

AQUEOUS WASTE TREATMENT SYSTEM OPERATION & MAINTENANCE MANUAL

*[NOTE: Figures to be added or deleted are identified by a **RED** NOTE.]*

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AQUEOUS WASTEWATER TREATMENT SYSTEM OPERATIONS AND MAINTENANCE MANUAL

CWM Chemical Services, LLC

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1 INTRODUCTION

1.1 GENERAL DESCRIPTION

CWM has engineered and constructed an Aqueous Wastewater Treatment System (AWTS) designed to treat on-site waters, landfill leachate, and gate receipts from customers (see Figure 1.1). The system occupies an area of approximately two acres, and is located at the western edge of the existing operating facility. The facility features enclosed tanks for receipt of waste materials, reaction vessels for the removal of inorganic contaminants from the wastes, filter presses for the removal of solids, biotowers for the removal of soluble organics (alcohols and ketones), carbon adsorption for the capture of residual organics, cartridge filters and adsorption media for the removal of arsenic, and storage tanks for the treated waste. The alkalization/precipitation, lime slurry, filter press, and gate receipts receiving operations are housed in the 10,000 square foot Aqueous Treatment (A/T) Building along with the control room, laboratory, and offices. The 1,500 square foot Water Treatment (W/T) Building houses the carbon adsorption and arsenic removal processes.

The system features a Programmable Logic Controller (PLC) to monitor operations and transfers of materials within the facility. The PLC is also used to insure system safety by interlocking with various control equipment.

The Aqueous Treatment and Water Treatment Buildings were designed to provide an environmentally safe water treatment operation. Environmental protection and treatment flexibility are the primary objectives in the design and operation of the facility. The system features concrete containment surrounding all tanks, reaction vessels, and other process equipment. In addition, where needed, process piping is lined with special corrosion resistant plastic (polypropylene) or is constructed of High Density Polyethylene (HDPE) in order to prevent corrosion on the interior surface of the piping and prolong the process life of the piping. Finally, process tanks within the A/T Building are tied into a vent collection system. This system collects odors associated with receipt and treatment of the waste materials.

1.2 PROCESS INTRODUCTION

The Aqueous Wastewater Treatment System is designed to treat various combinations of on-site generated liquid waste and gate receipts. The maximum capacity through the entire system is approximately 260,000 gallons per day.

The system is designed to be flexible in the treatment of waste streams. Flexibility is provided by the capability to by-pass or recirculate the process flow through major components of the treatment system. This allows for enhanced treatment, waste reduction and additional process capacity.

Leachate from SLF 1-6 typically goes through an oil/water separation step prior to treatment at the AWTs. Oil from the raw leachate is incinerated offsite. In the AWTs process, incoming aqueous leachate is pumped into the reaction/blending tanks where sulfuric acid and ferrous sulfate are added to lower the pH and facilitate cyanide precipitation prior to metals precipitation, as needed and directed by the laboratory. Other reagents may be added to treat the identified contaminants as needed. Gate receipts can be mixed in the special treatment tanks and then blended with the leachate flow in the reaction/blending tanks. Each batch of blended waste is carefully prepared and analyzed by facility chemists prior to proceeding to the next treatment step.

The blended wastes then go through an alkalization step and filter press units to remove metal contaminants. The filter cake may be incinerated offsite or transported to the site's secure landfill depending on the F039 analysis and achievement of land ban treatment standards. Aqueous effluent is then pumped into the biological treatment system (biotowers) where the wastewater undergoes biodegradation to remove organics. The treated effluent is then processed through carbon adsorption units for polishing. After carbon adsorption and depending on the arsenic concentration, the treated effluent may be processed through cartridge filters (for fine particulate removal) and pass through a series of tanks containing adsorption media specifically designed for the removal of arsenic. If the arsenic concentration meets treatment standards, the arsenic treatment process can be by-passed. Flow then passes on to the effluent holding tanks for testing prior to discharge to the facultative ponds. The biotowers can also be bypassed if organic

constituent concentrations are low and the carbon treatment system can handle the organic load. The final treated effluent undergoes extensive laboratory testing and is discharged to the lower Niagara River under a state SPDES permit.

2 FACILITY PROCESS DESCRIPTION

2.1 GENERAL FACILITY DESCRIPTION

2.1.1 Facility Description and Traffic Flow

The Aqueous Wastewater Treatment Building runs north and south, with the lab, the control room and the operator areas occupying the northeast corner of the building (approx. 15%). The balance of the building houses the process equipment.

The following facilities and equipment are located immediately outside the main Aqueous Treatment Building:

- south side - two bulk tanker unloading bays, unloading area for drum waste streams, lift stations, CC blower, bio tower blower , and vapor phase carbon units.
- east side - three large reaction/blending vessels, two biotowers and the entrance for truck drivers and operating personnel.
- north side - receiving area for operations and maintenance materials.
- west side - the lime storage silo, filter cake transfer point and unloading area for supplies.

The traffic flow is directed in a counterclockwise direction around the facility. The approach is from the east, then turning north along the roadway adjacent to the reaction/blend tanks. Upon arrival, the drivers will check in with facility personnel and will be directed to the appropriate location for spotting their vehicles.

2.1.2 Buildings, Rooms and Contiguous Areas

The Aqueous Wastewater Treatment System comprises an area of approximately 2 acres. Within this area is the Aqueous Treatment Building with a roofed area of about 9,900 square feet. The adjacent tank farm with the process tanks contains an approximate area of 2,725 square feet. The remote containment area housing the filtrate storage tank T-100 and one of the final effluent storage tanks T-125 has an approximate area of 12,700 square feet. The Water Treatment Building

is located immediately east of the Aqueous Treatment Building and has an area of approximately 1,240 square feet.

The Aqueous Treatment Facility is comprised of these major areas:

- unloading bays
- gate receipts area
- process tankage
- reagent and alkalization process area
- filter press building
- drum storage area
- control laboratory, office and utility rooms
- light storage mezzanine
- carbon adsorption

A description of each of these areas is provided in the following sections.

2.1.2.1 Unloading Bays

The unloading area is a concrete curbed containment area with a truck unloading/loading dock, located on the south end of the A/T Building. There are two tanker unloading stations from which aqueous material can be transferred to the reaction blend tanks, the special treatment tanks or the filtrate storage tank.

2.1.2.2 Receiving and Special Treatment Process Area

The receiving and special treatment process area is centrally located in the south portion of the Aqueous Treatment Building. It encompasses approximately 2,400 square feet. This area is a location where gate receipts can be introduced into the system. There are two pumps with basket filters located at the unloading station within this area. From the unloading pumps, the aqueous waste may be transferred to one of the three special treatment tanks, to one of the three receiving tanks outside in the process tank storage area, or to the filtrate holding tank. Solid wastes may be transferred into the treatment system after dissolving and mixing in warm water. After the lab has analyzed samples of the inbound material, the chemical operator may transfer the material to the

appropriate tank as specified by the laboratory. The caustic scrubber is also centrally located within this area..

The special treatment process area contains the following major process vessels and their ancillary devices:

- Dissolving and mixing tank T-850
- Special treatment tank T-810
- Special treatment tank T-820
- Special treatment tank T-710
- Ferrous sulfate storage tank T-830 (Chemical Bulk Storage (CBS), product tank)
- Ferrous sulfate storage tank T-840 (CBS, product tank)
- Caustic scrubber tank T-1310

2.1.2.3 Process Tankage

The tank farm portion of the process tankage encompasses approximately 2,725 square feet. It is located outside adjacent to the southeast corner of the A/T Building. This containment area houses the three receiving tanks and the two biological treatment tanks.

- Receiving and blend tank T-210
- Receiving and blend tank T-220
- Receiving and blend tank T-230
- Biotower T-310
- Biotower T-320

Material from one, two, or all three of the special treatment tanks may be blended in the receiving tanks according to the blend determined by the lab. On spec blends are then processed through the alkalization/lime slurry step. Outside, to the northeast of the Aqueous Treatment Building, is a separate containment area surrounded by concrete wall. This area contains two of the system's tanks:

- Filtrate storage tank T-100
- Treated effluent storage tank T-125

The filtrate storage tank T-100 holds treated filtrate that is discharged from the filter press operation prior to processing through the biotower, carbon units, and arsenic treatment process.

Storage tank T-125, with a capacity of 394,271 gallons, is the holding vessel for final treated effluent discharged after the carbon and/or arsenic treatment systems. Tank T-58 is also utilized as a final treated effluent holding tank in conjunction with T-125. Tank T-58, with a capacity of 488,529 gallons, is located west of the Aqueous Treatment Building. The effluent in these tanks is tested prior to discharge to the facultative ponds.

2.1.2.4 Reagent and Alkalization Process Area

The reagent and alkalization process area encompasses approximately 1,450 square feet. The area is centrally located in the northwest area of the A/T Building. This area contains the following major process vessels and their ancillary devices:

- Sulfuric acid storage tank T-910 (CBS, product tank)
- Alkalization tank T-1010
- Alkalization tank T-1020
- Lime slurry tank T-1410

This area is where the bulk sulfuric acid is stored for use throughout the process to chemically adjust the pH of the inbound waste materials. The alkalization tanks are used for the alkalization of the process solution by lime or calcium/magnesium hydroxide addition. This causes a precipitation of the heavy metals in the solution. The metal containing solids can then be removed by the filter presses.

2.1.2.5 Filter Press Building

The filter press area is a self-contained structure within the Aqueous Wastewater Treatment System. The area encompasses about 715 square feet and it is located in the northwest corner of

the A/T Building. Within the structure are two Durco plate and frame filter presses. These are used alternately and concurrently to provide semi-continuous filtering of the processed wastes. The filtrate is collected and transferred to tank T-100 for storage and transfer to other on-site processing facilities.

In the filter press area, there is an open grating second floor level allowing access to the filter presses. The lower elevation is utilized for the filtrate handling equipment and the material handling containers for the collection and transfer of the filter cake. The area contains the following major process pieces of equipment and their ancillary devices:

- Filter press F-1110
- Filter press F-1120
- Filtrate holding tank T-1111
- Filtrate holding tank T-1112

The structure is maintained under a slight negative pressure to contain any gases that may be emitted. The gases are discharged by a vent hood and wall mount fans.

2.1.2.6 Drum Storage Area

The drum storage and handling area is located in the southwest corner of the A/T Building and encompasses approximately 1,960 square feet. This area is used to store liquid and solid waste drums prior to treatment. Storage of miscellaneous product drums and satellite storage is also provided in this area.

All liquid waste drums are stored on modular containment units to control leaks and spills. The modular units are lined with a chemically resistant lining system and segregated according to drum compatibility. Drum handling equipment is provided to transfer the drum contents into one of the special treatment tanks or reaction/blending tanks as directed by the lab.

2.1.2.7 Control Room, Laboratory, Office and Utility Room

The control room, laboratory, office and utility room are located in a self contained structure within the A/T Building. It houses the following rooms:

- Mechanical equipment room 15' x 29'
- Electrical room 15' x 17'
- Supervisors office 13' x 13'
- Laboratory 13' x 17'
- Process control room 13' x 21'
- Employee lunch room 13' x 10'
- Bathroom

This is the only area within the A/T Building that has an electrical classification of general purpose. This area may contain open flames and sparking devices. The remainder of the A/T Building has an electrical classification of Class 1, Division 2, Group D, although under current site work practices and safety standards, it may be reviewed for a rating downgrade if so requested by the operations department. Adequate precautions as outlined in the safety section must be adhered to at all times.

The bathroom and employee lunch room are situated just south of the laboratory. The supervisor's office is located in the northeast corner of the building. The control room, main electrical room, utility room and laboratory are described in Sections 2.1.3 through 2.1.6.

2.1.2.8 Light Storage Mezzanine

The light storage mezzanine is the area directly over the control room, laboratory, office and utility room. This area is designed to be used for the storage of light office supplies and light maintenance items. The facilities compressed air dryer system is also located in this area. The area has a hazardous rating the same as the process area. The light storage mezzanine encompasses an approximate area of 2,000 square feet. Its size is 30' x 64'. Also included in the

mezzanine area is the 14' x 16' air handling room which contains the air conditioning unit, blowers, and other equipment associated with the A/T Building's HVAC systems.

2.1.2.9 Carbon and Arsenic Adsorption

The final treatment step is performed in the Water Treatment Building. Effluent from the biotowers is transferred through the carbon adsorbers where residual organics are removed. Additional process tankage associated with this operation is located adjacent to the W/T Building. Aqueous waste with low contamination levels of organics may be added to T-100 and processed directly through the W/T Building, bypassing the front part of the treatment train, as determined by the laboratory or AWT Supervisor. From the carbon adsorbers, the treated liquid may be processed through the arsenic treatment system or sent to the final effluent holding tanks T-58 and T-125. The arsenic treatment system contains two parallel treatment lines. Each treatment line consists of two cartridge filters in series followed by a primary and a secondary adsorption tank in series. The two parallel systems are piped and valved such that they can be operated individually or simultaneously. From the arsenic adsorbers, the treated liquid is sent to the final effluent holding tanks T-58 and T-125.

The W/T Building contains the following major process vessels and their ancillary devices:

- Carbon adsorber T-3007
- Carbon adsorber T-3008
- Four cartridge filters
- Arsenic Adsorption tanks T-3010 A/B/C/D
- Miscellaneous small tanks for reagent addition.

2.1.3 Control Room

The control room is located inside the A/T Building in the southwest corner of the personnel area. It is approximately 240 square feet and it contains the control panel, and an area for the operations logs and record keeping. From the control room the operator has the ability to monitor process conditions in the treatment plant and control functions enabling him to maintain certain process operations. A programmable logic controller is utilized in monitoring the operations and in activating the alarm systems.

2.1.4 Main Electrical Room

The electrical room houses the main power distribution center and the other electrical distribution and connection centers. This includes the Motor Control Center (MCC) which contains the main power disconnect, the disconnects for all major motors and large power consumers. There are several lighting, control and power panel boards. A remote I/O panel for the programmable logic controls is mounted within the electrical room along with the telephone service panel.

The electrical power is supplied by three 100 kva single phase 13.2 kv/480 vac pole transformers and it enters the control room via an underground conduit. 440 volt power is then distributed to the user through a General Electric Motor Control Center and 110 volt power through two "Square D" step down transformers. The electrical room has approximately 270 square feet of area and it is located in the northeastern corner of the facility. It is equipped with a ventilation exhaust fan to maintain a suitable room temperature for the equipment.

2.1.5 Utility Room

The utility room is located midway through the personnel area, on the east side of the Aqueous Treatment Building. It is approximately 450 square feet and contains the building heating plant boiler, Sullair 100 HP air compressor, and the process water system and backflow preventer. There are two entrances to the utility room, one from the outside of the building and the other from the building corridor.

2.1.6 Laboratory

The lab contains the required equipment and instrumentation to perform the analysis necessary to qualify incoming waste streams and direct the processing within the AWTS. The lab contains a four foot ventilation hood, work bench areas and a desk.

2.2 UTILITIES

2.2.1 Air Compressor & Air Dryer

The plant air system is designed to supply clean dry air to all facility controllers and positive displacement pumps which require air for operation. In addition, plant air may be used for cleaning out process piping and keeping the pipelines free from freezing conditions. The variable drive, high efficiency air compressor has a minimum capacity of 350 cfm at 100 psi. The plant air header pressure is automatically controlled to hold a pre-set pressure by loading or unloading the compressor as required. The piping header system transfers the air throughout the facility to the utility stations. It is piped directly to equipment requiring air such as pumps and instrument controls.

Also included in the plant air system is a Airtek heatless desiccant type air dryer. As the air is passed through the desiccant, the moisture in the air is adsorbed onto the desiccant. Plant air is supplied at a nominal 110 psig with a dewpoint of -40 degrees F.

2.2.2 Power Distribution

- a) Primary service is fed from an existing 13,200 volt aerial line on "M" Street south of the facility.
- b) The secondary service originates at a wood pole fifty feet from the southwest corner of the facility. The service consists of the following:
 - 1) Three kva pole mounted oil filled transformers arranged in a 300 kva three phase 480/277 vac bank.
 - 2) Kilo-watt hour meter installed on the west exterior face of the building at the south corner. Metering transformers are located at the weatherhead.
 - 3) Three pole 600 ampere main disconnect switch located in a 480 vac three phase, three wire, 60 hz. Motor Control Center located in the electric room at the northeast quadrant of the building.
 - 4) Secondary feeder consisting of a 336.4 quadruplex aerial line running from the pole southwest of the building to weatherheads on the southwest corner

of the building. The secondary feeder continues via eight 350 mcm conductors in 5 inch underground conduits to the main disconnect switch. Note that the encased buried conduits pass below a NEC Class 1, Division 2, Group D, hazardous process area.

- 5) The Motor Control Center has a 600 ampere copper main bus. All pumps and motors at the 480 vac service level are fed via fused combination motor starters and/or fused switches located in the MCC.
- 6) Four 120/208 vac lighting panel boards.

2.2.3 Water Distribution

City water enters the facility at the east side of the building in the utility room via a 2 inch PVC underground line. The city water line passes through a backflow preventer and is split into two services. One is potable water for lavatory, sanitary, safety showers and lab use. The other is service water for flushing and general facility use. The service water system incorporates a suction tank, a pump and a pressure control system to supply 100 psi water to the piping system that delivers water to all of the key areas in the facility.

2.2.4 Motorized Roll Up Doors

The A/T Building has three electrically motorized overhead roll up garage style doors. These doors are located in the filter press area and in the north and south walls of the A/T Building. The push button opening and closing controls are located adjacent to each of the doors. Also provided are manual pull chains to open or close the overhead doors in the event of a power outage, or in case the electrical controller fails.

2.3 PROCESS SYSTEMS

2.3.1 Tank Truck Unloading System

Inbound tank trucks are directed from the shipping/receiving office to the AWTS. The driver presents the paperwork accompanying his load to the A/T supervisor or designated laboratory personnel for review. The driver's access to the AWTS is limited to the office area of the complex.

The truck is representatively sampled with a sampling device as directed by the laboratory. The sample is analyzed by the lab and approved for unloading into one of the special treatment tanks, receiving blend tanks or filtrate storage tank.

The operator connects the product discharge hose from the tanker to the incoming feed line. Proper valve sequencing allows the liquid in the tanker to be unloaded, passing through an in-line basket strainer, unloading pump or pump by-pass, and process piping until it reaches the approved receiving vessel.

Once the truck is unloaded, pipes and hoses are flushed, valves are closed, and the transfer is complete. The driver is allowed to inspect his tanker. The operator disconnects the hoses, and the driver then proceeds to the outbound scale.

A sump has been provided at the unloading station to contain/collect any spilled material. Any material collected is pumped via process piping to one of the process vessels.

2.3.2 Special Treatment System

The three special treatment tanks are used to campaign drummed aqueous wastes for introduction into the AWTS. A separate pump station is used to handle drum wastes ("drum unloading station"). The drums are moved along a roller to the pump station, which includes a wand for removal of the liquid from the drums. Drums may also be rinsed/deconned in this area. Residual heels may also be solubilized and pumped. Containers of water soluble salts may be dissolved in drums and transferred into the AWTS from the drum pumping station.

The number and type of wastes to be blended is determined by the lab according to their chemical nature and compatibility. It may be necessary to add leachate or site waters to the tank(s) prior to the addition of drummed aqueous wastes as these materials are frequently very concentrated and will generate significant amounts of heat upon mixing. In general these tanks are used to blend materials for treatment through the blend tanks and/or alkalization tanks. Alternately, material may be collected in a batch for shipment to another off-site facility.

Sludges, if present, may be removed from the tanks and placed into drums. These sludges may then be handled by other treatment or disposal options depending on their constituents. There is also provision for sulfuric acid or other miscellaneous reagent addition in order to adjust the pH level of the stored material and facilitate treatment, if necessary.

The process flow design for the tanks and piping is shown in the P&IDs. The levels of the treatment tanks can be monitored on the control panel. Safety equipment for the tanks includes a maximum liquid level for the tank, which has been programmed into the computer. The feed pumps automatically shut off when this level is reached and a high level alarm is activated on the control panel.

2.3.3 Solids Dissolving System

Waste solid material may also be accepted for treatment through the AWTS. Typically delivered in drums, these solid wastes are dissolved and mixed in T-850, an 846 gallon tank, to create a solution amenable for treatment. The tank is constructed of Fiberglass Reinforced Plastic (FRP), using a Derakane 510N resin with an interior “C” glass veil and Nexus rich resin layer for corrosion protection. The tank has a mechanically removable clear lid with access hatch, and is connected to the AWTS tank venting system for the control of odors that may be generated from this process.

To process solid wastes, the tank is filled with clean service water from the AWTS piping system. A steam line enters the tank through the top. Introduction of steam will heat the water and provide rotational circulation of the tank contents. An air bubbler system is also provided for agitation. Solid waste is poured from drums into the open top of the tank using a drum loader and grabber. Up to ten drums of waste can be mixed in a single batch and will be solubilized at about 110-120 degrees F. Upon visual verification that the solids have been dissolved, , the contents are transferred via vacuum truck to the reaction blend tanks for treatment through the AWTS.

Although the tank was initially installed for dissolving a sodium chlorate waste, other solid waste materials may also be dissolved using this process after verification of the system compatibility.

The tank may also be used for blending various laboratory chemicals prior to treatment. The FRP tank material, as well as the associated pump and piping, has excellent corrosion resistance for a wide variety of chemical constituents.

The system can also be used for dissolving solid ferrous sulfate reagent used in the treatment process. After this material is dissolved, it is transferred into storage tanks T-830 and T-840 for introduction into the AWTs.

2.3.4 Aqueous Receiving Blend Tanks

There are three, 30,000 gallon agitated receiving tanks that are used to receive and blend aqueous wastes. One tank is fabricated of fiber reinforced plastic while the other two tanks are steel and lined in order to provide superior chemical resistance to organic and inorganic acids, oxidizing agents, and salts. Prior to filling these tanks with aqueous wastes, laboratory personnel review each waste stream to ensure chemical compatibility with the tank lining system.

Material may be added to these tanks from the unloading station, groundwater extraction system, leachate storage tanks, special treatment (drum decant or bulking) tanks or waste solids dissolving tank. Sulfuric acid may be transferred in from the reagent storage tank. Other miscellaneous wet or dry reagents may be added directly to the tanks to facilitate treatment, as needed. The level of each of the receiving tanks can be monitored on the control panel. Safety features include automatic shut off of feed pumps at a preset maximum tank level and a high level alarm on the control panel. The tanks are provided with a pressure relief system.

2.3.5 Leachate Storage Area

The Leachate Tank Farm (LTF) provides sufficient storage capacity and transfer of leachate collected from existing closed secure landfills (SLFs) 1-6, 7, 10, 11, 12 and active landfill RMU-1, as well as future landfills.

The facility consists of three (3) storage tanks (T-101, T-102, T-103), two (2) leachate transfer pumps, level monitors and ancillary devices, all installed within a chemically resistant lined concrete containment area.

A summary of the leachate storage area equipment is provided below:

- a) Three (3) flat bottom tanks with a capacity of approximately 350,000 gallons each (T-101, T-102, T-103).
- b) Two (2) centrifugal process pumps for transfer of leachate to the Aqueous Wastewater Treatment System (P-104, P-105).
- c) Four (4) collection sumps, with submersible pumps, that transfer accumulated precipitation to main containment area sump pit with submersible pump (P-108).
- d) Three (3) tank level monitors, one on each tank (LIT-101, LIT-102, LIT-103).
- e) Tank bottom and leachate transfer piping leak detection system.

Aqueous leachate from closed landfills SLF 1-6 is pretreated in the oil/water separator (T-158). The aqueous phase is transferred to the leachate storage tanks via an aboveground pipeline from tank T-158 located in the SLF 1-11 oil/water separator facility. The oil/water separator facility is located east of the leachate tank farm. If the leachate from SLF 10 or 11 has an organic layer/skim, it may be pretreated in a similar fashion; otherwise, leachate from these landfills is transferred to a 200 series process tank. Aqueous leachate from landfill SLF 12 is pumped directly to the leachate tank farm from the SLF 12 leachate lift station tank T-150 via an aboveground pipeline, since this leachate does not contain oil and the landfill is no longer accepting waste. RMU-1 leachate is pumped from its lift station tank T-160 through an underground double walled pipeline to RMU-1/SLF-12 Oil/Water Separator Building south of the leachate tank farm. Aqueous leachate is transferred through the RMU-1/SLF-12 Oil/Water Separator Building via an above ground single walled pipe to the leachate storage tanks. Miscellaneous reagents may be added to the leachate storage tanks to facilitate treatment, as needed. The levels in the leachate storage tanks are monitored by AWTS personnel daily.

The leachate is held in the storage tanks and transferred to the aqueous treatment plant on a demand basis. Typically, aqueous phase leachate from landfills SLF 1-6, 10 and 11 is transferred directly to the reaction blend tanks for treatment through the entire AWTS process. Leachate from SLF 1-6 and other aqueous waste from T-158 may be passed through a spent carbon bed for pre-treatment of volatile organics and then to the reaction blend tanks, via tank T-3009, for further

treatment. Leachate from the older landfills may also be pre-treated for reduction of organics using Fenton's reagent. SLF 7 leachate may be transferred to a process tank, treated with powdered activated carbon, tested and then shipped to CWM, Vickery for disposal. Due to the low level of hazardous constituents in the SLF 12 and RMU-1 leachates, they are generally transferred to tank T-100, or directly to the water treatment facility's carbon adsorption system. In circumstances of heavy precipitation events, the SLF 12 and RMU-1 leachates can be directly transferred from the leachate tank farm to tank T-3003 (lift station for carbon adsorbers) to process the flow. Constant monitoring of the leachate flowing into and out of the tank farm, plus the monitoring of the tank levels, provides a means to evaluate the process and maintain accurate records.

2.3.6 Alkalization Process

Lime or calcium/magnesium hydroxide is pneumatically discharged from the storage silo T-1030 into the slurry tank T-1410, which contains clean service water. Upon agitation, a slurry is produced. The percentage of reagent in the slurry can be controlled by adjusting a timing gate on the lime feeder. The flow rate of service water into T-1410 is controlled based on the current level in T-1410.

The slurry is added to the process liquid until a pre-determined pH is achieved (based upon material to be processed), in order to precipitate out the metals as metal hydroxide solids, or a cyanide precipitate.

The slurry is fed into both alkalization tanks (T-1010/T-1020) in order to ensure an alkaline waste stream prior to filtration. The addition of slurry is controlled strictly by the pH in each alkalization tank which can be monitored on the control panel. Temperature and level of the slurry tank, as well as the flow to the alkalization tanks, can be controlled and monitored on the control panel. The level of the reagents in the silo is also displayed.

Process flow is introduced into the alkalization tanks T-1010 and T-1020 from the reaction blend tanks, special treatment tanks, truck unloading station or filter press discharge. The safety features

of the alkalization process include an automatic shut off of the feed material if a preset maximum liquid is attained in the alkalization tank.

2.3.7 Filter Presses

The two Durco plate and frame filter presses are used for batch or semi-continuous filtering of the processed aqueous waste. The slurry containing suspended metal hydroxide solids and salts is pumped from the alkalization tanks to Filter Press No. 1 or No. 2. The filter presses may be operated with one press in standby or both continuously to increase process capacity. The filtrate is pumped to the filtrate storage tank T-100 via filtrate transfer tanks T-1111 and T-1112. Each press has a capacity of approximately 75 cubic feet. When the press is full, it is opened and the solids are dropped via a chute into a roll off box. When the box is full, the solids are sampled and tested and either transported to the landfill for disposal or otherwise treated or disposed in accordance with land disposal regulations. The pump pressures to the filter presses are monitored on the control panel. Both units can operate concurrently when processing large volumes.

2.3.8 Filtrate Storage Tank

The filtrate storage tank T-100 has an approximate capacity of 150,000 gallons and it allows for a buffer of storage between the alkalization/filtration processes and the treatment through the biotower and carbon beds during periods of surge operation. Miscellaneous reagents may be added to this tank to facilitate treatment, as needed. Wastewaters with organic contaminants may be added to this tank for treatment through the biotowers and carbon adsorbers. The inside of the tank is coated with Tnemec 50-330 polyura-prime and includes a cathodic protection system which is inspected annually. The tank has high and high-high level alarms and the current volume is displayed on the control panel. Safety features of the tank include automatic shut off of the filtrate pumps when the preset maximum liquid level is achieved.

2.3.9 Biological Treatment

Wastewater from tank T-100 is processed through the biological treatment system. The filtrate is pumped directly to mixing tank T-3001, where miscellaneous reagents may be added to facilitate treatment, as needed. The filtrate overflows into surge tank T-3002 where nutrients, inoculum and a defoamer can be added prior to pumping into the biological treatment unit.

The biological treatment unit consists of two biotowers (T-310 and T-320) with a total operational capacity of 60,000 gallons. The units contain an air and water distribution system on the bottom of the tank, a flow distributor and plastic packing. Air is supplied by either a direct drive rotary blower or by the facility's air compressor system.

When the tanks are operated in series, the effluent from tank T-320 overflows to a 375 gallon transfer tank T-3012. The effluent from this tank is then pumped to tank T-310 for further biological treatment. The biologically treated effluent from tank T-310 overflows by gravity to a 375 gallon transfer tank T-3011 where a centrifugal pump transfers the wastewater via a 2 inch HDPE pipeline to the carbon treatment system. Miscellaneous reagents may be added to tanks T-3011 and T-3012 to facilitate treatment, as needed. If the concentration of organics in the wastewater is high, the effluent from the biotowers may be sent back to T-100 for additional treatment (recirculation). If the concentration of organics in the wastewater is relatively low, the biotowers can be by-passed with the carbon adsorption system handling the organic load.

The biotowers are vented through the overflow piping into tanks T-3011 and T-3012. When processing Subpart CC material, these tanks are kept under a negative pressure by a 5 horsepower rotary blower. Tanks T-3011 and T-3012 are equipped with emergency vacuum relief vents. The air which is removed from tanks T-3011 and T-3012 is passed through one or two, 2,000 or 3,000 pound ventsorb carbon adsorption units, in series, to remove any organic emissions from the system. The ventsorb unit is replaced as needed.

2.3.10 Carbon and Arsenic Adsorbers

Biologically treated effluent is processed through the carbon treatment system located in the Water Treatment (W/T) Building. The liquid is pumped from the biotowers to tank T-3003. Miscellaneous reagents may be added to tank T-3003 to facilitate treatment, as needed. The liquid is pumped from tank T-3003 through two carbon vessels, normally arranged in series, each containing approximately 20,000 pounds of activated carbon. The two carbon vessels can also be operated independently or in parallel depending on the degree of treatment required. Organic contaminants in the wastewater are removed by adsorption onto the carbon. Chemical metering

pumps may be used to inject a hexametaphosphate mixture at various points in the system to reduce bridging in the carbon beds.

Organic loading of the carbon is monitored by analysis of the effluent. When organics are indicated in the effluent of the primary carbon bed, it is monitored closely and the system is taken off line prior to acetone being present in the effluent of the polish bed at a level that could produce a batch that would fail to meet the LDR standard. The spent carbon is replaced with a fresh load of carbon. The spent carbon is typically returned to the carbon supplier for regeneration.

After organic removal by the carbon adsorbers, the treated effluent may be processed through the arsenic treatment system. The arsenic treatment system contains two parallel treatment lines. Each treatment line contains two cartridge filters in series to remove fine particulate solids to less than 5 microns. After the cartridge filters, the liquid is transferred to a primary and a secondary arsenic adsorption tank piped in series. The arsenic tanks contain a special media designed specifically for the removal of arsenic. The two parallel systems are piped and valved such that they can be operated individually or simultaneously. From the arsenic adsorbers, the treated liquid is sent to the final effluent holding tanks T-58 and T-125. The arsenic treatment system may be by-passed if the arsenic concentration in the treated effluent, after carbon adsorption, is low and does not require additional arsenic removal.

Arsenic loading of the adsorbers is monitored by routine sampling and analysis. When the removal efficiency is no longer acceptable, the spent arsenic adsorber is replaced with a new adsorber, pre-loaded with fresh media. The adsorber containing the spent arsenic media is returned to the supplier for unloading and disposal.

2.3.11 Final Treated Effluent Holding Tanks

Treated wastewater from the carbon and arsenic treatment systems flows into tank T-125 or T-58 for testing prior to discharge. The tanks allow for a buffer prior to discharge should a possible upset occur with any of the treatment unit processes. Miscellaneous reagents and/or air may be added to facilitate treatment, as needed. The inside of tank T-125 is coated with Tnemec 50-330

polyurethane-prime and includes a cathodic protection system which is inspected annually. Tank T-58 is constructed of glass fused to steel material and also has a cathodic protection system which is also inspected annually. If tank T-125 or T-58 wastewater does not meet the criteria for discharge to the fac pond, it may be recirculated through the carbon and/or arsenic adsorption units and/or biotowers, or reprocessed through the entire system.

When approved for discharge, tanks T-125 and T-58 are pumped to Facultative Ponds 1 and 2, with subsequent transfers to Facultative Pond 3, for storage and prequalification of the effluent for eventual offsite discharge to the Niagara River.

2.4 AUXILIARY SYSTEMS

2.4.1 Sulfuric Acid Storage

Sulfuric acid with a concentration of >75% is stored in a 8,000 gallon carbon steel tank T-910 and used for pH adjustment in the receiving blend tanks. Tank T-910 is registered under the Chemical Bulk Storage (CBS) regulations. Acid is unloaded from a tank truck into T-910 using air pressure. The liquid level in the tank is displayed on the control panel and at the unloading station. The tank has a high level alarm. The tank is vented to allow normal breathing and to prevent the dangerous pressure build-up due to the small amount of hydrogen generated by the action of the acid on the steel. As hydrogen is flammable, potential sources of ignition must be excluded from this area. Care must be exercised when operating near the tank as sulfuric acid is very corrosive to the skin and causes severe skin burns.

2.4.2 Ferrous Sulfate Storage

Liquid ferrous sulfate, with an approximate 5% concentration of iron, is stored in two 2,000 gallon carbon steel storage tanks, T-830 and T-840, within the A/T Building. They are registered under the Chemical Bulk Storage (CBS) regulations. The tanks are lined with a chemically resistant coating Plasite 4310. The tanks are filled from a self pressurized tanker or from tank T-850. The liquid level in each of the tanks is monitored by a level indicator in the AWTs control room and at the unloading station. Each tank has high and high-high level alarms which are activated when the

preset maximum level is reached. Liquid ferrous sulfate is metered to the receiving blend tanks by a batch controller process. The volume of ferrous sulfate to be added is specified on the process batch sheet and programmed into the AWTs computer. The pump is then manually activated to begin the transfer. Shutdown of the pump is triggered by the AWTs computer when the programmed volume of ferrous sulfate is delivered.

2.4.3 Lime and Calcium/Magnesium Hydroxide Storage

Tank T-1030 is an 80 ton carbon steel silo utilized for storage of lime or calcium/magnesium hydroxide for the metals precipitation process. The reagent is delivered to the AWTs by a pneumatic tanker. A collection baghouse is located on top of the silo to prevent fugitive dust emissions to the atmosphere. A mass-based level indicator is located on the silo to monitor the level. The reagent is pneumatically transferred from the silo to tank T-1410 where the slurry is prepared for use in the alkalization tanks.

2.4.4 Tank Venting System

The AWTs has a caustic scrubber system for acid vapor neutralization. The caustic scrubber tank T-1310 is filled with a dilute caustic soda (sodium hydroxide) solution. It has a total capacity of about 580 gallons. The caustic solution is circulated through the venturi of the caustic scrubber by the caustic scrubber pump. This creates intimate contact with the incoming gases. Any foreign gases, acid mists, organics, or particulate matter are exposed to the caustic solution. The result is that the incoming gases are neutralized, and some removal of organics, particulates and condensables occurs. The scrubbed gases are discharged to the atmosphere above roof level. The caustic scrubber system is maintained under a negative atmospheric pressure by the caustic scrubber fan. This provides a constant draw on the process vessels connected to the scrubber system header. The vapors from the following tanks may be treated in the scrubber system:

Special treatment tanks T-810, T-820, T-710

Receiving/blend tanks T-210, T-220, T-230 (optional)

Alkalization tanks T-1010, T-1020 (optional)

Filtrate tanks T-1111, T-1112

Dissolving and mixing tank T-850

Ferrous sulfate tanks T-830, T-840 (CBS product tanks)

The level of the liquid in the scrubber is displayed on the control panel. The pH and condition of the scrubber solution must be checked periodically by the lab, and additions of caustic or replacement of the bath must be performed as needed. When a bath is spent, it is transferred to the alkalization tanks of the metals precipitation process.

Alternately, receiving/blend tanks T-210, T-220 and T-230, special treatment tanks T-710, T-810 and T-820 and alkalization tanks T-1010 and T-1020 are switched from the scrubber system to carbon canisters when processing aqueous waste with greater than 500 ppm volatile organics. This includes the aqueous leachate from SLFs 1-6, 7, 10 and 11. As required by 40CFR 264/265.1080-1091, Subpart CC, these tanks are then vented through carbon adsorption canisters.

The biotowers, T-310 and T-320, have air bubbled through them and a steam loop provides heat during the colder temperatures. The biotowers are vented through the overflow piping into tanks T-3011 and T-3012. When processing Subpart CC material, these tanks are kept under a negative pressure by a 5 horsepower rotary blower. Tanks T-3011 and T-3012 are equipped with emergency vacuum relief vents. The air which is removed from tanks T-3011 and T-3012 is passed through one or two, 2,000 or 3,000 pound ventsorb carbon adsorption units, in series, to remove any organic emissions from the system. The air exiting the ventsorb unit is monitored and the ventsorb unit is replaced as needed.

2.4.5 Process Sumps

Inside the A/T Building, there are two sump areas which are equipped with electrically operated submersible pumps and hard piping. An additional sump is located in the drum handling area, which does not require any permanent piping arrangement. Outside the A/T Building there are several locations where the site water is collected and pumped into the process system. Each sump is equipped with piping and quick connect fittings so that a portable submersible pump can be

utilized to remove accumulations of water as required. A majority of the outside piping is insulated to protect it from freezing.

2.4.6 Filter Ventilation System

The filter press area of the A/T Building is equipped with a ventilation system designed to remove any odors which may evolve from the filter cake, either during cleaning of the press or while the filter cake in the roll off box awaits transfer. The ventilation system consists of a vent hood and exhaust fan located in the roof and North wall of the filter press area.

2.4.7 Flushing System

The flushing system employs the same two inch piping system used to distribute process water. The piping is routed to all of the pumping areas inside the A/T Building. It is terminated with a two inch valve and flex hose in each user area. When a process transfer is complete, it is standard operating procedure to flush all equipment and piping used in the transfer with clean water. This is accomplished by connecting the flex hose to the appropriate flush connection point, opening all required valves and flushing for the specified amount of time.

2.4.8 Agitators

Most of the process tanks are equipped with agitators. The agitators are top mounted, have three blades and are chemically resistant to prevent corrosion. The agitators are necessary to obtain a homogeneous mixture in the tanks and to help keep the solids in suspension. Several of the tanks and agitators have low level controls which will automatically shut off the agitators if the liquid level in the tank is too low.

3 QUALITY CONTROL

The analysis of the constituents in the raw waste and the monitoring of the individual process steps and of the treated effluent are performed as required by the Site Waste Analysis Plan, Attachment C of the Sitewide Part 373 permit.

4 EQUIPMENT AND INSTRUMENTATION

4.1 GENERAL DESCRIPTION

CWM utilizes many different types of pumps, agitators, instruments and controls to operate the Aqueous Wastewater Treatment System. Several types of pumps include:

- * electrically operated centrifugal pumps
- * air operated diaphragm pumps
- * metering pumps
- * electric submersible pumps
- * electrically operated trash pumps

Instrumentation and controls include:

- * flow meters
- * control valves
- * pH probes
- *
- * variable speed drives
- * level indicators
- * pressure and temperature sensors
- * conductivity probes

Due to the vast majority of equipment available, its complexity, and a constant requirement to update equipment with new and improved components, a comprehensive list of all operating equipment is not included within this manual. Please refer to the Site Wide Part 373 permit, Exhibit D (Supplement to Module IV – Tanks), for complete listing of all permitted process tankage.

5 START UP PROCEDURES FOR UTILITIES AND SUPPORT SYSTEMS

5.1 ELECTRIC POWER DISTRIBUTION

Caution: Do not proceed with any tests without first verifying that all lines, transformers, and equipment are not energized and if previously energized under temporary power conditions, that all equipment has been safely de-energized and discharged.

- a) Primary service
 - 1) Caution: Do not proceed with this step until the entire secondary distribution system has been tested and verified ready as detailed here-in, including Appendix A "Visual Inspection" and Appendix B "Testing".
- b) Secondary service
 - 1) Obtain nameplate data for the transformers from maintenance and engineering records and verify that the size agrees with that specified on the drawings.
 - 2) Perform a visual inspection of the portion of the work done by the utility company and insure the following:
 - * no oil leaking from pole mounted transformers.
 - * pole area backfilled and properly guyed.
 - * aerial lines installed free and clear of obstructions, such as cranes etc.
 - 3) Check to verify that secondary cables have been terminated at the aerial connection point and at the main disconnect switch in the MCC.
 - 4) Perform all checks per attachments Appendix A "Visual Inspection" and Appendix B "Testing".

5.2 INSTRUMENT/PLANT AIR SYSTEM

The air system consists of a 100 hp Sullair compressor. The equipment is located in the utility room. It is capable of supplying a minimum of 350 cfm of dry air at 100 psig to the facility users.

- a) Start up and operation of Sullair compressor

- 1) Inspect unit for any visible signs of problems such as oil leaks, bad pressure gauges or dirty filters.
 - 2) Verify that all appropriate valves throughout the system have been opened before starting the compressor. Note: Starting a rotary screw compressor without opening a valve to relieve the pressure can damage the equipment.
 - 3) Verify that the 110v and 440v electrical system is energized.
 - 4) Notify all operations personnel who may be affected, of your intention to start up the compressor.
 - 5) Start the compressor by pushing the start button on the local control panel.
 - 6) Listen to and observe the compressor's operation for a few moments to verify that all systems are operating well and that the automatic controls have taken over.
- b) Shut down of Sullair compressor
- 1) Notify all operations personnel who may be affected, of your intention to shut down the compressor.
 - 2) Stop the compressor by pushing the stop-reset button on local control panel.
 - 3) Listen and observe for a few moments to ascertain that the system has shut down and that no problems have developed.
 - 4) Close all appropriate valves.
- Note: For emergency shut down, push the stop-reset button on the local control panel.
- c) Operation of the AirTek air drier
- 1) Inspect the unit for any visual signs of problems.
 - 2) Verify that the 110v electrical power is energized.
 - 3) Check that all appropriate valves are open.
- Note: This system is fully automatic and once it is energized, it requires only routine checks to verify proper operation and scheduled maintenance.

5.3 BUILDING HEATING, VENTILATION & AIR CONDITIONING

Refer to maintenance manual for information on these subjects.

5.4 LIGHTING AND EMERGENCY LIGHTING

- a) Perform all procedures in Section 5.1 before proceeding.
- b) Before the system is energized perform an insulation resistance test on at least three random cables in the lighting system.
- c) Check to see that all light fixtures have been lamped, and that all globes, guards and hardware, etc., have been properly installed.
- d) Perform a visual inspection of all lighting panel boards and equipment per Appendix A.
- e) Check all receptacle circuits for proper grounds and that all cover plates are secured.
- f) Check to see if outdoor photoelectric control faces north.
- g) After giving adequate notice to all on-site personnel and contractors, energize the lighting system.
 - 1) Switch the lighting panel board circuit breaker for the circuit to be tested "on". It is suggested that only one circuit be tested at a time.
 - 2) The fluorescent lamps for the tested circuit should ignite and come up to full brilliance immediately, at normal operating temperatures of about 65 to 70 degrees F. Check all fixtures for faulty ignition and flickering as well as for smoking ballasts. If any of these signs are indicated, turn off the respective circuit breaker and have the problem corrected before re-energizing that circuit. Proceed to test each succeeding circuit in like fashion.
 - 3) Check the self contained emergency lighting power station unit paying particular attention to all of the items listed and described in the "Holophane Installation and Maintenance Manual".
 - Simulate a loss of normal ac power and verify successful operation of designated emergency lights.
 - Time the transfer to emergency lights to verify that transfer took place in 10 seconds or less.
 - Restore normal AC power and verify that emergency lights extinguish and that normal AC lights are restored to operation.
 - 4) Check the operation of the outdoor light fixtures.
 - Place the outdoor lighting control switch in the "hand" position. Check to see if all outdoor lights are lit.

- Check for incorrect ignition and flickering as well as for smoking ballasts. If any of these signs are noted turn off the respective circuit breaker and have the problem corrected before re-energizing that circuit.
 - Insure that all outdoor lights return to off when control switch is returned to the "off" and "auto" positions.
 - Verify operation of the photoelectric control.
- 5) Check that no circuit breakers or other piece of lighting equipment is running hot.

5.5 PROCESS AND POTABLE WATER

City water, after entering the facility, is split into two services and it passes through two independent flow meters. The potable water service flows through a piping system that supplies the lavatory, safety showers and laboratory.

- a) The process water system includes a backflow preventer, isolation tank T-1910, level control valve and pump P-1901.
- b) Start up
 - 1) Open the inlet valve off the water line into tank T-1910 and fill the tank.
 - 2) Notify all operating personnel of your intention to start the process water system.
 - 3) Open all appropriate valves and start pump P-1901.
 - 4) Verify that the system operating pressure is up to 50 psi.
- c) To shut down the system, reverse the steps described above.

6 OPERATING PROCEDURES

This section describes the typical operating procedures for the various AWTs systems. Minor modifications to these procedures are allowed as needed. In addition to the following procedures, CWM requires that each new operator undergo 60 working days of on the job training with a qualified chemical operator. Also, to become a qualified chemical operator, the trainee must pass a written and oral examination which includes knowledge of the system, understanding of chemistry equipment processes, material sampling procedures, and process trouble shooting.

6.1 PROCESSING SYSTEMS

6.1.1 Tank Truck Unloading System

6.1.1.1 Receiving Inbound Tank Trucks

- a) Inbound tank trucks will be weighed at the inbound scale and proceed to AWTs, accompanied by a waste tracking form.
- b) Drivers will secure their trucks in the designated parking area on the south side of AWTs and set the parking brake. The operator will chock the rear wheels of the truck in both directions of travel. The driver will enter the personnel door and present their paperwork to the laboratory personnel.
- c) Lab personnel will review the Waste Profile, the Waste Management Decision (WMD) and the paperwork for possible manifest discrepancies, determine the nature of the waste material (oxidizer or reducer), any special sampling or safety requirements and note this information on the Waste Tracking Form (WTF) and notify the supervisor.

6.1.1.2 Sampling Inbound Tank Trucks (See also SDP 2003)

- a) The operator will review the WTF and profile information and note the type of waste being sampled, and any special precautions involved in handling the waste.
- b) Personal protective equipment will be worn during all sampling and unloading activities. When accessing top tanker, operator must wear body harness, safety lanyard, and be connected to fall restraint system.

- c) To sample, access the sampling location on top of the truck from the truck ladder.
- d) Release the pressure in the tanker by opening the relief valve at the top hatch, if tanker is so equipped. If not, slowly open the hatch wing nuts to vent the pressure.
- e) Fully open the top hatch, using caution to be sure that the pressure has been equalized.
- f) Using a Coli-wasa, obtain a pint size sample (or otherwise specified quantity) of the waste that is representative of the material in the tanker (see SDP 2003 for details on sampling and sample management).
- g) Dispose of the Coli-wasa in the container provided.
- h) Deliver the sample to the lab for analysis as specified in Section 3.0.
- i) Close the sampling hatch and secure.
- j) Before proceeding to unload, the operator will wait for the results of the lab analysis of the waste, including the compatibility assessment. The lab will determine whether the material will be accepted or rejected. If the material is "on spec", it will be unloaded as per Section 6.1.2, into the receiving vessel specified by the lab. However, if the material is found unacceptable for treatment in the AWTS, it may be rejected and would be sent back to the scalehouse for return to the generator or offsite shipment to an alternate treatment or disposal facility.

6.1.1.3 Unloading Inbound Tank Trucks via Pump

- a) Open the top hatch slowly, allowing pressure to equalize. Release the wing nuts and flip the hatch open.
- b) Select a product discharge hose of suitable size. Remove the end caps and connect one end to the tanker's product discharge valve, and the other end to the incoming feed line. Lock the ears securely.
- c) Open the product discharge valve(s).
- d) Follow the procedures outlined in Sections 6.1.2 or 6.1.3 to transfer the material to the appropriate tank.
- e) When the transfer is complete, as evidenced by a visual inspection of the tank truck, close the product discharge valve(s). Allow the driver to inspect the tanker. Follow the established flushing procedures for the hose(s).

- f) Disconnect the product discharge hose, replace all end caps.
- g) Close and secure the top hatch.
- h) Remove wheel chocks and store in designated area. Return the paperwork to the driver.
- i) The driver will then pull out of the unloading station and proceed directly to the outbound scale.
- j) The laboratory or AWTS supervisor will complete the transfer section of the WTF, computerized Waste Tracking (WT) and the transfer log.

6.1.1.4 Unloading Inbound Tank Trucks via Pressurized Air

- a) Connect the plant air supply hose to the air inlet on the tanker.
- b) Select a product discharge hose of suitable size. Remove the end caps and connect one end to the tanker's product discharge valve, and the other end to the incoming feed line. Lock the ears securely.
- c) Open the product discharge valve(s).
- d) Follow the procedures outlined in Sections 6.1.2 or 6.1.3 to transfer the material to the appropriate tank.
- e) Use only the regulated air supply to unload tankers. Do not allow the pressure to exceed 15 psi.
- f) When the transfer is complete, as evidenced by a visual inspection of the tank truck, close the product discharge valve(s). Allow the driver to inspect the tanker. Follow the established flushing procedures for the hose(s).
- g) Disconnect the product discharge hose, replace all end caps.
- h) Close and secure the top hatch.
- i) Remove wheel chocks and store in designated area. Return the paperwork to the driver.
- j) The driver will then pull out of the unloading station and proceed directly to outbound scale.
- k) The laboratory or shift supervisor will complete the transfer section of the WTF, computerized Waste Tracking (WT) and the transfer log.

6.1.2 Unloading and Transfer to the Receiving Tanks

- a) Check the liquid level and the remaining capacity in the reaction/blend tank via the readout on the control panel.
- b) Start unloading pump. Monitor pump rate by level increase in the reaction/blend tank, which is indicated on the control panel.
- c) Monitor filter for plugging problems based on the rate of flow.
- d) When transfer is complete, stop pump. Close all valves. Follow established flushing procedure.

6.1.3 Special Treatment System

6.1.3.1 Transferring Tankers from Front Unloading Station into Special Treatment Tanks T-810, T-820 and T-710

- a) Check the level and remaining capacity in the designated special treatment tank.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Follow the established unloading procedure outlined in Section 6.1.1.
- d) Start up pump. Monitor pump rate by level increase in the special treatment tank, which is indicated on the control panel.
- e) Monitor filter for plugging problems based on the rate of flow.
- f) When transfer is complete, stop pump follow established flushing procedure. Close all valves.
- g) Return all valves to their original positions.

6.1.3.2 Transfer from Special Treatment Tanks T-810, T-820 and T-710 to Reaction Blend Tanks T-210, T-220 and T-230

- a) Check the levels and remaining capacity in reaction/blend tank.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Start pump P-801, or P-802. Monitor level in reaction/blend tank.
- d) When transfer is complete, stop pump, and close all valves.

- e) After transfer is completed from specified tank, follow established flushing procedure.

6.1.4 Leachate Storage

6.1.4.1 Transfer of Leachate from Landfill Leachate Storage Tanks T-101, T-102 and T-103 to Reaction Blend Tanks T-210, T-220 and T-230 or Tank T-3003

- a) Check the level and remaining capacity in the reaction/blend tank or tank T-3003.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Start pump P-104 or P-105. Monitor level in the reaction blend tank or tank T-3003 on the control panel. Turn on the agitator, where necessary, when sufficient amount of liquid is present.
- d) When transfer is complete, stop pump, and close all valves.
- e) After all transfers completed from specified tank, follow established flushing procedure.
- f) Alternately, leachate may be transferred by vacuum truck from the Leachate Tank Farm to the process tanks

6.1.5 Solids Dissolving/Mixing Tank T-850

6.1.5.1 Dissolving and Mixing of Solid Wastes

- a) With tank T-850 empty, open the process water valve and add approximately 250 gallons of clean service water to the tank.
- b) When steam is available during winter months, open steam valve to heat the water to 110-120 degrees F.
- c) Using the drum loader and grabber, add 6 to 10 drums of solid material. In summer months, the number of drums is less because the water is cooler.
- d) Open the air supply valve to the submerged bubbler system and agitate the tank until a homogeneous solution is obtained.
- e) Complete transfer section of WTF and computerized WT.

6.1.5.2 Transfer of Solution from Solids Dissolving/Mixing Tank T-850 to Reaction Blend Tanks T-210, T-220 and T-230 or SLF 12 Lift Station Tank T-150

For transfers to reaction/blend tanks, ensure that the receiving tank has sufficient capacity to accept the batch and that all valves are properly positioned. Start up pump and empty the contents of the tank.

6.1.6 Reaction Blend Tanks T-210, T-220 and T-230

After the reaction/blend tanks have been filled as described in the previous sections, continue to agitate the material for approximately 10 more minutes to ensure complete mixing. Take representative samples of each tank of liquid and turn in to the laboratory for analysis. Add quantities of sulfuric acid, ferrous sulfate and other reagents determined by the laboratory as described in Section 6.2 and continue agitation. When thoroughly mixed, transfer the specified amounts from the reaction/blend tanks to the alkalization tanks.

6.1.7 Lime and Calcium/Magnesium Hydroxide Slurry Operation

6.1.7.1 Preparation of Slurry

- a) Fill slurry tank (T-1410) with plant water (by opening valve FV 1410-2).
- b) Deliver appropriate quantity of dry powdered reagent from the storage silo, MH-1030, via its rotary lobe blower.
- c) Ensure that the agitator in T-1410 (A-1411) is operating.

6.1.7.2 Transfer of Material from Reaction Blend Tanks T-210, T-220 and T-230 to Alkalization Tanks T-1010 and T-1020

- a) Check the level and remaining capacity in alkalization tank T-1010 or T-1020.
- b) Check that at least one (1) filter press, either F-1110 or F-1120, is ready to receive material (if operating in continuous mode).
- c) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.

- d) The pH controller set point should be set using the control panel interface to the desired value, typically around 9-11 pH units, as determined by the laboratory. Whenever the flow into the alkalization tanks, T-1010 and T-1020, drops to a minimum, or "no-flow", condition, the pH controller is automatically closed and the output to the valve drops to 0%.
- e) Check the fluid level in the slurry tank, T-1410, to ensure that adequate slurry is available. Start slurry pump P-1411.
- f) Start pump P-201, P-202 or P-203.
- g) Confirm that the pH controller has been placed in "automatic" and is controlling the addition of slurry from T-1410.
- h) Refer to the operation of the filter presses, F-1110 and F-1120. One of these must be placed "on-line" within five minutes of starting the feed to a prefilled alkalization tank, T-1010 or T-1020 (if operating alkalization vessel in continuous mode).
- i) Monitor the level in T-1010 and T-1020 on the control panel. Monitor temperature using the sensors located on the tanks. Turn on the agitator, A-1011 or A-1021, when the level in T-1010 or T-1020 is adequate to completely cover the lower blades of the agitator.
- j) When the transfer is complete, the pump will automatically stop due to low, or "no-flow", in the discharge line. The pH controller must be placed in manual. Close all valves that were open.
- k) After all transfers are completed from the specified tank, follow established flushing procedures.

6.1.7.3 Movement of Material from Alkalization Tanks T-1010 and T-1020 to the Filter Presses

- a) This activity must be coordinated with the operation of the alkalization tank and feed to the filter press.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Start pump P-1101, P-1102 or P-1103 and continue with Section 6.1.8, operation of the filter press.

- d) When all the material has been processed, stop the pump and close all valves.
- e) Follow the established flushing procedure.

6.1.8 Filter Press

6.1.8.1 Filter Press Process Description

The filter press system is used to remove precipitated metal salt sludges, etc., from the neutralized effluent. The separated solid filter cake material is trucked in roll-off boxes directly to the on-site landfill or otherwise treated or disposed in accordance with the land disposal regulations. The filtrate is pumped to the filtrate storage tank, T-100, for further processing to the biological treatment system.

The alkalization tanks T-1010 and T-1020 have a useable capacity of 10,000 and 8,000 gallons, respectively. The flow of unprocessed material is automatically controlled to match the average flow to the filter press. A continuous high level reading and a high-high level indication is provided at the control panel. The alkalization tanks are provided with electrically-driven agitators which keep the solid material in suspension until it is fed to the filter press.

The filter press feed pumps, P-1101, P-1102 and P-1103, transfer the slurry from the alkalization tanks to the filter presses, F-1110 and F-1120. These pumps have a maximum rated discharge pressure of 100 psig.

The filter presses, F-1110 and F-1120, are plate and frame type units that can operate on a batch basis. That is to say, when the solids fill the interplate spaces, the filter press feed pumps, P-1101, P-1102 and/or P-1103, must be shut off and that filter press cleaned. The cleaning operation is power-assisted, requiring the operator to initiate the cleaning cycle. The operator activates the mechanical plate "shifter" system and visually checks the plates for proper cake discharge.

The discharged filter cake drops through the floor into a roll-off bin below. When the roll-off bin is full, it must be transferred for proper disposal. An empty roll-off bin is placed under the filter presses to continue the press cleaning.

The filter operations sequence is as follows:

Prior to feeding the slurry to the filter press, the clean press is closed by means of the hydraulic ram. This ram tightly compresses the filter plates within the press. Once compressed, an air-driven booster pump maintains the proper compression pressure.

Flow from an alkalization tank is fed to the filter press through the center nozzle (valves FV 1110-1 or FV 1120-1). The first filtrate through the filter press may contain suspended solids. Therefore, the flow to the clean filter press is started slowly, so that the filter does not become blinded. The filter press will then have a sufficient cake to permit throughput and allow the filtrate to be clear.

The slurry feed rate is controlled by the piping restrictions and the setting of the control valve, FCV 1100-5, 1101-5 or 1102-5. This feed control prevents excessively high filter feed rates during the initial part of the filter cycle when only a thin cake is present on the filter plates. This assures that a predetermined maximum flow rate and/or feed pressure will not be exceeded. When the filter feed pumps, P-1101, P-1102 or P-1103, cease pumping, the controls recognize that the maximum pressure has been reached and the filter feed pump is shut off. The maximum pressure cannot exceed 100 psig.

The filtrate from both filter presses flows into filtrate tanks T-1111 or T-1112. These vessels are the surge reservoir for the filtrate pumps, P-1201 and P-1203. The pumps transfer the filtrate to the filtrate storage tank T-100. If the filtrate is received at a rate that will potentially overflow the filtrate tanks, the level system, by means of FIC 1100 or FIC 1112, will modulate the pressure control valves, PRV 1102-30, or PRV 1103-30. This will cause the filter feed pumps to reduce their output to the filter press.

When the filter press feed pump rate, as determined by the time between strokes, has been diminished to a value that has been predetermined as the point when the filter press is full, the feed valve, FV 1110-1 or FV 1120-1, is closed. The top discharge valves, FV 1110-2, FV 1110-3, and compressed air inlet, FV 1110-6 are opened (in the case of filter press F-1110). This air forces any

free liquid filtrate remaining in the filter press cavities to drain out the filter press discharge nozzle. After a predetermined time, the dewater cycle is stopped. The filter press can then be opened for cleaning. When the filter plates have been cleaned, they are recompressed and the filter press is ready to be placed on line.

The filter press system is constructed within the building slab, part of which is enclosed in a concrete block enclosure. The entire slab area is curbed to contain any spillage. Any process fluid spillage drains to a sump within the curbed area.

Compressed air for this process is supplied from an air compressor/air dryer system located in the mechanical room of the process building.

6.1.9 Biological Treatment Process Description

6.1.9.1 Transfer from Filtrate Tank to Surge Tank

To transfer from the filtrate storage tank T-100 through tank T-3001 to the surge tank T-3002 via pump P-0101, the following valves must be open:

FV 100-2 FV 101-1 FV 101-A2 FV 101-4

The following valves must be closed:

FV 100-3 FV 101-2 FV 101-5 FV 101-8

6.1.9.2 Add Nutrients to Filtrate

- a) Ammonium chloride, disodium phosphate and other specially manufactured products are added to surge tank T-3002 to provide a source of nutrients for biological treatment, as determined by the lab.
- b) Polypropylene day tanks are prepared by adding the appropriate quantity of nutrients to approximately 110 gallons of water.
- c) Metering pumps transfer the nutrients from the day tank to tank T-3002.

6.1.9.3 Transfer from Surge Tank to Biotower

- a) To transfer the filtrate from surge tank T-3002 to the biotower T-320 via pump P-3001A or P-3001B, the following valves must be open:

FV 320-1A FV 320-1B FV 3001-1 FV 3012-3 FV 3012-4

The following valves must be closed:

FV 3001 FV 3001-2 FV 3001-3 FV 150-2 FV 3010-2

The biotowers typically receive 30-60 gpm of filtrate. The setting of the flow valves to the biotower must be throttled accordingly to obtain the design flow rate. The flow to the biotowers may be increased to 100 gpm based upon processing capacity requirements.

6.1.9.4 Biotower Aerators

- a) A rotary blower (B-320-1) supplies air as a source of oxygen to each biotower for biological treatment. In the event that the rotary blower is undergoing maintenance, plant air from the facility air compressor can be used to supply air to the biotowers.
- b) Caution: The blower should be on continuously to maintain aerobic conditions within the tower.

6.1.9.5 Biotower (T-310 and T-320) Operation

- a) The biotowers are free standing units with no moving parts. Effluent enters from the bottom of biotower T-320 and discharges out its top into surge tank T-3012. Pump P-3012 then pumps the flow into the bottom of biotower T-310 from where it discharges out the top into surge tank T-3011. From there, pump P-3011 delivers the flow to tank T-3003.
- b) Air from the biotowers is captured and vented to tank T-3011 or T-3012.
- c) A defoamer may be needed to suppress foaming especially when surfactants are processed from incoming gate receipts.
- d) During winter months, steam from the AWTs boiler can be added to the biotowers to aid in the biological treatment.

6.1.9.6 Removal of Biological Solids from Treated Effluent

Biologically treated effluent is pumped from lift station T-3011 to T-3003 and then to the carbon adsorbers. Biological solids that are carried with the treated effluent from the biotowers are removed in these downstream units.

6.1.9.7 Transfer to Carbon Beds from Feed Tank T-3003

- a) The flow valves are set to transfer 40-230 gpm from the feed tank T-3003 to the carbon beds.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Set flow valves on the carbon beds to permit flow in the desired direction:
 - 1) The carbon vessels are used in a down flow mode. The following valves must be opened:
 FSV 012 FSV 015 or FSV 016
 and the following valves must be closed:
 FSV 013 FSV 014 FSV 017
 - 2) To utilize adsorption unit T-3007 as the primary vessel, the following valves should be opened:
 FSV 105 FSV 109
 and the following valves should be closed:
 FSV 103 FSV 104 FSV 106 FSV 108
 To utilize adsorption unit T-3008 as the secondary vessel, the following valves should be opened:
 FSV 204 FSV 209
 and the following valves should be closed:
 FSV 205 FSV 206 FSV 207 FSV 208
 Reversing the above valve orientations will reverse the primary and secondary units.
 - 3) Each unit can be used independently of the other by opening and closing the appropriate valves.

- 4) Open or close the appropriate valves downstream of the carbon adsorption units so that the treated effluent is transferred to either tank T-125/ T-58 or the arsenic treatment system.
- d) Start the respective feed pump, P-3002A or P-3002B, at the control panel. Set the automatic flow valve to the desired flow rate by adjusting the digital control. The selector switch must be in auto mode. Monitor the flow rate increase by the flow monitor and totalizer on the control panel.

6.1.9.8 Addition of Hexametaphosphate (Hex)

To start the transfer of the Hex mixture from the chemical addition tank to the waste water via pump P-180, open valve FV 180 and whichever flow valve leads to the outflow for the primary absorber, FV 181-1. Start pump P-180.

6.1.9.9 Arsenic Treatment System

To transfer the treated effluent from the carbon adsorption system to the arsenic treatment system, insure that all inlet and outlet valves to the cartridge filters and arsenic adsorbers are in the proper open position, and that the by-pass valve is closed. Monitor operating pressures of the cartridge filters. When the pressure on the cartridge filters exceed 60 psig:

- a. Isolate the appropriate filter(s) by manually closing the inlet and outlet valves of the filters,
- b. Hook up hose(s) to pipe fittings to relieve the pressure and drain the filters to a containment tub or vacuum truck unit,
- c. Open filters and remove cartridge filter from filter housing and place into containment tub,
- d. Either transfer filter(s) to the A/T Building for cleaning or place in appropriate container for disposal.
- e. Replace cleaned or new replacement cartridge filters in housings, close filter units, and open all inlet and outlet valves. Relieve trapped air as necessary.

When laboratory analysis identifies that arsenic from a primary adsorption tank has exceeded the pre-determined treatment level, replace the arsenic adsorption tank as follows:

- a. Isolate the arsenic treatment train side of the system for which the elevated arsenic levels has been identified by closing all the inlet and outlet valves of the adsorption tanks (primary and effluent tanks),
- b. Hook up hose(s) to tank fittings to relieve the pressure and drain the filters and piping via containment tub, vacuum truck unit, or by pressurizing tank with air and transferring liquid into tank T-3002 or tanker,
- c. When draining is complete, place caps on hose/pipe connections, remove the spent arsenic adsorption tank from the W/T Building with fork lift truck, and place into secondary containment or send adsorption tank and media directly back to media manufacturer for replacement,
- d. Replace with fresh arsenic adsorption tank and re-connect piping/hoses as necessary.
- e. Complete hydrostatic tightness testing of new adsorption tank and piping/hoses in accordance with approved procedures. A qualified inspector must observe hydrostatic test, inspect system for signs of leakage, and document the results of the test prior to start-up of the adsorption tank system. Documentation must be placed in the Operating Record.
- f. Open all inlet and outlet valves and relieve trapper air as necessary.

If arsenic treatment of the effluent is not required, close the inlet valves to the cartridge filters of the arsenic treatment system and open the by-pass valve to transfer effluent to either tanks T-125 or T-58 after carbon adsorption.

6.1.10 Effluent Holding Tanks T-125 and T-58

6.1.10.1 Transfer of Treated Effluent from Tank T-125 to Facultative Ponds 1/2

- a) If necessary, reagents may be added, air may be sparged and flow may be recirculated within the tank prior to discharge.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Obtain verification from the laboratory that the treated effluent meets all the required qualifications for discharge. If the treated effluent fails to meet all the discharge qualifications, pump the tank to the reaction/blend tanks or filtrate holding tank for required reprocessing, based upon laboratory analysis, as needed.
- d) Make sure that Fac Ponds 1 and 2 have sufficient capacity to accept the transfer without exceeding the freeboard requirements.

- e) Start pump P-126 (240 gpm) or P-127 (400 gpm).
- f) Shut down pump when transfer is complete.

6.1.10.2 Transfer of Treated Effluent from Tank T-58 to Facultative Ponds 1/2

- a) If necessary, reagents may be added, air may be sparged and flow may be recirculated within the tank prior to discharge.
- b) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- c) Obtain verification from the laboratory that the treated effluent meets all the required qualifications for discharge. If the treated effluent fails to meet all the discharge qualifications, pump the tank to the reaction/blend tanks or filtrate holding tank for required reprocessing, based upon laboratory analysis, as needed.
- d) Make sure that Fac Ponds 1 and 2 have sufficient capacity to accept the transfer without exceeding the freeboard requirements.
- e) Start submersible pump.
- f) Shut down pump when transfer is complete.

6.1.11 Facultative Ponds 1/ 2

- a) Allow discharge of T-58 or T-125 to fill Fac Pond 1 and 2.
- b) If necessary, start up the individual aerators in Fac Pond 1 and 2. The controls are located on the panel north of the pond (optional).
- c) Upon start up and periodically thereafter, check the discharge of the effluent holding tank and check the aerators.
- d) The level in Fac Pond 1 and 2 must not exceed two (2) feet of outage. Periodic pumping to a discharge pond (Fac Pond 3) will be executed to prevent a high level condition.
- e) Sample the liquid when requested by the laboratory for intermediate analysis.

6.2 AUXILIARY SYSTEMS

6.2.1 Sulfuric Acid Storage

6.2.1.1 Unloading Sulfuric Acid into Storage Tank T-910

- a) Follow the guidelines specified in Section 2.3.1 for general tanker unloading.
- b) Connect up the dedicated transfer line from the acid tanker to the sulfuric acid storage tank.
- c) Connect the air line to the tanker, if needed to make transfer.
- d) Pressurize the tanker to about 15 psi to transfer the liquid into the tank. Monitor the liquid level of the tank on the control panel.
- e) When all the liquid has been transferred, shut off the air supply and release the pressure on the system.
- f) Disconnect the air supply line. Disconnect the sulfuric acid transfer line and cap it off.

6.2.1.2 Transfer Sulfuric Acid from Storage Tank T-910 to Reaction Blend Tanks T-210, T-220 and T-230

- a) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- b) Input the volume to be transferred into the control panel in the control room. The volume is determined by the laboratory and shown on the process batch sheet.
- c) Start the transfer pump P-901. Pump will automatically shut off when the preset volume has been delivered.

6.2.2 Lime and Calcium/Magnesium Hydroxide Handling System

Lime and/or calcium/magnesium hydroxide is purchased from an outside source and supplied in bulk form by pneumatic truck.

6.2.2.1 Filling the Silo from a Commercial Carrier

- a) Before filling the silo with reagent, check the following:
 - 1) the level in the silo is low enough to accept a full load of reagent
 - 2) the high level light is not on

- 3) the power to the silo area is on
- b) Turn the dust collector on.
- c) Connect the fill-line hose from the bulk carrier to the fill pipe of the silo.
- d) Verify that both the bin-level indicator lights are operable. The "low" indicator light will be "on" when the level of the reagent is below the level of the bottom switch (see west side of silo). The "low" level indicator will be "off" when the reagent level is above the bottom switch. The "high" indicator light will be "off" when the level of the reagent is below the level of the top switch (see west side of silo). The "high" level indicator will be "on" when the level is above the top switch.
- e) If air padding is needed to unload the trucks, attach the air hose to the appropriate nozzle on the truck. Open valves FV 0410-7 and FV 0410-8 to admit the air.
- f) Transfer the reagent from the commercial bulk truck. If the "high indicator light is actuated, immediately stop transfer. Check the continuous level indication for the amount of space remaining. Note: Filling can continue until:
 - 1) the truck is empty; or
 - 2) the pressure relieve valve located on the silo pops open.
- g) After filling, disconnect the commercial bulk truck fill-line.
- h) Turn off the dust collector after five minutes.

6.2.3 Caustic Scrubber T-1310

6.2.3.1 Preparation of 5% Caustic Solution in Caustic Scrubber

- a) Transfer 450 gallons of process water to the caustic scrubber.
- b) Transfer at least 25 gallons of 50% caustic to the scrubber from 55 gallon drums.
- c) Monitor the liquid level in the scrubber on the control panel as each addition is made.

6.2.3.2 Operation of the Caustic Scrubber

- a) After charging the scrubber with the 5% caustic solution, start the caustic scrubber pump, P-1301, to circulate the solution through the venturi of the scrubber.
- b) Turn on the scrubber fan, B-2011, to provide a constant draw on the process vessels connected to the scrubber system header.

- c) Activate the caustic fume scrubber recirculation loop. Insure that the appropriate valves are set correctly. See instruction manual for setting and/or operation of the recirculation control valve FV 1301-1 and the bleed valves FV 1301-2, FV 1301-3 and FV 1301-4.

6.2.3.3 Monitoring the Operation of the Scrubber

- a) Observe the liquid level of the caustic fume scrubber on the control panel.
- b) Periodically sample the scrubber liquid to verify that the pH is >12 . If required, add additional caustic as described above. Have the lab determine if the solution is spent (i.e. contains significant amount of solids or organics). If the caustic solution can no longer be rejuvenated by the addition of another portion of 50% caustic, it should be transferred to the alkalization tank as described below.
- c) Monitor the discharge pressure of the caustic scrubber pump P-1301 and the flow of the scrubber solution.

6.2.3.4 Transfer of Spent Scrubber Solution from Scrubber Tank T-1310 to Alkalization Tanks T-1010 and T-1020

- a) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- b) Check level in alkalization tank T-1010 or T-1020 to ensure there is sufficient capacity to accept the spent scrubber solution.
- c) Install chemical hose from the tank T-1310 drain valve to the sump adjacent to tank T-1020.
- d) Open drain valve and start sump pump.
- e) Monitor alkalization tank level on control panel.
- f) After transfer is complete, stop pump, close all valves and proceed with established flushing procedure where applicable.
- g) Prepare a new batch of 5% caustic scrubber solution as described above.

6.2.4 Ferrous Sulfate Storage

6.2.4.1 Ferrous Sulfate Storage Tanks T-830 and T-840

- a) If liquid ferrous sulfate is delivered by a commercial carrier, follow the guidelines specified in Section 2.3.1 and Section 6.1.1.3 for general tanker unloading.
- b) If dry ferrous sulfate is used, prepare a solution in tank T-850 as specified in Section 6.1.5.1.

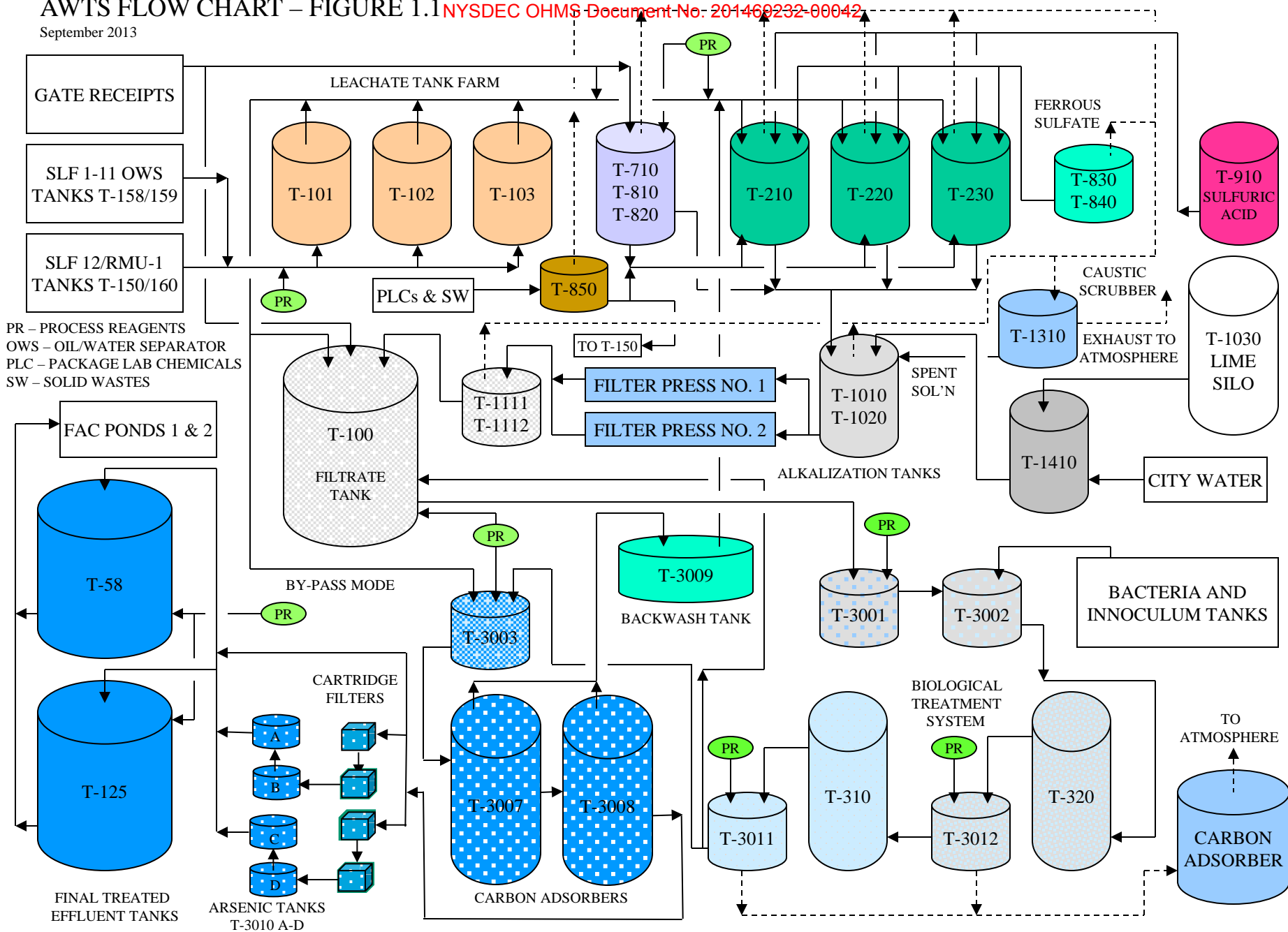
6.2.4.2 Transfer Ferrous Sulfate from Storage Tanks T-830 and T-840 to Reaction Blend Tanks T-210, T-220 and T-230

- a) Prior to any pump start-up, ensure that all appropriate valves are positioned properly.
- b) Input the volume to be transferred into the control panel in the control room. The volume is determined by the laboratory and shown on the process batch sheet.
- c) Open bottom valve on tank T-830 or T-840.
- d) Start the transfer pump P-702. Pump will automatically shut off when the preset volume has been delivered.
- e) Close bottom valve.

AWTS FLOW CHART – FIGURE 1.1

September 2013

NYSDEC OHMS Document No. 201460232-00042

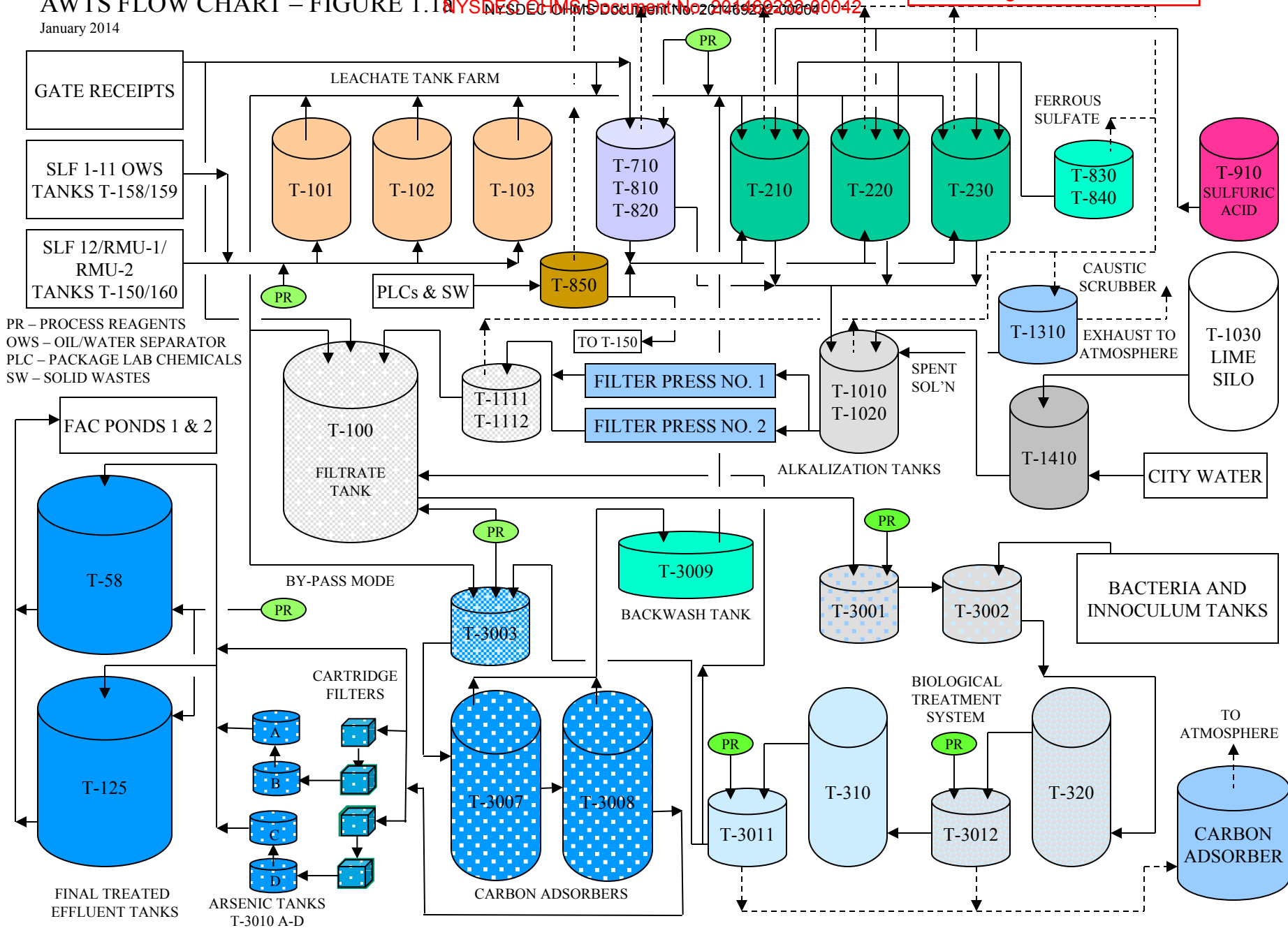


AWTS FLOW CHART – FIGURE 1.1

January 2014

AWTS Flow Chart Document No. 20140233-00042

NOTE: Figure to be added.

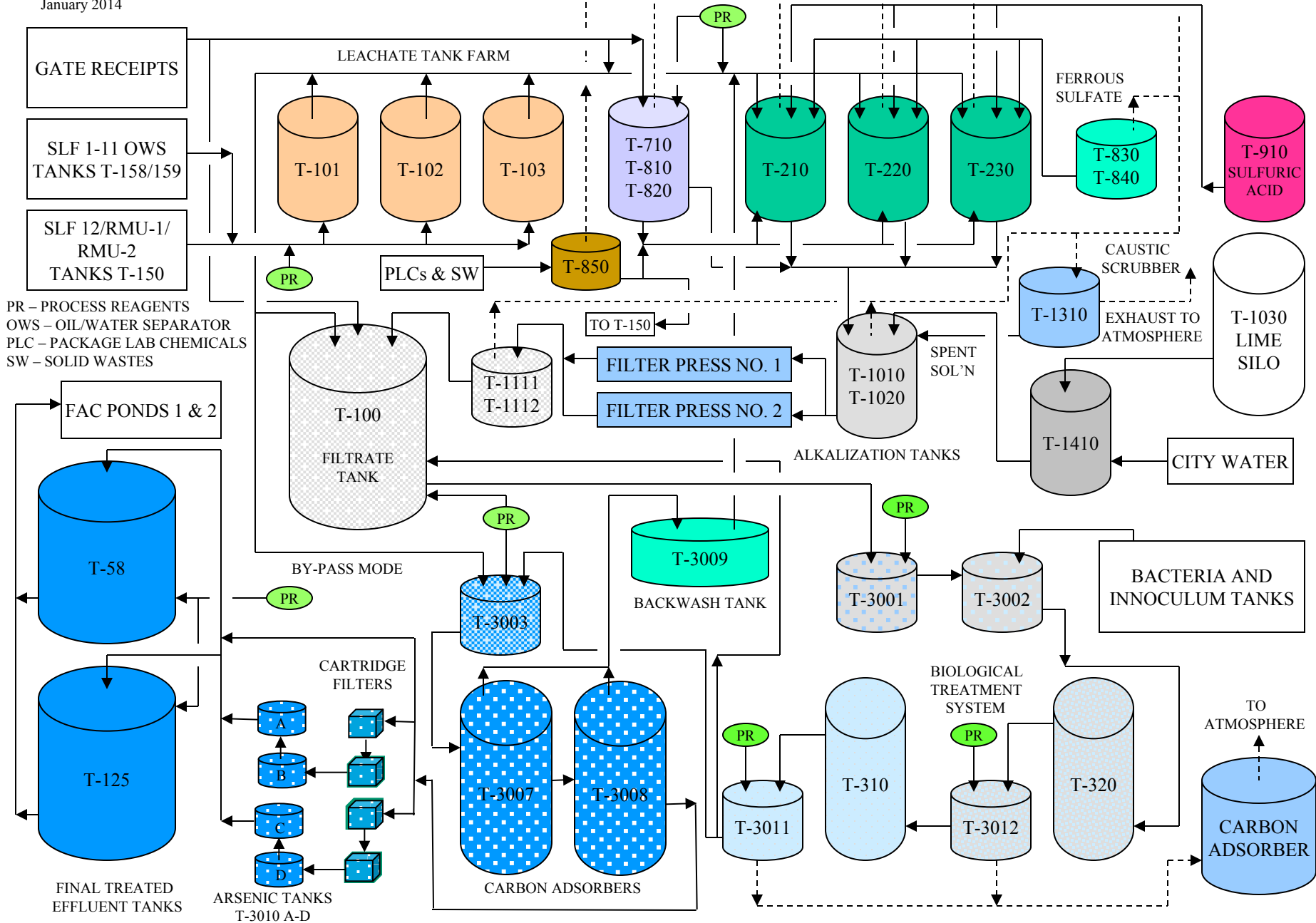


AWTS FLOW CHART – FIGURE 1.1

January 2014

NYSDEC OWS Document No. 20140233-00042

NOTE: Figure to be added.



APPENDIX A

ELECTRICAL VISUAL INSPECTION

- A) See caution notes under Section 5.1 before proceeding.
- B) Verify and confirm nameplate data.
- C) Check for paint scrapes, dents, and cracked or chipped porcelain or other signs of damage.
- D) Check for presence of dust, dirt, installation waste, surplus material and tools within or on equipment.
- E) Check for presence of water, moisture, condensation.
- F) Inspect all busses and arc chutes.
- G) Check phasing of all buss work for the incoming supplies through to the outgoing circuits.
- H) Confirm that all busses are securely mounted and that their joints are tight.
- I) Insure that all insulation materials are correctly installed.
- J) Check for proper grounding connections, tightness, and for ground continuity including the raceway system.
- K) Check wiring for sizing against that specified on the drawings.
- L) Insure that all steel hardware and parts are properly secured.
- M) Check mechanical action of all switches and breakers to be sure that none are stuck and that all move freely.
- N) Check all equipment for adequate electrical clearances.

APPENDIX B

ELECTRICAL TESTING

- A) See caution notes under section 5.1 before proceeding.
- B) Perform grounding system resistance tests and record data and compare readings against design requirements.
- C) On all dry type transformers perform insulation resistance tests on all windings and bushings. The value in meg-chms should not be less than that computed by the following:






$$\frac{30 \times \text{transformer voltage (in total)}}{\text{transformer kva}}$$

- D) Check the transformers ratio on full winding.
- E) Check transformers polarity and phasing.
- F) Perform insulation resistance tests on the 600 volt cable using a 1000 or 2500 volt meter. Values should not be less than infinity. Perform the insulation resistance test on all buswork. Values should not be less than 750 meg-chms.
- G) Caution: Give adequate notice to all on-site personnel and contractors that equipment will be energized. Close the main disconnect switch.
- H) After energizing the transformers check and record all secondary voltages.
- I) Energize one circuit at a time and check the following:
 - 1) proper operation as intended.
 - 2) proper rotation of motors.
- J) After system has been energized, check all equipment hourly for the first eight hour period for excessive operating temperatures.

APPENDIX C
FACILITY P&IDs




Sheets 1, 2, 16 through 27

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY
1550 BALMER ROAD
MODEL CITY, NEW YORK 14107

SHEET NO.	DRAWING NO.	SHEET NAME	SHEET NO.	DRAWING NO.	SHEET NAME
 1	C-INDEX	INDEX SHEET	14	C-TKFR	LEACHATE TANK FARM
 2	C-110	LEGENDS AND SYMBOLS	15	C-FRACTK	FRAC TANK FT-3
3	C-RMU-1	RMU-1 LIFT STATION	16	C-111	UNLOADING AND PRETREATMENT
4	C-N2	SLF 7 & 11 LEACHATE HOLDING	17	C-111A	SOLIDS DISSOLVING, SULFURIC ACID, DRUMS AND SUMPS
5	C-N3	SLF 10 LEACHATE HOLDING	18	C-112	OXIDIZING AND REDUCING
6	C-N4	SLF 1-6,7,10&11 OIL WATER SEPARATOR	19	C-112A	BIOTOWERS & CHEMICAL FEED
7	C-PRETR	SLF 1-6 PRETREATMENT	20	C-113	ALKALIZATION
8	C-GW	GROUNDWATER PUMPING SYSTEMS	21	C-113A	FILTER PRESSES
8A	C-GWA	GROUNDWATER PUMPING SYSTEMS PA III & PA IV 	22	C-113B	CAUSTIC SCRUBBER
9	C-SLF12	SLF 12 OIL WATER SEPARATOR	23	C-113C	LIME SYSTEM
10	C-TRCKWA	TRUCK WASH SUMP	24	C-200	MULTI-MEDIA FILTRATION SYSTEM
11	C-STAB	MAIN STABILIZATION	25	C-210	ADSORPTION SYSTEM
12	C-STABN	STABILIZATION NORTH EXPANSION	25a	C-220	ARSENIC REMOVAL SYSTEM 
13	C-STABS	STABILIZATION SOUTH EXPANSION	26	C-109	FILTRATE AND TREATED EFFLUENT TANKS 
			27	C-T-58	TANK 58

NOTES

1. ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, MAY 1993. UPDATED AND REVISED BY BBL MARCH AND DECEMBER 2001.

REVISION	NO.	BY	DATE	<div>EnSol, Inc. Environmental Solutions</div> <div>661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928</div>	PROJECT NO: 05-7017	TITLE: INDEX SHEET PROCESS AND INSTRUMENTATION DIAGRAM			
					SCALE: NOT TO SCALE				
ADDED SHEET NO. 25a.		TAS	9/10/13		DWG: 05-7017-INDEX SHT.DWG	PROJECT: CWM FACILITY P & ID UPDATES			
ADDED SHEET NO. 8A.		JCD	4/24/12		DRAWN BY: AJZ CHECKED BY: BDS	PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY			
RENAMED SHEET NO. 26.		BDS	5/2/06		DATE: MAY 2006	TOWN OF PORTER	COUNTY OF NIAGARA	STATE OF NEW YORK	DRAWING C-INDEX (SHEET 1)
IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER ANY ITEM IN ANY WAY.									

VALVE AND FLOW LINE EQUIPMENT LEGEND

	GATE VALVE (ASTERISK INDICATES LIMIT SWITCH)
	CHECK VALVE
	BALL VALVE
	BALL VALVE THREE-WAY
	GLOBE VALVE
	KNIFE GATE VALVE
	BUTTERFLY VALVE
	PLUG VALVE
	PRESSURE CONTROL VALVE
	PRESSURE RELIEF VALVE
	DRAIN VALVE
	SAMPLE VALVE
	FLUSHING CONNECTION
	HOSE BIB CONNECTION w/ BALL VALVE
	FLOW LINE REDUCER
	CONTROL VALVE WITH I/P TRANSDUCER
	SOLENOID VALVE ELECTRICALLY OPERATED
	PNEUMATIC ACTUATED VALVE WITH SOLENOID
	PNEUMATIC ACTUATED VALVE WITH POSITIONER
	ELECTRIC MOTOR ACTUATED
	ELECTRIC MOTOR ACTUATED WITH POSITIONER
	HYDRAULIC ACTUATED WITH POSITIONER
	HYDRAULIC ACTUATED WITH SOLENOID
	GAUGE WITH DIAPHRAGM SEAL
	DIAPHRAGM PUMP
	CENTRIFUGAL PUMP
	METERING PUMP w/ MOTOR
	CENTRIFUGAL BLOWER
	BASKET STRAINER, FLANGED
	CONSERVATION VENT
	ELECTRIC MOTOR
	AIR MOTOR
	VENT
	SUBMERSIBLE PUMP
	BLAMING PLATE (SPECTACLE FLANGE)
	STRAINER

FIRST LETTER	SUCCEEDING LETTERS			
	MEASURED OR INTRINSIC VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION
A	ANALYSIS		ALARM	USER'S CHOICE
B	BURNER FLAME		USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY (ELECTRICAL)		CONTROL	USER'S CHOICE
D	DENSITY(MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL		
E	VOLTAGE (EMF)		PRIMARY ELEMENT	
F	FLOW RATE	RATIO(FRACTION)		
G	GAGING (DIMENSIONAL)		GLASS	
H	HAND(MANUALLY INITIATED)			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER	SCAN		
K	TIME OR TIME SCHEDULE			CONTROL STATION
L	LEVEL		LIGHT(Pilot)	
M	MOISTURE OR HUMIDITY			LOW MIDDLE OR INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE
P	PRESSURE OR VACUUM		USER'S CHOICE	USER'S CHOICE
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE	(RESTRICTION) POINT (TEST CONNECTION)	
R	RADIOACTIVITY		REDUCE OR PRINT/REGULATING	
S	SPEED OR FREQUENCY	SAFETY		SWITCH
T	TEMPERATURE			TRANSMIT
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY		VALVE, DAMPER, OR LOUVER	
W	WEIGHT OR FORCE		WELL	
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED
Y	USER'S CHOICE		RELAY OR COMPUTE	
Z	POSITION		DRIVE, ACTUATE, OR UNCLAS-SIFIED FINAL CONTROL ELEMENT	

LINE ABBREVIATIONS AND DEFINITIONS

ASO	AMMONIA STRIPPER OVERFLOW	PA	PLANT AIR, 100 PSIG
ASF	AMMONIA STRIPPER FEED	RTV	REDUCING TANK VENT
ASD	AMMONIA STRIPPER DISCHARGE	RTD	REDUCING TANK DISCHARGE
ASV	AMMONIA STRIPPER VENT	RCV	REACTOR TANK VENT
ASR	AMMONIA STRIPPER RECYCLE	RDO	REACTOR TANK DISCHARGE
		RTO	REDUCING TANK OVERFLOW
		RRO	REACTOR TANK OVERFLOW
CAR	CHEMICAL ADDITION TO REACTORS	SAD	SULFURIC ACID DISCHARGE
CS	CAUSTIC SCRUBBER INTRODUCTION	STC	SPECIAL TREATMENT CAUSTIC
CSD	CAUSTIC SCRUBBER DISCHARGE	STD	SPECIAL TREATMENT DISCHARGE
CAD	CHEMICAL ADDITION DISCHARGE	SFD	STRIPPER FEED TO DRUMS
CTU	CAUSTIC TRUCK UNLOADING	STV	SPECIAL TREATMENT VENT
CSR	CAUSTIC SCRUBBER RECYCLE	SAD	SULFURIC ACID UNLOADING
CSV	CAUSTIC SCRUBBER VENT	STO	SPECIAL TREATMENT TANK OVERFLOW
CSD	CAUSTIC SCRUBBER OVERFLOW	SFO	STRIPPER FEED TANK OVERFLOW
CTO	CAUSTIC STORAGE TANK OVERFLOW	SAD	SULFURIC ACID STORAGE TANK OVERFLOW
CSDA	CAUSTIC SCRUBBER DISCHARGE - A (112-03)	SFO	STRIPPER FEED TANK OVERFLOW
CSDB	CAUSTIC SCRUBBER DISCHARGE - B (112-03)	SAD	SULFURIC ACID STORAGE TANK OVERFLOW
		SFO	SEAL POT OVERFLOW
DUR	DRUM UNLOADING - REDUCING	SSD	SILICO STORAGE DISCHARGE
DUD	DRUM UNLOADING - OXIDIZING	SLD	SPILL LIQUID DISCHARGE
DUV	DRUM UNLOADING VENT	SLS	SPILL LIQUID SLUMP
DSD	DRUM SOLIDS DISCHARGE	STC	SPECIAL TREATMENT CAUSTIC
		SSO	SILICO STORAGE TANK OVERFLOW
ESD	EMERGENCY STORAGE DISCHARGE	STV	SLURRY (LIME) TANK VENT
ESD	EMERGENCY STORAGE OVERFLOW	SSV	SILICO STORAGE VENT
		STH	SAMPLE TAP HEADER
FON	FILTER DISCHARGE TO NEUTRALIZATION	TUD	TRUCK UNLOADING OXIDIZING
FDS	FILTER DISCHARGE TO SLUDGE STORAGE	TUR	TRUCK UNLOADING REDUCING
FTH	FINAL FILTRATE TO HOLDING	TUN	TRUCK UNLOADING NEUTRALIZATION
FPV	FILTER PRESS VENT		
FSH	FUME SCRUBBER HEADER	WN	PLANT WATER
FPO	FILTER PRESS DISCHARGE	WNL	PLANT WATER, LIME SLURRY TANK
FPO	FINAL FILTER DISCHARGE	WHD	PLANT WATER, CAUSTIC DILUTION
FED	FILTRATE EQUALIZATION OVERFLOW	WIC	PLANT WATER TO CHEMICAL ADDITION
FED	FILTRATE EQUALIZATION DISCHARGE	WIS	PLANT WATER TO SCRUBBER
		WSS	PLANT WATER, SLUDGE STORAGE
LLS	LANDFILL LEACHATE TO STORAGE		
LTO	LEACHATE TANK OVERFLOW		
LTU	LIME TRUCK UNLOADING		
LSF	LIME SLURRY TO FILTER		
LSD	LIME SLURRY TANK OVERFLOW		
LSD	LEACHATE SLUMP DISCHARGE		
OSF	ORGANIC STORAGE FEED		
OSV	ORGANIC STORAGE VENT		
OTD	OXIDIZING TANK DISCHARGE		
OTV	OXIDIZING TANK VENT		
OTO	OXIDIZING TANK OVERFLOW		
OSO	ORGANIC STORAGE TANK OVERFLOW		
OSD	ORGANIC STORAGE DRAINAGE		

GENERAL INSTRUMENT SYMBOLS

	LOCALLY MOUNTED INSTRUMENT
	INSTRUMENT MOUNTED ON FRONT OF CONTROL PANEL
	INSTRUMENT MOUNTED ON BACK OF CONTROL PANEL
	COMPUTER CONTROL (DIGITAL INPUT)
	COMPUTER CONTROL (DIGITAL OUTPUT)
	COMPUTER CONTROL (ANALOG TO DIGITAL)
	LOCAL PUSHBUTTON STATION

INSTRUMENT AND PROCESS LINE

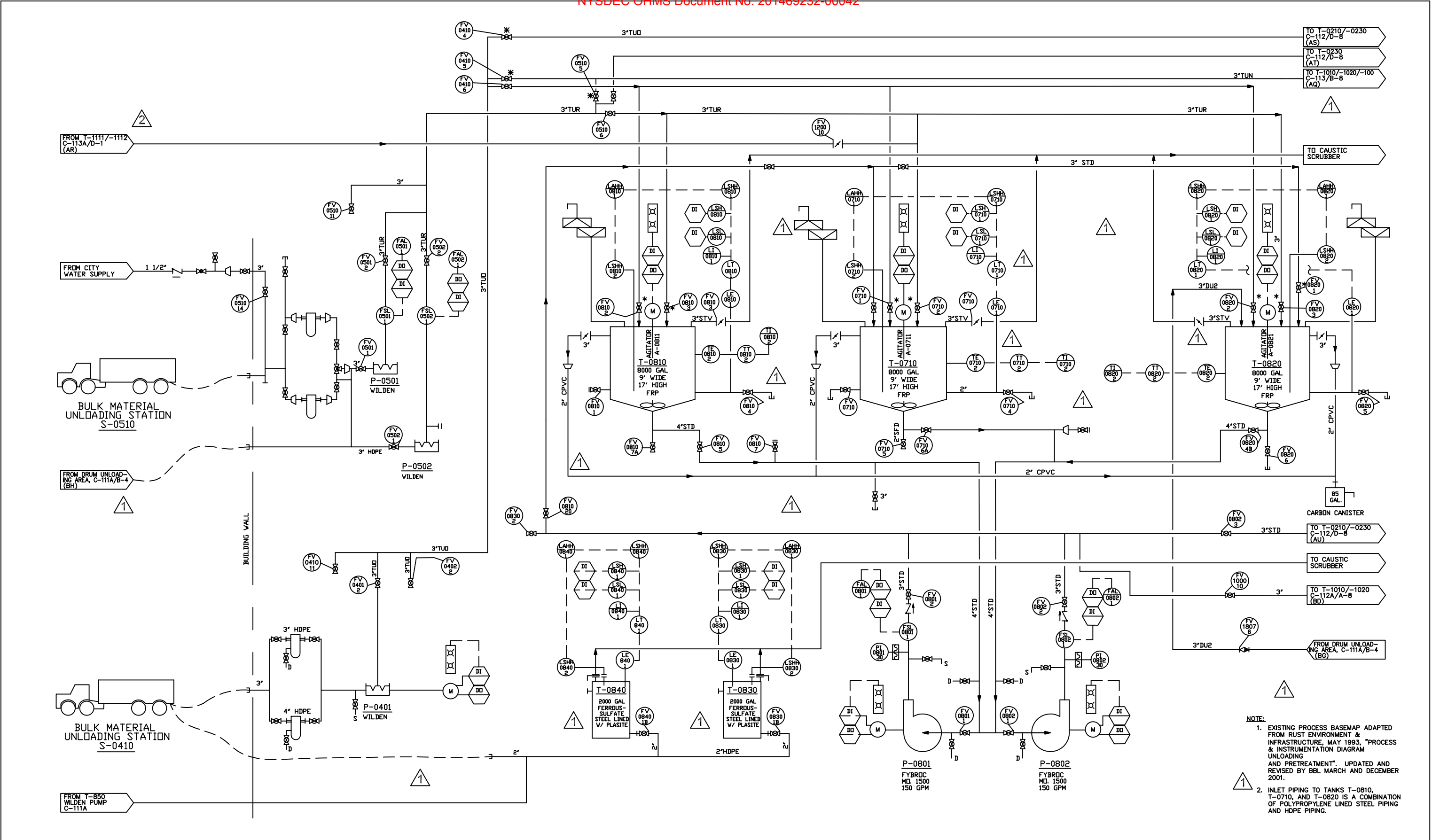
	MAIN PROCESS LINE
	SECONDARY LINE
	PNEUMATIC INSTRUMENT SIGNAL
	CAPILLARY TUBE
	CAPPED LINE
	ELECTRONIC INSTRUMENT SIGNAL
	FLEXIBLE HOSE, AIR TUBING
	FLEXIBLE HOSE, PROCESS LINE

NAME	DATE
DESIGNED JPD	3-1-83
DESIGNED	
CHECKED WCL	3-8-83
FILED	
APPROVED CHL	3-8-83
APPROVED	
APPROVED	

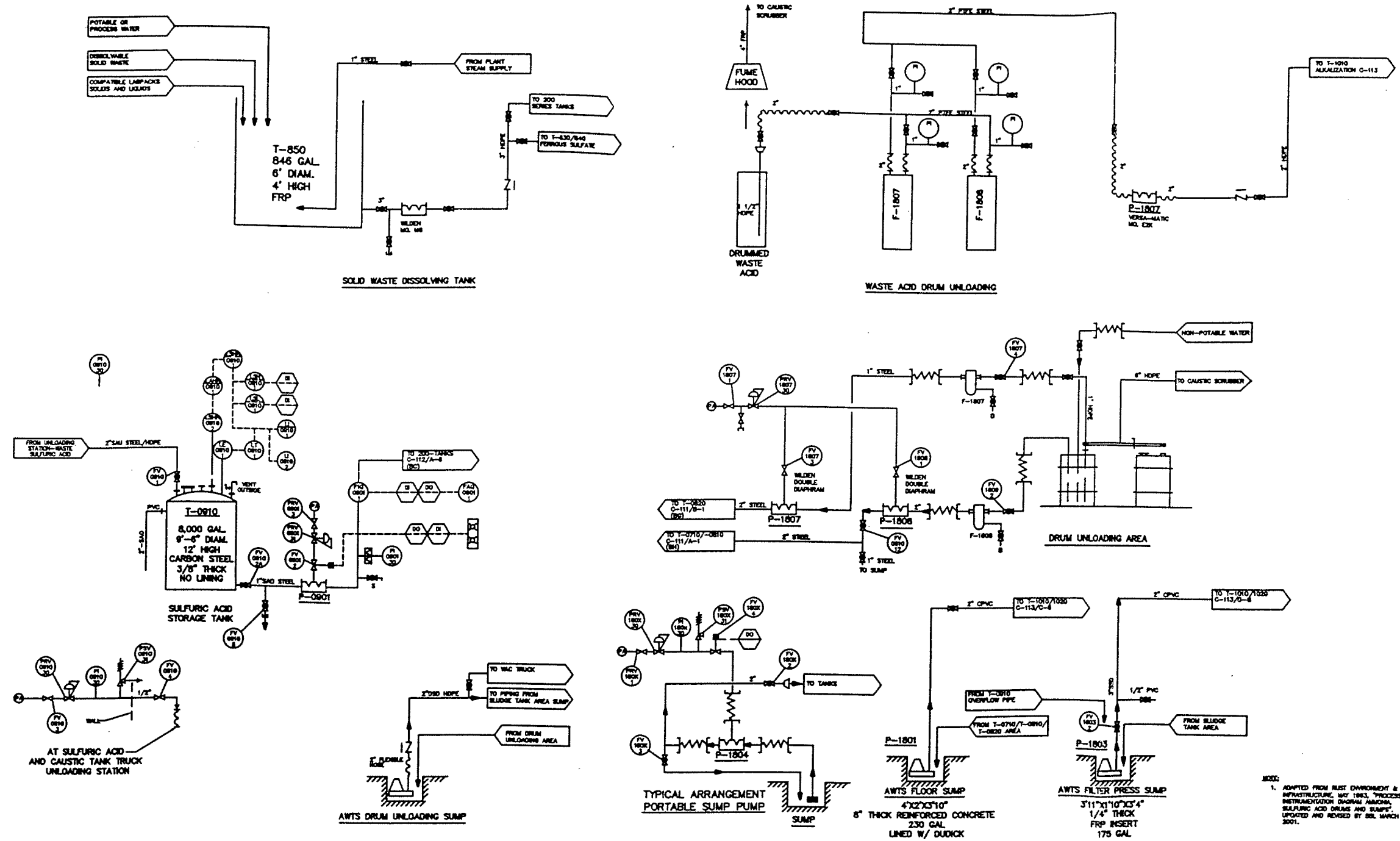
PROCESS & INSTRUMENTATION DIAGRAM LEGENDS & SYMBOLS	
MODEL CITY FACILITY CWM-CHEMICAL SERVICES, INC.	
PROJECT NUMBER 18808.400	DATE 3-8-83
FILE NUMBER C-110	FILE NUMBER
CLEARING 2	SHEET NUMBER 2

RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NUMBER 18808.400 DATE 3-8-83
 FILE NUMBER C-110
 SHEET NUMBER 2
 CWM FILE NAME: C-110.DWG
 DATE: 3-1-83



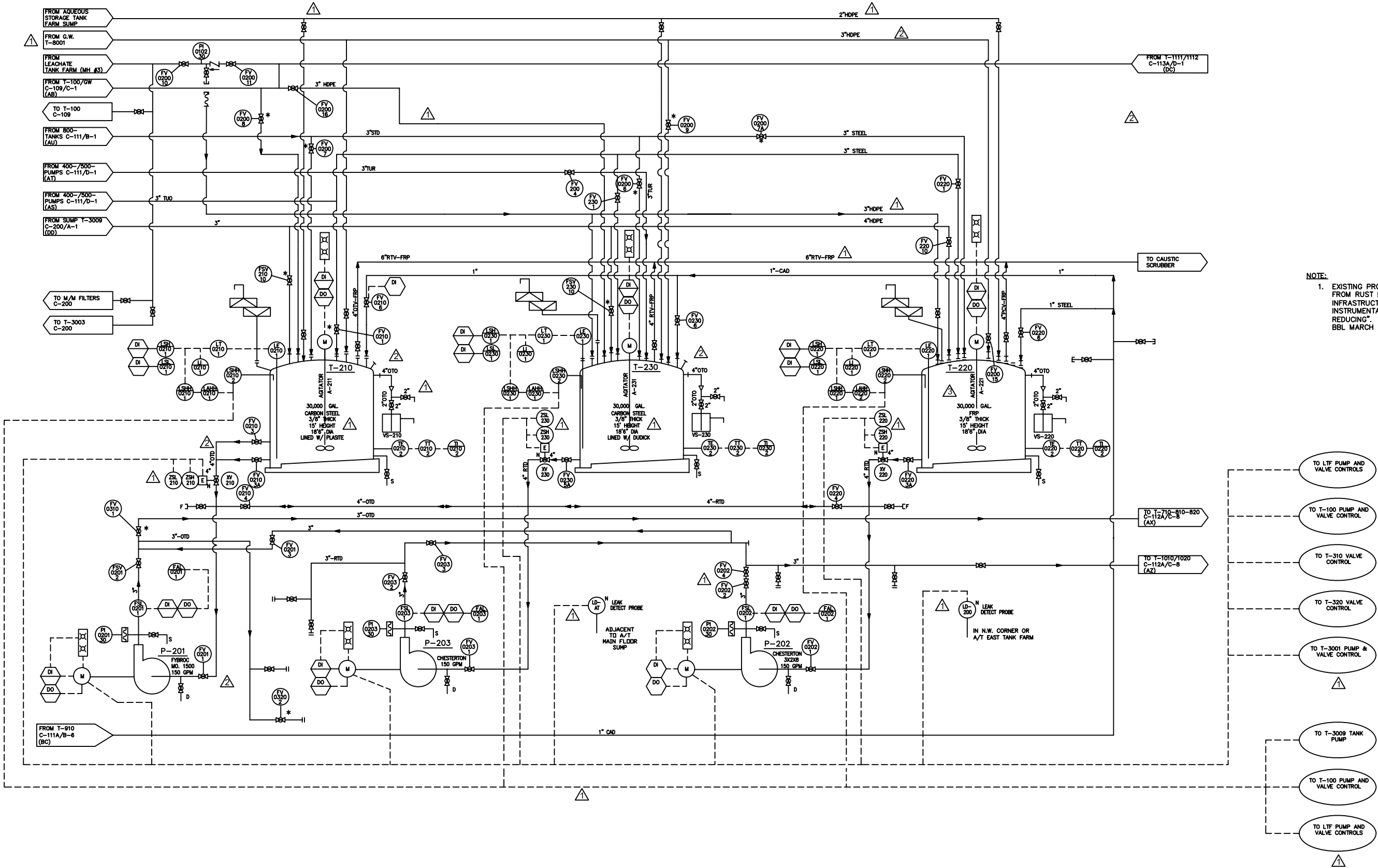
REVISION				REV	BY	DATE	<div>EnSol, Inc.</div> <div>Environmental Solutions</div> <div>661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928</div>	PROJECT NO: 07-7002		TITLE: UNLOADING AND PRETREATMENT PROCESS AND INSTRUMENTATION DIAGRAM			
								SCALE: NOT TO SCALE					
								DWG: 07-7002 C111 Sht.16.dwg		PROJECT: CWM FACILITY P & ID UPDATES			DRAWING C-111 (SHEET 16)
Removed carbon canisters from T-830/840; revised carbon canister for T-710/810/820; added inlet from T-850; removed P-0702; revised tank info.; general system updates.				1	MJM	1/29/07		DRAWN BY: MJM CHECKED BY: BDS		PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY			
IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 14-B, SECTION 1728, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER ANY ITEM IN ANY WAY.								DATE: JANUARY 2007		TOWN OF PORTER		COUNTY OF NIAGARA	



NOTE:
1. ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, MAY 1983, "PROCESS & INSTRUMENTATION DIAGRAM ANNOTA: SULFURIC ACID DRUMS AND SUMP".
UPDATED AND REVISED BY BBL MARCH 2001.

L: 081-*, OFF-REF*
P: 001-*, MBL-PCP
12/28/01 SYR-54 KLN ROC-54-SLM
050328090/05052011.DWG

Graphic Scale		No.	Date	Revisions	Init	Project Mgr. _____	<div>BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists</div>	CWM CHEMICAL SERVICES, LLC MODEL CITY, NEW YORK	PROCESS & INSTRUMENTATION DIAGRAM SOLIDS DISSOLVING, SULFURIC ACID, DRUMS AND SUMPS	File Number FILE NO.		DRAWING NO. C-111A (SHEET 17)
NOT TO SCALE		1	12/01	GENERAL SYSTEM UPDATES	BDS	Designed by _____				Date DECEMBER 2001		
						Drawn by _____				Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120		
						Checked by _____						
						Prof. Eng. _____						
NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW						PE License _____						



NOTE:
1. EXISTING PROCESS BASEMAP ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, MAY 1993, "PROCESS & INSTRUMENTATION DIAGRAM OXIDIZING & REDUCING". UPDATED AND REVISED BY BBL MARCH AND DECEMBER 2001.

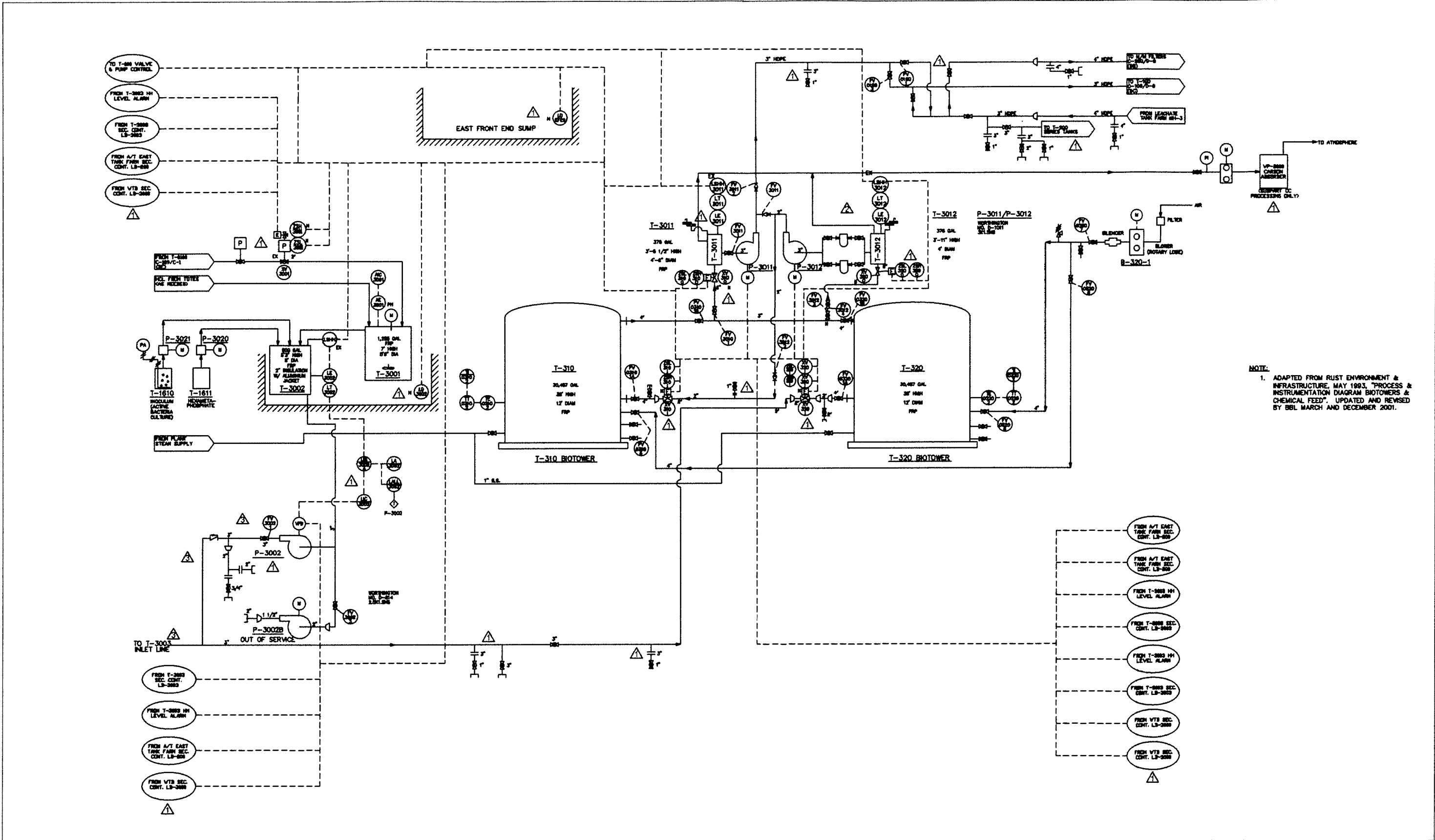
REVISION	NO.	BY	DATE
ADDED TANK T-220 PROJECT DETAILS & INTERCONNECTED TANKS PROJECT DETAILS WITH GENERAL SYSTEM UPDATES.	3	BDS	8/10/07
DELETED TANK T-220, FOUNDATION, AND ALL ASSOCIATED INLET AND OUTLET PIPING; CHANGED P-201 INLET PIPE LABEL; REMOVED LINE FROM FAC POND #3 AND ASSOCIATED PIPING.	4	BDS	11/13/06
ADDED TANK T-220 PROJECT DETAILS & INTERCONNECTED TANKS PROJECT DETAILS WITH GENERAL SYSTEM UPDATES.	5	BDS	5/2/06




EnSol, Inc.
Environmental Solutions

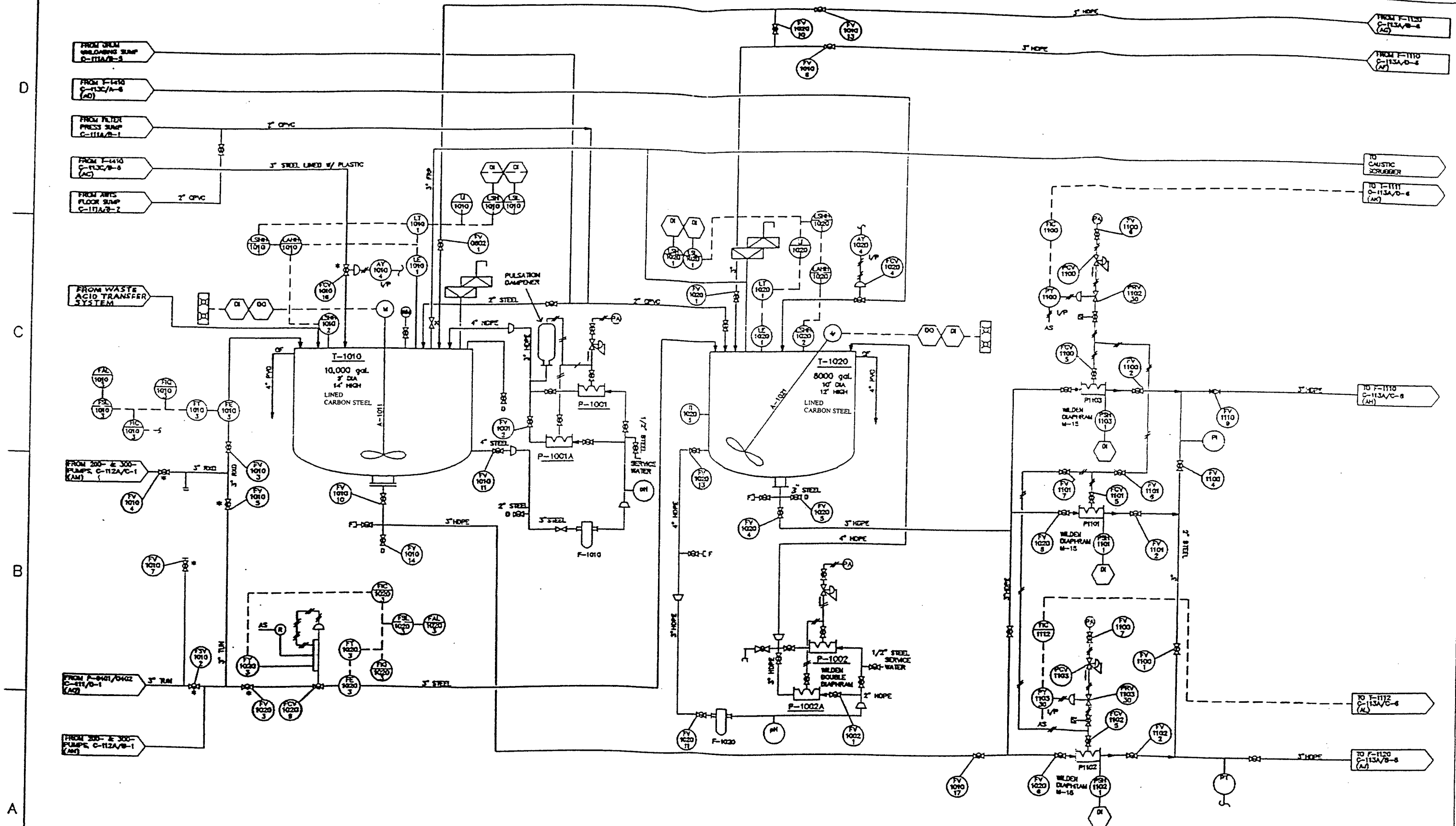
661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920 FAX (716) 285-3928

PROJECT NO:	05-7017		
SCALE:	NOT TO SCALE		
DWG:	05-7017-SHT.18.DWG		
DRAWN BY:	MJM	CHECKED BY:	BDS
DATE:	MAY 2006		

TITLE: OXIDIZING & REDUCING PROCESS AND INSTRUMENTATION DIAGRAM		
PROJECT: CWM FACILITY P & ID UPDATES		
PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY		
TOWN OF PORTER	COUNTY OF NIAGARA	STATE OF NEW YORK
DRAWING C-112 (SHEET 18)		



REVISION		NO.	BY	DATE	<div>EnSol, Inc.</div> <div>Environmental Solutions</div> <div>661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928</div>	PROJECT NO: 10-7006		TITLE: BIO-TOWERS & CHEMICAL FEED PROCESS & INSTRUMENTATION DIAGRAM				
						SCALE: NOT TO SCALE						
REMOVE VALVES ON P-3002 OUTLET			BDS	3/3/10			DWG: D19_10-7006-SHT19, REV3.DWG		PROJECT: CWM FACILITY P & ID UPDATES			DRAWING C-112A (SHEET 19)
ADDED DUAL BASKET STRAINERS TO T-3012 OUTLET			BDS	2/10/10			DRAWN BY: MJM CHECKED BY: BDS		PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY			
ADDED INTERCONNECTED TANKS PROJECT DETAILS, CHANGED T-3011/T-3012 TO FULL PORT BALL VALVES, REMOVED P-3002 DISCHARGE CONTROL VALVE, WITH GENERAL SYSTEM UPDATES.			BDS	5/2/06			DATE: FEBRUARY 2010		TOWN OF PORTER		COUNTY OF NIAGARA	
P IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 144 SECTION 7206, FOR ANY PERSON WHO ENGAGES IN ANY ACT OR ACTS UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ENGINEERING DRAWING.												

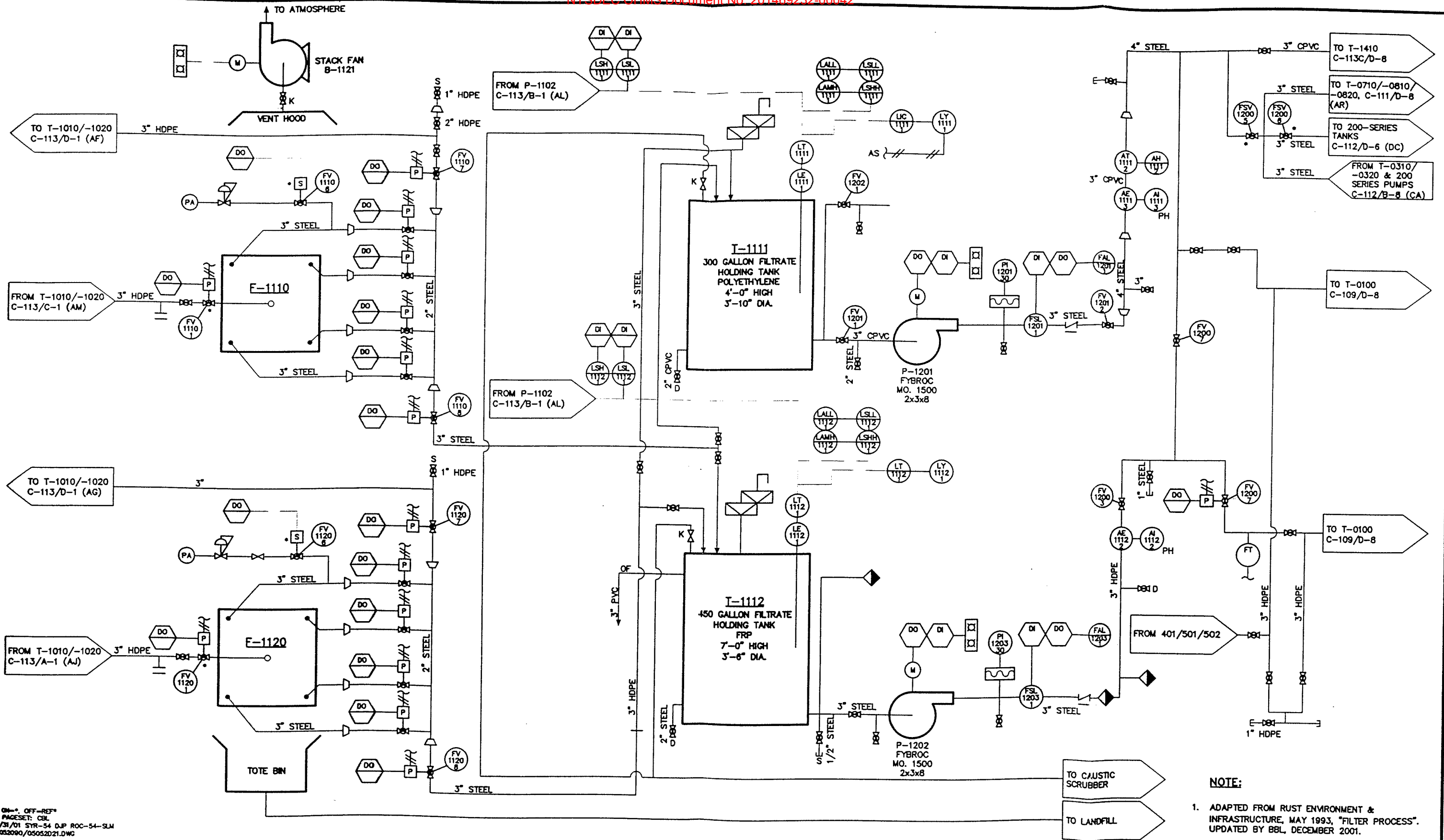


REVISIONS				REVISIONS				REVISIONS				REVISIONS			
NO.	DATE	BY	CHK	NO.	DATE	BY	CHK	NO.	DATE	BY	CHK	NO.	DATE	BY	CHK

PROCESS & INSTRUMENTATION DIAGRAM ALKALIZATION		MODEL CITY FACILITY CWM-CHEMICAL SERVICES, INC.		RUST ENVIRONMENT & INFRASTRUCTURE	
DATE	3-4-83	PROJECT NUMBER	1100000	DATE	8-8-83
DESIGN		FILE NUMBER	C-113	FILE NUMBER	
CHECKED/REV.	3-8-83	CLEARING NUMBER	8	SHEET NUMBER	20
APP'D. CHL	3-8-83	MODEL CITY	NEW YORK		
APP'D.					
APP'D.					

The drawings, specifications and other documents prepared by the Engineer for this project are instruments of the Engineer's service for use solely with respect to this project and, unless otherwise provided, the Engineer shall be deemed the author of these documents and shall retain all common law, statutory and other reserved rights, including the copyright.

OLD FILE NAME: 0-113000
NEW FILE NAME: 7-11-83



NOTE:

1. ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, MAY 1993, "FILTER PROCESS". UPDATED BY BBL, DECEMBER 2001.

L: ON=, OFF=REF
P: PAGESET: CBL
12/28/01 SYR-54 D/P ROC-54-SLM
05052090/05052021.DWG

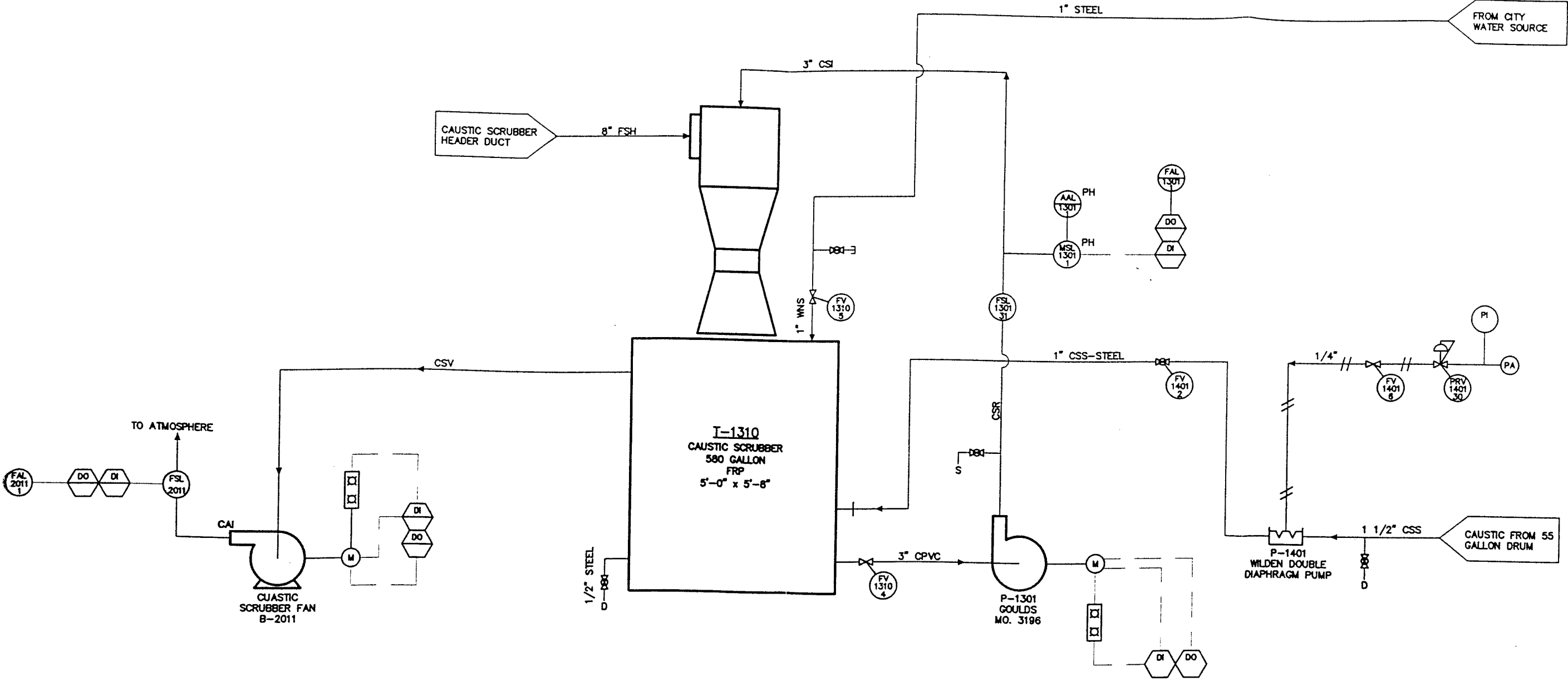
Graphic Scale
NOT TO SCALE
NO ALTERATIONS PERMITTED HEREON EXCEPT
AS PROVIDED UNDER SECTION 7209 SUBDIVISION
2 OF THE NEW YORK STATE EDUCATION LAW

No.	Date	Revisions	Init	Project Mgr.
				Designed by
				Drawn by
				Checked by
				Prof. Eng.
				PE License

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK
PROCESS & INSTRUMENTATION DIAGRAM
FILTER PRESSES

File Number
FILE NO.
Date
DECEMBER 2001
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Tawpath Road
Syracuse, NY 13214
315-448-9120
DRAWING NO.
C-113A
(SHEET 21)



L: ON-OFF-REF
P: PAGESET: CBL
12/31/08 31R-54 DLP ROC-54-SLM
05052008/05052022.DWG

Graphic Scale
NOT TO SCALE
NO ALTERATIONS PERMITTED HEREON EXCEPT
AS PROVIDED UNDER SECTION 7209 SUBDIVISION
2 OF THE NEW YORK STATE EDUCATION LAW

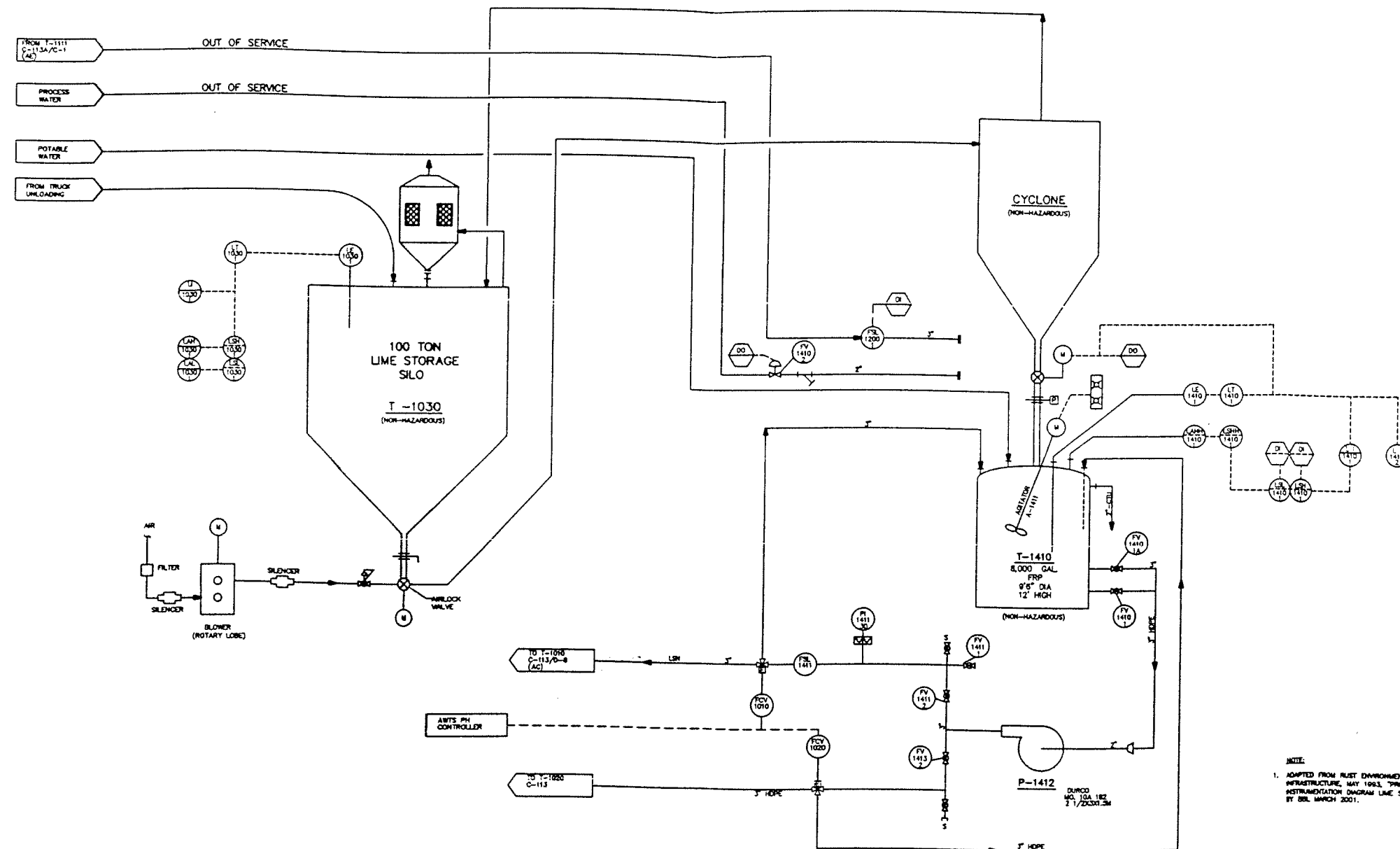
No.	Date	Revisions	Init	Project Mgr.
				Designed by
				Drawn by
				Checked by
				Prof. Eng.
				PE License

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK
**PROCESS & INSTRUMENTATION DIAGRAM
CAUSTIC SCRUBBER**

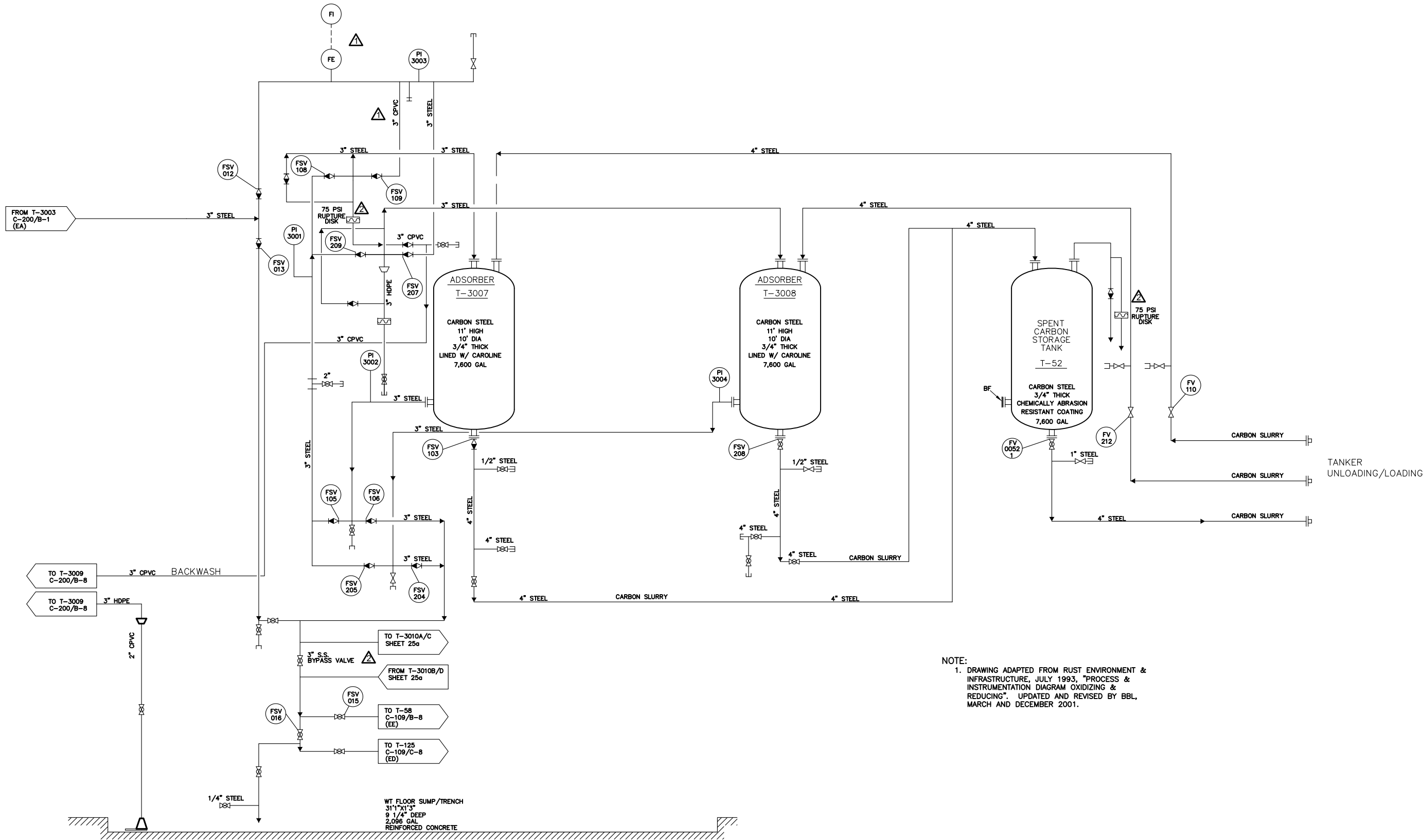
NOTE:
1. ADAPTED FROM RUST ENVIRONMENT &
INFRASTRUCTURE, MAY 1993, "PROCESS WATER &
PLANT AIR". UPDATED BY BBL, DECEMBER 2001.

File Number FILE NO.	DRAWING NO.
Date DECEMBER 2001	C-113B
Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Tompaw Road Syracuse, NY 13214 315-448-9120	(SHEET 22)





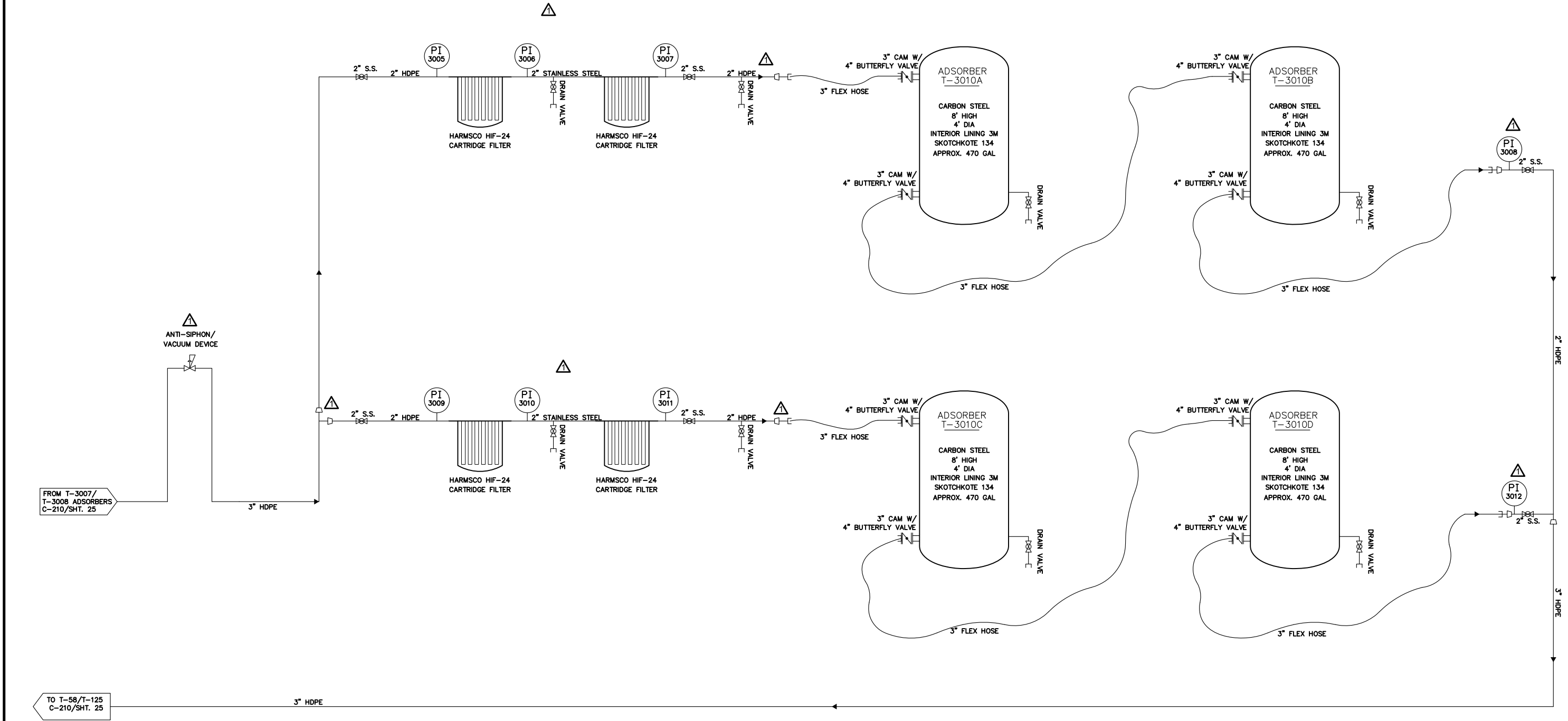
L: REF=OFF
P: STD=PCP/BL
12/31/01 ROC-S4-SLM
05052090/05052006.DWG


Graphic Scale		No.	Date	Revisions	Init	Project Mgr.	<div>BBL</div> <div>BLASLAND, BOUCK & LEE, INC.</div> <div>engineers & scientists</div>	CWM CHEMICAL SERVICES, LLC MODEL CITY, NEW YORK PROCESS & INSTRUMENTATION DIAGRAM LIME SYSTEM			File Number FILE NO.	DRAWING NO. C-113C (SHEET 23)
NOT TO SCALE		1	12/01	GENERAL SYSTEM UPDATES	BOS	Designed by		Date DECEMBER 2001				
NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW						Drawn by		Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120				
						Checked by						
						Prof. Eng.						
						PE License						



NOTE:
1. DRAWING ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, JULY 1993, "PROCESS & INSTRUMENTATION DIAGRAM OXIDIZING & REDUCING". UPDATED AND REVISED BY BBL, MARCH AND DECEMBER 2001.

REVISION	NO.	BY	DATE	<div>EnSol, Inc.</div> <div>Environmental Solutions</div> <div>661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928</div>	PROJECT NO: 05-7017	TITLE: CARBON ADSORPTION SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM			
					SCALE: NOT TO SCALE				
					DWG: 05-7017-Sht.25.DWG	PROJECT: CWM FACILITY P & ID UPDATES			DRAWING
ADDED T-3010 SYSTEM BYPASS AND RUPTURE DISK PRESSURE		AMW	5/22/13		DRAWN BY: AJZ CHECKED BY: BDS	PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY			C-210
ADDED ADSORBER TANKS INLET FLOW METER.		BDS	5/2/06		DATE: MAY 2006	TOWN OF PORTER	COUNTY OF NIAGARA	STATE OF NEW YORK	(SHEET 25)
IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY.									

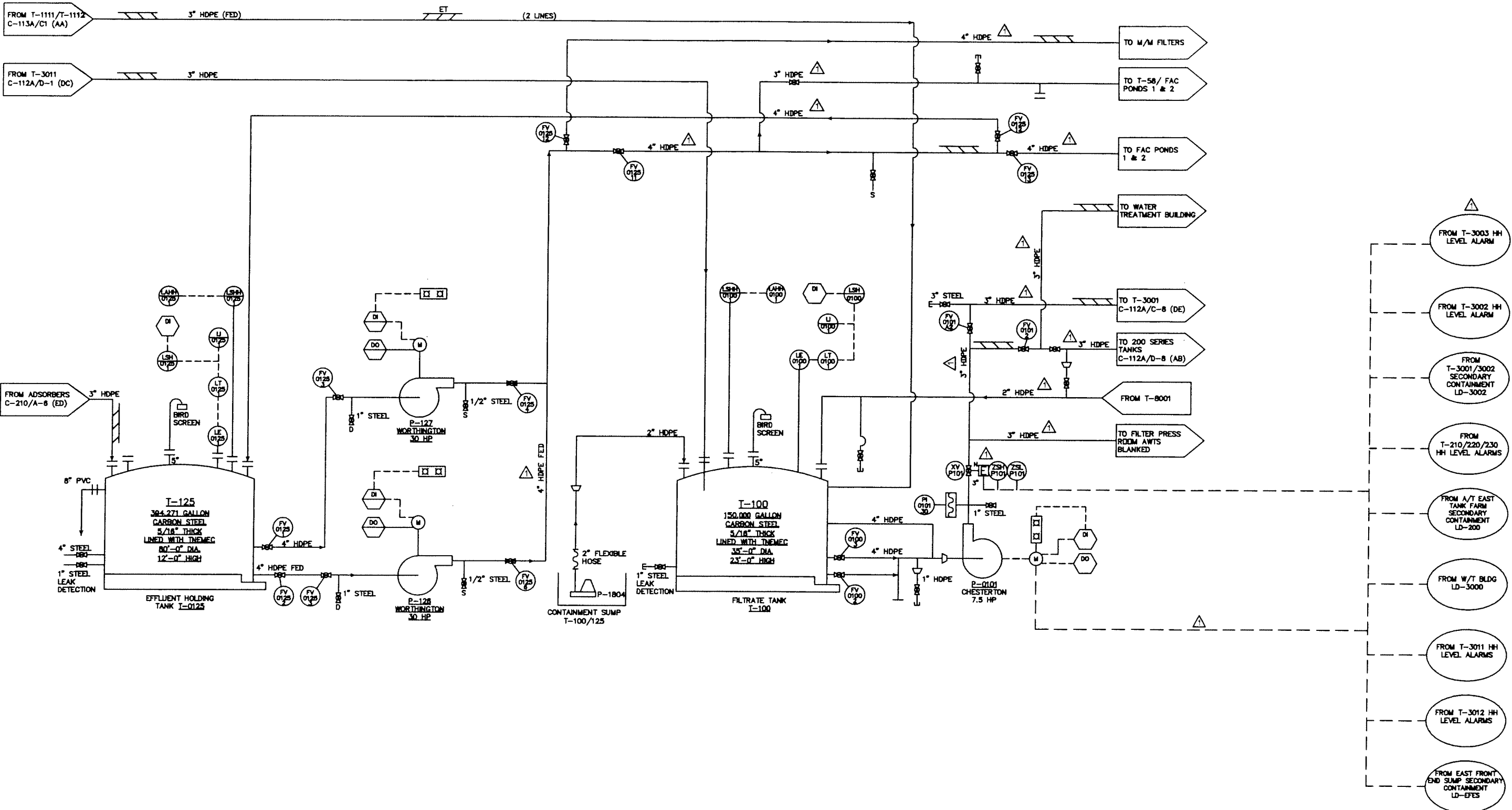


REVISION		NO.	BY	DATE	<div>EnSol, Inc.</div> <div>Environmental Solutions</div> <div>661 MAIN STREET NIAGARA FALLS, NY 14301 PHONE (716) 285-3920 FAX (716) 285-3928</div>	PROJECT NO: 13-7009		TITLE: <div>ARSENIC REMOVAL SYSTEM</div> <div>PROCESS AND INSTRUMENTATION DIAGRAM</div>			
						SCALE: NOT TO SCALE					
						DWG: D25A_13-7009-SHT.25A.DWG		PROJECT: CWM FACILITY P& ID UPDATES			DRAWING C-220 (SHEET 25a)
						DRAWN BY: AMW CHECKED BY: BDS		PREPARED FOR: CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY			
						DATE: APRIL 2013		TOWN OF PORTER		COUNTY OF NIAGARA	
ADDED PRESSURE INDICATORS, ANTI-SIPHON LOOP, AND REDUCERS			AMW	5/22/13							
IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY.											

IT IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW, ARTICLE 145 SECTION 7209, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY.

NOTE:

1. EXISTING BASEMAP ADAPTED FROM RUST ENVIRONMENT & INFRASTRUCTURE, MAY 1993, "FILTRATE & LEACHATE TANKS", UPDATED BY BBL, DECEMBER 2001.



REVISION	NO.	BY	DATE
ADDED INTERCONNECTED TANKS PROJECT DETAILS, REVISED T-100/125 DISCHARGE PIPING FROM STEEL TO HDPE, WITH GENERAL SYSTEM UPDATES, RENAMED DRAWING	1	BDS	5/2/06

EnSol, Inc.
Environmental Solutions

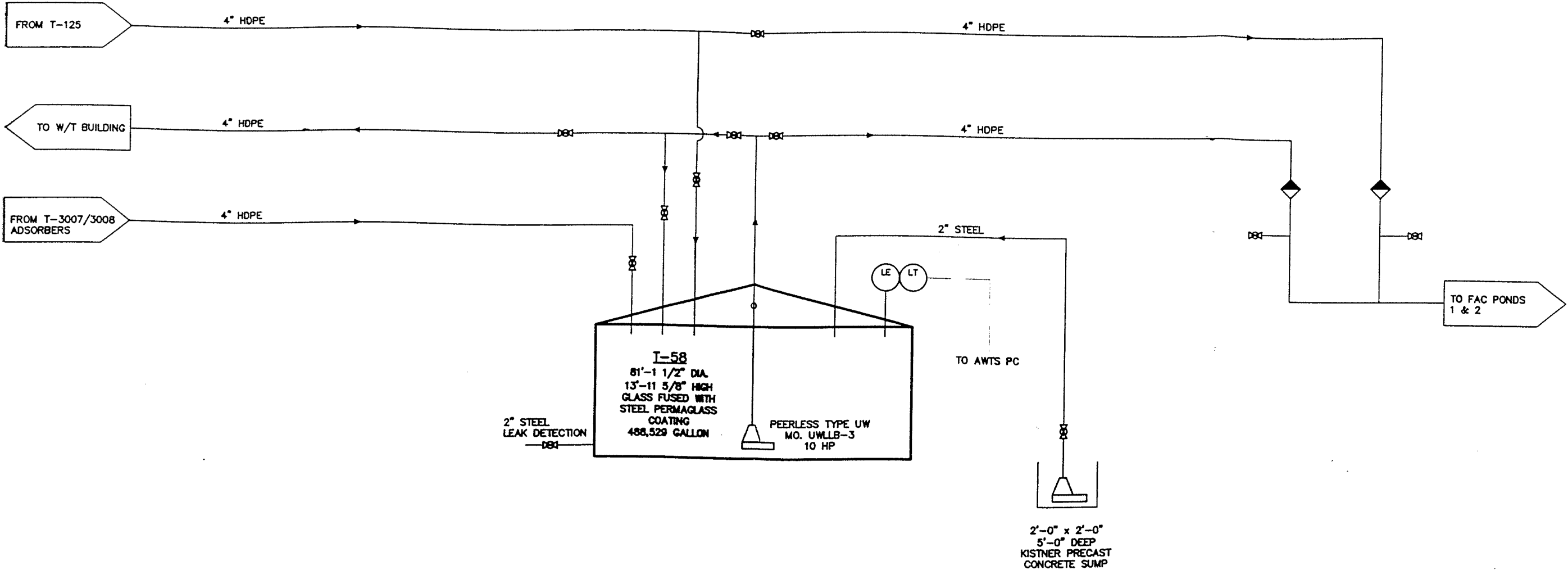
661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920 FAX (716) 285-3928

PROJECT NO:	05-7017
SCALE:	NOT TO SCALE
DWG:	05-7017-SHT 26 DWG
DRAWN BY	MJM
CHECKED BY:	BDS
DATE:	MAY 2006

TITLE: FILTRATE & TREATED EFFLUENT TANKS
PROCESS AND INSTRUMENTATION DIAGRAM

PROJECT:		CWM FACILITY P & ID UPDATES	
PREPARED FOR:		CWM CHEMICAL SERVICES, LLC., MODEL CITY FACILITY	
TOWN OF PORTER	COUNTY OF NIAGARA	STATE OF NEW YORK	

DRAWING
C-109
(SHEET 26)



NOTE:

- 1. ADAPTED FROM CWM CHEMICAL SERVICES, INC., FEBRUARY 1997, "TANK 58". UPDATED AND REVISED BY BBL, DECEMBER 2001.

L: ON=*, OFF=DEP*
P: PAGESET: CBL
12/31/01 SYR-SK DLP ROC-54-SLM
05052090/05052094.DWG

Graphic Scale

NOT TO SCALE

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

No.	Date	Revisions	Init	Project Mgr.

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NEW YORK

PROCESS & INSTRUMENTATION DIAGRAM

TANK 58

File Number
FILE NO.

Date
DECEMBER 2001

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

DRAWING NO.

C-T-58

(SHEET 27)