CHEMI-CON MATERIALS

OPERATIONS AND MAINTENANCE MANUAL

Land Application Permit # ST0005390

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This list can also be found on Operations & Maintenance Manual Appendices.

1. Introduction

Chemi-Con Materials Corporation (CMC) makes high purity anodized aluminum foil at their facility located in Moses Lake, WA. The company uses a renovated B-52 hanger building within the Port of Moses Lake property boundaries (see Figure 1) to house its operations. CMC receives etched aluminum foil in coils that are further oxidized using a stepwise anodizing process. The entire production process is conducted in a series of linked baths, rinses, and heat treatments in the formation machines (FMs). The anodizing process takes place in the baths containing a boric acid solution where direct current (DC) electricity is applied to the aluminum. The foil is then run through a series of phosphoric acid baths and furnaces to remove impurities from the anodized surface. Lastly, the foil is dried and rolled back into coils for shipment off site where it is used to make electrolytic capacitors.

Wastewater is generated by the FMs, the phosphoric acid recovery unit, noncontact cooling water blowdown, reverse osmosis and deionized rejection streams, boiler blowdown water, maintenance activities, and stormwater. The process wastewaters from the operation are managed primarily under two different methods. Noncontact wastewaters discharge to a publicly owned treatment works with a land treatment system owned and operated by the Port of Moses Lake. Contact wastewaters are managed under the treatment by generator guidelines in the WAC 173-303 Dangerous Waste Regulations and are either recycled back into the production process or evaporated. If the treatment by generator process cannot keep up with production, CMC hires a waste hauler to remove these wastes.

This Operations and Maintenance Manual (OMM) provides information and guidance for the operation and maintenance of the wastewater treatment system at CMC. The OMM has been prepared in accordance with Washington Administrative Code (WAC) 173-240-150. Specifically, WAC 173-240-150(2) requires the inclusion of 13 topics, which are cross referenced below with the section of this OMM where they are discussed.

1. The names and phone numbers of the responsible individuals (Section 2).
2. A description of plant type, flow pattern, operation, and efficiency expected (Section 3).
3. The principal design criteria (Section 3).
4. A process description of each plant unit that includes function, relationship to other plant units, and schematic diagrams (Section 4).
5. An explanation of the operational objectives for the various wastewater parameters, such as sludge age, settleability, etc. (Section 4).
6. A discussion of the detailed operation of each unit and a description of various controls, recommended settings, fail-safe features, etc. (Section 4/5).
7. A discussion of how the facilities are to be operated during anticipated startups and shutdowns, maintenance procedures, and less than design loading conditions, so as to maintain efficient treatment (Section 5).
8. A section on laboratory procedures that includes sampling techniques, monitoring requirements, and sample analysis (Section 6).
9. Recordkeeping procedures and sample forms to be used (Section 6).
10. A maintenance schedule that incorporates manufacturer's recommendations, preventative maintenance and housekeeping schedules, and special tools and equipment usage (Section 7).
11. A section on safety (Section 8).
12. A section that contains the spare parts inventory, address of local suppliers, equipment warranties, and appropriate equipment catalogues (Section 7).
13. Emergency plans and procedures (Section 8).

In addition to the above requirements, CMC's State Waste Discharge Permit ST0005390 Section S4.A.b. requires discussion of the following topics:

1. Wastewater system maintenance procedures that contribute to the generation of process wastewater (Section 5).
2. Emergency procedures for plant shutdown and cleanup in event of wastewater system upset, spill, failure, or demand by the publicly owned treatment works (POTW) treating the discharge (Sections 5 and 8).
3. Any directions to maintenance staff when cleaning, or maintaining other equipment, or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine.) (Section 5).
4. Wastewater sampling protocols and procedures for compliance with the sampling and reporting requirements in the wastewater discharge permit (Section 6).
5. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit (Section 5).
6. Treatment plant process control monitoring schedule (Section 6).

2. Responsible Personnel

All operators complete initial training on general practices and procedures, including basic knowledge of instrumentation, valves, meters, and standard operating procedures (SOPs). Operators who have operational responsibility for Outfall 001, phosphoric acid recovery unit (DPU), and/or the neutralization and evaporation units associated with process wastewaters have additional training requirements and must demonstrate their knowledge by passing a test on these requirements.

Several departments and individuals are responsible for the successful management and operation of the wastewater treatment systems. It is important that these departments share information between the responsible individuals of production plant operations and the wastewater treatment operations.

2.1. Environmental Manager/Supervisor

The Environmental Manager/Supervisor is responsible for ensuring that the wastewater treatment system is operated in a manner to provide treatment that meets the permit requirements and the protection of the environment. The Environmental Manager/Supervisor is responsible for implementing the proper controls and procedures to prevent failures and to ensure that the wastewater treatment system is operated in a manner to protect the safety of operators, maintenance staff, laborers, and the general public.

2.2. Operators

Operators are responsible, under the direction of the Environmental Manager/Supervisor, for operations, monitoring, and maintenance of the wastewater treatment systems. The operators are responsible to monitor and control the wastewater treatment system safely and to maintain operations within the treatment limits specified by the permit. The operators have daily contact with all of the wastewater treatment system for the purpose of ensuring the system is working correctly, gathering monitoring data, and assisting in the training of other employees.

The operator and personnel will have demonstrated knowledge of the principles, practices, materials, and operating procedures pertinent to the operation of the wastewater treatment system through training and testing. They will have experience, or the ability to be trained to work with each of the programmable logic controllers (PLCs), the evaporators, and the DPU, and are able to direct maintenance and repair of

pumps and associated plumbing. Furthermore, they will have fundamental knowledge of laboratory testing and sampling techniques.

2.3. Maintenance Manager

The maintenance manager and personnel are responsible for repairing and maintaining equipment and components of the production and wastewater treatment system. They are responsible to perform routine inspections and provide records of maintenance activities.

2.4. Responsible Individuals

The emergency call list is located in Table 1 below and contains a list of responsible personnel and phone numbers for anticipated emergencies. The list is readily available to all personnel at the plant.

Table 1. Titles and Responsible Individuals

Title	Responsibilities	Contact		
		Name	Phone (Area Code 509) Office 762-8788	Email
Plant Manager	Overall Facility Management & Maintenance	Masakazu Suda	Ext. 7119 Cell 750-7352	msuda@chemi-con.com
Production Manager	Overall Facility Production	Paul Smith	Ext. 7124 750-7191	psmith@chemi-con.com
Environmental Manager	Overall Facility Environmental	Anthony Carpenter	Ext. 7129 989-6490	acarpenter@chemi-con.com
Administration Manager	Compliance Reporting	Stela Heuschkel	Ext. 7110 989-1943	Sheuschkel@chemi-con.com
Safety Coordinator	Overall Facility Safety	James Stockton	Ext. 7144 760-9079	jstockton@chemi-con.com

3. Facility and Process Description

CMC makes high purity anodized aluminum foil at its facility located in Moses Lake. The facility ships the anodized foil off site to make electrolytic capacitors. The process wastewater from the operations is recycled, evaporated, or discharged to a publicly owned treatment works that includes a land treatment system owned and operated by the Port of Moses Lake.

3.1 Production

Chemi-Con Materials receives etched aluminum foil in coils that is anodized for use in electrolytic capacitors. CMC conducts the entire production process in FMs, where the aluminum foil travels through a series of heated boric acid baths, phosphoric acid baths, deionized water rinses, and furnaces. The anodizing process occurs in electrolytic baths containing a boric acid solution. The process applies DC electricity to the aluminum while in the boric acid bath to oxidize the surface. Following the anodizing process, the foil's oxidized surface is coated with an ammonia phosphate solution to preserve the oxidation layer, then dried and rolled back into coils for shipment off site.

Process wastewater generated at the facility includes two separate waste streams:

1. Cooling tower blowdown, boiler blowdown, and reject supply water from the City of Moses Lake.
2. Waste solutions from the anodizing process (rinsing, phosphoric acid, and boric acid baths), maintenance activities, and stormwater.

The facility either recycles or evaporates the processing solution wastewater. The discharge to the POTW consists only of noncontact wastewaters.

3.2 Wastewater Treatment Systems

Wastewater is either treated or directly discharged depending on its source. Any wastewater or waste solutions from the anodizing production line or other waters that could have come into contact with hazardous materials is treated onsite under the Treatment by Generator rule in WAC 173-303 and is recycled back into production or evaporated. If the wastewater treatment system cannot keep up with production, CMC contracts with a waste management company to haul off these wastes for proper disposal. Noncontact wastewater is discharged to the Port of Moses Lake land application unit.

The wastewater treatment system consists of collection tanks, neutralization tanks, evaporators, and a pressure filter. Noncontact wastewaters are collected in a designated tank and continuously pumped to the land application unit.

3.2.1 Noncontact Wastewater

Only the wastewater from the cooling tower blowdown, boiler blowdown, and water rejected from the supply water treatment system is discharged from Outfall 001 to the Port's land application system. The monthly flow rate from Outfall 001 must average no more than 76,000 gallons per day with only a single one day maximum flow rate of 100,000 gallons each year.

CMC is supplied with fresh water by the City of Moses Lake. High quality fresh water is required for processing. Therefore, city water cannot be directly used by CMC. Instead, city water first must be treated to remove dissolved ions prior to its use in processing. To accomplish this CMC uses a reverse osmosis (RO)/electrodeionization system for water treatment. The City Water RO Unit is able to produce 100–120 gallons per minute (gpm). During the production of usable RO water typically 25-35 gpm of city water is not able to be processed and is sent to an above ground tank (TK-4) and then onto the land application unit.

The cooling towers provide cooling to the FMs, the air compressors, and the rectifiers. The boilers provide the heat for the formation machines and to preheat the evaporation units. Water for the boilers is also provided by the City water RO units and the boiler condensate return water.

CMC routes cooling tower blowdown and boiler blowdown water to TK-4. From TK-4, the mixed wastewater flows through an effluent monitoring station prior to discharge to the Port of Moses land application unit.

3.2.2 Contact Wastewater and Waste Solutions

The contact waste solutions from the anodizing process (rinsing, phosphoric acid, and boric acid baths) flow to the holding tank under the Production Building. The boric acid bath waste is collected in tanks T-3501, T-3502, T-3506, and T-3507 to be evaporated and sent to the pressure filter. Spent phosphoric acid from the FMs is treated with the Eco-Tec Phosphoric Acid Recovery Unit to be recycled back into production.

3.2.2 Wastewater from Maintenance Activities

Low pH wastewaters generated from maintenance activities are collected in tanks in the basement of the West Production Building. From there it is piped to TK-1 in the Environmental Building where the waste is neutralized and evaporated. Wastewaters with a pH between 5–11 that are generated during maintenance activities are collected in the floor drain and sent to tank 5005 for evaporation and filtration.

3.2.4 Stormwater

Facility stormwater flows into a ditch that is east of CMC (see Figure 1) and is conveyed to the Port of Moses Lake's Larson POTW located on Randolph Road. This drainage ditch also collects stormwater from Genie Industries located to the north.

Stormwater that collects in the bulk acid tank skid is pumped to tank TK-1 in the Environmental Building where it is treated through neutralization (if necessary) and evaporation.

4. Facility Operation Information

This section describes the function of each plant unit at CMC, the relationship of these plant units in the production process, and the operation of these units. It will discuss the detailed operation of each unit and provide a description of the controls, recommended settings, and any fail-safe features associated with these units. Additionally, an explanation of the operational objectives for the wastewater treatment system will be discussed. The location of each unit is provided in Figure 2.

4.1 Facility Operations

The production of high purity anodized aluminum foil is a continuous process. Therefore, the wastewater production is also a continuous process. High purity water is continuously needed to supply the FMs, and this requires the RO units and deionization units to be continuously producing water. Boiler and cooling tower blowdown water is also continuously produced throughout the production process. The reject water and blowdown waters from these sources are collected in TK-4 and piped underground to the Port's land application system.

Waste solutions from the anodizing beds are piped to treatment systems that include tanks, pumps, filters, ion exchange resins, heat, and pressure filters. Wastewater and waste solutions are accumulated until sufficient volume for a batch treatment is attained. The treatment system is automated and managed with various programmable logic controls (PLCs). Production personnel are trained to monitor the systems to ensure they are operating within the manufacturer's guidelines.

4.2 Land Application System

The land application system is used to treat noncontact cooling tower blowdown water, boiler blowdown water, and rejected supplied water from the city water RO/electrodeionization system. Standard operating procedures and/or control narratives for the individual operations that produce wastewater that are sent to the land application system are located in Appendices B–E, along with emergency and troubleshooting procedures. Design criteria of individual components are described below.

4.2.1 City Water Reverse Osmosis Unit

The G.E. Glegg City Water Reverse Osmosis Unit (RO) operates automatically under the control of a factory installed PLC. The PLC allows the unit to function with little supervision and is accessible through the operator interface touch screen at each unit. The sole purpose of the city water RO is to reduce/eliminate the dissolved mineral salts, bacteria, silica, and other particles in CMC's incoming city water.

This is accomplished by filling T-3401 (city water RO feed tank) with city water. The impurities are then concentrated in the reject stream to TK-4 where it is sent to the land application unit. The water then passes through a skid mounted 1 micron (FL3405A) and 5-micron (FL3405B) cartridge filter housings where any suspended solids are removed. The solution is next fed to the RO feed pump where the pressure is increased to go through the RO inlet membranes at 125–145 gpm. The RO passes a minimum of 75% permeate to T-3402/3403 as product, at a rate of 100–120 gpm and the rest goes to TK-4 as reject at between 25–35 gpm. If the RO conductivity is >50µS/cm, the automatic dump valve will open and send the water to TK-4 as reject until the FEED "CONDUCTIVITY OUT" reaches ≤50µS/cm.

The city water RO automatically cycles on and off depending on the level in the storage tanks, T-3402/3403. When the storage tanks are at 90" level the units will start and continue to run until the level reaches 150" level.

4.2.2 Marley Cooling Towers

CMC has three cooling towers: #1, #2, and #3. Cooling towers #1 and #2 are located on the east side of the facility near the propane station and cooling tower #3 is located on the northeast side of the Environmental Building. The towers serve to cool the boric acid baths in the formation machine, cool the air compressors, and cool the rectifiers. Water from the city water RO unit serves as the supply water for all three cooling towers.

While the RO water used in the cooling towers is of high purity, the water can become contaminated with dirt from the air or scale from inside the piping. To remove these impurities water from the cooling towers is passed through Nalco Ultra treat sand filters. There are two sand filters at CMC, one located in the environmental building serving cooling tower #3 and a second filter located in the production building for cooling tower #1, 2. Water is pulled off the main cooling tower feed line and goes back into the system's return line. Both sand filters are fully automatic and run with little to no supervision.

Every 24 hours or if the pressure differential of the inlet and outlet lines within the system is more than 30 PSI, the sand filters complete a backwash cycle to clean the filter. Water from cooling tower #3 backwash cycle dumps to a holding tank next to the sand filter and is then pumped to TK-4. Water from cooling towers #1 and #2 backwash cycle dumps into T-1006 in the Production Building basement and then is pumped to TK-4.

4.2.3 Natural Gas Boilers

CMC has three natural gas boilers (#1, #2, and #3) located on the west side of the Production Building. The boilers provide steam to heat the boric acid baths in the FMs and to preheat the evaporators in the Environmental Building. Water for the boilers is provided from RO water from T-3402 and T-3403 that is pumped into the deaerator (DA) tank that serves as the source of water for all three boilers. The DA tank acts as a pre-heater, a condensate return receiver, a chemical mixing tank and a gaseous venting tank. All of these are essential for the highest possible efficient operation of the boilers.

The condensate return tank (T-2803) is the primary source of supply water to the DA tank. The recovery system allows for chemical enriched steam condensate from the formation machines to return to the system again.

4.2.4 Storage Tank (TK-4)

The 12,000 gallon storage tank, TK-4, functions to store noncontact cooling tower blowdown water, boiler blowdown water, and rejected supplied water to the RO/electrodeionization system. The flow of water from TK-4 to the land application system and related units is primarily controlled by a Yokogawa programmable logic control (PLC).

4.2.5 Land Application Field

Wastewater is applied to the land application field through a center pivot irrigation system managed by the Port of Moses Lake POTW.

4.3 Production Waste Solutions

Chemi-Con Materials receives etched aluminum foil in coils that is further anodized for use in capacitors. The entire production process is conducted in a FM where the aluminum foil travels through heated boric acid baths, phosphoric acid baths, deionized water rinses, and furnaces. The anodizing process occurs when DC current is run through the foil as it passes through the boric acid baths and deionized water rinses. The phosphoric acid baths and high temperature furnaces remove any impurities that may adhere to the foil during the process. Prior to being dried and rolled for shipment the anodized foil is rinsed with an ammonia phosphate solution to preserve the oxidized layer.

The facility does not discharge process wastewater from the aluminum anodizing operation. Instead, CMC treats the solutions to either be recycled back into the production process or to neutralize it before sending it to an evaporator and pressure filter. If the treatment process cannot keep up with production, CMC has a waste hauler remove the waste.

Standard operating procedures and/or control narratives for the individual operations that produce wastewater within the production operations are located in Appendices I–H, along with emergency and troubleshooting procedures. Design criteria of individual components are described below.

4.3.1 Boric Acid Baths

The purpose of the boric acid bath is to buildup the oxidation layer on the foil as it passes through the FMs. In each FM there are eight separate baths that contain a boric acid solution that are receiving voltage. As the foil passes through each bath the oxidation layer on the foil is increased. The boric acid waste solution is collected in tanks in the basement where it is sent to tank T-5005 in the Environmental Building where it is then sent to the boric evaporator and then on to the pressure filter. Solids from the pressure filter are collected and disposed of at the Grant County landfill in Ephrata, WA.

4.3.2 Deionized Water Rinse

As the foil leaves the boric acid bath it passes through a deionized water rinse before passing either into another boric acid bath or a furnace. The deionized water used for this process is produced in CMC's Eco-Tec Deionized units located in the Environmental Building.

The Eco-Tec Deionized units operate automatically under the control of a factory installed PLC. The PLC allows the units to function with little supervision. The PLC is set to supply deionized water that has a resistivity of no less than 1 mega ohm per centimeter. The system's operation is monitored hourly, and the results are regularly recorded in the DI Resistivity Log Sheet. The deionized unit receives water from both the city water RO and rinse water RO, the condensate from the boric evaporator, and the high TDS evaporator. When the level in the product tanks (T-3405, 3406, 3407) reaches a predetermined low level, the unit starts up and runs cycle after cycle until the liquid level reaches the high level. At this point, the unit will go into standby as indicated by the illumination of the 'CYCLE COMPLETED' light. The power will stay on until the 'EMERGENCY STOP' button is pushed.

4.3.3 Phosphoric Acid Baths

The purpose of the phosphoric acid bath is to dissolve or "loosen" any impurities on the foil's oxide layer before and after the foil passes through the furnace units. Once the phosphoric acid solution becomes contaminated with dissolved aluminum it is pumped from T-1005 in the basement to the Phosphoric Acid Recovery Unit (DPU). The feed solution passes through dual cartridge filters (F1 and F2) where any suspended solids are removed. The phosphoric acid solution passes through the cation exchange bed where the dissolved aluminum is stripped out. The resulting purified acid is returned to T-3106 or T-3109. Once T-3102 hits 14" level, it will then allow T-3106 or T-3109 to fill T-3102 for the next batch for production to reuse.

Regeneration of the phosphoric acid is accomplished using (75%) phosphoric acid, supplied to the unit by T-4801 (phosphoric acid bulk tank) located outside in the acid containment skid. Phosphoric acid is pumped from T-4801 to the DPU phosphoric acid tank (T-3102). There it is automatically diluted with deionized water to meet the proper regeneration strength. A cooling water heat exchanger is located next to the regenerate tank to remove the heat that is created during the recovery process. During regeneration, regenerate is pumped through the cation bed to remove aluminum from the resin. This stream of acid and dissolved aluminum is then sent through the DAU bed. Reversing the flow using an extended deionized water rinse removes the acid held in the cation bed and returns the waste to the regenerate tank. Wastewaters from the cycles are sent to TK-1 to be neutralized and then sent to the evaporator and filter press.

4.4 Contact Wastewater and Waste Solution Systems

The design purpose of the treatment systems that handle the wastewater generated from the anodizing process (rinsing, phosphoric acid, and boric acid baths) is to render the solution no longer dangerous waste through treatment and then recycle the materials back into production or send it to the evaporator and pressure filter.

Standard operating procedures and/or control narratives for the individual operations that treat wastewater within the production operations are located in Appendices D–H, along with emergency and troubleshooting procedures. Design criteria of individual components are described below.

4.4.1 Rinse 5 Reverse Osmosis (RO) Unit

The G.E. Reverse Osmosis Unit (RO) operates automatically under the control of a factory installed programmable logic control (PLC). The PLC allows the unit to function with little supervision and is accessible through the operator interface board. The primary purpose of the Rinse 5 RO is to reduce the need for additional deionized water. This is accomplished by processing the FM rinse 3 and rinse 5 make-up overflow water through the RO unit. The phosphates, sulfates, aluminum, and boron

contaminates are concentrated in the reject stream and sent to T-3514 to be used in the cation wash cycle of the DPU's.

The solution in T-9021(located in the east basement) are pumped to T-2402 (located in the west basement) by either PU-9021 A/B. From T-2402 the solution is then pumped to the Rinse 5 RO unit through PU-2402 A/B. The water passes through a 5-micron cartridge filter housing where any suspended solids are removed. The solution is next fed to the RO feed pump, where the pressure is increased to go through the RO membranes. The RO passes a minimum of 75% permeate to T-3408 as product at a rate of 25–40 gpm and the rest goes to T-3514 as reject at no more than 10 gpm. If the RO conductivity is >50 μS/cm, the automatic dump valve will open and recycle the boron solution back into T-3514.

The RO automatically cycles on and off depending on the level in T-2402 and T-3408. The current operating cycle shuts down when T-2402 reaches a predetermined low level. The RO then remains in standby until T-2402 recovers to a high level before turning back on. T-9021 will transfer to T-2402 once it reaches a high level. The makeup water going into T-3408 comes from the deionized utility pumps located behind the deionized tanks and is controlled by the level sensor in T-3408. When T-3408 is below the LOW setting, the automatic make-up valve will open and fill tank with deionized water until the RO unit starts.

4.4.3 Boric Evaporator and Pressure Filter

The boric evaporator and pressure filter are used to treat nonhazardous wastewater from production. The system consists of a concentrate tank (T-3508) with tube and shell heat exchanger, the boric evaporator, Oberlin pressure filter, and filtrate tank (T-3505). The boric evaporator is designed to evaporate boric wastewater and other nonhazardous wastewater at a rate of 40 gpm. The concentration of solids is maintained at a maximum of 15%, which is accomplished with the concentrate tank (T-3508). It is the operator's responsibility to maintain specific conditions and ensure the systems operates in the most efficient manner possible.

The filter press is the final dewatering step from the neutralization tank and occurs once the solution reaches 15% solids. Solids are collected from the filter press and disposed of at a landfill. The wastewater removed from the solids is recycled back to the evaporator if the pH is between 5 –11. If the pH is <5 or >11, then the wastewater is sent to TK-1 to be neutralized before being sent to the evaporator.

4.4.4 Lime Neutralizer

The lime neutralizer consists of tank T-1301, T-3112, lime silo, filter press, tank T-9005, tanks TK-2 and TK-3, as well as the related pumps and filters. The purpose of the lime neutralizer is to bring the pH of the low pH wastewaters collected in TK-1 into a range of 6–8. The neutralization process takes place in tank T-1301 and T-3112 before it is pumped to tank T-9005 as a slurry then sent through the filter press to T-9001 where it is mixed with a polymer to settle out the phosphates and sulfates in the wastewater. The mixture is then pumped through the filter canister to remove the phosphates and sulfates (and any solids the press may have passed to T-9001) before being pumped to Tanks 2 or 3.

4.4.5 TK-2 and TK-3

TK-2 and TK-3 are the high TDS and low pH waste storage tanks, respectively. Either tank can feed either evaporator #1 or #2, depending on the valves configuration. Under normal operating conditions TK-2 feeds evaporator #2 and TK-3 feeds evaporator #1. Each tank has its own pump and filtration system to remove any solids that have not been removed by the flocculent or polymer treatments.

4.4.6 Sasakura High TDS Evaporator and Dryer

The Sasakura High TDS evaporator and dryer are primarily controlled by a programmable logic control panel (PLC). The Sasakura evaporator is designed to evaporate high TDS wastewater at a rate of 14–16 gpm. To maintain this specification the system includes neutralization tank T-1301 a filter press (to remove suspended solids), and storage tanks TK-2 and TK-3 to hold the treated waste for evaporation.

The Sasakura Evaporator Dryer is used to remove the sodium carbonate that was added to T-1301 to adjust the pH. The water in the vapor body solution is sent to the concentrate tank T-502. From the concentrate tank the remaining solution is feed to the drum rollers, where the solution is heated dried and scrapped off the drums into a bin.

4.5 Sumps

Numerous sumps are located throughout the facility and serve to collect wastewaters that are drained from equipment during maintenance activities. Depending on the hazard associated with the wastewater from the maintenance activity, the water is sent to either TK-1 or T-5005. Wastewater that is low pH (<5) or high pH (>11) is sent to TK-1 where it will be neutralized and then sent to the evaporator and pressure filter, while wastewater with a pH 5–11 is sent to T-5005 where it will be run through the evaporator and pressure filter.

4.6 Stormwater

The stormwater collected from impervious surfaces are collected in storm drains located in between the environmental and production buildings. The water collected in these drains runs underground to a drainage ditch that carries the stormwater to the Port of Moses Lake Larson POTW.

4.7 Acid Containment Skid

The storage tanks for the sulfuric and phosphoric acid used in production are located outside the Environmental Building. The tanks are seated on a concrete pad and are surrounded by a berm large enough to contain the contents of both tanks. Water collected in the containment berm is pumped to TK-1. The water collected in TK-1 is neutralized and sent to the evaporator.

5. Operations During Startups, Shutdowns, Maintenance, and Less than Design Load Conditions

This section addresses how the facilities related to wastewater management are to be operated during anticipated startups and shutdowns, maintenance procedures, and less than design loading conditions, so as to maintain efficient treatment.

5.1 Land Application System

The land application system is used to treat noncontact cooling tower blowdown water, boiler blowdown water, and rejected supplied water to the RO/electrodeionization system.

5.1.1 Yokogawa Programmable Logic Control (PLC)

The flow of water from TK-4 to the land application system and related units is primarily controlled by a Yokogawa programmable logic control (PLC). Standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix B.

5.1.2 City Water Reverse Osmosis (RO) Unit

The G.E. Glegg City Water Reverse Osmosis Unit (city water RO) operates automatically under the control of a factory installed PLC. The PLC allows the unit to function with little supervision and is accessible through the operator interface touch screen at each unit. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix C.

5.1.2 Cooling Towers

Chemi-Con Corporation's cooling towers #1, #2, & #3 receive water from both RO units. Blowdown water from the cooling towers is sent to TK-4 and then to the land application unit. Standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix D.

5.1.3 Natural Gas Boilers

Boilers #1 and #2 are designed to generate a maximum of 10,350 pounds of steam per hour, per boiler under full load. Boiler #3 is designed to produce 17,250 pounds of steam per hour. Blowdown water from the boilers is sent to TK-4 and then the land application unit. Standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix E.

5.2 Production Units

5.2.1 Deionized Water Units

Deionized water is used in a number of production processes and is continually used in the FMs during the anodizing process. The use of deionized water is critical because it reduces the amount of impurities that adhere to and within the anodized surface of the foil. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix F.

5.2.2 Rinse 5 Reverse Osmosis Unit

The RO processes the third and fifth rinse overflows from the FMs. The phosphates, sulfates, aluminum, and boron contaminates are concentrated in the reject stream and sent to T-3514 to be used in the cation wash cycle of the DPU. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix G.

5.2.2 Phosphoric Acid Recovery

The Eco-Tec Phosphoric Acid Recovery Unit (DPU) serves to recover phosphoric acid solution from the FM phosphoric acid baths once it becomes contaminated with dissolved aluminum. By recovering this contaminated phosphoric acid from the FMs, CMC can reduce the amount of high grade phosphoric acid purchased for production and reduce the amount of corrosive waste that needs to be treated or disposed.

The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix H.

5.2.3 Boric Evaporator and Oberlin Pressure Filter

Wastewater from the boric acid baths and other nonhazardous wastewaters are treated in CMC's boric evaporator and Oberlin pressure filter. The evaporator is designed to evaporate boric wastewater at a rate of 40 gpm given the concentration is maintained at a maximum of 15% solids. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix I.

5.2.4 Lime Neutralizer

The lime neutralizer consists of tank T-1301, T-3112, lime silo, filter press, tank T-9005, tanks TK-2 and TK-3 as well as the related pumps and filters. A minimum of 500 gallons of wastewater from TK-1 is pumped to T-1301for recirculation where lime from the lime silo is slowly added to T-1301 in order to achieve the desired pH (6–8). Once the desired pH is reached. The wastewater can then be pumped to the filter press.

The liquids from the filter press are pumped to T-9001 where it is mixed with a polymer to settle out the phosphates and sulfates in the wastewater. The mixture is then pumped through the filter canister to remove the phosphates and sulfates (and any solids the press may have passed to T-9001) before being pumped to Tanks 2 or 3. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions are in Appendix J.

5.2.5 TK-2 and TK-3

TK-2 and TK-3 are the high TDS low pH waste storage tanks. Either tank can feed either evaporator #1 or #2, depending on how the valves are set. Under normal operating conditions TK-2 feeds evaporator #2 and TK-3 feeds evaporator #1. Each tank has its own pump and filtration system to remove any solids that have not been removed with the polymers and filter press. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions for TK-2 and TK-3 are in Appendix J.

5.2.6 Sasakura High TDS Evaporator and Dryer

The Sasakura High TDS evaporator and related units are primarily controlled by a programmable logic control panel (PLC). The Sasakura evaporator is designed to evaporate high TDS wastewater at a rate of 14–16 gpm. To maintain this specification the system includes a neutralization tank T-1301 (to adjust the ph), a filter press (to remove suspended solids), and storage tanks TK-2 and TK-3 to hold the treated waste for evaporation.

The Sasakura Evaporator Dryer is used to remove the sodium carbonate that was added to T-1301 to adjust the pH. The water in the vapor body solution is sent to the concentrate tank T-502. From the concentrate tank the remaining solution is feed to the drum rollers, where the solution is heated dried and scrapped off the drums into a bin. The standard operating procedures and procedures during startups and shutdowns, maintenance procedures, and less than design loading conditions for the Sasakura High TDS Evaporator and Dryer are in Appendix K.

6. Sampling and Laboratory Procedures

Operators are responsible for monitoring and reporting activities. In order to provide representative data, monitoring techniques are conducted according to accepted methods. Manufacturer's installation instructions and accepted sampling protocols provide the basis for valid, accurate data useful for monitoring, reporting, and process control. CMC's waste permit (Appendix A) specifies detailed monitoring requirements for the wastewater sent to the land application.

6.1 Wastewater Sampling Procedures

The land application process and related units are primarily controlled by the Yokogawa PLC. Every four hours the operator will record in the Environmental Daily Log Sheet (Appendix L) the pH, temperature, total dissolved solids (TDS), conductivity, and gallons per minute (gpm). The 24 hour composite samples submitted to Soiltest Farm Consultants (Soiltest) for monthly, quarterly, and annual analysis are collected from the sample container in the Yokogawa PLC the first Tuesday of each month. Soiltest Farm Consultants, Inc. (Soiltest) tests for the constituents listed in Section S.2.A of the permit (Appendix A).

Specific reporting requirements are outlined in Section S.3. of the permit (Appendix A). Discharge Monitoring Reports are submitted each month. As per the permit requirements, all sampling and monitoring records are retained by CMC for at least three years. Copies of the completed sample log and laboratory reports from Soiltest are retained by CMC for at least 3 years.

7. Maintenance Schedule

The maintenance schedule for the components covered in Section 5 above are also included in the corresponding SOPs found in Appendices B–K. Additionally, the operation manuals for each of these components are available in the Environmental Library located in the Environmental Building. They are kept available for operators and maintenance personnel.

An inventory of spare parts and the location of spare parts are maintained by the maintenance department using the Business Works software. The maintenance department holds information regarding and the address of local suppliers is in a Critical Vendor List. Components that are not available locally are purchased through equipment catalogues. Any equipment warranties are included in the vendor contracts that are maintained in CMC's front office.

8. Safety

This section of the OMM does not substitute the facility's Emergency Response Manual but serves as a general set of guidelines to facilitate a safe working environment.

8.1 General

General safety practices, as well as directives on personal protective equipment (PPE) are detailed in the following sections to maintain a safe environment at CMC. The importance of safety cannot be overemphasized. Wastewater treatment system operations and surrounding production operations pose a hazard to personnel, creating a need for safety procedures.

8.2 Personal Protective Equipment

Standard PPE is required for all CMC personnel that are in the production area or Environmental Building. At minimum, hard hats, eye protection, and high-top boots must be worn outside of the offices. Additional protective gear worn on an as-needed basis includes goggles, lab coat or chemical apron, full chemical suit, rubber boots, rubber gloves, face shield, and air purifying respirator.

8.3 Visitor Safety

All visitors, including other company personnel not associated with the day-to-day operation of the facility, must be safe-guarded against hazards. Visitors unfamiliar with the site and operation of the system are accompanied at all times by a responsible CMC employee. Contractors at CMC will require the proper level of orientation based on their potential level of exposure to hazards. Visitors are required to comply with the safety requirements and precautions.

8.4 Emergency Procedures

CMC maintains a Contingency Plan and Emergency Procedures (Contingency Plan), filed online at the facility that details the response plan for emergencies resulting from production activities and some natural disasters. Employees are oriented to the contents of the Contingency Plan and trained in the response plan relating to their area of operation.

Response plans and procedures due to upsets or spills from the wastewater treatment system are not specifically covered in the Contingency Plan. The following sections detail responses to wastewater system upsets and spills.

8.4.1 Wastewater Spill

In the event of a spill, contact the Environmental Manager or any of the other designated Emergency Coordinators listed in the Contingency Plan immediately.

<u>Stop the Water Flow</u>

If a spill occurs due to a leaking pipe, stopping the water flow will require the operator to power down facility equipment that is producing wastewater, and/or turn off the pump supplying wastewater to the pipe or tank involved. If a spill occurs due to a leaking tank, the operator will stop all transfer of wastewater to the tank. Once this is done, they will assess upstream of the leak to determine if other processes need to be shut down due to the loss of capacity.

<u>Contain Spill</u>

The wastewater structures are either contained by a bermed concrete pad that contains and directs the spill to TK-1. The facility also contains drains that direct spills to either TK-1 or T-5005 where the wastewater will be treated and evaporated. There are operators trained in spill response procedures and if a spill does occur, trained personnel will immediately take steps to contain the spill so it does not reach a drain. Spilled materials will be cleaned up and disposed of properly by CMC employees, or if the spill exceeds the volume CMC staff can safely handle under CMC's Spill Response Plan, a spill response company will be called to clean up the spill.

<u>Assess the Extent of the Spill</u>

Wastewater directed to the land application unit does not (under normal and foreseeable conditions) contain materials that would be considered dangerous or extremely hazardous waste. Wastewater or

waste solutions from the phosphoric acid recovery unit, boric evaporator, and deionized unit could contain materials or have a pH that would designate the material as dangerous waste. An accurate assessment of the spill is important for determining the next course of action and reporting. It is important to know the facts about the spill so an accurate report can be filed with Ecology if necessary.

1. Determine the time the spill started and stopped.
2. Estimate the amount of water spilled.
3. Record actions taken to stop and contain the spill.
4. Describe any damage caused by the spill including erosion and damage or harm to vegetation and wildlife.
5. Determine the cause of the spill.

Report the Spill to Washington State Department of Ecology

It will be the responsibility of the Environmental Manager to make sure the situation that resulted in the spill has been stabilized and to notify Ecology. All spills outside of containment must be reported to Ecology regardless of the amount. The 24 hour emergency phone number is (509) 329-3400.

8.4.2 Possible Emergency Conditions

The following are some, not necessarily all, of the events that can lead directly to the failure of the wastewater conveyance piping or holding tanks. Included after each potential event is a brief outline of the steps taken to stabilize the situation.

Earthquake

There have been a total of 48 earthquakes within 30 miles of Moses Lake since 1931, with the largest being a 4.8 magnitude that occurred in 1973. According the United States Geological Service (USGS) Moses Lake, WA has a moderate earthquake risk with a 13.4% probability of a 5.0 Richter Scale earthquake within the next 50 years.

If an earthquake occurs an immediate inspection should be conducted by a qualified CMC employee to look for any signs of cracks, structural issues, leaks, or changes in the structural integrity of pumps or other components of the wastewater units. If damage is detected then the steps outlined in 8.4.1 should be implemented.

Flooding

The average annual precipitation in Moses Lake, WA is 9.1 inches. Flooding is not a common event in this area; however it has occurred in the past. The last flood event that resulted in significant damage to the area occurred at the end of May – early June 1948 and was a result of heavy rain fall and snow melt. The estimated recurrence interval for a similar storm is 75 years.

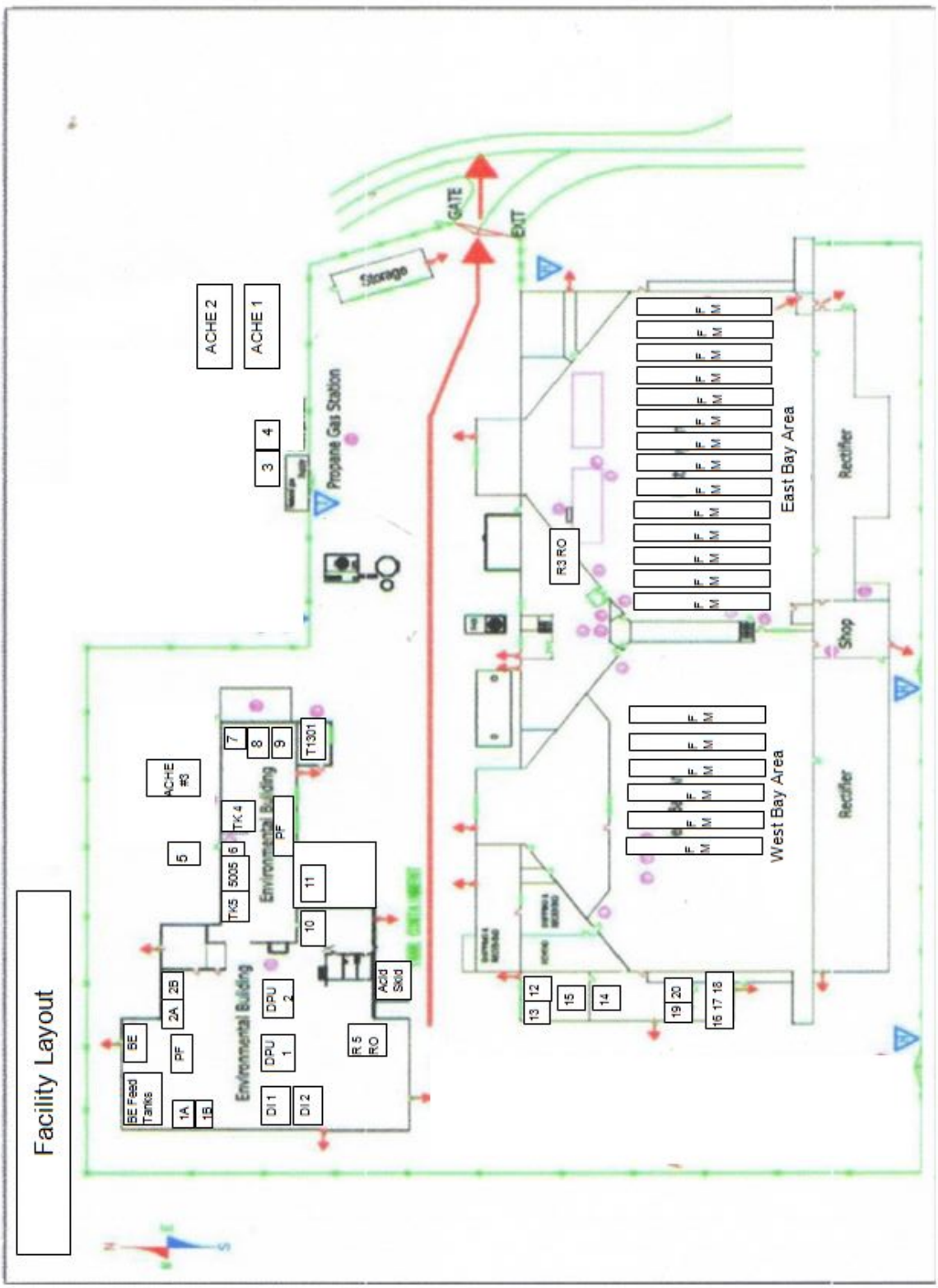
In the event of a major flood the containment berm for the acid storage tanks could be overwhelmed or the land application system may not be operational. It will be essential to make sure the pumps in the containment berm are functioning and removing water and that the land application unit is able to accept wastewater from TK-4. If this is not possible it may be necessary to suspend operations until the wastewater treatment systems are operational.

Figures

Figure 1. Facility Location
Figure 2. Facility Layout

Figure 1. Facility Map

Figure 2. Facility Layout



1A – City water reverseosmosis (RO) unit	16, 17, 18 – Chillers
1B – City water reverseosmosis (RO) unit	19 – Air compressor #3
2A – Air compressor #1	20 – Air compressor #4
2B – Air compressor #2	ACHE1 – Air cooled heat exchanger #1
3 – Coolingtower #1	ACHE2 – Air cooled heat exchanger #2
4 – Coolingtower #2	BE – Boric evaporator
5 – Coolingtower #3	BE Feed Tanks – Boric evaporator feed tanks
6 – Land application unit PLC and sampler	DI #1 – Deionized water unit #1
7 – Tank TK-2	DI #2 – Deionized water unit #2
8– Tank TK-1	DPU #1 – Eco-Tech phosphoric acid recovery unit #1
9 – Tank TK-3	DPU #2 – Eco-Tech phosphoric acid recovery unit #2
10 – High TDS evaporator #1	FM – Formation machine
11 – High TDS evaporator #2	PF –Pressure filter
12 – Boiler #1	R 5 RO – Rinse 5 reverse osmosis (RO) unit
13 – Boiler #2	T1301 – Tank 1301
14 – Boiler #3	
15 – DA Tank	

Issue Date: March 5, 2015
Effective Date: April 1, 2015
Expiration Date: March 31, 2020

State Waste Discharge Permit Number ST0005390

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7600

Eastern Regional Office
4601 North Monroe Street
Spokane, Washington 99205-1295

In compliance with the provisions of the
State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington, as amended,

Chemi-Con Materials Corporation

9053 Graham Road

Moses Lake, Washington 98837

is authorized to discharge wastewater in accordance with the special and general conditions which follow.

Facility Location: 9053 Graham Road NE, Moses Lake, WA 98837	SIC Code: 3353 NAICS Code: 331315
Industry Type: Forming of Aluminum Foil for Electrolytic Capacitors	POTW Receiving Discharge: Port of Moses Lake, Land Treatment System

James M. Bellatty
Water Quality Section Manager
Eastern Regional Office
Washington State Department of Ecology

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Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
All permit required submittals must be submitted electronically through the WQWebPortal.			
S3.A.	Discharge Monitoring Report	Monthly	May 15, 2015
S4.A.	O&M Manual Update or Review Confirmation Letter	Annually	October 15, 2015
S7.C.	Solid Waste Control Plan Update	1/permit cycle	October 15, 2015
S8.	Application for Permit Renewal	1/permit cycle	March 31, 2019
S10.	Spill Plan Update	1/permit cycle	April 15, 2016
S11.	Slug Discharge Control Plan	1/permit cycle	April 15, 2016
S11.	Slug Discharge Control Plan Update	1/permit cycle	March 31, 2019

Special Conditions

S1. Discharge limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a concentration in excess of, that authorized by this permit violates the terms and conditions of this permit.

A. Beginning on the effective date and lasting through the expiration date of this permit, the Permittee shall not discharge any process wastewater from the anodizing production lines to Port of Moses Lake land treatment system.

B. Beginning on the effective date and lasting through the expiration date of this permit, the Permittee is authorized to discharge cooling tower blowdown, boiler blowdown, and reject water from supply water treatment to the Port of Moses Lake land treatment system subject to the following limitations:

Effluent Limits: Outfall # 001Latitude 47.21806 Longitude 119.1.01694				
Parameter	**Annual Average [a]**	**Six Month Average [b]**	**Average Monthly [c]**	**Maximum Daily [d]**
Flow	--	--	76,000 gpd	100,000 gpd
Conductivity	--	1,600 µmhos/cm	--	3,200 µmhos/cm
pH	Within the range of 5.0 to 9.0 s.u.			
TSS		--	--	30 mg/L
TDS	1,000 lbs/day	--	--	2,000 lbs/day
Aluminum	--	5.0 mg/L	--	20 mg/L
Boron	--	1.0 mg/L	--	2.0 mg/L
Chloride	--	175 mg/L	--	350 mg/L
Manganese	--	0.2 mg/L	--	10 mg/L
Sodium	--	115 mg/L	--	230 mg/L
Sulfate	--	250 mg/L	--	500 mg/L
SAR [e]	6.0	--	--	9.0
BOD_5	--	20 mg/L	--	40 mg/L
Total Nitrogen	--	40 mg/L	--	80 mg/L
TKN	--	4.0 mg/L	--	9.0 mg/L
Fats, Oils and Grease	--	20 mg/L	--	40 mg/L
Arsenic	--	0.036 mg/L	--	2.0 mg/L

Effluent Limits: Outfall # 001Latitude 47.21806 Longitude 119.1.01694				
Parameter	**Annual Average [a]**	**Six Month Average [b]**	**Average Monthly [c]**	**Maximum Daily [d]**
Barium	--	1.0 mg/L	--	2.0 mg/L
Beryllium	--	0.01 mg/L	--	0.5 mg/L
Cadmium	--	0.01 mg/L	--	0.05 mg/L
Chromium	--	0.1 mg/L	--	1.0 mg/L
Cobalt	--	0.05 mg/L	--	5.0 mg/L
Copper	--	0.03 mg/L	--	5.0 mg/L
Total Cyanide	--	0.2 mg/L	--	0.5 mg/L
Fluoride	--	1.0 mg/L	--	15 mg/L
Iron	--	5 mg/L	--	20 mg/L
Lead	--	0.2 mg/L	--	5.0 mg/L
Lithium	--	1.0 mg/L	--	2.5 mg/L
Mercury	--	0.002 mg/L	--	0.05 mg/L
Molybdenum	--	0.02 mg/L	--	0.05 mg/L
Nickel	--	0.09 mg/L	--	2.0 mg/L
Selenium	--	0.008 mg/L	--	0.02 mg/L
Silver	--	0.05 mg/L	--	0.1 mg/L
Vanadium	--	0.1 mg/L	--	1.0 mg/L
Zinc	--	0.9 mg/L	--	10 mg/L

a	The annual average effluent limitation is defined as the highest allowable average of daily discharges over a calendar year period, calculated as the sum of all daily discharges measured during a calendar year divided by the number of daily discharges measured during the calendar year.
b	The six month average effluent limitation is defined as the highest allowable average of daily discharges over a continuous six month period, calculated as the sum of all daily discharges measured during the prior six month period divided by the number of daily discharges measured during the prior six month period.
c	The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
d	The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day.
e	The Sodium Adsorption Ratio (SAR) shall be calculated from the following equation:

	$$SAR = \frac{Na_{meq/L}}{\sqrt{(Ca_{meq/L}+Mg_{meq/L})/2}}$$ ***Where concentrations of sodium (Na), calcium (Ca), and Magnesium (Mg) are expressed in meq/L. Concentrations expressed in meq/L can be calculated from concentrations in mg/L as follows:*** $$Na_{meq/L} = \frac{Na_{mg/L}}{23} ; Ca_{meq/L} = \frac{Ca_{mg/L}}{20.04} ; Mg_{meq/L} = \frac{Mg_{mg/L}}{12.15}$$

S2. Monitoring requirements

S2.A. Monitoring requirements

The Permittee must monitor the wastewater and production according to the following schedule:

The Permittee must monitor in accordance with the following schedule and the requirements specified in **Appendix A**.

Parameter	Units	Sampling Frequency	Sample Type
(1) Final Wastewater Effluent			
Flow	GPD	Continuous [a]	Metered
Conductivity	umhos/cm	"	"
pH	s.u.	"	"
Temperature	°F	"	"
TSS	mg/L	1/month	24-Hour Composite [b]
TDS	mg/L, lbs/day	"	"
Boron	mg/L	"	"
Aluminum	mg/L	1/quarter [c]	"
Boron	mg/L	"	
Calcium	mg/L	"	"
Chloride	mg/L	"	"
Magnesium	mg/L	"	"
Manganese	mg/L	"	"
Sodium	mg/L	"	"
Sulfate	mg/L	"	"
SAR	--	"	Calculated
BOD_5	mg/L	1/year [d]	24-Hour Composite [b]
Total Nitrogen	mg/L	"	"
TKN	mg/L	"	"

Parameter	Units	Sampling Frequency	Sample Type
(1) Final Wastewater Effluent			
Fats, Oils and Grease	mg/L	“	“
Arsenic	mg/L	“	“
Barium	mg/L	“	“
Beryllium	mg/L	“	“
Cadmium	mg/L	“	“
Chromium	mg/L	“	“
Cobalt	mg/L	“	“
Copper	mg/L	“	“
Total Cyanide	mg/L	“	“
Fluoride	mg/L	“	“
Iron	mg/L	“	“
Lead	mg/L	“	“
Lithium	mg/L	“	“
Mercury	mg/L	“	“
Molybdenum	mg/L	“	“
Nickel	mg/L	“	“
Selenium	mg/L	“	“
Silver	mg/L	“	“
Vanadium	mg/L	“	“
Zinc	mg/L	“	“

[a]	Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. The Permittee must sample at a minimum of once per day when continuous monitoring is not possible.
[b]	24-Hour Composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
[c]	Quarterly sampling periods are January through March, April through June, July through September, and October through December.
[d]	Yearly sampling period is January through December.

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the water and wastewater monitoring requirements specified in this permit must conform to the latest revision of the following rules and documents unless otherwise specified in this permit or approved in writing by Ecology.

- Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136
- Standard Methods for the Examination of Water and Wastewater (APHA)

S2.C. Flow measurement and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard and the manufacturer's recommendation for that type of device.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
    a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
    b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.
    c. Must calibrate continuous chlorine measurement instruments using a grab sample analyzed in the laboratory within 15 minutes of sampling.
4. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year.
5. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement.

The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic Discharge Monitoring Report (DMR) form provided by Ecology within WQWebDMR. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.

To find out more information and to sign up for WQWebDMR go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html.

Enter the "no discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.

2. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
3. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.
4. Calculate average values (unless otherwise specified in the permit) using:
    a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.
    b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample for the reporting period.
    c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.

5. Report single-sample grouped parameters (for example priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include: sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary). The Permittee must also submit an electronic PDF copy of the laboratory report using WQWebDMR.

   If the Permittee has obtained a waiver from electronic reporting or if submitting prior to the compliance date, the Permittee must submit a paper copy of the laboratory report providing the following information: date sampled, sample location, date of analysis, parameter name, CAS number, analytical method/number, detection limit (DL), laboratory quantitation level (QL), reporting units, and concentration detected.

   The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.

6. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.

7. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:

   a. Submit **monthly** DMRs by the 15th day of the following month.

   b. Submit **quarterly** DMRs, unless otherwise specified in the permit, by the 15th day of the month following the sampling period. Quarterly sampling periods are January through March, April through June, July through September, and October through December.

   c. Submit **1/year** DMRs, unless otherwise specified in the permit, by January 15 for the previous calendar year. The annual sampling period is the calendar year.

8. Submit DMR reports to Ecology online using Ecology's electronic WQWebDMR submittal forms (electronic DMRs) as required above.

9. Changes to WebDMR users. The Permittee must notify Ecology when WQWebDMR users are no longer authorized to use WebDMR on behalf of the Permittee. The notice must be sent within 30 days in writing by mail or via email to the Permit Manager.

10. Submit reports through the WQWebPortal. Permit Managers may request additional paper copies. If requested, send to Ecology Permit Manager at:

    Water Quality Program
    Department of Ecology
    Eastern Regional Office
    4601 North Monroe Street
    Spokane, WA 99205-1295

S3.B. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit.

The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.C. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement
2. The individual who performed the sampling or measurement
3. The dates the analyses were performed
4. The individual who performed the analyses
5. The analytical techniques or methods used
6. The results of all analyses

S3.D. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Condition S2.

S3.E. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must report any noncompliance that may endanger health or the environment immediately to the Department of Ecology's Regional Office 24-hr. number listed below:

Ecology Eastern Regional Office	509-329-3400

b. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances. The Permittee must report:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S4.B., "Bypass Procedures").
3. Any upset that causes an exceedance of an effluent limit in the permit. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the noncompliance and its cause.
2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

f. Report submittal

The Permittee must submit reports to Ecology as specified in S3.A**.**

S3.F. Other reporting

a. Spills of Oil or Hazardous Materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm.

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.G. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S3.H. Dangerous waste discharge notification

The Permittee must notify the publicly owned treatment works (POTW) and Ecology in writing of the intent to discharge into the POTW any substance designated as a dangerous waste in accordance with the provisions of WAC 173-303-070. It must make this notification at least 90 days prior to the date that it proposes to initiate the discharge. The Permittee must not discharge this substance until authorized by Ecology and the POTW. It must also comply with the notification requirements of Special Condition S8 and General Condition G4.

S3.I. Spill notification

The Permittee must notify the POTW immediately (as soon as discovered) of all discharges that could cause problems to the POTW, such as process spills and unauthorized discharges (including slug discharges).

S4. Operation and maintenance

The Permittee must, at all times, properly operate and maintain all facilities or systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit.

Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

S4.A. Operations and maintenance manual

a. O&M manual submittal and requirements

The Permittee must:

1. Review the O&M Manual within six months after permit issuance date and confirm this review by letter to Ecology.
2. Submit to Ecology for review and approval substantial changes or updates to the O&M Manual whenever it incorporates them into the manual.
3. Keep the approved O&M Manual at the permitted facility.
4. Follow the instructions and procedures of this manual.
5. Submit reviews, changes and updates to Ecology through the WQWebPortal.

b. O&M manual components

In addition to the requirements of WAC 173-240-150(1) and (2), the O&M manual must include:

1. Emergency procedures for plant shutdown and cleanup in event of wastewater system upset, spill, failure, or demand by the publicly owned treatment works (POTW) treating the discharge.
2. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
3. Any directions to maintenance staff when cleaning, or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine.)
4. Wastewater sampling protocols and procedures for compliance with the sampling and reporting requirements in the wastewater discharge permit.
5. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.
6. Treatment plant process control monitoring schedule.

S4.B. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass is unavoidable, unanticipated, and results in noncompliance of this permit.

   This permit authorizes such a bypass only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. No feasible alternatives to the bypass exist, such as:

      - The use of auxiliary treatment facilities.
      - Retention of untreated wastes.
      - Stopping production.
      - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
      - Transport of untreated wastes to another treatment facility.

   c. The Permittee has properly notified Ecology of the bypass as required in Condition S3.E of this permit.

3. If bypass is anticipated and has the potential to result in noncompliance of this permit.

   a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and its cause.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
      - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

- The minimum and maximum duration of bypass under each alternative.
- A recommendation as to the preferred alternative for conducting the bypass.
- The projected date of bypass initiation.
- A statement of compliance with SEPA.
- A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
- Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during preparation of the engineering report or facilities plan and plans and specifications and must include these to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

S4.C. Best management practices\pollution prevention program

S5. Prohibited discharges

The Permittee must comply with these General and Specific Prohibitions.

S5.A. General prohibitions

The Permittee must not introduce into the POTW pollutant(s), which cause Pass Through or Interference.

S5.B. Specific prohibitions

In addition, the Permittee must not introduce the following into the POTW:

1. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than 60 degrees C (140 degrees F) using the test methods specified in 40 CFR 261.21
2. Solid or viscous pollutants in amounts, which will cause obstruction to the flow in the POTW resulting in interference
3. Any pollutant (including oxygen-demanding pollutants (BOD_5, etc.), released in a discharge at a flow rate and/or pollutant concentration that will cause interference with the POTW
4. Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees C (104 degrees F) unless the approval authority, upon request of the POTW, approves alternative temperature limits
5. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through
6. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems
7. Any trucked or hauled pollutants, except at discharge points designated by the POTW
8. Pollutants that will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0 or greater than 11.0, unless the collection and treatment system is specifically designed to accommodate such discharges.

S5.C. Prohibited unless approved

Any of the following discharges are prohibited unless approved by Ecology under extraordinary circumstances (such as a lack of direct discharge alternatives due to combined sewer service or a need to augment sewage flows due to septic conditions):

1. Noncontact cooling water in significant volumes
2. Storm water and other direct inflow sources
3. Wastewaters significantly affecting system hydraulic loading, which do not require treatment or would not be afforded a significant degree of treatment by the system
4. The discharge of dangerous wastes as defined in Chapter 173-303 WAC (Unless specifically authorized in this permit)

S6. Dilution prohibited

The Permittee must not dilute the wastewater discharge with stormwater or increase the use of potable water, process water, noncontact cooling water, or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limits contained in this permit.

S7. Solid waste disposal

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S7.C. Solid waste control plan

The Permittee must submit all proposed revisions or modifications to the solid waste control plan to Ecology for review and approval at least 30 days prior to implementation. Once approved, the Permittee must comply with any plan modifications.

a. Submittal requirements

1. Submit an update of the solid waste control plan **by October 15, 2015.** The Permittee must submit the report through the WQWebPortal and submit a paper copy to Ecology as specified in S3.

b. Solid waste control plan content

The solid waste control plan must:

1. Follow Ecology's guidance for preparing a solid waste control plan (www.ecy.wa.gov/biblio/0710024.html) and address all solid wastes generated by the Permittee.
2. Include at a minimum a description, source, generation rate, and disposal methods of these solid wastes.
3. Not conflict with local or state solid waste regulations.

S8. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit **by March 31, 2019.**

The Permittee must also submit a new application or supplement at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations.

These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

S9. Non-routine and unanticipated discharges

1. Beginning on the effective date of this permit, the Permittee is authorized to discharge non-routine wastewater on a case-by-case basis to the sanitary sewer if approved by Ecology and the POTW. Prior to any such discharge, the Permittee must contact Ecology and **at a minimum** provide the following information:
   a. The proposed discharge location
   b. The nature of the activity that will generate the discharge
   c. Any alternatives to the discharge, such as reuse, storage, or recycling of the water
   d. The total volume of water it expects to discharge
   e. The results of the chemical analysis of the water
   f. The date of proposed discharge
   g. The expected rate of discharge discharged, in gallons per day
2. The expected rate of discharge in gallons per minute for discharges greater than 20,000 gallons

3. The Permittee must analyze the water for all constituents limited for the discharge and report them as required by subpart 1.e above. The analysis must also include any parameter deemed necessary by Ecology. All discharges must comply with the effluent limits as established in Condition S1 of this permit and any other limits imposed by Ecology.
4. The discharge cannot proceed until Ecology has reviewed the information provided and has authorized the discharge by letter to the Permittee or by an Administrative Order.

S10. Spill control plan

S10.A. Spill control plan submittals and requirements

The Permittee must:

1. Submit to Ecology an update to the existing spill control plan **by April 15, 2016**. The Permittee must submit the report through the WQWebPortal and submit a paper copy to Ecology as specified in S3.
2. Review the plan at least annually and update the spill plan as needed.
3. Send changes to the plan to Ecology.
4. Follow the plan and any supplements throughout the term of the permit.

S10.B. Spill control plan components

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, designate as Dangerous Waste (DW) or Extremely Hazardous Waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on-site, which may become pollutants or cause pollution upon reaching state's waters.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

The Permittee may submit plans and manuals required by 40 CFR Part 112, contingency plans required by Chapter 173-303 WAC, or other plans required by other agencies, which meet the intent of this section.

S11. Slug discharge control plan

S11.A. Slug discharge control plan submittal and requirements

The Permittee must:

1. **By April 15, 2016,** prepare and submit to Ecology, a plan to minimize the potential of slug discharges from the facility covered by this permit. The plan and any subsequent revisions become effective 30 days following submission.
2. Review its slug discharge plan and update it as needed.
3. Submit all revisions or updates of this plan to Ecology for review and approval.
4. Keep the current approved plan on the plant site and make it readily available to facility personnel.
5. Follow the approved plan and any approved supplements throughout the term of the permit.

6. Submit an update of the slug discharge control plan, or a certification that it is current **by March 31, 2019.**

S11.B. Slug discharge control plan components

The slug discharge control plan must include the following information and procedures relating to the prevention of unauthorized slug discharges; it must include:

1. A description of a reporting system the Permittee will use to immediately notify facility management, the POTW operator, and appropriate state, federal, and local authorities of any slug discharges, and provisions to provide a written follow-up report within five days.
2. A description of operator training, equipment, and facilities (including overall facility plan) for preventing, containing, or treating slug discharges.
3. Procedures to prevent adverse impact from accidental spills including:
    a. Inspection and maintenance of storage areas
    b. Handling and transfer of materials
    c. Loading and unloading operations
    d. Control of plant site run-off
    e. Worker training
    f. Building of containment structures or equipment
    g. Measures for containing toxic organic pollutants (including solvents)
    h. Measures and equipment for emergency response
4. A list of all raw materials, products, chemicals, and hazardous materials used, processed, or stored at the facility; the normal quantity maintained on the premises for each listed material; and a map showing where they are located.
5. A description of discharge practices for batch and continuous processes under normal and non-routine circumstances.
6. A brief description of any unauthorized discharges which occurred during the 36-month period preceding the effective date of this permit and subsequent measures taken by Permittee to prevent or to reduce the possibility of further unauthorized discharges.
7. An implementation schedule including additional operator training and procurement and installation of equipment or facilities required to properly implement the plan.

General Conditions

G1. Signatory requirements

All applications, reports, or information submitted to Ecology must be signed as follows:

1. All permit applications must be signed by either a principal executive officer or ranking elected official.
2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a. The authorization is made in writing by the person described above and is submitted to Ecology at the time of authorization, and
   b. The authorization specifies either a named individual or any individual occupying a named position.
3. Changes to authorization. If an authorization under paragraph G1.2. above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.
4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of entry

Representatives of Ecology have the right to enter at all reasonable times in or upon any property, public or private, for the purpose of inspecting and investigating conditions relating to the pollution or the possible pollution of any waters of the state. Reasonable times include normal business hours; hours during which production, treatment, or discharge occurs; or times when Ecology suspects a violation requiring immediate inspection. Representatives of Ecology must be allowed to have access to, and copy at reasonable cost, any records required to be kept under terms and conditions of the permit; to inspect any monitoring equipment or method required in the permit; and to sample the discharge, waste treatment processes, or internal waste streams.

G3. Permit actions

This permit is subject to modification, suspension, or termination, in whole or in part by Ecology for any of the following causes:

1. Violation of any permit term or condition;
2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts;
3. A material change in quantity or type of waste disposal;
4. A material change in the condition of the waters of the state; or
5. Nonpayment of fees assessed pursuant to RCW 90.48.465.

Ecology may also modify this permit, including the schedule of compliance or other conditions, if it determines good and valid cause exists, including promulgation or revisions of regulations or new information.

G4. Reporting a cause for modification

The Permittee must submit a new application, or a supplement to the previous application, along with required engineering plans and reports, whenever a new or increased discharge or change in the nature of the discharge is anticipated which is not specifically authorized by this permit. This application must be submitted at least one hundred eighty (180) days prior to any proposed changes. Submission of this application does not relieve the Permittee of the duty to comply with the existing permit until it is modified or reissued.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with Chapter 173-240 WAC. Engineering reports, plans, and specifications should be submitted at least 180 days prior to the planned start of construction. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in the permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

This permit is automatically transferred to a new owner or operator if:

1. A written agreement between the old and new owner or operator containing a specific date for transfer of permit responsibility, coverage, and liability is submitted to Ecology;
2. A copy of the permit is provided to the new owner and;
3. Ecology does not notify the Permittee of the need to modify the permit.

Unless this permit is automatically transferred according to Section 1. above, this permit may be transferred only if it is modified to identify the new Permittee and to incorporate such other requirements as determined necessary by Ecology.

G8. Reduced production for compliance

The Permittee must control production or discharge to the extent necessary to maintain compliance with the terms and conditions of this permit upon reduction of efficiency, loss, or failure of its treatment facility until the treatment capacity is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power for the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the effluent stream for discharge.

G10. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology. Ecology may revoke this permit if the permit fees established under Chapter 173-224 WAC are not paid.

G11. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs is a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit incurs, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is a separate and distinct violation.

G12. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G13. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of chapter 90.48 RCW and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

CONVENTIONAL PARAMETERS

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Biochemical Oxygen Demand	SM5210-B		2 mg/L
Soluble Biochemical Oxygen Demand	SM5210-B [3]		2 mg/L
Chemical Oxygen Demand	SM5220-D		10 mg/L
Total Organic Carbon	SM5310-B/C/D		1 mg/L
Total Suspended Solids	SM2540-D		5 mg/L

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Total Ammonia (as N)	SM4500-NH3-B and C/D/E/G/H		20
Flow	Calibrated device		
Dissolved oxygen	SM4500-OC/OG		0.2 mg/L
Temperature (max. 7-day avg.)	Analog recorder or Use micro-recording devices known as thermistors		0.2º C
pH	SM4500-H^+ B	N/A	N/A

NONCONVENTIONAL PARAMETERS

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Total Alkalinity	SM2320-B		5 mg/L as CaCO3
Chlorine, Total Residual	SM4500 Cl G		50.0
Color	SM2120 B/C/E		10 color units
Fecal Coliform	SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Fluoride (16984-48-8)	SM4500-F E	25	100
Nitrate + Nitrite Nitrogen (as N)	SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)	SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H		300
Soluble Reactive Phosphorus (as P)	SM4500- PE/PF	3	10
Phosphorus, Total (as P)	SM 4500 PB followed by SM4500-PE/PF	3	10
Oil and Grease (HEM)	1664 A or B	1,400	5,000

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Salinity	SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids	SM2540 -F		100
Sulfate (as mg/L SO_4)	SM4110-B		200
Sulfide (as mg/L S)	SM4500-S^2F/D/E/G		200
Sulfite (as mg/L SO_3)	SM4500-SO3B		2000
Total Coliform	SM 9221B, 9222B, 9223B	N/A	Specified in method - sample aliquot dependent
Total dissolved solids	SM2540 C		20 mg/L
Total Hardness	SM2340B		200 as CaCO3
Aluminum, Total (7429-90-5)	200.8	2.0	10
Barium Total (7440-39-3)	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)	EPA SW 846 8021/8260	1	2
Boron Total (7440-42-8)	200.8	2.0	10.0
Cobalt, Total (7440-48-4)	200.8	0.05	0.25
Iron, Total (7439-89-6)	200.7	12.5	50
Magnesium, Total (7439-95-4)	200.7	10	50
Molybdenum, Total (7439-98-7)	200.8	0.1	0.5
Manganese, Total (7439-96-5)	200.8	0.1	0.5
NWTPH Dx [4]	Ecology NWTPH Dx	250	250
NWTPH Gx [5]	Ecology NWTPH Gx	250	250
Tin, Total (7440-31-5)	200.8	0.3	1.5

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Titanium, Total (7440-32-6)	200.8	0.5	2.5

PRIORITY POLLUTANTS

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total (7440-36-0)	200.8	0.3	1.0
Arsenic, Total (7440-38-2)	200.8	0.1	0.5
Beryllium, Total (7440-41-7)	200.8	0.1	0.5
Cadmium, Total (7440-43-9)	200.8	0.05	0.25
Chromium (hex) dissolved (18540-29-9)	SM3500-Cr EC	0.3	1.2
Chromium, Total (7440-47-3)	200.8	0.2	1.0
Copper, Total (7440-50-8)	200.8	0.4	2.0
Lead, Total (7439-92-1)	200.8	0.1	0.5
Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
Nickel, Total (7440-02-0)	200.8	0.1	0.5
Selenium, Total (7782-49-2)	200.8	1.0	1.0
Silver, Total (7440-22-4)	200.8	0.04	0.2
Thallium, Total (7440-28-0)	200.8	0.09	0.36
Zinc, Total (7440-66-6)	200.8	0.5	2.5
Cyanide, Total (57-12-5)	335.4	5	10
Cyanide, Weak Acid Dissociable	SM4500-CN I	5	10
Cyanide, Free Amenable to	SM4500-CN G	5	10

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Chlorination (Available Cyanide)			
Phenols, Total	EPA 420.1		50

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
ACID COMPOUNDS			
2-Chlorophenol (95-57-8)	625	1.0	2.0
2,4-Dichlorophenol (120-83-2)	625	0.5	1.0
2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	625/1625B	1.0	2.0
2,4 dinitrophenol (51-28-5)	625	1.0	2.0
2-Nitrophenol (88-75-5)	625	0.5	1.0
4-nitrophenol (100-02-7)	625	0.5	1.0
Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	625	1.0	2.0
Pentachlorophenol (87-86-5)	625	0.5	1.0
Phenol (108-95-2)	625	2.0	4.0
2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0

PRIORITY POLLUTANTS (continued)

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
VOLATILE COMPOUNDS			
Acrolein (107-02-8)	624	5	10
Acrylonitrile (107-13-1)	624	1.0	2.0
Benzene (71-43-2)	624	1.0	2.0
Bromoform (75-25-2)	624	1.0	2.0
Carbon tetrachloride (56-23-5)	624/601 or SM6230B	1.0	2.0
Chlorobenzene (108-90-7)	624	1.0	2.0
Chloroethane (75-00-3)	624/601	1.0	2.0
2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
Dibromochloromethane (124-48-1)	624	1.0	2.0
1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
Dichlorobromomethane (75-27-4)	624	1.0	2.0
1,1-Dichloroethane (75-34-3)	624	1.0	2.0
1,2-Dichloroethane (107-06-2)	624	1.0	2.0
1,1-Dichloroethylene (75-35-4)	624	1.0	2.0

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
VOLATILE COMPOUNDS			
1,2-Dichloropropane (78-87-5)	624	1.0	2.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) (542-75-6)[6]	624	1.0	2.0
Ethylbenzene (100-41-4)	624	1.0	2.0
Methyl bromide (74-83-9) (Bromomethane)	624/601	5.0	10.0
Methyl chloride (74-87-3) (Chloromethane)	624	1.0	2.0
Methylene chloride (75-09-2)	624	5.0	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
Tetrachloroethylene (127-18-4)	624	1.0	2.0
Toluene (108-88-3)	624	1.0	2.0
1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	624	1.0	2.0
1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
Trichloroethylene (79-01-6)	624	1.0	2.0
Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0

PRIORITY POLLUTANTS (continued)

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Acenaphthene (83-32-9)	625	0.2	0.4
Acenaphthylene (208-96-8)	625	0.3	0.6
Anthracene (120-12-7)	625	0.3	0.6
Benzidine (92-87-5)	625	12	24
Benzyl butyl phthalate (85-68-7)	625	0.3	0.6
Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2) [7]	610/625	0.8	1.6
Benzo(j)fluoranthene (205-82-3) [7]	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) (207-08-9) [7]	610/625	0.8	1.6
Benzo(r,s,t)pentaphene (189-55-9)	625	0.5	1.0
Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0
Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
Bis(*2-chloroethoxy)*methane (111-91-1)	625	5.3	21.2
Bis(*2-chloroethyl*)ether (111-44-4)	611/625	0.3	1.0
Bis(*2-chloroisopropyl*)ether (39638-32-9)	625	0.3	0.6

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Bis(*2-ethylhexyl*)phthalate (117-81-7)	625	0.1	0.5
4-Bromophenyl phenyl ether (101-55-3)	625	0.2	0.4
2-Chloronaphthalene (91-58-7)	625	0.3	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5
Chrysene (218-01-9)	610/625	0.3	0.6
Dibenzo (a,h)acridine (226-36-8)	610M/625M	2.5	10.0
Dibenzo (a,j)acridine (224-42-0)	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (53-70-3)(1,2,5,6-dibenzanthracene)	625	0.8	1.6
Dibenzo(a,e)pyrene (192-65-4)	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene (189-64-0)	625M	2.5	10.0
3,3-Dichlorobenzidine (91-94-1)	605/625	0.5	1.0
Diethyl phthalate (84-66-2)	625	1.9	7.6
Dimethyl phthalate (131-11-3)	625	1.6	6.4
Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
2,4-dinitrotoluene (121-14-2)	609/625	0.2	0.4
2,6-dinitrotoluene (606-20-2)	609/625	0.2	0.4

PRIORITY POLLUTANTS (continued)

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
1,2-Diphenylhydrazine (*as Azobenzene*) (122-66-7)	1625B	5.0	20
Fluoranthene (206-44-0)	625	0.3	0.6
Fluorene (86-73-7)	625	0.3	0.6
Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
Hexachlorobutadiene (87-68-3)	625	0.5	1.0
Hexachlorocyclopentadiene (77-47-4)	1625B/625	0.5	1.0
Hexachloroethane (67-72-1)	625	0.5	1.0
Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
Isophorone (78-59-1)	625	0.5	1.0
3-Methyl cholanthrene (56-49-5)	625	2.0	8.0
Naphthalene (91-20-3)	625	0.3	0.6
Nitrobenzene (98-95-3)	625	0.5	1.0
N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
N-Nitrosodiphenylamine (86-30-6)	625	0.5	1.0

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Perylene (198-55-0)	625	1.9	7.6
Phenanthrene (85-01-8)	625	0.3	0.6
Pyrene (129-00-0)	625	0.3	0.6
1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
DIOXIN			
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (176-40-16) (2,3,7,8 TCDD)	1613B	1.3 pg/L	5 pg/L

PRIORITY POLLUTANTS (continued)

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
PESTICIDES/PCBs			
Aldrin (309-00-2)	608	0.025	0.05
alpha-BHC (319-84-6)	608	0.025	0.05
beta-BHC (319-85-7)	608	0.025	0.05
gamma-BHC (58-89-9)	608	0.025	0.05
delta-BHC (319-86-8)	608	0.025	0.05
Chlordane (57-74-9) [8]	608	0.025	0.05

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
PESTICIDES/PCBs			
4,4'-DDT (50-29-3)	608	0.025	0.05
4,4'-DDE (72-55-9)	608	0.025	0.05[10]
4,4' DDD (72-54-8)	608	0.025	0.05
Dieldrin (60-57-1)	608	0.025	0.05
alpha-Endosulfan (959-98-8)	608	0.025	0.05
beta-Endosulfan (33213-65-9)	608	0.025	0.05
Endosulfan Sulfate (1031-07-8)	608	0.025	0.05
Endrin (72-20-8)	608	0.025	0.05
Endrin Aldehyde (7421-93-4)	608	0.025	0.05
Heptachlor (76-44-8)	608	0.025	0.05
Heptachlor Epoxide (1024-57-3)	608	0.025	0.05
PCB-1242 (53469-21-9) [9]	608	0.25	0.5
PCB-1254 (11097-69-1)	608	0.25	0.5
PCB-1221 (11104-28-2)	608	0.25	0.5
PCB-1232 (11141-16-5)	608	0.25	0.5
PCB-1248 (12672-29-6)	608	0.25	0.5
PCB-1260 (11096-82-5)	608	0.13	0.5
PCB-1016 (12674-11-2) [9]	608	0.13	0.5
Toxaphene (8001-35-2)	608	0.24	0.5

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer. (64 FR 30417).
   ALSO GIVEN AS:
   The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.

4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

6. 1, 3-dichloroproylene (mixed isomers) You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).

7. Total Benzofluoranthenes - Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.

8. Chlordane – You may report alpha-chlordane (5103-71-9) and gamma-chlordane (5103-74-2) in place of chlordane (57-74-9). If you report alpha and gamma-chlordane, the DL/PQLs that apply are 0.025/0.050.

9. PCB 1016 & PCB 1242 – You may report these two PCB compounds as one parameter called PCB 1016/1242.

Land Application

Purpose:

This S.O.P. will establish guidelines for surveillance of Chemi-Con Material Corporation's Land Application Process. The process is designed to allow non-contact water to be sent to the land application pond. The system consists of the following:

1. Non-contact low TDS, Land application storage tank (TK-4), located in building 1.
2. Pumping station with two pumps.
3. 2 pH probes located down stream from the pumps.
4. conductivity probe located down stream from the pumps
5. Sampling station, located next to T-9001.

It is the operator's responsibility to maintain specific conditions and ensure the system is ran in the most efficient manner possible. This procedure will provide the operator with guidelines that will enable them to make sure the water sent to the land application pond is within specifications.

I. STANDARD OPERATION

The Land Application Process and related units are primarily controlled by a programmable logic control (PLC). The PLC is located within a grey cabinet by T-9001; the PLC is a YOKOGAWA CONTROLER. Once set the PLC will allow operation with limited supervision by the operator. Every four (4) hours the operator will record all the specifics on the system and take the appropriate action.

EVERY FOUR HOURS

1. Check the pH reading on the Yokogawa and record, pH should be >5 but <9.
2. Check the temperature and record.
3. Check the TDS and record. No more than 2,000 Lbs MAX/DAY.
4. Check the conductivity and record.
5. Check the GPM and record.

ONCE A MONTH

Warning: Turn pump off, close all valves, and remove handles to prevent accidental release of energy prior to cleaning PH probes.

Check and clean the pH probes.

1. Verify the pH readout on the Yokogawa display with a hand held pH meter.
    a. If the reading is less than 5.5 on the Yokogawa, then you must check the pH with a hand held.
    b. If the reading is 8.5 or greater than the Yokogawa, then you must check the pH with a hand held.
    c. If either A or B above is out of spec contact Supervisor/Manager and then inform PE.

NOTE: Either the probe or the Yokogawa (or both) needs to be calibrated if they are not within specification of .5.

2. Take a contract lab sample.
    a. Open the cabinet, remove the jug and take the tube out.
    b. Use provided contract lab sample bottle
    c. Record the information on sample bottle label.
    d. Carefully fill the sample bottle (from the jug) and put the lid back on the bottle securely.
    e. Take the sample up front.
    f. Scrub the jug with green scrub pad, located in cabinet, then empty the jug and rinse it out.
    g. Put the fill hose back into the jug.
    h. Put the, rinsed out and empty, jug back into the cabinet.
    i. Close and latch the cabinet door.

NOTE: DO NOT USE ANY OTHER WATER TO CLEAN JUG IT CAN CONTAMINATE NEXT SAMPLE

CITY WATER REVERSE OSMOSIS UNIT

PURPOSE:
This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Materials Corporation City Water Reverse Osmosis Unit. It will also include operations for tanks T-3401, T-3402 and T-3403.

SAFETY PRECAUTIONS: It is essential that you read, and understand the **Notes**, **⚠Warning, and ⚠Danger statements** in each section before attempting to operate equipment. Failure to follow these precautions may result in, serious injury, or death. A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. Ref JSA EN05

I. STANDARD OPERATION

The G.E. Glegg City Water Reverse Osmosis Unit (C.W. R/O) operates automatically under the control of a factory installed programmable logic control (PLC). The PLC allows the unit to function with little supervision, and is accessible through the operator interface touch screen at each unit. The sole purpose of the city water R/O is to reduce the dissolved mineral salts, bacteria, silica and other particles, no matter how fine, in Chemi-Con Materials incoming city water.

This is accomplished by filling T-3401 (C.W. R/O feed tank) with city water. The impurities are then concentrated in the reject stream to TK-4 and then sent to land application.

The water passes through a skid mounted 1 micron (FL3405A) & 5-micron(FL3405B) cartridge filter housings where any suspended solids are removed. The solution is next fed to the R/O feed pump where the pressure is increased to go through the R/O inlet membranes at 125 – 145 GPM. The R/O passes a minimum of 75% permeate to T-3402/3403 as product, at a rate of 100 - 120 GPM and the rest goes to TK-4 as reject at 25 - 35 GPM. If the R/O conductivity is >8µS, the automatic dump valve will open and send the water to LAP (Land Application) as reject until the FEED "CONDUCTIVITY OUT" reaches ≤8µS/cm.

The R/O automatically cycles on and off depending on the level in the storage tanks, T-3402/3403. When the storage tanks are at 90" the units will start and continue to run until the level reaches 150".

NOTE … ONCE THE MEMBRANE ELEMENTS HAVE BEEN REMOVED FROM THE PACKAGE AND INSTALLED INTO THE R/O THEY MUST BE KEPT WET AT ALL TIMES.

> **⚠Danger: If Nalco chemicals are leaking from the pumps, hoses, fittings, etc... Prior to performing repair/shut off/clean up the following PPE is required to be worn; full chemical suit, rubber boots, rubber gloves, and face shield. If exposed to oxygen scavenger a respirator is also required.**
>
> **⚠Warning: Prior to opening any system, ensure the operators display panel reads a PH level that is acceptable, verify with PH paper. Wear latex gloves.**

ONCE PER SHIFT

1. The Environmental operators will record the information found on the Daily Log Sheet. The Environmental Manager/Supervisor will be notified of any deviancies from this log.

MONTHLY

1. The Environmental Manager or Supervisor will collect the Daily Log Sheet, at the beginning of each month for the previous month. The log sheets will be archived for 11 years.
2. Operate all solenoid valves. Look for sluggish operation or excessive leakage.
3. Open the drain valve on the filter regulator to remove moisture.
4. Check the status of the PLC battery pack. Replace the batteries as required.
5. Check the centrifugal pumps for proper bearing lubrication and inspect pump gaskets and mechanical seals for leakage.

EVERY 4 MONTHS

1. Check the air actuated automatic valves for air leakage, proper operation and seating.
2. Lubricate the diaphragm and ball valves. Also check for air leakage at the actuator.

EVERY 6 MONTHS

1. Clean and calibrate the conductivity sensor.
2. Clean and calibrate the pH sensors.
3. Calibrate or replace the flow meters / gauges.
4. Change feed pre-filter cartridges.

ANNUALLY

1. Replace all of the pressure gauges.
2. Check the centrifugal pumps shaft alignment and bearing wear. Rebuild as necessary.

A. Both City water R/O units are monitored by 3D trasars if chemical pumps fail and the units parameters are not being met the 3D trasars will alarm and begin sending emails to the environmental manager. The 3D trasars only purpose is to monitor the R/O and does not have any control of the R/O unit. Operators should check every hour for and deviations, and contact the environmental supervisor/manager if a problem occurs

CITY WATER REVERSE OSMOSIS UNIT

II. NON-STANDARD OPERATION

A. MANUAL STARTUP AND SHUTDOWN

A-1 EMERGENCY STOP

If necessary, the unit may be stopped before it completes a cycle. To do this:

1. Push the 'EMERGENCY STOP' button.
2. Put either R/O pump P-3421 / P-3422 into the "OFF" position.
3. Rectify the problem that initiated the emergency stop.
4. Put either R/O pump P-3421 / P-3422 into the "AUTO" position.

NOTE … EMERGENCY SHUTDOWN PROCEDURES ARE FOR A TEMPORARY STOP. IF THE DOWN TIME WILL EXCEED 72 HOURS THEN YOU MUST FOLLOW SHUT DOWN PROCEDURES FOUND BELOW.

A-2 SHUTDOWN LESS THAN 3 DAYS

1. Put either R/O pump P-3421 / P-3422 into the "OFF" position.
2. The R/O will automatically shut down.
3. Check that the R/O feed pump P-3401 A, B, C has stopped.
   NOTE … There is 3 R/O feed pumps. P-3401 A and C are dedicated to each unit. P-3401 B is a spare pump that may be valved in to take over should A or C fail.
4. Inlet and outlet isolation valves must be closed to ensure that the membranes will stay wet.

A-3 SHUTDOWN GREATER THAN 3 DAYS

1. Put either R/O pump P-3421 / P-3422 into the "OFF" position.
2. The R/O will automatically shut down.
3. Check that the R/O feed pump P-3401 A, B, C has stopped.
   NOTE … There is 3 R/O feed pumps. P-3401 A and C are dedicated to each unit. P-3401 B is a spare pump that may be valved in to take over should A or C fail.
4. All units must be flushed at least once per day with DI water.
5. Inlet and outlet isolation valves must be closed to ensure that the membranes will stay wet through shutdown.

CAUTION

IF THE AMBIENT WATER TEMPERATURE IS ABOVE 80 ºF, THE MEMBRANES SHOULD BE FLUSHED MORE FREQUENTLY TO REDUCE THE CHANCES OF BIOLOGICAL GROWTH IN THE SYSTEM, WHICH WILL RESULT IN MEMBRANE DEGRADATION.

A-4 START UP

1. Open all vent valves on the vessels.
2. Ensure that either PU-3401 A, B, or C is in the auto position. There is one pump per unit.

3. Turn the main disconnect switch on the R/O unit to the on position.
4. Place the R/O feed pump into the "AUTO" position. The unit will start immediately.
5. PU-3401 A, B, C should be running.
6. Give the unit a few minutes to run and fill out the Daily Log Sheet, EN4.4.403
   NOTE … THE UNIT WILL NOT START UNTIL T-3401 IS AT A HIGH LEVEL AND/OR T-3402/3403 IS LOW.

B. CHANGING CARTRIDGE FILTERS

Under certain circumstances ***(such as low or no flow)*** it is necessary to replace the cartridge filters. There are seven filters located within the stainless steel canister on the east end of the R/O. These are replaced in the following manner:

1. Shut down the R/O by following steps 1 in A-2 above.
2. Drain the canister by opening the drain cocks on the top and bottom of the canister filter.
3. Once the canisters are drained remove the canister filter top.
4. Once the cover is removed, pull the seven cartridge filters and replace with new filters located in the parts room.
5. Replace the canister covers securely.
6. Close the drain cocks ¾ of the way.
7. Start the unit back up following procedures in A-4 startup above.
8. After 1 minute close the drain cocks. This will give the unit enough time to purge any air in the system.
9. Check all pressures and flows to insure proper operation, adjust any valves as needed.
10. Dispose of the used filters and solution in accordance with environmental and safety practices.

MARLEY Cooling Towers

PURPOSE:
This S.O.P will establish a guideline for complete operation and surveillance of Chemi-Con Corporation's cooling towers #1, #2, & #3.

I. STANDARD OPERATION

ONCE A SHIFT

1. Visually check to ensure that there is an adequate supply of water in the basin of the cooling tower. The level should be approximately 8" to 12" below the access platform.
2. Visually check the cooling tower pumps (East bay towers PU-6009 or PU-6010, West bay tower PU-5233A or PU-5233B) for proper operating pressures. The East bay pump pressure should be 60 psi ± 2 psi. If the pressure is higher or lower, then the pump bypass must be open or closed accordingly. The West bay pump pressure should be 57 psi ± 2 psi. Panel view automatically controls the pressure to the West bay FM's by adjusting PIC-5233C. This is an automatic function. ***Please note that the set point (SP) and present value (PV) will differ slightly.***
3. Check to ensure that the 3d trasars appears to be operating correctly.
   a. Conductivity should read less than 50 in the tower basin or as specified by NALCO with management approval.
   b. Prime chemical injection pumps as needed.
4. Check the cooling tower.
   a. Check the top of the tower for any plugged holes.
   b. Check to ensure operation of the cooling tower pumps (PU-6009 or PU-6010 and PU-5233A or PU-5233B). ***NOTE:*** *Only one pump should be in operation at a time, on Cooling tower # 1, Cooling tower # 3 has 3 pumps and 2 pumps will always be running as long as all FM's are running in west bay .*
   c. Check to ensure operation of the cooling tower fan. ***NOTE:*** *The west bay cooling tower fan will only operate on days when the ambient temperature exceeds 75°F. The Air Cooled Heat Exchanger (ACHE) will handle the complete heat load until this point.*
   d. Check and adjust the flow on the top of the cooling tower as needed. The flow should appear to be equal to both sides.

II. NON STANDARD OPERATION

A. FILLING THE EAST BAY COOLING TOWER

1. Open hand valve #1 (HV-1) located in the pipe rack directly in front of the tower.
2. Open hand valve #2 (HV-2) located on the R/O make-up water supply pipe directly beneath the flow meter.
3. Visually check to ensure that there is water flowing into the sump.
4. Allow to fill to approximately 40" and check to see that the float has closed off the flow of water when full.

B. FILLING THE WEST BAY COOLING TOWER

1. Open hand valve #1 (HV-1) located on the R/O make-up water supply pipe directly above the float in the sump.
2. Turn PU-3403A at T-3403 into the Auto position.
3. Visually check to ensure that there is water flowing into the sump.
4. Allow the tower to fill to approximately 40" and check to see that the float valve has closed, stopping the flow of water when full.

C. DRAINING THE EAST BAY COOLING TOWER

1. Push the "OFF" button on the control box. This will generate a critical alarm.
2. Crack open the main drain valve at the bottom of the cooling tower basin.
3. Allow PU-9012 in auto to pump the trough to TK-4. Do not attempt to drain the tower quickly. PU-9012 does not pump fast enough to keep up and will overflow the trough.

II. NON STANDARD OPERATION (continued)

D. DRAINING THE WEST BAY COOLING TOWER

1. Connect a 2" air pump to a cam-lock on the west side of the tower basin.
2. Run 2" hose into Environmental building #1 and connect the hose to T-9001.
3. Turn the pump on.

AT NO TIME SHOULD THE COOLING TOWER BE FULLY DRAINED WHILE OPERATIONING!

E. STARTING UP THE EAST BAY COOLING TOWER

Maintenance is required for this procedure. They must monitor the pressure reducing valve, in the pipe rack for the east bay FM's.

1. Visually check to ensure that there is water in the bottom of the sump (approximately 40").
2. Close the supply valve on the pump that will be operating.
3. Open the recirculation valve on the pump that will be operating.
4. Push the "ON" button to the pump that will be operating.
5. Open the supply valve a few clicks. You must communicate with Production Engineering Maintenance as they are monitoring the PRV.
6. Close the recirculation valve a few clicks. You must communicate with Production Engineering Maintenance as they are monitoring the PRV.
7. Repeat steps #5 and #6 until the supply valve is all the way open and the recirculation valve is throttled to the desired pressure of 60 psi ± 2 psi. You must communicate with Production Engineering Maintenance as they are monitoring the PRV.
8. Switch the fan (CT 6001) to auto on frequency drive and (CT 6002) to auto below C/T # 2
9. Continue to monitor the pump pressure for the next several days. If the pressure is not 58 to 62 psi, adjust the recirculation valves as needed.

F. STARTING UP THE WEST BAY COOLING TOWER

1. Visually check to ensure that there is water in the bottom of the sump (approximately 40").
2. Close the supply wheel-valve on the pump that will be operating.
3. Open the recirculation valve on the pump that will be operating.
4. Place the switch for the pump that will be operating in the "auto" position.
5. Slowly open the supply wheel-valve approximately ¼ of the way.
6. Close the recirculation valve approximately ¼ of the way.
7. Repeat steps #5 and #6 until the supply wheel-valve is all the way open and the recirculation valve is closed.

Panel view will begin to automatically adjust the west bay FM's pressure to the set point of 50 psi. ***Please not that the set point (SP) and present value (PV) will differ slightly. The Critical Alarm will sound if the pressure drops below the set psi.***

CAUTION... DUE TO THE SIZE AND LENGTH OF THE SUPPLY AND RETURN LINES FOR PRODUCTION, LARGE AMOUNTS OF WATER ARE NEEDED TO FILL THESE LINES. THIS WATER MUST COME FROM THE SUMP. DO NOT EMPTY THE SUMP WHEN "CHARGING" THESE LINES.

G. SHUTTING DOWN THE EAST BAY COOLING TOWER

1. Slowly open the recirculation valve all the way.
2. Slowly close the supply valve all the way.
3. Push the "OFF" button to the operating pump.
4. Switch the fan (CT-6001) to the "OFF" position.

II. NON STANDARD OPERATION (continued)

H. SHUTTING DOWN THE WEST BAY COOLING TOWER

1. Slowly open the recirculation valve all the way.
2. Slowly close the supply wheel-valve all the way.
3. Place the operating pump in to the "OFF" position.
4. Switch the Variable Frequency Drive (VFD-5233) in the Environmental MCC room to the "OFF" position.

F. SWITCHING FROM PU-6010 to PU-6009

1. Open the recirculation valve on PU-6009.
2. Turn PU-6009 on, by pressing the "ON" button.
3. Open PU-6009's supply valve 3 clicks.
4. Close PU-6009's recirculation valve 3 clicks.
5. Open PU-6010's recirculation valve 3 clicks.
6. Close PU-6010's supply valve 3 clicks.
7. Continue steps #3 through #6 until PU-6009's supply valve is all the way open and the recirculation valve is throttled to the desired pressure of 60 psi ± 2 psi.
8. PU-6010 should now have the supply valve completely closed and the recirculation valve all the way open.
9. Shut down PU-6010 by pushing the "STOP" button.
10. Continue to monitor the pump pressure for the next several days. If the pressure is not 58 to 62 psi, adjust the recirculation valves as needed.

G. SWITCHING FROM PU-5233A to PU-5233B

1. Open the recirculation valve on PU-5233B.
2. Turn PU-5233B on, by placing the switch to the "AUTO" position.
3. Open PU-5233B supply wheel-valve a ¼ of the way.
4. Close PU-5233B recirculation valve a ¼ of the way.
5. Open PU-5233A recirculation valve a ¼ of the way.
6. Close PU-5233A supply wheel-valve a ¼ of the way.
7. Continue steps #3 through #6 until PU-5233B supply wheel-valve is all the way open and the recirculation valve is closed.
8. PU-5233A should now have the supply wheel-valve completely closed and the recirculation valve all the way open.
9. Shut down PU-5233A by placing the switch to the "OFF" position.
10. Panel view will begin to automatically adjust the west bay FM's pressure to the set point of 50 psi. ***Please note that the set point (SP) and present value (PV) will differ slightly. The Critical Alarm will sound if the pressure drops below the set psi.***

Nalco Ultra Treat Sand filters

The Nalco Ultra treat sand filters are used to remove any particles in the water, caused from dirt in the air or scale from inside the piping. There are 2 sand filters in the plant one located in environmental for cooling tower # 3 and one located in the plant for cooling tower # 1, 2.Water is pulled off the main cooling tower feed line and goes back into the system's return line.

Both sand filters are fully automatic and run with little to no supervision.

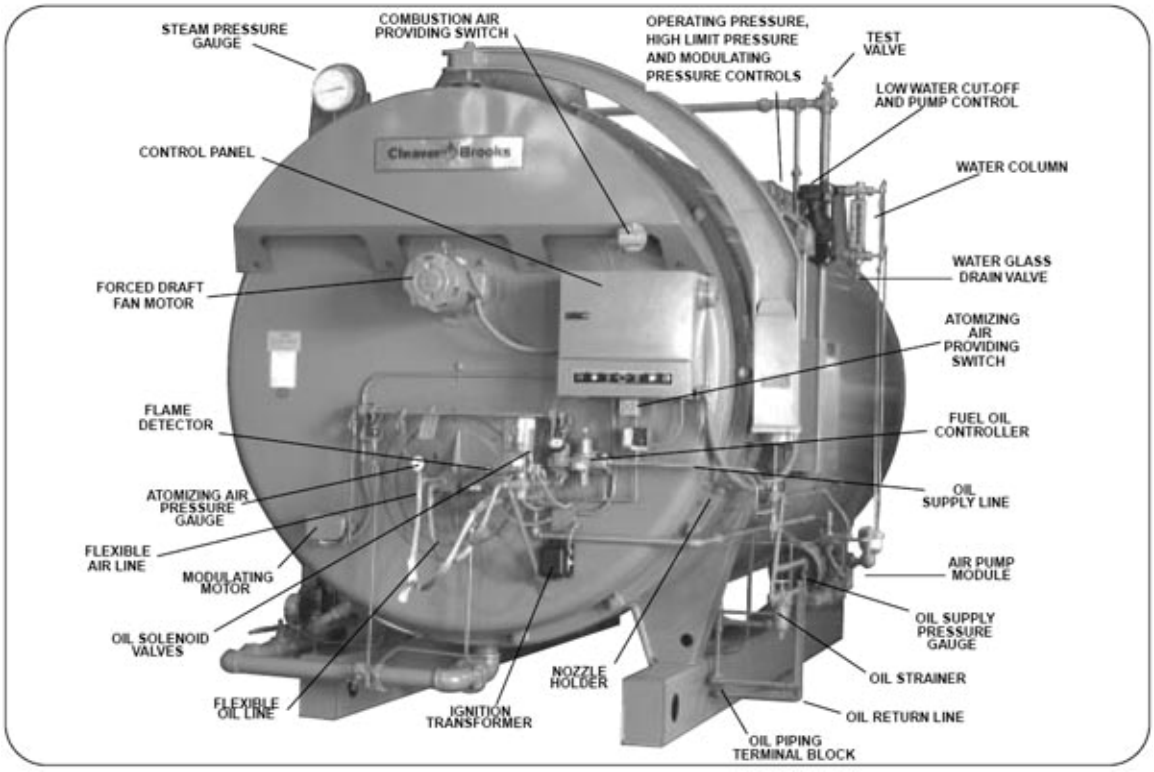
1. Both sand filters will do a "Backwash" cycle to clean themselves out based on pressure differential of the inlet and outlet lines
2. If more than 30PSI of differential the "Backwash" cycle will start
3. If in 24hrs a "Backwash" cycle has not run the sand filter will automatically do one to keep itself clean

Cooling tower # 3 backwash cycle dumps to a holding tank next to the sand filter then into TK-4
Cooling tower # 1, 2 backwash cycle dumps into T-1006 in the basement then into TK-4.

Superior Natural Gas Boilers

PURPOSE:
This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Material Corporation's natural gas steam boilers and all helping units. Boilers #1 and #2 are designed to generate a maximum of 10,350 pounds of steam per hour, per boiler under full load. Boiler #3 is designed to produce 17,250 pounds of steam per hour.

SAFETY PRECAUTIONS: It is essential that you read, and understand the warning, caution and danger statements in each section before attempting to operate equipment. Failure to follow these precautions may result in, serious injury, or death. A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. The equipment shall be operated only by personnel who have a working knowledge and understanding of the equipment. Per OEM. Ref Job Safety Analysis EN01



⚠

I. STANDARD OPERATION

EVERY HOUR-
A visual check should be done on the gas boilers and the information recorded on the daily log sheets for each boiler. This will ensure proper operation and parameters are being met.

⚠

1. Check the water level. It should be visible in the sight glass between the low and high marks on the "Low Water Cut Off" (LWCO) float chamber.

2. Check to ensure that the operating pressures read approximately 75-100 PSI for each boiler on the Boiler Steam Pressure gauges (BSP-1, BSP-2 and BSP-3).
   NOTE: The Low Pressure Critical Alarm is set for 75PSI, the High Pressure Critical Alarm is set for 100PSI.
3. Check the feed pump pressures on the DA (Deaerator Tank). It should read between 125 PSI and 175 PSI, ON the Boiler Feed Water (BFW-1) pressure gauge. The critical alarm will sound when pressure is reduced to 85 psi.
4. Check the feed water temperature of the DA tank. The temperature should be approximately 220°F ± 10°F.
5. Check the flue stack temperature. All boilers should be >220 and <450 degrees F.
6. Any leaks or uncommon noises need to be identified and addressed immediately.
7. Perform boiler log sheet checks.

NOTE: *When the Honeywell (r/o water) automatic make-up valve is closed the pump psi gauge (bfw-1) should be approx. 170 pounds. If more than one boiler is calling for water at the same time the psi will be about 130 psi. If it drops below 85 psi a critical alarm should alert you of the condition. Go to (IV nonstandard operation d) actions when DA tank pressure drops below 100psi.*

EVERY FOUR HOURS

1. Check the feed pumps at the DA tank for proper operation.
   a. Check for any leaks or unfamiliar noises.
2. Check the DA tank.
   a. Does the steam regulator appear to be working properly? The DA tank should always maintain 5 PSI of steam pressure.
   b. Is the R/O water auto-make up valve operating correctly?
   c. Check the level of the DA tank. It should be between the low and high lines on the float chamber.
3. Check the burners while in operation.
   a. Is it a clean even burning flame?
4. Check the fuel supply pressure gauge (NGPG-1, NGPG-2 and NGPG-3). The proper operating pressure should read between 4-7 PSI.

EVERY EIGHT HOURS

1. Access Panel View
   a. Go to Main Screen.
   b. Go to Security and Maintenance Screen.
   c. Go to Login
   d. Enter the operator or the Supervisor code.
   e. Press the (PRESS TO OVERRIDE THE BOILER ALARM) pad. The “Override Activated” prompt should appear.
   f. You now have 30 minutes to perform the following tests, before the critical alarm is reactivated.
2. Perform a blow down on the LWCO (low water cut out) float chamber.

   a. Open the drain on the float chamber while checking the following:
      i. The level in the sight glass should drop immediately followed by a boiler alarm and boiler shutdown. The alarm will reset as soon as the water level is at the normal operational level.
      ii. Silence(reset) the alarm on the boiler sequencer
3. Observe the feed valve while the boiler continues to re-fill:
   a. Did the feed valve open when the level in the float chamber dropped?
   b. Did the feed valve open freely without any apparent problems?
4. Close the drain on the float chamber and observe the following:
   a. The level in the sight glass should recover immediately.

   b. Does the water look clean? If not try to blow down a couple of times, sight glass should clear up.
   c. The boiler should begin a sequence of purge, low fire, and then high fire.
   d. Did the Honeywell feed valve close when the water level in the float chamber returned too normal?
5. Water column and sight glass tube.
   a. Check to ensure that the water level is between the high and low marks on the float chamber.
6. Check the gauge glass for steam and water leaks.
   a. If you have a problem with any of the above, contact your supervisor.

ONCE A SHIFT

1. Check the level of the 110-gallon tote, Nalco 1720 Oxygen scavenger and the chemical injection pump.
2. Check the level of the 75-gallon tote, Nexguard 22350 Multifunctional boiler treatment, and the chemical injection pump.
3. Check the level of the 30-gallon tote, Nalco 8735 pH stabilizer and the chemical injection pump
4. R/O water feed make-up.
   a. Watch the automatic feed water valve for smooth trouble free operation.
   b. Check for an adequate 65 PSI ± 5 PSI at the R/O storage T-3403, PU-3403A.
5. Insure proper operation of DA tank and related equipment.

ONCE A WEEK

Once a week boilers must be rotated, between 1&2 running together or Boiler 3 running by itself. Boiler(s) in lead must have steam set point at 91 and boiler(s) in lag must have set point at 85.

ANNUAL

1. Replace or disassemble and overhaul the "Low Water Cut Off" (LWCO) control valve during the annual boiler shutdown and inspection.

II. NON STANDARD OPERATION

A. ACKNOWLEDGING A LOW WATER ALARM

1. Check the water level in the LWCO float chamber sight glass.
2. Check the water level in the DA Tank sight glass.
   a. If the DA tank is full check pumps #1, #2 and #3 for proper operation. Switch pumps if needed.
   b. If the DA tank is empty check the automatic R/O water make-up valve. If the valve is closed you must open the makeup valve bypass and manually fill the DA tank.
   c. If R/O water in not available city water can be used to fill Boilers, Valve is located by tank 3504 H/E
   d. Now acknowledge the Low Level Cut Off switch located on top of the boiler
   e. Once the DA tank is full and the boilers are running you must check T-2803 in the basement.
   f. Determine why the alarm occurred.

NOTE: *If there is a problem with T-2803, or their related pumps, then immediate action must be taken to determine why the condensate is not returning to minimize the loss of heated and treated water.*

B. ACKNOWLEDGING A BOILER HIGH WATER CONDITION

1. Drain the boiler slowly through the bottom blow down to its proper level.
2. Reset the high limit pressure control (located above the float chamber).The boiler should begin auto sequence to run.
3. Determine why the condition occurred (stuck float or stuck feed water valve) and then have it fixed.

C. PUTTING A COLD BOILER ON LINE

1. Check to ensure that the 2nd main steam valve on the header is closed. This is the located above the boiler.
2. The 1st main steam valve should be open.
3. Open the vent valve above the boiler. When warming up a boiler, the vent is in the open position until the boiler pressure gauge reaches 35 PSI. Once the pressure reaches 35 PSI, then, slowly close the valve.
4. Check the water level in the boiler. Remember as water heats up it expands, you may need to drain some of the water so keep an eye on it. Drain using the bottom blow down valves.
5. Check the water level in the DA tank. Remember you might have another boiler on line (calling for water also), you do not want to starve that boiler.
6. Turn the main power supply breaker on (located in the electrical panel box on the east wall).
7. Open the Gas Valves on the side of the boiler.
8. Check the gas pressure to the boiler it should be between 4-7 psi, located on the same side as the gas valve.
9. Acknowledge the low pressure gas cut out by resetting it, located midway on the gas line on the side of the boiler.
10. Turn the boiler toggle switch to the on position. Located inside the panel on the same side as the gas valves.
    a. At this time the boiler will go through a low and high fire sequence.
    b. Next it will go into the heating mode.
    c. While waiting for the boiler to reach temperature and pressure check the following:
        i. One hour checks
        ii. Four-hour checks.
        iii. Eight-hour checks.
        iv. Shift checks.
11. Once up to temperature and pressure the following must be performed.
    a. Inform the Production Lead that the boiler is ready to go on line.
    b. Slowly open the main header valve to the plant.

> **Danger**; ***prior to closing/opening pressurized hot water or steam valves ensure you have insulated gloves, face shield, and protective garments on (PVC barriers along with a good cotton base garment should be adequate protection) due to hot surface exposure and if valve failure occurs. See JSA EN01#3***

Gas boiler is now on line, once again perform all the operator checks and record on the appropriate forms at the times indicated.

D. SHUTDOWN AND DRAINING A BOILER

> **Danger**; ***prior to closing/opening pressurized hot water or steam valves ensure you have insulated gloves, face shield, and protective garments (PVC barriers along with a good cotton base garment should be adequate protection) on due to hot surface exposure and if valve failure occurs. Same as JSA EN01#3***

1. Place the control switch to the off position located on the control box on the side of the boiler. Follow all LOTO procedures.
2. Close the 2nd main header steam supply valve. Usually a pipe wrench is necessary to fully close the valve all the way to ensure a proper seat.
3. Open the vent valve slowly located between the two headers on the boiler that is to be shut down. ***Do not open the valve all the way.*** This is a very slow process that should last 4 to 6 hours.
4. Wait for the pressure to slowly drop in the boiler while you continue to maintain a normal operating water level in the LWCO sight glass.

5. Close the feed valves from the DA tank. Be sure to close both valves on the supply line and the one on the bypass line all located on the side of the boiler.
6. Once the pressure is 0 PSI you may slowly drain the boiler through the bottom drain valve into the buildings floor sump.

E. EMERGENCY POWER FAILURE

1. ***AS SOON AS POSSIBLE...*** close the header valves on the boilers.
2. Place the control switch's into the off position.
3. Wait until power is restored.
4. Follow steps described in II C "PUTTING A COLD BOILER ONLINE".
5. If supervisor/manager is not in the plant, call him and let him know what is going on.

Deaerator Tank (DA Tank)

III. STANDARD OPERATION

The Deaerator (DA) tank is the only source for boiler feed water and is a multifunctional piece of equipment. The DA Tank acts as a pre-heater, a condensate return receiver, a chemical mixing tank and a gaseous venting tank. All of these are essential for the highest possible efficient operation of the boilers.

EVERY HOUR

A visual check should be done on the Deaerator (DA) tank to ensure proper operation and parameters are being met.

1. Check the DA tank level.
    a. The normal operating level of the DA tank should be within the high and low level marks on the float chamber.
2. Check the DA tank pressure.
    a. The normal operating pressure of the DA tank is 5 psi.
3. Check the DA tank temperature.
    a. The temperature of the DA tank should be around 220°F ± 10°F.
4. Check DA pumps #1, #2 and #3 for correct pressures.
    a. Approximately 110 to 175 PSI is acceptable.
5. Check to see that the conductivity controllers appear to be operating correctly.
    a. Contact the Environmental Manager / Supervisor if the conductivity in either boiler exceeds 2,000 micro siemens.

DAILY

Examine the level of the Nalco chemicals. If they are low or empty then you must replace or refill the container.

1. Inform the supervisor so more chemicals can be brought in when low.
2. Once the chemicals arrive you must put on the appropriate PPE and transfer or change from one container to another. See Above for PPE requirements.
2. Make sure the pump is primed and the chemicals are feeding the DA tank as required.

IV. NON STANDARD OPERATION

A. START UP

1. If the DA tank is empty,
    a. Allow the AUTO FEED CONTROL VALVE to fill the tank first.

NOTE*: if the DA tank is empty the boilers will not be functioning.*

2. Open all pump supply valves.
3. Open all pump discharge valves.
4. Fully open all pump recirculation valves.
5. Make sure that the main bypass valve is closed.
    a. This valve will stay closed at all times unless a pump has a malfunction or otherwise instructed by the Environmental Manager / Supervisor.
6. Place DA pumps #1, #2 and #3 switches into the "AUTO" position.

B. SHUTDOWN AND/OR DRAINING OF THE DA TANK

NOTE: *The boilers must be off line before the DA tank is shut down! If they are not, you will find this procedure under II NON STANDARD OPERATION of the boilers section d – shutdown and draining a boiler, on page 4 of this document.*

1. Place pumps #1, #2 and #3 switches into the "OFF" position.
    a. If maintenance is to be doing any work either on pump #1, #2 or #3 the breakers must be locked out and tagged out. ***Failure to do this is a direct violation of CMC's Lock-Out Tag-Out policy.***

Danger; ***prior to closing/opening main drain valve ensure you have insulated gloves, face shield, and protective garments on due to hot water and hot surface exposure. Water temperature can reach up to 130 degrees. SEE JSA EN01 #6***

2. Open the main drain line valve, this will allow the water in the DA tank to drain to the building floor sump.

C. ACTIONS WHEN DA TANK SUPPLY LEVEL IS LOW OR EMPTY

If the DA tank is empty or the level is diminishing, actions need to be taken quickly to minimize downtime.

1. If the DA tank is empty or low:
    a. Check the auto feed control valve for proper operation.
    b. If the auto control feed valve is not working properly you must open the auto control feed bypass valve and manually fill the DA tank.
    c. Once the DA tank is full, close the bypass feed valve and follow the steps provided in section 2-A- **"ACKNOWLEDGING A LOW WATER ALARM"** on page #3 of this procedure.
    d. If the boiler is running and calling for makeup water, but the DA tank is not filling, then open the auto control feed bypass valve and throttle the valve to keep enough water in the tank but not to overflow it. Contact the Environmental Manager / Supervisor as soon as possible.
    e. Keep a close watch on the level of the DA tank, until the system is back to normal.
    f. Inform production and maintenance of the problem.

D. DA tank float valves

Valves are located before and after DA tank floats. These valves are to remain open at all times. For this reason locks have been placed on the four valves. If a float needs to be repaired or replaced, keys are located in the environmental office and must be signed out and signed back in every time they are used.

CONDENSATE RETURN TANK

V. STANDARD OPERATION

The condensate return tank (T-2803) is the primary source of supply water to the DA tank. The recovery system allows for chemical enriched steam condensate from the formation machines to return to the system again.

EVERY HOUR
A visual check should be done on the return tanks to ensure proper operation.

1. The tanks should have almost no steam coming from the overflow tube. If steam is blowing out of T-2803 then the pumps on that tank will eventually cavitate. Those pumps must be turned off and the Environmental Manager / Supervisor notified immediately.
2. No water should be flowing from the overflow pipes. Contact the Environmental Manager / Supervisor if either T-2803 is overflowing, and check to see if the primary pump is cavitating.
   NOTE*: A condensate drip from the overflow pipe is <u>not</u> a problem.*

OPERATION OF T-2803

1. For tank T-2803 turn the pumps (2803A & B) on by placing the (HAND-AUTO) switches into the AUTO position.
2. Check to ensure proper PSI so as not to cavitate the pumps. Pump pressures should be above 30lbs. on T-2803.

NOTE: *Only one (1) pump per tank should be running at any time. The other pump is a back-up pump and should come on automatically if the first pump fails to run or the pressure drops***.**

Weishaupt Burner Operations

VI. <u>STANDARD OPERATION</u>

The Weishaupt Burner Operates automatically under the control of a factory installed Programmer, the programmer allows the unit to function with little supervision, and is accessible through the operator interface board

A.) **Changing set point**
ESC > Operation > Boiler set point > Set point W1
Adjust new set point in at "New :XXX" > wait for change at "Current :XXX"
To back out : ESC, ESC, ESC > Operational Stat > Normal Operation > returns you to main screen

B.) Fault Reset
ESC > will usually reset fault
If not: ESC > Operational Stat > Status / Reset >
If no fault is present reads "No Fault"
If fault is present, information of fault is displaced and can be reset with >>

1.) Alarm activate/deactivate: this is not to be deactivated. It is solely for trouble shooting by Tech
2.) Parameter and Display – no operator functions are located in this section, changes here can void warranty.

Eco-Tec Phosphoric Acid Recovery (DPU)

PURPOSE:
This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Corporation's Phosphoric Acid Recovery Unit. It will also include operations for T-1005, T1010, T2101, T-3102, T-3106, T-3107, T-3103, T-3154 and T-4801.

SAFETY PRECAUTIONS: It is essential that you read, and understand the **Notes**, ⚠**Warning, and** ⚠**Danger statements** in each section before attempting to operate equipment. Failure to follow these precautions may result in, serious injury, or death. A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. Ref Job Safety Analysis (JSA) EN03

I. STANDARD OPERATION

The Eco-Tec Phosphoric Acid Recovery Unit (DPU) operates automatically under the control of a factory installed programmable logic control (PLC). The PLC allows the unit to function with little supervision, and keep a ready supply of recovered phosphoric acid for Chemi-Con Corporation's needs. Each cycle lasts approximately 19-25 minutes with the onstream (product) cycle consuming 55% of the total operating cycle time.

The phosphoric acid solution, contaminated with dissolved aluminum, is pumped from T-1005 in the basement to the DPU. The feed solution passes through dual cartridge filters (F1 and F2) where any suspended solids are removed. The phosphoric acid solution passes through the cation exchange bed where the dissolved aluminum is stripped out. The resulting purified acid is returned to T-3106, once T-3102 hits 14" it will then allow T-3106 to fill T-3102 for the next batch for production to reuse. The conductivity of T-3102 must be 49 (+/-1) micro mhos. Water is used to displace the void of feed solution back to the feed tank before regeneration takes place.

Regeneration is accomplished by using (93%) sulfuric acid, supplied to the unit by T-4801 (sulfuric acid bulk tank), located outside in the acid containment skid. Sulfuric acid is pumped from T-4801 to the DPU sulfuric acid regenerate tank (T-1010). There it is automatically diluted with DI water to meet the proper regeneration strength. A cooling water heat exchanger is located next to the regenerate tank to remove the heat that is created during the mixing process. During regeneration, regenerate is pumped through the cation bed to remove aluminum from the resin. This stream of acid and dissolved aluminum is then sent through the DAU bed. Reversing the flow using an extended DI water rinse removes the acid held in the Cation bed and returns the waste to the regenerate tank. Waste from the cycles are sent to TK-1 and T-2101

EVERY CYCLE
The operator must inspect T-3102 for sulfuric acid contamination after the DPU has finished each cycle (see directions below). All the results must be logged in the DPU log sheet.

Test Method

Exposure controls / personal protection requirement;
⚠ **Danger;** Prior to performing sample testing the following PPE requirements shall be followed; **Eyes:** Wear safety glasses with side-shields or splash goggles. **Skin:** Rubber gloves. **Clothing:** Wear protective garments to prevent exposure to the body and clothing: lab coat or chemical apron.

1. Solution A
    a. Draw a sample from the sample port at T-3102.
    b. Pour 5ml of sample from T-3102 into a 25ml test tube.
    c. Add 1ml of Barium Chloride with the aide of the dispenser to the 25ml beaker.
    d. Mix the solutions.

2. Solution B
    a. Add 5ml of 490ppm sulfuric acid sample (standard) with the aide of the dispenser into a 25ml test tube.
    b. Add 1ml of Barium Chloride with the aide of the dispenser to the 25ml test tube.
    c. Mix the solutions.
3. Compare the clarity of solution of samples A and B.
    a. Sample A should be clearer than sample B.
    b. If sample A is not as clear as B notify the Manager / Supervisor immediately.
4. Log results on the DPU log sheet.
    a. Fill in the date, time, how many gallons of phosphoric acid and the level of T-3102.
    b. Check to ensure that the conductivity of T-3102 is within the proper operating parameters (49 (+1/-1) Millisiemens mS).
    c. Check (√) the appropriate test result (white or clear).
    d. Initial and/or sign on the results sheet.
5. If test results of T-3102 are unacceptable then:
    a. Drain T-3102 to the skid if it is unacceptable and T-3103/T-3107 level is maintained.
    b. Shut down the DPU. See Manual Startup and Shutdown under Non-Standard Operation; Section A-3 “Shutdown” of the DPU Standard Operating Procedure.
    c. Switch the auto transfer pump (PU-3102A) to the “OFF” position.
    d. Immediately notify Production shift leader of the DPU status.
    e. Immediately notify the Environmental Manager / Supervisor.

DAILY

Exposure controls / personal protection requirement; (see warning statement below)

1. The Environmental operators will review the DPU log sheets, at the beginning of the shift from the previous day. The Environmental Manager / Supervisor will be notified if there are any deficiencies with the log sheet.
2. Take a sample from T-3102 (with the sample bottle marked T-3102) and take to lab.

⚠ **Warning ;** Prior to transporting sample (T-3102) to the lab ensure you use the proper PPE, **Eyes:** Safety glasses. **Hand / Skin exposure:** Rubber gloves.

MONTHLY

1. The Environmental Supervisor will collect the DPU log sheet, at the beginning of each month for the previous month. The log sheets will be archived for 11 years.
2. Clean the level sensors of any build up.

II. NON-STANDARD OPERATION

A. – Manual Startup and Shutdown

A-1 Emergency Stop

If necessary, the unit may be stopped before it completes a cycle. To do this:

1. Push the ‘EMERGENCY STOP’ button.
2. Rectify the problem that initiated the emergency stop.

A-2 Startup after Emergency Stop

If the unit has been shutdown in the middle of a cycle pull the E-STOP and the DPU will continue its cycle.

A-3 Shutdown

1. Go to the PLC and touch the “SHUT DOWN” mode button. The current cycle will continue until it is completed.

A-4 Startup

1. Ensure that the DI water tank (T-4010) and the Cation Wash Tank (T-3154) are adequately filled. T-4010 is located by man door south wall bld#3.
2. Ensure that the necessary valves and main discharge lines are open.

3. Turn unit on by going to the PLC and push the "AUTO/ RUN" mode button.
4. Pull the "E-STOP". The unit will start and continue to proceed through its operating procedure. Unless interrupted, the unit will continue to run cycle after cycle until either T-1005 is empty or T-3106 is full.

NOTE: *The unit will not start until T-3106 is at a "low" level (44.9 inches) with a short delay due to delay timer.*

B. – Repacking the Resin Bed

Exposure controls / personal protection requirement;

⚠ **Danger;** Prior to performing steps 3 thru 18 the following PPE is required**;** Use splash goggles or safety glasses, full chemical suit, rubber gloves and face shield. After verifying that all pressure from the system has been released you can remove your chemical suit and face shield. Safety glasses and gloves are still required.

1. Shutdown the unit following the ***Normal Shutdown Procedure*** and turn off the power as found under II A-3.
2. Close the air valve located behind the PLC at the DI/DPU sampling station.
   ⚠ **WARNING** – ***Bed May Be Under Pressure!***
3. Slowly open the drain under the bed to relieve any pressure it may have.
4. Disconnect the piping at the top of the bed and remove the top section.
5. Allow the bed to continue to drain out the waste line or sample valve.
6. Unscrew the nuts from the bed bolts and withdraw the bolts.
7. Remove the head plate O ring. (It is what the PVC pipe sits on)
8. Remove the top metal reinforcement coverplate.
9. Remove the plastic distribution headplate with the screen and gasket assembly attached.
10. The resin level should be domed about ½" high above the surface of the bed ring. Note if resin is down because of resin shrinkage or attrition. It is also possible to loose resin because of a hole in one of the screens. The top screen should be carefully inspected. To inspect the bottom screen, it is necessary to remove the resin and disassemble the bed completely.
11. To finish disassembling the bed, undo and remove the small hold down bolts. The bed ring can be lifted from the screen. The resin should be rinsed from the screen to allow proper inspection. Defective screens should be replaced. Repair is not recommended as it is rarely successful *(This step is only necessary to completely disassemble the bed)*.
12. Clean all bed gasket-sealing surfaces completely before reassembling.
13. Inspect resin and remove if necessary.
14. Add resin if necessary.
    NOTE: *Resin should always be added to the bed as a resin water / slurry to ensure good packing with a minimum of air bubbles. This also shows the presence of dirt. If dirt is present, Follow the steps in the* ***"External Resin Wash"*** *procedure (in this section of the procedure) to clean the resin.*
15. Close the valve under the bed.
16. Completely reassemble by reversing steps 6-10 (ABOVE).
17. Retighten the bolts by pulling down on the bolts diametrically opposite each other. All bolts should be pulled gradually to a uniform tightness. Then, work around the bed by moving in a star pattern.
18. Reassemble the piping.
19. Turn the air back on.

20. Check for leaks once the unit comes back on line.

The unit is now ready to run.

C. – External Resin Wash

Exposure controls / personal protection requirement;

⚠ **Danger:** Prior to performing steps 4 thru 19 the following PPE is required**;** Use splash goggles, full chemical suit, rubber gloves and face shield. After verifying that all pressure from the system has been released (step 4) you can remove your chem.-suit and face shield. Safety glasses and gloves are still required. Read SDS for first aid measures.

If there are excessive suspended solids and/or oil that may have accumulated in the resin beds, the beds must be cleaned particularly the cation bed. This contamination can usually be removed by implementing the following procedure:

1. Shutdown the unit following the ***Normal Shutdown Procedure*** and turn off the power as found under II A-3.
2. Turn the air off; it's located behind the PLC by the DI/DPU sampling station.
3. Push the "E-STOP" then push "SHUT DOWN" mode on the PLC.
   ⚠**WARNING – Bed May Be Under Pressure!**
4. Slowly open the drain valve under the bed.
5. Disconnect the piping at the top of the bed and remove the top section.
6. Allow the bed to continue to drain out the waste line or sample valve.
7. Unscrew the nuts from the bed bolts and withdraw the bolts.
8. Remove the head plate O ring.(It's what the PVC piping sits on)
9. Remove the top metal reinforcement cover plate.
10. Remove the plastic distribution head plate with the screen and gasket assembly attached.
11. Remove the resin from the bed and place in 2, 55 gallon poly-drums.
12. Add water to provide a 100% head of water over the resin and slurry the resin in the water by hand (with a stir stick) mixing three times.
13. Let the resin settle out and decant off the "dirty water", taking care not to pour off any good resin.
14. Repeat steps 11, 12 and 13 until the supernatant water remains clear.
15. Re-pack the resin bed. The level of the resin should be ¼" to ½" domed center for used resin. If using new resin, level should be even.
16. Add resin if necessary.
17. Completely reassemble by reversing steps 5-10 (ABOVE).
18. Retighten the bolts by pulling down on the bolts diametrically opposite each other. All bolts should be pulled gradually to a uniform tightness. Then, work around the bed by moving in a star pattern.
19. Reassemble the piping.
20. Turn the air back on.
21. Check for leaks once the unit comes back on line.

The unit is now ready to run.

D. – Checking and cleaning the screens

The basic function of the screen assembly is to contain the ion exchange resin within the bed while still allowing the free movement of liquids. If a screen is allowed to become clogged or dirty, it will interrupt the free flow of liquids through the bed and result in an increasing pressure drop. If this is allowed to continue, at best, lower unit efficiency will result and, at worst, the increased pressure may rupture the screen and resin will be lost.

1. Disassemble the bed following Procedure C – steps 1-10 and follow the **Exposure controls / personal protection requirements!**

2. If the screens are dirty or clogged it is an indication that the acid feed is not being adequately filtered. Check the unit's filters.

3. The screens can often be cleaned with a jet of compressed air. Sometimes, letting the screens air dry will aid in cleaning.
4. If the screens have oil contamination, wash in a mild detergent and rinse thoroughly.
5. If either of the screens has developed flaws (rip, pinhole, etc.), it must be replaced as repairs on screens are rarely successful.
6. With the screens cleaned or replaced, reassemble the bed by reversing the procedures found in II-C-1 through 21.

E. – Replacing Filter Cartridges

Exposure controls / personal protection requirements:

⚠ **Danger:** Prior to performing the steps in this section the following PPE requirements shall be used; Splash proof goggles or safety glasses, properly fitted chemical suit including boots, rubber gloves and face shield. Read SDS for first aid measures.

1. Shutdown the unit following the Normal Shutdown Procedure.
2. Close the manual ball valve located at the bottom and left of the filter housing.
3. Open the filters air bleed off and drain valves. Let the contents of the filter drain into the skid.
4. Remove the top filter housing.
5. Before removing the filter cartridges, check for any dirt that may have accumulated at the bottom of the filter housing. If dirt is present, flush out the housing with water and let drain.
6. Undo the plastic clamp nuts from the top of the cartridges, lift out the cartridges and discard.
7. Replace new cartridges of the proper micron rating. Ensure that new cartridges are seated properly on the bottom supports.
8. Replace the plastic clamp nuts. Tighten carefully to ensure a proper seal.
9. Replace the top of the filter housing and close the drain valve.
10. With the air bleed valve on the filter still open, pull "E-STOP" and push "RUN/AUTO" mode on the PLC. Let the filter fill until liquid exhausts out of the air bleed off. Close the air bleed off valve. Open the manual ball valve at the bottom and left of filter.

The unit is now ready to run.

T-2101, T-1005, T-3102, T-3106, T-3103 and T-3107 Compensation System

III. STANDARD OPERATION

The DPU is essentially a closed loop system with exception of an acid bleed (On Stream Void) going to the High TDS waste stream and then into TK-1. The DPU tanks and transfer / supply pumps are controlled by a factory installed PLC. All the pumps are controlled by level sensors, which activate or deactivate with the increase or decrease of the tank levels. T-3102 is also equipped with an auto-compensation valve for mixing the appropriate concentration of phosphoric acid. The concentration of acid is determined by the conductivity level of 49 (+/-1) micro mhos. If the conductivity is less than 48 micro mhos, the phosphoric acid will slowly be added automatically. This also happens for the DI water addition, if the conductivity is too high. This tank also transfers automatically into T-3103/T-3107, as production needs. Once the DPU finishes the cycle, Panel View goes into a 5-minute ***"CONDUCTIVITY DELAY TIMER"***. This allows the auto compensation time to adjust the conductivity and stabilize. When the 5 –minutes has lapsed a ***"LOG INTO SYSTEM"*** button appears. You must enter a security screen and then a password. This is to prevent any accidental transfers. After the password login, the button will change to ***"SULFATE TEST COMPLETE?"*** Press the button and a screen will appear that reads ***"ARE YOU SURE? YES or NO".*** If the sulfate test is good you may now press the ***"YES"*** button. This will begin the auto transfer process. The DPU unit performance is tested to ensure that the sulfuric acid contamination is within Quality Assurance standards.

A. - Normal Operation

A-1 Auto Transfer from T-3102 to T-3103/T-3107

1. When T-3103/T-3107 is below the "High" setting, PU-3102A will activate.
    a. This function is to allow a constant level in T-3103 of approximately 35" to 75".
2. PU-3102A will run until T-3102 is below the "Low" setting (approximately 14").
3. Once the "Low" level in T-3102 has been achieved PU-3102A will deactivate.

NOTE: The auto-transfer function cannot occur until the auto start switch is turned on.

A-2 DPU Auto Start

The DPU is controlled by the level sensors, which are installed in T-3106 and T-1005.

1. When the level is below "Low" (44.9") in T-3106 the DPU will activate and begin a cycle.
2. When the level is above "High" (45.1") in T-3106 the DPU will finish with the current cycle and go into the "STANDBY" mode.

A-3 Compensation in T-3102

The conductivity meter in T-3102 compensates the concentration of recovered phosphoric acid. There is also an air agitator (AG-3102-P) in T-3102 that will automatically turn on and off at 18".

1. The auto compensation will not activate until the level of T-3102 has reached (70")
2. After compensation is complete T-3102 goes into a standby mode for auto transfer **(See A-1)**.

RINSE 5 REVERSE OSMOSIS UNIT

PURPOSE:
This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Materials Corporation Rinse 5 Reverse Osmosis Unit. It will also include operations for tanks T-3408, T-2402 and T-9021-A through D


I. STANDARD OPERATION

The G.E. Reverse Osmosis Unit (R/O) operates automatically under the control of a factory installed programmable logic control (PLC). The PLC allows the unit to function with little supervision, and is accessible through the operator interface board. The primary purpose of the R/O is to reduce the need for additional DI water. This is accomplished by using the Formation Machines rinse 3 & rinse 5 make-up overflow, and processing the waste through the R/O. The phosphates, sulfates, aluminum, and boron contaminates are concentrated in the reject stream and sent to T-3514 to be used in the cation wash cycle of the DPU.

The solution in T-9021A, B, C, and D (located in the east basement) is pumped to T-2402 (located in the west basement) by either PU-9021 A/B. From T-2402 the solution is then pump to the R/O unit through PU-2402 A/B. The water passes through a 5-micron cartridge filter housing where any suspended solids are removed. The solution is next fed to the R/O feed pump, where the pressure is increased to go through the R/O membranes. The R/O passes a minimum of 75% permeate to T-3408 as product, at a rate of 25 – 40gpm and the rest goes to T-3514 as reject at no more than 10 gpm. If the R/O conductivity is >50µS, the automatic dump valve will open and recycle the boron solution back into T-3514.

The R/O automatically cycles on and off depending on the level in T-2402 and T-3408. The current operating cycle shuts down when T-2402 reaches a low level. The R/O will now stay in standby until T-2402 recovers to a high level before turning back on. T-9021A, B, C, and D will transfer to T-2402 once it reaches a high level. The make up water going into T-3408 comes from the DI utility pumps located behind the DI tanks and is controlled by the level sensor in T-3408. When T-3408 is below the LOW setting, the automatic make-up valve will open and fill tank with DI water until the R/O unit starts.

> ***NOTE…*** *Verify the correct membranes are being installed, when membranes are being replaced there are multiple r/o units that use the same size membranes, but have different specifications.*

ONCE PER SHIFT

1. The Environmental operators will record the information found on the Daily Operations log, the Environmental Manager / Supervisor / Lead will be notified of any deviancies from this log.

DAILY

1. The Environmental Manager / Supervisor / Lead will review the log from the previous day and sign the approval of the Daily Operations log sheet.

MONTHLY

1. The Environmental Supervisor will collect the Daily log, at the beginning of each month for the previous month. The log sheets will be archived for 11 years.
2. Operate all solenoid valves. Look for sluggish operation or excessive leakage.
3. Check the centrifugal pumps for proper bearing lubrication and inspect pump gaskets and mechanical seals for leakage.

EVERY 6 MONTHS

1. Clean and calibrate the conductivity sensor.
2. Clean and calibrate the pH sensors.
3. Calibrate or replace the flow meters / gauges.

RINSE 5 REVERSE OSMOSIS UNIT

I. STANDARD OPERATION (continued)

ANNUALLY

1. Replace all of the pressure gauges.
2. Check the centrifugal pumps shaft alignment and bearing wear. Rebuild as necessary.

II. NON-STANDARD OPERATION

A. MANUAL STARTUP AND SHUTDOWN

A-1 EMERGENCY STOP

If necessary, the unit may be stopped before it completes a cycle. To do this:

1. Push the 'EMERGENCY STOP' button.
2. Place all the switches into the 'OFF' position.
3. Rectify the problem that initiated the emergency stop.

NOTE… *Emergency shutdown procedures are for a temporary stop. If the down time will exceed 72 hours then you must follow shut down procedures found below.*

A-2 STARTUP AFTER EMERGENCY STOP

After the problem that initiated the emergency has been rectified, the power can be turned back on. Refer to Startup under A-5. Maintenance procedures that need to be addressed should be found in the operation manual.

NOTE…*Always make sure to use proper LOTO when doing work on r/o unit*

A-3 SHUTDOWN LESS THAN 3 DAYS

1. Switch R/O unit to the off position
2. Inlet and outlet isolation valves must be closed to ensure that the membranes will stay wet.
3. Shut off pumps on T-2402

A-4 SHUTDOWN GREATER THAN 3 DAYS

1. Switch R/O unit to the off position
2. Inlet and outlet isolation valves must be closed to ensure that the membranes will stay wet.
3. All units must be flushed at least once per day with DI water.
4. All R/O membranes must remain wet during shut down.
5. Inlet and outlet isolation valves need to be closed.

Note:

If the ambient water temperature is above 80℉, the membranes should be flushed more frequently to reduce the chances of biological growth in the system, which will result in membrane degrade. See step C of this section, (changing membranes)

A-5 START UP

1. Open all vent valves on the vessels.
2. Ensure that the feed valve to T-2402 is open.
3. Ensure that T-2402 pump A or B are in the auto position. Only one pump should be turned on at a time.
4. Turn the main disconnect switch on the R/O unit to the on position.
5. Ensure that the R/O feed pump is operational.
6. Ensure that the R/O feed pump switch is in the auto position.
7. Ensure that the following valves are open:
   a. Feed valve from T-2402.
   b. Prefilter inlet valve.
   c. Prefilter outlet valve.

RINSE 5 REVERSE OSMOSIS UNIT

II. NON-STANDARD OPERATION (continued)

8. Switch R/O into auto position
9. Give the unit a few minutes to run and check the following:
    a. Product flow rates 25 - 40 GPM.
    b. Reject flow rate 4 - 9 GPM.
    c. Recycle flow rate 0 GPM.

NOTE… *The unit will not start until t-2402 is at a high level of 40". If the unit still will not start verify levels of t-2402 and t-3408.*

THE UNIT WILL NOT AUTOMATICALLY RESTART WHEN THE UNIT HAS FAULTED OUT. TO BEGIN AUTOMATIC PROCESS THE UNIT MUST BE STARTED BY SWITCHING MANUAL/AUTO SWITCH OFF AND BACK INTO AUTO AGAIN.

B. CHANGING CARTRIGE FILTERS

Under certain circumstances ***(such as low or no flow)*** it is necessary to replace the cartridge filters. These are replaced in the following manner:

1. Shut down the R/O, and close inlet and outlet valves

2. Drain the canister by opening the drain cocks on the top and bottom of the canister filter.
3. Once the canister is drained remove the canister filter top.
4. Once the cover is removed, remove the plug springs and tension plate.
5. Remove dirty filters and replace with new filters.
6. Replace the plug springs, tension plate, and canister cover securely.
7. Close the drain cock ¾ of the way, and open inlet and outlet valves.
8. Start the unit back in hand.
9. After the air has been purged from the canister close drain cock.
10. Check all pressures and flows to insure proper operation, adjust any valves as needed.
11. Dispose of the used filters and solution in accordance with environmental and safety practices.

NOTE…USE PROPER LOTO WHEN CHANGING FILTER CANISTER IF YOU ARE GOING TO WALK AWAY FROM EQUIPMENT.

C. CHANGING MEMBRANES

It is necessary to change the membranes when there is a reduced flow rate from the membranes fouling. These membranes are located in the West Bay, ensure that the part numbers are the same on the membranes before installing.

1. Push the 'EMERGENCY STOP' button.
2. Place all the switches into the 'OFF' position.
3. Place all inlet/outlet valves in the closed position.
4. Open drain valves at the end of the membrane housing.

5. Remove end caps.
6. Remove and install membranes (ensure that all gaskets are facing the correct way).
7. Replace end caps.
8. Leave drain valves a ¼ open to allow air to escape the system when starting.
9. Open all inlet/outlet valves.
10. Turn on unit.
11. Adjust reject flow as needed.

NOTE…USE PROPER LOTO WHEN CHANGING FILTER CANISTER IF YOU ARE GOING TO WALK AWAY FROM EQUIPMENT.

Eco-Tec Phosphoric Acid Recovery (DPU)

PURPOSE:
This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Corporation's Phosphoric Acid Recovery Unit. It will also include operations for T-1005, T1010, T2101, T-3102, T-3106, T-3107, T-3103, T-3154 and T-4801.

SAFETY PRECAUTIONS: It is essential that you read, and understand the **Notes**, ⚠**Warning, and** ⚠**Danger statements** in each section before attempting to operate equipment. Failure to follow these precautions may result in, serious injury, or death. A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. Ref Job Safety Analysis (JSA) EN03

I. STANDARD OPERATION

The Eco-Tec Phosphoric Acid Recovery Unit (DPU) operates automatically under the control of a factory installed programmable logic control (PLC). The PLC allows the unit to function with little supervision, and keep a ready supply of recovered phosphoric acid for Chemi-Con Corporation's needs. Each cycle lasts approximately 19-25 minutes with the onstream (product) cycle consuming 55% of the total operating cycle time.

The phosphoric acid solution, contaminated with dissolved aluminum, is pumped from T-1005 in the basement to the DPU. The feed solution passes through dual cartridge filters (F1 and F2) where any suspended solids are removed. The phosphoric acid solution passes through the cation exchange bed where the dissolved aluminum is stripped out. The resulting purified acid is returned to T-3106, once T-3102 hits 14" it will then allow T-3106 to fill T-3102 for the next batch for production to reuse. The conductivity of T-3102 must be 49 (+/-1) micro mhos. Water is used to displace the void of feed solution back to the feed tank before regeneration takes place.

Regeneration is accomplished by using (93%) sulfuric acid, supplied to the unit by T-4801 (sulfuric acid bulk tank), located outside in the acid containment skid. Sulfuric acid is pumped from T-4801 to the DPU sulfuric acid regenerate tank (T-1010). There it is automatically diluted with DI water to meet the proper regeneration strength. A cooling water heat exchanger is located next to the regenerate tank to remove the heat that is created during the mixing process. During regeneration, regenerate is pumped through the cation bed to remove aluminum from the resin. This stream of acid and dissolved aluminum is then sent through the DAU bed. Reversing the flow using an extended DI water rinse removes the acid held in the Cation bed and returns the waste to the regenerate tank. Waste from the cycles are sent to TK-1 and T-2101

EVERY CYCLE
The operator must inspect T-3102 for sulfuric acid contamination after the DPU has finished each cycle (see directions below). All the results must be logged in the DPU log sheet.

Test Method

Exposure controls / personal protection requirement;
⚠ **Danger;** Prior to performing sample testing the following PPE requirements shall be followed; **Eyes:** Wear safety glasses with side-shields or splash goggles. **Skin:** Rubber gloves. **Clothing:** Wear protective garments to prevent exposure to the body and clothing: lab coat or chemical apron.

1. Solution A
    a. Draw a sample from the sample port at T-3102.
    b. Pour 5ml of sample from T-3102 into a 25ml test tube.
    c. Add 1ml of Barium Chloride with the aide of the dispenser to the 25ml beaker.
    d. Mix the solutions.

2. Solution B
    a. Add 5ml of 490ppm sulfuric acid sample (standard) with the aide of the dispenser into a 25ml test tube.
    b. Add 1ml of Barium Chloride with the aide of the dispenser to the 25ml test tube.
    c. Mix the solutions.
3. Compare the clarity of solution of samples A and B.
    a. Sample A should be clearer than sample B.
    b. If sample A is not as clear as B notify the Manager / Supervisor immediately.
4. Log results on the DPU log sheet.
    a. Fill in the date, time, how many gallons of phosphoric acid and the level of T-3102.
    b. Check to ensure that the conductivity of T-3102 is within the proper operating parameters (49 (+1/-1) Millisiemens mS).
    c. Check (√) the appropriate test result (white or clear).
    d. Initial and/or sign on the results sheet.
5. If test results of T-3102 are unacceptable then:
    a. Drain T-3102 to the skid if it is unacceptable and T-3103/T-3107 level is maintained.
    b. Shut down the DPU. See Manual Startup and Shutdown under Non-Standard Operation; Section A-3 “Shutdown” of the DPU Standard Operating Procedure.
    c. Switch the auto transfer pump (PU-3102A) to the “OFF” position.
    d. Immediately notify Production shift leader of the DPU status.
    e. Immediately notify the Environmental Manager / Supervisor.

DAILY

Exposure controls / personal protection requirement; (see warning statement below)

1. The Environmental operators will review the DPU log sheets, at the beginning of the shift from the previous day. The Environmental Manager / Supervisor will be notified if there are any deficiencies with the log sheet.
2. Take a sample from T-3102 (with the sample bottle marked T-3102) and take to lab.

⚠ **Warning ;** Prior to transporting sample (T-3102) to the lab ensure you use the proper PPE, **Eyes:** Safety glasses. **Hand / Skin exposure:** Rubber gloves.

MONTHLY

1. The Environmental Supervisor will collect the DPU log sheet, at the beginning of each month for the previous month. The log sheets will be archived for 11 years.
2. Clean the level sensors of any build up.

II. NON-STANDARD OPERATION

A. – Manual Startup and Shutdown

A-1 Emergency Stop

If necessary, the unit may be stopped before it completes a cycle. To do this:

1. Push the ‘EMERGENCY STOP’ button.
2. Rectify the problem that initiated the emergency stop.

A-2 Startup after Emergency Stop

If the unit has been shutdown in the middle of a cycle pull the E-STOP and the DPU will continue its cycle.

A-3 Shutdown

1. Go to the PLC and touch the “SHUT DOWN” mode button. The current cycle will continue until it is completed.

A-4 Startup

1. Ensure that the DI water tank (T-4010) and the Cation Wash Tank (T-3154) are adequately filled. T-4010 is located by man door south wall bld#3.
2. Ensure that the necessary valves and main discharge lines are open.

3. Turn unit on by going to the PLC and push the "AUTO/ RUN" mode button.
4. Pull the "E-STOP". The unit will start and continue to proceed through its operating procedure. Unless interrupted, the unit will continue to run cycle after cycle until either T-1005 is empty or T-3106 is full.

NOTE: *The unit will not start until T-3106 is at a "low" level (44.9 inches) with a short delay due to delay timer.*

B. – Repacking the Resin Bed

Exposure controls / personal protection requirement;

⚠ **Danger;** Prior to performing steps 3 thru 18 the following PPE is required**;** Use splash goggles or safety glasses, full chemical suit, rubber gloves and face shield. After verifying that all pressure from the system has been released you can remove your chemical suit and face shield. Safety glasses and gloves are still required.

1. Shutdown the unit following the ***Normal Shutdown Procedure*** and turn off the power as found under II A-3.
2. Close the air valve located behind the PLC at the DI/DPU sampling station.
   ⚠ **WARNING** – ***Bed May Be Under Pressure!***
3. Slowly open the drain under the bed to relieve any pressure it may have.
4. Disconnect the piping at the top of the bed and remove the top section.
5. Allow the bed to continue to drain out the waste line or sample valve.
6. Unscrew the nuts from the bed bolts and withdraw the bolts.
7. Remove the head plate O ring. (It is what the PVC pipe sits on)
8. Remove the top metal reinforcement coverplate.
9. Remove the plastic distribution headplate with the screen and gasket assembly attached.
10. The resin level should be domed about ½" high above the surface of the bed ring. Note if resin is down because of resin shrinkage or attrition. It is also possible to loose resin because of a hole in one of the screens. The top screen should be carefully inspected. To inspect the bottom screen, it is necessary to remove the resin and disassemble the bed completely.
11. To finish disassembling the bed, undo and remove the small hold down bolts. The bed ring can be lifted from the screen. The resin should be rinsed from the screen to allow proper inspection. Defective screens should be replaced. Repair is not recommended as it is rarely successful *(This step is only necessary to completely disassemble the bed)*.
12. Clean all bed gasket-sealing surfaces completely before reassembling.
13. Inspect resin and remove if necessary.
14. Add resin if necessary.
    NOTE: *Resin should always be added to the bed as a resin water / slurry to ensure good packing with a minimum of air bubbles. This also shows the presence of dirt. If dirt is present, Follow the steps in the* ***"External Resin Wash"*** *procedure (in this section of the procedure) to clean the resin.*
15. Close the valve under the bed.
16. Completely reassemble by reversing steps 6-10 (ABOVE).
17. Retighten the bolts by pulling down on the bolts diametrically opposite each other. All bolts should be pulled gradually to a uniform tightness. Then, work around the bed by moving in a star pattern.
18. Reassemble the piping.
19. Turn the air back on.

20. Check for leaks once the unit comes back on line.

The unit is now ready to run.

C. – External Resin Wash

Exposure controls / personal protection requirement;

⚠ **Danger:** Prior to performing steps 4 thru 19 the following PPE is required**;** Use splash goggles, full chemical suit, rubber gloves and face shield. After verifying that all pressure from the system has been released (step 4) you can remove your chem.-suit and face shield. Safety glasses and gloves are still required. Read SDS for first aid measures.

If there are excessive suspended solids and/or oil that may have accumulated in the resin beds, the beds must be cleaned particularly the cation bed. This contamination can usually be removed by implementing the following procedure:

1. Shutdown the unit following the ***Normal Shutdown Procedure*** and turn off the power as found under II A-3.
2. Turn the air off; it's located behind the PLC by the DI/DPU sampling station.
3. Push the "E-STOP" then push "SHUT DOWN" mode on the PLC.
   ⚠**WARNING – Bed May Be Under Pressure!**
4. Slowly open the drain valve under the bed.
5. Disconnect the piping at the top of the bed and remove the top section.
6. Allow the bed to continue to drain out the waste line or sample valve.
7. Unscrew the nuts from the bed bolts and withdraw the bolts.
8. Remove the head plate O ring.(It's what the PVC piping sits on)
9. Remove the top metal reinforcement cover plate.
10. Remove the plastic distribution head plate with the screen and gasket assembly attached.
11. Remove the resin from the bed and place in 2, 55 gallon poly-drums.
12. Add water to provide a 100% head of water over the resin and slurry the resin in the water by hand (with a stir stick) mixing three times.
13. Let the resin settle out and decant off the "dirty water", taking care not to pour off any good resin.
14. Repeat steps 11, 12 and 13 until the supernatant water remains clear.
15. Re-pack the resin bed. The level of the resin should be ¼" to ½" domed center for used resin. If using new resin, level should be even.
16. Add resin if necessary.
17. Completely reassemble by reversing steps 5-10 (ABOVE).
18. Retighten the bolts by pulling down on the bolts diametrically opposite each other. All bolts should be pulled gradually to a uniform tightness. Then, work around the bed by moving in a star pattern.
19. Reassemble the piping.
20. Turn the air back on.
21. Check for leaks once the unit comes back on line.

The unit is now ready to run.

D. – Checking and cleaning the screens

The basic function of the screen assembly is to contain the ion exchange resin within the bed while still allowing the free movement of liquids. If a screen is allowed to become clogged or dirty, it will interrupt the free flow of liquids through the bed and result in an increasing pressure drop. If this is allowed to continue, at best, lower unit efficiency will result and, at worst, the increased pressure may rupture the screen and resin will be lost.

1. Disassemble the bed following Procedure C – steps 1-10 and follow the **Exposure controls / personal protection requirements!**

2. If the screens are dirty or clogged it is an indication that the acid feed is not being adequately filtered. Check the unit's filters.

3. The screens can often be cleaned with a jet of compressed air. Sometimes, letting the screens air dry will aid in cleaning.
4. If the screens have oil contamination, wash in a mild detergent and rinse thoroughly.
5. If either of the screens has developed flaws (rip, pinhole, etc.), it must be replaced as repairs on screens are rarely successful.
6. With the screens cleaned or replaced, reassemble the bed by reversing the procedures found in II-C-1 through 21.

E. – Replacing Filter Cartridges

Exposure controls / personal protection requirements:

⚠ **Danger:** Prior to performing the steps in this section the following PPE requirements shall be used; Splash proof goggles or safety glasses, properly fitted chemical suit including boots, rubber gloves and face shield. Read SDS for first aid measures.

1. Shutdown the unit following the Normal Shutdown Procedure.
2. Close the manual ball valve located at the bottom and left of the filter housing.
3. Open the filters air bleed off and drain valves. Let the contents of the filter drain into the skid.
4. Remove the top filter housing.
5. Before removing the filter cartridges, check for any dirt that may have accumulated at the bottom of the filter housing. If dirt is present, flush out the housing with water and let drain.
6. Undo the plastic clamp nuts from the top of the cartridges, lift out the cartridges and discard.
7. Replace new cartridges of the proper micron rating. Ensure that new cartridges are seated properly on the bottom supports.
8. Replace the plastic clamp nuts. Tighten carefully to ensure a proper seal.
9. Replace the top of the filter housing and close the drain valve.
10. With the air bleed valve on the filter still open, pull "E-STOP" and push "RUN/AUTO" mode on the PLC. Let the filter fill until liquid exhausts out of the air bleed off. Close the air bleed off valve. Open the manual ball valve at the bottom and left of filter.

The unit is now ready to run.

T-2101, T-1005, T-3102, T-3106, T-3103 and T-3107 Compensation System

III. STANDARD OPERATION

The DPU is essentially a closed loop system with exception of an acid bleed (On Stream Void) going to the High TDS waste stream and then into TK-1. The DPU tanks and transfer / supply pumps are controlled by a factory installed PLC. All the pumps are controlled by level sensors, which activate or deactivate with the increase or decrease of the tank levels. T-3102 is also equipped with an auto-compensation valve for mixing the appropriate concentration of phosphoric acid. The concentration of acid is determined by the conductivity level of 49 (+/-1) micro mhos. If the conductivity is less than 48 micro mhos, the phosphoric acid will slowly be added automatically. This also happens for the DI water addition, if the conductivity is too high. This tank also transfers automatically into T-3103/T-3107, as production needs. Once the DPU finishes the cycle, Panel View goes into a 5-minute ***"CONDUCTIVITY DELAY TIMER"***. This allows the auto compensation time to adjust the conductivity and stabilize. When the 5 –minutes has lapsed a ***"LOG INTO SYSTEM"*** button appears. You must enter a security screen and then a password. This is to prevent any accidental transfers. After the password login, the button will change to ***"SULFATE TEST COMPLETE?"*** Press the button and a screen will appear that reads ***"ARE YOU SURE? YES or NO".*** If the sulfate test is good you may now press the ***"YES"*** button. This will begin the auto transfer process. The DPU unit performance is tested to ensure that the sulfuric acid contamination is within Quality Assurance standards.

A. - Normal Operation

A-1 Auto Transfer from T-3102 to T-3103/T-3107

1. When T-3103/T-3107 is below the "High" setting, PU-3102A will activate.
    a. This function is to allow a constant level in T-3103 of approximately 35" to 75".
2. PU-3102A will run until T-3102 is below the "Low" setting (approximately 14").
3. Once the "Low" level in T-3102 has been achieved PU-3102A will deactivate.

NOTE: The auto-transfer function cannot occur until the auto start switch is turned on.

A-2 DPU Auto Start

The DPU is controlled by the level sensors, which are installed in T-3106 and T-1005.

1. When the level is below "Low" (44.9") in T-3106 the DPU will activate and begin a cycle.
2. When the level is above "High" (45.1") in T-3106 the DPU will finish with the current cycle and go into the "STANDBY" mode.

A-3 Compensation in T-3102

The conductivity meter in T-3102 compensates the concentration of recovered phosphoric acid. There is also an air agitator (AG-3102-P) in T-3102 that will automatically turn on and off at 18".

1. The auto compensation will not activate until the level of T-3102 has reached (70")
2. After compensation is complete T-3102 goes into a standby mode for auto transfer **(See A-1)**.

LIME NEUTRALIZATION

Purpose

This S.O.P. will establish a guideline for complete operation and surveillance of Chemi-Con Corporation's Lime Neutralization process and the following related system components. TK-1301, TK-3112, TK-9001, Lime Silo, Filter Press, TK-9005, TK-1, TK-2 & TK-3, Neutralization Control Panel as well as any related pumps and filters & valves. When done properly this system can save the company money, by preventing unnecessary waste, cost of damaged equipment, unnecessary down time and cost of cleaning. Therefore it is imperative that the operator adhere to the process control steps within this SOP.

SAFETY PRECAUTIONS: A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. It is essential that you read, and understand the **Notes, ⚠Warning, and ⚠Danger statements** in each section before attempting to operate equipment. Failure to follow these precautions may result in, serious injury, or death. Ref JSA EN09

I. STANDARD OPERATION

This system is a semi-automated process that can also be ran fully in manual if needed due to some unforeseen issues.

START OF PROCESS

Start with a solution sample of 1301, this sample should be between 25% – 50% solid concentration after settling for at least 15 minutes. While sample is settling use 10P to clean the pH sensors in TK-9005 and TK-3112. This step should be repeated at the start of every shift.

1. Ensure the valves before and after the pump on TK-1 are open (Bottom fully/Upper ½), TK-1 has solution and TK-1301 is full with a Lime Slurry (25%-50%) & pump is recirculating. Also that the valve from TK- 1301 to TK- 3112 is open. The Filter Press should be empty and closed.

2. Engage all switches into the auto position on the Neutralization Control Panel located by the lime room entrance. This panel is used to control the TK-1301 Lime Slurry, TK-3112 pH, TK-9005 pH/Level either automatically or manually by utilizing pH sensors, level sensors and timers.

3. After engaging the panel switches to auto, TK-1 will pump into TK-3112, if the pH is less than 6.5, then TK-1301 will pump into TK-3112 and overflow into TK-9005 as TK-3112 is mixed and neutralized. This will continue until TK-9005 reaches a HH level. Then the TK-1 pump will shut off.

4. After TK-9005 has reached the H level you will need to turn the mixer on located at Neutralization control panel (AG-9005), it will shut off automatically at L level. Once this has been done and TK-9005 has reached a HH level and a correct pH you are then ready to pump to the press.

5. To pump TK-9005 to the press open the valve labeled "To Press", close the valve labeled "Recirc". After doing this ensure that the solution is flowing into TK-9001.

⚠Warning: Prior to performing pH checks and pH cleaning put on and wear latex gloves to prevent potential chemical exposure.

- ⚠ **Warning: Wear latex gloves to prevent exposure to chemicals.**
- ⚠ **Prior to opening the canister, use the pressure relief valve to release air pressure; visually verify the pressure gauge reads zero; open lower drain to bleed off contents.**

II. STANDARD OPERATION

TK-2, TK-3 & TK-9001

TK-2 & 3 are the HIGH TDS LOW pH waste storage tanks. TK-9001 is the buffer tank

1. Either tank can feed either evaporator #1 or, #2 or be transferred to feed the Boric Evaporator depending on how you set the valves.

2. Each tank has its own pump and filtration system.
    a. Whenever a filter becomes plugged:
        1. Stop the pump.
        2. Close the valves before and after the pump.
        3. Bleed the pressure from the canister.
        4. Slowly open the canister.
        5. Remove the filters.
        6. Install clean filters.
        7. Reverse steps 4 – 1 above.

3. All tanks have the ability to pump waste back to T-1301 in case of an emergency.
    a. This procedure must be authorized by your supervisor/manager.

4. If the tank you are pumping from, has a lot of solids on the bottom and continuously plugs the filters do the following:
    a. Crack the valve on the bottom of the tank to purge out the solids.
    b. Once the waste runs fairly clear then stop the purge and try pumping again.
    c. Use caution, if the tank is full of solids then you must recycle the waste by sending it back to T-1301 and have it go through the press again.

III. STANDARD OPERATION

FILTER PRESS

A. Blow Back the Press

1. Blow back the press before opening.
2. Close the center valve located at the bottom left of the press. Orange handle.
3. Go on top of the press deck and do the following:
    a. Leave the brass valve open, coming from T-1301.
    b. Close the orange valve going too T-9005.
    c. Open the white valve, environmental air.
4. Use caution when doing this procedure, the lines are filled with liquid and you are pushing that liquid back into T-1301. **Open the white air valve slowly.**
5. Once the liquid has been blown back, do the following:
    a. Close the white valve, environmental air.
    b. Open the orange valve going to T-9005.
    c. Leave the brass valve open.
6. Go down off the press and do the following:
    a. Open the center valve located at the bottom left of the press. Orange handle.

B. Drying the Press

1. Make sure the Fork Lift has been moved from under the press.
2. Close the center valve located at the bottom left of the press. Orange handle.
3. Go on top of the press deck and do the following:
    a. Close the Brass Valve, feed from T-1301.
    b. Leave the Orange Valve going too T-9005 Open.
    c. Open the White Environmental Air Valve.

4. Use caution when doing this procedure, the lines are filled with liquid and you are pushing that liquid back into T-9005. **Open the white air valve slowly.**
5. When there is no longer any water being blown back too T-9005 stop drying, close the white valve.
6. The time for this procedure depends on how much lime it took to neutralize the waste water batch and how fast you push it through the press to plug it up. So don't add any more lime than is needed, do not pump a batch through the press too fast, make sure you add polymer to T-9005 and let it circulate and make sure the filter is not plugged or bypassed.
7. Once dry and the white valve is closed and the pressure has bled out of the press then OPEN the press.
8. Once the press is open and there is no longer any water pouring out of the press, put the Fork Lift under the press and dump the lime cakes. Remove the Fork Lift when press is empty.
9. Once empty, reverse the steps above to put the press back on line.

WEEKLY
PRESSURE WASH THE PRESS

⚠Warning; prior to pressure washing the filter press the following PPE shall be worn; wet suit, face shield, rubber gloves, and hearing protection

Based on the following the FILTER PRESS will be pressure washed:

1. The day of the week the supervisor/manager has designated.
2. The condition of the rags?
    a. Are they plugged?
    b. Do they have holes in them?
        i. Rags need to be replaced if the holes are such that they allow solids to pass.
3. The plates are getting plugged, causing the press to take too long to dry.
4. Any one of the above is reason enough to pressure wash the press.

Sasakura High TDS Evaporator

Purpose:

This S.O.P. will establish guidelines for complete operation and surveillance of Chemi-Con Material Corporation's Sasakura High TDS evaporator including dryer operations. The Sasakura evaporator is designed to evaporate high TDS (total dissolved solids) waste water at a rate of 14 – 16gpm. To maintain this specification the system includes a neutralization tank T-1301 (to adjust the ph) a filter press (to remove suspended solids), and storage tanks TK-2 and TK-3 to hold the treated waste for evaporation. It is the operator's responsibility to maintain specific conditions and ensure the system is ran in the most efficient manner possible. This procedure will provide the operator with guidelines that will enable them to maximize the efficiency of evaporation given standard conditions.

SAFETY PRECAUTIONS: It is essential that you read, and understand the **Notes**, ⚠**Warning, and** ⚠**Danger statements** in each section before attempting to operate or maintain equipment. Failure to follow these precautions may result in, serious injury, or death. A complete understanding of this SOP is required before attempting to startup, operate, or maintain the equipment. Refer to JSA EN07

I. STANDARD OPERATION

The Sasakura High TDS evaporator and related units are primarily controlled by a programmable logic control panel (PLC). Once set the PLC will allow operation with limited supervision by the operator. Twice per shift the operator will record all the specifics on the Treatment by Generator Log sheet, and take the appropriate action.

EVERY HOUR

A visual check should be done on the evaporator to ensure proper operating parameters are being maintained.

1.) Check the Evaporator for the following
   a.) Brine feed rate. The design is 14-16gpm. If low flow, filters need to be changed on the feed tanks. If no flow, before changing filters verify level of Seed Tank T-501, seed tank feed valve will close if T-501 reaches a high level of 90%
   b.) Sodium Carbonate flow rate. Flow rate should be set to .6gpm (based on pH of feed tank)
   c.) Vapor body level
   d.) Feed tank levels (TK-2&3)
2.) Check all motors visually for leaks or abnormal sounds
3.) Check all of Evaporator for leaks or abnormal sounds
4.) Check visibility of sight glasses and clean as needed, remember to close sprayers once windows are clean

Note: Any abnormal findings must be addressed when found. If you do not know what to do, contact your lead or supervisor/manager.

TWICE PER SHIFT

1.) Operators will log the Evaporator conditions using the Treatment by generator Log, if conditions are not within the specifications noted on the sheet; they need to be corrected immediately, notify supervisor or manager of any deviations

Note… The pH of the feed water going to the Evaporator needs to be between a 6-7, this is verified by checking the Treatment by Generator Daily Log and checking the feed tank pH.

Daily

Operators will check the level of Sodium Carbonate tank T-561 verifying the level and fill as needed. If needed to be filled follow procedure below:

⚠ **Danger; Prior to performing step e.) Wear chemical resistant gloves (latex is ok), lab coat or apron, dust mask, face shield and goggles. Wash hands thoroughly after handling**

a.) Filling the Sodium Carbonate tanks must be done when the level reaches a LL on the PLC
b.) Go to PLC and select "**VALVE OPERATE**" shut valve "**AV501**" on PLC by switching to manual closed
c.) Turn on R/O water valve and fill tank ¾ full

d.) As Sodium Carbonate tanking is filling Go to the PLC and select the "**Over View**" screen here you will need to turn on the auger inside T-561 by pressing "**MX561 RUN SW**" the auger will run for 30 minutes.
e.) While the sodium Carbonate tank is filling and mixing with the auger, six bags of sodium carbonate need to be added to T-561.

I. STANDARD OPERATON CONTINUED

f.) Once T-561 has reached ¾ full, slow down flow by closing valve and leaving valve ¼ open, if tank is filled to fast the sensor does not keep up with the tank level and may overflow tank, this is the reason for closing valve to a ¼ open.
g.) Once Sodium Carbonate tank level has reached a HH, an audible alarm will sound letting you know T-561 is full, reset audible alarm by pressing "**Buzzer stop**" below PLC
h.) Once the auger has finished mixing the solution, the tank will be ready to transfer to the Seed tanks T-501
i.) Place valve "**AV501**" on PLC back into auto and verify flow going to seed tank is .6gpm

II. NON STANDARD OPERATIONS

The following will provide the operator with in depth steps to starting and stopping the evaporator.

A. Starting the Evaporator

1.) Before starting evaporator both feed tanks (TK-2&3) need to be full
2.) Verify feed tanks have clean clear water at a pH of a 6-7 and new filters have been put into canisters
3.) Sodium Carbonate tank must be filled; if no solution is left from previous time ran. If there is solution left in tank please use first then refill
4.) Once tank levels have been verified, go to the Sasakura PLC and select "**EVAPO. PROCESS**" button. On this screen the column labeled "**WAITING**" list all the parameter that need to be met before evaporator will start. If a parameter is not met, for example, Seed tank T-501 level not at "M" 85%, it will show black on the screen and will not allow the evaporator to start, the tank must be filled before starting. There are 8 parameters that must be met before the evaporator is allowed to start. They are listed below

i.) Raw water supply available
ii.) Distillate water discharge available
iii.) Seed tank level >M (85%)
iv.) Concentrate tank level <M1 (25%)
v.) Seal water tank level >H
vi.) Sodium Carbonate tank >LL
vii.) Steam pressure
viii.) Instrument Air pressure

5.) Once all the PLC parameters have been met, the evaporator can be started, while on "**EVAPO. PROCESS**" screen press the "**auto start**" button located right below the PLC.
6.) After pressing the auto start button the Evaporator will beginning its starting sequence
7.) Starting sequence consist of items listing below in order

i.) Seal water pump run
ii.) Vacuum pump run
next step will not begin until a vacuum of -500mmHg is reached
iii.) circulation pump run
iv.) heat pump run
v.) steam valve open

8.) During start up sequence verify feed tanks pumps are on and ready to feed the seed tanks T-501
9.) Once start up sequence is complete the Evaporator will begin evaporating water and will require little to know supervision by operators

B. Shutting down the Evaporator

There are 3 different situations that can happen when shutting down the evaporator. Shutdown for a few hours, shutdown for a few days, and shutdown to clean the vapor body. Each will be described below

II. NON STANDARD OPERATIONS CONTINUED

1.) Shutdown for a few hour

If the evaporator needs to be shut down for any reason for short time, follow steps below. Leaving the concentrate solution in the vapor body

a.) Go to PLC and select "**EVAPO. PROCESS**" on top of screen labeled "**CONC**. **DISCHARGE MODE SELECT**" press "**DISCHARGE OFF**" and hold for 3 seconds

b.) Below PLC press "**AUTO STOP**" Sasakura Evaporator will begin its automatic shutdown cycle which takes thirty minutes, after thirty minutes if all parameters are met evaporator will be ready to start again

2.) Shutdown for a few days

If the evaporator needs to be shut down for any reason for a few days the vapor body will need to be drained, once the vapor body has drained the Evaporator will automatically fill the vapor body with R/O water. To do this, follow the steps below.

a.) Go to PLC and select "**EVAPO. PROCESS**" on top of screen labeled "**CONC**. **DISCHARGE MODE SELECT**" press "**DISCHARGE ON**" and hold for 3 seconds this will discharge the vapor body to the concentrate tanks T-502

b.) For the vapor body to discharge to the concentrate tank the following parameters need to be met

i.) Shutdown mode
ii.) Concentrate tank less the M2 level
iii.) All valves and pumps are in auto
iv.) No alarms and not shutdown for emergency stop

c.) Once the vapor body has emptied into the concentrate tank T-502, R/O water will begin to fill the vapor body to continue recirculation with clean solution

2.) Shutdown to clean vapor body

This process is used to clean the vapor body either with R/O water or 10P solution coming for T-3103. Operators will use best judgment on what type of cleaning is needed, or contact environmental supervisor/manager. Follow steps below for cleaning vapor body

a.) Go to PLC and select "**EVAPO. PROCESS**" on top of screen labeled "**CONC**. **DISCHARGE MODE SELECT**" press "**DISCHARGE ON**" and hold for 3 seconds this will discharge the vapor body to the concentrate tanks T-502

b.) For the vapor body to discharge to the concentrate tank the following parameters need to be met

i.) Shutdown mode
ii.) Concentrate tank less the M2 level
iii.) All valves and pumps are in auto
iv.) No alarms and not shutdown for emergency stop

c.) Once the vapor body has emptied into the concentrate tank T-502 R/O water will begin to fill the vapor body to continue recirculation with clean solution

d.) After the vapor body has been filled with clean water it must be drained to TK-1 before cleaning procedure can begin to start this

i.) On PLC select "**VALVE OPERATE**" open valve "**AV522**" manually and close valve "**AV523**" manually

ii.) This will transfer the vapor body to TK-1 once vapor body is empty put both valves "**AV522**" and **AV523**" back into auto

e.) On PLC select "**MAIN MENU**" and the select "**CLEANING PROCESS**"

f.) From this screen you can select what type of cleaning process will be done there are 3 types of cleaning process that can be done currently we are only using two, which are "Acid chemical" and "hot water" to select which type of cleaning needs to be done press and hold for 3 seconds.

II. NON STANDARD OPERATIONS CONTINUED

NOTE… operators will need to determine which type of cleaning will be done based on the scaled on the tubes in the vapor body if unsure please contact supervisor/manager

g.) When selecting "**Acid chemical**" cleaning make sure to open hand valve for 10P line After opening hand valve for 10P below PLC press "**Auto Start**"

h.) Before the cleaning cycle will begin the following parameters need to be met
   1.) Cleaning waste discharge available
   2.) Seal water tank level >H
   3.) Steam pressure normal
   4.) Instrument air pressure normal

i.) The cleaning procedure will run from start to finish with no supervision need by operators. Chemical solution will automatically dumb to TK-1 when cycle is completed

j.) After cycle is completed close hand valve to 10P line

Sasakura Dryer Operations

III. Standard operations

A.) Dryer operations (startup)

The Sasakura Evaporator dryer is used to remove the sodium carbonate from the solution in the vapor body. Based on the gravity of the water in the vapor body solution is sent from the vapor body to the concentrate tank T-502. From the concentrate tank the remaining solution is feed to the drum rollers, were there solution is heated dried and scrapped off the drums into a bin

To start the dryer follow the procedure bellow

Starting the Sasakura dryer

1.) Go to the PLC and select "**DRYER PROCESS**" screen, from this screen you can see what parameters need to be met before the Dryer is allowed to start

2.) The parameters that need to be met are listed below
   i.) Concentrate tank level >M2
   ii.) Scrubber level >LL
   iii.) Dryer bottom level >LL
   iv.) Instrument air pressure normal

3.) If any of the items listed above are not met the dryer will not run this is the same type of start up used to start the Evaporator, reference non standard operations section A-4 for more detailed explanation on meeting start up parameters

4.) Once parameters are met while on the "DRYER PROCESS" screen press the "AUTO START" button located right below PLC

5.) After auto start has been pressed the dryer will begin its startup procedures listed below
   i.) Bottom pump run
   ii.) Drum heating
   iii.) Drum run

6.) After the start up procedure has completed the dryer will run with little to no supervision from the operator

B.) Dryer operations (shutdown)

The Dryer can be shut down for many different situations that may arise (examples: General maintenance, plugged piping, blades being changed, general cleaning and Dryer not needed to be ran) for all situations the dryer can be shut down the same way. Follow the procedure below to shut down the Sasakura Dryer

Danger: Prior to performing general maintenance on internal components of dryer, Wear chemical resistant gloves, chemical resistant apron, dust mask, face shield and goggles.

⚠**Warning: Before attempting to perform maintenance of the Dryer ensure all LOTO requirements are followed.**

1.) Go to PLC and select Dryer Process screen
2.) From here select “auto stop” below PLC. This will shut down dryer and automatically begin its self-cleaning process. Steps listed below
    a.) Discharge residual water dryup
    b.) Scrubber water discharger
    c.) Scrubber water dryup

III. Standard Operations continued

    d.) Cleaning water supply
    e.) Cleaning water dryup
    f.) Dryer process finished
3.) Once these steps have been completed the dryer is now shutdown and will not start until the “auto start” button has been pressed

Environmental Daily Log Sheet

SOP-EN Date / / .Name DAY NIGHT

Limit number	Low	High		UNIT #1	UNIT #2
City Water RO			**Check Time**		
Permeate PSI			PSI		
Filter Inlet PSI	*20	100	PSI		
Filter Outlet PSI	*20	100	PSI		
Inlet Flow (GPM)			GPM		
Product Flow (GPM)			GPM		
Reject Flow (GPM)			GPM		
Inlet Total (GAL)			GAL		
Product Total (GAL)			GAL		
Reject Total (GAL)			GAL		
Inlet pH	*6.5	9	pH		
Inlet ORP					
Inlet Conductivity			uS/cm		
Outlet Cond.			uS/cm		
Temperature			C		
RO Inlet Feed PSI			PSI		
RO Interstage PSI			PSI		
RO Reject PSI			PSI		
Post Pump PSI			PSI		
Recycle Flow			GPM		
DI unit			**Check Time**		
Feed Total	-	-	GAL		
Product Total	-	-	GAL		
Waste Total	-	-	GAL		
Resistivity			Mohm-cm		
Cation Bed PSI	*20	100	PSI		
Anion Bed PSI	*20	100	PSI		
Caustic Soda Total	-	-	Gal		
Sulfuric Total	-	-	Gal		
DI unit sump Totalizer	-	-	GAL		
DPU			**Check Time**		
Unit #				**EP-1002**	**EP-1003**
75% Phos Make Up To T-3102	-	-	GAL		
Feed from T-1005	-	-	GAL		
Waste to TK-1	-	-	GAL		
DPU product to T-3106/3109	-	-	GAL		
Sulf Feed Totalizer	-	-	GAL		
Total Cycle Counter	-	-	#		
Cation PSI Top			PSI		
Cation PSI Bottom			PSI		
Anion Bed Pressure			PSI		
DHP to FM's	-	-	GAL		
DPU sump Totalizer	-	-	GAL		

***If any item is out of normal range contact your lead, supervisor or manager**

Limit number	Low	High		
DI storage tanks			**Check Time**	
EB DI usage	-	-	GAL	
WB DI usage	-	-	GAL	
Utility DI usage	-	-	GAL	
Boric R/O			**Check Time**	
Primary			PSI	
Pre filter In / Out PSI			PSI	
Waste PSI			PSI	
Feed			GPM	
Product			GPM	
Waste			GPM	
Temperature			F	
TDS In / Out				
Recovery %			%	
Reject %			%	
Product Total			Gal	
Waste Total			Gal	
Total Hours			Hr	
Filters Changed				
Conductivity Inlet (Test with hand held)			uS/cm	
Bulk Tank / Neutralize			**Check Time**	
Phos Tank Level			inch	
Sulf Tank Level			inch	
Lime weight			LB	
TK-1 Totalizer	-	-	GAL	
T-9008 Totalizer, HTDS	-	-	GAL	
Rinse 5 R/O			**Check Time**	
Filter Inlet PSI			PSI	
Filter Outlet PSI			PSI	
Feed Flow Rate			GPM	
Product Flow Rate			GPM	
Reject Flow Rate			GPM	
Recovery %			%	
Rejection %			%	
pump %			%	
Conductivity			uS/cm	
Temperature			F	
Inlet pH			pH	
Feed Total			GAL	
Reject Total			GAL	
Post pump PSI			PSI	
Pre Pass PSI			PSI	
Post Pass PSI			PSI	
Boiler Condesate Conductivity				
Eastbay boiler Condesate			uS/cm	
Westbay boiler condesate			uS/cm	

DPU EP-1002	**GPM**	**Cycle Start**	**Cycle Stop**	**Cycle Time**
Feed Water Dis.				
Product				
Reycle				
Feed Dis.				
Reg. Water Dis.				
Byproduct				
Reg. Dis.				
Reg. Wash				
Extended Wash				

DPU EP-1003	**GPM**	**Cycle Start**	**Cycle Stop**	**Cycle Time**
Feed Water Dis.				
Product				
Reycle				
Feed Dis.				
Reg. Water Dis.				
Byproduct				
Reg. Dis.				
Reg. Wash				
Extended Wash				

DI Unit #1 LOG	**GPM**	**Cycle Start**	**Cycle Stop**	**Cycle Time**
Recirculation				
Product				
Anion Regen.				
Anion Rinse				
Anion Fast Rinse				
Cation Regen.				
Cation Rinse				
DI # 1Total Cycle Counter				

DI Unit #2 LOG	**GPM**	**Cycle Start**	**Cycle Stop**	**Cycle Time**
Recirculation				
Product				
Anion Regen.				
Anion Rinse				
Anion Fast Rinse				
Cation Regen.				
Cation Rinse				
DI # 2 Total Cycle Counter				

City Water R/O Testing & Total			
Check Time		**UNIT**	
Daily	low high	# 1	# 2
Trasar	3ppm 7ppm		
City water Feed Total			
DA Make up Total			

Environmental Daily Log Sheet

SOP-EN Date / / .Name DAY NIGHT

Limit number	Low	High		UNIT #1	UNIT #2	UNIT #3	UNIT #4
Air Compressor			**Check Time**				
Air Filter changed	Yes	No					
Total Hour	-	-	Hr				
Loaded Hour	-	-	Hr				
1st Discharge Air Temp.			F				
2nd Suction Air Temp.			F				
2nd Discharge Air Temp.			F				
Oil Temp.			F				
1st Discharge PSI			PSI				
2nd Discharge PSI			PSI				
Lubrication PSI.			PSI				
Oil Filter changed	Yes	No					
Oil Level	low	good					
IC Drain	bad	good					
AC Drain	bad	good					
							Boiler In
Boilers			**Check Time**	**#1**	**#2**	**#3**	**Operation #**
N. Gas usage	-	-	cf				
Conductivity Setting	-	-	uS/cm				
Conductivity Actual	-	-	uS/cm				
Next guard	500	800					
Sulfite	10	30					
Conductivity	1200	1400	uS/cm				
pH	10.5	11.5	pH				
Land Application every 4 hours			**Check Time**				
Flow rate			GPM				
pH	*5	9	pH				
Conductivity			uS/cm				
Temperature			C				
TDS	-		Lb				
Discharge Total	-	-	GAL				
Manual pH test / once per day / while pump running							

Chiller			Check Time	#1 Sys.1	Sys. 2	#2 Sys.1	Sys. 2	# 3 Sys. 1	Sys. 2
CWS Temp			F						
CWR temp.	-	-	F						
LWT Temp			F						
LWT PSI (CHWS)			PSI						
RWT Temp	-	-	F						
RWT PSI (CHWR)			PSI						
System SP PSI			PSI						
System DP PSI			PSI						
Operation Hrs Comp # 1	-	-	Hr						
Operation Hrs Comp # 2	-	-	Hr						
Start Hrs Comp # 1	-	-	Hr						
Start Hrs Comp # 2	-	-	Hr						

Boric Sasakura				
Location PLC	**Tag No.**	**Unit**	**Time -**	**Time -**
Circulation	TIS-621	F		
Vapor	TIS-631	F		
Sealing Water	TIS-651	F		
Feed Pump Bearing		F		
Evaporator Vacuum	PIS-631	mmHg		
Evaporator Feed	FQ-611	Gal.		
Concentrate	FQ-621	Gal.		
Filtrate	FQ-622	Gal.		
Distillate	FQ-631	Gal.		
Heat Pump Vibration	VS-631	mm/sec		
Heat Pump Current	AMS-631	A		
Concentrate Density	DIS-621	g/cm3		
Condesate Conductivity	CIS-631	us/cm		
Evap Level Control Valve Opening	LIC-621	%		
Location Evaporator	**Tag No.**	**Unit**		
Preheater/Raw Water Inlet	TI-611	F		
Preheater/Raw Water Outlet	TI-612	F		
Preheater/Distillate Inlet	TI-631	F		
Preheater/Distillate Outlet	TI-632	F		
Ciculation Pump A Discharge	PIS-631	PSI		
Ciculation Pump B Discharge	PIS-631A	PSI		
Concentrate Pump Discharge	PI-621B	PSI		
Distillate Pump Discharge	PI-622	PSI		
Steam Pressure	PI-321	PSI		
Pump Seal Water	PI-651	PSI		
Service Water	PI-652	PSI		
Instrutment Air	PI-671	PSI		
Desuperheater Water Flow		GPM		
Scrubber Supply Water Flow		GPM		
Evaporator Level	LIC-621	%		
Concentrate Ratio		times		

pH Chiller

Chiller Makeup Total

Check Time :

Title : Daily Log Sheet **1/2/2019**