
	Fresh Water Supply, Sewage, and Wastewater Management Plan	Issue Date: March 31, 2019 Rev.: 6	
	Environment	Document #: BAF-PH1-830-P16-0010	

Appendix F - Steensby and Rail Camps Freshwater Supply, Sewage and Wastewater – Plans for Future Work

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There will be no construction and development of Steensby and the Rail camps in the near future. Updates to these sections of the Plan will be done when required and will be included in a future Annual Report to NWB as required by Part B, Item 4 of existing Type A Water Licence. Block Flow Diagrams for Steensby and Railway Camps will be updated when required.

A.1 Freshwater

A.1.1 Freshwater System Process Description


A.1.1.1 Steensby Port Site

Currently, there are no construction activities planned for Steensby Inlet. During the future construction phase the on-site population will be approximately 600 people. Half the camp personnel will be accommodated on a barge which will be equipped with potable water treatment systems. The potable system onboard the barge will be a reverse osmosis based system. The full configuration will include coagulation, filtration by media filter, reverse osmosis and chemical disinfection. The remaining personnel will be accommodated by a land based potable water treatment system. This system will continue to operate during the operation phase while the barge based system will only be used during the construction phase.

The existing fresh water equipment will not be used and a new fresh water distribution system will be installed. The fresh water demand for construction and operation are shown on the drawing Steensby Site - Water Supply Balance Block Flow Diagram in Appendix C.

For the land based system, a heated and insulated pump house will be built at Lake ST347 with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression, stockpile dust suppression, concrete and explosives manufacturing will be provided directly from nearby lakes using a vacuum truck.

The land based potable water treatment scheme will consist of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use. The applicable guidelines specify minimum required levels of chlorine residual free chlorine. The barge based potable water treatment scheme will include the same equipment as well as a membrane based system to desalinate the seawater source.

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A.1.1.2 Mid-Rail Site

Currently, there are no construction activities planned for the Mid-Rail Site. During the future construction phase, the on-site population will be approximately 200 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Mid-Rail - Water Supply Balance Block Flow Diagram in Appendix C.

A heated and insulated pump house will be built at an adjacent Unnamed Lake with duty/standby pumps to deliver fresh water to a fresh water tank during summer. During the winter, water will be trucked from Ravn Camp Lake to the fresh water tank. This tank will be located in close proximity to the new potable water treatment plant. Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by vacuum truck.


The potable water treatment scheme will consist of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

A.1.1.3 Ravn River Site

Currently, there are no construction activities planned for the Mid-Rail Site. During the future construction phase, the on-site population will be approximately 400 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Ravn River - Water Supply Balance Block Flow Diagram in Appendix C.

A heated and insulated pump house will be built at Ravn Camp Lake with duty/standby pumps to deliver fresh water to a fresh water tank (to be located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by vacuum truck.

The potable water treatment scheme will consist of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

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A.1.1.4 Cockburn Tunnels Camp Site (Cockburn North Camp)

Currently, there are no construction activities planned for the Cockburn Tunnels Camp Site. During the future construction phase, the on-site population will be approximately 100 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Cockburn Lake Tunnels Camp - Water Supply Balance Block Flow Diagram in Appendix C.

A heated and insulated pump house will be built at Cockburn Lake with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by vacuum truck.


The potable water treatment scheme will consist of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

A.1.1.5 Cockburn South Camp Site

Currently, there are no construction activities planned for the Cockburn South Camp Site. During the future construction phase, the on-site population will be approximately 400 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Cockburn South - Water Supply Balance Block Flow Diagram in Appendix C.

A heated and insulated pump house will be built at Cockburn Lake with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by truck.

The potable water treatment scheme will consist of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

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A.2 Sewage Treatment

A.2.1 Sewage Treatment Process Description

A.2.1.1 Steensby Site

During the construction and operation phase the camp population will increase to approximately 600 people. There is no planned construction at Steensby Site in the immediate future.


During construction start-up, sewage generated by the workforce will be treated in an existing sewage treatment plant that is on-site but not yet installed. During the construction phase, 300 people will be accommodated by a temporary sewage treatment system in place for the construction period. In addition, the temporary sewage treatment plant will be designed to process raw or partially treated sewage from the Cockburn Lake rail camps which will be conveyed to the Steensby temporary sewage treatment facility by truck. The remaining workforce will be accommodated by a permanent sewage treatment system which will remain in service during the operation phase.

These sewage treatment plants will be housed in a temperature controlled areas and as such their performance will not be negatively impacted by arctic conditions.

Effluent from the sewage treatment plants will be stored in effluent tanks. The effluent tanks will have a hydraulic retention time of two days (at minimum) based upon nominal flows. It is intended that the effluent tank will be at a low level during operation such that if sampling indicates that the effluent quality does not meet the applicable criteria further discharge can be prevented for a period in excess of a day to allow this effluent to be mixed, retreated, and retested. In addition this retention volume will allow for a minimal amount of recirculation through the STP using any spare STP capacity. This will improve the quality of the final effluent in the tank. The volume is sufficient to allow for periodic sampling and testing of the treated effluent before discharge or reuse. The new permanent sewage treatment facility will be RBC based technology or superior. Treated effluent will be discharged to the ocean.

The equalization tank that feeds the temporary sewage treatment plant will be sized to accommodate the sewage from the Cockburn Lake and Cockburn South rail camps. The rail camp sewage will be added during periods of low sewage generation at Steensby in order to reduce excessive surge volumes building up in the tank.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge cake will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary. The incinerator design will consider the solids content of the sludge from the dewatering device.

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The equalization tank that feeds the new sewage treatment plant will be sized to accommodate the sewage from the Cockburn Lake and Cockburn South rail camps. The rail camp sewage will be added during periods of low sewage generation at Steensby in order to reduce excessive surge volumes building up in the tank.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge cake will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary.

A.2.1.2 Mid-Rail and Ravn River Sites

Sewage waste generated at the Ravn River and Mid-Rail camps and Sewage generated at the Cockburn North and Cockburn South camps can only be transported and treated at either the Mine Site Sewage Treatment Facility or the Steensby Port Sewage Treatment Facility, unless otherwise approved by the Board in writing.

Sewage generated at these sites will mainly be conveyed to the Mary River permanent sewage treatment facility by truck. During the first year when there will only be access to the camp via an ice road, sewage can only be trucked from January to April. During the remaining months the sewage will be stored. There would be an opportunity to partially or fully treat sewage prior to storage. Sewage storage facilities may be aerated to prevent the waste from becoming septic (generating odours and noxious gases). Sludge will form and settle in the facility depending on how long the sewage resides there. This sludge will be withdrawn and delivered separately to the dewatering system at the Mine Site. Given the quantity of waste to be moved or stored every effort will be made to reduce this volume by using low flow showers and toilets and potentially segregating gray water to be treated and reused as urinal flush water. Other potential waste minimization techniques will also be reviewed. These will be evaluated during the detailed design. In addition, the surrounding water bodies will be modelled and sampled to potentially support having sewage treatment and waste discharge near the camp sites. An additional amendment to the Type A Water Licence would be required to support this option.


The equalization tank at Mary River will be sized to provide sufficient residence time for freshly added sewage from the Mid-Rail or Ravn River to mix with sewage generated at the Mine Site. Given that sewage generation follows diurnal patterns the sewage from the remote sites will be added during the low generation periods at the Mine Site.

A.2.1.3 Cockburn Tunnels (Cockburn North) and Cockburn South Sites

Sewage generated at these sites will be conveyed to the Steensby permanent sewage treatment facility by truck. Raw to partially treated sewage will be conveyed to Steensby Inlet by means of established roads along the rail alignment or by ice road. Depending on the volume of sewage to be stored at site, the

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sewage storage facilities will be sized accordingly. At the north camp there will only be access to the camp via an ice road and as such sewage can only be trucked from January to April. During the remaining months the sewage will be stored. Sewage storage facilities will be aerated to prevent the waste from becoming septic (generating odours and noxious gases). There will be the opportunity to partially or fully treat sewage prior to storage. Sludge will form and settle in the facility depending on how long the sewage resides there. This sludge will be withdrawn and delivered separately to the dewatering system at the Steensby site. Given the quantity of waste to be moved every effort will be made to reduce this volume by using low flow showers and toilets and potentially segregating gray water to be treated and reused as urinal flush water. Other potential waste minimization techniques will also be reviewed. These will be evaluated during the detailed design. In addition, the surrounding water bodies will be modelled and sampled to potentially support having sewage treatment and waste discharge near the camp sites. An additional amendment to the Type A Water Licence would be required to support this option.

The equalization tank at Steensby will be sized to provide sufficient residence time for freshly added sewage from the Cockburn Tunnels (Cockburn North) and Cockburn South camps to mix with sewage generated at the Steensby site. Given that sewage generation follows diurnal patterns the sewage from the remote sites will be added during the low generation periods at the Steensby site.


A.2.1.4 Design Considerations from ‘Lessons Learned’

Previous studies have recommended the use of Polishing Waste Stabilization Ponds (i.e. Mary River Project Appendix 10D-3 Wastewater Management Plan SD-EMMP-003, March 31, 2010) followed by a secondary waste polishing system. The existing infrastructure at the Mine Site and Milne Port include these ponds in part to allow for secondary treatment of the sewage treatment plant (STP) effluent which was not meeting the phosphorus discharge limit. However, based upon practical experience at the site with the STP it was projected that a secondary polishing system will not be required in the future.

The new systems will be installed with temporary storage ponds for off-spec water but will not require secondary polishing for the following reasons:

- The proposed new STPs will be based on membrane technology. This technology produces better quality effluent, is less susceptible to the impact of varying loads and has shorter start-up periods.
- The STP trains will be better able to handle upsets by using the available spare capacity to operate the equipment at more conservative flow rates.
- The existing equipment (at the Mine Site) was designed to meet a phosphorus discharge criterion of 0.5 mg/L. The new STPs shall be designed to meet a much lower phosphorus discharge criteria of <0.1 mg/L.

Sewage Treatment equipment vendors will be assessed based upon their experience producing equipment for arctic environments.

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A.2.2 Oily Water/Wastewater Treatment Process Description

The process descriptions for both oily water/wastewater treatment systems for Steensby are described in the section that follows.

A.2.2.1 Steensby Site

Future Construction and Operation Phase

Oily water may be generated from the following sources (this neglects minor oily water generated from accidental spills which will be handled by the Spill Response Plan):

- Vehicle maintenance and wash facilities (i.e. truck wash, equipment and floor wash down water).
- Fuel tank farm run-off.
- Emulsion plant wash water.
- Freight dock.
- Airstrip.

The vehicle maintenance and wash facility will have a sump located in close proximity to the maintenance facilities. Wash water produced in the maintenance facility (truck washing, equipment and floor washdown) will flow by gravity and be collected in the local sump. Suspended material in the wastewater will settle in the sump. Free oil in the wastewater will be removed by an oil/water separator system in order to meet the required oil discharge limits. The waste will then be further treated in the oily water treatment plant by activated carbon and clay to meet other specific parameters. The effluent will then be pH adjusted, if required, to meet discharge criteria.

Treated effluent from the oily water treatment plant will be pumped to discharge, or recycled and reused as washdown water at the maintenance shops. The separated waste oil will be stored in a local tank. Periodically, the oil will be drained and shipped off site or incinerated. Accumulated suspended solids will be periodically removed and sent to the landfarm for treatment, if necessary.


Run-off from the tank fuel storage areas will have to be treated by the mobile oily water separator system that will be used as needed. The resulting water will be discharged directly to the receiving body (Steensby – Ocean). The water will be periodically tested such that if any parameter is out of compliance the water will be removed by vacuum truck and treated in the vehicle maintenance shop wastewater treatment plant.

Run-off water from the freight dock will be collected and treated in a manner similar to the treatment scheme for the run-off from the tank fuel storage areas.

The emulsion plant shall be supplied with its own wastewater treatment plant which utilizes an evaporation system to evaporate the water leaving solid residue and oil. This residue will be tested for

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toxicity and if necessary taken off-site for disposal at a licensed facility otherwise the waste will be land filled.

Run-off water from the air strip run-off also has the potential for some oily water content. As such, this water will be collected through a drainage system and transported as needed by vacuum truck to the vehicle maintenance shop wastewater treatment plant.


Small amounts of propylene glycol will be used for de-icing of aircraft. The spent propylene glycol will be collected, stored in containers and sent by ship off-site to a licensed treatment/disposal facility. Some interim treatment of the spent propylene glycol may occur to reduce the overall waste volume generated. This will be evaluated during the detailed design.

Some dust suppression solution will be applied to roads at the Steensby site. The suppressant will be DL-10. This is an asphalt based emulsion and as such some water will be consumed for the dilution of the solution. This is an approved dust suppressant as specified by the Nunavut Department of Sustainable Development Environmental Protection Service (Environmental Guideline for Dust Suppression).

In addition, some Calcium Chloride solution will be used for drilling activities. The spent brine will be applied to nearby roads as a dust suppressant. This is an approved dust suppressant as specified by the Nunavut Environmental Protection Service. Treated oily water will be blended with treated sewage and discharged or discharged directly based on sampling.

A.2.2.2 Rail Camps

Two tunnels are to be built along the railway and a small amount of water will be consumed in the tunnelling operation. Calcium Chloride brine solution is used for tunnelling. This waste brine generated during the tunnelling will be collected and disposed of as per the Waste Management Plan for Construction, Operation and Closure. In addition, some Calcium Chloride solution will be used for drilling activities.

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Appendix G - Polishing Waste Stabilization Ponds (PWSP) Effluent Discharge Plan

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Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
900 Maple Grove Road, Unit 10
Cambridge, ON N3H 4R7
Canada

T: 519-650-7100

Technical Memo

To: Connor Devereaux, Baffinland Iron Mines
From: Jack Hinds, P.Eng, Wood E&IS
Reviewer: Jered Munro, P.Eng, Wood E&IS
Project No.: TPC192071
Date: 29 April 2020
Re: PWSP Treatment and Discharge

1.0 Background

Baffinland Iron Mines Corporation (Baffinland) has retained Wood Environment and Infrastructure Solutions, a Division of Wood Canada Ltd (Wood E&IS) to prepare this technical memo, outlining treatment, and disposal options for the water stored in the polishing/ waste stabilization ponds (PWSPs) at the Milne Inlet and Mary River sites.

The PWSPs can receive wastewater, sludge, grey water, and non-compliant sanitary effluent from various locations across both sites. These sources include, but are not limited to:

- Non-compliant effluent from wastewater treatment plants
- Excess sludge generated at wastewater treatment plants
- Raw sewage from spills
- Raw sewage from lift stations as a result of malfunction or emergency
- Greywater from lift stations

This plan updates and amends the previous plan that was completed in March 2012. The intent of this memorandum is to outline options that could be employed to treat the PWSPs to a level that is compliant with the approved Type A Water Licence requirements and be discharged to the environment under those requirements. The proposed treatment options may be used individually or combined with other treatment options to form a treatment system that is capable of achieving compliant effluent quality. This approach has been selected to provide operators with the ability to address various water quality issues that can occur due to changing conditions in the PWSPs, caused by the various site sources noted above, and the natural environment.

The PWSPs can potentially require treatment for:

- Removal of BOD/COD
- Removal of total suspended solids (TSS)
- Removal of total ammonia
- Removal of total phosphorus
- Removal of oil and grease
- Destruction of faecal coliforms
- Acute Toxicity associated with inorganic or organic compounds
- Control of pH



1.1 Onsite Water/Wastewater Treatment Equipment

There are a number of water and wastewater treatment equipment available at the Project site that are available for use in treating the PWSPs. The equipment is owned and maintained by Baffinland, and is typically operated by Baffinland, or is operated under contract with an engineering or operations firm. It is expected that Baffinland may be required to purchase additional equipment or replace existing equipment that is aging or no longer functional.

Baffinland maintains a supply of common treatment chemicals required by the treatment processes. Less common chemicals used for treatment are brought on site on an as-needed basis.

2.0 Treatment of PWSPs

PWSP treatment occurs during the spring and summer discharge seasons, when the water in these ponds is not frozen. Water quality in the PWSPs can be variable, and often changes over the course of the year. These variations in water quality are typically caused by:

- Contributions of impacted water to the PWSPs
- Spring melt, and ice retained within the PWSPs
- Fluctuations in temperature and pH
- Biological activity and consumption of nutrients
- Diurnal effects, exacerbated by long periods of daylight/twilight during the mid-summer months

The treatment methods presented below represent the treatment techniques that may be employed to achieve compliant water quality in the PWSPs, and allow for discharge to the environment. The options presented have been listed discretely but may be combined as required in order to address the influent water quality. As the water quality is variable over the course of a single season, multiple treatment methods or approaches may be required in a single season in order to maintain compliant effluent quality.

2.1 Winter Discharge

During the winter season, the PWSPs will stratify and eventually freeze the entire water column down to the lined bottom of the pond. If no additional non-compliant effluent is added to the ponds, it is possible that melted ice could be compliant for discharge. This offers Baffinland an opportunity to perform a discharge during winter months, if additional storage space is required before the spring melt.

To do so, Baffinland would use in-line heaters to recirculate hot water into the pond, to produce a layer of melt water. The melt water would then be heated, and returned to the pond, to further melt the surface ice. This process would be repeated, until there was sufficient free water on the surface to allow for sampling and discharge.

Samples will be collected for all criteria and analyzed prior to discharge. The discharge will be monitored for compliance following the guidelines given in Section 3.0, and will be shut down once water quality degrades below internally set limits.

2.2 Spring Discharge

As noted in Section 2.1 above, during the winter months the PWSPs will typically freeze down to the lined bottom of the ponds. During spring freshet, warmer temperatures and increased daylight hours cause the top layer of ice to thaw first, creating a pool of clear water on the surface of the PWSPs.

Typically, this initial melt water is compliant for discharge due to settling of solids at the end of the previous season. If the water quality analysis confirms the meltwater is compliant, it may be discharged to the receiving environment without further treatment.

The discharge will be monitored for compliance following the guidelines given in Section 3.0.

2.3 Membrane Bioreactor Treatment

Baffinland owns and operates Membrane Bioreactors (MBRs) for treatment of sewage at both the Mary River and Milne Inlet sites. If there is available capacity in these plants, impacted water from the PWSPs may be treated through the installed MBRs. This may be achieved either through the use of a vac-truck offloading to the equalization tank, or through installation of a temporary or permanent pumped line to the equalization tanks. Appropriate controls would be installed to ensure the total volume of pond water treated is controlled and recorded, and the equalization tank and MBR treatment system are adequately protected from damage.

An alternate approach that could be considered by Baffinland is to install a package treatment process specifically for the PWSPs. In this case, impacted water from the ponds will be pumped directly into the equalization tank, and treated through the system.

Generally, a package treatment system is comprised of the following processes:

- Equalization tank and pumps
- Coarse filtration system
- Aeration tank, with aeration grid and blowers
- Biological treatment process, including membranes or media, blowers, backwash system, cleaning system etc.
- Sludge pumps and sludge storage
- Sludge handling system, such as a sludge press
- Final effluent holding tank and pumps
- Disinfection system
- Chemical dosing systems

2.3.1 Filter Cake Disposal

Filtered sludge cake generated by the biological treatment process is either incinerated onsite, or backhauled south for disposal at an approved facility. All sludge cake will be handled in accordance with the applicable portions of Baffinland's Fresh Water Supply, Sewage, and Wastewater Management Plan.

2.4 Dissolved Air Flotation

Dissolved Air Flotation (DAF) is a treatment principle typically used to remove solid materials from wastewater, through the use of a recycle stream of air-saturated liquid. Baffinland may employ owned, constructed, or rental DAF units at either site for treatment of the PWSPs. DAF systems typically only remove solid material in the water, making them applicable for removal of BOD, TSS, and total phosphorus.

Wastewater is pumped into the system from the source, through a tube flocculator where coagulation and flocculation chemicals are added prior to entering the main treatment tank through a distribution header. A recycle pump draws a stream of partially-clarified liquid off the side of the tank and pressurizes it in an air saturation tank. At the same time, compressed air is injected into the air saturation tank, creating a recycle stream saturated with dissolved air. This recycle stream is then released back into the main tank, where the saturated air comes out of solution as very fine air bubbles. These bubbles act as nuclei for flocculated/coagulated solids, causing them to rise to the surface. A skimmer transfers floated solids from the

surface of the tank to a hopper, where it's pumped to a tote or tank for storage and disposal. Clarified effluent flows over a weir and out of the system.

Generally, a DAF system is comprised of the following processes:

- Influent pump
- Tube flocculator
- Dissolved air floatation tank, with distribution headers
- Compressor
- Air control panel
- Air saturation tank
- Recycle pump
- Float skimmer and hopper
- Float pump
- Effluent weir
- Solids drain
- Effluent break tank or holding tank, and pumps
- Chemical dosing system

For coagulation, a DAF system may use the following chemicals:

- Aluminum sulfate (alum)
- Poly-aluminum chloride (PAC)
- Sodium aluminate
- Alum potash
- Ferric/ferrous sulfate
- Ferric chloride
- Lime/soda ash
- Caustic soda

For flocculation, a DAF system may use the following chemicals:

- Vendor-specific, proprietary anionic or cationic polymers

2.4.1 Separated Solids Handling

Solids removed from the water by the flotation system are pumped into totes or other appropriate containers, labelled and manifested appropriately, and backhauled seasonally for disposal.

If possible, the floated solids may also be pressed through a filter press and incinerated, if the composition and water content allow.

2.5 Bulk Pond Treatment

If required, removal of TSS, BOD, total phosphorus, total ammonia, and/or faecal coliforms, may be performed in the ponds themselves. Doing so allows for rapid, bulk treatment of the contents of the PWSPs.

A typical treatment system would require:

- A pond mixing system
- Chemical dosing systems
- Inline mixers, such as a mixing tank, tube flocculator, or static mixer
- Flowmeter for flow measurement and totalization

Jar testing would be completed on the raw contents of the PWSP being treated to determine approximate chemical dosing rates required for treatment. The ponds would be mixed and chemicals would be injected into the mixing streams in accordance with dosing rates established during the jar tests. Chemical addition may be completed in multiple steps, to ensure no chemical is dosed beyond what is required for treatment.

Once dosing is complete, the PWSP will continue to be mixed for an appropriate amount of time, to ensure the chemical(s) reacts fully and all contents of the pond have been turned over. Once mixing is complete, the mixing system will be shut off, to allow any coagulated/flocculated solids to settle, or to allow for natural stripping

processes to occur. An effluent discharge system will be set up to allow for recirculation of effluent back into the PWSP. When water quality analyses confirm the clarified water is compliant for discharge, discharge may begin.

For in-pond treatment, the following chemicals may be used:

- Aluminum sulfate (alum)
- Poly-aluminum chloride (PAC)
- Sodium aluminate
- Alum potash
- Ferric/ferrous sulfate
- Ferric chloride
- Lime/soda ash
- Caustic soda
- Vendor-specific, proprietary anionic or cationic polymers
- Sulfuric acid
- Citric acid
- Hydrochloric acid
- Phosphoric acid
- Nitric acid
- Sodium hydroxide
- Sodium bicarbonate
- Magnesium hydroxide

2.5.1 Settled Solids Handling

Solids removed as part of this treatment method will naturally settle to the bottom of the ponds. Based on observations made in previous years, the quantities of settled solids are low enough to be considered insignificant in comparison to the total storage volume of the pond. Any settled solids typically remain settled and degrade naturally over time. If necessary, Baffinland may elect to drain any one of the ponds and remove and dewater any sludge remaining in the bottom.

2.6 pH Adjustment

pH adjustment may be required as a standalone treatment or may be required as part of a larger treatment system in order to maintain compliance. pH adjustment can be carried out in-pond or adjusted inline prior to discharge, depending on the requirements of the system and the condition of the PWSPs.

A typical pH adjustment system could require:

- A pond mixing system
- Chemical dosing systems
- Temporary chemical storage
- Inline mixers, such as a mixing tank, tube flocculator, or static mixer

Past observations suggest that pH in the PWSPs can be acidic, neutral, or basic, depending on what has been contributed to the pond, and what kind of natural biological activity has occurred. Various other treatment methods listed here may also have an impact on effluent pH and may require that pH adjustment be added as part of the treatment process to ensure compliant effluent.

The following chemicals may be used to form part of a pH adjustment system:

- Aluminum sulfate (alum)
- Poly-aluminum chloride (PAC)
- Sodium aluminate
- Alum potash
- Ferric/ferrous sulfate
- Ferric chloride
- Lime/soda ash
- Caustic soda
- Sulfuric acid
- Citric acid

- Hydrochloric acid
- Phosphoric acid
- Nitric acid
- Sodium hydroxide
- Sodium bicarbonate
- Magnesium hydroxide

2.7 Filtration

Filtration systems provide a physical barrier, allowing for the removal of solid matter from a liquid stream. Doing so may be an effective means of reducing/removing TSS, BOD, and total phosphorus. Filtration may be used as a standalone treatment process or as part of a larger treatment system. Solids removal through filtration can also be used as tertiary treatment when combined with other treatment processes, to protect against carry-over or suspended solids.

A typical solids filtration system may employ one or more of the following technologies:

- Basket strainers
- Bag filters
- Disposable cartridge filters
- Backwashing cartridge filters
- Sand filters
- Continuous backwash sand filters
- Multimedia filters
- Rotary drum screens
- Belt filters
- Microfiltration
- Ultrafiltration
- Nanofiltration
- Membrane filtration

Filters used either alone, or in conjunction with other treatment processes, may be stand-alone, skid mounted, packaged, or contained within their own seacan.

2.7.1 Filtered Solids Handling

For most cartridge or bag filtration systems, solids are removed through capture on a fiber media, which cannot be backwashed. The media must be removed and disposed of according to Baffinland's Waste Management Plan.

Effluent from the backwashing of filters may be directed back into the PWSPs, or into dedicated storage for further treatment or disposal.

2.8 Adsorption Media Treatment

For treatment of dissolved compounds in impounded waters, various forms of adsorption media can be employed. The media would be loaded into plastic or steel media vessels and connected to the remainder of a constructed system using hoses. Various types of media may be used in series to remove different contaminants of concern. Media that may be used include:

- Granular activated carbon (GAC)
- Synthetic ion exchange resins
- Activated iron products
- Natural Zeolites
- Other adsorptive and ion exchange media as applicable

Use of adsorption media is typically sensitive to solids in the water, and may become fouled if solids concentrations are too high. Typically adsorption vessels would be preceded by a suitably selected filtration process to prevent fouling.

2.9 Oxidation

Some of the chemical treatment approaches listed use an oxidation-reduction reaction to remove contaminants. However, it is sometimes necessary to augment that oxidation reaction to further remove any contaminants, or to remove specific species that are otherwise hard to treat. Most forms of enhanced oxidation require additional

power and would be purpose-built systems constructed or purchased from vendors and brought to site. These could include:

- Hydrogen peroxide addition
- Ozone addition
- Ultraviolet light (UV)
- Electrochemical oxidation

2.10 Transfer of Water Between Sites

Under some circumstances, it may be necessary to transfer non-compliant effluent or pond water between sites, to facilitate treatment or provide additional capacity to handle upset conditions. Both sites have separate PWSPs, with different capacities and different available methods of treatment. By transferring water from one site to another, Baffinland can more effectively manage and treat non-compliant effluent, during treatment plant upsets.

Treatment between sites is achieved through the use of vacuum trucks specifically designated for hauling non-compliant effluent. The trucks would transport the water between the PWSPs at both sites, as required to achieve treatment and discharge.

3.0 Sampling and Performance Monitoring

The effluent discharge quality criteria for the PWSPs is defined in the Type A Water Licence 2AM-MRY1325 Amendment No. 1 as issued by the Nunavut Water Board, July 31, 2014. The following table summarizes the discharge criteria:

Parameter	Discharge to Freshwater Max concentration of any grab sample (mg/L)	Discharge to Ocean Max concentration of any grab sample (mg/L)
BOD ₅	30	100
TSS	35	120
Faecal Coliforms	1000 CFU/100 ml	10,000 CFU/100 ml
Oil and Grease	No visible sheen	No visible sheen
pH	>6.0, <9.5	>6.0, <9.5
Ammonia (NH ₃ -N)	4.0	NR
Total Phosphorus	1.0	NR
Toxicity ¹	Not acutely toxic	Not acutely toxic

1: Acute lethality to rainbow trout (Method EPS/1/RM/13) and daphnia magna (Method EPS/1/RM/14)

Prior to commencing any treatment or discharge, Baffinland or their contractors will be required to develop and submit a discharge plan including details on monitoring and sampling frequency, safeguards, internal limits, etc. This plan shall be submitted to the Environmental Superintendent for review and approval before any treatment or discharge begins.

Baffinland will complete sampling to confirm treatment efficacy prior to and during discharge, which will be conducted at the intervals specified in the relevant discharge plan and the results of which will be used to guide treatment implementation and the ability to commence or continue discharge to the receiving environment. Discharge samples will be collected in accordance with the schedule laid out in the Type A Water Licence and provided to regulators to confirm treated effluent discharge meets the applicable criteria outlined above.

If there are any questions, comments, or concerns regarding the content of this memo, please feel free to reach out to Jack Hinds at 519-650-7143 or Jered Munro at 519-650-7130.

**Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited**



Jack Hinds, P.Eng

Process Engineer

Tel: 519-650-7143

Email: jack.hinds@woodplc.com




Jered Munro, P.Eng

Senior Engineer

Tel: 519-650-7130

Email: jered.munro@woodplc.com


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Appendix H - Mobile Oily Water Separator (OWS) Manual

(See BAF-PH1-830-T07-0001)

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Baffinland Iron Mines Corporation

Mobile Oily Water Separator (OWS) Manual

BAF-PH1-830-T07-0001

Rev 0

Prepared By: Andrew Vermeer
Department: Environment
Title: Environmental Coordinator
Date: March 21, 2016

Signature: 

Approved By: Allan Knight
Department: Environment
Title: Environmental Superintendent
Date: March 21, 2016

Signature: 

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1 PURPOSE AND SCOPE

The purpose of this manual is to provide guidance for the commissioning, operation, and decommissioning of the mobile oily water separator (OWS) in a safe, efficient and environmentally responsible manner.

2 REQUIREMENTS

2.1 REGULATIONS

Type A Water Licence No: "2AM-MRY1325 – Amendment No. 1", Nunavut Water Board

Nunavut Mine Health and Safety Act and Regulations.

2.2 HAZARDS AND REQUIRED HSE EQUIPMENT

2.2.1 HAZARDS

Identified hazards associated with commissioning, operation and decommissioning of the OWS include:

- Working with energized equipment and pressurized lines
- Working with electrically energized equipment near water
- Exposure to contaminated water and hazardous chemicals (i.e. diesel, bentonite)
- Working from heights
- Elevated noise levels (generator)
- Spills

2.2.2 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following personal protective equipment (PPE) requirements have been assigned to the commissioning, operation and decommissioning of the OWS:

Standard PPE


- Hard hat
- Reflective vest
- Safety glasses
- Steel toed boots
- Rubber gloves

Additional PPE

- Face respirator and P100 particulate cartridge (for handling bentonite and lead media)
- Rubber gloves and hip waiters (when installing the berm sump)
- Nitrile gloves, safety glasses and lab coat when performing sample analysis

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- Ear protection (when working near generator)

All PPE must comply with applicable Baffinland's PPE policy and be inspected for damage prior to use.

2.2.3 ADDITIONAL SAFETY AND ENVIRONMENTAL EQUIPMENT

The following safety and environmental equipment should be available at the OWS unit during operation.


- Fire extinguisher
- Spill kit
- Radio
- Spill pads (for fuel and free product tank)
- Quatrex bags (for used bag filters and spent media)

2.3 GENERAL SAFETY INSTRUCTIONS

- Monitor all pressure gauges and immediately shut down the OWS system if any exceedances occur
- Watch for pinch-points when exchanging bag filters
- Only trained personnel shall open or work on the electrical panels
- As a precaution against arc flashing, use your left hand and turn your body away from the electrical panel when switching off main breaker to the OWS
- When opening valves to vent air, do so slowly and carefully. Do not stand directly in front of valve.
- Ensure all electrical cords are in good condition and safely secured
- Practice good housekeeping inside and around the OWS unit
- Walk carefully between adsorption units, being careful not to become entangled with hoses or shut off valves by accident
- Wear all required PPE when working at OWS

2.4 TRAINING AND/OR QUALIFICATIONS

Any person commissioning, operating or decommissioning the OWS at the Project is required to have read and be familiar with this document. All operators will be trained by an experienced operator.

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3 DEFINITIONS

Total Adsorption Tank Bed Volume: the maximum total volume of water that the three (3) media vessels can hold when full of their respective medias (i.e. GAC, bentonite, anthracite).

GAC: granular activated carbon

GPM: gallons per minute

LPC: liquid phase carbon

HMI (Human Machine Interface): refers to the screen in the OWS control room.

API: refers to the baffled tank in the first stage of treatment where free product is removed.

BTE: refers to benzene, toluene and ethylbenzene.

4 RESPONSIBILITIES

The following responsibilities have been assigned to Baffinland's Environmental and Surface Works Personnel regarding the commissioning, operation and decommissioning of the OWS.

4.1 ENVIRONMENTAL COORDINATOR

Under the supervision of the Environmental Superintendent, the Environmental Coordinator will be responsible for implementing this SOP at their Project site. In the absence of the Environmental Coordinator, the Project Site Environmental Lead or his/her designate will assume all responsibilities outlined in this procedure. Specifically, the Environmental Coordinator shall:

- Ensure Environmental staff operating the OWS have read, understand and follow this SOP;
- Review and modify this SOP, as necessary;
- Provide updates to the Environment Superintendent and/or Environment Manager on the status and current operations of the OWS;
- Oversee and supervise all OWS operations;
- Report sample analysis results to the Environment Superintendent and/or Environment Manager.


4.2 OPERATORS

Under the supervision of the Environmental Coordinator, OWS operators will be responsible for adhering to and following this manual. Specifically, operators shall:

- Read and adhere to the protocols outlined in this manual
- Wear all required PPE;
- Conduct routine inspections of the OWS work area to ensure adequate controls are in place to mitigate known hazards;

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- Maintain a detailed log of all actions undertaken during operations and record all required data in the Daily Log Sheet (Appendix D);
- Complete required sampling and sample analysis (Section 5.5) to ensure OWS is operating as designed and that the final effluent meets water quality discharge criteria

4.3 SURFACE WORKS PERSONNEL

Surface Works personnel shall support OWS operations, as necessary. Specifically Surface Works personnel shall:

- Provide a vacuum truck and operator for removing spent media;
- Assist in transporting, relocating and levelling the OWS unit;
- Assist operators in commissioning OWS by providing electrical support regarding power generation and ancillary components (wiring configuration and electrical switches);
- Provide logistical support in transporting barrels, Quatrex bags, supplies and other components to and from the OWS unit, as required.

5 PROTOCOL


5.1 OILY WATER SEPARATOR (OWS) OVERVIEW

The OWS is a prefabricated system housed in a 40' foot seacan and is designed to remove oil, grease and BTE compounds from wastewater contaminated by hydrocarbons. The unit includes an API type separator to remove free product, a bag filter for solids removal and three adsorption units (one clay and two GAC) for hydrocarbon removal. In the event that the wastewater has lead concentrations that exceed the discharge limits outlined in Baffinland's Type 'A' Water License (2AM-MRY1325 Amendment No. 1), additional treatment barrels containing lead removal media will be added to the end of the OWS system. Refer to Section 5.3 for additional information on configuring the lead treatment barrels.

The OWS unit (Newterra model OWS-24) is sized for a water temperature of 7°C, specific gravity of 0.88 (diesel/furnace oil), TOG concentration of 50mg/L and flow rate of 50 gpm.

Error! Reference source not found. shows the Process Flow Diagram for the OWS.

Refer to Appendix A - Section 3 in the Newterra OWS O&M Manual for process and instrumentation drawings. These drawings include equipment sizing, valves, and instrumentation as well as equipment/instrument tag and model numbers.

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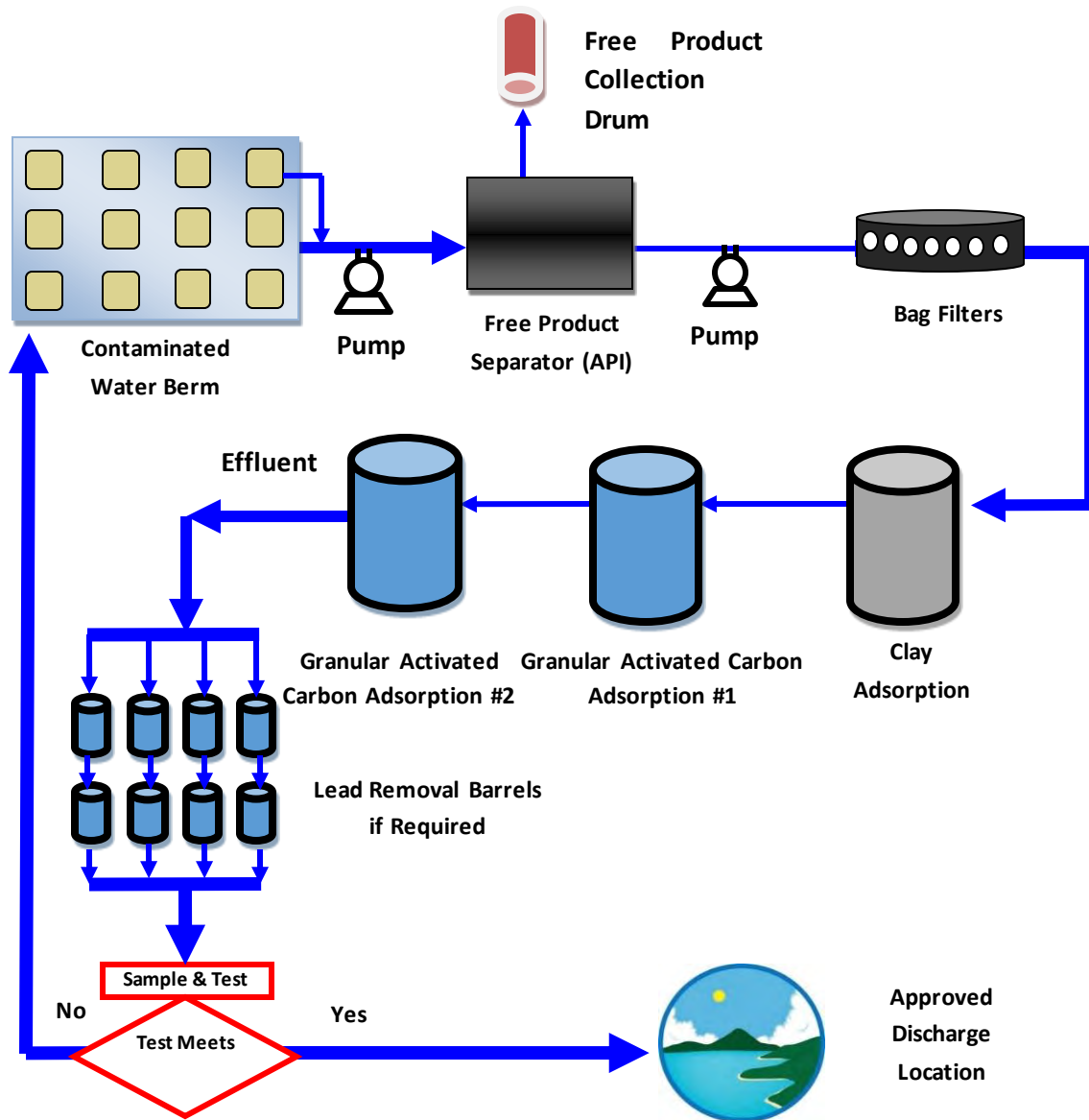



FIGURE 5-1 – OWS PROCESS FLOW DIAGRAM

The following protocols discuss in detail how to operate the OWS unit in a safe, efficient and environmentally responsible manner. Protocols discuss the commissioning, decommissioning and general operation procedures of the OWS unit as well as the water quality discharge criteria outlined in Baffinland's Type 'A' Water Licence (2AM-MRY1325 Amendment No. 1).

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5.2 WATER QUALITY DISCHARGE CRITERIA

The main sources of the contaminated water (wastewater) that the mobile OWS unit will be treating are the Bulk Fuel Containment Facilities/Berms and the Landfarm Facilities (including the Contaminated Snow Containment Berms).

All discharges from Bulk Fuel Storage Facilities will not exceed the following effluent quality limits outlined in Table 5-1. Applicable Monitoring Stations include MP-03, MP-MRY-7, MS-03, MS-04, MS-MRY-6, SP-04 and SP-05.

TABLE 5-1 – EFFLUENT QUALITY DISCHARGE LIMITS FOR BULK FUEL STORAGE FACILITIES

Parameter	Maximum Concentration of Any Grab Sample (ug/L)
Benzene	370
Toluene	2
Ethylbenzene	90
Total Lead	1
Oil and Grease	15,000 and no visible sheen


*Source: Type A Water Licence (2AM-MRY1325 – Amendment 1) Table 8

All discharges from Landfarm Facilities, including the Contaminated Snow Containment Berms, will not exceed the following effluent quality limits outlined in Table 5-2. Applicable Monitoring Stations include MP-04, MS-05 and SP-06.

TABLE 5-2 – EFFLUENT QUALITY DISCHARGE LIMITS FOR LANDFARM FACILITIES

Parameter	Maximum Concentration of Any Grab Sample (ug/L)
pH	Between 6.0 and 9.0
TSS	15
Oil and Grease	15,000 and no visible sheen
Total Lead	1
Benzene	370
Toluene	2
Ethylbenzene	90

*Source: Type A Water Licence (2AM-MRY1325 – Amendment 1) Table 9

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5.3 COMMISSIONING THE OILY WATER SEPARATOR

Prior to commissioning the OWS, operators should review the OWS Commissioning Job Hazard Analysis (JHA) presented in Appendix B and inventory all chemicals/equipment required for OWS operation, including the supplies needed for sampling and conducting internal sample analysis.

As previously mentioned, the OWS system is a treatment train comprised of an API separator, a bag filter and three adsorption media vessels (tanks). The first process in the system's treatment train is the API separator which separates free-floating product with a skimmer and densely emulsified product with coarse screen filters. After the API separator, contaminated water is put through a bag filter unit to remove solids and is then percolated through three adsorption media tanks to remove any remaining hydrocarbon fractions. The first adsorption tank contains clay media comprised of two chemicals: anthracite and bentonite. Anthracite is a coarse media which is added to the tank first so that the anthracite is located at the bottom of the tank near the outlets. Anthracite is added first to prevent the finer bentonite media (added after the anthracite) from clogging the outlet filters located at the bottom of the tank. Following the clay adsorption tank, the second and third adsorption tanks are referred to as the GAC (LPC) tanks and are filled entirely with granulated activated carbon (GAC).

Table 5-3 provides the media types used in the OWS adsorption media tanks and their respective quantities.


TABLE 5-3 – ADSORPTION TANK MEDIAS AND QUANTITIES

OWS Adsorption Tank	Media Type	Quantity	# of bags/boxes
Clay (Tank 1)	Anthracite (added first and is utilized as coarse media around the outlet ports at the bottom of the tank)	1,000 lbs	18
Clay (Tank 1)	Bentonite	5000 lbs	103
GAC #1 (Tank 2)	Granulated Activated Carbon	3000 lbs	54.5
GAC #2 (Tank 3)	Granulated Activated Carbon	3000 lbs	54.5
Lead media (2 barrels per train, 3-4 trains in parallel)	Metsorb HMRG	3.5 cubic feet	3.5

Before commissioning the OWS system for the upcoming season, the influent and effluent TOG results from the previous year's treatment records should be assessed to determine if the existing media in the

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OWS adsorption tanks needs to be replaced. Percent removals for each applicable parameter (i.e. BTE, TOG, lead, etc.) should be calculated using the previous year's influent and effluent analysis results just prior to the previous year's winterization/decommissioning of the OWS system.

$$\text{Percent removal} = \frac{\text{Conc influent} - \text{Conc effluent}}{100}$$

The media is completely spent (used) and will need to be replaced when the influent concentration is equal to the effluent concentration (i.e. percent removal = 0%). The percent removal is used to assess and determine whether the media is capable of effectively treating current hydrocarbon concentrations found in the wastewater to be treated. The media will need to be replaced if the percent removal is not sufficient to reduce the contaminants concentrations below the discharge requirements outlined in Section 5.2. Contact Environmental Coordinator for direction if unsure.

The following steps are required to replace media from the adsorption media tanks:

1. Review JHA (Appendix B) with supervisor. Modify JHA, if necessary.
2. Wear all appropriate PPE (including respirator and P100 particulate cartridge)
3. Remove lids from adsorption tanks.
4. Contact Surface Works to provide vacuum truck to remove media from tanks.
5. Transfer spent media into labelled Quatrex bags (white).
6. Refill tanks with quantities listed in Table 5-3.

Note: *Bentonite contains silica dust which is carcinogenic and therefore requires personnel to wear a half mask respirator equipped with a P100 particulate cartridge when handling bentonite. Refer to MSDS for full instructions before handling or opening bags.*

7. Reattach adsorption tank lids.


Whether the existing media from the previous year or brand new media is being used, the media in the adsorption tanks must be soaked in clean freshwater for 24 hours prior to running contaminated water through the system. This allows air trapped in the media's pores to be removed and the full surface area of the media to be utilized in treatment.

The following steps are required to soak the media within the adsorption tanks:

1. Contact Surface Works to provide a water truck with a full load of freshwater.
2. Open up all inlet and outlet valves on adsorption tanks except the outlet valve on the last adsorption tank (GAC#2). This will allow water to equalize among all three adsorption tanks
3. Open pressure valves on the top of each adsorption tank for air venting.
4. Hook up water line to inlet of the first adsorption tank.
5. Begin pumping water into the adsorption tanks using water truck. Ensure water truck pump is throttled to its lowest setting.
6. As tanks fill, use a rubber mallet to hit around the circumference of each tank to release any remaining air.

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7. Monitor pressure valves on adsorption tanks and ensure tank pressures **NEVER exceed 40 psi**. If necessary, shut off water truck periodically to allow pressure to release and equalize among tanks.
8. Shut off top pressure valves on each adsorption tank once water begins to come out of the each valve.
9. Shut off water truck once water has come out of each adsorption tank's top pressure valve.
10. Allow media to soak for 24 hours.

The OWS does not have its own power supply and therefore will need to be hooked up to a diesel generator to operate. For a generator and fuel tank, contact Surface Works. Refer to the Newterra OWS manual presented in Appendix A for engineered drawings and detailed instructions on how to hook-up the power line/supply, sump pump, water level float and free-product float.

Prior to starting the OWS unit, the wastewater to be treated (influent) should be sampled and analyzed internally to confirm the OWS unit is able to treat the hydrocarbon (TOG) levels found in the wastewater. If TOG levels are determined to be greater than 120 mg/L, contact the Environmental Coordinator for instruction.


Prior to discharging treated effluent from the OWS to the receiving environment, contaminated water should be re-circulated between the OWS unit and the wastewater containment berm. This is done to (1) flush out the freshwater used to soak the media in the adsorption tanks and (2) confirm the treated effluent discharged from the OWS meets the water quality discharge criteria outlined in Section 5.2. Approximately 10 m³ (2640 USG) of wastewater must be recirculated through the OWS unit to flush the system of freshwater and confirm effluent quality.

Once the freshwater has been flushed out of the system, effluent samples can be collected for internal and external analysis. External effluent samples should be collected and tested for all parameters required by the facility's effluent discharge criteria presented in Section 5.2. Internal samples should be taken in parallel to external samples and tested for TOG on-site using the procedure outlined in Section 5.5.3.

If after receiving the external analysis results, it is determined that lead treatment barrels will be required to ensure that the treated effluent meets the facility's discharge criteria, barrels will be setup following the third adsorption tank (GAC#2) of the OWS. Lead media barrels are typically configured into four trains in parallel with each train made of two barrels hooked up in series. The number of trains used is the limiting factor that determines the overall flow rate that can pass through the system, with each train having an approximate flow rate of 5 gpm. Each lead media barrel is equipped with a pressure gauge and water vent at the inlet valve located at the top of the barrel and an outlet valve at the bottom of the barrel. The effluent manifold should be placed at a higher elevation than the barrels to ensure barrels remain flooded when system is off. Air should be purged from the system upon start up. For more details on how to configure the lead treatment barrels and replace the lead removing media refer to Section 5.4.8.

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Do NOT discharge any treated effluent from the OWS system to the receiving environment unless it has been authorized by the Environmental Manager.

5.4 OPERATION AND MAINTENANCE PROCEDURES

The following procedures provide detail on how to safely operate and monitor the mobile OWS system. Prior to operating the OWS, all operators should review the OWS Operation JHA presented in Appendix C.

5.4.1 TARGET OPERATING CONDITIONS

The following table outlines the initial target operating conditions:

TABLE 5-4 – INITIAL OPERATING TARGETS


Parameter	Units	Initial Target
Flow rate from Pump 4901 (FQI 7001) without Lead Treatment trains.	gpm	45-50
Flow rate from Pump 4901 (FQI 7001) with four (4) Lead Treatment trains.	gpm	15-20
Discharge Pressure of Pump 4901 (PI 4901)	psi	55
Max Bag Filter Inlet Pressure (PI 6701)	psi	40
Max Adsorption Unit Inlet Pressure (PI 7001)	psi	40
Max Lead Treatment Barrel Inlet Pressure	psi	10

5.4.2 SYSTEM START-UP

1. Turn generator **ON** if not already running. Ensure sufficient oil in generator and diesel in fuel tank.
Note: All operators must be trained by Surface Works electricians on the proper starting and fueling procedures when operating the OWS system.
2. Ensure electrical panel is securely closed/locked.
Note: Only trained personnel should open and adjust breakers in electrical panel.
3. Turn **ON** main disconnect for power to the OWS if not already on. **DO NOT** stand directly in front of panel when turning **ON** or **OFF** main disconnect.
4. The HMI screen will display system status and active alarms. Scroll right or left to view the active alarms. Address any alarms present. Refer to Section 3 of the Newterra O&M Manual presented in Appendix A for a list of alarms and activation/deactivation conditions.

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Note: Immediate power surge alarm will show on the HMI screen after power up. This will reset itself after five minutes. Address any other alarms present (float switches, free product barrel level, pressure alarms, etc.).

- Once alarms are addressed go to main menu and clear alarms.
- Walk through system to check for leaks and ensure influent pump and discharge lines are properly connected. Ensure all valves are properly positioned. Ensure there are no obstacles over any moving parts.
- Ensure influent/sump pump and discharge lines are properly positioned and connected. If discharging, make sure a dissipater plate is in place at the discharge point to prevent surface erosion.
- If no issues are observed turn the system **ON** at the HMI. Pumps should be manually set to **AUTO** mode.
- Observe system operation to ensure the OWS is operating as designed. Check flow rates, pressures and confirm discharge.
- Open valves at top of adsorption units and bag filter to purge air as described above.

5.4.3 SYSTEM SHUTDOWN

- Turn system **OFF** on HMI.
- Shutdown generator if system will be off for more than approximately 12 hours.
Important Note: Turn **OFF** main disconnect in the OWS control room if personnel plan on conducting work on the OWS while the system and generator are off.


5.4.4 ROUTINE SYSTEM CHECKS

During normal operation the OWS system should be checked every four (4) hours at a minimum. As the amount of wastewater in the berm decreases or as specific concerns arise, the OWS system should be checked more regularly to ensure excessive amounts of sand or free product are NOT entering the system. The following instructions outline the tasks that should be completed during these routine checks.

- Walk through system to check for leaks and ensure influent pump and discharge lines are properly placed/connected.
- Confirm discharge flow and conduct visual inspection for any sheen or odor at the discharge location.
- Record flow rates and pressures. Complete Daily Log presented in Appendix D. Collect samples as outlined in Section 5.5.2.
- At the API, check level of free product using dipstick and water-detecting paste. If the free product level is 1/4" or more thick adjust the slotted pipe at the far end of the API using a 4" pipe wrench. The slit in the pipe should be at the surface of the liquid, just enough to remove any free product, and leave any remaining water in the tank. **Note: This is a completely manual step. Do not leave the slotted pipe at the liquid surface unattended for long periods of time as the free product**

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level will change over time and result in the free product collection barrel quickly filling up with water.

5. Check level of free product around sump in the berm. If there is significant free product present protect the intake pump with booms. If necessary, the OWS may need to be shut down temporarily to remove excessive amounts of free product within the sump area.
6. Adjust flow balance between influent pump (P 4001) and API discharge pump (P 4901) using the appropriate ball/globe valve if required.


Note: The target flow rate from the API effluent pump (P 4901) is 30 gpm (20 gpm if using four lead treatment barrel trains in parallel). Flow balance should be such that the desired flow rate through the system is achieved, and the influent pump runs continuously if possible. If the influent pump flow rate is greater than the API effluent pump the LAHH 4901 switch will turn the influent pump off to prevent overflowing the API. This will result in frequent LAHH 4901 alarms on the HMI. A significant amount of flow rate monitoring and adjustment may be required during the initial startup/commissioning of the system to achieve the proper flow balance.

7. Monitor bag filter inlet pressure. Replace bag filters if the maximum bag filter inlet pressure, 35 psi, is reached. Bag filters may require frequent replacement. Refer to Section 5.4.7.
8. Replace GAC/clay media if inlet pressure to the first adsorption unit exceeds 35 psi or if breakthrough of contaminants is observed in the final effluent (visual sheen or high TOG results).
9. Purge any air collected in the system via the vents on the bag filter/adsorption units.
10. Perform/schedule any required maintenance as per the Newterra O&M manual.
11. Collect and analyze samples according to Section 5.5 and take appropriate action.
12. If at any point during the operation of the mobile OWS, the final effluent at the discharge point is discovered to have a sheen or hydrocarbon odour, the OWS must be shut off and all discharge to the natural environment must stop immediately. Contact Environmental Coordinator.
13. If at any point during the operation of the mobile OWS, the internal TOG analyses indicates the final effluent does not meet the required discharge criteria outlined in Section 5.2, the OWS must be shut off and all discharge to the natural environment must stop immediately. Contact Environmental Coordinator.

5.4.5 SYSTEM ALARMS

The OWS system has several shutdown alarms and non-critical alarms. Shutdown alarms will turn the system off. Non-critical alarms will be displayed in the HMI and will activate the alarm light but will not shutdown the system. If an alarm appears on the HMI, investigate the cause and take the appropriate action. Once the issue has been addressed, clear the alarm using the HMI.

Refer to Section 3 in the Newterra O&M manual for details on the how the alarms are activated/deactivated.

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5.4.6 MAINTENANCE

Several maintenance activities will need to be carried out after a recommended number of operating hours have passed. Refer to Section 8 in the Newterra O&M manual for details on the maintenance procedures and required, daily, weekly, monthly and yearly checks.

- Strainer cleaning: every 200 operating hours
- Pumps: every 800 operating hours
- Pressure gauges: every 4000 operating hours


In addition to these activities the filter bags and media will need to be replaced based on system pressures and water quality. See the following sections for more information.

5.4.7 FILTER BAG REPLACEMENT

Filter bags will need to be replaced when the inlet pressure to the filter housings reaches 35 psi. At 40 psi an alarm will be initiated.

To change out the filter bags complete the following steps:

1. Turn the system **OFF**.
2. Close inlet and outlet valves.
3. Relieve the pressure in the bag filter housing via the valve at the top of the housing.
4. Undo the housing bolts and remove lid.
5. If possible remove some of the water from the filter housing by partially draining the housing through the two inch line at the bottom of the stand or by removing the water from the top. Ensure drained water is contained and not spilled on floor. The bag filters can be replaced without removing the water however replacing the filter bags is easier when the housings is not full of water.
6. Place used filter bags into a pail or other container for disposal. The bags will be water logged and heavy. Use two people if required and proper lifting techniques (lift with knees NOT back). Filters can be burned and should be dropped off at the Waste Management Building to be incinerated onsite.
7. Insert new filter bags into the housing. The bags should fit flush at the top. Change all seven bags at the same time.
8. Apply silicon grease to the O-ring to prevent leaks from the lid if required.
9. Close the lid and bolt the lid down.
10. Check strainers and empty if required.
11. Open valves to bag filters.
12. Perform pre-start checks of system and turn system **ON**. Remove air trapped in filter housing by opening valve at top of housing until water is observed.

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5.4.8 LEAD REMOVAL MEDIA


As discussed in Section 5.3, eight barrels containing lead removal media (Metsorb HMRG) should be added downstream of the system following the adsorption tanks if lead concentrations in the effluent exceed discharge criteria. The maximum flow through one barrel is 5 gpm, therefore the maximum flow through four barrels in parallel is 20 gpm. At an influent concentration of 5 µg/L (effluent of >1 µg/L) 1 ft³ of media should be able to process approximately 70 m³ of wastewater. Other heavy metals and contaminants in the wastewater will also be adsorbed by the media so the volume of water processed by each cubic foot of media will vary and depend on the total amount of metals in the wastewater. Taking samples of the final effluent and the discharge from the first row of barrels will indicate when the media needs to be replaced.

5.4.8.1 LEAD MEDIA REPLACEMENT PROCEDURE

If breakthrough (exceedance) is observed at the discharge of the first row of four barrels, the media in these barrels should be replaced and the order of the barrels switched. **The four barrels with new media will be moved to the second row and barrels that were originally in the second row will be moved to the first row.**

To change out the lead media in the barrels complete the following steps:

1. Drain barrels.
2. Remove lids and scoop out spent media into labelled Quatrex bags for hazardous waste disposal.
3. Rinse barrels with a small amount of clean water.
4. Replace or rinse filter sock on bottom piping inside the barrels.
5. Put on appropriate respirators and review MSDS for procedures on handling media. Slowly pour new media into barrels being careful not to damage piping at bottom of barrels. Barrels will be approximately 1/3 full of media with 3-3.5 ft³ of media. Settling of media inside the barrel can be aided by tapping the barrel sides with a rubber mallet.
6. Replace lids and ensure adequate seal.

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5.5 SAMPLING SCHEDULE, SUPPLIES AND PROCEDURES


The following table provides the sampling schedule and requirements for the commissioning and normal operation of the OWS. Confirm with Environmental Coordinator when sending out external samples.

Table 5-5 – Sampling Schedule

Parameter	Location within OWS	Internal Sampling Frequency	External Sampling Frequency
Oil and Grease	Influent	Start of open water season at each source/facility that contains wastewater potentially requiring treatment	Start of open water season at each source/facility that contains wastewater potentially requiring treatment
	API Effluent	Every 4 hours	
	Final Effluent	Every 4 hours	Prior to discharge/ Weekly during discharge
Total Lead pH TSS (only effluent)	Influent		Start of open water season at each source/facility that contains wastewater potentially requiring treatment
	Final Effluent		Prior to discharge/ Weekly during discharge
Benzene Toluene Ethylbenzene	Influent		Start of open water season at each source/facility that contains wastewater potentially requiring treatment.
	GAC #1 Effluent		Weekly
	Final Effluent		Prior to discharge/ Weekly during discharge

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5.5.1 SAMPLING EQUIPMENT

- Required PPE (refer to Section 2.2.2)
- Sampling bottles: Group 5 bottle set for external samples (See Appendix E for exact bottle set requirements), 250 mL glass wide-mouth jars for internal samples.

5.5.2 SAMPLING PROCEDURE

1. Obtain and wear appropriate PPE listed in Section 2.2.2.
2. Obtain sampling equipment outlined Section 5.5.1.
3. Check HMI to identify any active alarms.
4. Conduct a visual inspection to identify any leaks, system failures, and potential hazards (high pressures, electrical malfunctions, improperly opened valves, poor discharge/recirculation lines, etc.),
5. Record any system failures, leaks, hazards or inconsistencies observed on the Daily Log (refer to Appendix D).
6. Record all readings on the Daily Log.
7. Collect water samples at designated sampling ports for analyses (see Table 5-5 for required sampling locations and analysis).
8. Use 250mL wide-mouthed glass jars to collecting internal samples. Samples should be labeled with the date, time and sampling location/station. Internal sampling jars can be reused for internal analyses however, if reused, sampling jars should be used for the same sampling locations within the system (i.e. influent, effluent, etc.). Replace jars if suspected cross contamination is occurring.
9. All internal samples should be collected by following steps 1 through 6 at the required intervals outlined by Table 5-5.
10. Analyze internal samples for TOG following the analysis procedure outlined in Section 5.5.3.
11. Complete Daily Log with all the required information filled out including the date, time of routine checks, pressure readings throughout the system, totalizer values and internal TOG results. At the end of the day, information on the Daily Log will be transferred to the electronic Discharge Log located on the Mine Site Environmental Server (refer to Appendix D).
12. External samples must be collected according the Sampling Schedule (Table 5-5) and should be delivered to the onsite ALS lab within 24 hours of being collected accompanied with a completed COC.

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5.5.3 TOG SAMPLE ANALYSIS PROCEDURE


Required Lab Supplies, Equipment and PPE

- 2 x 20ml glass graduated cylinder
- Glass funnel
- TOG analyzer + cuvette(s)
- Sulphuric Acid (98%) + pump
- S-316 Solvent
- Sodium Sulfate, anhydrous
- Spoon
- Pipette and tips
- Two glass mix jars for influent and effluent samples with 100ml marked
- Whatman filter Paper
- Kim wipes
- Nitrile gloves
- Lab coat
- Safety glasses

1. Turn TOG analyzer **ON** if it is not already on. Allow TOG analyzer to warm up for 1 hour.
Note: The TOG analyzer can be kept on for the entire length of time the mobile OWS is operating.
2. Rinse all glassware with solvent: Horiba S-316 (i.e. funnels, graduated cylinders, pre marked 100mL mix jars, and cuvettes)
3. Add 100mL of sample to pre-marked mix jar.
4. Add 1mL of sulfuric acid (~98% conc.) to sample in mix jar.
5. Shake for 10 seconds.
6. Add 11mL of solvent to sample. The volume of solvent should be 10% of the total volume of solvent-sample mix.
7. Shake the mix jar for 2 minutes, opening mix jar at least twice to release any vapour buildup.
8. Allow mix jar contents to settle. A solvent layer containing the hydrocarbons in the sample should form at the bottom of the mix jar.
9. Fill cuvette with solvent, wipe thoroughly with Kim wipe and place in analyzer. This will serve as a blank.
10. Press and hold ZERO on analyzer. BAL will display on the screen followed by a number. Leave the cuvette in the analyzer and press RUN. If the result is within ± 2 mg/L the analyzer is zeroed.
Note: The cuvette should be placed in the analyzer with the frosted side facing you. The cuvette should always be placed in the analyzer in the same direction.
11. Add 1 spoonful of sodium sulfate to a folded Whatman filter in the glass funnel.
12. Extract settled solvent layer from bottom of mix jar with a 10mL pipette and filter it through the sodium sulfate inside the Whatman filter and into a clean graduated cylinder. This will remove any remaining water captured during the extraction of the solvent. Only 3-5 mL of filtered solvent

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is required to analyze the solvent layer and determine the hydrocarbon concentration in the sample (i.e. effluent, influent, etc.).

13. Fill cuvette with the filtered solvent, wipe thoroughly with Kim wipe and place in analyzer.
14. Press **RUN** to analyze.
15. Record results on Daily Log.
16. If TOG results seem high in comparison to external results, clean all glassware with solvent and redo analysis. If the hydrocarbon concentration in the influent sample water is equal or greater than 120 mg/L, system checks should be done more frequently and sampling should increase to every two (2) hours. Notify Environmental Coordinator of inflated TOG levels in influent.
17. If at any point during the operation of the mobile OWS, the internal TOG analyses indicates the final effluent does not meet the required discharge criteria outlined in Section 5.2, the OWS must be shut off and all discharge to the natural environment must stop immediately. Contact Environmental Coordinator.

5.6 DECOMMISSIONING THE OIL WATER SEPARATOR

The following procedures should be followed to safely and effectively decommission the mobile OWS unit when transporting the unit between Project sites or for winterization/end of season storage.

5.6.1 DECOMMISSIONING FOR TRANSPORT

Before transporting the mobile OWS unit between Project sites, the unit must be drained. The draining procedure required for transport is identical to seasonal storage draining procedure (refer to Section 5.6.2), however since this is completed to reduce weight for shipping, the lines and pumps are not required to be drained since this is a very time consuming process. Only media vessels and the API tank are required to be drained prior to transport. Additionally, all valves should remain closed during transport.

5.6.2 DECOMMISSIONING FOR SEASONAL STORAGE


The decommissioning of the mobile OWS unit for seasonal storage requires all water to be drained from the system. Electricians are required to disconnect all wiring. All drained sensors and pumps should be placed and stored inside the control room. All hoses and lines must be drained of any residual water so that lines can be disassembled and will not rupture due to ice expansion. Hoses and lines should be drained using the valves at low points and available ports. Residual water must be drained back into the berm or captured in pails/tubs to be eventually transferred back into berm. Spilling contaminated water onto the ground is considered a spill and must be reported.

Complete removal of all water is required for the adsorption tanks and API tank.

To drain the three (3) adsorption tanks, a 3" trash pump must be hooked up to the bottom ball valve of each adsorption tank and used to effectively pump out all remaining water out of each tank. To minimize the possibility of removing any media in this process, the bottom ball valve on the bottom of each adsorption tank should only be partially opened and the trash pump should be throttled down to its lowest

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setting to reduce the overall flow rate/vacuum at the outlet of each adsorption tank. When each tank is empty and the trash pump begins to suck in air, the trash pump must be shut-down for 5-10 minutes to allow residual water to gravity drain through media and collect at the bottom of the adsorption tank.

Leave the bottom ball valve of each adsorption tank in the open position with a pail placed underneath the valve to catch any residual water dripping out of the tanks (empty as necessary). Open the lid on the top of each media vessel and allow the media to dry for a 2-3 days. If weather is cold, turn heaters on in the OWS unit or use a frost fighter to expedite the drying process.

To drain the API tank, setup a tub underneath the drain port on the outside of the OWS unit. Open the lowest ball valve on the drain port to allow the water in the API tank to gravity drain into the tub. Transfer contaminated water from the tub to the facility's containment berm.

Double-check that all valves and drain ports are opened and drained to ensure ALL residual water has been removed. It is absolutely critical that all lines, pipes, tanks and vessels have been completely drained of any water prior to freeze up.

5.7 OWS DISCHARGE LOG, RESULTS DISSEMINATION AND APPROVAL FOR DISCHARGE

All the monitoring documentation to be completed during the operation of the OWS unit is located in the OWS Discharge Log file on the Mine Site Environmental Server at [FINAL File System\2.0 ENV MANAGEMENT, MONITORING PLANS \(BIM INTERNAL\)\2.08 Oily Water Separators](#). This file contains the Summary Sheet, the External Results Sheet and the Daily Log Forms presented in Appendix G, Appendix F and Appendix D, respectively.


The External Results Sheet presented in Appendix F must be updated upon receipt of any external sample results, including preliminary results. The Environmental Coordinator or his/her designate will provide the results to the Environment Superintendent and/or Manager who will assess the results and determine whether the effluent quality is acceptable for discharge or will assign instructions for additional treatment.

The Daily Log (refer to Appendix D) must be updated to include all internal samples and weekly external samples (if applicable) throughout the treatment process. End-of-shift cumulative discharge values and additional notes must also be recorded on the Daily Log.

The Summary Sheet (refer to Appendix G) must be filled out after all wastewater has been treated for a specific facility (i.e. Bulk Fuel Storage Facility, Landfarm Facility, etc.).

All documentation must be added to the appropriate site server location ([FINAL File System\2.0 ENV MANAGEMENT, MONITORING PLANS \(BIM INTERNAL\)\2.08 Oily Water Separators](#)). Upon the completion of wastewater treatment at a facility, the completed OWS Discharge Log must be provided to the Environmental Coordinator, Superintendent and Manager.

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Water Licence No: 2AM-MRY1325 – Amendment No. 1, Nunavut Water Board (July 21, 2015)

Newterra, (2013), Process Treatment System Project # 102140. Operation and Maintenance Manual

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APPENDIX A - **NEWTERRA OWS O&M MANUAL**

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1.0 Start Up Procedure
Commissioning Checklist

Test Records
Packing List

2.0 Mechanical Drawings

3.0 Electrical Drawings

4.0 Control Panel Module

5.0 Components

6.0 Specs

7.0 Manuals

8.0 System Maintenance, Troubleshooting

RTS - 151

150 GPM WATER TREATMENT SYSTEM

STARTUP PROCEDURE

- If the system is being started for the first time then work your way through the commissioning checklist in the installation guide or system manual before starting the system.
- If kill switch on panel (red mushroom shaped button) is pulled out then push it in to confirm that system is off.
- Pull kill button out in process room so the system can start at the appropriate time.
- Walk through process piping and check the position of all process valves.
- Check that there are no obstructions over any moving parts.
- Check that main disconnect is on.
- Put all hand/off/auto switches in auto.
- Pull the kill Button (red button on panel) out to start the process.
- Push the reset button on the operator interface to reset all alarms.
- Push the start button on the Operator Interface.
- If an alarm occurred on startup, then review the alarm descriptions and troubleshooting guide in the installation guide or manual for guidance on how to troubleshoot the problem. Fix the alarm condition and restart the system with the above procedure.

RTS - 151 150 GPM

Mech Eng: _____ Control: _____ Tester #1: Warren, Kevin
 Mechanical Team: _____ Electrical Team: _____ Panel Team: _____ Tester #2: _____
 -Select One- -Select One- -Select One-
 Start Date: 8/20/2013
 End Date: 8/27/2013

SECTION A - PRE-TEST FLOW RATES AND POWER DETAILS

P-VLS _____ B-STRIP _____
 B-SVE _____ P-STRIP _____
 P-OWS _____ C-SPRG _____
 OTHER: _____ OTHER: _____

System Certifications	Panel Standard	System Standard	SETPOINTS
Building #1 / Room #1:	UL 698A	MET us, Classified	
Building #2 / Room #2:	N/A	N/A	
Site Power Requirements			
Voltage:	208 Vac	3-Phase , 3-Wire	
Amperage:	125 Amps		

Notes: _____

SECTION B - WALK AROUND

Check That Walk Through Issues Have Been Resolved, Review Shop Aids
 Lay Down Electrical Safety Mat and Set Up Testing Cart
 Ensure That Testing Tote Is Connected and That Hoses Are Secure
 Ensure That Carbon Vessels Are Bypassed
 Verify That Exhaust Mufflers and Elbows are Installed (SVE/Sparge/Compressed Air)
 Make Sure That Building Fan and Louvre Shipping Braces Have Been Removed

OK / NA INITIALS

OK	KW
OK	KW
OK	KW
OK	KW
OK	KW
OK	KW

SECTION C - WALK THROUGH

Inspect Valves and Process Lines
 Check Transmitter / Magnehelic Lines for Low Lying Spots Where Moisture can Collect
 Check That Floor Vents Have Been Installed
 Record Process Equipment Model and Serial Numbers* and Motor Nameplates
 Notify Project Manager and Production Staff of Any Outstanding Issues

OK / NA INITIALS

OK	KW
N/A	KW
N/A	KW
OK	KW
OK	KW

* This includes motors, blowers, compressors, oxygen/ozone generators, pumps, etc.

SECTION D - PANEL OFF INSPECTION

Check for Dielectric Test Label
 Check for Auto Re-Start Label, Check for Ground, L1, L2, L3 and High Leg Labels
 Check for IS Wiring Warning Stickers in Panel and on Lines From Panel
 Ensure Neutral Wire is Connected To Terminal Block
 Inspect 24Vdc and 120Vac Relays for Proper Connections
 Check That Spare IS Input Wires Are Pulled
 Cross Check Fuses, Circuit Breakers and Starters with Fuse Schedule
 Determine Service Factor Amps and Set Motor Overloads

OK / NA INITIALS

OK	KW
OK	KW
OK	KW
OK	KW
OK	KW
OK	KW
OK	KW
OK	KW

RTS-151 TEST DOCS.xls

SECTION E - PANEL ON INSPECTION							OK / NA	INITIALS
Record Test Supply Voltages								
Primary:			Secondary:					
L1/L2	L2/L3	L3/L1	L1/L2	L2/L3	L3/L1			
213	213	213 Vac	245		Vac			
L1/N	L2/N	L3/N	124	124	L3/N			
124	124	124 Vac			Vac	OK	KW	
Record 24Vdc Supply Voltage						24 Vdc	OK	KW
Test GFI and non GFI Outlets							OK	KW
Check "Push To Test" Panel Indicators							N/A	KW
SECTION F - INITIAL SYSTEM SETUP AND TESTING							OK / NA	INITIALS
Archive Pre-Test Program Revisions and Create New Revision						N/A	KW	
Check E-mail Configuration Through ECOM Card on PLC						N/A	KW	
Record H0-ECOM100 Firmware Revision						v.	N/A	KW
Update PLC Firmware and Record Revision:						v.	OK	KW
Initialize Scratch Pad of Automation Direct PLCs						OK	KW	
Upload PLC Program						OK	KW	
Set PLC Clock and Calendar						OK	KW	
Check Functionality of All Discrete Inputs						OK	KW	
Check Functionality of All Discrete Outputs						OK	KW	
Check Functionality of All Analog Inputs and Outputs						OK	KW	
Switch System Outputs to AUTO Mode						OK	KW	
Set and Test All Setpoints						OK	KW	
SECTION G - OPERATOR INTERFACE (PANEL DOOR / TOUCHSCREEN)							OK / NA	INITIALS
Type of Operator Interface:						-Select One-		
Update Display Screen Firmware, Record Revision						v.	OK	KW
Upload Panel Program						OK	KW	
Test Panel Menu Hierarchy						OK	KW	
Check PLC to Panel Communication, Remove Ground Jumper if Necessary						OK	KW	
Verify Value, Scale, Significant Digits and Units of Analogue Signals						N/A	KW	
Check Functionality of All Discrete Inputs						OK	KW	
Check Functionality of All Discrete Outputs						OK	KW	
Test All User-Adjustable Setpoints						OK	KW	
Verify Correct Hourmeter Values, Ensure Proper Time is Kept						OK	KW	
SECTION H - VFD / SOFT START DEVICES							OK / NA	INITIALS
Drive Type and Application:						N/A	N/A	
Verify Drive Parameter Settings Match Electrical Drawings						N/A	KW	
Test Frequency Control						N/A	KW	
Check VFD Noise on Analog Signals / Adjust Carrier Frequency Accordingly						N/A	KW	
Save VFD Set-up Variables From PowerSuite / Record VFD Settings						N/A	KW	
Verify Integrity of RS-485 Communications, Record Settings						N/A	KW	
BAUD: N/A PARITY: N/A STOP BITS: N/A CARRIER: N/A								
SECTION I - ANALOG SIGNALS								INITIALS
PLC Card Slot #1:						N/A - Not Installed		KW
PLC Card Slot #2:						N/A - Not Installed		KW
PLC Card Slot #3:						N/A - Not Installed		KW
PLC Card Slot #4:						N/A - Not Installed		KW
Check mA Signals at Different Operating Points for Device Hysterisis and Calibration						N/A	KW	
Check Conversion Math and Square Root Functions in PLC Logic						N/A	KW	

SECTION J - SYSTEM OPERATION	OK / NA	INITIALS
Check Building Fan(s) and/or Heater(s) Operation	OK	KW
Test All Kill Buttons	OK	KW
Bump Motors and Check For Excessive or Abnormal Current Draw	OK	KW
Ensure that LSL Switches are Above Pump Intakes	OK	KW
Set and Test Pressure and Vacuum Relief Valves According to P&ID	N/A	KW
Thoroughly Test Control Logic	OK	KW
Check Functionality of Oxidizer Interlocks	N/A	KW
Run System In Full Automatic	OK	KW
Simulate All Alarms, Check That Non-Critical Alarms Do Not Shut Down System	N/A	KW
Check Magnehelic Gauges for Accuracy, Verify Air Flows Using Hot Wire Anemometer	N/A	KW
Measured CFM: _____ @ _____ PSI/"Hg/"WC		
Measured CFM: _____ @ _____ PSI/"Hg/"WC		
Measured CFM: _____ @ _____ PSI/"Hg/"WC		
Measured CFM: _____ @ _____ PSI/"Hg/"WC		
Verify Logic and Flow For All Solenoid Valves, Including Auto-Oillers	N/A	KW
Run System With Doors Closed and Monitor Ventilation	N/A	KW
Verify Auto Restart Functionality of Whole System (Including VFD)	OK	KW
Check for Water / Compressed Air (Bubble Test) Leaks	OK	KW
SECTION K - PLC FINAL CHECK	OK / NA	INITIALS
Check Hour Meter Variable Memory Locations and Minute Counters	N/A	KW
Force Datalogging	N/A	KW
Update PLC Program Revision(and Operator Interface if Applicable)	OK	KW
Final Program Revision # : v. 2.0		
SECTION L - TELEMETRY	OK/ NA	INITIALS
Select Communication Type: _____		
Confirm Remote Access, Record Method _____	N/A	KW
Check Modem Auto-Reboot Feature	N/A	KW
Test System Operation Using Offsite Package, Review Datalog Files	N/A	KW
Test System Email Out	N/A	KW
Configure Autodialer (Set Sensaphone Passwords to "2000" and "s2000")	N/A	KW
Test Autodialer Alarm Dial-out and Report	N/A	KW
SECTION M - FINAL SYSTEM TESTING / AS BUILT	OK/ NA	INITIALS
Record Max Noise Level _____ dBA @ _____ ft.	N/A	KW
Record Motor Voltages, Currents and Operating Conditions	OK	KW
Add Flow Charts, Piping Labels (Hot**, Directional), Oxygen / Ozone Generator Labels	OK	KW
Pump Water Out Of System	OK	KW
Turn Off All Breakers and HOA Switches	OK	KW
Take System Pictures	OK	KW
Email Project Manager and Production Staff	OK	KW
Update System Approval Data Plates, Fuse Schedule and Startup Procedure	OK	KW
Ensure appropriate approval labels are obtained (GP, Haz). Rentals require US and CAN.	OK	KW
Attach System Approval Stickers, Fuse Schedule and Startup Procedure	OK	KW
Take Panel Pictures and Transfer All Pictures to Project Folder	OK	KW
Check Off "Testing" as Being Complete in APES	N/A	KW
Make Changes to the IO and Alarms Tables Are Captured in the Markups	OK	KW
Update Project Software Folder	OK	KW
Copy Completed Test Sheets to Electrical As-Built's Directory with DWG Files and Bill of Materials		
Check Off "As-Built's" Box in APES		
** Hot Labels to be Applied to Any Piping >= 140 DegF as Determined by IR Readings		

MECHANICAL TEST RECORD									
Device Name: P-4901					Manufacturer: GOULDS				
Device Model #: 4SH2K52COW					Device Serial #: F1200054				
Motor Manufacturer: WEG					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #: JM007402					Motor Serial #: 1014500858				
HP: 7.50		Voltage: 208		Frame: 184JM		RPM: 3480			
Phase: 3		Current: 20.70		SF: 1.15		ENCL: TEFC			
Factory Test:					Field Test:				
L1	L2	L3		L1	L2	L3			
20.9	20.6	21.4	Amps						
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1			
213	213	213	Vac						

Device Name: P-4001					Manufacturer: GOULDS				
Device Model #: WS15112BHF					Device Serial #: RC-061				
Motor Manufacturer: GOULDS					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP: 1.50		Voltage: 230		Frame:		RPM: 3450			
Phase:		Current: 18.00		SF:		ENCL:			
Factory Test:					Field Test:				
L1	L2	L3		L1	L2	L3			
17.1			Amps						
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1			
213			Vac						

Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL:			
Factory Test:					Field Test:				
L1	L2	L3		L1	L2	L3			
			Amps						
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1			
			Vac						

Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL:			
Factory Test:					Field Test:				
L1	L2	L3		L1	L2	L3			
			Amps						
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1			
			Vac						

MECHANICAL TEST RECORD									
Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL.:			
Factory Test:					Field Test:				
L1	L2	L3			L1	L2	L3		
			Amps					Amps	
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1		
			Vac					Vac	

Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL.:			
Factory Test:					Field Test:				
L1	L2	L3			L1	L2	L3		
			Amps					Amps	
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1		
			Vac					Vac	

Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL.:			
Factory Test:					Field Test:				
L1	L2	L3			L1	L2	L3		
			Amps					Amps	
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1		
			Vac					Vac	

Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL.:			
Factory Test:					Field Test:				
L1	L2	L3			L1	L2	L3		
			Amps					Amps	
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1		
			Vac					Vac	

MECHANICAL TEST RECORD									
Device Name:					Manufacturer:				
Device Model #:					Device Serial #:				
Motor Manufacturer:					Area Classification Tag Checked: <input type="checkbox"/>				
Motor Model #:					Motor Serial #:				
HP:		Voltage:		Frame:		RPM:			
Phase:		Current:		SF:		ENCL.:			
Factory Test:					Field Test:				
L1	L2	L3			L1	L2	L3		
			Amps					Amps	
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1		

Vac	Vac
-----	-----

Device Name:				Manufacturer:			
Device Model #:				Device Serial #:			
Motor Manufacturer:				Area Classification Tag Checked: <input type="checkbox"/>			
Motor Model #:				Motor Serial #:			
HP:		Voltage:		Frame:		RPM:	
Phase:		Current:		SF:		ENCL.:	
Factory Test:				Field Test:			
L1	L2	L3		L1	L2	L3	
			Amps				Amps
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1	
			Vac				Vac

Device Name:				Manufacturer:			
Device Model #:				Device Serial #:			
Motor Manufacturer:				Area Classification Tag Checked: <input type="checkbox"/>			
Motor Model #:				Motor Serial #:			
HP:		Voltage:		Frame:		RPM:	
Phase:		Current:		SF:		ENCL.:	
Factory Test:				Field Test:			
L1	L2	L3		L1	L2	L3	
			Amps				Amps
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1	
			Vac				Vac

Device Name:				Manufacturer:			
Device Model #:				Device Serial #:			
Motor Manufacturer:				Area Classification Tag Checked: <input type="checkbox"/>			
Motor Model #:				Motor Serial #:			
HP:		Voltage:		Frame:		RPM:	
Phase:		Current:		SF:		ENCL.:	
Factory Test:				Field Test:			
L1	L2	L3		L1	L2	L3	
			Amps				Amps
L1/L2	L2/L3	L3/L1		L1/L2	L2/L3	L3/L1	
			Vac				Vac



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Pre-commissioning Checklist

Please return copy of completed form to newterra prior to startup Project number and name:

The purpose of this report is that the customer is prepared for startup.

Please send us the completed Pre-Commissioning Checklist 5 days prior to our site visit.

Return to Shane Henderson at shenderson@newterra.com or Fax 613-345-7633

Checked by: _____

Date: _____

Checklist	Ck
Verify site power is correctly installed to the control panel and necessary electrical approvals have been completed.	
Verify that all input wiring is completed and wired into the control panel according to the installation guide.	
Verify that all power wiring is completed and wired into the control panel according to the installation guide.	
Verify that Compressed air will be connected to system (if required).	
Verify that Fresh Water supply is installed to system (if required).	
Verify that all process piping will be installed and completed.	
Verify that the required approvals are in place to allow the system to discharge air and water as designed.	
Verify that system has been installed on a level pad.	
Verify that all field piping will be completed and wells will be connected to the operating system.	
Verify that phone line is installed and activated if required.	
Additional Checklist Items related to Oxidizers	
Verify that all necessary wiring is completed between the oxidizer and the main control system.	
Verify that all piping between oxidizer and treatment system is completed.	
Verify that Power is connected to oxidizer and necessary electrical approvals have been completed.	
Verify that the required approvals are in place to allow the oxidizer to discharge air to the atmosphere.	
Verify that Gas is connected to the oxidizer and activated to allow for testing of the oxidizer. Note: Please ensure that the gas supply valves are not locked out by the local gas installer at time of commissioning.	
If local gas approval is required for oxidizer, ensure that this is completed or planned to occur during the commissioning.	

*****All Tasks will be completed No Later Than 5 Business days prior to newterra Technicians arrival onsite.**

Please note if newterra arrives onsite and items have not been completed there will be a charge associated.

Site Address: _____

Onsite Contact Name & Number: _____

Customer Sign-off _____

Date _____



System Field Test Checklist

This purpose of this report is to test the functionality of electrical, control, and mechanical components to ensure the system operates as originally designed. This testing is then documented so it can be referenced at a later date if needed.

The following field test records must be completed by the startup technician on site before operating the process system. This is the last quality check ensuring the process equipment is ready for continuous operation.

newterra™ highly recommends that the system is started by a newterra factory trained startup technician to ensure the long term success of your project. We understand that this may not always be feasible in which case we would require a highly skilled technician capable of troubleshooting both mechanical and electrical aspects of a process treatment system and be familiar with our manual, equipment and capable of training the operator on operating and maintenance requirements of the treatment system.

This checklist must be sent back to Product Support department at newterra to validate your equipment warranty which begins on the date of shipment from the factory. It can be sent back in one of the following methods:

Email: service@newterra.com

Fax: Att: Product Support
(613) 345 7633

If you choose to fax the document then, please follow up with an email explaining that a fax was sent so we can ensure that we received the fax and properly validated the equipment warranty.

Project number: _____

Project name: _____

Tested By: _____

Company: _____

Date Tested: _____



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System Field Test Checklist

Minimum Tools Required:

Clamp style amp meter	Socket Set
Multi meter for AC/DC Volts and ma signals	Wire Cutters
Instrumentation Screw Driver	Wire Strippers
Screw Driver Set	Channel Locks
Wrench Set	Pipe Wrenches
Straight Edge for Aligning couplings and belts	

Testing Checklist	Ck	Initial	Date
Verify site power per system design criteria			
Verify building process flow and instrumentation matches P +ID drawing, check off drawing components against actual (preferably with the customer present)			
Ensure all unions are tight, as some are loosened to prevent stress in shipping.			
Walk through system and open all valves that are required to run the system in automatic			
Check panel for loose wiring			
Tighten all terminals where wires are terminated			
Check alignment of motors			
Check field wiring and piping as per drawings			
Check all motor belt tensions			
Turn power on. Measure site voltage. L1/L2 _____ L2/L3 _____ L3/L1 _____ L1/GRD _____ L2/GRD _____ L3/GRD _____			
Test that incoming power has correct phase sequence. Bump a safe 3 phase motor to test rotation.			
Check voltage on AC step down transformer			
Check voltage on DC transformer			
Check rotation of all motors that were field wired.			
Check that PLC Run light is on and the stop/term/run switch is in term			
Manually test inputs as per input table			



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System Field Test Checklist

Check connections of all field wiring to ensure it was completed per the electrical drawings and per the NEC.			
Manually test control logic for each output			
Manually test all shut down alarms			
Manually test that non-critical alarms do not shut down SVE			
Run through complete logic and alarm sequence with customer and make allowable changes.			
Note name of individual and company with whom logic was reviewed:			
Check overload settings for all motors			
Check/Install filter bag in bag filters			
Test analogue inputs			
Run system in full automatic			
Fill out mechanical test record on each motor and check amperage and voltage. Document amperage on the System test records in the operating manual in the Field test load section.			
Wet test all control inputs and outputs			
Wet test all shut down alarms			
Check systems for leaks (liquid and vapor)			
Test position of ball float switches for proper start/stop level			
Test vacuum and pressure relief valve			
Test air stripper and discharge pump operating sequence			
Check flow rate on all pulse meters such that digital and analogue reading increment at the same rate			
Test operation of building exhaust fan			
Test operation of building heater			
Install louver hoods on system			
Test remote access			



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System Field Test Checklist

Test operation of Auto dialer and program if necessary.			
Note newterra modem offsite web address			
Check flow rate discharging from VLS, should maximize flow to prevent a high level shutdown. If you have a centrifugal pump ensure flow rate is low enough to prevent cavitation on the inlet under vacuum.			
Check the skimmer on the oil water separator should be ½" above water level when water is flowing at full speed. Adjust if necessary.			
If Kaeser Compressor Present – Confirm warranty validation has been completed and submitted to Kaeser for warranty			
Check water flow rate into stripper, should be set to minimum flow to keep up with incoming water to maximize contact time in the air stripper. Adjust flow rate if necessary.			
Check flow rate exiting the air stripper, if there is no carbon filters down stream then allow pump to discharge at maximum flow rate. If carbon vessels are installed, then set pump flow rate to the designed system flow rate			



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System Field Test Checklist

Customer Training Checklist			
Review the operating manual with the customer explaining the various components of the manual and sources of information.			
Review the startup and shutdown procedure with operator.			
Review operation of treatment system and describe the maintenance required for each piece of equipment.			
Describe operation of panel and panel components.			
Train customer to troubleshoot alarms based on input conditions to the PLC or relays in the panel.			
Discuss the operating logic with the customer so they understand how the system is configured to work.			



System Field Test Checklist

Operating Data and Records

The following table is a guideline to document the operating conditions of the system when running in automatic mode. The startup technician should document the operating conditions at all the locations in the system. This information can be used at a later date to troubleshoot problems that can arise.

Location of Record Description	Recorded Value
Air Vacuum readings:	
Air Pressure Readings	
Water Pressure Readings	
Water Flow Rates	
Air Flow Rates	
Operating Temperatures:	



System Field Test Checklist

Site Contractor Information: It is important that we capture the site contractor's information who was involved in the mechanical and electrical installation of equipment on site. We may be required to contact these companies during the project life to provide services at a later date.

Electrical Contractor:

Mechanical Contractor:

Company Name: _____

Company Name: _____

Contact: _____

Contact: _____

Phone Number: _____

Phone Number: _____

Quality Issues Identified during startup: The intension in this section is to list any problems, deficiencies or quality issues that were identified during startup. If the problem was solved during startup, please indicate. If MLE is required to follow up then please indicate.

Issue 1: Identified:

Check box that applies: newterra Follow up Required ☐ Sorted out on Startup ☐

Issue 2: Identified:

Check box that applies: newterra Follow up Required ☐ Sorted out on Startup ☐

Issue 3: Identified:

Check box that applies: newterra Follow up Required ☐ Sorted out on Startup ☐



System Field Test Checklist

Customer Feedback: newterra is committed to the success of our customers'. Please take a moment and provide any suggestions you may have for our quality and product support teams. We appreciate your comments and look forward to working with you again in the near future.

Please list one item you like about the system you have received:

Please indicate if there are items we could improve upon:



System Field Test Checklist

MECHANICAL TEST RECORD										
Device Name:					Manufacturer:					
Device Model #:					Device Serial #:					
Motor Manufacturer:					Motor Serial #:					
Motor Model #:			HP:		Voltage:		Frame:		RPM:	
Phase:			Current:		SF:		ENCL.:			
Factory Test:					Field Test:					
L1	L2	L3			L1	L2	L3			
			Amps					Amps		
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		
Device Name:					Manufacturer:					
Device Model #:					Device Serial #:					
Motor Manufacturer:					Motor Serial #:					
Motor Model #:			HP:		Voltage:		Frame:		RPM:	
Phase:			Current:		SF:		ENCL.:			
Factory Test:					Field Test:					
L1	L2	L3			L1	L2	L3			
			Amps					Amps		
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		
Device Name:					Manufacturer:					
Device Model #:					Device Serial #:					
Motor Manufacturer:					Motor Serial #:					
Motor Model #:			HP:		Voltage:		Frame:		RPM:	
Phase:			Current:		SF:		ENCL.:			
Factory Test:					Field Test:					
L1	L2	L3			L1	L2	L3			
			Amps					Amps		
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		
Device Name:					Manufacturer:					
Device Model #:					Device Serial #:					
Motor Manufacturer:					Motor Serial #:					
Motor Model #:			HP:		Voltage:		Frame:		RPM:	
Phase:			Current:		SF:		ENCL.:			
Factory Test:					Field Test:					
L1	L2	L3			L1	L2	L3			
			Amps					Amps		
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		



System Field Test Checklist

MECHANICAL TEST RECORD											
Device Name:						Manufacturer:					
Device Model #:						Device Serial #:					
Motor Manufacturer:						Motor Serial #:					
Motor Model #:			HP:			Voltage:			Frame:		
Phase:			Current:			SF:			RPM:		
									ENCL.:		
Factory Test:						Field Test:					
L1	L2	L3				L1	L2	L3			
			Amps						Amps		
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1			
			Vac						Vac		
Device Name:						Manufacturer:					
Device Model #:						Device Serial #:					
Motor Manufacturer:						Motor Serial #:					
Motor Model #:			HP:			Voltage:			Frame:		
Phase:			Current:			SF:			RPM:		
									ENCL.:		
Factory Test:						Field Test:					
L1	L2	L3				L1	L2	L3			
			Amps						Amps		
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1			
			Vac						Vac		
Device Name:						Manufacturer:					
Device Model #:						Device Serial #:					
Motor Manufacturer:						Motor Serial #:					
Motor Model #:			HP:			Voltage:			Frame:		
Phase:			Current:			SF:			RPM:		
									ENCL.:		
Factory Test:						Field Test:					
L1	L2	L3				L1	L2	L3			
			Amps						Amps		
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1			
			Vac						Vac		
Device Name:						Manufacturer:					
Device Model #:						Device Serial #:					
Motor Manufacturer:						Motor Serial #:					
Motor Model #:			HP:			Voltage:			Frame:		
Phase:			Current:			SF:			RPM:		
									ENCL.:		
Factory Test:						Field Test:					
L1	L2	L3				L1	L2	L3			
			Amps						Amps		
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1			
			Vac						Vac		

Project Packing List

PMProjNum 102140

SOLD - USED RTS151 - Baffinland 150GPM W

PM_ShippingNotes:

Tag	Part Number	Part Description	Req	PO #	EngMemo
			Rec	Line	
2	18661	Hose, Assembly, J300, 3"	2	-	
Inlet & Outl	ea	Green Hose	0		
	Type: G	-3" x 50' Hose assembly with camlocks		0	
2	10541	Camlock Fitting, Aluminum, 3", Part "F"	4		Male Camlocks
Inlet & Outl	ea	Male Adapter x Male Thread Cam Lock Fitting	4		
	Type: F	-	102140-003	2	
2	M1108	Switch, Level, Mech Float, Wide Angle, N.O.,	1	---	
LSH-4001	ea	Tilt Float Level Switch 90deg, w 40' cable	1		
	Type: I	13A, SPST, N/O	102140-011	9	
2	17149	Manual, System, Hard Copy	2	---	
Manual	ea		0		
	Type: P	---		0	
2	9999	Misc Part, See Details	1	---	
OVS VEN	ea	As per detailed specification below	0		
	Type: P	2IN. X 4FT. PVC OVS VENT STACK		0	
2	RC061	Pump, Sump, Goulds, 100GPM @ 40'	1	---	
P-4001	month	WS1512BHF, w/ switch	0		
	Type: R	230V 1 Ph, 1-1/2 HP		0	
2	RTS151	WTS, 150 gpm, OWS-24, Carbon, 40' Contair	1	---	
System	month	208/120V, 3ph, C11 Div 2	0		
	Type: R	Max Water 150gpm @ 40psi		0	
5200	M1272	Camlock Fitting, Aluminum, 2", Part "F"	1	---	
5200-Stack	ea	Male Adapter x Male Thread Cam Lock Fitting	0		
	Type: F	---		0	
5200	M1137	Drum, Black, Steel, 45 gal, 2 hole lid, bottom 2	1	-	
PST-5201	ea	including palletization	1		
	Type: I	-	102140-011	4	
5200	9999	Misc Part, See Details	1	---	
PST-5201	ea	As per detailed specification below	0		
	Type: P	2IN X 5 FT. TANK TRUCK HOSE ASSEMBLY WITH CAMLOCK, TYPE C AND TYPE F		0	
5200	9999	Misc Part, See Details	1	---	
PST-5201	ea	As per detailed specification below	0		
	Type: P	2IN X 4FT. PVC PST VENT STACK		0	

Tag	Part Number	Part Description	Req	PO #	EngMemo
			Rec	Line	
7900	10908	Lock, Passage, 107188, Taymor	2	---	
7900	ea	107188	0		
	Type: 1	---		0	
7900	10909	Lock, Deadbolt, 289648, Taymor, 1 cyl, S/S	2	---	
7900	ea	keyed alike #289648	0		
	Type: 1	---		0	
7900	24662	Hood, Fan, 27" - on use up	2	---	
F-7901	ea	Fits 24" Fan	2		
	Type: 1	---	102140-011	6	
7900	23989	Hood, 15"	2	---	
F-7902	ea	Fits 12" Fan & Louver	2		
	Type: 1	---	102140-011	5	

Project Packing List

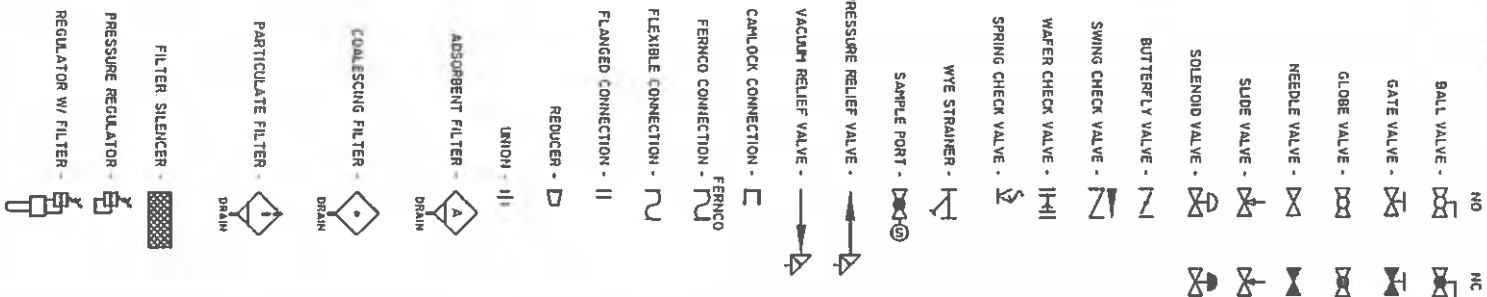
PMProjNum 102140A

Baffinland 20' Container for Loose Components

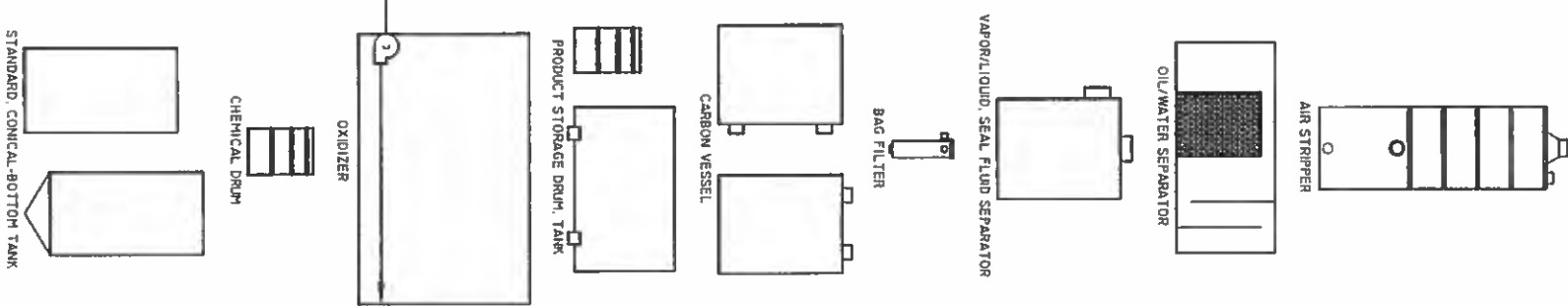
PM_ShippingNotes:

Tag	Part Number	Part Description	Req	PO #	EngMemo
			Rec	Line	
I	11686	Filter, Bag, FOS P2P, 7" x 32"	120	---	
EXTRA	ea	Oil Absorbing Bags, Sub-micron, Plastic Ring	0		
	Type: P	Box Quantity, 20 per box		0	
I	25263-T	Melt-Blown Spaghetti Media	15	---	
EXTRA	ea	Filter Bag Insert, Oil-Absorbing, Polypropylene	0		
	Type: I	25 lbs/bag		0	
I	11214	Media, Clay, TM100	5000	---	
EXTRA	lb	(stocked and ordered in lbs)	0		
	Type: I			0	
I	20220	Media, Carbon, Liquid, Virgin, 8 x 30 Coconut	6000	---	
EXTRA	lb	Sold in 1100 lb (500 Kg) sacks per pound	0		
	Type: I			0	
I	9999	Misc Part, See Details	2	---	
EXTRA	ea	As per detailed specification below	0		
	Type: P	O-ringsm 4155-1490-B (V6427)		0	
I	21891	Gasket, Flange, Tetrasolv AF Series	6	---	
EXTRA	ea	18" Hatch Gasket	0		
	Type: P	Fits, AF250, AF500, AF1000, AF2000, AF3000		0	
I	22353	Pump, Part, SSH, Mechanical Seal Kit	2	---	
EXTRA	ea	P/N: RPKSSHS	0		
	Type: P			0	
I	21605-T	Media, Coal, Anthracite, .9 to .95mm	20	---	
EXTRA	lb	52 lbs/bag; sold in lbs.	0		
	Type: I			0	
I	11610	Container, 8' x 20' x 8'6"	1	---	
EXTRA PA	ea	5-8 yr	0		
	Type: P			0	

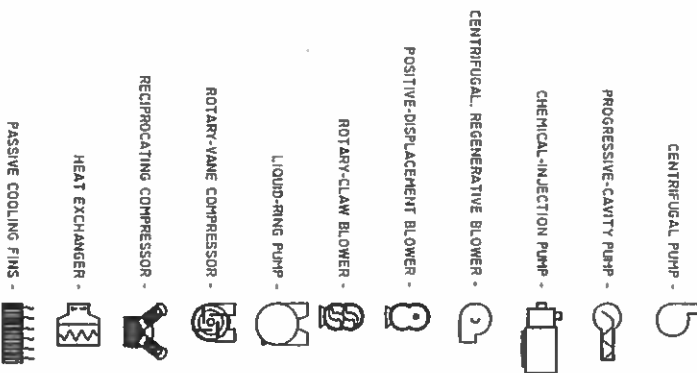
VALVES AND PIPING



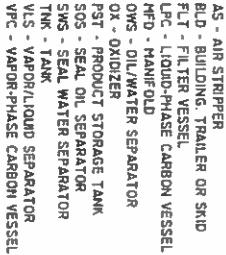
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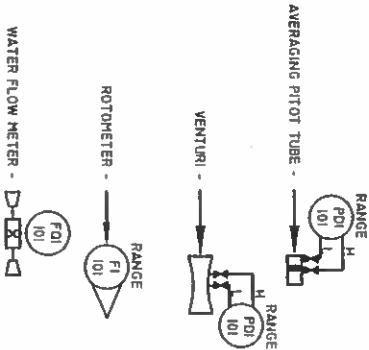
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EQUIPMENT



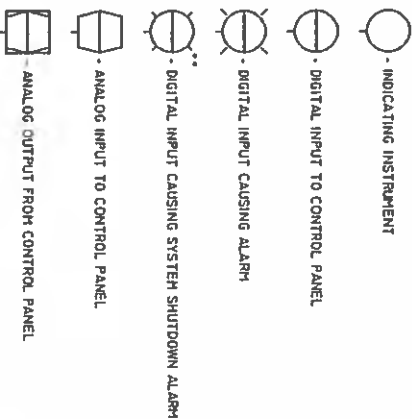
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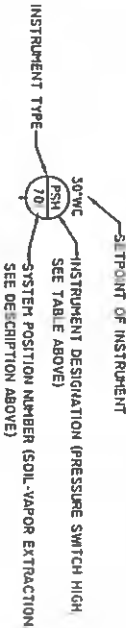
INSTRUMENT DESIGNATION

INPUT		1ST MODIFIER	2ND MODIFIER	3RD MODIFIER	OUTPUT		1ST MODIFIER
A			ALARM				A
B	CYCLE						B
C		DIFFERENTIAL					C
D							D
E	FLOW						E
F			GAUGE				F
G	GAS (LEL)			HIGH			G
H					HAND		H
I	CURRENT		INDICATOR				I
J							J
K							K
L	LEVEL			LOW			L
M					MOTORIZED		M
N							N
O	PRESSURE						O
P		QUANTITY			PNEUMATIC	PUMP	P
Q							Q
R	SPEED		SWITCH				R
S			TRANSMITTER		SOLENOID		S
T	TEMPERATURE						T
U							U
V						VALVE	V
W							W
X							X
Y							Y
Z	POSITION						Z

INSTRUMENT IDENTIFICATION



EXAMPLE



SYSTEM POSITION DESIGNATION

- 100 - VACUUM INLET MANFOLD
- 300 - INLET HEAT EXCHANGER
- 400 - VAPOR/LIQUID SEPARATOR
- 500 - VAPOR/LIQUID SEPARATOR - 2
- 700 - SOIL VAPOR EXTRACTION
- 1000 - LIQUID-RING PUMP
- 1300 - SVE HEAT EXCHANGER
- 1600 - VAPOR-PHASE CARBON
- 1900 - OXIDIZER
- 2200 - AIR SPARGE
- 2500 - SPARGE HEAT EXCHANGER
- 2800 - SPARGE OUTLET MANIFOLD
- 3100 - AIR COMPRESSOR
- 3400 - COMPRESSED-AIR OUTLET MANIFOLD
- 3700 - PNEUMATIC WELL PUMPS
- 4000 - SUBMERSIBLE WELL PUMPS
- 4300 - SURFACE-MOUNT WELL PUMPS
- 4600 - GROUNDWATER INLET MANIFOLD
- 4900 - OIL/WATER SEPARATOR
- 5200 - PRODUCT STORAGE TANK
- 5500 - INLET TANK
- 5800 - UPSTREAM BAG FILTER
- 6100 - CHEMICAL INJECTION
- 6400 - AIR STRIPPER
- 6700 - PRE-CARBON BAG FILTER
- 7000 - LIQUID-PHASE CARBON
- 7100 - PRE-MEDIA BAG FILTER
- 7200 - ACTIVATED ALUMINA
- 7300 - DISCHARGE TANK
- 7400 - POST-TREATMENT BAG FILTER
- 7600 - REINJECTION
- 7900 - BUILDING TRAILER OR SKID
- 8200 - CONTROL PANEL
- 8500 - ELECTRICAL PARTS
- 9900 - EXTRAS

PIPING DETAILS

- WATER FLOW METERS PROVIDE 10 DIA. OF STRAIGHT PIPE BEFORE AND 5 DIA. OF STRAIGHT PIPE AFTER METERS. ENSURE THAT THROTTLING VALVES ARE NOT DIRECTLY IN LINE WITH METERS.
- AIR FLOW METERS PROVIDE A DIA. OF STRAIGHT PIPE BEFORE AND 3 DIA. OF STRAIGHT PIPE AFTER METERS. IF POSSIBLE, AVOID TEES AND ELBOWS BEFORE AND AFTER METERS.
- MATERIALS OF VALVES AND FITTINGS TO BE THE SAME AS THE DESCRIPTION AT THE LINE. IF THERE IS A TRANSITION FROM PVC TO STEEL, THE VALVE SHOULD BE BRASS.
- THERE ARE NO SPECIAL SPINNING REQUIREMENTS OTHER THAN WHAT IS EXPLAINED ON THE DIAGRAM.
- WHEN PVC HOSE IS SPECIFIED ALWAYS USE VACUUM HOSE. USE GREEN HOSE FOR PRESSURES LESS THAN 60PSI. USE TANK TRUCK HOSE FOR PRESSURES BETWEEN 60PSI AND 150PSI.
- FOR PIPE ONLY BE SUBSTITUTED WITH EQUAL SIZE BUT UNDER WHATEVER A FITTING IS PROVIDED ONLY BE SUBSTITUTED.

DWG. NO.

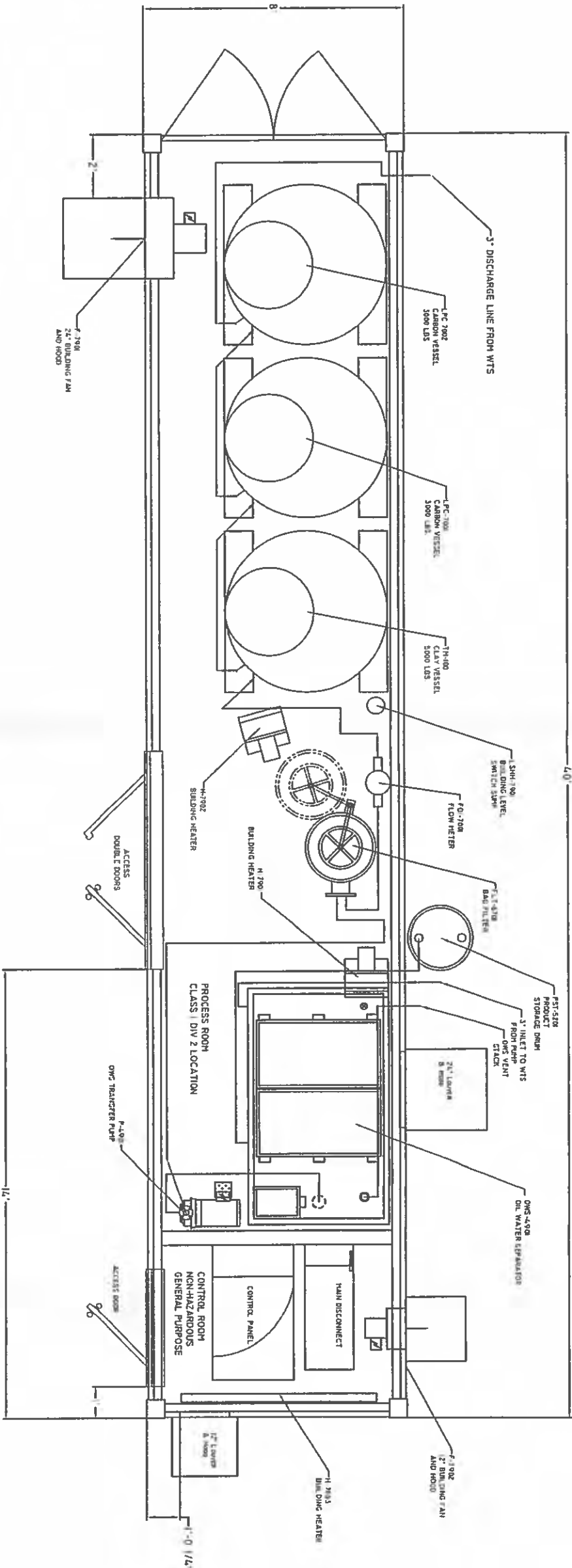
102140-01 (PAGE 2 OF 2)

TITLEPROCESS & INSTRUMENTATION DRWG LEGEND

CUSTOMER: MARY RIVER PROJECT

BAFFINLAND

SCALE BAR, EACH BLOCK IS 12" LONG



PLEASE NOTE, THIS BUILDING IS SHIPPING ON A BOAT AND MUST NOT BE MORE THE 96" IN WIDTH. THIS INCLUDES ALL EQUIPMENT AND CONNECTIONS THAT PROTRUDE THROUGH THE ENCLOSURE.

CIVIL CONSTRUCTION NOTES

- BUILDING TO BE PAINTED WITH APPROX. 16 GAL. 65410 BLUE HEAVY COAT COAT 21520 COAT COLOR TO BE THE SAME AS BUILDING EXTERIOR WALLS
- PROVIDE WOOD UP ANCHORS PERMITTED TO ALLOW EARTH JUNCTION TO TOP
- INSTALL GASKING BETWEEN BUILDING PANS AND INSIDE LAMINATE
- INTERNAL INSULATION ON WALLS AND CEILING
- MAXIMUM WIDTH FOR SHIPPING IS 96" THIS INCLUDES ALL CONNECTIONS THAT PROTRUDE THROUGH THE ENCLOSURE
- INSIDE AND OUTSIDE WALLS (WITH WALLS) AND FLOOR IN THE FLOOR TO CONTAIN WATER SPILLS
- LOCATE COILING THERMOSTAT IN THE HIGHEST LOCATION AT CEILING IS WEL
- LOCATE HEATING THERMOSTAT AT FLOOR LEVEL
- COMMISSIONING NOTES
- INTERNAL HEATING COILS AT 12" MAX. 12" LAMINATE FLOORING IN ALL DIRECTIONS
- LOCAL CODES MAY REQUIRE ALTERNATE SCHEDULING BUILDINGS WELD TO BE SHIPPED ON SITE TO ALLOW OWNER TO OPERATE FULLY PLEASE HAVE SUFFICIENT MATERIAL READY DURING BUILDING INSTALLATION
- FOR BUILDINGS IN COLD WEATHER (WINTER) WHERE THE BUILDING IS EXPOSED, A CARRY MUST BE PROVIDED TO THE SIDE TO PROTECT THE FLOOR FROM FREEZING
- * AND DRAFTS MUST BE TO BE INSTALLED IT CANNOT SHIP WITH WOODS ATTACHED

DIMENSION INFORMATION

DESCRIPTION	DIM (L X W X H)	WEIGHT
60" CONTAINER	8' X 6.2' X 9.5'	22222

FLOW DIRECTION

- ☒ FLOW INTO THE PAGE
- ☒ FLOW OUT OF THE PAGE




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REV.	DATE	BY
E1	2013-08-20	DM
E2	2013-08-07	DM

AS BUILT FOR 102140	PRODUCTION RELEASE FOR 102140	REVISION

DWG NO.	102140 - 02
TITLE	SYSTEM LAYOUT
CUSTOMER	BAFFINLAND MARY RIVER PROJECT
DATE	2013-08-07

1.  MET SYSTEM CLASSIFIED

CMET
SYSTEM
CLASSIFIED

WARNING: INTRINSICALLY SAFE CIRCUIT INSIDE

WARNING : SYSTEM WILL AUTOMATICALLY RESTART AFTER POWER FAILURE

CAUTION: DISCONNECT THE POWER BEFORE OPENING

CMET&US
PANEL


DS201

MAIN
DISCONNECT

200 AMP
125A FUSES

200Y CH
108 FLA

F1	
F2	
F3	
F4	
F5	


 P-4901

P-4001

G

17614

17608

L1755

OFF
HAND AUTO
SW609

OFF
HAND AUTO
SW615



15A GF

WIRE LEGEND

BLACK: POWER
RED: CONTROL
WHITE: NEUTRAL
BL/WH: +24VDC & I.S. (Intrinsically Safe)
YELLOW: 0VDC
INTERLOCKS

NOTES:

MET US CERTIFIED, CONTROL ROOM BUILT TO NEC GENERAL PURPOSE STANDARDS, PROCESS ROOM BUILT TO NEC CLASS 1 DIV 2 STANDARDS, ALL WIRING COMPLETE AND ALL EQUIPMENT PRE-PIPED, FACTORY TESTED AND MOUNTED IN ENCLOSURE.

REV	DATE(mm/dd/yy)	BY	DESCRIPTION		NAME	DATE(mm/dd/yy)
E	08/14/13	dbeiste	FOR PROJECT 102140			
					DRAWN	JUN18/07
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NAME _____

DATE (mm/dd/yy)

1325 CALIFORNIA AVE

PROJECT: **BTS151 / 150GPM QWS**

DRAWING-NO

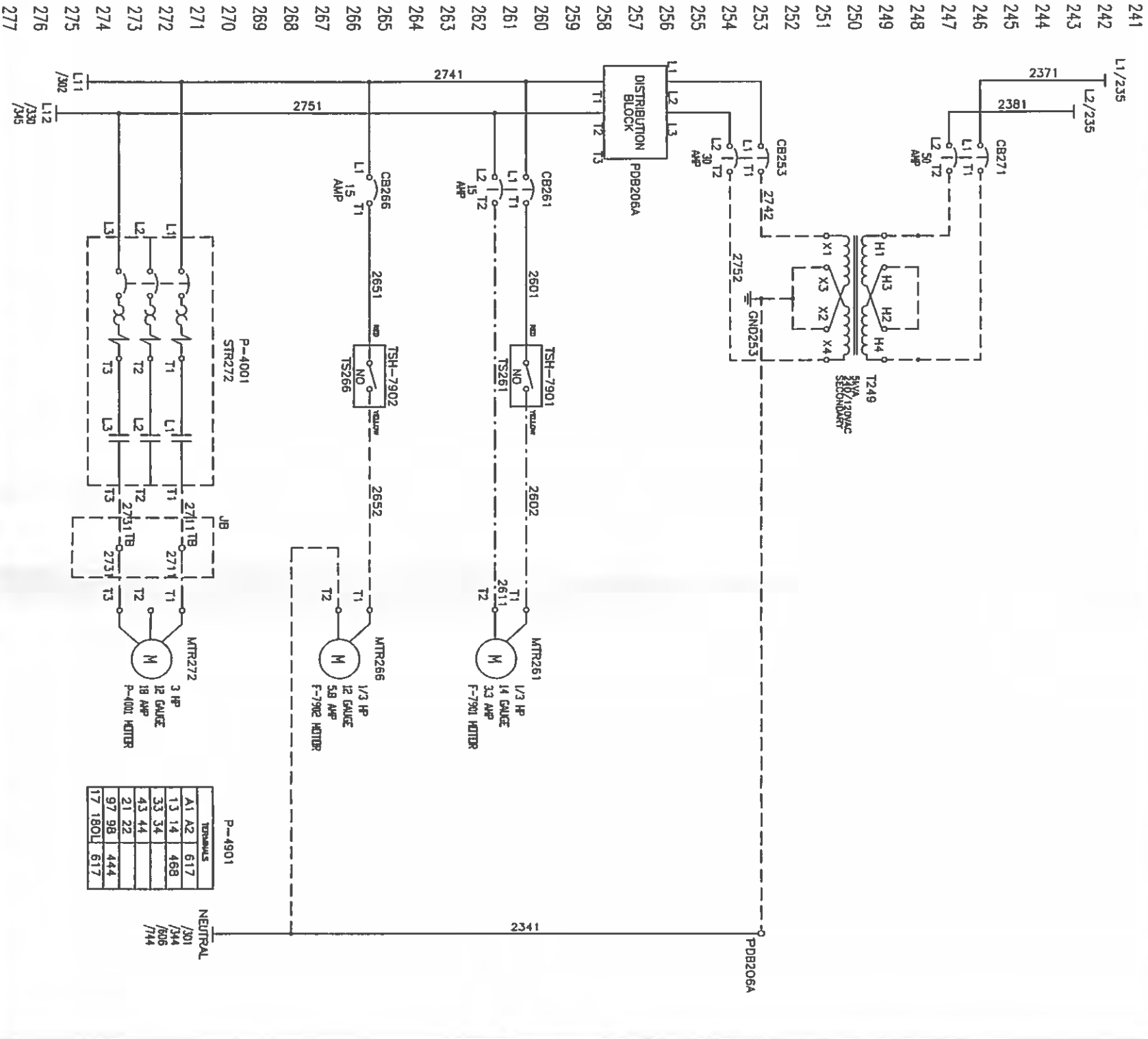
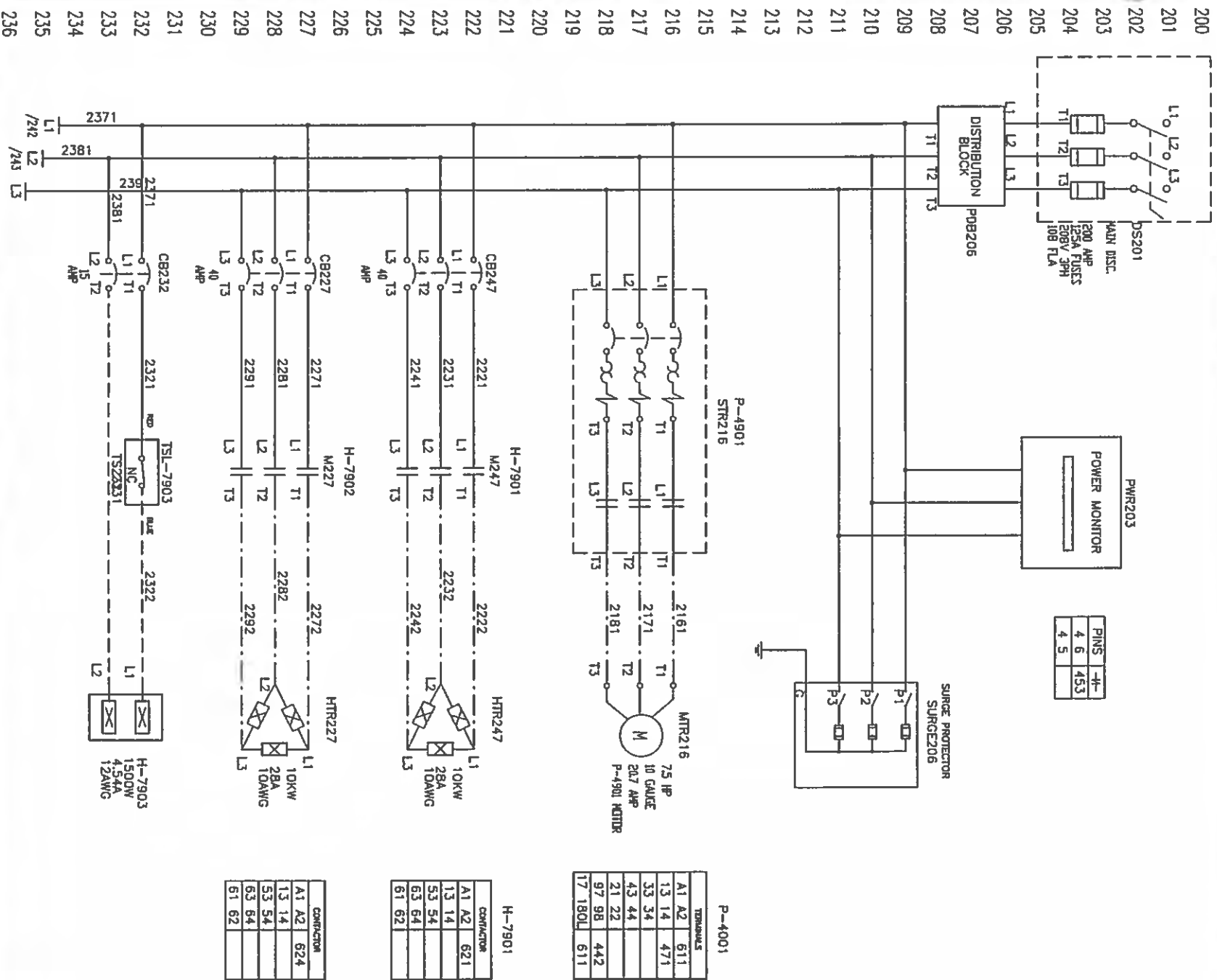


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PROJECT:	RTS151 / 150GPM OWS Baffinland Iron Mines Corp Mary River Project / PM 005
PAGE DESCRIPTION	PANEL VIEW

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JOB-NO: 102140	PAGE: 1 OF 8

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WIRE LEGEND

BLACK: POWER CONTROL
RED: CONTROL
WHITE: NEUTRAL
BLUE: +24VDC & 1.S. (Intrinsically Safe)
BL/WH: OVDG
YELLOW: INTERLOCKS

NOTES:

MET US CERTIFIED, CONTROL ROOM BUILT TO NEG. GENERAL PURPOSE STANDARDS, PROCESS ROOM BUILT TO NEG CLASS 1 DIV 2 STANDARDS, ALL WIRING COMPLETE AND ALL EQUIPMENT PRE-PIPED, FACTORY TESTED AND MOUNTED IN ENCLOSURE.

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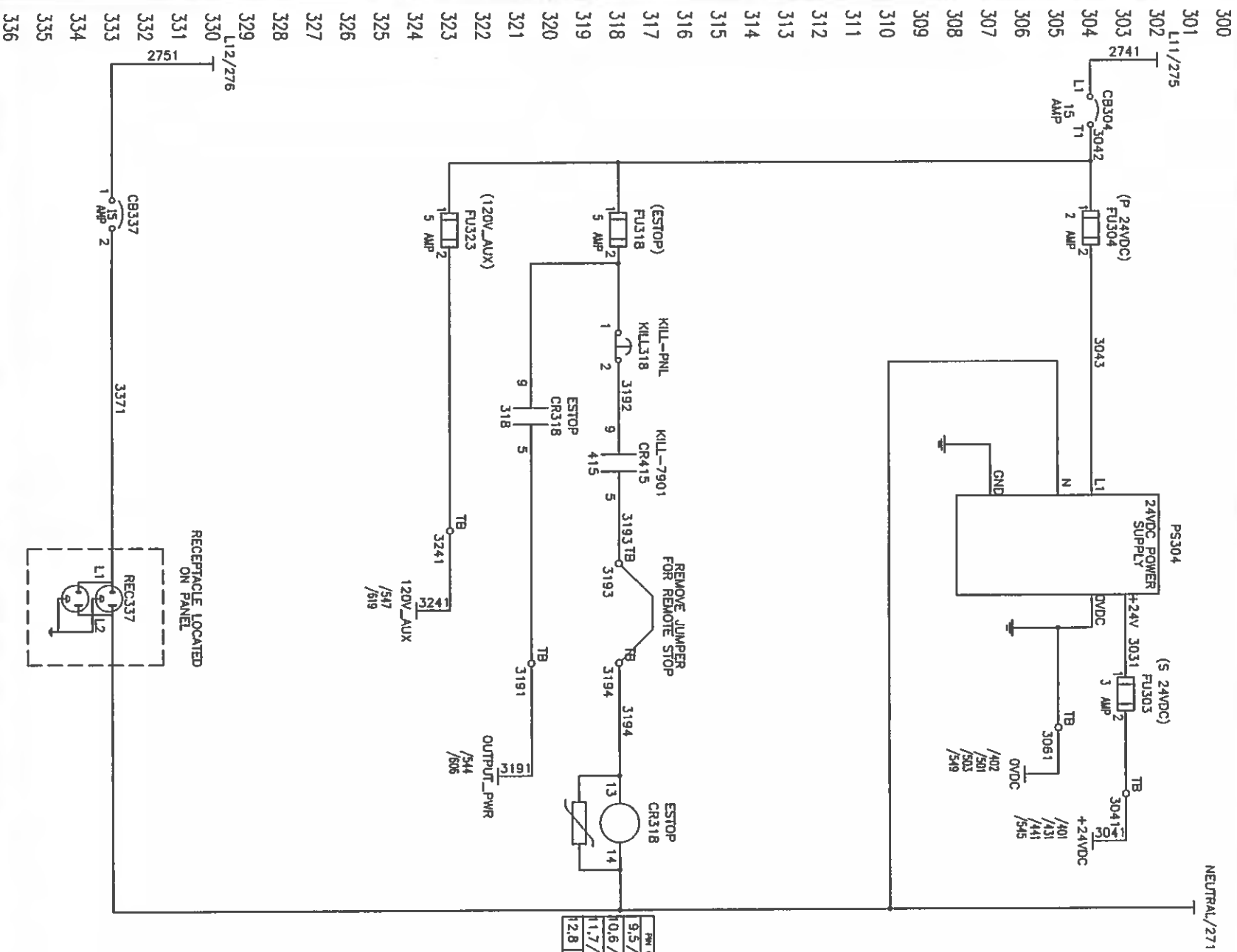
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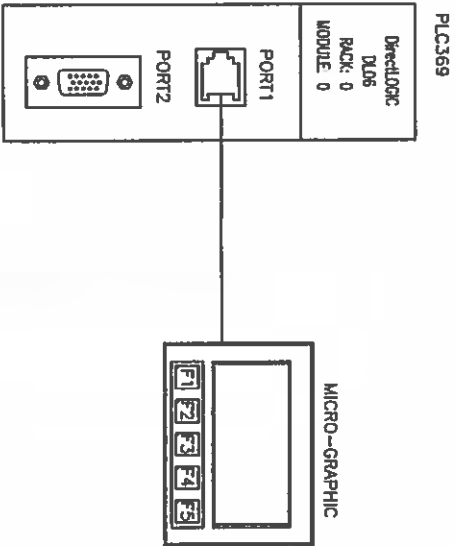
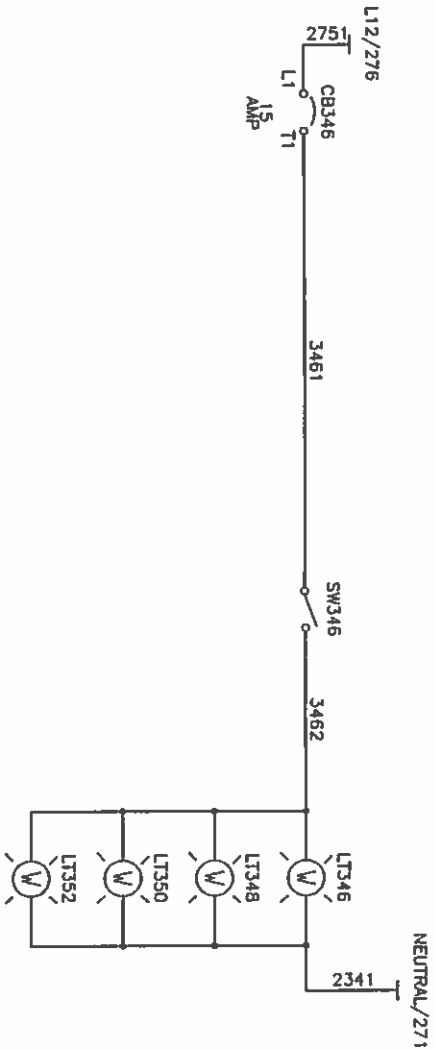
PROJECT: RTS151 / 150GPM OWS Baffinland Iron Mines Corp Mary River Project/ PM 005

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PAGE DESCRIPTION **PAGE:** 2 of 8



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11.7	11.3		
12.8	12.4		



WIRE LEGEND

BLACK: POWER
RED: CONTROL
WHITE: NEUTRAL
BLUE: +24VDC & I.S. (Intrinsically Safe)
BL/WH: 0VDC
YELLOW: INTERLOCKS

NOTES:

MEET US CERTIFIED CONTROL ROOM BUILT TO
NEC GENERAL PURPOSE STANDARDS, PROCESS
ROOM BUILT TO NEC CLASS 1 DIV 2
STANDARDS. ALL WIRING COMPLETE AND ALL
EQUIPMENT PRE-PIPED, FACTORY TESTED AND
MOUNTED IN ENCLOSURE.

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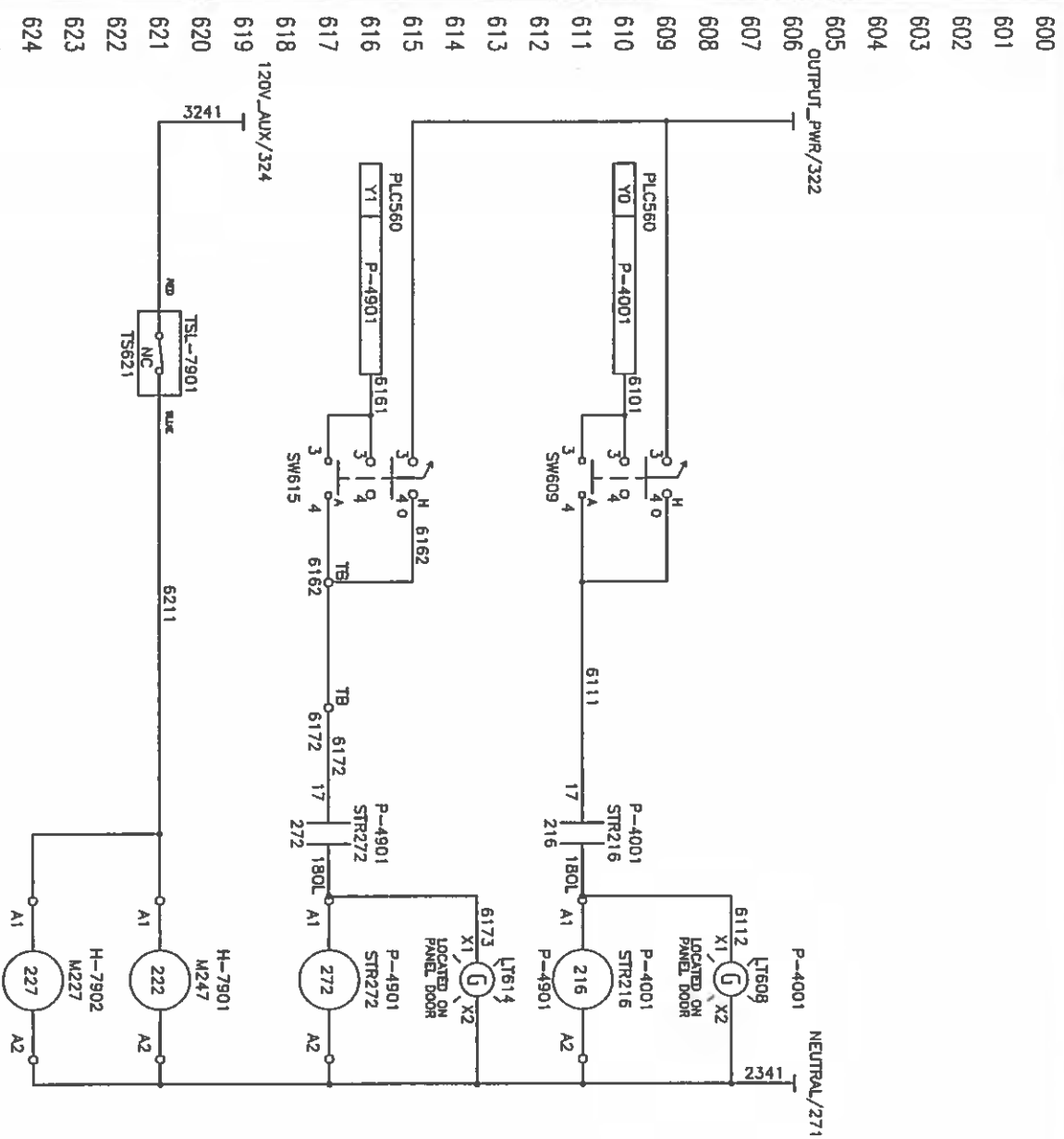



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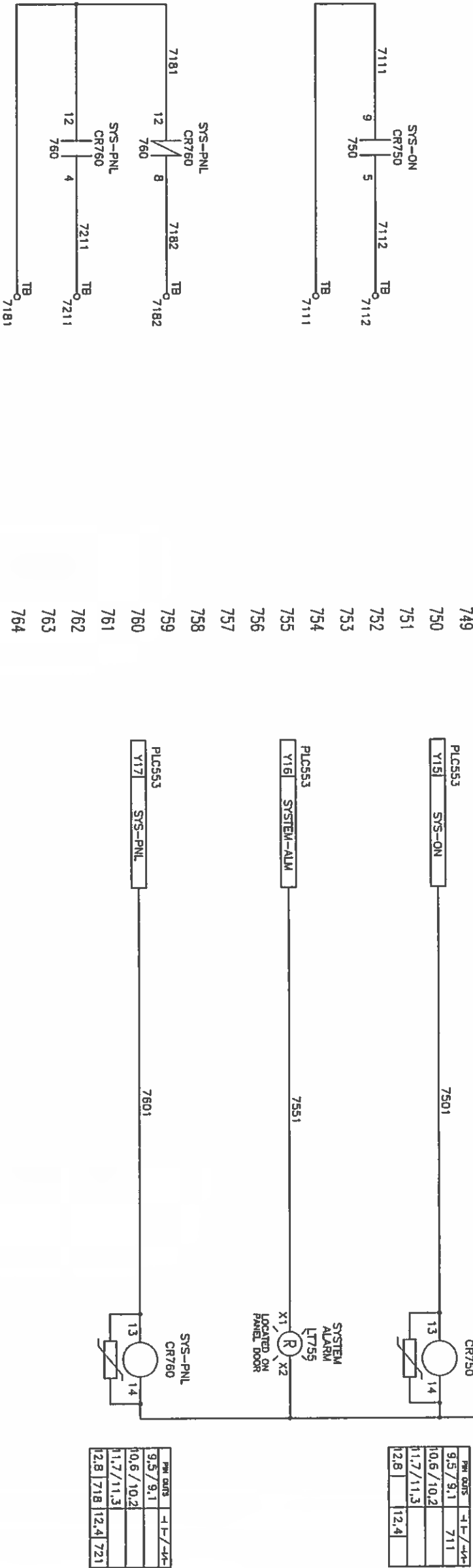
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Mary River Project/ PMOOS

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3 OF 8



BLACK:	POWER	NOTES: MET US CERTIFIED, CONTROL ROOM BUILT TO NEC GENERAL PURPOSE STANDARDS, PROCESS ROOM BUILT TO NEC CLASS 1 DIV 2 STANDARDS, ALL WIRING COMPLETE AND ALL EQUIPMENT PRE-PIPED, FACTORY TESTED AND MOUNTED IN ENCLOSURE.	REV	DATE(mm/dd/yy)	BY	DESCRIPTION		PROJECT: RTS151 / 150GPM OWS Baffinland Iron Mines Corp. Mory River Project/ PM 005	DRAWING-Nº: JOB-Nº: 102140	PAGE: 6 OF 8
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							PR	JUN18/07		
							DRAIN			
							CXD			
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WIRE LEGEND


BLACK: POWER CONTROL
RED: NEUTRAL
WHITE: +24VDC & I.S. (Intrinsically Safe)
BLUE: DVDC
BL/WH: INTERLOCKS
YELLOW: INTERLOCKS

NOTES:

MET US CERTIFIED CONTROL ROOM BUILT TO NEC GENERAL PURPOSE STANDARDS, PROCESS ROOM BUILT TO NEC CLASS 1 DIV 2 STANDARDS, ALL WIRING COMPLETE AND ALL EQUIPMENT PRE-PIPED, FACTORY TESTED AND MOUNTED IN ENCLOSURE.

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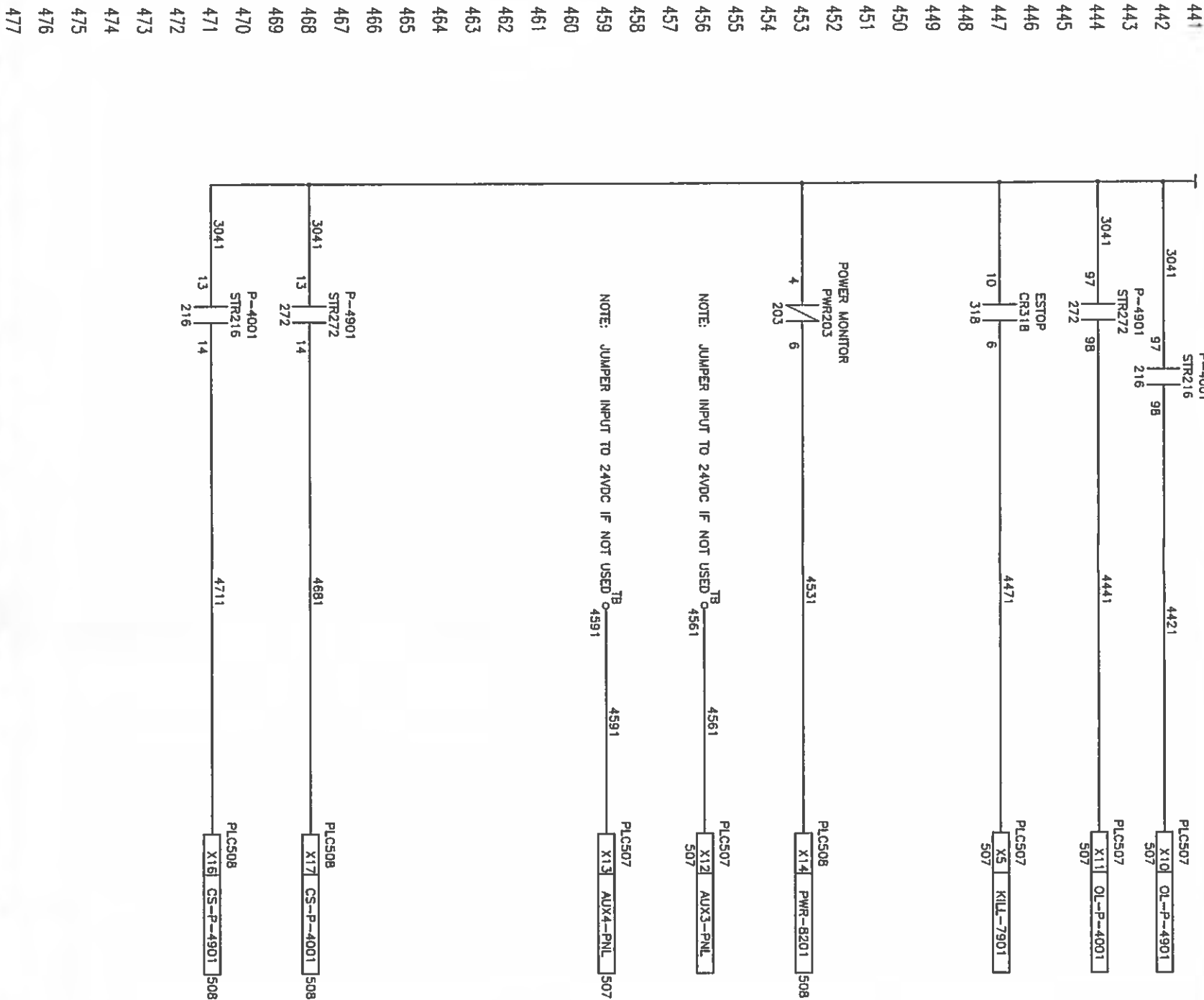
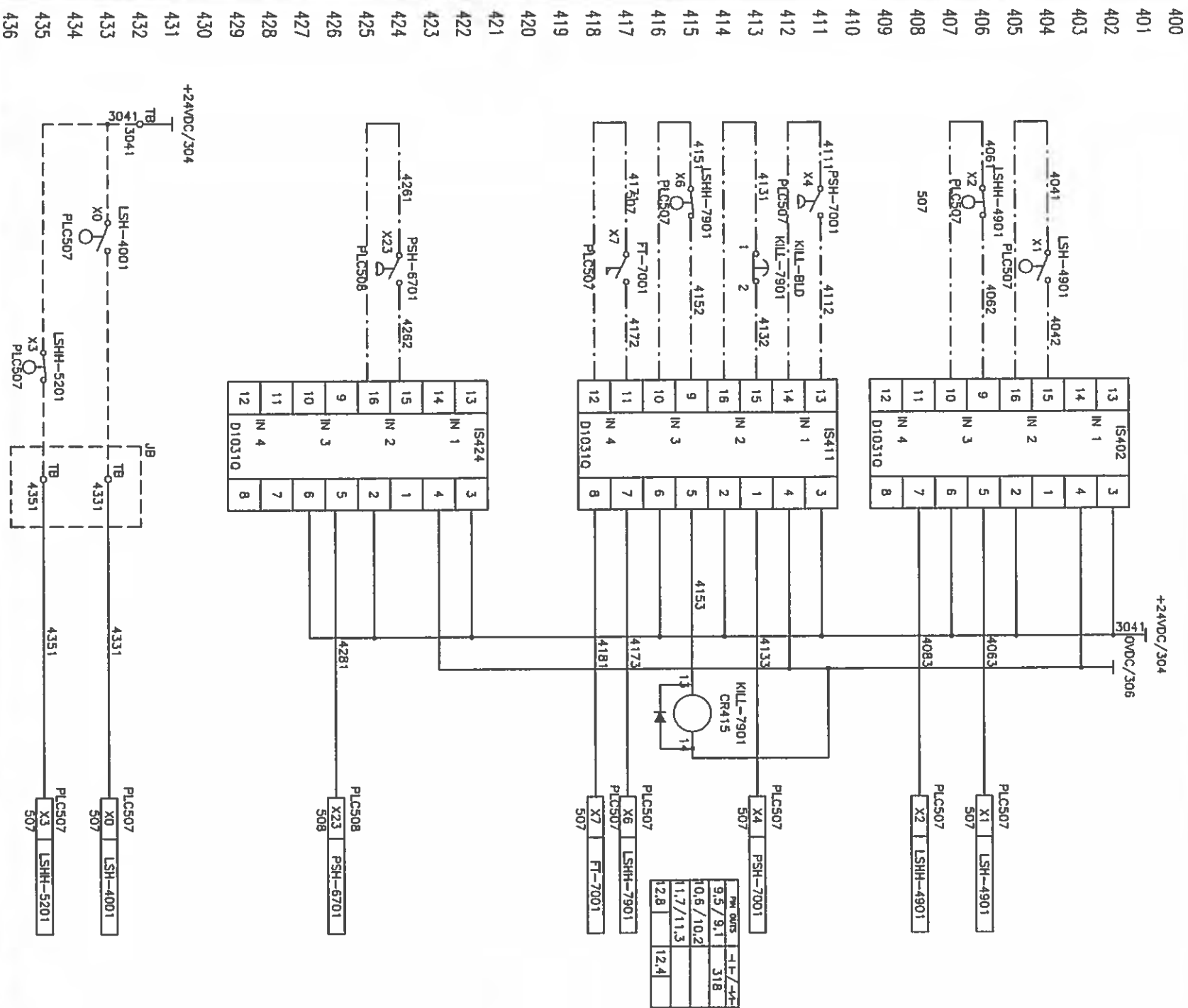
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WIRE LEGEND

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RED: CONTROL
WHITE: NEUTRAL
BLUE: +24VDC & I.S. (Intrinsically Safe)
BL/WH: OVDC
YELLOW: INTERLOCKS

NOTES:

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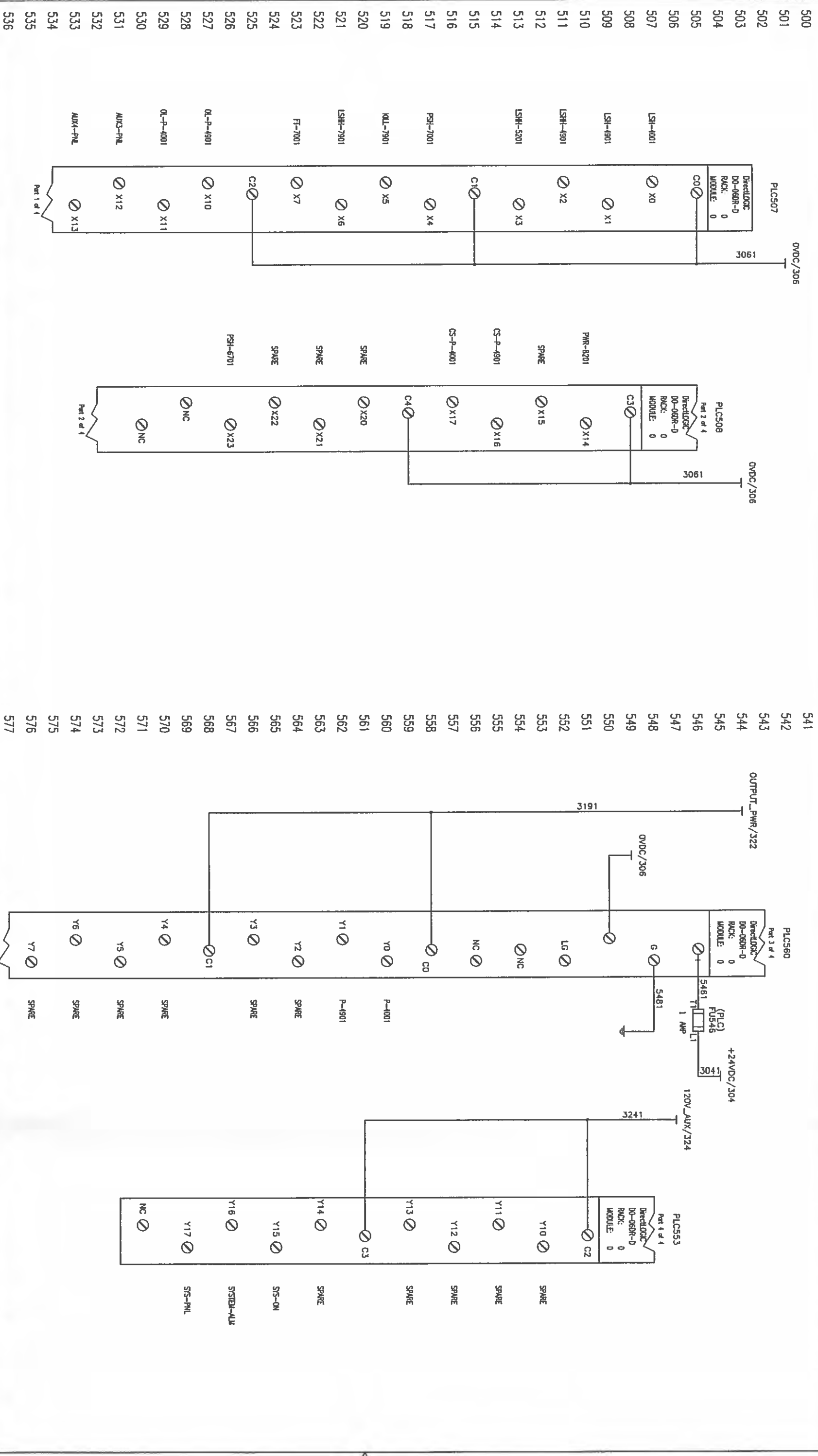
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RED:	CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & 1.S. (Intrinsically Safe)
BL/WH:	DVDC
YELLOW:	INTERLOCKS

WIRE LEGEND

NOTES:

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PLC LAYOUT	5 OF 8		

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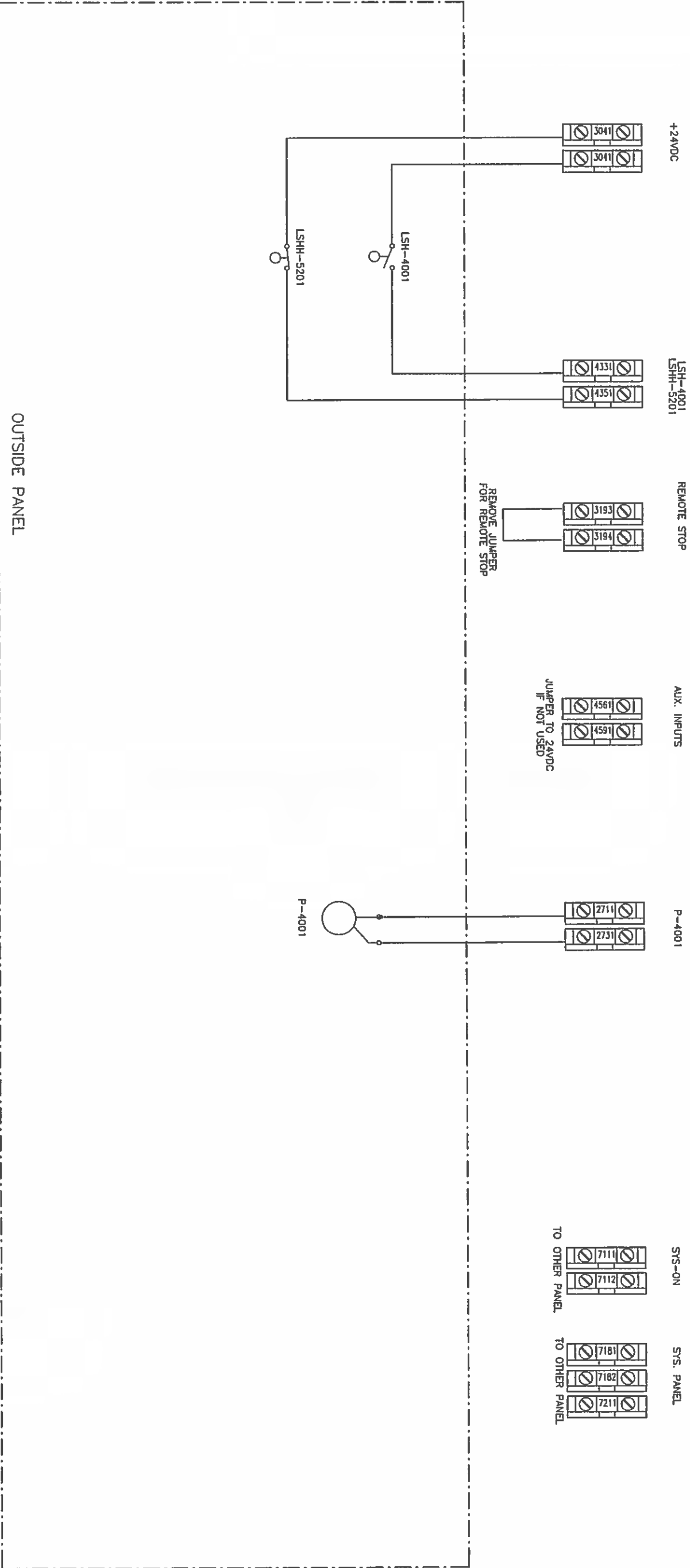


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CANADA
K6V 5Y6
www.newlettco.com


PROJECT:	RTS151 / 150GPM OWS Baffinland Iron Mines Corp Mary River Project/ PM 005
PAGE DESCRIPTION	PLC LAYOUT

DRAWING-NO:	
JOB-NO: 102140	PAGE: 5 OF 8

TERMINAL PLAN



OUTSIDE PANEL

WIRE LEGEND				NOTES:			
BLACK:	POWER	MET US CERTIFIED, CONTROL ROOM BUILT TO NEC GENERAL PURPOSE STANDARDS, PROCESS ROOM BUILT TO NEC CLASS 1 DIV 2 STANDARDS, ALL WIRING COMPLETE AND ALL EQUIPMENT PRE-PIPED, FACTORY TESTED AND MOUNTED IN ENCLOSURE.		REV	DATE(mm/dd/yy)	BY	DESCRIPTION
RED:	CONTROL			E	08/14/13	dbelise	FOR PROJECT 102140
WHITE:	NEUTRAL						
BLUE:	+24VDC & I.S. (Intrinsically Safe)						
BL/WH:	OVDC						
YELLOW:	INTERLOCKS						
				NAME	DATE(mm/dd/yy)		
		DRAWN	PR	JUN18/07			
		CKD					
		APPR					
newterra				1325 CALIFORNIA AVE. BROCKVILLE, ONTARIO CANADA K6V 5Y6 www.newterra.com			
				PROJECT: RTS151 / 150GPM OWS Baffinland Iron Mines Corp Mary River Project/ PM005			
				PAGE DESCRIPTION FIELD WIRING		DRAWING-NO: JOB-NO: 102140	
						PAGE: 8 of 8	

Inputs and Setpoints

Project: RTS151 WTS, 150gpm, OWS-24, Carbon, 4

Input Summary

Digital PLC Inputs: 15
Digital PLC Frequency: 1
Analog(4-20) Inputs: 0
Analog(5V) Inputs: 0
Analog(10V) Inputs: 0

IS Barrier Summary

Analog IS: 0
Digital IS: 9

Legend for Class

ISA : Intrinsically Safe Analog
ISD: Intrinsically Safe Digital
GP: Wire General Purpose
DI: Wire as DI1
D2: Wire as DI12

PLC

Signal

Datalogger(DLO6)

Tag	Name	Type	Class	Input	Value	State	Low	High	Units	SQRT	Fctr	Offsite	Col	Note	Main	Monthly (Daily for 30 days)
-----	------	------	-------	-------	-------	-------	-----	------	-------	------	------	---------	-----	------	------	-----------------------------

Digital_PLC

4000 Submersible Pump																
LSH-4001	Level Switch HI Well Pump 4001	Digital_PLC	ISD	X000		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
CS-P-4001	P-4001 Status	Digital_PLC	GP	X017		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
4900 Oil/Water Separator																
LSH-4901	Level Switch High - Oil Water Separato	Digital_PLC	ISD	X001		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
LSHH-4901	Level Switch High High - Oil Water Sep	Digital_PLC	ISD	X002		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
CS-P-4901	P-4901 Status	Digital_PLC	GP	X016		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
5200 Product Storage Tank																
LSHH-5201	Level Switch High High - Product Stora	Digital_PLC	ISD	X003		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
6700 Bag Filter																
PSH-6701	Pressure Switch High Bag Filter 6701	Digital_PLC	ISD	X023		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
7000 Liquid Phase Carbon																
PSH-7001	High Pressure Switch	Digital_PLC	ISD	X004		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
7900 Building, Trailer or Skid																
KILL-7901	Kill Switch 1 - Building	Digital_PLC	ISD	X005		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
LSHH-7901	Level Switch High High - Building	Digital_PLC	ISD	X006		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
8200 Main Control Panel																
OL-P-4801	P-4901 Overload	Digital_PLC	GP	X010		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
OL-P-4001	P-4001 Overload	Digital_PLC	GP	X011		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
AUX-8201	Auxiliary Contact - Control Panel	Digital_PLC	GP	X012		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
AUX-8202	Auxiliary Contact - Control Panel	Digital_PLC		X013		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
PWR-8201	Power/Phase Monitor Panel	Digital_PLC		X014		NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
Digital_PLC_Freq																
7000 Liquid Phase Carbon																
FT-7001	Flow Transmitter - Liquid Phase Carbo	Digital_PLC	ISD	X007		NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
Direct																
7900 Building, Trailer or Skid																
TSH-7901	Temperature Switch High - Room #1	Direct				NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
TSH-7902	Temperature Switch High - Room #2	Direct				NormOpen	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0
TSL-7901	Temp Switch Low - Room #1	Direct				NormClose	0	0				0			<input type="checkbox"/>	0 <input type="checkbox"/> 0

Tag	Name	Type	PLC		Signal		Units	SQRT	Fcir	Offsite_Col	Note	Datalogger (DL06)	
			Input	Value	State	Low	High					Main	Monthly (Daily for 30 days)

TSL-7902	Temp Switch Low - Room #2	Direct			NormClose		0	0	<input type="checkbox"/>	0		<input type="checkbox"/> 0	<input type="checkbox"/> 0
----------	---------------------------	--------	--	--	-----------	--	---	---	--------------------------	---	--	----------------------------	----------------------------

Outputs

Project

RTS151

WTS, 150gpm, OWS-24, Carbon, 40

Largest Motor 7.5

575V-3ph:	0
460V-3ph:	0
230V-3ph:	0
208V-3ph:	20.46

230V-1ph	11.43
208V-1ph	0
115V-1ph	12

230V/115-3ph	0
--------------	---

Tag	PLC Loc	Device	Voltage	Watts	HP	Amps	AI Device	On Panel	Panel Setup	Analog Setup	Offsite Communication Package	Hourmeter	Data/Log
Logic													
Digital PLC													
4000 Submersible Pump													
P-4001	Y000	Motor Cntr	230V-1ph	1.5	7.83	None		Hand/Off/Auto	Display Only	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
PUMPS FEEDING OWS													
PUMP START SYSTEM IN RUN AND LAHH-4901 OFF													
PUMP STOP SYSTEM NOT IN RUN OR LAHH-4901 ON													
4900 Oil/Water Separator													
P-4901	Y001	Motor Cntr	208V-3ph	7.5	20.46	None		Hand/Off/Auto	Display Only	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
PUMP START SYSTEM IN RUN AND LSH-4901 ON													
PUMP STOP SYSTEM NOT IN RUN OR LSH-4901 OFF													
8200 Main Control Panel													
AL-8201	Y016	Light	115V-1ph					None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
LIGHT ON: SYSTEM IN ALARM.													
LIGHT OFF SYSTEM NOT IN ALARM.													
AR-8201	Y017	Relay(110)	115V-1ph					None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
RELAY ON: SYSTEM IN SHUTDOWN ALARM.													
RELAY OFF: SYSTEM NOT IN SHUTDOWN ALARM.													
SYS ON	Y015	Relay(110)	115V-1ph					None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
RELAY ON: SYSTEM IN RUN AND KILL SWITCH NOT PRESSED													
RELAY OFF: SYSTEM NOT IN RUN OR KILL SWITCH PRESSED													
Power													
7900 Building, Trailer or Skid													
F-7901		Fan	230V-1ph	0.33	3.6	None		None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
FAN START TSH-7901 ON													
FAN STOP TSH-7901 OFF													
F-7902		Fan	115V-1ph	0	0.25	2	None	None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
FAN START TSH-7902 ON													
FAN STOP TSH-7902 OFF													
H-7901		Heater	208V/120V-3	10000	0	28	None	None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
HEATER START TSL-7901 OFF													
HEATER STOP TSL-7901 ON													
H-7902		Heater	208V/120V-3	10000		28	None	None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
HEATER START TSL-7901 OFF													
HEATER STOP TSL-7901 ON													
H-7903		Heater	208V/120V-3	1500	0	4.1	None	None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
HEATER START TSL-7902 OFF													
HEATER STOP TSL-7902 ON													
Lights	Light	115V-1ph	600		5	None		None	None	None		<input type="checkbox"/>	<input type="checkbox"/> 0 <input type="checkbox"/> 0 <input type="checkbox"/> 0
LIGHTS ON LIGHT SWITCH ON													
LIGHTS OFF LIGHT SWITCH OFF													

Alarms Project RTS151

WTS, 150gpm, OWS-24, Carbon, 40' Contai

Tag	PLC Loc	Alarm Type	Delay(sec)	Alarms On..	Alarm Setting
	Logic				Comment

Type: Alarm_PLC					
4900 Oil/Water Separator					
LAHH-4901	High High Level Alarm - Oil Water Separator	C103	Recovers	5	Open
SYSTEM SHUTDOWN:				0	
ALARM START: SYSTEM IN RUN AND LSHH-4901 OPEN FOR DELAY SHOWN					
ALARM STOP: SYSTEM RESET					
5200 Product Storage Tank					
LAHH-5201	High High Level Alarm - Product Storage Tank	C104	Sys_Shutdown	5	Open
SYSTEM SHUTDOWN:				0	
ALARM START: SYSTEM IN RUN AND LSHH-5201 DEACTIVATED FOR DELAY SHOWN (see table)					
ALARM STOP: SYSTEM RESET					
5800 Bag Filter					
PAH-6701	High Pressure Alarm Bag Filter 6701	C110	Light_Only	5	Open
SOFT ALARM:				0	
ALARM START: SYSTEM IN RUN AND PSH-6701 ACTIVATED FOR 5 SECONDS					
ALARM STOP: SYSTEM RESET					
7000 Liquid Phase Carbon					
PAH-7001	Pressure Alarm High	C106	Sys_Shutdown	5	Open
SYSTEM SHUTDOWN:				0	
ALARM START: SYSTEM ON AND PSH-7001 OPEN FOR DELAY SHOWN (see table)					
ALARM STOP: SYSTEM RESET					
7900 Building, Trailer or Skid					
KILLA-7901	Kill Switch Alarm 1 - Building	C102	Sys_Shutdown	0	Open
SYSTEM SHUTDOWN:				0	
ALARM START: ANY KILL INPUT OPEN					
ALARM STOP: SYSTEM RESET					
LAHH-7901	Level Alarm High High - Building	C105	Sys_Shutdown	5	Open
STANDARD LOGIC				0	
SYSTEM SHUTDOWN:					
ALARM START: LSHH-7901 OPEN FOR DELAY SHOWN					
ALARM STOP: SYSEET					
8200 Main Control Panel					
OLA-P-4901	Overload Alarm OWS Discharge Pump	C111	Sys_Shutdown	1	Open
SYSTEM SHUTDOWN:				0	
ALARM START: SYSTEM IN RUN AND OL-P-4901 ACTIVATED					
ALARM STOP: SYSTEM RESET					

Tag		PLC Loc	Alarm Type	Delay(sec)	Alarms On..	Alarm Setting Comment
OLA-P-4001	Overload Alarm Inlet Discharge Pump	C112 Logic	Sys_Shutdown	1	Open	0
		SYSTEM SHUTDOWN: ALARM START: SYSTEM IN RUN AND OL-P-4001 ACTIVATED ALARM STOP: SYSTEM RESET				
AUXA-8201	Auxiliary Alarm - Control Panel	C113	Sys_Shutdown	5	Open	0
		STANDARD LOGIC SYSTEM SHUTDOWN: ALARM START: SYSTEM IN RUN AND AUX-8201 DEACTIVATED ALARM STOP: SYSTEM RESET				
AUXA-8202	Auxiliary Alarm - Control Panel	C113	Sys_Shutdown	5	Open	0
		SYSTEM SHUTDOWN: ALARM START: SYSTEM IN RUN AND AUX-8202 DEACTIVATED ALARM STOP: SYSTEM RESET				
PWRA-8201	Panel Power Alarm	C114	Sys_Shutdown	0	Open	0
		SYSTEM SHUTDOWN: ALARM START: POWER LOSS OR INCOMING VOLTAGE FAULT ALARM STOP: SYSTEM RESET AND INCOMING POWER IS WITHIN LIMITS				

Note: Power limits and tolerance, as well as recovery time is all set locally on device.

1 Using the newterra Site-Link: Remote Offsite Telemetry

1.1 Document purpose

This document details the various features and functionality of and procedure for logging in to and using the newterra Site-Link: Remote Offsite Telemetry portal.

Revision control

Revision	Author	Date
Rev 1. Original draft.	T Coates/ W Moulton	11 April 2012

2 Table of Contents

1 Using the newterra Site-Link: Remote Offsite Telemetry 1

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9 Export Data 6

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3 Overview

The newterra Site-Link: Remote Offsite Telemetry is a customized software program and hardware configuration which provides a real-time link to a process control system via cellular modem using our secure Site-Link Server.

Site-Link does not require any additional software to be downloaded or installed and simply uses your favourite internet browser* to view your system from anywhere you can get internet and is Operating System independent (ie Windows/ MAC). This means that you have access to your system via your internet browser enabled computer, smart phone or similar device. To access your system simply type the following address into your browser: <https://siteblink.newterra.com>.

* *newterra recommends Internet Explorer 8.0@ or higher for best performance with 800x600 resolution or higher.*

Site-Link comes with the following features:

- | | |
|---|--|
| <ul style="list-style-type: none">• Customized P&ID layout with System Status• Start/ Stop/ Reset of System• Manual Control of most system components[†]• Data and Alarm logging exports in .csv format | <ul style="list-style-type: none">• Alarm History including Current Alarm Status• Hour Meters for Equipment^{††}• Customization of all system set points[†] |
|---|--|

[†] certain restrictions apply.

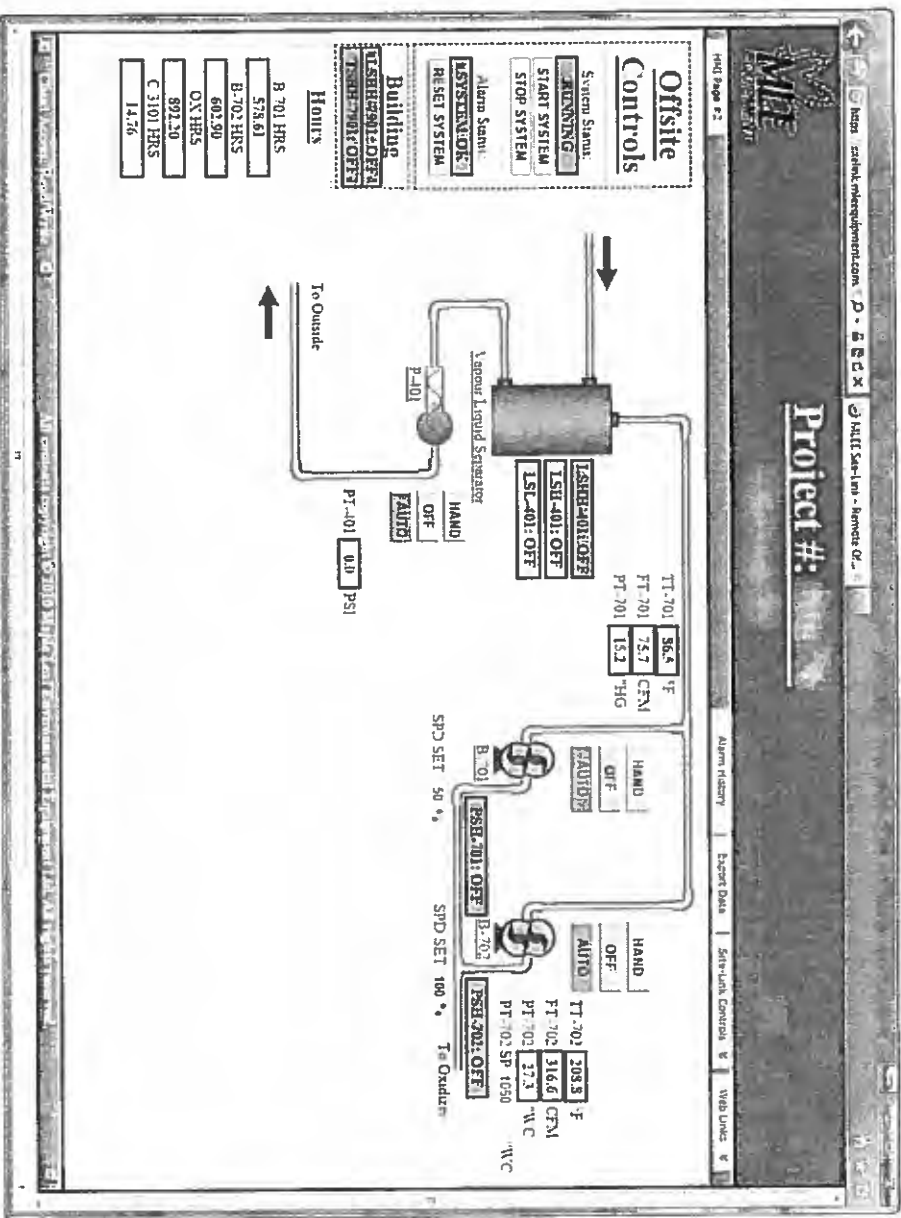
^{††} only applies when hour meters are quoted with system.

Multiple users can have access to Site-Link, each with their own unique login details. Users can have read and write privileges for monitoring and control, or read only privileges for monitoring only. For customers with multiple systems with Site-Link capability, all those systems will be available via the one login account.

4 P&ID Page 1

P&ID page 1 typically includes system status dialog box (Shutdown/ Running). Start and Stop buttons. Reset button to reset alarms. Alarm status box (System OK/ Alarm). Soft HOA switches for motors/ valves etc. Visual indicators for level switches, active pumps/ motors/ valves etc. Depending on the components used in the system; instantaneous flow, total flow, analog transmitters and SetPoints.

Tab1 for P&ID page 2 (if applicable), alarm history and export data.

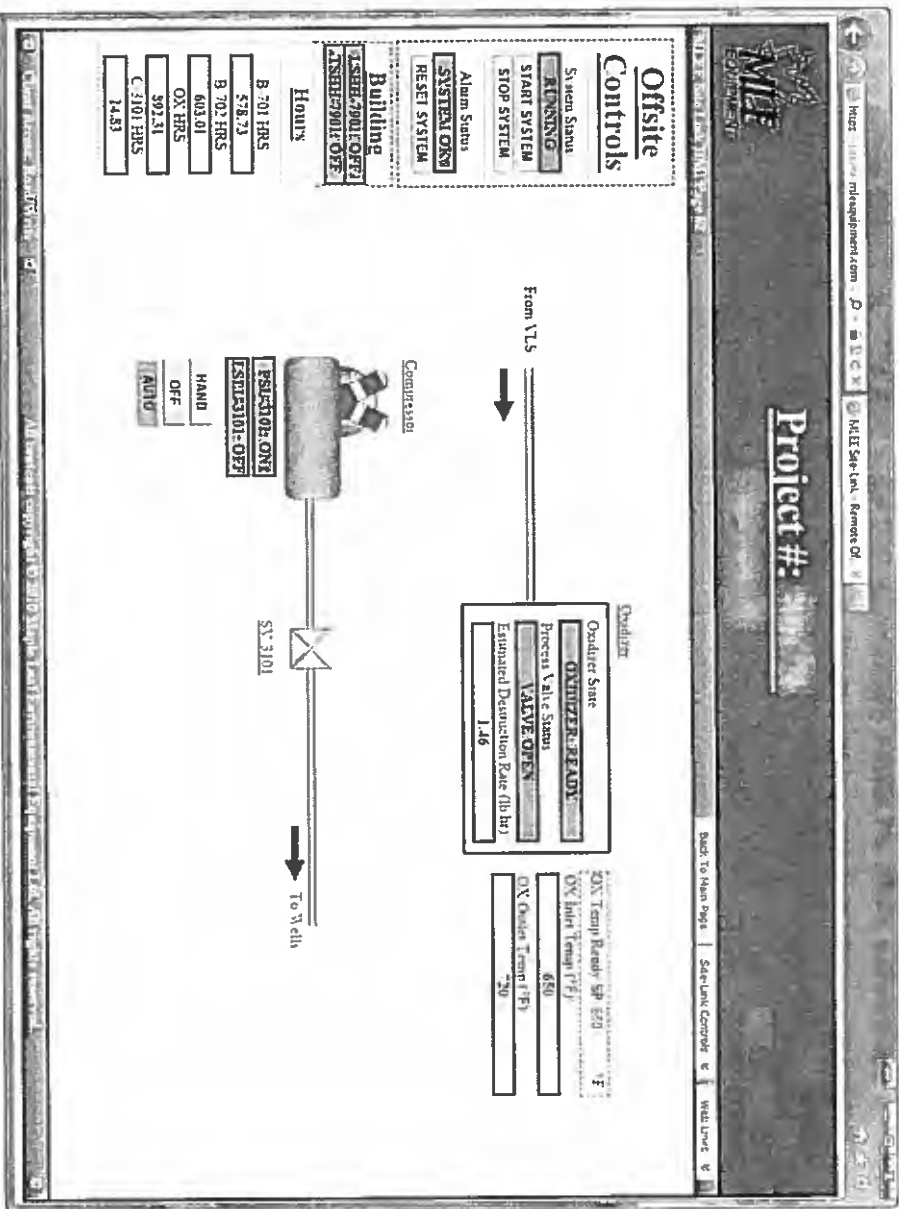


Display refresh rate is once per minute unless a Site-Link button is pressed, in which case the display refresh will be approximately 5 seconds.

To change analog SetPoints simply type into the text box provided and then press the enter key on your computer keyboard.

5 P&ID Page 2

P&ID page 2 is typically used for larger systems and includes many or all of the same features as mentioned above, depending on the system.



6 Datalogging

Analog values and flow data (if present on the system) and hour meters are logged automatically. If the system only has hour meters the standard logging rate is once per day. If the system has analog values and/or flow data the standard logging rate is once every 10 minutes.

Note: Data is only retained on the server for 90 days before the oldest data starts to be overwritten by the newest data. Therefore it is recommended that downloads are performed every 2 months (see [Export Data](#) section below).

7 Yellow/ orange boxes with ????

Yellow/ orange boxes with ??? instead of the usual red/ green boxes means the Site-Link server is unable to pull any data from the PLC on site. This typically means there is no power to the control panel or possibly an issue with the wireless signal or modem. If symptoms persist please call newterra.

8 Alarm History

This is a list of all the alarms the system is capable of generating, in the order that the alarm status last changed. It details the last date/ time that alarm changed state. For more detailed alarm history the alarm export data download can be performed.

Project #:

Date/Time	Test	Type	AlarmValue
3/28/2011 5:51:40 PM	STEAM-1931-ALM	Open	0
3/28/2011 5:30:42 PM	PAH1-701-ALM	Open	0
3/28/2011 5:28:42 PM	PH11-701-ALM	Open	0
3/23/2011 7:15:42 PM	KILL-SYS-ALM	Open	0
3/23/2011 6:48:35 PM	AUXA-4201-ALM	Open	0
3/23/2011 6:48:05 PM	PAH1-700-ALM	Open	0
3/16/2011 1:51:47 PM	PAH1-7301-ALM	Open	0
3/16/2011 7:40:16 PM	PAH1-401-ALM	Open	0
3/16/2011 7:31:19 PM	LAH11-7301-ALM	Open	0
3/16/2011 5:44:29 PM	OLA-4201-ALM	Open	0
12/22/2010 9:13:16 PM	VFDA-4201-ALM	Open	0
12/22/2010 8:56:08 PM	VFDA-4201-ALM	Open	0
12/22/2010 8:49:46 PM	VFDA-4201-ALM	Open	0
12/22/2010 8:35:12 PM	UAL1-3101-ALM	Open	0
12/16/2010 3:19:52 PM	PAH1-701-ALM	Open	0

DateTime: Date and time the alarm status changes. (Note: All times are taken from the Site-Link server clock which is Eastern Time, EST or EDT depending on the time of year).

Text: Short form alarm code. Please refer to O&M manual for more detailed description.

Type: This will always display Digital.

AlarmValue: 0 indicates that the alarm is inactive. 1 indicates that the alarm is active.

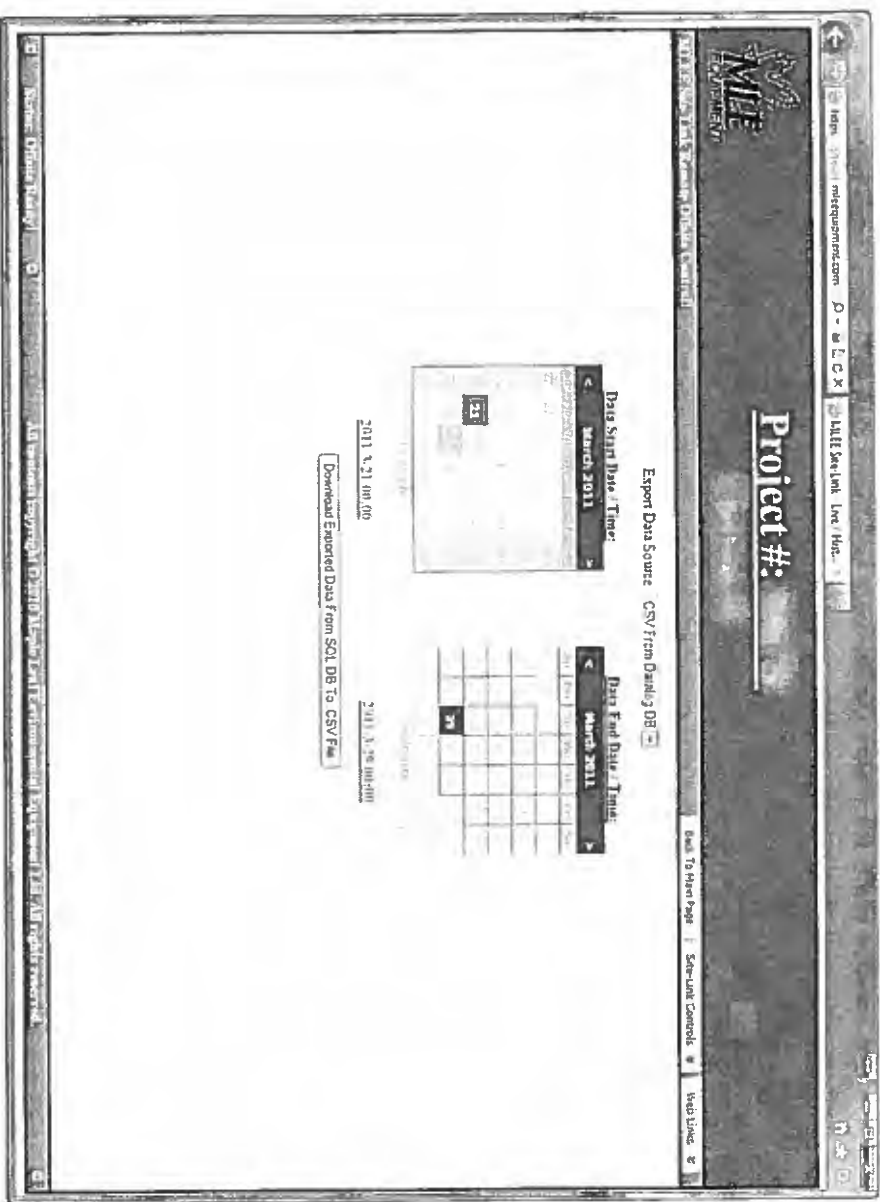
Colour: Yellow indicates alarm statuses that have been acknowledged, even if the alarm is still active. Red indicates alarm statuses that have not been acknowledged since it last changed state, even if the alarm is no longer active (so red does not necessarily mean the alarm is active, just that it has changed state since it was last acknowledged).

Ack All: This will acknowledge all the alarms in the table and turn all the lines yellow, whether the alarm is active or inactive. Please note that this does not physically cancel or reset any alarms on the subject system. An active alarm that has been acknowledged and is displayed on a yellow line will change to a red line once the alarm deactivates, as the alarm has changed state.

History: Provides limited alarm history, it is recommended to use the alarm [Export Data](#) download outlined in the next section.

9 Export Data

Data and/ or alarm logs can be downloaded for recording, reporting or trending purposes. Note: Data is only retained on the server for 90 days before oldest data starts to be overwritten by the newest data. Therefore it is recommended that downloads are performed every 2 months.



Select data source: Select the data export source from the drop down box, either Datalog DB or Alarm DB.

Select Start Date/ Time: Select the start date by navigating the Data Start Date/ Time calendar to the desired year/ month and click on the day. Set the desired start time in the box below the calendar. (Note: All times are taken from the Site-Link server clock which is Eastern Time, EST or EDT depending on the time of year).

Select End Date/ Time: Select the end date by navigating the Data End Date/ Time calendar to the desired year/ month and click on the day. (Note: You have to click on the day even if it is today's date, as today's date will always be highlighted and it looks like it is highlighted but it is not). Set the desired start time in the box below the calendar. (Note: All times are taken from the Site-Link server clock which is Eastern Time, EST or EDT depending on the time of year).

Download Data: Click on the 'Download Exported Data From SQL DB To .CSV File' button. When prompted by the File Download dialog box click on the Save button to save the .csv file and then navigate to the location you want to save the file to.

10 Sample Data Download snap shot

Copy and paste from a data download .csv file from a system with only hour meters.

DateAndTime	V_STATUS	C3101_HRS	C3201_HRS	P4901_HRS	B6401_HRS	P6401_HRS
3/13/2012 12:00:00 AM	2	73	159	6	0	0
3/14/2012 12:00:00 AM	2	76	165	6	0	0
3/15/2012 12:00:00 AM	2	81	173	6	0	0
3/16/2012 12:00:00 AM	2	86	180	6	0	0
3/17/2012 12:00:00 AM	2	90	187	7	0	0
3/18/2012 12:00:00 AM	2	95	195	7	0	0
3/19/2012 12:00:00 AM	2	99	202	7	0	0
3/20/2012 12:00:00 AM	2	103	209	7	0	0
3/21/2012 12:00:00 AM	2	109	217	7	0	0
3/22/2012 12:00:00 AM	102	112	220	7	0	0
3/23/2012 12:00:00 AM	114	113	221	7	0	0
3/24/2012 12:00:00 AM	1	116	225	8	0	0
3/25/2012 12:00:00 AM						
3/26/2012 12:00:00 AM	1	116	225	8	0	0
3/27/2012 12:00:00 AM	2	119	228	9	0	0
3/28/2012 12:00:00 AM	2	126	235	12	0	0
3/29/2012 12:00:00 AM	2	132	242	15	0	0
3/30/2012 12:00:00 AM	2	139	249	18	0	0
3/31/2012 12:00:00 AM	2	145	254	20	0	0
04/01/2012 0:00	2	151	261	23	0	0
04/02/2012 0:00	2	158	268	26	0	0
04/03/2012 0:00	2	164	275	29	0	0
04/04/2012 0:00	2	170	282	32	0	0
04/05/2012 0:00	105	177	288	35	0	0
04/06/2012 0:00	105	183	294	37	0	0
04/07/2012 0:00	105	189	301	40	0	0
04/08/2012 0:00	105	196	307	42	0	0
04/09/2012 0:00	105	202	313	43	0	0

DateAndTime: Date and time data log was taken (Eastern Time). If there are no values for a particular data log date/ time then the server was unable to connect to the system (eg power outage at the system).
V_STATUS: Internal PLC status bit used by Site-Link to determine whether the system is running (2), stopped (1) or in alarm (other value).
C3101_HRS: Accumulated run time hours for component.

11 Sample Alarm Download snap shot
Cut and paste from alarm download .csv file.

AlarmID	AlarmType	AlarmGroup	Priority	AlarmText	Active	Acked	TimeDelay	AlarmValue	ClearedValue	AlarmDateTime
200213.C-SYSTEM-KILL-ALM_Dig	Digital	ALM200213	0	SYSTEM-KILL-ALM	TRUE	FALSE	0	1		3/21/2012 10:02:22 AM
200213.C-SYSTEM-KILL-ALM_Dig	Digital	ALM200213	0	SYSTEM-KILL-ALM	TRUE	FALSE	0	0		3/22/2012 5:13:44 PM
200213.C-CGA-3101-ALM_Dig	Digital	ALM200213	0	CGA-3101-ALM	TRUE	FALSE	0	1		3/22/2012 7:26:07 PM
200213.C-CGA-3101-ALM_Dig	Digital	ALM200213	0	CGA-3101-ALM	TRUE	FALSE	0	0		3/23/2012 8:16:04 AM
200213.C-SYSTEM-KILL-ALM_Dig	Digital	ALM200213	0	SYSTEM-KILL-ALM	TRUE	FALSE	0	1		3/23/2012 8:25:28 AM
200213.C-SYSTEM-KILL-ALM_Dig	Digital	ALM200213	0	SYSTEM-KILL-ALM	TRUE	FALSE	0	0		3/23/2012 8:25:41 AM
200213.C-LALL-3101-ALM_Dig	Digital	ALM200213	0	LALL-3101-ALM	TRUE	FALSE	0	1		3/23/2012 10:36:42 AM
200213.C-LALL-3101-ALM_Dig	Digital	ALM200213	0	LALL-3101-ALM	TRUE	FALSE	0	0		3/23/2012 11:03:57 AM
200213.C-LAHH-4901-ALM_Dig	Digital	ALM200213	0	LAHH-4901-ALM	TRUE	FALSE	0	1		3/23/2012 11:04:03 AM

AlarmID: Short form alarm code. Please refer to O&M manual for more detailed description.
AlarmType: Will always will report Digital. Unable to suppress column.
AlarmGroup: Will always report ALMxxxxxx. Unable to suppress column.
Priority: Will always report zero. Unable to suppress column.
AlarmText: Short form alarm code. Please refer to O&M manual for more detailed description.
Active: Will always report True. Unable to suppress column.
Acked: Will always report False. Unable to suppress column.
TimeDelay: Will always report zero. Unable to suppress column.
AlarmValue: 1 means alarm is/ became active. 0 means alarm is/ became inactive.
ClearedValue: Will always be blank. Unable to suppress column.
AlarmDateTime: Date and time at which alarm changed state (became active and/ or inactive)

12 PLC Program Changes

Wireless telemetry also enables newterra to perform remote PLC program/ system troubleshooting and upload PLC program modifications remotely.

13 Logging in

Each user is added to the Site-Link database and set up with an account by an Administrator at newterra. Once this has been done the user will receive an automated Email similar to the one shown below.

From: MLEE Site-Link Admin <sitelink@newterra.com>
Date: 12 April 2012 08:11
Subject: Re: New User Account Created For jsmith
To: jsmith <jsmith@email.com>

Site-Link Account Information

Project # / Username: jsmith
Contact E-Mail Address: jsmith@email.com

New Random Password: 96a35b

Please feel free to return to <https://sitelink.newterra.com> to change your password at any time

Thank You Very Much For Using The newterra Site-Link Offsite Software,

~The Site-Link Administrator

Multiple users can have access to Site-Link, each with their own unique login details. Users can have read and write privileges, for monitoring and control, or read only privileges for monitoring only. For customers with multiple systems with Site-Link capability, all those systems will be available with the one login.

14 E-Alarm

An instant Email or Email to cell phone text is optionally available as a separate service. Personnel on the call out list will receive an automated Email or text similar to the one shown below.

From: 200000 - ABC Air Sparge [mailto:plc@newterra.com]
Sent: April 13, 2012 8:33 AM
To: plc201217
Subject: ALARM! 200000 - ABC Airsparge

C103 - PAH-2401 SPG1
04/13/12,12:32PM
Help: <http://goo.gl/wpNS6>

14.1 E-Alarm Re-Email

Any alarm condition will re-Email every 2 hours (unless specified otherwise by the customer) until the alarm either self clears (if it is recoverable) or is reset via the Site-Link P&ID page.



(800) 42U-4U56 / www.newterra.com

15 E-Monitor

A daily system status Email is optionally available as a separate service. Personnel on the call out list will receive a daily automated Email similar to the ones shown below, the more complex the system the more detailed the report.



Site-Link E-Monitor

Daily Report for

Start
3/23/2012 6:50:00 AM

Stop
3/23/2012 9:20:00 AM

newterra
www.newterra.com

SYSTEM STATUS: **RUNNING**

Analogs:

VT-LRP

MIN: 16.20000762939

MAX: 17.8999996

AVERAGE: 17.3577464

HOUR METERS:

DP-PS	2272
VP-LRP	3043
DP-OWS	505
AB-STRP	1406
DP-STRP	423

ALARM STATUS

Lost Alarm Active

KILL-SYS-ALM NO
3/13/2012 2:42:10 PM

3/23/2012 9:22:52 AM

Page 1 of 1

Project As-Built Document

27-Aug-13

RTS151 WTS, 150gpm, OWS-24, Carbo
Customer: newterra ltd.

System Site Specifications

Elevation: 0 ft
Max Temp 0 deg F
Min Temp: 0 deg F
Noise Target:
Gas Required:
Water Required:
Telephone Req'd:
Building:

System SVE (First Blower)

0 @ 0
Blower Disch Temp: 0 deg F
Inlet Legs: 0
Disch Press: 0 in wc
Water Flowrate: 0 gpm
Heat xchg Disch: 0 deg F

Air Sparge

0 @ 0 psi
Sparge Disch Temp: 0 deg F
Disch Legs: 0
Heat xchg Disch: 0 deg F

Contaminants

System Electrical Specifications

Voltage: 208V/120V-3ph
Main Disconnect 100amp
Panel Approval: MET1604(CL Class CL1DIV2
System Approval: Class CL1DIV2
Panel Type: PLC-DL06
Telemetry:
Autodialer:
EMonitor: Server:

System SVE (Second Blower)

0 @ 0
Blower Disch Temp: 0 deg F
Inlet Legs: 0
Disch Press: 0 in wc
Water Flowrate: 0 gpm
Heat xchg Disch: 0 deg F

Other Specifications

Other Inlet Liquid Flow: 0 gpm
Disch Flow: 150 gpm @ 40 psi
AirTreatment: None
Water_Treatment: Carbon
Stripper Airflow: 0 cfm
Stripper Dsn Flow: 0 gpm
OWS_Dsn_Flow: 150 gpm

Other Information May be Presented Below

Connection Info:

Shipping Information

Parts

Module Code: 0

Insulation, Foil Back Foam, 1", R, Thinsulate, 4x8	Part: 10636
	Qty: 34
	Mfg:
	Mfg Part: 356075
Lumber, Spruce, Dry, 2" x 4" x 10'	Part: 10912
818011	Qty: 96
	Mfg:
	Mfg Part: 818011
Lumber, Plywood, Spr, STD, 4 x 8 x 3/8"	Part: 14463
620295	Qty: 34
	Mfg:
	Mfg Part: 620295
Switch, Temperature, Probe, A19ABC-24D	Part: 15651
range -30/100F	Qty: 2
	Mfg: Johnson Controls
	Mfg Part:
Breaker, Techna, JTEC4892C40	Part: 17700
240V 40 AMP 2P C Trip Curve	Qty: 1
10k SCCR	Mfg: Fusetek
	Mfg Part: JTEC4892C40
Combination Starter, SQT LUCC32FU	Part: 19434
TeSysU 1 Phase Control Unit 8-32A	Qty: 1
110/120VAC coil	Mfg: Telemecanique
	Mfg Part: SQT LUCC32FU
Wire, Stranded, T90, #1 AWG, Black	Part: 25152
	Qty: 10
	Mfg:
	Mfg Part: T901BLK
<i>FLT-6701</i>	
Filter, Bag, Dewatering, Assembly, Four (4)	Part: RC036
	Qty: 1
	Mfg:
--	Mfg Part: --
<i>PI-6701</i>	
Gauge, Pressure, 0-60psi, Indumart, P16K2-FG-60 (back)	Part: 19393
SS, brass internals, Glyc Filled, back mount	Qty: 8
	Mfg:
	Mfg Part: P16K2-FG-60
<i>PSII-6701</i>	
Switch, Pressure, A1F-0-SS-1-2	Part: 20589
4-75 PSI Range	Qty: 1
Deadband at Min Range 4 - Max Range 15	Mfg: Dwyer
--	Mfg Part:

Rental Components

Module Code: 2

RCHOSE DISCH

Hose, Assembly, J300, 3"
Green Hose

Part: 18661
Qty: 50
Mfg: Maple Leaf Environmental Equipment
Mfg Part: -

RCHOSE-INLET

Hose, Assembly, J300, 3"
Green Hose

Part: 18661
Qty: 50
Mfg: Maple Leaf Environmental Equipment
Mfg Part: -

Submersible Pump

Module Code: 4000

LSH-4001

Switch, Level, Mech Float, Wide Angle, N.O., Red

Tilt Float Level Switch 90deg, w 40' cable

13A, SPST, N/O

Part: M1108

Qty: 1

Mfg: Warrick Controls

Mfg Part: GR20W4000

P-4001

Pump, Sump, Goulds, 160GPM @ 40'

WS2038BHF, 200V, 3 Ph, 2 HP, w/o switch

3" Type F Camlock Fitting

Part: RC073

Qty: 1

Mfg: Goulds

Mfg Part:

Oil/Water Separator

Module Code: 4900

LSHH-4901

Switch, Level, Mech Float, Narrow Angle, N.C., YEL	Part:	19279
N/C, Yellow float	Qty:	1
---	Mfg:	
	Mfg Part:	PY2CW4000

OWS-4901

Media, Coalescing, HD Q-PAC	Part:	13959
0.25" spacing, 132 sqft/cuft	Qty:	24
---	Mfg:	
	Mfg Part:	HD Q-PAC

Oil Water Separator, OWS-24, Stainless	Part:	16263
24 cubic feet of packing, 304SS	Qty:	1
Note: Build up price from Price Sheet	Mfg:	Maple Leaf Environmental Equipment
To be removed from RTS-148, SVE, WTS returning from Veron, TX.	Mfg Part:	
Purchased used equipment, 50430 Jerry Wood #2 project.		

Strain Relief, Connector, PVC, 1/2"	Part:	16884
TSRC10	Qty:	2
---	Mfg:	
None	Mfg Part:	TSRC10

Oil Water Separator, Assembly, OWS-24	Part:	17535
-	Qty:	1
	Mfg:	Maple Leaf Environmental Equipment
	Mfg Part:	-

Switch, Level, Mech Float, Wide Angle, N.O., Red	Part:	m1108
Till Float Level Switch 90deg, w 40' cable	Qty:	1
13A, SPST, N/O	Mfg:	Warrick Controls
None	Mfg Part:	GR20W4000

Valve, Ball, Brass, 2", 150#	Part:	p1065
NPT, Teflon seats, 600 PSI WOG	Qty:	1
---	Mfg:	Kitz
None	Mfg Part:	601-2

Valve, Ball, Brass, 2", 150#	Part:	p1065
NPT, Teflon seats, 600 PSI WOG	Qty:	1
---	Mfg:	Kitz
None	Mfg Part:	601-2

Valve, Ball, Brass, 1", 150#	Part:	p1067
NPT, Teflon seats, 600 PSI WOG	Qty:	3
---	Mfg:	Kitz
None	Mfg Part:	601-1

Valve, Ball, Brass, 3", 150#	Part:	P1104
NPT, Teflon seats, 600 PSI WOG	Qty:	3
---	Mfg:	
	Mfg Part:	601-3

P-4901

Valve, Gate, Brass, 3"	Part: 10167
	Qty: 1
	Mfg:
None	Mfg Part: 514T10
Gauge, Pressure, 0-60psi, Indumart, P16T2-FG-60	Part: 16203
SS, brass internals, Glyc. Filled, bottom mount	Qty: 1
	Mfg: Indumart
None	Mfg Part:
Reinforced, Adapter, PVC 80, Female, 3", SxSS	Part: 17055
Fitting, transition, socket x SS	Qty: 1
	Mfg:
---	Mfg Part: 835-030SR
Pump, Piping, Centrifugal, 3" x 3", 170gpm	Part: 17316
	Qty: 1
	Mfg: Maple Leaf Environmental Equipment
	Mfg Part: -
Pump, Suction, Goulds, SSH Series, 4SH2K52C0	Part: 21028
7.5hp, 3ph, 208-230/460V, TEFC	Qty: 1
C Impeller	Mfg: Goulds
---	Mfg Part: ---
Hose, Braided, SS, 3", MNPT fittings, 12" long	Part: 21971
5680K2	Qty: 2
304SS	Mfg:
None	Mfg Part: 5680K2
Strainer, Wye, Brass, 3"	Part: M1523
threaded	Qty: 1
	Mfg:
None	Mfg Part: 145T10
Valve, Check, Swing, Brass, 3"	Part: M1524
	Qty: 1
	Mfg:
None	Mfg Part: 521T10
Valve, Check, Swing, Brass, 3"	Part: M1524
	Qty: 1
	Mfg:
None	Mfg Part: 521T10
Union, Galv, 3"	Part: M1530
	Qty: 2
	Mfg:
None	Mfg Part: 3GLU
Valve, Ball, Brass, 3", 150#	Part: P1104
NPT, Teflon seats, 600 PSI WOG	Qty: 1
	Mfg:
-	Mfg Part: 601-3

Product Storage Tank

Module Code: 5200

LSHH-5201

Switch, Level, Almeg, Vertical, ATB3-48B
1/4NPT

Part: 12351
Qty: 1
Mfg: Almeg
Mfg Part: ATB3-48B

Reducer, Bushing, Galv, 2" x 1/2"
Hex

Part: P1021
Qty: 1
Mfg:
Mfg Part: 2X12GZB

Union, Galv, 2"

Part: P1093
Qty: 1
Mfg:
Mfg Part: 2GZU

PST-5201

Tee, Galv, 2"
1

Part: 10136
Qty: 1
Mfg:
Mfg Part: 2GZT

Drum, Black, Steel, 45 gal, 2 hole lid, bottom 2" port
including palletization

Part: M1137
Qty: 1
Mfg:
Mfg Part: SOH00733

Elbow, 90deg, Galv, 2"

Part: P1058
Qty: 4
Mfg:
Mfg Part: 2GZE9

Valve, Ball, Brass, 2", 150#
NPT, Teflon seats, 600 PSI WOG

Part: P1065
Qty: 1
Mfg: Kitz
Mfg Part: 601-2

Nipple, Galv, 2" x Short

Part: P1192
Qty: 5
Mfg:
Mfg Part: 2xSHGZN

Bag Filter

Module Code: 5800

FLT-5801

O-Ring, Buna-N, 8-3/8" OD, 3/16" Thick	Part:	21619
A70 Hardness	Qty:	25
* Fits most Filter Innovation EB112 series	Mfg:	
---	Mfg Part:	369 BUNA
Filter, Bag, Dewatering, Assembly, Four (4)	Part:	RC033
---	Qty:	1
---	Mfg:	
---	Mfg Part:	---

FLT-5802

Reducer, Bushing, Galv, 3" x 2"	Part:	10019
Hex	Qty:	4
---	Mfg:	
---	Mfg Part:	3X2GZB
Tee, Galv, 2"	Part:	10136
1	Qty:	2
---	Mfg:	
---	Mfg Part:	2GZT
Nipple, Galv, 2" x Close	Part:	10222
---	Qty:	14
---	Mfg:	
---	Mfg Part:	2XCLGZN
Tee, Galv, 3"	Part:	10302
---	Qty:	2
---	Mfg:	
---	Mfg Part:	3GZT
Valve, Ball, Brass, 1/2", 150#	Part:	10538
NPT, Teflon seats, 600 PSI WOG	Qty:	2
---	Mfg:	
---	Mfg Part:	601-1/2
Nipple, Galv, 1/2" x Close	Part:	10619
---	Qty:	2
---	Mfg:	
---	Mfg Part:	12CLGZN
Skid, 2ft x 4ft	Part:	15152
---	Qty:	1
---	Mfg:	Maple Leaf Environmental Equipment
---	Mfg Part:	
Sample Port Assembly, 1/4"	Part:	18682
---	Qty:	2
---	Mfg:	Maple Leaf Environmental Equipment
---	Mfg Part:	-
Filter, Bag, Housing, #2, Carbon Steel	Part:	19117
SS Basket, CS legs	Qty:	2
---	Mfg:	
---	Mfg Part:	

Reducer, Bushing, Galv, 2" x 1/2"	Part:	P1021
Hex	Qty:	2
---	Mfg:	
	Mfg Part:	2X12GZB
Valve, Ball, Brass, 2", 150#	Part:	P1065
NPT, Teflon seats, 600 PSI WOG	Qty:	4
---	Mfg:	Kitz
	Mfg Part:	601-2
Union, Galv, 2"	Part:	P1093
---	Qty:	4
	Mfg:	
	Mfg Part:	2GZU
<i>PI-5801</i>		
Gauge, Pressure, 0-60psi, Indumart, P16K2-FG-60 (back)	Part:	19393
SS, brass internals, Glyc. Filled, back mount	Qty:	12
---	Mfg:	
	Mfg Part:	P16K2-FG-60
<i>PSH-5801</i>		
Switch, Pressure, A1F-0-SS-1-2	Part:	20589
4-75 PSI Range	Qty:	1
Deadband at Min Range 4 - Max Range 15	Mfg:	Dwyer
---	Mfg Part:	

Bag Filter

Module Code: 6700

FLT-6701

Nipple, Galv, 3" x Close	Part: 11220
	Qty: 6
	Mfg:
	Mfg Part: 3CLGZN
Flange, Companion, Galv, 6" threaded	Part: 12572
	Qty: 2
	Mfg:
	Mfg Part: 6GZCIF / 12.0905
Valve, Butterfly, Wafer, Ductile Iron, 6" 316SS disc & stern, BUNA, 10 position lever	Part: 15019
	Qty: 2
	Mfg:
	Mfg Part: CIWB-SBL 6" CO
Reducer, Bushing, Galv, 6" x 3" Hex	Part: 19681
	Qty: 2
	Mfg:
	Mfg Part:
Tee, PVC 40, 3", SxSxS, 401-030G	Part: 22578
	Qty: 2
	Mfg:
	Mfg Part:
Elbow, 90deg, PVC 40, 3", SxS, 406-030G	Part: 22619
	Qty: 8
	Mfg:
	Mfg Part: 406-030G
Misc Part, See Details As per detailed specification below	Part: 9999
	Qty: 1
	Mfg:
Pricing from Steve Hughes, Aug. 7th, 2013 e-mail	Mfg Part: Qo8L100RB9
V6427-A, Multi-Bag Filter Housing - 7 Bag Model - 304 Stainless	
Vessel A - Inlet and Outlet are on the right hand side of the unit when looking at the label.	
Misc Part, See Details As per detailed specification below	Part: 9999
	Qty: 2
	Mfg:
4155-1490-B, O-rings for V6427-A Bag Filter Housing	Mfg Part: Qo8L100RB9
Valve, Ball, Brass, 3", 150# NPT, Teflon seats, 600 PSI WOG	Part: P1104
	Qty: 1
	Mfg:
	Mfg Part: 601-3
Elbow, 90deg, Galv, 3"	Part: P1220
	Qty: 1
	Mfg:
	Mfg Part: 3GZE9

FT-6701

Reinforced, Adapter, PVC 80, Female, 3", SxSS
Fitting, transition, socket x SS

Part: 17055
Qty: 4
Mfg
Mfg Part: 835-030SR

PSH-6701

Switch, Pressure, A1F-0-SS-1-2
4-75 PSI Range
Deadband at Min Range 4 - Max Range 15

Part: 20589
Qty: 1
Mfg: Dwyer
Mfg Part

Liquid Phase Carbon

Module Code: 7000

7000

Nipple, Galv, 3" x Close	Part:	11220
	Qty:	2
	Mfg:	
---	Mfg Part:	3CLGZN
Valve, Ball, Brass, 3", 150#	Part:	P1104
NPT, Teflon seats, 600 PSI WOG	Qty:	1
	Mfg:	
---	Mfg Part:	601-3
Adapter, PVC 80, Female, 3", SxT, 835-030G	Part:	P1153
	Qty:	2
	Mfg:	
---	Mfg Part:	835-030

FQI, FT-7001

Meter, Water, 2", US Gal, w/ pulse, Turbine, DLJ	Part:	15499
Flange	Qty:	1
	Mfg:	Daniel L. Jerman Co.
---	Mfg Part:	DLJ200TC

LPC-7001

Reducer, Bushing, Galv, 3" x 2"	Part:	10019
Hex	Qty:	5
	Mfg:	
---	Mfg Part:	3X2GZB
Tee, Galv, 3"	Part:	10302
	Qty:	5
	Mfg:	
---	Mfg Part:	3GZT
Nipple, Galv, 3" x Short (3")	Part:	10445
	Qty:	4
	Mfg:	
---	Mfg Part:	3SHGZN
Camlock Fitting, Aluminum, 3", Part "F"	Part:	10541
Male Adapter x Male Thread Cam Lock Fitting	Qty:	6
	Mfg:	Bayco Industries
-	Mfg Part:	BAL-300F
Camlock Fitting, Aluminum, 3", Part "C"	Part:	10542
Female Adapter x Hose Shank Cam Lock Fitting	Qty:	6
	Mfg:	Bayco Industries
-	Mfg Part:	BAL-300C
Hose, Suction, PVC, Green, 3", J300	Part:	12043
TigerFlex, 65psi@70F, 40psi@100F	Qty:	30
PVC, 150F, (min 100ft order)	Mfg:	Kuriyama
-	Mfg Part:	J300
Reinforced, Adapter, PVC 80, Female, 3", SxSS	Part:	17055
Fitting, transition, socket x SS	Qty:	6
	Mfg:	
---	Mfg Part:	835-030SR

Hose, Assembly, J300, 3"	Part:	18661
Green Hose	Qty:	3
-	Mfg:	Maple Leaf Environmental Equipment
	Mfg Part:	-
Sample Port Assembly, 1/4"	Part:	18682
-	Qty:	3
	Mfg:	Maple Leaf Environmental Equipment
	Mfg Part:	-
Valve, Check, Spring, Brass, 2"	Part:	M1529
-	Qty:	1
	Mfg:	
	Mfg Part:	26PUCV
Clamp, Hose, SS, 3", HAS48	Part:	P1044
-	Qty:	12
None	Mfg:	
	Mfg Part:	HAS48
Valve, Ball, Brass, 3", 150#	Part:	P1104
NPT, Teflon seats, 600 PSI WOG	Qty:	4
-	Mfg:	
	Mfg Part:	601-3
Reducer, Bushing, Galv, 2" x 1/4"	Part:	P1219
Hex	Qty:	5
-	Mfg:	
	Mfg Part:	2x14GZB
<i>PI-7001</i>		
Gauge, Pressure, 0-60psi, Indumart, P16T2-FG-60	Part:	16203
SS, brass internals, Glyc. Filled, bottom mount	Qty:	2
-	Mfg:	Indumart
	Mfg Part:	
<i>PI-7004</i>		
Gauge, Pressure, 0-60psi, Indumart, P16K2-FG-60 (back)	Part:	19393
SS, brass internals, Glyc. Filled, back mount	Qty:	1
-	Mfg:	
	Mfg Part:	P16K2-FG-60
<i>PSH-7001</i>		
Switch, Pressure, A1F-0-SS-1-2	Part:	20589
4-75 PSI Range	Qty:	1
Deadband at Min Range 4 - Max Range 15	Mfg:	Dwyer
-	Mfg Part:	

Building, Trailer or Skid

Module Code: 7900

7900

Door, Single, 36", Steel slab/no brick moulding, No sill ext 1103A, wooden frame, open out, RH **to be pre drilled for passage and deadbolt**	Part: 10822 Qty: 1 Mfg: Mfg Part: 1103-Dalmen
Lock, Passage, 107188, Taymor 107188	Part: 10908 Qty: 1 Mfg: Mfg Part:
None	
Lock, Deadbolt, 289648, Taymor, 1 cyl, S/S keyed alike #289648	Part: 10909 Qty: 1 Mfg: Mfg Part:
None	
Container, Painting, 40ft exterior/interior	Part: 12063 Qty: 1 Mfg: Mfg Part:
Building exterior, to be painted our standard white finish	
Container, Shipping, Tilt load	Part: 13593 Qty: 1 Mfg: Mfg Part:

Container, 8' x 40' x High Cube	Part: 15512 Qty: 1 Mfg: Mfg Part:

Container, Modification As per specification below or drawing provided.	Part: 15513 Qty: 1 Mfg: Mfg Part:

Door, Assembly, 72", Double	Part: 19012 Qty: 1 Mfg: Maple Leaf Environmental Equipment Mfg Part: -

Door, Assembly, 36", Single	Part: 19014 Qty: 1 Mfg: Maple Leaf Environmental Equipment Mfg Part: -

Access Cover

Misc Part, See Details	Part: 9999
As per detailed specification below	Qty: 3
	Mfg:
As per attached drawing. For 36"x36" Carbon Access Cover	Mfg Part: ---

F-7901

Fan, Building, 24", 1/3hp, 1625rpm, 120/230V, 1ph, XPF	Part: 10329
SD24-XPF, OSHA Guard, Turnout Box	Qty: 1
	Mfg: Canarm
---	Mfg Part: SD24-XPF-OSHA

Fan Shutter Assembly, KD, 24", KDS24-SS - Use 23082	Part:	10330
---	Qty:	1
---	Mfg:	Canarm
---	Mfg Part:	KD24-SS

Fan, Hood, White, 24", HFPW-24	Part:	M1411
---	Qty:	2
---	Mfg:	Canarm
---	Mfg Part:	HFPW-24

F-7903

Fan, Shutter, Backdraft damper, 12"x12" Non-Motorized	Part:	23080
---	Qty:	1
---	Mfg:	Canarm
---	Mfg Part:	SR3212X12

Hood, 15" Fits 12" Fan & Louver	Part:	23989
---	Qty:	2
---	Mfg:	
---	Mfg Part:	

Fan, Building, 12", 1/4hp, 1750rpm, 120V, 1ph, TEFC CSA Approved, S12-E1	Part:	M1072
---	Qty:	1
---	Mfg:	Canarm
---	Mfg Part:	SD120311

H-7901

Switch, Temperature, Johnson Controls, Assembly	Part:	18985
---	Qty:	2
---	Mfg:	Johnson Controls
---	Mfg Part:	-

H-7903

Heater, Baseboard, Ouellet, 1.5kW, OFM1508 208V, 66" long	Part:	22314
---	Qty:	1
---	Mfg:	Ouellet
---	Mfg Part:	OFM1508

TSH-7903

Switch, Temperature, Probe, A19ABC-24D range -30/100F	Part:	15651
---	Qty:	1
---	Mfg:	Johnson Controls
-30 - 100 F option	Mfg Part:	

Switch, Temperature, Probe, WEL 14A-602R Bulb, Well for Temperature Switch, Brass	Part:	15653
---	Qty:	1
---	Mfg:	Johnson Controls
-30 - 100 F option	Mfg Part:	WEL 14A-602R

Switch, Temperature, Johnson Controls, Assembly	Part:	18985
---	Qty:	1
---	Mfg:	Johnson Controls
---	Mfg Part:	-

TSL-7903

Switch, Temperature, Probe, A19ABC-24D range -30/100F	Part:	15651
---	Qty:	1
---	Mfg:	Johnson Controls
-30 - 100 F option	Mfg Part:	

Switch, Temperature, Probe, WEL 14A-602R
Bulb, Well for Temperature Switch, Brass

Part: 15653
Qty: 1
Mfg: Johnson Controls
Mfg Part: WEL 14A-602R

-30 - 100 F option

Switch, Temperature, Johnson Controls, Assembly

Part: 18985
Qty: 1
Mfg: Johnson Controls
Mfg Part: -

Main Control Panel

Module Code: 8200

8200

Contactor, SQD LC1D32G7 32A, 10/10/20/25HP 120VAC coil ---	Part: 10520 Qty: 1 Mfg: Square D Mfg Part: SQD LC1D32G7
Disconnect, 3ph, D324N 200A, UL240V, Nema 1, fusible disconnect ---	Part: 11163 Qty: 1 Mfg: Square D Mfg Part: SQD D324N
Contactor, SQD LC1D09G7 9A, 2/2/5/7.5HP 120VAC coil ---	Part: 12547 Qty: 1 Mfg: Square D Mfg Part: SQD LC1D09G7
Contactor, SQD LC1D50AG7 50A, 15/15/40/40HP 120VAC coil ---	Part: 12548 Qty: 1 Mfg: Square D Mfg Part: SQD LC1D50G7
Modem, Antenna, Airlink GPRS, N-Female 120-110-2107 MAX-BMLPVDB800/1900 Antenna & MAX-MTPM-800 Hardwar ---	Part: 13723 Qty: 1 Mfg: Mfg Part: 120-110-2107
PLC, EA1-S3ML C-more micro graphic user interface ---	Part: 17233 Qty: 1 Mfg: Automation Direct Mfg Part: EA1-S3ML
PLC, DV-1000CBL 2m Cable RJ12 to RJ12 C-more Micro to DL05/06/205 ---	Part: 17234 Qty: 1 Mfg: Automation Direct Mfg Part: DV-1000CBL
Breaker, Techna, JTEC4892C30 480/277V 30 AMP 2P C Trip Curve 10k SCCR ---	Part: 17543 Qty: 1 Mfg: Fusetek Mfg Part: JTEC4892C30
Breaker, Techna, JTEC4893C06 480/277V 6 AMP 3P C Trip Curve 10k SCCR ---	Part: 17709 Qty: 1 Mfg: Fusetek Mfg Part: JTEC4893C06
Breaker, Techna, JTEC4893C40 240V 40 AMP 3P C Trip Curve 10k SCCR ---	Part: 17717 Qty: 2 Mfg: Fusetek Mfg Part: JTEC4893C40
Breaker, Techna, JTEC4893C50 240V 50 AMP 3P C Trip Curve 10k SCCR ---	Part: 17718 Qty: 1 Mfg: Fusetek Mfg Part: JTEC4893C50

Breaker, Techna, JTEC4891C15 240V 15A, 1P C Trip Curve 10k SCCR ---	Part: 18359 Qty: 1 Mfg: Fusetek Mfg Part: JTEC4891C15
Motor Saver, 460 w/Diagnostic 3ph Finger Safe, DIN Rail Mountable ---	Part: 18396 Qty: 1 Mfg: Symcom Mfg Part: 460
Combination Starter, SQT LUB12 TeSysU Power Base 12A 3HP@208/240, 7.5HP@480, 10HP@600 ---	Part: 19264 Qty: 1 Mfg: Telemecanique Mfg Part: SQT LUB12
Combination Starter, SQT LUA1C20 TeSysU Aux Contact Module 1NO Ready 1NO Fault ---	Part: 19269 Qty: 2 Mfg: Telemecanique Mfg Part: LUA1C20
Combination Starter, SQT LU9SP0 TeSysU UL508 Type E Phase Barrier ---	Part: 19270 Qty: 2 Mfg: Telemecanique Mfg Part: SQT LU9SP0
Combination Starter, SQT LUB32 TeSysU Power Base 32A 10HP@208/240, 20HP@480, 25HP@600 ---	Part: 19273 Qty: 1 Mfg: Telemecanique Mfg Part: SQT LUB 32
Combination Starter, SQT LUCA32FU TeSysU Standard Control Unit 8-32A 110/120VAC coil ---	Part: 19274 Qty: 1 Mfg: Telemecanique Mfg Part: SQT LUCA32FU
Combination Starter, SQT LUCC12FU TeSysU 1 Phase Control Unit 3-12 110/120VAC coil ---	Part: 19456 Qty: 1 Mfg: Telemecanique Mfg Part: LUCC12FU
Transformer, Hammond, HAT Q005YEKF 208V to 240V,5KVA,UL/CSA,3R 1ph ---	Part: 19999 Qty: 1 Mfg: Hammond Power Solutions Mfg Part: HAT Q005BECF
Modem, Cable, RF, N-Male to SMA-Male, 15' Length GW195-180-SM-NM Use with Raven XE ---	Part: 20569 Qty: 1 Mfg: Mfg Part: GW195-180-SM-N
Relay, SQT RXM4AB1F7 Miniature Relay 4PDT 120 V AC ---	Part: 21887 Qty: 1 Mfg: Telemecanique Mfg Part: SQT RXM4AB1F
Relay, SQT RXM4AB1BD Miniature Relay 4PDT 24 V DC ---	Part: 21888 Qty: 1 Mfg: Telemecanique Mfg Part: SQT RXM4AB1B

Relay, SQT RXZE2S114M Base/Socket for RXM4 4P Relays ---	Part: 21889 Qty: 1 Mfg: Telemecanique Mfg Part: SQT RXZE2S114
Relay, SQT RXZE2S114M Base/Socket for RXM4 4P Relays ---	Part: 21889 Qty: 1 Mfg: Telemecanique Mfg Part: SQT RXZE2S114
Relay, SQT RXZE2S114M Base/Socket for RXM4 4P Relays ---	Part: 21889 Qty: 1 Mfg: Telemecanique Mfg Part: SQT RXZE2S114
Modem, Bracket, Mounting, Airlink Raven XE 100-170-1015 Use with Raven XE ---	Part: 22143 Qty: 1 Mfg: --- Mfg Part: 100-170-1015
Modem, Airlink Raven, XE V2228E-SA w/AC Pwr Adapter, Sprint V2228E-SA Requires mounting bracket MLE# 22143 ---	Part: 22170 Qty: 1 Mfg: Airlink_Communications Mfg Part: V2221E-SA
Fuse, GLD GDL3 3A 250V Time Delay Miniature 1/4"x1-1/4" ---	Part: E1187 Qty: 1 Mfg: Ferraz Shawmut Mfg Part: GLD GDL3
Fuse, GLD TR125R 125A 240V Time Delay Class R ---	Part: E1206 Qty: 3 Mfg: Ferraz Shawmut Mfg Part: GLD TR125R
<i>Panel</i>	
Misc Part, See Details As per detailed specification below Use and modify the old RTS070 PLC Control panel and Disconnect in the rental tent.	Part: 9999 Qty: 1 Mfg: --- Mfg Part: ---

Bill of Material

Project RTS151
 Description Baffinland Iron Mines Corp^Mary River Project/ PM
 Ordernumber 102140
 Drawing Number

1325 CALIFORNIA AVE.
 BROCKVILLE, ONTARIO
 CANADA
 K6V 5Y6

Installation

No.	Device Id	Function Text	Quantity	Partnumber	Description	Technical Des	Manufacturer
1	CB227		1	17717	Breaker, Techna, JTE	Breaker, Techna, JTEC4893C40, 240V 40 AMP 3P C Trip Curve	
2	CB232		1	17397	Breaker, Techna, JTE	Breaker, Techna, JTEC4892C15, 480/277V 15 AMP 2P C Trip Curve	
3	CB247		1	17717	Breaker, Techna, JTE	Breaker, Techna, JTEC4893C40, 240V 40 AMP 3P C Trip Curve	
4	CB253		1	17698	Breaker, Techna, JTE	Breaker, Techna, JTEC4892C20, 480/277V 20 AMP 2P C Trip Curve	
5	CB261		1	17397	Breaker, Techna, JTE	Breaker, Techna, JTEC4892C15, 480/277V 15 AMP 2P C Trip Curve	
6	CB266		1	18359	Breaker, Techna, JTE	Breaker, Techna, JTEC4891C15, 240V 15A, 1P C Trip Curve	Fusetek
7	CB271		1	17701	Breaker, Techna, JTE	Breaker, Techna, JTEC4892C50, 240V 50 AMP 2P C Trip Curve	
8	CB304		1	18359	Breaker, Techna, JTE	Breaker, Techna, JTEC4891C15, 240V 15A, 1P C Trip Curve	Fusetek
9	CB337		1	18359	Breaker, Techna, JTE	Breaker, Techna, JTEC4891C15, 240V 15A, 1P C Trip Curve	Fusetek
10	CB346		1	18359	Breaker, Techna, JTE	Breaker, Techna, JTEC4891C15, 240V 15A, 1P C Trip Curve	Fusetek
11	CR318	ESTOP	1	21887	Relay, SQT RXM4AB1F7	Relay, SQT RXM4AB1F7, Miniature Relay 4PDT 120 V AC	Telemecanique
12	CR318	ESTOP	1	21889	Relay, SQT RXZE2S114	Relay, SQT RXZE2S114M, Base/Socket for RXM4 4P Relays	Telemecanique
13	CR415	KILL-7901	1	21888	Relay, SQT RXM4AB1BD	Relay, SQT RXM4AB1BD, Miniature Relay 4PDT 24 V DC	Telemecanique
14	CR415	KILL-7901	1	21889	Relay, SQT RXZE2S114	Relay, SQT RXZE2S114M, Base/Socket for RXM4 4P Relays	Telemecanique
15	CR750	SYS-ON	1	21887	Relay, SQT RXM4AB1F7	Relay, SQT RXM4AB1F7, Miniature Relay 4PDT 120 V AC	Telemecanique
16	CR750	SYS-ON	1	21889	Relay, SQT RXZE2S114	Relay, SQT RXZE2S114M, Base Socket for RXM4 4P Relays	Telemecanique
17	CR760	SYS-PNL	1	21887	Relay, SQT RXM4AB1F7	Relay, SQT RXM4AB1F7, Miniature Relay 4PDT 120 V AC	Telemecanique
18	CR760	SYS-PNL	1	21889	Relay, SQT RXZE2S114	Relay, SQT RXZE2S114M, Base/Socket for RXM4 4P Relays	Telemecanique
19	DS201	200 AMP	1	11163	Disconnect, 3ph, D32	Disconnect, 3ph, D324N, 200A, UL, 240V, Nema 1, fusible disconnect	SQD
20	DS201	200 AMP	1	E1206	Fuse, GLD TR125R	Fuse, GLD TR125R, 125A 240V Time Delay	Gould
21	DS201	200 AMP	1	E1206	Fuse, GLD TR125R	Fuse, GLD TR125R, 125A 240V Time Delay	Gould

Installation

No	Device Id	Function Text	Quantity	Partnumber	Description	Technical Des	Manufacturer
22	DS201	200 AMP	1	E1206	Fuse, GLD TRI25R	Fuse, GLD TRI25R . 125A 240V Time Delay	Gould
23	FU303		1	E1187	Fuse, GLD GDL3	Fuse, GLD GDL3 . 3A 250V Time Delay	Gould
24	FU303		1	19077	Fuse, Holder, PHX 30	Fuse, Holder, PHX 3004171 . 1P 10A 250V	Phoenix
25	FU304		1	E1186	Fuse, GLD GDL2	Fuse, GLD GDL2 . 2A 250V Time Delay	Gould
26	FU304		1	19077	Fuse, Holder, PHX 30	Fuse, Holder, PHX 3004171 . 1P 10A 250V	Phoenix
27	FU318		1	E1188	Fuse, GLD GDL5	Fuse, GLD GDL5 . 5A 250V Time Delay	Gould
28	FU318		1	19077	Fuse, Holder, PHX 30	Fuse, Holder, PHX 3004171 . 1P 10A 250V	Phoenix
29	FU323		1	E1188	Fuse, GLD GDL5	Fuse, GLD GDL5 . 5A 250V Time Delay	Gould
30	FU323		1	19077	Fuse, Holder, PHX 30	Fuse, Holder, PHX 3004171 . 1P 10A 250V	Phoenix
31	FU546		1	E1190	Fuse, GLD GGC1	Fuse, GLD GGC1 . 1A 250V Fast Acting	Gould
32	FU546		1	19077	Fuse, Holder, PHX 30	Fuse, Holder, PHX 3004171 . 1P 10A 250V	Phoenix
33	IS402		1	12475	Barriers, IS, D1031Q	Barriers, IS, D1031Q . Must be marked with UL Approval	GMI
34	IS411		1	12475	Barriers, IS, D1031Q	Barriers, IS, D1031Q . Must be marked with UL Approval	GMI
35	IS424		1	12475	Barriers, IS, D1031Q	Barriers, IS, D1031Q . Must be marked with UL Approval	GMI
36	KILL318		1	14607	Button, E-Stop, ZB5	Button, E-Stop, ZB5 AT4 . E-Stop Button	SQD
37	KILL318		1	14607	Button, E-Stop, ZB5	Button, E-Stop, ZB5 AT4 . E-Stop Button	SQD
38	KILL318		1	14609	Button, ZB5 AZ105	Collar with 1-N/O and 1-N/C Contact Block	SQD
39	KILL318		1	14609	Button, ZB5 AZ105	Collar with 1-N/O and 1-N/C Contact Block	SQD
40	KILL318		1	23054	Label, Emergency Sto	Label, Emergency Stop, SQT ZBY9330 .	SQD
41	KILL318		1	23054	Label, Emergency Sto	Label, Emergency Stop, SQT ZBY9330 .	SQD
42	LT608	P-4001	1	18625	Button, XB7EV03GP	Button, XB7EV03GP . Green LED Pilot Light 120VAC	Square D
43	LT614	P-4901	1	18625	Button, XB7EV03GP	Button, XB7EV03GP . Green LED Pilot Light 120VAC	Square D
44	LT755	SYSTEM	1	18626	Button, XB7EV04GP	Button, XB7EV04GP . Red LED Pilot Light 120VAC	Square D
45	M227	11-7902	1	10520	Contactor, SQD LC1D3	Contactor, SQD LC1D3G7 . 32A, 10/10/20/25HP	SQD
46	M247	11-7901	1	10520	Contactor, SQD LC1D3	Contactor, SQD LC1D3G7 . 32A, 10/10/20/25HP	SQD
47	OP367	MICRO-GRAPHIC	1	17233	PLC, EAI-S3ML	PLC, EAI-S3ML . C-more micro graphic user interface	
48	OP367	MICRO-GRAPHIC	1	17234	PLC, DV-1000CBL	PLC, DV-1000CBL . 2m Cable RJ12 to RJ12	
49	PDB206		1	E1217	Power Block, GLD 675	Power Block, GLD 67583 . 175A 1Pri 8Sec Aluminum	Gould
50	PDB206		1	16071	Power Block, GLD 857	Power Block, GLD 8570 . safety cover	Gould
51	PDB206		1	16071	Power Block, GLD 857	Power Block, GLD 8570 . safety cover	Gould
52	PDB206		1	16071	Power Block, GLD 857	Power Block, GLD 8570 . safety cover	Gould
53	PDB206A		1	E1215	Power Block, GLD 631	Power Block, GLD 63163 . 90A 1Pri 4Sec Aluminum 3P	Gould

Installation

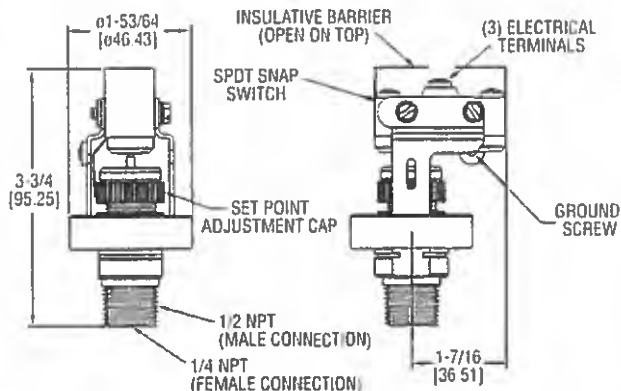
No.	Device Id	Function Text	Quantity	Partnumber	Description	Technical Des	Manufacturer
54	PDB206A		1	16010	Power Block, GLD 853	Power Block, GLD 8530 , safety cover	Gould
55	PDB206A		1	16010	Power Block, GLD 853	Power Block, GLD 8530 , safety cover	Gould
56	PDB206A		1	16010	Power Block, GLD 853	Power Block, GLD 8530 , safety cover	Gould
57	PLC369		1	DLO6			
58	PLC507		1	12752	PLC, D0-06DR-D	PLC, D0-06DR-D . 20PT 24VDC Input 16PT Relay Output Base Unit DL06	Koyo
59	PLC507		1	E1024	PLC, D2-Bat-I	PLC, D2-Bat-I . Battery for PLC DL05/06/205	
60	PLC508		1	D0-06DR-D			
61	PS304		1	20780	Power supply, Teleme	Power supply, Telemecanique ABL7 RM24025 , In 100-240VAC Out 24VDC 2.5A	Telemecanique
62	PWR203		1	18396	Motor Saver, 460 w/D	Motor Saver, 460 w/Diagnostic 3ph . Finger Safe. DIN Rail Mountable	
63	REC337		1	GFI-15			
64	STR216	P-4001	1	19274	Combination Starter.	Combination Starter, SQT LUCA32FU , TeSysU Standard Control Unit 8-32A	
65	STR216	P-4001	1	19273	Combination Starter.	Combination Starter. SQT LUB32 . TeSysU Power Base 32A	
66	STR216	P-4001	1	19269	Combination Starter.	Combination Starter. SQT LUA1C20 . TeSysU Aux Contact Module	Telemecanique
67	STR216	P-4001	1	19270	Combination Starter.	Combination Starter. SQT LU9SP0 . TeSysU UL508 Type E Phase Barrier	
68	STR272	P-4901	1	20669	Combination Starter.	Combination Starter. SQT LUCC18FU , TeSysU I Phase Control Unit 4.5-18	
69	STR272	P-4901	1	19273	Combination Starter.	Combination Starter, SQT LUB32 , TeSysU Power Base 32A	
70	STR272	P-4901	1	19269	Combination Starter.	Combination Starter. SQT LUA1C20 . TeSysU Aux Contact Module	Telemecanique
71	STR272	P-4901	1	19270	Combination Starter.	Combination Starter, SQT LU9SP0 , TeSysU UL508 Type E Phase Barrier	
72	SW609		1	14660	Button, ZB5 AD3	Button, ZB5 AD3 , 3 Pos. Switch, Maintained	SQD
73	SW609		1	14610	Button, ZB5 AZ103	Button, ZB5 AZ103 , 3	SQD
74	SW615		1	14660	Button, ZB5 AD3	Button, ZB5 AD3 , 3 Pos. Switch, Maintained	SQD
75	SW615		1	14610	Button, ZB5 AZ103	Button, ZB5 AZ103 , 3	SQD
76	T249		1	19999	Transformer, Hammond	Transformer, Hammond. IAT Q005YEKF . 208V to 240V, 5KVA, UL/CSA, 3R, 1ph	



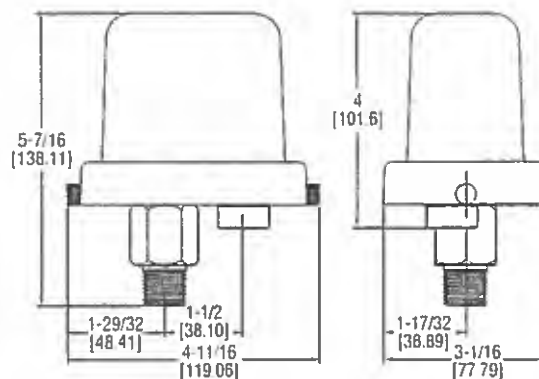
Series A1F Compact OEM Pressure Switch

Specifications - Installation and Operating Instructions

A1F



A1F with A-447



The Series A1F Compact OEM Pressure Switch is ideal for panel mounting wherever a high-quality, economical open-case or weatherproof control is required.

INSTALLATION

1. **Location:** Select a location where the temperature limits of -40 to 180°F (-40 to 82°C) will not be exceeded. Locate the switch as close as possible to the pressure source. Long lengths of piping will not affect accuracy of the actuation point but will slightly add to response time.

2. **Mounting and Processing Connection:** Avoid mounting surfaces with excess vibration which could cause false actuation when pressure is near setpoint. The switch should be mounted within 20° of vertical for proper operation. Mount the switch by connecting it to the process piping using either 1/4" NPT female or 1/2" male connection. Pipe joint compound or TFE thread tape should be used to prevent leakage.

3. **Electrical Connections:** The SPDT snap switch includes normally open, normally closed and common connections. The common and normally open contacts will close and the common and normally closed contacts will open when pressure increases to the setpoint. The actions will reverse when pressure decreases below the setpoint minus the deadband. A green grounding screw is provided on the switch bracket. All wiring should be in accordance with local codes.

SETPPOINT ADJUSTMENT

1. Determine the setpoint pressure. The approximate actuation point can be set by turning the adjustment cap up or down, aligning the top of the O-ring, located above the cap, with the appropriate scale graduation.

2. Connect tubing or piping from the pressure port on bottom of switch to one leg of a tee. Connect the second leg to a pressure

SPECIFICATIONS

Service: Compatible liquids and gases.

Wetted Materials:

Pressure Chamber: 316 SS.

Diaphragm: Fluorocarbon.

Temperature Limit: -40 to 175°F (-40 to 80°C).

Pressure Limits: 750 psig (51 bar).

Enclosure Rating: No rating for open construction. Installed properly within an optional A-447 enclosure meets NEMA 4X standards.

Switch Type: SPDT snap switch.

Electrical Rating: 15A @ 120/240/480 VAC, 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC.

Electrical Connection: Screw terminals.

Process Connection: 1/4" female NPT and 1/2" male NPT

Mounting Orientation: Within 20° of vertical.

Set Point Adjustment: Knurled screw cap with indicating scale

Deadband: Fixed, See deadband chart.

Weight: 10.5 oz (297 g).

test gage of known accuracy and in an appropriate range. The third leg should be connected to a controllable source of pressure. 3. Connect a volt/ohm meter or other circuit tester to the snap action terminals to indicate when switching occurs.

4. Slowly apply pressure to the system and note the pressure at which switching occurs.

5. Operate the switch through several cycles to confirm proper actuation point.

6. Remove test apparatus and attach switch to pressure source and control circuit wiring. Place switch in service.

Example of how to order:

A1F - 0 - SS - 1 - 4
1 2 3 4 5

1. Diaphragm Designation:
F - Fluorocarbon
2. Enclosure Designation:
O - Open Construction No Enclosure
3. Housing Material Designation:
SS - 316SS
4. Switch Designation:
1 - SPDT Snap Action Switch
5. Operating Pressure Range Designation:
1 - 2 to 15 psig
2 - 4 to 75 psig
3 - 8 to 225 psig
4 - 16 to 450 psig

Series A1F Deadband Chart-psig (bar)

Range	Deadband at Minimum Range	Deadband at Maximum Range
2 to 15 (0.14 to 1.03)	2 (0.14)	3 (0.21)
4 to 75 (0.28 to 5.17)	4 (0.27)	15 (1.0)
8 to 225 (0.55 to 15.5)	8 (0.55)	25 (1.7)
16 to 450 (1.1 to 31.0)	15 (1.0)	50 (3.5)

MAINTENANCE

Upon final installation of the Series A1F Compact OEM Pressure Switch, no routine maintenance is required. A periodic check of the system calibration is recommended. The Series A1F is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

Series M Mechanical Tilt Float Level Switch

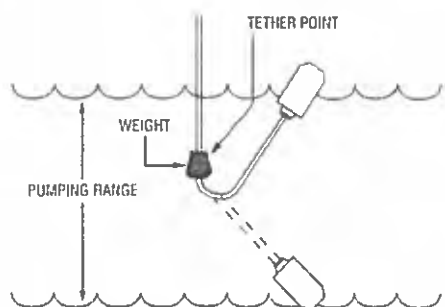
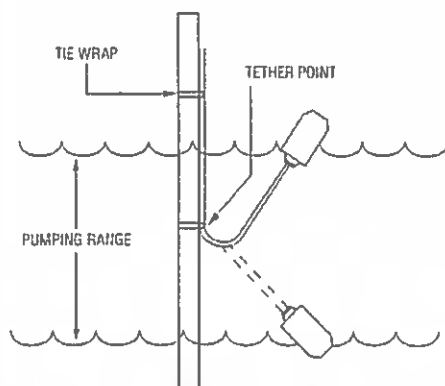
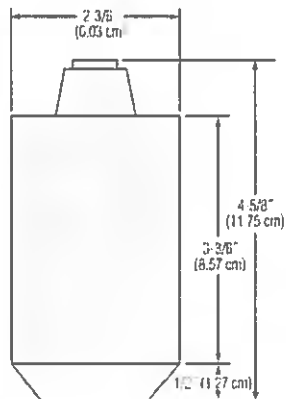
- ▶ Non-Mercury Switch
- ▶ Sealed Cable
- ▶ Impact & Corrosion Resistant ABS Shell
- ▶ N.O., N.C., SPDT Contacts
- ▶ Various Cable Lengths
- ▶ Color Coded Body

Designed for level control and alarm applications in difficult liquids such as sewage and waste water. Series M mechanical tilt floats are ideal for applications where the presence of mercury is a concern. Series M Switches have impact resistant ABS shell and neoprene jacketed cable.

Specifications

Cord	2 or 3 conductor 16 AWG wire SJOW Oil Resistant CPE
Contact Rating	13 amp @ 120/240 VAC 1/2 hp
Contact Design	SPST, Normally Open or Normally Closed Common with N.O. & N.C. (form C)
Temperature Rating	
Dry	32°F to 194°F (0°C to 90°C)
Water Resistant	32°F to 140°F (0°C to 60°C)
Overall Weight	1.0 lbs. (not including weight)
Tether Method	Tie-wrap nylon, weight: 2.5 lbs.
Approvals	U.L. Recognized, CSA Cert.

Dimensions



Applications

- Level Control
- Alarms
- Sewage Lift Systems
- Slurries
- Drainage Sumps
- Wastewater Treatment
- Holding Tanks

How to Order

Use the **Bold** characters from the chart below to construct a product code.

Series	M	XXX	XX	X
Contact Configuration				
BLU – SPST, Normally Open, narrow angle ¹				
YEL – SPST, Normally Closed, narrow angle ¹				
RED – SPST, Normally Open, wide angle ²				
WHI – SPST, Normally Closed, wide angle ²				
GRE – SPDT, Form C, wide angle ²				
Length				
40 – 40 feet (12.19 m)				
Tether Method				
T – Tie				
W – Weight				

Tether Method	Part Number
Tie Wrap	7762360
Weight	7762381

Notes

- 1 Narrow angle pumping range approximately 2 in. to 8 in
- 2 Wide angle pumping range approximately 5 in. to 18 in

OIL WATER SEPARATORS – OWS SERIES

Application:

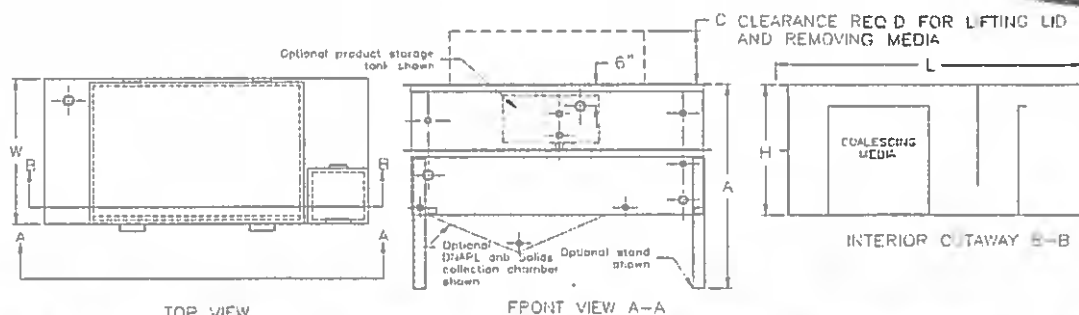
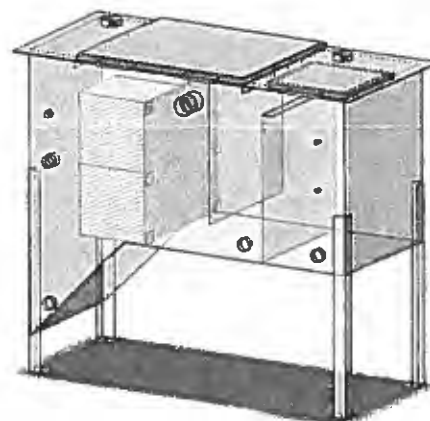
newterra Oil Water Separators are designed to remove oil from a liquid phase inlet stream. As the oil/water mixture is passed through the coalescing oil/water separator, larger oil droplets migrate to the surface to be collected and skimmed off. The media collects the smaller droplets until they are large and buoyant enough to float to the surface.

Construction:

The standard OWS Series are fabricated from carbon steel. For corrosion resistance, the interior is epoxy coated and the exterior is painted. Optional stainless steel construction is also available. A large lid allows access to the coalescing media and oil skimmer while a small lid allows access to the pump-out tank.

Standard Features:

- Standard finish: Interior is epoxy coated. Exterior is painted **newterra** blue over zinc primer (except stainless steel option)
- Sacrificial anode to prevent corrosion of tank.
- 11 AWG carbon steel construction
- Sludge containment section
- Adjustable oil skimmer
- Water underflow/overflow weir design
- Easy removal of coalescing media for cleaning
- High Alarm Level Coupling and Pump High/Low Level Coupling in the pump-out chamber



Dimension Chart:

Part Number	Width "W"	Standard Height "H"	Standard Overall Length	Length with Extended Pump-out	Height with Elevated Pump-out "A"	Overhead Clearance "C"	Standard Pump-out Volume	Extended Pump-out Volume	Elevated Pump-out Volume	Product Tank Volume
OWS-2	16"	30"	64"	76"	n/a	14"	23 Gal	41 Gal	n/a	8.1 Gal
OWS-4	28"	30"	64"	76"	n/a	26"	46 Gal	81 Gal	n/a	8.1 Gal
OWS-8	28"	30"	76"	88"	n/a	26"	46 Gal	81 Gal	n/a	8.1 Gal
OWS-12	40"	30"	76"	88"	n/a	38"	70 Gal	122 Gal	n/a	8.1 Gal
OWS-18	40"	30"	88"	n/a	60"	24"	70 Gal	n/a	130 Gal	12.2 Gal
OWS-24	52"	30"	88"	n/a	60"	24"	93 Gal	n/a	173 Gal	12.2 Gal
OWS-36	52"	42"	88"	n/a	72"	24"	133 Gal	n/a	212 Gal	17.8 Gal
OWS-45	64"	42"	88"	n/a	72"	24"	166 Gal	n/a	265 Gal	17.8 Gal
OWS-72	100"	42"	88"	n/a	72"	24"	266 Gal	n/a	425 Gal	17.8 Gal

OIL WATER SEPARATORS – OWS SERIES

Specification Chart:

Part Number	HQ PAC		½" Packing		¾" Packing		1¼" Packing		Slant Plate	
	Oil (0.9)	Gas (0.72)	Oil (0.9)	Gas (0.72)	Oil (0.9)	Gas (0.72)	Oil (0.9)	Gas (0.72)	Oil (0.9)	Gas (0.72)
OWS-2	9.7	27.0	5.0	14.1	3.5	9.8	2.3	6.3	0.9	2.5
OWS-4	19.3	54.0	10.1	28.2	7.0	19.7	4.5	12.7	1.8	4.9
OWS-8	38.6	108.1	20.2	56.5	14.0	39.3	9.1	25.4	3.5	9.8
OWS-12	57.9	162.1	30.3	84.7	21.1	59.0	13.6	38.1	5.3	14.7
OWS-18	86.9	243.2	45.4	127.1	31.6	88.4	20.4	57.1	7.9	22.1
OWS-24	115.8	324.2	60.5	169.5	42.1	117.9	27.2	76.1	10.5	29.5
OWS-36	159.2	445.8	88.1	190.7	47.4	132.6	30.6	85.7	11.8	33.2
OWS-45	199.0	557.3	85.1	238.4	59.2	165.8	38.2	107.1	14.8	41.5
OWS-72	318.5	891.7	136.2	381.4	94.7	265.3	61.2	171.3	23.7	66.3

Rated US GPM (Based on 25 micron particles at 65 deg F and design safety factor of 1.25)

Larger spaced packing will not plug as quickly as closely spaced packing allowing longer intervals between maintenance requirements. The coalescing slant plate should be used in applications with heavy sludge loads because it does not foul quickly.

Options Table:

Option	Description
Stand	The separator will be elevated above ground to assist in gravity discharge or to provide room underneath the separator for blowers and pumps. This replaces the standard foot mounts. The maximum stand height for 8' clearance is 36" for OWS-18 and OWS-24 and 24" for OWS-36 and larger.
Oversize Pump-out (Extended)	OWS-2, OWS-4, OWS-8 and OWS-12 only. The final section of the separator can be oversized to allow a greater water pump-out volume. For the OWS-2, OWS-4, OWS-8 and OWS-12 the oversized pump-out will be an extended length of the final section of the separator.
Oversize Pump-out (Elevated)	OWS-18, OWS-24, OWS-36 and OWS-45 only. The final section of the separator can be oversized to allow a greater water pump-out volume. For the OWS-18, OWS-24, OWS-36 and OWS-45 the separator will be raised on a stand and the final section will extend to the ground to give the oversized volume.
Top Inlet	A top mounted option is available to allow for pre-separation of air and liquid at the inlet to the separator.
Product Storage Tank	A tank may be mounted on the front of the separator to collect the oil from the skimmer. The volume of the product storage tank is: OWS-2, OWS-4, OWS-8 and OWS-12: 8.1 US Gal OWS-18, OWS-24: 12.2 US Gal OWS-36, OWS-45: 17.8 US Gal
Telerette Basket	A telerette basket may be added to allow for a high surface area polishing media for final hydrocarbon removal.
Oversize Inlet and Outlet	The inlet and outlet couplings may be increased by one size to allow for higher flow through the separator.
Stainless Steel	Each separator can be purchased with Stainless Steel construction instead of the standard Carbon Steel.
Main Tank Low Coupling	Additional couplings may be added to allow for the installation of a low level switch in the main separator tank. NOTE: This option covers only the cost of installing the coupling, the switches must be purchased separately.
Main Tank High Coupling	Additional couplings may be added to allow for the installation of a high level switch in the main separator tank. NOTE: This option covers only the cost of installing the coupling, the switches must be purchased separately.
Custom Size	A custom sized separator can be designed to meet specific project needs.
Media	Custom media available for contaminants other than oil/BTEX such as chlorinated solvents and other DNAPL products
DNAPL Separation	The separator can be supplied with a DNAPL sump to capture heavy fluids and solids and allow collection below the media of the oil water separator.

Sample Ordering Format:

OWS-4 with ½" Packing
SG: 0.9
Temp: 65 deg F
Minimum Micron Size: 25
Design Safety Factor: 1.25

Options:
Oversize Pumpout (Extended)
Product Storage Tank
Stand: 24"

ATB 3 and ATS3 Series Spec Sheet

Level Switch - Small Size - Heavy Duty



The ATB3 is designed for high or low level alarm or switch point applications in rugged situations similar to oil tank reservoirs or industry vessels that require a more robust level switch. Notice the larger brass one piece machined hex to get a wrench on - this model also has an optional brass set screw locking collar in place of the clip.

Internal reed switch selection is the same Almeg quality standard but we've beefed up the external part as well as fully encapsulated the reed switch to maintain a complete moisture free environment. The leads are wire wrapped (not clipped) soldered and heat shrink sealed to the reed switch before encapsulating.

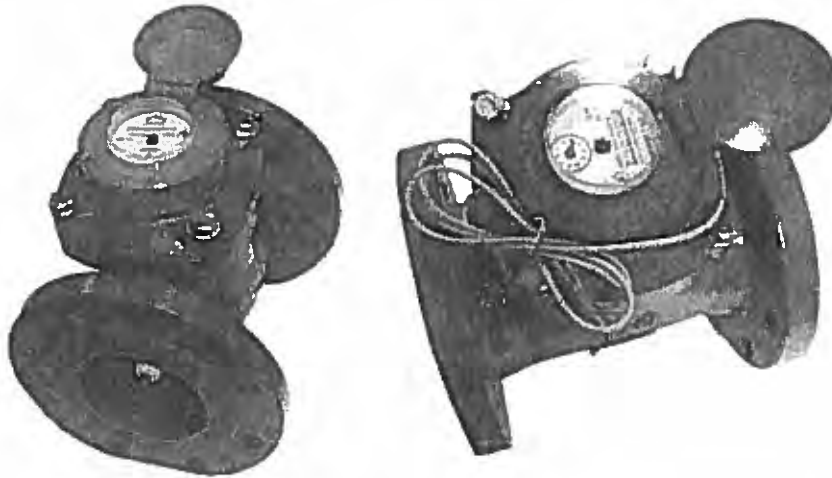
The TRUE closed cell Buna float will not swell or take on moisture - even if cut or drilled. It is designed like a tight bee hive or honey comb construction.

100% of our controls are tested before shipping.

The ATB3 is available in a single order or OEM applications.

DLJ Epoxy Coated Cast Iron Turbine Meters

200T, 250T, 300T, 400T, 600T, 800T



Description

Operation DLJ Turbine Meters are horizontal Woltman type water meters designed for installation where occasional low and moderate to high sustained flows are demanded. Water flow drives a vertical impeller in direct proportion to the quantity of water passing through the meter. Impeller revolutions are transferred to the register assembly through a reduction gear and magnetic drive.

Compliance The DLJ Turbine Meters comply with AWWA C701 and ISO 4064 Class B standards.

Installation The meter must be installed in a clean pipeline, free of any foreign materials. Install the meter with direction of flow as indicated by the arrow cast into the meter body. You can install the meter vertically or horizontally and the registers are fully revolvable for ease of reading. It is recommended to strain the incoming water to prevent foreign debris damage and to reduce the effects of water turbulence.

Application The DLJ Cold Water Turbine Meters are for use only with cold water up to 120 degrees F (50 degrees C)

Construction The meter consists of a fully epoxy coated cast iron main case with the flow direction cast into it and a removable measuring element for easy maintenance.

Characteristics	Specifications					
	DLJ 200T 2"	DLJ 250T 2 1/2"	DLJ 300T 3"	DLJ 400T 4"	DLJ 600T 6"	DLJ 800T 8"
Flow Rating (gpm)	325	395	495	1250	2500	3450
Continuous Flow (gpm)	250	300	375	1000	2000	2800
Low Flow (gpm)	4	5	6	9	32	38
Maximum Pressure (psi)	175	175	175	175	175	175
Maximum Temperature (°F)	120	120	120	120	120	120
Sweep Hand Registers (Gallons)	10/100	10/100	10/100	10/100	10/100	10/100
Register Capacity (Millions of Gallons)	1000	1000	1000	1000	1000	1000

watermeters.com

*the first and still the best online source for
water meters*

DLJ Meter



www.watermeters.com

DLJ Epoxy Coated Cast Iron Turbine Meters

200T, 250T, 300T, 400T, 600T, 800T

Direct Read Register The register is contained in a hermetically sealed nylon casing with a 5mm tempered glass lens. The totalizer wheels are large and easy to read and the sweep hands are offset on separate 10 gallon and 100 gallon register wheels. The large black spinning trickle indicator is excellent for leak detection. Each register clearly shows its applicable meter size.



Maintenance The register/measuring assembly is easily removable and replaceable if needed, and doesn't require taking the meter off line.

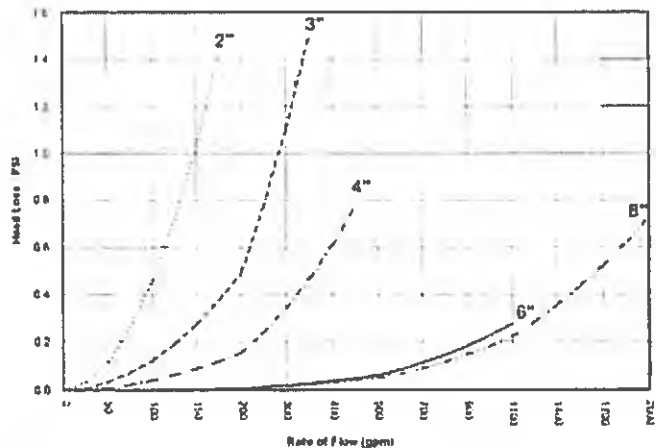
Connections The DLJ Turbine Meters are available with standard Class 150lb ANSI flanges (4 bolt in 2, 2 1/2" and 3", 8 bolt in 4, 6 and 8"). Companion Flange sets in Cast Iron or PVC and Uni-Flanges are available for ease of connection.

Pulse Output The DLJ line is available with a dry contact reed switch pulse output. This requires external DC power, 4 watts, 30VDC maximum. Contact closure is 1 pulse per 100 gallons on the 2 - 3" Turbines and 1 pulse per 1000 gallons on the 4 - 8" Turbines



Magnetic Drive The magnetic drive design eliminates all miscouplings associated with conventional right angle drives. Excess torque is eliminated in the encased undergear assembly, ensuring constant magnet coupling.

DLJ 2" - 8" Turbine Meter Head Loss



Characteristics	Specifications					
	DLJ 200T 2"	DLJ 250T 2 1/2"	DLJ 300T 3"	DLJ 400T 4"	DLJ 600T 6"	DLJ 800T 8"
Length (Inches)	12	7.75	8.75	9.75	11.6	13.6
Weight (Pounds)	32	29	35	40	92	141
Crated Weight (Pounds)	43	40	47	50	110	150

Daniel L. Jerman Co.
275 Railroad Place
Hackensack, NJ 07601
Phone 800.654.3733
Fax 201.487.3953
International Phone 201.487.7444
email: sales@watermeters.com

DLJ Meter



www.watermeters.com

Stacking Shipping Containers on Land for an Off-Axis Detector

J. Cooper, J. Kilmer, B. Wands
Fermi National Accelerator Laboratory, Batavia, IL 60510

(May 29, 2003)

Introduction

Fig. 1 shows a typical International Standards Organization (ISO) Series 1 shipping container.

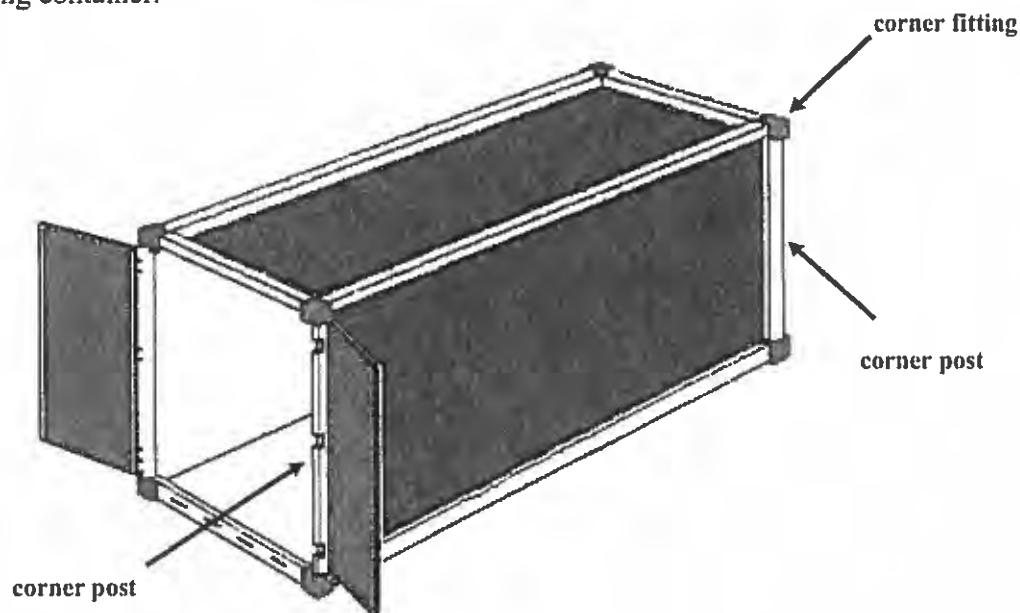


Figure 1. ISO Series 1 Shipping Container

These containers are designed to make vertical contact with each other through discrete corner fittings; when stacked, all vertical force is transferred through these fittings, in turn loading the corner posts, and not the walls, of the container. The number of containers which can be stacked on each other is determined by the strength of the corner posts.

ISO Standard 1496⁽¹⁾ states that the corner posts of ISO Series 1 containers should be tested to a load of 86,400 kg (190,480 lbs). This is the load applied to the posts of the bottom container in an 8-on-1 stack of 24,000 kg (gross weight) containers,

multiplied by a factor of 1.8. This extra factor is used to take into account "conditions aboard ship and the relative eccentricities between superimposed containers."⁽¹⁾ The "conditions aboard ship" were derived from a 1964 study of maximum acceleration values under the worst sea and wind conditions.⁽²⁾

Calculating the safe stacking height for loaded containers *on land* requires some understanding of the corner posts, their material properties, possible failure modes, and what constitutes an adequate factor of safety.

Corner Post Geometry and Compressive Load-Bearing Capacity

Corner post steels typically correspond to the specification ASTM A-572, with a yield stress of 47,000 psi, and an ultimate stress of 70,000 psi. This is a low alloy columbium or vanadium steel commonly used for high-strength steel weldments, such as bridges. The load-bearing characteristics of corner posts are complex, because in a walled container the posts receive substantial lateral stability, and compressive cross sectional area, from the participation of the walls and doors.

The corner post can fail in two ways: The first is collapse, or buckling. This occurs in a slender column when the compressive load reaches a critical load P_{cr} which is so large that the column can no longer recover from small lateral displacements along its length. The result is sudden and catastrophic loss of stiffness, and gross deformation of the column and its attached material.

A second type of failure can occur if the compressive load P_{comp} exceeds the value $S_y A$, where S_y is the yield stress of the material, and A is the cross sectional area of the post. Even a column which is stable against buckling failure can fail from compressive yielding. Failures of this type are rare for columns, since the yielding will tend to produce larger cross sectional area through plastic deformation, and eventually become self-limiting. This self-limit may not be reached before even a very short column becomes unstable, however, resulting in a type of collapse that is characterized by large amounts of plastic deformation.

The most likely failure mode, given the substantial lateral constraint offered by the walls, is probably a combination of collapse and gross yielding, a type of failure referred to as elastic/plastic collapse.

The calculation of collapse (buckling) loads for long, slender steel columns uses the Euler equation:

$$P_{cr} = k\pi^2 EI/L^2$$

where P_{cr} = critical (collapse) load

E = modulus of elasticity of steel = 30e6 psi

I = minimum moment of inertia of section

L = length of column

k = factor for end rotational restraint (theoretical range from 1-4)

For the corner posts, the degree of end rotational restraint is difficult to quantify. The top, bottom, and side rails will serve to provide substantial restraint, and even the corner fitting contact of the loading container above a corner post will tend to limit rotation. Therefore, a k factor of 2 is chosen for calculating the estimates of collapse load.⁽³⁾ This is less than the complete rotational restraint ($k = 4$), but greater than free rotation ($k = 1$).

In addition to resisting collapse, the corner post must also work at a compressive stress that is below the yield of the material. Corner posts will yield at a stress of 47,000 psi. Therefore, the minimum cross sectional area for resisting the corner post loads is $A = 190,840/47,000 = 4.05 \text{ in}^2$.

While the minimum performance of a corner post is standardized via ISO, the actual geometry of the post is not. Manufacturers have explored many different designs for many different types of containers, all of which will pass the ISO test load of 86,400 kg or 190,840 pounds. Figure 2 shows the most common corner post cross-sections at the door and walled ends of a Series 1 container. These posts are made of 6mm thick pressed steel shapes welded together along the length of the post. In the case of the door end post, a piece of hot rolled channel 113 x 40 x 10 mm is welded to the 6mm plate. Both posts in Figure 2 have adequate cross sectional area from the standpoint of compressive stress. However, the Door End post (a), has a collapse load which is less than the load required by the ISO standard, and therefore must rely on interaction with the walls and doors of the container to produce the necessary load-bearing capacity.

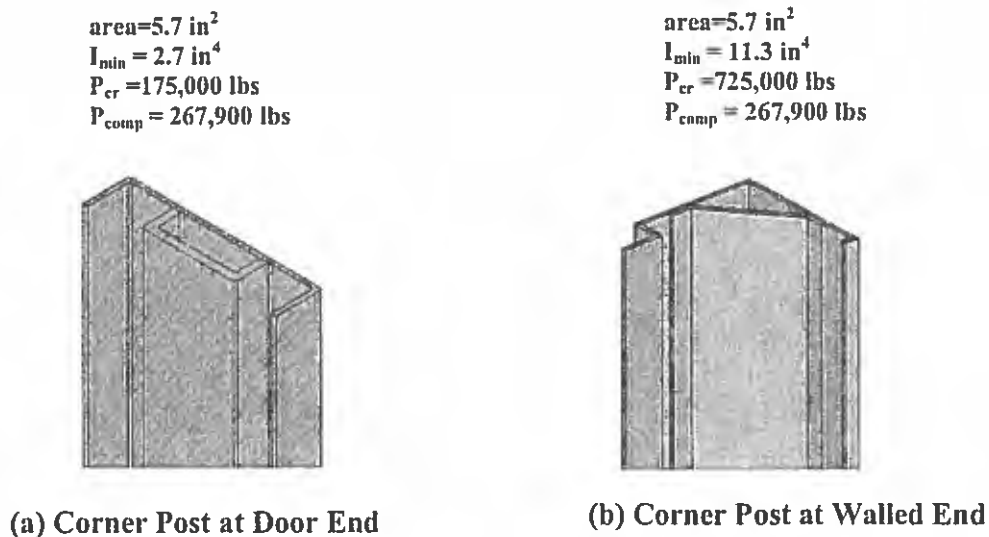


Figure 2. Corner Post Cross Sections – Properties and Load Capacities without Wall/Door Participation

The effect of participation of the walls and doors is illustrated in Fig. 3. The profile of Fig. 2(a) has been used with a 3-inch wide strip of adjacent container sidewall (3.6 mm thick) and a 2-inch wide strip of door panel (2 mm thick), to form a column of considerably higher strength than the profile of Fig. 2(a) alone. The cross section shown, with walls, has a critical load of approximately 252,000 lbs, which is well above the 175,000 lbs of the corner post alone, and well above the 190,480 lbs required by the ISO Standard.

These calculations show that the door is an important part of the load path under stacking, providing additional cross-sectional area for compression and stability. The door also acts as a sheer wall, preventing the parallelogram deformation of the end referred to as "racking" or "sideway." For these reasons, in commercial practice, the doors on a container within a stack are presumably never opened. This is not a constraint on the way the containers are used in commerce, since only one container at a time is loaded or unloaded at terminals, with stacking occurring only during transit.

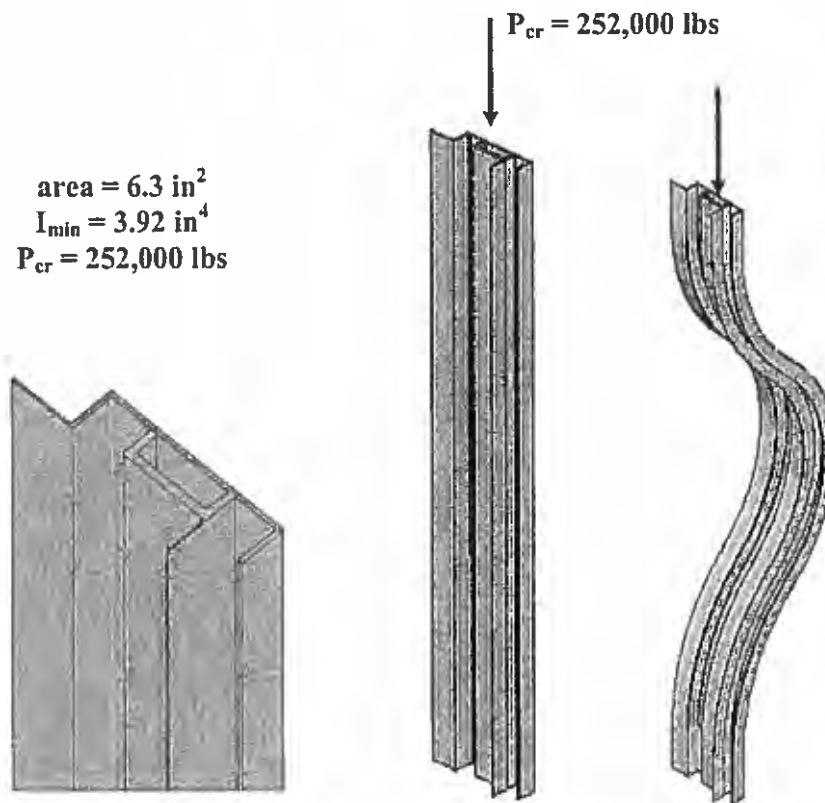


Figure 3. Corner Post from Fig. 2(a) showing increase in buckling strength due to participation of wall

Corner Fittings

The corner fittings shown in Figure 1 are an integral part of the load-bearing column in the container. ISO 1161-1984(E)⁽⁴⁾ states "Corner fittings for Series 1 freight containers shall be capable of withstanding the loads calculated in accordance with the requirements of ISO 1496/1 for Series 1 containers." This means that the bottom corner fitting of the bottom container in a stack must withstand the weight of the containers stacked above it, plus the weight of the bottom container itself. The maximum load which a single corner fitting must take is then

$$P_{\text{tot}} = 190,480 + (52,800/4) = 203,680 \text{ lbs}$$

A typical corner fitting is shown in Fig. 4. The cross sectional area of this fitting is shown in Fig. 5. The total cross sectional area available for compression is 10.15 in². This results in an average compressive stress under maximum load of 20,067 psi.

Corner fittings are typically cast and machined from A-216 steel, which has a minimum specified yield stress of 40,000 psi. Therefore, under maximum load, a corner fitting of the cross section shown below operates with a safety factor on yield of nearly 2.0

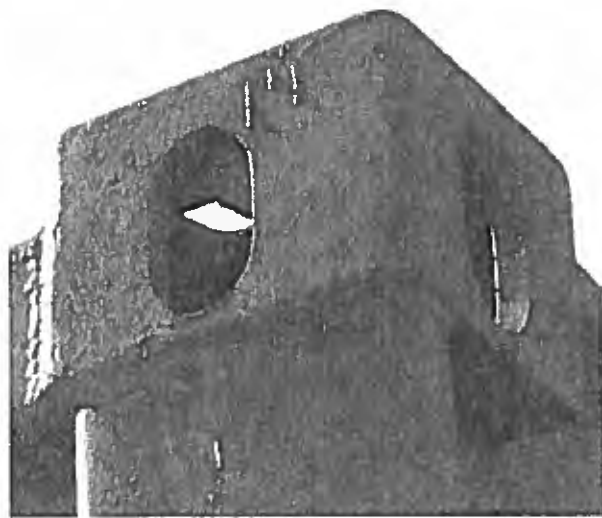


Figure 4. Corner Fitting

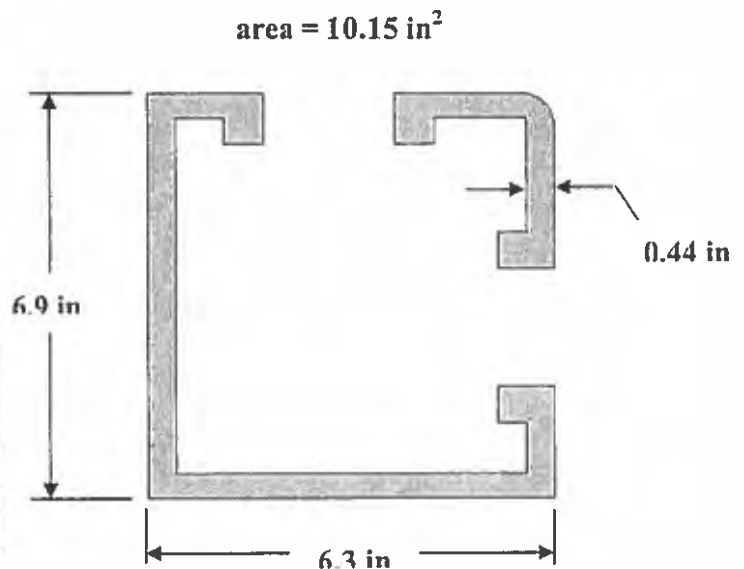


Figure 5. Fitting Cross Section

Safety Factor for Stacking Containers on Land

A safety factor for the corner posts in the bottom container of a stack can be defined as

$$SF = F_{cp-fail} / F_{cp-act}$$

where SF = safety factor

F_{cp-act} = actual operating load on corner post

$F_{cp-fail}$ = failure load of corner post

The ISO Standard, however, does not define a force $F_{cp-fail}$; rather, it specifies the load that each corner post must withstand *without* failure. In this sense, the specified load is a *proof* load, $F_{cp-proof}$, which is simply a load which each corner post must be shown capable of resisting. For the purposes of calculating a safety factor, the specified test load can be thought of as an absolute lower limit on the failure load. Any safety factor calculated with $F_{cp-fail} = F_{cp-proof}$ will be smaller than the actual safety factor, since $F_{cp-proof}$ is always smaller than $F_{cp-fail}$.

Using the expression above, the safety factor of an 8-on-1 stack of containers on land is at least 1.8. Safety factors in engineering commonly range from 1.25 to 2.0 or greater, depending on the amount of confidence the designer has in material performance and load characterization. The AISC Steel Construction Code⁽⁵⁾, for example, uses a safety factor of 2 for column loading; however, conservative design in civil structures is necessary because there is typically no load-testing of the parts; they are designed, manufactured, and set in place with only the calculation and fabrication standards serving as proof of merit. Aircraft design, however, uses safety factors closer to 1.25, due to the great penalties incurred by excess weight. The extremely rigorous materials and testing programs common in the aviation industry justify these smaller safety factors.

Because the corner posts of all containers are known to have been tested to the load stipulated by ISO 1496 with no failures occurring at a load that is less than the test load, a safety factor of about 1.5 is adequate for a stack of containers on land. Table I shows the safety factor on the corner post loading of the bottom container in a stack, for stacks of various heights. This table is based on the application of the equation for safety factor, with $F_{cp-fail} = F_{cp-proof} = 190,480$ lbs, and containers of 52,910 lbs gross weight:

**Table I. Safety Factors on Land for Various Stack Heights on Land
with Container Corner Post Capacity of 190,480 lbs (86,400 kg)**

Number of Containers Stacked on One	Total Height of Stack	Safety Factor on Corner Post Loading
8	9	1.80
9	10	1.60
10	11	1.44
11	12	1.31

The table shows that we can stack 9-on-1 on land, and maintain a safety factor of greater than 1.5.

Possible Modifications

For a final detector design, good engineering practice would require that the corner posts of several containers be loaded to failure to more precisely determine F_{cp_fail} , from which more accurate stacking safety factors could be calculated. Some advantage might be taken of the fact that while F_{cp_fail} is not known, it is certainly higher than 190,480 lbs (86,400 kg). If the measured failure load is just 4% higher than the test (proof) load, the safety factor on a 10-on-1 stack becomes 1.5, and stacking to that height becomes defensible.

Some vendors advertise containers with a higher capacity⁽⁶⁾ than the ISO Series 1 standard, and advantage could be taken of the greater payload, as well as the higher post strength, in configuring the detector array. The typical higher post rating quoted is 214,290 lbs (97,400 kg), allowing exactly 9 on 1 stacking of 52,910 lb (24,000 kg) containers at sea and therefore allowing 10 on 1 on land with a safety factor of $(9/8) \times (1.44) = 1.62$.

Similarly, if the Off-Axis detector density is small enough that our standard gross weight container is less than 52,910 lbs (24,000 kg), then even higher stacks could be supported. Table II shows the stack heights possible when the higher strength containers are used. A container volume of 33.2 m³ is assumed with a tare weight of 2,250 kg and four different detector gross weights of 22,150 kg, 24,000 kg, 26,000 kg and 30,480 kg. The 30,480 kg number is the vendor quoted maximum gross weight for the higher strength containers. Comparing Tables I and II shows that the higher strength posts lead to the same height stacks as the lower strength posts for containers of density 0.75 gm/cc vs. 0.66 gm/cc.

**Table II. Stack Heights on Land for Various Detector Densities
with Container Corner Post Capacity of 214,290 lbs (97,400 kg)**

Number of Containers Stacked on One	Total Height of Stack (m)	Safety Factor on Corner Post Loading			
		with payload density = 0.60 g/cc	with payload density = 0.66 g/cc	with payload density = 0.75 g/cc	with payload density = 0.85 g/cc
		(22,150 kg gross)	(24,000 kg gross)	(27,150 kg gross)	(30,480 kg gross)
8 on 1	23.3	2.20	2.03	1.80	1.60
9 on 1	25.9	1.95	1.80	1.59	1.42
10 on 1	28.5	1.76	1.62	1.43	1.28
11 on 1	31.1	1.60	1.48	1.30	1.16

Conclusion

Stacking ISO containers 10 high on land is reasonable, and stacks as high as 12 may be possible depending on the type of container purchased and on the loading of the container with Off-Axis detector elements. For a final detector design, good engineering practice would require that the corner posts of the selected containers be loaded to failure to more accurately determine the safety factor of the stacked array.

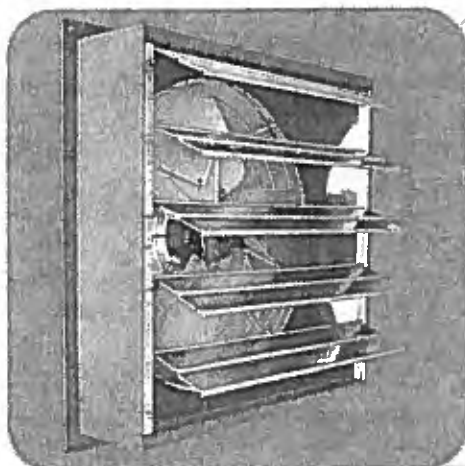
References

1. ISO 1496-1:1990 *Series 1 freight containers – Specification and testing – Part 1: General cargo containers for general purposes*
2. ISO/TR 15070:1996(E) *Series 1 freight containers – Rationale for structural test criteria*
3. “Commentary on the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings”, Section 1.8, American Institute of Steel Construction, 1978
4. ISO 1161-1984(E) *Series 1 freight containers – Corner fittings – Specification*
5. “Commentary on the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings”, Section 1.5.1.3, American Institute of Steel Construction, 1978
6. We have several specification documents from container vendors that stipulate a higher load capacity, but no details on just how this is accomplished by any container manufacturer via changes in the post configuration. We suspect that these vendors may just be taking advantage of a specification requiring a higher measured failure load as discussed in the preceding paragraph. After all, our post calculations for Figures 2(b) and Figure 3 indicate that these “standard” posts should easily pass a failure load test at 214,290 lbs vs. the original ISO test at 190,480 lbs.



Efficient • Low Maintenance • Easy Installation

Canarm's Standard Fans follow a tradition of quality in design, materials and construction.



Features

- Available in 8" to 36" sizes.
- Single, two and variable speed models are available.
- All fans use a totally enclosed, ball bearing motor with thermal overload protection.
- The motor mount is manufactured with heavy welded rods and has a powder coated finish.
- The fan blades are well-balanced, heavy gauge aluminum.
- The rugged steel welded box housing has a durable powder coated finish.
- Aluminum louver shutters are supported by long life nylon bushings (30" and 36" have PVC louvers).
- All fans are shipped completely assembled.

General Information

Canarm's Standard Fans follow a tradition of quality in design, materials and construction. All our Standard Fans are developed to be efficient and economically priced. All variable speed Standard Fans use an energy efficient variable speed, dual voltage motor and blade combination.

To determine the proper Canarm Fan for your applications, use the following formula.

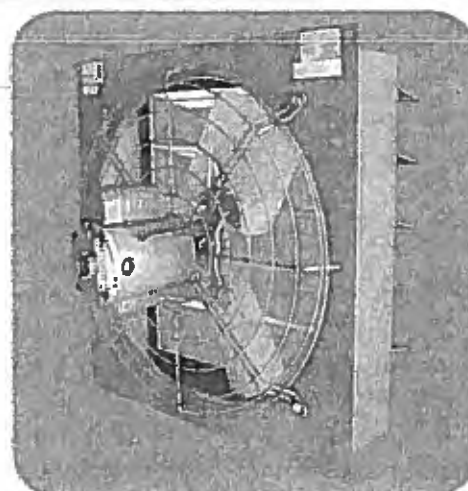
Number of cubic feet in room / Number of minutes per air change = Required C.F.M. Capacity

****Example****

A general office, (see chart) which requires an air change every ten minutes, would require the following fan capacity. If office is 100' x 40' x 10' = 40,000 cubic feet

40,000 cubic feet / 10 minutes per air change = 4000 Required C.F.M.

From the "Performance Data" section on the back of this page, you would select a fan that is rated at 4000 C.F.M. at 1/8" S.P. (Static Pressure)



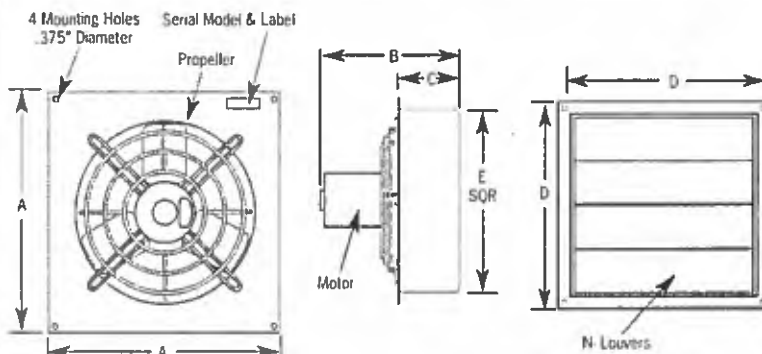
Fan Selection Chart

Application	Minutes per Air Change	Application	Minutes per Air Change	Application	Minutes per Air Change
Assembly Hall	7	Department Store	6	Plating Room	3
Auditorium	10	Dry Cleaning	5	Pressing Room	1
Bakery	3	Engine Room	6	Projection Booth	2
Barber Shop	6	Forge Room	3	Restaurant	6
Basement	8	Foundry	4	School	7
Battery Room	4	Garage	5	Summer Cooling	1
Boiler Room	1	General Office	10	Store	8
Bowling Alley	5	Gymnasium	8	Tavern	3
Church	15	Hospital	8	Toilet	3
Cocktail Bar	3	Kitchen	2	Transformer Room	1
Corridor	10	Laundry	2	Warehouse	12
Dairy	4	Locker Room	3	Welding Shop	2
		Machine Shop	8		



Fan Dimensions

Fan Auto	A	B	C	D (c/c)	E	N
8"	13 1/4"	10"	4"	12"	10 3/4"	2
10"	15 1/4"	10"	4"	14"	12 3/4"	2
12"	17 1/4"	14"	6"	16"	14 3/4"	3
14"	19 1/4"	14"	6"	18"	16 3/4"	3
16"	21 1/4"	14"	6"	20"	18 3/4"	4
18"	23 1/4"	15"	6"	22"	20 3/4"	4
20"	25 1/4"	16"	6"	24"	22 3/4"	5
24"	29 1/4"	16"	6"	28"	26 3/4"	5
30"	35 1/4"	19"	6"	34"	32 3/4"	16
36"	41 1/4"	16"	6"	40"	38 3/4"	20



Performance Data & Specifications

Model Number	Fan Size	Motor HP	Operation Speed	Fan RPM	Current Load Amps		Input Watts	Airflow Capacity - CFM				CFM Watts	Sound Level Decibel (A)	Framing Dimensions	Shipping Weight Lbs.
					@ 115V	@ 230V		0" S.P.	10" S.P.	125" S.P.	25" S.P.				
S8-B2	8"	1/20	Two	High 1550 Low 1300	0.95 0.45	-	109	360 300	270 150	230 110	0 0	2.5	48 43	11" x 11"	12
S10-B2	10"	1/20	Two	High 1550 Low 1300	1.2 0.7	-	125	690 580	590 460	570 390	0 0	4.72	56 50	13" x 13"	13
S12-E1	12"	1/4	Single	High 1750 Low 1180	3.5 2.3	-	245	1,640 1,090	1,540 950	1,510 930	1,390 -	6.00 7.31	63 50	15" x 15"	28
S12-E2			Two	High 1760 Low 1180	3.4 2.3	-	230	1,650 1,090	1,550 950	1,520 930	1,390 -	6.74 7.31	64 50		32
SD12-EV			Variable	Max 1625 Min 600	2.2	1.1	205	1,650 560	1,540 440	1,510 420	1,390 -	7.50	60		32
S14-E1	14"	1/4	Single	High 1740 Low 1170	3.6 2.2	-	257	2,170 1,350	2,070 1,190	2,030 1,160	1,860 -	8.05 8.69	67 53	17" x 17"	30
S14-E2			Two	High 1740 Low 1170	3.8 2.2	-	253	2,180 1,350	2,080 1,190	2,060 1,160	1,890 -	8.22 8.69	65 53		34
S16-E1			Single	High 1740 Low 1170	3.7 2.3	-	274	2,370 1,640	2,270 1,490	2,210 1,430	2,060 -	8.28 9.80	68 55	19" x 19"	33
S16-E2	16"	1/4	Two	High 1740 Low 1170	3.7 2.3	-	270	2,380 1,640	2,280 1,490	2,230 1,430	2,070 -	8.44 9.80	69 55		36
SD16-EV			Variable	Max 1625 Min 450	2.6	1.3	248	2,370 610	2,270 580	2,210 570	2,063 -	9.15	63		36
S18-F1	18"	1/3	Single	High 1700 Low 1140	4.8 3.1	-	448	3,200 2,100	3,090 1,890	3,040 1,820	2,920 -	6.89 7.56	73 64	21" x 21"	37
S18-F2			Two	High 1700 Low 1140	5.7 3.1	-	446	3,200 2,100	3,090 1,890	3,040 1,820	2,920 -	6.93 7.56	74 64		43
SD18-FV			Variable	Max 1625 Min 390	3.7	1.9	378	3,150 700	3,050 650	2,980 630	2,860 -	8.07	74		45
S20-F1	20"	1/3	Single	High 1735 Low 1165	4.8 2.6	-	322	3,420 2,300	3,220 2,000	3,170 1,950	2,920 -	10.00 10.52	77 67	23" x 23"	41
S20-F2			Two	High 1745 Low 1165	4.3 2.6	-	315	3,440 2,300	3,240 2,000	3,180 1,950	2,930 -	10.20 10.52	77 67		45
SD24-F1			Variable	Max 1100 Min 310	4.2	2.1	290	5,050 800	4,940 710	4,810 650	4,400 -	13.2	72		56
SD30-G1D	30"	1/2	Single	High 1075 Low 850	4.6 3.0	2.3	600	8,000 12,000	7,000 11,000	6,000 10,500	5,000 9,500	11.5 13.0	82 72	33" x 33"	72
SD36-G1D	36"	1/2	Single	High 1075 Low 850	4.6 3.0	2.3	600	8,000 12,000	7,000 11,000	6,000 10,500	5,000 9,500	11.5 13.0	82 72	39" x 39"	88

NOTE: RPM Min (Minimum) is determined when louvers are opened one inch

Note: Wind has a significant effect on exhaust fans. A 10 mph wind creates a 0.05" pressure against the fan. A 20 mph wind creates 0.20" pressure and 30 mph a 0.45" pressure. These pressures are in addition to the static pressure in the building. Wind blocks or hoods should be included in all designs where fans will be subjected to winds above 10 mph.

Warranty

- 1 year on all components

CANARM LTD. - Corporate Office
2157 Parkdale Ave., Brockville, ON
Canada K6V 5V6
Tel: (613) 342-5424 Fax: 1-800-263-4598

Web Site: www.canarm.com
E-Mail: agsales@canarm.ca

CANARM LTD. - USA Warehouse
808 Commerce Park Drive
Ogdensburg, New York, USA 13669
Tel: 1-800-267-4427 Fax: 1-800-263-4598

Arthur Manufacturing Facility
#7686 Concession 16, RR 4 Arthur, ON
Canada N0G 1A0
Tel: (519) 848-3910 Fax: (519) 848-3948
Web Site: www.bsmagri.com
E-Mail: sales@bsmagri.com

A19 Series

Remote Bulb Control

Description

The A19 Series are single-stage temperature controls that incorporate environmentally friendly liquid-filled sensing elements.

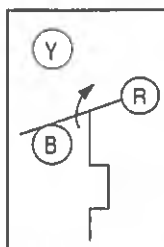
Features

- wide temperature ranges available
- constant differential throughout the entire range
- compact enclosure
- fixed or adjustable differential available
- variety of sensing element styles
- unaffected by cross-ambient conditions

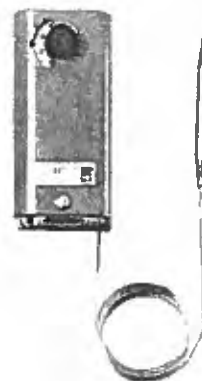
Applications

The A19 is suitable for temperature control in heating, ventilating, air conditioning, and refrigeration.

A19 Series



Action on Increase
of Temperature



A19ABC-24

A19 Series
Terminal Arrangement for SPDT

Selection Charts

A19 Series Remote Bulb Control¹

Code Number	Switch Action	Range °F (°C)	Diff °F (°C)	Bulb and Capillary	Bulb Well No. (order separately)	Range Adjuster	Max. Bulb Temp. °F (°C)
Adjustable Differential (Wide Range)							
A19ABA-40C ²	SPST Open Low	-30 to 100 (-34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19ABC-4C	SPDT	50 to 130 (10 to 55)	3 1/2 to 14 (1.9 to 8)	3/8 in. x 5 in., 8 ft. Cap.	WEL14A-603R	Knob	170 (77)
A19ABC-24C ³	SPDT	-30 to 100 (-34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 8 ft. Cap.	WEL14A-602R	Convertible	140 (60)
A19ABC-36C	SPDT	-30 to 100 (-34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 20 ft. Cap.	WEL14A-602R	Convertible	140 (60)
A19ABC-37C	SPDT	-30 to 100 (-34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 10 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
A19ABC-74C	SPDT	-30 to 100 (-34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
Fixed Differential							
A19AAF-12C	SPDT	25 to 225 (-4 to 107)	3 1/2 (1.9)	3/8 in. x 3 in., 10 ft. Cap.	WEL14A-602R	Screwdriver slot	275 (135)
Fixed Differential (Case Compensated)							
A19AAC-4C	SPDT	0 to 80 (-18 to 27)	5 (2.8)	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
A19AAD-12C	SPST Open Low	-30 to 50 (-34 to 10)	2 1/2 (1.4)	3/8 in. x 4 in., 7 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
Fixed Differential (Close)							
A19AAD-5C ⁴	SPST Open Low	30 to 50 (-1 to 10) (Bulk Milk Cooler)	2 1/2 (1.4)	3/8 in. x 2 5/8 in., 6 ft. Cap.	WEL16A-601R	Screwdriver slot	190 (88)
A19AAF-20C	SPDT	-30 to 100 (-34 to 38)	2 1/2 (1.4)	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
A19AAF-21C	SPDT	40 to 90 (4 to 32)	1 1/2 (0.8)	3/8 in. x 5 3/4 in., 6 ft. Cap.	WEL14A-603R	Screwdriver slot	140 (60)
Manual Reset							
A19ACA-14C	SPST Open Low	-30 to 100 (-34 to 38)	Manual Reset	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
A19ACA-15C	SPST Open Low	-30 to 100 (-34 to 38)	Manual Reset	3/8 in. x 4 in., 10 ft. Cap.	WEL14A-602R	Screwdriver slot	140 (60)
A19ADB-1C	SPST Open High	100 to 240 (38 to 116)	Manual Reset	3/8 in. x 3 1/2 in., 6 ft. Cap.	WEL14A-602R	Knob	290 (143)
A19ADN-1C	SPST Open High	100 to 240 (38 to 116)	Manual Reset	3/8 in. x 4 in., 6 ft. Cap.	WEL14A-602R	Screwdriver slot	290 (143)

1. Specify the control model code number, packing nut code number (if required), and bulb well code number (if required).

2. Replaces White-Rodgers 1609-101

3. Replaces White-Rodgers 1609-12, -13, Ranco 010-1408, -1409, -1410, -1490, 060-110, Honeywell L6018C-1006, L6021A-1005, T675A-1011, -1508, -1516, -1821, T4301A-1008, T6031A-1011, T6031A-1029

4. Case-Compensated



Remote Bulb Control (Continued)

Selection Charts (Continued)

Replacement Parts

Code Number	Description
CVR28A-817R	Concealed adjustment cover
CVR28A-818R	Visible scale cover
KNB20A-602R	Replacement Knob Kit

Accessories

A packing nut is available for closed tank application.
Specify the part number FTG13A-600R.

Bulb wells (WEL14A Series) are available for liquid immersion applications.
Refer to the selection chart or to *Bulb Wells Catalog Page, LIT-1922135*.

Technical Specifications

Electrical Ratings

Motor Ratings VAC	120	208	240
Wide Range – Adjustable Differential			
AC Full Load A	16.0	9.2	8.0
AC Locked Rotor A	96.0	55.2	48.0
Non-Inductive A ¹	22 A, 120 to 277 VAC		
Pilot Duty – 125 VA, 24 to 600 VAC			
Fixed Differential and Close Differential			
AC Full Load A	6.0	3.4	3.0
AC Locked Rotor A	36.0	20.4	18.0
Non-Inductive A	10 A, 24 to 277 VAC		
Pilot Duty – 125 VA, 24 to 277 VAC			
Case Compensated – Fixed Differential A19AAC-4			
AC Full Load A	16.0	9.2	8.0
AC Locked Rotor A	96.0	55.2	48.0
Non-Inductive A ¹	22 A, 120 to 277 VAC		
Pilot Duty – 125 VA, 24 to 600 VAC			
A19AAD-12			
AC Full Load A	6.0	3.4	3.0
AC Locked Rotor A	36.0	20.4	18.0
Non-Inductive A	10 A, 24 to 277 VAC		
Pilot Duty – 125 VA, 24 to 277 VAC			
Manual Reset			
AC Full Load A	16.0	9.2	8.0
AC Locked Rotor A	96.0	55.2	48.0
Non-Inductive A	16.0	9.2	8.0
Pilot Duty – 125 VA, 24 to 600 VAC			

¹ SPST and NO contact of SPDT control.
SPDT NC contact- 16 amps 120 to 277 VAC

Features

The 460's universal range from 190-480VAC, 50/60 Hz provides the versatility needed to handle global applications.

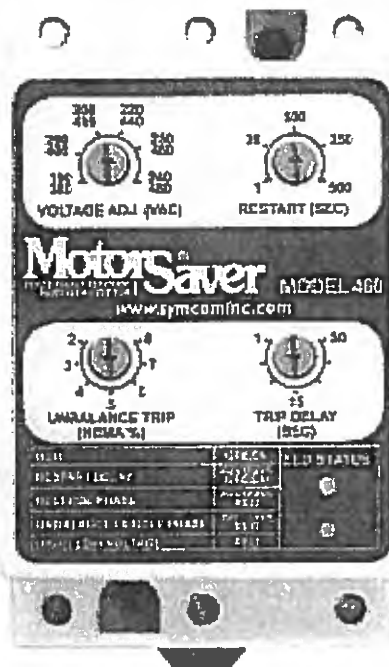
Four adjustment pots provide versatility for a variety of applications.

Diagnostic LEDs indicate trip status and provide simple troubleshooting.

Microcontroller-based circuitry provides better accuracy and higher reliability than analog designs.

Single-phase conditions are detected regardless of regenerated voltages.

Transient protection meets IEEE and IEC standards and permits operation under tough conditions.



MotorSaver
THREE PHASE ELECTRIC
MOTOR PROTECTOR

Model 460

**Three-Phase
Voltage Monitor**

**Engineered
Protection**

**Microcontroller
Based**

*Protects 3-Phase
Motors from:*

- Loss of any phase
- Low voltage
- High voltage
- Voltage unbalance
- Phase reversal
- Rapid cycling

Additional Features:

- Compact design
- UL and cUL listed
- CE compliant
- Finger-safe terminals
- 5-year warranty
- Made in USA
- Standard surface or DIN rail mountable
- Standard 1-500 sec. variable restart delay
- Standard 2-8% variable voltage unbalance
- Standard 1-30 sec. variable trip delay
- One 10 amp general purpose Form C relay
- Optional manual reset

The **Model 460** is designed to protect 3-phase motors from damaging power conditions. The 460's wide operating range combined with UL and CE compliance enables quick access to domestic and global markets.

A unique microcontroller-based voltage and phase-sensing circuit constantly monitors the 3-phase voltages to detect harmful power line conditions. When a harmful condition is detected, the MotorSaver's output relay is deactivated after a specified trip delay. The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (restart delay). The trip delay prevents nuisance tripping due to rapidly fluctuating power line conditions.

The Model 460 automatically senses whether it is connected to a 190-240V, 60Hz system, a 440-480V, 60Hz system, or a 380-416V, 50Hz system. An adjustment is provided to set the nominal line voltage from 190-240 or 380-480VAC. Other adjustments include a 1-30 second trip delay, 1-500 second restart delay, and 2-8% voltage unbalance trip point.

 **SymCom** Inc.
Motor Protection & Controls Since 1974

2880 North Plaza Drive • Rapid City, SD 57702
(800) 843-8848 • (605) 348-5580 • FAX (605) 348-5685
www.symcominc.com • email: sales@symcominc.com

Motorsaver®

THREE-PHASE ELECTRIC
MOTOR PROTECTOR

Specifications
Operating Points
Special Options

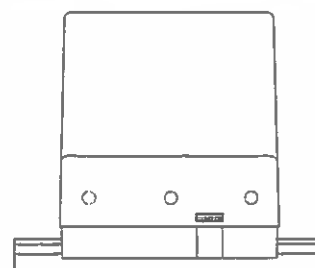
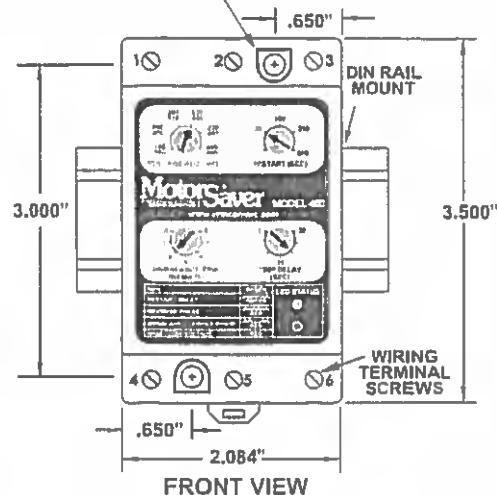
Model 460 Three-Phase Voltage Monitor

Specifications	
3-Phase Line Voltage	190-480VAC (475-600VAC optional) (95-120VAC optional)
Frequency	50/60Hz
Low Voltage (% of setpoint)	
•Trip	90% ±1%
•Reset	93% ±1%
High Voltage (% of setpoint)	
•Trip	110% ±1%
•Reset	107% ±1%
Voltage Unbalance (NEMA)	
•Trip	2-8% adjustable
•Reset	Trip setting minus 1% (5 - 8%) Trip setting minus .5% (2 - 4%)
Trip Delay Time	
•Low, High and Unbalanced Voltage	1-30 seconds adjustable
•Single-Phasing Faults	1 second fixed
Restart Delay Time	
•After a Fault	1-500 seconds adjustable
•After a Complete Power Loss	1-500 seconds adjustable
Output Contact Rating	
•1-Form C	10A General Purpose @ 240VAC Pilot Duty 480VA @ 240VAC, B300
Power Consumption	6 Watts (max.)
Weight	14 oz
Enclosure	Polycarbonate
Terminal Torque	6 in.-lbs
Wire Type	Stranded or solid 12-20 AWG, one per terminal
Safety Marks	
•UL	UL508
•CE	IEC 60947-6-2
Standards Passed	
•Electrostatic Discharge (ESD)	IEC 1000-4-2, Level 3, 6kV contact, 8kV air
•Radio Frequency Immunity, Radiated	150 MHz, 10V/m
•Fast Transient Burst	IEC 1000-4-4, Level 3, 3.5kV input power & controls
Surge	
•IEC	IEC 1000-4-5, Level 3, 4kV line-to-line, Level 4, 4kV line-to-ground
•ANSI/IEEE	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line
•Hi-potential Test	Meets UL508 (2 x rated V + 1000V for 1 minute)
Environmental	
Temperature Range	Ambient Operating: -20° to 70° C (-4° to 158°F) Ambient Storage: -40° to 80° C (-40° to 176°F)
Class of Protection	IP20, NEMA 1 (FINGER SAFE)
Relative Humidity	10-95%, non-condensing per IEC 68-2-3
Special Options	
Manual Reset	External momentary pushbutton required

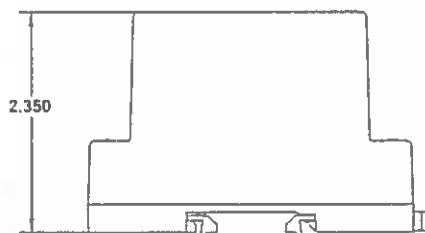
*Note: 50 Hz will increase all delay timers by 25%

SymCom warrants its microcontroller based products against defects in material or workmanship for a period of five (5) years from the date of manufacture. All other products manufactured by SymCom shall be warranted against defects in material and workmanship for a period of two (2) years from the date of manufacture. For complete information on warranty, liability, terms, returns, and cancellations, please refer to the SymCom Terms and Conditions of Sale document.

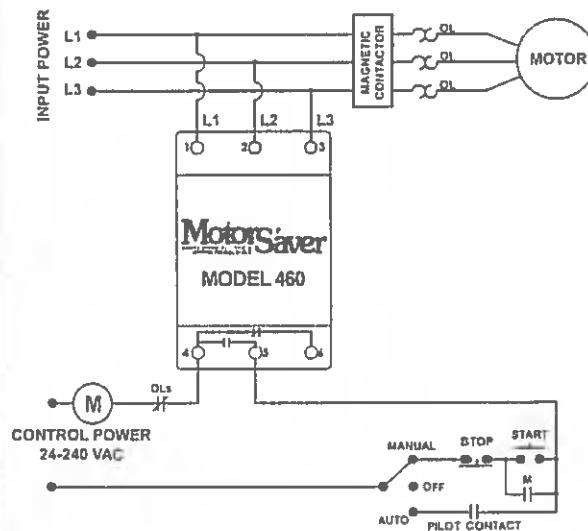
Surface Mount
2- #6 or #8 x 5/8 Screws



BOTTOM VIEW



SIDE VIEW



TYPICAL WIRING DIAGRAM

Manual Document List

PMPProjNum

RTS151

WTS, 150gpm, OWS-24, Carbon, 40' Container

Tag	Part Number	Part Description
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Module: 4900

P-4901	21028	Pump, Suction, Goulds, SSH Series, 4SH2K	Manufacturer:	Goulds
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Module: 8200

8200	18396	Motor Saver, 460 w/Diagnostic 3ph	Manufacturer:	Symcom
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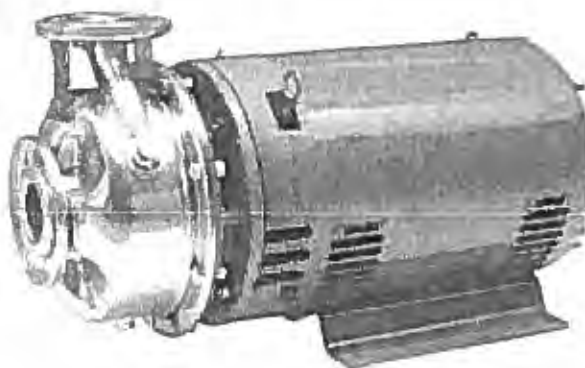
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Tuesday, August 27, 2013

Page 1 of 1

Installation, Operation and Maintenance Instructions

Models SSH-C and SSH-F



Owner's Information

Please fill in data from your pump nameplate.
Warranty information is on page 28.

Pump Model: _____

Serial Number: _____

Dealer: _____

Dealer's Phone Number: _____

Date of Purchase: _____

Installation Date: _____

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Discharge Piping	3
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SSH S-Group Close-Coupled – Dimensions & Weights	9
SSH S-Group Frame-Mounted – Dimensions & Weights	10
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SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.



DANGER Warns of hazards that **WILL** cause serious personal injury, death or major property damage.



WARNING Warns of hazards that **CAN** cause serious personal injury, death or major property damage.



CAUTION Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.



Hazardous fluids
can cause fire,
burns or death

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

NOTICE: INSPECT UNIT FOR DAMAGE AND REPORT ALL DAMAGE TO THE CARRIER OR DEALER IMMEDIATELY.

1. Important Instructions

1. Inspect unit for damage. Report damage to carrier immediately.
2. Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and Local electrical codes. Install an all-leg disconnect switch near pump.



Hazardous voltage
can shock, burn or
cause death

ALWAYS DISCONNECT ELECTRICAL POWER WHEN HANDLING PUMP OR CONTROLS.

3. Motors must be wired for proper voltage (check nameplate). Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.
4. **Single-Phase:** Thermal protection for single-phase units is sometimes built-in (Check nameplate). If no built-in protection is provided, use a contactor with proper overload. Fusing is permissible if properly fused.
5. **Three-Phase:** Provide three-leg protection with proper size magnetic starter and thermal overloads.
6. **Maximum Liquid Temperatures:**
212°F (100°C) with standard seal.
250°F (120°C) with optional high-temperature seal.
7. Maximum allowable operating pressure: 230 PSI (15 bars).
8. Maximum number of starts per hour: 20, evenly distributed.
9. Regular Inspection and Maintenance will increase service life. Base schedule on operating time.

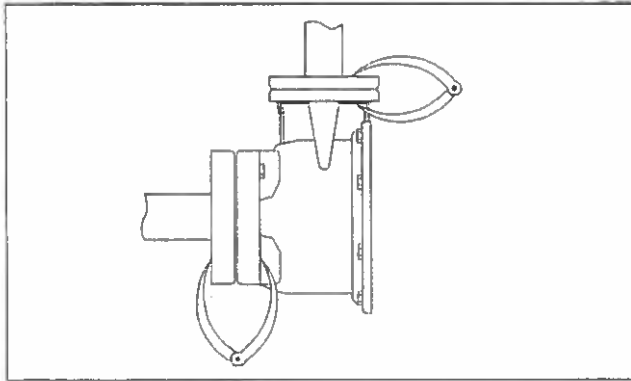
2. Installation

1. Close-coupled units may be installed inclined or vertical.



DO NOT INSTALL WITH MOTOR BELOW PUMP. CONDENSATION WILL BUILD UP IN MOTOR.

2. Locate pump as near liquid source as possible (below level of liquid for automatic operation).
3. Protect from freezing or floods.
4. Allow adequate space for servicing and ventilation.
5. For close-coupled pumps, the foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration. Tighten motor hold-down bolts before connecting piping to pump.
6. For frame-mounted pumps, permanent and solid foundation is required for smooth operation. Bedplate must be grouted to a foundation with solid footing.
7. Place unit in position on wedges located at four points (Two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit, bringing coupling halves into reasonable alignment. Level or plumb suction and discharge flanges.
8. Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming if necessary.
9. Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are filled solid. Allow grout to harden 48 hours before further tightening foundation bolts.
10. All piping must be supported independently of the pump, and must "line-up" naturally. Never draw piping into place by forcing the pump suction and discharge connections!
11. Angular alignment of the flanges can best be accomplished using calipers at bolt locations (See illustration).



12. On frame-mounted units, tighten foundation, pump and driver hold-down bolts before connecting piping to pump.
13. Avoid unnecessary fittings. Select sizes to keep friction losses low.
14. After completing piping, rotate unit by hand to check for binding. Note: A screwdriver slot or flats are provided in end of motor shaft.

3. Alignment

1. No field alignment is necessary on close-coupled pumps.
2. Even though the pump-motor unit may have a factory alignment, in transit this alignment could be disturbed and must be checked prior to running.
3. Check the tightness of all hold-down bolts before checking the alignment.
4. If re-alignment is necessary, always move the motor. Shim as required.
5. Final alignment is achieved when parallel and angular requirements are achieved with both pump and motor hold down bolts tight.

CAUTION ALWAYS RECHECK BOTH ALIGNMENTS AFTER MAKING ADJUSTMENTS.

6. Parallel misalignment exists when the shafts are not concentric. Place dial indicator on one hub and rotate this hub 360° while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total Indicator Reading is .005" or less.
7. Angular misalignment exists when the shafts are not parallel. Place dial indicator on one hub and rotate this hub 360° while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005" or less.

4. Suction Piping

1. Low static lift and short, direct suction piping is desired. For suction lift over 15 feet, consult pump performance curve for *Net Positive Suction Head Required*.
2. Suction pipe size must be at least equal to suction connection of pump.
3. If larger pipe is used, an eccentric pipe reducer (with straight side up) must be used at the pump.
4. Installation with pump below source of supply:
 - 4.1. Install isolation valve in piping for inspection and maintenance.

4.2. Do not use suction isolation valve to throttle pump!

5. Installation with pump above source of supply:
 - 5.1. To avoid air pockets, no part of piping should be higher than pump suction connection. Slope piping upwards from liquid source.
 - 5.2. All joints must be airtight.
 - 5.3. Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.
 - 5.4. Suction strainer open area must be at least triple the pipe area.
6. Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump.

5. Discharge Piping

1. Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or inspection of pump or check valve.
2. If reducer is required, place between check valve and pump.

6. Rotation

WARNING



DO NOT PLACE HANDS IN PUMP WHILE CHECKING MOTOR ROTATION. TO DO SO WILL CAUSE SEVERE PERSONAL INJURY.

1. Pumps are right-hand rotation (Clockwise when viewed from the driver end). Switch power on and off. Observe shaft rotation. On frame-mounted units, check rotation before coupling pump to motor.
2. Single-Phase: Refer to wiring diagram on motor if rotation must be changed.
3. Three-Phase: Interchange any two power supply leads to change rotation.

7. Operation

1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

CAUTION

PUMPED LIQUID PROVIDES LUBRICATION. IF PUMP IS RUN DRY, ROTATING PARTS WILL SEIZE AND MECHANICAL SEAL WILL BE DAMAGED.

2. Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping. Check coupling alignment.
3. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing.

8. Maintenance

⚠ WARNING
Hazardous
voltage

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

1. Bearings are located in and are part of the motor. For lubrication procedure, refer to manufacturer's instructions.
2. On frame-mounted units, regrease at 2,000 hours use or after 3 months. Use #2 Sodium or Lithium grease and fill until grease comes out of the relief fitting.

9. Disassembly

1. Always turn power off.
2. Drain system. Flush if necessary.
3. Remove motor hold-down bolts on close-coupled or disconnect coupling and remove spacer.
4. Remove casing bolts and pump hold-down bolts.
5. Remove motor and rotating element from casing.
6. Unscrew impeller bolt with a socket wrench. Do not insert screwdriver between impeller vanes to prevent rotation. It may be necessary to use a strap wrench around the impeller if impacting the socket wrench will not loosen the impeller bolt.
7. Remove impeller o-ring.
8. Insert two pry bars (180° apart) between impeller and seal housing. Pry off impeller.
9. Remove shaft sleeve, seal spring, cupwasher, seal rotary and impeller key.
10. Remove seal housing.
11. Place seal housing on flat surface. Press out stationary seal parts.
12. Remove deflector from shaft on frame-mounted units.
13. Remove bolts holding bearing cover to frame and remove bearing cover (frame-mount).
14. Remove lip seals from bearing frame and bearing cover (frame-mount).
15. Remove shaft and bearings from frame (frame-mount).
16. Remove bearing retaining ring (frame-mount).
17. Use bearing puller or arbor press to remove ball bearings (frame-mount).
18. Remove wear ring if excessively worn. Use pry bar and/or vicegrips.

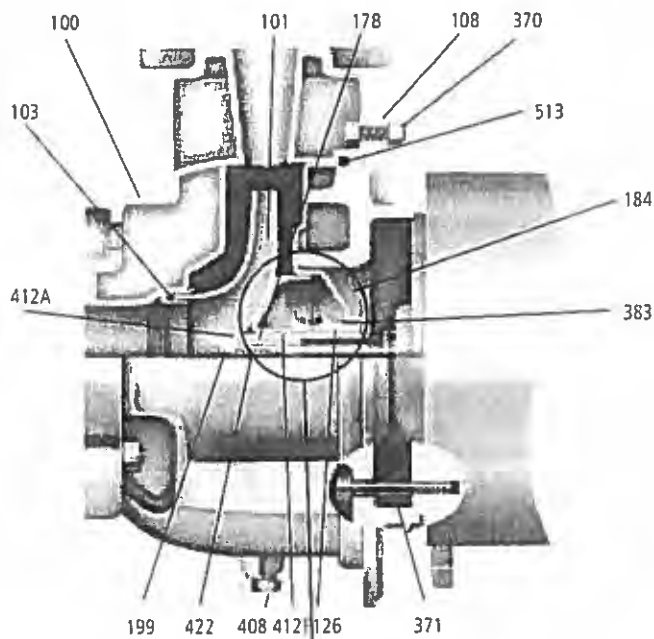
10. Reassembly

1. All parts should be cleaned before assembly.
 2. Refer to parts list to identify required replacement items.
 3. Reassembly is the reverse of the disassembly procedure.
 4. Replace lip seals if worn or damaged (frame-mount only).
 5. Replace ball bearings if loose, rough or noisy when rotated (frame-mount only).
 6. Check shaft for maximum runout of .005" TIR. Bearing seats and lip seal areas must be smooth and free of scratches or grooves. Replace if necessary (frame-mount only).
 7. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.
 8. If wear ring is being replaced, do not use lubricants on the metal-to-metal fit when pressing in the replacement.
 9. If the impeller is removed, as for example to effect a mechanical seal change, this procedure must be followed: Old impeller bolt and impeller o-ring cannot be reused.
 10. Install the mechanical seal stationary seat in the seal housing, using soapy water as a lubricant to ease insertion.
 11. S-Group – Install the mechanical seal spring retainer, spring and rotary assembly on the shaft sleeve using soapy water to lubricate. Slide the shaft sleeve over the pump shaft, be sure that a new shaft sleeve o-ring is used.
- NOTE:** THE SHAFT SLEEVE O-RING AND IMPELLER WASHER O-RING ARE ALMOST IDENTICAL IN DIAMETER. BE SURE TO USE THE SQUARE CROSS-SECTION O-RING IN THE IMPELLER WASHER. THE ROUND CROSS-SECTION O-RING IS USED IN THE SHAFT SLEEVE.
11. M-Group – Install the mechanical seal spring and rotary on the shaft sleeve using soapy water to lubricate. Slide the shaft sleeve over the pump shaft. Be sure that a new shaft sleeve o-ring is used. Place the mechanical seal spring retainer over the impeller hub.
 12. Place the impeller key into the shaft keyway and slide the impeller in place. Install the impeller stud and impeller washer. Be sure that a new impeller o-ring is used. Tighten S-Group ($\frac{3}{8}$ " thread) to 17 lb.ft. and M-Group ($\frac{1}{4}$ " thread) to 38 lb.ft.

11. Troubleshooting

1. Motor does not start, and no noise or vibration occurs:
 - 1.1. Power supply not connected.
 - 1.2. Fuses or protection device tripped or defective.
 - 1.3. Loose or broken electrical connections.
2. Motor will not start, but generates noise and vibration:
 - 2.1. Motor not wired as directed on diagram.
 - 2.2. Shaft locked due to mechanical obstructions in motor or pump.
 - 2.3. Low voltage or phase loss on three phase supply.
3. Pump does not deliver rated capacity:
 - 3.1. Pump not filled and primed.
 - 3.2. Pump has lost prime due to leaks in suction line.
 - 3.3. Direction of rotation incorrect. See Rotation.
 - 3.4. Head required is higher than that originally specified. (Valve may be partially closed.)
 - 3.5. Foot valve clogged.
 - 3.6. Suction lift too high.
 - 3.7. Suction pipe diameter too small.
4. Protection trips as unit starts:
 - 4.1. Phase loss on three-phase supply.
 - 4.2. Protection device may be defective.
 - 4.3. Loose or broken electrical connections.
 - 4.4. Check motor resistance and insulation to ground.
5. Protection device trips too often:
 - 5.1. Protection may be set to a value lower than motor full load.
 - 5.2. Phase loss due to faulty contacts or supply cable.
 - 5.3. Liquid is viscous or its specific gravity is too high.
 - 5.4. Rubbing occurs between rotating and stationary parts.
6. Shaft spins with difficulty:
 - 6.1. Check for obstructions in the motor or the pump.
 - 6.2. Rubbing occurs between rotating and stationary parts.
 - 6.3. Check bearings for proper conditions.
7. Pump vibrates, runs noisily, and flow rate is uneven:
 - 7.1. Pump runs beyond rated capacity.
 - 7.2. Pump or piping not properly secured.
 - 7.3. Suction lift too high.
 - 7.4. Suction pipe diameter too small.
 - 7.5. Cavitation caused by insufficient liquid supply or excessive suction losses.
 - 7.6. Impeller blockage.
8. When stopped, unit turns slowly in the reverse direction:
 - 8.1. Leaks or air locks in suction pipe.
 - 8.2. Partial blockage in check valve.
9. In pressure boosting applications, the unit starts and stops too often:
 - 9.1. Pressure switch settings are incorrect.
 - 9.2. Tank size may be incorrect.
10. In pressure boosting applications, the unit does not stop:
 - 10.1. Pressure switch maximum setting is higher than was specified.
 - 10.2. Direction of rotation incorrect. See Rotation.

SSH-C Components

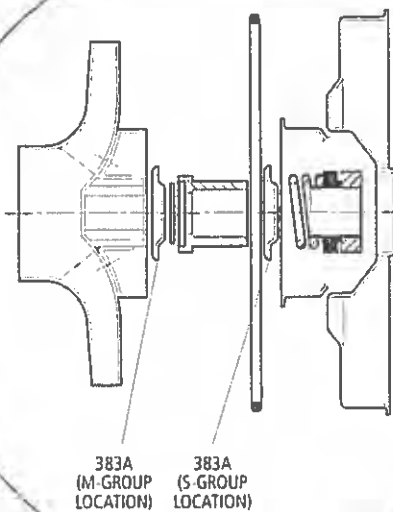


MATERIALS OF CONSTRUCTION

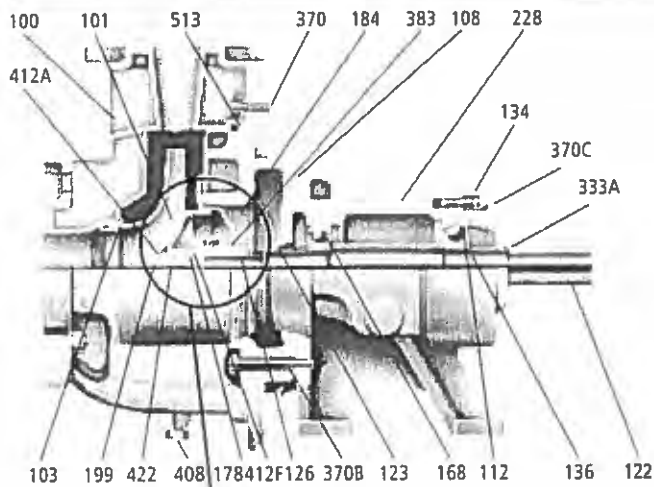
Item	Description	Material
100	Casing	AISI TYPE 316L Stainless Steel
101	Impeller	
103	Wear Ring	
184	Seal Housing	
370	Socket Head Cap Screw (Casing to Adapter)	
408	Drain Plug — 1/2" NPT	AISI TYPE 316 SS
126	Shaft Sleeve	316 SS
178	Impeller Key	Steel
422	Impeller Stud	Steel
199	Impeller Washer	316 SS
108	Adapter	Cast Iron ASTM A48CL20
371	Hex Head Cap Screw (Adapter to Motor)	Steel
412A	O-ring, impeller	BUNA-N
412F	O ring, shaft sleeve	BUNA-N
513	O-Ring	BUNA-N
383	Mechanical Seal Part No. 10K13	Carbon/Ceramic Buna Elastomers 316 SS Metal Parts
383A	Spring Retainer	AISI Type 316 SS

OPTIONAL MECHANICAL SEALS

John Crane Type 21 Mechanical Seals						
Item	Part No.	Rotary	Stationary	Elastomers	Metal Parts	Intended Duty
383 Options	10K19	Carbon	Ni-Resist	EPR	316 SS	Hi-Temperature
	10K25		Ni-Resist	Viton		Chemical
	10K27		Tungsten Carbide	EPR		Hi-Temperature Mild Abrasive



SSH-F Components



MATERIALS OF CONSTRUCTION

Item	Description	Material
Pump End Components	100 Casing	AISI TYPE 316L Stainless Steel
	101 Impeller	
	103 Wear Ring	
	184 Seal Housing	
	370 Socket Head Cap Screw	
	408 Drain plug - 1/4 NPT	AISI TYPE 316 SS
	126 Shaft Sleeve	316 SS
	178 Impeller Key	Steel
	422 Impeller Stud	Steel
	199 Impeller Washer	316 SS
Power End Components	412A O-ring, impeller	BUNA-N
	412F O-ring, shaft sleeve	BUNA-N
	513 O-Ring	BUNA-N
	383 Mechanical Seal Standard Part No. 10K13	Carbon/Ceramic BUNA-N Elastomers 316 SS Metal Parts
	383A Spring Retainer	AISI Type 316SS
	108 Adapter	Cast Iron ASTM A48 CL20
	228 Bearing Frame	
	134 Bearing Cover	
	122 Pump Shaft	Steel
	168 Ball Bearing (Inboard)	
	112 Ball Bearing (Outboard)	
	136 Retaining Ring	
	370B Hex Head Cap Screw (Adapter to Bearing Frame)	
	370C Hex Head Cap Screw (Bearing Frame to Cover)	
	333A Lip Seal	BUNA-N
	193 Grease Fitting	Steel
	123 V-Ring Deflector	BUNA-N

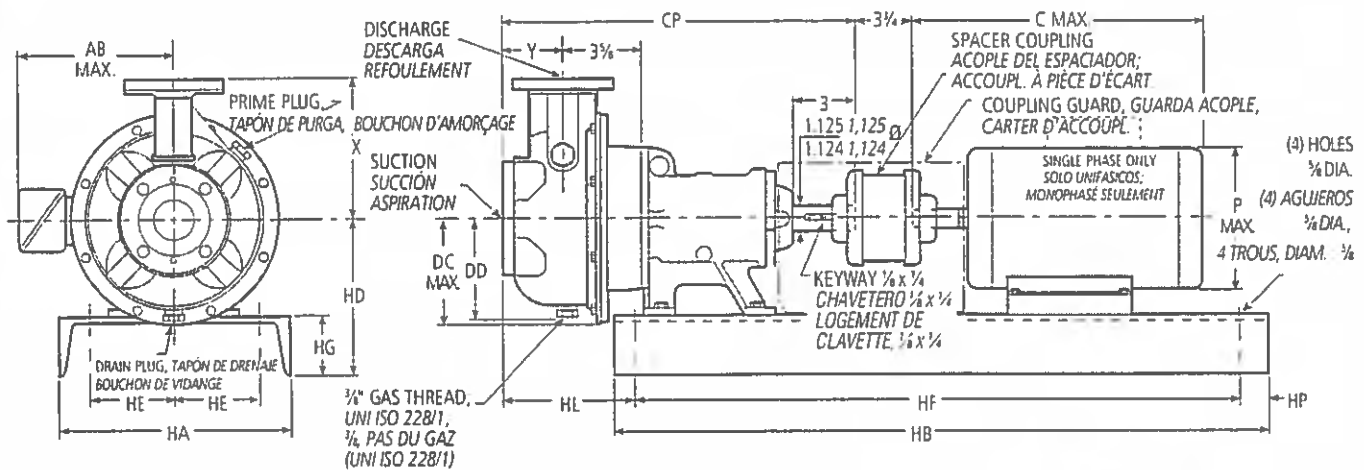
OPTIONAL MECHANICAL SEALS

John Crane Type 21 Mechanical Seals

Item	Part No.	Rotary	Stationary	Elastomers	Metal Parts	Intended Duty
383 Options	10K19	Carbon	Ni-Resist	EPR	316 SS	Hi-Temperature
	10K25		Ni-Resist	Viton		Chemical
	10K27		Tungsten Carbide	EPR		Hi-Temperature
						Mild Abrasive

383A (M-GROUP LOCATION)
383A (S-GROUP LOCATION)

Channel Steel Bedplate, Clockwise Rotation Viewed from Drive End;
Fundación de Acero, Rotación en Dirección de las Agujas del Reloj Visto desde el Extremo del Motor;
Plaque de base profilée en U et rotation en sens horaire (vue de l'extrémité du moteur)



Dimensions and Weights – Determined by Pump,
Dimensiones y Pesos – Determinados por la Bomba;
Dimensions et poids – pompe

Pump, Bomba, Pompe	Suction Succión ① Aspir.	Discharge Descarga ① Refoul.	CP	DC Max., DC Máx. DC max.	DD	X	Y	Wt. (lbs.), Peso (lib.) Poids	143/145	183/184	213/215	254/256	284/286
9SH 1 X 2-6	2	1	16 1/2	5	4 1/4	6 1/4	3 1/4	56					
10SH 1 X 2-8				5 1/2	5 1/4	7 1/4		64	9 1/4	7 1/4	3 1/4		
11SH 1 X 2-10			17 1/4	6 1/4	6 1/4	8 1/4		86	10	8 1/4	4 1/4		
4SH 1 1/2 X 2 1/2-6	2 1/2	1 1/2	16 1/2	5	4 1/4	6 1/4	3 1/4	57	9 1/4	7 1/4	4		
7SH 1 1/2 X 2 1/2-8				5 1/2	5 1/4	7 1/4		66					
5SH 2 X 2 1/2-6		2	17 1/4	5	4 1/4		4	57	10	8 1/4	4 1/4		
8SH 2 X 2 1/2-8				6	5 1/4	7 1/4		68					
6SH 2 1/2 X 3-6	3	2 1/2						59					

Dimension "HL" Determined by Pump and Bedplate, Dimensión "HL" determinada la bomba y el motor, Dimensions HL – pompe et plaque de base

Motor Frame Size, Tamaño del bastidor del motor, Carcasse de moteur

NOTES:

- All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten 1/4" – 16 casing bolts to 12 ft/lbs. torque.
- Dimensions in inches.
- Motor dimensions may vary with motor manufacturer.
- Not to be used for construction purposes.

NOTAS:

- Todas las bombas transportadas en posición de descarga vertical. Pueden rotarse en aumentos de 90°. Aprieta 1/4" – 16 tornillos de carcasa a 12 pies/libras potencia.
- Las dimensiones en pulgadas.
- Las dimensiones puede que varien con los fabricantes.
- No para propósitos de construcción.

NOTA:

- L'orifice de refoulement est orienté vers le haut. On peut le tourner de 90° en 90°. Serrer les vis 1/4" – 16 du corps de pompe à 12 lbf pi.
- Les dimensions sont en pouces, et le poids, en livres.
- Les dimensions et le poids du moteur peuvent varier selon le fabricant.
- Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

Available Motor and Bedplate Dimensions and Weights, Pesos y Dimensiones Disponibles de la Fundación y del Motor Dimensions et poids – moteur et plaque de base

① For use with ANSI class 150 mating flanges. Para usar con bridas que casan ANSI clase 150. À utiliser avec des contre-brides ANSI, classe 150.

Motor Frame, Armazón del Motor, Carcasse de moteur	HP @ 3500 RPM, HP a 3500 RPM, hp à 3 500 tr/min				HP @ 1750 RPM, HP a 1750 RPM, hp à 1 750 tr/min				AB Max., AB Máx., AB max.	C Max., C Máx., C max.	P Max., P Máx., P max.	Wt. Max., Peso Máx., Poids max.	Bedplate Data, Datos de la Fundación, Plaque de base											Wt. (lbs.), Peso (libras), Poids	Motor Shim, Plancha de relleno del motor, Cale de moteur	Bearing Frame Shim, Plancha de relleno del bastidor, Cale de palier
	Single Phase, Monofásicos, 1 Ø		Three Phase, Trifásicos, 3 Ø		Single Phase, Monofásicos, 1 Ø		Three Phase, Trifásicos, 3 Ø						HA	HB	HD*	HE	HF	HG	HP*							
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC																		
143T					1	1	1	1	5½	13%	6%	45	10	28	8	3¼	24	2½	¾	48	1½	—				
145T	2	2	2 or ou 3	2	1½	1½	1½ or ou 2	1½ or ou 2		14½		53														
182T	3	3	5	3	2	2	3	3	5½	16%	7¼	74														
184T	5	5	7½	5	3 or ou 5	3	5	3		18%		95														
213T			10	7½					7%	18	9%	116	12	31	8%	4¼	29	3	1	65	—	—				
215T			15	10						19½		136														
254T			20	15					10½	21%	13	266											13	42	9%	5¼
256T			25	20						23¾		264														
284TS			30	25					12½	24%	15	392	15	44	10%	5¼	40%	3½		124	—	1½				
286TS			40	30						26½		432														

Dimensions and weights vary with manufacturers. Dimensions in inches and weights in lbs

* "HP" Dimensions at motor end only.

* "HD" Dimension for 254T/256T motor frame on 1 x 2-10 only is 11". A 1/4" motor shim and a 1 1/4" bearing frame shim are required.

Dimensiones y pesos varían con los fabricantes. Dimensiones en pulgadas y pesos en libras

Dimensiones "HP" sólo en el extremo del motor.

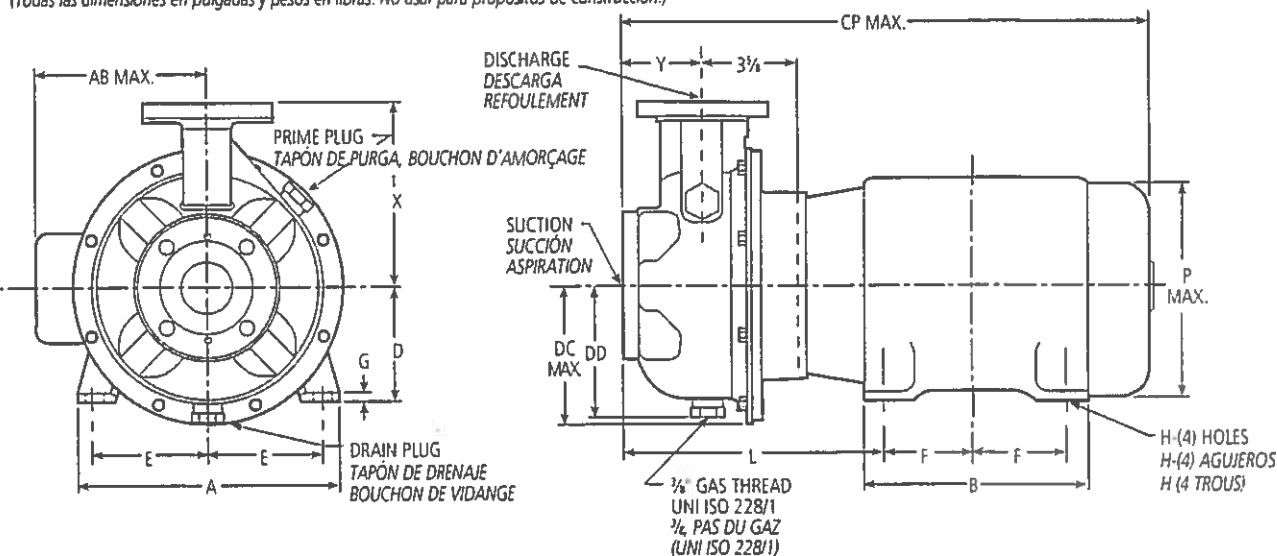
* La dimensión "HD" para el bastidor del motor 254T/256T de 1 x 2-10 es sólo 11". Se requieren una cuña del motor de 1/4" y una cuña del bastidor de apoyo de 1 1/4".

ODP = carcasse a bridade (à ouvertures de ventilation protégées), TEFC = carcasse fermée autoventilée

* Dimensiones HP a l'extrémité du moteur seulement. La dimension HD pour la carcasse 254T ou 256T, version 1X2-10 seulement: est de 11 po; une cale de moteur de 1/4 po et une cale de palier de 1 1/4 po sont requises.

SSH S-Group Close Coupled – Dimensions and Weights, SSH Acople Cerrado – Dimensiones y Pesos, Dimensions et poids – SSH montée sur moteur, groupe S

(All dimensions in inches and weights in lbs. Do not use for construction purposes.)
(Todas las dimensiones en pulgadas y pesos en libras. No usar para propósitos de construcción.)



Dimensions "L" Determined by Pump and Motor, Dimensiones "L" Determinadas por la Bomba y el Motor, Dimensions L – pompe et moteur

Pump, Bomba, Pompe	150 lb. Flange, Brida de 150 lb., Bride, 150 lb/po ¹	Suct. Succ. ① Aspir.	Disch. Desc. ① Re foul.	CP Max., CP Máx., CP max.	DC Max., DC Máx., DC max.	DD	X	Y	Motor Frame Size, Tamaño del Armazón del Motor, Carcasse de moteur				Wt. (lbs.), Pesos (libras), Poids
									143/145	182/184	213/215	254/256	
9SH 1 x 2 – 6	2	1		25 1/4	5	4 3/4	6 3/4	3 3/4	9 1/4	10 1/4	11 1/4	—	24
10SH 1 x 2 – 8				27 1/4	5 1/4	5 1/4	7 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	32
11SH 1 x 2 – 10				27 1/4	6 1/4	6 1/4	8 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	54
4SH 1 1/2 x 2 1/2 – 6	2 1/2	1 1/2		25 1/4	5	4 1/4	6 1/4	3 3/4	9 1/4	10 1/4	11 1/4	—	25
7SH 1 1/2 x 2 1/2 – 8				27 1/4	5 1/4	5 1/4	7 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	34
5SH 2 x 2 1/2 – 6				27 1/4	5	4 1/4	6 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	25
8SH 2 x 2 1/2 – 8	3	2 1/2		27 1/4	6	4 1/4	7 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	36
6SH 2 1/2 x 3 – 6				27 1/4	6	4 1/4	7 1/4	4	10 1/2	11 1/2	12 1/2	12 1/2	27

① For use with ANSI class 150 mating flanges.
Para usar con bridas que casan ANSI clase 150.
À utiliser avec des contre-brides ANSI, classe 150.

NOTE:

1. Pumps shipped in vertical discharge as standard. For other orientations, remove casing bolts, rotate discharge to desired position, and tighten 1/4 – 16 bolts to 12 ft./lbs., 3/4 – 14 bolts to 20 ft./lbs.
2. ALL dimensions in inches.
3. Motor dimensions may vary with motor manufacturer.
4. Not for construction purposes.

NOTA:

1. Las bombas se transportarán en descarga vertical como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y apretar 1/4 – 16 tornillos a 12 pies/libras, 3/4 – 14 tornillos a 20 pies/libras.
2. TODAS las dimensiones en pulgadas.
3. Las dimensiones puede que varíen con los fabricantes.
4. No para propósitos de construcción.

NOTA :

1. L'orifice de refoulement est orienté vers le haut. Pour l'orienter autrement, enlever les vis de fixation du corps de pompe, placer l'orifice dans le sens voulu, puis reposer et serrer les vis 1/4 – 16 à 12 lbf pi et 3/4 – 14 à 20 lbf pi.
2. Les dimensions sont en pouces, et le poids, en livres.
3. Les dimensions et le poids du moteur peuvent varier selon le fabricant.
4. Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

Dimensions Determined by JM Motor Frame, Dimensiones Determinadas por el Armazón del Motor JM, Dimensions – carcasse de moteur JM

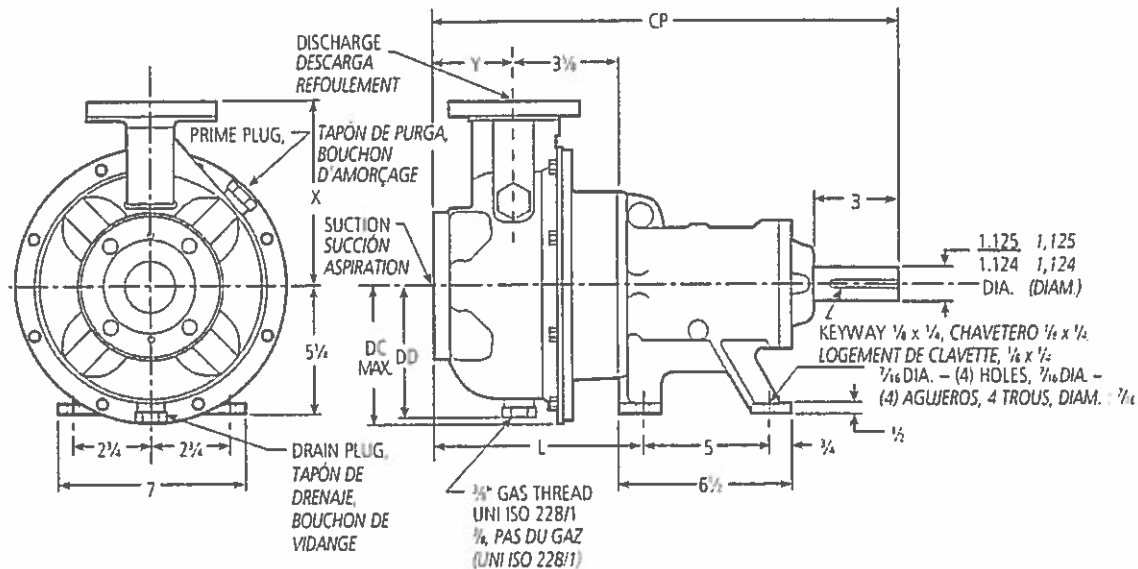
JM Frame, JM Armazón, Carcasse	A	AB	B	D	E	F	G	H Dia., H Diam., H (diam.)	P Max., P Máx., P max.	Motor Wt. (lbs.) Peso Motor (lib.), Poids du moteur
143JM	6 1/4	5 1/4	6	3 1/2	2 3/4	2	1/8	1 1/32	6 1/2	41
145JM						2 1/4				57
182JM						2 1/4				77
184JM	8 1/2	5 1/4	6 1/2	4 1/2	3 3/4		3/16		7 1/4	97
213JM						2 1/4		1/32		122
215JM	9 1/2	7 3/4	8	5 1/4	4 1/4		3/32		9 1/4	155
254TCZ			9 1/2	6 1/4	5	4 1/4		1/4	11 1/2	265
256TCZ	11 1/4	9	11 1/4			5				320

Motor Frame Selections, Selecciones del Armazón del Motor, Choix de carcasses de moteur

Motor Frame, Armazón del Motor, Carcasse	Motor Horsepower, Potencia del Motor, Puissance (hp)							
	3500 RPM, 3500 RPM, 3 500 tr/min				1750 RPM, 1750 RPM, 1750 tr/min			
	1Ø, Monofásicos 1 Ø		3Ø, Trifásicos 3 Ø		1Ø, Monofásicos 1 Ø		3Ø, Trifásicos 3 Ø	
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC
143JM	—	—	—	—	—	—	1	1
145JM	2	2	2-3	2	1-1 1/2	1-1 1/2	1 1/2-2	1 1/2-2
182JM	3	3	5	3	2	2-3	3	3
184JM	5	5	7 1/2	5	3	—	5	5
213JM	7 1/2	—	10	7 1/2	5	—	7 1/2	7 1/2
215JM	10	—	15	10-15	—	—	—	—
254TCZ	—	—	20	—	—	—	—	—
256TCZ	—	—	25	20-25	—	—	—	—

ODP = carcasse abîmée (à ouvertures de ventilation protégées),
TEFC = carcasse fermée autoventilée.

SSH S-Group Frame-Mounted – Dimensions and Weights, SSH Armazón Montado – Dimensiones y Pesos, Dimensions et poids – SSH montée sur palier, groupe S



**Dimensions and Weights – Bare Pump Only,
Dimensiones y Pesos – Solamente Bomba,
Dimensions et poids – pompe nue seulement**

Pump, Bomba, Pompe	150 lb. Flange, Brida de 150 lib., Bride, 150 lb/po ¹	Suction Succión ① Aspir.	Discharge Descarga ① Re foul.	DC Max., DC Máx., DC max.	DD	CP Max., CP Máx., CP max.	L	X	Y	Wt. (lbs.), Peso (libras), Poids
9SH 1 x 2 – 6	2	2	1	5	4 1/4	16 1/4	7 1/4	6 1/4	3 1/4	56
10SH 1 x 2 – 8				5 1/2	5 1/4	16 1/4	7 1/4	7 1/4	3 1/4	64
11SH 1 x 2 – 10				6 1/4	6 1/4	17 1/4	8 1/2	8 1/4	4	86
4SH 1 1/2 x 2 1/2 – 6	2 1/2	2 1/2	1 1/2	5	4 1/4	16 1/2	7 1/4	6 1/4	3 1/4	56
7SH 1 1/2 x 2 1/2 – 8				5 1/2	5 1/4	16 1/2	7 1/4	7 1/4	4	64
5SH 2 x 2 1/2 – 6			2	5	4 1/4	16 1/2	8 1/2	6 1/4	4	57
8SH 2 x 2 1/2 – 8				6	5 1/4	16 1/2	8 1/2	6 1/4	4	66
6SH 2 1/2 x 3 – 6	3	3	2 1/2	6	5 1/4	16 1/2	8 1/2	6 1/4	4	57

① For use with ANSI class 150 mating flanges.
Para usar con bridas que casan ANSI clase 150.
À utiliser avec des contre-brides ANSI, classe 150.

NOTE:

- Pumps will be shipped with top vertical discharge as standard. For other orientations, remove casing bolts, rotate discharge to desired position, and tighten $\frac{3}{4}$ – 16 bolts to 12 ft./lbs., $\frac{7}{16}$ – 14 bolts to 20 ft./lbs.
- ALL dimensions in inches.
- Not for construction purposes.

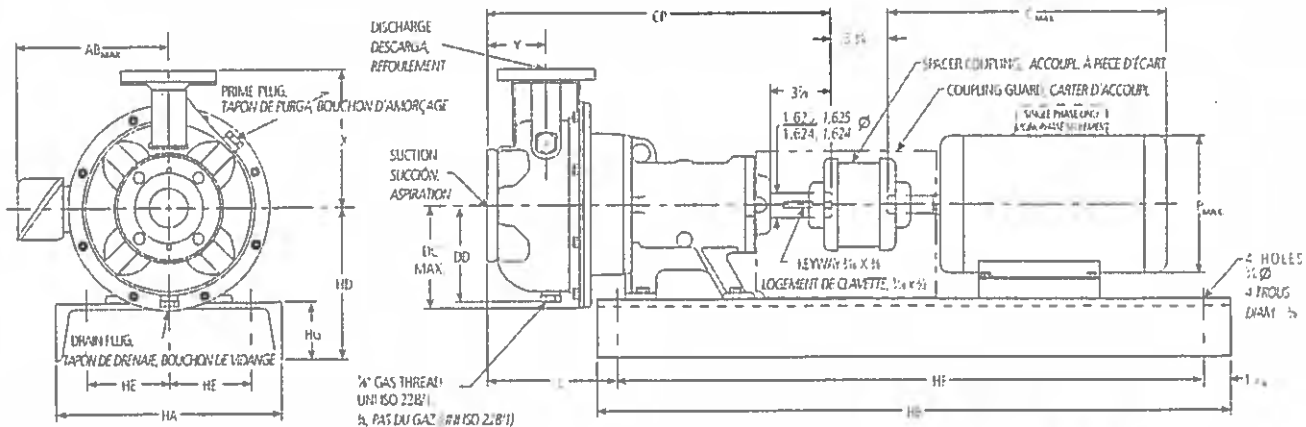
NOTA:

- Las bombas se transportarán con la descarga vertical superior como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y apretar $\frac{3}{4}$ – 16 tornillos a 12 pies/libras, $\frac{7}{16}$ – 14 tornillos a 20 pies/libras.
- TODAS las dimensiones en pulgadas.
- No para propósitos de construcción.

NOTA :

- L'orifice de refoulement est orienté vers le haut. Pour l'orienter autrement, enlever les vis de fixation du corps de pompe, placer l'orifice dans le sens voulu, puis reposer et serrer les vis $\frac{3}{4}$ – 16 à 12 lbf-pi et $\frac{7}{16}$ – 14 à 20 lbf-pi.
- Les dimensions sont en pouces, et le poids, en livres.
- Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

Channel Steel Bedplate, Clockwise Rotation Viewed from Drive End;
Fundación de Acero, Rotación en Dirección de las Agujas del Reloj Visto desde el Extremo del Motor;
Plaque de base profilée en U et rotation en sens horaire (vue de l'extrémité du moteur)



Dimensions and Weights – Determined by Pump,
Dimensiones y Pesos – Determinados por la Bomba,
Dimensions et poids – pompe

Pump, Bomba, Pompe	Pump Size, Tamaño de la Bomba, Dimensions	① Suction Succión Aspir.	① Discharge Descarga Refoul.	CP	DC Max., DC Máx., DC max.	DD	L	X	Y	Wt. (lbs.), Peso (libras), Poids
24SH	1 1/2 x 2 1/2-10	2 1/2	1 1/2	23	6 1/4	6 1/4	10 1/4	8 1/2	4	125
25SH	2 x 2 1/2-10		2		6 1/4	5 7/8				125
22SH	2 1/2 x 3-8	3	2 1/2		6 1/4	6 1/4				125
27SH	2 1/2 x 3-10	4	3	24	6 1/4	6 1/4	11 1/4	9 1/2	5	134
23SH	3 x 4-8				7 1/4	7 1/4				136
28SH	3 x 4-10				7 1/4	7 1/4				148

① For use with ANSI class 150 mating flanges.
 Para usar con bridas que casan ANSI clase 150.
 À utiliser avec des contre-brides ANSI, classe 150.

NOTE:

- Pumps will be shipped with top vertical discharge as standard. For other orientations, remove casing bolts, rotate discharge to desired position and tighten 1/2 – 16 bolts to 12 ft./lbs.
- ALL dimensions in inches.
- Not for construction purposes.

NOTA:

- Las bombas se transportarán con la descarga vertical superior como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y apretar 1/2 – 16 tornillos a 12 pies/libras.
- TODAS las dimensiones en pulgadas.
- No para propósitos de construcción.

NOTA:

- L'orifice de refoulement est orienté vers le haut. Pour l'orienter autrement, enlever les vis de fixation du corps de pompe, placer l'orifice dans le sens voulu, puis reposer et serrer les vis 1/2 – 16 à 12 lbf/pi.
- Les dimensions sont en pouces, et le poids, en livres.
- Les dimensions et le poids du moteur peuvent varier selon le fabricant.
- Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

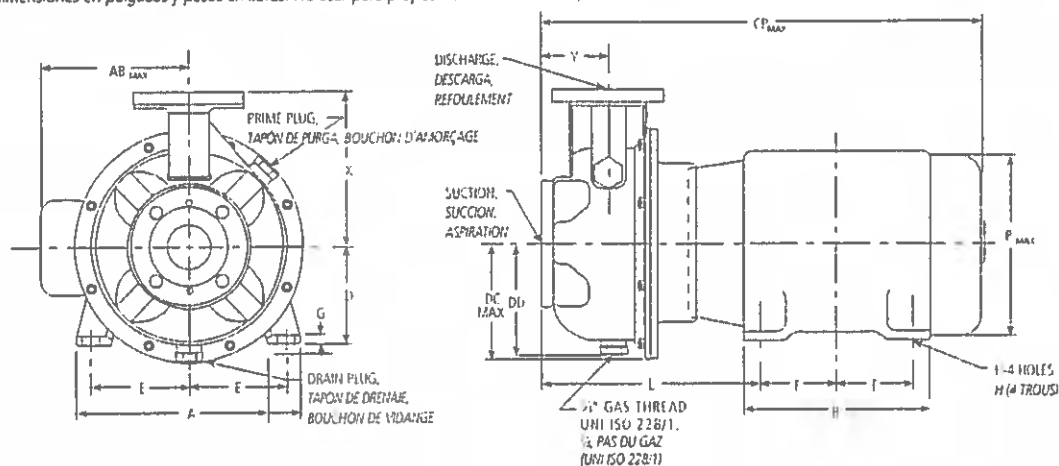
Available Motor and Bedplate Dimensions and Weights,
Pesos y Dimensiones Disponibles de la Fundación y del Motor,
Dimensions et poids – moteur et plaque de base

Motor Frame, Amazón del Motor, Carcasse de moteur	HP @ 3500 RPM, hp à 3 500 tr/min		HP @ 1750 RPM – T-Frame Only hp à 1 750 trimin – carc. T seulem.				AB Max., AB Máx., AB max.	C Max., C Máx., C max.	P Max., P Máx., P max.	Wt. Max., Peso Máx., Poids max.	Bedplate Data, Datos de la Fundación, Plaque de base											
	Three Phase, Trifásicos, 3 Ø		Single Phase, Monofásicos, 1 Ø		Three Phase, Trifásicos, 3 Ø						HA	HB	HD	HE	HF	HG	Wt. (lbs.), Peso (libras), Poids					
	ODP	TEFC	ODP	TEFC	ODP	TEFC																
184T			3 or ou 5	3	5	5	5⅞	18½	7½	95	13	42	10¼	5¼	38½	4	111					
213T					7½	7½	7¾	18	9½	116												
215T	15				10	10		19½	13	136												
254T	20	15			15	15		21½	13	266												
256T	25	20			20	20	23½		264													
284TS/T	30	25			25	25	12½	24½	15	392	15	44	10½	5¼	40½	3½	124					
286TS/T	40	30						26½		422												
324TS/T	50	40					14½	28¾	17¾	592	18	48	12	7¼	44½	4	183					
326TS/T	60	50						30¼		634												
364TS/T	75	60					31½	834														
365TS/T	100	75					15½	32½	18½	1000								13				
405TS/T		100						18		36¾			20½					1060	22	56	14	7¼

Dimensions and weights vary with manufacturers. Dimensions in inches and weights in lbs.
 Dimensiones y pesos varían con los fabricantes. Dimensiones en pulgadas y pesos en libras.
 ODP = carcasse abritée (à ouvertures de ventilation protégées), TEFC = carcasse fermée autoventilée

SSH M-Group Close Coupled – Dimensions and Weights, SSH Acople Cerrado – Dimensiones y Pesos, Dimensions et poids – SSH montée sur moteur, groupe M

(All dimensions in inches and weights in lbs. Do not use for construction purposes.)
(Todas las dimensiones en pulgadas y pesos en libras. No usar para propósitos de construcción.)



Dimensions "L" Determined by Pump and Motor, Dimensiones "L" Determinadas por la Bomba y el Motor, Dimensions L - pompe et moteur																
Pump, Bomba, Pompe	Pump Size, Tamaño de la Bomba, Dimensions	① Suction Succión Aspir.	① Discharge Descarga Refoul.	CP Max., CP Máx., CP max.	DC Max., DC Máx., DC max.	DD	X	Y	Wt. (lbs.), Peso (libras), Poids	Motor Frame Size, Tamaño del Armazón del Motor, Carcasse de moteur						
										140	180	210	250	280	320	360
24SH	1½ x 2 ¼-10	2½	1½	34½	6½	6½	8½ ₁₆	4	75	10½	11½	12½	13½	14½	15	-
25SH	2 x 2½-10		2	36					75							
22SH	2½ x 3-8	3	2½		72	-										
27SH	2½ x 3-10		84		-											
23SH	3 x 4-8	4	3	37	6½	6½	9½ ₁₆	5	86	11½	12½	13½	14½	15½	16	
28SH	3 x 4-10				7½	7½	11½		98	-						

① For use with ANSI class 150 mating flanges
Para usar con bridas que casan ANSI clase 150.
À utiliser avec des contre-brides ANSI, classe 150.

NOTES:
1. Pumps shipped in vertical discharge as standard. For other orientations, remove casing bolts, rotate discharge to desired position, and tighten 1/4 - 16 bolts to 12 ft./lbs., 3/4 - 14 bolts to 20 ft./lbs., 1/2 - 13 bolts to 35 ft./lbs.
2. Motor dimensions may vary with motor manufacturer.
3. Not for construction purposes.

NOTAS:
1. Las bombas se transportarán en descarga vertical como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y apretar 1/4 - 16 tornillos a 12 pies/libras, 3/4 - 14 tornillos a 20 pies/libras, 1/2 - 13 tornillos a 35 pies/libras.
2. TODAS las dimensiones en pulgadas.
3. No para propósitos de construcción.

NOTA:
1. L'orifice de refoulement est orienté vers le haut. Pour l'orienter autrement, enlever les vis de fixation du corps de pompe, placer l'orifice dans le sens voulu, puis reposer et serrer les vis 1/4 - 16 à 12 lbf-pi, 3/4 - 14 à 20 lbf-pi et 1/2 - 13 à 35 lbf-pi.
2. Les dimensions sont en pouces, et le poids, en livres.
3. Les dimensions et le poids du moteur peuvent varier selon le fabricant.
4. Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

Dimensions Determined by JM Motor Frame, Dimensiones Determinadas por el Armazón del Motor JM, Dimensions - carcasse de moteur JM

Frame, Armazón, Carcasse	A	AB Max., AB max.	B	D	E	F	G	H	P Max., P Máx., P max.
145JM	6 1/2	5 1/4	6	3 1/2	2 1/4	2 1/4	1/8	1 1/32	7 1/16
182JM	8 1/2	5 3/8	6 1/2	4 1/2	3 3/4	2 1/4	3/16	1 1/32	8 1/2
184JM						2 3/4			
213JM	9 1/2	7 3/8	8	5 1/4	4 1/4	3 1/2	7/32		10 7/16
215JM						3 1/2			
254JM	11 1/4	9	11 3/4	6 1/4	5	4 1/8	1/4	1 7/32	13 1/4
256JM						5			
284JM						4 3/4			
286JM						5 1/2			
324JM	14	13 1/4	14	8	6 1/4	5 1/2	3/16	2 1/32	16 13/16
326JM						5 1/2			
364TCZ	17 1/4	15 1/8	15 1/2	9	7	5 3/8	1		19
365TCZ						6 1/8			

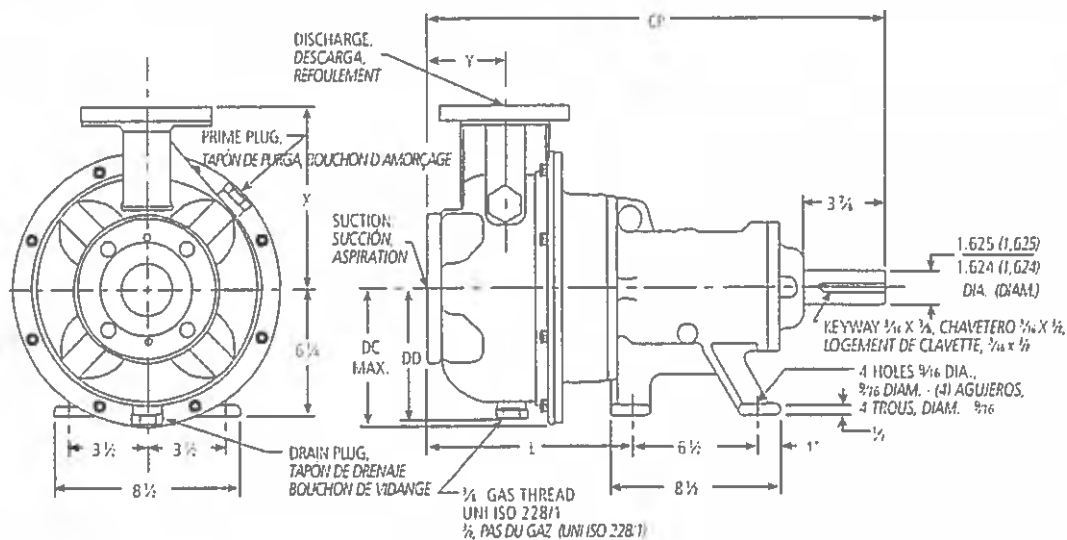
364TCZ and 365TCZ frames are built with 326JM shaft extensions.
Dimensions may vary with manufacturer.
Los armazones 364TCZ y 365TCZ se construyen con extensiones del eje 326JM.
Las dimensiones puede que varien con los fabricantes.
Les carcasses 364TCZ et 365TCZ possèdent la rallonge d'arbre de la 326JM

Motor Frame Selections, Selecciones del Armazón del Motor, Choix de carcasses de moteur

Frame, Armazón, Carcasse	Motor Horsepower, Potencia del Motor, Puissance (hp)						Wt. Max., Peso Máx., Poids max.
	3500 RPM, 3500 tr/min		1750 RPM, 1750 tr/min				
	3 PH, Trifásicos, 3 Ø		1 PH, Monofásicos, 1 Ø		3 PH, Trifásicos, 3Ø		
	ODP	TEFC	ODP	TEFC	ODP	TEFC	
145JM	—	—	—	—	2	2	57
182JM	—	—	2	2, 3	3	3	77
184JM	—	—	3	—	5	5	97
213JM	10	—	5	—	7½	7½	141
215JM	15	10	—	—	10	10	155
254JM	20	15	—	—	15	15	265
256JM	25	20	—	—	20	20	320
284JM	30	25	—	—	25	25	419
286JM	40	30	—	—	—	—	422
324JM	50	40	—	—	—	—	562
326JM	60	50	—	—	—	—	625
364TCZ	75	60	—	—	—	—	775
365TCZ	100	75 100	—	—	—	—	905

364TCZ and 365TCZ frames are built with 326JM shaft extensions.
Los armazones 364TCZ y 365TCZ se construyen con extensiones del eje 326JM.
ODP = carcasse abritée (à ouvertures de ventilation protégées); TEFC = carcasse fermée autoventilée. Les carcasses 364TCZ et 365TCZ possèdent la rallonge d'arbre de la 326JM

SSH M-Group Frame Mounted – Dimensions and Weights, SSH Armazón Montado – Dimensiones y Pesos, Dimensions et poids – SSH montée sur palier, groupe M



Dimensions and Weights – Bare Pump Only, Dimensiones y Pesos – Solamente Bomba, Dimensions et poids – pompe nue seulement

Pump, Bomba, Pompe	Pump Size, Tamaño de la Bomba, Dimensions	① Suction, Succión, Aspir.	① Discharge, Descarga, Refoul.	CP	DC Max., DC Máx., DC max.	DD	L	X	Y	Wt. (lbs.), Peso (libras), Poids
24SH	1 1/2 x 2 1/2-10	2 1/2	1 1/2	23	6 1/8	6 1/8	10 1/2	8 1/4	4	125
25SH	2 x 2 1/2-10		2		6 1/8	6 1/8				125
22SH	2 1/2 x 3-8		2 1/2		6 1/8	5 1/8				125
27SH	2 1/2 x 3-10	3	2 1/2	24	6 1/8	6 1/8	11 1/2	9 1/4	5	134
23SH	3 x 4-8				6 1/8	6 1/8				136
28SH	3 x 4-10				7 1/8	7 1/8				148

① For use with ANSI class 150 mating flanges.
Para usar con bridas que casan ANSI clase 150.
À utiliser avec des contre-brides ANSI, classe 150.

NOTES:

- Pumps will be shipped with top vertical discharge as standard. For other orientations, remove casing bolts, rotate discharge to desired position, replace and tighten 1/2-16 bolts to 12 ft./lbs.
- Motor dimensions may vary with motor manufacturer.
- Not for construction purposes.

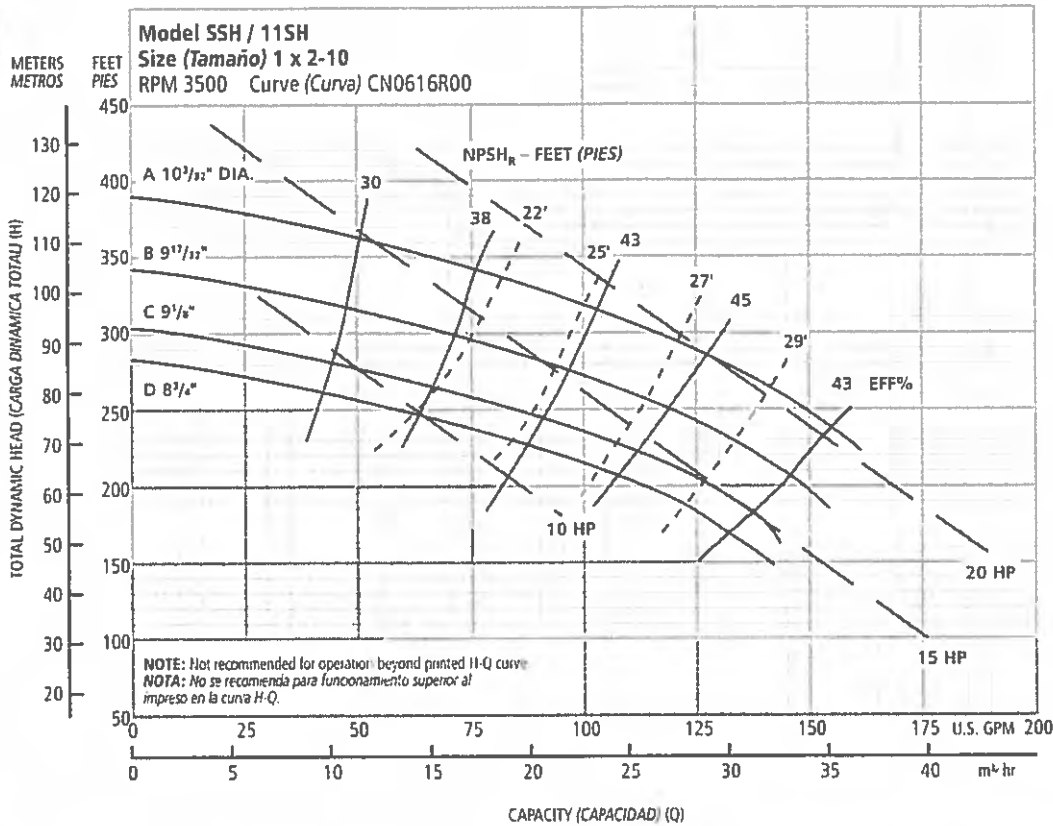
NOTAS:

- Las bombas se transportarán con la descarga vertical superior como estándar. Para otras orientaciones, retirar los tornillos de la carcasa, rotar la descarga a la posición deseada, y apretar 1/2-16 tornillos a 12 pies/libras.
- TODAS las dimensiones en pulgadas.
- No para propósitos de construcción.

NOTA :

- L'orifice de refolement est orienté vers le haut. Pour l'orienter autrement, enlever les vis de fixation du corps de pompe, placer l'orifice dans le sens voulu, puis reposer et serrer les vis 1/2-16 à 12 lbf pi.
- Les dimensions sont en pouces, et le poids, en livres.
- Les dimensions et le poids du moteur peuvent varier selon le fabricant.
- Ne pas utiliser les dimensions pour la construction si elles ne sont pas certifiées à cette effet.

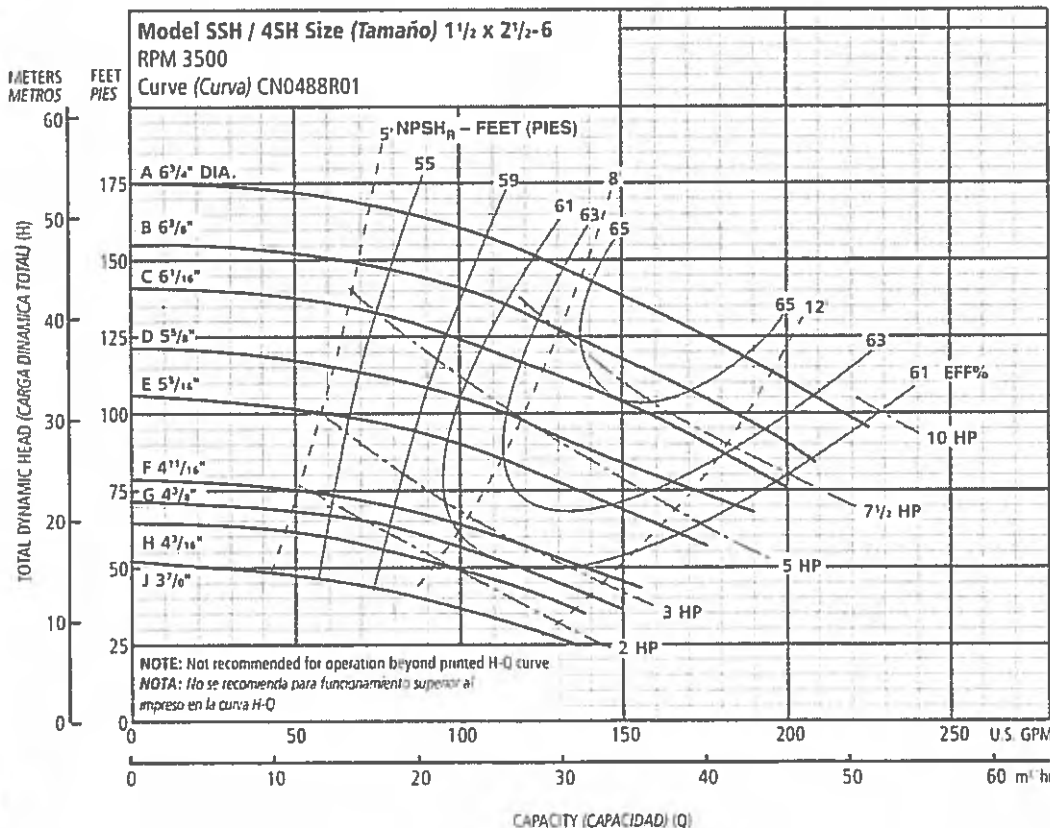
Performance Curves – 60 Hz, 3500 RPM
Curvas de Funcionamiento – 60 Hz, 3500 RPM



Optional Impeller, Impulsor Opcional		
Impeller Code, Código del Impulsor	Dia., Diá.	Standard HP Rating, Estándar HP Potencia
A	10 ³ / ₃₂ "	20
B	9 ¹ / ₃₂ "	15
C	9 ¹ / ₈ "	15
D	8 ¹ / ₄ "	15

NOTE: Pump will pass a sphere to ¹/₄" diameter.

NOTA: La bomba pasará una esfera a ¹/₄" diámetro.



Optional Impeller, Impulsor Opcional		
Impeller Code, Código del Impulsor	Dia., Diá.	Standard HP Rating, Estándar HP Potencia
A	6 ¹ / ₄ "	10
B	6 ³ / ₈ "	7 ¹ / ₂
C	6 ¹ / ₁₆ "	7 ¹ / ₂
D	5 ⁷ / ₈ "	5
E	5 ¹ / ₁₆ "	5
F	4 ¹ / ₁₆ "	3
G	4 ¹ / ₈ "	3
H	4 ³ / ₁₆ "	2
J	3 ¹ / ₈ "	2

NOTE: Pump will pass a sphere to ³/₁₆" diameter.

NOTA: La bomba pasará una esfera a ³/₁₆" diámetro.

Wastewater Pumps

Dewatering, Effluent and Sewage

Installation and Operation Manual

Owner's Information

Pump Model Number: _____

Pump Serial Number: _____

Control Model Number: _____

Dealer: _____

Dealer Phone No. _____

Date of Purchase: _____ Installation: _____

Current Readings at Startup:

1Ø	3Ø	L1-2	L2-3	L3-1
Amps: _____	Amps: _____	_____	_____	_____
Volts: _____	Volts: _____	_____	_____	_____

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Goulds Pumps



SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING All electrical work must be performed by a qualified technician. Always follow the National Electrical Code (NEC), or the Canadian Electrical Code, as well as all local, state and provincial codes. Code questions should be directed to your local electrical inspector. Failure to follow electrical codes and OSHA safety standards may result in personal injury or equipment damage. Failure to follow manufacturer's installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, provide unsatisfactory performance, and may void manufacturer's warranty.

⚠ WARNING Standard units are not designed for use in swimming pools, open bodies of water, hazardous liquids, or where flammable gases exist. These fluids and gases may be present in containment areas. Tank or wetwell must be vented per local codes.

Only pumps specifically Listed for Class 1, Division 1 are allowable in hazardous liquids and where flammable gases may exist. *See specific pump catalog bulletins or pump nameplate for all agency Listings.*

⚠ WARNING Disconnect and lockout electrical power before installing or servicing any electrical equipment. Many pumps are equipped with automatic thermal overload protection which may allow an overheated pump to restart unexpectedly.

⚠ CAUTION All three phase (3Ø) control panels for submersible pumps must provide Class 10, quick-trip, overload protection.

PRE-INSTALLATION CHECKS

Open all cartons and inspect for shipping damage. Report any damage to your supplier or shipping carrier immediately.

Important: Always verify that the pump nameplate Amps, Voltage, Phase, and HP ratings match your control panel and power supply.

Many of our sewage pumps are oil-filled. If there are any signs of oil leakage or if the unit has been stored for an extended period check the oil level in the motor dome and the seal housing, if so equipped.

Check the motor cover oil level through the pipe plug on top of the unit. The motor chamber oil should just cover the motor. Do not overfill, leave room for expansion!

To check the seal housing oil level, where used, lay the unit on its side with the fill plug at 12 o'clock. Remove the plug. The oil should be within ½" (13mm) of the top. If low, refill with an ASTM 150 turbine oil. Replace the plug.

Oil is available in 5 gallon cans through our distributors. You can also source oil locally at motor repair shops. Typical oil brands are: Shell Turbo 32, Sunoco Sunvis 932, Texaco Regal R&O 32, Exxon Nuto 32 and Mobil DTE Light.

Check the strain relief nut on power cable strain assemblies. Power cables should be torqued to 75 in. lbs. for #16 cables and 80 in. lbs. for all other cable assemblies. Seal/heat sensor cables, where used, should be torqued to 75 in. lbs.

Warranty does not cover damage caused by connecting pumps and controls to an incorrect power source (voltage/phase supply).

Record the model numbers and serial numbers from the pumps and control panel on the front of this instruction manual for future reference. Give it to the owner or affix it to the control panel when finished with the installation.

LIFTING OF PUMP



DO NOT LIFT, CARRY OR HANG PUMP BY THE ELECTRICAL CABLES. DAMAGE TO THE ELECTRICAL CABLES CAN CAUSE SHOCK, BURNS OR DEATH.

Lift the pump with an adequately sized chain or cable attached to the lifting eye bolt. **DO NOT** damage electrical and sensor cables while raising and lowering unit.

OPTIONAL GUIDE RAIL OR LIFT-OUT SYSTEM

In many effluent and sewage basins or lift stations it is advisable to install the pump on a guide rail system or on a lift-out adapter to facilitate installation and removal for inspection and/or service. Most codes do not allow personnel to enter a wetwell without the correct protective equipment and training. Guide rails are designed to allow easy removal of the pump without the need for entry into the wetwell or need to disturb piping. The guide rail or lift-out adapter should locate the pump opposite the influent

opening preventing stagnate areas where solids can settle. The basin or pit must be capable of supporting the weight of the pump and guide rail. The pit floor must be flat.

NOTICE: FOLLOW THE INSTRUCTIONS THAT ARE PROVIDED WITH THE GUIDE RAIL ASSEMBLY.

PIPING

Discharge piping should be no smaller than the pump discharge diameter and kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

Install an adequately sized check valve matched to the solids handling capability of the pump to prevent fluid backflow. Backflow can allow the pump to "turbine" backwards and may cause premature seal and/or bearing wear. If the pump is turning backwards when it is called on to start the increased torque may cause damage to the pump motor and/or motor shaft and some single-phase pumps may actually run backwards.

Install an adequately sized gate valve **AFTER** the check valve for pump, plumbing and check valve maintenance.


Important – Before pump installation. Drill a $\frac{1}{16}$ " (4.8mm) relief hole in the discharge pipe. It should be located within the wetwell, 2" (51mm) above the pump discharge but below the check valve. The relief hole allows any air to escape from the casing. Allowing liquid into the casing will insure that the pump can start when the liquid level rises. Unless a relief hole is provided, a bottom intake pump could "air lock" and will not pump water even though the impeller turns.


All piping must be adequately supported, so as not to impart any piping strain or loads on the pump.

The pit access cover must be of sufficient size to allow for inspection, maintenance and crane or hoist service.

WIRING AND GROUNDING


Important notice: Read Safety Instructions before proceeding with any wiring.


 Use only stranded copper wire to pump/motor and ground. The ground wire must be at least as large as the power supply wires. Wires should be color coded for ease of maintenance and troubleshooting.


 Install wire and ground according to the National Electrical Code (NEC), or the Canadian Electrical Code, as well as all local, state and provincial codes.


 Install an all leg disconnect switch where required by code.


 Disconnect and lockout electrical power before performing any service or installation.

 The electrical supply voltage and phase must match all equipment requirements. Incorrect voltage or phase can cause fire, motor and control damage, and voids the warranty.

 All splices must be waterproof. If using splice kits follow manufacturer's instructions.

 **WARNING** Select the correct type and NEMA grade junction box for the application and location. The junction box must insure dry, safe wiring connections.

 **WARNING** Seal all controls from gases present which may damage electrical components.

 **WARNING** **FAILURE TO PERMANENTLY GROUND THE PUMP, MOTOR AND CONTROLS BEFORE CONNECTING TO POWER CAN CAUSE SHOCK, BURNS OR DEATH.**

SELECTING AND WIRING PUMP CONTROL PANELS AND SWITCHES

FLOAT SWITCH TYPES

There are two basic float switch designs; single-action and wide-angle. Single-action switches operate over a range of 15" so they open and close quickly. Wide-angle floats operate over a 90" swing with the tether length between the float body and the pivot point controlling the On-Off range. The design determines how many floats are required with different systems or controls.

Floats may be normally open (NO) for pump down applications or to empty a tank. Normally closed (NC) switches are used to pump up or to fill a tank.

A single-action control switch may be used only with a control panel, never direct connected to a pump.

The wide-angle, pump down switches may be used as direct connected pump switches or as control switches.

SETTING THE FLOAT SWITCHES

There are no absolute rules for where to set the float switches, it varies from job to job.

Suggested Rules to Follow:

All floats should be set below the Inlet pipe!

Off Float: Best: set so the water level is always above the top of the pump (motor dome). Next Best: set so the water level is not more than 6" below the top of the pump.

On Float: set so the volume of water between the On and Off floats allows pumps of 1½ HP and under to operate for 1 minute minimum. Two (2) HP and larger pumps should run a minimum of 2 minutes. Basin literature states the gallons of storage per inch of basin height.

Lag/Alarm Float(s): should be staggered above the Off and On floats. Try to use most of the available storage provided by the basin, save some space for reserve storage capacity. *See Diagrams and Charts in Float Switch Chart Section.*

PANEL WIRING DIAGRAMS

Our control panels are shipped with instructions and wiring diagrams. Use those instructions in conjunction with this IOM. Electrical installation should be performed only by qualified technicians. Any problem or questions pertaining to another brand control must be referred to that control supplier or manufacturer. Our technical people have no technical schematics or trouble shooting information for other companies' controls.

ALARMS

We recommend the installation of an alarm on all Wastewater pump installations. Many standard control panels come equipped with alarm circuits. If a control panel is not used, a stand alone high liquid level alarm is available. The alarm alerts the owner of a high liquid level in the system so they can contact the appropriate service personnel to investigate the situation.

SINGLE PHASE PUMPS

Single phase (1Ø) pumps may be operated using a piggyback or hard wired float switch, a contactor, or a Simplex or Duplex control panel. See Figures 1, 2 and 5.

All 1/3 and 1/2 HP, 115 or 230 volt pumps, and some 3/4 and 1 HP pumps, are supplied with plug style power cords. They may be plugged into piggyback float switches for simple installations. It is allowable to remove the plugs in order to hardwire or connect to a Simplex or Duplex controller. Removing the plug neither voids the warranty nor violates the agency Listings. See Figure 5.



WARNING PLUG-CONNECTED UNITS MUST BE CONNECTED TO A PROPERLY GROUNDED, GROUNDING TYPE RECEPTACLE.

ON NON-PLUG UNITS, DO NOT REMOVE CORD AND STRAIN RELIEF. DO NOT CONNECT CONDUIT TO PUMP.

Pumps with bare lead power cords can be hard-wired to a float switch, wired to a 1Ø contactor, a Simplex controller or a Duplex controller. Always verify that the float switch is rated for the maximum run amperage, maximum starting amperage, and the HP rating on the pump. Single-phase wastewater pumps contain on-winding overloads, unless noted on the pump nameplate. See Figures 1 and 2.

THREE PHASE PUMPS:

As a Minimum a 3Ø pump requires a 3 pole circuit breaker/fused circuit, an across the line magnetic starter rated for the pump HP, and ambient compensated Quick Trip Class 10 overloads.

SINGLE AND THREE PHASE CONTROL PANELS:

Control panels are available as Simplex (controls 1 pump) or Duplex (controls 2 pumps). Our standard SES Series Panels are available with many standard features and can be built with our most popular options. We also custom build panels which offer many more design options than the SES panels. Custom control panels are available in many different configurations. Custom panel quote requests may be forwarded to Customer Service through any authorized distributor.

Our "SES" Duplex panels feature a solid-state printed circuit board design with standard high level alarm circuits. Other standard features are: an auxiliary dry alarm contact for signaling a remote alarm and float switch position indicator lights. Our 3Ø panels have built-in, adjustable, Class 10 overloads. The adjustable overloads on all our 3Ø panels mean less labor for the installer and no need to order specific overloads. Most SES panels are in stock for immediate delivery.

On pumps equipped with seal fail and/or heat (high temperature) sensors it is recommended that you use our control panel with the appropriate options. The pump sensors do not function without a seal fail relay or terminal connection in the control panel and a warning device such as a bell, horn or light.

Seal Failure Circuit - Some dual seal pumps are equipped with a standard, built-in seal failure circuit, which may also be called a moisture detection circuit. This circuit must be connected to a control panel with an optional seal fail relay. The panel must be special ordered with the seal fail relay and alarm. There are also stand alone seal fail panels

such as the A4-3 or A4-4 available as standard items. The pumps can be identified by an extra control cable exiting the motor cover. The cable contains two wires, a black wire, connects to panel "terminal" going to "probe"; and a white wire, connects to the panel "terminal" going to the relay ground. Do not connect to the panel ground screw. Follow the wiring instructions supplied with the panel.

Heat Sensor and Seal Failure Circuit - Some pumps are equipped with a seal fail and normally closed, on-winding high temperature thermostats (heat sensors). The pumps have a control cable with four (4) leads, black (probe) and green (relay ground) for the seal fail circuit and red and white for the high temperature circuit. Connect the high temperature (heat sensor) circuit to the panel terminal strip as indicated on the panel drawing using the red and white wires. The high temperature panel circuit is also an optional item which you must specifically order when you order your control panel. The high temperature circuit is different from the Class 10 overloads which are always required on three phase pumps. Follow the wiring instructions supplied with the panel.

INSTALLATION

Connect the pump(s) to the guide rail pump adapters or to the discharge piping. Slide rail bases should be anchored to the wetwell floor.

Complete all wiring per the control panel wiring diagrams and NEC, Canadian, state, provincial and/or local codes. This a good time to check for proper rotation of the motors/impellers.



DO NOT PLACE HANDS IN PUMP SUCTION WHILE CHECKING MOTOR ROTATION. TO DO SO WILL CAUSE SEVERE PERSONAL INJURY.

Always verify correct rotation. Correct rotation is indicated on the pump casing. Three phase motors are reversible. It is allowable to bump or jog the motor for a few seconds to check impeller rotation. It is easier to check rotation before installing the pump. Switch any two power leads to reverse rotation.

Lower the pump(s) into the wetwell.

Check to insure that the floats will operate freely and not contact the piping.

OPERATION

Once the piping connections are made and checked you can run the pumps.

Piggyback Switch Operation - Plug the piggyback switch into a dedicated grounded outlet and then plug the pump into the switch. Test the pump by filling the wetwell until the pump goes On. If the pumps run but fail to pump, they are probably air locked, drill the relief holes per the instructions in the Piping Section.

Check the operating range to insure a minimum one minute run time and that the pump goes Off in the correct position.

Control Panel Operation - Fill the wetwell with clear water.

Use the pump H-O-A (Hand-Off-Automatic) switches in Hand to test the pumps. If they operate well in Hand proceed to test Automatic operation. If the pumps run but fail to pump, they are probably air locked, drill the relief holes per the instructions in the Piping Section.

Place Control Panel switch(es) in Automatic position and thoroughly test the operation of the ON, OFF, and Alarm floats by filling the wetwell with clear water. **Important:** Failure to provide a Neutral from the power supply to a 1Ø, 230 volt Control Panel will not allow the panel control circuit to operate. The Neutral is necessary to complete the 115 volt control circuit.

Check voltage and amperage and record the data on the front of this manual for future reference. Compare the amperage readings to the pump nameplate maximum amperage. If higher than nameplate amperage investigate

cause. Operating the pump off the curve, i.e. with too little head or with high or low voltage will increase amperage. The motor will operate properly with voltage not more than 10% above or below pump nameplate ratings. Performance within this range will not necessarily be the same as the published performance at the exact rated nameplate frequency and voltage. Correct the problem before proceeding. Three phase unbalance is also a possible cause. *See Three Phase Power Unbalance and follow the instructions.*

Reset the Alarm circuit, place pump switch(es) in the Automatic position and Control Switch in ON position. The system is now ready for automatic operation.

Explain the operation of the pumps, controls and alarms to the end user. Leave the paperwork with the owner or at the control panel if in a dry, secure location.

FLOAT SWITCH AND PANEL CHART

The purpose of this chart is to show the required switch quantities and the function of each switch in a typical wastewater system. The quantities required vary depending on the switch type, single-action or wide-angle. Switch quantities also vary by panel type: simplex with and without alarms, and duplex with alarms.

Duplex Panels using single-action switches:

Three Float Panel Wiring

SW1	Bottom	Pumps Off
SW2	Middle	1st Pump On
SW3	Top	2nd Pump & Alarm On

Four Float Panel Wiring ②

SW1	Bottom	Pumps Off
SW2	2nd	1st Pump On
SW3	3rd	2nd Pump On
SW4	Top	Alarm On

Duplex Panels using wide-angle switches:

Three Float Panel Wiring

SW1	Bottom	1st Pump On/Both Off
SW2	Top	2nd Pump & Alarm On

Four Float Panel Wiring

SW1	Bottom	1st Pump On/Both Off
SW2	Middle	2nd Pump On
SW3	Top	Alarm On

Simplex Panel using single-action switches:

Simplex Panel with Alarm ①

SW1	Bottom	Pump Off
SW2	Middle	Pump On
SW3	Top	Alarm On/Off

Simplex Panel with No Alarm

SW1	Bottom	Pump Off
SW2	Top	Pump On

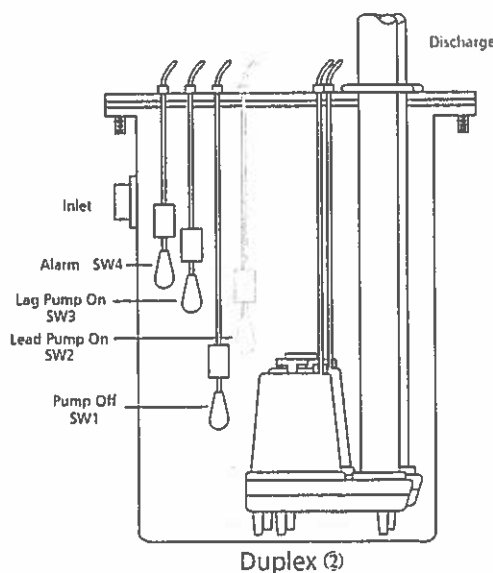
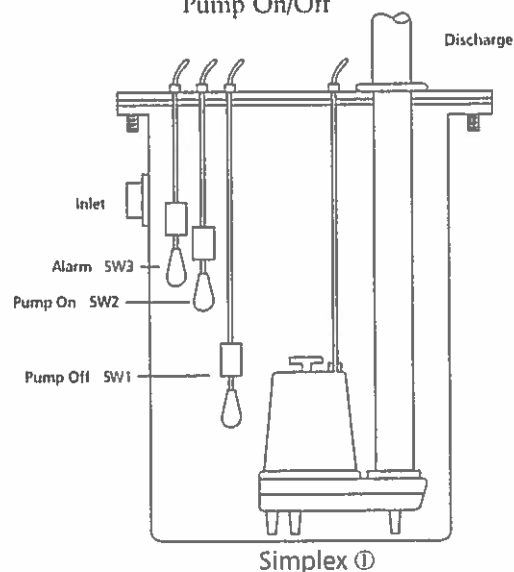
Simplex Panel using wide-angle switches:

Simplex Panel with Alarm

SW1	Bottom	Pump On/Off
SW2	Top	Alarm On/Off

Simplex Panel with No Alarm

SW1	Pump On/Off
-----	-------------



THREE PHASE POWER UNBALANCE

A full three phase supply consisting of three individual transformers or one three phase transformer is recommended. "Open" delta or wye connections using only two transformers can be used, but are more likely to cause poor performance, overload tripping or early motor failure due to current unbalance.

Check the current in each of the three motor leads and calculate the current unbalance as explained below.

If the current unbalance is 2% or less, leave the leads as connected.

If the current unbalance is more than 2%, current readings should be checked on each leg using each of the three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.

To calculate percent of current unbalance:

A. Add the three line amp values together.

B. Divide the sum by three, yielding average current.

C. Pick the amp value which is furthest from the average current (either high or low).

D. Determine the difference between this amp value (furthest from average) and the average.

E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.

Current unbalance should not exceed 5% at service factor load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected. If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the power source.

Contact your local power company to resolve the imbalance.

	Hookup 1			Hookup 2			Hookup 3		
Starter Terminals	L1	L2	L3	L1	L2	L3	L1	L2	L3
	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$	$\frac{1}{T}$
Motor Leads	R	B	W	W	R	B	B	W	R
	T3	T1	T2	T2	T3	T1	T1	T2	T3

Example:

T3-R = 51 amps
T1-B = 46 amps
T2-W = 53 amps
Total = 150 amps
 $\div 3 = 50$ amps
— 46 = 4 amps
 $4 \div 50 = .08$ or 8%

T2-W = 50 amps
T3-R = 48 amps
T1-B = 52 amps
Total = 150 amps
 $\div 3 = 50$ amps
— 48 = 2 amps
 $2 \div 50 = .04$ or 4%

T1-B = 50 amps
T2-W = 49 amps
T3-R = 51 amps
Total = 150 amps
 $\div 3 = 50$ amps
— 49 = 1 amps
 $1 \div 50 = .02$ or 2%

INSULATION RESISTANCE READINGS

Normal Ohm and Megohm Values between all leads and ground

Condition of Motor and Leads	Ohm Value	Megohm Value
A new motor (without drop cable).	20,000,000 (or more)	20 (or more)
A used motor which can be reinstalled in well.	10,000,000 (or more)	10 (or more)
Motor in well. Readings are for drop cable plus motor.		
New motor.	2,000,000 (or more)	2 (or more)
Motor in good condition.	500,000 - 2,000,000	.5 - 2
Insulation damage, locate and repair.	Less than 500,000	Less than .5

Insulation resistance varies very little with rating. Motors of all HP, voltage and phase ratings have similar values of insulation resistance.

Insulation resistance values above are based on readings taken with a megohmmeter with a 500V DC output. Readings may vary using a lower voltage ohmmeter, consult factory if readings are in question.

This table was reprinted through the courtesy of Franklin Electric.

ENGINEERING DATA

Engineering data for specific models may be found in your catalog and on our website (address is on the cover).

Control panel wiring diagrams are shipped with the control panels. Please use the control panel drawings in conjunction with this instruction manual to complete the wiring.

PUMP CONSTRUCTION			
Minimum Submergence		Maximum Fluid Temperature	
Continuous Duty	Fully Submerged	Continuous Operation	104° F 40° C
Intermittent Duty	6" Below Top of Motor	Intermittent Operation	140° F 60° C

Pumpmaster and Pumpmaster Plus - Hard Wired

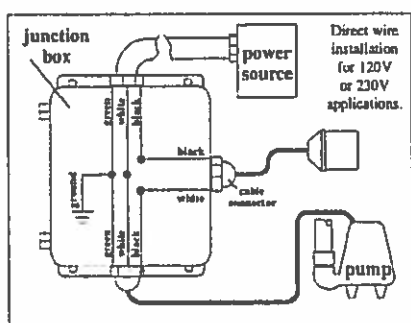


Fig. 1

Single-Action Float Switch
"Typical" Installation

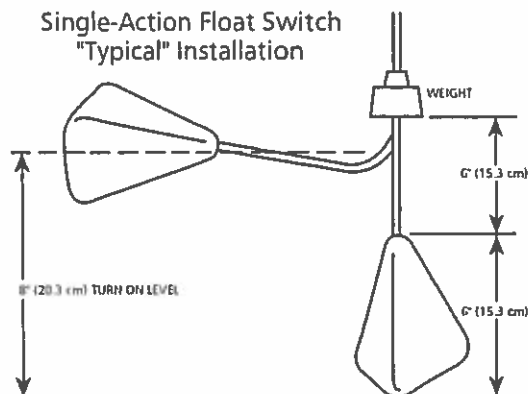


Fig. 4

Double Float - Hard Wired

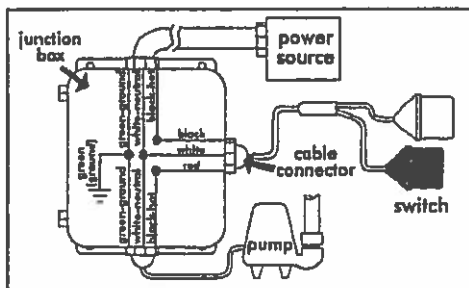


Fig. 2

Wide-Angle Float Switch

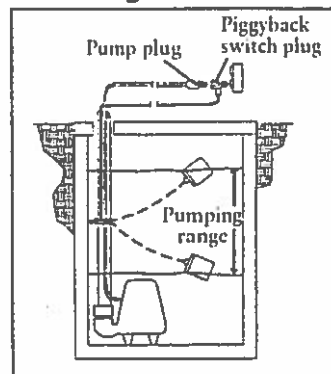


Fig. 5

Determining Pumping Range

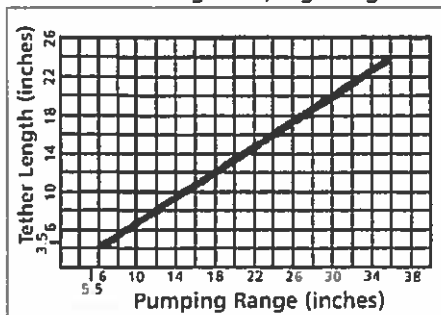


Fig. 3

Three Phase Connection Diagram

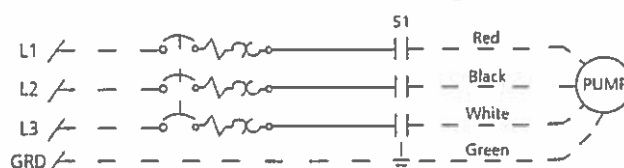
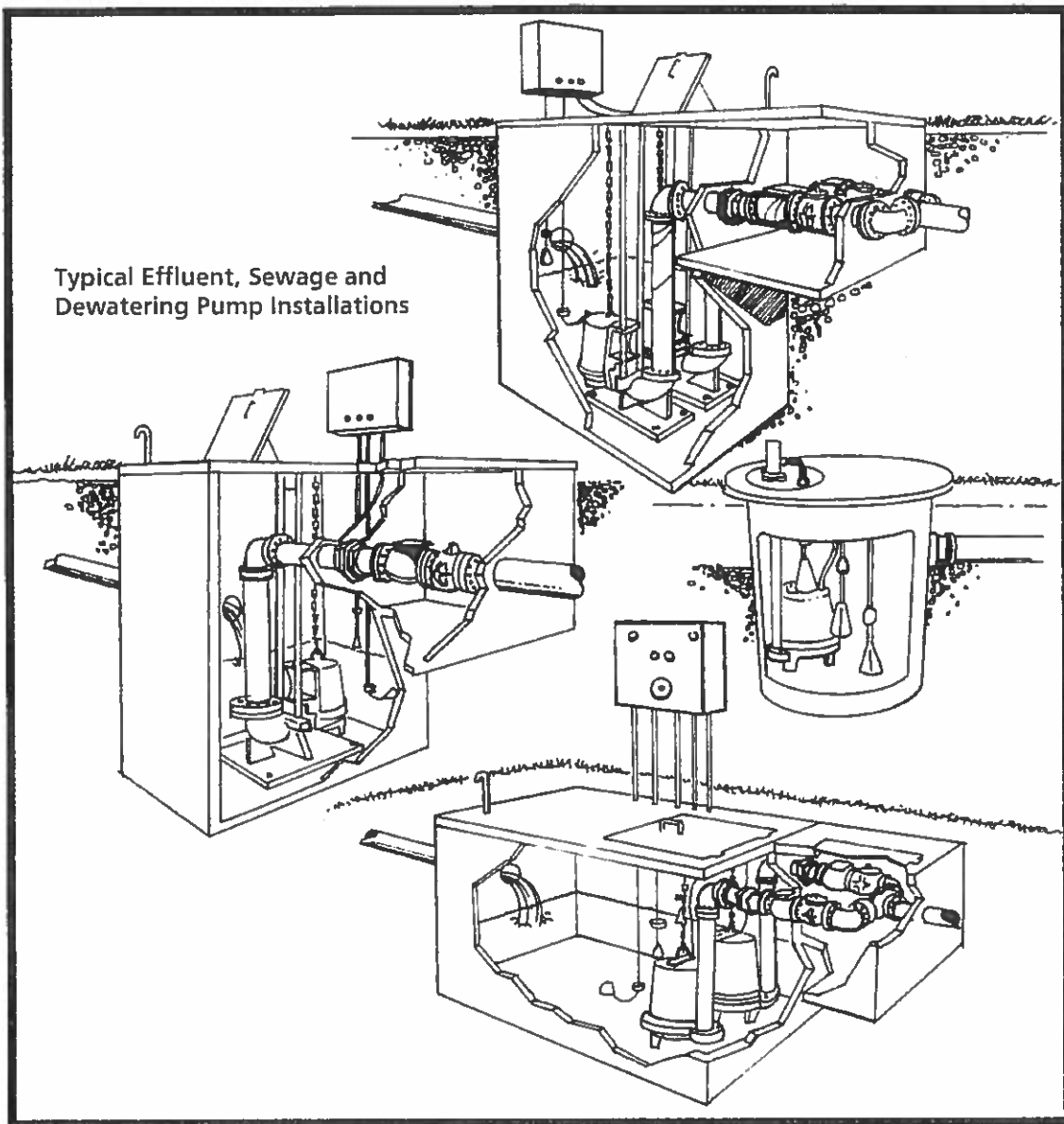


Fig. 6



TROUBLE SHOOTING

⚠ WARNING
Hazardous
voltage

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL
POWER BEFORE ATTEMPTING ANY SERVICE CAN CAUSE
SHOCK, BURNS OR DEATH.

SYMPTOM	PROBABLE CAUSE	RECOMMENDED ACTION
MOTOR NOT RUNNING NOTE: If circuit breaker "OPENS" repeatedly, DO NOT reset. Call qualified electrician. a) Manual operation b) Automatic operation NOTE: Check the pump in manual mode first to confirm operation. If pump operates, the automatic control or wiring is at fault. If pump does not operate, see above.	Motor thermal protector tripped.	Allow motor to cool. Insure minimum pump submergence. Clear debris from casing and impeller.
	Open circuit breaker or blown fuse.	Determine cause, call a qualified electrician.
	Pump impeller binding or jammed.	Check motor amp draw. If two or more times higher than listed on pump nameplate, impeller is locked, motor bearings or shaft is damaged. Clear debris from casing and impeller, consult with dealer.
	Power cable is damaged. Inadequate electrical connection in control panel.	Resistance between power leads and ground should read infinity. If any reading is incorrect, call a qualified electrician.
	No neutral wire connected to control panel.	Inspect control panel wiring. Call a qualified electrician.
	Inadequate electrical connection in control panel.	With switch disconnected, check continuity while activating liquid level switch. Replace switch, as required.
	Defective liquid level switch.	Allow liquid level to rise 3" to 4" (76 mm - 101 mm) above turn-on level.
	Insufficient liquid level to activate controls.	Untangle cords and insure free operation.
PUMP WILL NOT TURN OFF	Liquid level cords tangled.	Untangle cords and insure free operation.
	Pump is air locked.	Shut off pump for approximately one minute, then restart. Repeat until air lock clears. If air locking persists in a system with a check valve, a 3/16" (4.8 mm) hole may be drilled in the discharge pipe approximately 2" (51 mm) above the discharge connection.
	Influent flow is matching pump's discharge capacity.	Larger pump may be required.
	Check valve installed backwards, plugged or stuck closed.	Check flow arrow on valve and check valve operation.
LITTLE OR NO LIQUID DELIVERED BY PUMP	Excessive system head.	Consult with dealer.
	Pump inlet plugged.	Inspect and clear as required.
	Improper voltage or wired incorrectly.	Check pump rotation, voltage and wiring. Consult with qualified electrician.
	Pump is air locked.	See recommended action, above.
	Impeller is worn or damaged.	Inspect impeller, replace as required.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
	Discharge check valve inoperative.	Inspect, repair or replace as required.
PUMP CYCLES CONSTANTLY	Sewage containment area too small.	Consult with dealer.
	Liquid level controls defective or improperly positioned.	Inspect, readjust or replace as required.
	Influent excessive for this size pump.	Consult with dealer.

GOULDS PUMPS LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by Goulds Pumps.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Pumps distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Pumps Customer Service Department.

The warranty excludes:

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Pumps and the dealer in purchases, consignments or contracts for sale of the subject pumps.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
- (3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

Goulds Pumps and the ITT Engineered Blocks Symbol are registered trademarks and tradenames of ITT Industries.

Goulds Pumps



ITT Industries



ITT

Wastewater

Goulds Pumps

WS_BHF Series Model 3887BHF

Submersible Sewage Pump

Prosurance available for residential applications.



FEATURES

- **Impeller:** Cast iron, enclosed, non-clog, dynamically balanced with pump out vanes for mechanical seal protection.
- **Casing:** Cast iron flanged volute type for maximum efficiency. Designed for easy installation on A10-20 slide rail or base elbow rail systems.
- **Mechanical Seal:** Silicon Carbide vs. Silicon Carbide sealing faces for superior abrasive resistance, stainless steel metal parts, BUNA-N elastomers.
- **Shaft:** Corrosion resistant, 300 series stainless steel. Threaded design. Locknut on all models to guard against component damage on accidental reverse rotation.
- **Fasteners:** 300 series stainless steel.
- **Capable of running dry** without damage to components.
- **Designed for continuous operation**, when fully submerged.



AGENCY LISTINGS

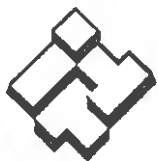


Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association — File #LR38549
Goulds Pumps is ISO 9001 Registered.

Goulds Pumps is a brand of ITT Corporation.

www.goulds.com

Engineered for life



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GOULDS PUMPS Wastewater

APPLICATIONS

Specifically designed for the following uses:

- Homes
- Sewage systems
- Dewatering/Effluent
- Water transfer
- Light industrial
- Commercial applications

Anywhere waste or drainage must be disposed of quickly, quietly and efficiently.

SPECIFICATIONS

Pump

- Solids handling capabilities: 2" maximum.
- Capacities: up to 220 GPM.
- Total heads: up to 81 feet TDH.
- Discharge size: 2" NPT threaded companion flange as standard. 3" option available but must be ordered separately. (Order no. A1-3)
- Temperature: 104°F (40°C) continuous
140°F (60°C) intermittent.

MOTORS

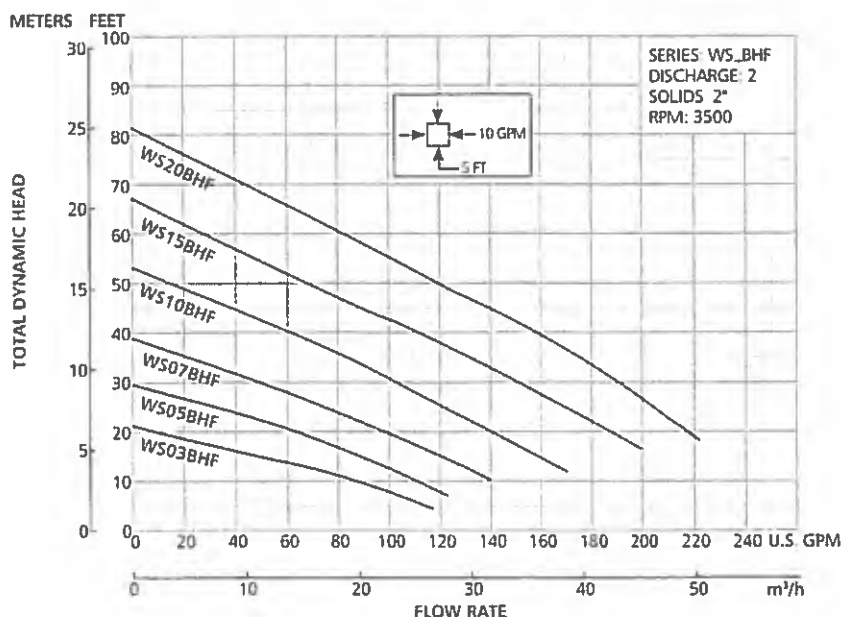
- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer. All ratings are within the working limits of the motor.
- Class B insulation on 1/3-1 1/2 HP models.
- Class F insulation on 2 HP models.

Single phase (60 Hz):

- Capacitor start motors for maximum starting torque.
- Built-in overload with automatic reset.
- SJTOW or STOW severe duty oil and water resistant power cords.
- 1/2 – 1 HP models have NEMA three prong grounding plugs.
- 1 1/2 HP and larger units have bare lead cord ends.

Three phase (60 Hz):

- Class 10 overload protection must be provided in separately ordered starter unit.
- STOW power cords all have bare lead cord ends.
- **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage when fully submerged.
- **Bearings:** Upper and lower heavy duty ball bearing construction.
- **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. Standard cord is 20'. Optional lengths are available.
- **Motor Cover O-ring:** Assures positive sealing against contaminant and oil leakage.

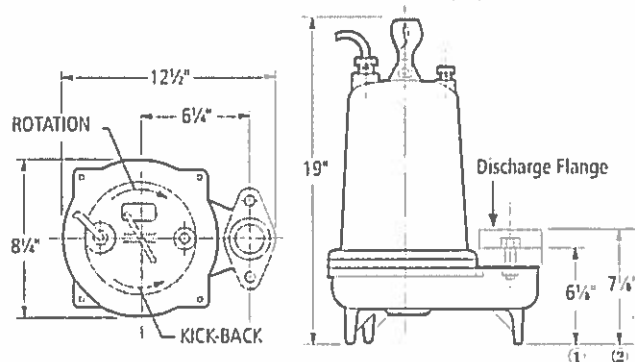


MOTOR AND MODEL INFORMATION

ORDER NUMBER	HP	PHASE	VOLTS	RPM	IMPELLER DIA. (IN.)	MAX. AMPS	LOCKED ROTOR AMPS	KVA CODE	FULL LOAD MOTOR EFF. %	RESISTANCE	
										START	LINE-LINE
WS0311BHF	0.33	1	115	3500	2.94	12.4	46.0	M	54	7.5	1.0
WS0318BHF	0.33	1	208			6.8	31.0	K	68	9.7	2.4
WS0312BHF	0.33	1	230			6.2	34.5	M	53	9.6	4.0
WS0511BHF	0.5	1	115		3.19	14.5	46.0	M	54	7.5	1.0
WS0518BHF	0.5	1	208			8.4	31.0	K	68	9.7	2.4
WS0512BHF	0.5	1	230			7.6	34.5	M	53	9.6	4.0
WS0538BHF	0.5	3	200			4.9	22.6	R	68	—	3.8
WS0532BHF	0.5	3	230			3.6	18.8	R	70	—	5.8
WS0534BHF	0.5	3	460			1.8	9.4	R	70	—	23.2
WS0537BHF	0.5	3	575			1.5	7.5	R	62	—	35.3
WS0718BHF	0.75	1	208		3.44	11.0	31.0	K	68	9.7	2.4
WS0712BHF	0.75	1	230			10.0	27.5	J	65	12.2	2.7
WS0738BHF	0.75	3	200			6.2	20.6	L	64	—	5.7
WS0732BHF	0.75	3	230			5.4	15.7	K	68	—	8.6
WS0734BHF	0.75	3	460			2.7	7.9	K	68	—	34.2
WS0737BHF	0.75	3	575			2.2	9.9	L	78	—	26.5
WS1018BHF	1	1	208		3.75	14.5	59.0	K	68	9.3	1.1
WS1012BHF	1	1	230			13.0	36.2	J	69	10.3	2.1
WS1038BHF	1	3	200			8.6	27.6	M	77	—	2.7
WS1032BHF	1	3	230			7.5	24.1	L	79	—	4.1
WS1034BHF	1	3	460			3.8	12.1	L	79	—	16.2
WS1037BHF	1	3	575			3.1	9.9	L	78	—	26.5
WS1512BHF	1.5	1	230		4.00	18.0	52.0	J	67	2.76	0.53
WS1538BHF	1.5	3	200			10.0	42.4	K	78	—	1.7
WS1532BHF	1.5	3	230			9.6	42.4	K	78	—	1.7
WS1534BHF	1.5	3	460			4.8	21.2	K	78	—	6.6
WS1537BHF	1.5	3	575			3.9	16.3	L	78	—	10.5
WS2012BHF	2	1	230		4.44	18.0	49.6	F	78	3.2	1.1
WS2038BHF	2	3	200			12.0	42.4	K	78	—	1.7
WS2032BHF	2	3	230			11.6	42.4	K	78	—	1.7
WS2034BHF	2	3	460			5.8	21.2	K	78	—	6.6
WS2037BHF	2	3	575			4.7	16.3	L	78	—	10.5

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)



Discharge Flange:

- ① 2" NPT standard
- ② 3" NPT optional (order an A1-3)



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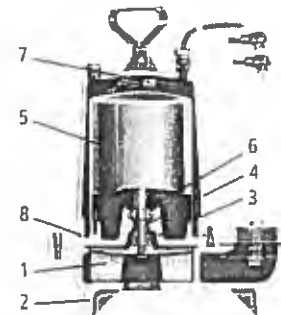
Wastewater

PERFORMANCE RATINGS (gallons per minute)

Order No.	WS03BHF	WS05BHF	WS07BHF	WS10BHF	WS15BHF	WS20BHF	
HP ▶	¼	½	¾	1	1½	2	
RPM ▶	3500	3500	3500	3500	3500	3500	
Total Head Feet of Water	10 ▶	86	110	140	—	—	
	15	48	88	120	158	—	
	20	—	62	98	139	217	
	25	—	32	74	120	204	
	30	—	—	49	101	190	
	35	—	—	21	82	175	
	40	—	—	—	60	159	
	45	—	—	—	38	88	140
	50	—	—	—	—	67	120
	55	—	—	—	—	47	100
	60	—	—	—	—	29	80
	65	—	—	—	—	—	62
	70	—	—	—	—	—	43
	75	—	—	—	—	—	23

COMPONENTS (for reference only)

Item No.	Description
1	Impeller
2	Casing
3	Mechanical Seal
4	Motor Shaft
5	Motor
6	Ball Bearings
7	Power Cable
8	Casing O-Ring



* For repair parts, reference
repair parts book



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SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

B3887BHF April, 2007

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Engineered for life



INSTALLATION INSTRUCTIONS FOR SYMCOM'S MOTORSAVER® MODEL 460

DANGER!



HAZARDOUS VOLTAGES MAY BE PRESENT DURING INSTALLATION.

Electrical shock can cause death or serious injury.

Installation should be done by qualified personnel following all national, state and local electrical codes.



**BE SURE POWER IS DISCONNECTED PRIOR TO INSTALLATION!
FOLLOW NATIONAL, STATE, AND LOCAL CODES!
READ THESE INSTRUCTIONS ENTIRELY BEFORE INSTALLATION!**

! WARNING !

UNEXPECTED OUTPUT ACTUATION CAN OCCUR.

Use hard-wired safety interlocks where personnel and/or equipment hazards exist.

Failure to follow this instruction can result in death, injury or equipment damage.

The Model 460 MotorSaver® is an auto ranging voltage monitor designed to protect three-phase motors regardless of size. The MotorSaver® is used on 190-480 VAC, 50 to 60 Hz motors to protect from damage caused by single phasing, low voltage, high voltage, phase reversal, and voltage unbalance.

CONNECTIONS

1. Mount the MotorSaver® in a convenient location in or near the motor control panel. If the location is wet or dusty, the MotorSaver® should be mounted in a NEMA 4 or 12 enclosure. The MotorSaver® can be mounted to a back panel using two #6 or #8 x 5/8 screws or can be snapped onto a DIN rail.
2. Connect L1, L2 and L3 on the MotorSaver's terminal strip to the LINE SIDE of the motor starter. (See Figure No. 1).
3. Connect the output relay to the circuitry to be controlled. For motor control, connect the normally open contact in series with the magnetic coil of the motor starter as shown in Figure No. 1. For alarm operation, connect the normally closed contact in series with the control circuit as shown in Figure No. 2.



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Motor Protection & Controls Since 1974

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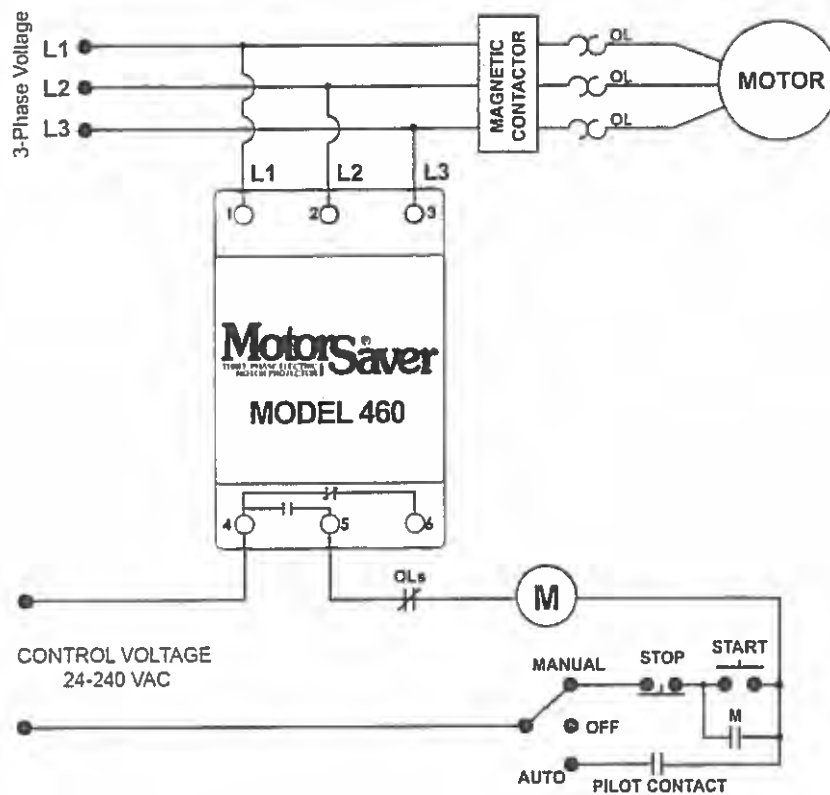


FIGURE NO. 1: CONTROL WIRING DIAGRAM

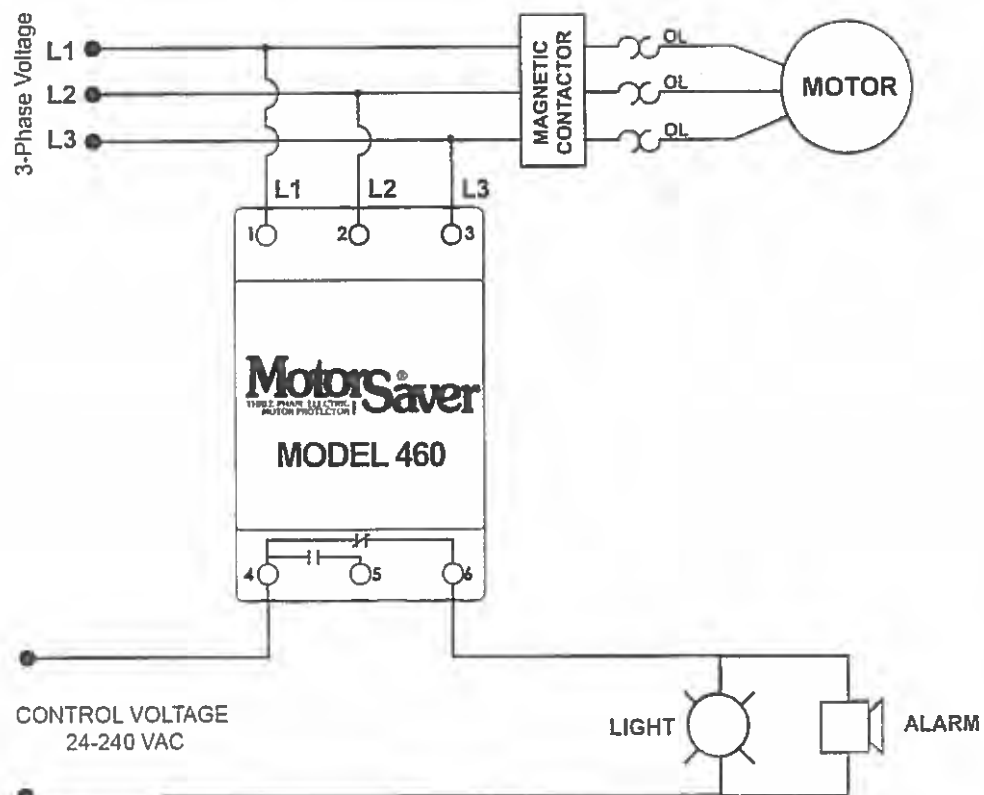
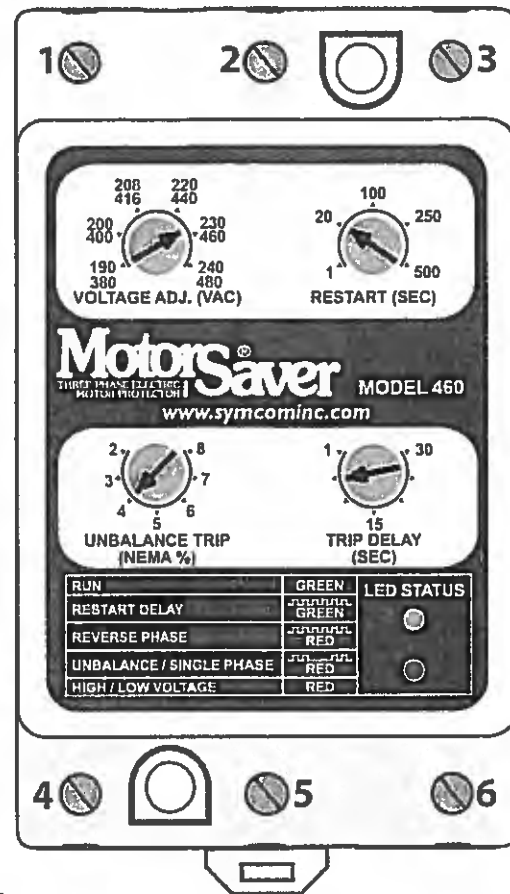


FIGURE NO. 2: ALARM WIRING DIAGRAM

SETTINGS

1. Line voltage adjustment: Rotate the **"VOLTAGE ADJ. (VAC)"** to the nominal three-phase line voltage feeding the motor to be protected.
2. Restart delay adjustment: Rotate the **"RESTART (SEC)"** adjustment to the desired position. The restart delay is the time between MotorSaver[®] seeing acceptable voltage and the MotorSaver[®] closing its output contacts. For compressor applications, the restart delay should be set for the approximate time it takes for the head pressure to bleed off of the compressor. For other applications, the restart delay is typically set between 2 and 10 seconds.
3. Trip delay adjustment: Rotate the **"TRIP DELAY (SEC)"** adjustment to the desired setting. This adjustment does not affect the trip delay on phasing faults. Typically, the trip delay adjustment is set between 1 and 5 seconds. In areas where voltage fluctuations are frequent, the trip delay adjustment may be set greater than 10 seconds.
4. Voltage unbalance adjustment: Rotate the **"UNBALANCE TRIP (NEMA%)"** adjustment to the desired unbalance trip level. The NEMA MG1 standard does not recommend operating a motor above 1% voltage unbalance without derating the motor. The NEMA MG1 standard also recommends against operating a motor above a 5% voltage unbalance under any circumstances. SymCom recommends consulting the motor manufacturer for specific tolerances.



$$\text{Percent Unbalance} = \frac{\text{Maximum Deviation from the Average}}{\text{Average}} \times 100$$

Example: The measured line-to-line voltages are 203, 210, and 212.

$$\text{Average} = \frac{203 + 210 + 212}{3} = 208.3$$

The maximum deviation from the average is the largest difference between the average voltage (208.3) and any one voltage reading.




$$208.3 - 203 = 5.3 \quad 210 - 208.3 = 1.7 \quad 212 - 208.3 = 3.7$$

The maximum deviation from the average is 5.3.

$$\frac{5.3}{208.3} \times 100 = 2.5\% \text{ Unbalance}$$





POWER-UP

Turn on the 3Ø power to the motor. The MotorSaver's green RUN light will blink during the RESTART delay. After the RESTART delay, the MotorSaver® will energize its output contacts and the green RUN light will illuminate. If the contacts do not energize and the RUN light does not illuminate, see the TROUBLESHOOTING section.

<u>DIAGNOSTIC INDICATOR LIGHTS</u>	
RUN	GREEN
RESTART DELAY	 GREEN
REVERSE PHASE	 RED
UNBALANCE / SINGLE PHASE	 RED
HIGH / LOW VOLTAGE	RED

**CONGRATULATIONS!!
YOU HAVE JUST INSTALLED THE FINEST
MOTOR PROTECTION AVAILABLE!!**

TROUBLESHOOTING

SYMPTOM	LIGHT PATTERN	SOLUTION
No lights are on. The unit seems completely dead.	N / A	Measure the three line-to-line voltages. If any of the voltages are below 150 VAC, the MotorSaver [®] does not have enough power to operate its internal electronics. This may occur on a single-phased system. If the voltages are correct, call SymCom at 1-800-843-8848 or 1-605-348-5580.
Red light is blinking (on initial power up).	 RED	Turn off the three-phase power. Swap any two leads powering the MotorSaver [®] (L1, L2, or L3). There is a 50-50 chance of connecting L1, L2, and L3 correctly the first time. Re-apply the three-phase power.
Red light is blinking (after the motor has been previously running).	 RED	The incoming lines have been reverse phased. The MotorSaver [®] is preventing the motor from running backwards. Correct the phase sequence.
Red light is blinking in this pattern.	 RED	The voltage is unbalanced or single-phased. Measure the incoming line voltages and calculate the % unbalance. If the voltage unbalance does not exceed the % unbalance reset value, call SymCom at 1-800-843-8848 or 1-605-348-5580.
Red light is on steady.	RED	The voltage is out of tolerance. Measure the three line-to-line voltages. Calculate the average of the three voltages. If the average is 7% above or below the nominal voltage as selected by the LINE VOLTAGE ADJUST, the MotorSaver [®] is functioning properly. If the voltage is within $\pm 7\%$ of the selected line voltage, call SymCom at 1-800-843-8848 or 1-605-348-5580.
Green light blinks and motor is not running.	 GREEN	The MotorSaver [®] is in restart delay.
Green light is on steady, but motor does not start.	GREEN	The MotorSaver [®] is in run mode. Ensure other control devices are allowing the motor to start. Check control circuit for loose wires or malfunctioning switches.

Any questions or comments call SymCom at 1-800-843-8848 or 1-605-348-5580

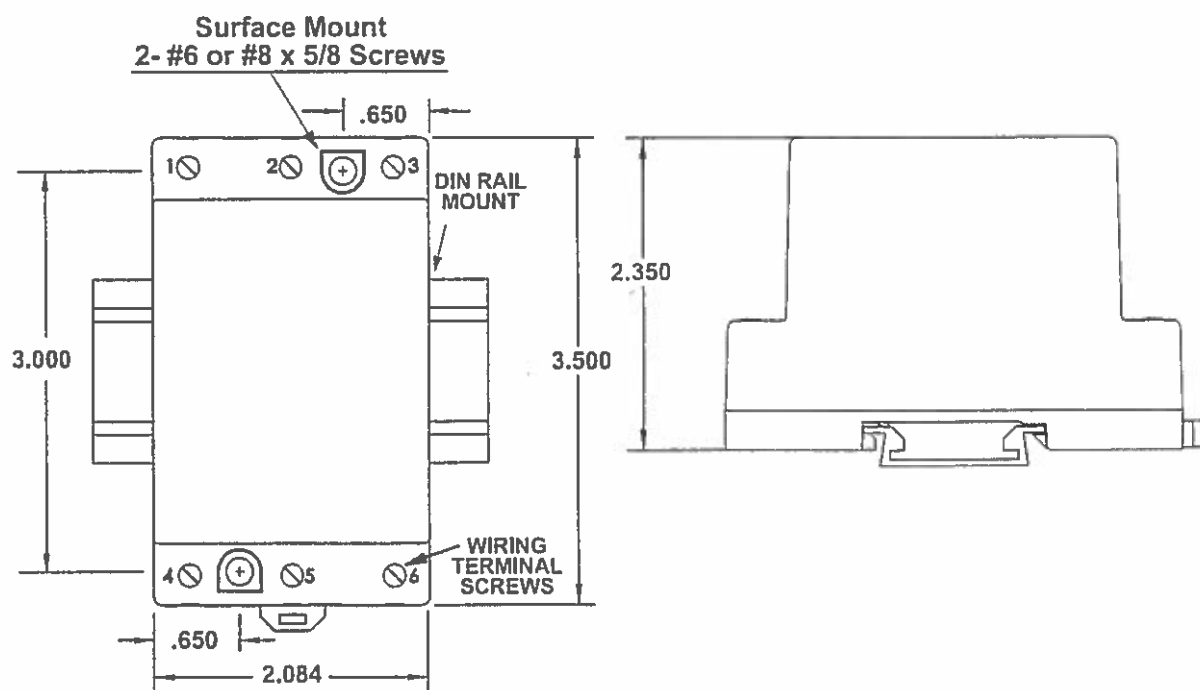
SPECIFICATIONS

3 - Phase Line Voltage	190 - 480 VAC
Frequency	50* - 60 Hz
Low Voltage (% of setpoint)	
Trip	90% \pm 1%
Reset	93% \pm 1%
High Voltage (% of setpoint)	
Trip	110% \pm 1%
Reset	107% \pm 1%
Voltage Unbalance (NEMA)	
Trip	2 - 8% Adjustable
Reset	Trip Setting minus 1% (5 - 8%)
	Trip Setting minus 0.5% (2 - 4%)
Trip Delay Time	
Low, High, and Unbalanced Voltage	1 - 30 Seconds Adjustable
Single-phasing faults (>25% UB)	1 Second Fixed
Restart Delay Time	
After a fault or complete power loss	1 - 500 Seconds Adjustable
Output Contact Rating - SPDT	
Pilot Duty	480 VA @ 240 VAC
General Purpose	10 A @ 240 VAC
Power Consumption	6 Watts (maximum)
Weight	14 oz
Enclosure	Polycarbonate
Terminal	
Torque	6 Inch-Pounds Max.
Wire AWG	12 - 20 AWG
Safety Marks	
UL	UL508 (File # E68520)
CE	IEC 60947-6-2
Standards Passed	
Electrostatic Discharge (ESD)	IEC 1000-4-2, Level 3, 6 kv contact, 8 kv air
Radio Frequency Immunity, Radiated	159 MHz, 10 V/m
Fast Transient Burst	IEC 1000-4-4, Level 3, 3.5 kv input power and controls

*NOTE: 50 Hz will increase all delay timers by 20%

Surge	
IEC	IEC 1000-4-5, Level 3, 4kv line-to-line; Level 4, 4kv line-to-ground
ANSI / IEEE	C62.41 Surge and Ring Wave Compliance to a level of 6kv line-to-line
Hi-potential Test	Meets UL508 (2 x rated V +1000V for 1 minute)
Environmental	
Temperature Range	Ambient Operating: -20° - 70° C (-4° - 158°F) Ambient Storage: -40° - 80° C (-40° - 176°F)
Class of Protection	IP20, NEMA 1 (Finger Safe)
Relative Humidity	10-95%, non-condensing per IEC 68-2-3

DIMENSIONS



SymCom warrants its microcontroller based products against defects in material or workmanship for a period of five (5) years* from the date of manufacture. All other products manufactured by SymCom shall be warranted against defects in material and workmanship for a period of two (2) years from the date of manufacture. For complete information on warranty, liability, terms, and conditions, please refer to the SymCom Terms and Conditions of Sale document.

**Visit our website at www.symcominc.com for our
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**2880 North Plaza Drive, Rapid City, SD 57702
Phone: (800) 843-8848 or (605) 348-5580
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Project Maintenance Document

27-Aug-13

RTS151

WTS, 150gpm, OWS-24, Carbo

Customer:

newterra ltd.

Warning: This document does not replace the manufacturer's recommended maintenance schedules as referenced in the OM manual provided by the equipment manufacturer. It is provided as a quick guide to required OM activities for this project.

Section1: General Maintenance Activities

Section2: Cross Reference Maintenance Code to Parts

Section3: Maintenance Schedule by Hours

General Maintenance Activities

Daily

- ☐ Check the control panel for running status.
- ☐ Contact the system remotely to check system operation for:
 - ☐ Alarms
 - ☐ Operating Conditions

Weekly

- ☐ Check for Leaks.
- ☐ Check the volume of consumables. i.e. Chemicals, oil etc
- ☐ Check for excessive noise of various components.
- ☐ Check for Alarms.
- ☐ Check and record Flow Rates, Vacuums, Pressures, Temperatures, pH.
- ☐ Check for excessive moisture inside the control panels and transducer wiring boxes.
- ☐ Check for corrosion and grease the moving parts if required to reduce corrosion.

Monthly

- ☐ Test critical inputs for proper shutdown capacity.
- ☐ Test the operation of the overloads.
- ☐ Test building sump switch if it is present.

Yearly

- ☐ Test each input.
- ☐ Test alarm conditions.
- ☐ Test the operation of each output device.

Parts Listing per Maintenance Code

Fan

	Part		Qty	Module
<i>F-7901</i>	10329	Fan, Building, 24", 1/3hp, 1625rpm, 120/230V, 1ph, XPF	1	Building, Trailer or Skid
<i>F-7903</i>	M1072	Fan, Building, 12", 1/4hp, 1750rpm, 120V, 1ph, TEFC	1	Building, Trailer or Skid

Flow Meter (Liquid)

	Part		Qty	Module
<i>FQI,FT-7001</i>	15499	Meter, Water, 2", US Gal, w/ pulse, Turbine, DLJ	1	Liquid Phase Carbon

Gauge, Pressure

	Part		Qty	Module
<i>PI-7001</i>	16203	Gauge, Pressure, 0-60psi, Indumart, P16T2-FG-60	2	Liquid Phase Carbon
<i>P-4901</i>	16203	Gauge, Pressure, 0-60psi, Indumart, P16T2-FG-60	1	Oil/Water Separator

Oil Water Separator

	Part		Qty	Module
<i>OWS-4901</i>	16263	Oil Water Separator, OWS-24, Stainless	1	Oil/Water Separator

Pump, Discharge

	Part		Qty	Module
<i>P-4901</i>	21028	Pump, Suction, Goulds, SSH Series, 4SH2K52C0	1	Oil/Water Separator

Strainer

	Part		Qty	Module
<i>P-4901</i>	M1523	Strainer, Wye, Brass, 3"	1	Oil/Water Separator

Vertical Level Switch (Almeg)

	Part		Qty	Module
<i>LSHH-5201</i>	12351	Switch, Level, Almeg, Vertical, ATB3-48B	1	Product Storage Tank

Maintenance Schedule

RTS151

WTS, 150gpm, OWS-24, Carbon, 40' Conta

EVERY 200 OPERATING HOURS

Strainer

Remove strainer basket. Inspect strainer and empty if necessary.

Maintenance Schedule

RTS151

WTS, 150gpm, OWS-24, Carbon, 40' Conta

EVERY 800 OPERATING HOURS

Pump, Discharge

Close-Coupled Unit

Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

Frame-Mounted Units

Regrease frame with a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seal. Then wipe off excess. Follow motor and coupling manufacturers' lubrication instructions.

Note: Alignment must be rechecked after any maintenance work involving any disturbance of the unit.

Fan

- 1) Check the fan outlet pressure.
- 2) Check to ensure nothing is obstructing the air intake.
- 3) Check the fan wheel for corrosion.
- 4) Check the fan wheel alignment and positioning.

Flow Meter (Liquid)

Test the operation of the flow meter. Disassemble and clean the internal components if dirt or particles are preventing the meter from working properly.

Vertical Level Switch (Almeg)

- 1) Test the operation of the switch.
- 2) Remove the switch and check for debris buildup that can potentially cause a failure of normal operation.

EVERY 4000 OPERATING HOURS**Gauge, Pressure**

- 1) Check accuracy of gauges.
- 2) Zero gauge if required.

Oil Water Separator

After the first 6 months of operation, the inlet should be inspected and cleaned as follows:

- 1) Stop the flow of influent to the separator.
- 2) Remove separator cover.
- 3) Dispose of separated oil per regular procedures.
- 4) Remove water from separator through drain or hose. Measure and record the depth of the solids. Use this measurement as the timing basis for the next solids inspection and clean out. Consult OWS drawing for depth of sludge baffle. Solids should not exceed this depth.
- 5) The HD Q-PAC plates can be either cleaned in place or removed and cleaned.
- 6) Examine the tank interior for damage and repair any damage to internal coating.
- 7) To restart separator, install HD Q-PAC plate packs and polishing pack in original position. Make sure that both are securely in place so that they do not float when unit is operational.

WINTER OPERATION AND STORAGE IN COLD CLIMATES

GENERAL

Systems operating in climates where seasonal temperatures regularly fall below freezing may need to be winterized. Depending on the equipment in the system, different steps must be taken to prepare for winter operation.

If the system is going to be shut down and stored for the winter, additional measures should be taken above and beyond normal maintenance practices for an extended shut down.

SYSTEMS OPERATING THROUGH THE WINTER

- Confirm that the enclosure heater is working. This can be done by adjusting the set point on the low temperature switch (TSL) to a setting above the ambient temperature inside the enclosure. Verify that the heater has turned on before adjusting the setting on the low temperature switch to a point above 32°F. If the heater is controlled by a temperature transmitter (TT), the set point can be adjusted through the HMI.
- Confirm that the control panel heater is working by adjusting the thermostat inside the panel – follow the procedure above.
- If the enclosure has a sump with a high level switch, ensure the sump is free of water to prevent ice from forming and potentially disabling the switch.
- If the system has a heat exchanger or rotary screw compressor, provisions may be included to prevent cycling cold air through the system. Depending on the design of the system, the following options may be available for winter operation:
 - Systems where the heat exchanger/compressor is recessed from the wall or ceiling, by removing the hood and withdrawing the insert, the discharge port can be fully or partially boarded up to allow warm air to be re-circulated back into the enclosure. See Figure 1.
 - The hood provided on the exterior of the enclosure may have been designed to allow air to be re-circulated back into the container through a duct on the wall above the heat exchanger/compressor or through the roof. See Figure 2.

Note: Depending on the parameters of the system, the above mentioned options may need to be fine-tuned onsite to optimize performance of the system. While these methods are good for maintaining the temperature inside the enclosure above freezing, there are some situations where too much air is being re-circulated and the heat exchanger is not able to cool the process air sufficiently. This will cause the high temperature switch on the discharge of the heat exchanger to trip and send the system into alarm.

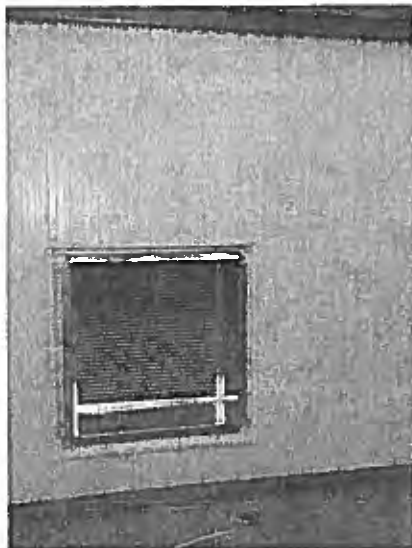


Figure 1: Recessed Heat Exchanger



Figure 2: Re-circulating Hood

SYSTEMS BEING STORED THROUGH THE WINTER

- All water must be drained from the system where possible.
- Valves should be left open to allow ice to expand in the event residual water was left in the system without damaging piping or equipment.
- Additional O&M as required for long-term system shutdowns.

WINTERIZING PROCEDURE

Progressive Cavity Pumps (Moyno)

- Remove bolts from pump end and ensure all water is removed.

Centrifugal Pumps (Goulds)

- Remove drain plug on the bottom of the outer steel body. Keep in mind water inside lines will also drain through these plugs depending on elevations.

Inlet Manifolds

- Drain all water from SVE and ground water extraction manifolds.

Vapor/Liquid Separators

- Drain all water from VLS.

Bag Filter Housings

- Drain all water and remove bag filter from housing.
- Pour antifreeze into bottom of housing ensuing drain valve is closed.

Oil/Water Separators

- Pour antifreeze in bottom of OWS, filling 1 to 2" from the bottom, ensuring drain lines are filled with antifreeze.

Air Strippers

- Sump should be drained and trays disassembled.
- Pour antifreeze in bottom of stripper and ensure drain lines are filled with antifreeze.

Air Compressors

- Drain receiver tank of any condensate.

Water Flow Meters (Paddlewheels and Rotameters)

- Remove via unions and drain. Store for the winter.



CAUTION

Freezing water poses a serious threat to the equipment in a system. Pipes, vessels and pumps can be severely damaged by freezing water.

Troubleshooting Chart

Symptom	Potential Cause	Possible Solution
Electrical Motor		
Motor will not start and there is no noise	Motor may not be receiving the proper power.	Check fuses and power distribution between power lines to motor.
	Overload is tripped.	Reset overload.
	Main power may be off.	Check main power.
	Contactor may not be closing because motor is in manual position.	Switch motor to Auto position.
	Contactor may not be closing because PLC is not telling output to be on.	Check PLC operating sequence to determine if a start requirement is not met.
Motor will not start but makes a humming noise.	One of the phases of power is not getting to the Motor as a result of a blown fuse.	Change fuse.
	One of the phases of power is not getting to the Motor as a result of a poor wire connection.	Check wiring for a loose wire or a poor connection.
	The driven component (i.e. pump) will not spin and could be seized up.	Disassemble driven component, check clearances and clean internal components and replace any damaged components.
	Bearing on drive shaft of motor or driven component may be seized up.	Replace bearings.
Overloads trip immediately after startup.	Check for short circuit in motor windings.	Re-wind motor.
	One of the phases of power is not getting to the motor as a result of a blown fuse.	Change fuse.
	Motor power wires may be shorting out to ground.	Search for wiring short and replace wiring if required.
	Motor may have too much load or backpressure as a result of operating the driven component outside of its operating capabilities.	Check operating capabilities of driven component. I.e. Ensure positive displacement pump is not over pressured or that centrifugal pump is not operating at too high a flow rate.
Motors amps are above the allowable value on the nameplate.	Motor may be designed to operate on the upper limit.	Calculate maximum allowable amps. Name plate amps x safety factor.
	Driven component may have scale build up inside.	Clean internal components of driven component.

	Driven component may be rotating in the wrong direction.	Check direction of rotation and switch rotation of motor if it is incorrect.
	Check voltage of power. Low voltage results in high amps.	Adjust overloads for higher amps if the difference is only slight, otherwise change power or motor.
Centrifugal Pumps		
Pump does not produce sufficient pressure/vacuum.	Pump is not primed.	Prime pump.
	Pump is rotating in wrong direction.	Check and change rotation if required.
	Vacuum or pressure gauge is faulty.	Replace gauge.
	Pump is not operating at required RPM.	Check and replace motor if required.
	Pump has wrong sized impeller.	Check impeller and replace if required.
	Pump pressure or vacuum is lost due to an obstruction located between the pump and gauge.	Check for flow restrictions and clean strainers or piping if required.
	Pump is not turned on.	Turn pump on.
	Coupling between pump and motor is no longer connected preventing the pump from rotating with the motor.	Reconnect and realign motor and pump.
Pump is leaking.	Gaskets are worn or faulty.	Replace gaskets.
	Mechanical seal has been overheated. This is often a result of operating the pump without any water.	Replace mechanical seal.
	Fittings are leaking on or around pump.	Tighten fittings.
	Water may be coming from another location.	Check for leaks around pump.
Pump flow rate is too low.	Backpressure is too high for pump.	Reduce backpressure.
	Pump may not be sized correctly for process.	Replace pump.
	Pump impeller is too small.	Change pump impeller but watch power consumption on motor.
	Flow control valve is closed.	Open flow control valve.
	May have blocked line or filter.	Replace filter and clean line.

Pump is making excessive noise during operation.	Manually rotate pump impeller and listen for clearance problems.	Disassemble pump and fix clearance problems.
	Alignment of pump may be off causing the flexible coupling to degrade.	Check alignment and reset alignment if needed. Replace flexible coupling if it is degraded.
Liquid Ring Pump		
Pump does not produce enough vacuum.	Pump is not primed.	Prime pump and start under vacuum.
	Service fluid is too low in seal oil tank.	Add seal oil.
	No restriction on inlet of pump.	Close valves to create suction.
	Dilution valve is open.	Close dilution valve.
	Service fluid is not flowing into the pump.	Check for flow restrictions in service fluid lines. Check strainer.
	Pump is rotating in the wrong direction.	Check and change direction if required.
	Vacuum gauge is not working correctly.	Replace vacuum gauge.
	Pump seals may be allowing air into the pump.	Check for leaking and replace seals if required.
	Pump is too small for application.	Replace pump.
	Vacuum relief valve is set too low.	Replace or reset vacuum relief valve.
	Air may be leaking into vapor lines.	Check for air leaks in vapor lines.
	Pump internal components are damaged.	Disassemble pump and replace components if required.
Pump is making a growling noise.	Cavitation is occurring.	Decrease the vacuum.
	Insufficient seal fluid flow or excessive seal fluid flow.	Increase/decrease seal fluid flow rate.
Pump is leaking	Gaskets are faulty.	Replace gaskets.
	Mechanical seal has been overheated or is faulty.	Replace mechanical seal.
	Oil may be leaking from 1/8" vacuum relief valves in pump housing.	Remove valves and install plugs.
Pump is running too hot.	Seal fluid strainer is plugged restricting seal fluid.	Clean out strainer.
	LRP is not providing enough suction to draw sufficient seal fluid.	Increase seal oil suction. Pipe seal fluid into a higher vacuum port of pump.

MANUAL TROUBLESHOOTING CHART

	Seal fluid flow rate is too low.	Open seal fluid control valve to allow more seal fluid to enter the pump.
	Seal fluid heat exchanger is not working properly.	Check heat exchanger.
Excessive discharge pressure built up in seal oil tank.	Demister filter is plugged and requires replacement.	Replace demister.
	Seal oil is not being drawn out of demister filter through scavenger line.	Increase vacuum of LRP to allow oil to be sucked through scavenger line. Ensure that scavenger line has sufficient vacuum to draw oil out of the demister filter.
Seal Oil Low Level Alarm	Seal oil temperature may be operating too high causing the oil to evaporate.	Check seal oil operating temperature and increase seal oil flow.
	Seal oil suction line may be plugged causing seal oil to collect in bottom of demister filter.	Check for plugging of seal oil return line and clean or replace if required.
Air to Air and Air to Fluid Heat Exchangers		
Heat exchanger fan is drawing too many amps.	See troubleshooting for motors.	
	Fan blade pitch and diameter may be wrong.	Change fan blade.
	Motor may be operating at wrong RPM for fan blade.	Replace motor or fan blade.
	Check clearance of fan blade.	Make adjustments if blade is making contact.
Phase Separator		
Water will not pump out of phase separator.	Base of separator may be plugged with sand.	Flush sand and debris out of separator.
Electric Solenoid Valve		
Valve will not completely shut.	May have dirt or rocks preventing it from shutting properly.	Disassemble and clean out internal components.
Valve will not open	Check for power to solenoid.	Trace power lines and determine why power is not going to valve.
	PLC may not be telling it to open.	Check start requirements in manual.
	Coil may be damaged or faulty.	Replace coil.
Level Switches		
Level switch is staying closed when water in tank drops below switch.	Level switch is upside down or on its side.	Check orientation of level switch. Level switch may be designed as normally closed and therefore will be upside down.

	Sight glass is plugged giving a false level in the tank.	Clean sight glass.
	Level switch has dirt or film causing it to stick up.	Remove level switch, clean and test for normal operation using a millimeter.
	Level switch may be damaged or faulty and failed closed regardless of the switch position.	Replace switch.
	Wiring to level switch may be shorting out to ground causing the switch to appear closed at all times.	Disconnect switch from system wiring and separate system wires so they are not in contact with each other or any metal. If the input is still on, the input wiring is being grounded somewhere. Find short and replace or fix wiring.
	IS barrier is shorted out internally.	Switch IS barrier with working barrier and if problem goes away then the barrier may be faulty and should be changed.
	Input wiring is loose in terminal strip.	Tighten terminal strip where field wiring is brought into panel.
	Level switch is wired incorrectly.	Consult input wiring diagram and inspect wiring of level switch. Change if required.
Level switch stays open when water in tank is above the switch.	Level switch is upside down or on its side.	Check orientation of level switch. Level switch may be designed as normally closed and therefore will be upside down.
	Sight glass is plugged giving a false level in the tank.	Clean sight glass.
	Level switch has dirt or film causing it to stick down.	Remove level switch, clean and test for normal operation using a millimeter.
	Level switch may be damaged or faulty and failed open regardless of the switch position.	Replace switch.
	IS barrier is blown preventing the level switch signal from crossing the barrier.	Switch IS barrier with working barrier and if problem goes away then the barrier may be blown. If barrier is blown, the input wire on the right side of the barrier will have 24 V DC and the wire on the opposite side will have 0V DC.
	Level switch is wired incorrectly.	Consult input wiring diagram and inspect wiring of level switch. Change if required.

Regenerative Blowers		
Blower does not produce sufficient pressure/vacuum.	Blower is not turned on.	Turn on blower.
	Wrong direction of rotation.	Check and change rotation if required.
	Vacuum or pressure gauge is faulty.	Replace gauge.
	Blower is not operating at required RPM.	Check and replace motor if required.
	Blower has wrong sized impeller.	Check impeller and replace if required.
	Pressure or vacuum is lost due to obstruction located between blower and gauge.	Check for flow restrictions and clean strainers or piping if required.
Blower is leaking.	Fittings are leaking on or around blower.	Tighten fittings.
Blower flow rate is too low.	Backpressure is too high for blower.	Reduce backpressure.
	Blower may not be sized correctly for process.	Replace blower.
	Blower impeller is too small.	Change blower impeller but watch power consumption on motor.
	Flow control valve is closed.	Open flow control valve.
	May have blocked line or filter.	Replace filter and clean line.
Air Stripper		
Stripper leaks.	Gaskets are leaking.	Apply silicon grease to gaskets and close up stripper. If they cannot be fixed the gaskets may need to be replaced.
Pressure or vacuum is building up in stripper.	Stripper is being fouled by mineral precipitates.	Clean stripper with acid to dissolve precipitates.
	Airflow rate through stripper has risen or is above the design value.	Decrease airflow rate.
Stripper is not cleaning contaminants sufficiently.	Inlet concentrations are higher than the design values.	Decrease water flow rate to obtain required stripping capacity.
	Flow rate of water through stripper is too high.	Decrease flow rate allowing longer residence time in stripper.
	Water temperature is lower than the design (below 60°F).	Increase water temperature or slow down water flow rate or increase airflow rate.
	Airflow rate is not high enough.	Increase airflow rate or decrease water flow rate.

	Products that are not easily strippable may be in higher concentrations than originally planned.	Consult manufacturer with test results of discharge contaminants.
	Stripper may have been shut down manually causing the contaminated water in the trays to fall into the sump without being cleaned.	Allow stripper to go through proper shutdown cycle when stopping the unit.
	Stripper may be setup wrong allowing the water to bypass trays.	Check orientation of trays to ensure water will flow through each tray properly.
	Some contaminants may be present that are affecting the ability to strip other contaminants.	Consult manufacturer with test results of intake and discharge contaminants.
	Increase in pressure causes a decrease in airflow resulting in a decrease of contaminant concentrations.	See pressure rise in stripper troubleshooting above.
Water is collecting in discharge piping of stripper.	Air leaving the stripper is very humid and will condense some water in the pipelines.	Install a knockout drum in discharge line before air is piped to another section of the process.
	The stripper causes foaming of the water which results in water collecting in the discharge lines.	Test for foaming contaminants such as soaps and install antifoaming dosing system to prevent foaming.
	Airflow rate is higher than the design value causing water to be carried over into the discharge lines.	Decrease flow rate to within design range.
Stripper often shuts down on a high stripper sump alarm.	Transfer pump is flowing faster than the discharge pump.	Slow transfer pump or speed up discharge pump.
	Discharge pump is not working properly.	Troubleshoot discharge pump.
Moyno Pumps		
Pump does not produce sufficient pressure/vacuum.	Pump is not primed.	Prime pump.
	Wrong direction of rotation.	Check and change rotation if required.
	Vacuum or pressure gauge is faulty.	Replace gauge.
	Pump is not operating at required RPM.	Check and replace motor if required.
	Pump has wrong sized impeller.	Check impeller and replace if required.
	Pump pressure or vacuum is lost due to obstruction located between pump and gauge.	Check for flow restrictions and clean strainers or piping if required.

MANUAL: TROUBLESHOOTING CHART

	Pump is not turned on.	Turn pump on.
	Coupling between pump and motor is no longer connected preventing the pump from rotating with the motor.	Reconnect and realign motor and pump.
Pump is leaking.	Gaskets are worn or faulty.	Replace gaskets.
	Mechanical seal has been overheated. This is often a result of operating the pump without any water.	Replace mechanical seal.
	Fittings are leaking on or around pump.	Tighten fittings.
	Water may be coming from another location.	Check for leaks around pump.
	Pump was run in reverse allowing the rotor to spin off of the pump shaft.	Disassemble pump and screw rotor back onto shaft (See manufacturer's manual).
Pump flow rate is too low.	Backpressure is too high for pump.	Reduce backpressure.
	Pump may not be sized correctly for process.	Replace pump.
	Pump impeller is too small.	Change pump impeller but watch power consumption on motor.
	Flow control valve is closed.	Open flow control valve.
	May have blocked line or filter.	Replace filter and clean line.
Pump is making excessive noise during operation.	Manually rotate pump impeller and listen for clearance problems.	Disassemble pump and fix clearance problems.
	Alignment of pump may be off causing the flexible coupling to degrade.	Check alignment and reset alignment if needed. Replace flexible coupling if it is degraded.
Pressure Switch/Vacuum Switch		
Switch is not reacting at desired set point.	Switch is out of adjustment.	Change set point to desired value.
Switch is not working.	Switch may be faulty.	Remove input wires and test switch at desired pressure. If it does not trigger, it should be replaced.
Flow meter		
Flow meter is not rotating.	Dirt could have caused meter internals to jam up.	Disassemble flow meter and clean internal components.
Flow meter is rotating but pulse input is not working.	Switch on meter may be faulty.	Remove wiring and test contacts on meter to ensure that they are opening and closing. If not meter head needs to be replaced.

MANUAL TROUBLESHOOTING CHART

	Input wiring may be grounding out preventing the signal from opening and closing.	Test input wiring by isolating input wires and checking if input is on. If so you have a grounded input wire.
	Input to PLC is not working.	Simulate rotating meter by contacting input wires together and check for a detected flow rate and change in totalized flow
Belt Driven Assemblies		
Squealing noise occurs on startup.	Belt is too loose.	Check tension of belt and tighten if required.
Excessive wear on bearings.	Belt is too tight.	Loosen belt tension.
Belt is wearing excessively.	Check orientation of blower and motor.	Adjust orientation if required.
Carbon Vessel		
Vessel is operating over pressure.	Silt may have collected in water phase vessel.	Remove lid and check for silt. Remove top layer of silt or replace vessel.
Vessel is breaking through earlier than expected.	Flow rate through vessel may be too high. Check design specifications.	Decrease flow rate.
	Air contaminant concentrations are higher than expected.	Test inlet concentrations.
	Check piping orientation to ensure that water is going in the top of water phase vessels and air is going in the bottom of air phase vessels.	Repipe vessel if piping is wrong.
	Ensure that there is not a large trapped air gap in the top of the water phase carbon vessel allowing the water to bypass a portion of the carbon.	Release air gap if present.
Bag Filter		
Vessel is operating over pressure.	Bag filter may be full of dirt and silt.	Remove cover and check for dirt buildup in the bag. Replace filter element if required.
	Equipment down stream of bag filter may be plugging.	Check for pressure buildup down stream of filter and fix pressure buildup downstream if found.
Water will not flow through filter fast enough.	Pump may not be able to supply enough pressure.	Check pressure output of pump with pump curve. Replace pump if needed.
Filters are plugging too fast.	Filter element micron size may be too low.	Install larger micron filter element.

MANUAL TROUBLESHOOTING CHART

	Filter pressure switch setpoint may be too low.	Increase high pressure shutdown setpoint.
Oil Water Separator		
Water is collecting in product tank	Oil water separator may not be level causing water to spill into the skimmer tube.	Check level of oil water separator and adjust if necessary.
	Skimmer tube is not adjusted properly.	Check position of skimmer tube ensure that tube is rotated so the skimming slot allows at least 1-2" of oil to collect before spilling over into the oil tank.
	Skimmer tube is cracked or leaking.	Check that skimmer tube is not cracked, replace if necessary.
	Separator can be full of sludge on the bottom restricting water flow through to the clean water reservoir.	Check for dirt buildup in bottom. Drain and clean separator if necessary.
Oil is collecting on the clean water side	Oil water separator may be operating outside of design parameters.	Check that specific gravity of product and flow rate of separator match site-specific design print out for oil water separator. This can be found in the oil water separator section of your newterra manual or submittal package.
	Oil water separator was not primed with clean water on startup and large amounts of product were initially pumped into separator contaminating the clean water sections.	Drain separator, clean separator and media, and fill with clean water before proceeding.
	Silt can build up in the bottom of the separator restricting volume capacity and flow through media.	Inspect bottom of separator and inside of media. Drain and clean separator and clean or replace media if plugged or restricted.
	Inlet side of separator can have excessive amounts of oil on the top layer. This will reduce effective capacity of oil water separator.	Check level of oil collected in inlet side of separator. Adjust skimmer if required. Re-prime separator so only 1-2" of product remains on the top of the separator.
	Biological bacteria is suspending product in high-density mucus like collections that are passing through the separator.	Check for signs of bacteria in the inlet side of the separator. Contact newterra to discuss solutions to eliminating biological suspension.
	Product may be made up of two different components. The component breaking through may have a different density from what the separator was designed for.	Collect a sample of what is breaking through and confirm that it has the same properties as the product collecting on the inlet side.

MANUAL TROUBLESHOOTING CHART

	Oil storage tank may be full and high-level alarm not working properly. This will back the product up and fill the inlet side of the separator with product until the product passes under the lower weir and collects in the clean-water side.	Check product storage tank and ensure that level switch is working properly and that tank has not overfilled.
Oil and water is building up on inlet side but is not passing through separator and collecting in the clean water side.	Sludge and dirt may have built up on floor of separator preventing the water from passing by the lower weir.	Check for dirt buildup on bottom of separator. Drain and clean if necessary.
	Oil Water interface may be too low indicating that the separator has insufficient water to properly separate.	Fill the separator with clean water allowing water to collect in the inlet side forcing the oil water interface level to rise up too about 1" - 2" below the skimmer level.
	Only product is being pumped into inlet of separator.	If water is not present in sample entering the separator then it will not collect in the clean water side.
Water is in the oil outlet.	Skimmer opening is below the oil/water interface.	Adjust skimmer alignment to allow more oil to collect before skimming.
Oil is making its way to the outlet.	Water flow rate is too high.	Reduce flow rate through system.
	Filter media is plugged.	Replace or clean media.
	Oil discharge is plugged backing up OWS.	Drain oil down stream of skimmer.
Sand Filter		
Vessel is operating over pressure.	Sand filter may be full of dirt and silt.	Remove cover and check for dirt buildup on top of filter. Backwash filter.
	Equipment down stream of sand filter may be plugging.	Check for pressure buildup down stream of filter and fix pressure buildup downstream if found.
Water will not flow through filter fast enough.	Pump may not be able to supply enough pressure.	Check pressure output of pump with pump curve. Replace pump if required.
Filters are plugging too fast.	Filter was not backwashed properly.	Backwash filter vessel as per manufacturer's instructions.
	Filter pressure switch setpoint may be too low.	Increase high-pressure shutdown setpoint.
	Filter sand has solidified with calcification.	Replace sand in filter.

	Process water flow rate is operating above the design flow rate for the sand filter.	Check process flow rate and compare with design flow rate listed on manufacturer's literature or on the component sheet of the sand filter section of your newterra Manual.
Rotary Screw Compressor Package		
Compressor not starting.	Motor Overload.	Reset overload. Check compressor output pressure. Oil separator may be dirty, replace if needed. Check supply voltage.
	Stopped by compressed air temperature relay.	Oil level is too low. Not enough cooling air flow. Wrong compressor oil. Ambient temperature too high. Cooler dirty.
Insufficient air output.	Clogged intake filter.	Check condition of the filter and replace if needed.
	Clogged oil separator element.	Check condition of the oil separator element and replace if needed.
	Pressure switch is not working.	Check pressure switch adjustment. Repair or replace if switch is faulty.
	Receiver blow down valve open.	Disassemble and clean out internal components.
	Too high air consumption.	Check network for leaks and air powered devices.
	Drive belt slipping.	Check tension of belt and tighten if required. Replace belt if worn.
Compressor overheating.	Insufficient amount of oil.	Add more oil.
	Clogged oil filter.	Check condition of the filter and replace if needed.
	Cooler dirty.	Clean.
	Ambient temperature too high.	Check temperature and air circulation.
High oil consumption.	Oil return tube or its orifice is blocked.	Open and clean all internal components.
	Oil separator or sealing damaged or loosened.	Check seals and repair if needed.
	Oil separator dirty.	Replace.
	Wrong compressor oil	Change oil. Use the correct oil as specified in the manufacturer's instructions.
	Output air temperature too high.	Check output temperature correct if it is too high.


MANUAL TROUBLESHOOTING CHART

	Faulty non-return valve of oil return pipe.	Check operation and replace valve if needed.
	Too much oil.	Drain extra oil out.
Network pressure rises over set valve.	Pressure switch is not working or damaged.	Check operation of switch.
	Output valve leaking.	Replace seal.
	Loose wire connections.	Check for loose wires and correct as needed.
Compressor doesn't restart automatically.	Pressure switch damaged.	Replace pressure switch.
	Output valve leaks.	Replace seals of output valve.
	Loose wires.	Check for loose wires and correct as needed.
Compressor doesn't stop automatically.	Output valve leaks.	Replace seals of output valve.
	Pressure Switch Damaged.	Replace pressure switch.
Refrigerated Dryer		
Water down stream of dryer.	Residual air in piping.	Blow out system with dry air.
	Air bypass system is open.	Check the bypass valve position.
	Inlet and Outlet conditions are reversed.	Check for correct connection.
	Air temperature on outlet of dryer may be too low.	Add heat trace to piping.
	Automatic drain mechanism is not working.	Replace drain mechanism.
	Dryer overloaded.	Check flow rate and inlet temperature.
High pressure drop across dryer.	Inlet air strainer clogged.	Clean inlet air strainer.
	Excessive air flow.	Check flow rate and reduce if needed.
	Separator filter clogged.	Replace filter sleeve.
	Freezing of moisture in evaporator.	Shut down dryer until system thaws.
Fault Alarm.	Dryer overloaded resulting in high air outlet temperature.	Check operating conditions.
	High outlet air temperature.	Correct high temperature.
	Thermostat switch is malfunctioning or not securely mounted.	Replace thermostat switch.
Refrigeration system not functioning properly in on position.	Power failure.	Check power.
	Line disconnect switch is open.	Check disconnect.

MANUAL: TROUBLESHOOTING CHART

	Fuses blown, breaker blown.	Check fuses or breaker.
	Loose or faulty wiring.	Check wiring.
Refrigeration system cycles on and off.	High or low ambient conditions.	Check min/max temperature ranges.
	Air filter clogged.	Clean filter.
	Condenser fins clogged.	Clean fins.
	Fan motor or control switch not working.	Replace fan motor or switch.

Analog 4-20mA Transmitters		
Transmitter is sending a signal that is not accurate.	There may be water in the air sampling lines that is throwing off the readings.	Drain any moisture out of the air sampling lines.
	Transmitter may be out of calibration.	Refer to transmitter specification sheets on how to calibrate the transmitter. Note if transmitter is more than 10-25% out of calibration it will likely require factory recalibration.
Transmitter is sending 0-2 mA to the PLC input.	Transmitter may not be wired properly or one or more wire connections may be loose.	Check wiring with device specification sheet and newterra drawing. Check wiring for loose connections.
	Transmitter may be damaged or not working properly.	If you have a similar transmitter installed in another location on the system, switch them around to determine if the faulty transmitter works in another location. If the transmitter works you know the transmitter is not the problem. If the transmitter does not work in the other location then it is likely the transmitter. If the good transmitter does not work in the faulty location the problem is likely the wiring at that location or the input into the PLC.
Transmitter is sending over 20 mA to the PLC.	Transmitter is likely damaged.	Send back to manufacturer for re-calibration.
PLC's		
Power is on, Lights are on but PLC is not running the logic. Run light is not on.	PLC may not be in run mode. If the power has been off to the panel for an extended period of time, the PLC will switch out of run mode and stop running the logic.	Use external switch on PLC to switch from "term" to "run" then back to "term". This will force the PLC back into run mode. The run light should now indicate that the PLC is in run mode.
Power is on to panel but PLC lights are not on.	Fuse for PLC is pulled out or blown.	Test PLC fuse and replace if necessary. This is in the "PLC" fuse holder.

	Mobile Oily Water Separator Manual	Issue Date: March 21, 2016 Revision: 0	
	Environment Department	Document #: BAF-PH1-830-T07-0001	

APPENDIX B – **OWS COMMISSIONING JOB HAZARD ANALYSIS** **(JHA)**

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Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.

Job Hazard Analysis Form

PROJECT/TASK: Commissioning Mobile OWS		CONTRACTOR: BIM			JOB No.:				
SUPERVISOR:		LOCATION:			DATE:				
JOB STEP Break the job into steps. Listing work which may be hazardous.	HAZARDS List the hazard or type of harm identified with each step.	Inherent			CONTROL MEASURE List the necessary control measures to be followed to eliminate/reduce the identified hazards.	Residual			ACTION Person who will ensure this happens
		Consequence	Likelihood	Risk Ranking		Consequence	Likelihood	Risk Ranking	
Opening Media canisters	Potential built up gases				Technicians will use appropriate PPE and wear Gas Tester alarm systems while opening GAC canisters and opening vent ports.				
Vacuum Media from OWS	Vacuum line inside OWS area				Operators/technician will open valve and ensure system is operating properly before working inside OWS canisters				
	Potential for inhalation of carcinogenic particulate being disturbed				Respirators will be worn while disturbing spent bentonite and GAC to avoid inhalation of particulate				
	Working from a ladder or raised platform				Work platform or ladder will be tested for stability before working with vacuum line to remove media				
Discharge or Vacuum to/from an open vessel	Working with pressurized hoses				When completing discharge, pressure is released, 3" opened, and the line will be vacuumed out.				
					Open end must always be controlled –				



Installing new media	Potential for inhalation of carcinogenic particulate being disturbed				braced by operator, or in a bracket.				
	Working from heights				Respirators will be worn while disturbing spent bentonite and GAC to avoid inhalation of particulate				
Commissioning new media	Heavy lifting at heights				Scaffolding will be present to ensure platform and railing to prevent falling.				
	Potential for inhalation of carcinogenic particulate being disturbed				Telehandler will need to be used to remove pallets of media from Sea Cans and onto OWS roof so bags of media are within reach of the scaffolding and railing system				
	Potential for inhalation of carcinogenic particulate being disturbed				Respirators will need to be worn while pouring media through roof ports into canisters to prevent inhalation of particulate				
	Working with pressurized hoses				A water truck operator will need to hook up line to tanks and fill through influent port in first media canister until fresh water comes out the effluent line into the berm.				

Job Hazard Analysis

Attendees:

	Name	Signature	Date
Written by:			
Reviewed by:			



Score	TABLE OF CONSEQUENCE		
	People	Plant	Environment
5 – Very High/ Catastrophic	Multiple Fatalities.	Greater than \$10 Million Loss	Catastrophe, destruction of sensitive environment, worldwide attention. Likely EPA prosecution. More than 30 days delay.
4 – High/ Major	Fatality or Permanent Disabilities.	\$1 Million to \$10 Million Loss	Disaster, high levels of media attention, high cost of clean up. Offsite environmental harm; more than 10 days delay.
3 – Moderate	Major Injuries – Incapacitations or requiring time of work.	\$100 Thousand to \$1 Million Loss	Major spills, onsite release, substantial environmental nuisance, more than 1day delay. (Leads to an additional resources call out i.e. SES).
2 – Low/ Minor	Significant Injuries – Medical Treatments, non-permanent injury.	\$10 Thousand to \$100 Thousand Loss	Significant spills. (Leads to a call out of Site Emergency Response Group).
1 – Very Low/ Insignificant	Minor Injuries – First Aid Treatments (cuts/bruises).	Less than \$10 Thousand Loss	Low environmental impact. Minor Spills less than 80 Litres.

Score	LIKELIHOOD
	5 – Almost Certain
4 – Likely/ Probable	The event will probably occur in most circumstances. Likely to occur several times – 1 per year.
3 – Moderate/ Occasional	The event should occur at some time. Likely to occur some time – 1 per 5 years.
2 – Remote/ Unlikely	The event could occur at some time. Unlikely but possible. 1 per 10 years.
1 – Rare/ Very Unlikely	The event may occur only in exceptional circumstances. Assumed it may not be experienced. 1 per 100 years.

Risk Rating = Consequence + Likelihood						
Consequence	Risk Rating					
5	6	7	8	9	10	
4	5	6	7	8	9	
3	4	5	6	7	8	
2	3	4	5	6	7	
1	2	3	4	5	6	
	1	2	3	4	5	
	Likelihood					

Risk Rating - Definitions		
Risk Rating	Definitions	Action Required
8 - 10	Intolerable	Task not to start till the risk is eliminated or reduced. Bring to the immediate attention of management. Formal assessment required. MUST reduce the risk as a matter of priority.
7	High	Bring to the immediate attention of management. Task not to start till the risk is eliminated or reduced. Further Assessment required. MUST reduce the risk as a matter of priority.
6	Significant Risk	Bring to the attention of supervision. Review risks and ensure that they are reduced to as low as reasonably practicable. To be dealt with as soon as possible, preferably before the task commences. Introduce some form of hardware to control risk.
5	Moderate Risk	Needs to be controlled but not necessarily immediately, an action plan to control the risk should be drawn up. Review effectiveness of controls. Ensure responsibilities for control are specified.
2-4	Low Risk	If practical reduce the risk. Ensure personnel are competent to do the task. Manage by routing procedure. Monitor for change

A JHA considers a variety of activities/tasks involved in a job scope and analyses the key hazards (sources of harm) and their consequences (types of harm) eg. Sources of harm – lifting a heavy pipe - manual handling. Types of harm – Back strain.


Main Points – On how to write a JHA.

1. Define the task – what is to be done.
2. Review previous JHA if any – have we done it before?
3. Identify the steps – what is to be done.
4. Identify the hazards of each step.
5. Identify who or what could be harmed.
6. Give the task a risk rating – Consequence + Frequency
7. Develop solutions to eliminate or control hazards in each step.
8. Review the risk rating after the control system has been implemented.
9. If risk rating unacceptable review the solutions till risk rating acceptable.
10. Agree who will implement the control system.
11. Document the JHA and discuss with the relevant personnel.

Hierarchy of Hazard Management – Control Measures

These steps outline what should be planned for when deciding what control measures are to be put in place. Whenever possible the highest step should be used first and then progress down the list.

1. Eliminate the hazard.
2. Substitution.
3. Reducing the frequency of a hazardous task.
4. Enclosing the hazard.
5. Additional procedures.
6. Additional supervision.
7. Additional training.
8. Instructions / information.
9. Some personal protective equipment.

	Mobile Oily Water Separator Manual	Issue Date: March 21, 2016 Revision: 0	
	Environment Department	Document #: BAF-PH1-830-T07-0001	

APPENDIX C –

OWS OPERATIONS JOB HAZARD ANALYSIS

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Job Hazard Analysis Form

PROJECT/TASK: Operating OWS		CONTRACTOR: BIM			JOB No.:				
SUPERVISOR:		LOCATION:			DATE:				
JOB STEP Break the job into steps. Listing work which may be hazardous.	HAZARDS List the hazard or type of harm identified with each step.	Inherent			CONTROL MEASURE List the necessary control measures to be followed to eliminate/reduce the identified hazards.	Residual			ACTION Person who will ensure this happens
		Consequence	Likelihood	Risk Ranking		Consequence	Likelihood	Risk Ranking	
Starting System	Leaks of fuel or contaminated water				Operator will address all active alarms.				
	Energized equipment failure				Pre inspection of all electrical equipment and pumps.				
	Skin contact with contaminated water				Wear hip waiters and rubber gloves when installing sump in berm				
Operating system	Exceeding maximum pressure in pumps and tanks				Operators/technician monitor all pressure valves and shut down system if any exceedances occur.				
	Leaks of fuel or contaminated water				Continuously monitor all lines and fittings to make sure they are secured properly				



	Slips, trips and falls				Proper footwear, be aware of surroundings				
	Congested work area				Communicate with other occupants, be aware of all valves and hoses when walking through seacan				

Job Hazard Analysis

Attendees:

	Name	Signature	Date
Written by:			
Reviewed by:			



Score	TABLE OF CONSEQUENCE		
	People	Plant	Environment
5 – Very High/ Catastrophic	Multiple Fatalities.	Greater than \$10 Million Loss	Catastrophe, destruction of sensitive environment, worldwide attention. Likely EPA prosecution. More than 30 days delay.
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	Likelihood					

Risk Rating - Definitions		
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2-4	Low Risk	If practical reduce the risk. Ensure personnel are competent to do the task. Manage by routing procedure. Monitor for change

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5. Identify who or what could be harmed.
6. Give the task a risk rating – Consequence + Frequency
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9. If risk rating unacceptable review the solutions till risk rating acceptable.
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These steps outline what should be planned for when deciding what control measures are to be put in place. Whenever possible the highest step should be used first and then progress down the list.

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2. Substitution.
3. Reducing the frequency of a hazardous task.
4. Enclosing the hazard.
5. Additional procedures.
6. Additional supervision.
7. Additional training.
8. Instructions / information.
9. Some personal protective equipment.

	Mobile Oily Water Separator Manual	Issue Date: March 21, 2016 Revision: 0	
	Environment Department	Document #: BAF-PH1-830-T07-0001	


APPENDIX E – BOTTLE SET REQUIREMENTS FOR SAMPLING STATIONS

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Monitoring Group	Station			Parameters	Bottles	Total Bottles	Notes
Group 1	All water taking and discharge			Water withdrawal/discharge volumes in cubic meters			Daily
Group 2	MS-01 MS-01a	MP-01 MP-01a	SP-01 SP-01a	pH, TSS alkalinity, BOD TKN, N-NH3, TP, COD O&G Faecal coliforms (effluent only)	1 x 1L Plastic or glass for on site analysis of pH and TSS 1 x 1L Plastic for alkalinity, BOD 1 x 250mL glass with H2SO4 preservative for NH3, TKN, TP, COD 2 x 500mL glass with HCL preservative for Oil & Grease 1 x 300mL sterile PET with sodium thiosulfate filled to shoulder for feecal coliforms	6 Effluent 5 Influent	On Site
Group 3	MS-01 MS-01a MS-MRY-04 MS-MRY-04a MS-06+ MS-07 MS-08 MS-09 MS-MRY-09 MS-MRY-10 MQ-C	MP-01 MP-01a MP-Q1	SP-01 SP-01a SP-03 SP-07	Acute Toxicity	1 x 20L pail a. Acute lethality to Rainbow Trout, <i>Oncorhynchus mykiss</i> (as per Environment Canada's Environmentla Protection Series Biological Test Method EPS/1/RM/13) b. Acute lethality to <i>Daphnia magna</i> (as per Environment Canada's Environmentla Protection Series Biological Test Method EPS/1/RM/14)	1	Sterile Aquatox Pail
Group 4	MS-02	MP-02 MP-03	SP-02	pH, TSS, TDS N-NH3, TP benzene, ehtylbenzene, toluene O&G total metals: As, Cu, Pb, Ni, Zn	1 X 1L plastic or glass for on site lab analysis of pH and TSS 1 X 250ml glass bottle with H2SO4 preservative for NH3 3 X 40ml septa vials with no headspace for benzene, ethylbenzene and toluene 2 X 500ml glass with HCL preservatives for oil and grease 1 X 125ml HDPE with HNO3 preservative	8	On Site
Group 5	MS-03 MS-04 MS-05 (add TSS) MS-MRY-6	MP-03 MP-04 (add TSS)	SP-04 SP-05 SP-06 (add TSS)	pH, TSS benzene, ethylbenzene, toluene Total Lead (Pb) O&G total petroleum hydrocarbons (TPH)	1 x 1L plastic or glass for on-site lab analysis of pH and TSS 3 X 40ml septa vials with no headspace and sodium bisulfate preservative for BTE, TPH (F1) 1 X 125ml HDPE with HNO3 preservative for total lead 2 X 500ml glass bottles with HCL preservative for Oil & Grease 2 X 500ml amber glass bottles with sodium bisulfate preservative for TPH (F2-F4)	9	On Site
Group 6	MS-MRY-13A MS-MRY-13B		SP-08	pH, TSS, TDS alkalinity, conductivity, DOC O&G phenols, TOC total petroleum hydrocarbons (TPH - F1) total petroleum hydrocarbons (TPH - F2-F4) total full list of metals total mercury	1 X 1L plastic or glass for on site analysis of pH and TSS, turbidity, TDS 1 X 1L Plastic for alkalinity conductivity, DOC 2 X 500ml glass with HCL preservative for oil & grease 1 X 250ml glass with H2SO4 preservative for phenols(4AAP), TOC 3 X 40ml septa vials with no headspace and sodium bisulfate preservative for TPH (F1) 2 X 500ml amber glass bottles with sodium bisulfate preservative for TPH (F2-F4) 1 X 125ml HDPE with HNO3 preservative for total metals 1 X 120ml square glass with HCL preaservative for total mercury.	12	On Site
Group 7	MS-06+ MS-07 MS-09 MS-MRY-09 MS-MRY-10 MS-MRY-11 MS-08 MS-08-US MS-MRY-10a	MP-07?	SP-07	pH, TSS, TDS, turbidity alkalinity, hardness, DOC, sulphate, fluoride, chloride TKN, N-NH3, N-NO3, TOC, TP Total Full List Metals Dissolved Full List Metals Total mecury Dissolved mercury	1 X 1L plastic or glass for on site analysis of pH and TSS, turbidity, TDS 1 X 1L Plastic for alkalinity, anions, DOC 1 X 250ml glass with H2SO4 preservative for tkn,nh3,toc, TP 1 X 125ml HDPE with HNO3 for total metals 1 X 125ml HDPE field filtered and preserved with HNO3 preservative for dissolved metals 1 X 120ml square glass with HCL for total mercury 1 X 120ml glass field filtered and preserved with HCL for dissolved mercury	7	On Site
Group 7a	MS-MRY-10a MS-08-US MS-08						
Group 8	MS-C MQ-C	MP-C MP-Q1		N-NH3 N-NO3, conductivity pH, TSS O&G	1 X 1L plastic or glass for on site analysis of pH and TSS, turbidity 1 X 250ml glass with H2SO4 preservative for NH3 1 X 1L plastic or glass for NO3, conductivity 2 X 500ml glass with HCL preservative for oil & grease.	5	On Site

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	Mobile Oily Water Separator Manual	Issue Date: March 21, 2016	
	Environment Department	Revision: 0	Document #: BAF-PH1-830-T07-0001

APPENDIX G –

OWS DISCHARGE LOG – SUMMARY SHEET

24-08-15 - MP OWS Discharge Log 2015 - Excel

FILE

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PAGE LAYOUT

FORMULAS

DATA

REVIEW

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Note

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	Fresh Water Supply, Sewage, and Wastewater Management Plan	Issue Date: March 31, 2019 Rev.: 6	
	Environment	Document #: BAF-PH1-830-P16-0010	

Appendix I – Oily Water Treatment Plant (For Vehicle Wash Water) O & M Manuals

(Available upon request)

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	Fresh Water Supply, Sewage, and Wastewater Management Plan	Issue Date: March 31, 2019 Rev.: 6	
	Environment	Document #: BAF-PH1-830-P16-0010	

Appendix J – BAF-PH1-340-PRO-048 – Waste Pond Water Treatment Plant Operations

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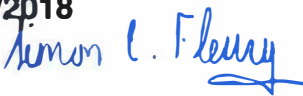
	Waste Pond Water Treatment Plant Operations	Issue Date: 17-Aug-2018 Revision: 1	Page 1 of 9
	Mine Operations	Document #: BAF-PH1-340-PRO-048	

Baffinland Iron Mines Corporation

Waste Pond Water Treatment Plant Operations


Rev 1.0

Prepared By: Chet Fong
Department: Mine Operations
Title: Senior Mining Engineer
Date: 17/08/2018
Signature: 

Approved By: Simon Fleury
Department: Mine Operations
Title: Mine Manager
Date: 17/08/2018
Signature: 

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
08/17/18	V1.0	CF		Initial

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1 PURPOSE

This document outlines the basic procedure to safely operate the Water Treatment Plant

2 SCOPE

This document will cover the basic operations of the plant, including start up and shut down, monitoring, treatment, and emergency protocols and procedures for at risk activities at the Water Treatment Plant.

2.1 EXEMPTIONS

This document does not include instructions related to water treatment, which can be found in the plant Operations and Maintenance Manual.

3 RESPONSIBILITIES

Any visitor shall request permission to the plant operator prior to entering the work area. In the absence of an operator, permission shall be requested to the mine supervisor.

The Plant operator shall ensure that everyone working in the plant wears the requisite PPE according to the activities being performed (e.g. chemical handling).

4 PROCEDURES

The information in this section is intended as a summary of plant operations. In the case of a discrepancy between this document and the Operations and Maintenance Manual, the latter will take precedence.


For full details on design and plant operation, refer to the operator's manual. In standard operations, the WTP is intended to draw water from the Waste Dump Pond and treat the intake water in 3 steps inside the WTP structure. The water is then discharged to a Geotube Settling Pond, where a fourth treatment step of settlement will occur, before water is either discharged into the environment or, if not compliant, recirculated back to the Waste Dump Pond.

The three steps of treatment involve the injection of chemical into temporary storage tanks.

- Step 1 – Iron Precipitation
- Step 2 – Hydroxide Precipitation and pH Adjustment

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- Step 3 – Flocculation
- Step 4 - Filtration

Steps 1-3 occur inside the WTP structure, with the 4th step taking place in the Geotube Settling Pond.

4.1 PLANT OPERATIONS

Plant operations consists primarily of managing flow, dosage and water levels across the pond, sump, and tanks. Flow is managed with a combination of control panel adjustments and manual valve manipulations.

The plant consists of the following components:

1. Intake Pump – pulls water from the Waste Dump Pond into the WTP
2. Onion tanks – water is stored for treatment prior to discharge. There are two trains, which can be run independently or concurrently.
3. Control panel – use to remotely manage pumps – can be set for automatic and manual operations
4. Dosing pumps – use to inject chemical into onion tanks at a fixed rate
5. Dosing tanks – mixing tanks from which chemicals (Lime, Polymer) is depleted at a configurable rate
6. Transfer pumps – used to take treated water from the plant out to the Geotube Pond
7. Geotube Pond – discharge from the plant is deposited here for particulate settlement prior to final discharge.
8. Discharge pump – used to pull treated water from the Geotube Pond to either be discharged into the environment or recirculated back to the Waste Dump Pond.
9. Blower motors – used to agitate water in onion tanks during treatment to ensure more even dispersion of chemicals.

Once the Plant is operational, the operator will commence with monitoring the measured levels of pH and suspended solids with built in instrumentations and gauges. These readings may be corroborated with manual instrumentations such as a YSI meter.


When readings indicate pH readings at the desired values, the operator shall then initiate discharging of water into the Geotube Pond. This water is allowed to percolate through the Geotube, which catches particulates as a filter. Once in the Sump, where any remaining particulates are then captured and settle into the bottom of the pond.

Water is discharged from this Geotube Pond, either directly into the environment or back into the Waste Dump Pond. The maximum flow rate for these discharging is 1200 gal/min, this limit imposed by the flowmeter installed.

At design capacity, the intake pump(s) should be able to pull water into the WTP for treatment at an equal rate to the discharge pump. The plant effectively runs continuously with dosing in-stream.

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4.2 PLANT START UP

The following steps should be undertaken when starting up the WTP.

1. Ensure blower motors are activated.
2. Ensure all the Valves to the Geotube Sump are open.
3. Ensure the transfer pumps are switched to automatic
4. Check that all the intake valves are open
5. Keep valves open between tanks on each train
6. Start up intake pump and adjust pressure accordingly. To do this, adjust the following:
 - a. Rpm of the pump
 - b. Valve openings
7. Start Ferric Sulphate Dosing system. Ensure intake is in the Ferric Sulphate barrels, and there are no leaks present. Pumps should be activated.
8. Start Lime Dosing system. Dosing pumps should be activated.
9. Start up Polymer Dosing System. Dosing pumps should be activated

Plant operations can now commence.

4.3 PLANT SHUT DOWN

Plant shut down can be undertaken when it is to be unmanned for a longer period of time (eg. More than 2 shifts) within the same system (for winter decommissioning, procedure XXX). To run a plant shut down

1. Shut all intake valves
2. Shut all Ferric Sulphate dosing equipment
3. Shut all Lime dosing equipment
4. shut all Polymer dosing equipment
5. Rinse Lime lines (reference other procedure)

Plant can now be shut down. This procedure can be utilized with the onion tanks full. This should also be done before any interruptions in power due to generator maintenance or other causes.


4.4 DISCHARGING

Discharging be undertaken whenever the plant is running. It is most efficient to run the discharge when there is moderate to high water levels in the Geotube Sump. The intake hose for the Geotube Sump should utilize the ring to ensure that drawn water is from the top of the water surface.

Discharging requires the manual operation of the valves to discharge the water either to the environment or back to the Waste Dump Pond. Readings should also be checked and logged on the flowmeter when discharge begins using the totalizer values.

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NOTE: discharge flow rate should be kept below 1200 gal/min, as flow greater than this will not be measureable.

To discharge, the following steps should be undertaken:

1. Ensure enough water to discharge. Water levels should be at least 50 centimetres from the bottom of the sump prior to beginning discharge.
2. Ensure valve on re-circulation line is closed. This will enable the water to discharge into the environment. Where re-circulation is required, close the valve on the discharge line and open the valve on the re-circulation line.
3. If discharging to the environment, check the totalizer reading on the flowmeter prior to discharge. This is not required if re-circulating.
4. On the control panel, Set discharge to “on”
5. While discharging, check discharge pH and Turbidity with sampling tap periodically. Samples can be collected and tested using YSI instrument.
6. When discharging is complete or to be disabled, go to control panel and set discharge to “off”

4.5 CHEMICAL DOSING

Chemical dosing is performed as part of the treatment process. The primary drivers for chemical dosing is:

1. Reduce the pH
2. Reduce the suspended solids

Prior to discharging water back into the environment.

As dosing quantities will vary depending on flow rate and water qualities, refer to user manual for dosing quantities.

Dosing procedures will vary slightly between the stages of treatment. The three stages that require chemical intervention are Ferric Sulphate, Lime, and Polymer.


4.5.1 FERRIC SULPHATE – LIQUID

PPE Required: long chemical resistant gloves, apron, face shield, standard PPE

- Prepare a barrel for dosing by placing the barrel into the duck pond by the ferric sulphate dosing area and removing the top seal.
- Put 2 dosing pumps into 1 barrel (1 per train)
- Switch on dosing pump on the control panel
- On the pump, check frequency and stroke length to ensure dosage is as expected.
- To change barrels, switch off on the dosing pump and change barrel

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4.5.2 LIME – BAGS

PPE Required: long chemical resistant gloves, respirator, face shield, respirator, standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add lime to water

4.5.3 POLYMER – BAGS

PPE Required: standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add polymer to water

4.6 SYSTEM AUTOMATION

For instruction on System Automation, please refer to the Operations and Maintenance Manual.

4.7 TROUBLE SHOOTING

For issue identification, please refer to the checklists in the Operations and Maintenance Manual.


4.8 ACCIDENT RESPONSE

As the WTP involves the handling of a number of chemicals that may be harmful, precautions must be taken to ensure all personnel who are in the work area are informed of the hazards and the preventative and treatment measures.

4.8.1 RESPONSE EQUIPMENT AVAILABLE

The WTP is equipped with a stationary emergency shower, 2 portable emergency shower stations and eyewash stations (dual purpose), 2 fire extinguishers, and 1 stationary eyewash station.

Additionally, the WTP is equipped with spare PPE, face shields, respirators, chemical resistant gloves, hearing protection, and spill kits.

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There are also patch kits for the onion tanks, hose and fitting replacements, tools, and a base station radio available at the WTP.

In the event that an incident occurs that requires emergency response, same basic steps should be immediately undertaken. The following lists some of the possible situations and a brief of the response steps.

4.8.2 SPILLS ON THE GROUND

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.8.3 SPILLS ON PERSON

- Proceed to stationary emergency shower
- Notify secondary operator
- Secondary operator activates pump switch
- Pull handle and rinse for 10 mins
- If unable to proceed to stationary emergency shower, refer to “emergency response procedure”

4.8.4 LIME IN EYES

- If possible, proceed immediately to emergency eyewash station
- Activate emergency eyewash and rinse for 10 mins.
- Repeat if required
- Notify secondary operator
- If unable to proceed to emergency eyewash station, refer to “emergency response procedure”

4.8.5 LIME SPILL


- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.9 APPENDICIES

Appendix A – Operations and Maintenance Manual for Mary River Mine Waste Rock Pile Water Treatment Plant

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APPENDIX A – OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE WASTE ROCK PILE WATER TREATMENT PLANT 20180817_v02

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**OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE
WASTE ROCK PILE WATER TREATMENT PLANT
20180817_v02**

Baffinland Iron Mines Corporation

Prepared by:



BROWNFIELDS TO GOLD MINES

McCue Engineering Contractors
203-8291 92 Street
Delta, BC
V4G 0A4

Project No. 137-0001

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1.0 INTRODUCTION

This documents outlines the Operations Manual for Baffinland Iron Mine Corporation's (BIM) Mary River Mine Waste Rock Pile water treatment plant (WTP).

2.0 PLANT OVERVIEW

2.1 General Process Description

The WTP employs a process of coagulation, pH adjustment, flocculation, and filtration to treat acid rock surface runoff collected in the pond at the base of the waste rock pile. The objective of the system operation is to treat water to within the parameters outlined in the Metal Mining Effluent Regulations (MMER), as specified to McCue by BIM, and summarized in Table 1.

Table 1: MMER Effluent Limits

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentrations in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic	mg/L	0.5	0.75	1.00
Copper	mg/L	0.3	0.45	0.60
Cyanide	NTU	1.00	1.50	2.00
Lead	mg/L	0.20	0.30	0.40
Nickel	mg/L	0.50	0.75	1.00
Zinc	mg/L	0.50	0.75	1.00
Total Suspended Solids	mg/L	15.00	22.50	30.00
Radium 226	Bq/L	0.37	0.74	1.11
pH	SU	6-9.5	6-9.5	6-9.5

The treatment steps are described in Section 2.2. Refer to drawings in Appendix A:

2.2 Brief Process Overview

2.2.1 System Inlet

Water is collected at an inlet storage pond (P-001) where it is held for treatment. Two diesel powered centrifugal trash pumps (PU-100A/B) are used to transfer water from the storage pond to an equipment enclosure where the WTP is housed.

At the WTP, the flow can be divided into two separate treatment trains (1 and 2), with each train having a flow meter on the inlet line to monitor flow.

Water is directed into two reactor tanks (TA-110 and TA-210) for processing.

2.2.2 Step 1 – Iron Precipitation

Ferric sulphate solution is injected into TA-110 and TA-210 to promote coagulation and precipitation of some heavy metals.

As of system commissioning in June 2018, ferric sulphate liquid solution (12% Fe) is used and injected directly into the process. Each process train utilizes an independent chemical pump to introduce chemical into the system.

The WTS also includes a ferric sulphate make down system, including a holding tank and mixer to allow for makeup of solution using dry ferric sulphate.

Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.3 Step 2 – Hydroxide Precipitation and pH Adjustment

Water flows by gravity from TA-110 and TA-210 to TA-120 and TA-220 respectively. Here, hydrated lime is injected into the process to increase pH and aid in further precipitation of some metals through hydroxide precipitation.

Hydrated lime solution is made manually by adding dry hydrated lime and raw influent water to a mixing tank (TA-020). A mixer is run continuously to ensure the hydrated lime slurry does not solidify.

One hydrated lime chemical pump is utilized to dose each reactor tank with chemical. Two motorized valves (MV-120 and MV-220) are used to control the flow of lime to each reactor tank. Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.4 Step 3 – Flocculation

Water flows by gravity from TA-120 and TA-220 to TA-130 and TA-230 respectively. Here, polymer is injected into the process to aid in flocculation of suspended solids prior to filtration.

Polymer solution is made manually by adding dry polymer and raw influent water to a mixing tank (TA-030). A mixer is run continuously to ensure uniformity of the polymer solution.

Two polymer chemical pumps are utilized to provide polymer dosing to each train. Polymer can be dosed directly into each reactor tank, or inline through a static mixer located directly downstream of the reactor tank.

2.2.5 Step 4 – Filtration

Water from TA-130 and TA-230 is pumped to a geotube pond via two diesel powered centrifugal trash pumps (PU-200A/B).

Water is directed to a manifold where it can be distributed to two geotube bags for solids filtration. Two additional geotube bags can be deployed in the pond once the currently operating geotube bags have reached capacity. These spare geotubes are currently stored in a warehouse for future use.

Filtered water leaves the geotube bags and is directed to a collection point at the North West corner of the pond. From here, water is pumped via one diesel trash pump (PU-300) to the Mary River discharge point, or recycled back to the inlet pond. A flow meter is installed on the discharge line to Mary River to allow for data logging of flow.

2.3 Major Equipment List

The WTP layout is provided in appendix A. A list of major equipment is provided in Table 2.

Table 2: Major WTP Equipment

Equipment	Description	Qty	Drawing Reference (If Available)
Pond Transfer Pump	Model: Prime Aire PA4A60-404ST Power: Diesel Driven Capacity: 140m3/hr	2	PU-100 A / PU-100 B
Inlet Flow Meter	Model: GF Signet 3-2551-P1-42	2	FT-100 / FT-200
Ferric Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-110 / TA-210
Lime Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-120 / TA-220
Polymer Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-130 / TA-230
Aeration Blowers	Gast R7100A-3 Blower • 208 V / 3 HP / 60 Hz	2	BL-100A / BL-100B
pH Controller and Sensors	Model: Walchem W900 (Controller) Model: Walchem WEL-PHF-NN (Sensors)	1	pH-110/120/210/220
Motorized Ball Valve	Hayward 1" Ball Valve Model: HRSN2	2	MV-120 and MV-220
Level Transmitter	Model: Echosonic 11 LU27	2	LT-130 / LT-230
Bag Filter	Model: FTI830-2P-150-CS-BS-P13-DP Bag Size: 5 Micron	1	FIL-100
Ferric Chemical Pump	Model: Walchem EHE31E1-VC Power: 115 VAC/1hp/60Hz Capacity: 1 LPM @ 105m TDH	2	PU-010A / PU-010B
Lime Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 9.5 LPM @ 105 m TDH	1	PU-020
Polymer Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 16.5 LPM @ 105 m TDH	2	PU-030A / PU-030B
Ferric Mixing Tank	Material: Polyurethane Size: Ø 1.2m x 1.3m Height	1	TA-010
Lime Mixing Tank	Material: Polyurethane Size: Ø 1.8m x 1.7m Height	1	TA-020
Polymer Mixing Tank	Material: Polyurethane Size: Ø 1.6m x 1.6m Height	1	TA-030
Coarse Bubble Diffusers	Model: Maxair 24" SS	24	-

2.4 System Automation

The system is automated through a main control panel located in the system enclosure. The system P&ID is provided in Appendix A. Operation is outlined in Table 3.

Table 3: Control Panel Automation

Equipment ID	Equipment Description	Control Logic	PID Control Reference	Controls	Panel Indication
PU – 100 A/B	Inlet Pond Pump	Units can be controlled in Hand or in Auto.	-	-	Pump icon will indicate run status
		Pump will turn on in Hand in Auto or in Hand.			
		Pump will turn off if high level is measured in TA-110 or TA-210	LSH-110 / LSH-210	Auto	High level alarm at panel
		Pump will turn off if high level measured in TA-130 or TA-230	LIT-130 / LIT-230	Auto - High level settable at panel	High level alarm at panel
BL-100 A/B	Blower	Units can be controlled in Hand or in Auto	-	-	Blower icon will indicate run status
		Blower will turn on in Auto or in Hand			
		BL-100 A will turn off if low level is measured by LIT-130	LIT-130	Auto – Low level settable at panel	Low level alarm
		BL-100 B will turn off if low level is measured by LIT-230	LIT-230	Auto – Low level settable at panel	Low level alarm
pH-110	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC
pH-210	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC

pH-210	pH Sensor	If pH>9.5, close MV-120 - Alarm	MV-120	Auto – pH set point settable at panel	Display pH on PLC
pH-220	pH Dosage	If pH>9, close MV-220 - Alarm	MV-220	Auto – pH set point settable at panel	Display pH on PLC
PU-010A	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-100 measures flow, PU-010A energizes.	FIT-100	Auto	Display run status on PLC
PU-010B	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-200 measures flow, PU-010B energizes.	FIT-100	Auto	Display run status on PLC
PU-020	Lime Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		<u>Speed Control (1 train only)</u> If pH-120> 8.5, PU-020 will reduce speed. If pH < 8, pump will increase pump speed. If pH is between 8 to 8.5, pump will maintain pump speed.	pH-110 / pH-120	Auto – pH set point adjustable at panel	Display run status on PLC
		<u>Speed Control Disabled</u> If flow is detected by both trains, speed control is disabled.	FIT-100 / FIT-200	Auto	Display run status on PLC
PU-030 A	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status

		Polymer pump energizes if PU-200 A is on	PU-200A	-	Display run status on PLC
PU-030 B	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Polymer pump energizes if PU-200 B is on	PU-200B	-	Display run status on PLC
PU-200 A	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-130 measures < 3', PU-200A off. If LT-130 measures >3', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-130 measures >4.5', PU-200A off. If LT-130<4.5', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-200 B	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-230 measures < 3', PU-200B off. If LT-230 measures >3', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-230 measures >4.5', PU-200B off. If LT-230<4.5', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-300	Discharge Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Pump off at LSL-200	LSL-200	-	Level indicator on panel

		Pump on at LSH-200	LSH-200	-	Level indicator on panel
		High Level Alarm at LSHH-200	LSHH-200	-	High Level Alarm
MX-010 /020/030	Mixer	Units can be controlled on/off manually	-	-	-

3.0 GENERAL STARTUP PROCEDURE

3.1 After Dormancy Pre-start-up Procedures

The following steps shall be taken after extended periods of dormancy, prior to general startup of the WTP.

Task	Check
Perform a visual inspection of the system enclosure for signs of water/snow ingress.	<input type="checkbox"/>
Inspect hose and pipe for signs of leaks, abrasion, or other physical damage.	<input type="checkbox"/>
Inspect Reactor tanks as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Tank connections for signs of strain or stress. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Blowers as follows: <ul style="list-style-type: none"> Signs of abrasion, or other physical damage on all external accessories such as relief valves, gauges and filters. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Diesel Pumps as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Check for and tighten loose attaching hardware. Make sure that valves at the inlet and outlet are opened. Check oil levels and lubricate as necessary. 	<input type="checkbox"/>
Inspect Ferric Sulphate pump as follows <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Hydrated Lime pumps as follows <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Inspect condition of internal pump hose. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Polymer pump as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Inspect condition of internal pump hose. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Level Transmitter as follows: <ul style="list-style-type: none"> Monitor debris and ensure the sensor is level and mounted perpendicular to water level. Check and roughly compare measurement on the PLC with the real on the field. 	<input type="checkbox"/>
Inspect pH sensors as follows: <ul style="list-style-type: none"> Monitor debris and deposition of scaling on the transmitter. Perform a cleaning of the sensors as necessary. 	<input type="checkbox"/>

Inspect Bag Filter vessel as follows: <ul style="list-style-type: none"> • Signs of leaks, abrasion, or other physical damage. • Inspect filter bag and replace as necessary 	<input type="checkbox"/>
Inspect Inlet Flow Meter as follows: <ul style="list-style-type: none"> • Signs of leaks, abrasion, or other physical damage. • Inspect flow sensor for scaling. Clean as necessary. 	<input type="checkbox"/>
Inspect Geotube Bag as follows: <ul style="list-style-type: none"> • Ensure inlet connection points are securely attached. • Ensure height of bag does not exceed recommended limits. If so, decommission geotube bag. • Clean geotube surface of sediment and scaling to prevent fouling using a push broom, or gentle pressure washing. 	<input type="checkbox"/>

3.2 Commissioning

After pre-start-up procedures are completed, the system can be energized. The following procedure reflects a high level overview of equipment checks to be performed. Detailed instructions can be found in the product specific manuals. Before any mechanical intervention, disconnect the electrical supply.

3.2.1 Hydrated Lime Pump / Polymer Pump

Task	Check
Ensure that all protections (cover, cover window, ventilator hood, coupling protection) are in place before operating the pump.	<input type="checkbox"/>
Check the direction of rotation of the pump.	<input type="checkbox"/>
Make sure that valves at the inlet and outlet are opened.	<input type="checkbox"/>
Start the pump by checking its direction of rotation through the cover window.	<input type="checkbox"/>
Check the flow and discharge pressure and adjust rollers if these figures don't match the pump specifications.	<input type="checkbox"/>

IMPORTANT: Ensure lime pump valves remains open during operation. Should valves be left in the closed position, the process line can over pressurize, leading to a rupture of the chemical hose.

3.2.2 Blowers

Task	Check
Ensure impeller rotation is correct.	<input type="checkbox"/>
Check filters and inspect for signs of fouling. Replace if necessary.	<input type="checkbox"/>

Ambient temperature – Check room and discharge air temperatures. Exhaust air should not exceed 135°C.	<input type="checkbox"/>
Working pressure and vacuum values – Adjust relief valve pressure or vacuum setting, if needed.	<input type="checkbox"/>
Motor current – Check that the supply current matches recommended current rating on product nameplate.	<input type="checkbox"/>
Electrical overload cutout – Check that the current matches the rating on product nameplate.	<input type="checkbox"/>

3.2.3 *Ferric Pump*

Task	Check
Ensure pump is energized.	<input type="checkbox"/>
Make sure that valves at the inlet and outlet are opened.	<input type="checkbox"/>
Start the pump manually, in order to prime and adjust dosing rates.	<input type="checkbox"/>
Prime the pump. See manual for details.	<input type="checkbox"/>
Adjust dosing according to inlet water flow rate. See below.	<input type="checkbox"/>
Check dosing rate with calibration cylinder.	<input type="checkbox"/>

3.2.4 *Motorized Valve*

Task	Check
Ensure valve is energized.	<input type="checkbox"/>
Ensure valve opens/closes reliably in manual mode:	<input type="checkbox"/>

3.2.5 *Diesel Pumps*

Task	Check
Check fuel level and oil levels in the engine, air compressor, pump bearings and seal housing.	<input type="checkbox"/>
Consult engine operations manual before attempting to start the unit.	<input type="checkbox"/>
Allow pump to prime.	<input type="checkbox"/>
Adjust engine speed to desired output.	<input type="checkbox"/>

3.2.6 pH Sensors

Task	Check
Ensure sensor is calibrated.	<input type="checkbox"/>
Ensure the pH reading displayed locally at the Walchem panel is transmitted correctly to PLC.	<input type="checkbox"/>

3.2.7 Geotube

Task	Check
Ensure surface is clean of sediment and debris.	<input type="checkbox"/>
Ensure all inlet valve are open.	<input type="checkbox"/>
Ensure height of geotube does not exceed manufacturer recommended limit.	<input type="checkbox"/>

4.0 OPERATION

4.1 General Operating Instructions

Operation of the WTP will consist of ensuring major equipment (blowers, dosing pumps, motorized valves, level transmitters) is running correctly, and ensuring influent/effluent monitoring and sampling are conducted on schedule.

The drivers for pH adjustment and TSS treatment are operation of the Ferric Sulfate, Hydrated Lime and Polymer Pump, along with the proper performance of the aeration blowers and diffusers equipment.

The unit will run manually. During short term dormancy, the unit can be operated in a "Sleep Mode" where the system is run in a re-cycle status using two submersible pumps inside TA-130 and TA-230 to recirculate water from the end of each train to the beginning of each train. Chemical injection is disabled during dormancy, however, the lime mixer should remain on to maintain suspension of the hydrated lime slurry. Blowers will also remain on to ensure suspension of solids within the reactor tanks.

Parameters to be measured and recorded daily include temperature, pH (typical values are between 6.5 and 9), and TSS. The system must be monitored regularly to ensure pH does not drop below the low level set point or raise above the level set point.

The pH reading should be recorded daily. The pH should be cross referenced regularly with a hand held device. Should the pH differ from the hand held reading, the operator should clean the pH electrodes using a 2-5% solution of hydrochloric acid.

System data can be recorded in the spreadsheet provided in Appendix B. Regular daily monitoring of parameters such as pH, temperature, TSS, and Geotube height must be recorded to ensure proper operation.

4.2 Operating Procedure

The following section will outline the step-by-step procedures for operating the treatment system.

4.2.1 Standard Operation

Inlet

The inlet pond level should be checked and recorded prior to start up. Two pond pumps can be utilized to transfer raw water to the treatment system. Usage will depend on the volume of treatment required. At low pond levels, one pond pump and one process train can be utilized. At high levels, both pumps can be utilized to increase the treatment volume.

All pump discharge valves must be opened. The pumps (PU-100 A/B) shall be placed in “Hand” at the PLC. This will energize the pumps and begin transfer of water to the treatment system. The pumps will only turn on if a high level is measured by LSH-110/210 or LT-130/230.

Operators must ensure the inlet pond level is monitored, as the pumps do not include a low level shut off.

Ferric Pumps (PU-010 A/B)

Water is transferred from the inlet pond to two reactor tanks (TA-110 and TA-210) where ferric sulphate is injected. The dosage rate of the ferric pumps is determined by the inlet quality of the raw water and can range from 0 to 20 mg/l. The dosage rate is to be determined by the operator.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The ferric pumps, PU-010 A and PU-010 B, will energize when flow is detected by FIT-100 and FIT-200 respectively.

Before starting the pumps, all discharge valves must be opened.

Lime Pump (PU-020)

After coagulant addition, water flows by gravity to TA-120 and TA-220 where hydrated lime is injected into the process. The dosage rate of the Lime pump is determined by the inlet quality of raw water and the pH required, and can range from 0 to 300 mg/l. The dosage rate is to be determined by the operator.

In manual mode, the speed of the pump can be set at the pump VFD, located on the lime pump stand.

Pump speed will be dependent on the pH measured by pH-120, and the pH set point entered into the panel (adjustable by an operator). At a setpoint of 8.5, the pump will increase speed if pH-120 measures a pH below 8. If pH-120 measures a pH above 9, pump speed will decrease. If pH is measured between 8 to 8.5, the dosage rate will remain the same.

-

At a pH above 9.5, MV-120 and MV-220 will close.

The lime pump will operate continuously, with chemical consistently recirculated to the lime mixing tank (TA-020). This is done to ensure the lime slurry does not settle and solidify in the piping system. At the end of every shift, clean water must be flushed through the piping in order to prevent fouling. Flushing may be required more frequently depending on operational conditions.

Due to the possibility of fouling, the lime pump system must be monitored for pressure consistently.

Lime Solution Make Up

Hydrated lime solution is made manually, with the solution concentration ranging from 5-10% depending on volume of raw water to be treated. A concentration of 5% is recommended to minimize line fouling caused by the lime slurry. Higher concentrations can be made, but more frequent line flushing will be required.

The lime tank mixer is operated from the panel, and should be operated continuously to prevent the slurry from solidifying.

Polymer Pumps (PU-030 A/B)

The dosage rate of the ferric pumps is determined by the inlet quality and can range from 0 to 3 mg/l.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The polymer pumps, PU-020 A and PU-020 B, will energize when the transfer pumps, PU-200 A and PU-200 B are energized.

Before starting the pumps, all discharge valves must be opened.

Polymer Solution Make Up

Polymer solution is made manually, with concentration ranging from 0.1 to 0.25% depending on volume to be treated.

The polymer tank mixer is operated from the panel, and should be kept on at all times to maintain uniformity of the solution.

Blowers

The blowers are operated from the panel, and should be energized at all times when raw water is being processed in the reactor tanks.

Both blowers (BL-100A and BL-100B) can be set in “Auto” at the panel, at which point they will run continuously until the water level in TA-130 and TA-230 is measured to be less than 6”. This level is settable at the panel.

Raw Water Bag Filter

The bag filter provides filtration of water required for chemical makeup. The filter bags should be replaced periodically when differential pressure across the filter exceeds approximately 20 psi.

Geotube Bags

Water is transferred from the final reactor tanks (TA-130 and TA-230) by diesel generated trash pumps (PU-200 A and PU-200 B) to the geotube pond. The transfer pumps, PU-200A and PU-200B are operated based on the level measured by the reactor tank level transmitters, LT-130 and LT-230 respectively. These set points are adjustable at the panel.

The height of the geotube bags must be monitored regularly.

4.3 Daily Operator Checklist

The following steps outline day-to-day operational procedures for the WTS.

Standard Operation

Task	Check
Check inlet pond and record water level	<input type="checkbox"/>
Check lime and polymer solutions, make up additional solution as required.	<input type="checkbox"/>
Place PU-100 A (and PU-100 B if necessary) in Hand mode at the control panel.	<input type="checkbox"/>
Set Ferric Sulphate pump (PU-010 A / B) dose rate and place pump in Auto at control panel. Ensure pump energizes when flow is detected by FIT-100 or FIT-200.	<input type="checkbox"/>
Turn on hydrated lime pump (PU-020 A) manually. Adjust dose rate based on flow measured by inlet flow meters.	<input type="checkbox"/>
Monitor hydrated lime pump pressure gauge. If pressure gauge is showing a pressure greater than 15 psi, flush line with water.	<input type="checkbox"/>
Set polymer pump dose rate at panel. Set in "remote" mode. Set pump to auto at panel. Pump will turn on when PU-200A/B energize.	<input type="checkbox"/>
Set Blowers (BL-100 A / BL-100B) to Hand.	<input type="checkbox"/>
Once onion tanks are full, set PU-200A/B to Auto (if using both trains). Ensure downstream valves to geotube bags are open.	<input type="checkbox"/>

Observe reactor tank water levels to ensure inlet and outlet flows are balanced.	<input type="checkbox"/>
Observe and record height of geotube bags. Height must not exceed 6 feet.	<input type="checkbox"/>
Set PU-300 to auto in the panel. Once the water in the pond reaches the operating float switch, the pump will be energized.	<input type="checkbox"/>
Discharge vales must be set manually to allow for discharge to the creek, or recycle back to the inlet pond. Set valves in correct position.	<input type="checkbox"/>

Daily Shutdown

Task	Check
Set inlet pump to Off position	<input type="checkbox"/>
Allow reactor tanks to be pumped down to ¼ volume.	<input type="checkbox"/>
Turn off chemical pumps.	<input type="checkbox"/>
Flush lime line with water	<input type="checkbox"/>
Keep lime mixer (Mix-020) on to ensure hydrated lime slurry remains in liquid form.	<input type="checkbox"/>
If tanks are lowered, blowers can be turned off. If tanks are kept full, energize recirculation pumps.	<input type="checkbox"/>
Check lime and polymer solutions, make up additional solution if required.	<input type="checkbox"/>
Turn transfer pumps (PU-200 A/B) and discharge diesel pump (PU-300) off.	<input type="checkbox"/>

APPENDIX A –DRAWINGS

-




NOTES:

PU-200A/B- Transfer Pump
PU-300- Discharge Pump
FT-300- Flow Meter
LS- Level Switch
-LSHH 200
-LSH 200
-LSL 200

— Process lines
— Instrumentation lines

Process based on conceptual design by Golder Associates

REVISION TABLE		
No.	DESCRIPTION	DATE
0	Original Issue	2018/04/30
1	Record Drawing	2018/07/31

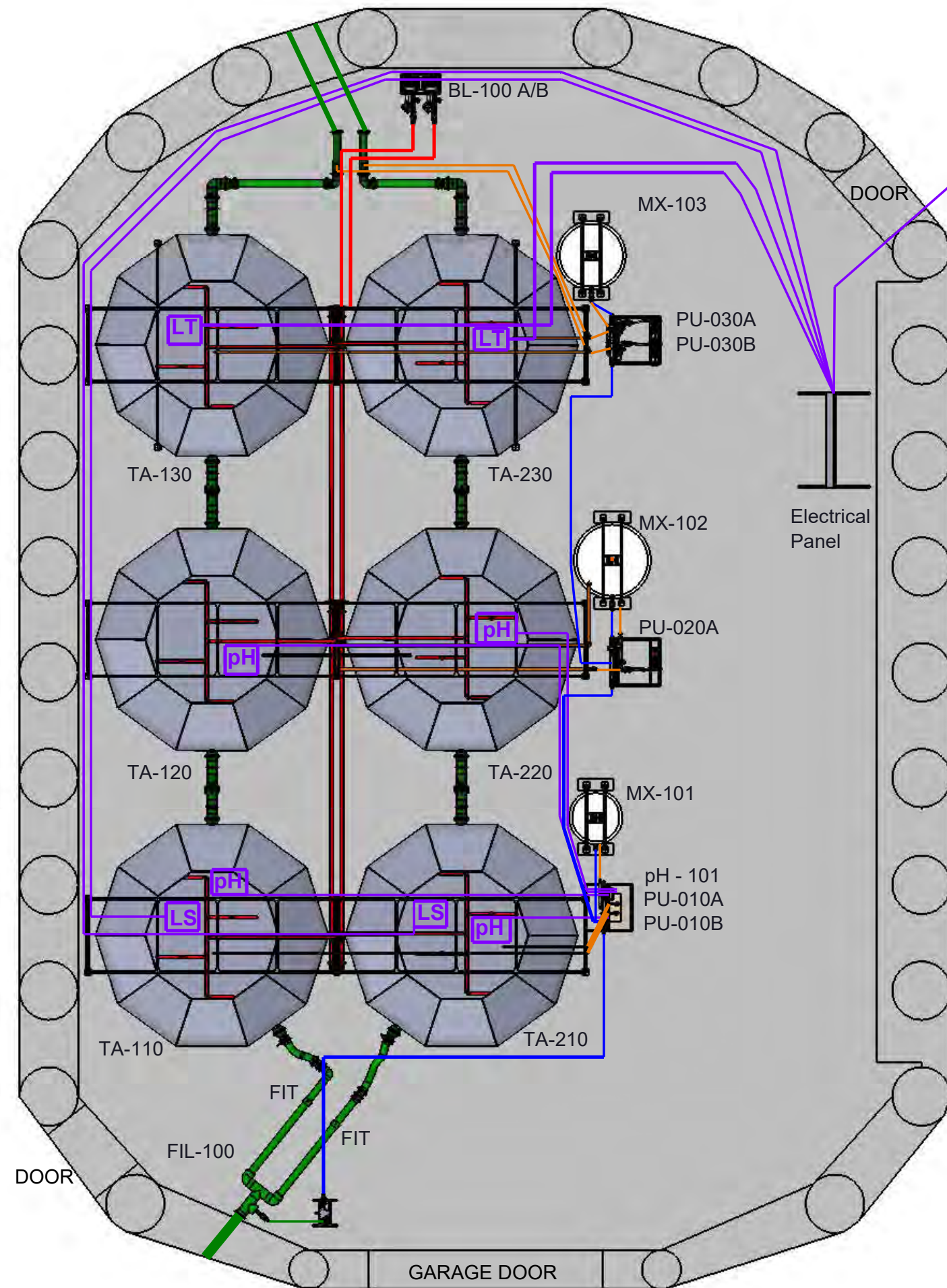
 **McCUE ENGINEERING CONTRACTORS**

CLIENT:

BAFFINLAND IRON MINES CORPORATION

**FULL SITE LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: L.S.	FIG: GA-001



LEGEND

BL-100 A/B - Blower
 FIL-100 - Bag Filter
 MX-101 - Ferric Mixing Station
 MX-102 - Lime Mixing Station
 MX-103 - Polymer Mixing Station
 PU-010 A/B - Ferric Pump
 PU-020 - Lime Pump
 PU-030 A/B - Polymer Pump
 TA-110 - Ferric Process Tank (Train 1)
 TA-210 - Ferric Process Tank (Train 2)
 TA-120 - Lime Process Tank (Train 1)
 TA-220 - Lime Process Tank (Train 2)
 TA-130 - Polymer Process Tank (Train 1)
 TA-230 - Polymer Process Tank (Train 2)
 pH-101 - pH Controller
 FIT - Flow Meter
 pH - pH Sensor
 LS - Level Switch
 LT - Level Transmitter

Notes:

- Process Lines
- Water Make-up Lines
- Chemical Lines
- Air Lines
- Instrumentation Line

Process based on conceptual design by Golder Associates

REVISION TABLE

No.	DESCRIPTION	DATE
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1	Record Drawing	2018/08/17

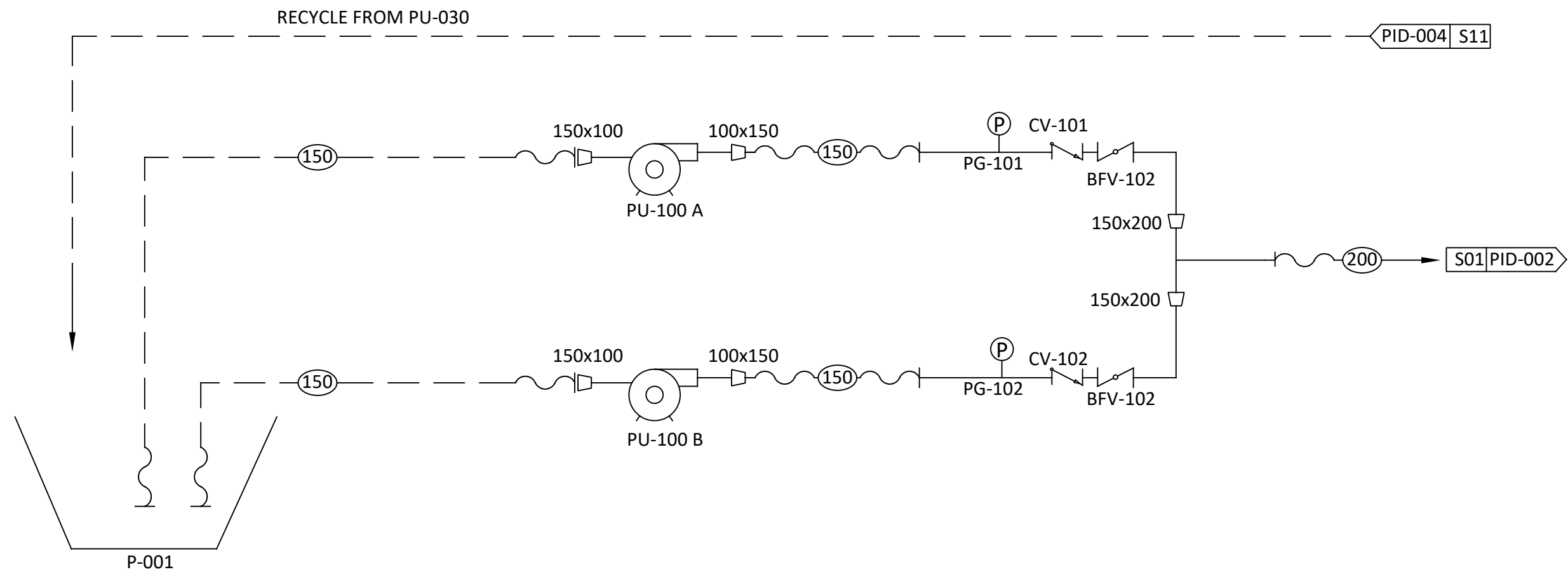


CLIENT:


BAFFINLAND IRON MINES CORPORATION

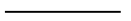
**BUILDING LAYOUT
GENERAL ARRANGEMENT DRAWING**
Waste Rock Pile Water Treatment Plant


DATE: August 17, 2018	SCALE: AS SHOWN
DATA BY: R.B	JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-002





LEGEND :


Hose

Sch. 80 PVC Pipe

Butterfly Valve


Check Valve

Reducer

Pressure Gauge

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

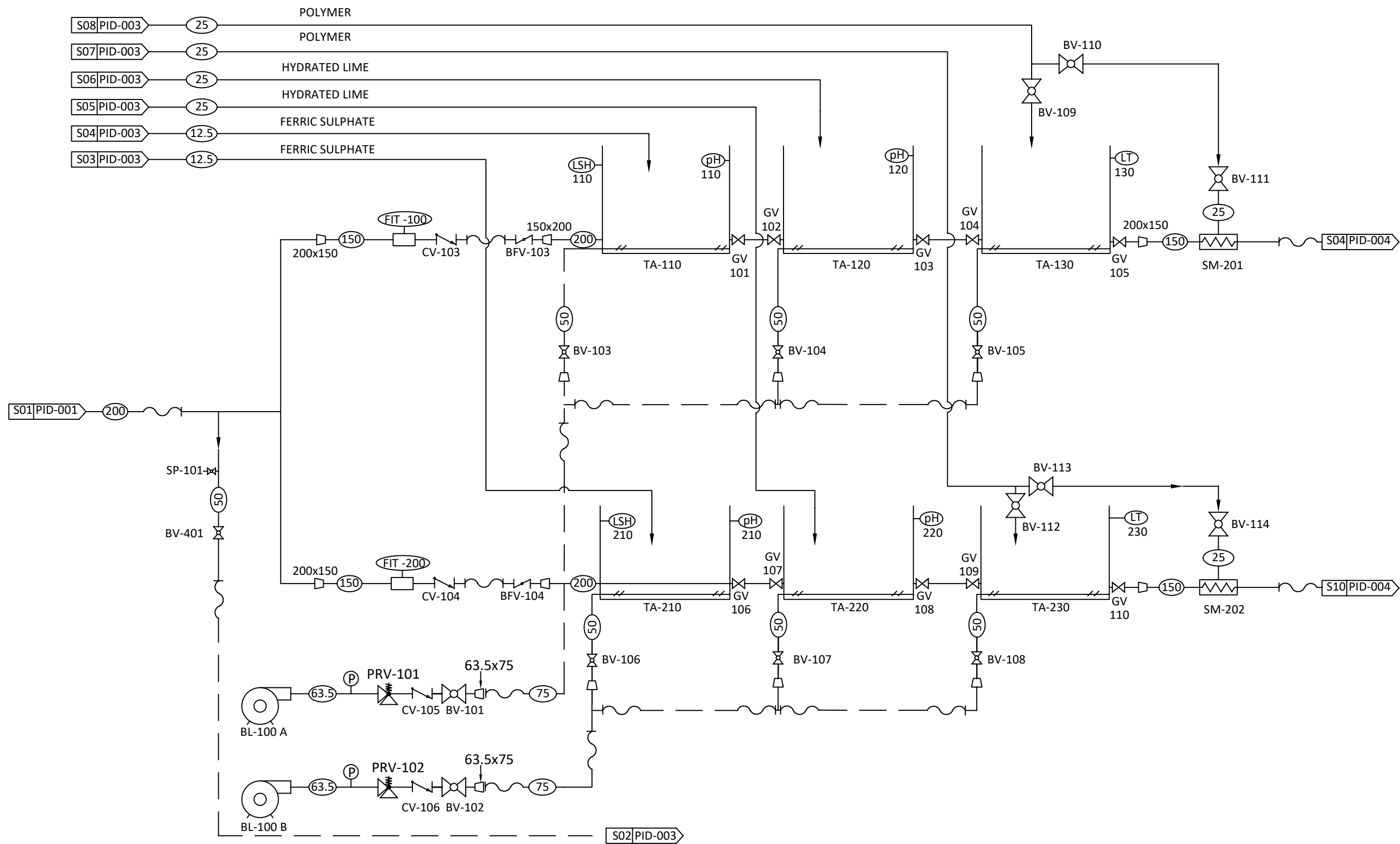
McCUE ENGINEERING
CONTRACTORS

CLIENT:

**BAFFINLAND IRON MINES
CORPORATION**

**Waste Rock Water Storage Pond
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0001



BL-100 A/B
Blower
Model: Gast R7100A-3
Power: 208V/3hp/60Hz
Capacity: 500m³/hr @ 1.9m TDH

TA-110/210
Ferric Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-120/220
Lime Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-130/230
Polymer Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

FT-100/200
Influent Flow Meter
Model: GF Signet 3-2551-P1-41

LT-130/230
Level Transmitter
Model: Echosonic 11 LU27

pH-110/120/210/220
pH Meter
Model: Walchem WEL-PHF-NN

- LEGEND:**
- Hose
 - Sch. 80 PVC Pipe
 - Butterfly Valve
 - Check Valve
 - Reducer
 - Pressure Gauge
 - Static Mixer
 - Gate Valve
 - Pressure Relief Valve
 - Ball Valve
 - Sample Port
 - Flow Meter
 - Level Switch
 - pH Sensor
 - Level Transmitter

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

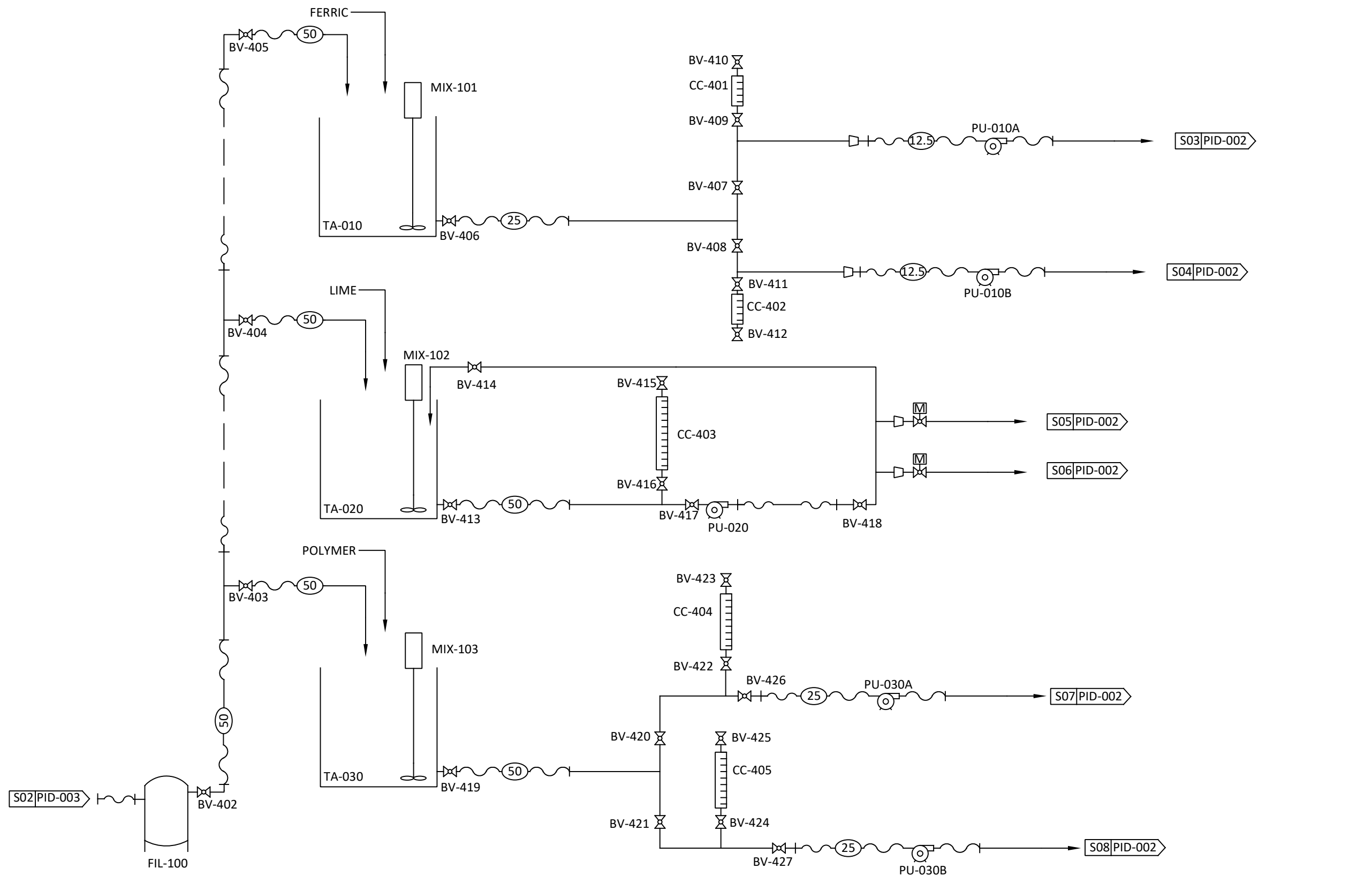


CLIENT:

BAFFINLAND IRON MINES CORPORATION

**REACTION TANKS
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0002



FIL-100
Bag Filter
Model: FTI 830-2P-150-CS-BS-P13-DP
Bag Size: 5 Micron

PU-010A/B
Ferric Chemical Pump
Model: Welchmen EHE31E1-VC
Power: 115 VAC/1hp/60Hz
Capacity: 21 LPM @ 106m TDH

PU-020
Lime Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 570 LPM @ 42m TDH

PU-030
Polymer Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 990 LPM @ 42m TDH

MIX-101
Ferric Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 41" Long

MIX-102
Lime Mixer
Model: Dynamix DMX-5505K-2
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 52" Long

MIX-103
Polymer Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 49" Long

TA-010
Ferric Mixing Tank
Material: Polyurethane
Size: Ø 1.2m x 1.3m Height

TA-020
Lime Mixing Tank
Material: Polyurethane
Size: Ø 1.8m x 1.7m Height

TA-030
Polymer Mixing Tank
Material: Polyurethane
Size: Ø 1.6m x 1.6m Height

CC-401/402/403/404/405
Calibration Column

- LEGEND:**
- Hose
 - Sch. 80 PVC Pipe
 - Ball Valve
 - Reducer
 - Motorized Ball Valve

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

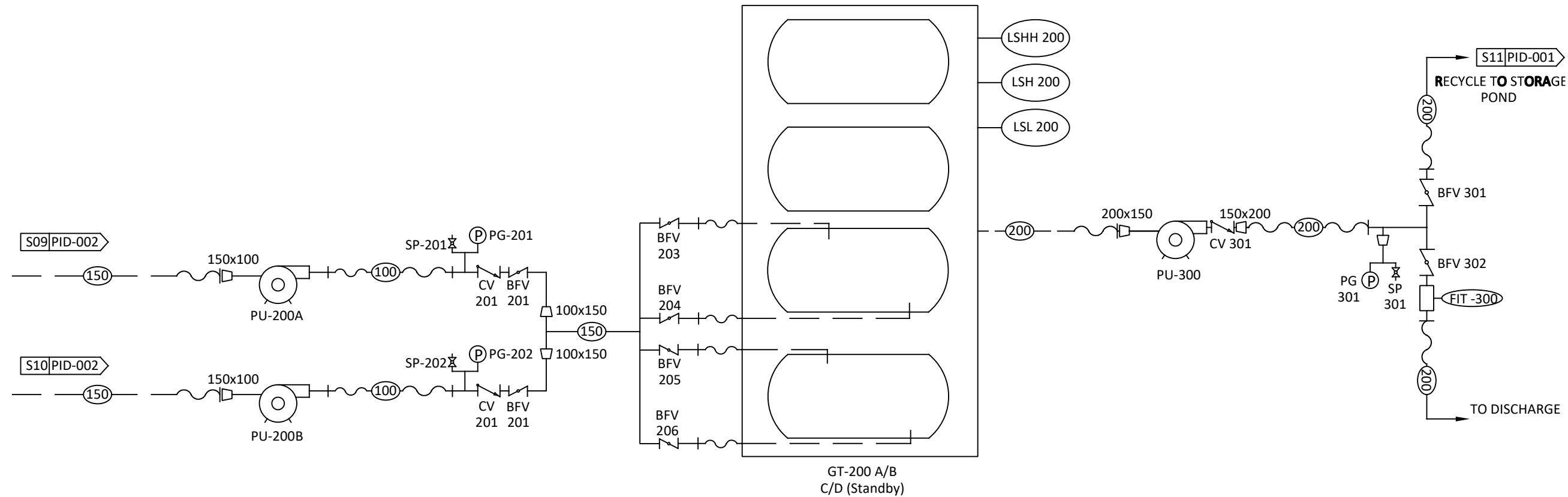


CLIENT:

BAFFINLAND IRON MINES CORPORATION

**CHEMICAL MAKEUP
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-003



PU-200A/B
Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

GT-200 A/B/C/D
Geotube
Model: Tencare GT500
Dimensions: 60' Circumference x 100' Long

PU-300
Discharge Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 280m³/hr

FT-300
Flow Meter
Model: Toshiba GFG32

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge
- Sample Port
- Level Switch

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018



CLIENT:

BAFFINLAND IRON MINES CORPORATION

**GEOTUBE FIELD
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-004


APPENDIX B - MONITORING

-



Project Name: BaffinLand Iron Mine
Waste Pile Water Treatment

Chemical Availability	Week #1 Date:	Week #2 Date:	Week #3 Date:	Week #4 Date:
Ferric Sulphate				
Hydrated Lime				
Polymer				

	Fresh Water Supply, Sewage, and Wastewater Management Plan	Issue Date: March 31, 2019 Rev.: 6	
	Environment	Document #: BAF-PH1-830-P16-0010	

Appendix K – BAF-PH1-830-P16-0047– Metal and Diamond Mining Effluent Regulations Emergency Response Plan

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Baffinland Iron Mines Corporation

METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN

BAF-PH1-830-P16-0047

Rev 2

Prepared By: Connor Devereaux
Department: Environment
Title: Environmental Superintendent
Date: February 27, 2019

Signature: 

Approved By: Gerald Rogers
Department: Operations
Title: General Manager
Date: February 27, 2019

Signature: 

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
01/15/18	0	BW	WB	Use
01/30/18	1	BW	GR	Use
02/27/19	2	CD	GR	Use

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1 PURPOSE

In accordance with Part 3, Section 30 of the Metal and Diamond Mining Effluent Regulations (MDMER), Baffinland Iron Mines Corporation (Baffinland) has prepared an MDMER Emergency Response Plan.

Revisions to this plan shall be completed based on future modifications to the work scope, emergency and spill response procedures, and the associated approvals. Updates to this Plan shall be completed in accordance with: the terms and conditions of Metal and Diamond Mining Effluent Regulations, Baffinland's water licenses, QIA Commercial Lease (Q13C301; issued September 6, 2013), the amended Project Certificate No. 005 [issued May 28, 2014 by the Nunavut Impact Review Board (NIRB)] and any subsequent requirements that may be issued.

2 SCOPE

Baffinland's Emergency Response Plan (ERP) (BAF-PH10840-P16-0002 r2) identifies potential environmental, health, and safety emergencies that could arise during the construction and operation phases of the Mary River Project. The ERP establishes the framework for responding to these situations, and applies to all facets of the Mary River Project. It defines requisite organizational roles and responsibilities for project personnel, internal and external contact information, training, resources, and reporting requirements. All Baffinland employees and project contractors are required to comply with the ERP.

Baffinland has two ponds subject to the MDMER, both located at the Mine Site. Baffinland identifies the Waste Rock Facility (WRF) Pond as 'MS-08' and the Crusher Facility (CF) Pond as 'MS-06' for MDMER reporting purposes. Both the WRF Pond (MS-08) and the CF Pond (MS-06) are subject to Metal and Diamond Mining Effluent Regulations (MDMER; Appendix B).

The WRF at the Mine Site is located approximately one kilometre east of the Deposit 1 mine (Appendix A), and is the storage location for the mine area's waste rock and overburden. Seepage and runoff from the WRF is intercepted by the drainage diversion ditches and directed downstream into the WRF Pond. Water from the WRF Pond is pumped into the Water Treatment Plant (WTP) for pH adjustment, and subsequently discharged into a Geotube adjacent to the WTP for solids removal via filtering and settling (as per the Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048). The MDMER regulated Final Discharge Point (FDP) for MS-08 is a sampling port located after the discharge pump (Appendix A). Following the FDP, effluent passes through approximately 475 metres (m) of layflat hose and is discharged to the tundra of the approved receiving environment, the Mary River watershed.

The WTP consists of physical-chemical treatment for pH adjustment, chemical precipitation and removal of solids by physical barrier. The water treatment processes include coagulation, pH adjustment and precipitation, flocculation and filtration. Water from the WRF pond is pumped to the first reactor tank

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and mixed by an aeration system. Lime and coagulant (ferric sulfate) solutions are added and pH adjusted to a desired value to assist the precipitation of heavy metals. The intent of coagulation is to neutralize the electric charge on colloidal particles, and assist with precipitation of heavy metals. The coagulated water then enters a second reactor tank to provide additional mixing and retention time for reactions to occur. The pH adjusted water then flows to the third reactor in which polymer is added for flocculation. Flocculation creates flocs to assist with the separation of solids and liquids in subsequent stages. The overflow from the third reactor tank is pumped to the geotube to facilitate the removal of solids via a membrane. The filtered final effluent from the geotubes is then collected in the sump and discharged via layflat hose to the receiving environment if internal effluent water quality is in compliance with the applicable discharge criteria. Effluent that does not comply with the applicable discharge criteria is recirculated to the WRF pond for further treatment.

The treatment system has a 280 m³/hr treatment capacity consisting of two 140 m³/hr treatment trains. For each train, the water flow rate and pH in Reactor tanks 1 and 2 is continuously monitored. Ferric sulfate and polymer is added based on flow rate, while the lime dosage is based on pH in the reactor tank 1. The chemical dose rate is adjusted by the plant operator in the PLC to meet the targets. Monitoring of the treated effluent at various stages of the treatment system is conducted to monitor the treatment system's performance. Effluent discharge volumes are monitored and recorded during periods of discharge through the use of a Krohne Enviromag 6" Magnetic Flow Meter. The frequency and volume of effluent discharges from the WTP is dictated by the pond's capacity, weather, air logistics, sample holding times and treatment requirements. As such, effluent is discharged intermittently on an as-needed basis from approximately late-June to early September. Consequently, the implementation of MDMER effluent and water quality monitoring is restricted to periods of effluent discharge rather than throughout the year due to Project constraints.

The CF is located approximately four kilometres from the WRF (Appendix A). The CF at the Mine Site consists of a pad that houses three (3) crusher spreads as well as associated run-of-mine, lump and fines ore stockpiles. The CF Pond, which collects storm water runoff diverted with drainage diversion ditches around the CF, is located east of the CF. Water from the CF Pond is treated for solids removal via pond-based settling. The MDMER regulated FDP is a sampling port located after the discharge pump to the North of the CF Pond, and before the connection to the sewage effluent pipeline (Appendix A). Following the FDP, effluent from the pond is pumped to the approved Mary River outfall discharge location located approximately 1.3 km southeast of the pond using the Mine Site's treated sewage effluent pipeline, originating at the Mine Site sewage treatment plant. The frequency and volume of effluent discharges from the CF pond is also dictated by the pond's capacity, weather, air logistics, sample holding times and settling requirements. As such, effluent is discharged intermittently on an as-needed basis from approximately late-June to early September. Consequently, the implementation of MDMER effluent and

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water quality monitoring is restricted to periods of effluent discharge rather than throughout the year due to Project constraints.

This MDMER Emergency Response Plan provides a guide for preventing and controlling the release of water outside of the normal course of events for the WRF Pond and CF Pond operations. This Plan has been prepared in accordance with MDMER (Fisheries Act. 2002-2018), and is to be used in conjunction with Baffinland's Emergency Response Plan (BAF-PH1-830-P16-0007) and the Spill Contingency Plan (BAF-PH1-830-P16-0036). Copies of these Plans can be obtained from:

Baffinland Iron Mines Corporation

2275 Upper Middle Road East, Suite 300

Oakville, ON L6H 0C3

Tel: (416) 364-8820

Fax: (416) 364-0193

TABLE 2-1 EXTERNAL CONTACT LIST FOR NOTIFICATION OF A RELEASE

Department of Environment - Environmental Protection Division PO Box 1000 Station 200 Iqaluit, Nunavut X0A 0H0 Tel : (877) 212-6638, (867) 975-6000 Fax : (867) 975-6099	Environment Climate Change Canada Enforcement Officer 933 Mivvik Street, Suite 301-Qiliaut Building P.O. Box 1870 Iqaluit, Nunavut X0A 0H0 Tel:(867)-975-4644 Cell: (867)-222-1925 Fax: (867)-975-4594
Qikiqtani Inuit Association Igluvut Building, 2 nd Floor PO Box 1340 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-8400, 1-800-667-2742 Fax : (867) 979-3238	Indigenous and Northern Affairs Canada Field Operations Division PO Box 2200 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-4295 (Field Operations Manager) Cell: (867) 222-8458 Fax : (867) 975-6445
Crown-Indigenous Relations and Northern Affairs Canada – Water Resources Division Building 918, PO BOX 100 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-4517 (Water Resources Manager) Fax (867) 975-4560	Mittimatalik Hunters and Trappers Organization PO Box 189 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8856 Fax : (867) 899-8095
Nunavut Impact Review Board 29 Mitik Street PO Box 1360 Cambridge Bay, Nunavut X0B 0C0 Tel : 1-866-233-3033 Fax : (867) 983-2594, (867) 983-2574	Nunavut Water Board PO Box 119 Gjoa Haven, Nunavut X0B 1J) Tel : (867) 360-6338 Fax : (867) 360-6369

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Hamlet of Pond Inlet PO Box 180 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8934, (867) 899-8935 Fax : (867) 899-8940	Department of Fisheries and Oceans Central and Arctic Region 520 Exmouth Street Sarnia, Ontario N7T 8B1 Tel : (519) 383-1813, 1-866-290-3731 Fax : (519) 464-5128
---	--

Baffinland requires all site personnel to be trained on the specific spill response initiation and reporting procedures. Reference Table B: Internal Distribution List for the Emergency Response Plan in the ERP (BAF-PH1-840-P16-0002) for key internal contact information if a spill is discovered. All site personnel must comply with the following procedure upon initiation of a spill response involving a regulated substance:

1. Immediately warn other personnel working near the spill area.
2. Evacuate the area if the health and safety of personnel is threatened.
3. In the absence of danger, and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain, and identify the nature of the spill.
4. Notify the Environment and Health and Safety department and the department who owns the facility, who will initiate further spill response operations.

Upon initiation of spill response, as directed by the Head of Health, Safety and Environment or designate, the following procedure shall be completed by the spill response team:

Source Control – If safe to do so, reduce or stop the flow of product. This may be accomplished with simple actions such as: turning off a pump; closing a valve; sealing a punctured liner with readily available materials; raising a leaking or discharging hose to stop flow; or transferring product from a leaking container (if required activate Baffinland’s Emergency Response Plan BAF-PH1-840-P16-0002).

Contain and Control the Free Product – If safe to do so, prevent or minimize the spread of the spilled product. Accumulate/concentrate spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop flow of liquid. Barriers can consist of absorbent booms and pads, dykes, berms, fences, and/or trenches (dug in the ground, snow or ice).

Protection – Evaluate the risk of the impacted area to the surrounding environment. Protect sensitive ecosystems (i.e. fish-bearing streams) and/or natural resources that are at risk by isolating the area and/or diverting the spilled material to a less sensitive area. Protection/isolation may be achieved through the use of the above mentioned barriers.

Spill Clean-up – Recover and dispose of as much product as possible.

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Report the Spill – Record information about the spill such as: date and time of occurrence; location and approximate size; type and amount of discharge product; photographic records; actions already taken to stop and contain the spill; ambient conditions; and any perceived threat to humans or the environment. Reports shall be completed as per Baffinland’s Incident Investigation Form (BAF-PH1-810-FOR-0005).

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2.1 CROSS-REFERENCE OF MDMER REGULATIONS, 30 (1) TO 30(2), TO THIS MDMER EMERGENCY RESPONSE PLAN

MDMER Reference	Description	Emergency Response Plan Reference
30(1)	The owner or operator of a mine shall prepare an emergency response plan that describes the measures to be taken in respect of a deleterious substance within the meaning of subsection 34(1) of the Act to prevent any deposit out of the normal course of events of such a substance or to mitigate the effects of such a deposit.	Entirety of Document
30 (2)(a)	The identification of any deposit out of the normal course of events that can reasonably be expected to occur at the mine and that can reasonably be expected to result in damage or danger to fish habitat or fish or the use by man of fish, and the identification of the damage or danger;	Pages 12 to 16
30 (2)(b)	a description of the measures to be used to prevent, prepare for and respond to a deposit identified under paragraph (a);	Pages 12 to 17
30 (2)(c)	a list of the individuals who are to implement the plan in the event of a deposit out of the normal course of events, and a description of their roles and responsibilities;	Pages 9 to 10
30 (2)(d)	the identification of the emergency response training required for each of the individuals listed under paragraph (c);	Pages 17 to 20
30 (2)(e)	a list of the emergency response equipment included as part of the plan, and the equipment's location; and	Appendix D
30 (2)(f)	alerting and notification procedures including the measures to be taken to notify members of the public who may be adversely affected by a deposit identified under Section 30 paragraph 2(a).	Table 2-1

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3 RESPONSIBILITIES

In the event of an emergency associated with the WRF Pond or CF Pond it will be necessary for multiple departments to work in conjunction with each other. The following outlines the specific responsibilities of those departments.

3.1 GENERAL MANAGER

The General Manager (GM) is responsible for ensuring that each departmental Manager/Superintendent understands the contents of the plan and follows its requirements. The GM is responsible for ensuring that departments contact the appropriate external authorities as per this Plan and the Baffinland Emergency Response Plan (BAF-PH1-840-P16-0002).

3.2 MINE OPERATIONS

3.2.1 MINE OPERATIONS MANAGER

The Mine Operations Manager or designate is responsible for implementing the Plan within their department and area of operation. They must ensure that their personnel understand the contents of this Plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and to apply corrective actions in the event of identified non-compliances, non-conformances, and/or issues of concern.

3.2.1.1 MINE OPERATIONS SUPERVISOR

The Mine Operations Supervisor is responsible for the following:

- The health and safety of all persons while managing and directing activities associated with the working around the WRF Pond.
- Ensuring all workers and operators are trained and understand this Plan.
- Assist in approved discharging activities.
- Inspections of the WRF and WRF Pond for movement, settlement, or liner damage.
- Inspection of the drainage ditches.

3.2.1.2 MINE OPERATIONS OPERATORS

The Mine Operations Operators have the following responsibilities:

- Report all spills and/ or non-compliances to their supervisor.
- Follow procedures outlined in Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048.
- Understand and follow detailed instructions when assisting with discharging and working around the WRF Pond.
- Ensuring the WRF Pond access road is kept clear of snow during winter months.

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3.2.1.3 WRF WTP OPERATORS

The WRF WTP Operators have the following responsibilities:

- Report all spills and/ or non-compliances to their supervisor.
- Follow procedures outlined in Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048.
- Understand and follow detailed instructions when assisting with discharging and working around the WRF Pond.
- Ensure the internal plant process parameters and field effluent parameters are recorded in the log book daily

3.3 CRUSHER OPERATIONS

3.3.1 CRUSHER OPERATIONS MANAGER

The Crusher Operations Manager or designate is responsible for implementing the Plan within their department and area of operation. They must ensure that their personnel understand the contents of the plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and to apply corrective actions in the event of identified non-compliances, non-conformances, and/or issues of concern.

3.3.1.1 CRUSHER OPERATIONS SUPERVISOR

The Crusher Operations Supervisor is responsible for the following:

- The health and safety of all persons while managing and directing activities associated with the working around the CF Pond.
- Ensuring all workers and operators are trained and understand this plan.
- Assist in approved discharging activities.
- Inspections of the CF area and CF Pond for movement, settlement, or liner damage.

3.3.1.2 CRUSHER OPERATIONS OPERATORS

The Crusher Operations Operators have the following responsibilities:

- Report all spills to their supervisor.
- Understand and follow detailed instructions when assisting with discharging and working around the CF Pond.
- Ensuring the CF Pond access road is kept clear of snow during winter months.

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3.4 ENVIRONMENT

3.4.1 ENVIRONMENTAL SUPERINTENDENT

The Environmental Superintendent or designate is responsible for implementing the Plan within their department. They must ensure that their personnel understand the contents of the plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and advise on how best to evaluate, contain and remediate and/or recover a spill if one should occur associated with the CF Pond and WRF Pond. The Environmental Superintendent is also responsible for all required reporting to regulators regarding WRF Pond and CF Pond water quality, discharging, and spills (Section 6.2) (MDMER, 2018).

3.4.2 ENVIRONMENTAL COORDINATORS AND TECHNICIANS

The Environmental Coordinators and Technicians have the following responsibilities:

- Reviewing and understanding all the applicable plans and procedures.
- Contacting their immediate supervisor if uncertain about any of the tasks.
- Inspections of the CF Pond, WRF Pond, and surrounding tundra for:
 - Signs of instability (i.e. collapsing berm, settlement, erosion, cracks, seepage, movement, settlement)
 - Damage to the liner (i.e. tears)
 - Ditches unobstructed and functioning as per design
- Monitoring and sampling of the Final Discharge Point (FDP) during discharge of the CF Pond and WRF Pond as per BIM Environment's Water Sampling and Flow Measurement SOP and Working Near Water Containment Facilities SOP.
- Respond to spills that are associated with the CF Pond and WRF Pond in conjunction with the Emergency Response Team and the Department responsible for the facility.

4 DEFINITIONS

4.1 SPILL

A spill in this ERP is defined as the uncontrolled release of a deleterious substance from its containment into a receiving environment. A deleterious substance is defined as any acutely lethal effluent or any substance that does not meet the criteria in Table 6-2. Under MDMER (2018), Schedule 4 outlines the discharge limits for substances that must be prevented from depositing into the receiving environment. Such releases are potentially hazardous to humans, vegetation, water resources, and aquatic and terrestrial wildlife, both directly and through food web interaction. The severity of impact varies depending on several factors, including: the type and quantity of spilled material; the location of the spill; and the time of year. MDMER discharge limits are used as the standards for risk analysis of CF Pond and

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WRF Pond releases to the environment. As a result, additional levels of spill response have been developed for spills that exceed these MDMER limits. Additional products with the potential for release include hydrocarbon fuels, anti-freeze, or lubricants from machinery.

4.2 SPILL PREVENTION

Spill prevention is an effective means of maintaining the safety of site personnel and the environment. Spills are less likely to occur when adhering to the criteria listed below. Inspections of the CF Pond and WRF Pond are conducted by the Mine Operations, Crusher Operations, and the Environmental Department when it is safe to do so. The conditions of the surrounding environment and current understood risk will determine the frequency of inspections, such as: freshet melt; heavy rain events; increasing reservoir levels (with limited freeboard space); and/or changing water quality conditions

4.3 FINAL DISCHARGE POINT

The Final Discharge Point (FDP) is the “identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent” (MDMER, 2018). Baffinland has two designated FDPs, one at the WRF Pond and one at the CF Pond where Baffinland has identified that they no longer exercise control over the effluent of the respective pond.

4.4 ACUTE LETHALITY

Baffinland’s effluent is determined to be acutely lethal if “the effluent at 100% concentration kills more than 50% of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1” (MDMER, 2018). This acute lethality test is conducted with effluent from the WRF Pond and CF Pond on a monthly basis.

4.5 DELETERIOUS SUBSTANCES

Deleterious substances under the MDMER consist of the following:

- Arsenic;
- Copper;
- Cyanide;
- Lead;
- Nickel;
- Zinc;
- Suspended solids; and
- Radium 226.

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5 LEVELS OF EMERGENCY SPILL RESPONSE

To effectively manage emergency responses, Baffinland has adopted a tiered emergency classification scheme (Figure 5-1). Each level of emergency, based on its severity, require varying degrees of response, effort, and support. Each level has distinct effects on normal business operations, as well as requirements for investigation and reporting. The ERP details each level of emergency; levels of classification specific to spill response are as follows:

Level 1 (Low) – Minor accidental release of a deleterious substance with:

- No threat to public safety; and/or
- Negligible environmental impact to receiving environment.

Level 2 (Medium) – Major accidental release of a deleterious substance with:

- Some threat to public safety; and/or
- Potential Moderate environmental impact to receiving environment

Level 3 (High) – Uncontrolled hazard which:

- Jeopardizes project personnel safety: and/or
- Potential significant environmental impacts to receiving environment

SPILL RESPONSE LEVELS				
	Level 1 (Low)	Level 2 (Medium)	Level 3 (High)	
Explosives	<100 kg	100 – 1,000 kg	>1,000 kg	in water
	<500 kg	500 – 5,000 kg	>5,000 kg	on land
Sewage	<1,000 L	1,000 – 10,000 L	>10,000 L	in water
	<10,000 L	10,000 – 100,000 L	>100,000 L	on land
Hazardous Materials*	<10 L	10 – 1,000 L	>1,000 L	in water
	<500 L	500 – 5,000 L	>5,000 L	on land
	<1,000 L	1,000 – 100,000 L	>100,000 L	in containment

*Include Fuels (Diesel/JetA), Lubricants, Antifreeze, Hydraulic Oil, Waste Oil, Antifreeze, etc.

FIGURE 5-1 EMERGENCY SPILL RESPONSE LEVELS

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6 PROTOCOL

6.1 EMERGENCY SPILL RESPONSE PROCEDURES

6.1.1 WATERFOWL LANDING IN PONDS

Migratory birds use the Mary River project area during open-water season in their migration routes. The presence of open water in the WRF and CF Pond mimics the natural habitat of some of these birds. This creates the risk of migratory birds landing in the WRF or CF Pond. During occasions when the WRF Pond and CF Pond contain non-compliant water (i.e. low pH), that water poses a hazard to migratory birds if they were to land in the ponds. Harming migratory birds is prohibited under the Migratory Birds Convention Act (1994).

Prevention techniques must be employed to prevent birds from landing in the ponds. These deterrent techniques may include human/ predatory bird effigies or acoustic devices. If birds do land in the ponds, all reasonable efforts must be focused on deterring and removing birds from area. If birds are impacted by any hydrocarbons, dish detergent will be used to clean the birds. In addition, a Wildlife biologist will be consulted further in an event of contamination of birds.

6.1.2 SPILLS ON LAND

The main control techniques for spills on land are the use of barriers such as dykes, trenches, booms and fences. Such barriers slow the progression of the spill and also serve as containment to facilitate spill recovery. They should be placed down gradient from the source of the spill, and as close as possible to the source. Depending on the volume spilled, the site of the spill, as well as available material, a dyke may be built with soil, booms, lumber, snow, etc. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V shaped or U-shaped). Trenches are useful in the presence of permeable soil and when the spilled product is potentially migrating below the ground surface to facilitate spill recovery and/ or containment.

6.1.3 BERM INTEGRITY FAILURE

Runoff collected in the CF Pond and WRF Pond can be released into the receiving environment if the integrity of the pond's berm structure(s) is compromised. Factors that can compromise berm integrity include: construction activities; rainfall; berm design; frost heaving; and poor management. If signs of berm failure are noticed during an inspection, Operations, Environment and Health and Safety must be contacted immediately.

In the event of failure of a CF/ WRF Pond berm, a Code 1 should be called immediately, dependent upon the extent. The Emergency Response Team will deploy the emergency spill truck and personnel to help set up pumps, manage water, and help stop/prevent further uncontrolled release of water into the receiving environment. Operations will provide personnel and equipment necessary to seal or hold the

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breach. Departmental Managers and Superintendents of Operations and Environment will provide direction following such an occurrence.

6.1.4 DRAINAGE DITCH INTEGRITY FAILURE

In the event of high flows during freshet and heavy rainfalls, the capacity of the drainage diversion ditches that collect runoff from the WRF and CF may be compromised. There is the potential for the water levels in the diversion ditches to rise over the ditch berm height, resulting in an uncontrolled overflow into the receiving environment. A potential result of high water levels in a ditch, even if the ditch berm walls aren't breached, is the seepage of the ditch water through the permeable berms into the surrounding environment (further discussed in Section 6.1.5).

In such an event, immediate corrective actions must aim to ensure all water in the ditches reports to the pond. Controlled pumping from the ditches into the pond may alleviate the volume of water required to be contained by the ditches, and emergency dykes/ berms can be constructed to increase the capacity of the ditch berm. Any water that overflows and does not report to the pond must be sampled with a full suite of water samples.

Preventative efforts must include daily inspections of the drainage diversion ditches at both the WRF and CF. These inspections must include any culvert crossings to ensure water can flow unimpeded through them. Personnel must notify their supervisors of impending overflow situations to enable an effective emergency response.

6.1.5 EMERGENCY SPILLWAY

In the event that runoff inflows to the CF Pond and WRF Pond exceed the rate that can be intentionally discharged, for a prolonged period of time, pond water levels may reach an elevation that results in water being released to the receiving environment via the pond's engineered emergency spillway. In such an event, the first mitigation measure that will be implemented to prevent such occurrence will involve performing an emergency controlled discharge. The plan to conduct an emergency controlled discharge will be formulated by the Operations and Environmental Managers/Superintendents. If the controlled emergency discharge does not lower the level of water contained in the pond(s), the emergency spillway will be used, as designed, to release volumes of water that exceeds the capacity of the pond and prevent the failure of the pond's berm structures. In such an occurrence, close monitoring of the pond and spillway is required to assess any erosional degradation of the pond, spillway and surrounding tundra. Monitoring to be conducted in the event that the emergency spillway is used will include inspecting pond infrastructure and adjacent tundra area for cracks, slumping, movement and/or sinkholes. As the level of control is significantly less utilising the emergency spillway, a controlled emergency discharge is the first and preferred measure to be undertaken. If signs of instability or erosional degradation are noticed during a spillway discharge, the Mine Operations, Crushing and Environmental Superintendents should be notified immediately.

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In the event of a controlled emergency or spillway discharge, a full suite sample set (BIM-MMER-WT) group and acute toxicity sample (Group 3) will be collected to determine the quality of the water being discharged to the receiving environment. Volumes of water released during such an event will be measured using a flowmeter or suitable estimation method (i.e. flowrate extrapolation) and recorded.

6.1.6 SEEPAGE

The potential exists that excessive precipitation and runoff at the WRF or CF could saturate the underlying substrate and result in the release of seepage outside of the containment areas via active-layer groundwater flow that does not report to the ponds. This groundwater flow could not be captured by the keyed in pond liner and therefore flow through the substrate to the surrounding environment. Another potential effect of excessive precipitation and runoff is high water levels in the drainage diversion ditches, allowing water to seep through permeable berm walls into the surrounding environment.

Close monitoring of the areas surrounding the WRF and CF will be conducted during the open water season. Inspections will look to identify newly formed wet areas, flowing water, and/or areas of pooling. If suspected seepage is observed, the Operations and Environmental Superintendents will be notified immediately. If seepage is confirmed, all reasonable and safe emergency containment methods must be implemented to capture the seepage and/or minimize the extent of seepage migration. For example, an emergency containment ditch and sumps may be utilized to capture observed seepage. This seepage must be pumped back into the pond, and any seepage that can't be contained will be sampled with a full suite sample set to determine potential impacts on the receiving environment.

6.1.7 SPILLS INTO CONTAINMENT FACILITY

If hazardous products (i.e. hydrocarbons, etc.) are released into the CF Pond and WRF Pond, spill response should be initiated as outlined in Section 2 of this Plan. To determine the best method for spill clean-up/recovery, the Environmental Superintendent or their designate should be consulted. Responses to a spill in a pond can include various containment and recovery techniques, including skimming and booming, in concert with water treatment. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be utilized, as required.

6.1.8 SPILLS AT THE WRF WATER TREATMENT PLANT

The water from the WRF Pond is treated in the WTP in a three step process involving the injection of chemical into temporary storage tanks, and a final step of filtration in the Geotube. Further protocols on plant operation and management can be found in Appendix F Waste Rock Pile Water Treatment Plant Operations (BAF-PH1-340-PRO-048). The water is first treated in the temporary storage tanks using iron precipitation, hydroxide precipitation and flocculation, with pH readings monitored to indicate when the pH has reached desired values. With a desired pH value, the water is discharged from the WTP into the Geotube for further treatment of suspended solids. The water from the Geotube sump can be discharged

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either back into the WRF Pond if deemed non-compliant after settling, or out into the receiving environment if compliant (refer to section 6.3.1 and 6.3.2 for guidance on this decision).

Chemicals used during the treatment of the WRF Pond water include ferric sulphate, lime and polymer. Additionally, there is fuel and other hydrocarbon products present at the plant for heating and power purposes. These hazardous products would necessitate spill response if released into the environment. Figure 5-1 should be consulted to determine the level of Emergency Spill Response.

6.2 REPORTING REQUIREMENTS IN THE EVENT OF A SPILL

In the event of a spill of deleterious substances from one of WRF or CF ponds, the spill report submitted by the Environmental Superintendent to applicable regulators (Table 6-1) must contain the following information:

- “The name, description and concentration of the deleterious substance deposited;
- The estimated quantity of the spill and how this estimate was achieved;
- The day on which, and hour at which, the deposit occurred;
- The quantity of the deleterious substance that was deposited at a place other than through a final discharge point and the identification of that place, including the location by latitude and longitude and, if applicable, the civic address;
- The quantity of the deleterious substance that was deposited through a final discharge point and the identification of that discharge point;
- The name of the receiving body of water, if there is a name, and the location by latitude and longitude where the deleterious substance entered the receiving body of water;
- The results of the acute lethality tests conducted under subsection 31.1(1) or a statement indicating that acute lethality tests were not conducted but that notification was given under subsection 31.1(2);
- The circumstances of the deposit, the measures that were taken to mitigate the effects of the deposit and, if the emergency response plan was implemented, details concerning its implementation; and
- The measures that were taken, or that are intended to be taken, to prevent any similar occurrence of an unauthorized deposit.” (MDMER, 2018)

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TABLE 6-1 CONTACT LIST FOR MDMER NOTIFICATION OF A RELEASE

Name	Location	Phone Number	Purpose
Environmental Superintendent and Head of Health, Safety, Environment & Security	Mary River Mine site	416-364-8820 x6016	All spills, leaks and releases of hazardous materials will be reported to the Environment Department immediately and documented by submitting the necessary documentation within 4 hours of the spill.
Environment and Climate Change Canada	933 Mivvik Street, Suite 301-Qiliaut Building P.O. Box 1870 Iqaluit, Nunavut X0A 0H0	Tel: (867)-975-4644 Cell: (867)-222-1925 Fax: (867)-975-4594	Any release of a deleterious substance or acute toxicity failure will trigger notification.
Crown Indigenous Relations and Northern Affairs Canada	Water Resources Officer, P.O. Box 100, Iqaluit, NU X0A 0H0	1-867-975-4550	Spills greater than 100 liters require notification to the regulators within 24 hours of the spill.
NT-NU 24-hr Spill Report Line	Iqaluit, NU	1-867-920-8130	Spills greater than 100 liters or deposit of a deleterious substance as outlined in MDMER Section 34 require notification to the spill line and documentation submitted within 24 hours of the spill.

6.3 ENSURING NO ACCIDENTAL DISCHARGE OF NON-COMPLIANT WATER

6.3.1 PROCEDURE FOR DISCHARGING CONTAINMENT PONDS

All personnel must adhere to the following procedure when planning to discharge a containment pond. If personnel are unsure of a task at any time, the work must cease, and the worker must contact their supervisor.

1. Prior to sampling, the YSI calibration must be checked and the results of this check recorded in the log book.
2. Obtain full-suite pre-discharge samples from pond if discharge is not immediately required to avoid overflow.
3. If pre-discharge sample results are compliant, notify applicable regulators of planned discharge. The sampling date for the monthly acute toxicity sample must be selected and recorded not less than 30 days in advance of collecting the acute toxicity sample.
4. Obtain approval from the Environmental Superintendent or Manager to begin discharging.
5. Prior to pumping, record totalizer values on the flow meter, as well as the time of pump start-up, in the appropriate log book. This is the standard requirement before any pumping occurs.

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Note: Baffinland is required to report the total volume of effluent discharged daily and monthly from containment ponds as per the Water License and MDMER.

6. Effluent sampling frequency must adhere to MDMER and Water License Criteria utilizing accredited laboratory analysis, with accompanying field parameters, while discharging.
 - a. All discharge samples must be taken from the particular pond's FDP.
 - b. YSI readings must accompany all samples, and the BIM assigned YSI equipment number recorded in the field log.
 - c. All Acute Toxicity samples must be collected with a BIM-MMER-WT sample set.
7. The containment pond must be inspected daily while discharging.
8. Ensure the appropriate field log is completed daily while discharging. There is one designated field book for each pond, and all notes must be recorded in this.
9. After sample collection, the following actions must be completed as soon as possible:
 - a. Photographs of discharge activities and scans of field notes must be documented and the discharge log updated.
 - b. Samples are to be stored in the lab refrigerator, or in a cooler with ice.

6.3.2 ENSURING NO DISCHARGE OF NON-COMPLIANT WATER

Water discharged to the receiving environment from containment ponds must adhere to MDMER and Baffinland's Water License discharge limits (Table 6-2). Historically, the WRF Pond has contained low pH (acidic) water as result of impacted runoff from the Waste Rock Stockpile. In cases where water contained in the WRF Pond or CF Pond is determined to be non-compliant with applicable discharge limits, water contained in the pond(s) must be treated as per Baffinland's Waste Rock Management Plan (BAF-PH1-830-P16-0029) and Waste Pond Water Treatment Plant Operations (BAF-PH1-340-PRO-048) to ensure compliance with the applicable discharge limits.

It is the responsibility of both the supervisor and the worker to discontinue discharging the ponds, and to notify their supervisor immediately, for any of the following reasons. A re-evaluation of the water quality is required prior to further discharge.

Reasons to discontinue discharging:

1. If external lab results for MS-06 (CF Pond) or MS-08 (WRF Pond) effluent are received that exceed the maximum concentrations listed in the 'BIM Internal Limits' column in Table 6-2. These limits are a threshold of conservatism to ensure regulated discharge limits are not exceeded (Table 6-2).

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TABLE 6-2 BIM STANDARDS FOR EFFLUENT QUALITY DISCHARGE LIMITS FOR MS-06 AND MS-08

Parameter	Maximum Authorized Monthly Mean Concentration, as per MDMER	Maximum Concentration In A Grab Sample, as per BIM Internal Limits
Total Arsenic	0.50 mg/L	0.40 mg/L
Total Copper	0.30 mg/L	0.24 mg/L
Total Lead	0.20 mg/L	0.16 mg/L
Total Nickel	0.50 mg/L	0.40 mg/L
Total Zinc	0.50 mg/L	0.40 mg/L
TSS	15.0 mg/L	15.0 mg/L
Cyanide	1.00 mg/L	
Radium 226	0.37 Bq/L	
pH	Between 6.0 and 9.5	Between 6.5 and 9.0
Toxicity	Not acutely toxic (<50% mortality)	

- If field pH measurements (i.e. YSI) fall outside the range/limits outlined in the 'BIM Internal Limits' column of Tables 6-2. These field readings are real-time measurements that characterize the water quality of effluent being discharged at that instance. As such, if measured field parameters fall outside of the 'BIM Internal Limits' outlined in Table 6-2, the discharge of effluent to the receiving environment must cease and the worker's supervisor notified.
- Pumping must stop for at least 12 hours following heavy precipitation or wind events to allow for the pond water to stabilize, any suspended sediments to settle and be re-sampled, unless advised otherwise by the Environmental Superintendent.

If non-compliant water is accidentally discharged to the receiving environment, Operations and Environment Departments will work collaboratively to mitigate, evaluate and document possible effects. In the case of the accidental release of non-compliant water, pumping of effluent to the receiving environment must cease immediately and the Head of Health, Safety, Environment and Security, Mine Manager and the Environmental Superintendent must be notified immediately. In the event of a release of non-compliant water to the receiving environment, all notes, photographs, pumping/discharge times, and water quality data must be compiled for the investigation and the scene of the incident shut down until further instruction.

In the occurrence of an acute toxicity test determining the effluent to be acutely lethal, Baffinland will cease discharge immediately. The inspector will be notified of this non-compliance without delay. Water quality data collected when the acute toxicity sample was collected will be reviewed, and an additional BIM-MMER-WT sample set will be collected with the discharge pump set in recirculation mode. Additionally, reference and exposure area samples will be collected to monitor any impacts on the receiving environment. Reference area sample site for both ponds is MS-08-US, and the exposure area sample site is MS-08-DS for the WRF Pond, and MS-06-DS for the CF Pond. This is outlined in Section 15 of the MDMER. If discharge is not ceased increased frequency of acute lethality testing will occur as per

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Section 15 of the MDMER. In most cases the pond will be recirculated until water quality is confirmed to be compliant before discharge to the receiving environment occurs.

6.4 TRAINING FOR SPILL RESPONSE

Emergency spill responses often occur in conjunction with other emergency responses (i.e. an overturned fuel tanker on the Tote Road); to facilitate an efficient response to an emergency, personnel trained to respond to health and safety emergencies shall also be trained in spill response. Baffinland's ERT Coordinator, with support from the Environmental Superintendents, will identify training and resource requirements for personnel involved with emergency spill responses. Emergency spill response training required by this Plan shall be reviewed in conjunction with Baffinland's ERP. Emergency and spill response training shall be updated throughout the lifecycle of Project to ensure the following requirements are fulfilled:

- The requirements of NWT/Nunavut Mines Health and Safety Regulations are met or exceeded.
- Emergency responders can competently operate the equipment employed for spills and other emergencies.
- Emergency responders will undertake practices, drills, and full scale exercises, for responding to emergencies that are plausible on site.

6.4.1 DRILLS AND EXERCISES

While drills and exercises can be used for training purposes, their primary function for this Plan is to provide the means of testing the adequacy of the Plan's provisions and the level of readiness of response personnel. The Emergency Response Trainer and Environmental Superintendents are responsible for coordinating the development of and assisting in conducting drills and exercises annually. The following section outlines the types of drills and exercises that can be practiced:

6.4.1.1 TABLE TOP EXERCISES

Table top exercises involve presenting a simulated emergency situation to key emergency response personnel in informal settings to elicit constructive discussions as the participants examine and resolve problems based on this Plan. These exercises shall be performed during ERT training sessions conducted throughout the year.

6.4.1.2 FUNCTIONAL DRILLS

Functional drills are practical exercises designed to evaluate the capability of personnel to perform a specific function (i.e. communications, first aid, and spill response). Deficiencies and competencies identified during functional drills are documented as per Section 30(4) of MDMER, and used as effective development tools in the preparation of response procedures required for full-scale exercises.

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6.4.1.3 FULL-SCALE EXERCISES

Full scale exercises are intended to evaluate the operational capability of Baffinland's emergency response and preparedness. Full-scale exercises require sufficient notice to allow for the preparation of effective emergency response procedures and to identify and correct deficiencies in advance. Examples of mock full scale exercises at Baffinland include: non-compliant water discharge, berm breach, controlled discharge, seepage observed, and migratory waterfowl landing in ponds. Deficiencies and competencies identified during full scale exercises are documented as per Section 30(4) of MDMER, and used as effective development tools in the preparation of response procedures required for full-scale exercises.

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7 REFERENCES AND RECORDS

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Golder, (2018). Interim Waste Rock Management Plan.

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	METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN	Issue Date: Jan.15, 2018 Revision: 0 Revision date: Jan.15, 2018	
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APPENDICES

The information contained herein is proprietary to Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

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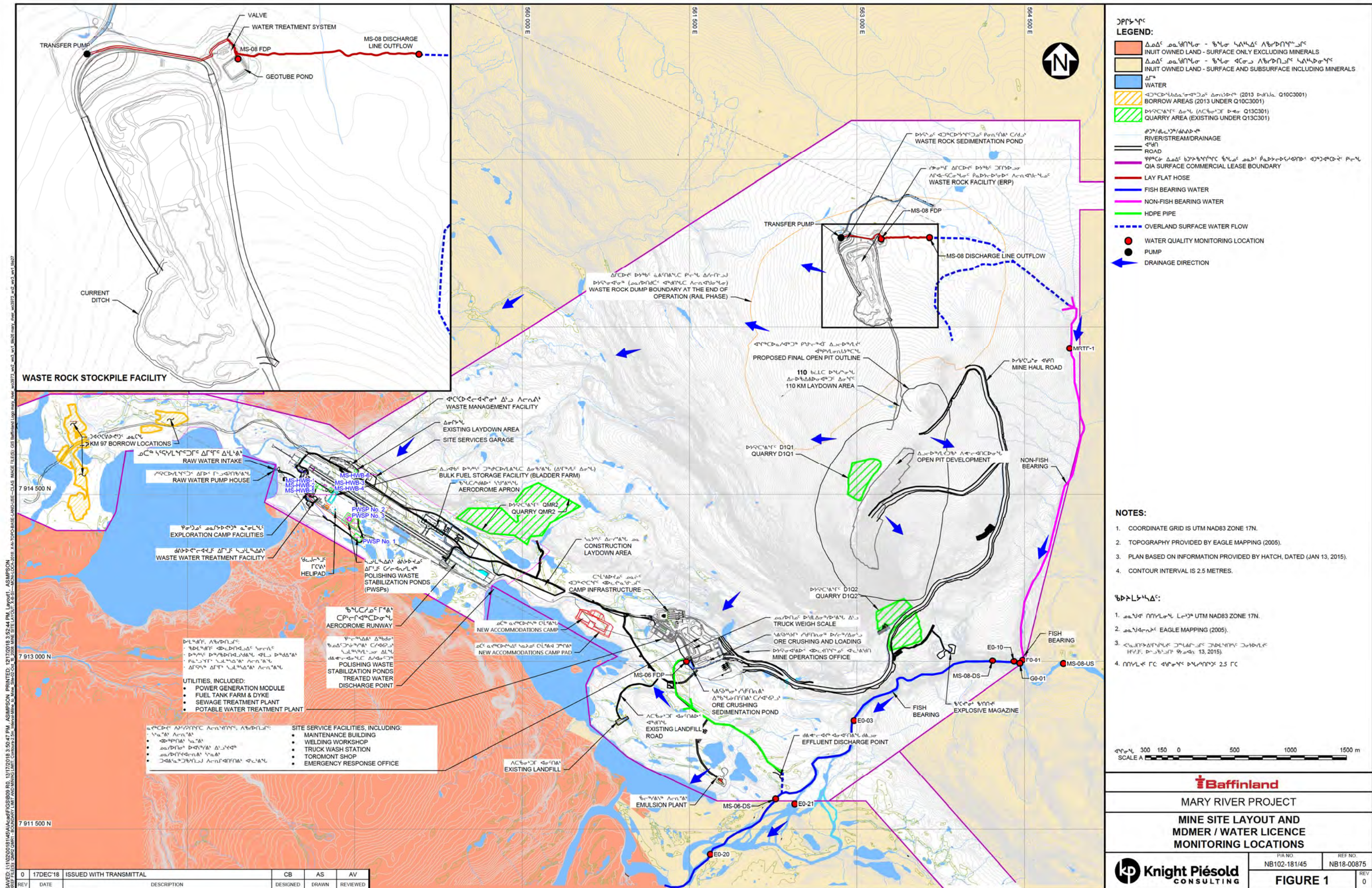
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APPENDIX A

SITE LAYOUT AND WATER LICENCE/ MDMER MONITORING LOCATIONS

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APPENDIX B

METAL AND DIAMOND MINING EFFLUENT REGULATIONS

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CANADA

CONSOLIDATION

CODIFICATION

Metal and Diamond Mining Effluent Regulations

Règlement sur les effluents des mines de métaux et des mines de diamants

SOR/2002-222

DORS/2002-222

Current to July 5, 2018

À jour au 5 juillet 2018

Last amended on June 1, 2018

Dernière modification le 1 juin 2018

OFFICIAL STATUS OF CONSOLIDATIONS

Subsections 31(1) and (3) of the *Legislation Revision and Consolidation Act*, in force on June 1, 2009, provide as follows:

Published consolidation is evidence

31 (1) Every copy of a consolidated statute or consolidated regulation published by the Minister under this Act in either print or electronic form is evidence of that statute or regulation and of its contents and every copy purporting to be published by the Minister is deemed to be so published, unless the contrary is shown.

...

Inconsistencies in regulations

(3) In the event of an inconsistency between a consolidated regulation published by the Minister under this Act and the original regulation or a subsequent amendment as registered by the Clerk of the Privy Council under the *Statutory Instruments Act*, the original regulation or amendment prevails to the extent of the inconsistency.

NOTE

This consolidation is current to July 5, 2018. The last amendments came into force on June 1, 2018. Any amendments that were not in force as of July 5, 2018 are set out at the end of this document under the heading “Amendments Not in Force”.

CARACTÈRE OFFICIEL DES CODIFICATIONS

Les paragraphes 31(1) et (3) de la *Loi sur la révision et la codification des textes législatifs*, en vigueur le 1^{er} juin 2009, prévoient ce qui suit :

Codifications comme élément de preuve

31 (1) Tout exemplaire d'une loi codifiée ou d'un règlement codifié, publié par le ministre en vertu de la présente loi sur support papier ou sur support électronique, fait foi de cette loi ou de ce règlement et de son contenu. Tout exemplaire donné comme publié par le ministre est réputé avoir été ainsi publié, sauf preuve contraire.

[...]

Incompatibilité — règlements

(3) Les dispositions du règlement d'origine avec ses modifications subséquentes enregistrées par le greffier du Conseil privé en vertu de la *Loi sur les textes réglementaires* l'emportent sur les dispositions incompatibles du règlement codifié publié par le ministre en vertu de la présente loi.

NOTE

Cette codification est à jour au 5 juillet 2018. Les dernières modifications sont entrées en vigueur le 1 juin 2018. Toutes modifications qui n'étaient pas en vigueur au 5 juillet 2018 sont énoncées à la fin de ce document sous le titre « Modifications non en vigueur ».

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SOR/2002-222 June 6, 2002

FISHERIES ACT

Metal and Diamond Mining Effluent Regulations

P.C. 2002-987 June 6, 2002

Her Excellency the Governor General in Council, on the recommendation of the Minister of Fisheries and Oceans, pursuant to subsections 34(2), 36(5) and 38(9) of the *Fisheries Act*, hereby makes the annexed *Metal Mining Effluent Regulations*.

Enregistrement
DORS/2002-222 Le 6 juin 2002

LOI SUR LES PÊCHES

Règlement sur les effluents des mines de métaux et des mines de diamants

C.P. 2002-987 Le 6 juin 2002

Sur recommandation du ministre des Pêches et des Océans et en vertu des paragraphes 34(2), 36(5) et 38(9) de la *Loi sur les pêches*, Son Excellence la Gouverneure générale en conseil prend le *Règlement sur les effluents des mines de métaux*, ci-après.

Metal and Diamond Mining Effluent Regulations

PART 1

General

Interpretation

1 (1) The following definitions apply in these Regulations.

Act means the *Fisheries Act*. (*Loi*)

acute lethality test [Repealed, SOR/2018-99, s. 2]

acutely lethal, in respect of an effluent, means that the effluent at 100% concentration kills

(a) more than 50% of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1; or

(b) more than 50% of the threespine stickleback subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.2. (*léthalité aiguë*)

acutely lethal effluent [Repealed, SOR/2018-99, s. 2]

authorization officer [Repealed, SOR/2018-99, s. 2]

commercial operation, in respect of a mine, means an average rate of production equal to or greater than 10% of the design-rated capacity of the mine over a period of 90 consecutive days. (*exploitation commerciale*)

composite sample means

(a) a quantity of effluent consisting of not less than three equal volumes or three volumes proportionate to flow that have been collected at approximately equal time intervals over a sampling period of not less than seven hours and not more than 24 hours; or

(b) a quantity of effluent collected continuously at a constant rate or at a rate proportionate to the rate of flow of the effluent over a sampling period of not less than seven hours and not more than 24 hours. (*échantillon composite*)

Règlement sur les effluents des mines de métaux et des mines de diamants

PARTIE I

Dispositions générales

Définitions et interprétation

1 (1) Les définitions qui suivent s'appliquent au présent règlement.

agent d'autorisation [Abrogée, DORS/2018-99, art. 2]

autorisation transitoire [Abrogée, DORS/2018-99, art. 2]

chantier [Abrogée, DORS/2018-99, art. 2]

concentration moyenne mensuelle La valeur moyenne des concentrations mesurées dans les échantillons composites ou instantanés prélevés de chaque point de rejet final chaque mois où il y a rejet de substances nocives. (*monthly mean concentration*)

dépôt de résidus miniers [Abrogée, DORS/2006-239, art. 1]

eau de drainage superficiel [Abrogée, DORS/2018-99, art. 2]

échantillon composite

a) Soit le volume d'effluent composé d'au moins trois parties égales ou de trois parties proportionnelles au débit, prélevées à intervalles sensiblement égaux, pendant une période d'échantillonnage d'au moins sept heures et d'au plus vingt-quatre heures;

b) soit le volume d'effluent prélevé de façon continue à un débit constant ou à un débit proportionnel à celui de l'effluent, pendant une période d'échantillonnage d'au moins sept heures et d'au plus vingt-quatre heures. (*composite sample*)

échantillon instantané [Abrogée, DORS/2018-99, art. 2]

effluent S'entend, selon le cas :

a) de l'effluent de bassins de traitement, de l'effluent d'eau de mine, de l'effluent des dépôts de résidus miniers, de l'effluent d'installations de préparation du

***Daphnia magna* monitoring test** [Repealed, SOR/2018-99, s. 2]

deleterious substance [Repealed, SOR/2018-99, s. 2]

diamond mine means any work or undertaking that is designed or is used, or has been used, in connection with a mining or milling activity to produce a diamond or an ore from which a diamond may be produced. It includes any cleared or disturbed area that is adjacent to such a work or undertaking. (*mine de diamants*)

effluent means any of the following:

(a) hydrometallurgical facility effluent, milling facility effluent, mine water effluent, tailings impoundment area effluent, treatment pond effluent or treatment facility effluent other than effluent from a sewage treatment facility; or

(b) any seepage or surface runoff containing any deleterious substance that flows over, through or out of the site of a mine. (*effluent*)

final discharge point, in respect of an effluent, means an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent. (*point de rejet final*)

grab sample [Repealed, SOR/2018-99, s. 2]

hydrometallurgical facility effluent means effluent from the acidic leaching, solution concentration and recovery of metals by means of aqueous chemical methods, tailings slurries, and all other effluents deposited from a hydrometallurgical facility. (*effluent d'installations d'hydrométallurgie*)

hydrometallurgy means the production of a metal by means of aqueous chemical methods for acidic leaching, solution concentration and recovery of metals from metal-bearing minerals other than metal-bearing minerals that have been thermally pre-treated or blended with metal-bearing minerals that have been thermally pre-treated. (*hydrométallurgie*)

metal mine means any work or undertaking that is designed or is used, or has been used, in connection with a mining, milling or hydrometallurgical activity to produce a metal or a metal concentrate or an ore from which a metal or a metal concentrate may be produced, as well as any cleared or disturbed area that is adjacent to such a work or undertaking. It includes any work or undertaking, such as a smelter, pelletizing plant, sintering plant, refinery or acid plant, if its effluent is combined with the effluent from a mining, milling or hydrometallurgical

mineral, de l'effluent d'installations d'hydrométallurgie ou de l'effluent d'installations de traitement à l'exclusion de l'effluent d'installations de traitement d'eaux résiduelles;

b) des eaux d'exfiltration et des eaux de ruissellement qui contiennent une substance nocive et qui coulent sur le site d'une mine ou en proviennent. (*effluent*)

effluent à létalité aiguë [Abrogée, DORS/2018-99, art. 2]

effluent d'eau de mine Dans le cadre d'activités minières, l'eau pompée d'ouvrages souterrains, de compartiments d'extraction par solution ou de mines à ciel ouvert ou l'eau s'écoulant de ceux-ci. (*mine water effluent*)

effluent d'installations de préparation du minerai Boues de stériles, effluent des lixiviats de terrils, effluent de l'extraction par solution et tout autre effluent rejeté à partir d'une installation de préparation du minerai. (*milling facility effluent*)

effluent d'installations de traitement Eau des bassins de polissage, des bassins de traitement, des bassins de décantation, des stations de traitement de l'eau et de toute installation de traitement des effluents miniers. (*treatment facility effluent*)

effluent d'installations d'hydrométallurgie Effluent rejeté à partir d'une installation d'hydrométallurgie, notamment effluent de lixiviation acide, de concentration de solution et de récupération de métal par procédés chimiques aqueux et boues de résidus miniers. (*hydrometallurgical facility effluent*)

essai de détermination de la létalité aiguë [Abrogée, DORS/2018-99, art. 2]

essai de suivi avec bioessais sur la Daphnia magna [Abrogée, DORS/2018-99, art. 2]

exploitant Personne qui exploite une mine, qui en a le contrôle ou la garde, ou qui en est responsable. (*operator*)

exploitation commerciale Le taux de production moyen d'une mine qui, au cours d'une période de quatre-vingt-dix jours consécutifs, est égal ou supérieur à 10 % de la capacité nominale de la mine. (*commercial operation*)

exploitation des placers Exploitation minière où le minerai ou les métaux sont extraits de sédiments de cours

activity whose purpose is to produce a metal or a metal concentrate or an ore from which a metal or a metal concentrate may be produced. (*mine de métaux*)

milling means any of the following activities for the purpose of producing a diamond, metal or metal concentrate:

- (a) the crushing or grinding of ore or kimberlite;
- (b) the processing of uranium ore or uranium enriched solution; or
- (c) the processing of tailings. (*préparation du minerai*)

milling facility effluent means tailing slurries, heap leaching effluent, solution mining effluent and all other effluent deposited from a milling facility. (*effluent d'installations de préparation du minerai*)

mine [Repealed, SOR/2018-99, s. 2]

mine under development [Repealed, SOR/2018-99, s. 2]

mine water effluent means, in respect of mining activities, water that is pumped from or flows out of any underground works, solution chambers or open pits. (*effluent d'eau de mine*)

monthly mean concentration means the average value of the concentrations measured in all composite or grab samples collected from each final discharge point during each month when a deleterious substance is deposited. (*concentration moyenne mensuelle*)

new mine [Repealed, SOR/2018-99, s. 2]

operations area [Repealed, SOR/2018-99, s. 2]

operator means any person who operates, has control or custody of or is in charge of a mine. (*exploitant*)

placer mining means a mining operation that extracts minerals or metals from stream sediments by gravity or magnetic separation. (*exploitation des placers*)

recognized closed mine [Repealed, SOR/2018-99, s. 2]

Reference Method EPS 1/RM/10 means *Biological Test Method: Reference Method for Determining Acute Lethality Using Threespine Stickleback*, published in December 2017 by the Department of the Environment, as amended from time to time. (*méthode de référence SPE 1/RM/10*)

d'eau par gravité ou par séparation magnétique. (*placer mining*)

hydrometallurgie La production d'un métal par des procédés chimiques aqueux de lixiviation acide, concentration de solution et récupération de métal à partir de minéraux métallifères n'ayant pas subi de prétraitement thermique ou n'ayant pas été mélangés à des minéraux métallifères qui ont subi un prétraitement thermique. (*hydrometallurgy*)

léthalité aiguë S'agissant d'un effluent à l'état non dilué, la capacité de provoquer, selon le cas, la mort de :

- a) plus de 50 % des truites arc-en-ciel qui y sont exposées pendant une période de quatre-vingt-seize heures au cours de l'essai de détermination de la léthalité aiguë visé à l'article 14.1;
- b) plus de 50 % des épinoches à trois épines qui y sont exposés pendant une période de quatre-vingt-seize heures au cours de l'essai de détermination de la léthalité aiguë visé à l'article 14.2. (*acutely lethal*)

Loi La Loi sur les pêches. (*Act*)

matières en suspension Toutes matières solides présentes dans un effluent et retenues sur un papier-filtre dont les pores mesurent 1,5 micron lorsque l'effluent est soumis à un essai conforme aux exigences analytiques prévues au tableau 1 de l'annexe 3. (*suspended solids*)

méthode de référence SPE 1/RM/10 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la léthalité aiguë à l'aide de l'épinoche à trois épines*, publiée en décembre 2017 par le ministère de l'Environnement, avec ses modifications successives. (*Reference Method EPS 1/RM/10*)

méthode de référence SPE 1/RM/13 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la léthalité aiguë d'effluents chez la truite arc-en-ciel* (Méthode de référence SPE 1/RM/13), publiée en juillet 1990 par le ministère de l'Environnement, dans sa version modifiée en décembre 2000 et avec ses modifications successives. (*Reference Method EPS 1/RM/13*)

méthode de référence SPE 1/RM/14 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la léthalité aiguë d'effluents chez Daphnia magna* (Méthode de référence SPE 1/RM/14), publiée en juillet 1990 par le ministère de l'Environnement, dans sa version modifiée en décembre 2000 et avec ses modifications successives. (*Reference Method EPS 1/RM/14*)

Reference Method EPS 1/RM/13 means *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout* (Reference Method EPS 1/RM/13), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time. (*méthode de référence SPE 1/RM/13*)

Reference Method EPS 1/RM/14 means *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna* (Reference Method EPS 1/RM/14), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time. (*méthode de référence SPE 1/RM/14*)

reopened mine [Repealed, SOR/2018-99, s. 2]

surface drainage [Repealed, SOR/2018-99, s. 2]

suspended solids means any solid matter contained in an effluent that is retained on a 1.5 micron pore filter paper when the effluent is tested in compliance with the analytical requirements set out in Table 1 of Schedule 3. (*matières en suspension*)

tailings impoundment area [Repealed, SOR/2006-239, s. 1]

total suspended solids [Repealed, SOR/2018-99, s. 2]

transitional authorization [Repealed, SOR/2018-99, s. 2]

treatment facility effluent means water from a polishing pond, treatment pond, settling pond or water treatment plant or from any mine effluent treatment facility. (*effluent d'installations de traitement*)

mine [Abrogée, DORS/2018-99, art. 2]

mine de diamants Ouvrage ou entreprise qui est conçu ou qui est ou a été utilisé dans le cadre d'activités d'extraction ou de préparation du minerai visant à produire un diamant ou un minerai à partir duquel un diamant peut être produit ainsi que toute zone déboisée ou perturbée qui y est adjacente. (*diamond mine*)

mine de métaux Ouvrage ou entreprise qui est conçu ou qui est ou a été utilisé dans le cadre d'activités d'extraction, d'hydrométallurgie ou de préparation du minerai visant à produire un métal, un concentré de métal ou un minerai à partir duquel un métal ou un concentré de métal peut être produit ainsi que toute zone déboisée ou perturbée qui y est adjacente. La présente définition comprend tout ouvrage ou entreprise, telles les fonderies, usines de bouletage, usines de frittage, affineries et usines d'acide, dont l'effluent est combiné aux effluents provenant d'activités d'extraction, d'hydrométallurgie ou de préparation du minerai visant à produire un métal, un concentré de métal ou un minerai à partir duquel un métal ou un concentré de métal peut être produit. (*metal mine*)

mine en développement [Abrogée, DORS/2018-99, art. 2]

mine fermée reconnue [Abrogée, DORS/2018-99, art. 2]

mine remise en exploitation [Abrogée, DORS/2018-99, art. 2]

nouvelle mine [Abrogée, DORS/2018-99, art. 2]

point de rejet final Le point de rejet de l'effluent d'une mine qui est repérable et au-delà duquel l'exploitant de la mine n'agit plus quant à la qualité de l'effluent. (*final discharge point*)

préparation du minerai S'entend des activités ci-après effectuées en vue de la production d'un diamant, d'un métal ou d'un concentré de métal :

- a) le concassage ou le broyage d'un minerai ou de kimberlite;
- b) le traitement du minerai d'uranium ou de solutions uranifères;
- c) le traitement de résidus miniers. (*milling*)

rejet Est assimilée au rejet l'immersion au sens du paragraphe 34(1) de la Loi. (*French version only*)

substance nocive [Abrogée, DORS/2018-99, art. 2]

(2) [Repealed, SOR/2018-99, s. 2]

SOR/2006-239, s. 1; SOR/2009-156, s. 1; SOR/2012-22, s. 1; SOR/2018-99, s. 2.

Application

2 (1) These Regulations apply in respect of the following mines:

(a) metal mines that, at any time on or after June 6, 2002,

(i) exceed an effluent flow rate of 50 m³ per day, based on the effluent deposited from all the final discharge points of the mine, and

(ii) deposit a deleterious substance in any water or place referred to in subsection 36(3) of the Act; and

(b) diamond mines that, at any time on or after June 1, 2018,

(i) exceed an effluent flow rate of 50 m³ per day, based on the effluent deposited from all the final discharge points of the mine, and

(ii) deposit a deleterious substance in any water or place referred to in subsection 36(3) of the Act.

(2) However, these Regulations do not apply in respect of

(a) placer mining;

(b) a metal mine that stopped commercial operation before June 6, 2002, unless it returns to commercial operation on or after that date; and

(c) a diamond mine that stopped commercial operation before June 1, 2018, unless it returns to commercial operation on or after that date.

(3) Despite subsection (1), sections 4 to 31 do not apply in respect of a mine that is a recognized closed mine under subsection 32(2) unless it returns to commercial operation, in which case it ceases to be a recognized closed mine.

SOR/2012-22, s. 2; SOR/2018-99, s. 3.

total des solides en suspension [Abrogée, DORS/2018-99, art. 2]

(2) [Abrogé, DORS/2018-99, art. 2]

DORS/2006-239, art. 1; DORS/2009-156, art. 1; DORS/2012-22, art. 1; DORS/2018-99, art. 2.

Champ d'application

2 (1) Le présent règlement s'applique à l'égard des mines suivantes :

a) les mines de métaux qui, à un moment quelconque, le 6 juin 2002 ou après cette date :

(i) d'une part, ont un débit d'effluent supérieur à 50 m³ par jour, déterminé d'après les rejets d'effluent à partir de tous leurs points de rejet final,

(ii) d'autre part, rejettent une substance nocive dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi;

b) les mines de diamants qui, à un moment quelconque, le 1^{er} juin 2018 ou après cette date :

(i) d'une part, ont un débit d'effluent supérieur à 50 m³ par jour, déterminé d'après les rejets d'effluent à partir de tous leurs points de rejet final,

(ii) d'autre part, rejettent une substance nocive dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi.

(2) Toutefois, le présent règlement ne s'applique pas à l'égard :

a) des exploitations des placers;

b) des mines de métaux dont l'exploitation commerciale a pris fin avant le 6 juin 2002, à moins que l'exploitation commerciale ne reprenne le 6 juin 2002 ou après cette date;

c) des mines de diamants dont l'exploitation commerciale a pris fin avant le 1^{er} juin 2018, à moins que l'exploitation commerciale ne reprenne le 1^{er} juin 2018 ou après cette date.

(3) Malgré le paragraphe (1), les articles 4 à 31 ne s'appliquent pas à l'égard d'une mine qui est une mine fermée reconnue en application du paragraphe 32(2), à moins que l'exploitation commerciale ne reprenne, auquel cas elle cesse d'être une mine fermée reconnue.

DORS/2012-22, art. 2; DORS/2018-99, art. 3.

Prescribed Deleterious Substances

3 For the purpose of the definition *deleterious substance* in subsection 34(1) of the Act, the following substances or classes of substances are prescribed as deleterious substances:

- (a) arsenic;
- (b) copper;
- (c) cyanide;
- (d) lead;
- (e) nickel;
- (f) zinc;
- (g) suspended solids; and
- (h) radium 226.

SOR/2018-99, s. 3.

Authority to Deposit in Water or Place Referred to in Subsection 36(3) of Act

4 (1) For the purposes of paragraph 36(4)(b) of the Act, the owner or operator of a mine is authorized to deposit, or to permit the deposit of, an effluent containing any deleterious substance that is prescribed in section 3 in any water or place referred to in subsection 36(3) of the Act if

- (a) the concentration of the deleterious substance in the effluent does not exceed the maximum authorized concentrations that are set out in columns 2, 3 and 4 of Schedule 4;
- (b) the pH of the effluent is equal to or greater than 6.0 but is not greater than 9.5; and
- (c) the effluent is not acutely lethal.

(2) The authority in subsection (1) is conditional on the owner or operator complying with sections 6 to 27.

SOR/2018-99, s. 3.

Authority to Deposit in Tailings Impoundment Areas

5 (1) Despite section 4, the owner or operator of a mine may deposit or permit the deposit of waste rock, acutely

Substances nocives désignées

3 Pour l'application de la définition de *substance nocive* au paragraphe 34(1) de la Loi, sont désignées comme substances nocives et les substances ou les catégories de substance suivantes :

- a) l'arsenic;
- b) le cuivre;
- c) le cyanure;
- d) le plomb;
- e) le nickel;
- f) le zinc;
- g) les matières en suspension;
- h) le radium 226.

DORS/2018-99, art. 3.

Rejet autorisé dans les eaux ou lieux visés au paragraphe 36(3) de la Loi

4 (1) Pour l'application de l'alinéa 36(4)b) de la Loi, le propriétaire ou l'exploitant d'une mine est autorisé à rejeter ou à permettre que soit rejeté un effluent contenant l'une ou l'autre des substances nocives désignées à l'article 3 dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi, si les conditions suivantes sont réunies :

- a) la concentration de la substance nocive dans l'effluent ne dépasse pas les concentrations maximales permises qui sont établies aux colonnes 2, 3 et 4 de l'annexe 4;
- b) le pH de l'effluent est égal ou supérieur à 6,0 mais ne dépasse pas 9,5;
- c) l'effluent ne présente pas de létalité aiguë.

(2) Le propriétaire ou l'exploitant d'une mine ne peut se prévaloir de l'autorisation que lui confère le paragraphe (1) que s'il respecte les conditions prévues aux articles 6 à 27.

DORS/2018-99, art. 3.

Autorisation de rejeter dans un dépôt de résidus miniers

5 (1) Malgré l'article 4, le propriétaire ou l'exploitant d'une mine peut rejeter — ou permettre que soient

lethal effluent or effluent of any pH and containing any concentration of a deleterious substance that is prescribed in section 3 into a tailings impoundment area that is either

- (a) a water or place set out in Schedule 2; or
- (b) a disposal area that is confined by anthropogenic or natural structures or by both, other than a disposal area that is, or is part of, a natural water body that is frequented by fish.

(2) The authority in subsection (1) is conditional on the owner or operator complying with sections 7 to 28.

(3) For the purposes of this section, any acutely lethal effluent is prescribed as a deleterious substance.

SOR/2006-239, s. 2; SOR/2018-99, s. 5.

PART 2

Conditions Governing Authority to Deposit

DIVISION 1

General

Prohibition on Diluting Effluent

6 The owner or operator of a mine shall not combine effluent with water or any other effluent for the purpose of diluting effluent before it is deposited.

Environmental Effects Monitoring

7 (1) The owner or operator of a mine shall conduct environmental effects monitoring studies in accordance with the requirements and within the periods set out in Schedule 5.

(2) The studies shall be conducted using documented and validated methods, and their results interpreted and reported on in accordance with generally accepted standards of good scientific practice at the time that the studies are conducted.

rejetés — des stériles, un effluent à létalité aiguë ou tout autre effluent, quel que soit le pH de l'effluent ou sa concentration en substances nocives désignées à l'article 3, dans l'un ou l'autre des dépôts de résidus miniers suivants :

- a) les eaux et lieux mentionnés à l'annexe 2;
- b) toute aire de décharge circonscrite par une formation naturelle ou un ouvrage artificiel, ou les deux, à l'exclusion d'une aire de décharge qui est un plan d'eau naturel où vivent des poissons ou qui en fait partie.

(2) Le propriétaire ou l'exploitant d'une mine ne peut se prévaloir de l'autorisation que lui confère le paragraphe (1) que s'il respecte les conditions prévues aux articles 7 à 28.

(3) Pour l'application du présent article, tout effluent à létalité aiguë est désigné comme une substance nocive.

DORS/2006-239, art. 2; DORS/2018-99, art. 5.

PARTIE 2

Conditions régissant l'autorisation de rejeter

SECTION 1

Dispositions générales

Interdiction de diluer

6 Il est interdit au propriétaire ou à l'exploitant d'une mine de combiner un effluent avec de l'eau ou avec tout autre effluent dans le but de le diluer avant son rejet.

Études de suivi des effets sur l'environnement

7 (1) Le propriétaire ou l'exploitant d'une mine effectue des études de suivi des effets sur l'environnement selon les exigences et dans les délais prévus à l'annexe 5.

(2) Il effectue les études selon des méthodes éprouvées et validées et évalue et présente leurs résultats conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques au moment de l'étude.

(3) The owner or operator shall record the results of the studies and submit to the Minister of the Environment, in accordance with the requirements set out in Schedule 5, the reports and information required by that Schedule.

SOR/2006-239, s. 3; SOR/2018-99, s. 6.

Identifying Information

8 (1) The owner or operator of a mine shall submit in writing to the Minister of the Environment the information referred to in subsection (2) not later than 60 days after the day on which any of the following occur:

- (a)** the mine becomes subject to these Regulations;
- (b)** ownership of the mine is transferred; and
- (c)** the mine returns to commercial operation after it has become a recognized closed mine.

(2) The information that shall be submitted is

- (a)** the name and address of both the owner and the operator of the mine;
- (b)** the name and address of any parent company of the owner and the operator; and
- (c)** the design-rated capacity of the mine, expressed as tonnes per year, and a description and rationale of how the design-rated capacity was determined.

(3) The owner or operator shall submit in writing to the Minister of the Environment any change in the information not later than 60 days after the change occurs.

SOR/2018-99, ss. 7, 36.

Final Discharge Points

9 The owner or operator of a mine shall identify each final discharge point and submit in writing to the Minister of the Environment, not later than 60 days after the day on which the mine becomes subject to these Regulations, the following information:

- (a)** plans, specifications and a general description of each final discharge point together with its location by latitude and longitude;
- (b)** a description of how each final discharge point is designed and maintained in respect of the deposit of deleterious substances; and

(3) Il enregistre les résultats des études et présente au ministre de l'Environnement, selon les exigences prévues à l'annexe 5, les rapports et les renseignements visés à cette annexe.

DORS/2006-239, art. 3; DORS/2018-99, art. 6.

Renseignements d'identification

8 (1) Le propriétaire ou l'exploitant d'une mine présente par écrit au ministre de l'Environnement les renseignements mentionnés au paragraphe (2) :

- a)** dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent règlement;
- b)** dans les soixante jours suivant le transfert de la propriété de la mine;
- c)** s'agissant d'une mine fermée reconnue, dans les soixante jours suivant la date à laquelle l'exploitation commerciale reprend.

(2) Les renseignements à présenter sont :

- a)** les nom et adresse du propriétaire et de l'exploitant;
- b)** les nom et adresse de toute société mère du propriétaire et de l'exploitant;
- c)** la capacité nominale de la mine, exprimée en tonne par année, ainsi qu'une description et une explication de la façon dont elle a été établie.

(3) Le propriétaire ou l'exploitant présente par écrit au ministre de l'Environnement des précisions sur tout changement des renseignements dans les soixante jours suivant le changement.

DORS/2018-99, art. 7 et 36.

Points de rejet final

9 Le propriétaire ou l'exploitant d'une mine détermine chaque point de rejet final et fournit par écrit au ministre de l'Environnement, dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent règlement, les renseignements suivants :

- a)** les plans, les spécifications et une description générale de chaque point de rejet final, ainsi que la latitude et la longitude de son emplacement;
- b)** la façon dont chacun des points de rejet final est conçu et entretenu en ce qui a trait au rejet de substances nocives;

(c) the name of the receiving body of water, if there is a name.

SOR/2006-239, s. 4; SOR/2018-99, ss. 8, 36.

10 (1) The owner or operator of a mine shall submit in writing to the Minister of the Environment the information required by section 9, for

(a) any final discharge point that is identified by an inspector, and that was not identified as required by section 9, within 30 days after the discharge point is identified; and

(b) each new final discharge point, at least 60 days before depositing effluent from that new final discharge point.

(2) The owner or operator shall submit in writing to the Minister of the Environment the information on any proposed change to a final discharge point at least 60 days before the change is to be made.

SOR/2018-99, s. 36.

Monitoring Equipment Information

11 The owner or operator of a mine shall keep records relating to effluent monitoring equipment that contain

(a) a description of the equipment and, if applicable, the manufacturer's specifications and the year and model number of the equipment; and

(b) the results of the calibration tests of the equipment.

DIVISION 2

Effluent Monitoring Conditions

Deleterious Substance and pH Testing

12 (1) The owner or operator of a mine shall, not less than once per week and at least 24 hours apart, collect from each final discharge point a grab sample or composite sample of effluent and record the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of the deleterious substances prescribed in section 3.

c) le nom du milieu aquatique récepteur, si ce nom existe.

DORS/2006-239, art. 4; DORS/2018-99, art. 8 et 36.

10 (1) Le propriétaire ou l'exploitant d'une mine présente par écrit au ministre de l'Environnement les renseignements visés à l'article 9 relativement à :

a) tous les points de rejet final que désigne l'inspecteur et qui n'ont pas été déterminés en application de l'article 9, dans les trente jours suivant leur désignation;

b) tout nouveau point de rejet final, au moins soixante jours avant qu'un effluent en soit rejeté.

(2) Il présente par écrit au ministre de l'Environnement des précisions sur toute modification proposée d'un point de rejet final au moins soixante jours avant que la modification soit apportée.

DORS/2018-99, art. 36.

Renseignements sur l'équipement de surveillance

11 Le propriétaire ou l'exploitant d'une mine tient un registre concernant l'équipement de surveillance des effluents et y consigne :

a) la description de l'équipement et, le cas échéant, les spécifications du fabricant ainsi que l'année et le numéro du modèle de l'équipement;

b) les résultats des essais d'étalonnage de l'équipement.

SECTION 2

Conditions portant sur le suivi de l'effluent

Essais concernant le pH et les substances nocives

12 (1) Au moins une fois par semaine et à au moins vingt-quatre heures d'intervalle, le propriétaire ou l'exploitant d'une mine prélève, à partir de chaque point de rejet final, un échantillon instantané ou un échantillon composite d'effluent dont il enregistre le pH au moment du prélèvement ainsi que, sans délai après celui-ci, les concentrations des substances nocives désignées à l'article 3.

(2) Testing conducted under subsection (1) shall comply with the analytical requirements set out in Table 1 of Schedule 3 and shall be done in accordance with generally accepted standards of good scientific practice at the time of the sampling using documented and validated methods.

(3) Despite subsection (1), the owner or operator of a mine is not required to collect samples for the purpose of recording the concentrations of cyanide if cyanide has never been used as a process reagent at the mine.

SOR/2006-239, s. 5; SOR/2018-99, s. 9.

13 (1) The owner or operator of a mine may reduce the frequency of conducting tests relating to the concentrations of arsenic, copper, cyanide, lead, nickel or zinc at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one month apart, if that substance's monthly mean concentration at that final discharge point is less than 10% of the value set out in column 2 of Schedule 4 for 12 consecutive months.

(2) The owner or operator of a mine, other than an uranium mine, may reduce the frequency of conducting tests relating to the concentration of radium 226 at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one month apart, if the concentration of radium 226 at that final discharge point is less than 0.037 Bq/L for 10 consecutive weeks.

(3) The owner or operator of a mine shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at a final discharge point to the frequency prescribed in section 12

(a) in the case of a deleterious substance mentioned in subsection (1), if that substance's monthly mean concentration at that final discharge point is equal to or greater than 10% of the value set out in column 2 of Schedule 4; and

(b) in the case of radium 226, if the concentration of radium 226 at that final discharge point is equal to or greater than 0.037 Bq/L.

(4) The owner or operator of a mine shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at all final discharge points to the frequency prescribed in section 12 for all the substances mentioned in subsections (1) and (2) if the owner or operator

(a) fails to perform a test required under those subsections in accordance with the prescribed frequency; or

(2) Les essais effectués en application du paragraphe (1) doivent satisfaire aux exigences analytiques prévues au tableau 1 de l'annexe 3 et doivent être effectués conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques au moment de l'échantillonnage et selon des méthodes éprouvées et validées.

(3) Malgré le paragraphe (1), le propriétaire ou l'exploitant d'une mine n'a pas à prélever d'échantillon afin d'enregistrer la concentration de cyanure si cette substance n'a jamais été utilisée comme réactif de procédé à la mine.

DORS/2006-239, art. 5; DORS/2018-99, art. 9.

13 (1) Le propriétaire ou l'exploitant d'une mine peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration d'arsenic, de cuivre, de cyanure, de plomb, de nickel ou de zinc à au moins une fois par trimestre civil, chaque essai étant effectué à au moins un mois d'intervalle, si la concentration moyenne mensuelle de la substance à ce point de rejet final est inférieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4 pendant douze mois consécutifs.

(2) Le propriétaire ou l'exploitant d'une mine autre qu'une mine d'uranium peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration de radium 226 à au moins une fois par trimestre civil, chaque essai étant effectué à au moins un mois d'intervalle, si la concentration à ce point de rejet final est inférieure à 0,037 Bq/L pendant dix semaines consécutives.

(3) Le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives ci-après à celle prévue à l'article 12, à un point de rejet final, si :

a) dans le cas d'une substance nocive énumérée au paragraphe (1), la concentration moyenne mensuelle de cette substance, à ce point de rejet final, est égale ou supérieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4;

b) dans le cas du radium 226, la concentration de cette substance, à ce point de rejet final, est égale ou supérieure à 0,037 Bq/L.

(4) Le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives énumérées aux paragraphes (1) et (2) à celle prévue à l'article 12, à tous les points de rejet final, s'il omet :

a) soit d'effectuer les essais visés à ces paragraphes selon la fréquence requise;

(b) fails to submit a report required under subsection 21(1) or section 22 within the prescribed time.

(5) If the owner or operator of a mine changes the location of a final discharge point, the owner or operator shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at that final discharge point to the frequency prescribed in section 12 for all the deleterious substances mentioned in subsections (1) and (2).

(6) The owner or operator of a mine who reduces the frequency of conducting tests under subsection (1) or (2) shall

(a) notify the Minister of the Environment, in writing, at least 30 days in advance, of that fact;

(b) select and record the sampling dates not less than 30 days in advance of collecting the samples of effluent; and

(c) collect the sample on the selected day except if, owing to unforeseen circumstances, they cannot sample on that day, in which case, they shall do so as soon as practicable after that day.

SOR/2006-239, s. 6; SOR/2018-99, s. 9.

Acute Lethality Testing

General

14 (1) Subject to section 15, the owner or operator of a mine shall collect, once a month, a grab sample of effluent from each final discharge point and determine whether the effluent is acutely lethal by conducting acute lethality tests on aliquots of each effluent sample in accordance with sections 14.1 and 14.2.

(2) For the purposes of subsection (1), the owner or operator of a mine

(a) shall select and record the sampling date not less than 30 days in advance of collecting the grab sample;

(b) shall collect the sample on the selected day except if, owing to unforeseen circumstances, they cannot sample on that day, in which case, they shall do so as soon as practicable after that day; and

(c) shall collect the grab samples not less than 15 days apart.

b) soit de présenter le rapport visé au paragraphe 21(1) ou à l'article 22 dans les délais prescrits.

(5) Si un point de rejet final est déplacé, le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives, à ce point de rejet final, à celle prévue à l'article 12 pour toutes les substances nocives énumérées aux paragraphes (1) et (2).

(6) Le propriétaire ou l'exploitant d'une mine qui réduit la fréquence des essais en vertu des paragraphes (1) ou (2) prend les mesures suivantes :

a) il avise par écrit le ministre de l'Environnement de la réduction de la fréquence des essais, au moins trente jours avant celle-ci;

b) il choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

c) il prélève l'échantillon ce jour-là ou, si des circonstances imprévues l'en empêchent, le plus tôt possible après ce jour.

DORS/2006-239, art. 6; DORS/2018-99, art. 9.

Essai de détermination de la létalité aiguë

Généralités

14 (1) Sous réserve de l'article 15, le propriétaire ou l'exploitant d'une mine prélève une fois par mois un échantillon instantané d'effluent à chaque point de rejet final et détermine si cet effluent présente une létalité aiguë en effectuant des essais de détermination de la létalité aiguë sur des portions aliquotes de chaque échantillon conformément aux articles 14.1 et 14.2.

(2) Pour l'application du paragraphe (1), le propriétaire ou l'exploitant d'une mine :

a) choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

b) prélève l'échantillon ce jour-là ou, si des circonstances imprévues l'en empêchent, le plus tôt possible après ce jour;

c) prélève les échantillons instantanés à au moins quinze jours d'intervalle.

(3) When collecting a grab sample of effluent for the purposes of subsection (1), the owner or operator of a mine shall collect a sufficient volume of effluent to enable the owner or operator to comply with paragraph 15(1)(a).

SOR/2006-239, s. 7; SOR/2011-92, s. 4; SOR/2012-22, s. 3; SOR/2018-99, s. 10.

Acute Lethality Test — Rainbow Trout

14.1 Unless the salinity value of the effluent is equal to or greater than ten parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/13.

SOR/2018-99, s. 10.

Acute Lethality Test — Threespine Stickleback

14.2 If the salinity value of the effluent is equal to or greater than ten parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/10.

SOR/2018-99, s. 10.

Increased Frequency of Acute Lethality Testing

15 (1) If an effluent sample is determined to be acutely lethal by an acute lethality test, the owner or operator of a mine shall

(a) without delay, conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample collected under subsection 14(1) and record the concentrations of the deleterious substances prescribed in section 3;

(b) collect, from the final discharge point from which the effluent sample that was determined to be acutely lethal was collected, a grab sample twice a month and, without delay after collecting the sample, conduct the acute lethality test that determined the effluent sample to be acutely lethal on each grab sample in accordance with the procedure set out in section 6 of the applicable reference method and, if the sample is determined to be acutely lethal, then conduct the effluent characterization set out in subsection 4(1) of

(3) Lors du prélèvement des échantillons instantanés en application du paragraphe (1), le propriétaire ou l'exploitant d'une mine prélève un volume d'effluent suffisant pour lui permettre de se conformer à l'alinéa 15(1)a).

DORS/2006-239, art. 7; DORS/2011-92, art. 4; DORS/2012-22, art. 3; DORS/2018-99, art. 10.

Essai de détermination de la létalité aiguë — Truite arc-en-ciel

14.1 Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à dix parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/13.

DORS/2018-99, art. 10.

Essai de détermination de la létalité aiguë — Épinoche à trois épines

14.2 Si la salinité de l'effluent est égale ou supérieure à dix parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/10.

DORS/2018-99, art. 10.

Fréquence accrue des essais de détermination de la létalité aiguë

15 (1) S'il est établi qu'un échantillon d'effluent présente une létalité aiguë après un essai de détermination de la létalité aiguë, le propriétaire ou l'exploitant d'une mine :

a) sans délai, effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané prélevé en application du paragraphe 14(1) et enregistre les concentrations des substances nocives désignées à l'article 3;

b) deux fois par mois, prélève un échantillon instantané à partir du point de rejet final d'où l'échantillon d'effluent qui présente une létalité aiguë a été prélevé et effectue sans délai après le prélèvement, sur chacun de ces échantillons, selon le mode opératoire prévu à la section 6 de la méthode de référence, l'essai de détermination de la létalité aiguë à partir duquel la létalité aiguë de l'échantillon a été établie. S'il est ainsi établi que l'échantillon présente une létalité aiguë, le

Schedule 5 and record the concentrations of the deleterious substances prescribed in section 3; and

(c) collect the grab samples not less than seven days apart.

(2) The owner or operator may resume sampling and testing at the frequency prescribed in section 14 if the effluent is determined not to be acutely lethal in three consecutive tests conducted under paragraph (1)(b).

SOR/2006-239, s. 8; SOR/2018-99, s. 12.

Reduced Frequency of Acute Lethality Testing

16 (1) The owner or operator of a mine may reduce the frequency of conducting an acute lethality test at a final discharge point to once in each calendar quarter if the effluent from that final discharge point is determined not to be acutely lethal by that acute lethality test for 12 consecutive months.

(2) For the purpose of determining whether that effluent is acutely lethal for the 12-month period referred to in subsection (1), the owner or operator of a mine shall use the results of the acute lethality tests conducted under subsection 14(1).

(3) The owner or operator of a mine shall notify the Minister of the Environment in writing at least 30 days before the reduction of the frequency of acute lethality testing.

(4) The owner or operator who reduces the frequency of conducting acute lethality testing under subsection (1) shall

(a) select and record the sampling date not less than 30 days in advance of collecting the grab samples; and

(b) collect the grab samples not less than 45 days apart.

(5) If a grab sample is determined to be acutely lethal by an acute lethality test when the owner or operator of a mine is testing at the frequency prescribed in subsection (1), the owner or operator shall increase the frequency of conducting that test to the frequency prescribed in section 15 and conduct that test in accordance with that section.

(6) If the location of a final discharge point is changed, the owner or operator of a mine shall, at that final discharge point, increase the frequency of conducting all the acute lethality tests to the frequency prescribed in

propriétaire ou l'exploitant d'une mine effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 et enregistre les concentrations des substances nocives désignées à l'article 3;

c) prélève les échantillons instantanés à au moins sept jours d'intervalle.

(2) Il peut recommencer à effectuer l'échantillonnage et les essais à la fréquence fixée à l'article 14 si l'effluent ne présente pas de létalité aiguë dans trois essais consécutifs effectués selon l'alinéa (1)b).

DORS/2006-239, art. 8; DORS/2018-99, art. 12.

Fréquence réduite des essais de détermination de la létalité aiguë

16 (1) Le propriétaire ou l'exploitant d'une mine peut réduire à une fois par trimestre civil la fréquence d'un essai de détermination de la létalité aiguë à un point de rejet final si, pendant douze mois consécutifs, l'effluent à ce point de rejet final ne présente pas de létalité aiguë selon cet essai.

(2) Pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe (1), le propriétaire ou l'exploitant d'une mine se fonde sur les résultats obtenus aux termes du paragraphe 14(1).

(3) Le propriétaire ou l'exploitant d'une mine avise par écrit le ministre de l'Environnement de la réduction de la fréquence des essais au moins trente jours avant celle-ci.

(4) Le propriétaire ou l'exploitant qui réduit la fréquence des essais en application du paragraphe (1) prend les mesures suivantes :

a) il choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

b) il prélève les échantillons instantanés à au moins quarante-cinq jours d'intervalle.

(5) S'il est établi qu'un échantillon instantané d'effluent présente une létalité aiguë selon un essai de détermination de la létalité aiguë alors que cet essai est effectué à la fréquence prévue au paragraphe (1), le propriétaire ou l'exploitant d'une mine porte la fréquence de cet essai à celle prévue à l'article 15 et effectue cet essai conformément à cet article.

(6) Si l'emplacement d'un point de rejet final est déplacé, le propriétaire ou l'exploitant d'une mine porte la fréquence de tous les essais de détermination de la létalité aiguë à ce point de rejet final à celle prévue au

subsection 14(1) and conduct those tests in accordance with that subsection.

SOR/2012-22, s. 4; SOR/2018-99, s. 14.

Daphnia magna Monitoring Tests

17 (1) Unless the salinity value of the effluent is equal to or greater than four parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall conduct *Daphnia magna* monitoring tests in accordance with the procedure set out in section 5 or 6 of Reference Method EPS 1/RM/14 at the same time that the acute lethality tests are conducted under section 14, 15 or 16 of these Regulations.

(2) The owner or operator shall conduct *Daphnia magna* monitoring tests on the aliquots of each effluent sample collected for the acute lethality tests.

SOR/2018-99, s. 15.

Obligation to Record All Test Results

18 The owner or operator of a mine shall record without delay the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 for all acute lethality tests and *Daphnia magna* monitoring tests that are conducted to monitor deposits from final discharge points.

SOR/2018-99, s. 16.

Volume of Effluent

19 (1) The owner or operator of a mine shall record, in cubic metres, the total monthly volume of effluent deposited from each final discharge point for each month during which there was a deposit.

(2) The total monthly volume of effluent deposited shall be either

(a) determined on the basis of the average of the flow rates, expressed in cubic metres per day, measured and calculated as follows:

(i) by measuring the flow rate at the same time as samples are collected under section 12,

(ii) by calculating the average monthly flow rate by adding the flow rate measurements taken during

paragraphe 14(1) et effectue ces essais conformément à ce paragraphe.

DORS/2012-22, art. 4; DORS/2018-99, art. 14.

Essai de suivi avec bioessais sur la *Daphnia magna*

17 (1) Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à quatre parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine qui fait des essais de détermination de la létalité aiguë en application des articles 14, 15 ou 16 effectue au même moment des essais de suivi avec bioessais sur la *Daphnia magna* selon les modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14.

(2) Il effectue chaque essai de suivi sur des portions aliquotes de chaque échantillon d'effluent prélevé pour les essais de détermination de la létalité aiguë.

DORS/2018-99, art. 15.

Enregistrement des renseignements

18 Le propriétaire ou l'exploitant d'une mine enregistre sans délai les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14 pour tous les essais de détermination de la létalité aiguë et tous les essais de suivi avec bioessais sur la *Daphnia magna* effectués dans le cadre du suivi des rejets provenant de points de rejet final.

DORS/2018-99, art. 16.

Volume d'effluent

19 (1) Le propriétaire ou l'exploitant d'une mine enregistre, en mètres cubes, le volume mensuel total d'effluent rejeté à partir de chaque point de rejet final, pour chaque mois au cours duquel un effluent a été rejeté.

(2) Le volume mensuel total d'effluent rejeté est :

a) soit fondé sur la moyenne des débits, exprimée en mètres cubes par jour, auquel cas il est déterminé de la façon suivante :

(i) le débit est mesuré au moment où les échantillons sont prélevés en application de l'article 12,

the month and dividing the total by the number of times the flow rate was measured, and

(iii) by multiplying the average monthly flow rate by the number of days during the month that effluent was deposited; or

(b) determined by using a monitoring system that provides a continuous measure of the volume of effluent deposited.

(3) The owner or operator shall

(a) measure the flow rate or volume of effluent deposited by using a monitoring system that is accurate to within 15% of measured flow rate or volume; and

(b) maintain and calibrate the monitoring system at least once in each year and record the results, as well as the date on which and the manner in which the requirement to maintain and calibrate has been met.

SOR/2006-239, s. 9; SOR/2012-22, s. 5; SOR/2018-99, s. 17.

Calculation of Monthly Mean Concentration and Loading

19.1 (1) With respect to the deleterious substances that are contained in the effluent deposited from each final discharge point, the owner or operator of a mine shall, for each month during which there is a deposit and during which samples are collected, record the monthly mean concentration

(a) in mg/L for deleterious substances referred to in paragraphs 3(a) to (g); and

(b) in Bq/L for a deleterious substance referred to in paragraph 3(h).

(2) If the analytical result from any test conducted under section 12 or 13 is less than the method detection limit used for that test, the test result shall be considered to be equal to one half of the detection limit used for the purpose of calculating the monthly mean concentration.

SOR/2006-239, s. 9; SOR/2018-99, s. 18.

20 (1) With respect to the deleterious substances that are contained in the effluent deposited from each final discharge point, the owner or operator of a mine shall, for each month and for each calendar quarter during which there was a deposit and during which a sample is collected, record the loading

(ii) la moyenne mensuelle des débits est calculée par la division du total des mesures de débit enregistrées au cours du mois par le nombre de mesures prises,

(iii) la moyenne mensuelle des débits est multipliée par le nombre de jours où l'effluent a été rejeté;

b) soit déterminé à l'aide d'un système de surveillance à mesure continue.

(3) Le propriétaire ou l'exploitant mesure le volume ou le débit d'effluent rejeté en tenant compte des exigences suivantes :

a) il utilise à cette fin un système de surveillance donnant des mesures exactes à 15 % près;

b) il entretient et étalonne le système de surveillance au moins une fois par année et enregistre les résultats, la date à laquelle il s'est conformé à cette exigence ainsi que la manière dont il s'y est pris.

DORS/2006-239, art. 9; DORS/2012-22, art. 5; DORS/2018-99, art. 17.

Calcul de la concentration moyenne mensuelle et de la charge

19.1 (1) À l'égard des substances nocives désignées à l'article 3 se trouvant dans l'effluent rejeté à partir de chaque point de rejet final, le propriétaire ou l'exploitant d'une mine enregistre, pour chaque mois au cours duquel un effluent est rejeté et des prélèvements sont effectués :

a) la concentration moyenne mensuelle en mg/L des substances nocives énumérées aux alinéas 3a) à g);

b) la concentration moyenne mensuelle en Bq/L de la substance nocive figurant à l'alinéa 3h).

(2) Si le résultat analytique de tout essai effectué en application des articles 12 ou 13 est inférieur à la limite de détection de la méthode utilisée pour l'essai, il est considéré comme égal à la moitié de la limite de détection de la méthode utilisée pour le calcul de la concentration moyenne mensuelle.

DORS/2006-239, art. 9; DORS/2018-99, art. 18.

20 (1) À l'égard des substances nocives désignées à l'article 3 se trouvant dans l'effluent rejeté à partir de chaque point de rejet final, le propriétaire ou l'exploitant d'une mine enregistre, pour chaque mois et pour chaque trimestre civil au cours duquel un effluent a été rejeté et des prélèvements ont été effectués :

(a) in kg for deleterious substances referred to in paragraphs 3(a) to (g); and

(b) in MBq for a deleterious substance referred to in paragraph 3(h).

(2) The owner or operator shall determine the loading for each month using the following formula:

$$ML = C \times V / 1,000$$

where

ML is the loading for a month;

C is the monthly mean concentration of the deleterious substance, recorded under section 19.1; and

V is the total monthly volume of effluent deposited from each final discharge point, recorded under section 19.

(3) The owner or operator shall determine the loading for each calendar quarter using the following formula:

$$QL = C \times V / 1,000$$

where

QL is the loading for a calendar quarter;

C is the mean of the monthly mean concentrations of the deleterious substance for that calendar quarter, recorded under section 19.1; and

V is the total volume of effluent deposited from each final discharge point during that calendar quarter, based on the sum of the total monthly volumes of effluent deposited from each final discharge point, recorded under section 19.

SOR/2006-239, s. 9; SOR/2018-99, s. 19.

Reporting Monitoring Results

21 (1) The owner or operator of a mine shall submit to the Minister of the Environment an effluent monitoring report for all tests and monitoring conducted during each calendar quarter not later than 45 days after the end of the quarter.

(2) Subject to subsection (3), the effluent monitoring report shall include

(a) the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 as required by section 18;

(b) the concentration and monthly mean concentration of each deleterious substance prescribed in section 3 that is contained in the effluent samples

a) la charge en kg des substances nocives énumérées aux alinéas 3a) à g);

b) la charge en MBq de la substance nocive figurant l'alinéa 3h).

(2) Il détermine la charge pour chaque mois civil selon la formule suivante :

$$CM = C \times V / 1\,000$$

où :

CM représente la charge pour un mois;

C la concentration moyenne mensuelle de la substance nocive enregistrée en application de l'article 19.1;

V le volume total d'effluent rejeté à partir de chaque point de rejet final au cours du mois et enregistré en application de l'article 19.

(3) Il détermine la charge pour le trimestre civil selon la formule suivante :

$$CT = C \times V / 1\,000$$

où :

CT représente la charge pour un trimestre;

C la moyenne des concentrations moyennes mensuelles de la substance nocive enregistrées au cours du trimestre en application de l'article 19.1;

V le volume total d'effluent rejeté à partir de chaque point de rejet final au cours du trimestre, fondé sur la somme des volumes mensuels d'effluent rejeté à partir de chaque point de rejet final et enregistrés en application de l'article 19.

DORS/2006-239, art. 9; DORS/2018-99, art. 19.

Rapports sur les résultats de suivi

21 (1) Le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement un rapport sur le suivi de l'effluent pour tout essai ou mesure de suivi effectué au cours de chaque trimestre civil, dans les quarante-cinq jours suivant la fin du trimestre.

(2) Sous réserve du paragraphe (3), le rapport comporte ce qui suit :

a) les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14, qu'exige l'article 18;

b) la concentration et la concentration moyenne mensuelle des substances nocives désignées à l'article 3 se trouvant dans les échantillons d'effluent prélevés en

collected under subsection 12(1) and the concentrations of such deleterious substances contained in the effluent samples collected under subsection 13(1) or (2);

(c) the pH of the effluent samples as required by subsection 12(1);

(d) whether a composite or grab sample collection method was used for each effluent sample as required by subsection 12(1);

(d.1) for each month of the calendar quarter, the number of days that effluent was deposited;

(e) the total volume of effluent deposited during each month of the reporting quarter as recorded under section 19;

(f) the mass loading of the deleterious substances prescribed in section 3 as recorded under section 20; and

(g) the results of the effluent characterization conducted under paragraph 15(1)(a).

(3) If no effluent is deposited in a calendar quarter, the report shall only include a statement to that effect.

SOR/2006-239, s. 10; SOR/2018-99, ss. 20, 36.

22 The owner or operator of a mine shall submit to the Minister of the Environment, not later than March 31 in each year, a report in the form set out in Schedule 6, that shall include the following:

(a) the identifying information set out in Part 1 of that Schedule;

(b) the effluent monitoring results for the previous calendar year, including

(i) test results respecting each final discharge point, and

(ii) the results of acute lethality tests; and

(c) the following information regarding non-compliance:

(i) if the results of any effluent monitoring tests indicate that the maximum authorized concentrations set out in Schedule 4 were exceeded or that the pH of the effluent is less than 6.0 or greater than 9.5, the causes of that non-compliance and the remedial measures that are planned or that have been implemented, and

application du paragraphe 12(1) de même que la concentration de ces substances nocives dans les échantillons d'effluent prélevés au titre des paragraphes 13(1) ou (2);

c) le pH des échantillons, exigé par le paragraphe 12(1);

d) pour chaque échantillon d'effluent prélevé en application du paragraphe 12(1), s'il s'agit d'un échantillon composite ou instantané;

d.1) pour chaque mois du trimestre civil, le nombre de jours où il y a eu rejet d'effluent;

e) le volume total d'effluent rejeté pour chaque mois du trimestre, enregistré en application de l'article 19;

f) la charge des substances nocives désignées à l'article 3 enregistrée en application de l'article 20;

g) les résultats des essais de caractérisation de l'effluent effectués conformément à l'alinéa 15(1)a).

(3) Si au cours d'un trimestre civil aucun effluent n'a été rejeté, le rapport ne comporte qu'une mention à cet effet.

DORS/2006-239, art. 10; DORS/2018-99, art. 20 et 36.

22 Le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement, au plus tard le 31 mars de chaque année, un rapport en la forme prévue à l'annexe 6 et comportant les renseignements suivants :

a) les renseignements identificatoires prévus à la partie 1 de cette annexe;

b) les résultats du suivi de l'effluent pour l'année civile précédente dont :

(i) les résultats des essais à chacun des points de rejet final,

(ii) les résultats des essais de détermination de la létalité aiguë;

c) les renseignements suivants sur la non-conformité :

(i) si les résultats des essais de suivi de l'effluent montrent que les concentrations maximales permises prévues à l'annexe 4 ont été dépassées ou que le pH de l'effluent est inférieur à 6,0 ou supérieur à 9,5, les causes ainsi que les mesures correctives projetées ou mises en œuvre,

(ii) if the results of any acute lethality tests indicate that an effluent sample was determined to be acutely lethal, the remedial measures that are planned or that have been implemented.

SOR/2006-239, s. 11; SOR/2018-99, s. 21.

23 Any report or information referred to in sections 7, 21 and 22 shall be submitted electronically in the format provided by the Department of the Environment, but the report or information shall be submitted in writing if

- (a) no such format has been provided; or
- (b) it is, owing to circumstances beyond the control of either the owner or the operator, impracticable to submit the report or information electronically in the format provided.

SOR/2006-239, s. 11; SOR/2018-99, s. 22.

24 (1) The owner or operator of a mine shall notify an inspector without delay if the results of the effluent monitoring tests conducted under section 12 or 13, subsection 14(1) or section 15 or 16 indicate that

- (a) the limits set out in Schedule 4 are being or have been exceeded;
- (b) the pH of the effluent is less than 6.0 or greater than 9.5; or
- (c) an effluent is acutely lethal.

(2) The owner or operator shall provide a written report of the test results to the inspector within 30 days after the tests have been completed.

(3) [Repealed, SOR/2018-99, s. 23]

SOR/2006-239, s. 12; SOR/2018-99, s. 23.

Relief

25 (1) Any time period specified for collecting samples of effluent referred to in this Division may be extended if

- (a) unforeseen circumstances cause safety concerns or access problems and render the collection of samples of effluent impracticable; and
- (b) the owner or operator of a mine notifies an inspector, without delay, of the circumstances and indicates when they expect to be able to collect the samples.

(ii) si les résultats des essais de détermination de la létalité aiguë démontrent qu'un échantillon d'effluent présente une létalité aiguë, les mesures correctives projetées ou mises en œuvre.

DORS/2006-239, art. 11; DORS/2018-99, art. 21.

23 Les rapports et renseignements visés aux articles 7, 21 et 22 sont présentés sous forme électronique selon le modèle fourni par le ministère de l'Environnement. Ils sont toutefois présentés par écrit dans l'un ou l'autre des cas suivants :

- a) aucun modèle n'est fourni;
- b) il est pratiquement impossible, pour des raisons indépendantes de la volonté du propriétaire ou de l'exploitant, selon le cas, de les présenter sous forme électronique selon le modèle fourni.

DORS/2006-239, art. 11; DORS/2018-99, art. 22.

24 (1) Le propriétaire ou l'exploitant d'une mine avise sans délai l'inspecteur si les résultats des essais de suivi de l'effluent effectués au titre des articles 12 ou 13, du paragraphe 14(1) ou des articles 15 ou 16 montrent que :

- a) les limites prévues à l'annexe 4 sont ou ont été dépassées;
- b) le pH de l'effluent est inférieur à 6,0 ou supérieur à 9,5;
- c) l'effluent est un effluent à létalité aiguë.

(2) Il présente à l'inspecteur un rapport écrit des résultats des essais dans les trente jours suivant la fin de ceux-ci.

(3) [Abrogé, DORS/2018-99, art. 23]

DORS/2006-239, art. 12; DORS/2018-99, art. 23.

Dispense

25 (1) Les délais prévus dans la présente section à l'égard du prélèvement des échantillons d'effluent peuvent être prorogés si les conditions suivantes sont réunies :

- a) des circonstances imprévues provoquent des problèmes de sécurité ou d'accessibilité et rendent le prélèvement d'échantillons d'effluent pratiquement impossible;
- b) le propriétaire ou l'exploitant d'une mine a avisé l'inspecteur sans délai des circonstances et lui a indiqué le moment où il croit pouvoir procéder au prélèvement des échantillons.

(2) The owner or operator shall collect the samples of effluent without delay when the circumstances permit.

SOR/2006-239, s. 13.

DIVISION 3

Notice, Records and Other Documents

End of Commercial Operation Notice

26 (1) The owner or operator of a mine shall notify the Minister of the Environment in writing of the day on which the mine has stopped commercial operation not later than 90 days after the end of commercial operation.

(2) The owner or operator shall notify the Minister of the Environment in writing without delay if the mine returns to commercial operation.

SOR/2018-99, s. 36.

Records, Books of Account or Other Documents

27 The owner or operator of a mine shall keep all records, books of account or other documents required by these Regulations at the mine for a period of not less than five years, beginning on the day on which they are made, including

- (a)** records relating to all final discharge points, including any changes to those records;
- (b)** records relating to effluent monitoring equipment, including the calibration of that equipment;
- (c)** records relating to the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14;
- (d)** compensation plans;
- (e)** emergency response plans, including each update to the plan;
- (f)** reports on any unauthorized deposits;
- (g)** reports or other documents prepared and data collected for the purposes of environmental effects monitoring studies; and

(2) Le propriétaire ou l'exploitant prélève les échantillons d'effluent sans délai dès que les circonstances le permettent.

DORS/2006-239, art. 13.

SECTION 3

Avis, registres et autres documents

Avis de la fin de l'exploitation commerciale

26 (1) Le propriétaire ou l'exploitant d'une mine avise le ministre de l'Environnement par écrit de la date où l'exploitation commerciale de la mine a cessé, dans les quatre-vingt-dix jours suivant la cessation.

(2) Il avise le ministre de l'Environnement, par écrit et sans délai, de la reprise de l'exploitation commerciale.

DORS/2018-99, art. 36.

Registres, livres comptables ou autres documents

27 Le propriétaire ou l'exploitant d'une mine conserve à la mine, pendant au moins cinq ans à compter de leur établissement, tous les registres, livres comptables ou autres documents exigés par le présent règlement, soit, notamment :

- a)** les registres concernant les points de rejet final et tout changement à ces registres;
- b)** les registres concernant les équipements de surveillance des effluents, y compris les registres de calibration de ces équipements;
- c)** les registres concernant les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14;
- d)** les plans compensatoires;
- e)** les plans d'intervention d'urgence et chacune de leurs mises à jour;
- f)** tout rapport sur le rejet non autorisé;

(h) records and reports of measurements with respect to the pH, temperature and concentration of any deleterious substance prescribed in section 3.

SOR/2018-99, s. 24.

DIVISION 4

Tailings Impoundment Areas

Compensation Plan

27.1 (1) The owner or operator of a mine shall, before depositing a deleterious substance into a tailings impoundment area that is set out in Schedule 2, submit to the Minister of the Environment a compensation plan that includes the information described in subsection (2) and obtain that Minister's approval of the plan.

(2) The purpose of the compensation plan is to offset the loss of fish habitat resulting from the deposit of any deleterious substance into the tailings impoundment area. It shall contain the following information:

- (a)** a description of the location of the tailings impoundment area and of fish habitat that will be affected by the deposit;
- (b)** a quantitative impact assessment of the deposit on fish habitat;
- (c)** a description of the measures to be taken to offset the loss of fish habitat;
- (d)** a description of the measures to be taken during the planning and implementation of the compensation plan to mitigate any potential adverse effects on fish habitat that could result from the plan's implementation;
- (e)** a description of the measures to be taken to monitor the plan's implementation;
- (f)** a description of the measures to be taken to verify the extent to which the plan's purpose has been achieved;
- (g)** the time required to implement the plan that allows for the achievement of the plan's purpose within a reasonable time; and
- (h)** an estimate of the cost of implementing each element of the plan.

g) tous les rapports ou autres documents préparés et toutes les données recueillies pour une étude de suivi des effets sur l'environnement;

h) registres et rapports concernant toutes les mesures de pH, de la température et des concentrations des substances nocives énumérées à l'article 3.

DORS/2018-99, art. 24.

SECTION 4

Dépôts de résidus miniers

Plan compensatoire

27.1 (1) Avant de rejeter des substances nocives dans tout dépôt de résidus miniers qui figure à l'annexe 2, le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement un plan compensatoire qui comporte les renseignements énumérés au paragraphe (2) et obtient son approbation.

(2) Le plan compensatoire a pour objectif de contrebalancer la perte d'habitat du poisson consécutive au rejet de substances nocives dans le dépôt de résidus miniers. Il comporte les renseignements suivants :

- a)** une description de l'emplacement du dépôt de résidus miniers et de l'habitat du poisson qui sera affecté par le rejet;
- b)** l'analyse quantitative de l'incidence du rejet sur l'habitat du poisson;
- c)** une description des mesures visant à contrebalancer la perte d'habitat du poisson;
- d)** une description des mesures envisagées durant la planification et la mise en œuvre du plan pour atténuer les effets défavorables sur l'habitat du poisson qui pourraient résulter de cette mise en œuvre;
- e)** une description des mesures de surveillance de la mise en œuvre du plan;
- f)** une description des mécanismes permettant de mesurer l'atteinte de l'objectif du plan;
- g)** le délai de la mise en œuvre du plan qui permet l'atteinte de son objectif dans un délai raisonnable;
- h)** l'estimation du coût de mise en œuvre de chacun des éléments du plan.

(3) The owner or operator of a mine shall submit with the compensation plan an irrevocable letter of credit to cover the plan's implementation costs, which letter of credit shall be payable upon demand on the declining balance of the implementation costs.

(4) The Minister of the Environment shall approve the compensation plan if it meets the requirements of subsection (2) and the owner or operator of a mine has complied with subsection (3).

(5) The owner or operator of a mine shall ensure that the compensation plan approved by the Minister of the Environment is implemented and, if the compensation plan's purpose is not being achieved, the owner or operator shall inform the Minister of the Environment.

(6) If the compensation plan's purpose is not being achieved, the owner or operator of a mine shall, as soon as practicable in the circumstances, identify and implement all necessary remedial measures to ensure that the purpose is achieved.

SOR/2006-239, s. 14; SOR/2018-99, s. 24.

Deposits from Tailings Impoundment Areas

28 (1) The owner or operator of a mine shall deposit effluent from a tailings impoundment area only through a final discharge point that is monitored and reported on in accordance with the requirements of these Regulations.

(2) The owner or operator of a mine shall comply with section 6 and the conditions prescribed in paragraphs 4(1)(a) to (c) for all effluent that exits a tailing impoundment area.

PART 3

Unauthorized Deposits

29 [Repealed, SOR/2018-99, s. 25]

Emergency Response Plan

30 (1) The owner or operator of a mine shall prepare an emergency response plan that describes the measures to be taken in respect of a deleterious substance within the meaning of subsection 34(1) of the Act to prevent any unauthorized deposit of such a substance or to mitigate the effects of such a deposit.

(3) Le propriétaire ou l'exploitant d'une mine présente, avec le plan compensatoire, une lettre de crédit irrévocable couvrant les coûts de mise en œuvre du plan et payable sur demande à l'égard du coût des éléments du plan qui n'ont pas été mis en œuvre.

(4) Le ministre de l'Environnement approuve le plan compensatoire si celui-ci satisfait aux exigences visées au paragraphe (2) et si le propriétaire ou l'exploitant de la mine s'est conformé au paragraphe (3).

(5) Le propriétaire ou l'exploitant d'une mine veille à ce que le plan compensatoire qui a été approuvé par le ministre de l'Environnement soit mis en œuvre et informe ce dernier si l'objectif du plan n'a pas été atteint.

(6) Si l'objectif du plan compensatoire n'est pas atteint, le propriétaire ou l'exploitant d'une mine prend les mesures correctives nécessaires le plus tôt possible, eu égard aux circonstances.

DORS/2006-239, art. 14; DORS/2018-99, art. 24.

Rejets à partir de dépôts de résidus miniers

28 (1) Le propriétaire ou l'exploitant d'une mine ne rejette l'effluent provenant d'un dépôt de résidus miniers qu'à un point de rejet final faisant l'objet d'un suivi et de rapports conformément aux exigences du présent règlement.

(2) Il remplit les conditions prévues aux alinéas 4(1)a) à c) et se conforme à l'article 6 lorsqu'il rejette un tel effluent.

PARTIE 3

Rejets non autorisés

29 [Abrogé, DORS/2018-99, art. 25]

Plan d'intervention d'urgence

30 (1) Le propriétaire ou l'exploitant d'une mine dresse un plan d'intervention d'urgence qui énonce, à l'égard d'une substance nocive au sens du paragraphe 34(1) de la Loi, les mesures à prendre pour prévenir tout rejet non autorisé d'une telle substance ou pour en atténuer les effets.

(2) The emergency response plan shall include the following elements:

- (a)** the identification of any unauthorized deposit that can reasonably be expected to occur at the mine and that can reasonably be expected to result in damage or danger to fish habitat or fish or the use by man of fish, and the identification of the damage or danger;
- (b)** a description of the measures to be used to prevent, prepare for, respond to and recover from a deposit identified under paragraph (a);
- (c)** a list of the individuals who are to implement the plan in the event of an unauthorized deposit, and a description of their roles and responsibilities;
- (d)** the identification of the emergency response training required for each of the individuals listed under paragraph (c);
- (e)** a list of the emergency response equipment included as part of the plan, and the equipment's location; and
- (f)** alerting and notification procedures including the measures to be taken to notify members of the public who may be adversely affected by a deposit identified under paragraph (a).

(3) The owner or operator shall complete the emergency response plan and have it available for inspection no later than 60 days after the mine becomes subject to this section.

(4) The owner or operator shall update and test the emergency response plan at least once each year to ensure that the plan continues to meet the requirements of subsection (2).

(4.1) The owner or operator of a mine shall, each time the emergency response plan is tested, record the following information and keep the record for at least five years:

- (a)** a summary of the test;
- (b)** the test results; and
- (c)** any modifications that are made to the plan as a consequence of the test.

(4.2) The owner or operator of a mine shall ensure that a copy of the most recent version of the emergency response plan is kept at the mine in a location that is readily available to the individuals who are responsible for implementing the plan.

(2) Le plan d'intervention d'urgence comporte en outre les éléments suivants :

- a)** la mention de tout rejet non autorisé qui pourrait se produire à la mine et entraîner des dommages ou des risques réels de dommages pour le poisson ou son habitat ou pour l'utilisation par l'homme du poisson, ainsi que l'identification de ces risques ou dommages;
- b)** le détail des mesures de prévention, de préparation, d'intervention et de réparation applicable à l'égard du rejet non autorisé mentionné au titre de l'alinéa a);
- c)** la liste des personnes chargées de mettre à exécution le plan en cas de rejet non autorisé ainsi qu'une description de leurs rôles et responsabilités;
- d)** la mention de la formation en intervention d'urgence exigée des personnes visées à l'alinéa c);
- e)** la liste de l'équipement d'intervention d'urgence prévu dans le plan et l'emplacement de cet équipement;
- f)** les procédures d'alerte et de notification, notamment les mesures prévues pour avertir les membres du public auxquels le rejet irrégulier mentionné au titre de l'alinéa a) pourrait causer un préjudice.

(3) Le propriétaire ou l'exploitant termine le plan d'intervention d'urgence, lequel doit être disponible pour inspection, dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent article.

(4) Il tient à jour et met à l'essai le plan d'intervention d'urgence au moins une fois par année afin de veiller à ce que celui-ci satisfasse aux exigences du paragraphe (2).

(4.1) Chaque fois que le plan d'intervention est mis à l'essai, le propriétaire ou l'exploitant d'une mine consigne dans un registre les renseignements ci-après qu'il conserve pendant au moins cinq ans :

- a)** un résumé de l'essai;
- b)** les résultats de cet essai;
- c)** les modifications apportées au plan à la suite de cet essai.

(4.2) Il veille à ce qu'une copie du plan d'intervention d'urgence à jour soit conservée à la mine, à un endroit facilement accessible aux personnes chargées de mettre à exécution le plan.

(5) If a mine has not been subject to the requirements of this section for more than one year, a new emergency response plan shall be prepared and completed no later than 60 days after the day on which the mine again becomes subject to this section.

SOR/2006-239, s. 16; SOR/2012-22, s. 6(F); SOR/2018-99, s. 26.

Reporting

31 A report required by subsection 38(7) of the Act in respect of the unauthorized deposit of a deleterious substance shall contain the following information:

- (a)** the name, description and concentration of the deleterious substance deposited;
- (b)** the estimated quantity of the deposit and how the estimate was achieved;
- (c)** the day on which, and hour at which, the deposit occurred;
- (d)** the quantity of the deleterious substance that was deposited at a place other than through a final discharge point and the identification of that place, including the location by latitude and longitude and, if applicable, the civic address;
- (e)** the quantity of the deleterious substance that was deposited through a final discharge point and the identification of that discharge point;
- (f)** the name of the receiving body of water, if there is a name, and the location by latitude and longitude where the deleterious substance entered the receiving body of water;
- (g)** the results of the acute lethality tests conducted under subsection 31.1(1) or a statement indicating that acute lethality tests were not conducted but that notification was given under subsection 31.1(2);
- (h)** the circumstances of the deposit, the measures that were taken to mitigate the effects of the deposit and, if the emergency response plan was implemented, details concerning its implementation; and
- (i)** the measures that were taken, or that are intended to be taken, to prevent any similar occurrence of an unauthorized deposit.

SOR/2006-239, s. 17; SOR/2011-92, s. 6; SOR/2018-99, s. 27.

(5) Si la mine n'a pas été assujettie au présent article pendant plus d'un an, un nouveau plan d'intervention d'urgence est dressé — et doit être terminé — dans les soixante jours suivant la date à laquelle elle le redevient.

DORS/2006-239, art. 16; DORS/2012-22, art. 6(F); DORS/2018-99, art. 26.

Rapport

31 Le rapport exigé au paragraphe 38(7) de la Loi, à l'égard du rejet non autorisé d'une substance nocive, comporte les renseignements suivants :

- a)** le nom, la description et la concentration de la substance nocive rejetée;
- b)** la quantité estimative du rejet ainsi que la méthode d'estimation utilisée;
- c)** la date et l'heure du rejet;
- d)** la quantité de la substance nocive qui a été rejetée à partir d'un lieu autre qu'un point de rejet final et la mention de ce lieu ainsi que sa latitude et sa longitude et, le cas échéant, l'adresse municipale;
- e)** la quantité de la substance nocive qui a été rejetée à partir d'un point de rejet final, et la mention de celui-ci;
- f)** le nom du milieu aquatique récepteur, si ce nom existe, et la latitude et la longitude du point de pénétration de la substance nocive dans le milieu aquatique;
- g)** les résultats des essais de détermination de la létalité aiguë effectués en application du paragraphe 31.1(1) ou une attestation indiquant qu'aucun essai de détermination de la létalité aiguë n'a été effectué mais que l'avis visé au paragraphe 31.1(2) a été donné;
- h)** les circonstances du rejet, les mesures d'atténuation prises et, le cas échéant, le détail de l'exécution du plan d'intervention d'urgence;
- i)** les mesures prises ou planifiées afin d'éviter d'autres rejets semblables à l'avenir.

DORS/2006-239, art. 17; DORS/2011-92, art. 6; DORS/2018-99, art. 27.

Acute Lethality Testing

31.1 (1) If an unauthorized deposit of a deleterious substance occurs, the owner or operator of a mine shall, without delay, collect a grab sample of effluent at the place where the deposit occurred and determine whether the effluent is acutely lethal by conducting tests on aliquots of each effluent sample in accordance with sections 14.1 and 14.2.

(2) Despite subsection (1), the owner or operator of a mine is not required to conduct those tests if they notify an inspector, without delay, that the deposit is an acutely lethal effluent.

SOR/2018-99, s. 27.

PART 4

Recognized Closed Mines

Requirements

32 (1) An owner or operator who intends to close a mine shall

(a) provide written notice of that intention to the Minister of the Environment;

(b) maintain the mine's rate of production at less than 10% of its design-rated capacity for a continuous period of three years starting on the day on which the written notice is received by the Minister of the Environment; and

(c) conduct a biological monitoring study during the three-year period referred to in paragraph (b) in accordance with Division 3 of Part 2 of Schedule 5.

(2) If the owner or operator has complied with all of the requirements set out in paragraphs (1)(a) to (c), the mine becomes a recognized closed mine after the expiry of the three-year period referred to in subsection (1).

(3) The owner or operator shall notify the Minister of the Environment in writing at least 60 days before reopening the recognized closed mine.

(4) The owner or operator referred to in this section shall keep at any place in Canada all records, books of account or other documents required by these Regulations for a period of not less than five years beginning on the day

Essai de détermination de la létalité aiguë

31.1 (1) En cas de rejet non autorisé d'une substance nocive, le propriétaire ou l'exploitant d'une mine prélève sans délai un échantillon instantané d'effluent sur les lieux du rejet non autorisé et détermine si cet effluent présente une létalité aiguë en effectuant des essais conformément aux articles 14.1 et 14.2 sur des portions aliquotes de chaque échantillon d'effluent prélevé.

(2) Malgré le paragraphe (1), le propriétaire ou l'exploitant d'une mine n'est pas tenu d'effectuer les essais s'il avise sans délai l'inspecteur que le rejet est un effluent à létalité aiguë.

DORS/2018-99, art. 27.

PARTIE 4

Mines fermées reconnues

Exigences

32 (1) Le propriétaire ou l'exploitant qui souhaite fermer sa mine :

a) en avise le ministre de l'Environnement par écrit;

b) maintient le taux de production de la mine à moins de 10 % de sa capacité nominale durant une période continue de trois ans commençant à la date à laquelle le ministre de l'Environnement reçoit l'avis;

c) effectue, durant la période prévue à l'alinéa b), une étude de suivi biologique conformément à la section 3 de la partie 2 de l'annexe 5.

(2) La mine devient une mine fermée reconnue à l'expiration de la période de trois ans prévue au paragraphe (1) si le propriétaire ou l'exploitant s'est conformé aux exigences visées aux alinéas (1)a) à c).

(3) Le propriétaire ou l'exploitant avise par écrit le ministre de l'Environnement de la réouverture de la mine fermée reconnue au moins soixante jours avant la réouverture.

(4) Le propriétaire ou l'exploitant visé par le présent article conserve n'importe où au Canada tous les registres, livres comptables ou autres documents exigés par le présent règlement pendant au moins cinq ans à compter de

they are made, and shall notify the Minister of the Environment in writing of their location.

SOR/2006-239, s. 18; SOR/2018-99, ss. 28, 36.

Identifying Information

33 (1) The owner or operator of a recognized closed mine shall submit in writing to the Minister of the Environment the information referred to in subsection (2) not later than 60 days after the day on which

(a) the recognized closed mine becomes subject to these Regulations; or

(b) ownership of the recognized closed mine is transferred.

(2) The information that shall be submitted is the name and address of

(a) both the owner and the operator of the recognized closed mine; and

(b) any parent company of the owner or the operator.

(3) The owner or operator shall notify the Minister of the Environment of any change in the information not later than 60 days after the change occurs.

SOR/2018-99, s. 36.

34 [Repealed, SOR/2018-99, s. 29]

35 [Repealed, SOR/2018-99, s. 29]

36 [Repealed, SOR/2018-99, s. 29]

37 [Repealed, SOR/2018-99, s. 29]

38 [Repealed, SOR/2018-99, s. 29]

39 [Repealed, SOR/2018-99, s. 29]

40 [Repealed, SOR/2018-99, s. 29]

41 [Repealed, SOR/2018-99, s. 29]

42 [Repealed, SOR/2018-99, s. 29]

leur établissement et avise le ministre de l'Environnement par écrit du lieu où ils se trouvent.

DORS/2006-239, art. 18; DORS/2018-99, art. 28 et 36.

Renseignements d'identification

33 (1) Le propriétaire ou l'exploitant d'une mine fermée reconnue présente par écrit au ministre de l'Environnement les renseignements mentionnés au paragraphe (2) :

a) dans les soixante jours suivant la date à laquelle la mine fermée reconnue devient assujettie au présent règlement;

b) dans les soixante jours suivant le transfert de propriété de la mine fermée reconnue.

(2) Les renseignements à présenter sont :

a) les nom et adresse du propriétaire et de l'exploitant;

b) les nom et adresse de toute société mère du propriétaire ou de l'exploitant.

(3) Le propriétaire ou l'exploitant avise le ministre de l'Environnement de tout changement des renseignements dans les soixante jours suivant le changement.

DORS/2018-99, art. 36.

34 [Abrogé, DORS/2018-99, art. 29]

35 [Abrogé, DORS/2018-99, art. 29]

36 [Abrogé, DORS/2018-99, art. 29]

37 [Abrogé, DORS/2018-99, art. 29]

38 [Abrogé, DORS/2018-99, art. 29]

39 [Abrogé, DORS/2018-99, art. 29]

40 [Abrogé, DORS/2018-99, art. 29]

41 [Abrogé, DORS/2018-99, art. 29]

42 [Abrogé, DORS/2018-99, art. 29]

SCHEDULE 1

[Repealed, SOR/2018-99, s. 30]

ANNEXE 1

[Abrogée, DORS/2018-99, art. 30]

SCHEDULE 2

(Subsections 5(1) and 27.1(1))

Tailings Impoundment Areas

Item	Water or Place	Description
1	Anderson Lake, Manitoba	Anderson Lake located at 54°51' north latitude and 100°0' west longitude near the town of Snow Lake, Manitoba. More precisely, the area bounded by <ul style="list-style-type: none"> (a) the contour of elevation around Anderson Lake at the 285-m level, and (b) the control dam built at the east end of Anderson Lake.
2	Garrow Lake, Nunavut	Garrow Lake located at 75°23' north latitude and 97°48' west longitude near the south end of Little Cornwallis Island, Nunavut.
3	South Kemess Creek, British Columbia	That part of South Kemess Creek being within the watershed of that tributary of South Kemess Creek <ul style="list-style-type: none"> (a) extending eastwards and upstream from the centre of a tailings dam constructed at 57°1' north latitude and 126°41' west longitude, and (b) below the crest of the dam at an elevation of 1515 m.
4	Albino Lake, British Columbia	Albino Lake located at 56°39.4' north latitude and 130°29.4' west longitude near the Eskay Creek Mine in British Columbia. More precisely, the area bounded by <ul style="list-style-type: none"> (a) the contour of elevation around Albino Lake at the 1040-m level, and (b) the outlet of Albino Lake.
5	Tom MacKay Lake, British Columbia	Tom MacKay Lake located at 56°39' north latitude and 130°34' west longitude near the Eskay Creek Mine in British Columbia. More precisely, the area bounded by <ul style="list-style-type: none"> (a) the contour of elevation around Tom MacKay Lake at the 1078-m level, and (b) the outlet of Tom MacKay Lake.
6	Trout Pond, Newfoundland and Labrador	Trout Pond located at 48°39'0.81882" north latitude and 56°29'19.704984" west longitude in west-central Newfoundland. More precisely, the area bounded by <ul style="list-style-type: none"> (a) the contour of elevation around Trout Pond at the 270 m level, and (b) the outlet of Trout Pond.
7	The headwater pond of a tributary to Gill's Pond Brook, Newfoundland and Labrador	The headwater pond of a tributary to Gill's Pond Brook, located at 48°38'29.599584" north latitude and 56°30'15.560676" west longitude in west-central Newfoundland. More precisely, the area bounded by <ul style="list-style-type: none"> (a) the contour of elevation around the pond at the 260 m level, and (b) the outlet of the pond.

ANNEXE 2

(paragraphe 5(1) et 27.1(1))

Dépôts de résidus miniers

Article	Eaux ou lieux	Description
1	Lac Anderson, Manitoba	Le lac Anderson, situé par 54°51' de latitude N. et 100°0' de longitude O., près de la ville de Snow Lake, au Manitoba. Plus précisément, le lieu délimité par : <ul style="list-style-type: none"> a) la courbe de niveau à 285 m autour du lac Anderson; b) le barrage de régulation à l'extrémité est du lac Anderson.
2	Lac Garrow, Nunavut	Le lac Garrow, situé par 75°23' de latitude N. et 97°48' de longitude O., près de l'extrémité sud de la petite île Cornwallis, au Nunavut.
3	Ruisseau South Kemess, Colombie-Britannique	La partie du ruisseau South Kemess située dans le bassin hydrographique du tributaire du ruisseau South Kemess : <ul style="list-style-type: none"> a) qui s'étend vers l'est et en amont du centre d'un barrage de retenue des stériles situé par 57°1' de latitude N. et 126°41' de longitude O.; b) qui se trouve en dessous de la crête du barrage, à une altitude de 1515 m.
4	Lac Albino, Colombie-Britannique	Le lac Albino, situé par 56°39,4' de latitude N. et 130°29,4' de longitude O., près de la mine Eskay Creek, en Colombie-Britannique. Plus précisément, la région délimitée par : <ul style="list-style-type: none"> a) la courbe de niveau à 1040 m autour du lac Albino; b) la décharge du lac Albino.
5	Lac Tom MacKay, Colombie-Britannique	Le lac Tom MacKay, situé par 56°39' de latitude N. et 130°34' de longitude O., près de la mine Eskay Creek, en Colombie-Britannique. Plus précisément, la région délimitée par : <ul style="list-style-type: none"> a) la courbe de niveau à 1078 m autour du lac Tom MacKay; b) la décharge du lac Tom Mackay.
6	Trout Pond, Terre-Neuve-et-Labrador	L'étang Trout Pond, situé par 48°39'0,818 82" de latitude N. et 56°29'19,704 984" de longitude O., dans la partie centrale ouest de Terre-Neuve et, plus précisément, la région délimitée par : <ul style="list-style-type: none"> a) la courbe de niveau à 270 m autour de l'étang Trout Pond; b) la décharge de l'étang Trout Pond.

	Column 1	Column 2
Item	Water or Place	Description
8	The northwest arm of Second Portage Lake, Nunavut	That portion of the northwest arm of Second Portage Lake, located at 65°1'39.29" north latitude and 96°3'43" west longitude, approximately 80 km north of the town of Baker Lake, Nunavut. More precisely, the area bounded by <p>(a) the contour of elevation around the arm at the 146 m level, and</p> <p>(b) the dam built at the southeast end of the arm.</p>
9	Tail Lake, Nunavut	Tail Lake, located at 68°7'25.8" north latitude and 106°33'31.2" west longitude, approximately 125 km southwest of the town of Cambridge Bay, Nunavut. More precisely, the area bounded by <p>(a) the contour of elevation around Tail Lake at the 33.5 m level, and</p> <p>(b) the dams built at the south and north ends of the lake.</p>
10	A portion of Wabush Lake, Newfoundland and Labrador	That portion of Wabush Lake near the towns of Labrador City and Wabush in western Labrador. More precisely, the area bounded by <p>(a) the southern limit, extending from 53° north latitude, 66°50'24" west longitude to 53° north latitude, 66°52'57" west longitude, and</p> <p>(b) the outlet of Wabush Lake, extending from 53°09'4.7" north latitude, 66°47'3.5" west longitude to 53°08'57.5" north latitude, 66°47'2.9" west longitude.</p>
11	Flora Lake, Newfoundland and Labrador	Flora Lake located at 52°55' north latitude, 66°49' west longitude, near the towns of Labrador City and Wabush in western Labrador.
12	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52'9.94" north latitude, 66°47'14.26" west longitude) for a distance of 75 m upstream from Flora Lake.
13	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52'10.70" north latitude, 66°47'6.49" west longitude) for a distance of 580 m upstream from Flora Lake.
14	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52'57.45" north latitude, 66°47'25.23" west longitude) for a distance of 256 m upstream from Flora Lake.

	Colonne 1	Colonne 2
Article	Eaux ou lieux	Description
7	L'étang d'amont d'un tributaire du ruisseau Gill, Terre-Neuve-et-Labrador	L'étang d'amont d'un tributaire du ruisseau Gill, situé par 48°38'29,599 584" de latitude N. et 56°30'15,560 676" de longitude O., dans la partie centrale ouest de Terre-Neuve et, plus précisément, la région délimitée par : <p>a) la courbe de niveau à 260 m autour de l'étang;</p> <p>b) la décharge de l'étang.</p>
8	Le nord-ouest du bras du lac Second Portage, Nunavut	La partie du nord-ouest du bras du lac Second Portage, située par 65°1'39,29" de latitude N. et 96°3'43" de longitude O., à environ 80 km au nord de la ville de Baker Lake, au Nunavut et, plus précisément, la région délimitée par : <p>a) la courbe de niveau à 146 m autour du bras;</p> <p>b) la digue construite à l'extrémité sud-est du bras.</p>
9	Lac Tail, Nunavut	Le lac Tail, situé par 68°7'25,8" de latitude N. et 106°33'31,2" de longitude O., à environ 125 km au sud-ouest de la ville de Cambridge Bay, au Nunavut et, plus précisément, la région délimitée par : <p>a) la courbe de niveau à 33,5 m autour du lac;</p> <p>b) les digues construites aux extrémités sud et nord du lac.</p>
10	Une partie du lac Wabush, Terre-Neuve-et-Labrador	La partie du lac Wabush, située près des villes de Labrador City et de Wabush dans la partie ouest du Labrador, et, plus précisément, la région délimitée par : <p>a) la limite sud s'étendant de 53° de latitude N. et 66°50'24" de longitude O., à 53° de latitude N. et 66°52'57" de longitude O.;</p> <p>b) la décharge du lac Wabush, s'étendant de 53°09'4,7" de latitude N. et 66°47'3,5" de longitude O., à 53°08'57,5" de latitude N. et 66°47'2,9" de longitude O.</p>
11	Lac Flora, Terre-Neuve-et-Labrador	Le lac Flora, situé par 52°55' de latitude N. et 66°49' de longitude O., près des villes de Labrador City et de Wabush dans la partie ouest du Labrador.
12	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52'9,94" de latitude N., 66°47'14,26" de longitude O.) sur une distance de 75 m en amont du lac Flora.
13	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52'10,70" de latitude N., 66°47'6,49" de longitude O.) sur une distance de 580 m en amont du lac Flora.

	Column 1	Column 2
Item	Water or Place	Description
15	Sandy Pond, Newfoundland and Labrador	<p>Sandy Pond, located at 47°25'33" north latitude and 53°46'52" west longitude, on the Avalon Peninsula, approximately 3 km east southeast of the town of Long Harbour-Mount Arlington Heights, Newfoundland and Labrador. More precisely, the area bounded by</p> <p>(a) the contour of elevation around Sandy Pond at the 137 m level, and</p> <p>(b) the dams built at the north end of Sandy Pond.</p>
16	A portion of King Richard Creek, British Columbia	A portion of King Richard Creek, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 3.3 km portion of the creek extending northwards and upstream from the centre of a dam constructed at 55°06'42" north latitude and 123°59'29" west longitude, to the centre of a dam constructed at 55°07'52" north latitude and 124°00'50" west longitude.
17	A portion of an unnamed tributary to Alpine Lake, British Columbia	A portion of an unnamed tributary to Alpine Lake, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 900 m portion of the tributary extending southwards and upstream from the centre of a dam constructed at 55°08'19" north latitude and 124°00'27" west longitude, to the centre of a dam constructed at 55°07'59" north latitude and 124°01'00" west longitude.
18	A portion of an unnamed tributary to Alpine Lake, British Columbia	A portion of an unnamed tributary to Alpine Lake, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 590 m portion of the tributary extending southwards and upstream from the centre of a dam constructed at 55°08'18" north latitude and 124°00'41" west longitude, to the centre of a dam constructed at 55°08'09" north latitude and 124°01'08" west longitude.
19	Mallard Lake, Saskatchewan	<p>Mallard Lake, located at 56°00'32" north latitude and 104°16'38" west longitude, approximately 120 km northeast of the town of La Ronge, Saskatchewan. More precisely, the area bounded by</p> <p>(a) the contour of elevation around Mallard Lake at the 490 m level, and</p> <p>(b) the dam built at the south end of Mallard Lake.</p>
20	The unnamed headwater pond of an unnamed tributary of East Creek, Ontario	An unnamed headwater pond of an unnamed tributary of East Creek, located at 50°02'17" north latitude and 79°40'57" west longitude, approximately 145 km northeast of the town of Cochrane, Ontario.

	Colonne 1	Colonne 2
Article	Eaux ou lieux	Description
14	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52'57,45" de latitude N., 66°47'25,23" de longitude O.) sur une distance de 256 m en amont du lac Flora.
15	Sandy Pond, Terre-Neuve-et-Labrador	<p>L'étang Sandy Pond, situé par 47°25'33" de latitude N. et 53°46'52" de longitude O., dans la péninsule Avalon, à environ 3 km est-sud-est de la ville de Long Harbour-Mount Arlington Heights, Terre-Neuve-et-Labrador, et, plus précisément, la région délimitée par :</p> <p>a) la courbe de niveau à 137 m autour de l'étang Sandy Pond;</p> <p>b) les digues construites à l'extrémité nord de l'étang Sandy Pond.</p>
16	Une partie du ruisseau King Richard, Colombie-Britannique	La partie du ruisseau King Richard située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 3,3 km vers le nord et en amont du centre du barrage situé par 55°06'42" de latitude N. et 123°59'29" de longitude O. jusqu'au centre du barrage situé par 55°07'52" de latitude N. et 124°00'50" de longitude O.
17	Une partie d'un affluent sans nom tributaire du lac Alpine, Colombie-Britannique	La partie d'un affluent sans nom tributaire du lac Alpine située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie de l'affluent qui s'étend sur 900 m vers le sud et en amont du centre du barrage situé par 55°08'19" de latitude N. et 124°00'27" de longitude O. jusqu'au centre du barrage situé par 55°07'59" de latitude N. et 124°01'00" de longitude O.
18	Une partie d'un affluent sans nom tributaire du lac Alpine, Colombie-Britannique	La partie d'un affluent sans nom tributaire du lac Alpine située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie de l'affluent qui s'étend sur 590 m vers le sud et en amont du centre du barrage situé par 55°08'18" de latitude N. et 124°00'41" de longitude O. jusqu'au centre du barrage situé par 55°08'09" de latitude N. et 124°01'08" de longitude O.
19	Lac Mallard, Saskatchewan	<p>Le lac Mallard, situé par 56°00'32" de latitude N. et 104°16'38" de longitude O., à environ 120 km au nord-est de la ville de La Ronge en Saskatchewan et, plus précisément, la région délimitée par :</p> <p>a) la courbe de niveau à 490 m autour du lac Mallard;</p> <p>b) le barrage construit à l'extrémité sud du lac Mallard.</p>
20	L'étang d'amont sans nom d'un tributaire sans nom du ruisseau East, Ontario	L'étang d'amont sans nom d'un tributaire sans nom du ruisseau East situé par 50°02'17" de latitude N. et 79°40'57" de longitude O., à environ 145 km au nord-est de la ville de Cochrane, en Ontario.

Column 1		Column 2
Item	Water or Place	Description
21	A portion of an unnamed tributary to East Creek, Ontario	A portion of an unnamed tributary to East Creek, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 2.3-km portion of the tributary extending northwards and downstream from the outlet of the unnamed headwater pond referred to in item 20, to the centre of a dam constructed at 50°02'43" north latitude and 79°40'20" west longitude.
22	A portion of an unnamed tributary to Linden Creek, Ontario	A portion of an unnamed tributary to Linden Creek, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 1.8-km portion of the tributary extending southwards and downstream from the northern perimeter of a waste rock disposal area at 50°00'17" north latitude and 79°43'37" west longitude to the southern perimeter of the waste rock disposal area at 49°59'30" north latitude and 79°43'07" west longitude.
23	A portion of an unnamed tributary to an unnamed lake in the Linden Creek watershed, Ontario	A portion of an unnamed tributary to an unnamed lake in the Linden Creek watershed, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 1.4-km portion of the tributary extending southwards and downstream from the headwaters of the tributary at 50°00'17" north latitude and 79°42'39" west longitude to the southern perimeter of a waste rock disposal area at 49°59'25" north latitude and 79°42'27" west longitude.
24	A portion of Trail Creek, British Columbia	A portion of Trail Creek, located approximately 20 km southeast of the community of Iskut, British Columbia. More precisely, a 0.6 km portion of the creek extending southwards and downstream from a natural barrier located at 57°42'59" north latitude and 129°44'10" west longitude, to the centre of a dam constructed at 57°42'43" north latitude and 129°44'20" west longitude.
25	Lake Hesse, Quebec	<p>Lake Hesse, located at 52°46'21" north latitude and 67°20'58" west longitude, approximately 15 km west of the town of Fermont, Quebec. More precisely, the area bounded by</p> <ul style="list-style-type: none"> (a) the contour of elevation around Lake Hesse at the 620 m level, (b) the dam built at the north end of Lake Hesse, and (c) the control dam built at the south end of Lake Hesse.

Colonne 1		Colonne 2
Article	Eaux ou lieux	Description
21	Une partie d'un tributaire sans nom du ruisseau East, Ontario	La partie d'un tributaire sans nom du ruisseau East située à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 2,3 km vers le nord et en aval de la décharge de l'étang d'amont sans nom visé à l'article 20 de la présente annexe, jusqu'au centre du barrage situé par 50°02'43" de latitude N. et 79°40'20" de longitude O.
22	Une partie d'un tributaire sans nom du ruisseau Linden, Ontario	La partie d'un tributaire sans nom du ruisseau Linden situé à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 1,8 km vers le sud et en aval du périmètre nord d'une aire de décharge de stériles située par 50°00'17" de latitude N. et 79°43'37" de longitude O., jusqu'au périmètre sud de l'aire de décharge de stériles située par 49°59'30" de latitude N. et 79°43'07" de longitude O.
23	Une partie d'un tributaire sans nom d'un lac sans nom du bassin hydrographique du ruisseau Linden, Ontario	La partie d'un tributaire sans nom d'un lac sans nom du bassin hydrographique du ruisseau Linden située à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 1,4 km vers le sud et en aval des eaux d'amont du tributaire située par 50°00'17" de latitude N. et 79°42'39" de longitude O., jusqu'au périmètre sud d'une aire de décharge de stériles située par 49°59'25" de latitude N. et 79°42'27" de longitude O.
24	Une partie du ruisseau Trail, Colombie-Britannique	Une partie du ruisseau Trail situé en Colombie-Britannique à environ 20 km au sud-est de la communauté d'Iskut et, plus précisément, la partie du ruisseau qui s'étend sur 0,6 km vers le sud et en aval de la barrière naturelle située par 57°42'59" de latitude N. et 129°44'10" de longitude O. jusqu'au centre du barrage situé par 57°42'43" de latitude N. et 129°44'20" de longitude O.
25	Le lac Hesse, Québec	<p>Le lac Hesse, situé par 52°46'21" de latitude N. et 67°20'58" de longitude O., à environ 15 km à l'ouest de la ville de Fermont, au Québec, et, plus précisément, la région délimitée par :</p> <ul style="list-style-type: none"> a) la courbe de niveau à 620 m autour du lac Hesse; b) le barrage construit à l'extrémité nord du lac Hesse; c) le barrage de régulation construit à l'extrémité sud du lac Hesse.

Item	Column 1 Water or Place	Column 2 Description
26	An unnamed lake approximately 20 km west of Fermont, Quebec and a portion of its outlet	An unnamed lake, located at 52°49'43" north latitude and 67°22'23" west longitude, approximately 20 km west of the town of Fermont, Quebec, and a portion of its outlet. More precisely, the area bounded by (a) the contour of elevation around the lake at the 660 m level, and (b) the outlet of the lake extending from the mouth of an outlet stream at 52°49'33" north latitude and 67°22'18" west longitude for a distance of 30 m downstream from that mouth.
27	A portion of an unnamed stream discharging waters from an unnamed lake, other than the one referred to in item 26, approximately 20 km west of Fermont, Quebec	A portion of an unnamed stream discharging waters from an unnamed lake, other than the one referred to in item 26, approximately 20 km west of the town of Fermont, Quebec. More precisely, the 1815 m portion of the stream that extends southwards and downstream from the point located at 52°50'02" north latitude and 67°21'29" west longitude to the point located at 52°49'20" north latitude and 67°21'39" west longitude.
28	A portion of South Teigen Creek, British Columbia	A portion of South Teigen Creek, located approximately 65 km northwest of Stewart, British Columbia. More precisely, an 8.1-km portion of the creek extending northwards and downstream from the point located at 56°37'53" north latitude and 129°54'44" west longitude to the centre of a dam located at 56°40'11.57" north latitude and 129°58'20.92" west longitude.
29	A portion of North Treaty Creek, British Columbia	A portion of North Treaty Creek, located approximately 65 km northwest of Stewart, British Columbia. More precisely, a 3.3-km portion of the creek extending southwards and downstream from the headwaters of the creek located at 56°37'34" north latitude and 129°54'50" west longitude to the centre of a dam located at 56°35'54.24" north latitude and 129°51'25.31" west longitude.
30	An unnamed watercourse that is a tributary to Lake Jean, located approximately 25 km southeast of Chibougamau, Quebec	The unnamed watercourse that is a tributary to Lake Jean, located approximately 25 km southeast of the town of Chibougamau, Quebec, beginning at the unnamed pond located at 49°47'58" north latitude and 74°01'38" west longitude and extending northwards and downstream for a distance of 6.4 km to the centre of the dam constructed at 49°49'29" north latitude and 74°03'07" west longitude.
31	A portion of an unnamed watercourse that is a tributary to the watercourse referred to in item 30	A portion of an unnamed watercourse beginning at that watercourse's point of confluence with the watercourse referred to in item 30, which confluence is located at 49°47'57" north latitude and 74°03'25" west longitude, and extending for a distance of 1 km northwards and upstream from that point.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
26	Un lac sans nom situé à environ 20 km à l'ouest de Fermont, Québec et une partie de sa décharge	Un lac sans nom, situé par 52°49'43" de latitude N. et 67°22'23" de longitude O., à environ 20 km à l'ouest de la ville de Fermont, au Québec, et une partie de sa décharge, et, plus précisément, la région délimitée par : (a) la courbe de niveau à 660 m autour du lac; (b) la décharge du lac s'étendant de l'embouchure de l'émissaire situé par 52°49'33" de latitude N. et 67°22'18" de longitude O., sur une distance de 30 m en aval de son embouchure.
27	Une partie d'un ruisseau sans nom évacuant les eaux d'un lac sans nom, autre que celui mentionné à l'article 26, situé à environ 20 km à l'ouest de Fermont, Québec	Une partie d'un ruisseau sans nom évacuant les eaux d'un lac sans nom, autre que celui mentionné à l'article 26, situé à environ 20 km à l'ouest de la ville de Fermont, au Québec, et, plus précisément, la partie du ruisseau s'étendant sur une distance de 1815 m, au sud et en aval à partir du point situé par 52°50'02" de latitude N. et 67°21'29" de longitude O. jusqu'au point situé par 52°49'20" de latitude N. et 67°21'39" de longitude O.
28	Une partie du ruisseau South Teigen, Colombie-Britannique	La partie du ruisseau South Teigen située à environ 65 km au nord-ouest de Stewart, en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 8,1 km vers le nord-ouest et en aval d'un point situé par 56°37'53" de latitude N. et 129°54'44" de longitude O. jusqu'au centre d'un barrage situé par 56°40'11,57" de latitude N. et 129°58'20,92" de longitude O.
29	Une partie du ruisseau North Treaty, Colombie-Britannique	La partie du ruisseau North Treaty située à environ 65 km au nord-ouest de Stewart, en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 3,3 km vers le sud et en aval des eaux d'amont du ruisseau situé par 56°37'34" de latitude N. et 129°54'50" de longitude O. jusqu'au centre d'un barrage situé par 56°35'54,24" de latitude N. et 129°51'25,31" de longitude O.
30	Un cours d'eau sans nom tributaire du lac Jean, situé à environ 25 km au sud-est de Chibougamau, Québec	Le cours d'eau sans nom tributaire du lac Jean, situé à environ 25 km au sud-est de la ville de Chibougamau, au Québec, débutant à l'étang sans nom situé par 49°47'58" de latitude N. et 74°01'38" de longitude O. et s'étendant vers le nord et en aval sur une distance de 6,4 km jusqu'au centre du barrage situé par 49°49'29" de latitude N. et 74°03'07" de longitude O.
31	Une partie d'un cours d'eau sans nom tributaire du cours d'eau visé à l'article 30	La partie d'un cours d'eau sans nom débutant au point de confluence de celui-ci avec le cours d'eau visé à l'article 30 situé par 49°47'57" de latitude N. et 74°03'25" de longitude O. et s'étendant vers le nord et en amont de ce point sur une distance de 1 km.
32	Une partie d'un cours d'eau sans nom tributaire du cours d'eau visé à l'article 30	La partie du cours d'eau sans nom débutant au point situé par 49°48'06" de latitude N. et 74°03'41" de longitude O. et s'étendant vers le nord et en aval de ce point sur une distance de 740 m jusqu'au point de confluence avec le cours d'eau visé à l'article 30 situé par 49°48'25" de latitude N. et 74°03'25" de longitude O.

	Column 1	Column 2
Item	Water or Place	Description
32	A portion of an unnamed watercourse that is a tributary to the watercourse referred to in item 30	A portion of an unnamed watercourse beginning at a point located at 49°48'06" north latitude and 74°03'41" west longitude and extending for a distance of 740 m northwards and downstream from that point to the point of confluence with the watercourse referred to in item 30, which confluence is located at 49°48'25" north latitude and 74°03'25" west longitude.
33	An unnamed pond east of Lake Bernadette, Quebec, and a portion of its outlet	An unnamed pond located at 49°48'43" north latitude and 74°04'01" west longitude and a portion of its outlet extending from the mouth of the outlet located at 49°48'47" north latitude and 74°03'59" west longitude for a distance of 190 m northwards and downstream from that mouth.
34	A portion of an unnamed creek (locally known as Loslo Creek), and of its unnamed tributaries, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Loslo Creek), and of its unnamed tributaries, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the northernmost point of the creek at 48°53'6" north latitude and 94°2'43" west longitude to the point located at 48°50'24" north latitude and 94°3'36" west longitude.
35	A portion of an unnamed creek (locally known as Marr Creek), and of its unnamed tributaries, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Marr Creek), and of its unnamed tributaries, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the northernmost point of the creek at 48°52'12" north latitude and 94°1'49" west longitude to the point located at 48°51'18" north latitude and 94°2'25" west longitude.
36	A portion of an unnamed creek (locally known as Marr Creek), other than the portion referred to in item 35, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Marr Creek), other than the portion referred to in item 35, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the point located at 48°50'52" north latitude and 94°2'11" west longitude, for a distance of 1.85 km, to the point located at 48°49'53" north latitude and 94°2'24" west longitude.
37	A portion of an unnamed stream and its unnamed tributaries located approximately 25 km northwest of the town of Amos, Quebec	A portion of an unnamed stream and its unnamed tributaries located approximately 25 km northwest of the town of Amos, Quebec. More precisely, the 4.6 km portion of the stream extending from the point located at 48°40'44.00" north latitude and 78°29'12.68" west longitude to the point located at 48°40'7.19" north latitude and 78°28'1.52" west longitude and covering an area of 3.4 ha.

	Colonne 1	Colonne 2
Article	Eaux ou lieux	Description
33	Un étang sans nom à l'est du lac Bernadette, Québec, et une partie de sa décharge	Un étang sans nom situé par 49°48'43" de latitude N. et 74°04'01" de longitude O. et une partie de sa décharge s'étendant de l'embouchure de celle-ci située par 49°48'47" de latitude N. et 74°03'59" de longitude O. sur une distance de 190 m vers le nord en aval de son embouchure.
34	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Loslo) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Loslo) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point le plus au nord du ruisseau situé par 48°53'6" de latitude N. et 94°2'43" de longitude O., jusqu'au point situé par 48°50'24" de latitude N. et 94°3'36" de longitude O.
35	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point le plus au nord du ruisseau situé par 48°52'12" de latitude N. et 94°1'49" de longitude O., jusqu'au point situé par 48°51'18" de latitude N. et 94°2'25" de longitude O.
36	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr), autre que la partie mentionnée à l'article 35, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr), autre que la partie mentionnée à l'article 35, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point situé par 48°50'52" de latitude N. et 94°2'11" de longitude O., sur une distance de 1,85 km, jusqu'au point situé par 48°49'53" de latitude N. et 94°2'24" de longitude O.
37	Une partie d'un ruisseau sans nom, et ses tributaires sans nom, située à environ 25 km au nord-ouest de la ville d'Amos, Québec	La partie d'un ruisseau sans nom, et ses tributaires sans nom, située à environ 25 km au nord-ouest de la ville d'Amos, au Québec, et, plus précisément, la partie du ruisseau qui s'étend sur 4,6 km à partir du point situé par 48°40'44,00" de latitude N. et 78°29'12,68" de longitude O. jusqu'au point situé par 48°40'7,19" de latitude N. et 78°28'1,52" de longitude O. et qui couvre une superficie de 3,4 ha.
38	Une partie d'un tributaire sans nom du Petit lac du Portage, Québec	La partie d'un tributaire sans nom du Petit lac du Portage située à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec. Plus précisément, la partie qui s'étend sur 465 m vers le sud-ouest et en amont du point situé par 50°16'00,90" de latitude N. et 66°33'42,71" de longitude O. jusqu'au point situé par 50°16'06,00" de latitude N. et 66°33'31,55" de longitude O. et qui couvre une superficie de 0,233 ha.

	Column 1	Column 2
Item	Water or Place	Description
38	A portion of an unnamed tributary to Petit lac du Portage, Quebec	A portion of an unnamed tributary to Petit lac du Portage located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 465 m portion of the tributary to Petit lac du Portage extending southwest and upstream from the point located at 50°16'00.90" north latitude and 66°33'42.71" west longitude to the point located at 50°16'06.00" north latitude and 66°33'31.55" west longitude and covering an area of 0.233 ha.
39	An unnamed headwater pond of ruisseau Clet and its unnamed tributaries, Quebec	An unnamed headwater pond of ruisseau Clet located at 50°15'15.82" north latitude and 66°33'13.6" west longitude and covering an area of 2.486 ha, approximately 15 km northwest of the town of Sept-Îles, Quebec, and (a) a 471 m portion of its unnamed tributary extending upstream from the point located at 50°15'18.37" north latitude and 66°33'24.01" west longitude to the point located at 50°15'20.27" north latitude and 66°33'13.51" west longitude and covering an area of 0.117 ha; and (b) a 76 m portion of its unnamed tributary extending upstream from the point located at 50°15'11.97" north latitude and 66°33'22.57" west longitude to the point located at 50°15'12.82" north latitude and 66°33'20.66" west longitude and covering an area of 0.033 ha.
40	A portion of ruisseau Clet and its unnamed tributaries, Quebec	A portion of ruisseau Clet, and its unnamed tributaries, located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 1897 m portion of ruisseau Clet extending southeast and downstream from the outlet of the unnamed headwater pond referred to in item 39 to the point on ruisseau Clet located at 50°15'11.26" north latitude and 66°32'15.99" west longitude and covering an area of 0.850 ha.
41	An unnamed watercourse that is a tributary to Rivière Hall, Quebec	An unnamed watercourse that is composed of interconnected streams and ponds and is a tributary to Rivière Hall and located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 910 m portion of the unnamed watercourse extending downstream from the point located at 50°14'52.33" north latitude and 66°33'27.75" west longitude to the point located at 50°14'39.67" north latitude and 66°32'45.74" west longitude and covering an area of 3.619 ha.

	Colonne 1	Colonne 2
Article	Eaux ou lieux	Description
39	Un étang d'amont sans nom du ruisseau Clet et ses tributaires sans nom, Québec	L'étang d'amont sans nom du ruisseau Clet qui est situé par 50°15'15,82" de latitude N. et 66°33'13,6" de longitude O. et qui couvre une superficie de 2,486 ha, à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et : a) la partie de son tributaire sans nom qui s'étend sur 471 m en amont du point situé par 50°15'18,37" de latitude N. et 66°33'24,01" de longitude O. jusqu'au point situé par 50°15'20,27" de latitude N. et 66°33'13,51" de longitude O. et qui couvre une superficie de 0,117 ha; b) la partie de son tributaire sans nom qui s'étend sur 76 m en amont du point situé par 50°15'11,97" de latitude N. et 66°33'22,57" de longitude O. jusqu'au point situé par 50°15'12,82" de latitude N. et 66°33'20,66" de longitude O. et qui couvre une superficie de 0,033 ha.
40	Une partie du ruisseau Clet et ses tributaires sans nom, Québec	La partie du ruisseau Clet, et ses tributaires sans nom, située à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et, plus précisément, la partie du ruisseau qui s'étend sur 1 897 m vers le sud-est et en aval de la décharge de l'étang d'amont sans nom visé à l'article 39 jusqu'au point du ruisseau situé par 50°15'11,26" de latitude N. et 66°32'15,99" de longitude O. et qui couvre une superficie de 0,850 ha.
41	Un cours d'eau sans nom tributaire de la rivière Hall, Québec	Le cours d'eau sans nom qui est composé de ruisseaux et d'étangs interconnectés, qui est tributaire de la rivière Hall et qui est situé à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec. Plus précisément, la partie du cours d'eau sans nom qui s'étend sur 910 m en amont du point situé par 50°14'52,33" de latitude N. et 66°33'27,75" de longitude O. jusqu'au point situé par 50°14'39,67" de latitude N. et 66°32'45,74" de longitude O. et qui couvre une superficie de 3,619 ha.
42	Des parties d'un ruisseau sans nom, Québec	Les deux parties d'un ruisseau sans nom situées à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et, plus précisément : a) la partie ouest du ruisseau qui s'étend sur 253 m du point situé par 50°15'18,78" de latitude N. et 66°29'52,43" de longitude O. jusqu'au point situé par 50°15'13,76" de latitude N. et 66°29'46,60" de longitude O. et qui couvre une superficie de 0,0585 ha; b) la partie est du ruisseau qui s'étend sur 267 m du point situé par 50°15'19,58" de latitude N. et 66°29'45,99" de longitude O. jusqu'au point situé par 50°15'14,18" de latitude N. et 66°29'45,19" de longitude O. et qui couvre une superficie de 0,0555 ha.

Column 1		Column 2
Item	Water or Place	Description
42	Portions of an unnamed creek, Quebec	<p>Two portions of an unnamed creek located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely,</p> <p>(a) the west portion of the creek extending for a distance of 253 m from the point located at 50°15'18.78" north latitude and 66°29'52.43" west longitude to the point located at 50°15'13.76" north latitude and 66°29'46.60" west longitude and covering 0.0585 ha; and</p> <p>(b) the east portion of the creek extending for a distance of 267 m from the point located at 50°15'19.58" north latitude and 66°29'45.99" west longitude to the point located at 50°15'14.18" north latitude and 66°29'45.19" west longitude and covering 0.0555 ha.</p>

SOR/2006-239, ss. 21 to 23; SOR/2008-216, s. 1; SOR/2009-27, s. 1; SOR/2009-156, s. 2; SOR/2010-250, s. 1; SOR/2011-202, s. 1; SOR/2015-45, s. 1; SOR/2016-87, s. 1; SOR/2016-196, s. 1; SOR/2017-128, s. 1; SOR/2017-129, s. 1; SOR/2017-197, s. 1; SOR/2017-272, s. 1; SOR/2018-100, s. 1.

DORS/2006-239, art. 21 à 23; DORS/2008-216, art. 1; DORS/2009-27, art. 1; DORS/2009-156, art. 2; DORS/2010-250, art. 1; DORS/2011-202, art. 1; DORS/2015-45, art. 1; DORS/2016-87, art. 1; DORS/2016-196, art. 1; DORS/2017-128, art. 1; DORS/2017-129, art. 1; DORS/2017-197, art. 1; DORS/2017-272, art. 1; DORS/2018-100, art. 1.

SCHEDULE 3

(Subsections 1(1) and 12(2) and subsection 4(2) of Schedule 5)

Analytical Requirements for Metal or Diamond Mining Effluent

TABLE 1

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance/pH/temperature	Precision ¹	Accuracy ²	Method Detection Limit (MDL)
1	Arsenic	10%	100 ± 10%	0.0025 mg/L
2	Copper	10%	100 ± 10%	0.001 mg/L
3	Cyanide	10%	100 ± 10%	0.005 mg/L
4	Lead	10%	100 ± 10%	0.0005 mg/L
5	Nickel	10%	100 ± 10%	0.0125 mg/L
6	Zinc	10%	100 ± 10%	0.010 mg/L
7	Suspended Solids	15%	100 ± 15%	2.000 mg/L
8	Radium 226	10%	100 ± 10%	0.01 Bq/L
9	Total ammonia	10%	100 ± 10%	0.05 mg/L expressed as nitrogen (N)
10	pH	0.1 pH unit	0.1 pH unit	Not Applicable
11	Temperature	10%	± 0.5 °C	Not Applicable

¹ Relative standard deviation at concentrations 10 times above the MDL.

² Analyte recovery at concentrations above 10 times the MDL.

TABLE 2

	Column 1	Column 2	Column 3	Column 4
Item	Substances/hardness/alkalinity/electrical conductivity	Precision ¹	Accuracy ²	Method Detection Limit (MDL)
1	Aluminum	10%	100 ± 10%	0.005 mg/L
2	Cadmium	10%	100 ± 10%	0.000045 mg/L
3	Chloride	10%	100 ± 10%	60 mg/L

ANNEXE 3

(paragraphe 1(1) et 12(2) et paragraphe 4(2) de l'annexe 5)

Exigences analytiques pour les effluents des mines de métaux et des mines de diamants

TABEAU 1

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance nocive/pH/température	Précision ¹	Exactitude ²	Limite de détection de la méthode (LDM)
1	Arsenic	10 %	100 ± 10 %	0,0025 mg/L
2	Cuivre	10 %	100 ± 10 %	0,001 mg/L
3	Cyanure	10 %	100 ± 10 %	0,005 mg/L
4	Plomb	10 %	100 ± 10 %	0,0005 mg/L
5	Nickel	10 %	100 ± 10 %	0,0125 mg/L
6	Zinc	10 %	100 ± 10 %	0,010 mg/L
7	Matières en suspension	15 %	100 ± 15 %	2,000 mg/L
8	Radium 226	10 %	100 ± 10 %	0,01 Bq/L
9	Ammoniac total	10 %	100 ± 10 %	0,05 mg/L sous forme d'azote (N)
10	pH	0,1 unité pH	0,1 unité pH	Sans objet
11	Température	10 %	± 0,5 °C	Sans objet

¹ Écart-type relatif à des concentrations dix fois supérieures à la LDM.

² Récupération de l'analyte à des concentrations de plus de dix fois la LDM.

TABEAU 2

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance/dureté/alkalinité/conductivité électrique	Précision ¹	Exactitude ²	Limite de détection de la méthode (LDM)
1	Aluminium	10 %	100 ± 10 %	0,005 mg/L
2	Cadmium	10 %	100 ± 10 %	0,000045 mg/L
3	Chlorure	10 %	100 ± 10 %	60 mg/L

	Column 1	Column 2	Column 3	Column 4
	Substances/ hardness/ alkalinity/ electrical conductivity			Method Detection Limit (MDL)
Item	Precision ¹	Accuracy ²		
4	Chromium	10%	100 ± 10%	0.00445 mg/L
5	Cobalt	10%	100 ± 10%	0.00125 mg/L
6	Iron	10%	100 ± 10%	0.15 mg/L
7	Manganese	10%	100 ± 10%	0.005 mg/L
8	Mercury	10%	100 ± 10%	0.00001 mg/L
9	Molybdenum	10%	100 ± 10%	0.0365 mg/L
10	Nitrate	10%	100 ± 10%	1.46835 mg/L, expressed as nitrogen (N)
11	Phosphorus	10%	100 ± 10%	0.05 mg/L
12	Selenium	10%	100 ± 10%	0.0005 mg/L
13	Sulphate	10%	100 ± 10%	0.6 mg/L
14	Thallium	10%	100 ± 10%	0.0004 mg/L
15	Uranium	10%	100 ± 10%	0.0075 mg/L
16	Total ammonia	10%	100 ± 10%	0.05 mg/L expressed as nitrogen (N)
17	Hardness	10%	100 ± 10%	1 mg/L
18	Alkalinity	10%	100 ± 10%	2 mg/L
19	Electrical Conductivity	10%	100 ± 10%	1 µS/cm

¹ Relative standard deviation at concentrations 10 times above the MDL.

² Analyte recovery at concentrations above 10 times the MDL.

SOR/2006-239, s. 24; SOR/2018-99, s. 31.

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
	Substance/ dureté/ alcalinité/ conductivité électrique			Limite de détection de la méthode (LDM)
Article	Précision ¹	Exactitude ²		
4	Chrome	10 %	100 ± 10 %	0,00445 mg/L
5	Cobalt	10 %	100 ± 10 %	0,00125 mg/L
6	Fer	10 %	100 ± 10 %	0,15 mg/L
7	Manganèse	10 %	100 ± 10 %	0,005 mg/L
8	Mercure	10 %	100 ± 10 %	0,00001 mg/L
9	Molybdène	10 %	100 ± 10 %	0,0365 mg/L
10	Nitrate	10 %	100 ± 10 %	1,46835 mg/L sous forme d'azote (N)
11	Phosphore	10 %	100 ± 10 %	0,05 mg/L
12	Sélénium	10 %	100 ± 10 %	0,0005 mg/L
13	Sulfate	10 %	100 ± 10 %	0,6 mg/L
14	Thallium	10 %	100 ± 10 %	0,0004 mg/L
15	Uranium	10 %	100 ± 10 %	0,0075 mg/L
16	Ammoniac total	10 %	100 ± 10 %	0,05 mg/L sous forme d'azote (N)
17	Dureté	10 %	100 ± 10 %	1 mg/L
18	Alcalinité	10 %	100 ± 10 %	2 mg/L
19	Conductivité électrique	10 %	100 ± 10 %	1 µS/cm

¹ Écart-type relatif à des concentrations dix fois supérieures à la LDM.

² Récupération de l'analyte à des concentrations de plus de dix fois la LDM.

DORS/2006-239, art. 24; DORS/2018-99, art. 31.

SCHEDULE 4

(Paragraph 4(1)(a), subsection 13(1), paragraph 13(3)(a), subparagraph 22(c)(i) and paragraph 24(1)(a))

Authorized Limits of Deleterious Substances

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.50 mg/L	0.75 mg/L	1.00 mg/L
2	Copper	0.30 mg/L	0.45 mg/L	0.60 mg/L
3	Cyanide	1.00 mg/L	1.50 mg/L	2.00 mg/L
4	Lead	0.20 mg/L	0.30 mg/L	0.40 mg/L
5	Nickel	0.50 mg/L	0.75 mg/L	1.00 mg/L
6	Zinc	0.50 mg/L	0.75 mg/L	1.00 mg/L
7	Total Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L

NOTE: All concentrations are total values.

SOR/2006-239, s. 25; SOR/2018-99, s. 32.

ANNEXE 4

(alinéa 4(1)a), paragraphe 13(1), alinéa 13(3)a), sous-alinéa 22c)(i) et alinéa 24(1)a))

Limites permises pour certaines substances nocives

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance nocive	Concentration moyenne mensuelle maximale permise	Concentration maximale permise dans un échantillon composite	Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,50 mg/L	0,75 mg/L	1,00 mg/L
2	Cuivre	0,30 mg/L	0,45 mg/L	0,60 mg/L
3	Cyanure	1,00 mg/L	1,50 mg/L	2,00 mg/L
4	Plomb	0,20 mg/L	0,30 mg/L	0,40 mg/L
5	Nickel	0,50 mg/L	0,75 mg/L	1,00 mg/L
6	Zinc	0,50 mg/L	0,75 mg/L	1,00 mg/L
7	Total des solides en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L

NOTE : Toutes les concentrations sont des valeurs totales.

DORS/2006-239, art. 25; DORS/2018-99, art. 32.

SCHEDULE 5

(Subsections 7(1) and (3) and paragraphs 15(1)(a) and (b) and 32(1)(c))

Environmental Effects Monitoring Studies

Interpretation

1 (1) The following definitions apply in this Schedule.

biological monitoring study means a study referred to in section 9. (*étude de suivi biologique*)

effect on fish tissue from mercury means a concentration of total mercury that exceeds 0.5 µg/g wet weight in fish tissue that is taken in an exposure area and that is statistically different from and higher than the concentration of total mercury in fish tissue that is taken in a reference area. (*effet du mercure sur les tissus de poissons*)

effect on the benthic invertebrate community means a statistical difference between data referred to in subparagraph 12(1)(e)(ii) and paragraph 12(1)(f) from a study respecting the benthic invertebrate community conducted in

- (a) an exposure area and a reference area; or
- (b) sampling areas within an exposure area where there are gradually decreasing effluent concentrations. (*effet sur la communauté d'invertébrés benthiques*)

effect on the fish population means a statistical difference between data relating to the indicators referred to in subparagraph 12(1)(e)(i) from a study respecting fish population conducted in

- (a) an exposure area and a reference area; or
- (b) sampling areas within an exposure area where there are gradually decreasing effluent concentrations. (*effet sur la population de poissons*)

exposure area means all fish habitat and waters frequented by fish that are exposed to effluent. (*zone exposée*)

fish has the same meaning as in section 2 of the Act but does not include parts of fish, parts of shellfish, parts of crustaceans or parts of marine animals. (*poisson*)

reference area means water frequented by fish that is not exposed to effluent and that has fish habitat that, as far as practicable, is most similar to that of the exposure area. (*zone de référence*)

sampling area means the area within an exposure or reference area where representative samples are collected. (*zone d'échantillonnage*)

ANNEXE 5

(paragraphes 7(1) et (3), alinéas 15(1)a) et b) et 32(1)c))

Études de suivi des effets sur l'environnement

Définitions et interprétation

1 (1) Les définitions qui suivent s'appliquent à la présente annexe.

effet du mercure sur les tissus de poissons Concentration du mercure total dans les tissus de poissons pris dans la zone exposée, supérieure à 0,5 µg/g (poids humide), présentant une différence statistique et ayant une concentration plus élevée par rapport à la concentration du mercure total dans les tissus de poissons pris dans la zone de référence. (*effect on fish tissue from mercury*)

effet sur la communauté d'invertébrés benthiques Différence statistique entre les données visées au sous-alinéa 12(1)e)(ii) et à l'alinéa 12(1)f) d'une étude sur la communauté d'invertébrés benthiques effectuée :

- a) soit dans la zone exposée et dans la zone de référence;
- b) soit dans les zones d'échantillonnage de la zone exposée qui présentent un gradient décroissant de concentration d'effluent. (*effect on the benthic invertebrate community*)

effet sur la population de poissons Différence statistique entre les données portant sur les indicateurs visés au sous-alinéa 12(1)e)(i) d'une étude sur la population de poissons effectuée :

- a) soit dans la zone exposée et dans la zone de référence;
- b) soit dans les zones d'échantillonnage de la zone exposée qui présentent un gradient décroissant de concentration d'effluent. (*effect on the fish population*)

étude de suivi biologique Étude visée à l'article 9. (*biological monitoring study*)

poisson S'entend au sens de l'article 2 de la Loi, à l'exclusion des parties de poissons, de mollusques, de crustacés et d'animaux marins. (*fish*)

zone d'échantillonnage Partie de la zone exposée ou de la zone de référence où les échantillons représentatifs sont prélevés. (*sampling area*)

zone de référence Les eaux où vivent des poissons et où se trouve un habitat du poisson, qui ne sont pas exposées à un effluent et qui présentent, dans la mesure du possible, les caractéristiques les plus semblables à celles de la zone exposée. (*reference area*)

(2) For the purpose of this schedule, **critical effect size**, in relation to an effect indicator set out in column 1 of the following table, means the critical effect size set out in column 2:

Item	Column 1 Effect Indicator	Column 2 Critical Effect Size
	For Fish Population	(% of reference mean)
1	Total body weight at age	± 25%
2	Gonad weight at total body weight	± 25%
3	Liver weight at total body weight	± 25%
4	Total body weight at length (condition)	± 10%
5	Age	± 25%
	For Benthic Invertebrate Community	(Standard Deviation Units)
6	Density	± 2 SD
7	Simpson's Evenness Index	± 2 SD
8	Taxa Richness	± 2 SD

2 Environmental effects monitoring studies consist of the effluent and water quality monitoring studies set out in Part 1 and the biological monitoring studies set out in Part 2.

PART 1

Effluent and Water Quality Monitoring Studies

Required Studies

3 Effluent and water quality monitoring studies consist of effluent characterization, sublethal toxicity testing and water quality monitoring.

zone exposée Les eaux où vivent des poissons et l'habitat du poisson qui sont exposés à un effluent. (*exposure area*)

(2) Pour l'application de la présente annexe, **seuil critique d'effet** s'entend, à l'égard d'un indicateur d'effet qui figure dans la colonne 1 du tableau ci-après, du seuil critique d'effet correspondant de la colonne 2 :

Article	Colonne 1 Indicateur d'effet	Colonne 2 Seuil critique d'effet
	Pour la population de poissons	(% par rapport à la moyenne de référence)
1	Poids corporel total selon l'âge	± 25 %
2	Poids des gonades par rapport au poids corporel total	± 25 %
3	Poids du foie par rapport au poids corporel total	± 25 %
4	Poids corporel total par rapport à la longueur (condition)	± 10 %
5	Âge	± 25 %
	Pour la communauté d'invertébrés benthiques	(multiple d'écart type)
6	Densité	± 2 ET
7	Indice de régularité de Simpson	± 2 ET
8	Richesse des taxons	± 2 ET

2 Les études de suivi des effets sur l'environnement se composent des études de suivi de l'effluent et de la qualité de l'eau prévues à la partie 1 et des études de suivi biologique prévues à la partie 2.

PARTIE 1

Études de suivi de l'effluent et de la qualité de l'eau

Composition des études

3 Les études de suivi de l'effluent et de la qualité de l'eau se composent de la caractérisation de l'effluent, des essais de toxicité sublétales et du suivi de la qualité de l'eau.

Effluent Characterization

4 (1) Effluent characterization is conducted by analyzing a sample of effluent and recording the hardness, alkalinity, electrical conductivity and temperature of the sample and the concentrations, in total values, of the following substances:

- (a)** aluminum;
- (b)** cadmium;
- (c)** iron;
- (d)** subject to subsection (4), mercury;
- (e)** molybdenum;
- (f)** selenium;
- (g)** nitrate (concentration in units of nitrogen);
- (h)** chloride;
- (i)** chromium;
- (j)** cobalt;
- (k)** sulphate;
- (l)** thallium;
- (m)** uranium;
- (n)** phosphorus (concentration in units of phosphorus);
- (o)** manganese; and
- (p)** ammonia (concentration in units of nitrogen).

(2) The analysis shall comply with the analytical requirements set out in Table 2 of Schedule 3.

(3) The effluent characterization shall be conducted once per calendar quarter on an aliquot of effluent sample collected under sections 12 and 13 of these Regulations from each final discharge point at least one month after the sample on which the previous characterization was conducted.

(4) The recording of the concentration of mercury in effluent referred to in paragraph (1)(d) may be discontinued if that concentration is less than 0.10 µg/L in 12 consecutive samples collected under subsection (3).

(5) Quality assurance and quality control measures shall be implemented that will ensure the accuracy of the effluent characterization data.

Caractérisation de l'effluent

4 (1) La caractérisation de l'effluent est effectuée par l'analyse d'un échantillon d'effluent et par l'enregistrement de sa dureté, de son alcalinité, de sa conductivité électrique, de sa température et des concentrations, exprimées en valeurs totales, des substances suivantes :

- a)** l'aluminium;
- b)** le cadmium;
- c)** le fer;
- d)** sous réserve du paragraphe (4), le mercure;
- e)** le molybdène;
- f)** le sélénium;
- g)** le nitrate (la concentration en unités d'azote);
- h)** le chlorure;
- i)** le chrome;
- j)** le cobalt;
- k)** le sulfate;
- l)** le thallium;
- m)** l'uranium;
- n)** le phosphore (la concentration en unités de phosphore);
- o)** le manganèse;
- p)** l'ammoniac (la concentration en unités d'azote).

(2) Les analyses doivent satisfaire aux exigences analytiques prévues au tableau 2 de l'annexe 3.

(3) La caractérisation de l'effluent est effectuée, une fois par trimestre civil, sur une portion aliquote de l'échantillon d'effluent prélevé à chaque point de rejet final en application des articles 12 et 13 du présent règlement au moins un mois après la caractérisation précédente.

(4) La concentration en mercure n'a plus à être enregistrée aux termes de l'alinéa (1)d) si la concentration de mercure de douze échantillons consécutifs prélevés selon le paragraphe (3) est inférieure à 0,10 µg/L.

(5) Des mesures d'assurance de la qualité et de contrôle de la qualité sont prises pour garantir l'exactitude des données visant la caractérisation de l'effluent.

Sublethal Toxicity Testing

5 (1) Sublethal toxicity testing shall, in the case of effluent deposited into fresh waters, be conducted using the following test methodologies, as amended from time to time:

(a) in the case of a fish species,

(i) *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows* (Report EPS 1/RM/22), published by the Department of the Environment, or

(ii) *Biological Test Method: Toxicity Tests Using Early Life Stages of Salmonid Fish (Rainbow Trout)* (Reference Method EPS 1/RM/28), published by the Department of the Environment;

(b) in the case of an invertebrate species, *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia* (Report EPS 1/RM/21), published by the Department of the Environment;

(c) in the case of a plant species, *Biological Test Method: Test for Measuring the Inhibition of Growth Using the Freshwater Macrophyte, Lemna minor* (Reference Method EPS 1/RM/37), published by the Department of the Environment, as it applies to the biological endpoint based on the number of fronds; and

(d) in the case of an algal species,

(i) *Biological Test Method: Growth Inhibition Test Using a Freshwater Alga* (Report EPS 1/RM/25), published by the Department of the Environment, or

(ii) *Détermination de la toxicité: inhibition de la croissance chez l'algue Pseudokirchneriella subcapitata*, (Méthode de référence MA 500 – P. sub. 1.0, rév. 3), published by the Centre d'expertise en analyse environnementale du Québec du ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques du Québec.

(2) Sublethal toxicity testing shall, in the case of effluent deposited into marine or estuarine waters, be conducted for fish species, invertebrate species and algal species using the following test methodologies, as amended from time to time, as applicable to each species:

(a) *Biological Test Method: Fertilization Assay Using Echinoids (Sea Urchins and Sand Dollars)* (Report EPS 1/RM/27), published by the Department of the Environment;

(b) *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (Reference Method EPA/821/R-02/014), published by the U.S. Environmental Protection Agency; and

Essais de toxicité sublétales

5 (1) Dans le cas d'effluent rejeté dans l'eau douce, les essais de toxicité sublétales sont effectués en conformité avec les méthodes ci-après, avec leurs modifications successives :

a) dans le cas d'une espèce de poissons :

(i) soit la *Méthode d'essai biologique : essai de croissance et de survie sur des larves de tête-de-boule* (Rapport SPE 1/RM/22), publiée par le ministère de l'Environnement,

(ii) soit la *Méthode d'essai biologique : essais toxicologiques sur des salmonidés (truite arc-en-ciel) aux premiers stades de leur cycle biologique* (Méthode de référence SPE 1/RM/28), publiée par le ministère de l'Environnement;

b) dans le cas d'une espèce d'invertébré, la *Méthode d'essai biologique : essai de reproduction et de survie du cladocère Ceriodaphnia dubia* (Rapport SPE 1/RM/21), publiée par le ministère de l'Environnement;

c) dans le cas d'une espèce de plante, la *Méthode d'essai biologique : essai de mesure de l'inhibition de la croissance de la plante macroscopique dulcicole Lemna minor* (Méthode de référence SPE 1/RM/37), publiée par le ministère de l'Environnement et appliquée au paramètre biologique en fonction du nombre de thalles;

d) dans le cas d'une espèce d'algue :

(i) soit la *Méthode d'essai biologique : essai d'inhibition de la croissance d'une algue d'eau douce* (Rapport SPE 1/RM/25), publiée par le ministère de l'Environnement,

(ii) soit la méthode intitulée *Détermination de la toxicité : inhibition de la croissance chez l'algue Pseudokirchneriella subcapitata*, (Méthode de référence MA 500 – P. sub. 1.0, rév. 3), publiée par le Centre d'expertise en analyse environnementale du Québec du ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques du Québec.

(2) Dans le cas d'effluent rejeté dans l'eau de mer ou d'estuaire, les essais de toxicité sublétales sont effectués conformément aux méthodes ci-après, avec leurs modifications successives, à l'égard d'une espèce, selon le cas, de poisson, d'invertébré et d'algue :

a) la *Méthode d'essai biologique : essai sur la fécondation chez les échinides (oursins globuleux et oursins plats)* (Rapport SPE/1/RM/27), publiée par le ministère de l'Environnement;

b) les méthodes intitulées *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (Méthode de référence EPA/821/R-02/014), publiées par l'Environmental Protection Agency des États-Unis;

(c) *Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms* (Reference Method EPA/600/R-95-136), published by the U.S. Environmental Protection Agency.

(3) The sublethal toxicity tests shall be conducted on aliquots of the same effluent sample collected for effluent characterization collected from the mine's final discharge point that has potentially the most adverse environmental impact on the environment, taking into account

(a) the loading of the deleterious substances contained in the effluent as determined under subsection 20(2) of these Regulations; and

(b) the manner in which the effluent mixes within the exposure area.

6 (1) The sublethal toxicity tests shall be conducted on the species referred to in subsections 5(1) and (2) two times each calendar year for three years and each test shall be conducted on an aliquot of effluent sample collected at least one month after the collection of the sample used in the previous tests.

(2) However, if effluent is discharged for 31 consecutive days or less in a calendar year, the tests may be conducted only once in that year.

(3) After three years, the tests shall be conducted once per calendar quarter on the species referred to in subsection 5(1) or (2), as the case may be, whose results for all the tests conducted in accordance with subsections (1) and (2) — including such tests conducted in addition to the number required by those subsections — produce the lowest geometric mean, taking into account the inhibition concentration that produces a 25% effect or an effective concentration of 25%.

Water Quality Monitoring

7 (1) Water quality monitoring is conducted by

(a) collecting samples of water from

(i) the exposure area surrounding the point of entry of effluent into water from each final discharge point and from the related reference areas, and

(ii) the sampling areas that are selected under clauses 10(b)(i)(B) and 10(c)(i)(A);

(b) recording the temperature of the water and the dissolved oxygen concentration in the water in the exposure and reference areas where the samples are collected;

(c) recording the concentration of the substances set out in paragraphs 4(1)(a) to (p) and,

(i) in the case of effluent that is deposited into fresh water, recording the pH, hardness, alkalinity and electrical conductivity of the water samples,

c) les méthodes intitulées *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (Méthode de référence EPA/600/R-95-136), publiées par l'Environmental Protection Agency des États-Unis.

(3) Les essais de toxicité sublétales sont effectués sur des portions aliquotes d'un même échantillon d'effluent prélevé pour la caractérisation de l'effluent au point de rejet final de la mine qui représente le plus grand risque de répercussions néfastes sur l'environnement, compte tenu :

a) de la charge des substances nocives se trouvant dans l'effluent, déterminée conformément au paragraphe 20(2) du présent règlement;

b) de la façon dont l'effluent se mélange dans la zone exposée.

6 (1) Les essais de toxicité sublétales sont effectués, à l'égard de chaque espèce visée aux paragraphes 5(1) et (2), à raison de deux fois par année civile pendant trois ans et chaque essai est effectué sur une portion aliquote de l'échantillon d'effluent prélevé au moins un mois après le prélèvement de l'échantillon utilisé pour les essais précédents.

(2) Toutefois, dans le cas de l'effluent rejeté pendant trente et un jours consécutifs ou moins dans une année civile, ces essais peuvent être effectués une fois pour cette année.

(3) Après trois ans, les essais sont effectués une fois par trimestre civil pour l'espèce visée au paragraphe 5(1) ou (2), selon le cas, à l'égard de laquelle les résultats de tous les essais effectués conformément aux paragraphes (1) ou (2) — y compris ceux excédant le nombre d'essais exigés par ces paragraphes — révèlent la moyenne géométrique la plus faible, compte tenu d'une concentration inhibitrice qui produit un effet de 25 % ou d'une concentration effective de 25 %.

Suivi de la qualité de l'eau

7 (1) Le suivi de la qualité de l'eau s'effectue :

a) par prélèvement d'échantillons d'eau :

(i) dans la zone exposée entourant l'endroit où l'effluent rejeté par chaque point de rejet final se mélange à l'eau, et dans les zones de référence connexes,

(ii) dans les zones d'échantillonnage choisies aux termes des divisions 10b)(i)(B) et 10c)(i)(A);

b) par enregistrement de la température de l'eau et de la concentration d'oxygène dissous dans l'eau des zones exposées et des zones de référence où les échantillons sont prélevés;

c) par enregistrement de la concentration des substances énumérées aux alinéas 4(1)a) à p) et :

(i) dans le cas où l'effluent est rejeté dans l'eau douce, par enregistrement du pH, de la dureté, de l'alcalinité et de la conductivité électrique des échantillons d'eau,

(ii) in the case of effluent that is deposited into estuarine waters, recording the pH, hardness, alkalinity, electrical conductivity and salinity of the water samples, and

(iii) in the case of effluent that is deposited into marine waters, recording the salinity of the water samples;

(d) recording the concentration of the deleterious substances prescribed in section 3 of these Regulations, but

(i) not recording the concentrations of cyanide if that substance is not used as a process reagent within the operations area, and

(ii) not recording the concentrations of radium 226 if the conditions of subsection 13(2) of these Regulations are met; and

(e) implementing quality assurance and quality control measures that will ensure the accuracy of water quality monitoring data.

(2) The water quality monitoring shall be conducted

(a) four times per calendar year and at least one month apart on the samples of water collected, while the mine is depositing effluent, from the areas referred to in subparagraph (1)(a)(i); and

(b) at the same time that the biological monitoring studies are conducted on samples of water collected in the areas referred to in subparagraph (1)(a)(ii).

Information Related to Effluent and Water Quality Monitoring Studies

8 The following information in relation to the effluent and water quality monitoring studies conducted during a calendar year under sections 4 to 7 shall be submitted to the Minister of the Environment not later than March 31 of the following year:

(a) the dates on which samples were collected for effluent characterization, sublethal toxicity testing and water quality monitoring;

(b) for each sample collected for effluent characterization, the location of the final discharge point from which samples were collected for effluent characterization;

(c) the location of the final discharge point from which samples were collected for sublethal toxicity testing and the data used in selecting the final discharge point in accordance with subsection 5(3);

(d) the latitude and longitude of sampling areas for water quality monitoring and a description that is sufficient to identify the location of the sampling areas;

(ii) dans le cas où il est rejeté dans l'eau d'estuaire, par enregistrement du pH, de la dureté, de l'alcalinité, de la conductivité électrique et de la salinité des échantillons d'eau,

(iii) dans le cas où il est rejeté dans l'eau de mer, par enregistrement de la salinité des échantillons d'eau;

d) par enregistrement de la concentration des substances nocives désignées à l'article 3 du présent règlement, sous réserve de ce qui suit :

(i) la concentration de cyanure n'est enregistrée que si cette substance est utilisée comme réactif de procédé sur le chantier,

(ii) la concentration de radium 226 n'est pas enregistrée si les conditions mentionnées au paragraphe 13(2) du présent règlement sont remplies;

e) par la prise des mesures d'assurance de la qualité et de contrôle de la qualité pour garantir l'exactitude des données visant le suivi de la qualité de l'eau.

(2) Le suivi de la qualité de l'eau est effectué :

a) quatre fois par année civile et à au moins un mois d'intervalle sur les échantillons d'eau prélevés, lorsque la mine rejette de l'effluent, dans les zones visées au sous-alinéa (1)a(i);

b) en même temps que les études de suivi biologique, sur les échantillons d'eau prélevés dans les zones visées au sous-alinéa (1)a(ii).

Renseignements relatifs aux études de suivi de l'effluent et de la qualité de l'eau

8 Les renseignements ci-après, relatifs aux études de suivi de l'effluent et de la qualité de l'eau effectuées au cours d'une année civile en application des articles 4 à 7, sont présentés au ministre de l'Environnement au plus tard le 31 mars de l'année suivante :

a) les dates de prélèvement des échantillons pour la caractérisation de l'effluent, les essais de toxicité sublétales et le suivi de la qualité de l'eau;

b) l'emplacement des points de rejet final où les échantillons sont prélevés pour la caractérisation de l'effluent;

c) l'emplacement du point de rejet final où les échantillons ont été prélevés pour les essais de toxicité sublétales et les données qui ont servi à le sélectionner conformément au paragraphe 5(3);

d) la latitude et la longitude des zones d'échantillonnage utilisées pour le suivi de la qualité de l'eau et une description qui permet de reconnaître l'emplacement de ces zones;

- (e)** the results of effluent characterization, sublethal toxicity testing and water quality monitoring;
- (f)** the methodologies used to conduct effluent characterization and water quality monitoring, and the related method detection limits;
- (g)** a description of the quality assurance and quality control measures that were implemented and the data related to the implementation of those measures; and
- (h)** with respect to every effluent sample collected at each final discharge point, the annual mean concentration of mercury and selenium.

PART 2

Biological Monitoring Studies

Required Studies

9 (1) Biological monitoring studies shall include

- (a)** a study respecting fish population, if the highest concentration of effluent in the exposure area, during a period in which there are deposits, is greater than 1% at any location that is 250 m from a point at which the effluent enters the area from a final discharge point, unless the results of the previous two biological monitoring studies indicate
 - (i)** for all effect indicators with no assigned critical effect size, no effect on the fish population, and
 - (ii)** for all effect indicators with an assigned critical effect size, no effect on the fish population or an effect on the fish population the absolute value of the magnitude of which is less than the absolute value of its assigned critical effect size;
- (b)** a study respecting the benthic invertebrate community, if the highest concentration of effluent in the exposure area, during a period in which there are deposits, is greater than 1% at any location that is 100 m from a point at which the effluent enters the area from a final discharge point, unless the results of the previous two biological monitoring studies indicate
 - (i)** for all effect indicators with no assigned critical effect size, no effect on the benthic invertebrate community, and
 - (ii)** for all effect indicators with an assigned critical effect size, no effect on the benthic invertebrate community or an effect on the benthic invertebrate community the absolute value of the magnitude of which is less than the absolute value of its assigned critical effect size;
- (c)** a study respecting fish tissue mercury, if

- e)** les résultats de la caractérisation de l'effluent, des essais de toxicité sublétales et du suivi de la qualité de l'eau;
- f)** les méthodes utilisées pour la caractérisation de l'effluent et le suivi de la qualité de l'eau, ainsi que les limites de détection de celles-ci;
- g)** la description des mesures d'assurance de la qualité et de contrôle de la qualité qui ont été prises ainsi que les données associées à leur mise en œuvre;
- h)** à l'égard de chaque échantillon d'effluent prélevé à tout point final de rejet, les concentrations moyennes annuelles de mercure et de sélénium.

PARTIE 2

Études de suivi biologique

Composition des études

9 (1) Les études de suivi biologique comportent :

- a)** une étude sur la population de poissons, si la concentration de l'effluent la plus élevée dans une zone exposée, lors d'une période pendant laquelle il y a des rejets, est supérieure à 1 % à tout endroit situé à 250 m du point où l'effluent entre dans la zone depuis un point de rejet final, à moins que les résultats des deux études de suivi biologique précédentes révèlent, à la fois :
 - (i)** à l'égard des indicateurs d'effet pour lesquels il n'y a pas de seuil critique d'effet, qu'il n'y a aucun effet sur la population de poissons,
 - (ii)** à l'égard des indicateurs d'effet pour lesquels il y a un seuil critique d'effet, qu'il n'y a aucun effet sur la population de poissons ou qu'il y a un effet sur la population de poissons, dont la valeur absolue de l'ampleur est inférieure à la valeur absolue du seuil critique d'effet;
- b)** une étude sur la communauté d'invertébrés benthiques, si la concentration de l'effluent la plus élevée dans une zone exposée, lors d'une période pendant laquelle il y a des rejets, est supérieure à 1 % à tout endroit situé à 100 m d'un point où l'effluent entre dans la zone depuis un point de rejet final, sauf si les résultats des deux études de suivi biologique précédentes révèlent à la fois :
 - (i)** à l'égard des indicateurs d'effet pour lesquels il n'y a pas de seuil critique d'effet, qu'il n'y a aucun effet sur la communauté d'invertébrés benthiques,
 - (ii)** à l'égard des indicateurs pour lesquels il y a un seuil critique d'effet, qu'il n'y a aucun effet sur la communauté d'invertébrés benthiques ou il y a un effet sur la communauté d'invertébrés benthiques, dont la valeur absolue de l'ampleur est inférieure à la valeur absolue du seuil critique d'effet;

- (i) effluent characterization reveals an annual mean concentration of total mercury in the effluent that is equal to or greater than 0.10 µg/L, based on a calendar year, unless the results of the previous two biological monitoring studies indicate no effect on fish tissue from mercury, or
- (ii) the method detection limit used in respect of mercury for the analysis of at least two of four effluent samples in a calendar year is equal to or greater than 0.10 µg/L;
- (d) a study respecting fish tissue selenium, if
- (i) effluent characterization reveals a concentration of total selenium in the effluent that is equal to or greater than 10 µg/L,
- (ii) effluent characterization reveals an annual mean concentration of total selenium in the effluent that is equal to or greater than 5 µg/L, based on a calendar year, or
- (iii) the method detection limit used in respect of selenium for the analysis of any effluent sample is equal to or greater than 10 µg/L, or the method detection limit used in respect of selenium for the analysis of at least two of four effluent samples in a calendar year is equal to or greater than 5 µg/L; and
- (e) if the cause of any effect on the fish population, on fish tissue from mercury or on the benthic invertebrate community is not known, a study that will be used to determine the cause of the effect if
- (i) the results of the previous two biological monitoring studies indicate a similar type of effect, and
- (ii) for an effect indicator with an assigned critical effect size, the absolute value of the magnitude of the effect is equal to or greater than the absolute value of its critical effect size in either of those studies.
- (2) If the results of the previous two biological monitoring studies are used to lift the requirement to conduct a study under any of paragraphs (1)(a), (b), (c) or (e), the earlier of those two studies shall not be used to lift a requirement to conduct a subsequent study.
- (3) For the purposes of subsection (1), the concentration of effluent shall be determined or the effluent characterization shall be carried out, as the case may be,
- (a) in the case of the first biological monitoring studies, beginning on the day on which the mine becomes subject
- c) une étude sur le mercure dans les tissus de poissons, si :
- (i) soit la caractérisation de l'effluent révèle une concentration annuelle moyenne de mercure total égale ou supérieure à 0,10 µg/L pour une année civile donnée, sauf si les résultats des deux études de suivi biologique précédentes révèlent qu'il n'y a aucun effet du mercure sur les tissus de poissons,
- (ii) soit la limite de détection de la méthode utilisée, à l'égard du mercure, pour l'analyse d'au moins deux échantillons d'effluent sur quatre pour une année civile donnée est égale ou supérieure à 0,10 µg/L;
- d) une étude sur le sélénium dans les tissus de poissons, si :
- (i) soit la caractérisation de l'effluent révèle une concentration de sélénium total égale ou supérieure à 10 µg/L,
- (ii) soit la caractérisation de l'effluent révèle une concentration annuelle moyenne de sélénium total égale ou supérieure à 5 µg/L pour une année civile donnée,
- (iii) soit la limite de détection de la méthode utilisée, à l'égard du sélénium, pour l'analyse de tout échantillon d'effluent est égale ou supérieure à 10 µg/L ou la limite de détection de la méthode utilisée, à l'égard du sélénium, pour l'analyse d'au moins deux échantillons d'effluent sur quatre pour une année civile donnée est égale ou supérieure à 5 µg/L;
- e) si la cause d'un effet sur la population de poissons, d'un effet du mercure sur les tissus de poissons ou d'un effet sur la communauté d'invertébrés benthiques n'est pas connue, une étude qui sera utilisée pour établir la cause de l'effet si, à la fois :
- (i) les résultats des deux études de suivi biologique précédentes indiquent un type d'effet semblable,
- (ii) à l'égard de tout indicateur d'effet pour lequel un seuil critique d'effet est prévu, la valeur absolue de l'ampleur de l'effet est égale ou supérieure à la valeur absolue du seuil critique d'effet, dans l'une ou l'autre de ces deux études précédentes.
- (2) Si les résultats des deux études de suivi biologique précédentes sont utilisés pour lever l'obligation de présenter une étude en application des alinéas (1)a), b), c) ou e), celle qui est antérieure à l'autre ne peut être utilisée pour lever l'obligation de présenter une étude subséquente.
- (3) Pour l'application du paragraphe (1), la concentration de l'effluent est déterminée — et la caractérisation de l'effluent est effectuée — selon les périodes suivantes :
- a) dans le cas des premières études de suivi biologique, à partir de la date à laquelle la mine est assujettie à l'article 7 du présent règlement et jusqu'au jour qui précède la date à laquelle le premier plan d'étude doit être présenté;

to section 7 of these Regulations and ending on the day before the day on which the first study design is required to be submitted; and

(b) for any subsequent biological monitoring studies, beginning on the day on which the previous study design was required to be submitted and ending on the day before the day on which the subsequent study design is required to be submitted.

DIVISION 1

First Biological Monitoring Studies

First Study Design

10 A first study design shall be submitted to the Minister of the Environment not later than 12 months after the day on which a mine becomes subject to section 7 of these Regulations. It shall contain

(a) a site characterization that includes

(i) a description of the manner in which the effluent mixes within each exposure area, during a period in which there are deposits, including an estimate of the concentration of effluent in the exposure area at 100 m and 250 m from every point at which the effluent enters the area from a final discharge point and — in respect of each calendar year — any supporting data, including raw data, for the estimate,

(ii) a description of the exposure and reference areas where the biological monitoring studies would be conducted — whether or not they are required — that includes information on the geological, hydrological, oceanographical, limnological, chemical and biological features of those areas,

(iii) the type of production process used by the mine and the environmental protection practices in place at the mine,

(iv) a description of any anthropogenic, natural or other factors that are not related to the effluent but that may reasonably be expected to affect the results of any biological monitoring study, whether or not it is required, and

(v) any additional information that would enable a determination as to whether studies would be conducted in accordance with generally accepted standards of good scientific practice;

(b) a description of how any required study respecting fish population, fish tissue mercury and fish tissue selenium will be conducted that includes

(i) a description of and the scientific rationale for

b) pour les études de suivi biologique subséquentes, à partir de la date à laquelle le plan d'étude précédent devait être présenté et jusqu'au jour qui précède la date à laquelle le plan d'étude subséquent doit être présenté.

SECTION 1

Premières études de suivi biologique

Premier plan d'étude

10 Un premier plan d'étude est présenté au ministre de l'Environnement au plus tard douze mois après la date à laquelle la mine devient assujettie à l'article 7 du présent règlement et comporte :

a) la caractérisation du site comportant :

(i) une description de la façon dont l'effluent se mélange dans chaque zone exposée, lors d'une période pendant laquelle il y a des rejets, notamment une estimation de la concentration de l'effluent à 100 m et à 250 m de chaque point où l'effluent entre dans la zone depuis un point de rejet final ainsi que, à l'égard de toute année civile, toute donnée justificative à l'appui de l'estimation, y compris les données brutes,

(ii) une description des zones exposées et des zones de référence, si une étude de suivi biologique serait menée, qu'elle soit exigée ou non, y compris les renseignements sur les caractéristiques géologiques, hydrologiques, océanographiques, limnologiques, chimiques et biologiques de ces zones,

(iii) le type de procédé de production utilisé par la mine et les pratiques de protection de l'environnement appliquées à la mine,

(iv) les facteurs anthropiques, naturels ou autres non liés à l'effluent, mais dont on peut raisonnablement s'attendre à ce qu'ils affectent les résultats de toute étude de suivi biologique, qu'elle soit exigée ou non,

(v) tout renseignement supplémentaire qui permet de déterminer si des études seraient effectuées conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques;

b) la description du déroulement de l'étude portant sur la population de poissons, sur le mercure dans les tissus de poissons ou sur le sélénium dans les tissus de poissons, si une telle étude est exigée :

(i) les éléments ci-après, y compris les motifs scientifiques à l'appui :

- (A)** the fish species selected, taking into account the abundance of the species most exposed to effluent,
 - (B)** the sampling areas selected within the exposure area and the reference area,
 - (C)** the sampling period selected,
 - (D)** the sample size selected, and
 - (E)** the field and laboratory methodologies selected, and
 - (ii)** an explanation as to how, in the case of the study respecting fish population or fish tissue mercury, the study will provide the information necessary to determine if the effluent has an effect on fish population or on fish tissue from mercury;
 - (c)** a description of how any required study respecting the benthic invertebrate community will be conducted that includes
 - (i)** a description of and the scientific rationale for
 - (A)** the sampling areas selected, taking into account the benthic invertebrate diversity and the area most exposed to effluent,
 - (B)** the sampling period selected,
 - (C)** the sample size selected, and
 - (D)** the field and laboratory methodologies selected, and
 - (ii)** an explanation as to how the study will provide the information necessary to determine if the effluent has an effect on the benthic invertebrate community;
 - (d)** the month in which the samples will be collected for each required biological monitoring study;
 - (e)** a description of the quality assurance and quality control measures that will be implemented for each required biological monitoring study to ensure the validity of the data that is collected; and
 - (f)** a summary of the results of any studies to determine whether the effluent was causing an effect on the fish population, fish tissue from mercury or the benthic invertebrate community and of any studies in the exposure and reference areas respecting fish tissue selenium completed before the mine becomes subject to section 7 of these Regulations and any scientific data to support the results.
- (A)** les espèces de poissons choisies, compte tenu de l'abondance des espèces les plus exposées à l'effluent,
 - (B)** les zones d'échantillonnage choisies de la zone exposée et de la zone de référence,
 - (C)** la période d'échantillonnage choisie,
 - (D)** la taille des échantillons choisie,
 - (E)** les méthodes choisies sur le terrain et en laboratoire,
 - (ii)** dans le cas de l'étude sur la population de poissons ou de l'étude sur le mercure dans les tissus de poissons, la façon dont l'étude fournira les renseignements permettant de déterminer si l'effluent a un effet sur la population de poissons ou un effet du mercure sur les tissus de poissons;
 - c)** la description du déroulement de toute étude sur la communauté d'invertébrés benthiques exigée, notamment :
 - (i)** une description des éléments ci-après, y compris les motifs scientifiques à l'appui :
 - (A)** les zones d'échantillonnage choisies, compte tenu de la diversité des invertébrés benthiques et de la zone la plus exposée à l'effluent,
 - (B)** la période d'échantillonnage choisie,
 - (C)** la taille des échantillons choisie,
 - (D)** les méthodes choisies sur le terrain et en laboratoire,
 - (ii)** la façon dont l'étude fournira les renseignements permettant de déterminer si l'effluent a un effet sur la communauté d'invertébrés benthiques;
 - d)** le mois pendant lequel les échantillons seront prélevés pour toute étude de suivi biologique exigée;
 - e)** la description des mesures d'assurance de la qualité et de contrôle de la qualité pour toute étude de suivi biologique exigée qui seront prises pour garantir la validité des données recueillies;
 - f)** un résumé des résultats de toute étude qui indique si l'effluent produit un effet sur les populations de poissons, un effet du mercure sur les tissus de poissons ou un effet sur la communauté d'invertébrés benthiques et de toute étude sur le sélénium dans les tissus de poissons dans la zone exposée et de référence, effectuées avant la date à laquelle la mine devient assujettie à l'article 7 du présent règlement, ainsi que toutes données scientifiques justificatives.

First Biological Monitoring Studies

11 (1) Subject to subsection (2), the first biological monitoring studies shall start not earlier than six months after the day on which the first study design is submitted under section 10, and shall be conducted in accordance with that study design.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or operator shall inform the Minister of the Environment without delay of those circumstances and of the changes that are made to the study.

First Interpretative Report

12 (1) A first interpretative report shall be submitted to the Minister of the Environment not later than 36 months after the day on which the mine becomes subject to section 7 of these Regulations. It shall contain

- (a)** a description of any deviation from the study design that occurred while the biological monitoring studies were being conducted and any impact that the deviation had on the studies;
- (b)** the latitude and longitude of sampling areas and a description of the sampling areas sufficient to identify the location of the sampling areas;
- (c)** the dates and times when samples were collected;
- (d)** the sample sizes;
- (e)** the mean, median, standard deviation, standard error and minimum and maximum values in the sampling areas for
 - (i)** in the case of the study respecting fish population, effect indicators of growth, reproduction, condition and survival that include, if practicable, the length, total body weight and age of the fish, the weight of its liver or hepatopancreas and, if the fish are sexually mature, the egg weight, fecundity and gonad weight of the fish,
 - (ii)** in the case of the study respecting the benthic invertebrate community, effect indicators of the total benthic invertebrate density, evenness index, taxa richness and, if the study is conducted in an area where it is possible to sample sediment, total organic carbon content of sediment and particle size distribution of sediment,
 - (iii)** in the case of the study respecting fish tissue mercury, the effect indicator of the concentration of total mercury (wet weight) in the fish tissue, and
 - (iv)** in the case of the study respecting fish tissue selenium, the concentration — in the muscle or whole body and, if practicable, in the ovaries or eggs — of total selenium (dry weight) reported in µg/g and the percentage of the moisture content of the sample;

Premières études de suivi biologique

11 (1) Les premières études de suivi biologique débutent au plus tôt six mois après la date à laquelle le premier plan d'étude a été présenté en application de l'article 10 et sont effectuées conformément à ce plan.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Premier rapport d'interprétation

12 (1) Un premier rapport d'interprétation est présenté au ministre de l'Environnement au plus tard trente-six mois après la date à laquelle la mine devient assujettie à l'article 7 du présent règlement et comporte :

- a)** la description de tout écart par rapport au plan d'étude qui s'est produit durant les études de suivi biologique et l'incidence de ces écarts sur les études;
- b)** la latitude et la longitude des zones d'échantillonnage et une description qui permet de reconnaître l'emplacement de ces zones;
- c)** les dates et heures de prélèvement des échantillons;
- d)** la taille des échantillons;
- e)** la moyenne, la médiane, l'écart-type, l'erreur-type ainsi que les valeurs minimales et maximales dans les zones d'échantillonnage quant aux éléments suivants :
 - (i)** dans le cas de l'étude sur la population de poissons, les indicateurs d'effet qui portent sur la croissance des poissons, leur reproduction, leur condition et leur survie qui comprennent, dans la mesure du possible, la longueur, le poids corporel total, l'âge, le poids du foie ou de l'hépatopancréas et, si les poissons ont atteint la maturité sexuelle, le poids des œufs, le taux de fécondité et le poids des gonades,
 - (ii)** dans le cas de l'étude sur la communauté d'invertébrés benthiques, les indicateurs d'effet qui portent sur la densité totale des invertébrés benthiques, l'indice de régularité, la richesse des taxons et, si des sédiments peuvent être prélevés à l'endroit où s'effectue l'étude, la teneur en carbone organique total des sédiments et la distribution granulométrique de ceux-ci,
 - (iii)** dans le cas de l'étude sur le mercure dans les tissus de poissons, l'indicateur d'effet portant sur la concentration de mercure total (poids humide) dans les tissus,
 - (iv)** dans le cas de l'étude sur le sélénium dans les tissus de poissons, la concentration — dans les muscles ou le corps et, dans la mesure du possible, les ovaires ou

(f) in the case of the study respecting the benthic invertebrate community, a calculation of the similarity index effect indicator;

(g) an identification of the sex of the fish sampled and of the presence of any lesions, tumours, parasites or other abnormalities and, in the case of the study respecting fish tissue selenium, the type of fish tissue studied and the scientific rationale for the selection of that tissue;

(h) a determination as to whether there is a statistically significant difference between the sampling areas for the calculations under subparagraphs (e)(i) to (iii) and paragraph (f) taking into consideration the information identified under paragraph (g), with the statistical comparison made separately and independently for each effect indicator;

(i) a statistical analysis of the results of the calculations under subparagraphs (e)(i) to (iii) and paragraph (g) that indicates the probability of correctly detecting an effect of a pre-defined size and the degree of confidence that can be placed in the calculations;

(j) for an effect indicator referred to in paragraph (e) with an assigned critical effect size, a comparison of the magnitude of the effect — calculated in accordance with subsection (2) or (3), as the case may be — to its critical effect size;

(k) any supporting data, including raw data, for the information provided under paragraphs (e) to (j);

(l) a description of any quality assurance or quality control measures that were implemented and the data related to the implementation of those measures;

(m) based on the information referred to in paragraphs (e) to (k), the identification of

(i) any effect on the fish population,

(ii) any effect on the benthic invertebrate community, and

(iii) any effect on fish tissue from mercury;

(n) for an effect indicator with an assigned critical effect size, a statement as to whether the absolute value of the magnitude of the effect is equal to or greater than the absolute value of its critical effect size;

(o) a summary of the results of effluent characterization, sublethal toxicity testing and water quality monitoring reported under paragraph 8(e) beginning on the day on which the mine becomes subject to section 7 of these Regulations;

(p) the conclusions of the biological monitoring studies, and a description of how those conclusions will impact the study design for subsequent biological monitoring studies, taking into account

les œufs — de sélénium total (poids sec), rapportée en µg/g, et le pourcentage d'humidité de l'échantillon;

f) dans le cas de l'étude sur la communauté d'invertébrés benthiques, le calcul de l'indicateur d'effet portant sur l'indice de similitude;

g) l'identification du sexe des poissons pris et la présence de lésions, de tumeurs, de parasites et d'autres anomalies et, dans le cas de l'étude sur le sélénium dans les tissus de poissons, le type de tissu étudié ainsi que les motifs scientifiques à l'appui du choix de tissu;

h) l'établissement à savoir s'il existe une différence statistique significative entre les zones d'échantillonnage pour les calculs effectués en application des sous-alinéas e)(i) à (iii) et de l'alinéa f) et eu égard aux renseignements visés à l'alinéa g), selon une comparaison statistique séparée et indépendante pour chaque indicateur d'effet;

i) une analyse statistique des résultats des calculs effectués en application des sous-alinéas e)(i) à (iii) et de l'alinéa g) qui indique la probabilité de détection correcte d'un effet d'une ampleur prédéterminée ainsi que le degré de confiance pouvant être accordé aux calculs;

j) une comparaison de l'ampleur de l'effet — calculée conformément aux paragraphes (2) ou (3) — par rapport au seuil critique d'effet d'un indicateur d'effet visé par l'alinéa e) et pour lequel il y a un seuil critique d'effet;

k) toute donnée justificative à l'appui, y compris les données brutes, relatives aux renseignements visés aux alinéas e) à j);

l) la description des mesures d'assurance de la qualité et de contrôle de la qualité qui ont été prises ainsi que les données associées à leur mise en œuvre;

m) selon les renseignements visés aux alinéas e) à k), l'indication de tout :

(i) effet sur la population de poissons,

(ii) effet sur la communauté d'invertébrés benthiques,

(iii) effet du mercure sur les tissus de poissons;

n) à l'égard de tout indicateur d'effet, un énoncé à savoir si la valeur absolue de l'ampleur de l'effet est égale ou supérieure à la valeur absolue du seuil critique d'effet prévu pour cet indicateur d'effet;

o) un résumé des résultats de la caractérisation de l'effluent, des essais de toxicité sublétales et du suivi de la qualité de l'eau visés à l'alinéa 8e) à partir de la date où la mine devient assujettie à l'article 7 du présent règlement;

p) les conclusions des études de suivi biologique et l'incidence de ces conclusions sur le plan d'étude pour les études de suivi biologique subséquentes, compte tenu des éléments suivants :

(i) les résultats de toute étude visée à l'alinéa 10f),

(i) the results of any studies referred to in paragraph 10(f),

(ii) the presence of anthropogenic, natural or other factors that are not related to the effluent under study and that may reasonably be expected to contribute to any observed effect,

(iii) the results of the statistical analysis conducted under paragraphs (h) and (i), and

(iv) the data referred to in paragraph (l);

(q) the month in which the next biological monitoring studies will start, if any biological monitoring studies are required; and

(r) the date when the next interpretative report is required to be submitted or would be required to be submitted but for the application of subsection 16(3).

(2) For the purpose of the study respecting fish population, the magnitude of the effect for an effect indicator is to be calculated using the following formula:

$$(A - B)/B \times 100$$

where

A is

(a) for the purpose of the age indicator, the mean value for the indicator in the exposure area, and

(b) for the purpose of the indicators other than age, the adjusted mean value — obtained using the analysis of covariance (ANCOVA) statistical test method — for the indicator in the exposure area; and

B is

(a) for the purpose of the age indicator, the mean value for the indicator in the reference area, and

(b) for the purpose of the indicators other than age, the adjusted mean value — obtained using the analysis of covariance (ANCOVA) statistical test method — for the indicator in the reference area.

(3) For the purposes of the study respecting the benthic invertebrate community, the magnitude of the effect for an effect indicator is to be calculated using the following formula:

$$(A - B)/C$$

where

A is the mean value for the indicator in the exposure area;

B is the mean value for the indicator in the reference area; and

C is the standard deviation for the indicator in the reference area.

(ii) la présence de facteurs anthropiques, naturels ou autres non liés à l'effluent à l'étude et dont on peut raisonnablement s'attendre à ce qu'ils contribuent à tout effet observé,

(iii) les résultats de l'analyse statistique effectuée en application des alinéas h) et i),

(iv) les données visées à l'alinéa l);

q) le mois pendant lequel les prochaines études de suivi biologique débiteront, si des études de suivi biologique sont exigées;

r) la date à laquelle le prochain rapport d'interprétation doit être présenté ou devrait être présenté si ce n'était l'application du paragraphe 16(3).

(2) Pour l'étude sur la population de poissons, l'ampleur de l'effet d'un indicateur d'effet se calcule selon la formule suivante :

$$(A - B)/B \times 100$$

où :

A représente :

a) dans le cas de l'âge, la moyenne pour l'indicateur dans la zone exposée;

b) dans le cas des autres indicateurs d'effet, la moyenne ajustée — obtenue en application de la méthode statistique de l'analyse de covariance (ANCOVA) — pour l'indicateur dans la zone exposée;

B selon le cas :

a) dans le cas de l'âge, la moyenne pour l'indicateur dans la zone de référence;

b) dans le cas des autres indicateurs d'effet, la moyenne ajustée — obtenue en application de la méthode statistique de l'analyse de covariance (ANCOVA) — pour l'indicateur dans la zone de référence.

(3) Pour l'étude sur la communauté d'invertébrés benthiques, l'ampleur de l'effet d'un indicateur se calcule selon la formule suivante :

$$(A - B)/C$$

où :

A représente la moyenne pour l'indicateur dans la zone exposée;

B la moyenne pour l'indicateur dans la zone de référence;

C l'écart-type pour l'indicateur dans la zone de référence.

DIVISION 2

Subsequent Biological Monitoring Studies

Subsequent Study Designs

13 (1) Each subsequent study design shall be submitted to the Minister of the Environment

- (a) at least six months before the start of the biological monitoring studies that are set out in that study design; or
- (b) if no biological monitoring studies are required, not later than 12 months after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3).

(2) Each subsequent study design shall include

- (a) a summary of the information referred to in paragraph 10(a) and a description of any changes to that information since the submission of the most recent study design, as well as — in respect of each calendar year — any supporting data, including raw data, for the estimate referred to in subparagraph 10(a)(i), whether or not the estimate has changed;
- (b) the information referred to in paragraphs 10(b) to (e);
- (c) a summary of the results of any biological monitoring studies conducted after June 6, 2002;
- (d) if the study referred to in paragraph 9(1)(e) is required,
 - (i) the month in which the study will start, and
 - (ii) a description of how the study will be conducted that includes any field and laboratory methodologies that will be used to determine the cause of the effect; and
- (e) if the cause of an effect on the fish population, on fish tissue from mercury or on the benthic invertebrate community is known, the cause of the effect and any supporting data, including raw data.

Conduct of Subsequent Biological Monitoring Studies

14 (1) Subject to subsection (2), the subsequent biological monitoring studies shall be conducted in accordance with the study design submitted under section 13.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or

SECTION 2

Études de suivi biologique subséquentes

Plans d'étude subséquents

13 (1) Tout plan d'étude de suivi biologique subséquent est présenté au ministre de l'Environnement :

- a) au moins six mois avant le début des études de suivi biologique visées dans ce plan d'étude;
- b) si aucune étude de suivi biologique n'est exigée, au plus douze mois après la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3).

(2) Tout plan d'étude de suivi biologique subséquent comporte :

- a) un résumé des renseignements visés à l'alinéa 10a) et une description de toute modification à ces renseignements apportée depuis la présentation du dernier plan d'étude ainsi que, à l'égard de toute année civile, toute donnée justificative à l'appui de l'estimation visée au sous-alinéa 10a)(i), y compris les données brutes, que cette estimation ait changé ou non;
- b) les renseignements visés aux alinéas 10b) à e);
- c) un résumé des résultats de toute étude de suivi biologique effectuée depuis le 6 juin 2002;
- d) si une étude visée à l'alinéa 9(1)e) est requise :
 - (i) le mois pendant lequel l'étude débutera,
 - (ii) une description de la façon dont l'étude sera effectuée, y compris toute méthode sur le terrain et en laboratoire, pour établir la cause de l'effet;
- e) si la cause d'un effet sur la population de poissons, d'un effet du mercure sur les tissus de poissons ou d'un effet sur la communauté d'invertébrés benthiques est connue, la cause de l'effet ainsi que toute donnée justificative à l'appui, y compris les données brutes.

Déroulement des études de suivi biologique subséquentes

14 (1) Toute étude de suivi biologique subséquent est effectuée conformément au plan d'étude présenté en application de l'article 13.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de

operator shall inform the Minister of the Environment without delay of those circumstances and the changes that are made to the study.

Content of Subsequent Interpretative Reports

15 Subject to subsection 16(3), each subsequent study design shall be followed by a subsequent interpretative report that includes

- (a)** for a study referred to in paragraphs 9(1)(a) to (d), the information referred to in paragraphs 12(1)(a) to (n) and (p) to (r);
- (b)** a summary of the results of effluent characterization, sublethal toxicity testing and water quality monitoring reported under paragraph 8(e) after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3); and
- (c)** if the study design includes the description required under paragraph 13(2)(d),
 - (i)** the cause of the effect, if determined, and any supporting data, including raw data, or
 - (ii)** if the cause of the effect was not determined, an explanation of why and a description of any steps that need to be taken in the next study to determine that cause.

Submission of Subsequent Interpretative Reports

16 (1) Subject to subsection (2), each subsequent interpretative report shall be submitted to the Minister of the Environment not later than 36 months after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3).

(2) The interpretative report following a resumption of effluent discharge referred to in subsection 17(2) shall be submitted not later than 36 months after the day on which effluent discharge resumes.

(3) An interpretative report is not required in respect of a 36-month period if no biological monitoring studies are required in respect of that period.

Cessation of Discharge

17 (1) The owner or operator of a mine that has ceased discharging effluent for a period of at least 36 months is not required to conduct environmental effects monitoring studies so long as the period of cessation continues.

sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Contenu des rapports d'interprétation subséquents

15 Sous réserve du paragraphe 16(3), tout plan d'étude subséquent est suivi d'un rapport d'interprétation subséquent qui comporte :

- a)** dans le cas des études visées aux alinéas 9(1)a) à d), les renseignements visés aux alinéas 12(1)a) à n) et p) à r);
- b)** un résumé des résultats de la caractérisation de l'effluent, des essais de toxicité sublétales et du suivi de la qualité de l'eau visés à l'alinéa 8e) à partir de la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3);
- c)** si le plan d'étude comprend une description exigée par l'alinéa 13(2)d) :
 - (i)** la cause de l'effet, si elle a été déterminée, ainsi que toutes données justificatives à l'appui, y compris les données brutes,
 - (ii)** si la cause n'a pas été déterminée, les raisons de l'échec ainsi que les mesures nécessaires pour déterminer cette cause lors de la prochaine étude.

Présentation des rapports d'interprétation subséquents

16 (1) Tout rapport d'interprétation subséquent est présenté au ministre de l'Environnement au plus tard trente-six mois après la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3).

(2) Toutefois, le rapport d'interprétation suivant la reprise du rejet d'effluents visée au paragraphe 17(2) est présenté au plus tard trente-six mois après la date de cette reprise.

(3) Aucun rapport d'interprétation n'est exigé à l'égard d'une période de trente-six mois à l'égard de laquelle aucune étude de suivi biologique n'est exigée.

Cessation du rejet d'effluent

17 (1) Le propriétaire ou l'exploitant d'une mine dont les rejets d'effluent ont cessé pour une période d'au moins trente-six mois n'a pas l'obligation de mener des études de suivi des effets sur l'environnement tant que l'absence de rejets se poursuit.

(2) The requirement to conduct environmental effects monitoring studies shall resume, as the case may be, on

- (a)** the day on which effluent discharge resumes; or
- (b)** the day on which a notice referred to in paragraph 32(1)(a) of these Regulations is received by the Minister of the Environment.

(3) The owner or operator shall notify the Minister of the Environment in writing without delay

- (a)** when the period of cessation begins; and
- (b)** when the mine resumes effluent discharge.

(4) Any biological monitoring study that began before the end of the 36-month period shall be completed and followed by an interpretative report in accordance with section 15.

DIVISION 3

Final Studies

General

18 (1) If an owner or operator of a mine has provided a notice referred to in paragraph 32(1)(a) of these Regulations to the Minister of the Environment, the owner or operator shall

- (a)** if the notice is received before biological monitoring studies have started, conduct the biological monitoring studies and submit any interpretative report that is required in respect of those studies; and
- (b)** if the notice is received after biological monitoring studies have started, in addition to submitting any interpretative report that is required in respect of those studies, submit a final study design in accordance with subsection (2), conduct final biological monitoring studies in accordance with section 19 and submit a final interpretative report in accordance with section 20.

(2) The final study design shall be submitted to the Minister of the Environment not later than six months after the day on which the notice referred to in paragraph 32(1)(a) of these Regulations is received. It shall include the information required under subsection 13(2).

Conduct of Final Biological Monitoring Studies

19 (1) Subject to subsection (2), the final biological monitoring studies shall be conducted in accordance with the study design submitted under subsection 18(2) not earlier than six months after the day on which the final study design has been submitted.

(2) L'obligation de mener des études de suivi des effets sur l'environnement reprend, selon le cas :

- a)** à la date de reprise du rejet d'effluents;
- b)** à la date à laquelle l'avis visé à l'alinéa 32(1)a) du présent règlement est reçu par le ministre de l'Environnement.

(3) Le propriétaire ou l'exploitant d'une mine avise le ministre de l'Environnement par écrit sans délai :

- a)** au début de la période d'absence de rejet d'effluents;
- b)** à la reprise du rejet d'effluents.

(4) Toute étude de suivi biologique débutée avant la fin de la période de trente-six mois est complétée et suivie d'un rapport d'interprétation conformément à l'article 15.

SECTION 3

Études finales

Généralités

18 (1) S'il a présenté au ministre de l'Environnement un avis visé à l'alinéa 32(1)a) du présent règlement, le propriétaire ou l'exploitant d'une mine :

- a)** dans le cas où l'avis est reçu avant le début des études de suivi biologique, effectue les études de suivi biologique et présente tout rapport d'interprétation requis à l'égard de ces études;
- b)** dans le cas où l'avis est reçu après le début des études de suivi biologique, en plus d'effectuer les études de suivi biologique et de présenter tout rapport d'interprétation exigé à l'égard de ces études, présente un plan d'étude final conformément au paragraphe (2), effectue une étude de suivi biologique finale conformément à l'article 19 et présente un rapport d'interprétation final conformément à l'article 20.

(2) Le plan d'étude final est présenté au ministre de l'Environnement au plus tard six mois après la date de réception de l'avis visé à l'alinéa 32(1)a) du présent règlement et comporte les renseignements exigés par le paragraphe 13(2).

Déroulement des études de suivi biologique finales

19 (1) Les études de suivi biologique finales sont effectuées conformément au plan d'étude présenté en application du paragraphe 18(2), au plus tôt six mois après la date de présentation du plan d'étude final.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or operator shall inform the Minister of the Environment without delay of those circumstances and the changes that are made to the study.

Content of Final Interpretative Report

20 The final interpretative report shall be submitted to the Minister of the Environment not later than three years after the day on which the notice referred to in paragraph 32(1)(a) of these Regulations is received and shall include the information referred to in paragraphs 15(a) to (c).

SOR/2006-239, ss. 26 to 33, 34(F); SOR/2012-22, ss. 10 to 17; SOR/2018-99, s. 33.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Contenu du rapport d'interprétation final

20 Le rapport d'interprétation final est présenté au ministre de l'Environnement au plus tard trois ans après la date de réception de l'avis visé à l'alinéa 32(1)a) du présent règlement et comporte les renseignements visés aux alinéas 15a) à c).

DORS/2006-239, art. 26 à 33 et 34(F); DORS/2012-22, art. 10 à 17; DORS/2018-99, art. 33.

SCHEDULE 6

(Section 22)

Annual Report Summarizing Effluent Monitoring Results

PART 1

Identifying Information

- 1 Name of the mine
- 2 Address of the mine
- 3 Name of the operator of the mine
- 4 Operator's telephone number and e-mail address, if any
- 5 Reporting period
- 6 Date of report

PART 2

Test Results Respecting Each Final Discharge Point

- 1 Complete the following table with the monthly mean concentration for the deleterious substances set out in the table for each final discharge point and identify the location of the final discharge point.
- 2 Any measurement not taken because there was no deposit from the final discharge point shall be identified by the letters "NDEP" (No Deposit).
- 3 Any measurement not taken because no measurement was required in accordance with the conditions set out in section 12 or 13 of the *Metal Mining Effluent Regulations* shall be identified by the letters "NMR" (No Measurement Required).

Location of final discharge point:											
Month	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	Lowest pH	Highest pH	Effluent Volume (m ³)
Jan											
Feb											
Mar											
Apr											
May											
June											
July											
Aug											
Sept											
Oct											
Nov											
Dec											

ANNEXE 6

(article 22)

Rapport annuel résumant les résultats du suivi de l'effluent

PARTIE 1

Renseignements identificatoires

- 1 Nom de la mine
- 2 Adresse de la mine
- 3 Nom de l'exploitant de la mine
- 4 Numéro de téléphone de l'exploitant et adresse électronique, le cas échéant
- 5 Période visée
- 6 Date du rapport

PARTIE 2

Résultats des essais à chacun des points de rejet final

- 1 Remplir le tableau suivant pour chaque point de rejet final, identifier son emplacement et indiquer la moyenne mensuelle de la concentration des substances nocives.
- 2 S'il n'y a pas eu de résultats parce qu'il n'y avait pas de rejet à partir du point de rejet final, inscrire « A.R. » (aucun rejet).
- 3 S'il n'y a pas eu de mesure parce que l'article 12 ou 13 du *Règlement sur les effluents des mines de métaux* n'en exigeait aucune, inscrire « A.M.E. » (aucune mesure exigée).

Emplacement du point de rejet final :											
Mois	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	pH le plus bas	pH le plus haut	Volume d'effluent (m ³)
Janv											
Févr.											
Mars											
Avr											
Mai											
Juin											
Juill.											
Août											
Sept											
Oct											
Nov											
Déc											

PART 3

Results of Acute Lethality Tests
and *Daphnia Magna* Monitoring
Tests

Location of final discharge point:			
Date Sample Collected	Results for Rainbow Trout Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for <i>Daphnia magna</i> Monitoring Tests (mean percentage mortality in 100% effluent test concentration)	Results for Threespine Stickleback Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)

PART 4

[Repealed, SOR/2018-99, s. 34]

SOR/2006-239, s. 35; SOR/2018-99, s. 34.

PARTIE 3

Résultats des essais de
détermination de la létalité
aiguë et des essais de suivi avec
bioessais sur la *Daphnia magna*

Emplacement du point de rejet final :			
Date du prélèvem ent de l'échantill on	Résultats des essais de détermination de la létalité aiguë sur la truite arc-en- ciel (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de suivi avec bioessais sur la <i>Daphnia magna</i> (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de détermination de la létalité aiguë sur l'épinoche à trois épines (pourcentage moyen de mortalité dans l'effluent non dilué)

PARTIE 4

[Abrogée, DORS/2018-99, art. 34]

DORS/2006-239, art. 35; DORS/2018-99, art. 34.

SCHEDULE 6.1

[Repealed, SOR/2018-99, s. 35]

ANNEXE 6.1

[Abrogée, DORS/2018-99, art. 35]

SCHEDULE 7

[Repealed, SOR/2018-99, s. 35]

ANNEXE 7

[Abrogée, DORS/2018-99, art. 35]

SCHEDULE 8

[Repealed, SOR/2018-99, s. 35]

ANNEXE 8

[Abrogée, DORS/2018-99, art. 35]

RELATED PROVISIONS

— SOR/2018-99, s. 37

37 (1) Despite subsection 8(1) of the *Metal and Diamond Mining Effluent Regulations*, the owner or operator of a mine that is subject to those Regulations on the day on which this section comes into force shall submit in writing to the Minister of the Environment the information referred to in paragraph 8(2)(c) of those Regulations not later than 60 days after the day on which this section comes into force.

(2) During the 12-month period beginning on the day on which this section comes into force, despite subsection 16(2) of the *Metal and Diamond Mining Effluent Regulations*, the owner or operator of a diamond mine may, for the purposes of determining whether effluent is acutely lethal for the 12-month period referred to in subsection 16(1) of those Regulations, use acute lethality data that was collected during any period of 12 consecutive months before the day on which this section comes into force, if the owner or operator submits a report to the Minister of the Environment that indicates that

- (a)** the tests to determine acute lethality have been conducted in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/10 or section 5 or 6 of Reference Method EPS 1/RM/13;
- (b)** the data relates to effluent generated after the start of commercial operation by the mine; and
- (c)** the data was collected not more than 36 months before the day on which this section comes into force.

(3) During the 12-month period beginning on the day on which section 14.3 of the *Metal and Diamond Mining Effluent Regulations* comes into force, despite subsection 16(2) of those Regulations, the owner or operator of a metal mine or diamond mine may, for the purposes of determining whether effluent is acutely lethal for the 12-month period referred to in subsection 16(1) of those Regulations, use acute lethality data that was collected during any period of 12 consecutive months before the day on which that section 14.3 comes into force, if the owner or operator submits a report to the Minister of the Environment that indicates that

- (a)** the tests to determine acute lethality have been conducted in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14;
- (b)** the data relates to effluent generated after the start of commercial operation by the mine; and
- (c)** the data was collected not more than 36 months before the day on which that section 14.3 comes into force.

DISPOSITIONS CONNEXES

— DORS/2018-99, art. 37

37 (1) Malgré le paragraphe 8(1) du *Règlement sur les effluents des mines de métaux et des mines de diamants*, le propriétaire ou l'exploitant d'une mine qui est assujettie à ce règlement, à la date d'entrée en vigueur du présent article, présente par écrit au ministre de l'Environnement les renseignements visés à l'alinéa 8(2)c) de ce règlement dans les soixante jours suivant la date d'entrée en vigueur du présent article.

(2) Pendant la période de douze mois commençant à la date d'entrée en vigueur du présent article, malgré le paragraphe 16(2) de ce règlement, le propriétaire ou l'exploitant d'une mine de diamants peut se fonder sur les données d'essai de détermination de la létalité aiguë recueillies pendant toute période de douze mois consécutifs précédant la date d'entrée en vigueur du présent article pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe 16(1) de ce règlement, s'il présente au ministre de l'Environnement un rapport indiquant que :

- a)** les essais de détermination de la létalité aiguë ont été effectués conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/10 ou aux sections 5 ou 6 de la méthode de référence SPE 1/RM/13;
- b)** les données se rapportent à l'effluent émanant de la mine depuis le début de son exploitation commerciale;
- c)** les données ont été recueillies au cours des trente-six mois précédant la date d'entrée en vigueur du présent article.

(3) Pendant la période de douze mois commençant à la date d'entrée en vigueur de l'article 14.3 de ce règlement, malgré le paragraphe 16(2) de ce règlement, le propriétaire ou l'exploitant d'une mine de métal ou d'une mine de diamants peut se fonder sur les données d'essai de détermination de la létalité aiguë recueillies pendant toute période de douze mois consécutifs précédant la date d'entrée en vigueur de l'article 14.3 de ce règlement pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe 16(1) de ce règlement, s'il présente au ministre de l'Environnement un rapport indiquant que :

- a)** les essais de détermination de la létalité aiguë ont été effectués conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14;
- b)** les données se rapportent à l'effluent émanant de la mine depuis le début de son exploitation commerciale;
- c)** les données ont été recueillies au cours des trente-six mois précédant l'entrée en vigueur de l'article 14.3 de ce règlement.

— SOR/2018-99, s. 38

38 (1) Despite section 10 of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, the first study design of a diamond mine that is subject to those Regulations on June 1, 2018 may be submitted not later than the earlier of June 1, 2021 and the day on which a document that is equivalent to a study design is required to be submitted under provincial or territorial laws.

(2) In the case of a diamond mine in respect of which the first study design is submitted under subsection (1), the period referred to in subsection 11(1) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations* does not apply.

(3) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the results of any studies conducted before the day on which the first study design is submitted may be used for the purpose of determining which biological monitoring studies are required to be conducted under section 9 of Schedule 5 to those Regulations if those results can be used for the purpose of meeting the requirements of section 12 of that Schedule.

(4) However, only information gathered — for the purpose of meeting the requirements of provincial or territorial laws — during the three-year period before the day on which the first study design is submitted may be used to determine the concentration of effluent, mercury and selenium for the application of subsections 9(1) and (2) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*. If that information is used, paragraph 9(3)(a) of that Schedule does not apply.

(5) If the results of studies referred to in subsection (3) and the information referred to in subsection (4) are used in accordance with those subsections, the first study design shall include, in addition to the information referred to in section 10 of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, the information referred to in paragraph 13(2)(d) or (e), as the case may be, of that Schedule, copies of and a summary of the results of the studies and an explanation — that includes supporting information — as to how the results and information can be used for the purposes of meeting the requirements of sections 9 and 12 of that Schedule.

(6) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the effluent and water quality monitoring studies set out in Part 1 of Schedule 5 to those Regulations shall be started on the day on which the first study design is submitted.

(7) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the results of sublethal toxicity tests conducted — for the purpose of meeting the requirements of provincial or territorial laws — during the three-year period before the day on which the first study design is submitted may be used for the application of subsection 6(3) of Schedule 5 to those Regulations, as if three years had elapsed, if those tests meet the requirements of subsection 5(1) of that Schedule. If those results are used, subsections 6(1) and (2) of that Schedule do not apply.

— DORS/2018-99, art. 38

38 (1) Malgré l'article 10 de l'annexe 5 du *Règlement sur les effluents des mines de métaux et des mines de diamants*, le premier plan d'étude concernant une mine de diamants assujettie à ce règlement le 1^{er} juin 2018 peut être présenté, au plus tard, le 1^{er} juin 2021 ou, si elle est antérieure, à la date à laquelle un document équivalent à un plan d'étude doit être présenté aux termes de règles de droit provinciales ou territoriales.

(2) Dans le cas d'une mine de diamants à l'égard de laquelle le premier plan d'étude est présenté en application du paragraphe (1), la période visée au paragraphe 11(1) de cette annexe ne s'applique pas.

(3) Dans le cas d'une mine de diamants assujettie à ce règlement le 1^{er} juin 2018, les résultats d'études effectuées avant la date à laquelle le premier plan d'étude est présenté peuvent être utilisés pour déterminer quelles études de suivi biologique doivent être effectuées en application de l'article 9 de cette annexe, à condition que ces résultats puissent être utilisés pour satisfaire aux exigences prévues à l'article 12 de cette annexe.

(4) Toutefois, seuls les renseignements recueillis — pour satisfaire aux règles de droit provinciales ou territoriales — dans les trois ans qui précèdent la date de présentation du premier plan d'étude peuvent être utilisés pour déterminer la concentration de l'effluent, de mercure et de sélénium pour l'application des paragraphes 9(1) et (2) de cette annexe. Si ces renseignements sont utilisés, l'alinéa 9(3)a) de cette annexe ne s'applique pas.

(5) Si les résultats d'études visés au paragraphe (3) et les renseignements visés au paragraphe (4) sont utilisés conformément à ces paragraphes, le premier plan d'étude comprend, en plus des renseignements visés à l'article 10 de cette annexe, les renseignements visés, selon le cas, à l'alinéa 13(2)d) ou e) de cette annexe, des copies et un résumé des résultats des études et une explication — y compris les renseignements à l'appui — quant à la manière dont les résultats et les renseignements peuvent être utilisés pour satisfaire aux exigences des articles 9 et 12 de cette annexe.

(6) Dans le cas d'une mine de diamants assujettie à ce règlement le 1^{er} juin 2018, les études de suivi de l'effluent et de la qualité de l'eau prévues à la partie 1 de cette annexe débutent à la date de présentation du premier plan d'étude.

(7) Dans le cas d'une mine de diamants assujettie à ce règlement le 1^{er} juin 2018, les résultats d'essais de toxicité sublétales effectués — pour satisfaire aux règles de droit provinciales ou territoriales — dans les trois ans qui précèdent la date de présentation du premier plan d'étude peuvent être utilisés pour l'application du paragraphe 6(3) de cette annexe, comme s'il s'était écoulé trois ans, si ces essais satisfont aux exigences du paragraphe 5(1) de cette annexe. Si ces résultats sont utilisés, les paragraphes 6(1) et (2) de cette annexe ne s'appliquent pas.

(8) If the results of sublethal toxicity tests are used in accordance with subsection (7), the information referred to in paragraphs 8(a), (c), (e) and (g) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, in relation to those tests, shall be submitted to the Minister of the Environment not later than the day on which the first study design is submitted and shall be accompanied by a summary of the results of the tests and an explanation — that includes supporting information — as to how the results can be used for the purposes of meeting the requirements of subsection 5(1) of that Schedule.

(9) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the first interpretative report shall, despite subsection 12(1) of Schedule 5 to those Regulations, be submitted not later than 24 months after the day on which the first study design is submitted and shall contain, in addition to the information referred to in section 12 of that Schedule, the information referred to in paragraph 15(c) of that Schedule.

— SOR/2018-99, s. 39

39 In the case of a metal mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018,

(a) sections 4 to 8 of Schedule 5 to those Regulations apply beginning on January 1, 2019 and, until that day, the *Metal Mining Effluent Regulations*, as they read immediately before June 1, 2018, continue to apply to the matters referred to in those sections;

(b) subsections 6(1) and (2) of Schedule 5 to those Regulations do not apply and the results of sublethal toxicity tests conducted under the *Metal Mining Effluent Regulations* during the three-year period before January 1, 2019 shall be used for the application of subsection 6(3) of that Schedule, as if three years had elapsed; and

(c) biological monitoring studies started on or before June 1, 2018 shall be completed, and the corresponding interpretative report shall be submitted, in accordance with the *Metal Mining Effluent Regulations*, as they read immediately before June 1, 2018.

(8) Si les résultats d'essais de toxicité sublétales sont utilisés conformément au paragraphe (7), les renseignements relatifs à ces essais visés aux alinéas 8a), c), e) et g) de cette annexe sont présentés au ministre de l'Environnement au plus tard à la date de présentation du premier plan d'étude et ils sont accompagnés d'un résumé des résultats des essais ainsi qu'une explication — y compris les renseignements à l'appui — quant à la manière dont les résultats peuvent être utilisées pour satisfaire aux exigences du paragraphe 5(1) de cette annexe.

(9) Dans le cas d'une mine de diamants assujettie à ce règlement le 1^{er} juin 2018, le premier rapport d'interprétation est présenté, malgré le paragraphe 12(1) de cette annexe, au plus tard vingt-quatre mois après la date de présentation du premier plan d'étude et il comprend, en plus des renseignements visés à l'article 12 de cette annexe, les renseignements visés à l'alinéa 15c) de l'annexe.

— DORS/2018-99, art. 39

39 Dans le cas d'une mine de métaux assujettie au *Règlement sur les effluents des mines de métaux et des mines de diamants* le 1^{er} juin 2018 :

a) les articles 4 à 8 de l'annexe 5 de ce règlement s'appliquent à partir du 1^{er} janvier 2019 et, jusqu'à cette date, les dispositions du *Règlement sur les effluents des mines de métaux*, dans leur version antérieure au 1^{er} juin 2018, continuent de régir les matières visées par ces articles;

b) les paragraphes 6(1) et (2) de cette annexe ne s'appliquent pas et les résultats des essais de toxicité sublétales effectués au titre du *Règlement sur les effluents des mines de métaux* dans les trois années qui précèdent le 1^{er} janvier 2019 sont utilisés pour l'application du paragraphe 6(3) de cette annexe, comme s'il s'était écoulé trois ans;

c) les études de suivi biologique débutées le 1^{er} juin 2018 ou avant cette date sont menées à terme conformément aux dispositions du *Règlement sur les effluents des mines de métaux*, dans leur version antérieure au 1^{er} juin 2018, et le rapport d'interprétation qui s'y rapporte est présenté selon les modalités prévues à cette version du même règlement.

AMENDMENTS NOT IN FORCE

— SOR/2018-99, s. 2(4)

2 (4) The definition *acutely lethal* in subsection 1(1) of the Regulations is amended by striking out “or” at the end of paragraph (a), by adding “or” at the end of paragraph (b) and by adding the following after paragraph (b):

(c) more than 50% of the *Daphnia magna* subjected to it for a period of 48 hours, when tested in accordance with the acute lethality test set out in section 14.3.

— SOR/2018-99, s. 2(6)

2 (6) Section 1 of the Regulations is amended by adding the following after subsection (1):

(2) Every reference in these Regulations to column 1, 2, 3 or 4 of Schedule 4 shall be read as

(a) a reference to column 1, 2, 3 or 4 of Table 1 of Schedule 4, in the case of a mine to which subparagraph 4(1)(a)(i) applies; or

(b) a reference to column 1, 2, 3 or 4 of Table 2 of Schedule 4, in the case of a mine to which subparagraph 4(1)(a)(ii) applies.

— SOR/2018-99, ss. 3(2), (3)

3 (2) Section 3 of the Regulations is amended by striking out “and” at the end of paragraph (g), by adding “and” at the end of paragraph (h) and by adding the following after paragraph (h):

(i) un-ionized ammonia.

(3) Paragraph 4(1)(a) of the Regulations is replaced by the following:

(a) the concentration of the deleterious substance in the effluent does not exceed the maximum authorized concentrations that are set out in columns 2, 3 and 4 of

(i) Table 1 of Schedule 4, in the case of a mine in respect of which these Regulations apply for the first time on or after June 1, 2021 or in the case of a recognized closed mine that returns to commercial operation on or after June 1, 2021, or

(ii) Table 2 of Schedule 4, in any other case;

— SOR/2018-99, s. 4

4 The Regulations are amended by adding the following after section 4:

MODIFICATIONS NON EN VIGUEUR

— DORS/2018-99, par. 2(4)

2 (4) La définition de *létalité aiguë*, au paragraphe 1(1) du même règlement, est modifiée par adjonction, après l’alinéa b), de ce qui suit :

c) plus de 50 % des *Daphnia magna* qui y sont exposées pendant une période de quarante-huit heures au cours de l’essai de détermination de la létalité aiguë visé à l’article 14.3.

— DORS/2018-99, par. 2(6)

2 (6) L’article 1 du même règlement est modifié par adjonction, après le paragraphe (1), de ce qui suit :

(2) Tout renvoi à la colonne 1, 2, 3 ou 4 de l’annexe 4 dans le présent règlement constitue un renvoi :

a) dans le cas d’une mine à laquelle s’applique le sous-alinéa 4(1)a)(i), à la colonne 1, 2, 3 ou 4 du tableau 1 de l’annexe 4;

b) dans le cas d’une mine à laquelle s’applique le sous-alinéa 4(1)a)(ii), à la colonne 1, 2, 3 ou 4 du tableau 2 de l’annexe 4.

— DORS/2018-99, par. 3(2) et (3)

3 (2) L’article 3 du même règlement est modifié par adjonction, après l’alinéa h), de ce qui suit :

i) l’ammoniac non ionisé.

(3) L’alinéa 4(1)a) du même règlement est remplacé par ce qui suit :

a) la concentration de la substance nocive dans l’effluent ne dépasse pas les concentrations maximales permises qui sont établies aux colonnes 2, 3 et 4 :

(i) du tableau 1 de l’annexe 4, dans le cas d’une mine à l’égard de laquelle le présent règlement s’applique pour la première fois le 1^{er} juin 2021 ou après cette date ou d’une mine reconnue fermée dont l’exploitation commerciale a repris le 1^{er} juin 2021 ou après cette date,

(ii) du tableau 2 de l’annexe 4, dans tous les autres cas;

— DORS/2018-99, art. 4

4 Le même règlement est modifié par adjonction, après l’article 4, de ce qui suit :

4.1 Paragraph 4(1)(c) does not apply in the case where the effluent is determined to be acutely lethal in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14 when the owner or operator of a mine is testing at the frequency prescribed in subsection 14(1), unless the effluent is determined to be acutely lethal in accordance with any other acute lethality test.

— SOR/2018-99, ss. 9(2) to (4)

9 (2) Subsection 12(1) of the Regulations is replaced by the following:

12 (1) The owner or operator of a mine shall, not less than once per week and at least 24 hours apart, collect from each final discharge point

(a) a grab sample or composite sample of effluent and record the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of the deleterious substances prescribed in section 3 except un-ionized ammonia; and

(b) a grab sample of effluent and record the temperature and the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of total ammonia expressed as nitrogen (N).

(3) Section 12 of the Regulations is amended by adding the following after subsection (3):

(4) The owner or operator of a mine shall determine and record the concentration of un-ionized ammonia, using the temperature, pH and concentration of total ammonia recorded under paragraph (1)(b), in accordance with the following formula:

$$A / (1 + 10^{pK_a - pH})$$

where

A is the concentration of total ammonia — which is the sum of un-ionized ammonia (NH₃) and ionized ammonia (NH₄⁺) — expressed in mg/L as nitrogen (N);

pH is the pH of the effluent sample; and

pK_a is a dissociation constant calculated in accordance with the following formula:

$$0.09018 + 2729.92/T$$

where

T is the temperature of the effluent sample in kelvin.

(4) Subsection 13(1) of the Regulations is replaced by the following:

13 (1) The owner or operator of a mine may reduce the frequency of conducting tests relating to the concentrations of arsenic, copper, cyanide, lead, nickel, zinc or un-ionized ammonia at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one

4.1 L'alinéa 4(1)c) ne s'applique pas s'il est déterminé que l'effluent présente une létalité aiguë conformément aux modes opératoires visés aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14, lorsque le propriétaire ou l'exploitant d'une mine effectue l'essai à la fréquence prévue au paragraphe 14(1) à moins qu'un autre essai de détermination de la létalité aiguë indique que l'effluent présente une létalité aiguë.

— DORS/2018-99, par. 9(2) à (4)

9 (2) Le paragraphe 12(1) du même règlement est remplacé par ce qui suit :

12 (1) Au moins une fois par semaine et à au moins vingt-quatre heures d'intervalle, le propriétaire ou l'exploitant d'une mine prélève, à partir de chaque point de rejet final :

a) un échantillon instantané ou un échantillon composite d'effluent dont il enregistre le pH au moment du prélèvement, ainsi que, sans délai après celui-ci, les concentrations des substances nocives désignées à l'article 3, à l'exception de l'ammoniac non ionisé;

b) un échantillon instantané d'effluent dont il enregistre la température et le pH au moment du prélèvement, ainsi que, sans délai après celui-ci, la concentration d'ammoniac total sous forme d'azote (N).

(3) L'article 12 du même règlement est modifié par adjonction, après le paragraphe (3), de ce qui suit :

(4) Le propriétaire ou l'exploitant d'une mine calcule et enregistre la concentration d'ammoniac non ionisé selon la formule ci-après, en utilisant la température, le pH et la concentration d'ammoniac total enregistré en application de l'alinéa (1)b) :

$$A / (1 + 10^{pK_a - pH})$$

où :

A représente la concentration d'ammoniac total — soit l'ammoniac non ionisé (NH₃) et l'ammoniac ionisé (NH₄⁺) — exprimée en mg/L et sous forme d'azote (N);

pH le pH de l'échantillon d'effluent;

pK_a la constante de dissociation calculée selon la formule suivante :

$$0,09018 + 2729,92/T$$

où :

T représente la température de l'échantillon d'effluent en kelvin.

(4) Le paragraphe 13(1) du même règlement est remplacé par ce qui suit :

13 (1) Le propriétaire ou l'exploitant d'une mine peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration d'arsenic, de cuivre, de cyanure, de plomb, de nickel, de zinc ou d'ammoniac non ionisé à au moins une fois par trimestre civil, chaque essai étant effectué à au moins

month apart, if that substance's monthly mean concentration at that final discharge point is less than 10% of the value set out in column 2 of Schedule 4 for 12 consecutive months.

— SOR/2018-99, ss. 10(2), (3)

10 (2) Subsection 14(1) of the Regulations is replaced by the following:

14 (1) Subject to section 15, the owner or operator of a mine shall collect, once a month, a grab sample of effluent from each final discharge point and determine whether the effluent is acutely lethal by conducting acute lethality tests on aliquots of each effluent sample in accordance with sections 14.1 to 14.3.

(3) Subsection 14(3) of the Regulations is replaced by the following:

(3) When collecting a grab sample of effluent for the purposes of subsection (1), the owner or operator of a mine shall

(a) collect a sufficient volume of effluent to enable the owner or operator to comply with paragraph 15(1)(a); and

(b) record the temperature and the pH of each grab sample of effluent at the time of the sample's collection.

— SOR/2018-99, s. 11

11 The Regulations are amended by adding the following after section 14.2:

Acute Lethality Test — *Daphnia Magna*

14.3 Unless the salinity value of the effluent is equal to or greater than four parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall, in addition to conducting the acute lethality test set out in section 14.1, determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14.

— SOR/2018-99, s. 12(2)

12 (2) Paragraphs 15(1)(a) and (b) of the Regulations are replaced by the following:

(a) without delay,

(i) conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample collected under subsection 14(1),

(ii) record the concentration of total ammonia and, using that concentration and using the temperature and pH recorded under paragraph 14(3)(b), determine the

un mois d'intervalle, si la concentration moyenne mensuelle de la substance à ce point de rejet final est inférieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4 pendant douze mois consécutifs.

— DORS/2018-99, par. 10(2) et (3)

10 (2) Le paragraphe 14(1) du même règlement est remplacé par ce qui suit :

14 (1) Sous réserve de l'article 15, le propriétaire ou l'exploitant d'une mine prélève une fois par mois un échantillon instantané d'effluent à chaque point de rejet final et détermine si cet effluent présente une létalité aiguë en effectuant des essais de détermination de la létalité aiguë sur des portions aliquotes de chaque échantillon conformément aux articles 14.1 à 14.3.

(3) Le paragraphe 14(3) du même règlement est remplacé par ce qui suit :

(3) Lors du prélèvement des échantillons instantanés en application du paragraphe (1), le propriétaire ou l'exploitant d'une mine :

a) prélève un volume d'effluent suffisant pour lui permettre de se conformer à l'alinéa 15(1)a);

b) enregistre, au moment du prélèvement, la température et le pH de chaque échantillon.

— DORS/2018-99, art. 11

11 Le même règlement est modifié par adjonction, après l'article 14.2, de ce qui suit :

Essai de détermination de la létalité aiguë — *Daphnia magna*

14.3 Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à quatre parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant, en plus de l'essai de détermination de la létalité aiguë prévu à l'article 14.1, un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14.

— DORS/2018-99, par. 12(2)

12 (2) Les alinéas 15(1)a) et b) du même règlement sont remplacés par ce qui suit :

a) sans délai :

(i) effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané prélevé en application du paragraphe 14(1),

(ii) enregistre la concentration d'ammoniac total et, au moyen de cette concentration et de la température et du

concentration of un-ionized ammonia in accordance with the formula set out in subsection 12(4), and

(iii) record the concentrations of the deleterious substances prescribed in section 3;

(b) collect a grab sample twice a month from the final discharge point from which the effluent sample determined to be acutely lethal was collected, record the temperature and the pH of each sample at the time of its collection and, without delay, conduct the acute lethality test that determined the effluent sample to be acutely lethal on each grab sample in accordance with the procedure set out in section 6 of the applicable reference method and, if the sample is determined to be acutely lethal, without delay,

(i) conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample,

(ii) record the concentration of total ammonia and, using that concentration and using the temperature and pH recorded under this paragraph, determine the concentration of un-ionized ammonia in accordance with the formula set out in subsection 12(4), and

(iii) record the concentrations of the deleterious substances prescribed in section 3; and

— SOR/2018-99, s. 13

13 The Regulations are amended by adding the following after section 15:

15.1 Despite paragraph 15(1)(c), if an effluent sample is determined to be acutely lethal when tested using the acute lethality test set out in section 14.3, the owner or operator of a mine shall, without delay, collect the first grab sample required by paragraph 15(1)(b) and comply with the requirements of that paragraph.

— SOR/2018-99, s. 15(2)

15 (2) Section 17 of the Regulations and the heading before it are repealed.

— SOR/2018-99, s. 16(2)

16 (2) Section 18 of the Regulations is replaced by the following:

18 The owner or operator of a mine shall record without delay the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 for all acute lethality tests that are conducted to monitor deposits from final discharge points.

pH enregistrés en application de l'alinéa 14(3)b), calcule la concentration d'ammoniac non ionisé selon la formule prévue au paragraphe 12(4),

(iii) enregistre les concentrations des substances nocives désignées à l'article 3;

b) deux fois par mois, prélève un échantillon instantané à partir du point de rejet final d'où l'échantillon d'effluent qui présente une létalité aiguë a été prélevé, enregistre, au moment du prélèvement, la température et le pH de chaque échantillon, et effectue sans délai après le prélèvement, sur chacun de ces échantillons, selon le mode opératoire prévu à la section 6 de la méthode de référence, l'essai de détermination de la létalité aiguë à partir duquel la létalité aiguë de l'échantillon a été établie. S'il est ainsi établi que l'échantillon présente une létalité aiguë, le propriétaire ou l'exploitant d'une mine, sans délai :

(i) effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané,

(ii) enregistre la concentration d'ammoniac total et, au moyen de cette concentration et de la température et du pH enregistrés en application du présent alinéa, calcule la concentration d'ammoniac non ionisé selon la formule prévue au paragraphe 12(4),

(iii) enregistre les concentrations des substances nocives désignées à l'article 3;

— DORS/2018-99, art. 13

13 Le même règlement est modifié par adjonction, après l'article 15, de ce qui suit :

15.1 Malgré l'alinéa 15(1)c), s'il est établi qu'un échantillon d'effluent présente une létalité aiguë après l'essai de détermination de la létalité aiguë prévu à l'article 14.3, le propriétaire ou l'exploitant d'une mine prélève sans délai le premier échantillon instantané exigé par l'alinéa 15(1)b) et se conforme aux exigences de cet alinéa.

— DORS/2018-99, par. 15(2)

15 (2) L'article 17 du même règlement et l'intertitre le précédant sont abrogés.

— DORS/2018-99, par. 16(2)

16 (2) L'article 18 du même règlement est remplacé par ce qui suit :

18 Le propriétaire ou l'exploitant d'une mine enregistre sans délai les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14 pour tous les essais de détermination de la létalité aiguë effectués dans le cadre du suivi des rejets provenant de points de rejet final.

— SOR/2018-99, s. 18(2)

18 (2) Paragraph 19.1(1)(a) of the Regulations is replaced by the following:

(a) in mg/L for deleterious substances referred to in paragraphs 3(a) to (g) and (i); and

— SOR/2018-99, s. 19(2)

19 (2) Paragraph 20(1)(a) of the Regulations is replaced by the following:

(a) in kg for deleterious substances referred to paragraphs 3(a) to (g) and (i); and

— SOR/2018-99, s. 27(2)

27 (2) Subsection 31.1(1) of the Regulations is replaced by the following:

31.1 (1) If an unauthorized deposit of a deleterious substance occurs, the owner or operator of a mine shall, without delay, collect a grab sample of effluent at the place where the deposit occurred and determine whether the effluent is acutely lethal by conducting tests on aliquots of each effluent sample in accordance with sections 14.1 to 14.3.

— SOR/2018-99, s. 32(2)

32 (2) Schedule 4 to the Regulations is replaced by the Schedule 4 set out in Schedule 2 to these Regulations.

SCHEDULE 4

(Subsection 1(2), subparagraphs 4(1)(a)(i) and (ii), subsection 13(1), paragraph 13(3)(a), subparagraph 22(c)(i) and paragraph 24(1)(a))

Maximum Authorized Concentrations of Prescribed Deleterious Substances

TABLE 1

Item	Column 1 Deleterious Substance	Column 2 Maximum Authorized Monthly Mean Concentration	Column 3 Maximum Authorized Concentration in a Composite Sample	Column 4 Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.10 mg/L	0.15 mg/L	0.20 mg/L
2	Copper	0.10 mg/L	0.15 mg/L	0.20 mg/L
3	Cyanide	0.50 mg/L	0.75 mg/L	1.00 mg/L

— DORS/2018-99, par. 18(2)

18 (2) L'alinéa 19.1(1)a du même règlement est remplacé par ce qui suit :

a) la concentration moyenne mensuelle en mg/L des substances nocives énumérées aux alinéas 3a) à g) et i);

— DORS/2018-99, par. 19(2)

19 (2) L'alinéa 20(1)a du même règlement est remplacé par ce qui suit :

a) la charge en kg des substances nocives énumérées aux alinéas 3a) à g) et i);

— DORS/2018-99, par. 27(2)

27 (2) Le paragraphe 31.1(1) du même règlement est remplacé par ce qui suit :

31.1 (1) En cas de rejet non autorisé d'une substance nocive, le propriétaire ou l'exploitant d'une mine prélève sans délai un échantillon instantané d'effluent sur les lieux du rejet non autorisé et détermine si cet effluent présente une létalité aiguë en effectuant des essais conformément aux articles 14.1 à 14.3, sur des portions aliquotes de chaque échantillon d'effluent prélevé.

— DORS/2018-99, par. 32(2)

32 (2) L'annexe 4 du même règlement est remplacée par l'annexe 4 figurant à l'annexe 2 du présent règlement.

ANNEXE 4

(paragraphe 1(2), sous-alinéas 4(1)a)(i) et (ii), paragraphe 13(1), alinéa 13(3)a, sous-alinéa 22c)(i) et alinéa 24(1)a))

Concentrations maximales permises des substances nocives désignées

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
4	Lead	0.08 mg/L	0.12 mg/L	0.16 mg/L
5	Nickel	0.25 mg/L	0.38 mg/L	0.50 mg/L
6	Zinc	0.40 mg/L	0.60 mg/L	0.80 mg/L
7	Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L
9	Un-ionized ammonia	0.50 mg/L expressed as nitrogen (N)	Not applicable	1.00 mg/L expressed as nitrogen (N)

TABLEAU 1

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance nocive	Concentration moyenne mensuelle maximale permise	Concentration maximale permise dans un échantillon composite	Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,10 mg/L	0,15 mg/L	0,20 mg/L
2	Cuivre	0,10 mg/L	0,15 mg/L	0,20 mg/L
3	Cyanure	0,50 mg/L	0,75 mg/L	1,00 mg/L
4	Plomb	0,08 mg/L	0,12 mg/L	0,16 mg/L
5	Nickel	0,25 mg/L	0,38 mg/L	0,50 mg/L
6	Zinc	0,40 mg/L	0,60 mg/L	0,80 mg/L
7	Matières en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L
9	Ammoniac non ionisé	0,50 mg/L sous forme d'azote (N)	Sans objet	1,00 mg/L sous forme d'azote (N)

NOTE: The concentrations for items 1 to 8 are total values.

NOTE : Les concentrations pour les articles 1 à 8 sont des valeurs totales.

TABLE 2

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.30 mg/L	0.45 mg/L	0.60 mg/L
2	Copper	0.30 mg/L	0.45 mg/L	0.60 mg/L
3	Cyanide	0.50 mg/L	0.75 mg/L	1.00 mg/L
4	Lead	0.10 mg/L	0.15 mg/L	0.20 mg/L

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
5	Nickel	0.50 mg/L	0.75 mg/L	1.00 mg/L
6	Zinc	0.50 mg/L	0.75 mg/L	1.00 mg/L
7	Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L
9	Un-ionized ammonia	0.50 mg/L expressed as nitrogen (N)	Not applicable	1.00 mg/L expressed as nitrogen (N)

TABLEAU 2

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance nocive	Concentration moyenne mensuelle maximale permise	Concentration maximale permise dans un échantillon composite	Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,30 mg/L	0,45 mg/L	0,60 mg/L
2	Cuivre	0,30 mg/L	0,45 mg/L	0,60 mg/L
3	Cyanure	0,50 mg/L	0,75 mg/L	1,00 mg/L
4	Plomb	0,10 mg/L	0,15 mg/L	0,20 mg/L
5	Nickel	0,50 mg/L	0,75 mg/L	1,00 mg/L
6	Zinc	0,50 mg/L	0,75 mg/L	1,00 mg/L
7	Matières en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L
9	Ammoniac non ionisé	0,50 mg/L sous forme d'azote (N)	Sans objet	1,00 mg/L sous forme d'azote (N)

NOTE: The concentrations for items 1 to 8 are total values.

NOTE : Les concentrations pour les articles 1 à 8 sont des valeurs totales.

— SOR/2018-99, ss. 33(2), (3)

33 (2) Schedule 5 to the Regulations is amended by replacing the references after the heading “Schedule 5” with the following:

(Subsections 7(1) and (3), subparagraphs 15(1)(a)(i) and (b)(i) and paragraph 32(1)(c))

(3) Subsection 4(1) of Schedule 5 to the Regulations is amended by adding “and” at the end of paragraph (n), by striking out “and” at the end of paragraph (o) and by repealing paragraph (p).

— DORS/2018-99, par. 33(2) et(3)

33 (2) Les renvois qui suivent le titre « Annexe 5 », à l'annexe 5 du même règlement, sont remplacés par ce qui suit :

(paragraphe 7(1) et (3), sous-alinéas 15(1)a)(i) et b)(i) et alinéa 32(1)c))

(3) L'alinéa 4(1)p) de l'annexe 5 du même règlement est abrogé.

— SOR/2018-99, s. 34(1)

34 (1) Part 2 of Schedule 6 to the Regulations is replaced by the following:

PART 2

Test Results Respecting Each Final Discharge Point

1 Complete the following table with the monthly mean concentration for the deleterious substances set out in the table for each final discharge point and identify the location of the final discharge point.

2 Any measurement not taken because there was no deposit from the final discharge point shall be identified by the letters “NDEP” (No Deposit).

3 Any measurement not taken because no measurement was required in accordance with the conditions set out in section 12 or 13 of these Regulations shall be identified by the letters “NMR” (No Measurement Required).

— DORS/2018-99, par. 34(1)

34 (1) La partie 2 de l'annexe 6 du même règlement est remplacée par ce qui suit :

PARTIE 2

Résultats des essais à chacun des points de rejet final

1 Remplir le tableau suivant pour chaque point de rejet final, identifier son emplacement et indiquer la moyenne mensuelle de la concentration des substances nocives.

2 S'il n'y a pas eu de résultats parce qu'il n'y avait pas de rejet à partir du point de rejet final, inscrire « A.R. » (aucun rejet).

3 S'il n'y a pas eu de mesure parce que l'article 12 ou 13 du présent règlement n'en exigeait aucune, inscrire « A.M.E. » (aucune mesure exigée).

Location of final discharge point:												
Month	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	SS (mg/L)	Ra 226 (Bq/L)	Un-ion- ized am- monia (mg/L, ex- pressed as Nitro- gen (N))	Lowest pH	Highest pH	Effluent Volume (m ³)
Jan.												
Feb.												
Mar.												
Apr.												
May												
June												
July												
Aug.												
Sept.												
Oct.												
Nov.												
Dec.												

Emplacement du point de rejet final :												
Mois	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	SS (mg/L)	Ra 226 (Bq/L)	Ammoniac non ionisé (mg/L sous forme d'a- zote (N))	pH le plus bas	pH le plus haut	Volume d'effluent (m ³)
Janv.												
Févr.												
Mars												
Avr.												
Mai												
Juin												
Juil.												
Août												
Sept.												
Oct.												
Nov.												
Déc.												

— SOR/2018-99, s. 34(3)

— DORS/2018-99, par. 34(3)

34 (3) Part 3 of Schedule 6 to the Regulations is replaced by the following:

34 (3) La partie 3 de l'annexe 6 du même règlement est remplacée par ce qui suit :

PART 3

Results of Acute Lethality Tests

[illegible]

PARTIE 3

Résultats des essais de détermination de la létalité aiguë

[illegible]

	METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN	Issue Date: Jan.15, 2018 Revision: 0 Revision date: Jan.15, 2018	
	Environment	Document #: BAF-PH1-830-P16-0047	

APPENDIX C

EMERGENCY RESPONSE TRUCK INVENTORY

The information contained herein is proprietary to Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

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Rescue EMG-005



Equipment checklist Date: Time: Inspector:

N/A - Not Applicable

Compartment	Items	Yes	Condition	Full	Empty	Tested	Comments
Cabin							Sat Phone
							Check Battery level
	1						Safety Glasses clear box
	1						Safety glasses Darks box
	1						Binoculars
	1						Rolls of duck tape
	2						Care Flare
	1						Emergency Road kit
	1						First Aid kit
	1						Thermal Imaging Camera
1 Left Compartment	4						Change with spare battery
	1						Eyewash
	1						10 pound fire extinguisher
2 Left Compartment	7						5 Delta Air, 2 Scott 2.2
	17						SCBA Cylinder
	21						SCBA face Masks (straps extended)
	1						Piercing Nozzle with Shut Off
	1						Red Rope (coil)
	1						Rit Pack
	10						Banks Pelican flashlights
3 Left Compartment	1						Step Ladder
	1						Skill Saw, 1 blade
	1						Cable Power Puller
	1						Saws all (reciprocating saw)
	1						Saws all Blades (kits)
	3						Drill Bits set
	1						Cordless drill
	1						Tape measure
	1						Socket Set
	1						9mm socket missing
	1						Wrench Set (in tool box)
	2						Boxes of 30' socks
	1						roll mech wire
	1						Tool Box with assorted tools
	1						Large Bolt Cutters
	3						Battery Charger
	8						Batteries Dewalt
	2						Battery Milwaukee
	1						Charger & battery TIC
	1						Safety Glasses (box) Assorted
	1						Small Axe
	1						Small Bolt Cutters
	1						Haligan Bar
	2						Axe
	2						Pick Head Axe
	1						Fire Pole
	1						Steel Jerry can (gas)
	1						Plastic Jerry Can (gas)
	1						portable Fan
	1						Start and run for 5 min
							Yellow rope (spool)
							Miscellaneous Oils
	2						Chop Saw Blade
	1						Power pack for Jaws of Life
	1						Start and run for 5 min
	1						Chain Saw chain
	1						Duck Tape
	1						Red Cordless Drill/Charger/Batteries
3 Left Compartment	1						Portable Fan (electric)
	2						Tarps
	3						Ratchet Straps
	1						Air Hammer
	1						20 ton bottle jack
	3						Hurst Tool Hose

	1	Spreader					
	1	Cutter					
	1	Combi Tool					
	1	Ram					
	1	Gloves					
	1	Regulator Assembly					
	2	Air Hoses					
	1	32" Air bag					
	1	13" Air Bag					
	1	1/2 air impact					
	1	80 ton Air bag					
	2	Grizzly Struts					
		Assorted Cribbing					
4 Left Compartment	2	1.5 inch hose (yellow)					
	4	1.5 inch hose (red)					
	3	2.5 inch hose (white)					
	4	2.5 inch hose (red)					
	6	Mustang suits					
	1	Spanners					
	4	1.5 inch nozzle					
	1	3 inch adapter 2.5"					
	1	1.5" plastic Nozzle					
	2	10 lbs. extinguisher					
	1	6" connector pipe for portatanks					
	1	Rolliglis 550					
		Wood (cribbing)					
	1	Chainsaw					Start and run for 5 min
	1	Rescue Saw					Start and run for 5 min
	2	20lbs fire extinguisher					
5 Left Compartment	6	Exo Fit harness					
	1	Rollglis R 550					
	6	Self Inflatable Life vests					
	4	Boots (pairs) (Hip waiters)					
	3	Rescue rope (200 foot bags)					
	1	Tripod straps and pullies (bag)Top of ARFF					
	4	Climbing harness					
	3	Petzl AVAO Harness					
	1	Edge covers (bag)					
	8	Rock climbing helmet					
	1	Rescue ring					
	1	Life jackets (bag) of 4					
	9	Air horn					
	1	Kovak Ice drillkit					
	1	Bag assorted webbing straps					
	2	Mini 4:1					
	3	Bags of Caribiner					
	1	Bag Prusick					
	1	Pelican case Assorted High angle rescue gear					
	2	Assender kits					
	4	Pylons					
	2	Beam Clamps					
	1	Rope Launcher					
	2	400' rope bags					
	2	Confined space SCBA (Black case					
	5	6' lanyard					
	2	Telescopic reach pole					
1 Right Compartment	16	Orange blankets					
	1	Kendrick Extrication Device (KED)					
	8	Folding stretchers					
	1	White plastic rigid Leg splint					
	8	Safety vests					
	4	Misc. rigid splints (sets) (orange bag)					
	1	6 Bank Radio Charger (5 batteries)					
	1	Ferno Stair chair					
	2	Spider Straps					
	1	Burn kit					
	2	Neck brace					
	5	Quick connect straps (back board)					
	3	Trauma bag (red)					Check Expiry Data (Burn Kits, Sterile water)
	4	CID blocks (orange)					
	2	Flashlights (Box) MAG lites					
	1	Incident Command Board					

	3	Roll Caution tape					
	3	Roll Danger tape					
	1	SKED					
	1	SCBA Mask cleaning wipes					
	1	Bag stretcher cover					
	1	Nutragrain bars					
	2	Basket Stretcher kits (complete)					
2 Right Compartment	1	Empty Cube Totes					
	1	6" tube for portable tank					
		Diaphragm pump (Hoses)					
3 Right Compartment	3	Quatrex bags (white)					
	2	Lithium fire extinguisher					
	2	Magnesium fire extinguisher					
	4	Grey spill pads					
	4	12x 18 tarp					
	2	Boxes of 30' sock					
	2	Backboard					
	1	Water bottle/sleeve cups					
	9	coveralls					
	1	4 white spill pads					
4 Right Compartment	1	1000 VSG Bladder					
	1	5000 VSG Bladder					
	1	15000 VSG Bladder					
	5	Quatrex bags (black)					
	3	Bladder repair kits					
	1	4X4 duck pond					
	2	Box 30' spill boom					
	3	Bladder fitting kit					
5 Right Compartment	1	Spade					
	2	Mass Casualty Kits					Check Expiry Data (Burn Kits, Sterile water)
	2	Rake					
	1	Push broom					
	2	Shovel (square head)					
	2	Chicken wire (roll)					
	12	Long gloves (pair)					
	6	Extension cord					
	1	Honda GX 270 trash pump					Start and run for 5 min
	1	3 inch flat hose					
	3	Tyvek coveralls (box)					
	1	Funnel					
	1	Gap seal; 20 L bucket (plug agent)					
	1	Scoop					
	3	3 inch x 10 foot spill booms (box)					
	4	Cones					
	2	Dumpster liners					
	1	Box of Garbage bags					
	3	Spill pads white					
	1	Honda generator					Start and run for 5 min
	4	spill pads Grey					

MRT Emergency Response Truck

Right Side:



Left Side:

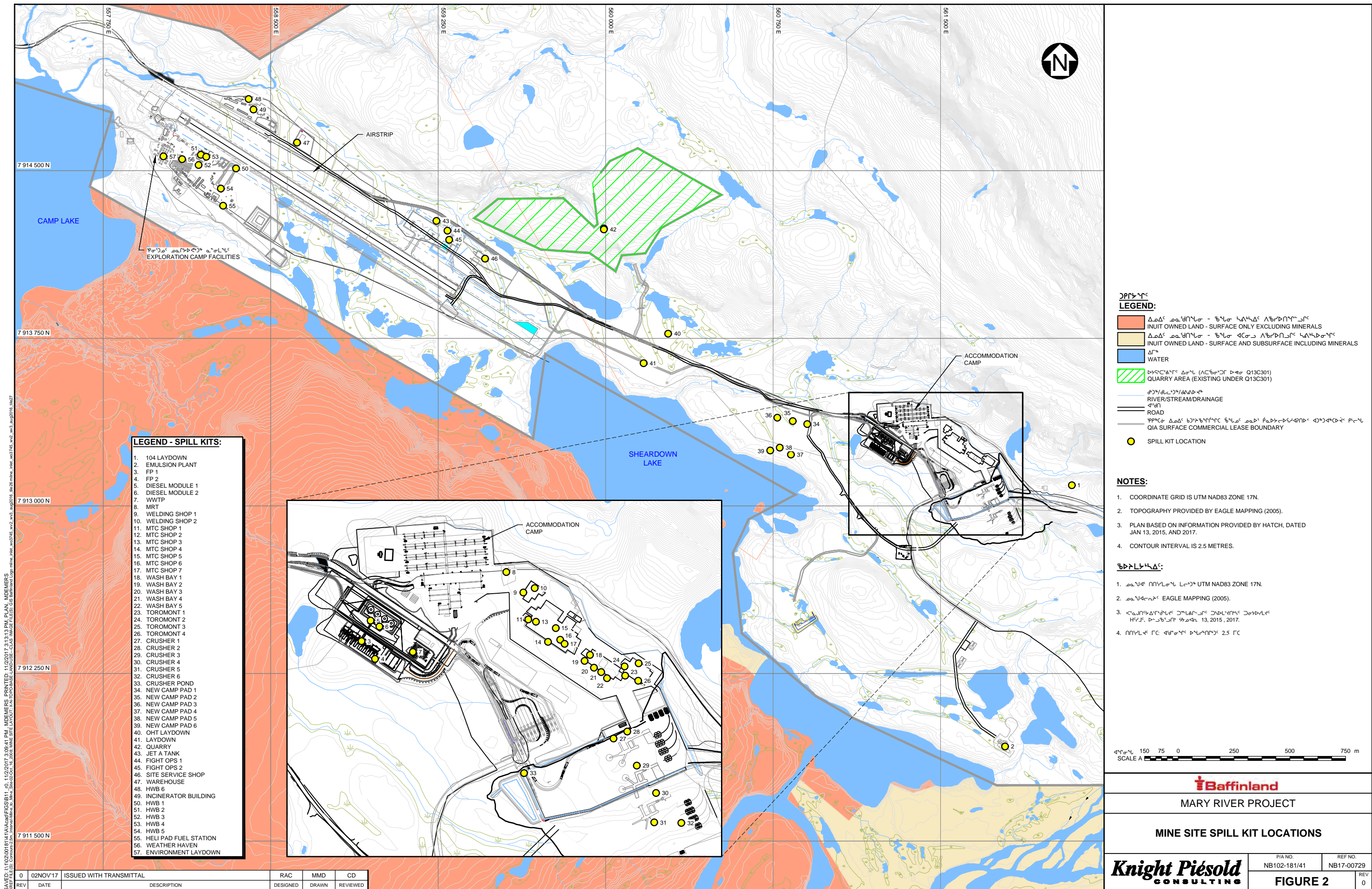


	METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN	Issue Date: Jan.15, 2018 Revision: 0 Revision date: Jan.15, 2018	
	Environment	Document #: BAF-PH1-830-P16-0047	

APPENDIX D MINE SITE SPILL KIT INVENTORY AND LOCATIONS

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Inventory of Typical Spill Kits	
Amount	Description
1	30 Gallon Drum with Lid
50	Sorbent Pads
4	Sorbent Socks
2	Sorbent Booms
1	Shaker of Safety Sorb
1	Neoprene Drain Cover
1	Disposable Bag
2 Pair	Safety Goggles
2 Pair	Nitrile Gloves

* Best efforts are made to ensure spill kits remain fully stocked at their designated locations.

	METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN	Issue Date: Jan.15, 2018 Revision: 0 Revision date: Jan.15, 2018	
	Environment	Document #: BAF-PH1-830-P16-0047	

APPENDIX E

NT-NU SPILL REPORT FORM

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Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR		REPORT TIME		<input type="checkbox"/> ORIGINAL SPILL REPORT, OR <input type="checkbox"/> UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____-_____
	OCCURRENCE DATE: MONTH – DAY – YEAR		OCCURRENCE TIME			
C	LAND USE PERMIT NUMBER (IF APPLICABLE)			WATER LICENCE NUMBER (IF APPLICABLE)		
	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION				REGION <input type="checkbox"/> NWT <input type="checkbox"/> NUNAVUT <input type="checkbox"/> ADJACENT JURISDICTION OR OCEAN	
E	LATITUDE			LONGITUDE		
	DEGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME		RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION			
	ANY CONTRACTOR INVOLVED		CONTRACTOR ADDRESS OR OFFICE LOCATION			
H	PRODUCT SPILLED		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES		U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES		U.N. NUMBER	
I	SPILL SOURCE		SPILL CAUSE		AREA OF CONTAMINATION IN SQUARE METRES	
	FACTORS AFFECTING SPILL OR RECOVERY		DESCRIBE ANY ASSISTANCE REQUIRED		HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS					
L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE	
	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE	

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLED	REPORT LINE NUMBER
		STATION OPERATOR		YELLOWKNIFE, NT	(867) 920-8130
LEAD AGENCY <input type="checkbox"/> EC <input type="checkbox"/> CCG <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILA <input type="checkbox"/> INAC <input type="checkbox"/> NEB <input type="checkbox"/> TC			SIGNIFICANCE <input type="checkbox"/> MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> UNKNOWN		FILE STATUS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED
AGENCY		CONTACT NAME	CONTACT TIME	REMARKS	
LEAD AGENCY					
FIRST SUPPORT AGENCY					
SECOND SUPPORT AGENCY					
THIRD SUPPORT AGENCY					

	METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN	Issue Date: Jan.15, 2018 Revision: 0 Revision date: Jan.15, 2018	
	Environment	Document #: BAF-PH1-830-P16-0047	

APPENDIX F

WASTE POND WATER TREATMENT PLANT OPERATIONS

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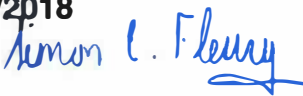
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	Mine Operations	Document #: BAF-PH1-340-PRO-048	

Baffinland Iron Mines Corporation

Waste Pond Water Treatment Plant Operations


Rev 1.0

Prepared By: Chet Fong
Department: Mine Operations
Title: Senior Mining Engineer
Date: 17/08/2018
Signature: 

Approved By: Simon Fleury
Department: Mine Operations
Title: Mine Manager
Date: 17/08/2018
Signature: 

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
08/17/18	V1.0	CF		Initial

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1 PURPOSE

This document outlines the basic procedure to safely operate the Water Treatment Plant

2 SCOPE

This document will cover the basic operations of the plant, including start up and shut down, monitoring, treatment, and emergency protocols and procedures for at risk activities at the Water Treatment Plant.

2.1 EXEMPTIONS

This document does not include instructions related to water treatment, which can be found in the plant Operations and Maintenance Manual.

3 RESPONSIBILITIES

Any visitor shall request permission to the plant operator prior to entering the work area. In the absence of an operator, permission shall be requested to the mine supervisor.

The Plant operator shall ensure that everyone working in the plant wears the requisite PPE according to the activities being performed (e.g. chemical handling).

4 PROCEDURES

The information in this section is intended as a summary of plant operations. In the case of a discrepancy between this document and the Operations and Maintenance Manual, the latter will take precedence.


For full details on design and plant operation, refer to the operator's manual. In standard operations, the WTP is intended to draw water from the Waste Dump Pond and treat the intake water in 3 steps inside the WTP structure. The water is then discharged to a Geotube Settling Pond, where a fourth treatment step of settlement will occur, before water is either discharged into the environment or, if not compliant, recirculated back to the Waste Dump Pond.

The three steps of treatment involve the injection of chemical into temporary storage tanks.

- Step 1 – Iron Precipitation
- Step 2 – Hydroxide Precipitation and pH Adjustment

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- Step 3 – Flocculation
- Step 4 - Filtration

Steps 1-3 occur inside the WTP structure, with the 4th step taking place in the Geotube Settling Pond.

4.1 PLANT OPERATIONS

Plant operations consists primarily of managing flow, dosage and water levels across the pond, sump, and tanks. Flow is managed with a combination of control panel adjustments and manual valve manipulations.

The plant consists of the following components:

1. Intake Pump – pulls water from the Waste Dump Pond into the WTP
2. Onion tanks – water is stored for treatment prior to discharge. There are two trains, which can be run independently or concurrently.
3. Control panel – use to remotely manage pumps – can be set for automatic and manual operations
4. Dosing pumps – use to inject chemical into onion tanks at a fixed rate
5. Dosing tanks – mixing tanks from which chemicals (Lime, Polymer) is depleted at a configurable rate
6. Transfer pumps – used to take treated water from the plant out to the Geotube Pond
7. Geotube Pond – discharge from the plant is deposited here for particulate settlement prior to final discharge.
8. Discharge pump – used to pull treated water from the Geotube Pond to either be discharged into the environment or recirculated back to the Waste Dump Pond.
9. Blower motors – used to agitate water in onion tanks during treatment to ensure more even dispersion of chemicals.

Once the Plant is operational, the operator will commence with monitoring the measured levels of pH and suspended solids with built in instrumentations and gauges. These readings may be corroborated with manual instrumentations such as a YSI meter.


When readings indicate pH readings at the desired values, the operator shall then initiate discharging of water into the Geotube Pond. This water is allowed to percolate through the Geotube, which catches particulates as a filter. Once in the Sump, where any remaining particulates are then captured and settle into the bottom of the pond.

Water is discharged from this Geotube Pond, either directly into the environment or back into the Waste Dump Pond. The maximum flow rate for these discharging is 1200 gal/min, this limit imposed by the flowmeter installed.

At design capacity, the intake pump(s) should be able to pull water into the WTP for treatment at an equal rate to the discharge pump. The plant effectively runs continuously with dosing in-stream.

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4.2 PLANT START UP

The following steps should be undertaken when starting up the WTP.

1. Ensure blower motors are activated.
2. Ensure all the Valves to the Geotube Sump are open.
3. Ensure the transfer pumps are switched to automatic
4. Check that all the intake valves are open
5. Keep valves open between tanks on each train
6. Start up intake pump and adjust pressure accordingly. To do this, adjust the following:
 - a. Rpm of the pump
 - b. Valve openings
7. Start Ferric Sulphate Dosing system. Ensure intake is in the Ferric Sulphate barrels, and there are no leaks present. Pumps should be activated.
8. Start Lime Dosing system. Dosing pumps should be activated.
9. Start up Polymer Dosing System. Dosing pumps should be activated

Plant operations can now commence.

4.3 PLANT SHUT DOWN

Plant shut down can be undertaken when it is to be unmanned for a longer period of time (eg. More than 2 shifts) within the same system (for winter decommissioning, procedure XXX). To run a plant shut down

1. Shut all intake valves
2. Shut all Ferric Sulphate dosing equipment
3. Shut all Lime dosing equipment
4. shut all Polymer dosing equipment
5. Rinse Lime lines (reference other procedure)

Plant can now be shut down. This procedure can be utilized with the onion tanks full. This should also be done before any interruptions in power due to generator maintenance or other causes.


4.4 DISCHARGING

Discharging be undertaken whenever the plant is running. It is most efficient to run the discharge when there is moderate to high water levels in the Geotube Sump. The intake hose for the Geotube Sump should utilize the ring to ensure that drawn water is from the top of the water surface.

Discharging requires the manual operation of the valves to discharge the water either to the environment or back to the Waste Dump Pond. Readings should also be checked and logged on the flowmeter when discharge begins using the totalizer values.

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NOTE: discharge flow rate should be kept below 1200 gal/min, as flow greater than this will not be measureable.

To discharge, the following steps should be undertaken:

1. Ensure enough water to discharge. Water levels should be at least 50 centimetres from the bottom of the sump prior to beginning discharge.
2. Ensure valve on re-circulation line is closed. This will enable the water to discharge into the environment. Where re-circulation is required, close the valve on the discharge line and open the valve on the re-circulation line.
3. If discharging to the environment, check the totalizer reading on the flowmeter prior to discharge. This is not required if re-circulating.
4. On the control panel, Set discharge to “on”
5. While discharging, check discharge pH and Turbidity with sampling tap periodically. Samples can be collected and tested using YSI instrument.
6. When discharging is complete or to be disabled, go to control panel and set discharge to “off”

4.5 CHEMICAL DOSING

Chemical dosing is performed as part of the treatment process. The primary drivers for chemical dosing is:

1. Reduce the pH
2. Reduce the suspended solids

Prior to discharging water back into the environment.

As dosing quantities will vary depending on flow rate and water qualities, refer to user manual for dosing quantities.

Dosing procedures will vary slightly between the stages of treatment. The three stages that require chemical intervention are Ferric Sulphate, Lime, and Polymer.


4.5.1 FERRIC SULPHATE – LIQUID

PPE Required: long chemical resistant gloves, apron, face shield, standard PPE

- Prepare a barrel for dosing by placing the barrel into the duck pond by the ferric sulphate dosing area and removing the top seal.
- Put 2 dosing pumps into 1 barrel (1 per train)
- Switch on dosing pump on the control panel
- On the pump, check frequency and stroke length to ensure dosage is as expected.
- To change barrels, switch off on the dosing pump and change barrel

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4.5.2 LIME – BAGS

PPE Required: long chemical resistant gloves, respirator, face shield, respirator, standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add lime to water

4.5.3 POLYMER – BAGS

PPE Required: standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add polymer to water

4.6 SYSTEM AUTOMATION

For instruction on System Automation, please refer to the Operations and Maintenance Manual.

4.7 TROUBLE SHOOTING

For issue identification, please refer to the checklists in the Operations and Maintenance Manual.


4.8 ACCIDENT RESPONSE

As the WTP involves the handling of a number of chemicals that may be harmful, precautions must be taken to ensure all personnel who are in the work area are informed of the hazards and the preventative and treatment measures.

4.8.1 RESPONSE EQUIPMENT AVAILABLE

The WTP is equipped with a stationary emergency shower, 2 portable emergency shower stations and eyewash stations (dual purpose), 2 fire extinguishers, and 1 stationary eyewash station.

Additionally, the WTP is equipped with spare PPE, face shields, respirators, chemical resistant gloves, hearing protection, and spill kits.

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There are also patch kits for the onion tanks, hose and fitting replacements, tools, and a base station radio available at the WTP.

In the event that an incident occurs that requires emergency response, same basic steps should be immediately undertaken. The following lists some of the possible situations and a brief of the response steps.

4.8.2 SPILLS ON THE GROUND

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.8.3 SPILLS ON PERSON

- Proceed to stationary emergency shower
- Notify secondary operator
- Secondary operator activates pump switch
- Pull handle and rinse for 10 mins
- If unable to proceed to stationary emergency shower, refer to “emergency response procedure”

4.8.4 LIME IN EYES

- If possible, proceed immediately to emergency eyewash station
- Activate emergency eyewash and rinse for 10 mins.
- Repeat if required
- Notify secondary operator
- If unable to proceed to emergency eyewash station, refer to “emergency response procedure”

4.8.5 LIME SPILL


- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.9 APPENDICIES

Appendix A – Operations and Maintenance Manual for Mary River Mine Waste Rock Pile Water Treatment Plant

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**APPENDIX A – OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE
WASTE ROCK PILE WATER TREATMENT PLANT
20180817_v02**

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**OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE
WASTE ROCK PILE WATER TREATMENT PLANT
20180817_v02**

Baffinland Iron Mines Corporation

Prepared by:



BROWNFIELDS TO GOLD MINES

McCue Engineering Contractors
203-8291 92 Street
Delta, BC
V4G 0A4

Project No. 137-0001

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1.0 INTRODUCTION

This documents outlines the Operations Manual for Baffinland Iron Mine Corporation's (BIM) Mary River Mine Waste Rock Pile water treatment plant (WTP).

2.0 PLANT OVERVIEW

2.1 General Process Description

The WTP employs a process of coagulation, pH adjustment, flocculation, and filtration to treat acid rock surface runoff collected in the pond at the base of the waste rock pile. The objective of the system operation is to treat water to within the parameters outlined in the Metal Mining Effluent Regulations (MMER), as specified to McCue by BIM, and summarized in Table 1.

Table 1: MMER Effluent Limits

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentrations in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic	mg/L	0.5	0.75	1.00
Copper	mg/L	0.3	0.45	0.60
Cyanide	NTU	1.00	1.50	2.00
Lead	mg/L	0.20	0.30	0.40
Nickel	mg/L	0.50	0.75	1.00
Zinc	mg/L	0.50	0.75	1.00
Total Suspended Solids	mg/L	15.00	22.50	30.00
Radium 226	Bq/L	0.37	0.74	1.11
pH	SU	6-9.5	6-9.5	6-9.5

The treatment steps are described in Section 2.2. Refer to drawings in Appendix A:

2.2 Brief Process Overview

2.2.1 System Inlet

Water is collected at an inlet storage pond (P-001) where it is held for treatment. Two diesel powered centrifugal trash pumps (PU-100A/B) are used to transfer water from the storage pond to an equipment enclosure where the WTP is housed.

At the WTP, the flow can be divided into two separate treatment trains (1 and 2), with each train having a flow meter on the inlet line to monitor flow.

Water is directed into two reactor tanks (TA-110 and TA-210) for processing.

2.2.2 Step 1 – Iron Precipitation

Ferric sulphate solution is injected into TA-110 and TA-210 to promote coagulation and precipitation of some heavy metals.

As of system commissioning in June 2018, ferric sulphate liquid solution (12% Fe) is used and injected directly into the process. Each process train utilizes an independent chemical pump to introduce chemical into the system.

The WTS also includes a ferric sulphate make down system, including a holding tank and mixer to allow for makeup of solution using dry ferric sulphate.

Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.3 Step 2 – Hydroxide Precipitation and pH Adjustment

Water flows by gravity from TA-110 and TA-210 to TA-120 and TA-220 respectively. Here, hydrated lime is injected into the process to increase pH and aid in further precipitation of some metals through hydroxide precipitation.

Hydrated lime solution is made manually by adding dry hydrated lime and raw influent water to a mixing tank (TA-020). A mixer is run continuously to ensure the hydrated lime slurry does not solidify.

One hydrated lime chemical pump is utilized to dose each reactor tank with chemical. Two motorized valves (MV-120 and MV-220) are used to control the flow of lime to each reactor tank. Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.4 Step 3 – Flocculation

Water flows by gravity from TA-120 and TA-220 to TA-130 and TA-230 respectively. Here, polymer is injected into the process to aid in flocculation of suspended solids prior to filtration.

Polymer solution is made manually by adding dry polymer and raw influent water to a mixing tank (TA-030). A mixer is run continuously to ensure uniformity of the polymer solution.

Two polymer chemical pumps are utilized to provide polymer dosing to each train. Polymer can be dosed directly into each reactor tank, or inline through a static mixer located directly downstream of the reactor tank.

2.2.5 Step 4 – Filtration

Water from TA-130 and TA-230 is pumped to a geotube pond via two diesel powered centrifugal trash pumps (PU-200A/B).

Water is directed to a manifold where it can be distributed to two geotube bags for solids filtration. Two additional geotube bags can be deployed in the pond once the currently operating geotube bags have reached capacity. These spare geotubes are currently stored in a warehouse for future use.

Filtered water leaves the geotube bags and is directed to a collection point at the North West corner of the pond. From here, water is pumped via one diesel trash pump (PU-300) to the Mary River discharge point, or recycled back to the inlet pond. A flow meter is installed on the discharge line to Mary River to allow for data logging of flow.

2.3 Major Equipment List

The WTP layout is provided in appendix A. A list of major equipment is provided in Table 2.

Table 2: Major WTP Equipment

Equipment	Description	Qty	Drawing Reference (If Available)
Pond Transfer Pump	Model: Prime Aire PA4A60-404ST Power: Diesel Driven Capacity: 140m3/hr	2	PU-100 A / PU-100 B
Inlet Flow Meter	Model: GF Signet 3-2551-P1-42	2	FT-100 / FT-200
Ferric Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-110 / TA-210
Lime Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-120 / TA-220
Polymer Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-130 / TA-230
Aeration Blowers	Gast R7100A-3 Blower • 208 V / 3 HP / 60 Hz	2	BL-100A / BL-100B
pH Controller and Sensors	Model: Walchem W900 (Controller) Model: Walchem WEL-PHF-NN (Sensors)	1	pH-110/120/210/220
Motorized Ball Valve	Hayward 1" Ball Valve Model: HRSN2	2	MV-120 and MV-220
Level Transmitter	Model: Echosonic 11 LU27	2	LT-130 / LT-230
Bag Filter	Model: FTI830-2P-150-CS-BS-P13-DP Bag Size: 5 Micron	1	FIL-100
Ferric Chemical Pump	Model: Walchem EHE31E1-VC Power: 115 VAC/1hp/60Hz Capacity: 1 LPM @ 105m TDH	2	PU-010A / PU-010B
Lime Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 9.5 LPM @ 105 m TDH	1	PU-020
Polymer Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 16.5 LPM @ 105 m TDH	2	PU-030A / PU-030B
Ferric Mixing Tank	Material: Polyurethane Size: Ø 1.2m x 1.3m Height	1	TA-010
Lime Mixing Tank	Material: Polyurethane Size: Ø 1.8m x 1.7m Height	1	TA-020
Polymer Mixing Tank	Material: Polyurethane Size: Ø 1.6m x 1.6m Height	1	TA-030
Coarse Bubble Diffusers	Model: Maxair 24" SS	24	-

2.4 System Automation

The system is automated through a main control panel located in the system enclosure. The system P&ID is provided in Appendix A. Operation is outlined in Table 3.

Table 3: Control Panel Automation

Equipment ID	Equipment Description	Control Logic	PID Control Reference	Controls	Panel Indication
PU – 100 A/B	Inlet Pond Pump	Units can be controlled in Hand or in Auto.	-	-	Pump icon will indicate run status
		Pump will turn on in Hand in Auto or in Hand.			
		Pump will turn off if high level is measured in TA-110 or TA-210	LSH-110 / LSH-210	Auto	High level alarm at panel
		Pump will turn off if high level measured in TA-130 or TA-230	LIT-130 / LIT-230	Auto - High level settable at panel	High level alarm at panel
BL-100 A/B	Blower	Units can be controlled in Hand or in Auto	-	-	Blower icon will indicate run status
		Blower will turn on in Auto or in Hand			
		BL-100 A will turn off if low level is measured by LIT-130	LIT-130	Auto – Low level settable at panel	Low level alarm
		BL-100 B will turn off if low level is measured by LIT-230	LIT-230	Auto – Low level settable at panel	Low level alarm
pH-110	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC
pH-210	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC

pH-210	pH Sensor	If pH>9.5, close MV-120 - Alarm	MV-120	Auto – pH set point settable at panel	Display pH on PLC
pH-220	pH Dosage	If pH>9, close MV-220 - Alarm	MV-220	Auto – pH set point settable at panel	Display pH on PLC
PU-010A	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-100 measures flow, PU-010A energizes.	FIT-100	Auto	Display run status on PLC
PU-010B	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-200 measures flow, PU-010B energizes.	FIT-100	Auto	Display run status on PLC
PU-020	Lime Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		<u>Speed Control (1 train only)</u> If pH-120> 8.5, PU-020 will reduce speed. If pH < 8, pump will increase pump speed. If pH is between 8 to 8.5, pump will maintain pump speed.	pH-110 / pH-120	Auto – pH set point adjustable at panel	Display run status on PLC
		<u>Speed Control Disabled</u> If flow is detected by both trains, speed control is disabled.	FIT-100 / FIT-200	Auto	Display run status on PLC
PU-030 A	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status

		Polymer pump energizes if PU-200 A is on	PU-200A	-	Display run status on PLC
PU-030 B	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Polymer pump energizes if PU-200 B is on	PU-200B	-	Display run status on PLC
PU-200 A	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-130 measures < 3', PU-200A off. If LT-130 measures >3', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-130 measures >4.5', PU-200A off. If LT-130<4.5', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-200 B	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-230 measures < 3', PU-200B off. If LT-230 measures >3', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-230 measures >4.5', PU-200B off. If LT-230<4.5', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-300	Discharge Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Pump off at LSL-200	LSL-200	-	Level indicator on panel

		Pump on at LSH-200	LSH-200	-	Level indicator on panel
		High Level Alarm at LSHH-200	LSHH-200	-	High Level Alarm
MX-010 /020/030	Mixer	Units can be controlled on/off manually	-	-	-

3.0 GENERAL STARTUP PROCEDURE

3.1 After Dormancy Pre-start-up Procedures

The following steps shall be taken after extended periods of dormancy, prior to general startup of the WTP.

Task	Check
Perform a visual inspection of the system enclosure for signs of water/snow ingress.	<input type="checkbox"/>
Inspect hose and pipe for signs of leaks, abrasion, or other physical damage.	<input type="checkbox"/>
Inspect Reactor tanks as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Tank connections for signs of strain or stress. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Blowers as follows: <ul style="list-style-type: none"> Signs of abrasion, or other physical damage on all external accessories such as relief valves, gauges and filters. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Diesel Pumps as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Check for and tighten loose attaching hardware. Make sure that valves at the inlet and outlet are opened. Check oil levels and lubricate as necessary. 	<input type="checkbox"/>
Inspect Ferric Sulphate pump as follows <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Hydrated Lime pumps as follows <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Inspect condition of internal pump hose. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Polymer pump as follows: <ul style="list-style-type: none"> Signs of leaks, abrasion, or other physical damage. Inspect condition of internal pump hose. Make sure that valves at the inlet and outlet are opened. 	<input type="checkbox"/>
Inspect Level Transmitter as follows: <ul style="list-style-type: none"> Monitor debris and ensure the sensor is level and mounted perpendicular to water level. Check and roughly compare measurement on the PLC with the real on the field. 	<input type="checkbox"/>
Inspect pH sensors as follows: <ul style="list-style-type: none"> Monitor debris and deposition of scaling on the transmitter. Perform a cleaning of the sensors as necessary. 	<input type="checkbox"/>

Inspect Bag Filter vessel as follows: <ul style="list-style-type: none"> • Signs of leaks, abrasion, or other physical damage. • Inspect filter bag and replace as necessary 	<input type="checkbox"/>
Inspect Inlet Flow Meter as follows: <ul style="list-style-type: none"> • Signs of leaks, abrasion, or other physical damage. • Inspect flow sensor for scaling. Clean as necessary. 	<input type="checkbox"/>
Inspect Geotube Bag as follows: <ul style="list-style-type: none"> • Ensure inlet connection points are securely attached. • Ensure height of bag does not exceed recommended limits. If so, decommission geotube bag. • Clean geotube surface of sediment and scaling to prevent fouling using a push broom, or gentle pressure washing. 	<input type="checkbox"/>

3.2 Commissioning

After pre-start-up procedures are completed, the system can be energized. The following procedure reflects a high level overview of equipment checks to be performed. Detailed instructions can be found in the product specific manuals. Before any mechanical intervention, disconnect the electrical supply.

3.2.1 Hydrated Lime Pump / Polymer Pump

Task	Check
Ensure that all protections (cover, cover window, ventilator hood, coupling protection) are in place before operating the pump.	<input type="checkbox"/>
Check the direction of rotation of the pump.	<input type="checkbox"/>
Make sure that valves at the inlet and outlet are opened.	<input type="checkbox"/>
Start the pump by checking its direction of rotation through the cover window.	<input type="checkbox"/>
Check the flow and discharge pressure and adjust rollers if these figures don't match the pump specifications.	<input type="checkbox"/>

IMPORTANT: Ensure lime pump valves remains open during operation. Should valves be left in the closed position, the process line can over pressurize, leading to a rupture of the chemical hose.

3.2.2 Blowers

Task	Check
Ensure impeller rotation is correct.	<input type="checkbox"/>
Check filters and inspect for signs of fouling. Replace if necessary.	<input type="checkbox"/>

Ambient temperature – Check room and discharge air temperatures. Exhaust air should not exceed 135°C.	<input type="checkbox"/>
Working pressure and vacuum values – Adjust relief valve pressure or vacuum setting, if needed.	<input type="checkbox"/>
Motor current – Check that the supply current matches recommended current rating on product nameplate.	<input type="checkbox"/>
Electrical overload cutout – Check that the current matches the rating on product nameplate.	<input type="checkbox"/>

3.2.3 *Ferric Pump*

Task	Check
Ensure pump is energized.	<input type="checkbox"/>
Make sure that valves at the inlet and outlet are opened.	<input type="checkbox"/>
Start the pump manually, in order to prime and adjust dosing rates.	<input type="checkbox"/>
Prime the pump. See manual for details.	<input type="checkbox"/>
Adjust dosing according to inlet water flow rate. See below.	<input type="checkbox"/>
Check dosing rate with calibration cylinder.	<input type="checkbox"/>

3.2.4 *Motorized Valve*

Task	Check
Ensure valve is energized.	<input type="checkbox"/>
Ensure valve opens/closes reliably in manual mode:	<input type="checkbox"/>

3.2.5 *Diesel Pumps*

Task	Check
Check fuel level and oil levels in the engine, air compressor, pump bearings and seal housing.	<input type="checkbox"/>
Consult engine operations manual before attempting to start the unit.	<input type="checkbox"/>
Allow pump to prime.	<input type="checkbox"/>
Adjust engine speed to desired output.	<input type="checkbox"/>

3.2.6 pH Sensors

Task	Check
Ensure sensor is calibrated.	<input type="checkbox"/>
Ensure the pH reading displayed locally at the Walchem panel is transmitted correctly to PLC.	<input type="checkbox"/>

3.2.7 Geotube

Task	Check
Ensure surface is clean of sediment and debris.	<input type="checkbox"/>
Ensure all inlet valve are open.	<input type="checkbox"/>
Ensure height of geotube does not exceed manufacturer recommended limit.	<input type="checkbox"/>

4.0 OPERATION

4.1 General Operating Instructions

Operation of the WTP will consist of ensuring major equipment (blowers, dosing pumps, motorized valves, level transmitters) is running correctly, and ensuring influent/effluent monitoring and sampling are conducted on schedule.

The drivers for pH adjustment and TSS treatment are operation of the Ferric Sulfate, Hydrated Lime and Polymer Pump, along with the proper performance of the aeration blowers and diffusers equipment.

The unit will run manually. During short term dormancy, the unit can be operated in a "Sleep Mode" where the system is run in a re-cycle status using two submersible pumps inside TA-130 and TA-230 to recirculate water from the end of each train to the beginning of each train. Chemical injection is disabled during dormancy, however, the lime mixer should remain on to maintain suspension of the hydrated lime slurry. Blowers will also remain on to ensure suspension of solids within the reactor tanks.

Parameters to be measured and recorded daily include temperature, pH (typical values are between 6.5 and 9), and TSS. The system must be monitored regularly to ensure pH does not drop below the low level set point or raise above the level set point.

The pH reading should be recorded daily. The pH should be cross referenced regularly with a hand held device. Should the pH differ from the hand held reading, the operator should clean the pH electrodes using a 2-5% solution of hydrochloric acid.

System data can be recorded in the spreadsheet provided in Appendix B. Regular daily monitoring of parameters such as pH, temperature, TSS, and Geotube height must be recorded to ensure proper operation.

4.2 Operating Procedure

The following section will outline the step-by-step procedures for operating the treatment system.

4.2.1 Standard Operation

Inlet

The inlet pond level should be checked and recorded prior to start up. Two pond pumps can be utilized to transfer raw water to the treatment system. Usage will depend on the volume of treatment required. At low pond levels, one pond pump and one process train can be utilized. At high levels, both pumps can be utilized to increase the treatment volume.

All pump discharge valves must be opened. The pumps (PU-100 A/B) shall be placed in “Hand” at the PLC. This will energize the pumps and begin transfer of water to the treatment system. The pumps will only turn on if a high level is measured by LSH-110/210 or LT-130/230.

Operators must ensure the inlet pond level is monitored, as the pumps do not include a low level shut off.

Ferric Pumps (PU-010 A/B)

Water is transferred from the inlet pond to two reactor tanks (TA-110 and TA-210) where ferric sulphate is injected. The dosage rate of the ferric pumps is determined by the inlet quality of the raw water and can range from 0 to 20 mg/l. The dosage rate is to be determined by the operator.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The ferric pumps, PU-010 A and PU-010 B, will energize when flow is detected by FIT-100 and FIT-200 respectively.

Before starting the pumps, all discharge valves must be opened.

Lime Pump (PU-020)

After coagulant addition, water flows by gravity to TA-120 and TA-220 where hydrated lime is injected into the process. The dosage rate of the Lime pump is determined by the inlet quality of raw water and the pH required, and can range from 0 to 300 mg/l. The dosage rate is to be determined by the operator.

In manual mode, the speed of the pump can be set at the pump VFD, located on the lime pump stand.

Pump speed will be dependent on the pH measured by pH-120, and the pH set point entered into the panel (adjustable by an operator). At a setpoint of 8.5, the pump will increase speed if pH-120 measures a pH below 8. If pH-120 measures a pH above 9, pump speed will decrease. If pH is measured between 8 to 8.5, the dosage rate will remain the same.

-

At a pH above 9.5, MV-120 and MV-220 will close.

The lime pump will operate continuously, with chemical consistently recirculated to the lime mixing tank (TA-020). This is done to ensure the lime slurry does not settle and solidify in the piping system. At the end of every shift, clean water must be flushed through the piping in order to prevent fouling. Flushing may be required more frequently depending on operational conditions.

Due to the possibility of fouling, the lime pump system must be monitored for pressure consistently.

Lime Solution Make Up

Hydrated lime solution is made manually, with the solution concentration ranging from 5-10% depending on volume of raw water to be treated. A concentration of 5% is recommended to minimize line fouling caused by the lime slurry. Higher concentrations can be made, but more frequent line flushing will be required.

The lime tank mixer is operated from the panel, and should be operated continuously to prevent the slurry from solidifying.

Polymer Pumps (PU-030 A/B)

The dosage rate of the ferric pumps is determined by the inlet quality and can range from 0 to 3 mg/l.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The polymer pumps, PU-020 A and PU-020 B, will energize when the transfer pumps, PU-200 A and PU-200 B are energized.

Before starting the pumps, all discharge valves must be opened.

Polymer Solution Make Up

Polymer solution is made manually, with concentration ranging from 0.1 to 0.25% depending on volume to be treated.

The polymer tank mixer is operated from the panel, and should be kept on at all times to maintain uniformity of the solution.

Blowers

The blowers are operated from the panel, and should be energized at all times when raw water is being processed in the reactor tanks.

Both blowers (BL-100A and BL-100B) can be set in “Auto” at the panel, at which point they will run continuously until the water level in TA-130 and TA-230 is measured to be less than 6”. This level is settable at the panel.

Raw Water Bag Filter

The bag filter provides filtration of water required for chemical makeup. The filter bags should be replaced periodically when differential pressure across the filter exceeds approximately 20 psi.

Geotube Bags

Water is transferred from the final reactor tanks (TA-130 and TA-230) by diesel generated trash pumps (PU-200 A and PU-200 B) to the geotube pond. The transfer pumps, PU-200A and PU-200B are operated based on the level measured by the reactor tank level transmitters, LT-130 and LT-230 respectively. These set points are adjustable at the panel.

The height of the geotube bags must be monitored regularly.

4.3 Daily Operator Checklist

The following steps outline day-to-day operational procedures for the WTS.

Standard Operation

Task	Check
Check inlet pond and record water level	<input type="checkbox"/>
Check lime and polymer solutions, make up additional solution as required.	<input type="checkbox"/>
Place PU-100 A (and PU-100 B if necessary) in Hand mode at the control panel.	<input type="checkbox"/>
Set Ferric Sulphate pump (PU-010 A / B) dose rate and place pump in Auto at control panel. Ensure pump energizes when flow is detected by FIT-100 or FIT-200.	<input type="checkbox"/>
Turn on hydrated lime pump (PU-020 A) manually. Adjust dose rate based on flow measured by inlet flow meters.	<input type="checkbox"/>
Monitor hydrated lime pump pressure gauge. If pressure gauge is showing a pressure greater than 15 psi, flush line with water.	<input type="checkbox"/>
Set polymer pump dose rate at panel. Set in "remote" mode. Set pump to auto at panel. Pump will turn on when PU-200A/B energize.	<input type="checkbox"/>
Set Blowers (BL-100 A / BL-100B) to Hand.	<input type="checkbox"/>
Once onion tanks are full, set PU-200A/B to Auto (if using both trains). Ensure downstream valves to geotube bags are open.	<input type="checkbox"/>

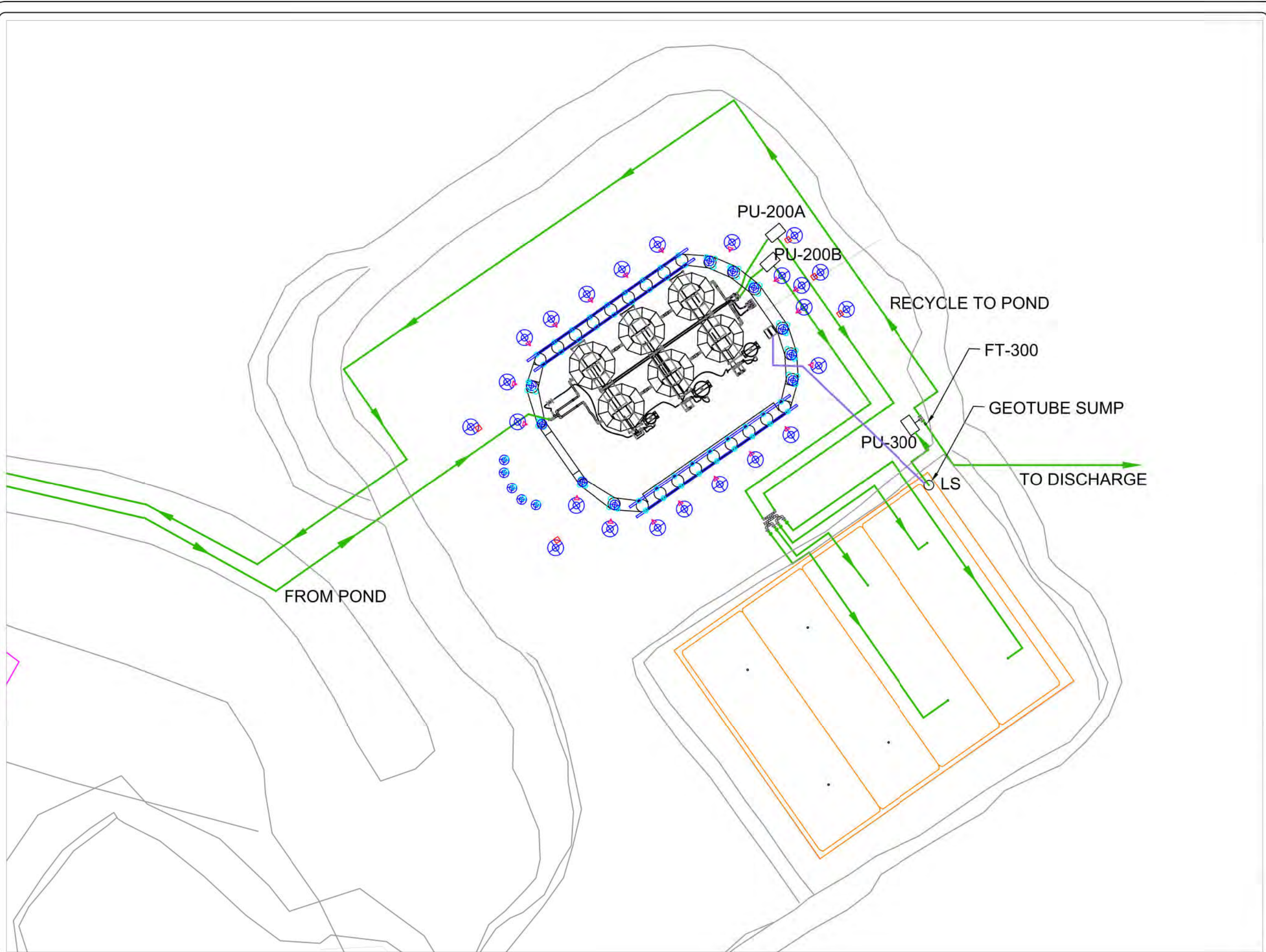
Observe reactor tank water levels to ensure inlet and outlet flows are balanced.	<input type="checkbox"/>
Observe and record height of geotube bags. Height must not exceed 6 feet.	<input type="checkbox"/>
Set PU-300 to auto in the panel. Once the water in the pond reaches the operating float switch, the pump will be energized.	<input type="checkbox"/>
Discharge vales must be set manually to allow for discharge to the creek, or recycle back to the inlet pond. Set valves in correct position.	<input type="checkbox"/>

Daily Shutdown

Task	Check
Set inlet pump to Off position	<input type="checkbox"/>
Allow reactor tanks to be pumped down to ¼ volume.	<input type="checkbox"/>
Turn off chemical pumps.	<input type="checkbox"/>
Flush lime line with water	<input type="checkbox"/>
Keep lime mixer (Mix-020) on to ensure hydrated lime slurry remains in liquid form.	<input type="checkbox"/>
If tanks are lowered, blowers can be turned off. If tanks are kept full, energize recirculation pumps.	<input type="checkbox"/>
Check lime and polymer solutions, make up additional solution if required.	<input type="checkbox"/>
Turn transfer pumps (PU-200 A/B) and discharge diesel pump (PU-300) off.	<input type="checkbox"/>

APPENDIX A –DRAWINGS


-



- NOTES:
- PU-200A/B- Transfer Pump
 - PU-300- Discharge Pump
 - FT-300- Flow Meter
 - LS- Level Switch
 - LSHH 200
 - LSH 200
 - LSL 200
- Process lines
- Instrumentation lines

Process based on conceptual design by Golder Associates

REVISION TABLE		
No.	DESCRIPTION	DATE
0	Original Issue	2018/04/30
1	Record Drawing	2018/07/31



McCUE ENGINEERING
CONTRACTORS

CLIENT:
**BAFFINLAND IRON MINES
CORPORATION**

**FULL SITE LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018

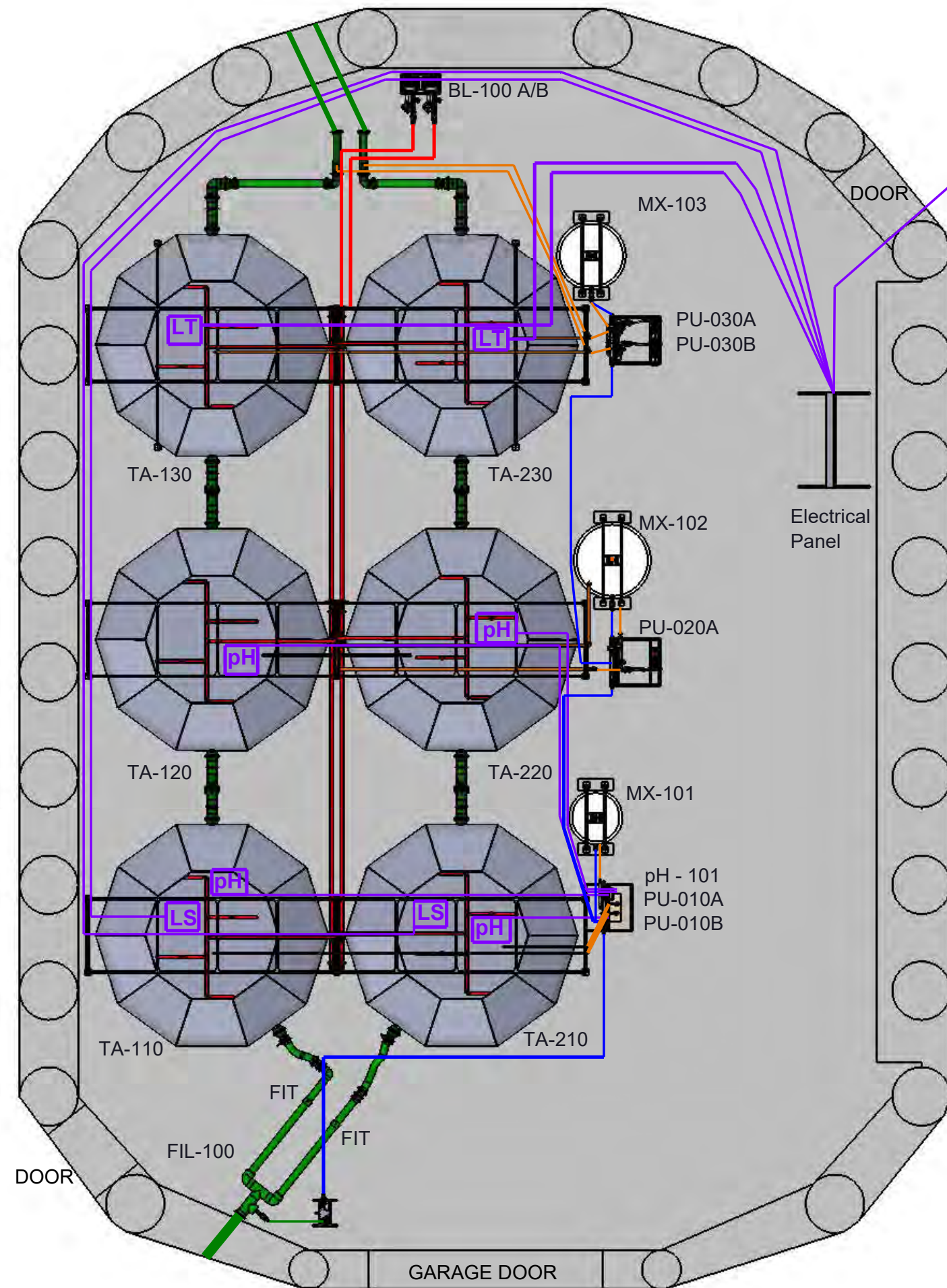
SCALE: NTS

DATA BY: R.B.

MCCUE JOB NO: 137-0001

DRAWN BY: L.S.

FIG: GA-001



LEGEND

BL-100 A/B - Blower
 FIL-100 - Bag Filter
 MX-101 - Ferric Mixing Station
 MX-102 - Lime Mixing Station
 MX-103 - Polymer Mixing Station
 PU-010 A/B - Ferric Pump
 PU-020 - Lime Pump
 PU-030 A/B - Polymer Pump
 TA-110 - Ferric Process Tank (Train 1)
 TA-210 - Ferric Process Tank (Train 2)
 TA-120 - Lime Process Tank (Train 1)
 TA-220 - Lime Process Tank (Train 2)
 TA-130 - Polymer Process Tank (Train 1)
 TA-230 - Polymer Process Tank (Train 2)
 pH-101 - pH Controller
 FIT - Flow Meter
 pH - pH Sensor
 LS - Level Switch
 LT - Level Transmitter

Notes:

- Process Lines
- Water Make-up Lines
- Chemical Lines
- Air Lines
- Instrumentation Line

Process based on conceptual design by Golder Associates

REVISION TABLE

No.	DESCRIPTION	DATE
0	Original Issue	2018/05/01
1	Record Drawing	2018/08/17

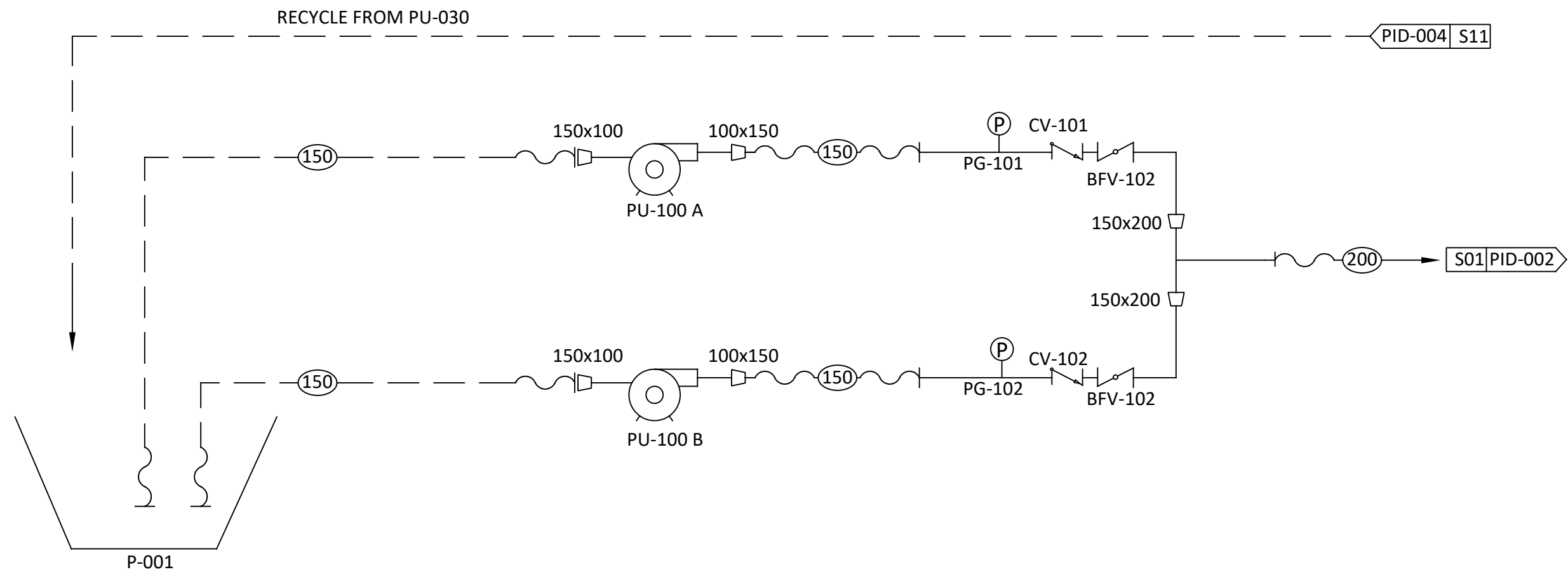


CLIENT:

BAFFINLAND IRON MINES CORPORATION

**BUILDING LAYOUT
GENERAL ARRANGEMENT DRAWING**
Waste Rock Pile Water Treatment Plant

DATE: August 17, 2018	SCALE: AS SHOWN
DATA BY: R.B	JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-002



P-001
Inlet Storage Pond

PU-100 A/B
Pond Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

LEGEND :

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge

Process based on conceptual
design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

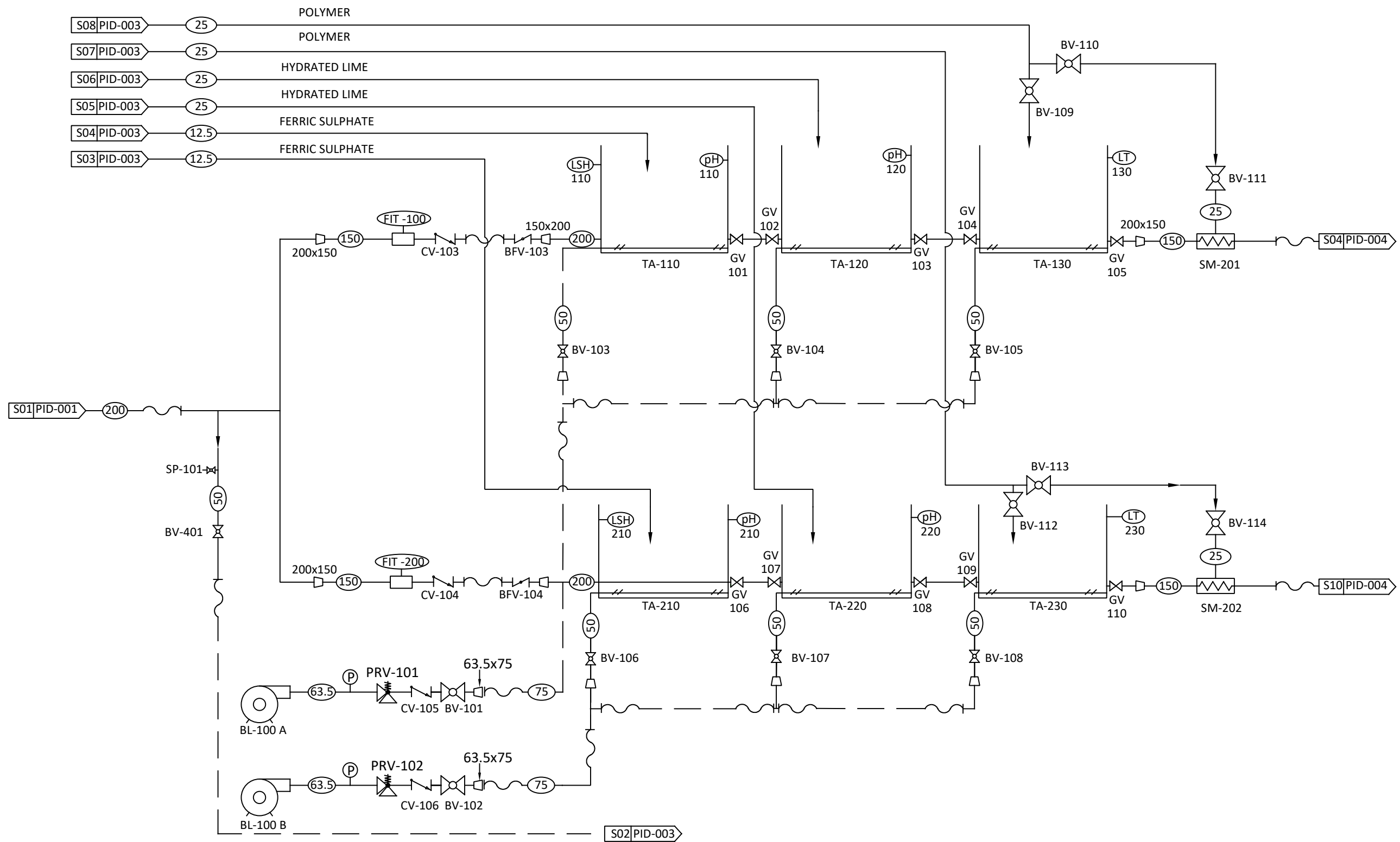


CLIENT:

**BAFFINLAND IRON MINES
CORPORATION**

**Waste Rock Water Storage Pond
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0001



BL-100 A/B
Blower
Model: Gast R7100A-3
Power: 208V/3hp/60Hz
Capacity: 500m³/hr @ 1.9m TDH

TA-110/210
Ferric Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-120/220
Lime Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-130/230
Polymer Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

FT-100/200
Influent Flow Meter
Model: GF Signet 3-2551-P1-41

LT-130/230
Level Transmitter
Model: Echosonic 11 LU27

pH-110/120/210/220
pH Meter
Model: Walchem WEL-PHF-NN

- LEGEND:**
- Hose
 - Sch. 80 PVC Pipe
 - Butterfly Valve
 - Check Valve
 - Reducer
 - Pressure Gauge
 - Static Mixer
 - Gate Valve
 - Pressure Relief Valve
 - Ball Valve
 - Sample Port
 - Flow Meter
 - Level Switch
 - pH Sensor
 - Level Transmitter

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

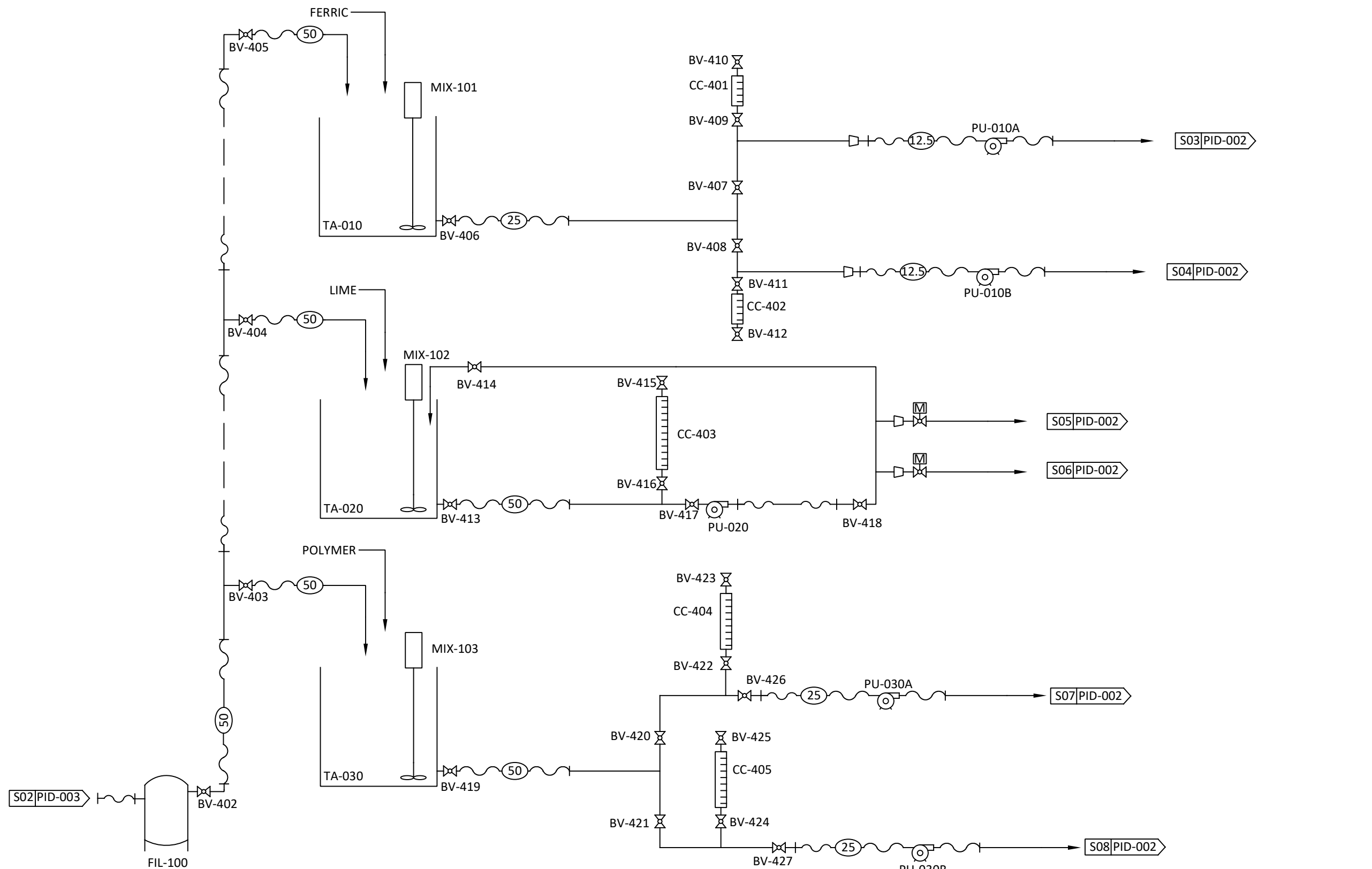
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

**REACTION TANKS
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0002



FIL-100
Bag Filter
Model: FTI 830-2P-150-CS-BS-P13-DP
Bag Size: 5 Micron

PU-010A/B
Ferric Chemical Pump
Model: Welchmen EHE31E1-VC
Power: 115 VAC/1hp/60Hz
Capacity: 21 LPM @ 106m TDH

PU-020
Lime Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 570 LPM @ 42m TDH

PU-030
Polymer Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 990 LPM @ 42m TDH

MIX-101
Ferric Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 41" Long

MIX-102
Lime Mixer
Model: Dynamix DMX-5505K-2
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 52" Long

MIX-103
Polymer Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 49" Long

TA-010
Ferric Mixing Tank
Material: Polyurethane
Size: Ø 1.2m x 1.3m Height

TA-020
Lime Mixing Tank
Material: Polyurethane
Size: Ø 1.8m x 1.7m Height

TA-030
Polymer Mixing Tank
Material: Polyurethane
Size: Ø 1.6m x 1.6m Height

CC-401/402/403/404/405
Calibration Column

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Ball Valve
- Reducer
- Motorized Ball Valve

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

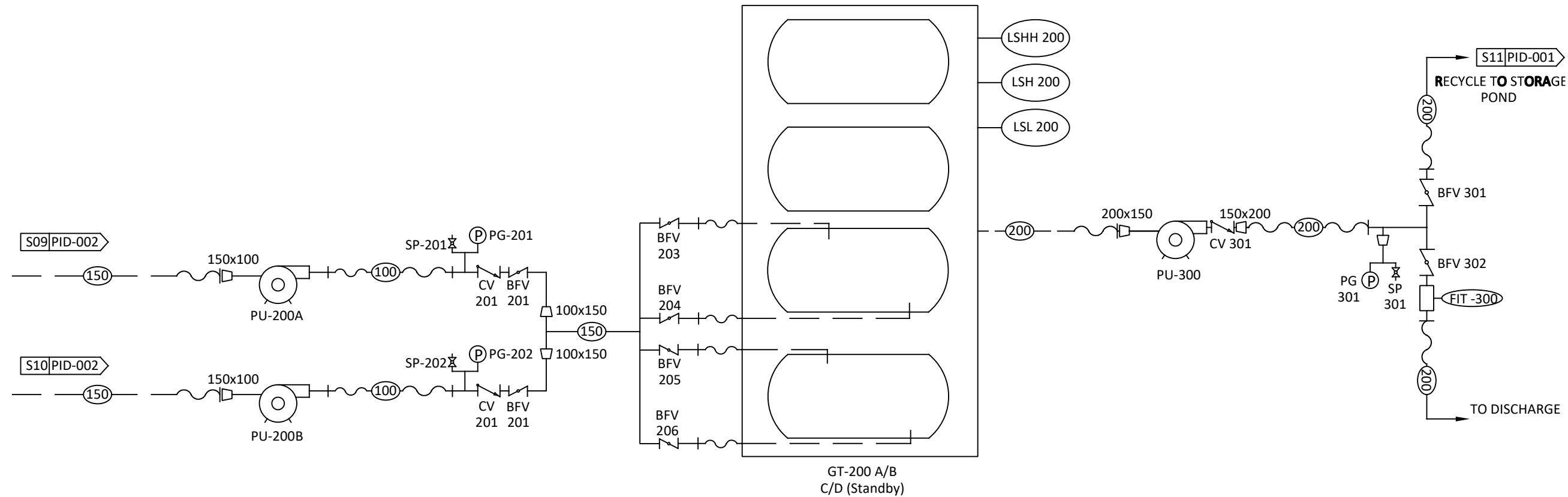


CLIENT:

BAFFINLAND IRON MINES CORPORATION

**CHEMICAL MAKEUP
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-003



PU-200A/B
Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

GT-200 A/B/C/D
Geotube
Model: Tencare GT500
Dimensions: 60' Circumference x 100' Long

PU-300
Discharge Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 280m³/hr

FT-300
Flow Meter
Model: Toshiba GFG32

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge
- Sample Port
- Level Switch

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018



CLIENT:

BAFFINLAND IRON MINES CORPORATION

**GEOTUBE FIELD
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant**

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-004


APPENDIX B - MONITORING

-



Project Name: BaffinLand Iron Mine
Waste Pile Water Treatment

Chemical Availability	Week #1 Date:	Week #2 Date:	Week #3 Date:	Week #4 Date:
Ferric Sulphate				
Hydrated Lime				
Polymer				

	Fresh Water Supply, Sewage, and Wastewater Management Plan	Issue Date: March 31, 2019 Rev.: 6	
	Environment	Document #: BAF-PH1-830-P16-0010	

Appendix L – Oily Water Treatment and Discharge Plan

The information contained herein is proprietary Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.



Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
900 Maple Grove Road, Unit 10
Cambridge, ON N3H 4R7
Canada

T: 519-650-7100

Technical Memo

To: Connor Devereaux, Baffinland Iron Mines
From: Jack Hinds, P.Eng, Wood E&IS
Reviewer: Jered Munro, P.Eng, Wood E&IS
Project No.: TPC192071
Date: 29 April 2020
Re: Oily Water Treatment and Discharge

1.0 Background

Baffinland Iron Mines Corporation (Baffinland) has retained Wood Environment and Infrastructure Solutions, a Division of Wood Canada Ltd (Wood E&IS) to prepare this technical memo, outlining treatment, and disposal options for hydrocarbon impacted and oil-contaminated waters contained in the hazardous waste berms (HWBs) at the Milne Inlet and Mary River sites.

The HWBs are typically used to house containers of contaminated material or hazardous waste from around site, and accumulation is comprised mostly of impacted stormwater. However, sump water from the maintenance shops is also periodically added to the HWBs.

In addition to the HWBs, Baffinland also operates a landfarm facility, and a snow dump facility, at the Milne Port Site. These facilities also contain stormwater impacted by their contents, and receive sump water from the maintenance shops. For the purposes of this report, the landfarm and snow dump facilities are referred to as HWBs.

The intent of this memorandum is to outline options that could be employed to treat waters contained in the HWBs, landfarm, and snow dump, to a level that is compliant with the approved Type A Water Licence requirements and be discharged to the environment under those requirements. The proposed treatment options may be used individually or combined with other treatment options to form a treatment system that is capable of achieving compliant effluent quality. This approach has been selected to provide operators with the ability to address various water quality issues that can occur due to changing conditions on site, caused by the various site sources noted above, and the natural environment.

The HWBs can potentially require treatment for:

- Removal of total oil and grease (TOG)
- Removal of benzene, toluene, ethylbenzene, xylene (BTEX)
- Removal of total and dissolved lead
- Removal of total suspended solids (TSS)
- Removal of total ammonia
- Removal of total phosphorus
- Removal of oil and grease
- Destruction of faecal coliforms
- Acute Toxicity associated with inorganic or organic compounds
- Control of pH



1.1 Onsite Water/Wastewater Treatment Equipment

There are a number of onsite water treatment resources at the Project site that are available for use in treating the HWBs. The equipment is owned and maintained by Baffinland, and is typically operated by Baffinland, or is operated under contract with an engineering or operations firm. It is expected that Baffinland may be required to purchase additional equipment and/or upgrade existing equipment.

Baffinland maintains a supply of common treatment chemicals required by the treatment processes. Less common chemicals used for treatment are brought to site on an as-needed basis.

2.0 Treatment of HWBs

HWB treatment occurs during the spring and summer discharge seasons, when the water in these structures is not frozen. Water quality in the HWBs can be variable, and often changes over the course of the year. The variations in water quality are typically caused by:

- Contributions to the HWBs
- Spring melt, and ice retained within the HWBs
- Fluctuations in temperature and pH
- Biological activity and consumption of nutrients (if present)
- Diurnal effects, exacerbated by long periods of daylight/twilight during the mid-summer months

The treatment methods represent the processes that may be employed to achieve compliant water quality in the HWBs and allow for discharge to the environment. The options presented have been listed discretely but may be combined to form a treatment train in order to address the specific impacted source water quality. As the water quality can change over the course of a single operating season, multiple treatment methods or approaches may be required in order to maintain compliant effluent quality.

2.1 Spring Discharge

During the winter months the HWBs will typically freeze down to the sand-lined bottom of the ponds. During spring freshet, warmer temperatures and increased daylight hours cause the top layer of ice to thaw first, creating a pool of clear water on the surface of the HWBs.

Under some circumstances, this initial melt water may be compliant for discharge due to stratification of various contaminants over the winter months. If the water quality analysis confirms the meltwater is compliant, it may be discharged to the receiving environment without further treatment.

The discharge will be monitored for compliance following the guidelines given in Section 3.0.

2.2 Oily Water Treatment Systems

Baffinland owns and operates two Oily Water Treatment System (OWS) for treatment of impacted water from the HWBs. These systems have been designed to be modular, and allow for modification of the treatment process depending on the quality of the source water. These systems are housed inside insulated, ventilated 40 foot-long shipping containers, and at a minimum contain the following:

- Influent submersible pumps
- Oil/Water Separator (American Petroleum Institute design)

- Forwarding pump
- Bag filter
- Flowmeter and totalizer
- Discharge assembly, including a vacuum breaker and effluent line connection
- Pressure sensing equipment
- Alarms and emergency stops
- Control system and HMI
- Main electrical control panel

Following the forwarding pump, different treatment components can be installed using camlock hoses, to provide various types and levels of treatment. These additional treatment steps will be discussed in the following sections.

2.3 Adsorptive Media Treatment

Adsorption media is inert and readily available for transportation and use for treatment for various organics and metal species. The OWS units onsite allow for use of plastic or steel media vessels to be loaded with the required contaminant removing media and connected to the remainder of the system. Multiple types of media may be used in series, to treat various contaminants as required. Typical adsorption medias that are used for treatment include:

- Granular activated carbon (GAC)
- Synthetic ion exchange resins
- Activated alumina
- Activated iron products
- Natural Zeolites
- Reductive media, such as zero-valent iron
- Other adsorptive and ion exchange media as applicable

Adsorption based treatment systems are typically sensitive to solids in the water and may become blocked if solids concentrations are too high. Filtration is typically required prior to an adsorptive media treatment step to prevent fouling.

2.4 Bulk Treatment

Bulk treatment of impounded water onsite may be used as a method to provide removal of TSS, BOD, total phosphorus, total ammonia, precipitation of metals, or oxidation of volatile compounds. Treatment of the entire impacted source allows for rapid, bulk treatment of the contents of the HWBs and allows for confirmatory sampling prior to discharge to the environment.

A typical treatment system would require:

- A berm mixing system
- Chemical dosing systems
- Inline mixers, such as a mixing tank, tube flocculator, or static mixer
- Flowmeter for flow measurement and totalization

Bench scale jar testing would be completed using chemistry that is accepted for treatment of the non-compliant water parameters and to estimate the chemical dosing rates required for the complete pond volume. The pond would then be mixed, and chemicals would be added at dosing rates in accordance with the jar test results. Chemical addition may be completed in multiple stages to achieve the required treatment results.

Once dosing is complete, the HWB will continue to be mixed for an appropriate amount of time, to ensure the chemical(s) reacts fully and all contents of the berm have been incorporated. Once mixing is complete, the mixing system will be shut off, to allow any coagulated/flocculated solids to settle, or to allow for natural stripping processes to occur. An effluent discharge system will be set up where required and will allow for recirculation of effluent back into the HWB in the event a non-compliant sample is tested or additional mixing is

required. A complete set of laboratory analysis compliant with the criteria outlined in Section 3.0 will be received and reviewed prior to any discharge.

For bulk treatment, the following chemicals may be used:

- Aluminum sulfate (alum)
- Poly-aluminum chloride (PAC)
- Sodium aluminate
- Alum potash
- Ferric/ferrous sulfate
- Ferric chloride
- Lime/soda ash
- Caustic soda
- Vendor-specific, proprietary anionic or cationic polymers
- Sulfuric acid
- Citric acid
- Hydrochloric acid
- Phosphoric acid
- Nitric acid
- Sodium hydroxide
- Sodium bicarbonate
- Potassium permanganate
- Sodium metabisulfite/sodium bisulfite
- Sodium hypochlorite
- Magnesium hydroxide

2.4.1 Settled Solids Handling and Disposal

Solids removed as part of this treatment method will naturally settle into the sand layer at the bottom of the containment facilities but may be stirred up by wind or other surface disturbance. Quantities of settled solids resulting from any treatment processes are considered to be insignificant relative to the volume of the berms. If necessary, Baffinland may elect to drain any of the berms to remove the settled solids and dispose of in the appropriate disposal location (landfarm, backhaul, etc).

2.5 pH Adjustment

pH adjustment may be required as a standalone treatment or may be required as part of a larger treatment system in order to maintain compliance. pH adjustment can be carried out within the containment berms or adjusted inline prior to discharge.

A typical pH adjustment system may require:

- A berm mixing system
- Chemical dosing systems
- Temporary chemical storage
- Inline mixers, such as a mixing tank, tube flocculator, or static mixer

pH in the HWBs can be acidic, neutral, or basic, depending on what has been stored in the containment area, and what kind of natural biological activity has occurred. The water quality from other treatment processes may require that pH adjustment be added as part of the treatment process to ensure compliant effluent.

The following chemicals may be used to form part of a pH adjustment system:

- Aluminum sulfate (alum)
- Poly-aluminum chloride (PAC)
- Sodium aluminate
- Alum potash
- Ferric/ferrous sulfate
- Ferric chloride
- Lime/soda ash
- Caustic soda
- Sulfuric acid
- Citric acid

- Hydrochloric acid
- Phosphoric acid
- Nitric acid
- Sodium hydroxide
- Sodium bicarbonate
- Magnesium hydroxide

2.6 Filtration

Filtration systems provide a physical barrier, allowing for the removal of solid matter from a liquid stream. Filtration may be used as an effective means of reducing/removing TSS, BOD, total phosphorus, TOG, and precipitated compounds such as metal hydroxides. Filtration may be used as a standalone treatment process or as part of a larger treatment system.

A typical solids filtration system may employ one or more of the following technologies:

- Basket strainers
- Bag filters
- Disposable cartridge filters
- Backwashing cartridge filters
- Sand filters
- Continuous backwash sand filters
- Multimedia filters
- Rotary drum screens
- Belt filters
- Microfiltration
- Ultrafiltration
- Nanofiltration
- Membrane filtration
- Reverse osmosis

Filters used either alone, or in conjunction with other treatment processes, may be stand-alone, skid mounted, packaged, or contained within their own seacan.

2.6.1 Filtered Solids Handling

For most cartridge or bag filtration systems, solids are removed through capture on a fiber media, which cannot be backwashed. The media must be removed and disposed of according to Baffinland's Waste Management Plan.

Effluent from the backwashing of filters may be directed into the HWBs, or into dedicated storage vessels for further treatment or disposal offsite.

2.7 Transfer of Water Between HWBs

It may be necessary to transfer contaminated water from one HWB to another, or from HWBs at one site, to HWBs at another. This allows for contaminated water at each site to be managed and treated in the most effective way possible.

As the treatment systems for these contaminated waters are typically only established once during a discharge season, contaminated water may also be transferred between HWBs to facilitate treatment. If possible, water may also be brought directly to a treatment system for immediate treatment and discharge.

3.0 Sampling and Performance Monitoring

The effluent discharge quality criteria for the HWBs varies based on the discharge location and is defined in the Type A Water Licence 2AM-MRY1325 Amendment No. 1 as issued by the Nunavut Water Board, July 31, 2014. The following tables summarizes the discharge criteria:

Table 1: Effluent Quality Discharge Limits for Oily Water Treatment Facilities

Parameter	Discharge to Freshwater
	Max concentration of any grab sample (mg/L)
pH	Between 6.0 and 9.5

TSS	35
Ammonia	4.0
Phosphorus	4.0
Benzene	0.370
Ethylbenzene	0.090
Toluene	0.002
Oil and Grease	15 and no visible sheen
Arsenic	0.5
Copper	0.3
Lead	0.2
Nickel	0.5
Zinc	0.5

Table 2: Effluent Quality Discharge Limits for the Bulk Fuel Storage Facilities

Parameter	Discharge to Freshwater
	Max concentration of any grab sample (mg/L)
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090
Lead	0.001
Oil and Grease	15 and no visible sheen

Table 3: Effluent Quality Discharge Limits for the Landfarm Facilities

Parameter	Discharge to Freshwater
	Max concentration of any grab sample (mg/L)
pH	Between 6.0 and 9.0
TSS	15
Oil and Grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090


Prior to commencing any treatment or discharge, Baffinland or their contractors will be required to develop and submit a discharge plan including details on monitoring and sampling frequency, safeguards, internal limits, etc.

This plan shall be submitted to the Environmental Superintendent for review and approval prior to any treatment or discharge activities.

Baffinland will complete sampling and confirm compliance prior to discharge to an approved discharge location. During discharge Baffinland will perform field monitoring and testing of representative parameters of concern. The monitoring will be conducted at the intervals specified in the relevant discharge plan and the results of which will be used to guide treatment implementation and the ability to commence or continue discharge to the receiving environment. Discharge samples will be collected in accordance with the schedule laid out in the Type A Water Licence to confirm treated effluent discharge meets the applicable criteria outlined above.

If there are any questions, comments, or concerns regarding the content of this memo, please feel free to reach out to Jack Hinds at 519-650-7143 or Jered Munro at 519-650-7130.

**Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited**



Jack Hinds, P.Eng
Process Engineer
Tel: 519-650-7143
Email: jack.hinds@woodplc.com



Jered Munro, P.Eng
Senior Engineer
Tel: 519-650-7130
Email: jered.munro@woodplc.com