Veolia Operation and Maintenance Manual



MELIADINE

Operations Water Treatment

Process Control Functional Descriptions

PACKAGE NUMBER : 515S-265-068

PURCHASE ORDER NUMBER : OC-568369

DOCUMENT NUMBER : 6515-S-265-068-280-GNS-SUB000

PROCESS CONTROL FUNCTIONAL DESCRIPTIONS

Agnico Eagle Mines Limited

PERMANENT EFFLUENT WATER TREATMENT PLANT

	
Vendor Document Status	
AGNICO EAGLE	
1	☐ Proceed to next submission and status.
2	☐ Proceed with exceptions as noted to next submission and status.
3	☐ Do not proceed. Revise as noted and resubmit next submission and status.
4	☐ Complete, no further submission required.
By: _____ Date: _____ Review and authorization to fabricate are only for general conformance with the design concept of the Project as expressed in the Contract Documents. Sole responsibility for the accuracy and completeness of this document, including but not limited to dimensions and quantities, remains with the Supplier/Contractor. Agnico Eagle does not warrant the accuracy or completeness of any of the information contained herein, nor does Agnico Eagle authorize or approve any construction means, methods, techniques, sequences or any safety precautions or procedures.	
Agnico Eagle No. 6515-S-265-068-280-GNS-0003 R: Sub001	
DOCUMENT FOR INFORMATION	

Rev. 1

WATER TECHNOLOGIES

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1.0 INTRODUCTION

1.1 Project Definition

Veolia Water Technologies Canada (VWTC) was contracted by Agnico Eagles Mines (A.E.M.) to supply the equipment for a mining effluent treatment.

VWTC is responsible for the supply of mechanical equipment and the control system.

This Control philosophy provides the platform from which the Functional Description shall be developed. The following items are described:

- Detailed process controls operation
- Parameters, set points and alarms list
- Trending and logging details

This control narrative shall be read in conjunction with the related documents as listed in Section 1.3.

1.2 Process Summary

The purpose of the plant is to remove TSS from the influent water. As no metal requirement is required to meet the discharge criteria, no pH adjustment is required.

The proposed equipment will be able to handle the full flow range expected in Phases 1 and 2. The ACP-700R has an operational range of 6 250 to 28 000 m³/d. There's one treatment train which consist of one Actiflo[®] clarifier with two recirculation line and two hydrocyclones. The Actiflo[®] can be operated with just one or both lines, depending on influent flow and TSS content. The hydrocyclone overflow will be sent to the Multiflo for thickening the sludge. The Multiflo overflow is going in a break tank by gravity, than pump in the raw water Actiflo inlet pipe for recirculation.

The Actiflo[®] overflow will meet the TSS criteria and can be discharged as it. It will be monitored for pH and turbidity and its flow rate will be recorded.

In addition, two polymers make up and dosing systems supplies the polymer needed in the Actiflo[®] and Multiflo, clarification process. Also one powder coagulation preparation and dosing system is added.

There's no service water available on this site, the client pumps fill a water service tank to stabilize the flow entering the treatment system. Some water from this tank is pumps to two filters then to a break tank, then its pump to two heaters and mix by a 3 way valve. The temperature water is monitored, and will serve as service water in the preparation of the coagulant and polymers preparations.

All piping from for the treatment system is by others.

1.3 List of Related Documents

This document is to be read in conjunction with the following documents:

- 5000216065_PI_0001_GEN
- Equipment List
- Control architecture

1.4 List of Abbreviations

The following abbreviations are used in the text of this document.

HMI: Human/Machine Interface

PLC: Programmable Logic Controller

SCADA: Supervisory Control and Data Acquisition

VFD: Variable Frequency Drive

VWTC: Veolia Water Technologies Canada

1.5 List of Units

The following lists the parameters referred to in this document and the units they are measured in unless otherwise specified.

Concentration (in general): mg/L

Flowrate (main process): m³/h

Flowrate (chemical dosing): LPH

Level in tank: %

pH: -

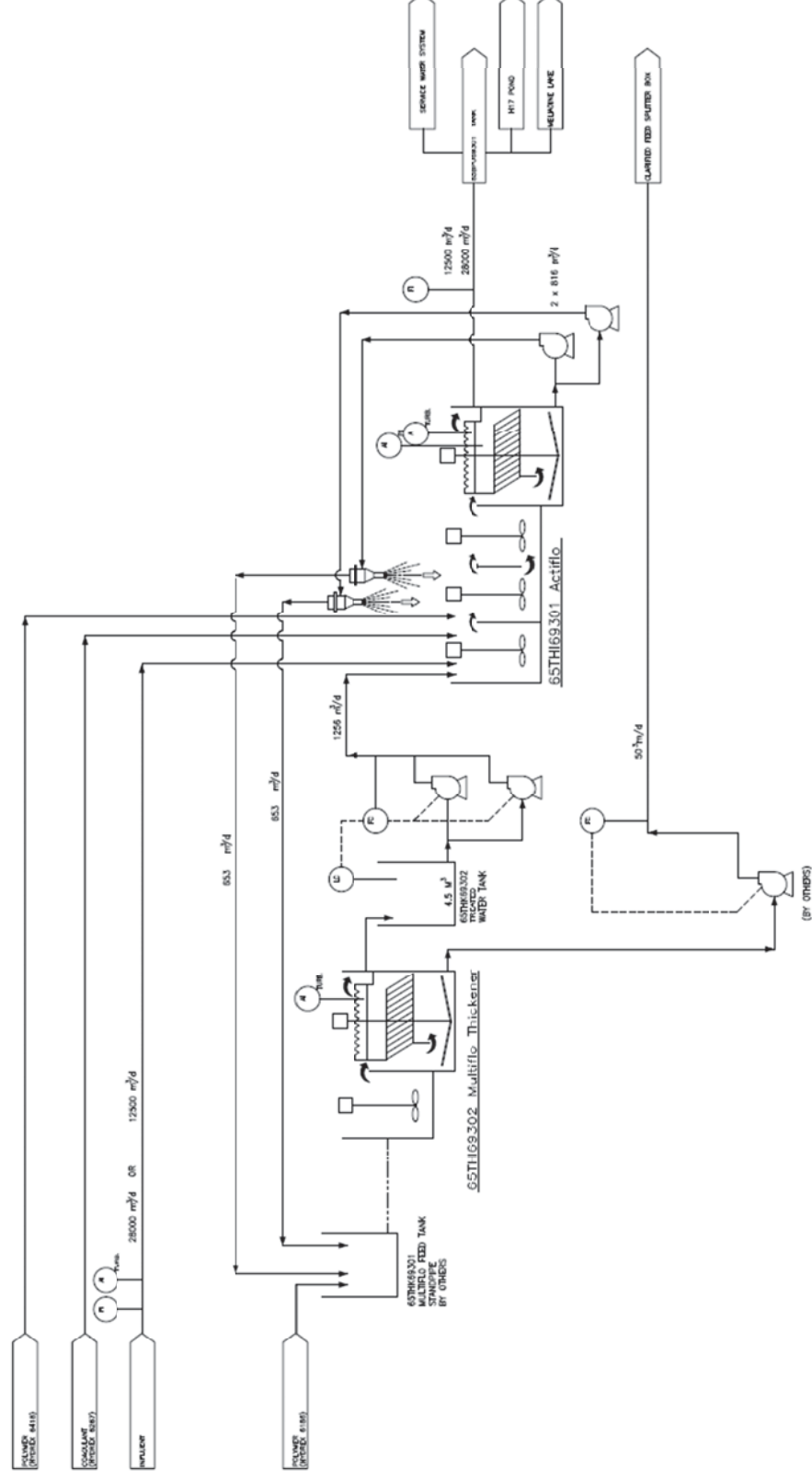
Pressure: PSI

Temperature: °C

Turbidity: NTU

2.0 OVERALL PLANT CONTROL

The treatment system is to treat a minimum flowrate of 6 250 m³/d and a maximum flow of 28 000 m³/d. The following process flow diagram shows the overall treatment process and principal control loops.



3.0 ACTIFLO® FEED

3.1 Description

The raw water flow is pumped by a pump equipped with a VFD. A flow meter measures it and a flow control loop maintains a flow set point entered on the operator interface. The Actiflo® feed control is achieved by the following control devices and instruments:

Table 3-1: Actiflo® feed control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
N/A	65FIT6930001	Raw water flow meter	
N/A	Unknown	Pumps	VFD
N/A	65AIT6930002	Turbidity	

3.2 Controls

3.2.1 General

The Actiflo® Feed Pump is equipped with VFD. A PID loop controls the Pump's VFD accordingly, using the flow 65FIT6930001 as a process value.

The raw water TSS analyzer is used to monitor the raw water quality; an alarm is triggered when a high high turbidity is reached and if only one recirculation pump is running.

3.2.2 Automatic Conditions

The Actiflo® Feed Pump should be placed in manual or automatic mode.

Automatic command can be activated thru the plant automatic sequence if at least one pump is on automatic, in remote and without a fault.

Actiflo needs to be running.

Manual mode:

The Actiflo® Feed Pump can be placed in manual mode by the operator.

3.3 Fault Response

If the Actiflo feed pump trips, it is stopped according to the automatic standby mode sequence.

3.4 Interlock

The Actiflo® Feed Pump stops if the Actiflo® is in major fault.

3.5 Dosing Matrix

The coagulation dosing rate will vary according to the turbidity.

A table completed by the user is used by the PLC to adapt the dosing rate.

The user can enter up to 10 points in the table.

4.0 ACTIFLO®

4.1 Description

The Actiflo® clarifier uses sand ballasted settling, a high rate coagulation/flocculation/sedimentation process. In the coagulation basin the TSS start to form flocs. Water then flows into a second tank called the injection tank. There, microsand and 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 polymer acts as a flocculant aid, binding the destabilized solids to the microsand particles by forming polymer bridges. From the injection tank, water flows into the maturation tank where microsand and sludge flocs agglomerate and grow into high density flocs known as microsand ballasted flocs. Water then overflows to the settling section of the tank, and finally clarified water exits the system via a collection trough or weirs. The clarified water is monitored for pH and turbidity.

The flocs settle in the clarifier portion of the system where they are collected by a rake mechanism. A percentage of the unit's design raw water flow is continuously withdrawn from the clarifier and pumped to a hydrocyclone system which separates the microsand from the sludge. The recovered microsand is reused in the process. A small quantity of the microsand is not recovered by the hydrocyclones and is discharged with the sludge. The lost microsand needs to be replaced periodically by adding more of it to the process. After sand separation, the sludge is rejected to the Multiflo clarifier, from which the supernatant is recirculated to the head of the Actiflo unit, and the sludge is extracted.

The Actiflo® unit consists of the following control devices and instruments:

Table 4-1: Actiflo® control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0201	65LSHH6930016	HIGH HIGH LEVEL SWITCH - ACTIFLO®	
0201	65XE6930017	SCRAPER - TORQUE	
0201	65AIT6930019	TURBIDITY ANALYZER TSS - ACTIFLO®	
0201	65AIT6930018	PH METER - ACTIFLO®	
0201	65AGI69301	MIXER - COAGULATION TANK ACTIFLO®	
0201	65AGI69302	MIXER - INJECTION TANK - ACTIFLO®	
0201	65AGI69303	MIXER - MATURATION TANK - ACTIFLO®	WITH VFD
0201	65TRM69301	SCRAPER MECHANISM - ACTIFLO®	
0201	65PSR69301A	RECIRCULATION PUMP No1 - ACTIFLO®	
0201	65PSR69301B	RECIRCULATION PUMP No2 - ACTIFLO®	

4.2 Controls

4.2.1 General

1. Actiflo® Start/Stop/Auto function:
 - By activating the Auto function, the Actiflo® is set in Auto start mode and is ready to start. If all start sequence conditions are satisfied, it starts only after receiving the automatic start command.
 - By activating the Stop function, the Actiflo® stops following the automatic stopping sequence.
 - By activating the Start function, the Actiflo® starts following the automatic starting sequence whatever the automatic start command status.
2. If essential equipment is in manual and not running when the Actiflo® Start/Auto function is triggered, starting sequence cannot be activated.

4.2.1.1 Recirculation Pump's Logic

In normal operation, only one recirculation pump needs to run. If the Effluent quality deteriorates, as indicated by an increase in turbidity, the operator can use the second recirculation line by starting the second pump from the HMI.

A turbidity set point is set on the HMI to indicate to the operator he needs to start the second pump and open the polymer associated manual valve.

4.2.1.1.1 Pump Fault

When the duty pump is in fault or not running and the Actiflo® unit is in operation, the standby pump starts, the Actiflo® does not stop, and a message is displayed. If the second pump is in fault or in manual (not running) a message is displayed and the Actiflo® unit is stopped according to the automatic stop sequence.

4.2.1.1.2 Pump Priority

Each time the running pump is stopped, the same pump starts at the next Actiflo® start sequence. If the pump is in manual or in fault, the second pump starts.

4.2.1.2 Maturation Agitator Speed

The maturation agitator motor is powered by a variable speed drive (VFD) The speed of the agitator is set on the operator interface during the process commissioning of the system to get an optimal mixing. Thereafter, the speed usually does not need any further adjustment.

4.2.1.3 Agitator Fault

If one of the agitator faults or is not running, Actiflo® unit is stopped according to the automatic stop sequence.

4.2.1.4 Actiflo® High High Level

A level switch over the settling tank is used as a high high Level.

When the switch is activated, the Actiflo® unit is stopped according to the automatic stop sequence.

4.2.1.5 High High Scraper Torque

A high high torque alarm is triggered when the torque is higher than the adjustable set point for more than the adjustable delay. Those adjustable variables are set on the microcontroller installed in the junction box.

The torque detector/alarm is through a hardwired interlock to the scraper starter.

When the alarm is triggered, the scraper is stopped and then the Actiflo® is stopped according to the automatic stop sequence.

4.2.1.5.1 High Scraper Torque

A high torque alarm is triggered when the torque is higher than the adjustable set point for more than the adjustable delay. Those adjustable variables are set on the microcontroller installed in the junction box.

4.2.1.6 Clarified Water TSS Analyzer

The clarified water TSS analyzer is used to monitor the clarified water quality; an alarm is triggered when a high high turbidity is reached.

4.2.1.7 Clarified Water Flowmeter

The clarified water flow meter is used only for monitoring.

4.2.2 Automatic Conditions

4.2.2.1 Conditions for Automatic Start Sequence

The automatic start sequence is activated when the automatic start command is true and the following conditions are met:

1. If the delay for power return is elapsed
2. No major faults
3. Actiflo® in Auto start mode
4. All equipment in Auto:
 - Coagulation agitator
 - Injection agitator
 - Maturation agitator
 - Scraper
 - At least one recirculation pump

- Coagulant and polymer dosing systems
- At least one Supernatant transfer pump
- Multiflo running
- The supernatant flow control loop must be activated

4.2.2.2 Conditions for Automatic Stop Sequence

The automatic stop sequence is activated when any of the following conditions are met:

1. A major fault is active
2. The Actiflo® stop button is activated on the interface
3. The Actiflo® automatic start command is false

4.2.2.3 Start and Stop Sequences

The following table outlines the Actiflo® automatic start sequence.

Table 4-2: Actiflo® automatic start sequence

Step #	STEP NAME	ACTION	STEP CHANGE CONDITION	Recirculation pumps	Coagulation agitator	Injection agitator	Maturation	Chemical Dosage	Feed pump	Scraper
0	FULL STOP	Stopped		S	S	S	S	S	S	S
			Start Condition Sequence							
1	START SEQUENCE	Start recirculation pump		R	S	S	S	S	S	S
			Delay (ACT_MOT_START_DEL 1 to 10 sec.)							
2	START SEQUENCE	Start scraper		R	S	S	S	S	S	R
			Delay (ACT_MOT_START_DEL 1 to 10 sec.)							
3	START SEQUENCE	Start coagulation agitator		R	R	S	S	S	S	R
			Delay (ACT_MOT_START_DEL 1 to 10 sec.)							
4	START SEQUENCE	Start injection agitator		R	R	R	S	S	S	S
			Delay (ACT_MOT_START_DEL 1 to 10 sec.)							
5	NORMAL AUTOMATED OPERATION	Start maturation agitator. Active chemical dosage		R	R	R	R	R	R	S

			Delay (ACT_MOT_START_ DEL 1 to 10 sec.)						
6	ACTIFLO® RUNNING	Start feed pump		R	R	R	R	R	R

Legend:

R=RUNNING

S= STOPPED

O= OPEN C=CLOSED

The following table outlines the Actiflo® automatic stop sequence.

Table 4-3: Actiflo® automatic stop sequence

Step #	STEP NAME	ACTION	STEP CHANGE CONDITION	Recirculation pumps	Coagulation agitator	Injection agitator	Maturation	Chemical Dosage	Extraction Sludge valves	Feed pump	Scrapper
			Stop Sequence conditions								
7	STOP SEQUENCE	Stop maturation agitator Stop injection agitator Stop coagulation agitator Stop feed pumps Stop chemical dosage (polymer, coagulant)		R	S	S	S	S	C	S	R
			Delay (DEL-STO-SCR 1 to 30 min.)								
8	STOP SEQUENCE	Stop scrapper		R	S	S	S	S	C	S	S
			Delay (DEL-STO-PRS 1 to 30 min.)								
9	STOP SEQUENCE	Stop recirculation pump.		S	S	S	S	S	C	S	S

Legend:

R=RUNNING S= STOPPED O= OPEN

C=CLOSED

4.3 Fault Response

The following faults will stop the Actiflo sequence:

1. Scraper high high torque fault
2. Both recirculation pumps fault
3. One agitator fault
4. High high level alarm
5. High high TSS interlock (to be confirmed by client)

If the Actiflo® was stopped by a fault, it does not restart automatically. The operator must fix the problem and activate the auto function on the operator interface. The Actiflo® restarts if all automatic start sequence conditions are satisfied.

4.4 Interlocks

Maturation mixer/scraper

At least one recirculation pump must be running to allow maturation mixer operation.

At least one recirculation pump must be running to allow scraper operation.

Interlocks are active in auto mode and interface manual mode.

5.0 MULTIFLO

5.1 Description

The sludge extracted from the Actiflo[®] will be transferred to a Multiflo to increase the sludge solid content to 5 to 8% w/w solids. The Multiflo is a compact clarification system using flocculation reactor and enhanced lamella settling. The sludge will enter the first tank section called the flocculation tank, where an anionic polymer is added. The polymer binds the suspended solids by forming polymer bridges and the flocs agglomerate and grow into high-density flocs. From the flocculation zone, the water overflows to the settling section of the tank. In the settling zone, the high-density 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 sludge is collected at the bottom of the settling tank, under the lamella tubes. The sludge produced will be pumped to the Mill, while the filtrate will flow to a transfer tank and pumped to the Actiflo[®].

The Multiflo unit consists of the following control devices and instruments:

Table 5-1: Multiflo control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0301	65LSHH6930116	HIGH HIGH LEVEL SWITCH - MULTIFLO	
0301	65XE6930117	SCRAPER - TORQUE	
0301	65AIT6930119	TURBIDITY ANALYZER TSS – MULTIFLO	
0301	65AIT6930118	PH METER - ACTIFLO [®]	
0301	65AGI69304	MIXER - MATURATION TANK – MULTIFLO	WITH VFD
0301	65TRM69304	SCRAPER MECHANISM - MULTIFLO	
0301	65PSR69302	SLUDGE PUMP MULTIFLO THICKENER U/F	BY OTHERS

5.2 Controls

5.2.1 General

1. Multiflo Start/Stop/Auto function:

- By activating the Auto function, the Multiflo is set in Auto start mode and is ready to start. If all start sequence conditions are satisfied, it starts only after receiving the automatic start command.
- By activating the Stop function, the Multiflo stops following the automatic stopping sequence.
- By activating the Start function, the Multiflo starts following the automatic starting sequence whatever the automatic start command status.

2. If essential equipment is in manual and not running when the Multiflo Start/Auto function is triggered, starting sequence cannot be activated.

5.2.1.1 Flocculation Agitator Speed

The flocculation agitator motor is powered by a variable speed drive (VFD) The speed of the agitator is set on the operator interface during the process commissioning of the system to get an optimal mixing. Thereafter, the speed usually does not need any further adjustment.

5.2.1.2 Agitator Fault

If one of the agitator faults or is not running, Multiflo unit is stopped according to the automatic stop sequence.

5.2.1.3 Multiflo High High Level

A level switch over the settling tank is used as a High High Level.

When the switch is activated, the Multiflo unit is stopped according to the automatic stop sequence.

5.2.1.4 High High Scraper Torque

A high high torque alarm is triggered when the torque is higher than the adjustable set point for more than the adjustable delay. Those adjustable variables are set on the microcontroller installed in the junction box.

The torque detector/alarm is through a hardwired interlock to the scraper starter.

When the alarm is triggered, the scraper is stopped and then the Multiflo is stopped according to the automatic stop sequence.

5.2.1.4.1 High Scraper Torque

A high torque alarm is triggered when the torque is higher than the adjustable set point for more than the adjustable delay. Those adjustable variables are set on the microcontroller installed in the junction box.

5.2.1.5 Supernatant TSS Analyzer

The Supernatant TSS analyzer is only used to monitor the supernatant quality.

5.2.1.6 Supernatant pH Analyzer

The Supernatant pH analyzer is only used to monitor the supernatant quality.

5.2.1.7 Extraction Pump

The Multiflo Extraction Pump is equipped with VFD. A PID loop controls the Pump VFD accordingly, using the flow 65FIT6930123 as a process value. The flow set point is entered by the operator on the interface.

5.2.2 Automatic Conditions

5.2.2.1 Conditions for Automatic Start Sequence

The automatic start sequence is activated when the automatic start command is true and the following conditions are met:

1. If the delay for power return is elapsed
2. No major faults
3. Multiflo in Auto start mode
4. All equipment in Auto:
 - Flocculation agitator
 - Scraper
 - At least one recirculation pump

5.2.2.2 Conditions for Automatic Stop Sequence

The automatic stop sequence is activated when any of the following conditions are met:

1. A major fault is active
2. The Multiflo stop button is activated on the interface
3. The Multiflo automatic start command is false

5.2.2.3 Start and Stop Sequences

The following table outlines the Multiflo automatic start sequence.

Table 5-2: Multiflo automatic start sequence

Step #	STEP NAME	ACTION	STEP CHANGE CONDITION	Extraction pump	Flocculation	Chemical Dosage	Feed pump	Scraper
0	FULL STOP	Stopped		S	S	S	S	S
			Start Condition Sequence					
1	START SEQUENCE	Start extraction pump		R	S	S	S	S
			Delay (ACT_MOT_START_ DEL 1 to 10 sec.)					
2	START SEQUENCE	Start scraper		R	S	S	S	R
			Delay (ACT_MOT_START_ DEL 1 to 10 sec.)					
3	NORMAL AUTOMATED OPERATION	Start flocculation agitator. Active chemical dosage		R	R	R	S	R

Legend:

R=RUNNING

S= STOPPED

O= OPEN C=CLOSED

The following table outlines the Multiflo automatic stop sequence.

Table 5-3: Multiflo automatic stop sequence

Step #	STEP NAME	ACTION	STEP CHANGE CONDITION	Extraction pump	Flocculation	Chemical Dosage	Scraper
			Stop Sequence conditions				
7	STOP SEQUENCE	Stop flocculation agitator Stop chemical dosage (polymer)		R	S	S	R
			Delay (DEL-STO-SCR 1 to 30 min.)				
8	STOP SEQUENCE	Stop scraper		R	S	S	S
			Delay (DEL-STO-PRS 1 to 30 min.)				
9	STOP SEQUENCE	Stop extraction pump.		S	S	S	S

Legend:

R=RUNNING S= STOPPED O= OPEN C=CLOSED

5.3 Fault Response

The following faults will stop the Multiflo sequence:

1. Scraper high high torque fault
2. Extraction pump fault
3. One agitator fault
4. High high level alarm

If the Multiflo® was stopped by a fault, it does not restart automatically. The operator must fix the problem and activate the auto function on the operator interface. The Multiflo® restarts if all automatic start sequence conditions are satisfied.

5.4 Interlocks

Flocculation mixer/scraper

At least one extraction pump must be running to allow flocculation mixer operation.

At least one extraction pump must be running to allow scraper operation.

Interlocks are active in auto mode and interface manual mode.

At least one supernatant transfer pump must be running.

6.0 SUPERNATANT TRANSFER TANK

6.1 Description

The effluent from the Multiflo unit flows with a free discharge to a transfer tank so that the water level in the tank has no influence on the water level in the Multiflo.

The level in the tank is maintained by a feed forward level control loop.

The supernatant transfer tank level control is achieved by the following control devices and instruments:

Table 6-1: Supernatant transfer tank devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
N/A	65FIT6930139	FLOWMETER 100 mm Ø	
	65LSHH6930130	HIGH HIGH LEVEL SWITCH	
	65LSLL6930130	LOW LOW LEVEL SWITCH	
	65LIT6930132	LEVEL TRANSMITTER	
	65PWA69304A	SUPERNATANT PUMP no1 (TREATED WATER)	WITH VFD
	65PWA69304B	SUPERNATANT PUMP no2 (TREATED WATER)	WITH VFD

6.2 Controls

6.2.1 General

The supernatant transfer pumps are equipped with VFD. A loop controls the pump VFD accordingly, using the flow 65FIT6930139 as a process value and the level in the supernatant transfer tank.

The variable flow set point is adjusted to the flow from 65FIT6930139 with a correction factor based on the level in the supernatant transfer tank. If the level in this tank increases, the flow rate entering the system should also increase. If the level in the tank is lower, the flow rate entering the system should decrease. The change in the flow rate set point is referred to as the flow correction factor. This flow correction factor is proportional to the level in the tank at a given time.

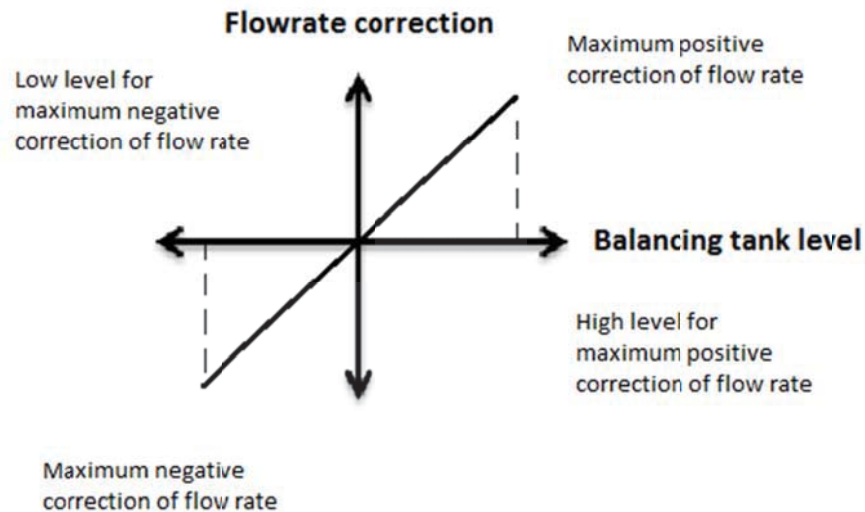


Figure 6.2-6-1 Supernatant transfer tank flow rate correction factor

The following four (4) set points must be entered by the operator to properly control the flow.

Maximum positive correction of the flow rate (65FIT6930139_SP1)

Maximum negative correction of the flow rate (65FIT6930139_SP2)

High level for maximum positive correction of the flow rate (65LIT6930132_SP1)

Low level for maximum negative correction of the flow rate (65LIT6930132_SP2)

The “Maximum positive correction of the flow rate” corresponds to the maximum value of the flow rate correction factor that is added to the current flow set point. This correction factor is at its maximum when the level in the tank is greater than or equal to the value of the “High level for maximum positive correction of flow rate” set point. When the level in the tank is high, the flow rate set point must increase in order to decrease the level in the tank.

The “Maximum negative correction of the flow rate” corresponds to the maximum value of the flow rate correction factor that is subtracted from the current flow set point. This correction factor is at its maximum when the level in the tank is less than or equal to the “Low level for maximum negative correction of flow rate” set point. When the level in the tank is low, the flow rate set point must be decreased in order to increase the level in the tank.

6.2.1.1 Supernatant Transfer Pumps' Logic

In normal operation, only one supernatant transfer pump needs to run. The operator selects the duty/standby pump on the interface.

When the duty pump is in fault or not running and the Multiflo unit is in operation, the standby pump starts. If the second pump is in fault or in manual (not running) a message is displayed and the Actiflo® unit is stopped according to the automatic stop sequence.

6.2.1.1.1 Pump Priority

Each time the running pump is stopped, the same pump starts at the next Multiflo start sequence. If the pump is in manual or in fault, the second pump starts.

7.0 SERVICE WATER SYSTEM

7.1 Description

The service water system consists of two (2) multimedia filters, two (2) heaters, one (1) filtered water tank and three (3) service water pumps. Service water is provided to the dry chemicals preparation and polymer dosing systems. Coagulant and polymer preparation required both filtered and heated water.

Skid polymer dosing required filtered water for transporting the polymer to the Actiflo® and to the standpipe in front the Multiflo. Polymer preparation required 70 psi minimum pressure in its wetting cone.

Two stages (or function) are used with the service water pumps;

The first stage pumps water coming from the Actiflo® clarified water pump box to the filters, then to the filtered water tank.

The second stage pumps from the filtered water tank and split the flow to the heaters skid 0502 and to the polymers skids. The third service water pump served as a common backup pump.

The service water system is composed of the following control devices and instruments.

Table 7.1-1: Service water system control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0502	65WHE69301	HEATER	Transfo required 575 to 480
0502	65WHE69302	HEATER	Transfo required 575 to 480
0502	65TV6930171	3WAYSVALVE	Pneumatic
0502	TIT15-001	TEMPERATURE TRANSMITTER	
N/A	65FIL69301	PRESSURE MULTIMEDIA FILTER	
N/A	65FIL69302	PRESSURE MULTIMEDIA FILTER	
	65LSHH6930150	HIGH HIGH LEVEL SWITCH	
	65LSLL6930150	LOW LOW LEVEL SWITCH	
	65LIT6930152	LEVEL TRANSMITTER	
	65PWA69303A	SERVICE WATER PUMP NO1	WITH VFD
	65PWA69303B	SERVICE WATER PUMP NO2	WITH VFD
	65PWA69303C	SERVICE WATER PUMP NO3	WITH VFD
	65PIT6930159	PRESSURE TRANSMITTER	Process_Variable
	65PIT6930160	PRESSURE TRANSMITTER	

7.2 Controls

7.2.1 General

Clarified water is first pumped to the pressurized filters by one service water pump (stage #1) and the filtered water is pumped through the heater and the service water network (stage #2).

The service water system consists of three (3) pumps (2 on duty and 1 on standby). The standby can be used either on the stage #1 or on the stage #2. The operator shall arrange the valves configuration as required and select the duty pumps on the interface.

7.2.2 Pressurized Multimedia Filters

A PID level control loop using the level transmitter in the filtered water reservoirs as a process variable and the pump VFD will keep the filtered water reservoirs full.

This inlet pressure is monitored by a pressure transmitter 65PIT6930160 that will triggered an alarm the pressure exceeds a set point (90 psig).

The service water pump frequency set point is calculated with a chart depending on the filtered water tank level. A switch on the filter head indicates when a filter is on backwash.

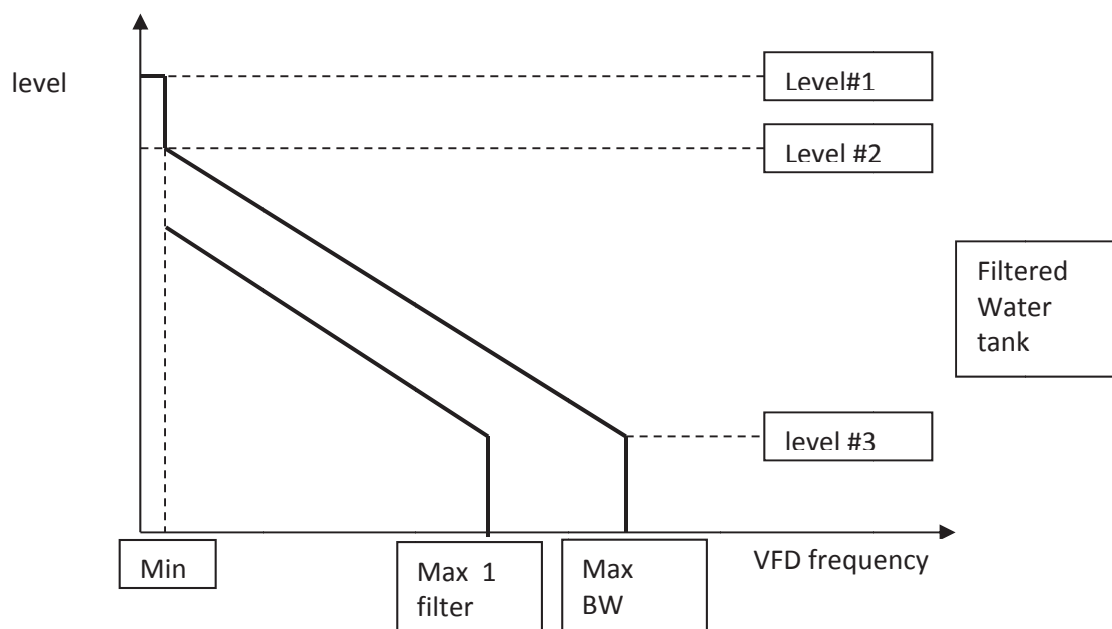


Figure 7-1: Filtered Water Tank Level Control Logic

1. Water above level #1 (=LSHH), the pump stops;
2. Water between level #1 and level #2, The drive is at the minimum frequency set by the operator at the interface ;
3. Water between level #2 and level #3, the frequency is inversely proportional to the water level. At level #2, the frequency is set to the minimum and at level #3, the frequency is set to the maximum;
4. Water below level #3, maximum frequency. The operator will set set points.

When one filter is in backwash: $f_{\max - BW}$

When one filter or two filters are in filtration: $f_{\max - oper}$

Level set points #1, #2, #3, #4 is set by the operator at the interface.

The pressurized filters are equipped with a completely autonomous controller and are independent of the central control system. For each filter the operator manually enters a value for the filtration volume to be met before initiating a backwash. This volume will be adjusted during commissioning, according to the observed head losses across the filtration units. In order to avoid simultaneous backwashes, a different volume set point will be set on each filter. Filtered water will be stored in the Filtered water tank 65TNK69303 from where it will be pumped by the service water (booster) pumps.

7.2.3 Service Water Network Pressure Control

The pressure is maintained by a PID control loop using the pressure transmitter on the line as a process variable and the filtered water pumps speed as the control variable. If the pressure at the outlet of the filtered water pumps reaches a high pressure (65PIT6930159) then the filtered water pumps (stage #2) stop. The pumps will automatically stop when the pressure decreases of 5 psig below the set point.

7.2.4 Heated Water Control

Heated water is to be used in chemicals preparation. The pressure in the heated water line must remain between 70 psig and the temperature set point can vary between 10 and 20°C.

The required temperature is achieved by a PID control loop using the value read at the temperature transmitter as the process variable and the modulating valve on the heated water line as the control variable.

7.2.5 Availability Conditions

7.2.5.1 Service Water Pumps Availability (stage 1)

The service water pumps will be available if the following conditions are met:

1. At least one of the pumps is in automatic mode
2. The filtered water tank high high level switch is not activated.
3. No major fault is present with the duty filtered water booster pump.

7.2.5.2 Filtered Water Booster Pumps Availability (stage 2)

The Filtered water booster pumps will be available if the following conditions are met:

1. At least two of the pumps are in automatic mode
2. The low level switch in the filtered water tank is not activated
3. No major fault is present with the duty service water pump.

7.2.6 Fault Response

The following are the major faults associated with the service water system.

1. Service water pump fault
2. Filtered water booster pump fault

Clarified Water High High Pressure Fault

If the pressure at the outlet of the clarified water pumps reaches a high high pressure (65PIT6930160) then an alarm is triggered and the clarified water pumps (stage #1) stop.

Filtered Water High High Pressure Fault

If the pressure at the outlet of the filtered water pumps reaches a high high pressure (65PIT6930159) then an alarm is triggered and the filtered water pumps (stage #2) stop.

Filtered Water Tank High High Level Fault

If the level in the filtered water tank reaches a high high level (65LSHH6930150) then an alarm is triggered and the clarified water pumps (stage #1) stop.

Filtered Water Tank Low Low Level Fault

If the level in the filtered water tank reaches a low low level (65LSLL6930150) then an alarm is triggered and the filtered water pumps (stage #2) stop.

Service water pump fault

If the duty pump fails, the standby pump will take over as the duty pump and start.

Filtered Water Booster Pump Fault

If one of the duty pumps fails, the standby pump will take over as a duty pump and start.

8.0 COAGULANT MAKE-UP (PREPARATION) SYSTEM

8.1 Description

The coagulant preparation system stores and prepares coagulant dosed by the metering pumps 65PME69301A/B. When the level is low in the storage tank, a batch transfer is made from the preparation tank.

Before changing a big bag, the operator activates the bag side agitators to pass the remainder of powder into the feeder hopper.

A trolley mounted on the system structure will be used to move a new to the bulk bag unloader support installed above the feeder hopper. The sleeve gate valve is closed to maintain the big bag sleeve compressed, the access door is opened. Then the inner bag is cut by the operator and the access door closed. The sleeve gate valve is manually opened to let the powder reach the feeder hopper.

The hopper includes one level switch, a mechanical vibration device and a manual knife-gate type isolation valve. The coagulant will be metered accurately via a volumetric screw feeder suited with a mechanical anti-bridging device. The dry coagulant will be prepared as required in an agitated mixing tank of 3.4 m³ and pumped into a storage tank of 3.4 m³.

For some dry coagulant an injection of sulphuric acid might be also required during the make-up process prior to the powder feeding in the mixing tank(not applicable)

The dry coagulant feeder operates at a fixed speed and water is added to the preparation tank at fixed flow; the feeder will stop when the desired concentration of coagulant is achieved.

The dry coagulant preparation system is made up of the following control devices and instruments:

Table 8.1: Coagulant control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0601-1	65HTS69301A	Hoist Motor	
0601-1	65HTS69301B	Trolley Motor	
0601-3	65FY6930201	Actuator Service Water Control Valve	
0601-2	LSL9-001	Powder Low Level	
0601-2	65CVI69303	Coagulant Dry Feeder Screw	
0601-2	65FV6930206	Solenoid Valve (Feeder Isolation)	
0601-3	65LIT693 0212	Level Transmitter Maturation Tank	

06023	65LIT693 0222	Level Transmitter Dosage Tank
N/A	65PWA69305	Coagulant Transfer Pump
0601-3	65AGI69305	Coagulant Maturation Tank Agitator
0602	65AGI69306	Coagulant Dosage Tank Agitator
0601-2	LB9-510	Lump Breaker

8.2 Controls

8.2.1 General

The slurry preparation is controlled by the preparation and transfer sequence. If equipment involved in the sequence faults during the sequence, an alarm is displayed on the operator interface and the operator must fix the problem and then manually start the sequence again. If this occurs the sequence will pick up where it left off unless otherwise indicated.

The working volume of the mixing tank should be a MAXIMUM of 2 m³ (762 mm height). This is a fixed value, determined by constraints of the tank size and allowing for a safety margin. The total volume is less than 3.4 m³ (1300 mm height) but it cannot be larger.

The operator must enter the concentration required per batch. The service water added for preparation of the diluted coagulant is controlled automatically (on/off valve).

For the first batch, the system will:

1. Open FY-02-01.
2. When water will be at low level (762 mm); the agitator (65AGI69305) will start, blower (65FAN69301) will start; after 5 seconds the feeder (65CVI69303 and FA9-510) will start and FY-0206 will open. Sequence for vibrator will run 5 sec/min (determined by operator).
3. When the quantity of powder is reached (determined by calculation below and by calibration curve of the screw) feeder will stop, FY0206 will close, vibrator will stop and after 90 sec (determined by operator) blower will stop.
4. When high level is reached, water inlet valve FY-0201 closes.
5. After a certain time of mixing (5 min determined by operator), valve FY-02-01 will open if LIT-0212 is not at high level.

The resulting diluted coagulant must be a maximum of 33% by volume. The operator will enter the desired final concentration on the interface.

Dilution water required:

The dilution water is added to the mixing tank to achieve the final desired concentration. The dilution water flow is preset by the operator (5.2 m³/hr approx.). Batch concentration is determined by feeder working time at the fixed speed. The service water can be adjusted with valve V15-012 and it has to be done manually by operator.

Flushing:

When the system has to be stopped, a flush shall be made. This flush is semi-automatic. When operator selects the flush sequence, it:

1. Stops the dry coagulant sequence; no batch will be started.
2. When low level in the preparation tank is reached, the FY-02-01 shall open and fill the tank of water. On HMI nothing can be selected but the cancel button.
3. Start agitator 65AGI69305.
4. When high level is reached then a message on the HMI appears: "ready to flush".
5. Operator has to open the drain valve V9-511 and press OK.
6. When low level is reached, agitator shall stop.
7. When low low level is reached then a message on HMI interface shall indicate: "close the drain valve on the mixing tank".
8. Operator closes the valve V9-511 and press OK.
9. A message do you want to make a second flush will appear and operator has to select yes or no.
10. If yes then repeat 2 to 7 if not then go to flush holding tank.

Holding tank:

1. Stops the dry coagulant sequence; no batch will be started.
2. When low level in the preparation tank is reached, the FY-02-01 shall open and fill the tank of water. On HMI nothing can be selected but the cancel button.
3. When high level is reached then a message on the HMI appears: "ready to flush the holding tank".
4. Start the transfer pump.
5. Start agitator 65AGI69306.
6. When low level is reached or high level in the holding tank the pump shall stop.
7. Operator has to open the drain valve V9-516 and press OK.
8. When low level is reached, agitator shall stop.
9. When low low level is reached then a message on HMI interface shall indicate: "close the drain valve on the mixing tank".
10. Operator closes the valve V9-516 and press OK.
11. A message do you want to make a second flush will appear and operator has to select yes or no.
12. If yes then repeat 12 to 19 if not stop.

8.2.2 Calculations

The density of diluted coagulant ρ_{dilFS} with a % solids is given by:

$$\rho_{dilcoag} (b\%) = 1 / [(b / \rho_{coag}) + (1 - b) / \rho_{water}]$$

where:

b = % by mass diluted coagulant

ρ_{coag} = TBD kg/m³

$1-b$ = % by mass water

ρ_{water} = 984 kg/m³

The required weight of solid coagulant is calculated as:

$$W_p = \frac{(L_f - L_i) \times d^2 \times \pi}{4} \times \rho_{dilcoag} \times b$$

Where:

W_p is the weight of powder to be dosed (kg)

$(L_f - L_i)$ = Level differential between final level in tank and initial level (m)

d = Tank diameter (m)

$\dot{m}_p$ = Mass flow of powder (this is a manual entry by operators according to feeder calibration) (kg/h)

The dosing time of dry coagulant is calculated as:

$$t_p = \frac{w_p \times 60}{m_p}$$

Where:

t_p = Dosing time required to get the concentration required of powder (min)

m_p = Mass flow of powder (this is a manual entry by operators according to feeder calibration) (kg/h)

8.2.3 Automatic Conditions

8.2.3.1 Conditions for Automatic Start Sequence

The automatic start sequence will be activated when the automatic start command is true and the following conditions are met:

1. If delay for power return is elapsed;
2. If remote run request bit is activated;
3. Transfer pump, water valve and feeder are in Auto mode;
4. Operator did not select the flush mode;
5. No major faults are present in the ferric sulphate preparation system.

8.2.3.2 Conditions for Automatic Stop Sequence

1. The dry coagulant preparation auto start mode is deactivated on the interface or one of the following occurs:
 - a. If the operator presses the “start/stop” push button;
 - b. If a major fault for an equipment in the ferric sulphate preparation system is active;
2. If remote contact is not activated;
3. The coagulant preparation automatic start command is false.
4. If major fault occur

8.2.4 Dry Coagulant Preparation and Transfer Sequence

The diluted coagulant preparation sequence is detailed in the following table.

Table 8.2: Dry coagulant batch preparation automatic sequence

Step #	Step Name	Actions / Transition conditions	Dry coagulant powder feeder	water Service valve	T- Isolation valve SV-8235 Nozzle	Vibrator hopper	Transfer pump	AG- 3235- Agitator 020	Blower
0	Waiting Time	Preparation system ready Waiting for preparation request	S	C	C	S	C	S	S
		Confirmation by the operator on the interface to start preparation sequence Enter concentration required							
1	Water	Water in the system	S	O	C	S	C	S	S
		LSL on LIT-0212 is reached on tank 65CUV69301							
2	Agitator/bl ower	Start agitator 65AGI69305 and blower 65FAN69301	S	O	C	S	C	R	R
		5 seconds							
3	Add dry coagulant	Feeder start; vibrator FA9-510 is working according to 5 sec/min; this parameter can be changed by the operator.	R	O	O	R	C	R	R
		Ferric sulphate quantity is reached according to the calculation							
4	Stop ferric sulphate	Feeder stop	S	O	C	S	C	R	R
		90 second (can be change by operator)							
6	Stop blower	Stop blower	S	O	C	S	C	R	S

		LSH on LIT-0212 is reached on tank 65CUV69301							
7	Stop water	Close Water inlet valve 65FV6930201	S	C	C	S	C	R	S
		2 min (can be changed by operator) Batch ready							
8	Diluted Coagulant transfer	LSL on LIT-02-02 is reached; stop agitator; start transfer pump	S	C	C	S	O	S	S
		Motor Delay							
9	Stop transfer	LSLL on LIT-02-12 is reached on tank 65CUV69301	S	C	C	S	C	S	S
		Re-do 1,2,3,4,5,6, 7,8 ,9 until LSH is reached on LIT -0202							
11	In steady state	When LSL in LIT-0212 (determined by operator) is hit,	S	C	C	S	C	R	S
		Re-do 1,2,3,4,5,6,7,8,9,10							

Legend:

Motor: S: Stop R: Running **Valve:** C: Closed O: Open

Manual Confirmation

When a manual confirmation is required on the interface, the operator will have to manually confirm that they completed the action. If they enter that they have not completed the action on the interface, the question will be posed again. The automatic sequence will not proceed to the next step until the operator confirms the action is complete. At each of the manual confirmations, the operator will also have the option to cancel the automatic preparation sequence if required.

8.2.5 Fault Response

The following are the major faults associated with the dry coagulant preparation system.

1. Dry coagulant feeder fault
2. Transfer pump and water valve open/close fault
3. LSLL-02-22
4. LSHH-02-12
5. Agitator 65AGI69305

Dry Coagulant Feeder Fault

The feeder stops, coagulant preparation system falls on major fault and sequence is stopped until the problem is fixed.

Transfer Pumps and Water Valve Open/Close Fault

The coagulant preparation system falls on major fault and sequence is stopped until the problem is fixed.

LSLL-02-22

Dosing pumps stop until LSLL is not activated.

LSHH-02-12

Valve 65FV6930201 closes until system hit LSL in 65CUV69301

Agitator Fault

Agitator stops, coagulant preparation system falls on major fault and sequence is stopped until the problem is fixed.

9.0 COAGULANT DOSING SYSTEM

9.1 Description

Coagulant is dosed proportionally to the Actiflo® unit's total raw water flow rate 65FIT6930001. It is pumped with 65PME69301A or 65PME69301B from the coagulant dosage tank 65TSO69301 towards the Inlet of the Actiflo®.

The coagulant dosing unit consists of the following control devices and instruments completely pre-piped and arranged on a skid as follows:

Table 9.1-1: Coagulant dosing system control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0701	JB9-510	JUNCTION BOX - COAGULANT DOSING	
0701	65PME69301A	DOSING PUMP 1 - COAGULANT DOSING	WITH VFD
0701	65ZS6930230	LEAK DETECTION DOSING PUMP #1	
0701	65PME69301B	DOSING PUMP 2 - COAGULANT DOSING	WITH VFD
0701	65ZS6930235	LEAK DETECTION DOSING PUMP #2	

10.0 CATIONIC POLYMER MAKE-UP SYSTEM

10.1 Process Overview, Description

The **Hydrapol 750** is an automatic machine for batch preparation of polymer solutions. A screw doses dry polymer powder into a cone, and then service water wets it in a water whirl. The mixture is discharged into a maturation tank where a mixer agitates the solution during a period of 60 to 90 minutes. After this period the solution is transferred into a storage tank.

The automatic polymer preparation system consists of the following control devices and instruments completely pre-piped and arranged as follow:

Table 10-1: Polymer preparation system control devices (PLC -520)

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0801	V22A	3-WAY SOLENOID VALVE - POLYMER PREPARATION	
0801	PSL-12	SERVICE WATER PRESSURE SWITCH	
0801	V22	ON/OFF SERVICE WATER VALVE	
0801	LSL-12	HOPPER LOW LEVEL SWITCH	
0802	M12	MIXER - POLYMER PREPARATION (MATURATION)	
0801	M22	FEEDER SCREW	
0802	LT-12	LEVEL TRANSMITTER MATURATION TANK	
0802	LT-22	LEVEL TRANSMITTER STORAGE TANK	
1001	PS9-520	PRESSURE SWITCH - POLYMER PREPARATION	
1001	V9-522	SOLENOID VALVE - POLYMER PREPARATION	
0801	LSL9-520	LEVEL SWITCH - POLYMER PREPARATION	
0802	V32	BUTTERFLY TRANSFER VALVE - POLYMER PREPARATION	

Refer to the standard control narrative in APPENDIX B

11.0 CATIONIC POLYMER DOSING SYSTEM

11.1 Process Overview

The polymer is metered proportional to the raw water flow. Three (3) dosing points can be selected manually by the operator on Actiflo® units. The polymer dosing unit consists of the following control devices and instruments completely pre-piped and arranged on a skid as follow:

Table 11.1-: Polymer dosing system control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0901	JB9-520	JUNCTION BOX - POLYMER DOSING	
0901	65PME69302A	DOSING PUMP 1 - POLYMER DOSING	WITH VFD
0901	65ZS6930270	LEAK DETECTION DOSING PUMP #1	
0901	65PME69302B	DOSING PUMP 2 - POLYMER DOSING	WITH VFD
0901	65ZS6930275	LEAK DETECTION DOSING PUMP #2	
0901	65FV6930281	TRANSPORT WATER ON/OFF VALVE	

11.2 Controls

The skid 0901 consists of one pump on duty and one pump in backup used to dose polymer into the Actiflo®.

A 4-20 mA signal is sent to the duty pump. Each pump is paired with a solenoid valve 65FV6930281 for carrying water line. The water transport solenoid valve is opened when the associated pump starts. The metering is done by entering the required dosage on the operator interface in mg/L or mL/L. The program calculates the speed of the pump using the entered dosage, the pump calibration and the actual water flow.

11.2.1 Duty/Standby Rotation

The Duty/Standby rotation is manual. The operator selects on the interface the duty pump.

11.2.2 Calculations

The required dosing flow is a function of the raw water flow, required concentration, chemical stock concentration and chemical specific gravity.

The operator can choose to enter a dosage value in mg/L or in mL/L.

The equation below describes the equation type and its variables. Each system (final pH correction and polishing reactor) has its own variables listed in appendix A.

Mode 1: RC_{POL1} in mg/L

Equation 1: polymer flow rate calculation

$$QC_{POL} = (RC_{POL1}) * (Q_{INF}) / ((SG_{POL}) * (CS_{POL}) * 10)$$

Where:

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

RC_{POL1} = Required Chemicals Concentration in the process (mg/L)

Q_{INF} = Influent Flowrate (m³/h) as currently read by 65FIT6930001

SG_{POL} = Chemical Specific Gravity (kg/L)

CS_{POL} = Chemical Stock Concentration (%)

Mode 2: RC_{POL2} in mL/L

Equation 4: Polymer flow rate calculation

$$QC_{POL} = (RC_{POL2}) * (Q_{INF})$$

Where:

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

RC_{POL2} = Required Chemicals Concentration in the process (mL/L)

Q_{INF} = Influent Flowrate (m³/h) as currently read by 65FIT6930001

The calculation of the dosage percentage is done by integrating calibration values retrieved from each dosing pump. Two (2) verification points are required to scale the chemical flow rate in percentages for an adjusted pressure. The chemical flow rate verification is always done for two (2) specific dosage percentage values, 20% and 80%.

The dosage percentage is given by:

Equation 2: Polymer percentage calculation

$$(CD_{POL}) = (60 \times ((QC_{POL}) - (QC_{20-POL})) / ((QC_{80-POL}) - (QC_{20-POL}))) + 20$$

Where:

CD_{POL} = Polymer Dosage Percentage (%)

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

QC_{20-POL} = Measured Polymer Dosing Flowrate at 20% of the calibration curve (L/h) (entered by the operator on the interface)

QC_{80-POL} = Measured Polymer Dosing Flowrate at 80% of the calibration curve (L/h) (entered by the operator on the interface)

The following parameters shall be available on the operator interface of the polymer dosing system:

(RC_{POL1}) Final concentration target in mg/l

(RC_{POL2}) Final concentration target in mL/L

(SG_{POL}) Density of the dosed solution in kg/l

(CS_{POL}) Chemical concentration in the stock solution in %

(QC_{20-POL}) Chemical flow rate at 20% dosage in l/h

(QC_{80-POL}) Chemical flow rate at 80% dosage in l/h

11.2.3 Availability Conditions

A metering pump may operate in manual mode from the HMI if the following conditions are met:

1. If Auto/Manual selector is in Manual position
2. If HOA selector is in Auto position
3. If no fault is detected (ALARM)
4. If the emergency stop is not activated
5. If Run/Stop selector is in Run position

A metering pump may operate in auto mode if the following conditions are met:

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1. If Auto/Manual selector is in Auto position
2. If HOA selector is in Auto position
3. If no fault is detected (ALARM)
4. If the emergency stop is not activated
5. If the Actiflo® is running
6. The polymer dosage is not in major fault

11.3 Fault Response

The polymer dosage is in major fault, if at least one of these faults is active:

1. Both dosing pumps fault
2. Low low level in the polymer storage tank

Polymer Pump Fault

When a polymer pump faults or if the ZS leak of the pump is active, an alarm is activated.

Sequence of event when the alarm is tripped:

1. Stop the dedicated polymer dosing pump
2. Stop service water
3. Start the stand by pump
4. Send an alarm to operator

Dosing Pump Out of Capacity Alarm

These alarms show that the required chemical flow is out of the dosing pump range for the adjusted stroke length.

Polymer Pump Low Dosing Capacity

1. If $(PO) > (PO_H)$ and the pump is running in auto for a period of 60 sec, an alarm will be displayed on the operator interface to inform the operator that the dosing capacity of the pump is low.
2. *Note: The low dosing percentage threshold (PO_L) is lower than 5%.*
3. Alarm is activated.

Polymer Pump High Dosing Capacity

1. If $(PO) < (PO_L)$ and the pump is running in auto for a period of 60 sec, an alarm will be displayed on the operator interface to inform the operator that the dosing capacity of the pump is high.
2. *Note: The high dosing percentage threshold (PO_H) is higher than 95%*
3. Alarm is activated.

11.4 Interlocks

Polymer Pump

The polymer pump cannot be started if the low low level transmitter 65LIT69030267 is active. If the pump is in operation and the low low level transmitter 65LIT69030267 is triggered the pump is stopped by interlock. The low low level alarm can be auto-reset with a level higher than low level set point.

Pump as spare is interlocked if not selected.

Actiflo® not running interlocks the polymer pumps.

12.0 ANIONIC POLYMER MAKE-UP SYSTEM

12.1 Process Overview

The **Hydrapol 1750** is an automatic machine for batch preparation of polymer solutions. A screw doses dry polymer powder into a cone, and then service water wets it in a water whirl. The mixture is discharged into a maturation tank where a mixer agitates the solution during a period of 60 to 90 minutes. After this period the solution is transferred into a storage tank.

The automatic polymer preparation system consists of the following control devices and instruments completely pre-piped and arranged as follow:

Table 12-1: Polymer preparation system control devices (PLC -620)

SKID	P&ID TAG	DESCRIPTION	COMMENTS
0801	V22A	3-WAY SOLENOID VALVE - POLYMER PREPARATION	
0801	PSL-12	SERVICE WATER PRESSURE SWITCH	
0801	V22	ON/OFF SERVICE WATER VALVE	
0801	LSL-12	HOPPER LOW LEVEL SWITCH	
0802	M12	MIXER - POLYMER PREPARATION (MATURATION)	
0801	M22	FEEDER SCREW	
0802	LT-12	LEVEL TRANSMITTER MATURATION TANK	
0802	LT-22	LEVEL TRANSMITTER STORAGE TANK	
1001	PS9-520	PRESSURE SWITCH - POLYMER PREPARATION	
1001	V9-522	SOLENOID VALVE - POLYMER PREPARATION	
0801	LSL9-520	LEVEL SWITCH - POLYMER PREPARATION	
0802	V32	BUTTERFLY TRANSFER VALVE - POLYMER PREPARATION	

Refer to the standard control narrative in APPENDIX B

13.0 ANIONIC POLYMER DOSING SYSTEM

13.1 Description

The polymer is metered proportional to the estimated Hydrocyclones flowrate. The polymer dosing unit consists of the following control devices and instruments completely pre-piped and arranged on a skid as follow:

Table 13-1: Polymer dosing system control devices

SKID	P&ID TAG	DESCRIPTION	COMMENTS
1101	JB9-620	JUNCTION BOX - POLYMER DOSING	
1101	65PME69305A	DOSING PUMP 1 - POLYMER DOSING	WITH VFD
1101	65ZS6930320	LEAK DETECTION DOSING PUMP #1	
1101	65PME69305B	DOSING PUMP 2 - POLYMER DOSING	WITH VFD
1101	65ZS6930325	LEAK DETECTION DOSING PUMP #2	
1101	65FV6930331	TRANSPORT WATER ON/OFF VALVE	

13.2 Controls

The skid 1101 consists of one pump on duty and one pump in backup used to dose polymer into the Multiflo.

A 4-20 mA signal is sent to the duty pump. Each pump is paired with a solenoid valve for carrying water line. The water transport solenoid valve is opened when the associated pump starts. The metering is done by entering the required dosage on the operator interface in mg/L or mL/L. The program calculates the speed of the pump using the entered dosage, the pump calibration and the actual water flow.

13.2.1 Duty/Standby Rotation

The Duty/Standby rotation is manual. The operator selects on the interface the duty pump.

13.2.2 Calculations

The sludge flow rate is given by the following equation:

$$Q_{\text{sludge}} = (Q_{\text{recirc1}} \times E_{\text{HYD}}) \times a + (Q_{\text{recirc2}} \times E_{\text{HYD}}) \times b$$

Where:

$$Q_{\text{sludge}} = \text{Sludge Flowrate (m}^3/\text{h)}$$

$Q_{recirc1}$: Flow rate of recirculation pump #1 (adjustable at the interface)

$Q_{recirc2}$: Flow rate of recirculation pump #2 (adjustable at the interface)

E HYD : Hydrocyclone split percentage (%) (adjustable at the interface)

a = 1 if recirculation pump #1 running; a=0 if recirculation pump#1 not running

b = 1 if recirculation pump #2 running; a=0 if recirculation pump#2 not running

The required dosing flow is a function of the raw water flow, required concentration, chemical stock concentration and chemical specific gravity.

The operator can choose to enter a dosage value in mg/L or in mL/L.

The equation below describes the equation type and its variables. Each system (final pH correction and polishing reactor) has its own variables listed in appendix A.

Mode 1: RC_{POL1} in mg/L

Equation 3: polymer flow rate calculation

$$QC_{POL} = (RC_{POL1}) * (Q_{INF}) / ((SG_{POL}) * (CS_{POL}) * 10)$$

Where:

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

RC_{POL1} = Required Chemicals Concentration in the process (mg/L)

Q_{INF} = Influent Flowrate (m³/h) as currently read by 65FIT6930001

SG_{POL} = Chemical Specific Gravity (kg/L)

CS_{POL} = Chemical stock concentration (%)

Mode 2: RC_{POL2} in mL/L

Equation 4: Polymer flow rate calculation

$$QC_{POL} = (RC_{POL2}) * (Q_{INF})$$

Where:

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

RC_{POL2} = Required Chemicals Concentration in the process (mL/L)

Q_{INF} = Influent Flowrate (m³/h) as currently read by 65FIT6930001

The calculation of the dosage percentage is done by integrating calibration values retrieved from each dosing pump. Two (2) verification points are required to scale the chemical flow rate in percentages for an adjusted pressure. The chemical flow rate verification is always done for two specific dosage percentage values, 20% and 80%.

The dosage percentage is given by:

Equation 4: Polymer percentage calculation

$$(CD_{POL}) = (60 \times ((QC_{POL}) - (QC_{20-POL})) / ((QC_{80-POL}) - (QC_{20-POL}))) + 20$$

Where:

CD_{POL} = Polymer Dosage Percentage (%)

QC_{POL} = Required Polymer Dosing Flowrate (L/h)

QC_{20-POL} = Measured Polymer Dosing Flowrate at 20% of the calibration curve (L/h) (entered by the operator on the interface)

QC_{80-POL} = Measured Polymer Dosing Flowrate at 80% of the calibration curve (L/h) (entered by the operator on the interface)

The following parameters shall be available on the operator interface of the polymer dosing system:

(RC_{POL1}) Final concentration target in mg/l

(RC_{POL2}) Final concentration target in mL/L

(SG_{POL}) Density of the dosed solution in kg/l

(CS_{POL}) Chemical concentration in the stock solution in %

(QC_{20-POL}) Chemical flow rate at 20% dosage in l/h

(QC_{80-POL}) Chemical flow rate at 80% dosage in l/h

13.2.3 Availability Conditions

A metering pump may operate in manual mode from the HMI if the following conditions are met:

1. If Auto/Manual selector is in Manual position
2. If HOA selector is in Auto position
3. If no fault is detected (ALARM)
4. If the emergency stop is not activated
5. If Run/Stop selector is in Run position

A metering pump may operate in auto mode if the following conditions are met:

1. If Auto/Manual selector is in Auto position
2. If HOA selector is in Auto position
3. If no fault is detected (ALARM)
4. If the emergency stop is not activated
5. If the Actiflo® is running
6. The polymer dosage is not in major fault

13.3 Fault Response

The polymer dosage is in major fault, if at least one of these faults is active:

1. Both dosing pumps fault
2. Low low level in the polymer storage tank

Polymer Pump Fault

When a polymer pump faults or if the ZS leak of the pump is active, an alarm is activated.

Sequence of event when the alarm is tripped:

1. Stop the dedicated polymer dosing pump
2. Stop service water
3. Start the stand by pump
4. Send an alarm to operator

Dosing Pump Out of Capacity Alarm

These alarms show that the required chemical flow is out of the dosing pump range for the adjusted stroke length.

Polymer Pump Low Dosing Capacity

1. If $(PO) > (PO_H)$ and the pump is running in auto for a period of 60 sec, an alarm will be displayed on the operator interface to inform the operator that the dosing capacity of the pump is low.
2. *Note: The high dosing percentage threshold (PO_H) is higher than 95%.*
3. Alarm is activated.

Polymer Pump High Dosing Capacity

1. If $(PO) < (PO_L)$ and the pump is running in auto for a period of 60 sec, an alarm will be displayed on the operator interface to inform the operator that the dosing capacity of the pump is high.
2. *Note: The low dosing percentage threshold (PO_L) is lower than 5%.*
3. Alarm is activated.

13.4 Interlocks

Polymer Pump

The polymer pump cannot be started if the low low level transmitter 65LIT69030267 is active. If the pump is in operation and the low low level transmitter 65LIT69030267 is triggered the pump is stopped by interlock. The low low level alarm can be auto-reset with a level higher than low level set point.

Pump as spare is interlocked if not selected.

Multiflo not running interlocks the polymer pumps.

14.0 INTERLOCKS THAT TRIGGER WTP TRIP

- Client feed pump not running (xxxxx)
- Raw water flowmeter out of range (65FIT6930001)
- High high Actiflo® TSS interlock (65AIT6930019) (to be confirmed)
- Actiflo® high high level LSHH-00-16
- High high Actiflo® scraper torque (XS-00-17)
- Actiflo® agitator not running (65AGI69301/65AGI69302/65AGI69303)
- Actiflo® both recirculation pumps not running (65PSR69301A/65PSR69301B)

- Multiflo high high level (LSHH-01-16)
- High high Multiflo scraper torque (XSHH-01-17)
- Multiflo agitator not running (65AGI69304)
- Extraction pumps not running (65PSR69302)

- Supernatant flowmeter out of range (FIT-01-39)
- Supernatant transfer pumps not running (65PWA69304A/65PWA69304B)
- High high supernatant tank level (LSHH-01-30)

- Coagulant preparation system major fault
- Coagulant dosing system major fault
- Anionic polymer preparation system major fault
- Anionic polymer dosing system major fault
- Cationic polymer preparation system major fault
- Cationic polymer dosing system major fault

15.0 APPENDIX A

Set Point Table

EXCEL FILE: Set point_rev1.xlsx

Project : Agnico Eagle Mines, Permanent effluent water treatment plant
By : Lj
Chkd : GP
Appvd :
Rev : 1

APPENDIX A
PARAMETERS, SET-POINTS, ALARMS
Main Equipments

Process	From or is	Parameters or Set-Points			Units	Value	Range	Delay (s)	Action/Comment
		Name	Control Philosophy Tag	Program Tag*					
RAW WATER	AIT-00-02	Raw water - Turbidity - High	H		mg/l TSS	800	0-50000	60	ALARM. Priority 2.
		Raw water - Turbidity - High High	HH		mg/l TSS	1000	0-50000	60	ALARM. Priority 2. if 1 recirculation pump
	FIT-00-01	Raw water Flowmeter Out of Range - ACTIFLO	FIT-00-01_OR		m ³ /h	-	-	0	FAULT. Initiate Actiflo Shut down sequence.
		Raw water water Flow control loop - setpoint	FIC-00-01_SP1		m ³ /h	To be set	0-1300		min.260 max 1167. To be set by the operator.
		Raw water water Flow control loop deviation							FAULT. Initiate Actiflo Shut down sequence.
		Raw water Flowmeter - ACTIFLO - Low low	LL		m ³ /h	200	0-1300	300	ALARM, priority2.
		Raw water Flowmeter - ACTIFLO - Low	L		m ³ /h	260	0-1300	60	ALARM, priority2.
		Raw water Flowmeter - ACTIFLO - High	H		m ³ /h	1166	0-1300	60	ALARM. Priority 2.
		Raw water Flowmeter - ACTIFLO - High high	HH		m ³ /h	1200	0-1300	60	FAULT. ALARM. Priority 1. Initiate Actiflo Shut down sequence. To determined SP>EU
ACTIFLO 65THI69301	LSHH-00-16	Actiflo Level - High High (switch)	LAHH		-	-	-	5	FAULT. Alarm Priority 1. Initiate Actiflo Stop sequence.
	AIT-00-18	Actiflo pHmeter - Out of Range	AAOR		pH	-	0-14.00		Alarm PRIORITY1 Use of calibration mode by operator
		Actiflo pHmeter - High High	AAHH		pH	9	0-14.00	60	Alarm PRIORITY1
		Actiflo pHmeter - High	AAH		pH	8	0-14.00	60	Alarm PRIORITY2
		Actiflo pHmeter -Low	AAL		pH	5,5	0-14.00	60	Alarm PRIORITY2
		Actiflo pHmeter -Low Low	AALL		pH	5	0-14.00	60	Alarm PRIORITY1
	AIT-00-19	Clarified water TSS level - Actiflo - Out of Range	AAOR		mg/l TSS	-	0-500		Alarm PRIORITY1 Use of calibration mode by operator
		Clarified water TSS level - Actiflo - High	AAH		mg/l TSS	20	0-500	60	Alarm PRIORITY2
	XS-00-17	Clarified water TSS level - Actiflo - High High	AAHH		mg/l TSS	30	0-500	60	FAULT. ALARM. Priority 1. Initiate Actiflo Shut down sequence.
		Scraper Torque - Actiflo - High	AAH		%	37%	0-100	10	Alarm PRIORITY2, base on 185/500Newton
	E HYD	Scraper Torque - Actiflo - High High	AAHH		%	49%	0-100	5	FAULT.Alarm PRIORITY1. Initiate Actiflo Shut down sequence. Base on 247/500 Newton
		Hydrocyclone removal efficiency	parameter		%	80	0-100		adjustable by the operator
	Qrecirc.1	Flow rate of recirculation pump#1	parameter		m3/h	34	0-40		adjustable by the operator
	Qrecirc.2	Flow rate of recirculation pump#2	parameter		m3/h	34	0-40		adjustable by the operator
	Qrecircflow	Sludge recirculated flow	parameter		m3/h	calculated			80% of34 or 68 = 27.2or54.4
	Delay	Motor Start Delay	ACT_MOT_START_DEL		S	10	0-30		adjustable by the operator
	Delay	Scraper stop Delay	DEL-STO-SCR		min	15	0-60		adjustable by the operator
	Delay	Recirculation stop Delay	DEL-STO-PRS		min	5	0-60		adjustable by the operator
	FIT-00-20	Raw water Flowmeter Out of Range - ACTIFLO	FIT-00-20_OR		m ³ /h	-	-	0	ALARM, priority2.
		Raw water Flowmeter - ACTIFLO - Low low	LL		m ³ /h		0-1300	300	desactivated
		Raw water Flowmeter - ACTIFLO - Low	L		m ³ /h		0-1300	60	desactivated
		Raw water Flowmeter - ACTIFLO - High	H		m ³ /h		0-1300	60	desactivated
		Raw water Flowmeter - ACTIFLO - High high	HH		m ³ /h		0-1300	60	desactivated

65THK69301 Multiflo	LSHH-01-16	Multiflo Level - High High (switch)	LAHH		-	-	-	5	FAULT. Alarm Priority 1. Start Multiflo Stop sequence.
	AIT-01-18	Multiflo pHmeter - Out of Range	AAOR		pH	-	0-14.00		Alarm PRIORITY1 Use of calibration mode by operator
		Multiflo pHmeter - High High	AAHH		pH	9	0-14.00	60	Alarm PRIORITY1
		Multiflo pHmeter - High	AAH		pH	8	0-14.00	60	Alarm PRIORITY2
		Multiflo pHmeter -Low	AAL		pH	5.5	0-14.00	60	Alarm PRIORITY2
		Multiflo pHmeter -Low Low	AALL		pH	5	0-14.00	60	Alarm PRIORITY1
	AIT-01-19	Clarified water TSS level - Multiflo - Out of Range	AAOR		mg/l TSS	20	0-500		Alarm PRIORITY1 Use of calibration mode by operator
		Clarified water TSS level - Multiflo - High	AAH		mg/l TSS	30	0-500	60	Alarm PRIORITY2
		Clarified water TSS level - Multiflo - High High	AAHH		mg/l TSS	50	0-500	60	FAULT. ALARM. Priority 1. Start Multiflo Shut down sequence.
	XS-01-17	Scraper Torque - Multiflo - High	AAH		%	39%	0-100	10	Alarm PRIORITY2 base on 197/500Newton
		Scraper Torque - Multiflo - High High	AAHH		%	53%	0-100	5	FAULT.Alarm PRIORITY1. Start Multiflo Shut down sequence, base on 263/500Newton
	Delay	Motor Start Delay	ACT_MOT_START_DEL		S	10	0-30		adjustable by the operator
	Delay	Scraper stop Delay	DEL-STO-SCR		min	15	0-60		adjustable by the operator
	Delay	Recirculation stop Delay	DEL-STO-PRS		min	5	0-60		adjustable by the operator
	FIT-01-23	Sludge Flowmeter Out of Range - Multiflo	FIT-01-23_OR		m ³ /h	-	0-70		Alarm PRIORITY 2
		Sludge water Flow control loop - setpoint	FIT-01-23_SP1		m ³ /h	50	0-70		To be set by the operator.
		Sludge water Flow control loop deviation							ALARM, priority2.
		Sludge Flowmeter - Multiflo - Low low	LL		m ³ /h	5	0-70	300	ALARM, priority2.
		Sludge Flowmeter - Multiflo - Low	L		m ³ /h	10	0-70	60	ALARM, priority2.
		Sludge Flowmeter - Multiflo - High	H		m ³ /h	55	0-70	60	ALARM. Priority 2.
		Sludge Flowmeter - Multiflo - High high	HH		m ³ /h	60	0-70	60	ALARM. Priority 2.
SUPERNATANT	LSHH-01-30	Supernatant Transfer Tank Level - High High (switch)	LAHH		Inches/ top	TBD ON SITE		5	FAULT. Start shut down Actiflo Sequence
	LSLL-01-30	Supernatant Transfer Tank Level - Low Low (switch)	LALL		Inches/ ground	TBD ON SITE		5	FAULT. Alarm Priority 1. Stop Supernatant Transfer pumps. INTERLOK. Supernatant Pumps cannot start.
	LIT-01-32	Supernatant Transfer Tank Level Transmitter -Out of Range	LIT-01-32_OR		%	-	0-100		Alarm PRIORITY 2
		Supernatant Transfer Tank Level control loop - setpoint	LIT-01-32_SP1		%	xx	0-100		Initial set point set by the operator.
		Supernatant Transfer Tank Level control loop deviation			%		0-100		ALARM, priority2.
		Supernatant Transfer Tank Level Transmitter - Low low	LL		%	23%	0-100	300	FAULT. Alarm Priority 1. Stop Supernatant Transfer pumps. 0,5meter from bottom, average pump height
		Supernatant Transfer Tank Level Transmitter - Low	L		%	71%	0-100	60	ALARM, priority2. 1,530m from bottom
		Supernatant Transfer Tank Level Transmitter - High	H		%	86%	0-100	60	ALARM. Priority 2. 1,860m frombottom
		Supernatant Transfer Tank Level Transmitter -High high	HH		%	95%	0-100	60	FAULT. Start shut down Actiflo Sequence, 2.160mfrom bottom
	FIT-01-39	Supernatant Flowmeter Out of Range	FIT-01-23_OR		m ³ /h	-	0-70		Alarm PRIORITY 2
		Supernatant water Flow control loop - setpoint	FIT-01-23_SP1		m ³ /h	50	0-70		To be set by the operator.
		Supernatant water Flow control loop deviation				20%			ALARM, priority2.
		Supernatant Flowmeter - Low low	LL		m ³ /h	5	0-70	300	ALARM, priority2.
		Supernatant Flowmeter - Low	L		m ³ /h	10	0-70	60	ALARM, priority2.
		Supernatant Flowmeter - High	H		m ³ /h	55	0-70	60	ALARM. Priority 2.
		Supernatant Flowmeter -High high	HH		m ³ /h	60	0-70	60	ALARM. Priority 2.

SERVICE WATER	LSHH-01-50	Filtered Water Tank Level - High High (switch)	LAHH		Inches/ top	TBD ON SITE		5	FAULT. Stop Clarified Water Pumps.
	LSSL-01-50	Filtered Water Tank Level - Low Low (switch)	LALL		Inches/ ground	TBD ON SITE		5	FAULT. Alarm Priority 1. Stop Filtered water pumps. INTERLOK. Filtered water pumps cannot start.
	LIT-01-52	Filtered Water Tank Level Transmitter -Out of Range	LIT-01-52_OR		%	-	0-100		Alarm PRIORITY 2
		Filtered Water Tank - Level#3 setpoint	LIT-01-52_SP3		%	xx	0-100		Set by the operator. <towards>
		Filtered Water Tank - Level#2 setpoint	LIT-01-52_SP2		%	xx	0-100		Set by the operator.
		Filtered Water Tank - Level#1 setpoint	LIT-01-52_SP1		%	xx	0-100		Set by the operator.
		Filtered Water Tank Level Transmitter - Low low	LL		%	23	0-100	300	FAULT. Alarm Priority 1. Stop Supernatant Transfer pumps.0,5meter from bottom, average pump height
		Filtered Water Tank Level Transmitter - Low	L		%	xx	0-100	60	ALARM, priority2.
		Filtered Water Tank Level Transmitter - High	H		%	xx	0-100	60	ALARM. Priority 2.
		Filtered Water Tank Level Transmitter -High high	HH		%	90	0-100	60	FAULT. Start shut down Actiflo Sequence,2.160mfrom bottom
	VFD xxx	Clarified Water Pumps - F max- BW setpoint	F max bw		%	92	0-60		Frequencies to be confirmed on site with a up test.
		Clarified Water Pumps - F max- oper setpoint	Fmax oper		%	83	0-60		Frequencies to be confirmed on site with a up test.
		Clarified Water Pumps - F min setpoint	Fmin oper		%	66	0-60		Frequencies to be confirmed on site with a up test.
	PIT-01-59	Filtered Water Tank Pressure Transmitter -Out of Range	PIT-01-59_OR			-	0-100		Alarm PRIORITY 2
		Filtered Water Tank Pressure control loop - setpoint	PIT-01-59_SP1		psig	85	0-150		
		Filtered Water Tank Pressure control loop deviation			psig	15%	0-150		ALARM, priority2.
		Filtered Water Tank Pressure Transmitter - Low low	LL		psig	30	0-150	5	FAULT. Alarm Priority 1. Stop Filtered pumps.
		Filtered Water Tank Pressure Transmitter - Low	L		psig	60	0-150	5	ALARM, priority2.
		Filtered Water Tank Pressure Transmitter - High	H		psig	90	0-150	5	Stop Filtered pumps.
		Filtered Water Tank Pressure Transmitter -High high	HH		psig	100	0-150	5	FAULT. Alarm Priority 1. Stop Filtered pumps.
		Filtered Water Tank Pressure Transmitter - Restart Permissive	PIT-01-59-SP2		psig	80	0-150	5	If pressure is below this value. Restart filtered pumps.
	PIT-01-60								
		Clarified Water Tank Pressure Transmitter -Out of Range	PIT-01-60_OR		psig	-	0-150		Alarm PRIORITY 2
		Clarified Water Tank Pressure Transmitter - Low low	LL		psig	30	0-150	300	FAULT. Stop Clarified Water Pumps.
		Clarified Water Tank Pressure Transmitter - Low	L		psig	60	0-150	60	ALARM, priority2.
		Clarified Water Tank Pressure Transmitter - High	H		psig	90	0-150	60	ALARM. Priority 2.
	TIT-01-72	Clarified Water Tank Pressure Transmitter -High high	HH		psig	100	0-150	60	FAULT. Stop Clarified Water Pumps.
		Mitigated Water Temperature Transmitter -Out of Range	TIT-01-72_OR		-	-	0-100		Alarm PRIORITY 2
		Mitigated Water Temperature Transmitter control loop - setpoint	TIT-01-72_SP1		deg C	20	0-150		adjustable by the operator
		Mitigated Water Temperature Transmitter control loop deviation			deg C	20%	0-150		ALARM, priority2.
		Mitigated Water Temperature Transmitter Transmitter - Low low	LL		deg C	5	0-150	5	ALARM, priority2.
		Mitigated Water Temperature Transmitter Transmitter - Low	L		deg C	10	0-150	5	ALARM, priority2.
		Mitigated Water Temperature Transmitter Transmitter - High	H		deg C	30	0-150	5	Stop Filtered pumps.
		Mitigated Water Temperature TransmitterTransmitter -High high	HH		deg C	45	0-150	5	FAULT. Alarm Priority 2. Stop Filtered pumps.

Project : Agnico Eagle Mines, Permanent effluent water treatment plant
By : Lj
Chkd : GP
Appvd :
Rev : 1

APPENDIX B
PARAMETERS, SET-POINTS, ALARMS
PREPARATION SYSTEMS

Process	From or is	Parameters or Set-Points			Units	Value	Range	Delay (s)	Action/Comment
		Name	Control Philosophy Tag	Program Tag*					
COAGULATION PREPARATION	LSL9-001	Coagulation hopper low level switch	LAL						FAULT. Alarm priority 1. Stop screw feeder
	LIT-02-12	Coagulation Mixing Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Coagulation Mixing Tank Level - High High	LAHH		%	100	0-100		Alarm priority 1. Close valve FY-02-01 and stop feeder,1185mm from bottom
		Coagulation Mixing Tank Level - High	LAH		%	80%	0-100		Alarm prioritry 2
		Coagulation Mixing Tank Level - Low	LAL		%	64%	0-100	-	Alarm prioritry 2- 762mm From bottom
		Coagulation Mixing Tank Level - Low Low	LALL		%	20%	0-100	-	Alarm priority 1 close mixer 65AGI69305/ VALVE 65FV6930201-235mm from bottom
		Mixing tank - Batch low level	LIT-02-12-SP1		%				
		Mixing tank - Batch high level	LIT-02-12-SP2		%				
	parameter	Mixing tank initial level			m				measured by LIT-02-12
	parameter	Mixing tank final Level			m				measured by LIT-02-12
	delay	Dry coagulant dosing time	t		min				
	parameter	Dry coagulant density	denscoag		kg/m3				
	parameter	Diluted Coagulant Density	dens _{dilcoag}		kg/m3		800-1200		
	parameter	massic powder concentration desired	b		%		30		
	parameter	Mixing Tank diameter	diamCoag		m				
	parameter	Mass flow of dry coagulant powder	mpcoag		kg/h				
	LIT-02-22	Coagulation Holding Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, back up in manual mode
		Coagulation Holding Tank Level - High High	LAHH		%	t.b.d.	0-100		preparation sequence.Restart availability condition : LSL of LIT-0212 is reached
		Coagulation Holding Tank Level - High	LAH		%	t.b.d.	0-100		Alarm prioritry 2
		Coagulation Holding Tank Level - Low	LAL		%	t.b.d.	0-100	-	Alarm prioritry 2
		Coagulation Holding Tank Level - Low Low	LALL		%	t.b.d.	0-100	-	Alarm priority 1, Stop Coagulation dosing pumps.

		Vibrator timer	Spvib Coagulation		sec/min	5			adjustabe by the operator
	delay	Dry Coagulant dosing time	t		min				
	parameter	Mixing Tank diameter	diamCoagulation		m				
POLYMER CATIONIC PREPARATION	LSL-12	Polymer hopper low level switch	LAL						Alarm priority 2.
	PSL-12	Pressure switch service water	PAL		psi				Alarm priority 1, stop sequence at step 7
	parameter	Mixing tank initial level	LiniPolymer		m				measured by LIT-12
	parameter	Mixing tank final Level	LfinPolymer		m				measured by LIT-12
	delay	Polymer dosing time	Dost		s				
	parameter	massic powder concentration desired	CONC		g/L		2		
	parameter	Mixing Tank diameter	diamPolymer		m				
	parameter	Mass flow of Polymer powder	Cap		kg/min				
	LIT121	Polymer Mixing Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Polymer Mixing Tank Level - High High	LAHH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Mixing Tank Level - High	LAH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Mixing Tank Level - Low	LAL		%	t.b.d.	0-100	-	Alarm priority 2
		Polymer Mixing Tank Level - Low Low	LALL		%	t.b.d.	0-100	-	Alarm priority 2
	LIT122	Polymer Holding Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Polymer Holding Tank Level - High High	LAHH		%	t.b.d.	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Polymer Holding Tank Level - High	LAH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Holding Tank Level - Low	LAL		%	t.b.d.	0-100	-	Alarm priority 2
		Polymer Holding Tank Level - Low Low	LALL		%	t.b.d.	0-100	-	Alarm priority 1, Stop polymer dosing pumps.
		Transfer level setpoint			%	t.b.d.	0-100	-	open Valve V-32
POLYMER ANIONIC PREPARATION	LSL-11	Polymer hopper low level switch	LAL		Inches/ top	t.b.d.			Alarm priority 1, Stop screw feeder, stop sequence at step 7
	PSL-11	Pressure switch service water	PAL		psi				Alarm priority 1, stop sequence at step 7
	parameter	Mixing tank initial level	LiniPolymer		m				measured by LIT-11
	parameter	Mixing tank final Level	LfinPolymer		m				measured by LIT-11
	delay	Polymer dosing time	Dost		s				
	parameter	massic powder concentration desired	CONC		g/L		2		
	parameter	Mixing Tank diameter	diamPolymer		m				
	parameter	Mass flow of Polymer powder	Cap		kg/min				
	LIT11	Polymer Mixing Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Polymer Mixing Tank Level - High High	LAHH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Mixing Tank Level - High	LAH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Mixing Tank Level - Low	LAL		%	t.b.d.	0-100	-	Alarm priority 2
		Polymer Mixing Tank Level - Low Low	LALL		%	t.b.d.	0-100	-	Alarm priority 2
		Polymer Holding Tank Level - Out of range	OR		%	-	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode

	LIT121	Polymer Holding Tank Level - High High	LAHH		%	t.b.d.	0-100		Alarm priority 1, stop automatic preparation sequence - back up in manual mode
		Polymer Holding Tank Level - High	LAH		%	t.b.d.	0-100		Alarm priority 2
		Polymer Holding Tank Level - Low	LAL		%	t.b.d.	0-100	-	Alarm priority 2
		Polymer Holding Tank Level - Low Low	LALL		%	t.b.d.	0-100	-	Alarm priority 1, Stop polymer dosing pumps.
		Transfer level setpoint			%	t.b.d.	0-100	-	open Valve V-31

Project : Agnico Eagle Mines, Permanent effluent water treatment plant
By : LJ
Chkd : GP
Appvd :
Rev : 1

APPENDIX A

PARAMETERS, SET-POINTS, ALARMS

DOSING SYSTEMS

Process	From or is	Parameters or Set-Points			Units	Value	Range	Delay (s)	Action/Comment
		Name	Control Philosophy Tag	Program Tag*					
GENERAL	DELAY	Maximum time for opening or closing valve automatic valves				30 S		30 S	FAULT, alarm. Investigate the reason why the valve will not open or close or check the limit switch.
COAGULANT DOSING SYSTEM	Parameter	Coagulant flow at 20 % (pump speed) - Pump #1	65PME69301A_Q20		L/h	TBD ON SITE	0-190	-	For calculations To be determined with pump calibration
	Parameter	Coagulant flow at 80 % (pump speed) - Pump #1	65PME69301A_Q80		L/h	TBD ON SITE	0-190	-	For calculations To be determined with pump calibration
	Parameter	Coagulant flow at 20 % (pump speed) - Pump #2	65PME69301B_Q20		L/h	TBD ON SITE	0-190	-	For calculations To be determined with pump calibration
	Parameter	Coagulant flow at 80 % (pump speed) - Pump #2	65PME69301B_Q80		L/h	TBD ON SITE	0-190	-	For calculations To be determined with pump calibration
	Parameter	Coagulant Stock concentration (15.9% Al)			%	12,2	0-20	-	For calculations- PAC
	Parameter	Coagulant specific gravity (density slurry 1,3 kg/dm3)			kg/L	1,55	1-1.7	-	For calculations
	Parameter	required Coagulant dose in mg/L			mg/L			-	For calculations Base Flow rate 65FIT6930001
		LS leak	zs0230						
		LS leak	zs0235						
CATIONIC POLYMER DOSING SYSTEM		Leak Switch high - pump#1	zs0270		L/h	TBD ON SITE		-	Alarm priority 1, stop pump
		Leak Switch high - pump#2	zs0275		L/h	TBD ON SITE		-	Alarm priority 1, stop pump
	Parameter	polymer flow at 20 % (pump speed) - Pump #1			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 80 % (pump speed) - Pump #1			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 20 % (pump speed) - Pump #2			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 80 % (pump speed) - Pump #2			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 20 % (pump speed) - Pump #3			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 80 % (pump speed) - Pump #3			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 20 % (pump speed) - Pump #4			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer flow at 80 % (pump speed) - Pump #4			L/h	TBD ON SITE	0-650	-	For calculations To be determined with pump calibration
	Parameter	polymer Stock concentration (as Fe) Hydrex 6418			%	12,2		-	For calculations
	Parameter	polymer specific gravity			kg/L	1,55	1-1.7	-	For calculations
	Parameter	required polymer dose in mg/L in Actiflo	65PME69302A		mg/L			-	For calculations
	Parameter	required polymer dose in ml/L in Actiflo	65PME69302B		ml/L			-	For calculations
	Parameter	service Transport water solenoid valve pump#1 or pump/2- fault	65FV6930281						Alarm priority 1, stop pump

16.0 APPENDIX B

Polymer Preparation System Functional Description

Polymer Preparation System Functional Description

REVISION LIST

REV NO.	REVISION DESCRIPTION	DATE	REVISED BY
2	Original issue	2015-06-18	Xavier Monette

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1 General description

The following document describes the typical operation of Polymer Preparation System. Some of the described components may not be supplied by Veolia Water Technologies Canada Inc.

1.1 Local control

An HMI operator interface located on the front of control panel enables process monitoring and operations such as alarm recognition and acknowledgement.

1.1.1 Operator Interface Security Level

Different security levels are configured into the local operator interface.

Level	Description	User id	Password	Permission
0	Viewer	None	-	None
1	Operator	Op1	1111	Equipment operation and setpoints
2	Admin	Admin	1234	All access

Table 1: Users

1.1.2 Pilot lights

Pilot lights are installed on the control panel door. They are used to identify the operating conditions that prevail:

Pilot light	Color	State	Operating condition
"GENERAL ALARM"	Red	Blinking	An alarm signal has been activated but not acknowledged.
		Steady	All activated alarm signals were acknowledged.
		Off	No alarm is present.
"EMERGENCY STOP"	Red	Steady	At least one emergency stop pushbutton is pressed.
		Off	No emergency stop pushbutton is pressed.

Table 2: Pilot lights

1.1.3 Pushbuttons and selectors

Push buttons and selectors are installed on the control panel door. They are used to operate the equipment manually, to select the automatic control of the equipment, to reset faults, etc.

Pushbutton	Color	Type
"FAULT RESET"	Black	Momentary

Selector	Type
"POWDER VACUUM"	2 positions "OFF-ON"
"POLYMER MIXER"	3 positions "HAND-OFF-AUTO"
"POLYMER FEEDER / HATCH"	3 positions "HAND-OFF-AUTO"
"TRANSFER VALVE"	3 positions "OPEN-CLOSED-AUTO"
"WATER INLET VALVE"	3 positions "OPEN-CLOSED-AUTO"

Table 3: Pushbuttons and selectors

1.2 Signal transmission

These signals are available by dry contact from the control panel. More details are available into the electric drawings.

Signals from Polymer Preparation System	Signals from user (by default with jumper)
Agitator status	External emergency stop
Dosing screw status	External start permissive
Dosing pump interlock – Low storage level	
Low powder level	
Low water pressure	
Overload (agitator or dosing screw)	
Emergency stop	
General alarm	
Power failure	

Table 4: Pushbuttons and selectors

1.3 Analyser and detector

1.3.1 Analyser

1.3.1.1 Display on operator interface

Each analog input is displayed in engineering units.

1.3.1.2 Scaling

Each analog input is scaled in engineering units. The scale values must be set up on the operator interface to match the range of the instrument.

1.3.1.3 Out of range

The minimum range and maximum range of an instrument are defined as the engineering values associated to 4 mA and 20 mA signals respectively. They stand for the limits of the operational scale of the instrument.

All instruments mentioned in this document have a programmed "Out of Range" alarm. If a signal exceeds 20.5 mA or drops below 3.5 mA for over 60 seconds, an "Out of Range" alarm is activated and the instrument's reading will be forced to 0. When the equipment is "Out of Range", all process alarms for the instrument will also be deactivated.

1.3.1.4 Activation conditions for alarms

The activation condition for setpoint process and deviation alarm are particular to each instrument and depends on the process step in which it is used, as well as its usage. The activation conditions are noted with the instrument's description.

1.4 Detectors

1.4.1.1 General

Detectors give a digital signal. A change of state produces an alarm and/or an action. Detectors may be high level switches, low level switches, chlorine leaks, intrusions, etc.

1.4.1.2 Digital alarm delay

The digital alarm delay, adjustable or not, is configured for all detectors to prevent false alarms. The delays are specified in the instrument's section.

1.4.1.3 Security logic

When a detector's dry contact is used to trigger an alarm, it is wired to trigger the alarm when the circuit opens (power loss).

1.4.1.4 Activation conditions for alarms

The activation conditions for detector alarms are particular to the detector and depend on the process step which it serves, and its usage.

1.5 Valves

1.5.1 Operational mode

Auto mode:

A valve may operate in auto mode if the following conditions are met:

1. If automatic mode is selected on interface
2. If the local selector is in "auto" position
3. If there is no detected fault (ALARM)
4. If the emergency stop is not activated
5. If the automatic open/close conditions are met
6. If no open interlock condition is activated

1.5.2 Open – Close – Auto Selectors

Valves may be operated manually with an "Open – Close - Auto" selector on front of control panel.

Selector's position:

- Open: the valve opens if there is no prevailing closing condition through wired logic.
- Close: valve closes.
- Auto: valve opens if the open control is activated from automation system, and if there is no closing condition by wired logic.

1.5.3 Open/close interlock condition

When an interlock condition is activated, the valve is forced into this position in its default state when in interface manual or auto mode.

1.6 Typical motor

1.6.1 Operational Mode

Auto mode:

A motor may operate in auto mode if the following conditions are met:

1. If auto mode is selected on interface
2. If local selector is in Auto position
3. If no fault is detected (ALARM)
4. If the emergency stop is not activated
5. If auto start conditions are met
6. If no running interlock condition is activated

1.6.2 Manual-Off-Auto Selectors

Mixer may be manually operated with the help of a Manual-Off-Auto selector installed on front of control panel.

Selector position:

- Manual: motor is running if there are no stopping conditions through hardwired logic.
- Off: motor is stopped
- Auto: motor starts if start signal from automation system is activated and if there are no stop conditions through hardwired logic..

1.6.3 Running interlock condition

When a running interlock condition is activated, the motor is forced to stop when in interface auto or manual mode.

1.6.4 Motor alarm delay

For each motor alarm, a delay is always programmed in alarm conditions. This delay is common to all motors unless otherwise indicated. The delay is specified in the motor description.

1.6.5 Start fault alarm

If the motor start command is activated, the running status is not and the alarm delay ran out, the start fault alarm is activated. Operator must address the situation and reset fault to restart.

This alarm occurs with the presence of one of the following conditions:

- Activated overload relay
- Local selector or override module in Off position
- Local disconnect open

1.6.6 VFD (if available)

Motor starter fault detection is a transmitted signal from the Soft Start or VFD to a digital input of the automation system. As soon as the starter fault detection signal is active, the starter fault alarm is activated. Operator must reset motor if fault is configured for manual reset on starter or else address the situation and then reset fault to restart.

1.6.7 Running time

For each motor two running time totalizers are programmed:

- The first one in hours and minutes (HHHHHHHH:MM) is dedicated to interface display
- The second, in minutes, is used for reports.

These totalizers are reset to zero at 99999999 and the one dedicated to display may be edited by operator on interface.

2 Automatic Polymer Preparation System

2.1 Polymer dosing

Powder polymer is injected into a preparation tank using a dosing apparatus. The apparatus operating time is calculated based on its capacity and the desired concentration.

Dosage calculation

The operating dosing time is calculated based with the following formula:

$$Ts = \frac{CONC \times ((LEVstop - LEV) \times Surf)}{Cap} \times 60$$

Ts:	Dosing apparatus operating time (sec.)
CONC:	Polymer concentration adjustable to operator interface (g/l)
LEV:	Preparation tank's current level (m)
LEVstop:	Preparation stop level set point (m)
Surf:	Preparation tank surface (m ²)
Cap:	Dosing apparatus capacity adjustable to operator interface (Kg/min)

Figure 1: Dosing calculations

Note: This formula may also be used to perform a manual preparation in case of automatic system failure. To ensure dosing accuracy of the tank, capacity must be validated by the operator.

2.1.1 Polymer Preparation Sequence

The automatic Polymer Preparation System shall follow a given sequence to obtain a constant polymer solution. The preparation sequence is described in the following table:

Step #	Step name	Actions Transition conditions	Polymer mixer	Dosing screw	Service water valve	Powder supply valve	Transfer valve
0	Stand-by	Equipment shut off	S	S	C	C	C
		-Preparation tank level set point for start of reached sequence -Transfer valve closed for 30 seconds if no confirmation of closure or when confirmation of closure is received.					
1	Filling	-Remove completed preparation confirmation -Open preparation water valve	S	S	O	C	C
		Level above impeller					
2	Start mixing	Start preparation mixer	R	S	O	C	C
		- Mixer running confirmation - 10 second delay has elapsed					
3	Dosing	-Supply valve opened (if Dost not reached) -Start dosing apparatus (if Dost not reached)	R	R	O	O	C
		Dosing time elapsed (Dost) (retentive dosing timer) or High level in preparation tank					
4	Stop dosing	-Stop powder supply screw -Close powder supply valve	R	S	O	C	C
		Filling stop level					
5	Maturation	Close preparation water valve Start of maturation period	R	S	C	C	C
		Time elapsed 30–180 adjustable minutes (Retentive maturation delay)					
6	End	-Completed preparation confirmation	R	S	C	C	C
		Go to Step 0 at end of normal sequence and reset timers -Go to Step 7 at end of sequence by a fault					
7	Sequence stopped on a fault	- Wait for fault reset	S	S	C	C	C
		-Go to Step 1					

Legend

Motor

S: Stop

R: Running

Valve

C: Closed

O: Open

Table 5: Polymer Preparation Sequence

Note: if there is a power outage before the completed preparation confirmation is active, repeat at Step 1 when the power returns.

2.1.2 Transfer from preparation tank to storage tank

When the storage tank level reaches the transfer set point, and the completed preparation confirmation is active, the transfer valve opens until the preparation tank level set point for the start of the next sequence is reached.

Note: if there is a power outage when the transfer is underway, continue the transfer from where it was.

2.2 Motor

2.2.1 Polymer mixer

Tag: M1

Auto mode

The mixer operates:

1. If preparation sequence is at Step 2, 3, 4 and 5.

Start fault alarm

Sequence of events when the alarm is tripped:

1. The mixer stops
2. The "POLYMER MIXER FAULT" message is displayed on the operator interface
3. If a preparation is underway, pass sequence directly to Step 7 (fault stop)

2.2.2 Dosing screw / hatch door

Tag: M2 – V1

Hatch door is open automatically with the activation of the dosing screw.

Auto mode

Dosing screw operates:

1. If preparation sequence is at Step 3.

Start fault alarm

Sequence of events when the alarm is tripped:

1. The dosing screw stops
2. The "DOSING SCREW FAULT" message is displayed on the operator interface screen
3. If a preparation is underway, pass sequence directly to Step 7 (fault stop)

2.2.3 Powder mixer (if available)

Tag: M3

Auto mode

Powder mixer operates:

1. If preparation sequence is at Step 3.

Start fault alarm

Sequence of events when the alarm is tripped:

1. The powder mixer stops
2. The "POWDER MIXER FAULT" message is displayed on the operator interface screen

2.3 Valve

2.3.1 *Service water valve*

Tag: V2

Auto mode

1. If preparation sequence is at Step 1, 2, 3 and 4.

Open interlock condition:

1. Preparation tank high level alarm

2.3.2 *Transfer valve*

Tag: V3

Auto mode

1. If transfer sequence is activated.

Open interlock condition:

1. Storage tank high level alarm

2.4 Analysers

2.4.1 Preparation tank level transmitter

Tag: LIT-1

Unit: m

Out of range

Sequence of events:

1. The "OUT OF RANGE LEVEL PREPARATION TANK" message is displayed on operator interface
2. If a preparation is underway, pass sequence directly to Step 7 (fault stop), and if no preparation is underway, prohibit start of new preparation

Activation conditions for this alarm:

1. Always active

High high level alarm

Sequence of events:

1. The "HIGH HIGH LEVEL PREPARATION TANK" message is displayed on operator interface

Activation conditions for this alarm:

1. Always active

2.4.2 Storage tank level transmitter

Tag: LIT-2

Unit: m

Out of range

Sequence of events:

1. The "OUT OF RANGE LEVEL STORAGE TANK" message is displayed on operator interface
2. Prohibit transfer from preparation tank to storage tank.

Low low level alarm

Sequence of events:

1. The "LOW LOW LEVEL STORAGE TANK" message is displayed on operator interface
2. Dosing pumps stop if tank corresponding with this fault supplies dosing pumps

Activation conditions for this alarm:

1. Always active

High high level alarm

Sequence of events:

1. The "HIGH HIGH LEVEL STORAGE TANK" message is displayed on operator interface
2. Prohibit transfer from preparation tank to storage tank.

Activation conditions for this alarm:

1. Always active

2.5 Detectors

2.5.1 *Powder level detector*

Tag: LSL-1

Very low level alarm

Sequence of events:

1. The "LOW POWDER LEVEL" message is displayed on operator interface
2. If a preparation is underway, pass sequence directly to Step 7 (fault stop)

Activation conditions for this alarm:

1. Always active

2.5.2 *Preparation water pressure detector*

Tag: PSL-1

Very low pressure alarm

Sequence of events:

1. The "LOW WATER PRESSURE" message is displayed on operator interface.
2. If a preparation is underway, pass sequence directly to Step 7 (fault stop)

Activation conditions for this alarm:

1. When the preparation water valve open control is active.

3 Hydra-Stat polymer verification system

The HYDRA-STAT is an integral part of the Polymer Preparation System. It is used to monitor the quality of the polymer and alert the operator in case of deviation.

3.1 Calibration

The HYDRA-STAT compares corrected conductivity readings of the polymer continuously and compared with a theoretical value, which was previously recorded. For each concentration of the polymer solution, a corrected conductivity curve is stored in the controller. (The temperature of preparation is also recorded). For a given concentration, if a curve does not exist in the controller, an automatic calibration is initiated.

Automatic calibration takes the five following polymer preparation, measuring the conductivity at specific points in time and calculates an averaged. The values found by the calibration are then recorded in the registers of the controller for comparison with the current reading conductivity of the polymer.

For five preparations of the calibration, the quality of the polymer are not monitored.

It is also possible to enter the calibration data manually.

3.2 Alarms

3.2.1 *Polymer quality in preparation tank*

High conductivity alarm

Alarm priority 1

Sequence of events:

1. The "HIGH CONDUCTIVITY ALARM PREPARATION TANK" message is displayed on operator interface.

Activation conditions for this alarm:

1. No current calibration
2. New preparation ongoing for 30 minutes or more.

Low conductivity alarm

Alarm priority 1

Sequence of events:

1. The "LOW CONDUCTIVITY ALARM PREPARATION TANK" message is displayed on operator interface.

Activation conditions for this alarm:

1. No current calibration
2. New preparation ongoing for 30 minutes or more.

Preparation stored for too long alarm

Sequence of events:

1. The "BATCH STORED FOR TOO LONG" message is displayed on operator interface.

Activation conditions for this alarm:

1. No current calibration
2. Storage time reached.

3.2.2 Polymer quality in storage tank

Problem with polymer quality alarm

Sequence of events:

1. The "PROBLEM WITH POLYMER QUALITY STORAGE TANK" message is displayed on operator interface.

Activation conditions for this alarm:

1. No current calibration
2. Polymer present in storage tank

3.3 Analysers

3.3.1 Preparation tank conductivity transmitter

Tag: AIT-1

Unit: $\mu\text{S/cm}$

Out of range

Sequence of events:

1. The "OUT OF RANGE CONDUCTIVITY PREPARATION TANK" message is displayed on operator interface

3.3.2 Preparation tank temperature transmitter

Tag: TIT-1

Unit: $^{\circ}\text{C}$

Out of range

Sequence of events:

1. The "OUT OF RANGE TEMPERATURE PREPARATION TANK" message is displayed on operator interface