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October 28, 2013

Alex G. Czuhanich
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Groundwater Treatment System O&M Plan, Revision 6
Olin Chemicals
Buffalo Avenue Facility, Niagara Falls, NY

Dear Mr. Czuhanich:

On behalf of Olin Corporation, AMEC Environment & Infrastructure, Inc. (AMEC) has prepared a revision to the existing Groundwater Treatment System (GWTS) Operations and Maintenance Plan. The attached Revision 6 is a general update of all sections. We have also added standard operating conditions in Section 3.0 and we've updated P&IDs, electrical drawings, DCS screen shots, and air stripper and carbon system information in the Appendices.

Following your review of the updated O&M Plan, Olin requests your approval to proceed with its implementation as the official O&M Plan for GWTS operations. If you have any questions whatsoever, please don't hesitate to call me.

Sincerely,
OLIN CORPORATION

Richard W. McClure, P.G.
Principal
Environmental Remediation Group

cc (via e-mail):
Tony Englund, AMEC
Dave Share, Olin Corporation
Christine Markham, Olin-Niagara
Rob Meyer, Olin-Niagara

Groundwater Treatment System Operations and Maintenance Plan

Revision 06

Olin Niagara Falls Plant
Niagara Falls, New York

Prepared for:

OLIN CORPORATION

Prepared by:

AMEC Environment &Infrastructure, Inc.
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October 21, 2013
Project 6107-13-0002

RECORD OF PLAN REVISIONS

Revision No.	Revision Date	Section(s) Revised	Revision Description/Reason
00	4/12/1999	Original Version	
00	11/1999	Sections 3 & 4	Bi-weekly inspections change to weekly; semi-annual maintenance changed to annual; continuous acid addition rates revised to reflect HCl instead of H2SO4. Added DNAPL checks and removal to monthly monitoring.
01	6/28/2002	Sections 2, 3, & 4	PR-4 converted to a pumping well
02	3/18/2004	All	PR-12 and OBA-9AR converted to pumping wells
03	4/11/2008	All	General update of all sections. Removed references to peristaltic pumps – all wells using submersible pumps now. Added information for Carbon Adsorption System installed on treatment system discharge to remove BHCs from effluent.
04	7/15/2011	All	General update of all sections. Removed references to decommissioned clarification tank and replaced references to OMNX with general control terminology. Updated air stripper model from STAT 400 to STAT 180.
05	6/29/2012	All	General update of all sections.
5.1	8/1/2012	5.1/Tables/ Figures	Minor editorial corrections per NYSDEC comments via email from July 20, 2012
06	9/30/2013	All	General update of all sections. Added standard operating conditions in Section 3.0. Added P&IDs, electrical drawings, DCS screen shots, and air stripper and carbon system info as Appendices.

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
ACGIH	American Conference of Governmental Industrial Hygienists
ARGC	Alundum Road/Gill Creek
BHC	benzene hexachloride
cfm	Cubic feet per minute
dB	Decibels
DCS	Distributed Control System
FRP	fiberglass reinforced plastic
gpm	gallons per minute
GWTS	Groundwater Treatment System
HDPE	high density polyethylene
HOA	HAND-OFF-AUTO
NYSDEC	New York State Department of Environmental Conservation
O&M	Operations and Maintenance
Olin	Olin Corporation
Order	Administrative Order on Consent
OSHA	Occupational Safety and Health
P&ID	Piping and Instrumentation Diagram
PEL	Permissible Exposure Limit
POTW	Publicly Owned Treatment Works
PR	Passive Relief Well
psid	pounds per square inch differential
psig	pounds per square inch gauge
RW	Recovery Well
TLV	Threshold Limit Value
V	volt
VOC	volatile organic compound

1.0 BACKGROUND

As required by the Administrative Order on Consent (Order) #R9-4171-94-08 between New York State Department of Environmental Conservation (NYSDEC) and Olin Corporation (Olin), Olin has implemented a Remedial Plan to address groundwater contamination at Plant 2, in Niagara Falls, New York. In accordance with the Remedial Plan, a Groundwater Treatment System (GWTS) was installed at the site in 1998 and has been operated since that time. The goals of the GWTS are to reduce the concentration of Olin-derived hazardous waste constituents in the site groundwater and restrict off-site migration of these constituents.

The GWTS currently consists of eight recovery wells, 11 passive relief wells, and a groundwater treatment plant. The groundwater treatment plant consists of a pH adjustment system, a low-profile air stripper, and two liquid phase carbon filters which treat the groundwater before discharge to the Publicly Owned Treatment Works (POTW). The current Niagara Falls Water Board POTW Permit is attached as Appendix A. Figure 1.1 shows the layout of the site including the locations of the recovery wells and the treatment system building (Building 73). Figure 1.2 provides a large view of the Alundum Road/Gill Creek (ARGC) area of the site.

This GWTS Operations and Maintenance (O&M) Plan has been prepared as required by the Order to: 1) guide the effective operation of the GWTS; 2) establish the requirements for monitoring the GWTS and the remediation progress; and 3) document the routine reporting requirements necessary to comply with the Order. The O&M Plan should be used in conjunction with the manufacturer O&M manuals for the GWTS equipment.

2.0 GROUNDWATER TREATMENT SYSTEM DESCRIPTION

This section describes the design and components of the GWTS. Additional information can be found in the 90 percent Design Report dated May 30, 1997 and the Construction Certification Report dated January 1998. The GWTS is located in the ARGC area of Plant 2 as shown on Figures 1.1 and 1.2. The treatment system equipment is located in Building 73 (Figure 2.1), and the treatment capacity of the plant is approximately 90 gallons per minute (gpm). The major components of the GWTS are as follows:

- Groundwater Recovery and Passive Relief Wells
- Acid Injection
- Two Stage pH Adjustment
- Low-Profile Air Stripper
- Liquid Phase Activated Carbon Vessels
- Effluent/Backwash Collection Tank
- Publicly Owned Treatment Works Discharge
- Secondary Containment

Site groundwater in the Alundum Road-Gill Creek (ARGC) area of Plant 2 is recovered to provide hydraulic containment of impacted groundwater. The groundwater is recovered by eight recovery wells (RWs), RW1, RW2, RW3, RW4, RW5, PR4, PR12, and OBA9AR, and pumped to the GWTS located in Building 73. The GWTS is designed to adjust the pH of the incoming groundwater, if necessary, and remove volatile organic compounds (VOCs) and pesticides prior to discharge to the POTW. A process flow diagram (PFD) and piping and instrumentation diagrams (P&IDs) are provided in Appendix B. Electrical and control drawings are provided in Appendix C.

The GWTS is operated predominately through the Plant's Distributed Control System (DCS). DCS terminals for GWTS control are available in Building 73 and in Building 29 (caustic loading area.) The DCS monitors and controls the recovery wells, pH adjustment, and air stripper

operations. There are ten DCS screens dedicated to GWTS control: one screen for each of the eight RWs, one screen for the pH adjustment system, and one screen for the air stripper and collection sump. The DCS screens are presented in Appendix D. The air stripper and activated carbon system also have local control panels.

2.1 GROUNDWATER RECOVERY AND PASSIVE RELIEF WELLS

The eight RWs pump groundwater from the surficial water bearing zone (A-Zone) and the subsequent fractured bedrock water bearing zone (B-Zone). Passive relief wells (PRs) were also installed in the ARGC area to enhance the capture of the A-zone groundwater. The PRs are screened across both the A-zone and the B-zone such that the A-Zone water is drained into the B-Zone for capture by the RWs. Table 2.1 presents a well construction summary, indicating well size, well construction, coordinates, elevations, and screen depth for the RWs, PRs, and other site monitoring wells and piezometers.

The GWTS originally consisted of five RWs (RW-1 – RW-5) and five PRs (PR-1 – PR-5). PR-1 to PR-5 were designed to allow easy conversion to RWs if additional groundwater capture is required. The well design is the same as the RWs and groundwater collection piping from the PRs to the treatment system was installed. In 2002, a passive relief well (PR-4) was retrofitted with a pump and tied into the existing treatment system. In September 2002, seven more passive relief wells (PR-6 – PR-12) were added to the system. In May 2003, PR-12 and OBA-9AR were retrofitted to be pumping wells and were put on-line with the existing system. An additional passive relief well (PR-13) was installed in June 2003.

Both the RWs and PRs are installed to a depth of approximately 25 feet below grade or about 3 to 5 feet below the bottom of the B-Zone. A lockable protective cover is installed on each well. Stainless steel submersible pumps are installed in each of the recovery wells. RW-1, RW-2, RW-4, RW-5, and PR-4 are equipped with pitless adapter units. The well discharge piping exits the side of the well casing through the pitless adapter assembly at a depth below the frost line. These adapters allow those wells fitted with submersible pumps to be removed for service using a removable steel pull pipe, which is threaded into the adapter unit.

RW-3, PR-12, and OBA-9AR are not equipped with pitless adapters. Groundwater at RW-3 and PR-12 is pumped above ground and then discharged to underground piping at the wellhead. OBA-9AR is piped to the discharge line at PR-12. The underground piping for PR-12 and OBA-9AR was installed and tied into the system at the junction with PR-5. The eight RWs are equipped with heated fiberglass covers.

Each RW is equipped with an electric submersible well pump and a water level transducer which measures the water elevation in the well. The water elevation is displayed on local displays at the wellheads and on the recovery well DCS screens (LIT730301A – H). The RW pumps can be operated in Auto or Manual modes from the DCS screens by XS730301A – H. The RW pumps should be operated in Auto mode. In Auto mode, the DCS starts and stops the well pump operation based on the water elevation in the well. Additionally, the DCS will stop the pumps for various interlock conditions (see P&ID drawings for interlock information). In Manual mode, the DCS will start the pumps and they will operate continuously and independent of the water elevation and other control interlocks until they are turned OFF by the operator.

Recovered groundwater is pumped from the RWs to the GWTS via underground dual-containment piping. Dual-containment piping was constructed to conform to the secondary containment requirements specified in 6NYCCR Part 373-2.10. A 4-inch outer diameter standard dimension ratio (SDR)-11 wall thickness high density polyethylene (HDPE) carrier pipe from each well contains a 1.5-inch HDPE SDR-11 groundwater discharge pipe. The 1.5-inch pipe was threaded through the 4-inch carrier pipe to each well to allow future replacement of the inner pipe, if needed, without the excavation of the 4-inch carrier pipe.

A fabricated HDPE leak detection fitting was attached to each pitless adapter flange with a 4-inch HDPE riser pipe extended to above ground surface, approximately 2 feet from the recovery well casing. Each leak detection riser contains a float switch, which provides continuous monitoring for the presence of liquid in the sump. The DCS will shut down the RW pump if liquid is detected in the leak detection sump. The leak detection status is displayed on each RW DCS screen.

Each RW is equipped with a flow meter and manual control valve which are located in Building 73 with the exception of OBA-9AR. The OBA-9AR flow meter and control valve are located at

the OBA-9AR wellhead. The well flow rates can be adjusted with the manual control valves. The flow rate and flow total are displayed on the RW DCS screens.

2.2 RECOVERY WELL ACID INJECTION

The acid injection system is used to control carbonate scaling of select RW screens, pumps, and piping as necessary. Hydrochloric acid is used to prevent and remove carbonate scaling. Acid injection tubing is installed from Building 73 to RW-1 and PR-12. Manual metering pumps deliver the acid directly to the wellhead as necessary to prevent and remove carbonate scaling.

The hydrochloric acid is stored in totes in Building 73 and is also used for the pH adjustment system as described in Section 2.3. PR-4 is also equipped with acid injection. The PR4 acid pump and acid supply are located at the PR4 wellhead.

2.3 TWO STAGE PH ADJUSTMENT

The two-stage pH adjustment system is designed to address high pH groundwater from the RWs. First-stage and second-stage pH adjustment tanks have a capacity of 3,000-gallons each, with a 50-minute retention time per tank (at 60 gpm) to allow adequate equalization and mixing. The tanks are constructed of premium fiberglass reinforced plastic (FRP) laminate resin for corrosion resistance. The tanks are continuously mixed by constant speed vertical-shaft mixers.

The mixers can be controlled on the pH adjustment system DCS screen via XS730302A and XS730302B. In AUTO mode, the tank mixers will always be on when the RW pumps are operating.

Groundwater is pumped from the RWs to the first-stage pH adjustment tank. The pH is continuously monitored and displayed on the pH adjustment system DCS screen (AIC730301B). The first-stage tank is used for equalization.

The groundwater flows by gravity to the second-stage pH adjustment tank. The second stage pH is continuously monitored using two pH probes for redundancy and to indicate if a pH probe needs service or calibration. The two pH values are displayed on the pH adjustment DCS screen (AIC730301A and AIT730301B) as well as on a display panel at the pH adjustment tanks. The DCS will interlock the RW pumps off if a high or low pH alarm is active in either the

first- or second-stage pH adjustment tank. The DCS will interlock the RW pumps off if the difference between the two pH probes in the second-stage pH adjustment tank exceeds 2 standard pH units.

The groundwater pH is adjusted as necessary to meet the POTW discharge criteria (see Appendix A). Acid is pumped to the first-stage pH adjustment tank using an acid metering pump controlled by the DCS. The metering pump is activated when the pH reaches the high-level pH set point and the speed is controlled by the DCS. The metering pump is deactivated when the pH reaches the low-level pH set point. Caustic can also be pumped to the first-stage pH adjustment tank with a manual metering pump to raise the pH if too much acid has been added.

The hydrochloric acid is stored and metered from polypropylene totes provided by the chemical supplier. Polypropylene spill pallets, each with a 400-gallon capacity, are provided for spill containment for these totes. Non-stainless steel exposed metal surfaces, piping, and ancillary equipment is protected from corrosion by an appropriate paint or coating as required by 6 NYCCR Part 598.9(e).

2.4 AIR STRIPPER

pH adjusted groundwater flows by gravity from the second stage pH adjustment tank to the air stripper. The air stripper reduces the volatile organic compound (VOC) concentrations prior to activated carbon treatment and final discharge to the City of Niagara Falls POTW. The original Carbonair STAT 400 air stripper was installed in 1997 and operated effectively until 2011. In 2011, the air stripper was replaced due to significant corrosion and increasing maintenance costs. The unit was replaced with a Carbonair STAT 180 based on the typical flow rates observed since 1997. The new unit is constructed of 316 stainless steel for improved corrosion resistance. The manufacturer O&M manual, panel schematic, and other equipment information are provided in Appendix E.

The air stripper has seven 316 stainless steel trays, a 15 horsepower (HP) blower capable of 900 cubic feet per minute (cfm), and a treated water collection sump. The seventh tray and larger, 15 HP New York Blower Model 2606 were added in 2013. The air stripper treated water collection sump has a capacity of approximately 225 gallons. The air stripper was originally

equipped with an inlet air heater. The inlet air heater has been decommissioned and its associated controls are no longer in service or shown on the P&IDs.

The air stripper is controlled by a local control panel and also by the DCS. A HAND-OFF-AUTO (HOA) switch for the blower is present on the local control panel. The local control panel also displays the air stripper alarms: low blower pressure and high sump level. The air stripper blower can be operated from the sump/air stripper control DCS screen via XS730401. The DCS will interlock the RW pumps off if the blower is not operating.

The blower intake pulls fresh air as well as from the headspace of the pH adjustment tanks to ventilate the tanks. A flow indicator is available to take manual vapor flow rate readings. Vapors exit the air stripper through the air stripper discharge stack.

The air stripper vapor discharge outlet is connected to a discharge stack to allow compliance with Occupational Safety and Health (OSHA) permissible exposure levels (PELs). The outlet meets the requirements specified in the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) for contaminants, and the NYSDEC annual Guideline Concentration and Short-Term Guideline Concentrations for constituents of concern. The 12-inch diameter FRP vapor discharge stack penetrates the roof of Building 73 and extends to a height of over 50 feet above ground level. Based on anticipated groundwater concentrations collection rates, and air modeling, Olin and NYSDEC have determined that the emission rate meets the applicable criteria.

Treated groundwater is collected in the air stripper sump. The air stripper effluent water can be pumped to the carbon adsorber unit before discharge, or it can be directly discharged to the sewer by gravity. The air stripper sump is equipped with a float switch which activates a high level alarm on the air stripper control panel. A high level in the air stripper sump typically indicates a low pump discharge flow rate, a discharge pump failure, fouling in the carbon vessels or in the discharge line. If the level in the sump reaches the high-level alarm set point, the recovery well pumps will stop pumping groundwater and the high-level alarm will activate.

The air stripper discharge sump is also equipped with a gravity drain line that will allow the water to drain directly to the sewer and bypass the pumps, carbon vessels, and

effluent/backwash collection tank. This line is provided to allow bypass in situations when carbon treatment is not necessary or both carbon feed pumps are out of service. The gravity line is equipped with a butterfly valve that can be opened to allow gravity drain and bypass. For general operation, the bypass valve should be kept closed and locked, and all water should be pumped through the carbon vessels before discharge.

2.5 LIQUID PHASE ACTIVATED CARBON VESSELS

Treated Groundwater from the air stripper discharge sump is pumped to the liquid phase activated carbon vessels as a polishing step to remove benzene hexachlorides (BHCs). These vessels were added to the system in April 2008. There are two FRP, skid-mounted, 1,400 pound activated carbon vessels. The vessels are connected with a piping manifold that allows series (lead/lag), parallel, single, or backwash operation. The vessels are capable of operating at flows up to 90 gpm, pressures up to 150 pounds per square inch gauge (psig), and temperatures up to 140 degrees Fahrenheit (^{o}F).

The carbon feed pumps consist of two in-line process pumps. One discharge pump is sufficient to handle system flows up to 90 gpm, and the other pump may be reserved as a backup. The pumps are controlled by HOA switches on a local control panel. The DCS does not monitor or control the carbon system.

Each carbon feed pump is equipped with a globe valve on the discharge piping to manually regulate the flow rate. A flow meter is installed in the combined pump discharge line, which measures and displays the pump flow rate and totalized flow. The pumps are controlled by high and low float switches installed in the sight glass of the air stripper sump.

The carbon vessels are equipped with a differential pressure transducer which measures the differential pressure (psid) between the inlet and outlet of the combined carbon unit. The differential pressure across the unit is transmitted to the local controller which displays the value. Additionally, each vessel is equipped with pressure gauges at the inlet and outlet to allow

manual differential pressure readings from the individual vessels. The carbon vessels are also equipped with a pressure switch and rupture discs to prevent over pressurization of the vessels.

The manufacturer operating instructions and the control panel schematic for the activated carbon vessels are provided in Appendix F.

2.6 EFFLUENT/BACKWASH COLLECTION TANK

The effluent from the carbon vessels is piped to a backwash collection tank. The tank is a 4,000 gallon domed HDPE tank. The treated water discharges into the tank and is allowed to overflow from piping near the top of the tank to the sewer discharge point. Therefore, the tank is constantly filled with treated water to provide an adequate supply of water for carbon vessel backwashing operations.

2.7 TREATED GROUNDWATER DISCHARGE TO POTW

Treated groundwater flows by gravity drainage from the backwash tank through a 6-inch PVC pipe to a 6-inch diameter HDPE single-wall discharge pipe that exits the south wall of Building 73. The discharge pipe is below the frost depth. This line connects with the gravity flow storm sewer, which carries the flow to the designated POTW outfall (the 7-S Sump) at Plant 2. The GWTS is interlocked with the 7S Sump such that the DCS will shut down the RW pumps if a high level is detected in the 7S Sump. The 7S Sump level is indicated on the Sump/Air Stripper Control DCS screen.

2.8 SECONDARY CONTAINMENT

Secondary containment is provided in Building 73 using a concrete containment curb 2 feet high around the treatment area. The containment volume provided by the curb exceeds 110 percent of the volume of all the interconnected tanks in the groundwater treatment plant as required by NYCRR Part 373.2-10. The floor sump has no outlet and is fed by existing floor drains and subfloor piping. An industrial floor coating resistant to chemical spills (TUFCO) was applied to the concrete floor in Building 73.

The floor sump in Building 73 within the containment area contains a submersible pump that discharges into the first-stage pH adjustment tank. The sump pump is operated manually by a

120-volt (V) receptacle. The sump is also equipped with a high level float switch. A DCS interlock will shut down the RW pumps if a high level is detected in the Building 73 sump.

3.0 STANDARD OPERATING PROCEDURES

This Section provides the Standard Operating Procedures for the major operations of the GWTS.

3.1 GWTS OPERATING OBJECTIVE AND STRATEGY

The operational objective of the groundwater collection system is to capture groundwater in the A-Zone and B-Zone which otherwise would move across the ARGC area to the northeastern portion of Olin's Plant 2. The operational control strategies are to pump groundwater from the RWs, enhance drainage of the A-Zone, and create a hydraulic gradient in the B-Zone towards the recovery wells. The groundwater capture in the A-Zone and B-Zone is evaluated quarterly by preparing potentiometric surface maps using site water level data as described in Section 5. The RW flow rates and water levels are adjusted accordingly based on the potentiometric surface maps.

3.2 GWTS NORMAL OPERATION

1. OPEN RW Discharge Valves.
2. OPEN Acid Tote Discharge Valve.
3. OPEN pH Adjustment Pump Inlet Valve.
4. OPEN pH Adjustment Pump Discharge Valve.
5. OPEN Air Stripper Blower Fresh Air Inlet Damper.
6. Verify that carbon system valves V1 through V40 are CLOSED.
7. OPEN valves V1, V2, V4, V5, V6, V8, V9, V11, V12, V13, V18, V31, V33, V35, and V37.
8. OPEN valves V19, V24, V25, and V30 on the vessel piping manifold for series operation of carbon vessels from vessel No. 1 to vessel No. 2. See Table 3.1 and Figure 3.1 for a tabular and graphical representation of the valve positions. Table 3.1 and Figure 3.2 show the valve positions for series operation from vessel No. 2 to vessel No. 1 (see discussion of lead/lag operation in Section 3.3).
9. Place the Carbon Feed Pump 1 (or 2) switch at the local control panel (CP-1) in the AUTO position. The operating Carbon Feed Pump should be alternated periodically to maintain functionality of both pumps.

10. Place the Air Stripper Blower in AUTO operation at the local Air Stripper Panel.
11. Place the Air Stripper Blower in AUTO operation at the DCS terminal.
12. Place the 1st Stage and 2nd Stage pH Adjustment Mixer local hand switches in the AUTO position.
13. Place the 1st Stage and 2nd Stage pH Adjustment Mixers in AUTO operation at the DCS terminal.
14. Place the pH Adjustment pump local hand switch in the AUTO position.
15. Place the RW pump local hand switches in the AUTO position. Note: PR12 and OBA9AR are not equipped with local hand switches.
16. Place the RW pumps in AUTO operation at the DCS terminal.
17. Adjust the RW flow rate and water level as desired using the manual throttling valves in the RW discharge lines.
18. Adjust blower air flow rate to 900 CFM per the manufacturer's instructions after the air stripper has filled.
19. Adjust carbon feed pump flow rate as necessary to be higher than the influent flow rate.

3.3 RECOVERY WELL ACID INJECTION

Generally, the acid feed rate is selected to maintain the pH of the extracted water in the range of 6.5 to 7. The recovery well acid metering pumps are operated manually by local ON-OFF switches. The pump flow rate must be manually set by manual stroke adjustments at the pump. The PR4 acid pump is controlled manually by a 120V receptacle at the PR4 wellhead. The acid flow rate is adjusted using manual speed and stroke controls located on the pump. The acid injection pumps must be manually shut down if the treatment system is shut down by the DCS to prevent acid build-up in the wells when the RW pumps are not pumping.

3.4 TWO STAGE PH ADJUSTMENT

The two-stage pH adjustment is automatically operated by placing the mixers and acid pump into AUTO mode as described in Section 3.1. If the pH becomes too low, it can be manually increased by adding caustic to the first-stage pH adjustment tank using the caustic metering pump. The caustic metering pump is controlled manually by a local ON-OFF switch and a manual stroke adjustment knob. The metering pump stroke should be

adjusted to a low value (<10%) using the adjustment knob prior to starting the pump. The pump is then started by placing the ON-OFF switch in the ON position. Add caustic carefully at a slow rate to avoid overshooting the pH to a high value. Stop the caustic metering pump once the pH has increased enough to clear the low pH interlock.

3.5 AIR STRIPPER

As mentioned above, the air flow to the air stripper should be adjusted once the air stripper has been filled with groundwater. A manual control damper is used to adjust the air flow rate to approximately 900 CFM per the manufacturer's instructions. The air flow through the air stripper is a critical operational parameter for adequate removal of VOCs from the groundwater. The air flow rate should be observed regularly and adjusted as necessary to maintain 900 CFM. Scaling in the air stripper will cause the air flow rate to decrease requiring adjustment of the control damper. If the air flow rate is consistently below 800 CFM and the control damper is completely open, the fresh air inlet screen should be cleaned. If the air flow rate remains low, the air stripper trays should be cleaned per manufacturer's instructions. **The GWTS should be manually shut down immediately if the air flow rate drops below 650 CFM. This situation requires operator intervention.**

The blower should be operated with the fresh air inlet damper fully open. The pH Adjustment Tank vent ducting damper should only be opened enough to induce air flow in the ducting to capture vapors from the headspace of the pH Adjustment Tanks. A gauge is present in the ducting to verify the negative pressure.

3.6 CARBON VESSEL LEAD/LAG OPERATION

The carbon vessels are designed to be operated in a lead/lag series configuration. The lead and lag configuration (e.g. vessel 1 to vessel 2) should be maintained until a carbon change out. The carbon in a vessel will be changed out when the vessel effluent mass flow of a constituent listed in the POTW permit exceeds 80% of its annual average limit. The specific monitoring procedures are detailed in Section 4. The lead and lag designations should be reversed after the carbon has been changed in one of the vessels.

3.7 CARBON VESSEL BACKWASH

The carbon vessel manufacturer recommends periodic backwashing of the vessels as necessary to maintain the system flow rate and pressure. The backwash procedure is performed manually and requires an operator's attention throughout the process. The following procedure should be used to backwash the carbon vessels.

1. Shut down the Carbon Feed Pump 1 (or 2) by placing the switch at CP-1 in the OFF position.
2. CLOSE the valves V1 and V8.
3. OPEN valve V15 to allow bypass of the carbon system while backwashing.
4. OPEN valve V41 (backwash supply).
5. Due to the containment wall, the backwash supply piping has a high point that may trap air and cause the feed pumps to vapor lock. Bleed valves have been installed in the backwash supply line between the backwash tank and feed pump. These valves should be opened slowly to allow any trapped air to escape. Reclose the bleed valves when water runs freely from the valves.
6. Place the valves on the carbon skid manifold in the appropriate positions for backwash of Vessel 1. See Table 3.1 and Figure 3.3.
7. Start Carbon Feed Pump 1 by placing the switch at CP-1 in the HAND position.
8. The initial backwash rate should be approximately 35 to 40 gpm. The globe valve (V4) on the pump discharge should be placed in a position that will yield a flow in this range.
9. Glove valve V4 should be gradually opened over one to two minutes to the full OPEN position.
10. Start Carbon Feed Pump 2 by placing the switch at CP-1 in the HAND position. The discharge globe valve (V11) should be partially open.
11. Glove valve V11 should be gradually opened over one to two minutes to the full OPEN position.
12. The backwash flow rate should be approximately 100 gpm per the manufacturer's instructions.
13. This backwash flow rate should be maintained for 10 to 15 minutes or until the backwash water clears. A sight glass is available on the backwash return line to visually observe the backwash water clarity.
14. After the backwash cycle has been completed, both carbon feed pumps should be shut down by placing the switches at the local control panel in the OFF position.

15. There may not be enough water in the Backwash Collection Tank to backwash both vessels back to back. The system may need to be restarted in normal operation and operated until the Backwash Collection Tank has refilled.

16. Once the Backwash Collection Tank has refilled, repeat steps 1 through 5.

17. Place the valves on the carbon skid manifold in the appropriate positions for backwash of Vessel 2. See Table 3.1 and Figure 3.4.

18. Repeat steps 7 through 14.

19. Return the valves on the carbon skid manifold to the appropriate positions for series operation. See Table 3.1 and Figures 3.1 and 3.2.

20. Close valve V41 (backwash supply).

21. Close valve V15.

22. Open valves V1 and V8.

23. Start Carbon Feed Pump 1 (or 2) by placing the switch at CP-1 in the AUTO position.

3.8 STANDARD OPERATING CONDITIONS

The GWTS should be operated in accordance with the following Standard Operating Conditions:

STANDARD OPERATING CONDITIONS
840 – GROUNDWATER TREATMENT SYSTEM

LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
LT730301A	RW1 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.
LT730301B	RW2 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.

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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
LT730301C	RW3 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.
LT730301D	RW4 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.

STANDARD OPERATING CONDITIONS
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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
LT730301E	RW5 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.
LT730301F	PR4 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.

STANDARD OPERATING CONDITIONS
840 – GROUNDWATER TREATMENT SYSTEM

LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
LT730301G	PR12 Water Level (feet elevation)			551	552		557.5	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.
LT730301H	OBA9AR Water Level (feet elevation)			555.2	556.2		557.7	558			R- Hi level will reduce groundwater capture Lo level indicates that the flowrate is too high and that the automatic pump shut off did not activate properly. Lo level may cause dry running of the pump and indicate fouling of well screen. C- If Hi level alarm is reached, pump flow rate should be increased if possible to decrease level and increase groundwater capture. If low level alarm is reached, automatic pump shut off operation should be checked. Pump flow rate may need to be decreased to raise level into operating range.

STANDARD OPERATING CONDITIONS
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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
FT730301A	RW1 Flow Rate (gallons per minute)				>0		5				C- Flow rate should be adjusted as necessary to control the RW1 water level.
FT730301B	RW2 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the RW2 water level.
FT730301C	RW3 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the RW3 water level.
FT730301D	RW4 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the RW4 water level.
FT730301E	RW5 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the RW5 water level.
FT730301F	PR4 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the PR4 water level.
FT730301G	PR12 Flow Rate (gallons per minute)				>0		10				C- Flow rate should be adjusted as necessary to control the PR12 water level.
FT730301H	OBA9AR Flow Rate (gallons per minute)				>0		5				C- Flow rate should be adjusted as necessary to control the OBA9AR water level.

STANDARD OPERATING CONDITIONS
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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	NEVER EXCEED MAX	INTERLOCKS MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
AI730302A	RW1 pH (Standard pH Units)			5	6		7	8			R- Hi pH will cause rapid and significant fouling of well, pump, and discharge piping. Lo pH can cause significant corrosion of the well, pump, and other downstream equipment. C- Hi pH - Increase Acid Flow to RW1. Lo pH – Reduce Acid Flow to RW1. T- Calibrate pH probe Check acid tote level Check acid metering pump operation
AI730302A	PR4 pH (Standard pH Units			5	6		7	8			R- Hi pH will cause rapid and significant fouling of well, pump, and discharge piping. Lo pH can cause significant corrosion of the well, pump, and other downstream equipment. C- Hi pH - Increase Acid Flow to PR4. Lo pH – Reduce Acid Flow to PR4. T- Calibrate pH probe Check acid tote level Check acid metering pump operation

STANDARD OPERATING CONDITIONS
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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
AIC730301B	1st Stage pH Adjustment (Standard pH Units)	5	5	6	6		8	8	9	9	R- Hi pH can increase air stripper fouling or **cause a Wastewater Discharge Permit violation.** Lo pH can cause corrosion in downstream equipment or **cause a Wastewater Discharge Permit violation.** C- Hi pH - Increase Acid Flow to RW1 and PR4 Lo pH – Reduce Acid Flow to RW1 and PR4 Lo pH - Carefully add caustic using manual caustic pump to increase pH T- Calibrate pH probe Verify mixer is operating Check acid tote level Check acid metering pump operation
AIC730301A	2nd Stage pH Adjustment (Standard pH Units)	5	5	6	6		8	8	9	9	R- Hi pH can increase air stripper fouling or **cause a Wastewater Discharge Permit violation**. Lo pH can cause corrosion in downstream equipment or **cause a Wastewater Discharge Permit violation.** C- Hi pH – HCl acid pump is controlled by DCS to lower pH Lo pH – Carefully add caustic using manual caustic pump to increase pH T- Calibrate pH probe Verify mixer is operating Check acid tote level Check acid metering pump operation Check acid controller operation and settings

STANDARD OPERATING CONDITIONS
840 – GROUNDWATER TREATMENT SYSTEM

LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
ADA730301 B	2nd Stage pH Difference (Standard pH Units)		2	2	<2		<2	2	2		R- Difference >2 standard pH units indicates one or both pH probes are not reading correctly. Hi pH can increase air stripper fouling or **cause a Wastewater Discharge Permit violation**. Lo pH can cause corrosion in downstream equipment or **cause a Wastewater Discharge Permit violation.** C- Calibrate pH probes T- Verify mixer is operating Check acid tote level Check acid metering pump operation Check acid controller operation and settings
FI730401	Air Stripper Air Flow Rate (Cubic Feet per Minute) Field Gauge	650			650	900	1000				R- Lo flow will reduce treatment efficiency and **potentially cause a Wastewater Discharge Permit violation.** Hi flow can cause excessive water carryover into the air stripper exhaust. C- Adjust blower discharge control damper as necessary to maintain air flow rate at ~900 CFM. T- Check inlet screen for plugging. Check inlet and outlet damper positions. Check blower operation. Check air stripper trays for fouling.

STANDARD OPERATING CONDITIONS
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LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
PI730401	Air Stripper Pressure (inches H2O) Field Gauge				30		45			45	R- Hi pressure can damage the air stripper trays. Lo pressure may indicate a low air flow condition. C- Hi pressure – clean air stripper trays per manufacturer instructions to remove fouling. Lo pressure - adjust blower discharge control damper as necessary to maintain air flow rate at ~900 CFM. T- Check inlet and outlet damper positions. Check blower operation. Check air stripper trays for fouling.
FIT730403	Carbon Vessel Feed Flow Rate (gallons per minute) Field Gauge				40		80				R- Lo flow will result in a high air stripper sump level. C- Adjust feed flow rate as necessary to be higher than combined RW influent flow rate. T- Check pump operation. Check carbon vessel differential pressure.
PI730501-1 PI730501-2	Carbon Vessel #1 Differential Pressure (inches H2O) Field Gauges				0.1		30				R- Hi differential pressure indicates fouling of the carbon vessel which can cause decreased flow rates and eventually high air stripper sump levels. C- Backwash carbon to remove fouling, lower differential pressure, and restore appropriate flow rates.

STANDARD OPERATING CONDITIONS
840 – GROUNDWATER TREATMENT SYSTEM

LOOP #	NAME (UNITS)	NEVER EXCEED MIN	INTERLOCKS MIN	ALARMS LO	OPERATING RANGE LO	OPERATING RANGE NORM	OPERATING RANGE HI	ALARMS HI	INTERLOCKS MAX	NEVER EXCEED MAX	REASON R – Reason for limit or effect of exceeding limit. C – Correction, &/or Control Action. T – Troubleshooting Guidelines.
PI730501-3 PI730501-4	Carbon Vessel #2 Differential Pressure (inches H2O) Field Gauges				0.1		30				R- Hi differential pressure indicates fouling of the carbon vessel which can cause decreased flow rates and eventually high air stripper sump levels. C- Backwash carbon to remove fouling, lower differential pressure, and restore appropriate flow rates.

4.0 SYSTEM MAINTENANCE

The objective of the maintenance program is to keep the system operating within normal operating parameters and minimize system downtime.

4.1 ROUTINE MAINTENANCE

Table 4.1 lists the recommended preventative maintenance activities and frequencies. Table 4.2 lists the instruments, gauges, and switches recommended for annual inspection and calibration. Table 4.3 lists the recommended components for the GWTS. Equivalent components may be substituted as necessary and documented in subsequent revisions of the O&M plan.

In addition to the activities listed on Table 4.1, a relatively clean working area will be maintained in Building 73. Leaks, splashes, or spills of acid, lubricant, or other chemical will be treated with the proper chemical absorbent material and swept up for disposal. Waste material will be properly segregated and disposed per Olin plant protocols. For leaks, splashes, or spills of groundwater or other non-hazardous materials in the treatment plant area, the area will be thoroughly washed down and the washwater recirculated to the pH adjustment tank from the treatment area sump.

4.2 SPECIAL MAINTENANCE

Special maintenance activities for the RWs will be performed as needed to manage carbonate scaling and other types of well scaling. It is anticipated that acid washing of the screens and piping will be used in less severe cases. A combination of mechanical and acid cleaning is anticipated to be used in more severe cases. The specific cleaning procedures will be developed on a case by case basis as necessary.

5.0 DATA COLLECTION PROGRAM

This section describes the data collection program for the Groundwater Treatment System at the site. The program includes:

- Quarterly Water Level Measurements
- Quarterly Recovery Well Water Quality Monitoring
- Quarterly Air Stripper Performance Monitoring
- Quarterly Carbon Breakthrough Monitoring
- Annual Monitoring Well Water Quality Monitoring

5.1 QUARTERLY WATER LEVEL MEASUREMENTS

Quarterly water level data will be recorded for use in monitoring the groundwater collection system's effectiveness in achieving hydraulic containment. The data will be used to generate quarterly potentiometric surface maps for each hydraulic zone monitored at the site (Zones A, B, C, and CD). Treatment system flow rates will be adjusted as necessary based on the potentiometric surface maps or groundwater chemistry trends. Water level measurements will be collected quarterly from the wells listed on Table 5.1.

5.2 QUARTERLY GWTS MONITORING

The GWTS will be monitored on a quarterly basis. Samples will be collected from the RWs and system locations listed on Table 5.2 and analyzed by the methods indicated. Table 5.3 presents the site specific monitoring constituents for the analytical methods used. OBA-9AR will be sampled at the well since it is combined with PR-12 at header sampling port in the building. OBA-9AR will be shut down when PR-12 is sampled from the header sampling port. Table 5.4 shows the appropriate sample ports for carbon vessel sample collection based on the lead/lag configuration of the vessels.

5.3 ANNUAL MONITORING WELL WATER QUALITY MONITORING

The site monitoring wells listed on Table 5.5 will be sampled and analyzed annually for parameters listed on Table 5.3. These data will be collected for submittal to NYSDEC in the

annual report for the year in which groundwater sampling and analyses are completed. The data will also be used to evaluate the effectiveness of the recovery system.

6.0 REPORTING

Groundwater remediation and verification reporting is mandated by Olin's Consent Order with NYSDEC.

6.1 ROUTINE REPORTING

Olin is required to submit annual reports to NYSDEC indicating hydraulic capture, system flow rates, analytical results, and operational information. Annual reports are submitted by April 1 each year.

6.2 SPECIAL REPORTS

Downtime Reports / Notification

The groundwater remediation and verification reporting is mandated by Olin's consent order with NYSDEC. Olin will notify NYSDEC if any component of the groundwater treatment system is down for over three consecutive days or any five days of a 30 day period. Periodically, single wells will be down for maintenance. This downtime is documented and listed in routine reporting and does not require a system-down notification.

System Modification Notification

Should Olin deem it necessary to implement system modification to enhance the performance of the system, a request will be made verbally and in writing to NYSDEC. The modification will be implemented on NYSDEC approval.

TABLES

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)
BH-1	1978-Harza	1 1/4" st. steel well point	5323	20055	574.38	570.63	560.53	10.1	12.1	16.1	B	
BH-3	1978-Harza	1 1/4" st. steel well point	5315	19553	573.15	569.13	560.63	8.5	14.0	18.0	B	
BH-9	1978-Harza	1 1/4" st. steel well point	5162	19494	574.49	570.06	561.66	8.4	4.4	8.4	Overburden	
OBA-1A	6/22/89-WCC	screened-4"PVC	4201.15	19999.64	571.02	571.3	565.8	5.5	2.5	8.5	A-Bedrock	
OBA-1B	6/23/89-WCC	open-4"rockhole	4213.82	20000.06	570.9	571.3	566.3	5	10.0	25.0	B	
OBA-1C	6/27/89-WCC	open-4"rockhole	4225.16	20000.67	570.96	571.3	566.3	5	25.0	38.5	C	
OBA-2A	8/22/89-WCC	screened-4"PVC	5088.62	20086.17	572.93	570.4	564.6	5.8	3.8	8.8	A-Bedrock	8.8
OBA-2B	8/24/89-WCC	open-4"rockhole	5096.54	20086.61	573.07	570.5	564.7	5.8	11.0	25.0	B	25
OBA-2C	8/30/89-WCC	open-4"rockhole	5077.08	20085.85	573.12	570.3	564.6	5.7	25.0	50.0	C/CD (1)	50
OBA-3A	6/30/89-WCC	screened-4"PVC	5750.81	20086.02	572.5	569.9	555.6	14.3	11.4	17.4	A-Bedrock	
OBA-3B	7/7/89-WCC	open-4"rockhole	5689.02	20066.19	572.17	569.9	555.9	14	19.0	33.5	B (1)	
OBA-3C	7/11/89-WCC	open-4"rockhole	5675.18	20066.79	573.14	569.8	555.8	14	33.0	58.0	C/CD (1)	
OBA-4A	7/14/89-WCC	screened-4"PVC	5433.18	19816.72	572.88	570.1	561.7	8.4	5.5	11.5	A-Bedrock	11.5
OBA-4B	7/20/89-WCC	open-4"rockhole	5433.3	19828.33	573.49	570.3	561.3	9	13.9	21.5	B	21.5
OBA-4C	7/24/89-WCC	open-4"rockhole	5435.37	19840.19	573.54	570.4	561.9	8.5	22.0	30.5	C	30.5
OBA-5A	8/7/89-WCC	screened-4"PVC	5116.7	19479.39	572.21	569.6	561.2	8.4	4.5	11.3	A-Bedrock	11.3
OBA-5B	8/8/89-WCC	open-4"rockhole	5106.73	19479.42	572.7	569.7	561.4	8.3	12.2	23.5	B	23.5
OBA-5C	8/10/89-WCC	open-4"rockhole	5124.83	19478.7	572.46	569.7	561.4	8.3	23.0	53.0	CD	53
OBA-6A	8/15/89-WCC	screened-4"PVC	4924.961	19648.867	570.75	570.95	564.4	6.55	3.6	9.6	A-Bedrock	9.55
OBA-6B	8/15/89-WCC	open-4"rockhole	4919.389	19648.867	570.71	571	564.7	6.4	11.5	24.0	B	24
OBA-6C	8/18/89-WCC	open-4"rockhole	4930.18	19650.24	570.71	570.99	565	6	24.0	49.5	C/CD (1)	49.5
OBA-7A	6/7/89-WCC	screened-4"PVC	4417.99	19808.26	573.97	571.5	566	5.5	2.3	8.3	A-Bedrock	
OBA-7B	6/13/89-WCC	open-4"rockhole	4428.31	19809.3	574.47	571.5	563	8.5	10.4	24.8	B	
OBA-7C	6/20/89-WCC	open-4"rockhole	4399.6	19807.47	574.85	571.7	567.7	4	25.0	40.0	C	
OBA-8A	7/26/89-WCC	screened-4"PVC	3478.868	19572.574	573.522	571.47	563.2	8.27	5.3	11.3	A-Bedrock	
OBA-8B	7/28/89-WCC	open-4"rockhole	3488.1	19566.78	573.24	570.6	563.1	7.5	12.4	25.0	B	
OBA-8C	8/4/89-WCC	open-4"rockhole	3469.86	19578.04	573.81	570.6	563.1	7.5	24.9	52.0	CD	
OBA-9A	11/2/92-WCC	screened-4"PVC	5342.71	19481.13	569.75	568.33	561.3	7	3.8	10.0	A-Bedrock	10
OBA-10A	11/4/92-WCC	screened-4"PVC	5417.11	19454.63	568.92	569.24	555.5 (3)	13.7 (3)	10.4	16.4	A-Bedrock/B-Bedrock	16.4
OBA-11A	11/30/93-WCC	screened-4"PVC	3249.8	20019.5	573.22	571	562.2	8.8	6.2	12.0	A-Bedrock	
OBA-11B	12/2/93-WCC	open-4"rockhole	3225.6	20015.4	573.29	571	562.5	8.5	13.5	24.5	B	
OBA-11C	12/6/93-WCC	open-4"rockhole	3239.1	20017.9	573.37	571	562.7	8.3	22.5	47.8	CD	
OBA-12A	Abandoned - 12/5/2012											
OBA-12B	Abandoned - 12/5/2012											
OBA-12C	Abandoned - 12/5/2012											
OBA-13AOB	Abandoned - 12/5/2012											
OBA-13A	Abandoned - 12/5/2012											
OBA-13B	Abandoned - 12/5/2012											
OBA-13C	Abandoned - 12/5/2012											
OBA-14A	4/25/94-WCC	screened-4"PVC	5784.3	19867.8	571.1	568.9	555.5	13.4	9.0	14.5	A-Bedrock	
OBA-14B	4/25/94-WCC	open-4"rockhole	5783.6	19886.2	571.26	568.9	555.3	13.6	17.3	24.2	B	
OBA-14C	4/27/94-WCC	open-4"rockhole	5784.1	19876.9	570.61	568.9	555.2	13.7	25.1	41.7	C	

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)
OBA-15A	4/13/94-WCC	screened-4"PVC	5476.4	20060.7	573.08	570.9	554	16.9	14.0	20.2	A	20.2
OBA-15B	4/20/94-WCC	open-4"rockhole	5473.2	19978.2	573.58	570.9	553.4	17.5	22.5	32.1	C	32.1
OBA-16A	4/5/94-WCC	screened-4"PVC	5214.8	19955.6	573.55	571.1	563.9	7.2	3.2	9.2	A-Bedrock	9.2
OBA-16B	4/20/94-WCC	open-4"rockhole	5215.3	19950.1	573.47	571.1	563.9	7.2	11.6	21.8	B	21.8
OBA-18A	-CRA		3344.93	20033.60	573.85	571.35	562.95	8.4	5.3	11.3	A-Bedrock	
OBA-19A	-CRA		3221.30	19788.90	574.34	571.74	561.64	10.1	7.0	12.8	A-Bedrock	
OBA-21AB	-CRA	screened-4" PVC	5160.88	19469.01	572.46	570	562	8	4.0	24.0	A-Bedrock/ B-Bedrock	24
OBA-23A	8/4/97-LAW	screened-4" st. steel	4982.9	19974.72	570.72	570.92	564.42	6.5	6.1	9.5	A	9.5
OBA-23B	8/1/97-CRA	screened-4" st. steel	4982.86	19968.04	570.54	570.84	564.34	6.5	12.0	20.0	B	20
OBA-24A	6/6/99-CRA	screened-2" PVC	5441.695	19512.105	569.45	569.71	561.23	8.47	8.3	11.3	A	
OBA-24B	6/6/99-CRA	open-4"rockhole	5440.7	19517.9	569.28	569.73	561.63	8.1	13.7	22.9		
OBA-25A	6/11/99-CRA	screened-2" PVC	5600.4	19521.6	569.47	569.94	561.44	8.46	6.5	11.5		
OBA-25B	6/12/99-CRA	open-4"rockhole	5601.4	19532.8	569.45	570.05	561.75	8.35	13.5	22.0		
OBA-26A	6/10/99-CRA	screened-2" PVC	5541	19667.8	570.04	570.45	560.75	9.7	9.3	14.3		
OBA-26B	6/10/99-CRA	open-4"rockhole	5532.9	19668.7	570.04	570.45	560.95	9.5	15.0	22.0		
OCW-6BR (4	-WCC		4689.71	19906.43	571.26	571.69	566.1	5.6	6.1	9.5	A-Bedrock	
OCW-1 (4)	-WCC		4670.11	20021.43	570.79	571.12	565.7	5.4	1.2	5.2	Overburden	
OCW-2 (4)	-WCC		4610.31	19881.13	572.27	572.7	568.5	4.2	0.9	3.9	Overburden	
OCW-3 (4)	-WCC		4611.01	19806.53	572.42	572.81	569	3.9	1.0	3.8	Overburden	
OCW-4 (4)	-WCC		4649.41	19755.33	571.63	572.2	564.2	7.9	2.0	7.9	Overburden	
OCW-5 (4)	-WCC		4689.11	19614.63	571.92	572.29	566.9	5.4	1.0	5.4	Overburden	
OCW-6 (4)	-WCC		4690.01	19880.13	571.17	571.5	565.6	5.9	1.2	5.9	Overburden	
RW-1	8/5/97-LAW	screened-6" st. steel	5002.98	19908.13	573.69	570.69	564.19	6.5	7.3	20.8	A/B	23.8
RW-1-PZ	8/5/97-LAW	screened-1 1/4" st. steel			572.73				13.6	23.4		23.4
PR-1	8/7/97-LAW	screened-6" st. steel	4992.24	19816.04	572.82	570.82	564.82	6	8.1	21.5	A/B	24.6
PR-1-PZ	8/7/97-LAW	screened-1 1/4" st. steel			571.58				15.0	24.5		24.8
PN-1			4941.1	19864.32		571.3	563.8	7.5				
PN-1A	8/13/97-LAW	screened-1 1/4" st. steel			571.01				5.3	10.1	A	10.1
PN-1B	8/13/97-LAW	screened-1 1/4" st. steel			570.87				16.8	21.6	B	21.6
RW-2	8/7/97-LAW	screened-6" st. steel	5176.11	20000.04	572.49	571.49	559.99	9	8.7	22.1	A/B	25.2
RW-2-PZ	8/7/97-LAW	screened-1 1/4" st. steel			572.22				14.9	24.8		24.8
PR-2	8/6/97-LAW	screened-6" st. steel	5075.32	19971.4	572.72	571.72	564.72	7	8.1	21.5	A/B	24.6
PR-2-PZ	8/6/97-LAW	screened-1 1/4" st. steel			572.7				14.8	25.6		24.6
PN-2			5136.33	19977.88		571.5	565	6.5				

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)
PN-2A	8/13/97-LAW	screened-1 1/4" st. steel			571.2				4.6	9.4	A	
PN-2B	8/13/97-LAW	screened-1 1/4" st. steel			571.01				17.2	22.0	B	
RW-3	8/5/97-LAW	screened-6" st. steel	5331.82	19957.65	570.09	569.09	560.09	9	6.5	19.9	A/B	23
RW-3-PZ	8/5/97-LAW	screened-1 1/4" st. steel			570.03				13.2	23.0		23
PR-3	8/11/97-LAW	screened-6" st. steel	5271.84	19983.45	572.79	571.67	561.17	10.5	9.0	22.4	A/B	25.5
PR-3-PZ	8/11/97-LAW	screened-1 1/4" st. steel			572.16				15.2	25.0		25
PN-3			5278.6	19961.62		571.65	562.65	9				
PN-3A	8/12/97-LAW	screened-1 1/4" st. steel			571.43				6.3	11.1	A	11.1
PN-3B	8/12/97-LAW	screened-1 1/4" st. steel			571.36				20.5	25.3	B	25.3
RW-4	8/8/97-LAW	screened-6" st. steel	5321.62	19758.67	569.77	568.77	560.27	8.5	10.4	23.8	A/B	26.8
RW-4-PZ	8/8/97-LAW	screened-1 1/4" st. steel			569.81				17.0	26.8		26.8
PR-4	8/6/97-LAW	screened-6" st. steel	5329.77	19859.85	570.21	569.21	559.71	9.5	7.3	20.7	A/B	23.8
PR-4-PZ	8/6/97-LAW	screened-1 1/4" st. steel			570.14				13.9	23.7		23.7
PN-4			5336.66	19902.25		569.08	562.08	7				
PN-4A	8/14/97-LAW	screened-1 1/4" st. steel			568.78				4.7	9.5	A	9.5
PN-4B	8/14/97-LAW	screened-1 1/4" st. steel			568.89				15.9	20.7	B	20.7
RW-5	8/8/97-LAW	screened-6" st. steel	5305.61	19561.54	569.79	568.79	560.29	8.5	7.6	21.0	A/B	24.1
RW-5-PZ	8/8/97-LAW	screened-1 1/4" st. steel			569.74				14.8	24.6		24.6
PR-5	8/13/97-LAW	screened-6" st. steel	5315.12	19646.18	570.68	569.08	562.08	7	8.8	22.2	A/B	25.3
PR-5-PZ	8/13/97-LAW	screened-1 1/4" st. steel			569.69				15.3	25.1		25.1
OBA-9AR	1/8/2007-MACTEC	screened-6" st. steel	5328.480	19488.774	570.68	568.67	560.87	7.8	4.55	13.55	A	13.55
OBA-9AR-PZ	1/8/2007-MACTEC	screened-1" st. steel	5328.384	19489.102	570.51	568.67	560.87	7.8	4.55	13.55	A	13.55
PR-6	9/4/02-LAW	screened-4" Sch-40 PVC	5329.3	19788.3	568.70	569.17	562.67	6.5	2.5	16.5	A/B	19
PR-7	9/4/02-LAW	screened-4" Sch-40 PVC	5317.7	19726.5	569.06	569.36	561.86	7.5	3.7	17.7	A/B	20
PR-8	9/6/02-LAW	screened-4" Sch-40 PVC	5317.6	19671.3	568.42	568.82	562.22	6.6	2.6	16.6	A/B	19
PR-9	9/6/02-LAW	screened-4" Sch-40 PVC	5312.8	19621.5	568.72	569.14	559.64	9.5	4.9	18.9	A/B	21.25
PR-10	9/6/02-LAW	screened-4" Sch-40 PVC	5311.4	19584	568.44	568.9	561.9	7	3.0	17.0	A/B	19.5
PR-11	9/6/02-LAW	screened-4" Sch-40 PVC	5305	19536.2	568.01	568.7	562.1	6.6	2.6	16.6	A/B	19
PR-12	9/9/2002-LAW	screened-4" Sch-40 PVC	5405	19500.9	569.79	568.87	561.87	7	4.7	18.7	A/B	21
PR-13	6/18/2003-CRA/MACTEC	screened-4" Sch-40 PVC	5331.4	19821.8	569.07	569.4	562.4	7	4.2	18.0	A/B	20
PN-5			5333.68	19817.17		569.1	562.1	7				

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)
PN-5A	8/15/97-LAW	screened-1 1/4" st. steel			569.1				5.2	10.0	A	10
PN-5B	8/15/97-LAW	screened-1 1/4" st. steel			569.1				19.2	24.0	B	24
PN-6			5312.54	19693.77		569.15	562.15	7				
PN-6A	8/18/97-LAW	screened-1 1/4" st. steel			568.93				5.2	10.0	A	10
PN-6B	8/18/97-LAW	screened-1 1/4" st. steel			569.07				19.2	24.0	B	24
PN-7			5308.86	19604.91		568.93	561.93	7				
PN-7A	8/19/97-LAW	screened-1 1/4" st. steel			568.7				5.4	10.2	A	10.2
PN-7B	8/19/97-LAW	screened-1 1/4" st. steel			568.95				16.8	21.6	B	21.6
PN-8			5310.35	19515.78		568.83	560.83	8				
PN-8A	8/20/97-LAW	screened-1 1/4" st. steel			568.83				5.4	10.2	A	10.2
PN-8B	8/20/97-LAW	screened-1 1/4" st. steel			568.38				16.7	21.5	B	21.5
PN-9A	10/10/05-MACTEC	2" 316SS Screen/PVC Riser	5272.198	20029.959	571.26	571.47	562.47	9	5.5 to 10.5		A	11
PN-9B	5/14/99-CRA		5271.67	20023.21	571.9	572.32	563.22	9.1	16.0	26.0	B	
PN-10A	9/9/2002-LAW	screened-2" Sch-40 PVC	4994	20004.8	570.56	571.02	564.82	6.2	3.9	8.9	A	9.5
PN-10B	5/17/99-CRA		5055.19	20005.85	571.63	572.01	564.53	7.1	12.5	24.1	B	
PN-11A	9/9/2002-LAW	screened-2" Sch-40 PVC	5320.5	19505	568.54	568.87	561.87	7	4.5	9.5	A	10
PN-11B	10/6/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5328.353	19506.559	568.21	568.55	562.05	6.5	11	21	B	21
PN-12A	10/10/05-MACTEC	2" 316SS Screen/PVC Riser	5185.064	19572.296	570.54	570.83	562.33	8.5	4	9	A	9.5
PN-12B	9/28/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5185.203	19565.850	570.43	570.81	561.81	9	13	23	B	23
PN-13A	10/11/05-MACTEC	2" 316SS Screen/PVC Riser	5144.864	19646.162	573.70	573.96	563.46	10.5	8.5	13.5	A	14
PN-13B	10/5/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5154.219	19644.685	573.73	573.95	563.45	10.5	17	24	B	24
PN-14A	10/11/05-MACTEC	2" 316SS Screen/PVC Riser	5117.620	19694.909	573.79	574.05	564.05	10	6.5	11.5	A	12
PN-14B	10/5/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5125.406	19694.716	573.76	574.06	563.06	11	15	24	B	24
PN-15A	10/10/05-MACTEC	2" 316SS Screen/PVC Riser	5214.288	19769.802	571.15	571.43	562.93	8.5	6.1	11.1	A	11.6
PN-15B	10/5/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5208.935	19771.714	571.14	571.46	562.96	8.5	13	22	B	22
PN-16A	10/7/05-MACTEC	2" 316SS Screen/PVC Riser	5195.492	19889.334	570.92	571.17	563.67	7.5	3.5	8.5	A	9
PN-16B	10/4/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5195.911	19895.828	570.85	571.15	563.15	8	11	21	B	21
PN-17A	10/6/05-MACTEC	2" 316SS Screen/PVC Riser	5082.319	19854.973	571.04	571.31	563.81	7.5	3.95	9	A	9.45
PN-17B	10/5/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5075.259	19855.222	571.07	571.44	563.94	7.5	11	21	B	21

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)
PN-18A	10/7/05-MACTEC	2" 316SS Screen/PVC Riser	5138.522	19911.747	570.77	571.03	565.03	6	3.5	8.5	A	9
PN-18B	10/4/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5130.691	19910.976	570.83	571.10	565.10	6	11	21	B	21
PN-19A	10/7/05-MACTEC	2" 316SS Screen/PVC Riser	5048.907	19915.199	571.20	571.43	565.43	6	2.5	7.5	A	8
PN-19B	10/4/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5048.760	19921.888	571.11	571.45	565.45	6	10	20	B	20
PN-20A	10/10/05-MACTEC	2" 316SS Screen/PVC Riser	5318.334	20052.922	570.49	570.82	561.82	9	6	11	A	11.5
PN-20B	10/4/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5326.090	20051.612	570.21	570.49	560.49	10	14	24	B	24
PN-21A	10/6/05-MACTEC	2" 316SS Screen/PVC Riser	5247.840	19526.565	569.88	570.19	562.19	8	4.65	9.7	A	10.15
PN-21B	10/6/05-MACTEC	NX (2.98") Open Rockhole/4" steel r	5255.670	19525.841	569.85	570.17	562.17	8	12	22	B	22
PN-22B	5/14/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19521.952	5224.533	569.59	570.10	561.60	8.5	12	20	B	20
PN-23B	5/14/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19497.818	5218.985	569.20	569.79	561.29	8.5	12	20	B	20
ORC-1	5/10/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19475.399	5276.381	568.89	569.31	560.61	8.7	12	19.7	B	19.7
ORC-2	5/14/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19489.096	5251.428	569.16	569.68	561.58	8.1	12	20	B	20
ORC-3	5/11/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19476.277	5205.231	569.68	570.01	561.71	8.3	12	20	B	20
ORC-4	5/11/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19476.348	5176.839	569.42	570.03	561.53	8.5	12	20	B	20
ORC-5	5/11/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19476.473	5145.46	569.39	569.91	561.41	8.5	12	20	B	20
ORC-6	5/14/07-MACTEC	HQ (3.75") Open Rockhole/4" steel r	19506.873	5180.015	569.33	569.97	561.77	8.2	12	20	B	20
SRW-1	6/12/01-LAW	A-zone screened-8" st. steel	5075.2	19717.6	572.57	573.06	563.06	10	7.1	25.0	A/B	
		B-zone open-8"rockhole										
SRW-2	6/8/01-LAW	A-zone screened-8" st. steel	5054	19627.3	573.04	573.04	561.24	11.8	9.9	28.0	A/B	
		B-zone open-8"rockhole										
PZ-1A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5265.3	19857.5	573.13	573.25	563.15	10.1	4.8	9.8	A/Overburden	
PZ-2A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5337	19787.1	568.98	569.11	562.21	6.9	1.7	6.7	A/Overburden	
PZ-3A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5249.5	19752.5	571.34	571.45	562.45	9	3.5	8.5	A/Overburden	
PZ-4A	3/27/02-LAW	screened-1 1/4" Sch-40 PVC	5330.1	19721.6	569.18	569.31	562.21	7.1	1.8	6.8	A/Overburden	
PZ-5A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5267.8	19668.7	569.51	569.62	562.04	7.58	2.2	7.2	A/Overburden	
PZ-6A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5308.1	19672.7	568.77	568.9	562.57	6.33	0.9	5.9	A/Overburden	
PZ-7A	3/27/02-LAW	screened-1 1/4" Sch-40 PVC	5330.8	19673.2	568.41	568.57	562.57	6	0.6	5.6	A/Overburden	
PZ-8A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5307.2	19625.1	568.99	569.05	562.15	6.9	1.5	6.5	A/Overburden	
PZ-9A	3/27/02-LAW	screened-1 1/4" Sch-40 PVC	5330.7	19624.5	568.36	568.54	562.44	6.1	0.9	5.9	A/Overburden	
PZ-10A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5270.1	19574.8	569.54	569.66	562.16	7.5	2.3	7.3	A/Overburden	
PZ-11A	3/27/02-LAW	screened-1 1/4" Sch-40 PVC	5331.3	19565.8	567.71	567.85	561.85	6	0.8	5.8	A/Overburden	
PZ-12A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5277.7	19533.2	569.54	569.66	561.41	8.25	2.7	7.7	A/Overburden	
PZ-13A	3/26/02-LAW	screened-1 1/4" Sch-40 PVC	5310.2	19540	568.43	568.47	561.55	6.92	1.5	6.5	A/Overburden	
PZ-14A	3/27/02-LAW	screened-1 1/4" Sch-40 PVC	5330	19509.1	567.85	567.99	561.16	6.83	1.7	6.7	A/Overburden	

Table 2.1: Well Construction Summary

Well	Installation Date	Well Type	Easting	Northing	Top of Riser Elevation (ft. AMSL)	Ground Elevation (ft. AMSL)	Top of Bedrock Elevation (ft. AMSL)	Depth to Bedrock (ft. BGS)	Top of Screen (ft. BGS)	Bottom of Screen (ft. BGS)	Zone Monitored	Total Depth of Well (ft. BGS)

Notes:
OBA - Water Quality Monitoring Well
RW - Groundwater Recovery Well (Coordinates apply to both Recovery well and adjacent piezometer)
PN - Piezometer Nest
PZ - Piezometer
PR - Passive Relief Well (Coordinates apply to both Passive Relief well and adjacent piezometer)
SRW- Supplemental Remediation Well
(1) No major waterbearing fractures encountered during drilling of the monitored interval.
(2) OBA-9AR was installed as a possible NAPL recovery well.
(3) OBA-10A was most likely installed in a sewer line trench excavated into rock, thus the top of rock elevation does not accurately reflect bedrock elevation in the surrounding area.
(4) OCW wells were installed as part of the investigation of the caustic spill of February 21, 1993.
(5) Competent bedrock; the depth to bedrock is questionable in this location due to the presence of an old foundation which may have been constructed on or into the bedrock surface.
** Total depth of well OBA-23A was re-measured on 11/??/98 at 9.5 feet bgs. (The original measurement was 9.0 feet bgs.)
AMSL Above Mean Sea Level.
BGS Below Ground Surface.

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 3.1: Carbon Adsorber Valve Schedule

	Valve Label											
Process Configuration	**V19**	**V20**	**V21**	**V22**	**V23**	**V24**	**V25**	**V26**	**V27**	**V28**	**V29**	**V30**
Series Operation 1=>2	OPEN	CLOSE	CLOSE	CLOSE	CLOSE	OPEN	OPEN	CLOSE	CLOSE	CLOSE	CLOSE	OPEN
Series Operation 2=>1	CLOSE	OPEN	CLOSE	CLOSE	OPEN	CLOSE	CLOSE	OPEN	CLOSE	CLOSE	OPEN	CLOSE
Vessel #1 Backwash	CLOSE	CLOSE	OPEN	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	OPEN	CLOSE	CLOSE	CLOSE
Vessel #2 Backwash	CLOSE	CLOSE	CLOSE	OPEN	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	OPEN	CLOSE	CLOSE

Notes:
1) This table reflects the actual field construction and labeling of the piping and valve arrangement.
2) Refer to Figures 3.1 through 3.4 for graphical representations of the valve arrangements.
4) Valve positions should only be changed with the carbon feeds pumps OFF.
5) Vessel #1 is on the left hand side of the unit when facing the vessels from the piping manifold side.

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 4.1: Recommended Preventive Maintenance

Frequency	System Component	Task
WEEKLY		
	Neutralization System	Calibrate pH Probes
	RW-1 & 2	Calibrate pH Probes
MONTHLY		
	Acid Metering Pumps	Check Hydraulic Oil Levels
QUARTERLY		
	Carbon Feed Pumps	Change Oil
		Grease Bearings
ANNUAL		
	Air stripper blower	Check fan wheel for wear, corrosion, build-up, & excessive vibration. Check all setscrews and bolts for tightness. Check damper setting.
	Mixers	Check lubrication.
	Air conditioner	Change air filter. Check condenser coils for signs of clogging. Clean grille.
	Pulsar Acid Metering Pump	Change Hydraulic Oil
		Inspect Diaphragm/Replace if Necessary
	Instruments, switches, and gauges	Annual Inspection and Calibration - see Table 4.2 for list of instruments, switches, and gauges
BI-ANNUAL		
	Pulsar Acid Metering Pump	Change Gear Oil

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 4.2: Instrument, Gauge, and Switch List

Instruments	Gauges	Switches
RW-1 Level Transducer	RW-1 Pressure Gauge - Bldg 73 Manifold	Air Stripper Sump Low Level Switch
RW-2 Level Transducer	RW-2 Pressure Gauge - Bldg 73 Manifold	Air Stripper Sump High Level Switch
RW-3 Level Transducer	RW-3 Pressure Gauge - Bldg 73 Manifold	Air Stripper High High Level Switch
RW-4 Level Transducer	RW-4 Pressure Gauge - Bldg 73 Manifold	Air Stripper Low Pressure Switch
PR-4 Level Transducer	PR-4 Pressure Gauge - Bldg 73 Manifold	Carbon Vessel High Pressure Switch
RW-5 Level Transducer	RW-5 Pressure Gauge - Bldg 73 Manifold	Sump Pump Low Level Switch
PR-12 Level Transducer	PR-12/OBA-9AR Pressure Gauge - Bldg 73 Manifold	Sump Pump High Level Switch
OBA-9AR Level Transducer	OBA-9AR Pressure Gauge - at wellhead	Sump Pump High High Level Switch
RW-1 Flowmeter	Air Stripper Blower Pressure Gauge	7S High High Level Switch
RW-2 Flowmeter	Air Stripper Blower Flow Gauge	RW-1 Leak Detection Switch
RW-3 Flowmeter	Carbon Feed Pump 1 Pressure Gauge	RW-2 Leak Detection Switch
RW-4 Flowmeter	Carbon Feed Pump 2 Pressure Gauge	RW-3 Leak Dectection Switch
PR-4 Flowmeter	GAC-SP1 Pressure Gauge	RW-4 Leak Detection Switch
RW-5 Flowmeter	GAC-SP2 Pressure Gauge	RW-5 Leak Dectection Switch
PR-12/OBA-9AR Flowmeter	GAC-SP3 Pressure Gauge	PR-4 Leak Detection Switch
OBA-9AR Flowmeter - at wellhead	GAC-SP4 Pressure Gauge	PR-12 Leak Detection Switch
RW-1 pH Meter	Sump Pump Pressure Gauge	OBA-9AR Leak Detection Switch
RW-2 pH Meter		
Stage 1 pH Meter		
Stage 2A pH Meter		
Stage 2B pH Meter		
Carbon Vessel Differential Pressure Transducer		

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 4.3: Recommended Component List

Component	Description	Manufacturer/Model
Groundwater Recovery		
Well Pump (4) - RW2, RW3, RW4, RW5, PR4	10 GPM - 1 HP - 480VAC - 3PH - SS Submersible with PTFE seals	Grundfos 10E14
Well Pump (2) - RW1, OBA9AR	5 GPM - 1/2HP - 480VAC - 3PH - SS Submersible with PTFE seals	Grundfos 5E8
Well Pump (1) - PR12	5 GPM - 1/2HP - 230VAC - 1PH - SS Submersible with PTFE seals	Grundos 5SQE05B-230
Pressure Transducer (8)	0-30 ft H2O - 4-20 mA output - Viton seal - 30 ft cable	Endress Hauser Waterpilot FMX167-A2AFE1E1
Magnetic Flow Meter Tube (8)	1" Wafer - ETFE Liner - SS Electrodes	Rosemount 8711TSA010UN0G1
Magnetic Flow Meter Transmitter (8)	Integral Mount, Rate and Total Indicator - 4-20mA output	Rosemount 8732E
Leak Detection Level Switch (7)	Displacer Type Level Measurement Switch	Various
Acid Injection		
Acid Metering Pump (1) - RW1	0.8 gph @ 100 psi, 1/3HP - 115VAC - 1PH, Kynar Head, Manual Control	Neptune 510-E-N8
Acid Metering Pump (1) - PR4	2 gph @ 50 psi, 120VAC, Kynar Head	LMI AA161-362HI
pH Transmitter (2) - RW1, PR4	4-20 mA output	ABB TB82 pH101011
pH Probe (2) - RW1, PR4	Insertion Type	ABB
pH Adjustment		
Process Mixer (2)	Vertical Shaft Process Mixer	Lightnin V6Q75
pH Transmitter (3)	4-20 mA output	ABB TB82 pH101011
pH Probe (3)	Immersion Type	ABB
Acid Metering Pump (1)	0.5 gph @ 140 psi, 1/3HP - 115V - 1PH, Automatic Control	Pulsafeeder Pulsar 25HJ
Air Stripper		
Air Stripper	7 tray, 316 SS, 225 gallon sump	Carbonair STAT 180 w/ 7th Tray (custom)
Blower	900 CFM @ 53.5" H2O	New York Blower 2606
Low Pressure Switch	SPDT, 1.4-5.5' H2O	Dwyer 1950-5-2F
Air Flow Measuring Probe	Averaging Pitot	Ultratech Ultraprobe FIAMP
Air Flow Gauge	0-2000 CFM	Carbonair/Dwyer Magnehelic Custom Scale
Carbon System		
Vessels (2)	Fiberglass, 1400 lb capacity, 90 gpm, 150 psi	Siemens PG-1400
Carbon	1400 lbs Liquid Phase Activated Carbon	Calgon DSR-C Granular Activated Carbon
Feed Pump (2)	In Line Centrifugal Process Pump - 75 gpm @ 155' TDH - 10 HP, 480VAC, 3PH	Goulds 3996ST 1.5x2-8, 6.125" Impeller
Differential Pressure Transmitter	Wet/Wet, 0-50 psid	Dwyer 629-04-CH-P2-E5-S1
High Pressure Switch	Bourdon Tube Pressue Switch, 5-75 psig	Mercoid DSW-7243-804-23E
Flow Sensor	1.5", PVC, Insertion Turbine, 2.8-190 gpm	SeaMetrics TX81
Flow Transmitter	Rate and Total Indicator, 4-20mA output	SeaMetrics FT520
Floor Sump		
Sump Pump	Submersible Sump Pump, 1/3HP - 115VAC - 1PH	Goulds WE0311M

Notes:
1. Equivalent components may be substituted as necessary.

Prepared By: AWE 10/16/2013
Checked By: AWM 10/16/2013

Table 5.1: Quarterly Site Wide Water Level Monitoring Locations

QUARTERLY WATER LEVEL LOCATIONS				
A ZONE	**B ZONE**	**A&B ZONE**	**C ZONE**	**CD ZONE**
OBA-1A	OBA-1B	PR-1	OBA-1C	OBA-2C
OBA-2A	OBA-2B	PR-2	OBA-4C	OBA-3C
OBA-5A	OBA-5B	PR-3	OBA-7C	OBA-5C
OBA-6A	OBA-6B	PR-4	OBA-14C	OBA-6C
OBA-7A	OBA-7B	PR-5	OBA-15B	OBA-8C
OBA-8A	OBA-8B	PR-6	Production Well	OBA-11C
OBA-9A	OBA-11B	PR-7		
OBA-9AR	OBA-16B	PR-8		
OBA-11A	OBA-23B	PR-9		
OBA-16A	PN-1B	PR-10		
OBA-18A	PN-2B	PR-11		
OBA-19A	PN-3B	PR-12		
OBA-23A	PN-4B	PR-13		
PN-1A	PN-5B	RW-1		
PN-2A	PN-6B	RW-2		
PN-3A	PN-7B	RW-3		
PN-4A	PN-8B	RW-4		
PN-5A	PN-9B	RW-5		
PN-6A	PN-10B	SRW-1		
PN-7A	PN-11B	SRW-2		
PN-8A	PN-12B			
PN-9A	PN-13B			
PN-10A	PN-14B			
PN-11A	PN-15B			
PN-12A	PN-16B			
PN-13A	PN-17B			
PN-14A	PN-18B			
PN-15A	PN-19B			
PN-16A	PN-20B			
PN-17A	PN-21B			
PN-18A	PR-1-PZ			
PN-19A	PR-2-PZ			
PN-20A	PR-3-PZ			
PN-21A	PR-4-PZ			
Gill Creek Stilling Well	PR-5-PZ			
	RW-1-PZ			
	RW-2-PZ			
	RW-3-PZ			
	RW-4-PZ			
	RW-5-PZ			

Prepared By: AWM 9/18/2012
Checked By: AWE 9/18/2012

Table 5.2: Quarterly Groundwater Treatment System Monitoring Locations

Well/Location	Analysis/Method		
	VOC 8260B	Pesticide 8081A	Mercury 7470A
RW-1	X	X	X
RW-2	X	X	X
RW-3	X	X	X
RW-4	X	X	X
RW-5	X	X	X
PR-4	X	X	X
PR-12	X	X	X
OBA-9AR	X	X	X
Air Stripper Influent	X		
Air Stripper Effluent/Before Carbon	X	X	
Between Carbon	X	X	
After Carbon/GWTS System Effluent	X	X	X

Notes:
1) See Table 5.4 for carbon vessel sample port details.

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 5.3: Site Specific Constituent List

Monitoring Parameters and Analysis Methods
Volatile Organic Compounds - SW846 8260B
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethene
1,2,4,-Trichlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzene
Carbon Tetrachloride
Chlorobenzene
Chloromethane
cis-1,2-Dichloroethene
Methylene Chloride
Tetrachloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl Chloride
Pesticides - SW846 8081A
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Mercury - SW846 7470A
Total Mercury

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 5.4: Carbon Adsorber Sample Port Schedule

	Sample Port			
Process Configuration	**GAC SP-1**	**GAC SP-2**	**GAC SP-3**	**GAC SP-4**
Vessel #1 Processing	Before	After	NA	NA
Vessel #2 Processing	NA	NA	Before	After
Series Operation 1=>2	Before	Between	Between	After
Series Operation 2=>1	Between	After	Before	Between

Notes:
1) Sample ports are labeled in field as denoted on this table.
2) Before-water sample prior to carbon treatment.
3) Between-water sample between carbon vessels
4) After-water sample after carbon treatment (system effluent).

Prepared By: AWE 5/29/2012
Checked By: AWM 5/29/2012

Table 5.5: Annual Site Wide Constituent Monitoring Locations

ANNUAL SAMPLING LOCATIONS	
A ZONE	**B ZONE**
OBA-1A	OBA-1B
OBA-1B	OBA-2B
OBA-5A	OBA-5B
OBA-6A	OBA-6B
OBA-8A	OBA-8B
OBA-16A	OBA-11B
OBA-23A	OBA-16B
PN-1A	OBA-23B
PN-3A	PN-4B
PN-4A	PN-5B
PN-5A	PN-6B
PN-6A	PN-7B
PN-7A	PN-11B
PN-11A	PN-12B
PN-12A	PN-14B
PN-14A	PN-15B
PN-15A	PN-17B
PN-17A	PN-20B
PN-18A	
PN-20A	

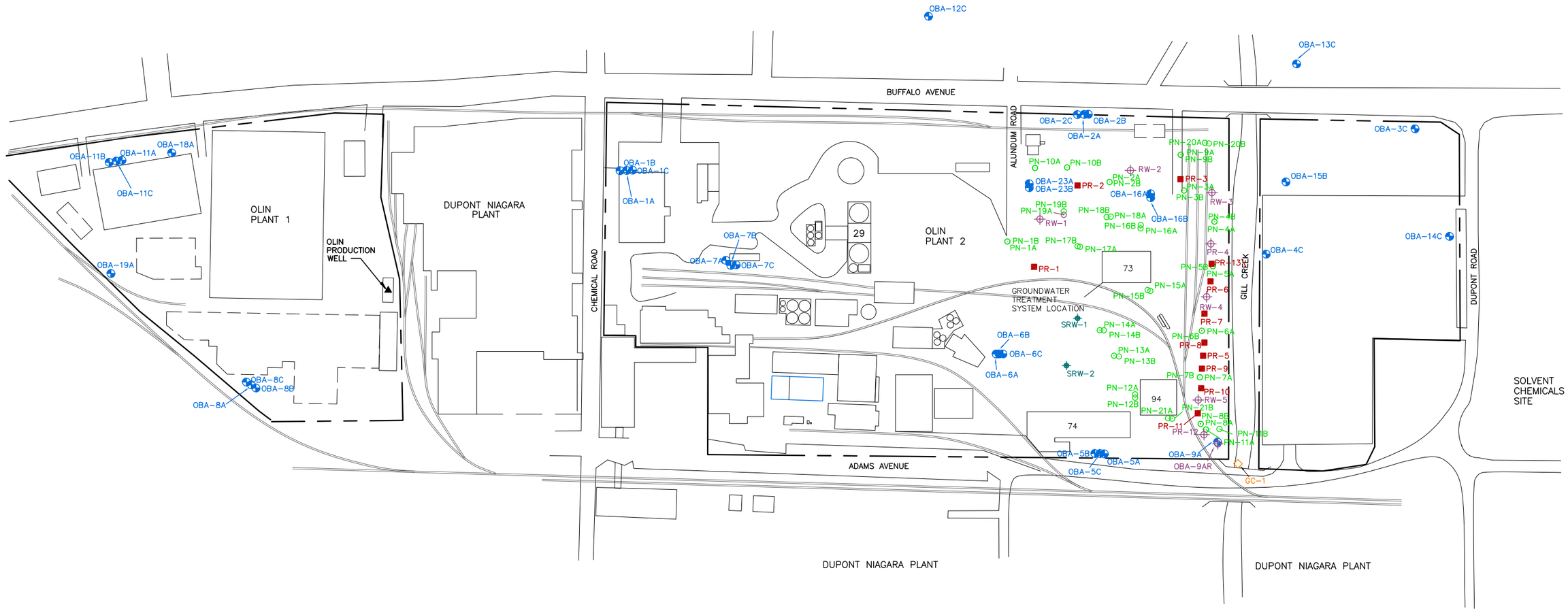
Notes:
1) The wells on Table 5.5 will be analyzed for the parameters shown on Table 5.3.
2) Annual sampling is anticipated to be performed in May or June of each year.

Prepared By: AWE 5/29/2012
Checked By: KM 5/29/2012

FIGURES

LEGEND

OBA–X	WATER QUALITY MONITORING WELLS
PN–4	WATER QUALITY MONITORING WELLS
GC–1	GILL CREEK STILLING WELL
RW–4	GROUND–WATER RECOVERY WELLS
PR–3	PASSIVE RELIEF WELLS
SRW–1	SUPPLEMENTAL REMEDIATION WELLS
▲	OLIN PRODUCTION WELL



SCALE IN FEET

0 100 200

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED R. MAROTTE
IN CHARGE R. MAROTTE
DATE 5/30/2012

olin CHEMICALS PLANT
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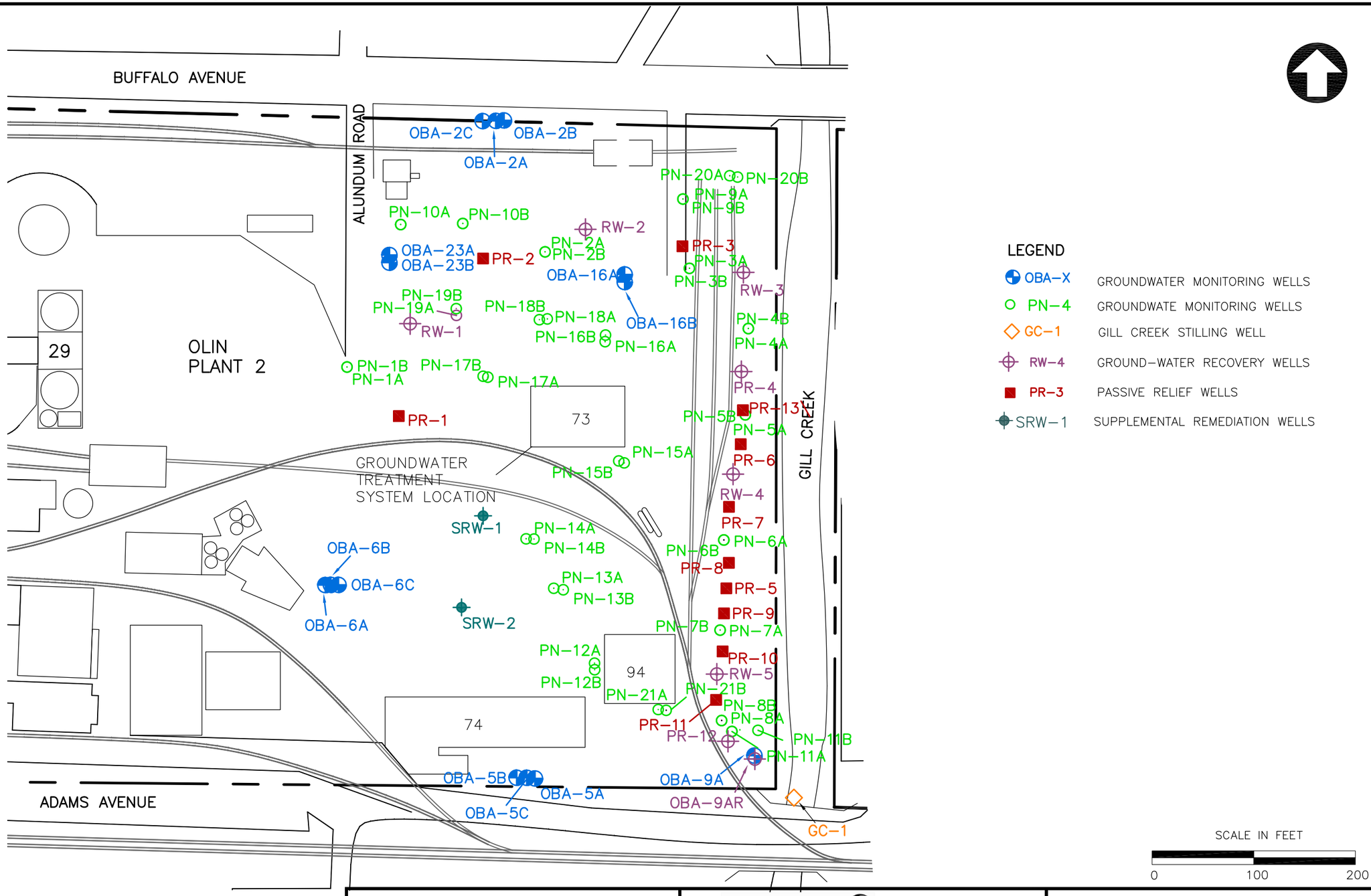
SITE LAYOUT

SCALE AS SHOWN
CONTRACT 6107–12–6002
DWG. NO. FIG 1.1
REV
PAGE NO

J:\OLIN–NIAGRA\APRIL 2012 O&M REVISION 03 FIGs\MAY 2012\FIGURE 1.1.dwg – D SIZE FULL MAP 06/14/2012 1:35pm Tonya.Gladstone

J:\OLIN-NIAGRA\APR08 O&M REVISION 03 FIGs\MAY 2012\FIGURE 1.1.dwg - Layout1 06/14/2012 2:05pm Tonya.Gladstone



LEGEND

OBA-X	GROUNDWATER MONITORING WELLS
PN-4	GROUNDWATE MONITORING WELLS
GC-1	GILL CREEK STILLING WELL
RW-4	GROUND-WATER RECOVERY WELLS
PR-3	PASSIVE RELIEF WELLS
SRW-1	SUPPLEMENTAL REMEDIATION WELLS

SCALE IN FEET

0 100 200

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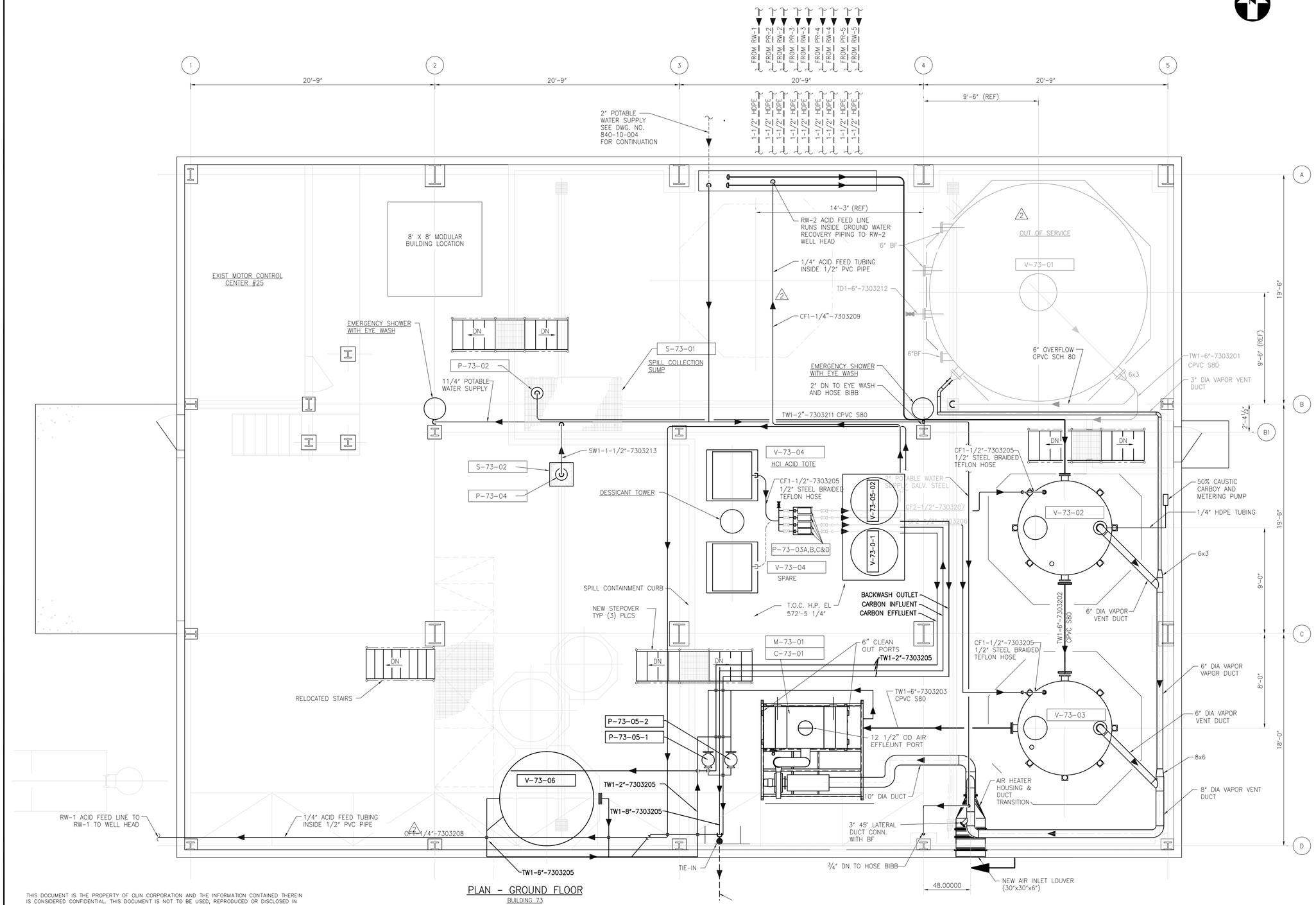
SITE LAYOUT - ARGC AREA

JOB NO. 6107-12-0002 FIGURE 1.2

PREPARED BY/DATE AWE 5/30/2012
CHECKED BY/DATE FRM 5/30/2012



NOTES:

1. PIPING RUNS SHOWN ON THIS DRAWING ARE FOR BASIC ROUTING SCHEMES ONLY. SEE PIPING ISOMETRIC DRAWING NO. 840-00-002 FOR ADDITIONAL DETAIL. ALL PIPING UNLESS OTHERWISE NOTED IS FIELD RUN.
2. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO ANY FABRICATION OR INSTALLATION AND MAKE NECESSARY ADJUSTMENTS TO FACILITATE FABRICATION AND ERECTION.
3. DUCTWORK SHALL BE ROUND GALVANIZED SPIRAL LOCK-SEAM RATED FOR NEGATIVE 4 INCHES W.G. DUCT AND FITTINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA AND ASHRAE STANDARDS. STANDARD FITTINGS SHALL BE USED UNLESS NOTED OTHERWISE.
4. INSTALL QUADRANT LOCKING DAMPERS WHERE INDICATED ON THE DRAWINGS.
5. SUPPORT DUCT AT 8' TO 10' INTERVALS AND AS INDICATED IN ACCORDANCE WITH SMACNA/ASHRAE STANDARDS AND MANUFACTURERS INSTRUCTIONS.
6. BALANCING AND TESTING: CONTRACTOR SHALL BE RESPONSIBLE FOR BALANCING SYSTEM. ENGINEER WILL PROVIDE CONTRACTOR WITH SYSTEM SETPOINTS UPON COMPLETION OF DUCT INSTALLATION.
7. SUBMIT DUCT, FITTINGS, LOUVER, SUPPORTS AND DAMPERS TO ENGINEER IN ACCORDANCE WITH SPECIFICATIONS. SUBMITTALS SHALL INCLUDE, BUT NOT BE LIMITED TO, DIMENSIONAL DATA, MATERIALS OF CONSTRUCTION, CONSTRUCTION SPECIFICATIONS AND MANUFACTURERS INSTALLATION INSTRUCTIONS.
8. REFER TO DRAWING NO. D-7734-840-04-002 FOR BUILDING HEATER(S) LOCATION AND SCHEDULE.

PLAN - GROUND FLOOR

BUILDING 73

SCALE IN FEET

0 4 8

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED R. MAROTTE
IN CHARGE R. MAROTTE
DATE 5/30/2012

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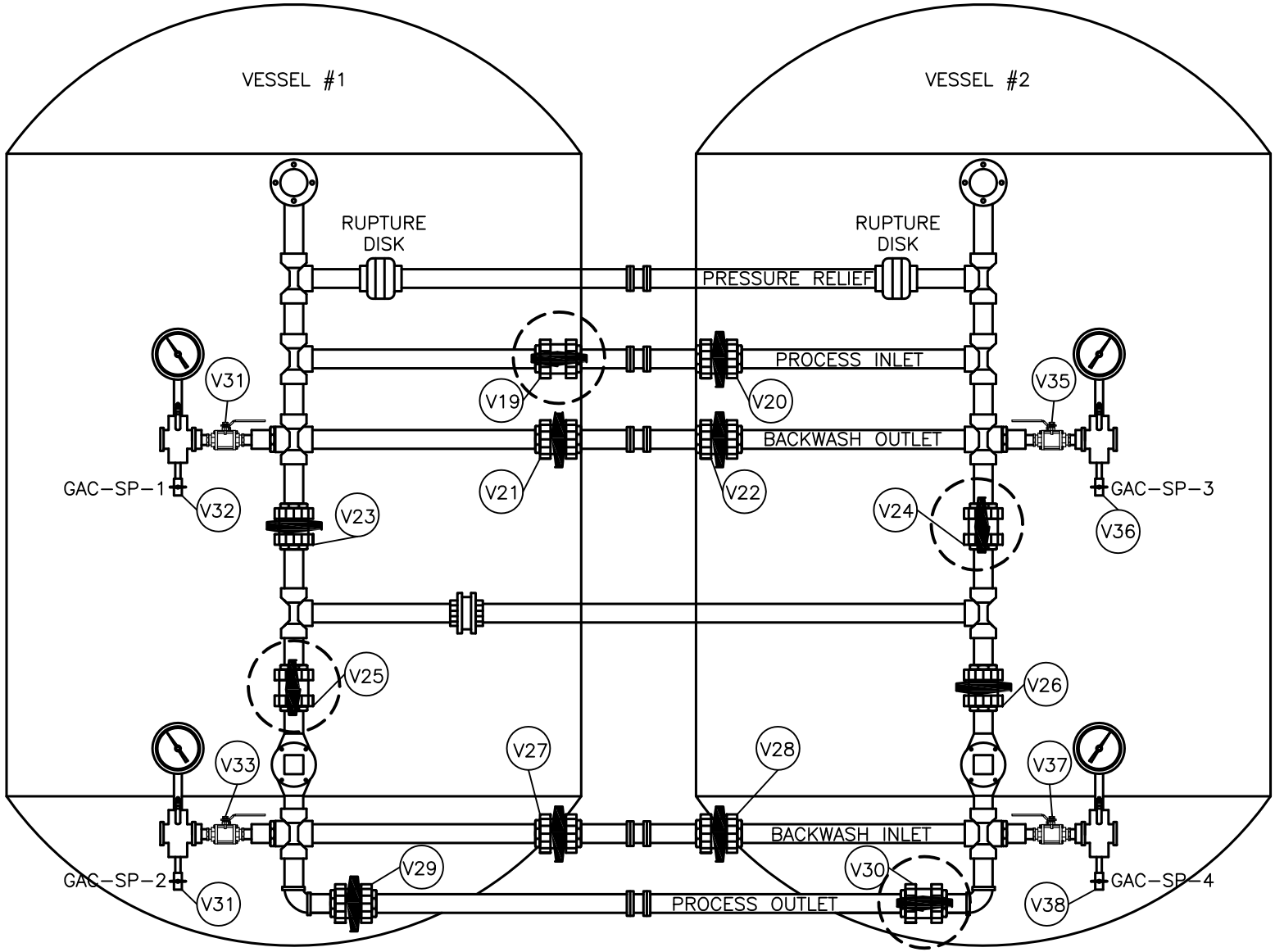
BUILDING 73 LAYOUT

SCALE: AS SHOWN
CONTRACT: 6107-13-0002
DWG. NO.: FIG 2.1
REV
PAGE NO.

J:\OLIN-NIAGRA\APR08 O&M REVISION 03 FIGS\MAY 2012\FIGURE 2.5.dwg - Layout1 10/18/2013 10:05am colleen.budsock

J:\OLIN-NIAGRA\APR08 O&M REVISION 03 FIGs\MAY 2012\FIGURE 3.1.dwg - SERIES 05/30/2012 1:17pm Tonya.Gladstone



NOTES:

1. **OPEN VALVES V19, V24, V25 AND V30**
2. **REFER TO TABLE 3.1 FOR CARBON ABSORBER VALVE SCHEDULE**
3. **VALVE POSITIONS SHOULD ONLY BE CHANGE WITH THE CARBON FEEDS PUMPS OFF.**

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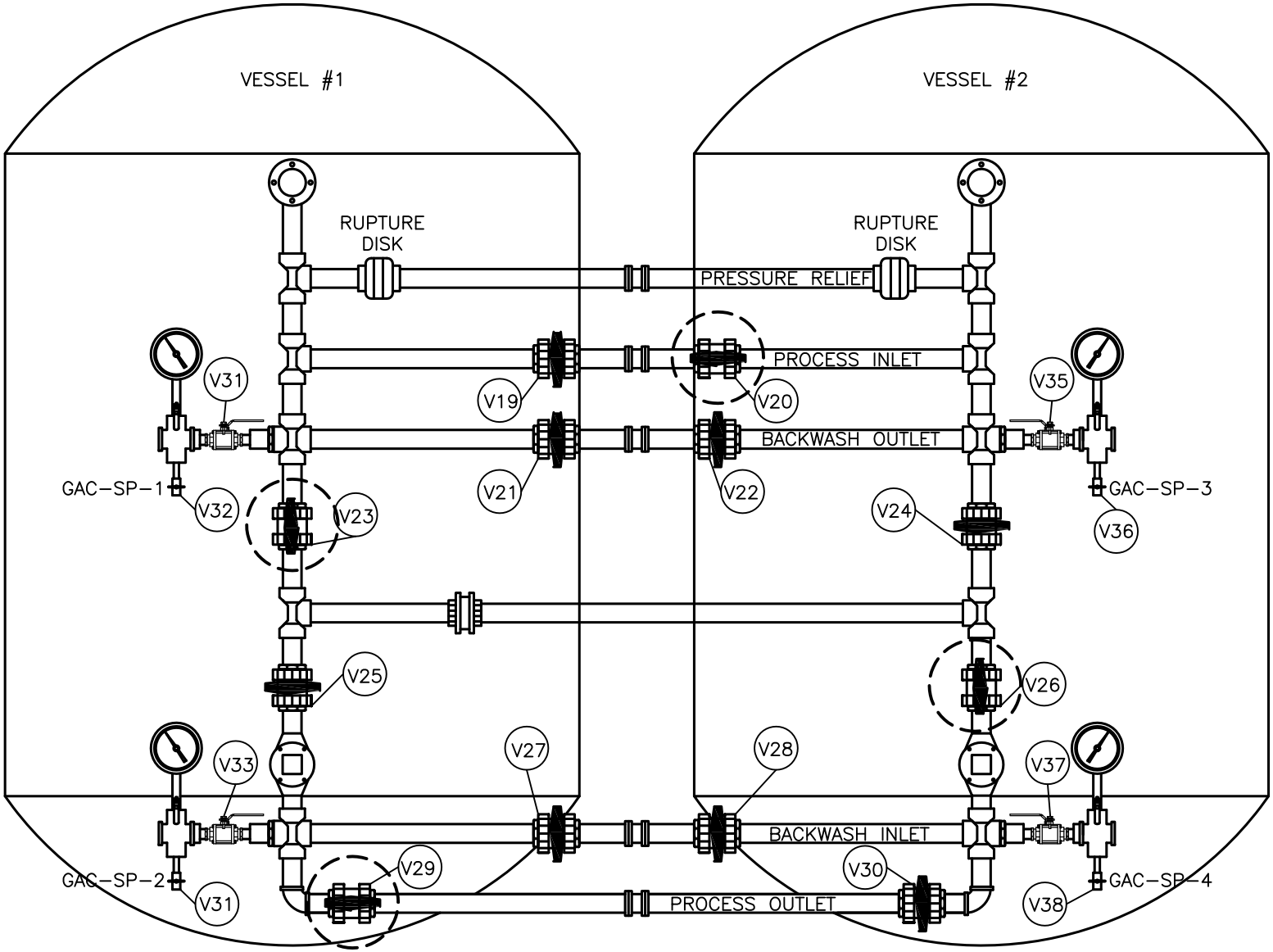
CARBON ABSORBER UNIT VALVE CONFIGURATION

SERIES OPERATION 1 TO 2

JOB NO. 6107-12-0002 FIGURE 3.1

PREPARED BY/DATE AWE 5/30/2012
CHECKED BY/DATE FKM 5/30/2012



NOTES:

1. **OPEN VALVES V20, V23, V26 AND V29**
2. **REFER TO TABLE 3.1 FOR CARBON ABSORBER VALVE SCHEDULE**
3. **VALVE POSITIONS SHOULD ONLY BE CHANGE WITH THE CARBON FEEDS PUMPS OFF.**

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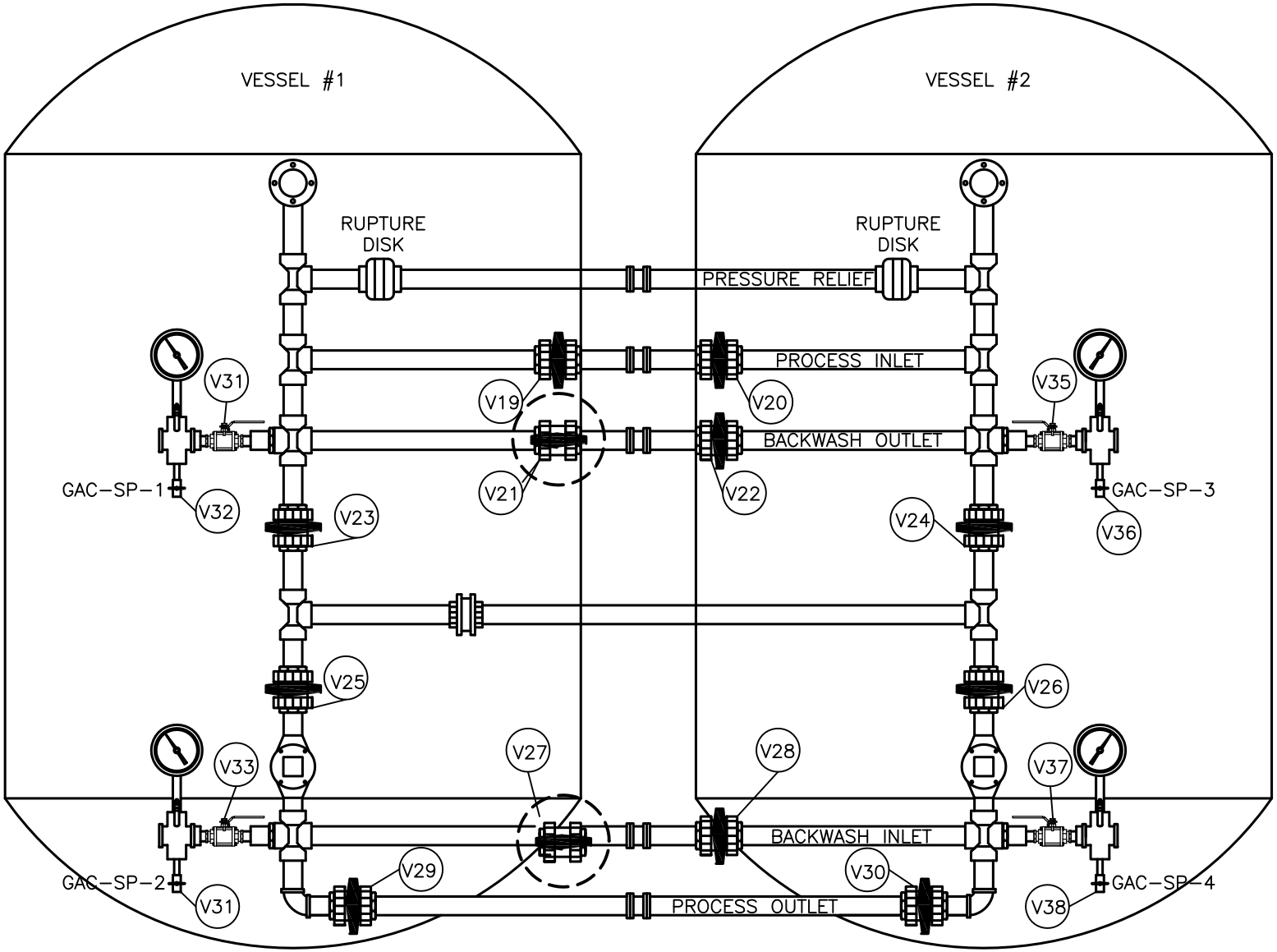
CARBON ABSORBER UNIT VALVE CONFIGURATION

SERIES OPERATION 2 TO 1

JOB NO. 6107-12-0002 FIGURE 3.2

PREPARED BY/DATE AWE 5/30/2012
CHECKED BY/DATE FKM 5/30/2012

J:\OLIN-NIAGRA\APR08 O&M REVISION 03 FIGs\MAY 2012\FIGURE 3.3.dwg - VESSEL 1 05/30/2012 1:36pm Tonya.Gladstone



NOTES:

1. **OPEN VALVES V21 AND V27**
2. **REFER TO TABLE 3.1 FOR CARBON ABSORBER VALVE SCHEDULE**
3. **VALVE POSITIONS SHOULD ONLY BE CHANGE WITH THE CARBON FEEDS PUMPS OFF.**

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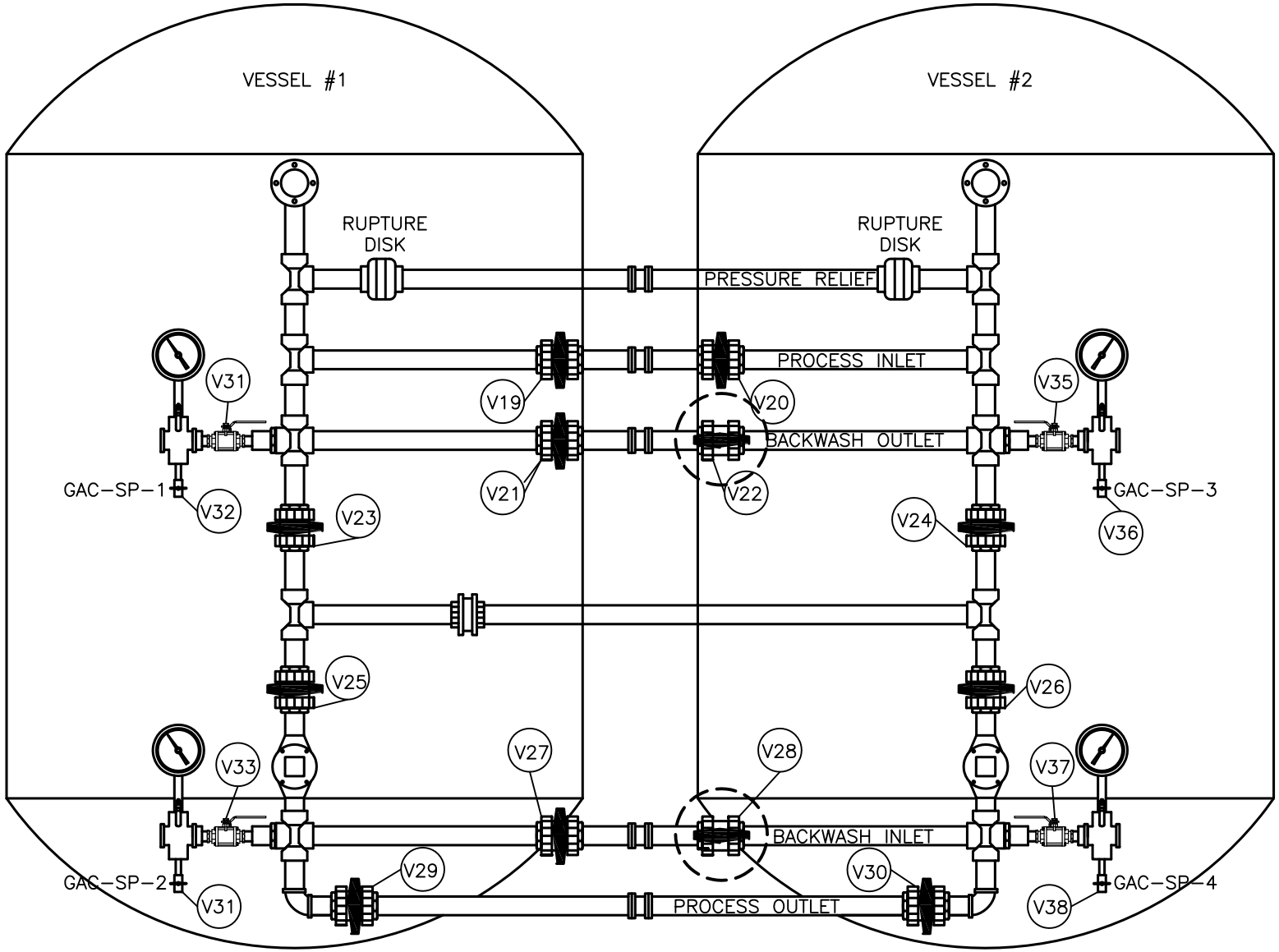
CARBON ABSORBER UNIT VALVE CONFIGURATION

VESSEL #1 BACKWASH

JOB NO. 6107-12-0002 FIGURE 3.3

PREPARED BY/DATE AWE 5/30/2012
CHECKED BY/DATE FKM 5/30/2012

J:\OLIN-NIAGRA\APR08 O&M REVISION 03 FIGs\MAY 2012\FIGURE 3.4.dwg - VESSEL 1 05/30/2012 1:38pm Tonya.Gladstone



NOTES:

1. **OPEN VALVES V22 AND V28**
2. **REFER TO TABLE 3.1 FOR CARBON ABSORBER VALVE SCHEDULE**
3. **VALVE POSITIONS SHOULD ONLY BE CHANGE WITH THE CARBON FEEDS PUMPS OFF.**

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CARBON ABSORBER UNIT VALVE CONFIGURATION

VESSEL #2 BACKWASH

JOB NO. 6107-12-0002 FIGURE 3.4

PREPARED BY/DATE AWE 5/30/2012
CHECKED BY/DATE FKM 5/30/2012

APPENDIX A

POTW PERMIT

NIAGARA FALLS WATER BOARD

SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 23 Olin Corporation

In accordance with all terms and conditions of the Niagara Falls Water Board Regulations Part 1960 and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: Olin Corporation

Located at: 2400 Buffalo Avenue
Niagara Falls, NY 14303

Classified by SIC No(s): 2812, 2819

For the contribution of wastewater into the Niagara Falls Water Board Publicity-Owned Treatment Works (POTW).

Effective this 5th day of October, 2010
To Expire this 5th day of October, 2015
This permit modified 1/11/12, 2/29/12, 3/30/12, 9/27/12

for

Paul J. Drof
Executive Director of the Niagara Falls Water Board

Signed this 27th day of September, 2012

This page modified 1/11/12, 2/29/12

DISCHARGE IDENTIFICATION

OUTFALL	DESCRIPTION	LOCATION	RECEIVING
MS #1	Monitoring Station No. 1 (1 S)	Plant #1 Buffalo Avenue	Storm water, ground water Infiltration, former SPDES #002
MS # 2	Monitoring Station No. 2 (7S)	Plant #2 Buffalo Avenue	Sodium Hypochlorite process, storm run off, parking lot, groundwater recovery and pretreatment system
MS # 3	Monitoring Site No. 3 (2 S)	(Out of Service)	
MS # 4	Monitoring Site No. 4 (3 S)	Plant #1 Buffalo Avenue	Storm water
MS # 5	Monitoring Site No. 5 (6 S)	Plant #2 Buffalo Avenue	Sanitary, storm water
MS # 6	Monitoring Site No. 6 (8 S)	Plant #2 Buffalo Avenue	Storm water
MS # 7	Monitoring Site No. 7 (9 S)	(Out of Service)	
MS # 8	DuPont's Main Monitoring Station MS # 1 (023)	Plant #3 East of Gill Creek	*

* This monitoring site receives discharges from Olin's Chlor Alkali process area formerly known as Niachlor. This includes brine processing and chlorine, caustic and hydrochloric acid production. These discharges commingle with DuPont's wastewater and discharge to the POTW via MS #1, 023.

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	**ACTION REQUIRED**	**REQUIRED DATE OF SUBMISSION**
A. <u>Discharges to the Niagara Falls Water Board (NFWB) Sewer</u>		
1. Identification of all discharges to the NFWB Sewer System on a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED September 10, 2010
2. Identification of each contributing waste stream to each discharge to the NFWB Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED September 10, 2010
3. Elimination of all uncontaminated discharges to the NFWB Sewer System. All uncontaminated flows should be clearly identified on a current sewer map certified by a New York State licensed professional engineer.	NONE	
4. Establishment of a control manhole that is continuously and immediately accessible for each discharge to the NFWB Sewer System.	NONE	
B. <u>Wastewater Discharge Management Practices</u>		
1. Identification of responsible person(s) (day to day and in emergencies).	NONE	

C. Slug Control Plan**

Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the Niagara Falls Water Board will evaluate the permittee, a minimum of once every two years for the need for a "Slug Control Plan." If a plan is required by the Niagara Falls Water Board, then the plan will contain, at a minimum, the following elements:

a) Description of discharge practices, including non-routine batch discharges;
b) Description of stored chemicals;
c) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow-up written notification within five days;
d) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.

**This section applies to all pollutants limited by the Niagara Falls Water Board SPDES Permit and all prohibited wastewater discharges (See Section 1960.5 of the Niagara Falls Water Board Wastewater Regulations).

D. General Wastewater Discharge Permit Conditions

1. Flow monitoring should be performed concurrently with any Wastewater Discharge Permit sampling and should be reported at the same time as analytical results. If it is not feasible to perform flow monitoring, an estimate of flow (method of estimated flow pre-approved by the Niagara Falls Water Board) should be submitted with the analytical results.

2. All sampling for billing and pretreatment compliance purposes will be coordinated through the Niagara Falls Water Board Industrial Monitoring Coordinator.

3. All analysis must be performed by a State certified laboratory using analytical methods promulgated and consistent with 40 CFR 136 and amendments thereto. The permittee will request their contract laboratory to report both Practical Quantitation Limit (PQL) and Method Detection Limit (MDL). The PQL and MDL are defined in the NYSDEC Technical Guidance Series 1.3.7.

   The permittee should report results that are less than the MDL or PQL on the NFWB Self Monitoring Report, as non-detect (ND), by placing a less than sign (<) followed by the analytical result. Every effort should be made to attain results down to the MDL. If this is not possible; then results less than PQL but greater than MDL must also be additionally flagged with the qualifier "J" on the Self Monitoring Report. For example, a result less than 5 PQL would be reported <5 (J). In either case the calculated load in lbs per day would be zero.

   Monitoring results which are lower than the PQL must be reported but will not be used to determine compliance with the permit limit.

4. An estimate of relative production levels for wastewater contributing processes at the time of any pretreatment compliance sampling will be submitted upon request of the Director of Niagara Falls Water Board - Wastewater Facilities.

5. All samples will be handled in accordance with EPA approved methods. Chain of Custody records will be submitted with all sampling results.

6. All conditions, standards and numeric limitations of the Niagara Falls Water Board Wastewater Regulations are hereby incorporated into this permit by reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said regulations constitutes

D. General Wastewater Discharge Permit Conditions, con't

reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said regulations constitutes a violation and is subject to enforcement actions(s) described in Section 1960.9 of said regulations, and in the Niagara Falls Water Board Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide." In the event of a violation, including slug discharges or spills, the Niagara Falls Water Board must be notified immediately by phone and confirmed by letter within five (5) working days.

Any person adjudicated of violating any provision in the Niagara Falls Water Board Wastewater Regulations shall be assessed a fine in the amount of up to $10,000. This amount is available for each violation, and each day of a violation is a separate incident for which penalties may be sought.

The person violating any of the provisions of the Niagara Falls Water Board Wastewater Regulations will be liable for any expense, loss, or damage occasioned by reason of such violation. The expense, loss or damage will be taken to be the extent determined by the Director.

In addition, any person who knowingly makes any false statements, representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to the Niagara Falls Water Board Wastewater Regulations, or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under the Niagara Falls Water Board Wastewater Regulations will, upon conviction be punished by a fine up to $10,000. Furthermore, the Niagara Falls Water Board may recover reasonable attorney's fees, court costs, court reporting fees, and other expenses of litigation by appropriate suit at law against the person violating any of the provisions of the Niagara Falls Water Board Wastewater Regulations will be liable to the person found to have violated applicable laws, orders, rules and permits required by the Niagara Falls Water Board Wastewater Regulations.

7. In accordance with Federal Regulation CFR 40, Part 403.12(g), any exceedance of a numeric limitation noted by the SIU must be re-sampled, analyzed and resubmitted to the Niagara Falls Water Board - Wastewater Facilities within 30 days.

D. General Wastewater Discharge Permit Conditions, con't

Specifically, if any limit that is *listed* in Section F of this permit is exceeded, then the permittee will undertake a short term monitoring program for that pollutant. Samples will be collected identical to those required for routine monitoring purposes and will be collected on each of at least *two (2)* operating days and analyzed. Results will be reported in both concentration and mass, and will be submitted within *30* days of becoming aware of the exceedence.

8. Sampling frequency for any permitted compounds may be increased beyond the requirements set forth in Section F and G of this permit. If the permittee monitors (sample and analysis) more frequent than required under this permit, **all** results of this monitoring must be reported.

9. As noted in Section 1960.5g of the Niagara Falls Water Board Wastewater Regulations, "Personnel as designated by the Director will be permitted at any time for reasonable cause to enter upon all properties served by the Niagara Falls Water Board - Wastewater Facilities for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Regulations."

10. As noted in Section 1960.5c of the Niagara Falls Water Board Wastewater Regulations, significant changes in discharge characteristics or volume must be reported immediately to the Niagara Falls Water Board - Wastewater Facilities.

11. As noted in Section 1960.6b of the Niagara Falls Water Board Wastewater Regulations, samples required to be collected via a 24-hour composite sampler must be retained refrigerated for an additional 24 hour plus un-refrigerated an additional 48 hours (total 72 hours).

12. As noted in Section 250.5.4 of the Sewer Use Ordinance, all "SIU's will keep on file for a minimum of three years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the Niagara Falls Water Board - Wastewater Facilities."

12. As noted in Section 1960.6g of the Niagara Falls Water Board Wastewater Regulations, "Permits are issued to a specific user for a specific monitoring station. A permit will not be reassigned or transferred without the approval of the Director which approval will not be unreasonably withheld. Any

D. General Wastewater Discharge Permit Conditions, con't

succeeding owner or user to which a permit has been transferred and approved will also comply with all the terms and conditions of the existing permit."

14. The Annual Average Limitation is equivalent to the specific SIU allocation, and will be defined as the permissible long-term average discharge of a particular pollutant. These limitations are listed in Section F of this permit. The computation of the Annual Average will be as follows; for each compound listed in Section G of this permit, the Annual Average will be the average of the present monitoring quarter and three previous quarters' data.

15. The Daily Maximum Limitation will be defined as the maximum allowable discharge on anyone day. The Daily Maximum Limitation will allow for periodic short-term discharge fluctuations. These specific limitations are listed in Section F of this permit.

16. Enforcement of the Annual Average Limitation will be based on the reported average of the last four quarters data vs. the Annual Average Limited listed in Section F of this permit. Enforcement of the Daily Maximum Limitation will be based on individual analysis results vs. the Daily Maximum Limit listed in Section F of this permit. These results may be obtained from self monitoring (Section G), City Verification, incident investigation or billing samples.

17. The Niagara Falls Water Board Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the Niagara Falls Water Board - Wastewater Facilities SPDES Permit. The limits defined in the procedure are values which are based on the quantity of substances discharged which can be easily related to the Treatment Plant's removal capacity.

    The pollutants listed in this procedure which are <u>not</u> specifically listed in Section F and G of this permit may be present in the permittee's wastewater discharge, but at levels which do not require specific permit limitations. Consequently, if any of the limits listed in this

    procedure, for pollutants <u>not</u> identified in Section F and G of this permit, are exceeded then the permittee will undertake a short-term, high intensity-monitoring program for that pollutant. Samples identical to those required for routine monitoring purposes will be collected on each of at least three

D. General Wastewater Discharge Permit Conditions, con't

operating days and analyzed. Results will be expressed in terms of both concentration and mass, and will be submitted no later than the end of the third month following the month when the limit was first exceeded. If levels higher than the limit are confirmed, the permit may be reopened by the Niagara Falls Water Board for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

   a) The determination of quantities of flow, TSS and SOC shall be made at the NFWB's expense and shall be based on five (5) representative 24 hour flow proportion composite samples from each monitoring station.

   b) Substances of Concern charges shall be based on the permittee's Quarterly Self Monitoring Report data.

   c) Because sanitary discharge points MS # 5 and MS # 6 bypass Monitoring Station MS # 2, a per capita sanitary formula will be applied for billing purposes. As such, the permittee shall indicate in the Quarterly Self Monitoring Report the average number of persons employed at the facility during the monitoring quarter.

   d) The sewer use charge for the discharge of storm water from MS#4 will be obtained by; multiplying the square footage of the area, as determined by the topographical study conducted in 2010, times the inches of rainfall deposited on the area each month. The result should be converted to MGD. This data will be submitted in the Monthly Flow Report.

2. Hypochlorite Process

   The permittee is hereby granted permission to release loads of off-specification hypochlorite to the POTW subject to the following conditions:

   a) Prior to release of such wastewater the load shall be analytically tested for total residual chlorine and sodium chloride.

   b) Prior to release of such wastewater the results of the testing noted in 2a shall be phoned into a member of the Wastewater Facilities Enforcement Division to receive verbal approval to discharge.

E. Specific Wastewater Discharge Permit Conditions, con't.

c) The NFWB reserves the right to revoke this approval in the event this discharge results in an upset of any portion of the POTW operation or violates any applicable Niagara Falls Water Board Regulations or federal pretreatment standard.

d) This approval includes the discharge of the soft water unit backwash, dike area weak bleach mixed with rain water, filter and equipment wash water, condensate, sample and sample line purge.

e) Weak Bleach Solution – The intermittent discharge of neutralized, low salt, weak bleach solution from this process area is permitted as part of this permit. Because this wastewater will contain sulfates and sulfites which could contribute to odors at the POTW; the NFWB reserves the right to suspend or terminate this approval at any time.

3. Former Niachlor Process Facility (Plant #3):

The NFWB agrees to accept wastewaters discharged from the former Niachlor Process Facility (Plant #3) for the production of chlorine, caustic soda and hydrochloric acid subject to the following provisions:

a) The permittee shall operate and maintain this facility in such a manner as to minimize discharge of chlorides to the Niagara Falls Water Board sewers.

b) The Niagara Falls Water Board acknowledges that because of former Niachlor's (Plant #3) physical location on and within the DuPont de Nemours Plant site, and its associated discharges commingle with DuPont's wastewater, this discharge will enter the Niagara Falls Water Board POTW via DuPont's Monitoring Station No. 1 (023).

c) The Niagara Falls Water Board acknowledges that this waste stream includes wastewater from: electrolysis area preparation wash and process flows, samples and sample line purges from all areas, steam condensate, process condensate, soft water, seal flushes, equipment cleaning wash downs and caustic area strainer basket backwash water.

d) The permittee is responsible for any required monitoring, reporting and necessary control of pollutants discharged from this facility. The Niagara Falls Water Board reserves the right to open this permit and impose pollutant monitoring and periodic reporting requirements that it deems necessary in the

future.
This page modified 1/11/12, 2/29/12

E. Specific Wastewater Discharge Permit Conditions, con't.

e) Olin shall maintain the pH and pollutant loading contained in the wastewaters discharged from this facility in such a manner that will not cause, or contribute to, violations of the conditions and limitations contained in DuPont's Wastewater Discharge Permit No. 7 at Monitoring Station MS # 1 (023).

4. Groundwater Recovery/Pretreatment System:

The permittee operates a groundwater recovery/pretreatment system on site. The pretreatment systems employs a multi-tray air stripper and carbon polish to reduce the quantities of volatile organic pollutants discharged. The Niagara Falls Water Board hereby grants permission for this discharge subject to the following conditions.

a) The pretreatment system shall be operated and maintained in such a manner that the permittee will consistently meet the discharge limitations noted in this permit.
b) Pollutants will be monitored and reported as directed in this permit.

5. Monitoring Station No. 1 has been reactivated as of August 2005 to co-mingle storm and ground water from 9S, former SPDES Outfall 002 and from Plant No. 1 paved areas to the Niagara Falls Water Board combined sewer on Buffalo Avenue.

6. Slug Control Plan:

Pursuant to the regulations contained in the Federal Industrial Pretreatment Program, 40CFR 403.8(f)(2), the NFWB is obligated to periodically review users for the need for a Slug Control Plan. This permittee has been reviewed and is required to develop and implement such a plan.

The permittee has developed an Emergency Response Procedure, SPCC Plan and a Spill Prevention Report to minimize the likelihood of a spill and to respond to spills that have already occurred. These plans must be implemented and all sections pertaining to sewer discharges to the NFWB are *enforceable under this permit*. All future revisions to these plans are also enforceable. Revised plans must be submitted to the Niagara Falls Water Board.

F. Discharge Limitations & Monitoring Requirements

During the Period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) shall be limited and monitored by the permittee as specified below.

OUTFALL NUMBER EFFLUENT PARAMENTER	DISCHARGE LIMITATIONS		UNITS	MINIMUM MONITORING REQUIREMENTS	
	ANNUAL AVERAGE	DAILY MAXIMUM		MEASUREMENT FREQUENCY	SAMPLE TYPE
MS #1 Flow	Monitor	Monitor	MGD	Continuous	
MS #1 Total Suspended Solids	Monitor	Monitor	Lbs/day	5/Qtr	7
MS #1 Soluable Organic Carbon	Monitor	Monitor	Lbs/day	5/Qtr	7
MS #1 Mercury	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #1 Chromium	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #1 Copper	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #1 Lead	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #1 Nickel	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #1 Zinc	Monitor	Monitor	Lbs/day	1/Qtr	3
MS #2 Flow	0.35	0.88	MGD	Continuous	N/A
MS #2 Total Suspended Solids	250	625	Lbs/day	5/Quarter	7
MS #2 Soluble Organic Carbon	100	250	Lbs/day	5/Quarter	7
MS #2 Chromium	0.092	0.23	Lbs/day	1/Quarter	3
MS #2 Mercury	0.01	0.05	Lbs/day	1/Quarter	3
MS #2* Total Residual Chlorine	450	2000	Lbs/day	1/Batch	Grab
MS #2* Sodium Chloride	Monitor	Monitor	Lbs/day	1/Batch	Grab
MS #2 1,1,2,2 Tetrachloroethane	2.0	7.0	Lbs/day	1/Quarter	2

F. Discharge Limitations & Monitoring Requirements, con't

OUTFALL NUMBER EFFLUENT PARAMENTER	Discharge Limitations		UNITS	MINIMUM MONITORING REQUIREMENTS	
	ANNUAL AVERAGE	DAILY MAXIMUM		MEASUREMENT FREQUENCY	SAMPLE TYPE
MS #2 Trichloroethylene	0.20	0.25	Lbs/day	1/Quarter	2
MS #2 Butyl benzyl phthalate	0.02	0.04	Lbs/day	1/Quarter	3
MS #2 Hexachlorocyclohexane	0.035	0.07	Lbs/day	2/Quarter	3
MS #2 Hexachlorobutadiene	0.025	0.05	Lbs/day	1/Quarter	3
MS #2 Chloroform	0.08	0.13	Lbs/day	1/Quarter	2
MS #4 Flow	**	**	MGD	Monthly	N/A

NOTE: * See Section E-2 of this permit

** The calculation of flow will be obtained as noted in Section E-1d of this permit.

F. DISCHARGE LIMITATIONS & MONITORING REQUIREMENTS, con't

SAMPLE TYPE FOOTNOTES

(1) Each sample will consist of four (4) grabs collected spaced throughout the **batch** discharge, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.

(2) Each sample will consist of four (4) grabs collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.

(3) Each sample will consist of a 24-hour, **flow proportioned** composite sample collected from the monitoring point.

(4) Flow will be monitored continuously with the use of a water meter or another acceptable flow metering device.

(5) Each sample will consist of a 24-hour, **time proportioned** composite sample collected from the monitoring point.

(6) Reserved

(7) Same as (3), however, five (5) samples will be collected per quarter from the monitoring point and analyzed by and at the Niagara Falls Water Board's expense.

(8) Four (4) grab samples will be collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. Each grab will be **analyzed and reported separately**.

(9) A grab sample is defined as an aliquot collected over a period of not more than 15 minutes.

G. Discharge Monitoring Reporting Requirements

During the period beginning the effective date of this permit and lasting until its expiration date, discharge monitoring results will be summarized and reported by the permittee; Monthly - 14 days after monitoring period, Quarterly - by the last day of the monitoring period = February 28, May 31, August 31, November 30. Semiannual reports will be submitted on the last day of the monitoring period = February 28, August 31. The annual average for each parameter listed in Section F, will be computed and reported quarterly. The individual sample analysis for present quarter will also be reported quarterly unless directed otherwise in this permit.

OUTFALL NO.	PARAMETER	REPORTING FREQUENCY
MS # 1	Flow	Monthly
MS #1	Mercury	Quarterly
MS #1	Chromium	Quarterly
MS #1	Copper	Quarterly
MS #1	Lead	Quarterly
MS #1	Nickel	Quarterly
MS #1	Zinc	Quarterly
MS #2	Flow	Monthly
MS # 2	Chromium	Quarterly
MS # 2	Mercury	Quarterly
MS # 2	Total Chlorine Residual	See Section E-2

This page modified 9/27/12

G. <u>Discharge Monitoring Reporting Requirements, con't</u>

OUTFALL NO.	PARAMETER	REPORTING FREQUENCY
MS # 2	Sodium Chloride	See Section E-2
MS # 2	1,1,2,2 Tetrachloroethane	Quarterly
MS # 2	Butyl benzyl phthalate	Quarterly
MS #2	Trichloroethylene	Quarterly
MS # 2	Hexachlorohexane	Quarterly
MS # 2	Hexachlorobutadiene	Quarterly
MS # 2	Chloroform	Quarterly
MS #4	Flow	Monthly

H. Comments/Revisions

1) Effective 1-11-12 Olin is granted permission to discharge strainer backwash (Niagara River) water to the POTW via DuPont's 023 Monitoring Station #1.
2) Effective 2-29-12 changes to nomenclature have been made to correctly identify current names of processes and report documents.
3) Effective 3-30-12, Olin is permitted to periodically discharge neutralized, low salt, weak bleach solution from the sodium hypochlorite process area.
4) Effective 9-27-12 this permit was modified in response to the results of an EPA Audit requiring the imposition of limits for trichloroethylene.

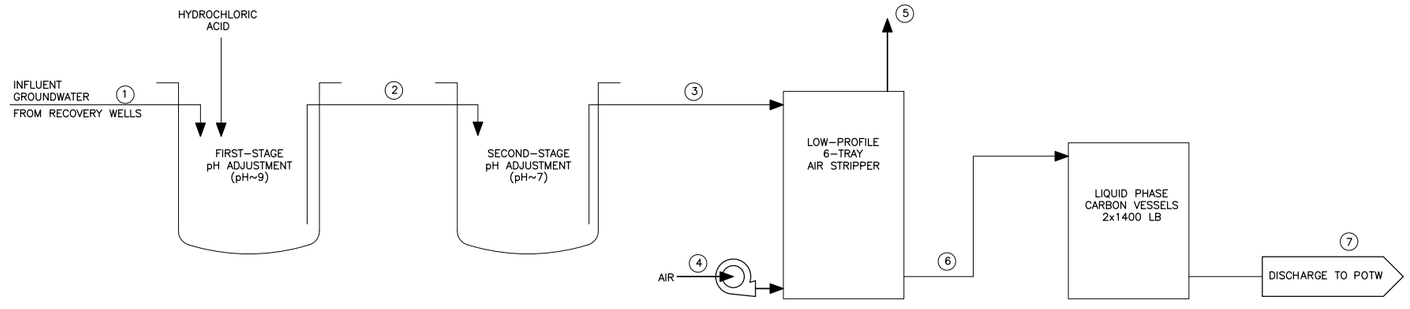
APPENDIX B

PROCESS FLOW DIAGRAM AND PIPING AND INSTRUMENTATION DIAGRAMS

STREAM NUMBER		1	2	3	4	5	6	7
STREAM TYPE		WATER	WATER	WATER	AIR	AIR	WATER	WATER
STREAM IDENTIFIER		INFLUENT WATER	1ST STAGE PH ADJUST	AIR STRIPPER INFLUENT	FRESH AIR	EFFLUENT AIR	CARBON VESSEL INFLUENT	DISCHARGE TO POTW
GENERAL PARAMETERS								
FLOW RATE	GPM	50	50	50	900 ACFM	900 ACFM	50	50
TOTAL MASS FLOW RATE	LB/HR	25020	25020	25020	4500	4500	25020	25020
TEMPERATURE	°F	50	50	50	> 33	> 45	> 45	> 45
pH	SU	6 to 13	7	7	NA	NA	7	7
VOLATILE ORGANIC COMPOUNDS					ug/m^3	ug/m^3		
1,1,1-Trichloroethane	ug/L	<250	<250	<250	0	< 485	<2.0	<4.0
1,1,2,2-Tetrachloroethane	ug/L	1600	1600	1600	0	2863	140	140
1,1,2-Trichloroethane	ug/L	<250	<250	<250	0	< 485	1.3	1.4
1,1-Dichloroethene	ug/L	<250	<250	<250	0	< 485	<2.0	<4.0
1,2,4-Trichlorobenzene	ug/L	980	980	980	0	1873	25	<4.0
1,2-Dichlorobenzene	ug/L	<250	<250	<250	0	< 485	2.4	<4.0
1,3-Dichlorobenzene	ug/L	<250	<250	<250	0	< 485	2.7	<4.0
1,4-Dichlorobenzene	ug/L	<250	<250	<250	0	< 485	3	<4.0
Benzene	ug/L	110	110	110	0	213	1.3	<4.0
Carbon tetrachloride	ug/L	<250	<250	<250	0	< 485	<2.0	<4.0
Chlorobenzene	ug/L	<250	<250	<250	0	< 485	1.7	<4.0
Chloromethane	ug/L	<250	<250	<250	0	< 485	<2.0	<4.0
cis-1,2-Dichloroethene	ug/L	3500	3500	3500	0	6739	63	58
Methylene chloride	ug/L	220	220	220	0	421	5.3	<4.0
Tetrachloroethene	ug/L	6800	6800	6800	0	13255	40	32
trans-1,2-Dichloroethene	ug/L	<250	<250	<250	0	< 485	<2.0	<4.0
Trichloroethene	ug/L	16000	16000	16000	0	31078	150	270
Vinyl Chloride	ug/L	<200	<200	<200	0	< 388	<2.0	<4.0
PESTICIDES								
alpha-BHC	ug/L	49	49	49	0	27	35	0.18
beta-BHC	ug/L	5.5	5.5	5.5	0	0	6.5	2.8
delta-BHC	ug/L	5.0	5.0	5.0	0	2	4.2	1.1
gamma-BHC	ug/L	36	36	36	0	16	28	0.44

NOTES:

1. STREAM INFORMATION AND CONSTITUENT CONCENTRATIONS ARE BASED ON NOVEMBER 2012 SYSTEM OPERATING DATA.
2. THE MAXIMUM GROUNDWATER FLOWRATE THROUGH THE SYSTEM IS 90 GPM AND IS LIMITED BY THE CARBON VESSEL FLOW RATING.



REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED K. WATSON
IN CHARGE T. ENGLUND
DATE 5/1/2013

Olin CHEMICALS PLANT
NIAGARA FALLS, NY.

amec
AMEC Environment & Infrastructure, Inc.
1075 BIG SHANTY ROAD, NW, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421–3400

GROUNDWATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

SCALE NOT TO SCALE
CONTRACT 6107–13–0002
DWG. NO. D–7734–840–09–001

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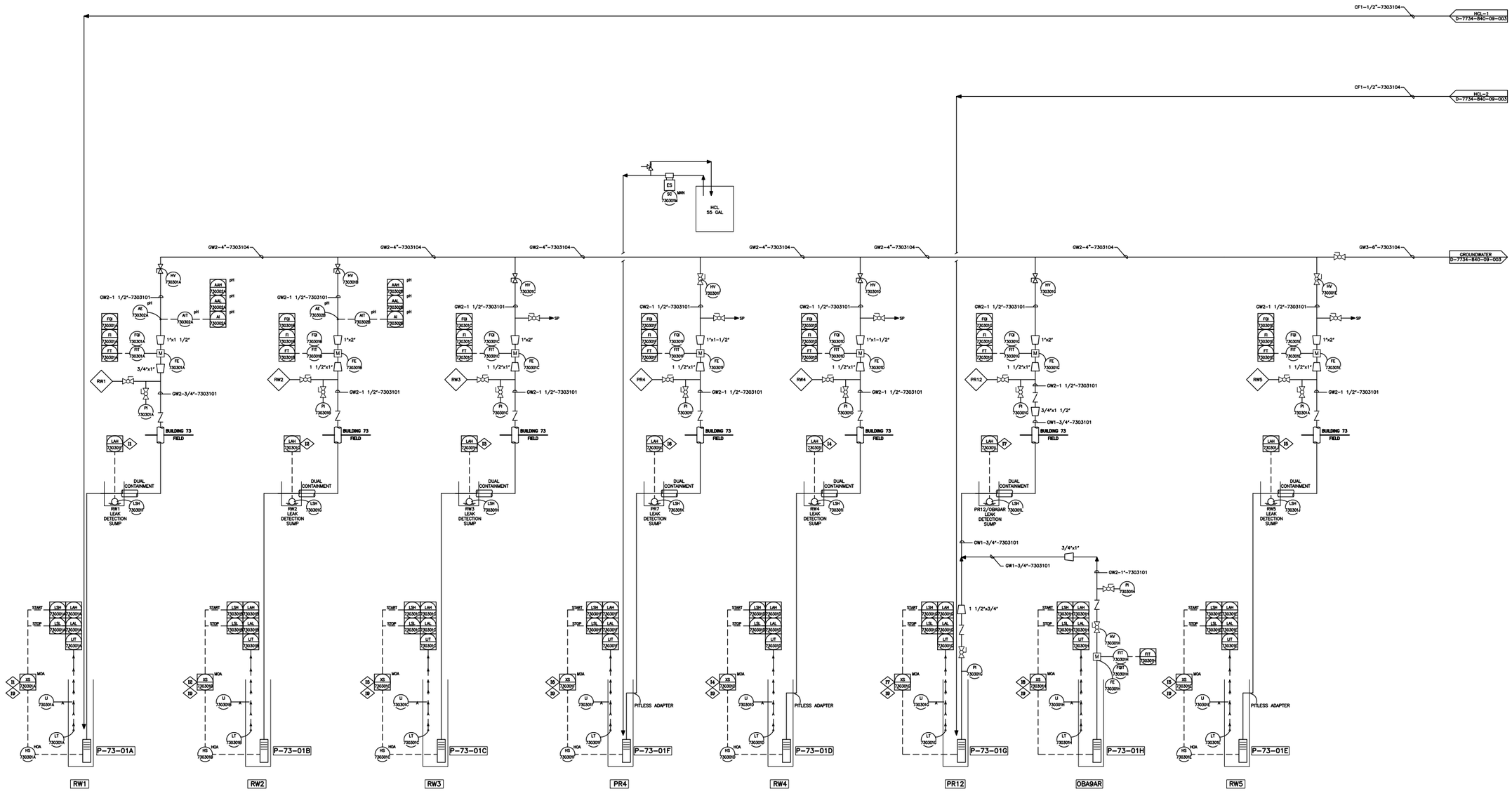

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KENNESAW, GEORGIA 30144 (770) 421-3400

GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM (SHEET 1 OF 3)

SCALE NOT TO SCALE
CONTRACT 6107-13-0002
DWG. NO. D-7734-840-09-002

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HCL-2 D-7734-840-09-002
HCL-1 D-7734-840-09-002
CF1-1/2"-7303104
CF2-1/2"-7303104
HCL TOTE 330 GAL V-73-04
LAL 730330
LIT 730330
LIT 730301
LE 730302
50% NaOH
1/2"x2"
P-73-03C
P-73-03B
P-73-03A
P-73-03D
HAD
SC 730303A
MAN
MOA
HS 730303
INTO CONTAINMENT PALLET
TO OVERFLOW DRUM
NaOH 25 GAL
HS 730307A
CF1-1/4"-7303104
AAH 730301A
AAL 730301A
AIC 730301A
AIT 730301A
ADA 730301A
pH
HS 730302A
VT1-8"-730325
VT1-8"-730326
VT1-6"-730323
VT1-6"-730322
CF1-½"-7303205
M-73-01A
M-73-01B
GW3-6"-7303104
GROUNDWATER D-7734-840-09-002
TW1-6"-7303202
TW1-6"-7303203
V-73-02 FIRST STAGE pH ADJUSTMENT
V-73-03 SECOND STAGE pH ADJUSTMENT
TD2-2"-7303209
TD2-2"-7303210
DRAIN
INFLUENT
VT2-12"-730406
DISCHARGE TO ATMOSPHERE
AMBIENT AIR
C-73-01
AIR STRIPPER
M-73-01
LIMITS OF AIR STRIPPER EQUIPMENT SKID
LAHH 730401
PAL 730401
PSL 730401
0.5 "H20
FI 730401
FT 730401
FE 730401
LSHH 730403
LSH 730403
LSL 730403
STOP
6"x3"
3"x8"
2" SCH 80 PVC
8" SCH 80 PVC
HV 730508
HV 730509
HV 730510
HV 730517
HV 730501
HV 730502
HV 730503
HV 730512
HV 730511
HV 730513
HV 730514
HV 730515
HV 730516
HV 730505
HV 730504
HV 730506
HV 730507
P-73-05-02 CARBON FEED PUMP #2
P-73-05-1 CARBON FEED PUMP #1
FQ 730403
FT 730403
FE 730403
FI 730403-2
FI 730501-1
GROUNDWATER-1 D-7734-840-09-004
GROUNDWATER-2 D-7734-840-09-004
BACKWASH WATER D-7734-840-09-004
EQUIPMENT LOCATED WITHIN SECONDARY CONTAINMENT CURB
HV 730303
FI 730302
TW1-2"-7303211
FROM CONTAINMENT AREA FLOOR DRAINS
LAHH 730302
LSHH 730302
LSH 730302
LSL 730302
XS 730302
SW1-1 1/2"-7303213
HS 730304
HS 730305
P-73-03
P-73-02
S-73-02 BUILDING 73 NON-CONTAINMENT AREA SUMP
S-73-01 BUILDING 73 CONTAINMENT AREA SUMP
EQUIPMENT LOCATED WITHIN SECONDARY CONTAINMENT CURB

REV	DATE	BY	SUB	APP	DESCRIPTION

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CHECKED K. WATSON
IN CHARGE T. ENGLUND
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NIAGARA FALLS, NY.

amec
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KENNESAW, GEORGIA 30144 (770) 421-3400

GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM (SHEET 2 OF 3)

SCALE NOT TO SCALE
CONTRACT 6107-13-0002
DWG. NO. D-7734-840-09-003

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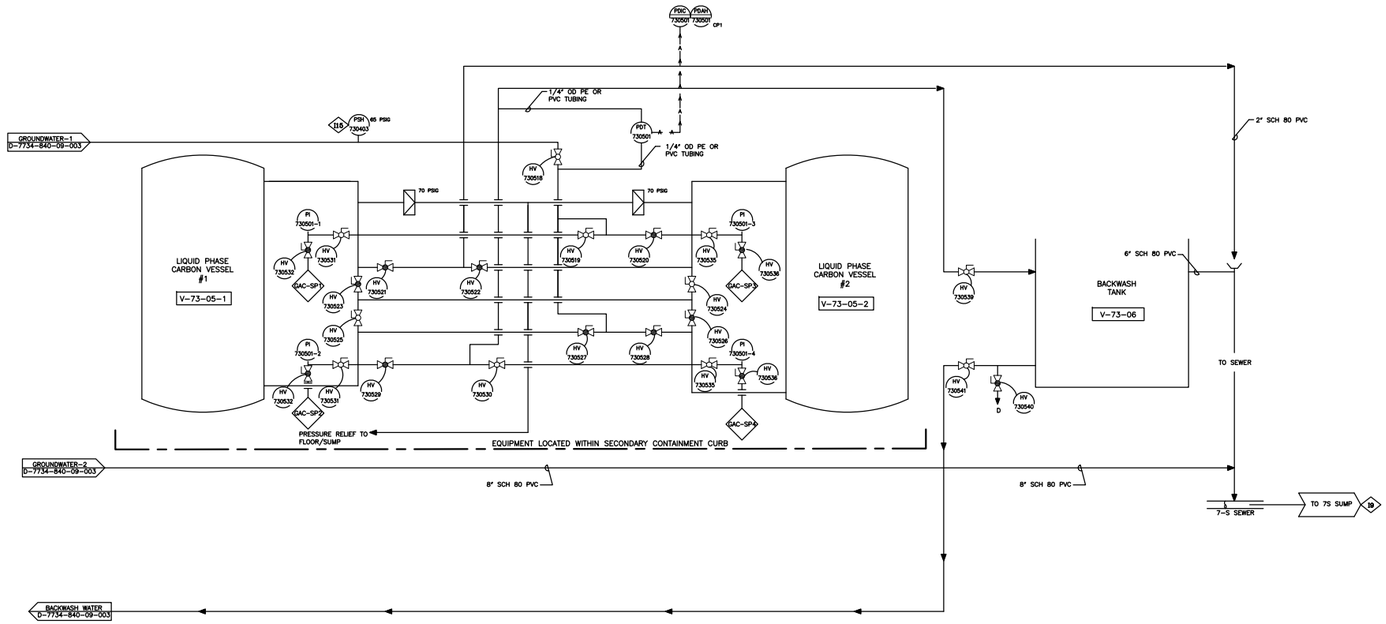

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DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED K. WATSON
IN CHARGE T. ENGLUND
DATE 5/1/2013

Olin CHEMICALS PLANT
NIAGARA FALLS, NY.

amec
AMEC Environment & Infrastructure, Inc.
1075 BIG SHANTY ROAD, NW, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM (SHEET 3 OF 3)

SCALE NOT TO SCALE
CONTRACT 6107-13-0002
DWG. NO. D-7734-840-09-004

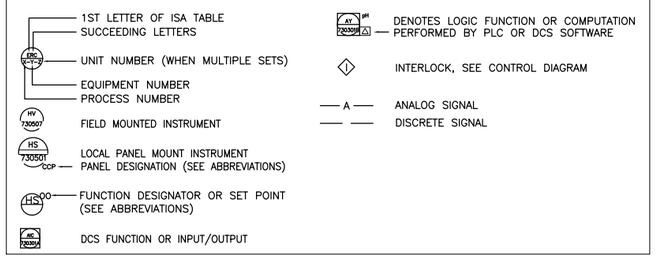
a:\OLIN-NIAGRA\JAN 2013\M-4 PROCESS FLOW DIAGRAM.dwg - SHEET 4 09/20/2013 8:22am Tonya.Gladstone

INSTRUMENT SOCIETY OF AMERICA TABLE

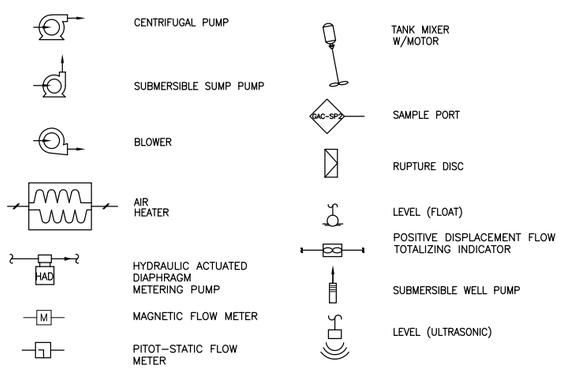
	FIRST LETTER (S)		SUCCEEDING LETTERS		
LETTER	PROCESS OR INTIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (+)		ALARM		
B	BURNER, COMBUSTION		USERS CHOICE (+)	USERS CHOICE (+)	USERS CHOICE (+)
C	USERS CHOICE(+)			CONTROL	
D	USERS CHOICE(+)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	USERS CHOICE(+)		GLASS, VIEWING DEVICE		
H	HAND (MANUAL)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	USERS CHOICE(+)	MOMENTARY			MIDDLE
N	USERS CHOICE (+)		USERS CHOICE (+)	USERS CHOICE (+)	USERS CHOICE (+)
O	USERS CHOICE(+)		ORIFICE, RESTRICTION		
P	PRESSURE (OR VACUUM)		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT (+)	INTEGRATE	INTEGRATE		
R	RADIATION		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE (+)		MULTIFUNCTION (+)	MULTIFUNCTION (+)	MULTIFUNCTION (+)
V	VIBRATION, MECH. ANAL.			VALVE OR DAMPER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED (+)	X-AXIS	UNCLASSIFIED (+)	UNCLASSIFIED (+)	UNCLASSIFIED (+)
Y	EVENT, STATE	Y-AXIS		RELAY OR COMPUTE (+)	
Z	POSITION	Z-AXIS		DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

P&ID BUBBLE IDENTIFICATION



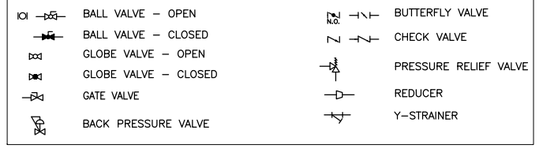
EQUIPMENT AND ELEMENT SYMBOLS



PIPING SERVICE/MATERIAL INDEX

LINE DESIGNATION	SERVICE	BASIC MATERIAL
GW1	GROUNDWATER RECOVERY	HDPE
GW2	GROUNDWATER RECOVERY	316 STAINLESS STEEL
GW3	GROUNDWATER RECOVERY	SCHEDULE 80 PVC
CF1	CHEMICAL FEED	TYGON TUBING
CF2	CHEMICAL FEED	SCHEDULE 80 PVC
TW1	TREATMENT WATER	CPVC
TW2	TREATMENT WATER	SCHEDULE 40 CARBON STEEL
TW3	TREATMENT WATER	HDPE
VT1	VENTILATION	CPVC
VT2	VENTILATION	FRP
TD1	TANK DRAIN	316 STAINLESS STEEL
TD2	TANK DRAIN	CPVC
SW1	SUMP RETURN	CPVC

VALVE SYMBOLS



ABBREVIATIONS

ASP	AIR STRIPPER PANEL	PE	POLYETHYLENE
CP1	CARBON CONTROL PANEL	pH	HYDROGEN ION CONCENTRATION
GAC	GRANULAR ACTIVATED CARBON	PVC	POLYVINYL CHLORIDE
HAD	HYDRAULICALLY ACTUATED DIAPHRAGM	SCH	SCHEDULE
HCL	HYDROCHLORIC ACID	SP	SAMPLE PORT
HOA	HAND-OFF-AUTO	°F	DEGREES FAHRENHEIT
NAOH	SODIUM HYDROXIDE	"H2O	INCHES OF WATER COLUMN
OD	OUTER DIAMETER	Δ	DIFFERENCE
OO	ON-OFF		

INTERLOCK DESCRIPTIONS:

1. DCS INTERLOCK – RW1 PUMP WILL INTERLOCK OFF IF RW1 LEAK DETECTION SWITCH (LSH-730301F) IS ENERGIZED.
2. DCS INTERLOCK – RW2 PUMP WILL INTERLOCK OFF IF RW2 LEAK DETECTION SWITCH (LSH-730301G) IS ENERGIZED.
3. DCS INTERLOCK – RW3 PUMP WILL INTERLOCK OFF IF RW3 LEAK DETECTION SWITCH (LSH-730301H) IS ENERGIZED.
4. DCS INTERLOCK – RW4 PUMP WILL INTERLOCK OFF IF RW4 LEAK DETECTION SWITCH (LSH-730301I) IS ENERGIZED.
5. DCS INTERLOCK – RW5 PUMP WILL INTERLOCK OFF IF RW5 LEAK DETECTION SWITCH (LSH-730301J) IS ENERGIZED.
6. DCS INTERLOCK – PR4 PUMP WILL INTERLOCK OFF IF PR4 LEAK DETECTION SWITCH (LSH-730301K) IS ENERGIZED.
7. DCS INTERLOCK – PR12 PUMP WILL INTERLOCK OFF IF PR12 LEAK DETECTION SWITCH (LSH-730301L) IS ENERGIZED.
8. DCS INTERLOCK – OBA9AR PUMP WILL INTERLOCK OFF IF OBA9AR LEAK DETECTION SWITCH (LSH-730301M) IS ENERGIZED.
9. DCS INTERLOCK – ALL RW PUMPS WILL INTERLOCK OFF FOR THE FOLLOWING CONDITIONS:
   - -SPILL SUMP HIGH HIGH LEVEL SWITCH (LSHH-730302) IS ENERGIZED.
   - -STAGE 2 LOW PH ALARM (AIT-730301B) IS ACTIVE.
   - -STAGE 2 HIGH PH ALARM (AIT-730301B) IS ACTIVE.
   - -STAGE 2 PH DIFFERENCE ALARM (ADA-730301) IS ACTIVE.
   - -AIR STRIPPER BLOWER RUN ALARM (QA-730401) IS ACTIVE.
   - -7S SPILL SUMP HIGH HIGH LEVEL ALARM (LI-2514 7S) IS ACTIVE.
10. DCS INTERLOCK – STAGE 1 PH CONTROLLER (AIC-730301B) ANALOG OUTPUT SIGNAL WILL BE INTERLOCKED TO 0% FOR THE FOLLOWING CONDITIONS:
    - -STAGE 1 LOW PH ALARM (AAL-730301B) IS ACTIVE.
    - -STAGE 2 PH DIFFERENCE ALARM (ADA-730301B) IS ACTIVE.
    - -INTERLOCK I9 IS ACTIVE STOPPING ALL RW PUMPS.
11. DCS INTERLOCK – STAGE 2 PH CONTROLLER (AIC-730301A) ANALOG OUTPUT SIGNAL WILL BE INTERLOCKED TO 0% FOR THE FOLLOWING CONDITIONS:
    - -STAGE 1 LOW PH ALARM (AAL-730301B) IS ACTIVE.
    - -STAGE 2 LOW PH ALARM (AAL-730301A) IS ACTIVE.
    - -STAGE 2 PH DIFFERENCE ALARM (ADA-730301B) IS ACTIVE.
12. AIR STRIPPER PANEL INTERLOCK – IN AUTO OPERATION, AIR STRIPPER BLOWER WILL INTERLOCK OFF IF LOW PRESSURE SWITCH (PSL-730401) IS ENERGIZED FOR 20 SECONDS. MANUAL RESTART REQUIRED.
13. AIR STRIPPER PANEL INTERLOCK – IN AUTO OPERATION, AIR STRIPPER BLOWER WILL INTERLOCK OFF IF HIGH HIGH LEVEL SWITCH (LSHH-730401) IS ENERGIZED. BLOWER WILL INTERLOCK OFF 8 MINUTES AFTER HIGH HIGH LEVEL ALARM IS ACTIVATED.
14. DCS INTERLOCK – IF THE AIR STRIPPER BLOWER RUN ALARM (QA-730401) IS ACTIVATED, POWER TO THE AIR STRIPPER PANEL (XS-730401) WILL INTERLOCK OFF.
15. CARBON CONTROL PANEL INTERLOCK – CARBON FEED PUMPS 1 & 2 WILL INTERLOCK OFF IF HIGH PRESSURE SWITCH (PSH-730403) IS ENERGIZED (65 PSIG).

NOTES:

1. AIC-730301A SENDS A 4-20mA ANALOG SIGNAL TO THE METERING PUMP SPEED CONTROLLER SC-730301A. THE SIGNAL IS SCALED BETWEEN pH 7 (4mA) AND pH 14 (20mA). BELOW pH 7 THE SIGNA DROPS OUT TO 0mA.
2. SC-730301A RECEIVES A 4-20A ANALOG SIGNAL FROM pH CONTROLLER AIC-730301A. WHEN THE SIGNAL IS PRESENT SC-730301A ADJUSTS THE SPEED OF THE METERING PUMP ACCORDINGLY. THE METERING PUMP IS STOPPED WHEN THE SIGNAL IS NOT PRESENT.
3. SUMP PUMP CONTROL SWITCH XS 730302 IS CONTROLLED BY LSH 730302 AND LSL 73032 WITH THE DCS. SUMP PUMP P-73-02 IS MANUALLY OPERATED BY PLUNGING INTO A 110V RECEPTACLE.
4. LEVEL DEVICE NOT PRESENT IN FIELD BUT SHOWN IN DCS.

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED K. WATSON
IN CHARGE T. ENGLUND
DATE 5/1/2013

Olin CHEMICALS PLANT
NIAGARA FALLS, NY.

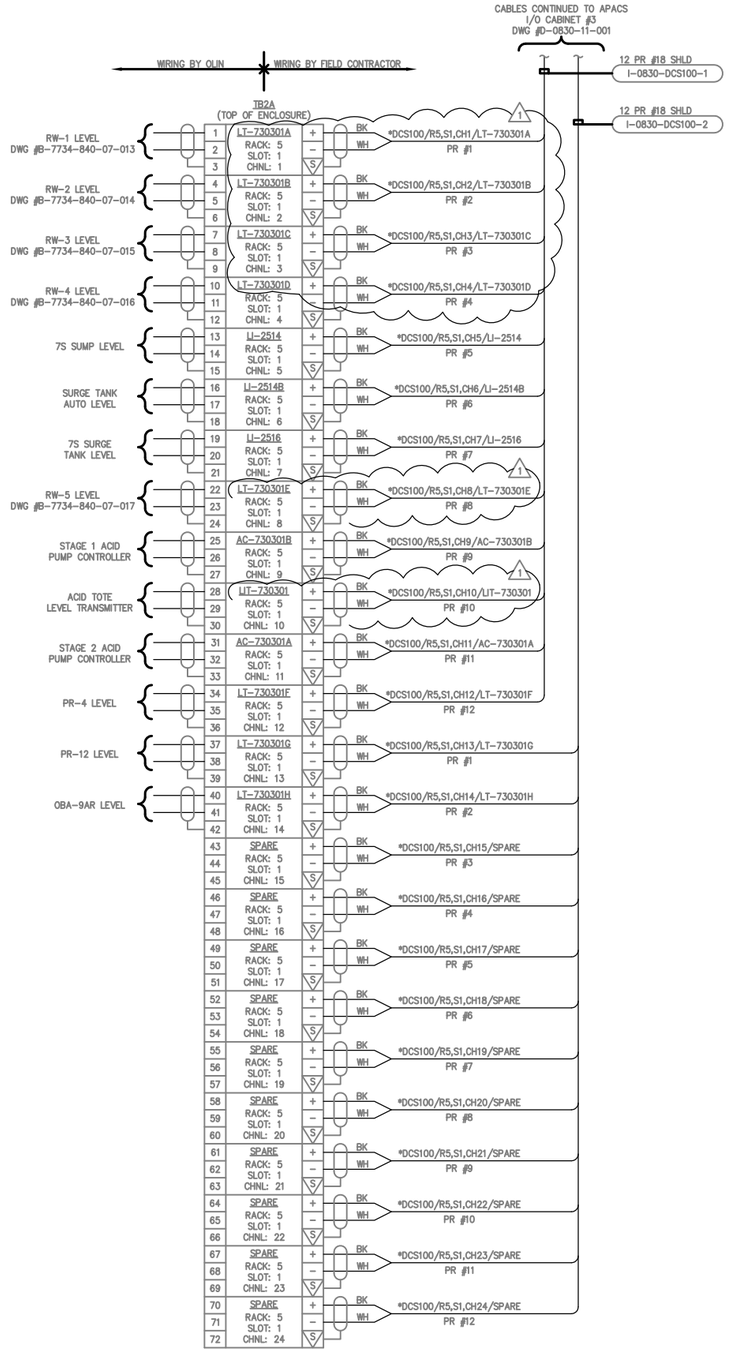
AMEC Environment & Infrastructure, Inc.
1075 BIG SHANTY ROAD, NW, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

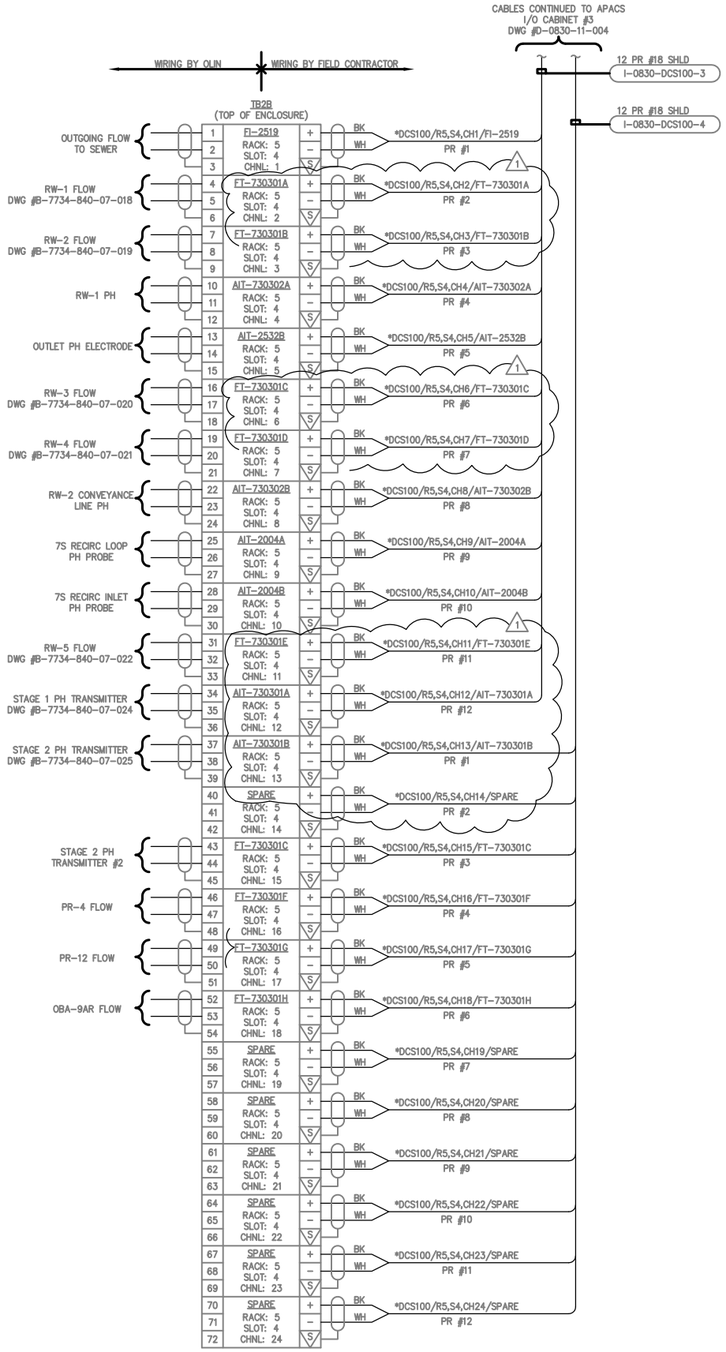
GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM LEGEND AND NOTES

SCALE: NOT TO SCALE
CONTRACT: 6107-13-0002
DWG. NO.: D-7734-840-09-005

APPENDIX C

ELECTRICAL AND CONTROL DRAWINGS





TYPICAL FOR ALL

* – PREFIX WIRE NUMBER WITH CABLE JACKET NUMBER.
EXAMPLE:
E-0830-DCS100-1/DCS100/TB2-F1

REFERENCE DRAWINGS

D-7734-840-07-011	BLDG 73, NORTH PLANT – INSTRUMENTATION PLAN
D-7734-840-07-012	BLDG 73, NORTH PLANT – I/O BOX #3 LAYOUT & BILL OF MATERIAL
D-0090-07-102	NIAGARA BLEACH EXPANSION, ETHERNET COMMUNICATIONS BLOCK DIAGRAM
D-0830-06-061	NORTH PLANT – B73 TO APACS I/O MIGRATION, I/O BOX #3 TB LAYOUT, DIGITAL
D-0830-11-001	NORTH PLANT – APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 1
D-0830-11-002	NORTH PLANT – APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 2
D-0830-11-003	NORTH PLANT – APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 3
D-0830-11-004	NORTH PLANT – APACS I/O WIRING, SAI MODULE, RACK 5, SLOT 4
D-0830-11-005	NORTH PLANT – APACS I/O WIRING, SDM-RMTA MODULE, RACK 5, SLOT 5

. REVISED . JUL 9, 2008

FILE NAME: 083006060

ATSI ENGINEERING SERVICES www.atsiinc.com

DATE 2/18/08	DRAWN MKG	DESIGN RJD		
SCALE NONE	CHECKED	APPROVED		
CAD FILE 083006060	ACT. NO.	CONTRACT NO. 75040		
DRAWING NUMBER			REV. 1	

			DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
1686	1686	1	UPDATED DEVICE I.D.'S & WIRE NUMBERS	MKG	7/9/08		
R.Z02.4037.1223	-	0	ISSUED FOR CONSTRUCTION	MKG	4/29/08		R.J. DILIMONE
R.Z02.4037.1223	-	P1	ISSUED FOR APPROVAL	MKG	2/18/08		R.J. DILIMONE
PROJ.	CAR	REV.					

DRAWN BY: MKG	DATE: 2/18/08
DESIGN BY: R. DILIMONE	DATE: 2/18/08
CHECKED BY:	DATE:
PROJECT DESIGN COORDINATOR:	DATE:
PROJECT ENGINEER:	DATE:
PROJECT MANAGER:	DATE:

Olin PLANT ENGINEERING

PROJECT NO.	C.A.R. NO.	SCALE
R.Z02.4037.1223	R.Z02.4037.1223	NONE

NORTH PLANT
B73 OMNIX TO APACS
I/O MIGRATION, I/O BOX #3
TERM BLOCK LAYOUT, ANALOG

DRAWING NUMBER D-0830-06-060 REV 1

CABLES CONTINUED TO APACS I/O CABINET #0830-DCS-100 DWG #D-0830-11-002

WIRING BY OLIN | WIRING BY FIELD CONTRACTOR

25/C #14 E-0830-DCS100-1

25/C #14 E-0830-DCS100-2

25/C #14 E-0830-DCS100-3

TB1A
(LEFT SIDE OF ENCLOSURE)

SUMP PUMP P-408A	1	XAP-409A RACK 5, SLOT 2 CHNL 1		BK	*DCS100/TB2-F1
	2			RD	*DCS100/TB2-CH1
SUMP PUMP P-408B	3	XAP-409B RACK 5, SLOT 2 CHNL 2		BL	*DCS100/TB2-F2
	4			OR	*DCS100/TB2-CH2
LO-LO SUMP LEVEL	5	LALL-2514 RACK 5, SLOT 2 CHNL 3		YL	*DCS100/TB2-F3
	6			BR	*DCS100/TB2-CH3
MOISTURE IN SEAL DWG #D-7909-830-06-015	7	ASP-408A RACK 5, SLOT 2 CHNL 4	C	RD/BK	*DCS100/TB2-F4
	8		NO	BL/BK	*DCS100/TB2-CH4
MOISTURE IN SEAL DWG #D-7909-830-06-015	9	ASP-408B RACK 5, SLOT 2 CHNL 5	C	OR/BK	*DCS100/TB2-F5
	10		NO	YL/BK	*DCS100/TB2-CH5
BATTERY TROUBLE ALARM DWG #D-0620-07-100 (2)	11	0620-EA-027 RACK 5, SLOT 2 CHNL 6	C	BN/BK	*DCS100/TB2-F6
	12		NC	BK/RD	*DCS100/TB2-CH6
	13	SPARE RACK 5, SLOT 2 CHNL 7		BL/RD	*DCS100/TB2-F7
	14			OR/RD	*DCS100/TB2-CH7
	15	SPARE RACK 5, SLOT 2 CHNL 8		YL/RD	*DCS100/TB2-F8
	16			BR/RD	*DCS100/TB2-CH8
	17	SPARE RACK 5, SLOT 2 CHNL 9		BK/BL	*DCS100/TB2-F9
	18			RD/BL	*DCS100/TB2-CH9
RW-1 LEAK DETECTION	19	LSH-730301F RACK 5, SLOT 2 CHNL 10		BK	*DCS100/TB3-F10
	20			RD	*DCS100/TB3-CH10
RW-2 LEAK DETECTION	21	LSH-730301G RACK 5, SLOT 2 CHNL 11		BL	*DCS100/TB3-F11
	22			OR	*DCS100/TB3-CH11
RW-3 LEAK DETECTION	23	LSH-730301H RACK 5, SLOT 2 CHNL 12		YL	*DCS100/TB3-F12
	24			BR	*DCS100/TB3-CH12
RW-4 LEAK DETECTION	25	LSH-730301I RACK 5, SLOT 2 CHNL 13		RD/BK	*DCS100/TB3-F13
	26			BL/BK	*DCS100/TB3-CH13
RW-5 LEAK DETECTION	27	LSH-730301J RACK 5, SLOT 2 CHNL 14		OR/BK	*DCS100/TB3-F14
	28			YL/BK	*DCS100/TB3-CH14
BLOWER RUN INDICATOR	29	QA-730401 RACK 5, SLOT 2 CHNL 15		BN/BK	*DCS100/TB3-F15
	30			BK/RD	*DCS100/TB3-CH15
RW-1 PUMP RUN INDICATOR DWG #D-7734-840-06-008	31	QL-730301A RACK 5, SLOT 2 CHNL 16	C	BL/RD	*DCS100/TB3-F16
	32		NO	OR/RD	*DCS100/TB3-CH16
RW-2 PUMP RUN INDICATOR DWG #D-7734-840-06-008	33	QL-730301B RACK 5, SLOT 2 CHNL 17	C	YL/RD	*DCS100/TB3-F17
	34		NO	BR/RD	*DCS100/TB3-CH17
RW-3 PUMP RUN INDICATOR DWG #D-7734-840-06-008	35	QL-730301C RACK 5, SLOT 2 CHNL 18	C	BK/BL	*DCS100/TB3-F18
	36		NO	RD/BL	*DCS100/TB3-CH18
RW-4 PUMP RUN INDICATOR DWG #D-7734-840-06-008	37	QL-730301D RACK 5, SLOT 2 CHNL 19	C	OR/BL	*DCS100/TB3-F19
	38		NO	YL/BL	*DCS100/TB3-CH19
PR-4 PUMP RUN INDICATOR	39	QL-730301F RACK 5, SLOT 2 CHNL 20		BR/BL	*DCS100/TB3-F20
	40			BK/OR	*DCS100/TB3-CH20
RW-5 PUMP RUN INDICATOR DWG #D-7734-840-06-008	41	QL-730301E RACK 5, SLOT 2 CHNL 21	C	RD/OR	*DCS100/TB3-F21
	42		NO	BL/OR	*DCS100/TB3-CH21
STAGE 1 PH MIXER RUN DWG #D-7734-840-06-008	43	QL-730303A RACK 5, SLOT 2 CHNL 22	C	BK	*DCS100/TB3-F22
	44		NO	RD	*DCS100/TB3-CH22
STAGE 2 PH MIXER RUN DWG #D-7734-840-06-008	45	QL-730303B RACK 5, SLOT 2 CHNL 23	C	BL	*DCS100/TB3-F23
	46		NO	OR	*DCS100/TB3-CH23
SPILL SUMP HI HI LEVEL DWG #B-1734-840-07-023	47	LSHH-730302 RACK 5, SLOT 2 CHNL 24	C	YL	*DCS100/TB3-F24
	48		NO	BR	*DCS100/TB3-CH24
SPILL SUMP HI LEVEL (START) DWG #B-1734-840-07-023	49	LSH-730302 RACK 5, SLOT 2 CHNL 25	C	RD/BK	*DCS100/TB3-F25
	50		NO	BL/BK	*DCS100/TB3-CH25
SPILL SUMP LOW LEVEL (STOP) DWG #B-1734-840-07-023	51	LSL-730302 RACK 5, SLOT 2 CHNL 26	C	OR/BK	*DCS100/TB3-F26
	52		NO	YL/BK	*DCS100/TB3-CH26
OBA-9AR HI HI LEVEL SWITCH	53	LSHH-730303H RACK 5, SLOT 2 CHNL 27		BN/BK	*DCS100/TB3-F27
	54			BK/RD	*DCS100/TB3-CH27
OBA-9AR HI LEVEL SWITCH	55	LSH-730303H RACK 5, SLOT 2 CHNL 28		BL/RD	*DCS100/TB3-F28
	56			OR/RD	*DCS100/TB3-CH28
PR-12 LEAK DETECTION	57	LSH-730301L RACK 5, SLOT 2 CHNL 29		YL/RD	*DCS100/TB3-F29
	58			BR/RD	*DCS100/TB3-CH29
OBA-9AR LEAK DETECTION	59	LSH-730301M RACK 5, SLOT 2 CHNL 30		BK/BL	*DCS100/TB3-F30
	60			RD/BL	*DCS100/TB3-CH30
PR-12 PUMP RUN INDICATOR	61	QL-730301G RACK 5, SLOT 2 CHNL 31		OR/BL	*DCS100/TB3-F31
	62			YL/BL	*DCS100/TB3-CH31
OBA-9AR PUMP RUN INDICATOR	63	QL-730301H RACK 5, SLOT 2 CHNL 32		BR/BL	*DCS100/TB3-F32
	64			BK/OR	*DCS100/TB3-CH32
LSH-730301K PR-4 LEAK DETECTION	65	LSH-730301K RACK 5, SLOT 2 CHNL 33		RD/OR	*DCS100/TB4-F33
	66			BL/OR	*DCS100/TB4-CH33
	67	SPARE			
	68	SPARE			
	69	SPARE			
	70	SPARE			
	71	SPARE			
	72	SPARE			

7 SP

1 SP

1 SP

(1)

TB1A (CONT'D)
(LEFT SIDE OF ENCLOSURE)

73	SPARE	
74	SPARE	
75	SPARE	
76	SPARE	
77	SPARE	
78	SPARE	
79	SPARE	
80	SPARE	
81	SPARE	
82	SPARE	
83	SPARE	
84	SPARE	
85	SPARE	
86	SPARE	
87	SPARE	
88	SPARE	
89	SPARE	
90	SPARE	
91	SPARE	
92	SPARE	
93	SPARE	
94	SPARE	
95	SPARE	
96	SPARE	
97	SPARE	
98	SPARE	
99	SPARE	
100	SPARE	

CABLES CONTINUED TO APACS I/O CABINET #0830-DCS-100 DWG #D-0830-11-005

WIRING BY OLIN | WIRING BY FIELD CONTRACTOR

25/C #14 E-0830-DCS100-4

25/C #14 E-0830-DCS100-5

TB1B
(LEFT SIDE OF ENCLOSURE)

RW-1 PUMP SIGNAL TO MCC DWG #D-7737-840-06-008	1	XS-730301A RACK 5, SLOT 5 CHNL 1		BK	*DCS100/R5,S5,CH1/NO1
	2			RD	*DCS100/R5,S5,CH1/COM1
RW-2 PUMP SIGNAL TO MCC DWG #D-7737-840-06-008	3	XS-730301B RACK 5, SLOT 5 CHNL 2		BL	*DCS100/R5,S5,CH2/NO2
	4			OR	*DCS100/R5,S5,CH2/COM2
RW-3 PUMP SIGNAL TO MCC DWG #D-7737-840-06-008	5	XS-730301C RACK 5, SLOT 5 CHNL 3		YL	*DCS100/R5,S5,CH3/NO3
	6			BR	*DCS100/R5,S5,CH3/COM3
RW-4 PUMP SIGNAL TO MCC DWG #D-7737-840-06-008	7	XS-730301D RACK 5, SLOT 5 CHNL 4		RD/BK	*DCS100/R5,S5,CH4/NO4
	8			BL/BK	*DCS100/R5,S5,CH4/COM4
RW-5 PUMP SIGNAL TO MCC DWG #D-7737-840-06-008	9	XS-730301E RACK 5, SLOT 5 CHNL 5		OR/BK	*DCS100/R5,S5,CH5/NO5
	10			YL/BK	*DCS100/R5,S5,CH5/COM5
STAGE 1 PH MIXER TO MCC DWG #D-7737-840-06-008	11	HS-730302A RACK 5, SLOT 5 CHNL 6		BN/BK	*DCS100/R5,S5,CH6/NO6
	12			BK/RD	*DCS100/R5,S5,CH6/COM6
STAGE 2 PH MIXER TO MCC DWG #D-7737-840-06-008	13	HS-730302B RACK 5, SLOT 5 CHNL 7		BL/RD	*DCS100/R5,S5,CH7/NO7
	14			OR/RD	*DCS100/R5,S5,CH7/COM7
STRIPPER ENABLE/ DISABLE TO MCC	15	XS-730401 RACK 5, SLOT 5 CHNL 8		YL/RD	*DCS100/R5,S5,CH8/NO8
	16			BR/RD	*DCS100/R5,S5,CH8/COM8
PR-4 PUMP SIGNAL TO MCC	17	XS-730301F RACK 5, SLOT 5 CHNL 9		BK/BL	*DCS100/R5,S5,CH9/NO9
	18			RD/BL	*DCS100/R5,S5,CH9/COM9
7S SUMP PH INTERLOCK	19	ASHL-2004 RACK 5, SLOT 5 CHNL 10		OR/BL	*DCS100/R5,S5,CH10/NO10
	20			YL/BL	*DCS100/R5,S5,CH10/COM10
SPILL SUMP PUMP HOA DWG #D-7737-840-06-008	21	XS-730302 RACK 5, SLOT 5 CHNL 11		BR/BL	*DCS100/R5,S5,CH11/NO11
	22			BK/OR	*DCS100/R5,S5,CH11/COM11
OBA-9AR PUMP SIGNAL TO MCC	23	XS-730301H RACK 5, SLOT 5 CHNL 12		RD/OR	*DCS100/R5,S5,CH12/NO12
	24			BL/OR	*DCS100/R5,S5,CH12/COM12
PR-12 PUMP SIGNAL TO MCC	25	XS-730301G RACK 5, SLOT 5 CHNL 13		BK	*DCS100/R5,S5,CH13/NO13
	26			RD	*DCS100/R5,S5,CH13/COM13
	27	SPARE RACK 5, SLOT 5 CHNL 14		BL	*DCS100/R5,S5,CH14/NO14
	28			OR	*DCS100/R5,S5,CH14/COM14
	29	SPARE RACK 5, SLOT 5 CHNL 15		YL	*DCS100/R5,S5,CH15/NO15
	30			BR	*DCS100/R5,S5,CH15/COM15
	31	SPARE RACK 5, SLOT 5 CHNL 16		RD/BK	*DCS100/R5,S5,CH16/NO16
	32			BL/BK	*DCS100/R5,S5,CH16/COM16
	33	SPARE RACK 5, SLOT 5 CHNL 17		OR/BK	*DCS100/R5,S5,CH17/NO17
	34			YL/BK	*DCS100/R5,S5,CH17/COM17
	35	SPARE RACK 5, SLOT 5 CHNL 18		BN/BK	*DCS100/R5,S5,CH18/NO18
	36			BK/RD	*DCS100/R5,S5,CH18/COM18
	37	SPARE RACK 5, SLOT 5 CHNL 19		BL/RD	*DCS100/R5,S5,CH19/NO19
	38			OR/RD	*DCS100/R5,S5,CH19/COM19
	39	SPARE RACK 5, SLOT 5 CHNL 20		YL/RD	*DCS100/R5,S5,CH20/NO20
	40			BR/RD	*DCS100/R5,S5,CH20/COM20
	41	SPARE RACK 5, SLOT 5 CHNL 21		BK/BL	*DCS100/R5,S5,CH21/NO21
	42			RD/BL	*DCS100/R5,S5,CH21/COM21
	43	SPARE RACK 5, SLOT 5 CHNL 22		OR/BL	*DCS100/R5,S5,CH22/NO22
	44			YL/BL	*DCS100/R5,S5,CH22/COM22
	45	SPARE RACK 5, SLOT 5 CHNL 23		BR/BL	*DCS100/R5,S5,CH23/NO23
	46			BK/OR	*DCS100/R5,S5,CH23/COM23
	47	SPARE RACK 5, SLOT 5 CHNL 24		RD/OR	*DCS100/R5,S5,CH24/NO24
	48			BL/OR	*DCS100/R5,S5,CH24/COM24
	49	SPARE			
	50	SPARE			

1 SP

1 SP

TYPICAL FOR ALL

* - PREFIX WIRE NUMBER WITH CABLE JACKET NUMBER.
EXAMPLE:
E-0830-DCS100-1/DCS100/TB2-F1

REFERENCE DRAWINGS

D-7734-840-07-011	BLDG 73, NORTH PLANT - INSTRUMENTATION PLAN
D-7734-840-07-012	BLDG 73, NORTH PLANT - I/O BOX #3 LAYOUT & BILL OF MATERIAL
D-0090-07-102	NIAGARA BLEACH EXPANSION, ETHERNET COMMUNICATIONS BLOCK DIAGRAM
D-0830-06-060	NORTH PLANT - B73 OMNIX TO APACS, I/O MIGRATION, I/O BOX #3, TB LAYOUT, ANALOG
D-0830-11-001	NORTH PLANT - APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 1
D-0830-11-002	NORTH PLANT - APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 2
D-0830-11-003	NORTH PLANT - APACS I/O WIRING, SAM MODULE, RACK 5, SLOT 3
D-0830-11-004	NORTH PLANT - APACS I/O WIRING, SAI MODULE, RACK 5, SLOT 4
D-0830-11-005	NORTH PLANT - APACS I/O WIRING, SDM-RMTA MODULE, RACK 5, SLOT 5
(2) D-0620-07-100	BLDG 36, NORTH PLANT, INSTRUMENT LOOP DIAGRAMS

FILE NAME: 083006061

ATSI ENGINEERING SERVICES
www.atsiinc.com

DATE	2/18/08	DRAWN	MKG
DESIGN	RJD	SCALE	NONE
CHECKED		APPROVED	
CAD FILE	083006061	ACT. NO.	
CONTRACT NO.	75040	DRAWING NUMBER	
REV.	2		

PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
1944	1944	2	SUBSTAION BATTERY ALARMS	MKG	2/25/11		
1686	1686	1	ADDED LSH-730310K	MKG	7/9/08		R.J. DILIMONE
R.Z02.4037.1223	-	0	ISSUED FOR CONSTRUCTION	MKG	4/29/08		R.J. DILIMONE
R.Z02.4037.1223	-	P1	ISSUED FOR APPROVAL	MKG	2/18/08		R.J. DILIMONE

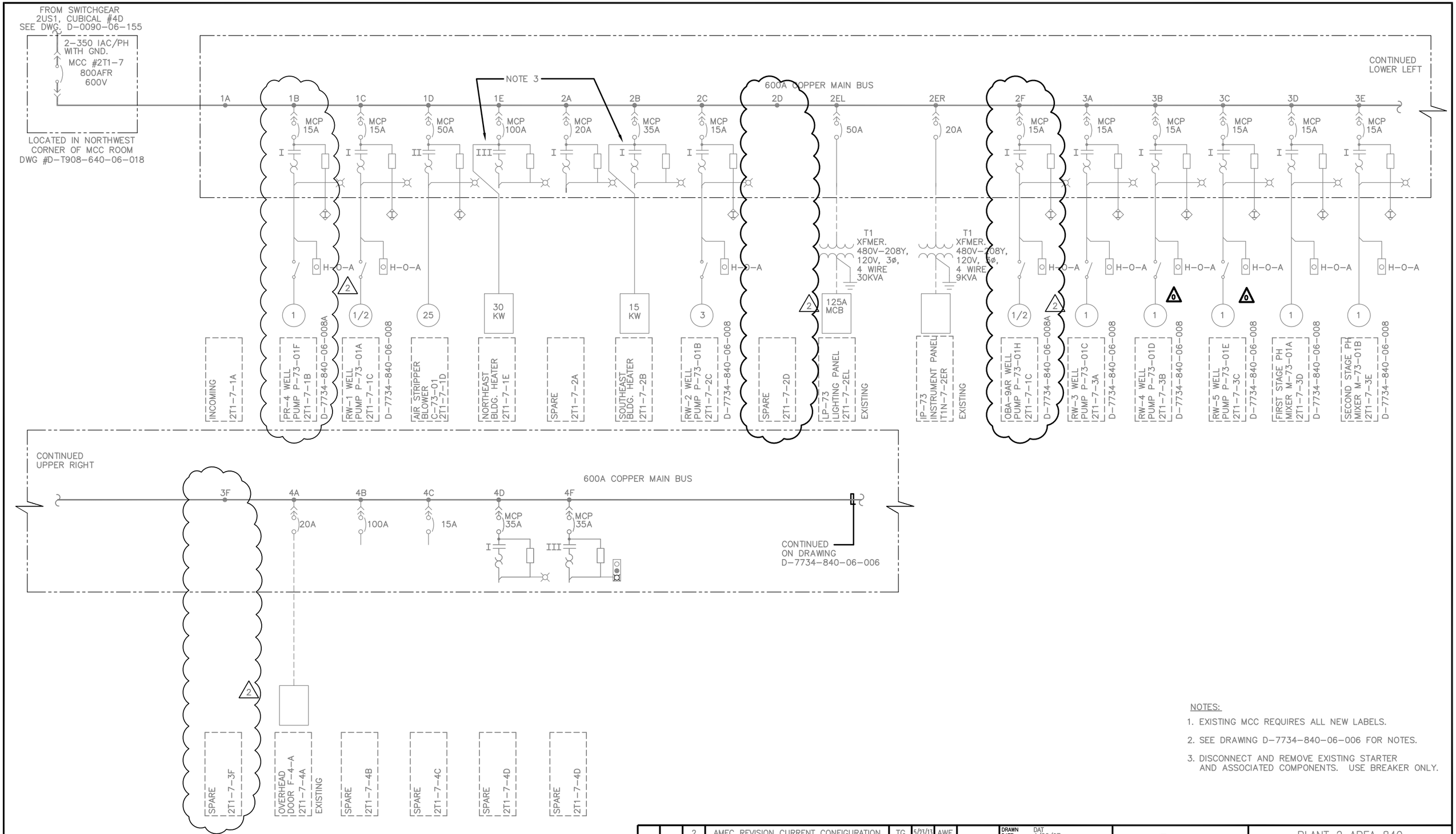
DRAWN BY: MKG	DATE: 2/18/08
DESIGN BY: R. DILIMONE	DATE: 2/18/08
CHECKED BY:	DATE:
PROJECT DESIGN COORDINATOR:	DATE:
PROJECT ENGINEER:	DATE:
PROJECT MANAGER:	DATE:

Olin
PLANT ENGINEERING

PROJECT NO.	C.A.R. NO.	SCALE
R.Z02. 4037.1223	R.Z02. 4037.1223	NONE

NORTH PLANT
B73 OMNIX TO APACS
I/O MIGRATION, I/O BOX #3
TERM BLOCK LAYOUT, DIGITAL

DRAWING NUMBER D-0830-06-061 REV 2



NOTES:

1. EXISTING MCC REQUIRES ALL NEW LABELS.
2. SEE DRAWING D-7734-840-06-006 FOR NOTES.
3. DISCONNECT AND REMOVE EXISTING STARTER AND ASSOCIATED COMPONENTS. USE BREAKER ONLY.

DRAWING NO. D-7734-840-06-005
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84006005.DWG DISK NO:

		REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
		2	AMEC REVISION CURRENT CONFIGURATION	TG	5/23/13	AWE	
1902	1902	1	BLDG 90 SWITCHGEAR UPGRADE	MKG	1/12/11		
7734		0	FOR CONSTRUCTION	DAT	8/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	FOR APPROVAL	DAT	4/26/97	PRN	

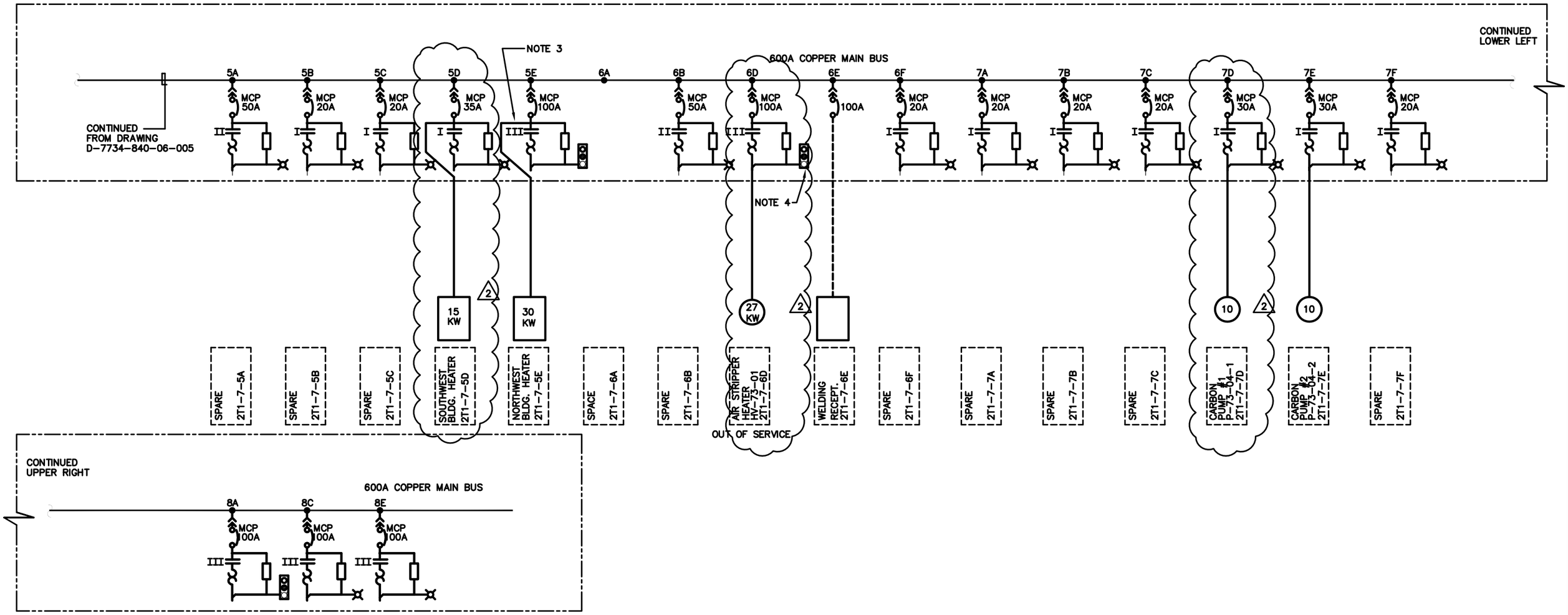
DRAWN DAT 4/26/97
CHECKED P.R. NAUS 4/26/97
APPROVED

CENTRAL GROUP ENGINEERING
NIAGARA FALLS

PROJECT NO. 7734 | C.A.R. NO. | SCALE NONE

PLANT 2 AREA 840
BLDG. 73 MCC #2T1-7
SINGLE LINE DIAGRAM
SHEET 1 OF 3

DRAWING NUMBER D-7734-840-06-005 | REV 1



NOTES:

1. EXISTING MCC REQUIRES ALL NEW LABELS.
2. PROVIDE AND INSTALL 1"x4" NAMEPLATE WITH 1/4" HIGH BLACK LETTERING ENGRAVED ON WHITE BACKGROUND FOR EACH MCC COMPARTMENT AND SUITABLY SIZE, AS FIELD REQUIRED, IDENTICAL NAMEPLATE FOR EACH FIELD ASSOCIATED DEVICE.
3. DISCONNECT AND REMOVE EXISTING STARTER AND ASSOCIATED COMPONENTS. USE BREAKER ONLY.
4. DISCONNECT AND REMOVE MCC CUBICLE DOOR MOUNTED CONTROLS. PATCH DOOR PENETRATIONS.

DRAWING NO. D-7734-840-06-006
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84006006.DWG DISK NO:

PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
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7734		0	FOR CONSTRUCTION	DAT	8/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	5/16/97	PRN	
7734		A	FOR APPROVAL	DAT	4/26/97	PRN	

DRAWN DAT 4/26/97
CHECKED P.R. NAUS 4/26/97
APPROVED

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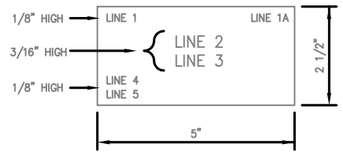
CENTRAL GROUP ENGINEERING
NIAGARA FALLS

PLANT 2 AREA 840
BLDG. 73 MCC #2T1-7
SINGLE LINE DIAGRAM
SHEET 2 OF 3

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
7734		NONE	D-7734-840-06-006	0



NAMEPLATE DETAIL

SCALE: 1/2"=1"
PHENOLIC NAMEPLATE
WHITE BACKGROUND WITH BLACK CHARACTERS
SIZE: 5"W X 2 1/2"H X 1/8"THK
ATTACH TO ENCLOSURE WITH EPOXY

1 NAMEPLATE ENGRAVING LEGEND

ITEM	LINE 1	LINE 1A	LINE 2	LINE 3	LINE 4	LINE 5
1	MCC-2T1-7	UNIT #1A	MAIN BREAKER	FED FROM SWGR #2US1, CUBICAL #4D	S/L: D-7734-840-06-005	S/L: D-0090-06-155

2"x8" NAMEPLATE (SEE NOTE 2 ON DWG. D-7734-840-06-006) "MCC #2T1-7" (TYPICAL 2)

1 CONTRACTOR TO PROVIDE NEW NAMEPLATE PER ENGRAVING LEGEND

1	2	3	4
INCOMING (1) 2T1-7-1A	SPARE SIZE 1 2T1-7-2A	RW-3 WELL PUMP P-73-01C 1 HP 2T1-7-3A	OVERHEAD DOOR F-4-A 20A CB 2T1-7-4A
PR4 WELL PUMP P-73-01F 2T1-7-1B	SOUTHEAST BLDG. HEATER 15KW 2T1-7-2B	RW-4 WELL PUMP P-73-01D 1 HP 2T1-7-3B	SPARE 100A CB 2T1-7-4B
RW-1 WELL PUMP P-73-01A 1 HP 2T1-7-1C	RW-2 WELL PUMP-P-73-01B 3 HP 2T1-7-2C	RW-5 WELL PUMP-P-73-01E 1 HP 2T1-7-3C	SPARE 15A CB 2T1-7-4C
AIR STRIPPER BLOWER C-73-01 2T1-7-1D	SPARE 2T1-7-2D	FIRST STAGE PH MIXER M-73-01A 1 HP 2T1-7-3D	SPARE SIZE 1 2T1-7-4D
NORTHEAST BLDG. HEATER 30KW 2T1-7-1E	LP-73 50A CB 2T1-7-2EL / IP-73 20A CB 2T1-7-2ER; OBA9AR WELL PUMP P-73-01H 2T1-7-2F	SECOND STAGE PH MIXER M-73-01B 1 HP 2T1-7-3E; SPARE 2T1-7-3F	SPACE; SPARE SIZE 3 2T1-7-4F

1"x4" NAMEPLATE REQUIRED ON ALL CUBICLE DOORS. (SEE NOTE ON DWG. D-7734-840-06-006) ENGRAVED TO MATCH SINGLE LINE DIAGRAMS D-7734-840-06-005 & 006.

5	6	7	8
SPARE SIZE 2 2T1-7-5A	SPACE 2T1-7-6A	SPARE SIZE 1 2T1-7-7A	SPARE SIZE 3 2T1-7-8A
SPARE SIZE 1 2T1-7-5B	SPARE SIZE 2 2T1-7-6B	SPARE SIZE 1 2T1-7-7B	SPACE
SPARE SIZE 1 2T1-7-5C	SPACE; AIR STRIPPER HEATER HV-73-01 (OUT OF SERVICE) 2T1-7-6D	SPARE SIZE 1 2T1-7-7C; CARBON PUMP 1 10 HP 2T1-7-7D	SPARE SIZE 3 2T1-7-8C
SOUTHWEST BLDG HEATER 2T1-7-5D	WELDING RECEPT. 100A CB 2T1-7-6E	CARBON PUMP 2 10 HP 2T1-7-7E	SPARE SIZE 3
NORTHWEST BLDG. HEATER 30KW 2T1-7-5E	SPARE SIZE 1 2T1-7-6F	SPARE SIZE 1 2T1-7-7F	2T1-7-8E

WEST ELEVATION MCC #2T1-7

EAST ELEVATION MCC #2T1-7

DRAWING NO. D-7734-840-06-007
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84006007.DWG DISK NO:

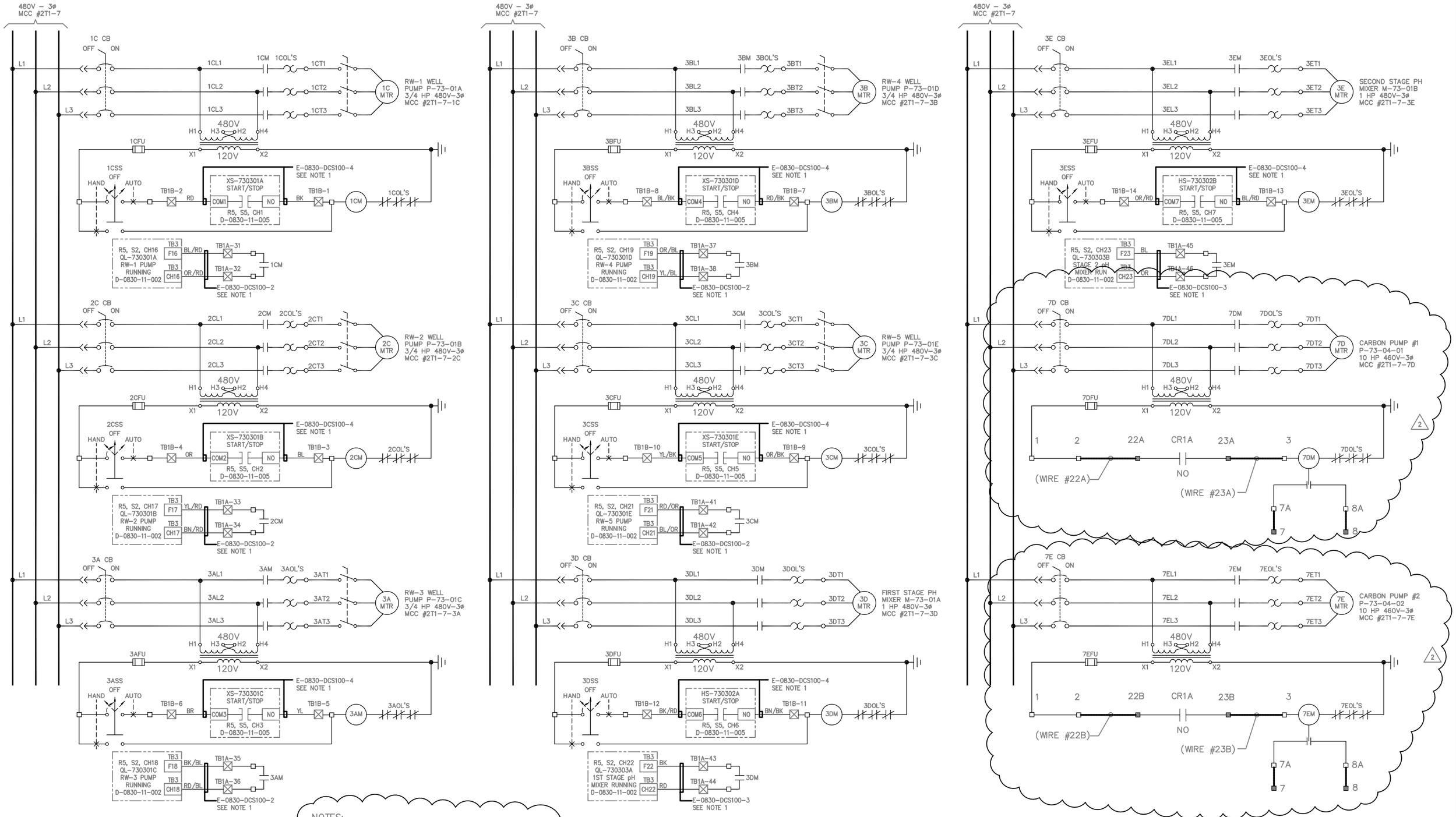
PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
		2	AMEC REVISION OF CURRENT CONFIGURATION	TG	6/23/13	AWE	
1902	1902	1	BLDG 90 SWITCHGEAR UPGRADE	MKG	2/2/11	MKG	
7734		0	FOR CONSTRUCTION	DAT	8/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	FOR APPROVAL	DAT	4/26/97	PRN	

DRAWN DAT 4/26/97
CHECKED P.R. NAUS 4/26/97
APPROVED

olin
CENTRAL GROUP ENGINEERING
NIAGARA FALLS

PLANT 2 AREA 840
BLDG. 73 MCC #2T1-7
SINGLE LINE DIAGRAM
SHEET 3 OF 3

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
7734		NONE	D-7734-840-06-007	1



NOTES:

1. FOR WIRE NUMBERS SEE I/O TERMINAL BLOCK LAYOUT, DWG #D–0830–06–061

LEGEND:

- ☐ – TERMINAL/DEVICE LOCATED IN MCC
- ☒ – TERMINAL/DEVICE LOCATED IN OMNIX BOX #3, DWG #D–7734–840–07–012
- ■ – TERMINAL/DEVICE LOCATED IN CARBON CONTROL PANEL CP–1

DRAWING NO. D–7734–840–06–008

CAD FILE – DO NOT CHANGE MANUALLY

CAD FILE: 84006008.DWG DISK NO:

PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
	R.202.40 37.1223	2	AMEC REVISION OF CURRENT CONFIGURATION	TG	6/23/13	AWE	
		1	GROUND WATER OMNIX REPLACEMENT	MKG	8/14/08		
7734		0	FOR CONSTRUCTION	DAT	8/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	FOR APPROVAL	DAT	4/26/97	PRN	

DRAWN DAT 4/26/97
CHECKED P.R. NAUS 4/26/97
APPROVED

CENTRAL GROUP ENGINEERING
NIAGARA FALLS

PLANT 2 AREA 840
BLDG. 73 MCC #2T1–7
MOTOR SCHEMATIC
SHEET 1

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
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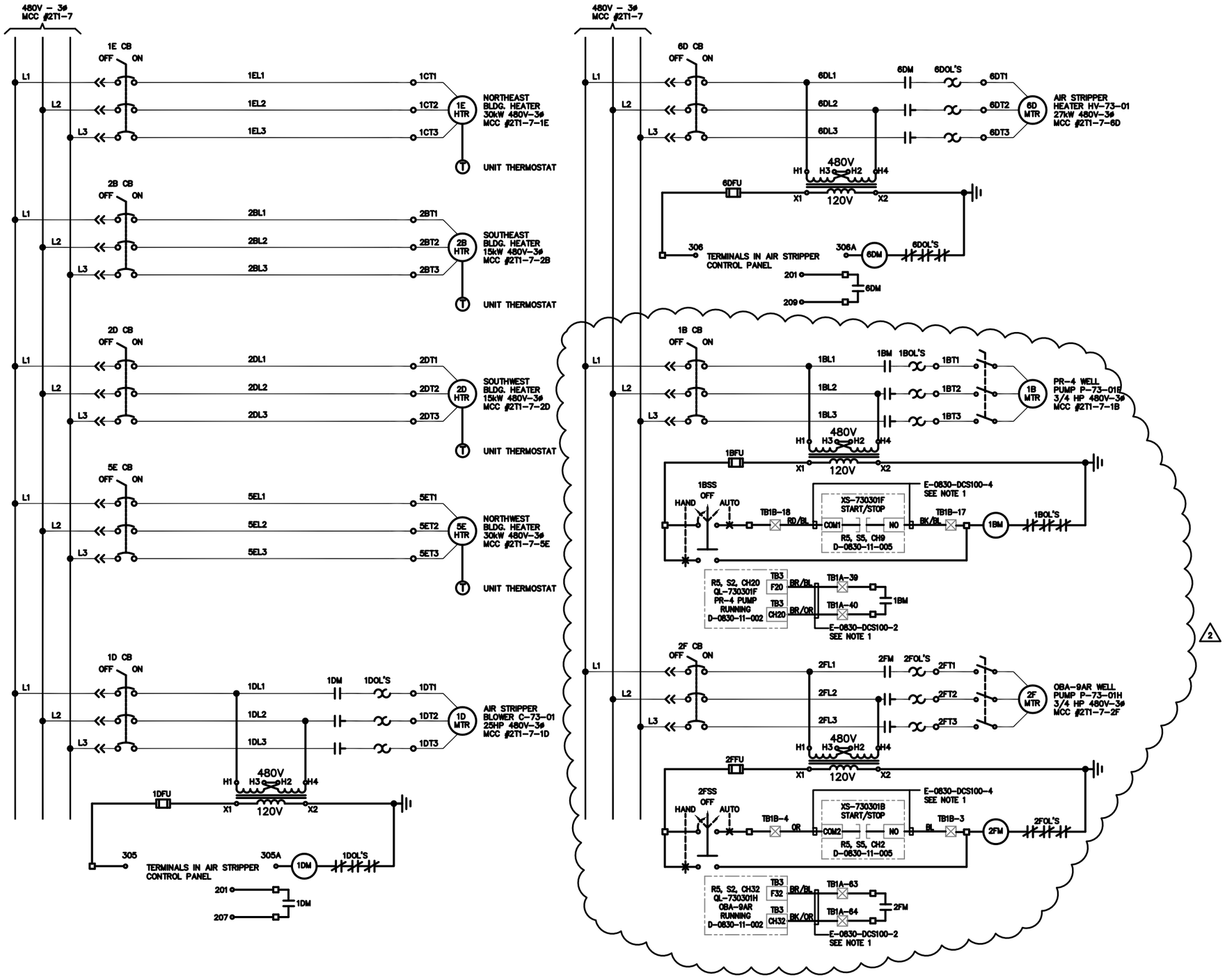

DRAWING NO. D-7734-840-06-008A

CAD FILE – DO NOT CHANGE MANUALLY

CAD FILE: 8400608A.DWG DISK NO:

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7734		0	FOR CONSTRUCTION	PRN	8/26/97	PRN	

DRAWN PRN 8/26/97
CHECKED P.R. NAUS 8/26/97
APPROVED

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CENTRAL GROUP ENGINEERING
NIAGARA FALLS

PLANT 2 AREA 840
BLDG. 73 MCC #2T1-7
MOTOR SCHEMATIC
SHEET 2

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
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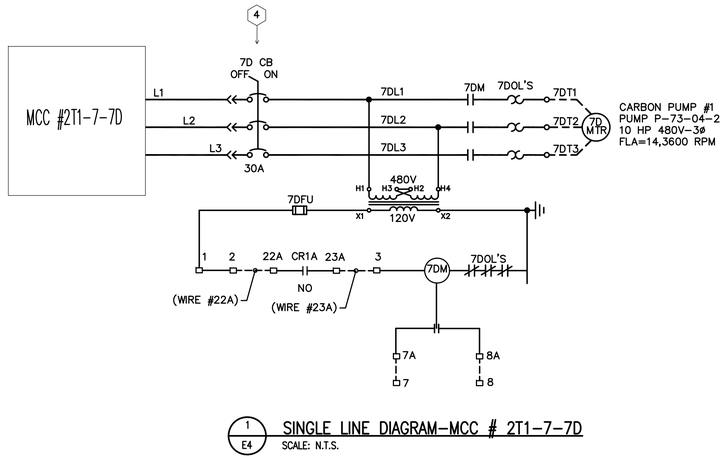

1 E4 SINGLE LINE DIAGRAM-MCC # 2T1-7-7D
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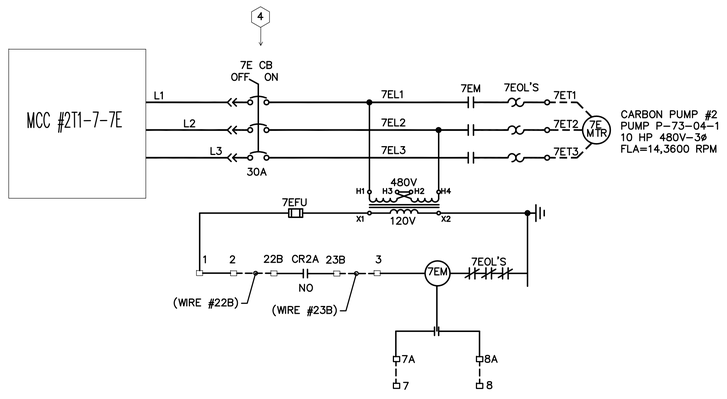
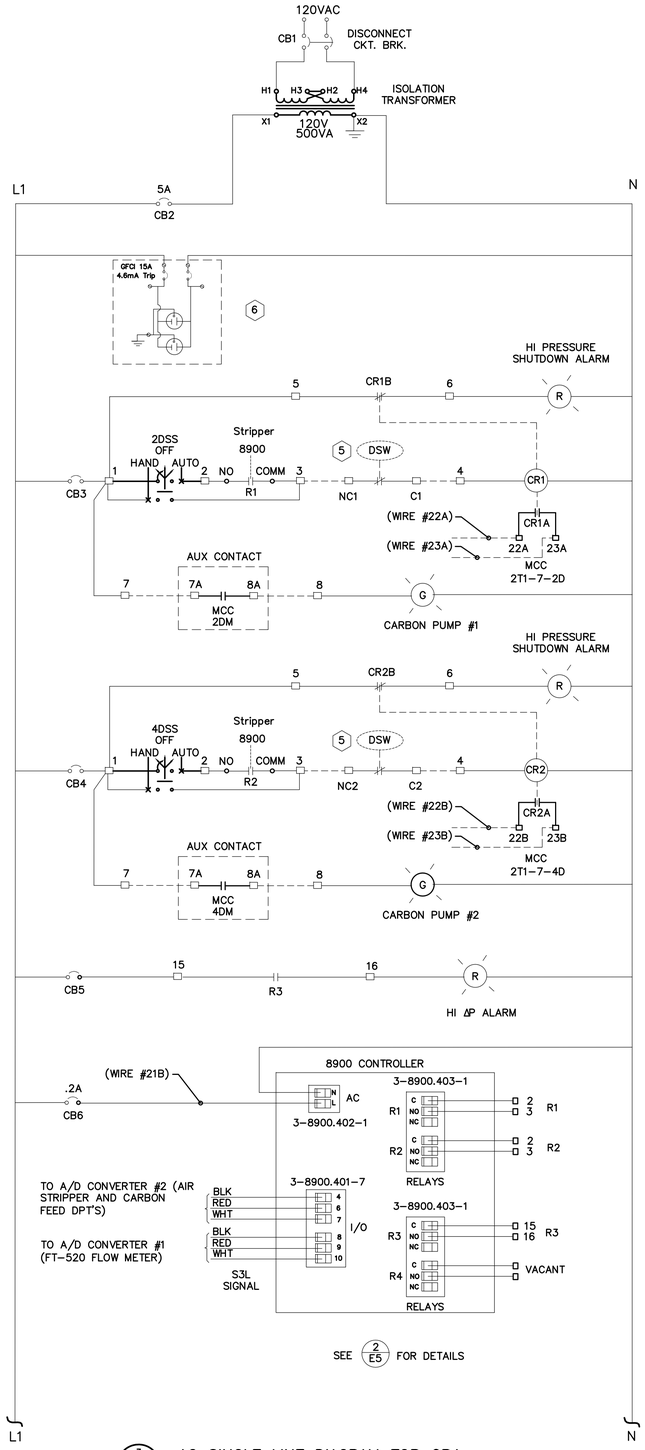


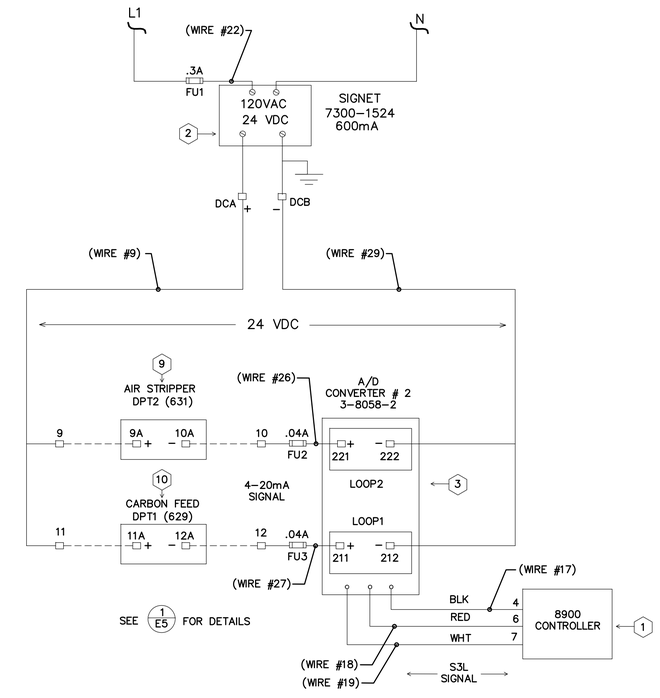
2 E4 SINGLE LINE DIAGRAM-2T1-7-7E
SCALE: N.T.S.

NOTES

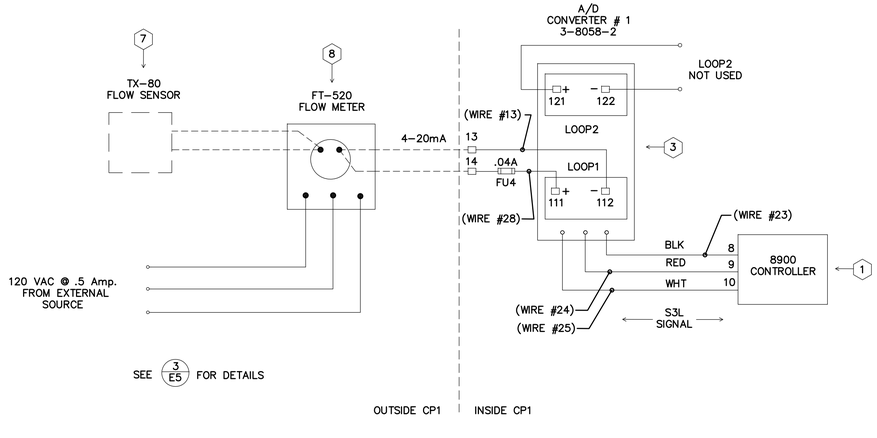
X	SEE EQUIPMENT SCHEDULE-E6
Y	SEE CABLE SCHEDULE-E6
A.	SEE LEGEND ON E1 FOR SYMBOLS & ABBREVIATIONS
B.	INSTRUMENTS LOCATION ARE APROXIMATE AND MAY BE ADJUSTED AS NECESSARY
C.	(FIELD ADDED WIRE #'S)



3 E4 AC SINGLE LINE DIAGRAM FOR CP1
SCALE: N.T.S.



4 E4 DC & A/D DIAGRAM FOR CP1
SCALE: N.T.S.



5 E4 SCHEMATIC DIAGRAM FOR THE FT-520
SCALE: N.T.S.

REV	DATE	BY	SUB	APP	DESCRIPTION
1	04/02/08				FIELD ADDED WIRE #'S

DESIGNED T. ENGLUND
DRAWN T. GLADSTONE
CHECKED T. ENGLUND
IN CHARGE R. MAROTTE
DATE 5/23/2013

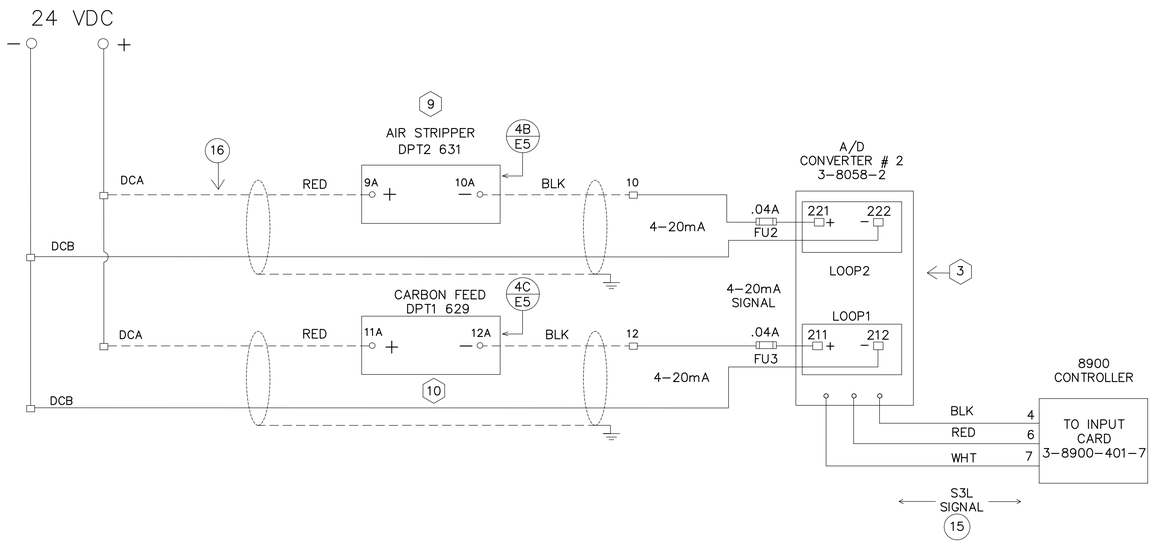
Olin CHEMICALS PLANT
NIAGARA FALLS, NY.

amec
AMEC Environment & Infrastructure, Inc.
1075 BIG SHANTY ROAD, NW, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

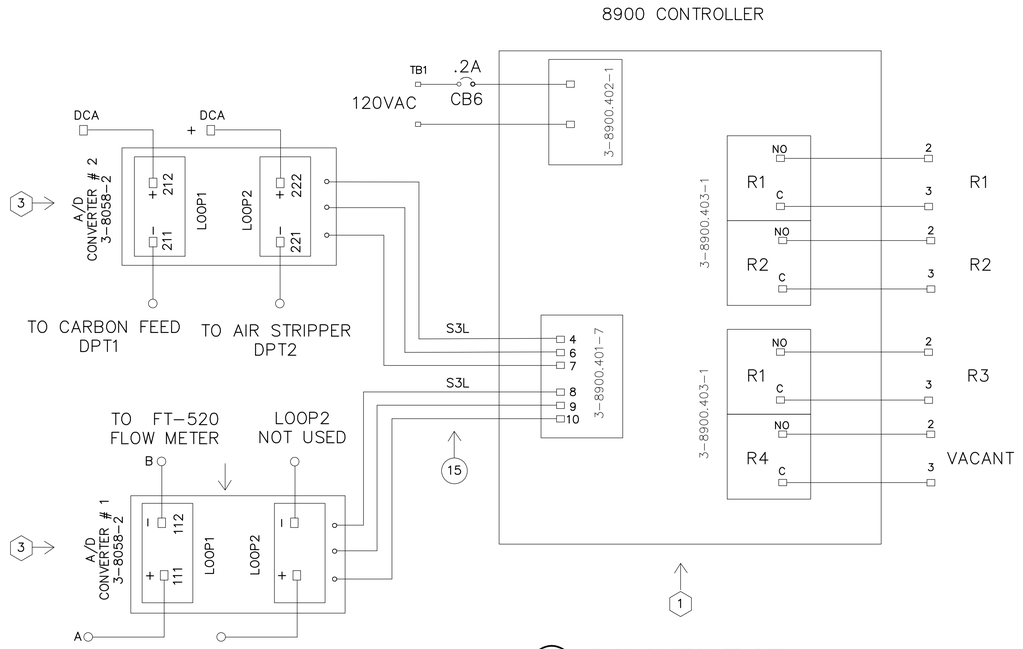
CARBON ADSORBER SYSTEM ELECTRICAL SCHEMATIC

SCALE: AS SHOWN
CONTRACT: 6100-08-0001
DWG. NO.: FIG 2.7
REV: 0
PAGE NO

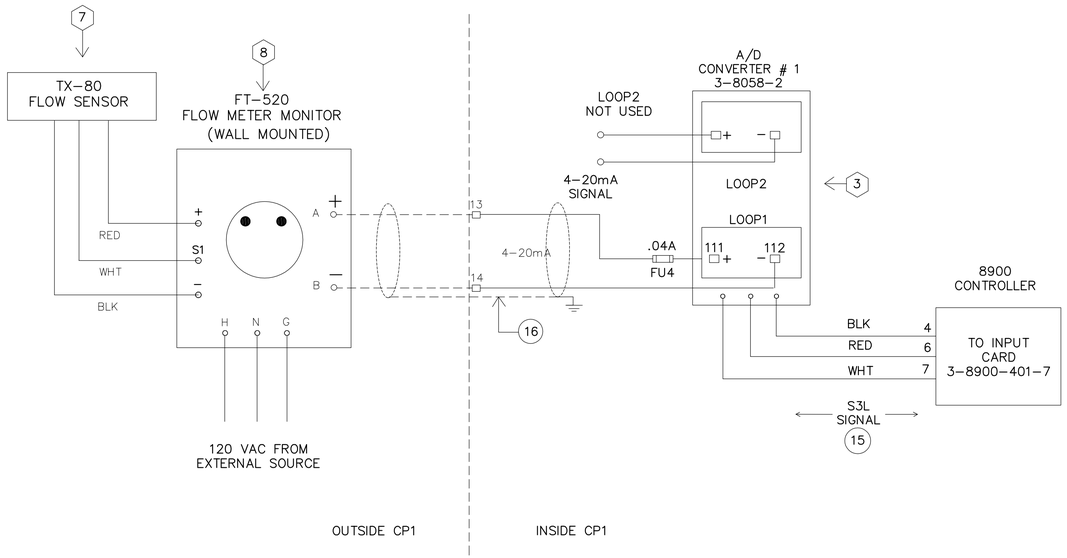
J:\OLIN-NIAGRA\JAN 2013\CARBON-ELECTRICAL.dwg - MCC & CP1 SCHED.-E4 06/11/2013 4:34pm Tonya.Gladstone



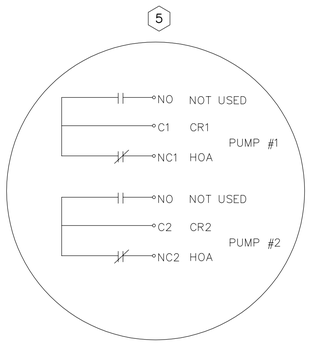
1 / E5 DPT's 631 & 629 W/4-20mA LOOP DETAIL
SCALE: N.T.S.



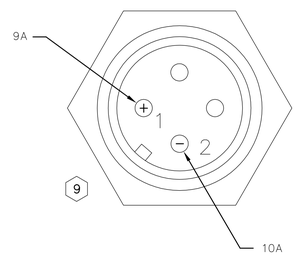
2 / E5 8900 CONTROLLER DETAIL
SCALE: N.T.S.



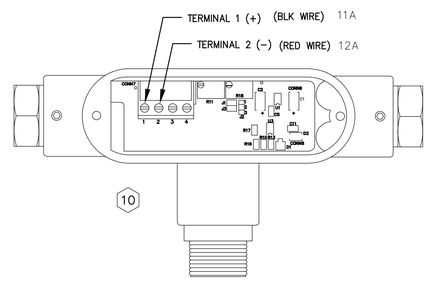
3 / E5 FT-520 FLOW METER DETAIL
SCALE: N.T.S.



4A / E5 DSW PRESSURE SWITCH DETAIL
SCALE: N.T.S.



4B / E5 AIR STRIPPER DPT1 631 DETAIL
SCALE: N.T.S.



4C / E5 CARBON FEED DPT2 629 DETAIL
SCALE: N.T.S.

NOTES

X SEE EQUIPMENT SCHEDULE-E6

Y SEE CABLE SCHEDULE-E6

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN J. GONZALEZ
CHECKED
IN CHARGE R. MAROTTE
DATE 12/14/2007

MACTEC Engineering and Consulting, Inc.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

CARBON SYSTEM RETROFIT
NIAGARA FALLS PLANT
GROUND-WATER TREATMENT SYSTEM
CONNECTION DETAILS

SCALE: AS SHOWN
CONTRACT: 6100-07-0001
DWG. NO.: E5
REV: 0
PAGE NO.:

CABLE SCHEDULE

ITEM #	EQUIPMENT DESCRIPTION	FROM	TO	* CABLE DESCRIPTION	SIGNAL TYPE	VOLT	AMP	DISC	COMMENTS
1	DWYER INSTRUMENT DPT1 SERIES 629	DPT1 (Carbon Feed)	A/D Converter # 2	2 #20 AWG SHIELDED; 3/4"⌀ PVC COATED RGC	4-20 mA Analog	24 VDC			DC Loop w/4-20mA for DPT1. See Equipment Schedule-Item 10 for details.
2	DWYER INSTRUMENT DPT2 SERIES 631 (See Table A)	DPT2 (Air Stripper)							DC Loop w/4-20mA for DPT2. See Equipment Schedule-Item 9 for details.
3	SEAMETRICS FT-520 FLOW METER	Flow Meter FT-520	A/D Converter # 1				250mA		See Equipment Schedule-Item 8 for details.
4	SEAMETRICS TX-80 SERIES FLOW SENSOR	Flow Sensor TX-81P	Flow Meter FT-520	3C #22 AWG SHLD; 3/4"⌀ PVC COATED RGC	Open Collector Current Sink		10mA		See Equipment Schedule-Item 7 for details.
5	BOURDON TUBE DSW-7243 -804 PRESSURE SWITCH	PRESSURE SWITCH	CP1	4 #12 CU + 1 #12G THWN; 3/4"⌀ PVC COATED RGC	TWO (2) SPDT CONTACT	120 VAC	5A		See Equipment Schedule A-Item 5 for details.
6	GOULDS PUMPS 3996, ESTABROOK CORP	CARBON PUMP # 1 (P-73-04-1)	MCC #2T1-7-2D	3 #12 CU + 1 #12G THWN; 3/4"⌀ PVC COATED RGC	MAIN LINE 3⌀	480 VAC	14A		Use Existing MCC # 2T1 Nema 1, W/New 30A 3 Poles Ckt. Brkr. Model HMCP030H1C In West 2D Frame Position
7		CARBON PUMP # 2 (P-73-04-2)	MCC #2T1-7-4D		MAIN LINE 3⌀		14A		Use Existing MCC # 2T1 Nema 1, W/New 30A 3 Poles Ckt. Brkr. Model HMCP030H1C In West 4D Frame Position
8	CONTROL RELAY (CR1A)	CONTROL PANEL (CP1)	CONTROL RELAY ON MCC #2T1-7-2D	2 #12 CU + 1 #12G THWN; 3/4"⌀ PVC COATED RGC	DRY CONTACT 1⌀	120 VAC			Relay that activate the Pump #1 based on the level of the Air Stripper sump.
9	CONTROL RELAY (CR2A)		CONTROL RELAY ON MCC #2T1-7-4D		DRY CONTACT 1⌀				Relay that activate the Pump #2 based on the level of the Air Stripper sump.
10	CONTROL RELAY (CR1B)		CONTROL RELAY IN CP1 FOR #2T1-7-2D		DRY CONTACT 1⌀				Relay that activate /deactivate the Pump #1 based on the set point at the carbon vessels.
11	CONTROL RELAY (CR2B)		CONTROL RELAY IN CP1 FOR #2T1-7-4D		DRY CONTACT 1⌀				Relay that activate / deactivate the Pump #2 based on the set point at the carbon vessels.
12	AUX CONTACT FOR GREEN LIGHT PUMP #1		AUX CONTACT ON MCC #2T1-7-2D		DRY CONTACT 1⌀				Relay output indicating Pump # 1 is working.
13	AUX CONTACT FOR GREEN LIGHT PUMP #2		AUX CONTACT ON MCC #2T1-7-24		DRY CONTACT 1⌀				Relay output indicating Pump # 2 is working.
14	CONTROL RELAY (R3)		CONTROL RELAY ON CP1 FOR HI ΔP ALARM LIGHT		DRY CONTACT 1⌀				Relay output that trigger a red light indicating Hi Pressure
15	BELDEN 9770 NON PAIRED (9770 001500)	8900 I/O Card	3-8058-2 A/D Converter	3 CONDUCTORS #22 W/ POLY-PROPYLENE (PP) INSULATION AND BELDFOILD (Z-FOLD) SIELDED PVC CABLE	S3L	24 VDC	3A		Digital signal coming into the 8900 controller. Maximum recommended current is: 3 Amp. per conductor @ 25° C
16	BELDEN 9320 PAIRED (9320 060U500)	FT-520, DPT1 & DPT2	A/D Converters	2 CONDUCTORS #20 W/POLYVINYL CLORIDE(PVC) INSULATION AND BELDFOILD SIELDED PVC JACKET CABLE	4-20mA		4A		DC Loop Cable for the FT-520, DPT1 & DPT2. Maximum recommended current is: 4 Amp. per conductor @ 25° C

** Contractor to verify actual cable routing and footage.*

A / E6 CABLE SCHEDULE
SCALE: N.T.S.

EQUIPMENT SCHEDULE

ITEM	QTY.	COMPANY	MODEL	DESCRIPTION	COMMENTS
1	1	+GF+Signet	3-8900 (159 000 869)	(1) 8900 Multi- Parameter Controller with Slot for (2) I/O Module, (1) 110/220 Vac power module and (2) Dry contact Relay Module.	8900, Base Unit
	2	+GF+Signet	3-8900.401-7 (159 000 876)	I/O Module for S3L Signal. (1) S3L Quad input with two (2) active loop outputs.	8900, Input Module
	1	+GF+Signet	3-8900.402-1 (159 000 878)	110 / 220 Vac Power Module	8900 DC Power Module
	2	+GF+Signet	3-8900.403-1 (159 000 880)	Two Dry Contact Relay Module	Two Relay Module Cards (R1, R2, R3, R4)
2	1	+GF+Signet	7300-1524 (159 000 688)	600 mA , 24 Vdc, 15 W Power Supply	DC Loop power forAir Stripper(DPT2) and Carbon Feed (DPT1) Transducers
3	2	+GF+Signet	3-8058-2 (159 000 967)	4-20 mA A/D Signal Converter w/two input DIN Rail mount	A/D Converter (Dual Loop Input Type)
4	1	Cutler Hammer	HMCP030H1C	30 AMP., 3 poles, NEMA Size 1 Circuit Breaker	The *full load amperage* is between 13.8 and 16 Amp. The trip seting is 13 times the minimum FLA value.
5	1	Dwyer Instruments, Inc (Mercoid Division)	DS--7000 (DSW-7243-804-23E)	316SS Bourdon Tube Pressure Switch w/5-75 psig. operating range and (2) SPDT Relay Contacts (6 Terminals)	Pressure switch set at 70 psig and installed in the influent piping to Prevent over-pressurization of the vessel. The PS shall stop the pumps at predetermined set points and alert the operator with a red alarm light on CP1.
6	1	Leviton	R44-07599-0GY	110 VAC 15A GFCI Duplex Outlet	
7	1	SeaMetrics	TX-81P	Remote Flow Sensor, Nema 4x, PVC type fitting.	Shall be installed in the combined pump discharge line between the pumps and the carbon vessels.
8	1	SeaMetrics	FT-520	Flow meter monitor Nema 4x, 4-20 mA current loop output.	Configure to display and transmit flowrate (4-20mA output) to the A/D converter. (DC Loop power supplied internally from FT-520)
9	1	Dwyer Instruments, Inc.	Series 631B-1	Diferential pressure transmitter (DPT2) for the Air Stripper, Nema 4x, 4-20 mA current loop output.	Transmit a 4-20 mA signal to the 8900. Will send a 4 mA signal when the pressure is 3 inches of water column (" H2O) and 20mA signal when the pressure is 25" H2O w.c. respectively.(DC loop power supplied by 600mA power supply. See Item 2)
10	1	Dwyer Instruments, Inc.	Series 629 (629-02-CH-P2-E5-S1)	Diferential pressure transmitter (DPT1) for the Carbon Feed, Nema 4x, 4-20 mA current loop output.	Transmit a 4-20 mA signal to the 8900, based on the ?P between the inlet and outlet of the carbon vessels. Also shall alert the operator with a red alarm light on the CP1 when the ΔP across the vessels reaches 15 psid. (DC loop power supplied by 600mA power supply. - See Item 2)
11	1	-----	Control Panel-CP1	Nema 4X Enclosure	To be specified by others.
12		Eastabrook Corp	GOULD PUMP # 3996 ST	10 HP, 3⌀, 460 v, 1.15 S.F. @ 3600 RPM-Gould Pumps	Carbon Pump # 1 & 2
13	2	Allen Bradley	1494G-BS3N	600V, Non-Fuse, (3 Pole, 3⌀), Disconnect Switch, Nema 4x Standard size Enclosure, Capable Of Being Locked To Off Position	Local Disconnect Switch (DS1, DS2) for Carbon Pump # (1 & 2)

B / E6 EQUIPMENT SCHEDULE
SCALE: N.T.S.

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED T. ENGLUND
DRAWN J. GONZALEZ
CHECKED
IN CHARGE R. MAROTTE
DATE 12/14/2007

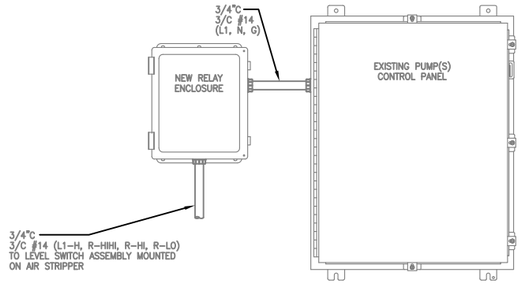
MACTEC Engineering and Consulting, Inc.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

CARBON SYSTEM RETROFIT
NIAGARA FALLS PLANT
GROUND-WATER TREATMENT SYSTEM
CABLE AND EQUIPMENT SCHEDULE

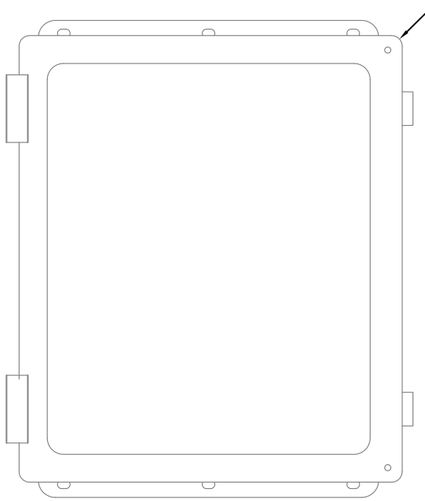
SCALE: AS SHOWN
CONTRACT: 6100-07-0001
DWG. NO.: E6
REV: 0
PAGE NO:

BILL OF MATERIALS

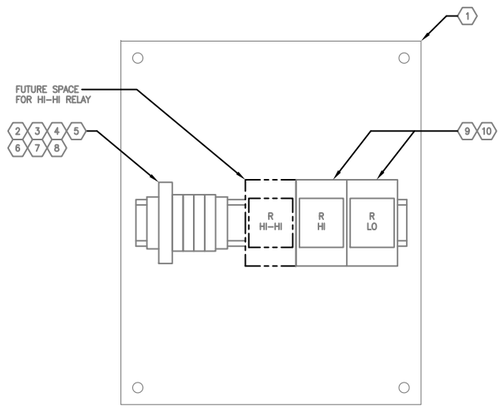
ITEM	QTY	DESCRIPTION			
1	1	ENCLOSURE, NEMA 4X, NON-METALLIC SIZE: 12"H x 10"W x 8"D			
	1	SUB-PANEL FOR ABOVE ENCLOSURE, SIZE: 10.75" X 8.88"			
2	4	TERMINAL BLOCK			
3	1	END COVER			
4	2	END BRACKET			
5	1	DIN MOUNTING RAIL			
6	AS REQ'D	TERMINAL MARKERS, PRINTED AS REQUIRED			
7	1	FUSE TERMINAL BLOCK			
8	1	FUSE, 1/4A			
9	2	RELAY, 120VAC COIL			
10	2	RELAY BASE			



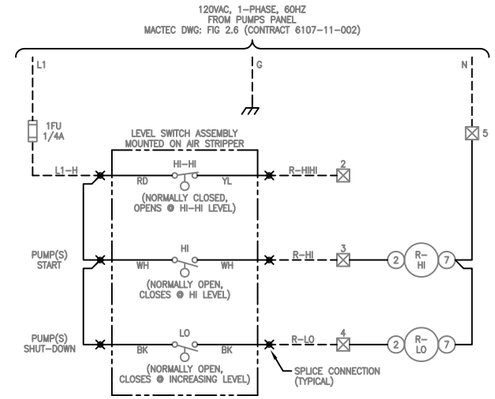
RELAY ENCLOSURE – CONDUIT LAYOUT
LOCATED ON SOUTH WALL OF BLDG 73
N.T.S.



RELAY ENCLOSURE – FRONT VIEW
LOCATED IN BLDG 73
SCALE: 1/2" = 1"



RELAY ENCLOSURE – PANEL LAYOUT
LOCATED IN BLDG 73
SCALE: 1/2" = 1"



WIRING DIAGRAM

LEGEND:

- – – – – – WIRING EXTERNAL TO NEW RELAY ENCLOSURE
- ——— WIRING INTERNAL TO NEW RELAY ENCLOSURE
- ☒ – TERMINAL/DEVICE LOCATED IN NEW RELAY ENCLOSURE

REFERENCE DRAWINGS:

FIG 2.6 MACTEC, CONTRACT 6107-11-002, CARBON ADSORBER SYSTEM, ELECTRICAL SCHEMATIC

FILE NAME: 08400604O.DWG

JNE CONSULTING
Professional Engineers
An ISO 9001:2000 Registered Company
2420 Sweet Home Rd., Suite 110, Amherst, NY, 14228, USA
Tel:716-691-6406, Fax:716-691-6407, www.jne.ca

PROJECT NO.	5567.2044	DRAWING NO.	
DRAWN BY	MKG	DESIGN BY	R. DILIMONE
CHECKED BY		APPROVED BY	

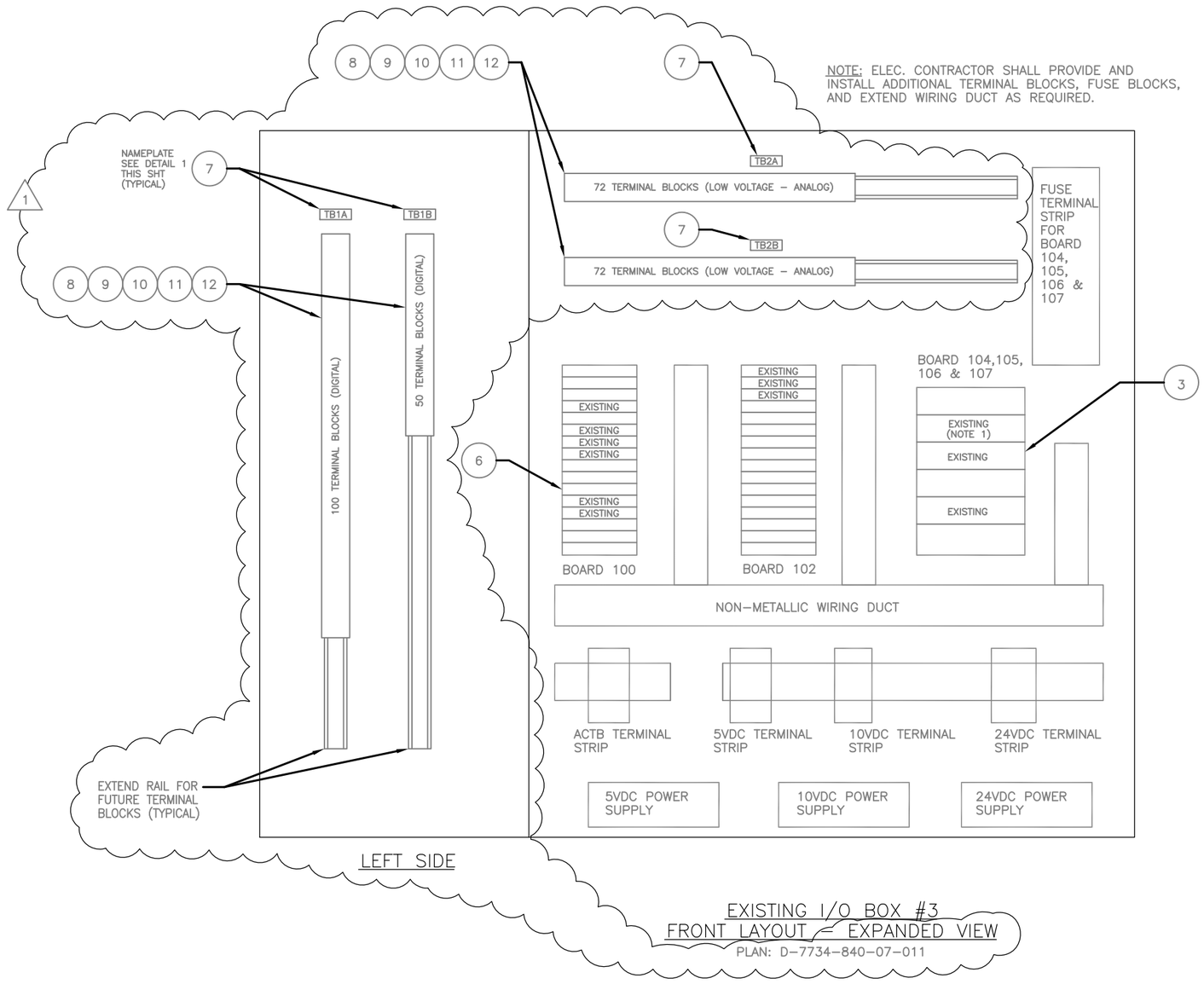
PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
X	X	0	ISSUED FOR CONSTRUCTION (DOCUMENTED)	MKG	6/8/11		

DRAWN BY: MKG	DATE: 6/8/11	
DESIGN BY: R. DILIMONE	DATE: 6/8/11	
CHECKED BY:	DATE:	
PROJECT DESIGN COORDINATOR:	DATE:	
PROJECT ENGINEER:	DATE:	
PROJECT MANAGER:	DATE:	

Olin
PLANT ENGINEERING
NIAGARA FALLS PLANT

BUILDING 73
GROUND WATER AIR SCRUBBER
RELAY ENCLOSURE

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
X	X	1/2"=1"	D-0840-06-040	0

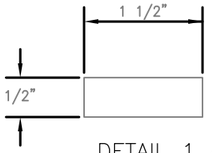


EXISTING I/O BOX #3
FRONT LAYOUT – EXPANDED VIEW
PLAN: D–7734–840–07–011

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	SOURCE
1	1	OPTO 22 DIGITAL I/O RACK FOR ODC5Q & IDC5Q MODULES	OWNER
2	4	OPTO 22 DIGITAL OUTPUT MODULES MODEL ODC5Q	OWNER
3	5	OPTO 22 DIGITAL INPUT MODULES MODEL IDC5Q	OWNER
4	1	OPTO 22 16 POSITION ANALOG I/O BOARD MODEL PB16AH	OWNER
5	2	OPTO 22 ANALOG OUTPUT MODULE MODEL DA4T	OWNER
6	21	OPTO 22 ANALOG INPUT MODULES MODEL AD3T	OWNER
7	4	EQUIPMENT NAMEPLATE, SEE DETAIL 1, THIS SHT.	ELECTRICAL CONTRACTOR
8	294	TERMINAL BLOCK "UK5N", PHOENIX #30 04 36 2	
9	4	END COVER "D–UK 4/10", PHOENIX #30 03 02 0	
10	8	END BRACKET "E/UK", PHOENIX #12 01 44 2	
11	2	DIN RAIL "NS35/15", PHOENIX #12 01 71 4	
12	AS REQ'D	TERMINAL MARKERS, PHOENIX #ZB	

1



DETAIL 1 (7)
NAMEPLATE
4 REQUIRED
ENGRAVE: TB1A, TB1B, TB2A & TB2B
WHITE BACKGROUND WITH BLACK 3/16" HIGH CHARACTERS
SIZE: 1 1/2"W X 1/2"H X 1/8" THK
SCALE: 1" = 1"

REFERENCE DRAWINGS

D–0830–06–060	INTERFACE TERM BLOCKS LAYOUT & WIRING DIAGRAM, ANALOG
D–0830–06–061	INTERFACE TERM BLOCKS LAYOUT & WIRING DIAGRAM, DIGITAL
D–7734–840–07–011	BLDG 73 INSTRUMENTATION PLAN

GENERAL NOTES

1. EXISTING DIGITAL OUTPUT MODULE SHALL BE RELOCATED TO NEW DIGITAL BOARD. RECONNECT EXISTING WIRING TO RELOCATED MODULE.

R.Z02.4037.1223

PROJ.	CAR	REV.	DESCRIPTION	DRAWN	DATE	CHK'D	APPROVED
		1	GROUNDWATER OMNIX REPLACEMENT	MKG	2/14/08		
7734		0	FOR CONSTRUCTION	PRN	08/16/97		
7734		B	FOR BID PURPOSE	PRN	06/16/97		
7734		A	FOR APPROVAL	PRN	05/19/97		

DRAWN DATE P.R. NAUS 05/97
CHECKED DATE
APPROVED

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CHEMICALS PLANT
NIAGARA FALLS, NY.

PLANT 2 AREA 840
BLDG #73 OMNX
I/O BOX #3
LAYOUT & BILL OF MATERIAL

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV
7734		1/4"=1"	D–7734–840–07–012	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

CT-730301A
RW-1
WELL LEVEL

\- W
\+ B

L B
N W
G G

TO LT730306A
DWG #B-7734-840-07-027

LT730301A

BK
WH

TB2A

1
2
3

LT730301A

\+
\-
S

BK
WH

I-0830-DCS100-1

PR #1

BK
WH

+1
-1
S

LT730301A

RACK: 5
SLOT: 1
CH: 1

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #1
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-001

0

CABLE BY MANUFACTURER

LE730301A

DRAWING NO. D-7734-840-07-013
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007013.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-1 WELL LEVEL
LT730301A

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-013	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

CT-730301B
RW-2
WELL LEVEL

– W
+ B

L B
N W
G G

LT730301B

BK
WH

4
5
6

TB2A

LT730301B

+
–
S

BK
WH

I-0830-DCS100-1

PR #2

BK
WH

+2
–2
S

LT730301B

RACK: 5
SLOT: 1
CH: 2

LOOP GROUND REF

TO LT730306B
DWG #B-7734-840-07-028

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #2
20A-1P

B
NEUTRAL
W
W

0

CABLE BY MANUFACTURER

LE730301B

DWG # N/A

DWG #D-0830-11-001

DRAWING NO. D-7734-840-07-014
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007014.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.	
								DRAWN BY: DAT
								CHECKED BY PRN
								APPROVED
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08			
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN		
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN		
7734		A	APPROVAL	DAT	5/17/97	PRN		

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NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-2 WELL LEVEL
LT730301B

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-014	1

FIELD
D–7734–840–07–010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830–DCS–100 @ BLDG 73

1

JUNCTION BOX AT WELL

LT–730301C
RW–3
WELL LEVEL

– W
+ B

L B
N W
G G

TO LT730306C
DWG #B–7734–840–07–029

0

CABLE BY MANUFACTURER

LE730301C

LT730301C

BK
WH

7
8
9

TB2A

LT730301C

+
–
S

BK
WH

I–0830–DCS100–1

PR #3

BK
WH

+3
–3
S

LT730301C

RACK: 5
SLOT: 1
CH: 3

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D–0830–06–060

PANEL IP–73 @ BLDG 73

D–7734–840–07–011

CIRCUIT #3
20A–1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D–0830–11–001

DRAWING NO. D–7734–840–07–015
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007015.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
CHEMICALS GROUP
ENGINEERING
NIAGARA FALLS, NY

PLANT 2 AREA 840

RW–3 WELL LEVEL
LT730301C

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B–7734–840–07–015	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

LT-730301D
RW-4
WELL LEVEL

W
B

L
N
G

B
W
G

TO LT730306D
DWG #B-7734-840-07-030

0

CABLE BY MANUFACTURER

LE730301D

LT730301D

BK
WH

TB2A

10
11
12

LT730301D

+
-
S

BK
WH

I-0830-DCS100-1

PR #4

BK
WH

+4
-4
S

LT730301D

RACK: 5
SLOT: 1
CH: 4

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #4
20A-1P

B

NEUTRAL

W

W

DWG # N/A

DWG #D-0830-11-001

DRAWING NO. D-7734-840-07-016
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007016.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
CHEMICALS GROUP
ENGINEERING
NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-4 WELL LEVEL
LT730301D

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-016	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

LT-730301E
RW-5
WELL LEVEL

W
B

LT730301E

BK
WH

TB2A

22
23
24

LT730301E

+
-
S

BK
WH

I-0830-DCS100-1

PR #8

BK
WH

+8
-8
S

LT730301E

RACK: 5
SLOT: 1
CH: 8

LOOP GROUND REF

L
N
G

B
W
G

TO LT730306E
DWG #B-7734-840-07-031

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

0

CABLE BY MANUFACTURER

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #4
20A-1P

B
NEUTRAL
W
W

LE730301E

DWG # N/A

DWG #D-0830-11-001

DRAWING NO. D-7734-840-07-017
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007017.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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ENGINEERING
NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-5 WELL LEVEL
LT730301E

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-017	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

FT-30301A
RW-1
FLOW

– W
+ B

L B
N W
G G

FT730301A

BK
WH

TB2B

4
5
6

FT730-301A

+
–
S

BK
WH

I-0830-DCS100-3
PR #2

BK
WH

+IN
COM
S

FT730301A

RACK: 5
SLOT: 4
CH: 2

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #6
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-018
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007018.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

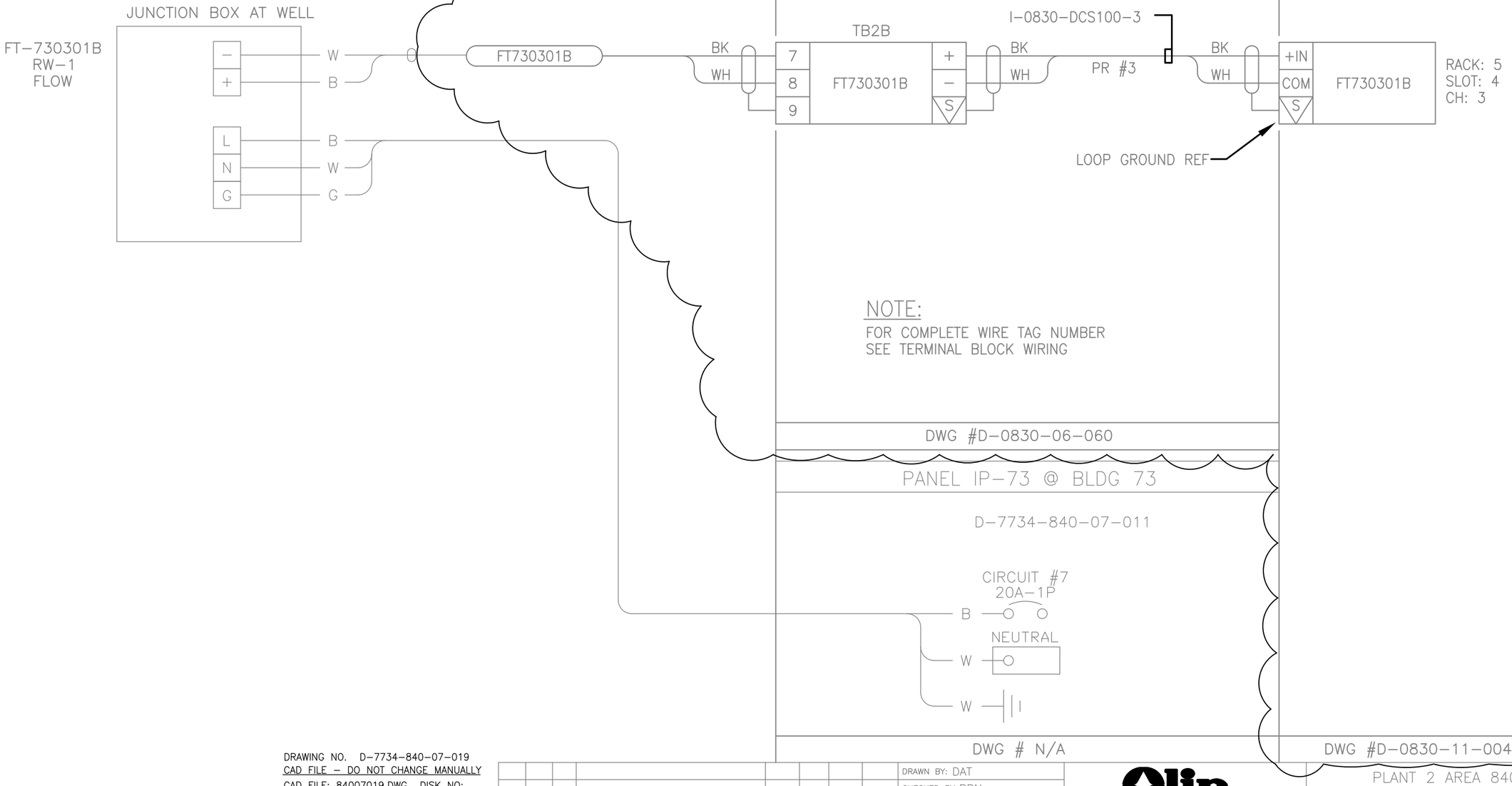
RW-1 WELL FLOW
FT730301A

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-018	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73



DRAWING NO. D-7734-840-07-019
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007019.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-2 WELL FLOW
FT730301B

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-019	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

FT-730301C
RW-3
FLOW

\- W
\+ B

L B
N W
G G

FT730301C

BK
WH

TB2B
16
17
18

FT730301C

\+
\-
S

BK
WH

I-0830-DCS100-3

PR #6

BK
WH

+IN
COM
S

FT730301C

RACK: 5
SLOT: 4
CH: 6

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #8
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-020
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007020.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-3 WELL FLOW
FT730301C

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-020	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

FT-730301D
RW-4
FLOW

W
B
B
W
G

FT730301D

BK
WH

TB2B
19
20
21
FT730301D
+
-
S

BK
WH

I-0830-DCS100-3
PR #7

BK
WH

+IN
COM
S
FT730301D

RACK: 5
SLOT: 4
CH: 7

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #8
20A-1P
B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-021
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007021.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-4 WELL FLOW
FT730301D

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-021	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JUNCTION BOX AT WELL

FT-730301E
RW-5
FLOW

– W
+ B

L B
N W
G G

FT730301E

BK
WH

TB2B

31
32
33

FT730301E

+
–
S

BK
WH

I-0830-DCS100-3

PR #11

BK
WH

+IN
COM
S

FT730301E

RACK: 5
SLOT: 4
CH: 11

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #10
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-022
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007022.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-5 WELL FLOW
FT730301E

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-022	1

FIELD
D-7734-840-07-011

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

JB730302

W — LHH730302
B
B — LH730302
W
B — LL730302
W

CABLE BY MANUFACTURER

TB1A

47	LSHH730302	C	YL	E-0830-DCS100-3
48		NO	BR	
49	LSH730302	C	RD/BK	E-0830-DCS100-3
50		NO	BL/BK	
51	LSL730302	C	OR/BK	E-0830-DCS100-3
52		NO	YL/BK	

TB3

YL	F24
BR	CH24
RD/BK	F25
BL/BK	CH25
OR/BK	F26
YL/BK	CH26

FROM PDA-1
120VAC — N

+24	LSHH730302	RACK: 5 SLOT: 2 CH: 24
-24		
+25	LSH730302	RACK: 5 SLOT: 2 CH: 25
-25		
+26	LSL730302	RACK: 5 SLOT: 2 CH: 26
-26		

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

LSHH730302
HIGH-HIGH
LEVEL
(ALARM)

LSH730302
HIGH
LEVEL
(START)

LSL730302
LOW
LEVEL
(STOP)

S-73-01
SPILL CONTAINMENT
SUMP

DRAWING NO. D-7734-840-07-023
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007023.DWG DISK NO:

DWG #D-0830-06-061

DWG #D-0830-11-002

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	6/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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NIAGARA FALLS, NY

PLANT 2 AREA 840

SPILL CONTAINMENT
LEVEL
LS730302

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-023	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

AIT730301A

AIT730301A

W
B
B
W
G

RD
BK
BL
WH
SH

CABLE BY MANUFACTURER

AE730301A

V-73-02
FIRST STAGE pH
ADJUSTMENT

AIT730301A

BK
WH

TB2B

34
35
36

AIT730301A

S

BK
WH

I-0830-DCS100-3

PR #12

BK
WH

+IN
COM
S

AIT730301A

RACK: 5
SLOT: 4
CH: 12

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #11
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-024
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007024.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	6/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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NIAGARA FALLS, NY

PROJECT NO. 7734 | CAR NO. | SCALE NONE

PLANT 2 AREA 840

FIRST STAGE pH
ANALYTICAL
AIT730301A

DRAWING NO. B-7734-840-07-024 | REV. 1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

AIT730301B

- W
+ B

L B
N W
G G

RD BK BL WH SH

CABLE BY MANUFACTURER

AE730301B

V-73-03
FIRST STAGE pH
ADJUSTMENT

AIT730301B

BK
WH

TB2B

37
38
39

AIT730301B

\+
−
S

BK
WH

I-0830-DCS100-4

PR #1

BK
WH

+IN
COM
S

AIT730301B

RACK: 5
SLOT: 4
CH: 13

LOOP GROUND REF

NOTE:
FOR COMPLETE WIRE TAG NUMBER
SEE TERMINAL BLOCK WIRING

DWG #D-0830-06-060

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #12
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #D-0830-11-004

DRAWING NO. D-7734-840-07-025
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007025.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	6/16/97	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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ENGINEERING
NIAGARA FALLS, NY

PROJECT NO. 7734 | CAR NO. | SCALE NONE

PLANT 2 AREA 840

FIRST STAGE pH
ANALYTICAL
AIT730301B

DRAWING NO. B-7734-840-07-025 | REV. 1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

2

ACID TOTE LEVEL SENSOR NO LONGER USED AND NOT PRESENT IN FIELD

LIT730302

1+ W
2- B
24+ B
24- W
5
6

LIT730302

BK
WH

TB2

X
X
X

LIT-730302

+
-
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LIT-730302

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

CABLE BY MANUFACTURER

LE730302

V-73-04
SULFURIC ACID
TOTE

LTP730302

B — 24VDC

W — 24V COM

DRAWING NO. D-7734-840-07-026
CAD FILE - DO NOT CHANGE MANUALLY
CAD FILE: 84007026.DWG DISK NO:

DWG # N/A

DWG # PLANT 2 AREA 840

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
							DRAWN BY: DAT
							CHECKED BY PRN
		2	AMEC REVISION OF CURRENT CONFIGURATION	TG	5/23/13	AWE	APPROVED
R.Z02.4037.1223 →		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

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GROUND WATER OMNIX REPLACEMENT MKG 2/19/08

SULRURIC ACID
TOTE LEVEL
LIT730302

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-026	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

LT730306A

– W
+ B
L B
N W
G G

BL WH SH

CABLE BY MANUFACTURER

LE730306A

JUNCTION BOX AT WELL

INSTR PANEL
IP-73, BKR #1
B-7734-840-07-013

L B
N W
G G

0

LT730306A

BK
WH

TB2

X
X
X

LT730-306A

+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LT730-306A

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DWG #

DWG #

DRAWING NO. D-7734-840-07-027
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007027.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-1 WELL LEAK
SENSING LEVEL
LT730306A

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-027	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

LT730306B

– W
+ B
L B
N W
G G

BL WH SH

CABLE BY MANUFACTURER

LE730306B

JUNCTION BOX AT WELL

INSTR PANEL
IP-73, BKR #2
B-7734-840-07-014

L B
N W
G G

0

LT730306B

BK
WH

TB2

X
X
X

LT730-306B

+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LT730-306B

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DWG #

DWG #

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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PLANT 2 AREA 840

RW-2 WELL LEAK
SENSING LEVEL
LT730306B

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-028	1

DRAWING NO. D-7734-840-07-028
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007028.DWG DISK NO:

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

LT730306C

– W
+ B
L B
N W
G G

BL WH SH

CABLE BY MANUFACTURER

LE730306C

JUNCTION BOX AT WELL

INSTR PANEL
IP-73, BKR #3
B-7734-840-07-015

L B
N W
G G

0

LT730306C

BK
WH

TB2

X
X
X

LT730-306C

+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LT730-306C

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DWG #

DWG #

DRAWING NO. D-7734-840-07-029
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007029.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
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NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-3 WELL LEAK
SENSING LEVEL
LT730306C

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-029	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

LT730306D

– W
+ B
L B
N W
G G

BL WH SH

CABLE BY MANUFACTURER

LE730306D

JUNCTION BOX AT WELL

INSTR PANEL
IP-73, BKR #4
B-7734-840-07-016

L B
N W
G G

0

LT730306D

BK
WH

TB2

X
X
X

LT730-306D

+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LT730-306D

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DRAWING NO. D-7734-840-07-030
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007030.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
		1	GROUND WATER OMNIX REPLACEMENT	MKG	2/19/08		
7734		0	FOR CONSTRUCTION	DAT	9/16/91	PRN	
7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

DWG #

DWG #

Olin
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ENGINEERING
NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-4 WELL LEAK
SENSING LEVEL
LT730306D

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-030	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

LT730306E

– W
+ B
L B
N W
G G

BL WH SH

CABLE BY MANUFACTURER

LE730306E

JUNCTION BOX AT WELL

INSTR PANEL
IP-73, BKR #5
B-7734-840-07-017

L B
N W
G G

0

LT730306E

BK
WH

TB2

X
X
X

LT730-306E

+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

LT730-306E

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DWG #

DWG #

DRAWING NO. D-7734-840-07-031
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007031.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
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7734		B	FOR BID PURPOSE	DAT	6/16/91	PRN	
7734		A	APPROVAL	DAT	5/17/91	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
CHEMICALS GROUP
ENGINEERING
NIAGARA FALLS, NY

PLANT 2 AREA 840

RW-5 WELL LEAK
SENSING LEVEL
LT730306E

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
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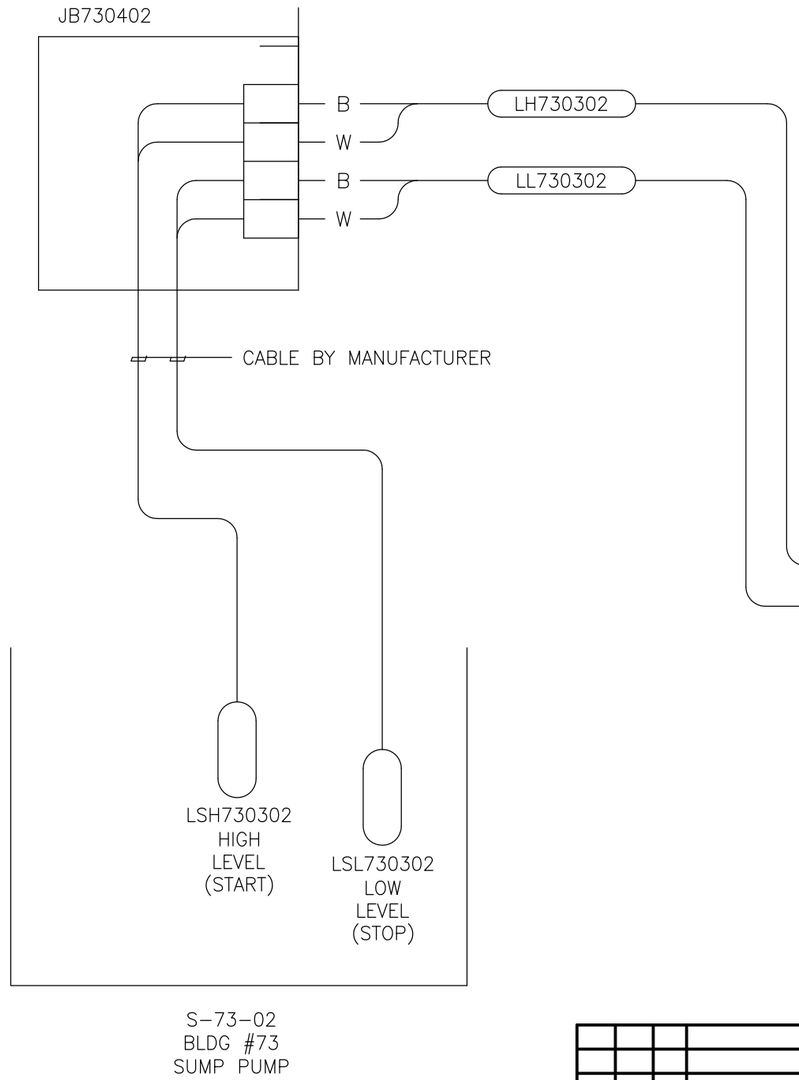
FIELD

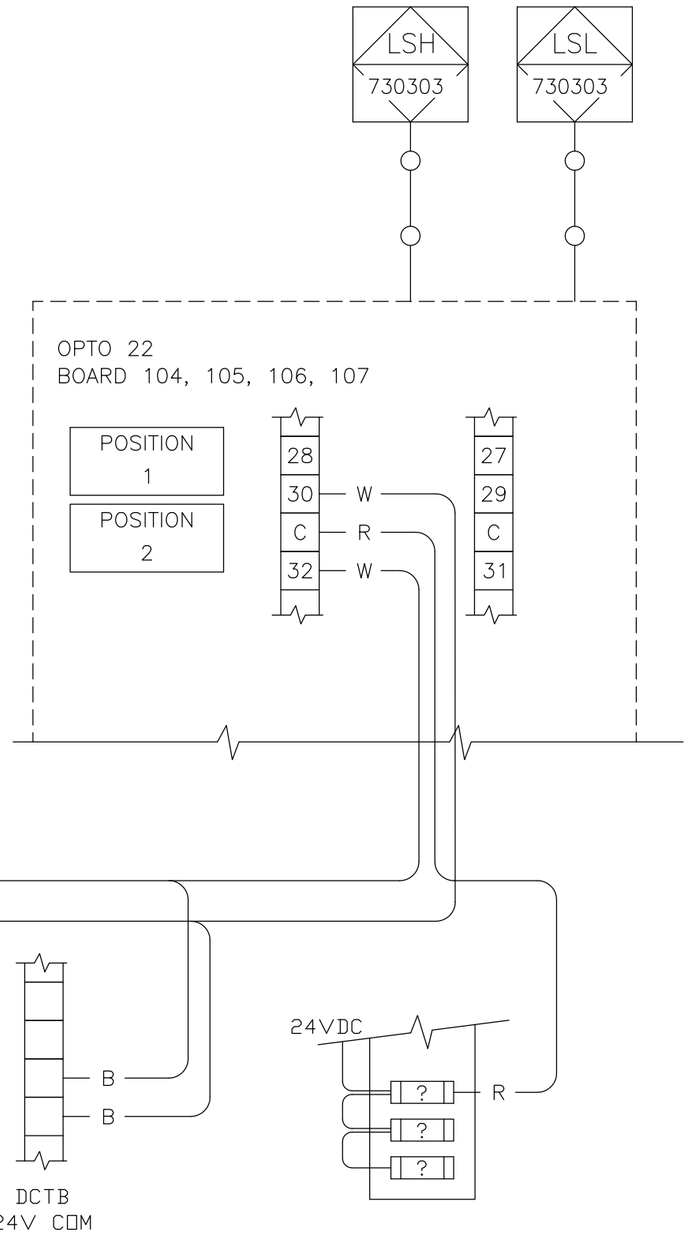
D-7734-840-07-011



S-73-02
BLDG #73
SUMP PUMP

I/O BOX # 3 BLDG. #73

D-7734-840-07-012



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CAD FILE: 84007032.DWG DISK NO:

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7734		A	APPROVAL	DAT	6/17/81	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

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NIAGARA FALLS, NY

PLANT 2 AREA 840

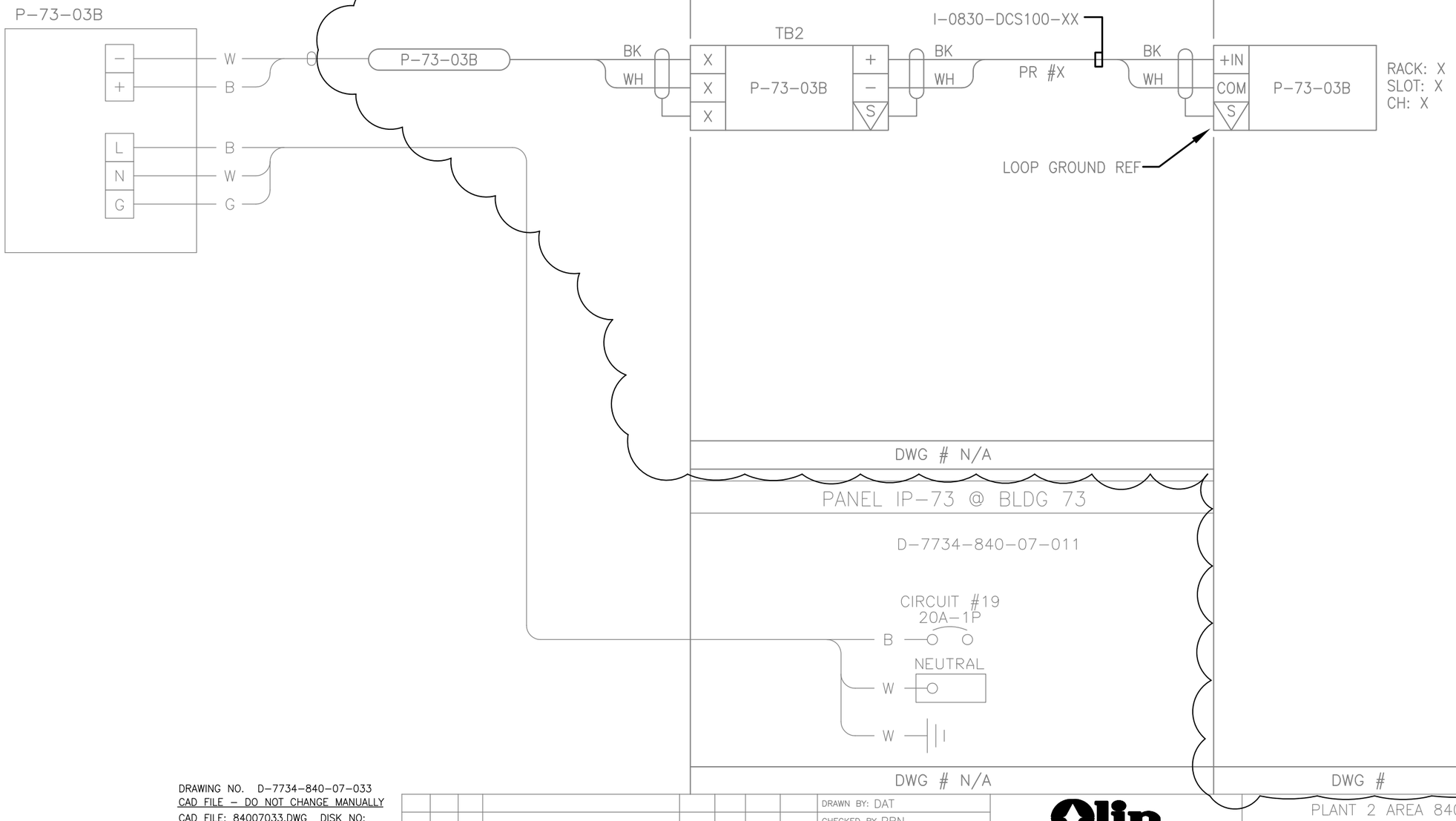
BLDG #73
SUMP PUMP LEVEL
LS730303

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-032	0

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73



DWG # N/A

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

DWG # N/A

DWG #

PLANT 2 AREA 840

P-73-03B
ANALOG OUTPUT SIGNAL
TO METERING PUMP

DRAWING NO. D-7734-840-07-033
CAD FILE – DO NOT CHANGE MANUALLY
CAD FILE: 84007033.DWG DISK NO:

R.Z02.4037.1223

PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
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7734		B	FOR BID PURPOSE	DAT	6/16/97	PRN	
7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
CHEMICALS GROUP
ENGINEERING
NIAGARA FALLS, NY

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
7734		NONE	B-7734-840-07-033	1

FIELD
D-7734-840-07-010

I/O BOX #3 @ BLDG 73

APACS I/O CABINET
0830-DCS-100 @ BLDG 73

1

P-73-03A

– W
+ B

L B
N W
G G

P-73-03A

BK
WH

TB2

X
X
X

P-73-03A

\+
–
S

BK
WH

I-0830-DCS100-XX

PR #X

BK
WH

+IN
COM
S

P-73-03A

RACK: X
SLOT: X
CH: X

LOOP GROUND REF

DWG # N/A

PANEL IP-73 @ BLDG 73

D-7734-840-07-011

CIRCUIT #20
20A-1P

B
NEUTRAL
W
W

DWG # N/A

DWG #

PLANT 2 AREA 840

DRAWING NO. D-7734-840-07-034
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PROJ.	C.A.R.	REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
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7734		A	APPROVAL	DAT	5/17/97	PRN	

DRAWN BY: DAT
CHECKED BY PRN
APPROVED

Olin
CHEMICALS GROUP
ENGINEERING
NIAGARA FALLS, NY

P-73-03A
ANALOG OUTPUT SIGNAL
TO METERING PUMP

PROJECT NO.	CAR NO.	SCALE	DRAWING NO.	REV.
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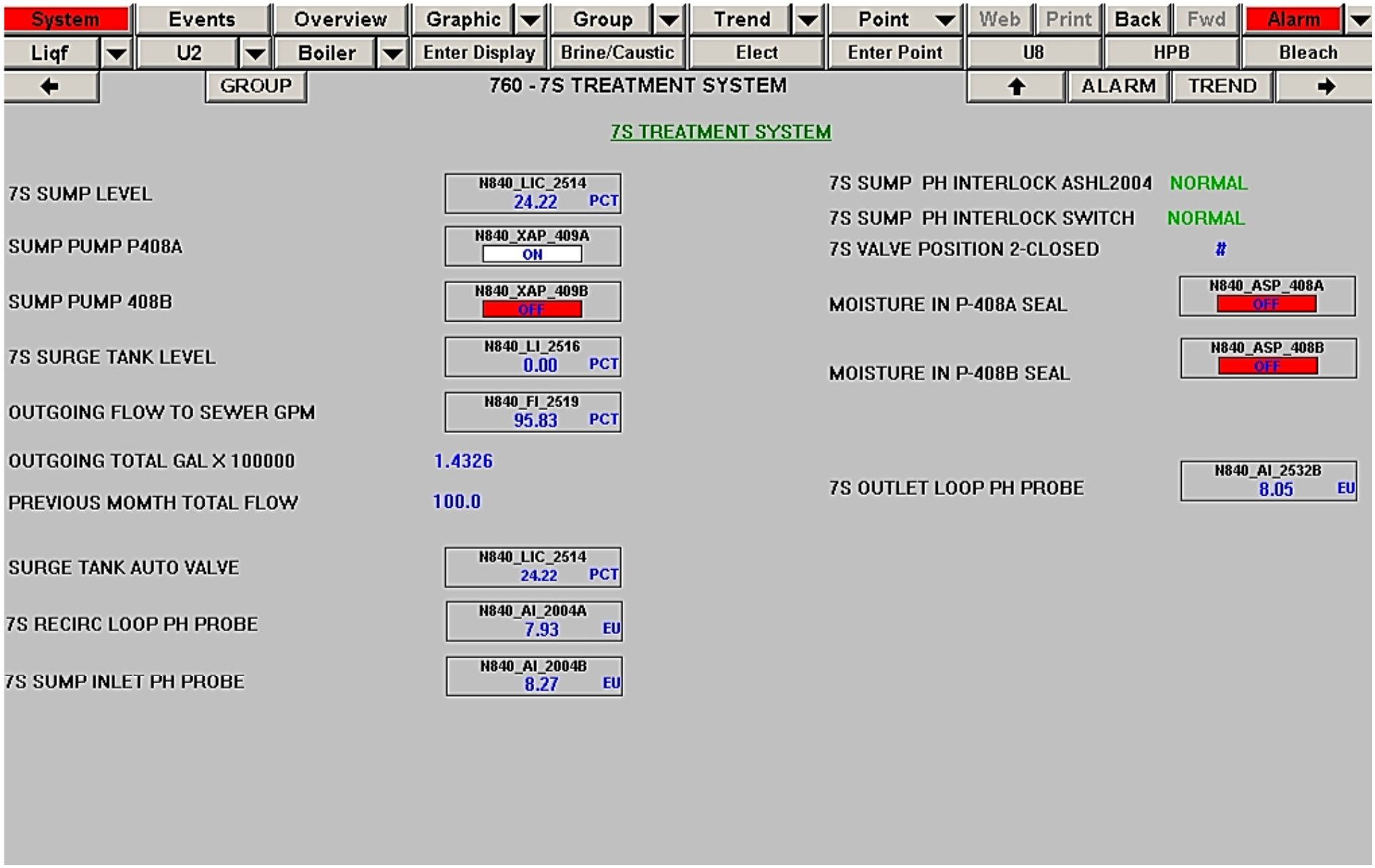
APPENDIX D

DCS SCREEN SHOTS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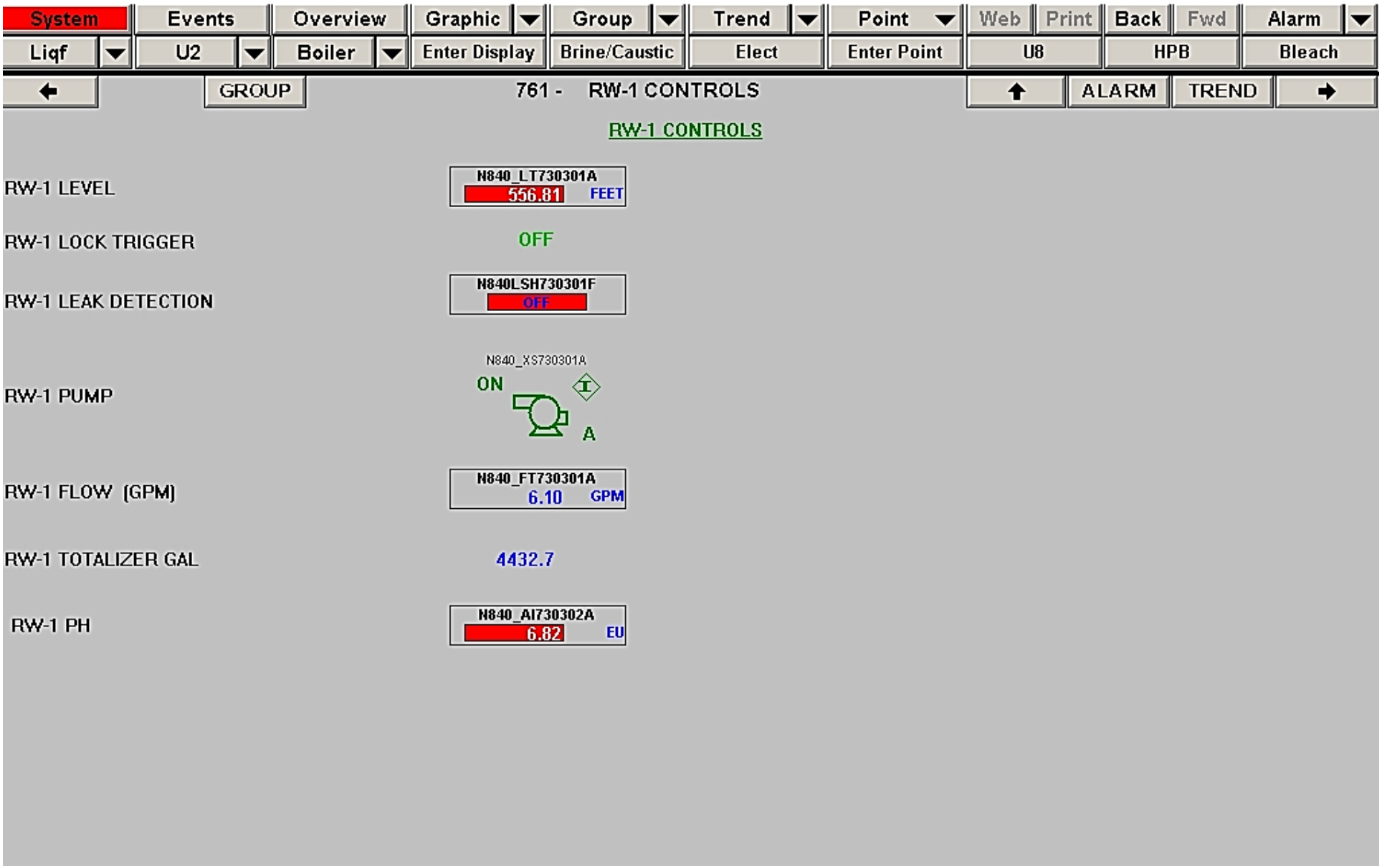
Events
Overview
Graphic
Group
Trend
Point
Web
Print
Back
Fwd
Alarm
Liqf
U2
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
760 - 7S TREATMENT SYSTEM
ALARM
TREND
7S TREATMENT SYSTEM
7S SUMP LEVEL
N840_LIC_2514
24.22 PCT
SUMP PUMP P408A
N840_XAP_409A
ON
SUMP PUMP 408B
N840_XAP_409B
OFF
7S SURGE TANK LEVEL
N840_LI_2516
0.00 PCT
OUTGOING FLOW TO SEWER GPM
N840_FI_2519
95.83 PCT
OUTGOING TOTAL GAL X 100000
1.4326
PREVIOUS MOMTH TOTAL FLOW
100.0
SURGE TANK AUTO VALVE
N840_LIC_2514
24.22 PCT
7S RECIRC LOOP PH PROBE
N840_AI_2004A
7.93 EU
7S SUMP INLET PH PROBE
N840_AI_2004B
8.27 EU
7S SUMP PH INTERLOCK ASHL2004
NORMAL
7S SUMP PH INTERLOCK SWITCH
NORMAL
7S VALVE POSITION 2-CLOSED
#
MOISTURE IN P-408A SEAL
N840_ASP_408A
OFF
MOISTURE IN P-408B SEAL
N840_ASP_408B
OFF
7S OUTLET LOOP PH PROBE
N840_AI_2532B
8.05 EU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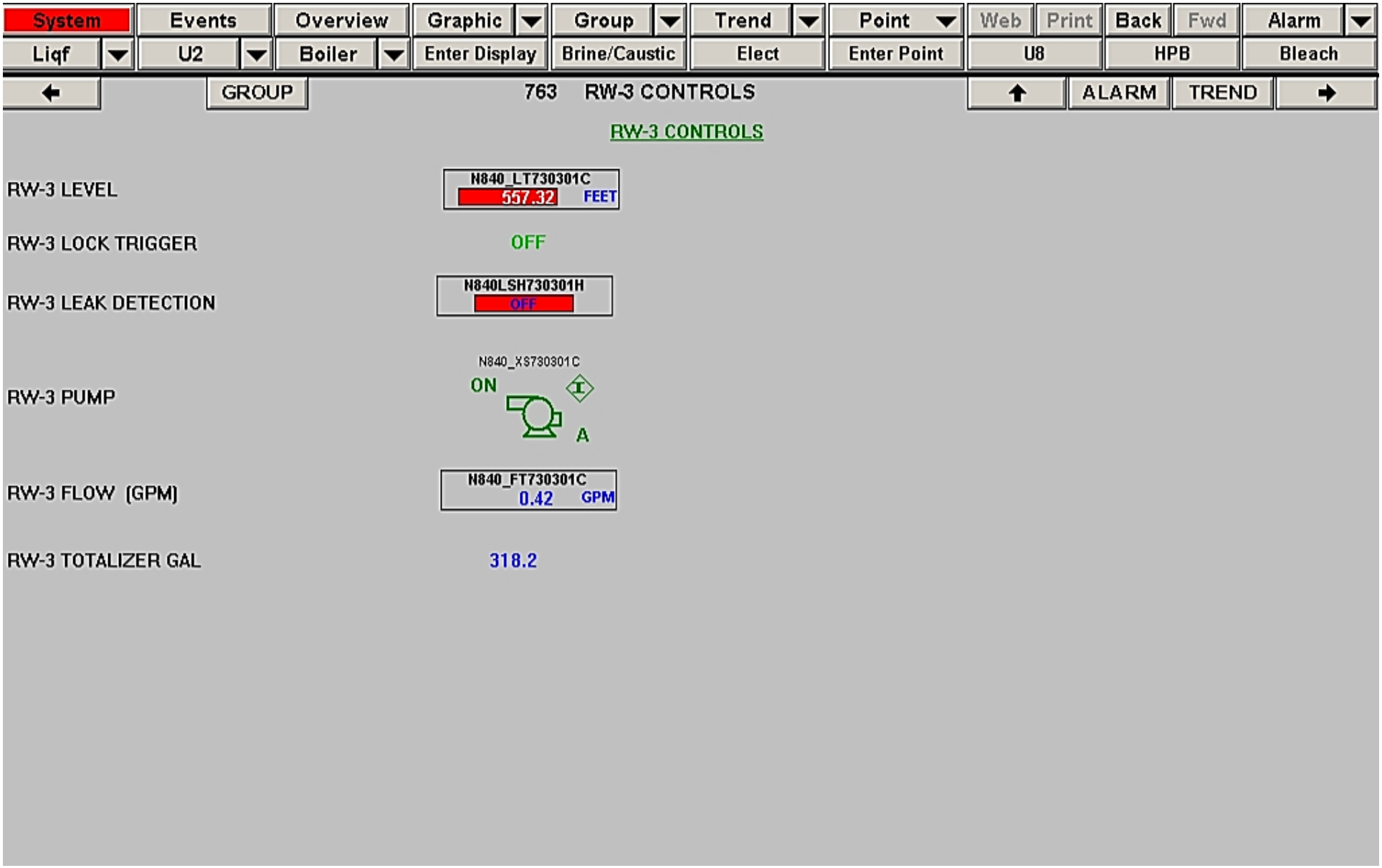
Web
Print
Back
Fwd
Alarm
Liqf
U2
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
761 - RW-1 CONTROLS
ALARM
TREND
RW-1 CONTROLS
RW-1 LEVEL
N840_LT730301A
556.81
FEET
RW-1 LOCK TRIGGER
OFF
RW-1 LEAK DETECTION
N840LSH730301F
OFF
RW-1 PUMP
N840_XS730301A
ON
A
RW-1 FLOW (GPM)
N840_FT730301A
6.10
GPM
RW-1 TOTALIZER GAL
4432.7
RW-1 PH
N840_AI730302A
6.82
EU

RW-2 CONTROLS

RW-2 LEVEL	N840_LT730301B 557.20 FEET
RW-2 LOCK TRIGGER	OFF
RW-2 LEAK DETECTION	N840LSH730301G OFF
RW-2 PUMP	N840_XS730301B ON A
RW-2 FLOW (GPM)	N840_FT730301B 9.26 GPM
RW-2 TOTALIZER GAL	6715.0
RW-2 CONVEYANCE LINE PH	N840_AI730302B 6.36 EU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Graphic
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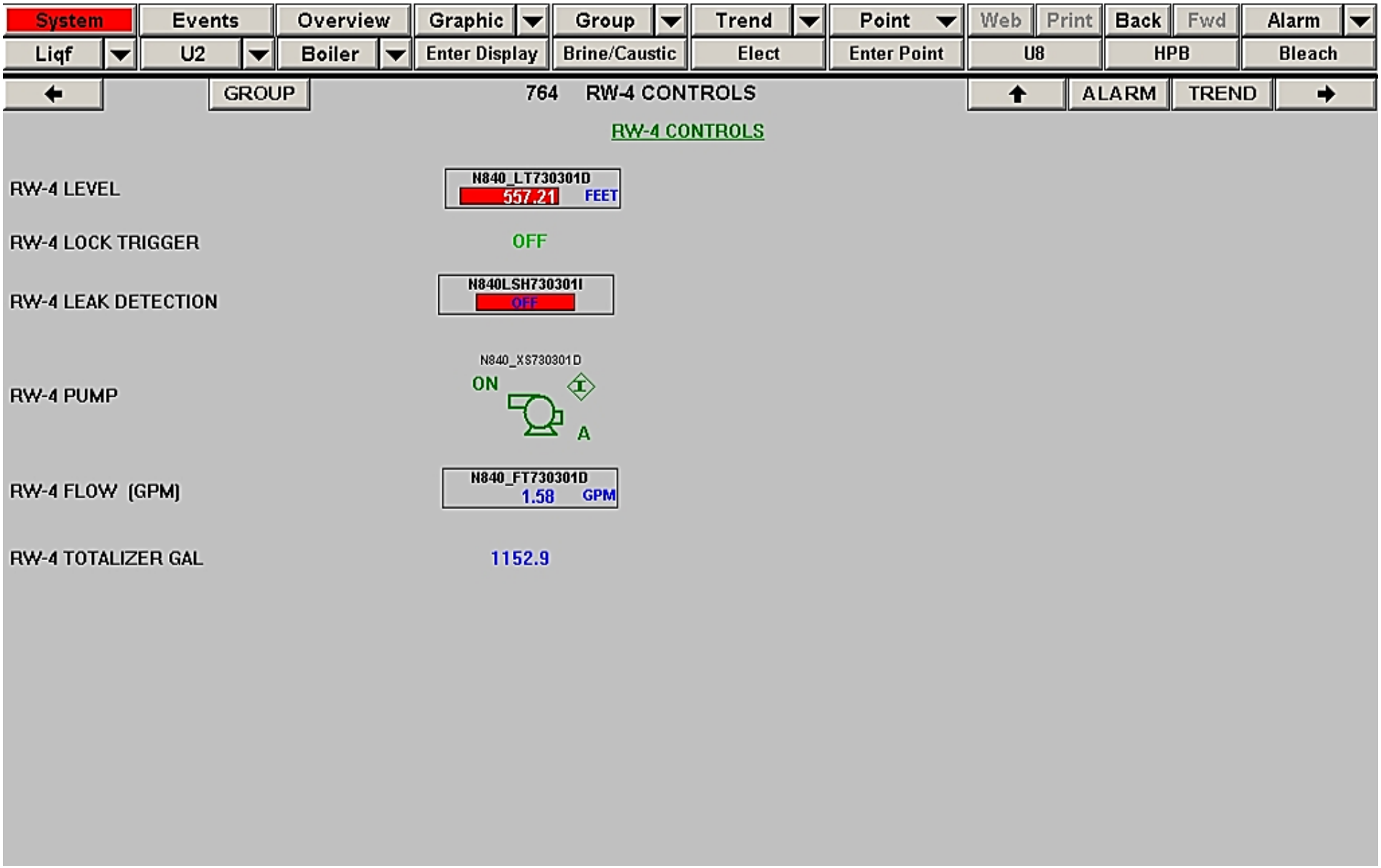
Back
Fwd
Alarm
Liqf
U2
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
763 RW-3 CONTROLS
ALARM
TREND
RW-3 CONTROLS
RW-3 LEVEL
N840_LT730301C
557.32 FEET
RW-3 LOCK TRIGGER
OFF
RW-3 LEAK DETECTION
N840LSH730301H
OFF
RW-3 PUMP
N840_XS730301C
ON
A
RW-3 FLOW (GPM)
N840_FT730301C
0.42 GPM
RW-3 TOTALIZER GAL
318.2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Trend
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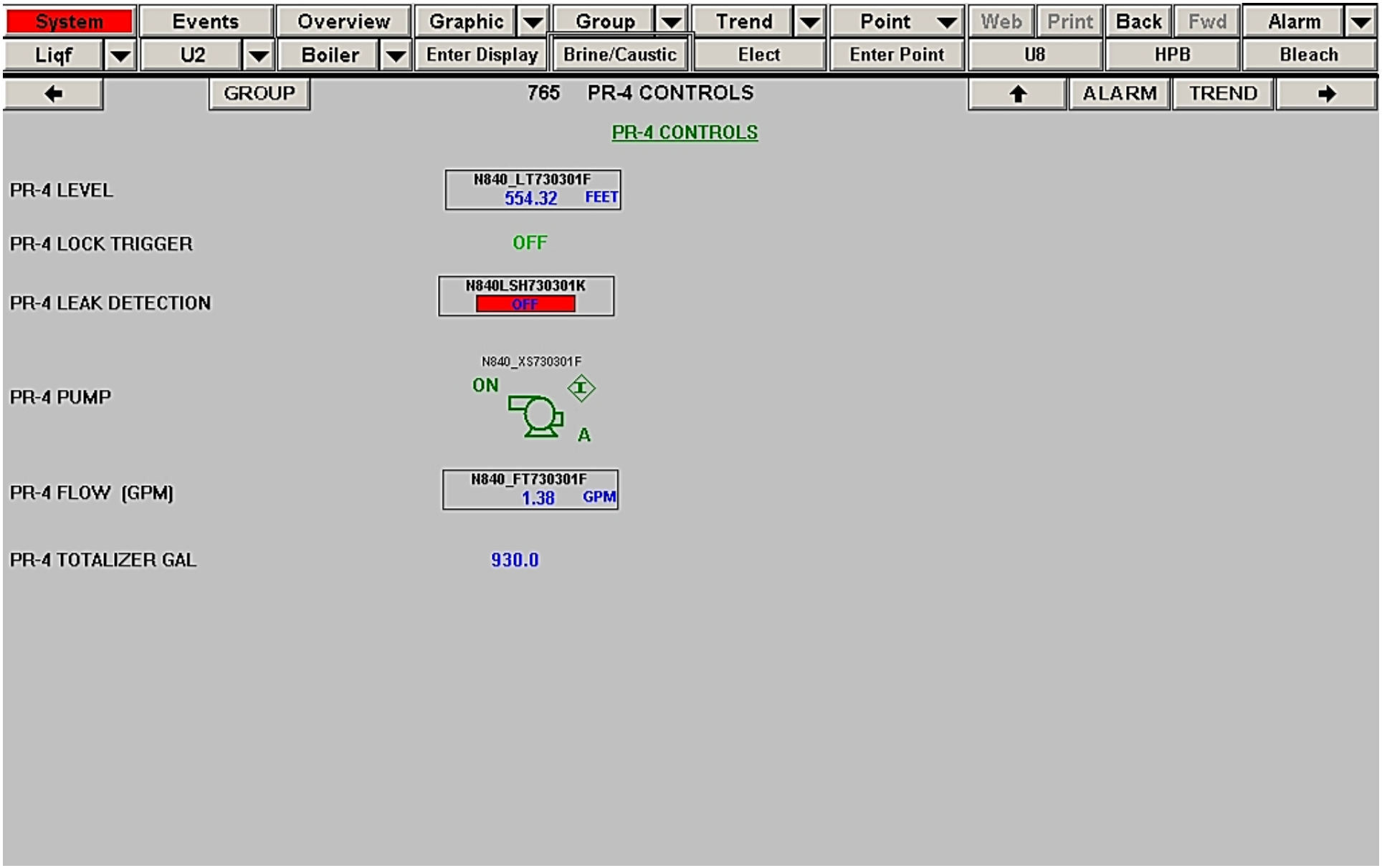
Alarm
Liqf
U2
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
764 RW-4 CONTROLS
ALARM
TREND
RW-4 CONTROLS
RW-4 LEVEL
N840_LT730301D
557.21 FEET
RW-4 LOCK TRIGGER
OFF
RW-4 LEAK DETECTION
N840LSH730301I
OFF
RW-4 PUMP
N840_XS730301D
ON
A
RW-4 FLOW (GPM)
N840_FT730301D
1.58 GPM
RW-4 TOTALIZER GAL
1152.9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Alarm
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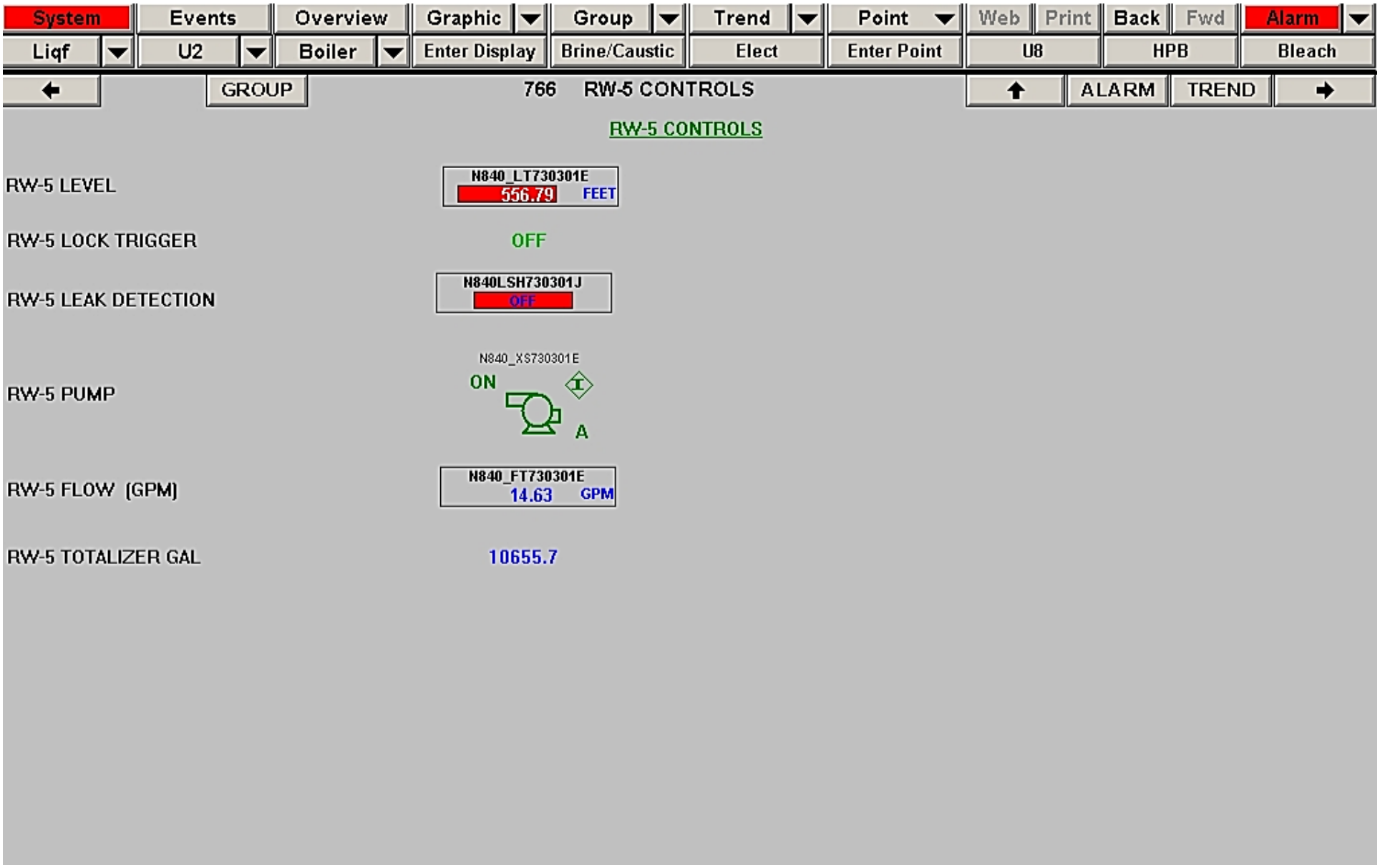
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
765 PR-4 CONTROLS
ALARM
TREND
PR-4 CONTROLS
PR-4 LEVEL
N840_LT730301F
554.32 FEET
PR-4 LOCK TRIGGER
OFF
PR-4 LEAK DETECTION
N840LSH730301K
OFF
PR-4 PUMP
N840_XS730301F
ON
A
PR-4 FLOW (GPM)
N840_FT730301F
1.38 GPM
PR-4 TOTALIZER GAL
930.0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Alarm
Liqf
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Boiler
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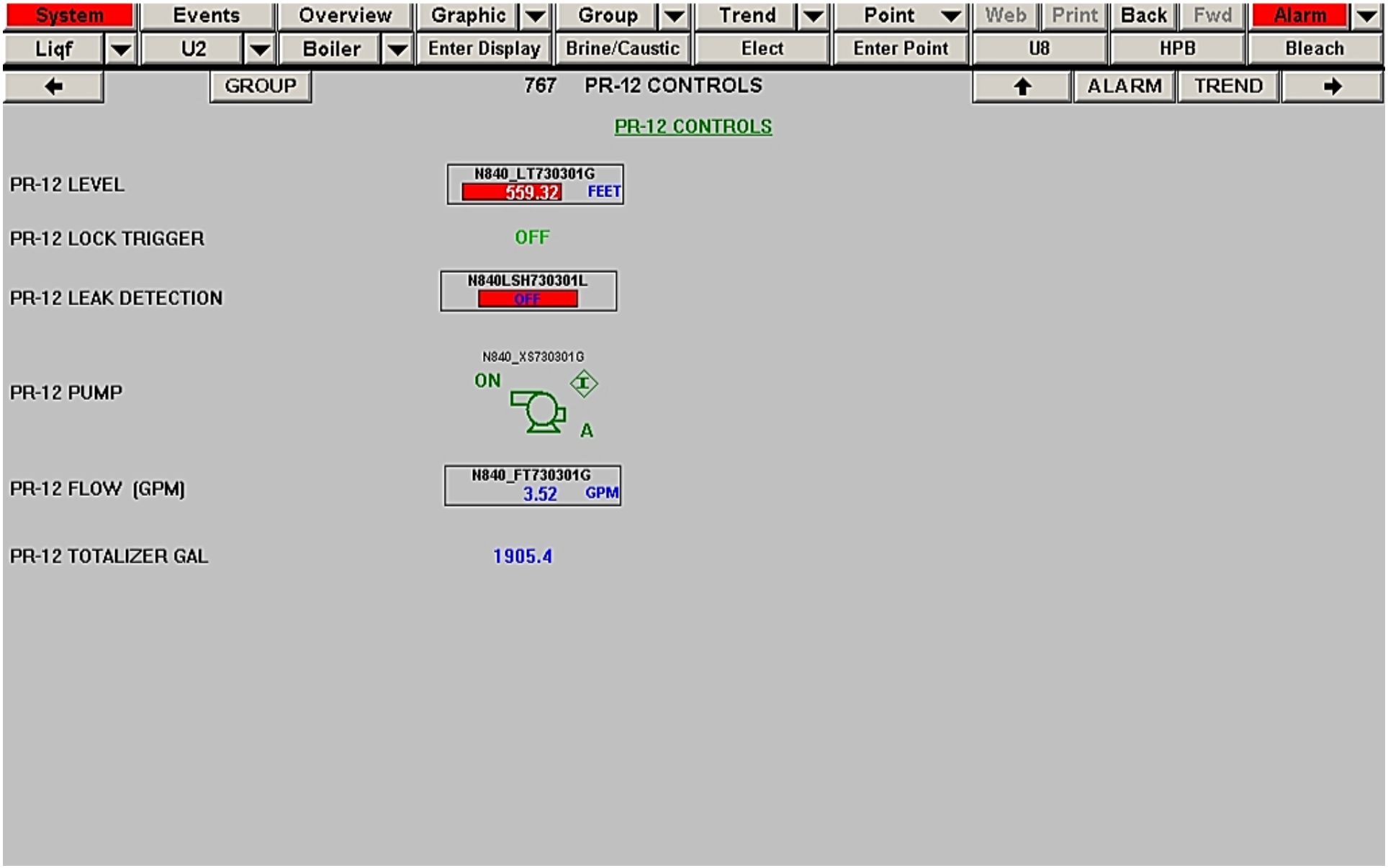
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
766 RW-5 CONTROLS
ALARM
TREND
RW-5 CONTROLS
RW-5 LEVEL
N840_LT730301E
556.79 FEET
RW-5 LOCK TRIGGER
OFF
RW-5 LEAK DETECTION
N840LSH730301J
OFF
RW-5 PUMP
N840_XS730301E
ON
A
RW-5 FLOW (GPM)
N840_FT730301E
14.63 GPM
RW-5 TOTALIZER GAL
10655.7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Alarm
Liqf
U2
Boiler
Enter Display
Brine/Caustic
Elect
Enter Point
U8
HPB
Bleach
GROUP
767 PR-12 CONTROLS
ALARM
TREND
PR-12 CONTROLS
PR-12 LEVEL
N840_LT730301G
559.32 FEET
PR-12 LOCK TRIGGER
OFF
PR-12 LEAK DETECTION
N840LSH730301L
OFF
PR-12 PUMP
N840_XS730301G
ON
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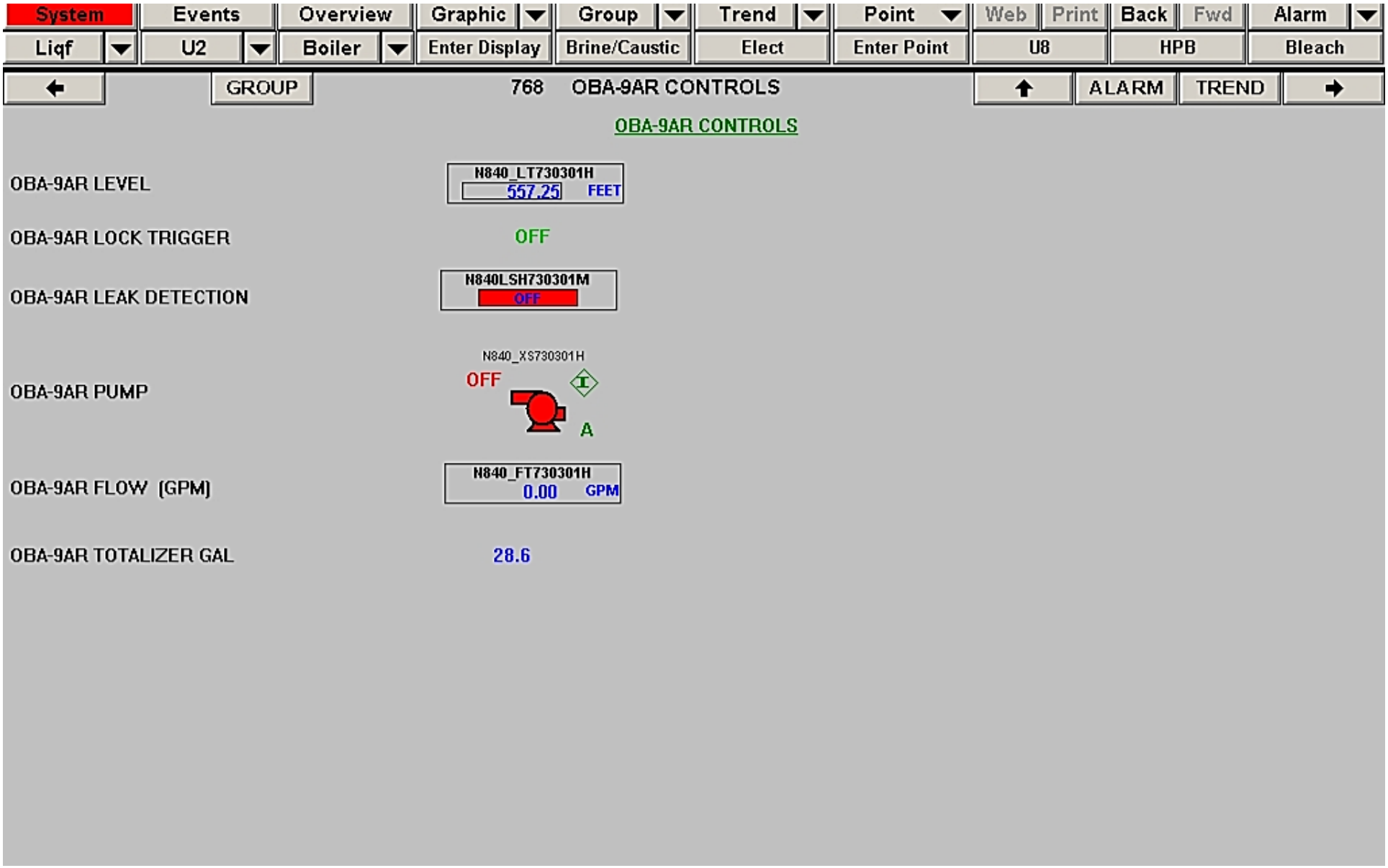
PR-12 FLOW (GPM)
N840_FT730301G
3.52 GPM
PR-12 TOTALIZER GAL
1905.4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HPB
Bleach
GROUP
768 OBA-9AR CONTROLS
ALARM
TREND
OBA-9AR CONTROLS
OBA-9AR LEVEL
N840_LT730301H
557.25 FEET
OBA-9AR LOCK TRIGGER
OFF
OBA-9AR LEAK DETECTION
N840LSH730301M
OFF
OBA-9AR PUMP
N840_XS730301H
OFF
A
OBA-9AR FLOW (GPM)
N840_FT730301H
0.00 GPM
OBA-9AR TOTALIZER GAL
28.6

System | Events | Overview | Graphic | Group | Trend | Point | Web | Print | Back | Fwd | Alarm

Liqf | U2 | Boiler | Enter Display | Brine/Caustic | Elect | Enter Point | U8 | HPB | Bleach

GROUP

769 SUMP/ AIR STRIPPER CONTROLS

ALARM | TREND

SPILL COLLECTION SUMP

SPILL SUMP HIHI LEVEL

N840LSHH730302
OFF

SPILL SUMP PUMP

N840_XS_730302
ON
A

EXISTING 7S SUMP

7S SUMP LEVEL

N840_LIC_2514
27.24 PCT

AIR STRIPPER

AIR STRIPPER

N840_XS_730401
ON
A

System | Events | Overview | Graphic | Group | Trend | Point | Web | Print | Back | Fwd | Alarm

Liqf | U2 | Boiler | Enter Display | Brine/Caustic | Elect | Enter Point | U8 | HPB | Bleach

GROUP

770 - PH ADJUSTMENT SYSTEM

ALARM | TREND

SULFURIC ACID SUPPLY

ACID TOTE LEVEL TRANSMITTER — N840_LIT730301 0.00 FEET

STAGE 1 PH ADJUST

ACID PUMP CONTROLLER — N840AIC730301B 7.38 PCT

STAGE 1 ACID FEED PUMP LOCK — OFF

STAGE 1 PH MIXER — N840_HS730302A ON A

STAGE 2 PH ADJUST

STAGE 2 PH TRANSMITTER #1 — N840AIT730301B 7.33 EU

STAGE 2 ACID FEED PUMP CONTROLLER — N840AIC730301A 7.39 PCT

STAGE 2 ACID FEED PUMP LOCK — OFF

STAGE 2 PH MIXER — N840_HS730302B ON A

STAGE 2 PH PROBE CHECK — N840_AY_730301B 7.33 EU

APPENDIX E

AIR STRIPPER MANUFACTURER INFORMATION

Operation & Maintenance Manual

STAT 180 Low Profile Air Stripper

CONTENTS

1.0 SAFETY PRECAUTIONS

Failure to observe these precautions could result in serious bodily injury and/or property damage.

- Be sure to read and understand this O & M manual before beginning operation. If you have any questions, please call Carbonair Environmental Systems, Inc. at (800) 526-4999.
- Be sure all electrical disconnects are "OFF" and locked out before servicing.
- Always wear gloves, eye protection & protective clothing when working with the equipment.
- Be sure the STAT is properly vented, has adequate air supply and the ducting between blower and STAT is fastened securely.
- The introduction of free-product into the STAT-180 is not recommended because it will adversely affect any nonmetallic materials and reduce system performance.
- Be sure to take proper precautions when lifting STAT trays.

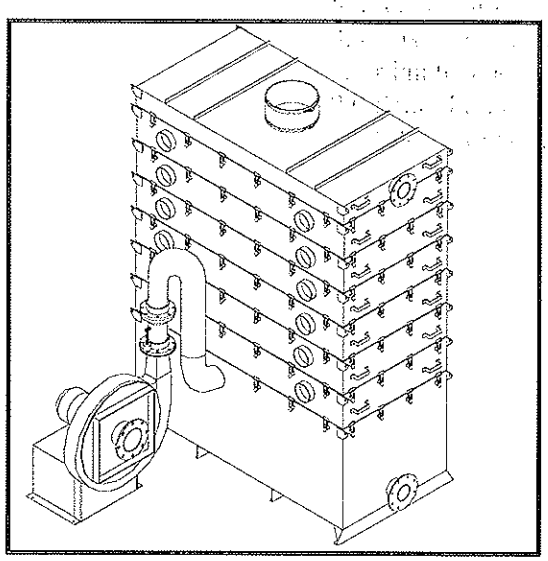


Figure No. 1
Typical STAT 180 Unit

2.0 EQUIPMENT DESCRIPTION

The STAT-180 is a low profile stainless steel air stripper with a modular design capable of accommodating from 1 to 6 aeration trays. The design allows the trays to be easily removed, cleaned and replaced with minimal downtime. The following table summarizes the specifications for the typical STAT-180 low profile air stripper.

Table No. 1 STAT-180 Specifications

Design Parameter	Specification
Tray Length	72 inches
Tray Width	36 inches
Tray Height	10 inches
Sump Height	34 inches
Demister Height	8 ½ inches
Overall Height (6 tray unit)	114 inches
Tray Weight	150 lbs.
Overall Weight (6 tray unit)	2,040 lbs.
Water Flow	10-200 gpm
Water Inlet	4" flange
Water Outlet (Gravity Drain)	6" flange
Water Outlet (Pump Out)	3" flange
Air Flow	900 cfm
Air Outlet	12" OD

The STAT-180 is equipped with the following standard system components:

- ✓ Gravity Drain Sump
- ✓ Sight Glass
- ✓ High Level Switch
- ✓ Aeration Trays
- ✓ Demister
- ✓ Blower
- ✓ Blower Damper Valve
- ✓ Low Pressure Switch

The STAT-180 can also be configured with the following optional components:

- ✓ Air Temperature Kit
- ✓ Air Flow Kit
- ✓ Water Flow Meter Kit
- ✓ Water Temperature Kit
- ✓ Sample Tap Kit
- ✓ Pump-Down Kit
- ✓ Pump-Down Collection Sump
- ✓ Level Control Kit
- ✓ Low, High, High-High Level Switches
- ✓ Blower Muffler Kit

3.0 PROCESS DESCRIPTION

Carbonair's STAT-180 air stripper is a sieve tray aeration unit and does not contain packing media.

In this technology the water and air are contacted in step-wise fashion through multiple trays. The water enters near the top and flows horizontally across each tray, over a weir, and through a downcomer to the tray below. A pressure blower provides air for the aerating process. The air enters the bottom of the unit and is forced through openings in the trays, bubbling through the water to form "an air/water froth", which provides extreme turbulence and excellent volatilization. The overall effect is a multiple counter-current contact of water and air, with each tray having a cross-flow of water opposing a vertical flow of air.

4.0 INSTALLATION

Be sure to carefully read all of the instructions before beginning the installation of the STAT-180 low profile air stripper.

4.1 Inspection

Upon receipt of the STAT unit, and before the unit is removed from the truck, be sure to inspect the system for damage to the shell, all the fittings, the inlet/outlet ports and other equipment. Structural damage to these items could compromise the integrity of the system. **DO NOT** operate the unit if it has been damaged since this could result in damage to other equipment or personal injury. If the STAT-180 low profile air stripper sustains damage during transit, notify the carrier and call Carbonair immediately at (800) 526-4999.

- ➢ ***If not notified immediately, Carbonair cannot warranty any shipping damage.***

4.2 Loading & Unloading

Be sure to follow proper safety procedures when loading and unloading the STAT unit.

The STAT-180 should be unloaded and placed by an appropriately sized forklift or lifting device operated by an experienced operator. A STAT-180 unit with six trays weighs approximately 2,040 lbs – excluding external piping, blower, pump, or skid.

The STAT-180 must be placed on a level concrete pad designed to handle the full operating load of the unit. The STAT base should be bolted to the concrete pad prior to initiating operation.

4.3 Connections

Assemble and mount all of the external piping, valves, and instrumentation after the STAT is in place. Make sure that the piping is adequately supported so that excessive load or torque is not placed on the unit fittings.

4.3.1 Mechanical Connections

1. Locate and anchor the STAT unit in an area which allows access to all sides of the unit. Shim as needed to make sure STAT unit is level.

2. Attach exhaust stack (or off gas downcomer if required). Avoid unnecessary restrictions in off-gas ducting. Ducting should be sized for minimal friction loss according to the STAT design air flow rate. When in doubt, ducting should match the size of the STAT air discharge.

3. Connect the influent water piping to the influent flange. We recommend installing a sampling valve in the influent piping and discharge piping. All interconnection piping should be self-supporting.

4. Connect the drain piping and install pump-down kit if supplied.

For gravity drainage, connect the effluent water discharge piping to the discharge flange. Discharge piping should be the same diameter as the effluent flange on the STAT unit, or larger.

IMPORTANT: ***STAT gravity discharge lines require a vacuum relief system. This will prevent any type of vacuum on the float valve on the interior of the STAT. Do not attempt to pump out a STAT sump intended for gravity drain. A simple vacuum relief system is a tee inserted in the discharge piping with a vertical pipe open to the atmosphere. The tee should be installed as close as possible to the STAT discharge connection.***

5. Locate and anchor the blower anywhere near the STAT air inlet tube, as long as the supplied ducting will reach from the blower discharge to the STAT inlet tube. Secure ends of the flex ducting with flexible connectors.

4.3.2 Electrical Connections

Make the following electrical connections, observing codes or restrictions (such as explosion-proof wiring) at your installation site:

1. Connect sump high level switch to control panel (if not already wired). The sump high level switch is located near the top of the sump sidewall. The switch can be set to operate either normally open or normally closed. We recommend the normally closed setting

2. Connect blower low pressure switch to controls (if not already wired). The blower low pressure switch is located either on the blower outlet pipe or on the blower stand. The blower low pressure switch has the following connections:

- ✓ Common
- ✓ Normally Open (closes on blower pressure)
- ✓ Normally Closed (opens on blower pressure)

3. For pump-down systems, a level control kit is provided in the sump sidewall. This control must also be wired (if not wired already) in order to control the discharge pump. The switch options are:

- ✓ Top (Red) ..... System Shutdown
- ✓ Middle (White) ..... Pump On
- ✓ Bottom (Black) ..... Pump Off

The high switch is N.C. and all others are normally open when the sump is empty.

5.0 START-UP

Upon completion of the system installation, checkout and startup of the unit can be initiated.

Before starting the unit, check the following:

1. Verify that the blower low pressure switch is calibrated before start-up. If blower low pressure switch does not operate as described in section 4.3.2, see the manufacturer's data sheet supplied to adjust the set point of the switch.

2. Bump the blower motor and verify proper rotation direction.

3. If a transfer pump is supplied, bump the transfer pump motor and verify proper rotation direction.

After the unit is checked-out, start up can be initiated to test system function prior to continuous operation. Whenever possible, it is advisable to use clean, fresh water for system start-up. This will eliminate possible discharge of contaminants if mechanical adjustments are required.

1. Verify that all the valves are positioned properly.

2. Start the STAT blower. It is important to start the blower first to ensure that contaminated water is treated immediately upon entering the STAT unit.

3. Start the flow of clean water to the unit.

Stripping starts immediately as the downcomer blocking valve forces air into the processing area of each tray, preventing air from passing upward through the water downcomer.

As the flow is initiated, water enters the top of the unit at the demisting section and is directed into the top tray. The water flows over the weir and gravity flows across each successive tray in a serpentine pattern.

If the STAT unit is not equipped with a transfer pump, the water accumulates in the sump section and then gravity drains to the discharge point through the mechanical float valve. The mechanical float valve prevents pressurized air from escaping through the effluent connection.

If the STAT unit is set up for pump-out operation, a mechanical float valve is not used.

4. Immediately start the transfer pump (if supplied) to remove the treated water from the STAT sump.

5. Check the system for leaks at the seams. (Leaks are more likely to occur at corners and on the lower trays.)

6. Check system pressures and equipment temperatures. Verify that the operating parameters are within equipment design specifications.

*Sump pressure should never exceed 45" w.c. under normal conditions.

7. Measure the water and air flows through the unit.

8. Check the pressure drop across the trays and compare with the pressure drop chart in Section 10. Verify that the pressure drop is within system design guidelines.

9. Adjust air flows to 900 cfm.

Air Flow Adjustment and Measurement
This STAT unit is designed to operate at 900 cfm. The blower air flow rate is not preset at the factory. Varying field conditions and the sensitivity of air damper valve require that the valve be set to field conditions. Improper adjustment of the valve can lead to excessive water carry over in the exhaust stream as well as a lowered stripping efficiency.

To adjust the STAT operating air flow rate, first turn on the STAT blower and begin to introduce water into the system at the design flow rate. (Note: You must have a means of measuring the water flow rate (flow meter) on the influent line, down stream of any pumps). Once the system is accepting water at the operating flow rate note the measured air flow rate using the air flow kit. If the measured air flow rate is above or below the specified 900 cfm air flow rate, you must adjust the air flow using the damper on the blower exhaust.

Note: You must periodically check and adjust the air flow during the operation of the system. Conditions may change (like increase or decrease in water flow rates, addition of down stream air treatment technologies or fouling of the air stripper) that will increase or decrease back pressure in the blower and cause the air flow rate to deviate from the design flow rate.

6.0 OPERATION

When STAT is operating within its parameters, a base line pressure drop should be established. This can be monitored during operation for maintenance purposes. Your STAT system should be supplied with the proper blower for overcoming the total pressure drop through the system. If adding gas phase carbon adsorption to the off-gas of a STAT unit previously operated with atmosphere discharge, contact Carbonair to determine if the current blower/ducting configuration will be adequate. Once the system has been tested with fresh water, proceed with treating contaminated water.

7.0 TROUBLE SHOOTING

There are a few situations that may arise while operating the STAT-180 which can adversely effect the performance of the unit and/or result in abnormally high maintenance costs. If these situations cannot be resolved using the following trouble shooting guide, contact Carbonair at (800) 526-4999 for additional help.

1. Situation:
Excessive condensate or foam is noted leaving the exhaust of the STAT.

Probable Causes:
There are two main items that can cause water carry over into the exhaust:

a. Air flow rate that is in excess of the rated air flow of unit.

b. Surfactants in the water such as soaps, detergents and other organic compounds may cause a stable bubble froth to form and accumulate in the unit.

Solutions:
a. Measure the air/water flows and compare with the design water and air flow rate of the system. If air flow is excessive, the flow should be adjusted to design conditions.

b. It may be necessary to add a defoaming agent to influent water of the STAT. This agent will prevent stable bubble formation and allow the STAT to operate properly. Contact Carbonair at (800) 526-4999 for information on defoaming agents.

2. Situation:
The pressure drop across the trays is higher at initial start-up than it should be according to the pressure drop chart in Section 10.

Probable Causes:
If this occurs, the flow of air through the tray holes is restricted. The most common causes for this pressure drop build up are:

a. Sediment/solids in the water stream have clogged the holes in the aeration trays.

At initial start-up, sometimes there can be an excessive amount of solids introduced into the system from the well(s). Eventually, these solids are removed from the well(s) and cleaner ground water is produced.

b. The flow of air through the STAT unit is greater than the system design specifications.

c. The flow of water through the STAT unit is greater than the system design specifications.

Solutions:
a. Measure the air/water flows and check the pressure drop curve to determine the design pressure drop and compare with the actual pressure drop.

b. If the flows are in excess of design specifications, adjust flow accordingly.

c. If process flow adjustments have no effect, clean out the STAT unit and develop the well(s) further before introducing flow to the STAT unit.

3. Situation:
Deteriorating treatment performance.

Probable Causes:
Treatment performance can deteriorate for a number of reasons including:

a. Inadequate air/water ratio resulting in poor volatilization of organic components.

b. Influent contaminant concentrations higher than initial design parameters.

c. Influent contaminant components different than initial design parameters.

d. Aeration tráys have become fouled.

Solutions:
a. Verify that the system flows are within the design specifications.
b. Verify that the air/water ratio is within design specifications.

c. Clean the STAT trays.

d. Conduct influent analyses to verify initial design parameters - components and concentrations.

e. Call Carbonair for assistance if operating parameters have changed - system modifications may be necessary.

4. Situation:
The STAT sump high level alarm frequently trips due to high sump level conditions.

Probable Causes:
If the sump high level alarm trips, it means that the water is not being removed as quickly as it is accumulating in the sump. This could occur for the following reasons:

a. The transfer pump has failed.

b. The influent water flow rate exceeds the effluent drainage or pumping capacity.

c. The drain piping is not sufficiently sloped to adequately drain the sump.

d. The effluent piping or effluent pump impeller is plugged.

Solutions:
a. Verify that the transfer pump is operating properly.

b. Measure the influent flow rate and check the effluent drainage design to determine if the influent flow rate exceeds the effluent drainage system capacity.

c. If the flow rate is within design specifications, clean the effluent piping to clear any blockages.

8.0 MAINTENANCE

There are several maintenance tasks which must be performed periodically to ensure continued, trouble free operation. These tasks are discussed in subsequent sections.

8.1 Disassembly/Cleaning

Read all installation instructions before beginning disassembly.

1. Prior to disassembly of unit, turn off influent pump and allow blower to operate for a few minutes. This will allow contaminated water within aeration plates to be treated as the unit drains.

2. When effluent flow has completely stopped, turn off blower and turn main power disconnects to the off position and lock them out. Be sure that STAT is completely drained by removing plug at the bottom of the sight glass.

3. Remove caps from inspection/cleaning ports.

4. Inspect interior of trays and sump to determine the extent of fouling/sediment build up in the trays and sump.

5. If cleaning is necessary, a pressure washer with a rotating head may be used loosen and flush inorganic, biological, and or sediment build up from the trays and sump.

6. After pressure washing through ports, re-inspect trays and sump. If cleaning was successful, replace caps and restart STAT unit. If addition cleaning is required, continue disassembling the unit.

7. Disconnect and remove air discharge stack or ducting from top of unit. This procedure may not be necessary if space permits removal of the demister section with stack attached.

8. Disconnect the influent piping. Make sure loose influent piping is adequately supported.

9. Before and during disassembly, it is important to note the placement of the aeration trays. Taking time to familiarize yourself with the STAT unit will make reassembly faster and easier.

Alignment of buttons on trays, sump and demister should be noted. Proper assembly of STAT requires alignment of buttons shown in Figure No. 2.

10. The unit must always be disassembled piece by piece from the top down. It is recommended that removed pieces be set on wooden supports, such as a pallet, to avoid damage to the gasket sealing surfaces and clips.

Starting with the demister section, unfasten the lever-lock clips and lift off the demister section.

11. Each section must be raised a few inches prior to moving piece horizontally.

12. Paying special attention to the placement of each aeration tray, remove each tray until only the sump section remains. Again, make note of proper alignment of buttons.

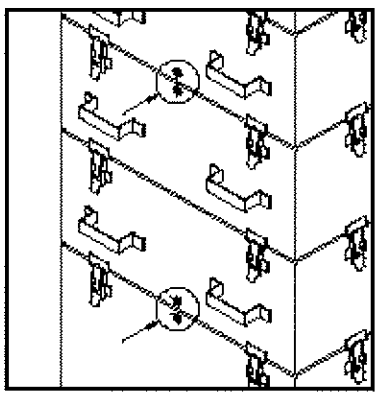


Figure No. 2
Proper Alignment of STAT Buttons

13. Once all aeration trays are removed, check the integrity of the gasket material.

14. Any fouling buildup on the trays may be cleaned using a pressure washer or may be scraped out. Use caution not to damage the flapper valve or gasket material when cleaning. Holes smaller than 3/16" indicate fouling.

15. When cleaning the demister section and aeration trays, be careful not to damage gaskets. The mist eliminator pad may have to be cleaned with water pressure or muriatic acid. If this is unsuccessful, the pad must be replaced. Fouling in the demister can cause excessive back pressure of the system.

16. The sump section should be cleaned in the same manner. Check the float valve gravity flow system in the sump section (if supplied) for plugging and material deterioration. Check each tray downcomer valve for scale and bacteria build-up. Clean if necessary.

17. Prior to reassembly, make sure the areas that mate with the gasket material are clean and free of foreign matter.

8.2 Reassembly

1. To reassemble the unit, follow the disassembly instruction in reverse order. A coating of silicone grease in the corners before reassembly will act as an inert gasket sealant and lubricant. DO NOT use any other material for gasket sealant, as it may affect the operation of the STAT unit. If silicone grease or gasket material is not available, contact Carbonair for supplies. Keep in mind that each piece MUST be put back in the same position and orientation as before disassembly. Improper assembly could cause malfunction or damage to the STAT unit. Refer to Figure No. 2 for button alignment.

2. Connect all inlet and outlet piping, discharge stacks, etc., prior to restarting unit.

3. Whenever possible, use clean, fresh water for system testing after reassembly. Start the blower first. Once blower is operating, start influent pump(s) or water flow.

4. After starting the influent pump(s), check for leaks throughout the system.

Refer to Section 5.0 Startup for full startup procedure.

8.3 Gasket Replacement

STAT Preparation

1. Disassemble STAT (see Section 8.1 of STAT Operations & Maintenance Manual).

2. Remove the old gasket and adhesive. Use a sharp putty knife to scrape off gasket and adhesive debris. Remove old adhesive and silicone using mineral spirits and then hot water and soap. Tray surfaces must be clean before the new gasket is installed.

Replacement Procedure

1. Avoid stretching the gasket while handling it. Place the new gasket in a clean STAT tray.

2. Install the new gasket, beginning at one corner and working around to all sides of the tray. If the gasket appears to be to long, distribute it back towards the fitted corner. You may need to trim the outside gasket lip in some areas to avoid clips or lifting lugs. DO NOT ALTER THE GASKET LENGTH.

Note: The gasket may start to pull itself off before the entire gasket is in place. If this happens, try to fasten the corners in place as you go around. A small dab of Super Glue, clothespins, or tape may be used every two feet to hold the gasket in place on the tray. Once the entire gasket is in place, the pins or tape can be removed and the gasket should remain in place on its own.

4. Apply a thin layer of silicone grease to the corners of the gasket and the corners of the tray under the gasket. This helps to create a better seal between the gasket and the tray above.

5. Reassemble STAT (See Section 8.2 of STAT Operations & Maintenance Manual).

6. Begin operation of STAT with clean water and check the system for leaks.

8.4 Maintenance Schedule

The following is the recommended maintenance schedule for the STAT unit.

Table No. 2
Recommended Maintenance Schedule

Parameter	Recommended Frequency
Sump Pressure	Weekly
Air Flow Rate	Weekly
Sump/Tray Inspection	Weekly
Water Flow Rate	Weekly
Blower Amp Draw	Monthly
Pump Amp Draw	Monthly
Low Pressure Alarm Switch Operation	Monthly
Level Switch Operation	Monthly
Gasket Inspection	Yearly
Demister Pad Inspection	Yearly

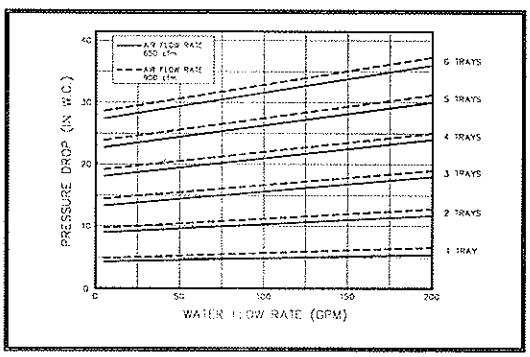
The frequency listed is provided as a guideline for maintenance. The actual frequency may be more or less frequent depending on site specific conditions.

9. SPARE PARTS

When ordering spare parts, refer to the drawings at the end of this manual. Be sure to provide the unit model number and the complete description of the part.

10.0 PRESSURE DROP CHART

The following is the pressure drop chart for the STAT 180 air stripper.



11.0 DRAWINGS

An assembly drawing has been included to simplify the part identification and ordering process.

Table No. 3
Low Profile Air Stripper Parts List

Number	Description
1	Sump
2	Float Rod
3	Float Ball
4	Stainless Steel Screw
5	Valve Drain Plate
6	Flapper Valve
7	Gasket
8	Aeration Tray
9	Demister Pad
10	Demister Section
11	Plastic Cable Tie
12	Downcomer Valve
13	Hex Lock Nut
14	Flexible Coupling
15	PVC Elbow
16	PVC Duct
17	Sight Glass with Level Controls (Pump Out)
18	Sight Tube with High Level Alarm Switch (Gravity Drain)
19	Air Temperature Gauge (Optional)
20	Water Flow Meter (Optional)
21	Water Temperature Gauge (Optional)
22	Sample Valve (Optional)
23	Transfer Pump and Associated Piping (Optional)
24	Blower Inlet Silencer
25	Air Flow Meter
26	Blower
27	Blower Low Pressure Alarm Switch

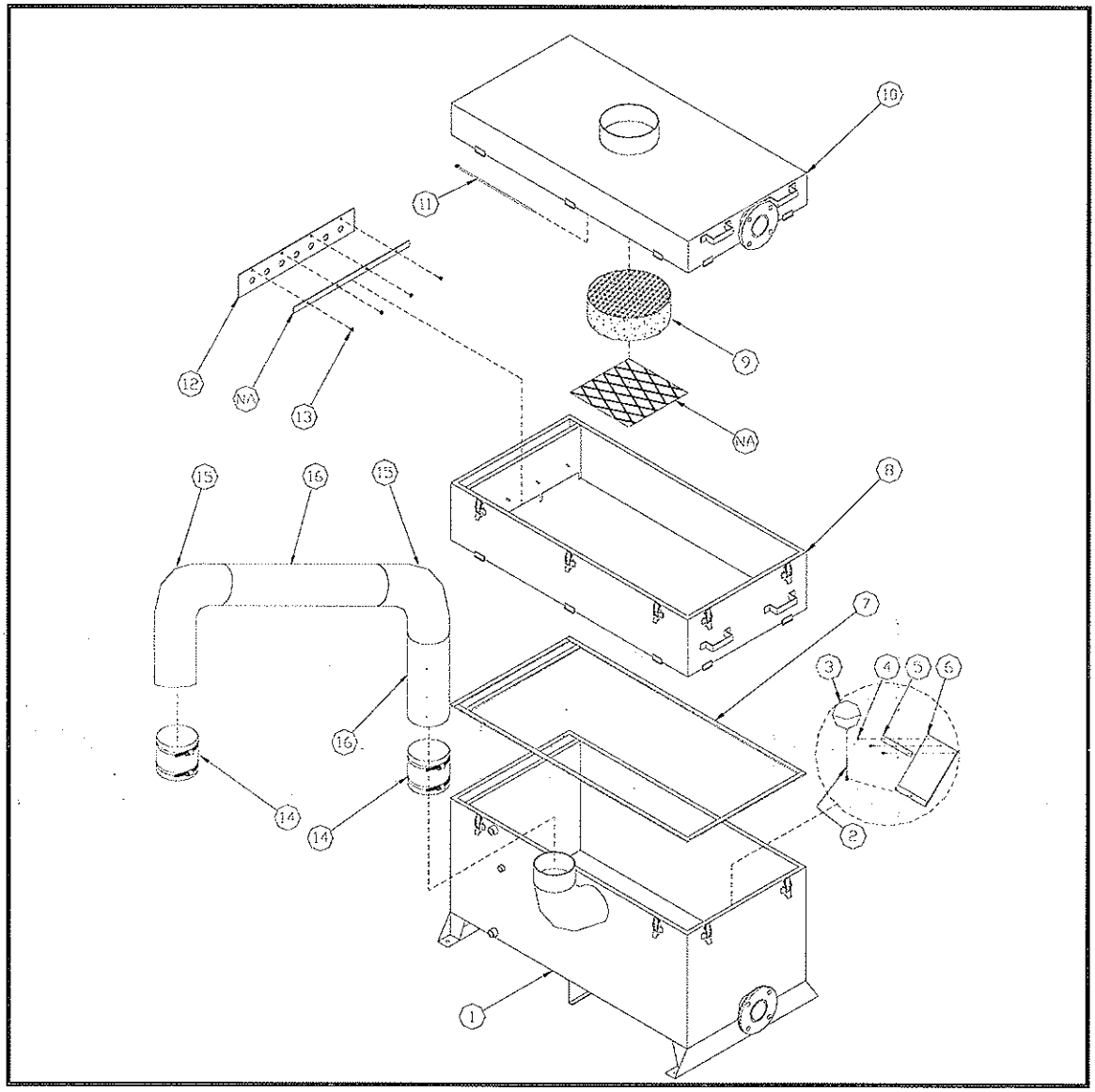


Figure No. 7
STAT-180 Low profile Air Stripper - Assembly Drawing No. 1

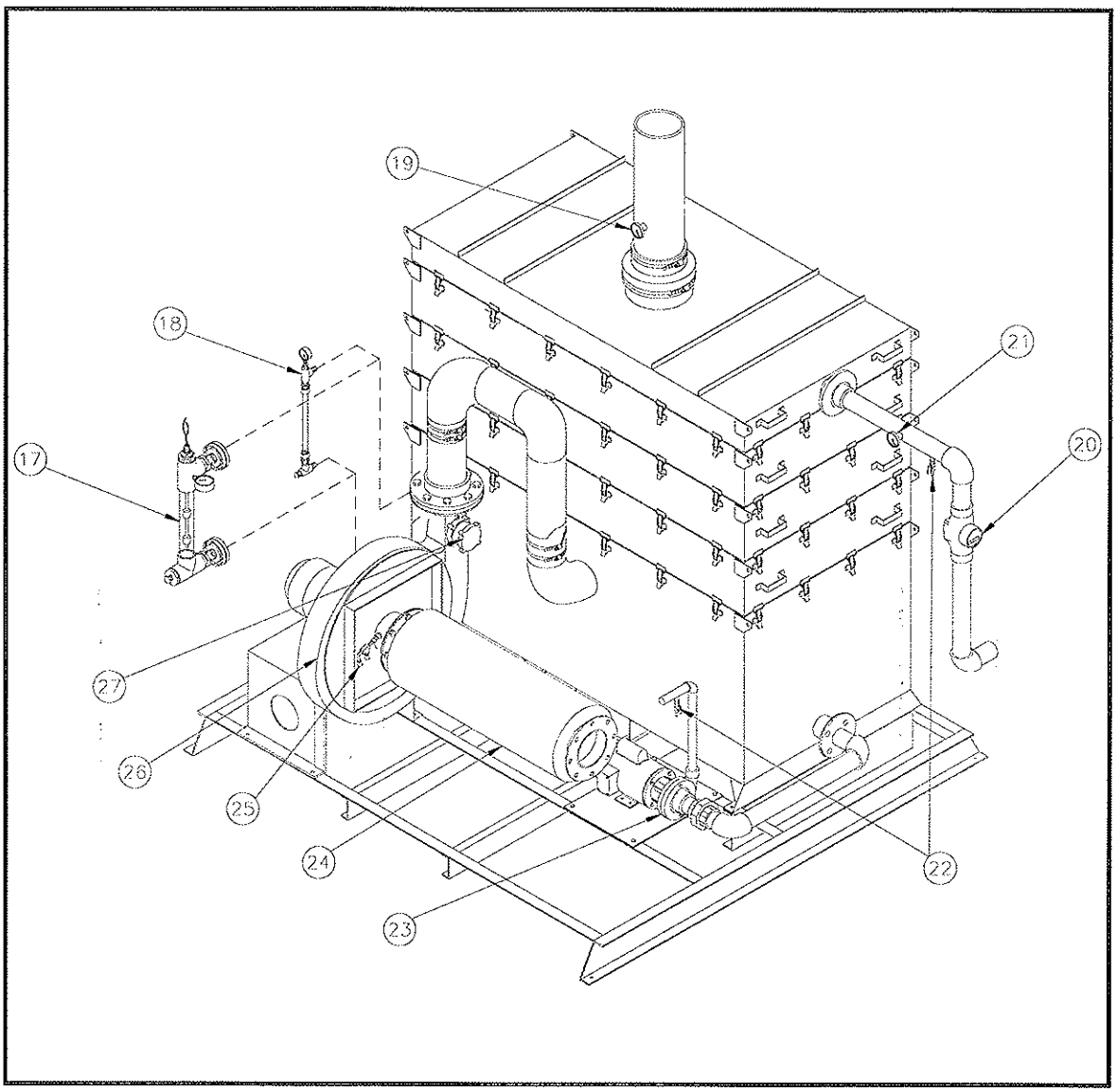
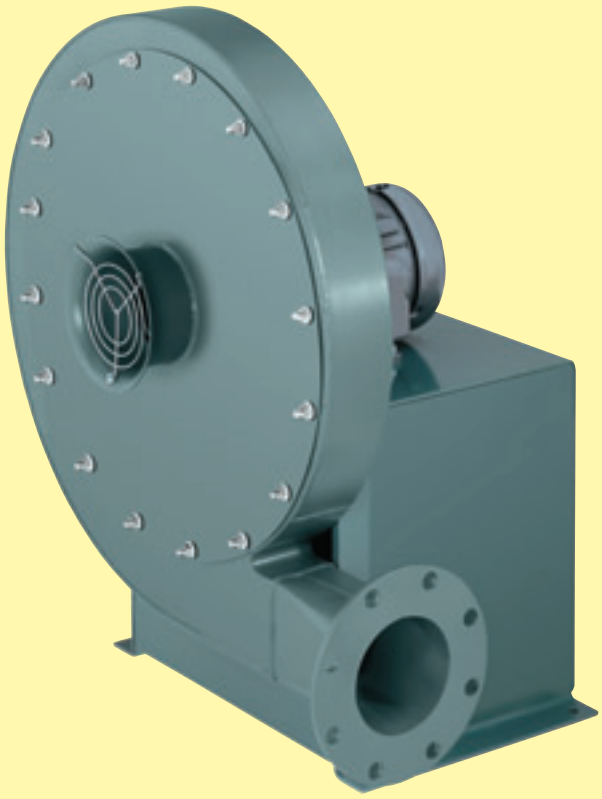


Figure No. 8
STAT-180 Low Profile Air Stripper - Assembly Drawing No. 2

BULLETIN 451
MARCH, 2005

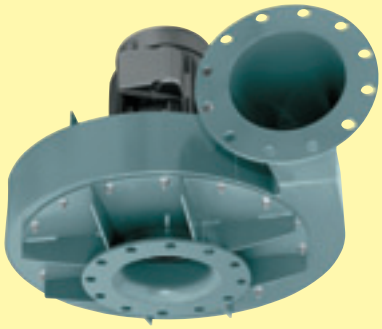
PRESSURE BLOWERS

- Capacities to 5200 CFM
- Two wheel choices
- Static pressures to 58"WG
- Temperatures to 600°F.



ARRANGEMENT 4

ARRANGEMENT 10



ARRANGEMENT 4-V

ISO 9001 CERTIFIED

THE NEW YORK BLOWER COMPANY®

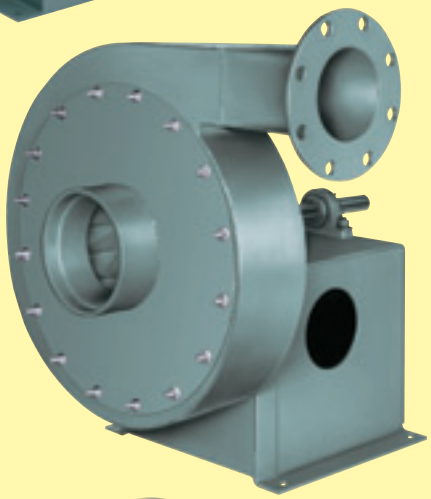
7660 QUINCY STREET—WILLOWBROOK, ILLINOIS 60527-5530
PHONE: [630] 794-5700 • FAX: [630] 794-5776 • E-MAIL: nyb@nyb.com
Visit us on the Web: http://www.nyb.com

For greater pressures and capacities: see Type HP Pressure Blowers

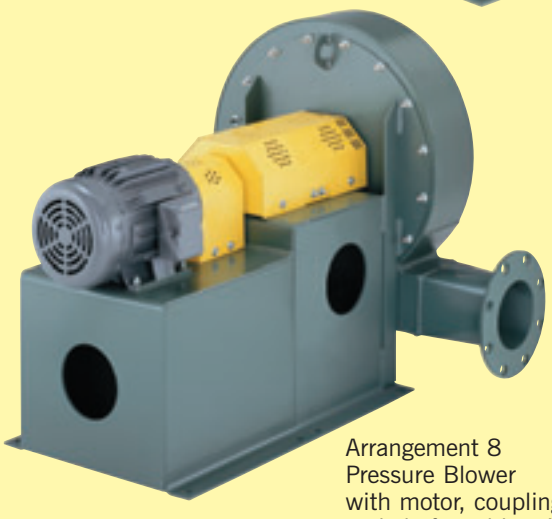
PRESSURE BLOWERS

...for process systems

Arrangement 4
Pressure Blower
with motor.



Arrangement 1
Pressure Blower
with plain pipe
inlet.



Arrangement 8
Pressure Blower
with motor, coupling guard,
and shaft and bearing guard.

amca CERTIFIED RATINGS AIR PERFORMANCE AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. ®

The New York Blower Company certifies that the Pressure Blowers shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

DESIGN FEATURES

- Pressures to 58"WG.
- Capacities to 5200 CFM.
- Stable performance . . . the pressure curve remains stable from wide-open to closed-off . . . fan instability, or pulsation, is eliminated even when "turn-down" approaches zero flow.
- Choice of wheel designs . . . standard aluminum wheel for optimum efficiency or optional steel wheel for more rugged applications.
- Efficiency . . . advanced wheel and aerodynamic housing design combine for air-handling efficiency superior to conventional radial-wheel designs.
- Variable wheel diameters and a choice of six outlet sizes enable efficient fan selection across a wide range of volumes and pressures.
- Choice of arrangements . . . direct-drive and belt-drive.
- Wide application range . . . designed for continuous operation in combustion, cooling, conveying, drying, and various process systems.

CONSTRUCTION FEATURES

- All-welded steel housings . . . heavy-gauge housings are designed to prevent "flexing" at high pressures.
- Flanges . . . continuously welded flanges match ANSI Class 125/150 hole pattern.
- Balance . . . all wheels are precision-balanced prior to assembly . . . fans with motors and drives mounted by **nyb** are given a final trim balance check at the specified running speed.
- Shafting . . . straightened to close tolerance to minimize "run-out" and ensure smooth operation.
- Inlet configuration . . . a choice of three inlet types allows units to be tailored to specific application requirements.
- Lifting eyes . . . standard on all units for ease of handling and installation.
- Finish . . . medium-green industrial coating.

ACCESSORIES/MODIFICATIONS

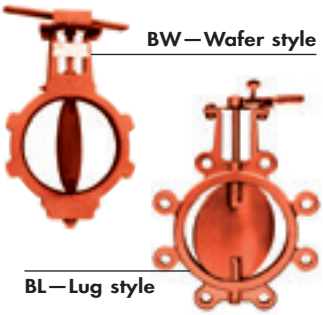
- **COMPANION FLANGES**
  Designed to fit flush with fan inlet and outlet flanges, provided with a matching hole pattern.

- **DRAINS**
  Tank flange is welded to the lowest point of the housing scroll . . . female pipe thread.

- **INLET FILTER**
  Filters are available with a choice of three element types: wire mesh, hi-flow polyester, and ultra-synthetic. High-efficiency filter is flange-mounted. Furnished standard with outboard support bracket and available with or without protective hood.

- **SILENCERS**
  Available to match standard inlet or outlet flange sizes. Heavy-welded construction filled with high-density, acoustical absorption material.

- **OUTLET DAMPERS**
  Available as either an integral outlet design for fixed damper control or a separate wafer design for variable-flow applications [shown]. Wafer damper is available with optional actuator and positioner.



- **SHAFT SEALS**
  Ceramic-felt shaft seals consist of compressed ceramic felt elements. Lubricated lip seals [Buna, Teflon®, and Viton®] and gas-purgeable, segmental bushing seals are also available. See your **nyb** representative for availability.
  [Teflon and Viton are registered trademarks of DuPont and DuPont Dow Elastomers, respectively.]

- **ACCESS DOOR**
  Gasketed, flush-bolted door opens to provide access to wheel.

- **HEAT-FAN CONSTRUCTION**
  Available on Arrangements 1, 8, and 10 steel wheel Pressure Blowers up to 600°F. Modifications include shaft cooler and shaft-cooler guard.

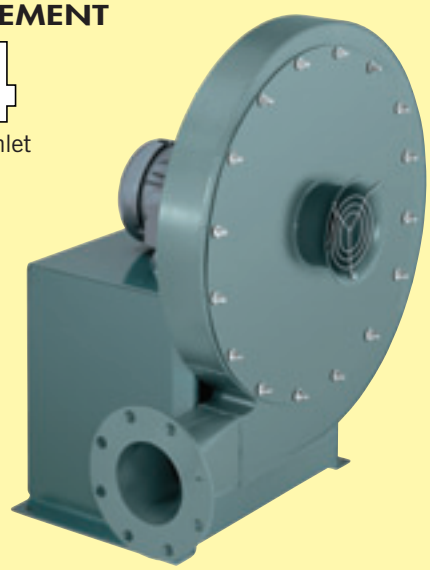
- **LL-1 LOW LEAKAGE CONSTRUCTION**
  Special construction to minimize leakage includes lip-type shaft seal, non-rotatable housing with solid drive side, double studs, and neoprene gasketing. Maximum temperature 200°F. due to gasketing limitations. Not available with heat-fan construction. See your **nyb** representative for other options.

- **SPECIAL ALLOY CONSTRUCTION**
  Airstream components can be constructed of a wide range of alternate alloys for corrosive applications.

- **UNITARY BASE**
  Arrangement 1 fan, motor, and guards can be mounted and shipped on a rugged, structural-steel base. Factory-assembled and run-tested prior to shipment.

ARRANGEMENT 4

with Venturi inlet and motor.

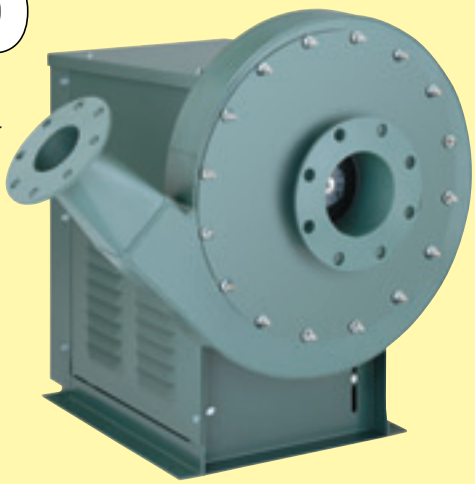


ARRANGEMENT 8

with Venturi inlet, shaft and bearing guard, coupling guard, and motor.

ARRANGEMENT 10

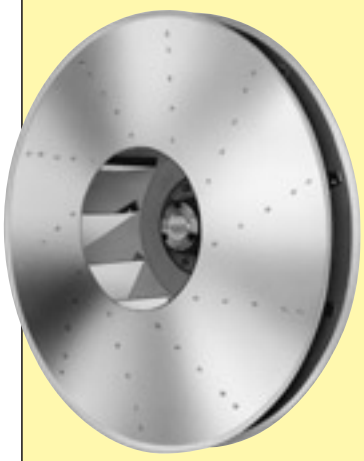
with flanged inlet and optional weather cover/belt guard.



Wheels

Standard Aluminum

The unique Aluminum Pressure Blower wheel is designed to provide efficient performance and reduced sound levels . . . the dual-taper design concept on all but the narrowest wheel sizes yields typical efficiencies up to 10 percentage points greater than conventional straight radial wheels. Riveted high-strength aluminum alloy blades and side plates minimize overhung wheel weight and starting inertia. Ductile-iron, taper-lock hubs make wheels easily removable.



Optional Steel

Either welded steel or stainless-steel wheel construction is available in straight radial design. AMCA Certified Ratings Seal applies to Pressure Blowers with aluminum-wheel design only. Air volume and pressure capabilities are the same as the dual-taper aluminum wheel, but brake horsepower requirements are typically higher. Refer to The New York Blower Company's fan-selection program for details.

Note: Some fan-and-motor combinations with steel wheels may be restricted due to starting torque requirements. Consult **nyb**.

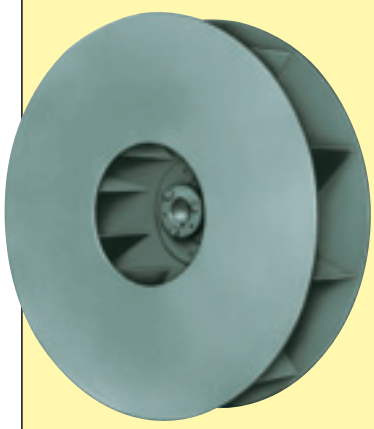


Chart I
Maximum Safe Speeds [RPM]†

Wheel diameter	Aluminum wheel	Steel wheel	
	All Arr.	Arr. 1, 4, 4-V, 8	Arr. 10
14	4000	4000	4000
15	4000	4000	4000
16	4000	4000	4000
17	4000	4000	4000
18	4000	4000	4000
19	3900	3900	2992
20	3900	3900	2918
21	3900	3900	2851
22	3900	3900	2787
23	3800	3800	3178
24	3800	3800	3121
25	3800	3800	3068
26	3800	3800	3017

† derate for temperature not required.

Chart II
STEEL WHEEL HORSEPOWER CORRECTIONS

18″ Pressure Blower with 04 outlet to handle 400 CFM at 23½″SP at .075 lbs./ft.³ density. Aluminum wheels require 2.6 BHP as shown on page 7. Steel or stainless-steel wheels require [1.15 x 2.6] 3.0 BHP.

Outlet size	Wheel size	BHP correction factors
03	14 to 22 23 to 26	0.96 1.02
04	14 to 26	1.15
06	14 to 18 19 to 26	1.06 1.15
08	15 to 22 23 to 26	1.06 1.15
10	19 to 26	1.06
12	23 to 26	1.06

Spark-Resistant Construction [SRC]

Intended to minimize the potential for any two or more fan components to generate sparks within the airstream by rubbing or striking during operation.

The following types are available:

AMCA A [AIRSTREAM] SRC

To include all airstream parts constructed of a spark-resistant alloy . . . maximum temperature: 200°F.

AMCA B [WHEEL] SRC

To include the fan wheel constructed of a spark-resistant alloy and a buffer plate around the housing shaft-hole opening . . . maximum temperature: 200°F.

SAFETY EQUIPMENT

Safety accessories are available from **nyb**, but selection of the appropriate devices is the responsibility of the system-designer who is familiar with the particular installation, or application, and can provide for guards for all exposed moving parts as well as protection from access to high-velocity airstreams. Neither **nyb** nor its sales representatives is in a position to make such a determination. Users and/or installers should read "Recommended Safety Practices for Air Moving Devices" as published by the Air Movement and Control Association International, Arlington Heights, Illinois.

PERFORMANCE

USING PERFORMANCE CURVES

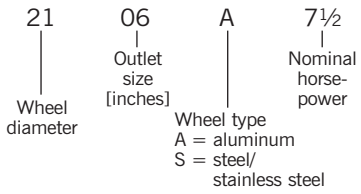
Performance is shown according to outlet sizes for quick reference to duct diameter. Brake horsepower increments are identified on each curve. Recommended standard blower size and motor combinations, which are based on the most efficient area of operation, are listed on page 12 for Arrangements 4 and 8, and on page 15 for Arrangement 4-V. Nonstandard combinations are generally available, but are usually less efficient than the standard combinations.

SIZING NOMENCLATURE

7-digit model number designates the wheel diameter, outlet size, wheel type, and nominal motor horsepower.

Note: the last two digits showing motor horsepower are not required for Arrangement 1 Pressure Blowers.

EXAMPLE



PROCEDURE	STEPS	EXAMPLE
Determine the appropriate outlet size.	1	The 06 outlet is selected for 800 CFM at 32″SP.
Plot the CFM and SP [standard] and select a performance curve for the fan size that meets or slightly exceeds the required performance.	2	A Size 2106A will provide 800 CFM at 33.6″SP.
Determine the BHP required for the point of operation . . . see page 4 for steel or stainless-steel wheel factors.	3	2106A requires 6.3 BHP. 2106S requires 7.2 BHP [6.3 x 1.15].
Read to the right to select motor horsepower.	4	A 7½ HP motor will cover both wheel types.

Note: The horsepower coverage of a given motor will increase 15% when a 1.15 service factor motor is utilized.

CORRECTION FACTORS

Performance is based on actual cubic feet per minute [ACFM] at the blower inlet at standard density [.075 lbs./ft.^{3}] and static pressure at the blower outlet. Static pressure capabilities are shown in inches water gauge [″WG].

Air density corrections are necessary for proper selection when air density varies from the standard .075 lbs./ft.^{3} at 70˚F. at sea level. This also occurs when negative static pressure exists [rarefication] on the inlet side of the fan. Multiply the required static pressure at conditions by the appropriate factors in Charts III, IV, and V to obtain corrected pressure for blower selection. Pressure and BHP will be reduced at conditions by the inverse of these factors. Multiply one factor by the other if temperature, altitude, and rarefication are non-standard. For example: If the installation is located at an altitude of 4000 feet, the gas temperature is 300°F., and the inlet pressure is –40″WG, the correction factor is 1.84 [1.16 x 1.43 x 1.11].

CHART III
ALTITUDE [ft.] CORRECTIONS

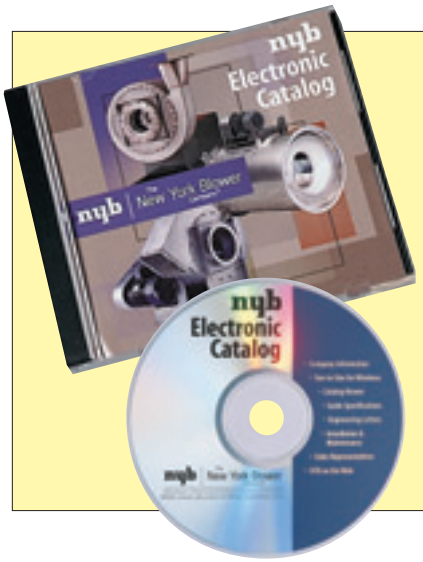
Alt.	Factor
0	1.00
500	1.02
1000	1.04
1500	1.06
2000	1.08
2500	1.10
3000	1.12
3500	1.14
4000	1.16
4500	1.18
5000	1.20
6000	1.25
7000	1.30
8000	1.35
9000	1.40
10000	1.45

CHART IV
TEMPERATURE CORRECTIONS

Temp.˚F.	Factor
0	.87
20	.91
40	.94
60	.98
70	1.00
80	1.02
100	1.06
120	1.09
140	1.13
160	1.17
180	1.21
200	1.25
300	1.43
400	1.62
500	1.81
600	2.00

CHART V
RAREFICATION CORRECTIONS

Neg. inlet pressure ″WG	Factor
15	1.04
20	1.05
25	1.07
30	1.08
35	1.09
40	1.11
45	1.12
50	1.14
55	1.16
60	1.17
65	1.19
70	1.21
75	1.23
85	1.26



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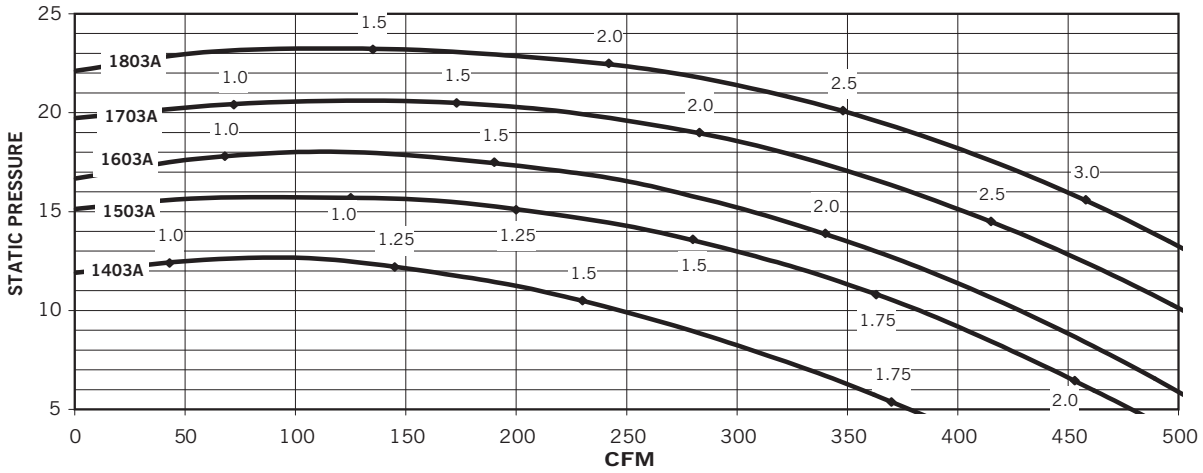
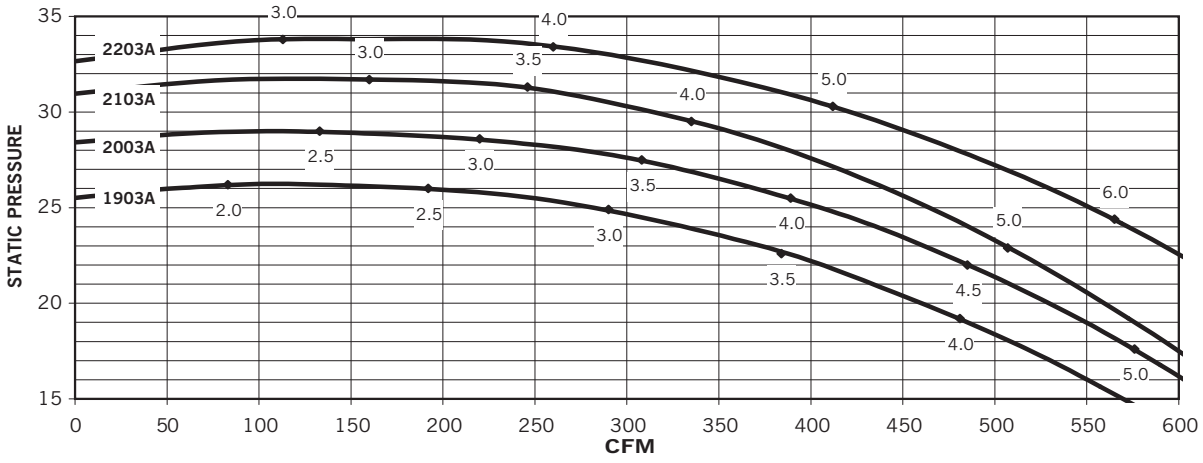
Performance at 3500 RPM

Aluminum Wheel
Pressure Blower

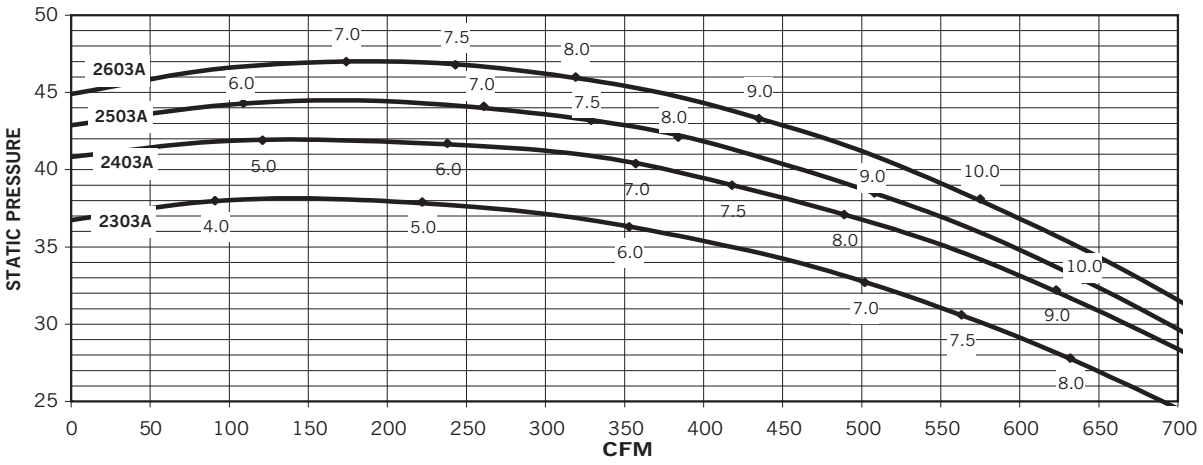
1403A-1803A



1903A-2203A



2303A-2603A

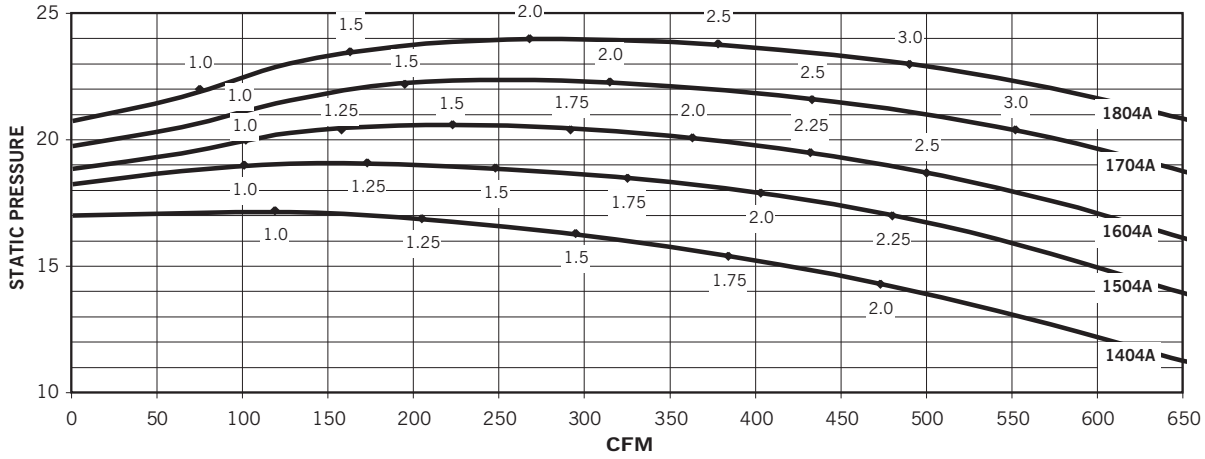


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

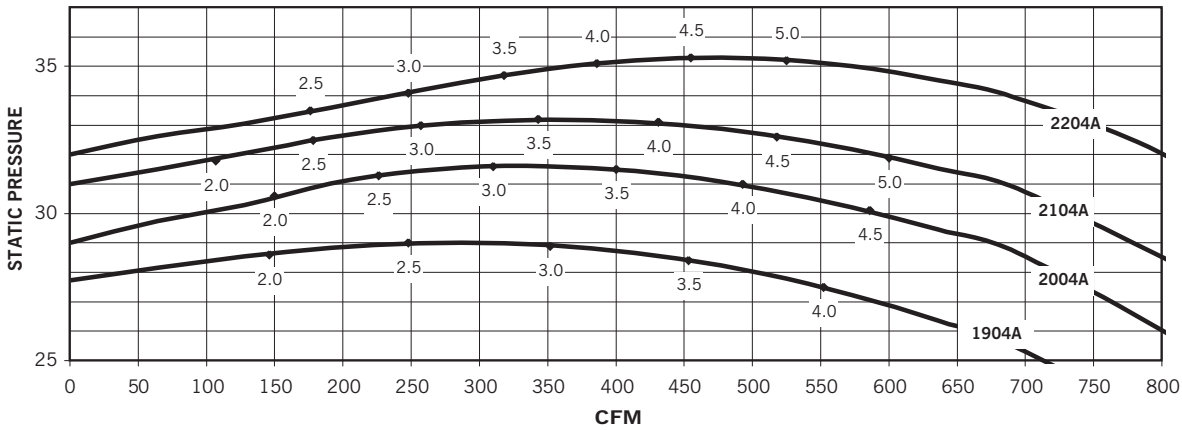
Performance at 3500 RPM

Aluminum Wheel
Pressure Blower

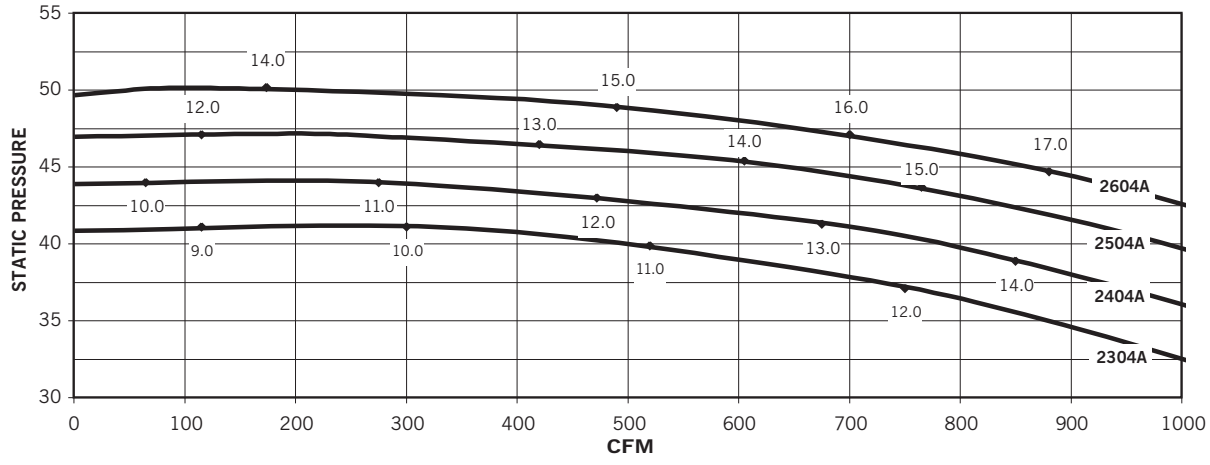
1404A-1804A



1904A-2204A



2304A-2604A

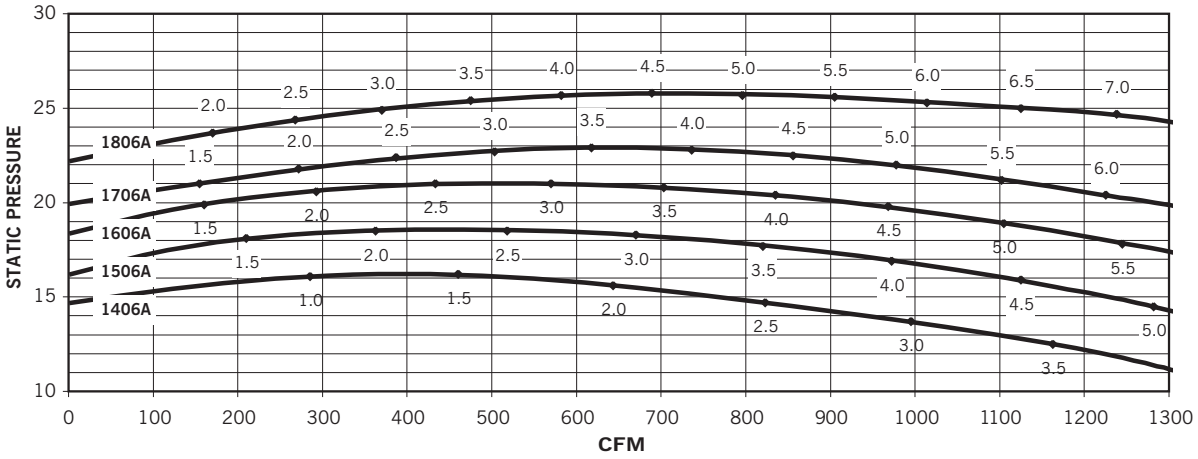


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

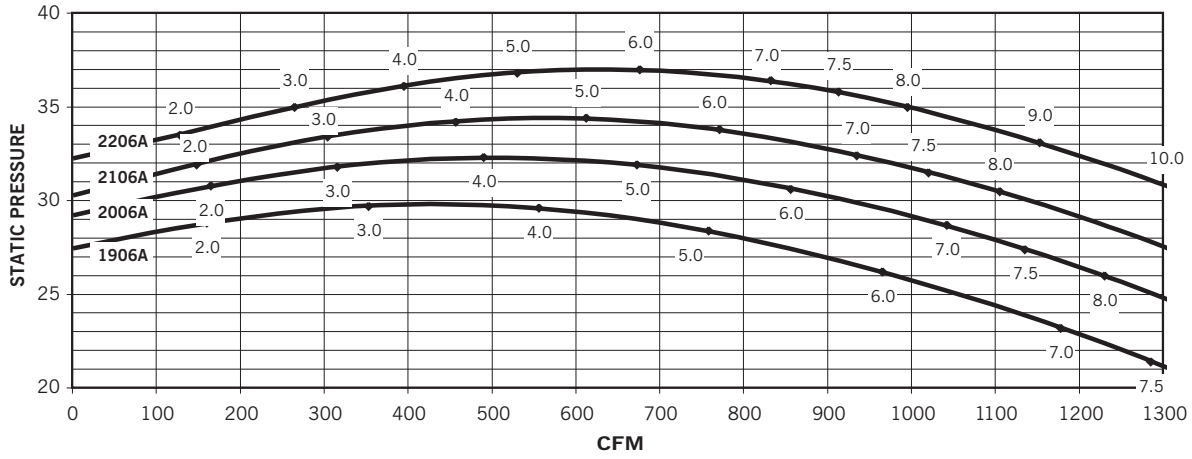
Performance at 3500 RPM

Aluminum Wheel
Pressure Blower

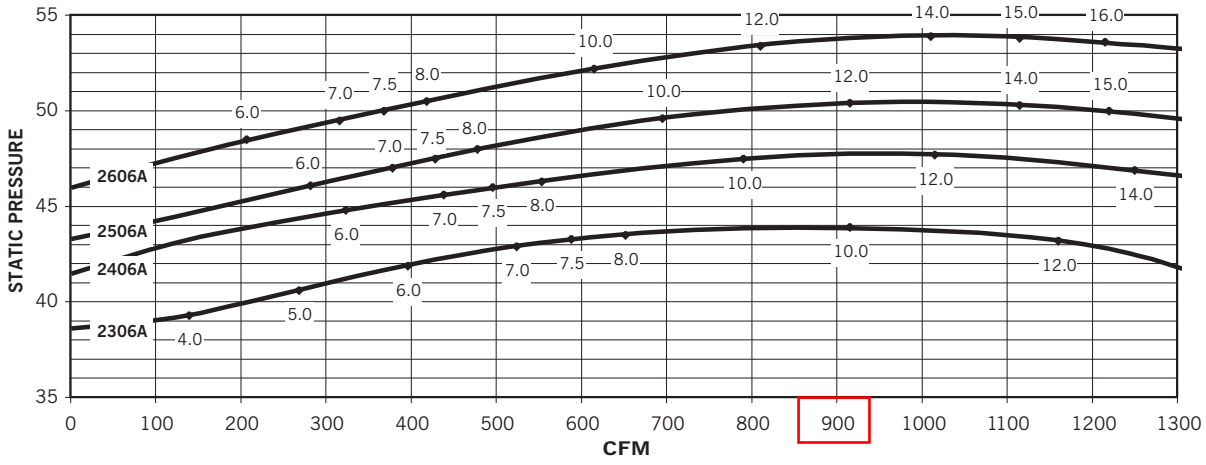
1406A-1806A



1906A-2206A



2306A-2606A

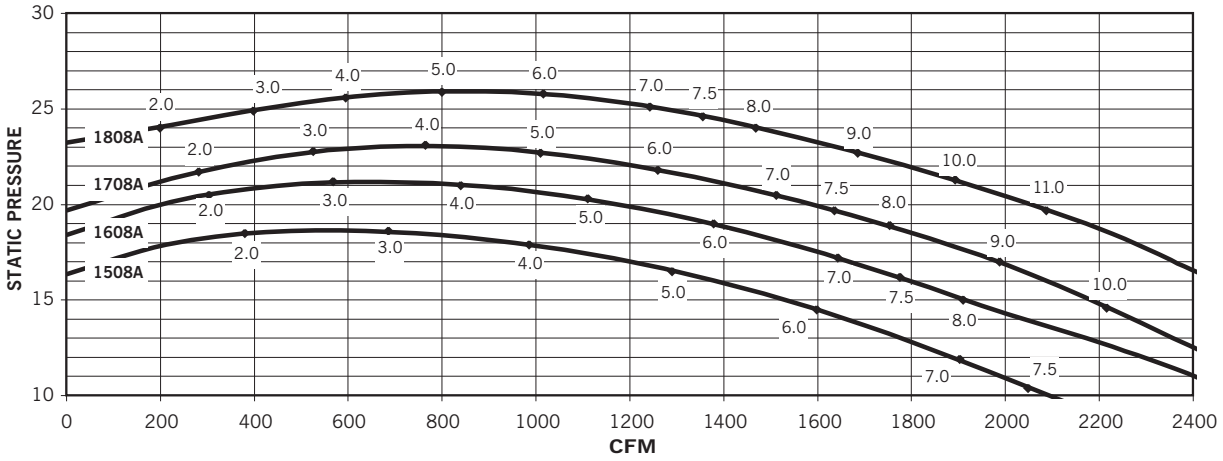


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

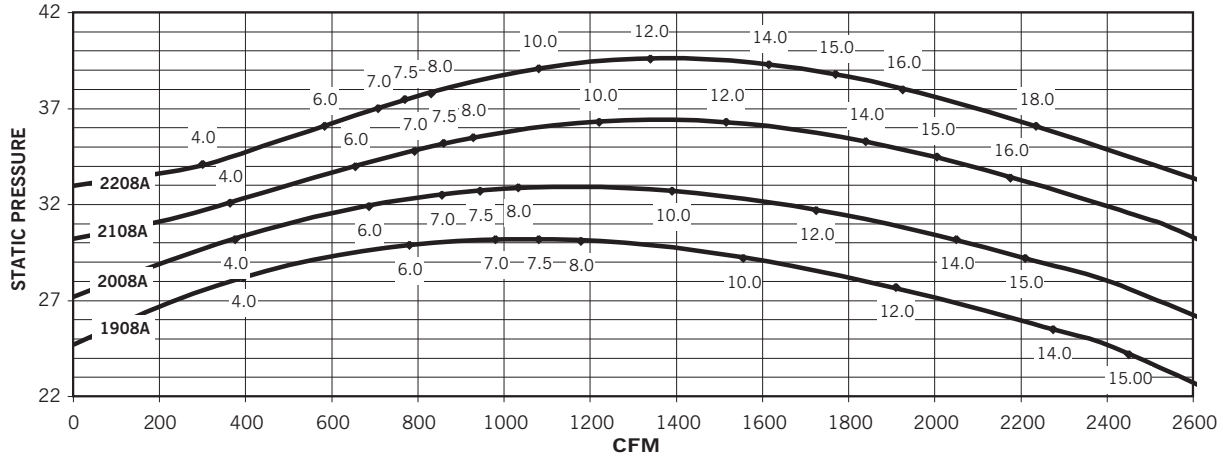
Performance at 3500 RPM

Aluminum Wheel
Pressure Blower

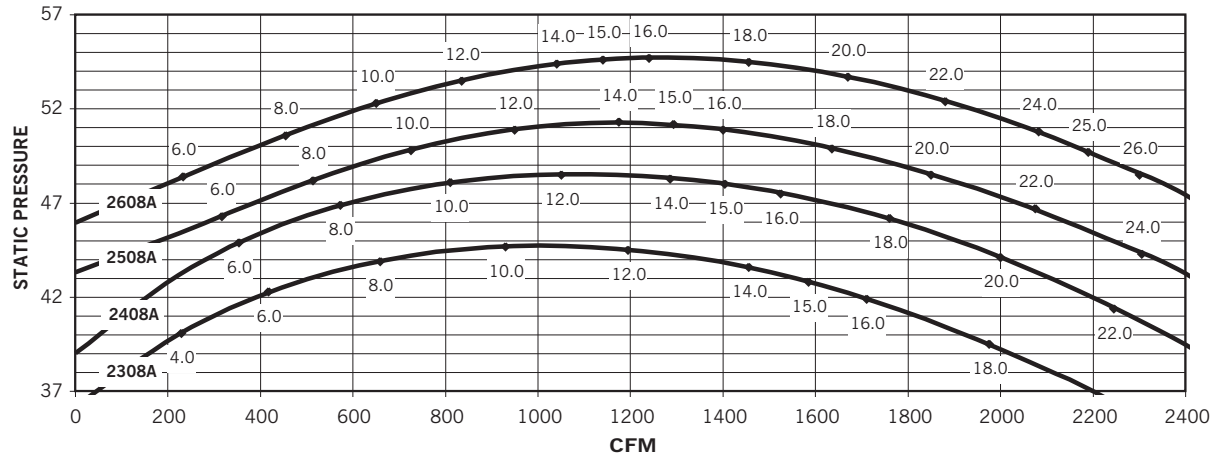
1508A-1808A



1908A-2208A



2308A-2608A

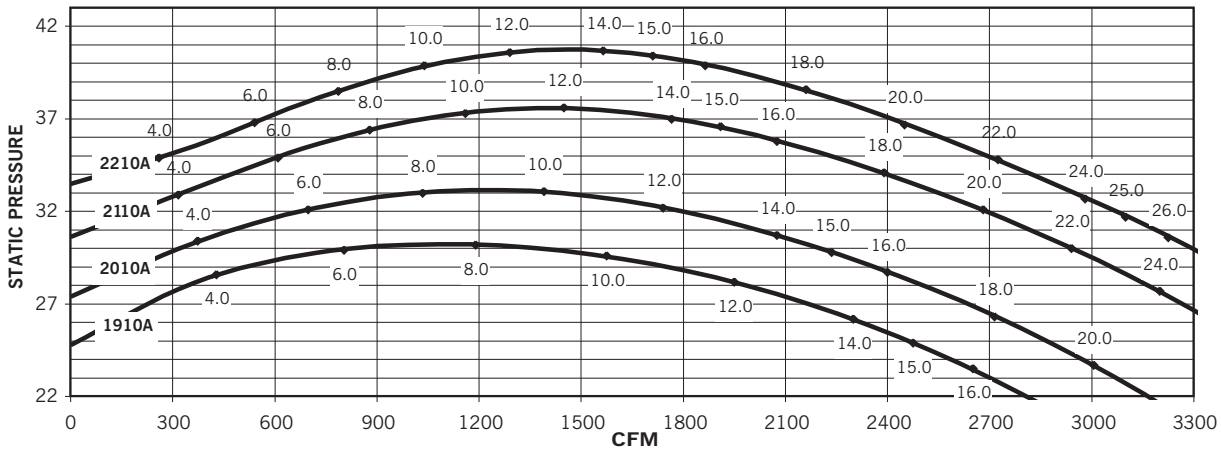


Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

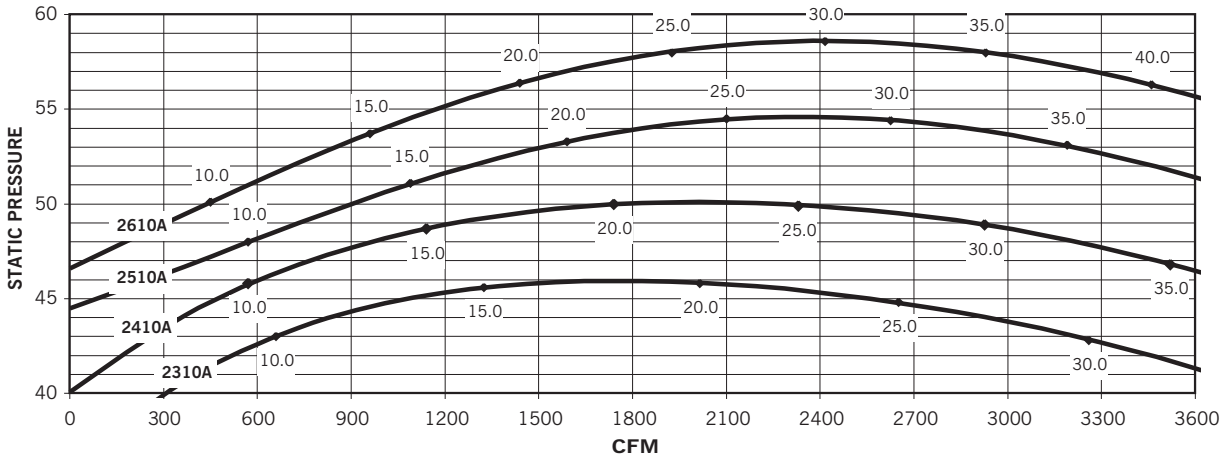
Performance at 3500/3550 RPM

Aluminum Wheel
Pressure Blower

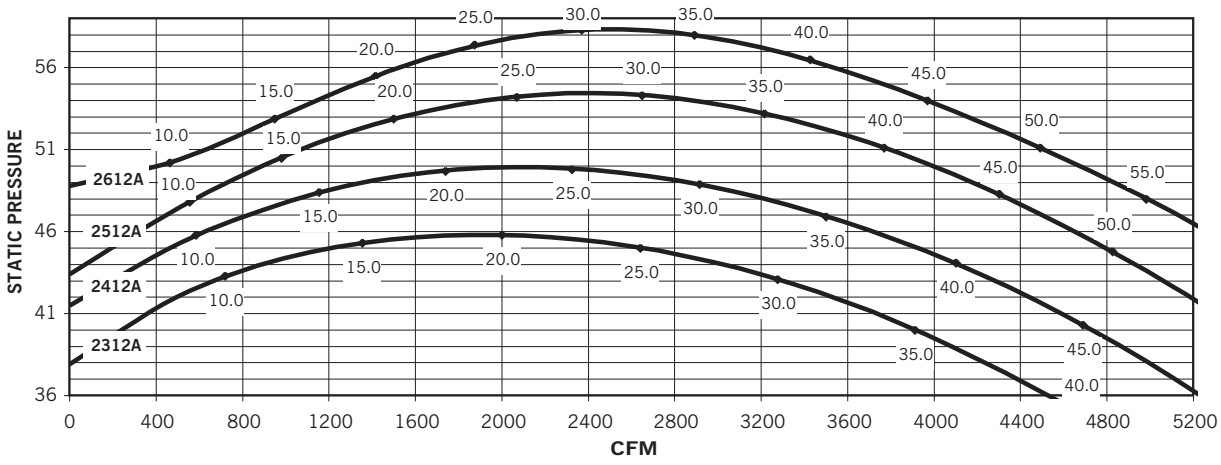
1910A-2210A



2310A-2610A



2312A-2612A



Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

SPECIFICATIONS

U.S. standard sheet gauge to 7 gauge. Dimensions in inches. Weights in pounds. WR^2 in lb.-ft.^{2}.

WHEEL SPECIFICATIONS

Size	Aluminum		Steel	
	Wt.	WR^2	Wt.	WR^2
1403	10.1	0.96	19.7	2.74
1404	8.5	1.43	18.0	3.04
1406	11.7	2.40	20.5	3.46
1503	10.8	1.23	21.8	3.59
1504	8.8	1.69	19.0	3.68
1506, 1508	11.8	2.40	21.5	4.16
1603	11.5	1.53	23.9	4.56
1604	9.0	1.98	20.0	4.41
1606, 1608	12.1	2.50	23.0	5.07
1703	12.3	1.93	26.3	5.79
1704	9.3	2.30	21.0	5.22
1706, 1708	12.2	2.60	24.5	6.09
1803	13.0	2.36	28.6	7.16
1804	9.5	2.65	22.0	6.13
1806, 1808	12.4	2.60	26.0	7.25
1903	14.2	2.92	31.1	8.42
1904, 1906	12.0	3.73	29.5	9.16
1908, 1910	15.1	5.10	34.5	10.72
2003	15.1	5.02	33.7	10.23
2004, 2006	12.3	4.22	31.0	10.67
2008, 2010	15.3	5.20	36.5	12.56
2103	16.0	4.24	36.5	12.31
2104, 2106	12.5	4.74	32.5	12.33
2108, 2110	15.5	5.30	38.0	14.42
2203	17.1	5.02	39.3	14.70
2204, 2206	12.8	5.31	34.0	14.16
2208, 2210	15.6	5.40	40.0	16.66
2303	18.3	6.07	49.4	20.83
2304	19.8	6.50	52.5	22.27
2306, 2308	18.5	8.42	45.0	20.93
2310, 2312	21.7	10.60	53.5	24.35
2403	19.4	7.16	53.1	24.50
2404	20.9	7.80	56.4	26.14
2406, 2408	18.8	9.29	48.0	23.79
2410, 2412	21.9	10.80	56.0	27.75
2503	20.5	8.33	56.9	28.64
2504	22.0	9.00	60.4	30.49
2506, 2508	19.0	10.22	50.0	26.89
2510, 2512	21.9	11.00	58.5	31.46
2603	21.8	9.63	60.9	33.27
2604	23.1	10.30	64.5	35.36
2606, 2608	19.3	11.20	52.0	30.24
2610, 2612	22.3	11.20	61.0	35.48

MATERIAL SPECIFICATIONS

HOUSING

Wheel diameter	Sides	Scroll	Inlet plate	Drive plate
14-18	10	10	1/4	10
19-22	10	10	1/4	10
23-26	10	10	1/4	10

SHAFT DIAMETER

Wheel diameter	Arrangement		
	1‡	8	10
14-18	1 7/16	1 7/16	1 7/16
19-22	1 7/16	1 7/16	1 7/16
23-26	1 11/16	1 7/16	1 11/16

‡ Arrangement 1 fans with heat fan construction and shaft seal:
Sizes 19-22 require 1 11/16" shaft and bearings in lieu of standard.
Sizes 23-26 require 1 15/16" shaft and inboard bearing in lieu of standard with turndown for standard outboard bearing.

BEARINGS*

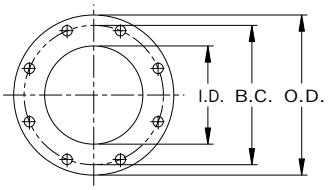
Wheel diameter	Arrangement 1		Arrangement 8	Arrangement 10
	Inboard	Outboard		
14-18	A	A	A	A
19-22	B	B	A	B
23-26	C	B	A	B

A–200 Series ball bearing. B–22400 Series roller bearing.
C–300 Series ball bearing.
***nyb** reserves the right to substitute bearings of equal rating.

DRIVE KEY

Wheel diameter	Arrangement 8	Arrangement 10
14-18	3/8	3/8
19-22	3/8	3/8
23-26	3/8	3/8

FLANGE



DIMENSIONS [INCHES]

Size	I.D.	O.D.	Bolt circle	Holes† No. – size
03	3	7 1/2	6	4 – 3/4"
04	4	9	7 1/2	8 – 3/4"
05	5	10	8 1/2	8 – 7/8"
06	6	11	9 1/2	8 – 7/8"
08	8	13 1/2	11 3/4	8 – 7/8"
10	10	16	14 1/4	12 – 1"
12	12	19	17	12 – 1"

† Holes straddle centerline. ANSI Class 125/150 hole pattern. Flange thickness 3/8"

ARRANGEMENTS 1, 4, 8, 10

Dimensions not to be used for construction unless certified. Note: See page 14 for dimensional drawings. Bare fan weight does not include wheel or motor. Weights in pounds. Wheel weights on page 11.

ARRANGEMENTS 1, 10 — DIMENSIONS [INCHES]

Wheel dia.	Outlet size	Inlet flange	A		H		K		N		R		S		Bare fan weight	
			Arr. 1†	Arr. 10	Arr. 1	Arr. 10	Arr. 1	Arr. 10	Arr. 1	Arr. 10	Arr. 1	Arr. 10	Arr. 1	Arr. 10	Arr. 1	Arr. 10
14-18	03	05	19 1/2	21	24 5/8	30 1/8	3	3 1/2	15 1/8	22	2 7/8	3 7/8	12 1/4	17 3/8	200	190
	04	06			25 5/8	31 1/8					3 3/8	4 3/8			205	200
	06	08			28	33 1/2					4 1/2	5 1/2			220	210
15-18	08	08													220	215
19-22	03	05	23 5/8	27 5/8	26 1/8	35 1/8	4	4 1/2	15 1/8	26	2 7/8	4 5/8		19 7/8	270	305
	04	06			27 1/8	36 1/8					3 3/8	5 1/8			275	310
	06	06													275	315
	08	08			29	38					4 1/2	6 1/4			290	330
	10	10													300	335
23-26	03	05	26 5/8	27 7/8	28 1/4	36 1/4	5	4 1/2	15 1/8	26	3 1/4	4 1/4		19 7/8	350	355
	04	06			29 5/8	37 5/8					3 7/8	5 5/8			350	355
	06	08													365	365
	08	08													365	370
	10	10			31	39					5	6 3/4			385	385
	12	12													395	400

† On fan Sizes 23-26 with Size 12 outlet and Bottom Horizontal discharge, the flange extends 1/2" below the floorline. Tolerance: ± 1/8"

ARRANGEMENTS 4, 8 — DIMENSIONS [INCHES]

Wheel dia.	Outlet size	Inlet flange	Motor frame size	A		H*		K	NN		R	S		Bare fan weight	
				Arr. 4	Arr. 8†	Arr. 4	Arr. 8	Arr. 8	Arr. 4	Arr. 8		Arr. 4	Arr. 8	Arr. 4	Arr. 8
14-18	03	05	143T–145T	17 3/4	19 1/2	18	38 1/2	3 3/8	13	31 3/8	2 7/8	8 5/8	15	145	285
			182T–184T	19		23 1/2	40 7/8		17 7/8	32 7/8		14 1/8	16 1/2	170	
	04	06	143T–145T	17 3/4		19	39 1/2		13 1/2	31 7/8	3 3/8	8 5/8	15	150	290
			182T–184T	19		24 1/2	41 7/8		18 3/8	33 3/8		14 1/8	16 1/2	175	
	06	08	143T–145T	17 3/4		21 3/8			14 5/8	33	4 1/2	8 5/8	15	165	305
			182T–184T	19		26 7/8	44 3/8		20 1/8	34 1/2		14 1/8	16 1/2	190	
			213T–215T	19 3/4			47 1/2	2 7/8		36 3/4			18 3/4		310
15-18	08	08	182T–184T	19	19 1/2	26 7/8	44 3/8	3 3/8	20 1/8	34 1/2	4 1/2	14 1/8	16 1/2	190	305
			213T–215T	19 3/4			47 1/2	2 7/8		36 3/4			18 3/4		310
19-22	03	05	143T–145T	23	23 5/8	24	38 7/8	3 3/8	18 1/2	31 3/8	2 7/8	14 1/8	15	235	380
			182T–184T	24			41 1/2			32 7/8			16 1/2		
	04	06	143T–145T	23		25	39 7/8		19	31 7/8	3 3/8	14 1/8	15	245	385
			182T–184T	24			42 1/2			33 3/8			16 1/2		
	06	06	143T–145T	23		25	39 7/8		19	31 7/8		14 1/8	15	245	385
			182T–184T	24			42 1/2			33 3/8			16 1/2		390
			213T–215T	24 3/4			45 5/8	2 7/8		36 5/8			18 3/4		395
	08	08	182T–184T	24		26 7/8	44 3/8	3 3/8	20 1/8	34 1/2	4 1/2	14 1/8	16 1/2	260	405
			213T–215T	24 3/4			47 1/2	2 7/8		36 3/4			18 3/4		410
			254T–256T	26		32 1/4	51 3/4		25 1/2	42 1/8		19 1/2	24 1/8	290	425
	10	10	213T–215T	24 3/4		26 7/8	47 1/2		20 1/8	36 3/4		14 1/8	18 3/4	270	415
			254T–256T	26		32 1/4	51 3/4		25 1/2	42 1/8		19 1/2	24 1/8	300	435
			284TS–286TS	26 3/4			54 3/8			42 7/8			24 7/8		430
23-26	03	05	182T–184T	24	26 5/8	25 1/8	43 1/8	3 7/8	18 3/4	33 3/4	3 1/4	14 1/8	17	270	400
			213T–215T	24 3/4			46 1/4			36			19 1/4		445
			254T–256T	26		30 1/2	50 1/2		24 1/4	41 3/8		19 1/2	24 5/8	300	450
	04	06	182T–184T	24		26 1/2	44 1/2		19 1/2	34 3/8	3 7/8	14 1/8	17	275	445
			213T–215T	24 3/4			47 5/8			36 5/8			19 1/4		450
			254T–256T	26		31 7/8	51 7/8		24 7/8	42		19 1/2	24 5/8	300	470
	06	08	182T–184T	24		26 1/2	44 1/2		19 1/2	34 3/8		14 1/8	17	285	460
			213T–215T	24 3/4			47 5/8	3 1/4		36 5/8			19 1/4		465
			254T–256T	26		31 7/8	51 7/8		24 7/8	42		19 1/2	24 5/8	315	485
	08	08	213T–215T	24 3/4		26 1/2	47 5/8		19 1/2	36 5/8		14 1/8	19 1/4	290	470
			254T–256T	26		31 7/8	51 7/8		24 7/8	42		19 1/2	24 5/8	320	485
			284TS–286TS	26 3/4			53			42 3/4			25 3/8		490
	10	10	254T–256T	26		33 1/4	53 1/4		26	43 1/8	5	19 1/2	24 5/8	335	505
			284TS–286TS	26 3/4			54 3/8			43 7/8			25 3/8		
			324TS–326TS	29 1/4		37 1/4	56 7/8		30	46 3/8		23 1/2	27 7/8	360	510
	12	12	284TS–286TS	28 1/4		37 1/4	54 3/8		30	43 7/8		23 1/2	25 3/8	345	515
			324TS–326TS	29 1/4			56 7/8			46 3/8			27 7/8	370	520

Tolerance: ± 1/8"

* Dimensions may vary slightly depending on motor manufacturer. Given "H" dimensions were based on the larger of those motors most frequently used by **nyb**. † On fan Sizes 23-26 with Size 12 outlet and Bottom Horizontal discharge, the flange extends 1/2" below the floorline.

ARRANGEMENTS 1, 4, 8, 10

Dimensions not to be used for construction unless certified. Note: See page 14 for dimensional drawings.

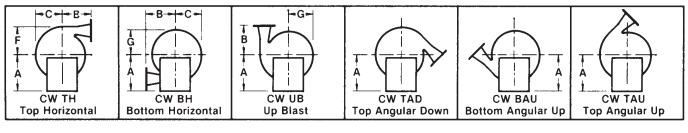
DIMENSIONS [INCHES]

Wheel dia.	Outlet size	B	C	D	F	G	Inlet size	JJ [Inlet types]			L
								Flanged	Plain pipe	Venturi	
14-18	03	18 1/4	13 5/8	11 3/4	14 3/8	12 3/4	05	5 1/8	4 3/4	4 5/8	5 5/8
	04						06	5 5/8	5 1/4	4 7/8	6 5/8
	06						08	6 3/4	6 3/8	6 3/8	8 5/8
	08										
19-22	03	17 3/4	16 1/2	14 7/8	17 1/2	15 1/2	05	5 5/8	5 1/4	5 1/4	5 5/8
	04						06	6 1/8	5 3/4	5 3/8	6 5/8
	06										
	08						08	6 3/4	6 3/8	6 3/8	8 5/8
	10	21 3/4					10				
23-26	03	19	19 1/2	17 5/8	20 5/8	18 1/4	05	6 3/8	6	5 5/8	5 5/8
	04						06	7	6 5/8	6 5/8	6 5/8
	06						08				8 5/8
	08										
	10	23					10	7 1/4	6 7/8	6 7/8	10 3/4
	12						12				

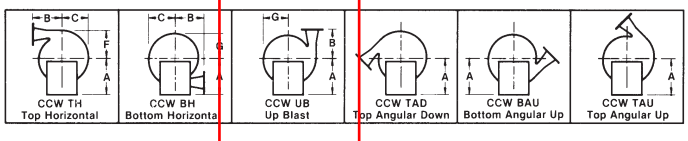
Wheel dia.	Outlet size	M	T				U			V	W
			Arr. 1	Arr. 4	Arr. 8	Arr. 10	Arr. 1	Arr. 4	Arr. 8	Arr. 10	Arr. 10
14-18	03	2 7/8	9 1/8	8 7/8	9 1/8	9 3/8	10	9 3/4	10	8 1/4	10 1/4
	04	3 7/8									
	06	6 1/4									
	08										
19-22	03	2 7/8	10 7/8	10 7/8	10 7/8	12 1/4	11 3/4	11 3/4	11 3/4	11	13
	04	3 7/8									
	06										
	08	6 1/4									
	10										
23-26	03	3 5/8	10 7/8	10 7/8	10 7/8	12 1/4	11 3/4	11 3/4	11 3/4	11	13
	04	5									
	06										
	08										
	10	7 1/4									
	12										

Tolerance: ± 1/8"

FAN DISCHARGES – VIEWED FROM DRIVE SIDE



Clockwise—angular discharges at 45°



Counterclockwise—angular discharges at 45°

Housings are reversible and rotatable in 22 1/2° increments except Down Blast and Bottom Angular Down which require special construction. Arrangement 10 fans Sizes 19–22 are not rotatable in the field.

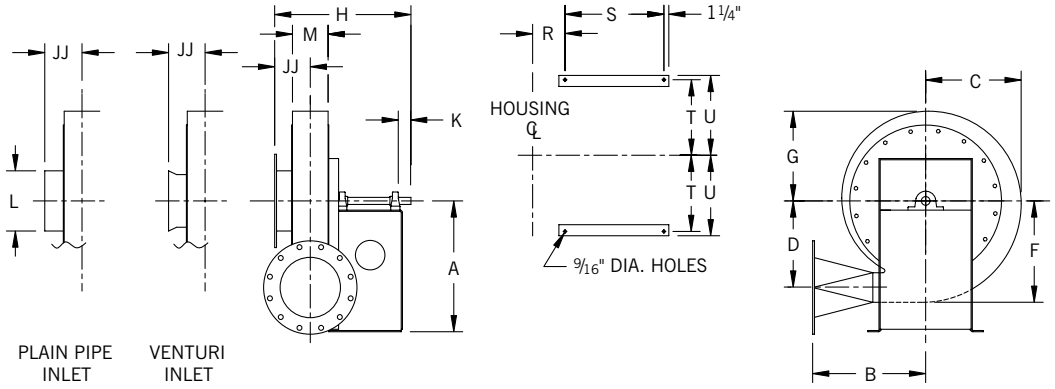
The New York Blower Company has a policy of continuous product development and reserves the right to change designs and specifications without notice.

ARRANGEMENTS 1, 4, 8, 10

Dimensions not to be used for construction unless certified.

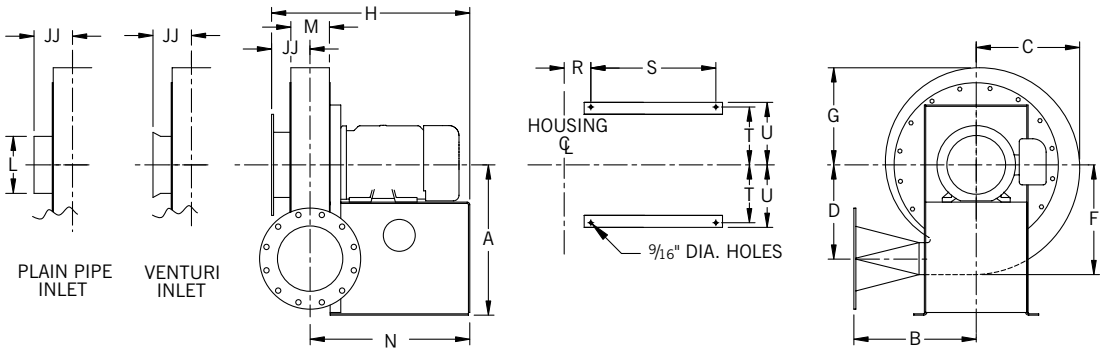
ARRANGEMENT 1

PRESSURE BLOWERS



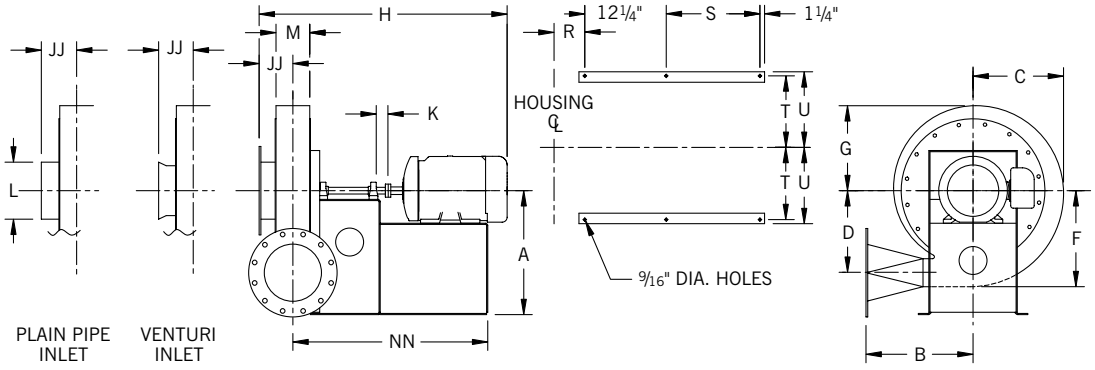
ARRANGEMENT 4

PRESSURE BLOWERS



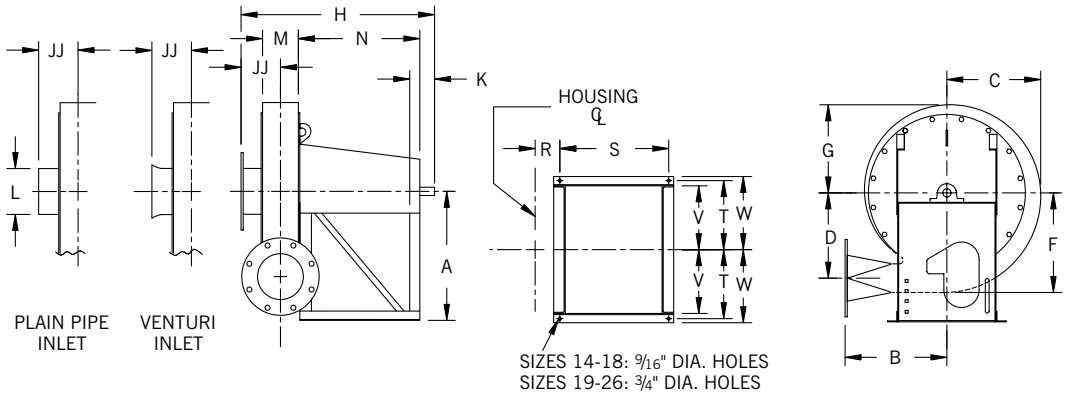
ARRANGEMENT 8

PRESSURE BLOWERS



ARRANGEMENT 10

PRESSURE BLOWERS

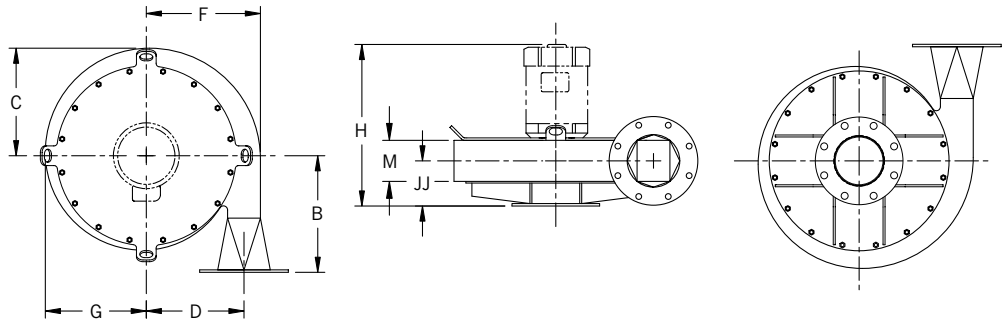


ARRANGEMENT 4-V

Dimensions not to be used for construction unless certified. Bare fan weight does not include wheel or motor. Weights in pounds. Wheel weights on page 11.

ARRANGEMENT 4-V

PRESSURE BLOWERS



DIMENSIONS [INCHES]

Wheel dia.	Outlet size	Motor frame‡	H*	Bare fan weight
14 thru 18	03	182TC–184TC	20 7/8	130
	04	182TC–184TC	21 7/8	135
	06	182TC–184TC	24 1/4	150
		213TC–215TC	25 1/2	
	08	182TC–184TC	24 1/4	155
		213TC–215TC	25 1/2	
19 thru 22	03	182TC–184TC	21 3/8	180
	04	182TC–184TC	22 3/8	185
	06	182TC–184TC	22 3/8	190
		213TC–215TC	23 5/8	
	08	182TC–184TC	24 1/4	205
		213TC–215TC	25 1/2	
		254TC–256TC	26 5/8	
	10	213TC–215TC	25 1/2	215
		254TC–256TC	26 5/8	
		284TSC–286TSC	33 3/8	
23 thru 26	03	182TC–184TC	22 1/2	235
	04	182TC–184TC	23 7/8	245
	06	182TC–184TC	23 7/8	245
		213TC–215TC	25 1/8	
		254TC–256TC	26 1/4	
	08	213TC–215TC	25 1/8	250
		254TC–256TC	26 1/4	
		284TSC–286TSC	33	
	10	254TC–256TC	27 5/8	265
		284TSC–286TSC	34 3/8	
		324TSC–326TSC	36 3/8	
	12	284TSC–286TSC	34 3/8	280
		324TSC–326TSC	36 3/8	

Tolerance: ± 1/8"

* For reference only, will vary across motor manufacturers.
‡ Minimum motor frame size is 182TC.

DIMENSIONS [INCHES]

Wheel dia.	Outlet size	Inlet size	B	C	D	F	G	JJ	M
14-18	03	05	18 1/4	13 5/8	11 3/4	14 3/8	12 3/4	5 1/8	2 7/8
	04	06						5 5/8	3 7/8
	06	08						6 3/4	6 1/4
	08								
19-22	03	05	17 3/4	16 1/2	14 7/8	17 1/2	15 1/2	5 5/8	2 7/8
	04	06						6 1/8	3 7/8
	06								
	08	08						6 3/4	6 1/4
	10	10	21 3/4						
23-26	03	05	19	19 1/2	17 5/8	20 5/8	18 1/4	6 3/8	3 5/8
	04	06						7	5
	06	08							
	08								
	10	10	23					7 1/4	7 1/4
	12	12							

Tolerance: ± 1/8"

Complete Selection of Air-Moving Equipment

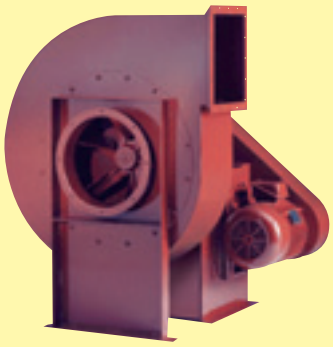
The New York Blower Company offers thousands of different types, models, and sizes of air-moving equipment. Contact your nyb representative for assistance in identifying the best fan for your application.

AIR-HANDLING [AXIAL]

For the ideal handling of clean to moderately dirty airstreams. Commercial and industrial HVAC, drying and cooling systems, fume extraction, and process-heat removal are typical applications.

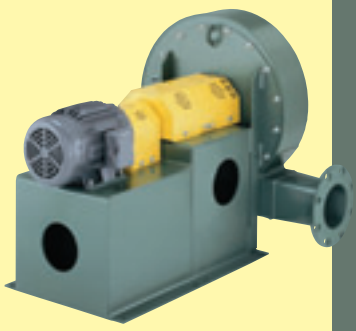
FIBERGLASS REINFORCED PLASTIC [FRP]

Choice of performance and duty for corrosive gas streams. Applications include chemical process, wastewater treatment, laboratory hood exhaust, and tank aeration.



DUST/MATERIAL HANDLING

Wide range of duty available with unique fan lines capable of handling light dust to heavy material. Typical applications include dust-collection and high-pressure process along with material-conveying.

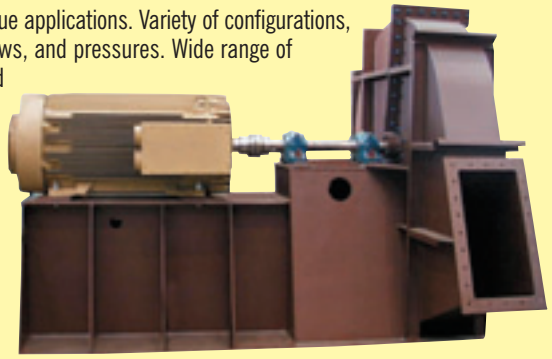


AIR-HANDLING [CENTRIFUGAL]

Designed for clean to moderately dirty gas streams. Commercial and industrial HVAC, process cooling, light material-conveying, heat removal, and dryer exhaust are just a few of the numerous sample applications

CUSTOM PRODUCTS

Designed for unique applications. Variety of configurations, temperatures, flows, and pressures. Wide range of modifications and accessories are available to meet the most demanding specifications.



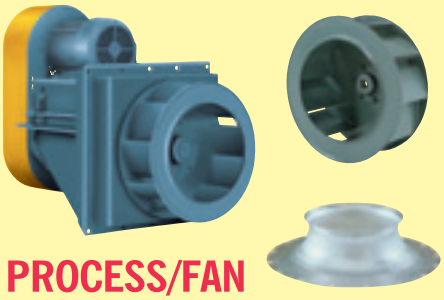
The best fans still keep coming from New York Blower!

ROOF VENTILATORS

Including both hooded and upblast ventilators, propeller fans, and centrifugal roof exhausters. These units are ideal for industrial, commercial, and institutional applications.

HEATING PRODUCTS

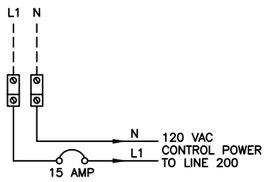
Industrial-duty steam unit heaters with steam heating coils are available for facility heating and process-heat transfer.



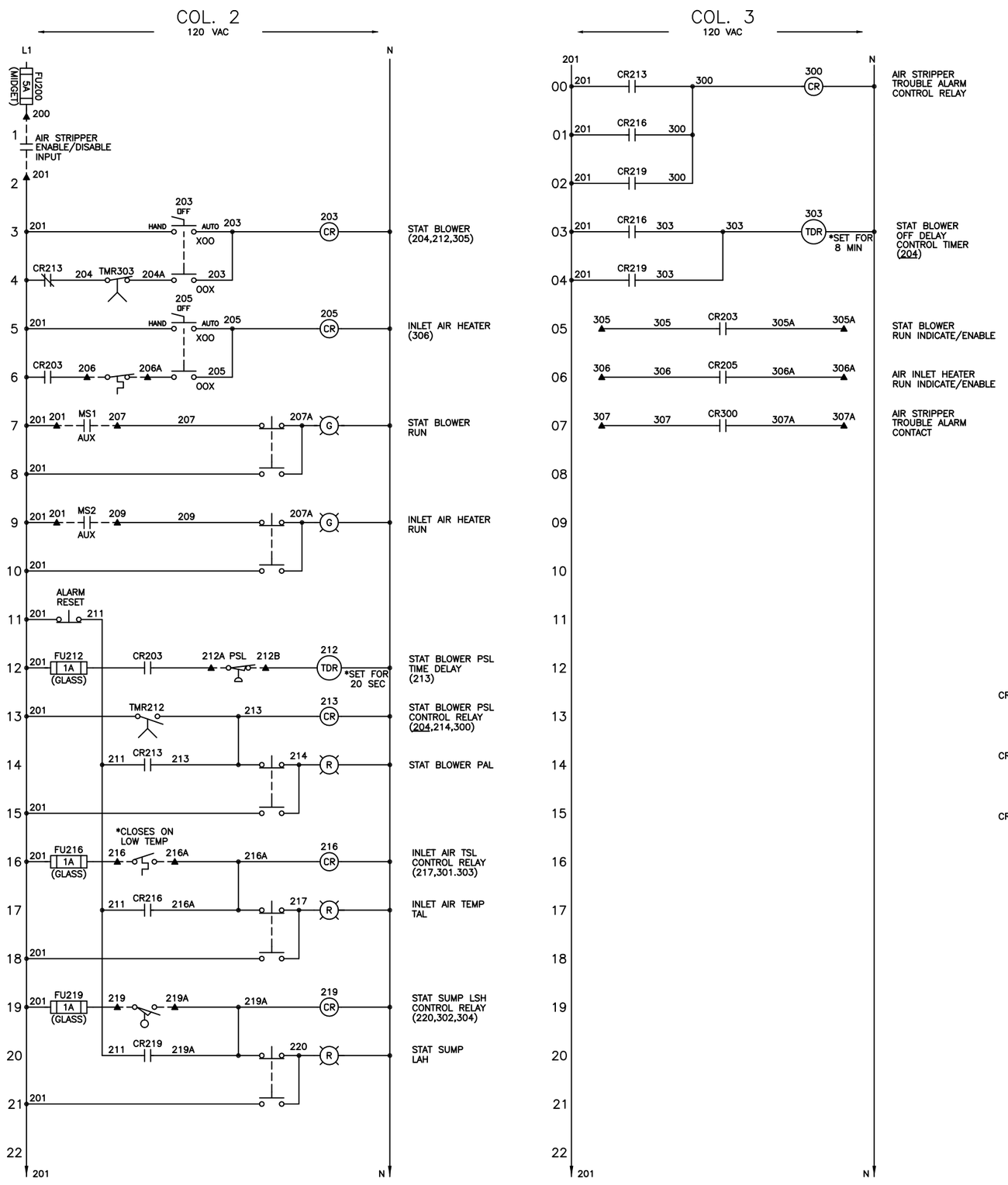
PROCESS/FAN COMPONENTS

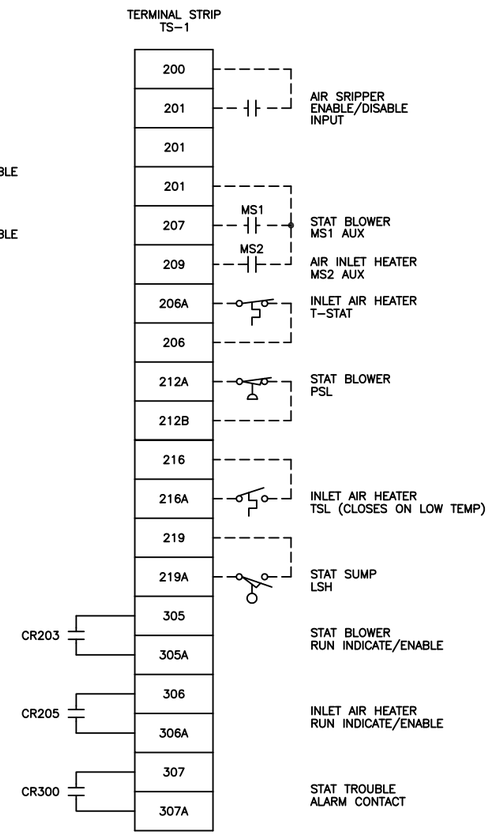
Plug fans, plenum fans, wheels, inlet cones, and housings for a wide variety of OEM applications. Process/fan components are used in air-handling units, ovens, dryers, freezer tunnels, and filtration systems.

120 VAC INCOMING POWER



REVISIONS				
REV	ECO	DESCRIPTION	DATE	DRN
	---	RELEASED FOR SUBMITTAL	07/24/97	RLC
	---	RELEASED TO PRODUCTION	08/27/97	RLC
A	---	AS BUILT	09/09/97	RLC
B	---	REVISED AS BUILT	09/12/97	GGR





LEGEND

- ▲ TERMINAL IN PANEL
- (P) LOCATED IN PANEL
- (F) FIELD MOUNTED DEVICE
- (PD) LOCATED ON PANEL DOOR
- (CK) MOTOR CONTACTOR
- (CR) CONTROL RELAY
- (G) GREEN PILOT LIGHT
- (R) RED PILOT LIGHT
- (W) WHITE PILOT LIGHT
- (Y) YELLOW PILOT LIGHT
- FLOAT SWITCH CLOSES ON RISING LEVEL
- FLOAT SWITCH OPENS ON RISING LEVEL
- PRESSURE SWITCH CLOSES ON RISING PRESSURE
- PRESSURE SWITCH OPENS ON RISING PRESSURE
- TEMPERATURE SWITCH OPENS ON RISING TEMPERATURE
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- FIELD WIRING
- NORMALLY OPEN PUSHBUTTON MOMENTARY
- THREE POSITION H.O.A. SELECTOR SWITCH ILLUMINATED
- SELECTOR SWITCH ADDITIONAL CONTACTS MAY BE ADDED
- MCP AUX — MOTOR CIRCUIT PROTECTOR (PROVIDES MAGNETIC TRIPS AND OVERLOAD PROTECTION)
- MCP AUX — MOTOR CIRCUIT PROTECTOR AUXILLARY CONTACTS (N.O. CONTACTS/CLOSED WHEN START BUTTON DEPRESSED)

NOTE:
1. DRAWING NOT TO SCALE
2. NORMAL STATE, DEVICE ENERGIZED

MATERIAL . .	APPROVAL	DATE
	DRFT R.L.C.	07/22/97
	DIMSCALE 1	LTSCALE 0.5
TOLERANCES UNLESS NOTED OTHERWISE: DECIMAL .03 FRACTIONAL 1/32" ANGLES 1°	D.L.	
	PROJECT NO. 207791	
THESE MATERIALS ARE CONFIDENTIAL AND ARE THE PROPRIETARY INFORMATION OF CARBONAIR SERVICES, INC. AND MAY NOT BE USED OR REPRODUCED WITHOUT THE CONSENT OF CARBONAIR SERVICES, INC.	THIRD ANGLE PROJECTION	
	UNLESS OTHERWISE SPECIFIED: * DIMENSIONS ARE IN INCHES * DO NOT SCALE DRAWING	

CARBONAIR
WATER AND AIR DECONTAMINATION
MINNEAPOLIS, MINNESOTA

TITLE: SCHEMATIC, CONTROL PANEL OLIN-NIAGARA

SIZE	DWG. NO.	REV
D	156633	B

SCALE	EQUIP. NO.	SHEET
1=1	.	1 OF 1

SUBMITTAL

for

Sevenson Environmental Services

Project Name

Olin Air Stripper Replacement
Niagara Falls, NY

Carbonair Project Number

#23400-01

prepared by

Carbonair Services
7500 Boone Avenue North, Suite 101
Brooklyn Park, MN 55428

Regional Manager: Bob Bergsgaard
Project Manager: Chris Riddle
(800) 526-4999
FAX (763) 315-4614

February 11, 2011

Carbonair Environmental Systems, Inc.
7500 Boone Avenue North, Suite 101
Brooklyn Park, MN 55428
763-315-4771 800-526-4999
FAX 763-315-4614

February 11, 2011

Mike Walker
Sevenson Environmental Services
2749 Lockport Road
Niagara Falls, NY

Phone: 716-284-0431
Email: mwalker@sevenson.com

Re: Project Number: 23400-01
Project Name: Olin Air Stripper Replacement
Project Location: Niagara Falls, NY

Dear Mike:

The following is our submittal for the above project. The equipment listed in this submittal is based on our sales proposal #23400-A. Additional items or changes from this list, could result in added project costs. If there are any questions about the equipment listed, in relation to the sales proposal and/or project specifications, please call.

Please review these submittals carefully and feel free to contact me if you should have any questions. Please sign the approval page, and all appropriate initial boxes, then return one complete copy (with your comments) for our records.

Please be advised that we will not proceed with processing this order until we receive approval of the submittals. Any delays or changes in approving this submittal could result in delays in delivery.

We look forward to working with you on this project. Please do not hesitate to call me if you have any questions.

Sincerely,

Chris Riddle
Project Manager

Submittal Approval

Please return a signed copy of the approval submittal package for the proposed equipment. **Production can not begin until an original submittal** has been returned to Carbonair.

Project Name: Olin Air Stripper Replacement.
Carbonair Project Number: 23400-01

CARBONAIR®

Date_____

SUBMITTAL REVIEW

- ❑ **APPROVED**
- ❑ **APPROVED AS CORRECTED**

If checked above, fabrication MAY be undertaken based on approved design. Future changes will be subject to a Change Order.

If checked below, fabrication MAY NOT be undertaken. Corrected copies will be resubmitted for final approval. Correction shall be limited to items marked.

- ❑ **REVISE AND RESUBMIT**
- ❑ **NOT APROVED**

SIGNATURE REQUIRED

By Date

Comments:

Equipment Description

(1) Carbonair Model STAT 180 low profile air stripper
- 316 SST pump out sump with high level alarm switch (P/N 118533)
- 6 trays with demister and fasteners
- New York Blower model 2306 pressure blower
    - 10 hp, 230/460V, 3 phase, TEFC motor
    - 900 cfm @ 43” wc
- Dwyer 1950-5 differential pressure switch
    - 1.4-5.5” wc range
- Blower pressure gauge (0-60” wc)
- New York Blower inlet silencer
    - 6” flange connections
- Air flow meter kit
    - Ultra probe flow sensor
    - 0-1,000 cfm gauge
- Mounted on a common skid

(1) Optional pump down level switches (P/N 130026)

STAT MODEL CALCULATIONS 11/19/10
VERSION 4.1 15:59:44

CARBONAIR ENVIRONMENTAL SYSTEMS
2731 NEVADA AVENUE NORTH, NEW HOPE, MN 55427
PHONE: 763-544-2154 FAX: 763-544-2151

UNIT MODEL:	STAT 180	WATER TEMPERATURE (F):	55.0
WATER FLOW RATE (GPM):	60.0	AIR TEMPERATURE (F):	55.0
AIR FLOW RATE (ACFM):	900.0	AIR-TO-WATER RATIO:	112:1
OPERATING PRESS (ATM):	1.0	SAFETY FACTOR (%):	30.0

Influent Conc. for CIS-1,2-DICHLOROETHENE 1200.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	72.19829	333.6205	7.7355	0.6241
2	91.93770	96.7476	9.8505	0.7947
3	97.63412	28.3905	10.4608	0.8439
4	99.30334	8.3599	10.6396	0.8584
5	99.79465	2.4642	10.6923	0.8626
6	99.93945	0.7266	10.7078	0.8639

Influent Conc. for METHYLENE CHLORIDE 180.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	62.51645	67.4704	1.0047	0.0811
2	85.06923	26.8754	1.3672	0.1103
3	93.91506	10.9529	1.5093	0.1218
4	97.49742	4.5046	1.5669	0.1264
5	98.96692	1.8595	1.5905	0.1283
6	99.57289	0.7688	1.6003	0.1291

Influent Conc. for 1,1,2,2-TETRACHLOROETHANE 1500.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	21.80589	1172.9117	2.9204	0.2356
2	36.46325	953.0512	4.8835	0.3940
3	46.97793	795.3311	6.2917	0.5076
4	54.87777	676.8334	7.3497	0.5929
5	61.02165	584.6753	8.1725	0.6593
6	65.92946	511.0581	8.8298	0.7124

Influent Conc. for TETRACHLOROETHENE 5000.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	80.51121	974.4396	35.9425	2.8997
2	96.14930	192.5352	42.9238	3.4629
3	99.23711	38.1447	44.3023	3.5741

4	99.84878	7.5612	44.5753	3.5961
5	99.97002	1.4990	44.6295	3.6005
6	99.99406	0.2972	44.6402	3.6014

Influent Conc. for 1,2,4-TRICHLOROBENZENE 520.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	38.68019	318.8630	1.7959	0.1449
2	60.52724	205.2584	2.8102	0.2267
3	73.85561	135.9508	3.4290	0.2766
4	82.37245	91.6633	3.8244	0.3085
5	87.97681	62.5206	4.0846	0.3295
6	91.73622	42.9716	4.2592	0.3436

Influent Conc. for TRICHLOROETHENE 12000.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	79.33789	2479.4534	85.0049	6.8578
2	95.63902	523.3177	102.4704	8.2669
3	99.07548	110.9422	106.1523	8.5639
4	99.80382	23.5415	106.9327	8.6268
5	99.95836	4.9964	107.0982	8.6402
6	99.99116	1.0605	107.1334	8.6430

Influent Conc. for VINYL CHLORIDE 190.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	89.62270	19.7169	1.5204	0.1227
2	98.91988	2.0522	1.6781	0.1354
3	99.88754	0.2137	1.6945	0.1367
4	99.98829	0.0222	1.6962	0.1368
5	99.99878	0.0023	1.6964	0.1369
6	99.99987	0.0002	1.6964	0.1369

Influent Conc. for BHC (ALPHA) 31.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	0.50630	30.8430	0.0014	0.0001
2	0.91534	30.7162	0.0025	0.0002
3	1.24637	30.6136	0.0034	0.0003
4	1.51465	30.5305	0.0042	0.0003
5	1.73232	30.4630	0.0048	0.0004
6	1.90909	30.4082	0.0053	0.0004

Influent Conc. for BHC (BETA) 3.4 ppb

NO OF	REMOVAL EFF	EFF CONC	OFF-GAS CONC	AIR EMISSION

TRAY	%	ppb	ug/l	lb/d
1	0.03593	3.3988	0.0000	0.0000
2	0.06504	3.3978	0.0000	0.0000
3	0.08862	3.3970	0.0000	0.0000
4	0.10772	3.3963	0.0000	0.0000
5	0.12319	3.3958	0.0000	0.0000
6	0.13573	3.3954	0.0000	0.0000

Influent Conc. for BHC (DELTA) 3.7 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	0.01947	3.6993	0.0000	0.0000
2	0.03524	3.6987	0.0000	0.0000
3	0.04801	3.6982	0.0000	0.0000
4	0.05836	3.6978	0.0000	0.0000
5	0.06675	3.6975	0.0000	0.0000
6	0.07354	3.6973	0.0000	0.0000

Influent Conc. for BHC (GAMMA)(LINDANE) 23.0 ppb

NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	0.09519	22.9781	0.0002	0.0000
2	0.17237	22.9604	0.0004	0.0000
3	0.23498	22.9460	0.0005	0.0000
4	0.28577	22.9343	0.0006	0.0000
5	0.32698	22.9248	0.0007	0.0001
6	0.36043	22.9171	0.0007	0.0001

Influent Conc. for TOTAL VOCs 20651.1 ppb

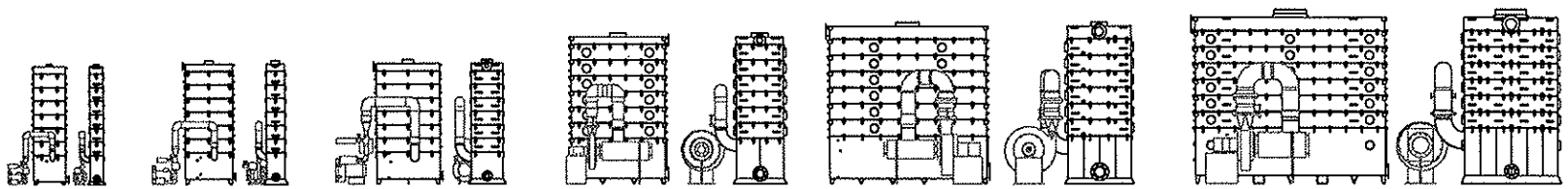
NO OF TRAY	REMOVAL EFF %	EFF CONC ppb	OFF-GAS CONC ug/l	AIR EMISSION lb/d
1	73.71862	5427.3947	135.9259	10.9659
2	90.02179	2060.6107	165.9865	13.3910
3	94.28321	1180.5807	173.8439	14.0249
4	95.77240	873.0451	176.5898	14.2465
5	96.52077	718.4984	177.9697	14.3578
6	97.01081	617.3009	178.8732	14.4307

CARBONAIR
www.carbonair.com

STAT® Series
Low Profile Air Strippers

Carbonair's exclusive STAT series represents the best choice in low profile air strippers, combining high performance, flexibility, and design simplicity. Carbonair's STAT units are available with a number of tray configurations, blowers and controls, and can achieve a removal efficiency of up to 99.99 % for a long list of volatile organic compounds.

Specifications[1]



Model	STAT 15	STAT 30	STAT 80	STAT 180	STAT 400	STAT 720
Liquid Flow Range (gpm)	0.5 - 12	1 - 35	5 - 80	10 - 200	20 - 400	40 - 1000
Minimum Airflow (cfm)	60	100	300	650	1800	3000
Maximum Airflow (cfm)	80	150	350	900	2100	4000
Blower HP [2]	1.0, 1.5	2, 3	5, 7.5, 10	10	20, 25	40, 50
Tray Dimensions (LxWxH, in)	24x10x10	36x14x10	48x24x10	72x36x11 5/8	120x48x12	144x72x12
Assembly Height (Approx.) [3]	7'-7 1/4"	7'-9 3/4"	7'-10 1/4"	9'-6"	10'-2 1/4"	10'-11 3/4"
Optional Skid Footprint (LxWxH, in)	47x29x4	64x34x6	66x60x6	88x86x6	138x102x6	--
Empty Tray Weight, Each (lb)	20	40	65	150	350	550
Assembly Weight (lb) [4]	360	560	1000	2040	4110	6820
Assembly Operating Weight (lb) [4]	610	940	2230	5550	11,820	21,850
Sump Holding Capacity (gal)	16	30	60	225	500	1000
Influent Connection (NPS) [5]	1.5" FPT	2"	3"	4"	6"	8"
Effluent Connection (NPS) [5]	2"	3"	3"	6"	8"	10"
Off-Gas Discharge OD	4 3/8"	6 3/8"	8 1/2"	12 19/32"	18"	24"

Design Features

- 304 stainless steel welded construction
- Gasoline-resistant neoprene gaskets
- Anti-bypass valve (no priming required)
- Polypropylene demister (99.5 % removal efficiency 10 microns and larger)
- Direct coupled blowers
- Clean-out ports (STAT 180-720)

Options

- ☐ Pump-down capability with discharge pump
- ☐ Pressure gauges and switches
- ☐ Water/air flow and temperature monitoring
- ☐ Explosion-proof controls and motors
- ☐ Off-gas carbon filtration
- ☐ Sample taps
- ☐ Control panel packages
- ☐ 316 SS construction
- ☐ Skid Mounted

Service Centers

FLORIDA
4710 Dignan Street
Jacksonville, FL 32254
800.241.7833
904.387.4465
904.387.5058 Fax

MINNESOTA
7500 Boone Ave N #101
Brooklyn Park, MN 55428
800.526.4999
763.315.4771
763.315.4614 Fax

TEXAS
4889 Hunter Rd. Bldg 1-C
San Marcos, TX 78666
800.893.5937
512.392.0085
512.392.0066 Fax

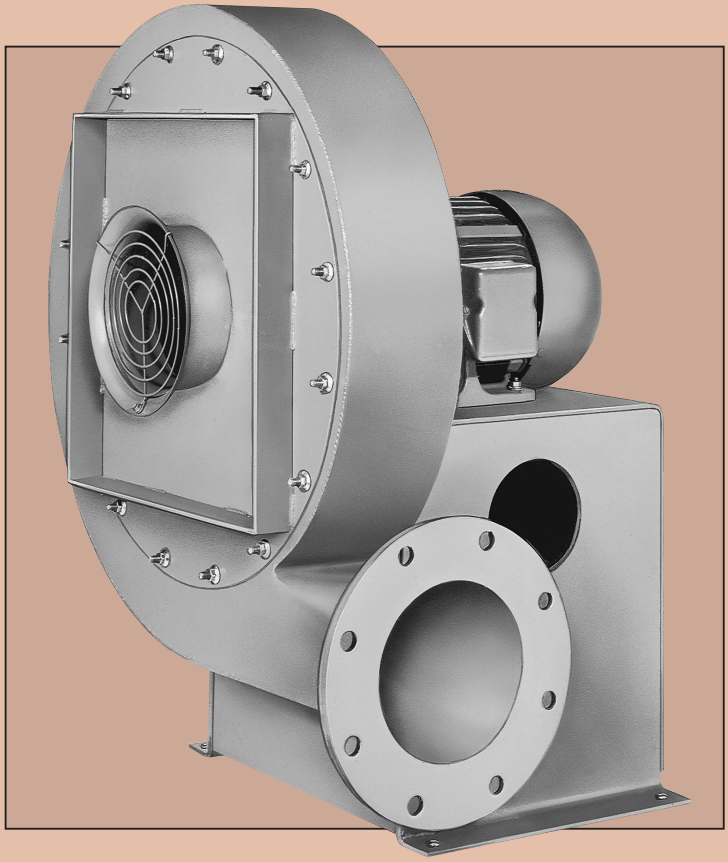
VIRGINIA
4003 West Main Street
Salem, VA 24153
800.204.0324
540.380.5913
540.380.5920 Fax

1. Specifications subject to change without notice
2. Blower HP depends on flow requirements. Single phase motors available up to 5 HP.
3. 6-tray unit without optional skid.
4. Includes approximate blower and ducting weight.
5. 150# flange pattern, unless noted. Effluent size is for gravity drain sumps.

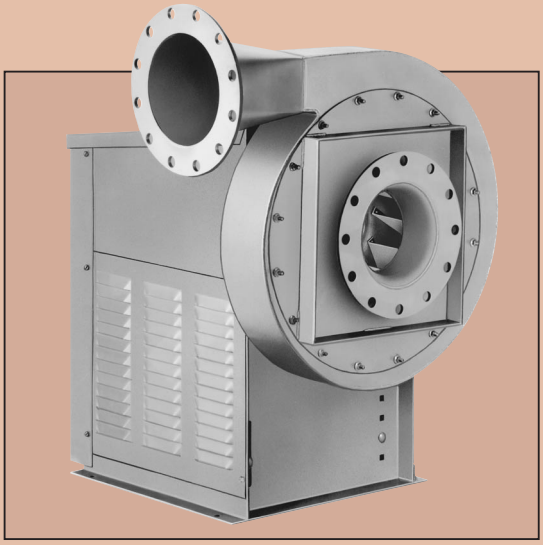
Dwg # 217355

BULLETIN 451
JANUARY, 2000

PRESSURE BLOWERS



ARRANGEMENT 4



ARRANGEMENT 10

ARRANGEMENT 8

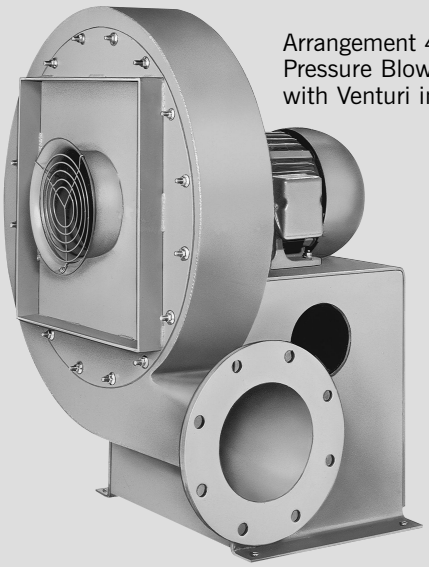
- Static pressures to 58"WG
- Capacities to 5200 CFM
- Temperatures to 600°F.

ISO 9001 CERTIFIED

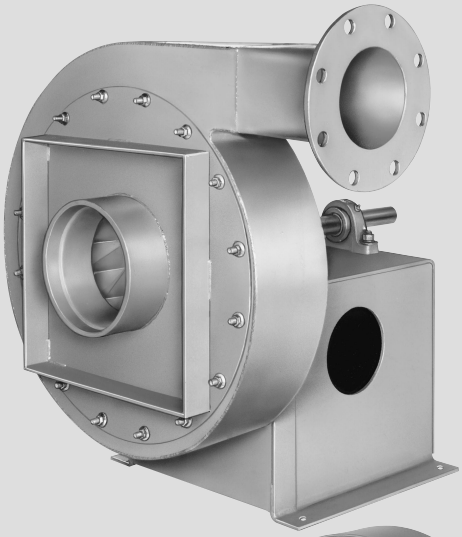
nyb | The New York Blower Company®

7660 QUINCY STREET–WILLOWBROOK, ILLINOIS 60521-5596
TEL: [630] 794-5700 • FAX: [630] 794-5776 • WEB: http://www.nyb.com • E-MAIL: nyb@nyb.com

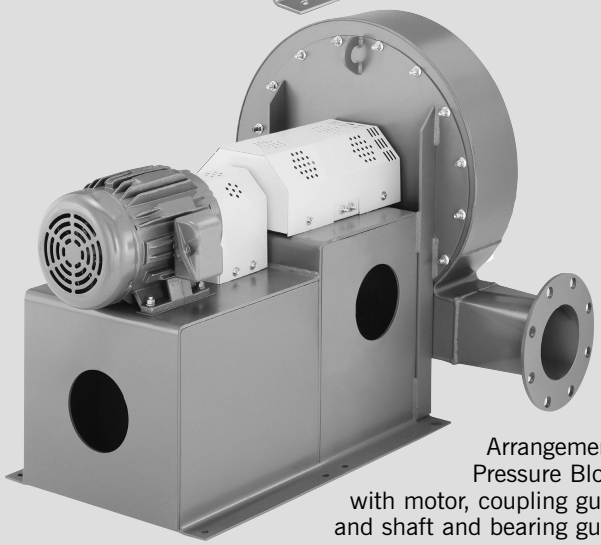
For greater pressures and capacities:
see Type HP Pressure Blowers



Arrangement 4
Pressure Blower
with Venturi inlet.



Arrangement 1
Pressure Blower
with plain pipe
inlet.



Arrangement 8
Pressure Blower
with motor, coupling guard,
and shaft and bearing guard.

amca CERTIFIED RATINGS — AIR PERFORMANCE — AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

The New York Blower Company certifies that the Pressure Blowers shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

PRESSURE BLOWERS ...for process systems

DESIGN FEATURES

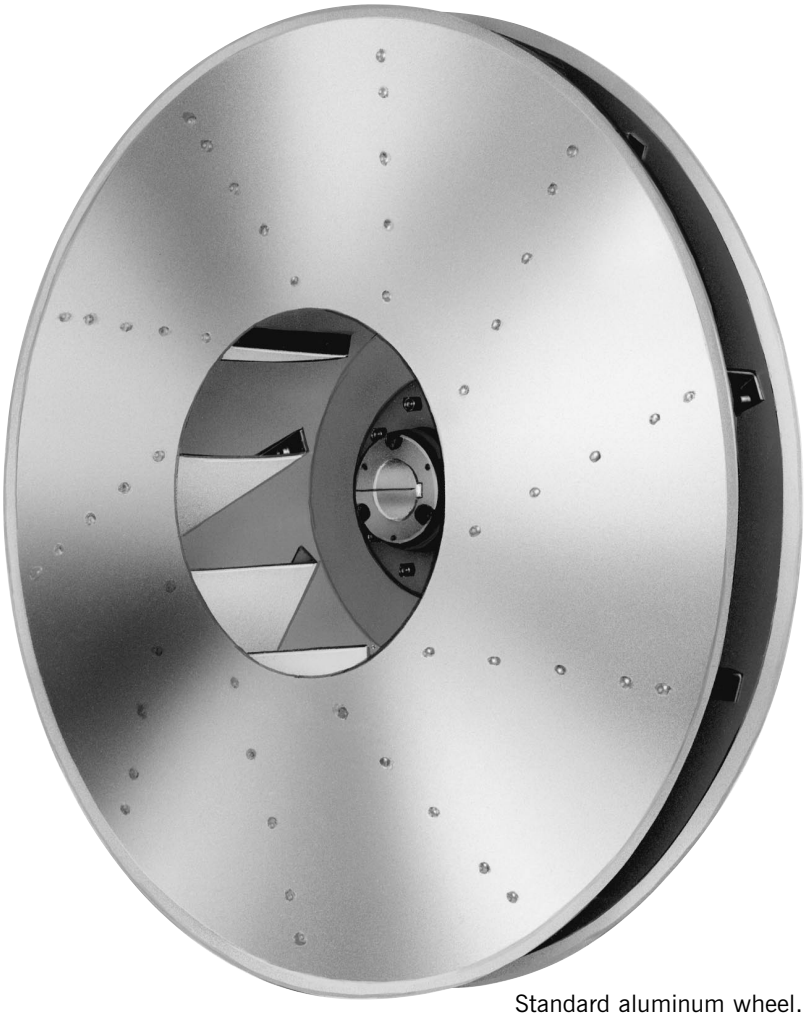
- Pressures to 58″WG.
- Capacities to 5200 CFM.
- Stable performance . . . the pressure curve remains stable from wide-open to closed-off . . . fan instability, or pulsation, is eliminated even when “turn-down” approaches zero flow.
- Efficiency . . . advanced wheel and aerodynamic housing design combine for air-handling efficiency superior to conventional radial-wheel designs.
- Wide performance range . . . choice of 13 wheel diameters and five outlet sizes enable efficient fan selection across a broad range of volumes and pressures.
- Choice of arrangements . . . direct-drive and belt-drive.
- Wide application range . . . designed for continuous operation in combustion, cooling, conveying, drying, and various process systems.

CONSTRUCTION FEATURES

- All-welded steel housings . . . heavy-gauge housings are rigidly braced to prevent “flexing” at high pressures.
- Flanges . . . continuously welded flanges match ANSI Class 125/150 hole pattern.
- Balance . . . all wheels are precision-balanced prior to assembly . . . fans with motors and drives mounted by **nyb** are final-balanced at the specified running speed.
- Shafting . . . straightened to close tolerance to minimize “run-out” and ensure smooth operation.
- Inlet configuration . . . a choice of three inlet types allows units to be tailored to specific application requirements.
- Lifting eyes . . . standard on all units for ease of handling and installation.
- Finish . . . medium-green industrial coating.

Standard Aluminum Wheel

The unique Pressure Blower wheel is designed to provide efficient performance and reduced sound levels . . . the dual-taper design concept yields typical efficiencies up to 10 percentage points greater than conventional straight radial wheels. Riveted high-strength aluminum alloy blades and side plates minimize overhung wheel weight and starting inertia. Ductile-iron, taper-lock hubs make wheels easily removable. Welded steel and stainless steel wheels are also available . . . see page 4.

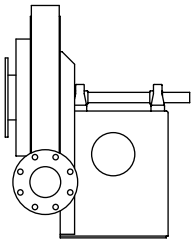


Standard aluminum wheel.

Arrangements

PRESSURE BLOWERS

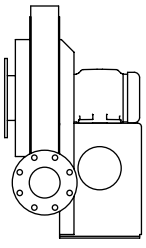
ARRANGEMENT 1



Recommended for belt-driven applications only. Wheel is mounted on shaft mounted in heavy-duty bearings.

Max. airstream temperature:
200˚F.–aluminum wheel.
300˚F.–steel wheel.
600˚F.–heat fan.

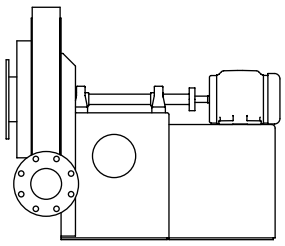
ARRANGEMENT 4



A compact direct-drive unit with a minimum number of moving parts for ease of maintenance. Wheel is mounted directly on motor shaft.

Max. airstream temperature:
180˚F.

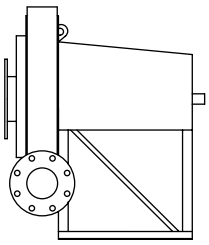
ARRANGEMENT 8



Direct-drive arrangement similar to Arrangement 1, but with integral motor pedestal . . . fan shaft is connected to the motor shaft with a flexible coupling.

Max. airstream temperature:
200˚F.–aluminum wheel.
300˚F.–steel wheel.
600˚F.–heat fan.

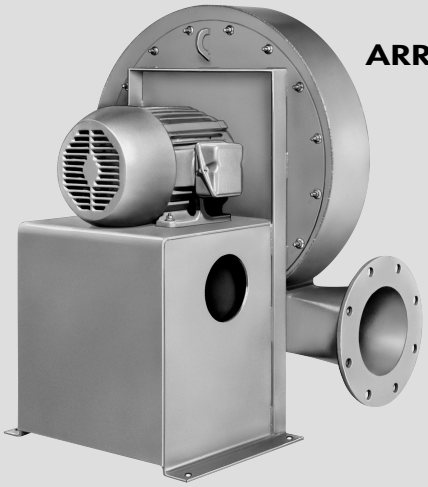
ARRANGEMENT 10



Enclosed belt-drive arrangement. Ideal for outdoor applications. Wheel mounted on shaft mounted in heavy-duty bearings.

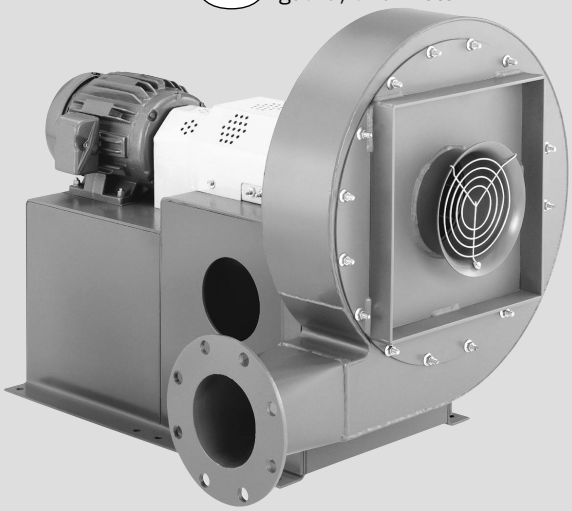
Max. airstream temperature:
200˚F.–aluminum wheel.
300˚F.–steel wheel.
600˚F.–heat fan.

ACCESSORIES MODIFICATIONS

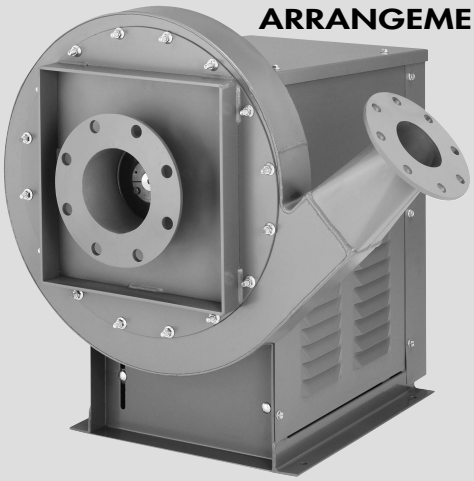


ARRANGEMENT 4

ARRANGEMENT 8 with Venturi inlet, shaft and bearing guard, coupling guard, and motor.



ARRANGEMENT 10 with flanged inlet and optional weather cover/belt guard.



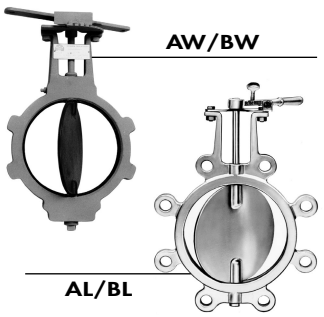
- **COMPANION FLANGES**
  Designed to fit flush with fan inlet and outlet flanges, provided with a matching hole pattern.

- **DRAINS**
  Tank flange is welded to the lowest point of the housing scroll . . . female pipe thread . . . includes plug.

- **INLET FILTER**
  Filters use oil-wetted or dry element. High-efficiency filter is flange-mounted. Furnished standard with outboard support bracket and available with or without protective hood.

- **SILENCERS**
  Available to match standard inlet or outlet flange sizes. Heavy-welded construction filled with high-density, acoustical absorption material.

- **OUTLET DAMPERS**
  Available as either an integral outlet design for fixed damper control or a separate wafer design for variable-flow applications [shown]. Wafer damper is available with optional actuator and positioner.



- **SHAFT SEALS**
  Ceramic-felt shaft seals consist of compressed ceramic felt elements. Lubricated lip seals [Buna, Teflon®, and Viton®] and gas-purgeable mechanical seals are also available. See your **nyb** representative for availabilty.
  [Teflon and Viton are registered trademarks of DuPont and DuPont Dow Elastomers, respectively.]

- **ACCESS DOOR**
  Gasketed, flush bolted door opens to provide access to wheel.

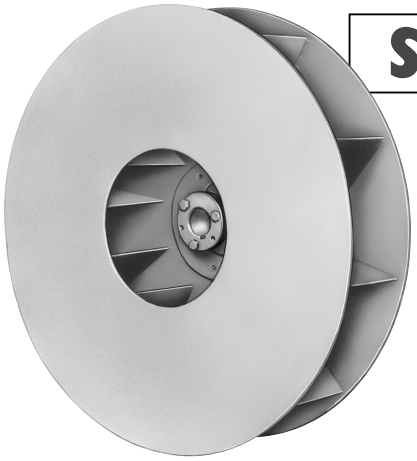
- **HEAT-FAN CONSTRUCTION**
  Available on Arrangements 1, 8, and 10 steel wheel Pressure Blowers up to 600˚F. Modifications include shaft cooler and shaft-cooler guard, and high-temperature paint above 500˚F.

- **NOMINALLY AIR-TIGHT CONSTRUCTION**
  Special construction to minimize leakage includes lip-type shaft seal, non-rotatable housing with solid drive side, double studs, and neoprene gasketing. Max. temperature 200˚F. with aluminum wheel, 300˚F. with steel wheel. Not available with heat-fan construction.

- **SPECIAL ALLOY CONSTRUCTION**
  Airstream components can be constructed of a wide range of alternate alloys for corrosive applications.

- **UNITARY BASE**
  Arrangement 1 fan, motor, and guards can be mounted and shipped on a rugged, structural-steel base. Factory-assembled and run-tested prior to shipment.

PERFORMANCE



Typical steel wheel.

STEEL WHEELS

Welded steel or stainless-steel wheel construction is available in straight radial design. AMCA Certified Ratings Seal applies to Pressure Blowers with aluminum wheel design only. Air volume and pressure capabilities are the same as the dual-taper aluminum wheel . . . brake horsepower requirements must be increased by the factors in Chart I.

CHART I
STEEL WHEEL HORSEPOWER CORRECTIONS

Outlet size	Wheel size	BHP correction factors*
04	14 to 22	1.15
06	14 to 18 19 to 26	1.06 1.15
08	15 to 22 23 to 26	1.06 1.15
10	19 to 26	1.06
12	23 to 26	1.06

*Some fan and motor combinations with steel wheels may be restricted due to starting torque requirements. Consult **nyb**.

18″ Pressure Blower with 04 outlet to handle 400 CFM at 23½″SP at .075 lbs./ft.^{3} density. Aluminum wheels require 2.6 BHP as shown on page 6. Steel or stainless-steel wheels require [1.15 x 2.6] 3.0 BHP.

MAXIMUM SAFE SPEED

CHART II
MAXIMUM SAFE SPEEDS [RPM]†

Wheel diameter	Aluminum wheel	Steel wheel	
	All Arr.	Arr. 1, 4, 8	Arr. 10
14	4000	4000	4000
15	4000	4000	4000
16	4000	4000	4000
17	4000	4000	4000
18	4000	4000	4000
19	3900	3900	2992
20	3900	3900	2918
21	3900	3900	2851
22	3900	3900	2787
23	3800	3800	3178
24	3800	3800	3121
25	3800	3800	3068
26	3800	3800	3017

† derate for temperature not required.

CORRECTION FACTORS

Performance is based on actual cubic feet per minute [ACFM] at the blower inlet at standard density [.075 lbs./ft.^{3}] and static pressure at the blower outlet. Static pressure capabilities are shown in inches water gauge [″WG].

Air density corrections are necessary for proper selection when air density varies from the standard .075 lbs./ft.^{3} at 70˚F. at sea level. This also occurs when negative static pressure exists [rarefication] on the inlet side of the fan. Multiply the required static pressure at conditions by the appropriate factors in Charts III, IV, and V to obtain corrected pressure for blower selection. Pressure and BHP will be reduced at conditions by the inverse of these factors. Multiply one factor by the other if temperature, altitude, and rarefication are non-standard. For example: If the installation is located at an altitude of 4000 feet, the gas temperature is 300˚F., and the inlet pressure is –40″WG, the correction factor is 1.84 [1.16 x 1.43 x 1.11].

CHART III
ALTITUDE [ft.] CORRECTIONS

Alt.	Factor
0	1.00
500	1.02
1000	1.04
1500	1.06
2000	1.08
2500	1.10
3000	1.12
3500	1.14
4000	1.16
4500	1.18
5000	1.20
6000	1.25
7000	1.30
8000	1.35
9000	1.40
10000	1.45

CHART IV
TEMPERATURE CORRECTIONS

Temp.˚F.	Factor
0	.87
20	.91
40	.94
60	.98
70	1.00
80	1.02
100	1.06
120	1.09
140	1.13
160	1.17
180	1.21
200	1.25
300	1.43
400	1.62
500	1.81
600	2.00

CHART V
RAREFICATION CORRECTIONS

Neg. inlet pressure ″WG	Factor
15	1.04
20	1.05
25	1.07
30	1.08
35	1.09
40	1.11
45	1.12
50	1.14
55	1.16
60	1.17
65	1.19
70	1.21
75	1.23
85	1.26

SAFETY EQUIPMENT

Belt guards, inlet and outlet guards, shaft and bearing guards, and coupling guards are available from The New York Blower Company. Contact your **nyb** representative for further information.

NOTE: Safe operation of air-moving equipment is dependent on proper installation and maintenance including selection and use of appropriate safety accessories for the specific installation. The system designer must consider providing guards for all exposed moving parts as well as protection from access to high-velocity airstreams. Improper application, installation, maintenance or safety-guard selection can create danger to life and limb of personnel. Users and/or installers should read “Recommended Safety Practices For Air Moving Devices” as published by the Air Movement and Control Association International, 30 West University Drive, Arlington Heights, Illinois 60004, which is included with the packing slips for all shipments from **nyb** and available on request.

Using Performance Curves

Performance is shown according to outlet sizes for quick reference to duct diameter and velocity. Brake horsepower increments are identified on each curve. Recommended standard blower size and motor combinations are based on the most efficient area of operation and are indicated by the arrows. Nonstandard combinations are generally available, but are usually less efficient than the standard combinations.

SIZING NOMENCLATURE

7-digit model number designates the wheel diameter, outlet size, wheel type, and nominal motor housepower.

Note: the last two digits showing motor horsepower are not required for Arrangement 1 Pressure Blowers

EXAMPLE

21 — Wheel diameter

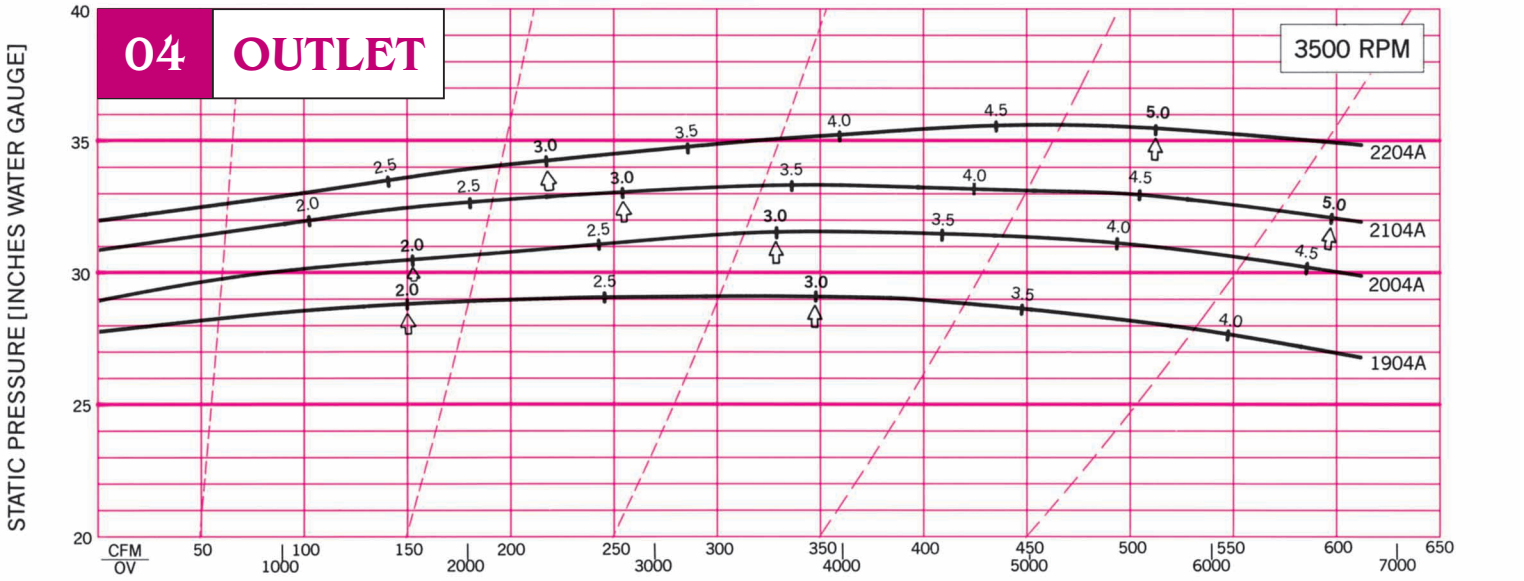
06 — Outlet size [inches]

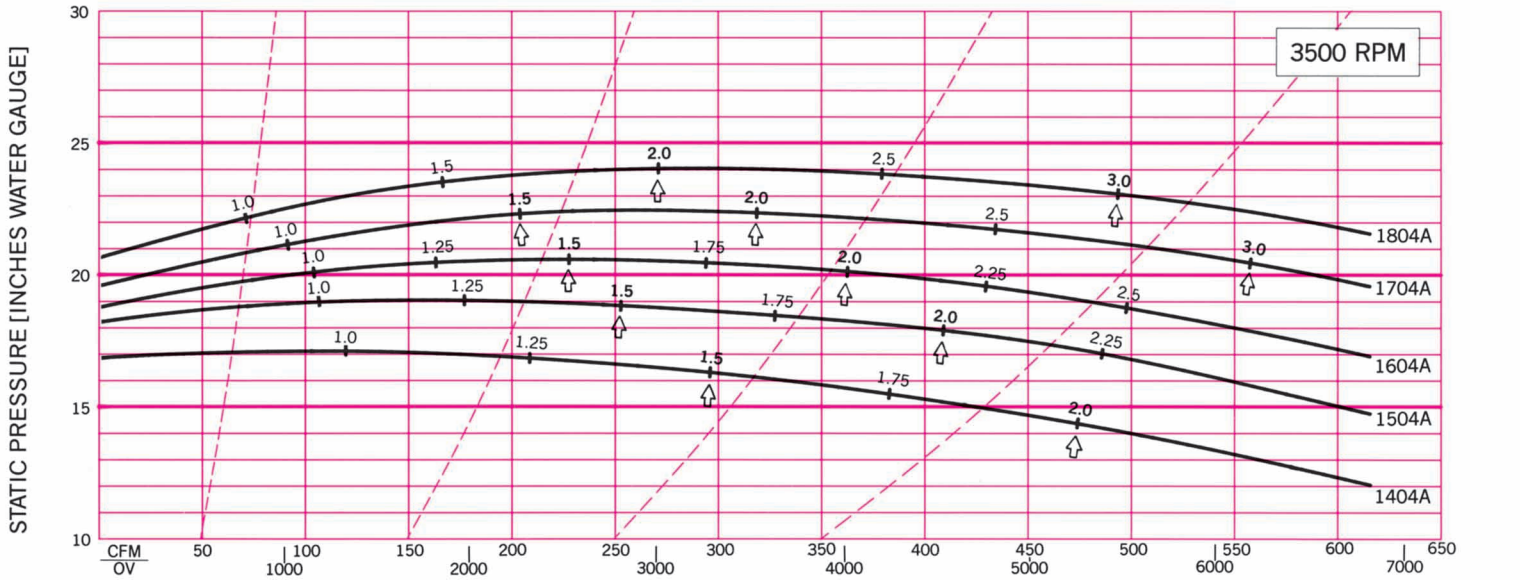
A — Wheel type: A = aluminum, S = steel/stainless steel

7½ — Nominal horsepower

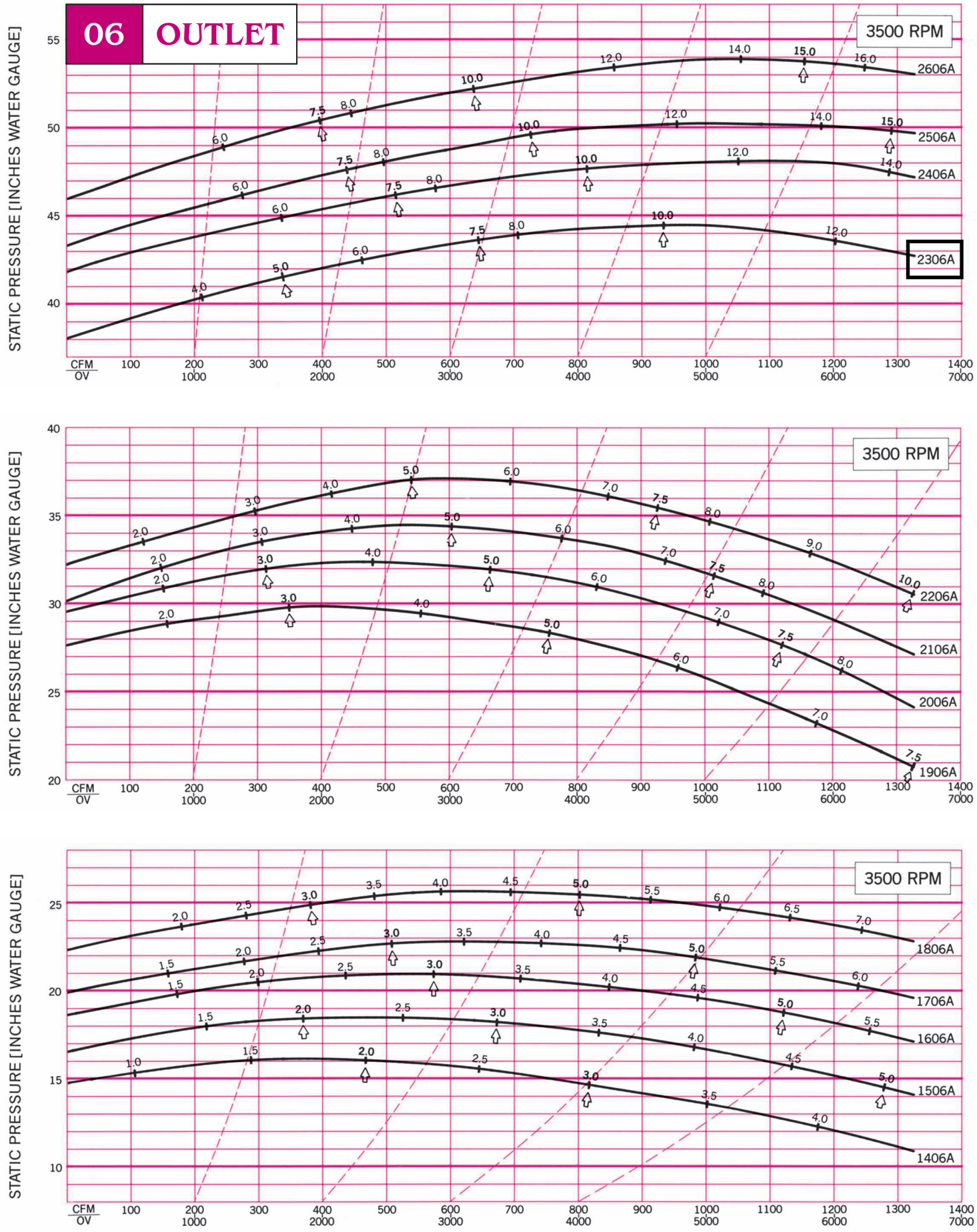
PROCEDURE	STEPS	EXAMPLE
Determine the appropriate outlet size.	1	The 06 outlet is selected for 800 CFM at 32″SP.
Plot the CFM and SP [standard] and follow a projected system line up to the pressure curve that meets or slightly exceeds the required performance.	2	A Size 2106A will provide 820 CFM at 33.6″SP.
Determine the BHP required for the point of operation . . . see page 4 for steel or stainless-steel wheel factors.	3	2106A requires 6.3 BHP. 2106S requires 7.2 BHP [6.3 x 1.15].
Read to the right to select motor horsepower.	4	A 7½ HP motor will cover both wheel types.

Note: The horsepower coverage of a given motor will increase 15% when a 1.15 service factor motor is utilized.





Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.



Performance shown is installation Type B: Free inlet, Ducted outlet. Power rating (BHP) does not include drive losses. Performance ratings do not include the effects of appurtenances in airstream.

DIMENSIONS [INCHES]

Dimensions not to be used for construction unless certified.

Wheel dia.	A		C	D	F	G	K	N	S	T			U		V	W
	Arr. 8	Arr. 10					Arr. 10	Arr. 10	Arr. 10	Arr. 4	Arr. 8	Arr. 10	Arr. 4	Arr. 8	Arr. 10	Arr. 10
14-18	19½	21	13⅜	11¾	14⅜	12¾	3½	22	17⅜	8⅞	9⅛	9⅜	9¾	10	8¼	10¼
19-22	23⅝	27⅝	16½	14⅞	17½	15½	4½	26	19⅞	10⅞	10⅞	12¼	11¾	11¾	11	13
23-26	26⅝	27⅝	19½	17⅝	20⅝	18¼	4½	26	19⅞	10⅞	10⅞	12¼	11¾	11¾	11	13

Wheel dia.	Outlet size	Inlet flange	Motor frame Arr. 4, 8	A Arr. 4	B	H Arrangement 4	H Arrangement 8	H Arrangement 10	JJ	K Arr. 8	L	M	NN Arr. 8	R Arr. 4, 8	R Arr. 10	S Arr. 4	S Arr. 8	Fan weight* Arrangement 4	Fan weight* Arrangement 8	Fan weight* Arrangement 10
14-18	04	6	143-145	17¾	18¼	19	39½	31⅛	5⅝	3⅜	6⅝	3⅞	31⅞	3⅜	4⅜	8⅝	15	145	295	205
			182-184	19		24½	41⅞						33⅜			14⅛	16½	165		
19-22			143-145	23	17¾	25	39⅞	36⅛	6⅛				31⅞		5⅛	14⅛	15	230	395	305
			182-184	24			42½						33⅜				16½			
14-18	06	8	143-145	17¾	18¼	21⅜	41⅞	33½	6¾	3⅜	8⅝	6¼	33	4½	5½	8⅝	15	165	315	210
			182-184	19		26⅞	44⅜						34½			14⅛	16½	185		
			213-215	19¾			47½			2⅞			36¾				18¾	190	320	
19-22		6	143-145	23	17¾	25	39⅞	36⅛	6⅛	3⅜	6⅝	3⅞	31⅞	3⅜	5⅛	14⅛	15	235	395	310
			182-184	24			42½						33⅜				16½	240		
			213-215	24¾			45⅝			2⅞			35⅝				18¾		400	
23-26		8	182-184	24	19	26½	44½	37⅞	7	3⅞	8⅝	5	34⅜	3⅞	5⅝	14⅛	17	290	490	390
			213-215	24¾			47⅝			3¼			36⅝				19¼			
			254-256	26		31⅞	51⅞						42			19½	24⅝	315	510	
15-18	08	8	182-184	19	18¼	26⅞	44⅜	33½	6¾	3⅜	8⅝	6¼	34½	4½	5½	14⅛	16½	190	315	215
			213-215	19¾			47½			2⅞			36¾				18¾		320	
19-22			182-184	24	17¾	26⅞	44⅜	38	6¾	3⅜	8⅝	6¼	34½	4½	6¼	14⅛	16½	260	420	315
			213-215	24¾			47½			2⅞			36¾				18¾		425	
			254-256	26		32¼	51¾						42⅛			19½	24⅛	290	440	
23-26			213-215	24¾	19	26½	47⅝	37⅞	7	3¼	8⅝	5	36⅝	3⅞	5⅝	14⅛	19¼	320	495	400
			254-256	26		31⅞	51⅞						42			19½	24⅝		515	
			284-286	26¾			53						42¾				25⅜			
19-22	10	10	213-215	24¾	21¾	26⅞	47½	38	6¾	2⅞	8⅝	6¼	36¾	4½	6¼	14⅛	18¾	300	430	325
			254-256	26		32¼	51¾						42⅛			19½	24¼		450	
			284-286	26¾			54⅜						42⅞				24⅞			
23-26			254-256	26	23	33¼	53¼	39	7¼	3¼	10¾	7¼	43⅛	5	6¾	19½	24⅝	350	535	405
			284-286	26¾			54⅜						43⅞				25⅜			
			324-326	29¼		37¼	56⅞						46⅜			23½	27⅞	375	540	
23-26	12	12	284-286	28¼	23	37¼	54⅜	39	7¼	3¼	10¾	7¼	43⅞	5	6¾	23½	25⅜	390	550	410
			324-326	29¼			56⅞						46⅜				27⅞			

* Bare fan weight, pounds, is approximate for units with aluminum wheels, less motors. For units with steel wheels, add the difference in wheel weights from the table at left.

Tolerance: ± ⅛″

WHEEL WEIGHTS AND INERTIA [WR²=LBS.–FT.²]

Size	Aluminum Wt.[lbs.]	Aluminum WR²	Steel Wt.[lbs.]	Steel WR²
1404	8.5	1.43	18.0	3.04
1406	11.7	2.4	20.5	3.46
1504	8.75	1.69	19.0	3.68
1506, 1508	11.8	2.4	21.5	4.16
1604	9.0	1.98	20.0	4.41
1606, 1608	12.1	2.5	23.0	5.07
1704	9.25	2.3	21.0	5.22
1706, 1708	12.2	2.6	24.5	6.09
1804	9.5	2.65	22.0	6.13
1806, 1808	12.4	2.6	26.0	7.25
1904, 1906	12.0	3.73	29.5	9.16
1908, 1910	15.1	5.1	34.5	10.72
2004, 2006	12.25	4.22	31.0	10.67
2008, 2010	15.3	5.2	36.5	12.56
2104, 2106	12.5	4.74	32.5	12.33
2108, 2110	15.5	5.3	38.0	14.42
2204, 2206	12.75	5.31	34.0	14.16
2208, 2210	15.6	5.4	40.0	16.66
2306, 2308	18.5	8.42	46.0	20.93
2310, 2312	21.7	10.6	53.5	24.35
2406, 2408	18.75	9.29	48.0	23.79
2410, 2412	21.9	10.8	56.0	27.75
2506, 2508	19.0	10.22	50.0	26.89
2510, 2512	21.9	11.0	58.5	31.46
2606, 2608	19.25	11.2	52.0	30.24
2610, 2612	22.3	11.2	61.0	35.48

MATERIAL SPECIFICATIONS U. S. STANDARD SHEET GAUGE TO 7 GAUGE

Wheel dia.	Housing: Scroll and sides	Housing: Side plates: Drive	Housing: Side plates: Inlet	Shaft dia. Arrangement: 1, 10	Shaft dia. Arrangement: 8	Bearings Arr. 1: Drive end	Bearings Arr. 1: Inboard	Bearings Arrangement: 8	Bearings Arrangement: 10	Drive key Arrangement: 8	Drive key Arrangement: 10
14-18	10	10	10	1 7/16	1 7/16	A	A	A	A	⅜	⅜
19-22	10	10	10	1 7/16	1 7/16	B	B	A	B	⅜	⅜
23-26	10	10	7	1 11/16	1 7/16	B	C	A	B	⅜	⅜

A–200 Series Ball B–22400 Series Roller C–300 Series Ball Tolerance: ± ⅛″

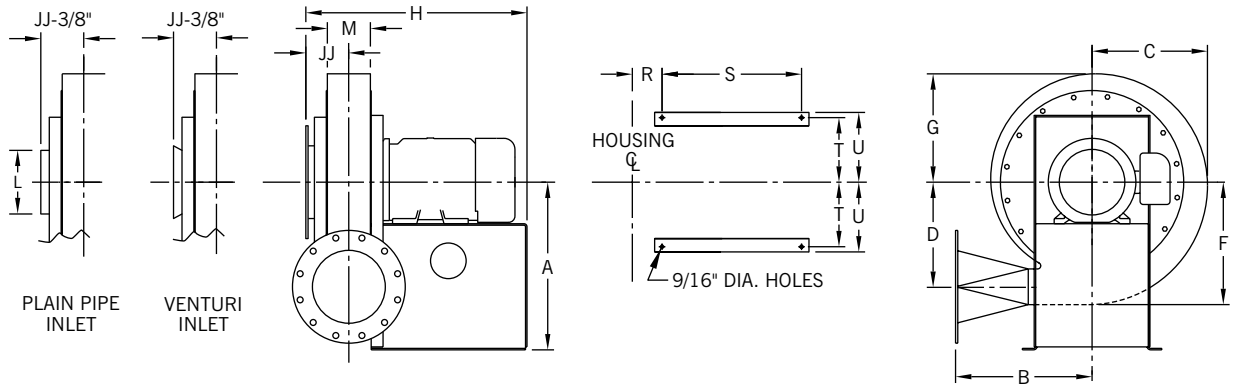
nyb reserves the right to substitute bearings of equal rating.

FLANGE DIMENSIONS [INCHES]	Flange size	I. D.	O. D.	Bolt circle	Holes† No. - Size
† Holes straddle centerline. ANSI Class 125/150 hole pattern. Flange thickness 3/8″	04	4	9	7½	8 - ¾″
	06	6	11	9½	8 - ⅞″
	08	8	13½	11¾	8 - ⅞″
	10	10	16	14¼	12 - 1″
	12	12	19	17	12 - 1″

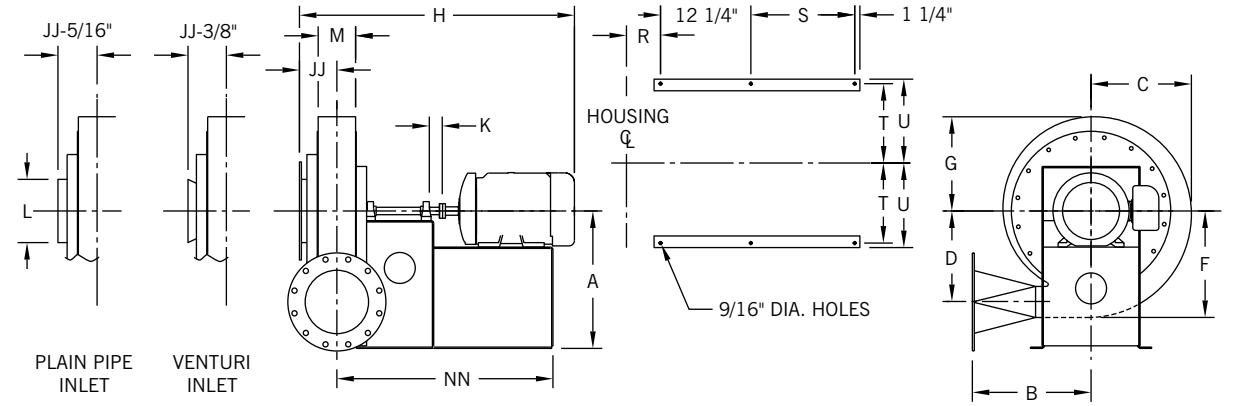
DRAWINGS

Dimensions not to be used for construction unless certified.

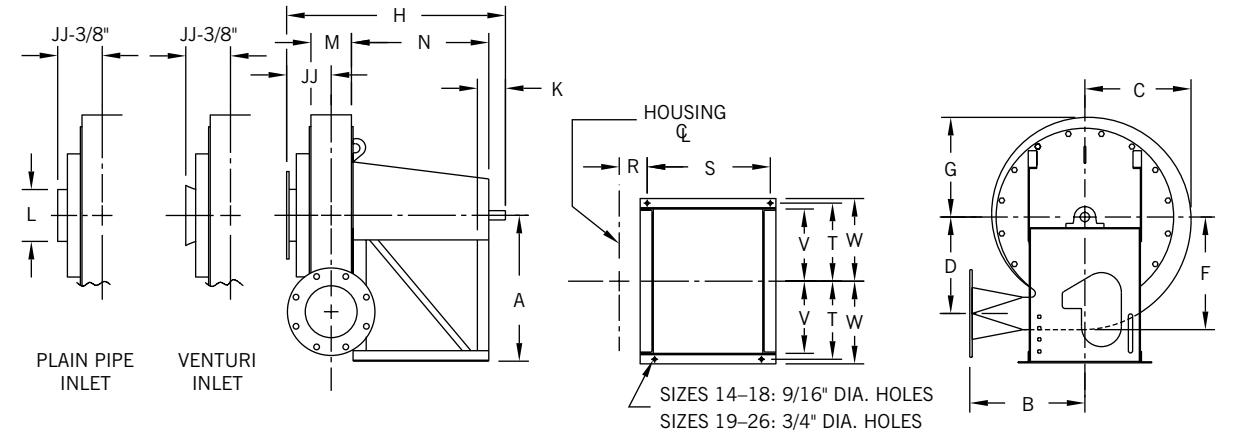
Arrangement 4 PRESSURE BLOWERS



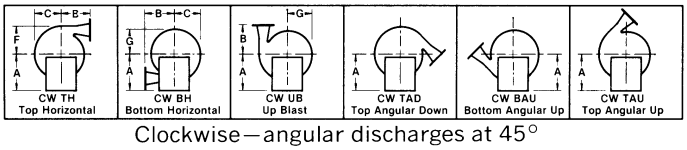
Arrangement 8 PRESSURE BLOWERS



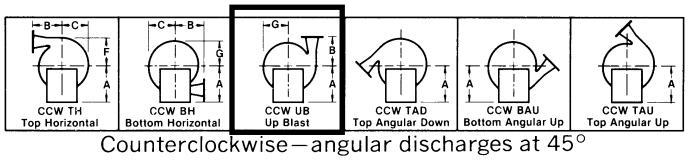
Arrangement 10 PRESSURE BLOWERS



FAN DISCHARGES—VIEWED FROM DRIVE SIDE



Clockwise—angular discharges at 45°



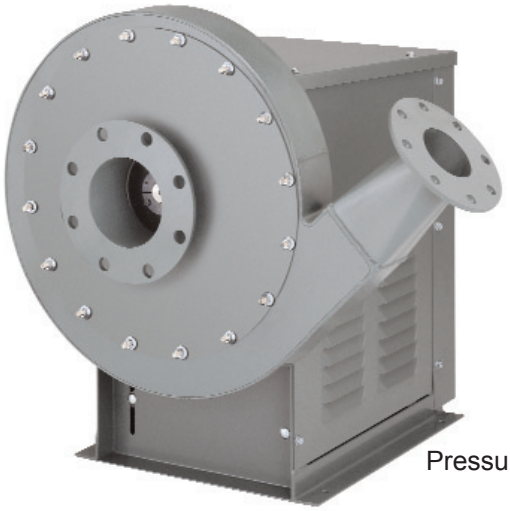
Counterclockwise—angular discharges at 45°

Housings are reversible and rotatable in 22½° increments except Down Blast and Bottom Angular Down which require special construction.
Arrangement 10 fans Sizes 19–22 are not rotatable in the field.

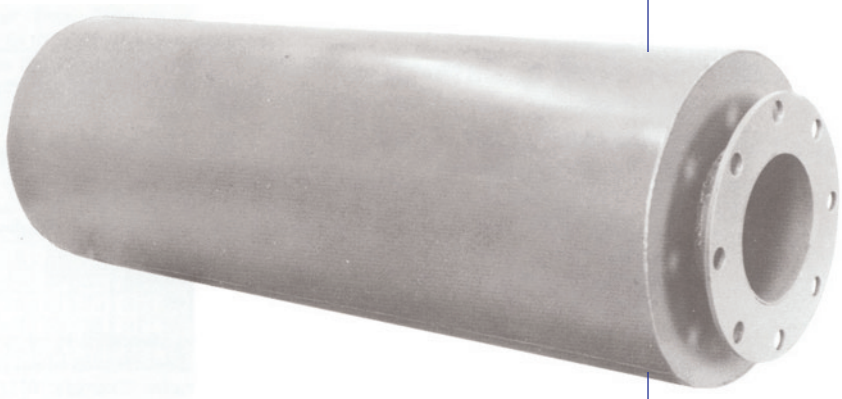
The New York Blower Company has a policy of continuous product development and reserves the right to change designs and specifications without notice.

PRESSURE BLOWER AND TYPE HP PRESSURE BLOWER SILENCERS

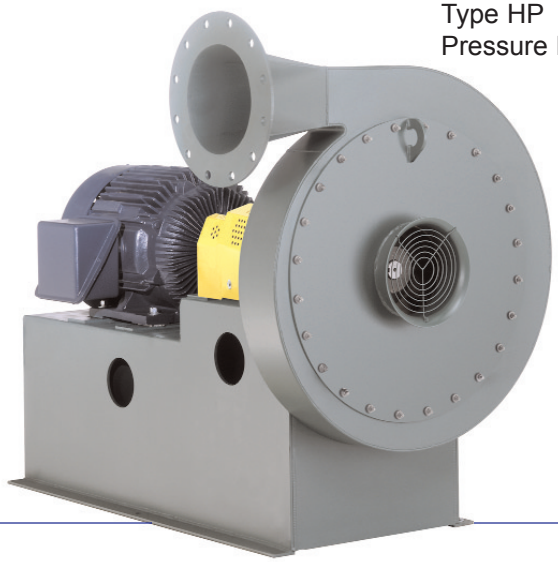
CS-853
604



Pressure Blower



Type HP
Pressure Blower



The New York Blower Company offers a wide variety of silencer solutions for its fans and blowers.

The silencers shown in this supplement have been designed specifically for **nyb**'s Pressure Blower and Type HP Pressure Blower products. They have been rated for acoustical attenuation with air flowing through them. The term "Dynamic Insertion Loss" is used to express attenuation when silencers are rated by this method, which has come to be recognized as the most accurate method for rating equipment that must handle air as well as attenuate sound.

The "Effective Flow Resistance" of a Pressure Blower Silencer is the result of the aerodynamic design of the silencer. The "Effective Flow Resistance" shown in Chart I provides a means of correcting for this resistance. However, note that in terms of fan static pressure, this correction becomes insignificant for most applications.

FEATURES

- **Versatile Design** - While **nyb** Pressure Blower/Type HP Pressure Blower Silencers were designed specifically for mounting on the inlet or outlet of the fan, they may also be used elsewhere in the duct.
- **Ease of Installation** - Silencers can be equipped with flanged or slip type connections to fit a variety of mounting arrangements. A venturi inlet with guard is also available for use on the inlet side of the silencer when no duct will be used.
- **Quality Construction** - Heavy welded steel construction ... casing filled with high density acoustical absorption material.
- **Temperature Capability** - Silencers operate efficiently at temperatures up to 600°F.
- **Accurately Rated** - The ratings in this supplement provide accurate values of sound power attentuation which can be used to calculate the sound power levels of the fan and silencer combination. All data is based on tests conducted in New York Blower's AMCA Certified laboratory using AMCA prescribed test methods.

ISO 9001 CERTIFIED

nyb | The New York Blower Company®

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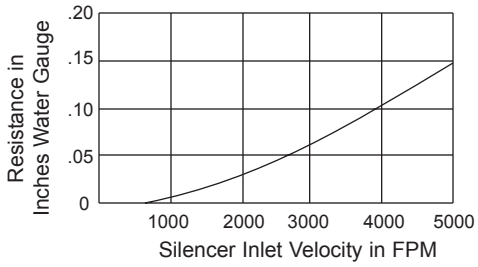
EFFECTIVE FLOW RESISTANCE

NOTE: The values shown in Chart I are flow losses through the silencer.

CHART I



SELECTING A SILENCER

1. If the silencer is to be mounted on the fan (inlet or outlet), the recommended size is that which corresponds to the flange diameter of the inlet or outlet, depending upon where the silencer will be used. For example, a Size 1704A1 1/2 Pressure Blower will take a Size 6 Pressure Blower Silencer on the inlet or a Size 4 Pressure Blower Silencer on the outlet. Consult the Pressure Blower Bulletin and the Type HP Pressure Blower Bulletin for inlet and outlet dimensions.

2. If the silencer is to be mounted remotely in the duct, use the Silencer size which corresponds to fan type and duct diameter. Example: 6" I.D. duct requires a Size 6 Silencer.

3. In applications where high duct velocities are present, it is recommended that Self-Noise . . . the sound produced in the silencer itself by the air flowing through it . . . be considered. This may indicate that a larger silencer is required. An appropriate transition must be provided by the customer in this event. Refer to Chart III.

PROPER INSTALLATION OF SILENCERS

1. If maximum attenuation is desired, the silencer should be structurally isolated from the fan and installed with flexible connections. This would necessitate the use of silencers with slip connections and independent supports by the customer.

2. Silencers mounted directly to the fan flange must be supported at the end opposite the fan. For inlet silencers, **nyb** offers a pre-designed support leg. For outlet silencers, the customer must provide the appropriate means of support.

3. Two silencers may be used in series to further reduce noise in the system. However, it should be remembered that each silencer contributes Self-Noise. Eventually, a practical limit is reached where the cumulative Self-Noise level equals or exceeds the Total Sound Power Level.

4. Plain pipe or flanged connections may be ordered on either or both ends of the Silencer.

NOTE: When a silencer is to be used on the inlet of the fan with no additional inlet duct, the use of a venturi inlet is recommended in order to minimize entrance loss. (A venturi inlet is not available on Size 3 or Size 4 Silencers.)

CALCULATING NET SOUND POWER

To determine the Sound Power Level of a fan and silencer combination, use the method shown below.

1. Determine the Fan Inlet or Outlet Sound Power Level from the sound power ratings obtained from **nyb's** Fan-To-Size selection program.
2. Subtract the DIL (Dynamic Insertion Loss) shown in Chart II/III from the values of Step 1. For most applications, this is the new Sound Power Level of the fan and silencer combination.
3. In most industrial applications, Self-Noise is a much lesser concern than in others. The Self-Noise values, however, are shown here for those few installations where extremely low levels result.

   Add the Self-Noise to the results of Step 2 **logarithmically**. To do this, find the difference (in db) between the value obtained in Step 2 and the Self-Noise and select the "Logarithmic Addition Value" from Chart V. Add the Logarithmic Addition Value to the Outlet (or Inlet) Sound Power Level, less DIL, or to the Self-Noise, whichever is greater. The sum is the Sound Power Level of the fan and silencer combination.

TYPE HP PRESSURE BLOWER SILENCER

CHART III DYNAMIC INSERTION LOSS (DIL) IN DECIBELS	Silencer Size	OCTAVE BAND 1	2	3	4	5	6	7	8
	10	5	7	6	3	3	5	4	3
	12	6	7	8	7	6	5	4	4
	14	5	6	7	7	6	5	4	5

CHART IV SELF-NOISE IN DECIBELS	Silencer Inlet Velocity (fpm)	OCTAVE BAND 1	2	3	4	5	6	7	8
	1000	35	29	25	20	*	*	*	*
	2000	40	34	29	26	25	22	*	*
	3000	50	44	39	37	36	34	29	20
	5000	57	51	47	46	45	45	42	35
	6000	60	55	52	51	50	49	48	42
	7000	61	56	54	53	52	52	51	46
	8000	64	59	58	57	57	57	56	51

*Values less that 20 db considered negligible.

PRESSURE BLOWER SILENCER

CHART II DYNAMIC INSERTION LOSS (DIL) IN DECIBELS	Silencer Size	OCTAVE BAND 1	2	3	4	5	6	7	8
	3								
	4	4	18	26	34	37	30	23	21
	5								
	6	2	14	23	32	34	29	25	23
	8	1	11	21	30	31	29	26	25
	10	2	14	23	32	31	28	25	24
	12	1	11	24	33	32	28	25	24

CHART V LOGARITHMIC ADDITION VALUES	Difference Between Sound Levels (db)	0	1	2	4	6	9	10 or over
	Add to Higher Sound Power Level	3	2 1/2	2	1 1/2	1	1/2	0

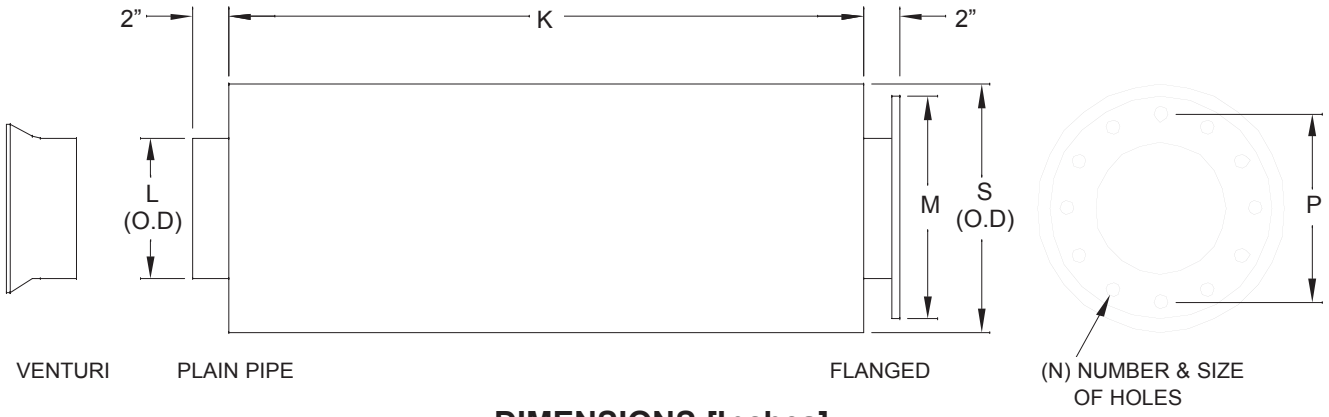
EXAMPLE

Calculate the Sound Power Level at the open downstream end of the outlet duct of a combination Pressure Blower Silencer and a Size 1910A15 Arrangement 4 Pressure Blower delivering 2100 CFM, 3838 FPM O.V., at 27.5" SP.

This Pressure Blower has a 10" outlet. Therefore, a Size 10 Pressure Blower silencer will be used.

Net Sound Power Level calculations are as follows:

Line	OCTAVE BAND	1	2	3	4	5	6	7	8
1.	Outlet Sound Power Level (from the Fan-To-Size selection program).	90	94	95	96	93	91	89	87
2.	Deduct the DIL (from Chart II/III).	-2	-14	-23	-32	-31	-28	-25	-24
3.	Outlet Sound Power Level less DIL (Line 1 plus Line 2).	88	80	72	64	62	63	64	63
	When low outlet sound power levels are encountered, it is advisable to complete Steps 4 through 6 to determine the effect of Pressure Blower/Type HP Pressure Blower Self-Noise on the Net Outlet Sound Power Level.								
4.	Self-Noise (from Chart IV).	54	48	44	43	42	40	38	30
5.	Logarithmic Addition Value (from Chart V) based on the difference between Line 3 and Line 4.	0	0	0	0	0	0	0	0
6.	Net Pressure Blower/Type HP Pressure Blower Combination Sound Power Level: Greater of Line 3 or 4 plus Line 5.	88	80	72	64	62	63	64	63



DIMENSIONS [Inches]

Pressure Blower

Silencer Size	K	L	M	S	P Bolt Circle	N Number & Size of Holes†	Outer Shell (Gauge)	Weight (Approx. Pounds)	Inlet or Outlet Area [sq. ft.]
3	36	3 5/8	7 1/2	14	6	4 - 3/4	14	65	.05
4	36	4 1/2	9	14	7 1/2	8 - 3/4	14	70	.09
5	36	5 5/8	10	14	8 1/2	8 - 7/8	14	70	.14
6	36	6 5/8	11	14	9 1/2	8 - 7/8	14	75	.20
8	36	8 5/8	13 1/2	14	11 3/4	8 - 7/8	14	80	.35
10	36	10 3/4	16	20	14 1/4	12 - 1	14	125	.55
12	36	12 3/4	19	20	17	12 - 1	14	130	.79

Type HP Pressure Blower

Silencer Size	K	L	M	S	P Bolt Circle	N Number & Size of Holes†	Outer Shell (Gauge)	Weight (Approx. Pounds)	Inlet or Outlet Area [sq. ft.]
10	36	10 1/4	16	20	14 1/4	12 - 1	14	125	.55
12	42	12 1/4	19	24	17	12 - 1	14	185	.79
14	42	14	21	24	18 3/4	12 - 1 1/8	14	180	1.07

† ANSI Class 125/150 hole pattern . . . flange thickness 3/8" Tolerance ± 1/8"
Dimension should not be used for construction unless certified. Weights shown are for silencers with flanged connections.

THE NEW YORK BLOWER COMPANY POLICY REGARDING "SOUND" SPECIFICATIONS

NOTE:This policy statement is presented both as a guide to purchasers of fan equipment and as a resolution of **nyb**'s responsibility in cases where the purchaser has requested that **nyb** equipment meet certain noise level specifications.

nyb provides sound power level ratings in each of the eight octave bands, as tested and rated in accordance with Air Movement and Control Association (AMCA) Publication 300. These ratings are statements of the total sound energy levels emanating from the inlet and outlet of the fan itself.

These sound power ratings are considered the only truly accurate basis for comparison, or for further estimating the resultant noise levels within a given system or installation. Refer to **nyb** Engineering Letter 12 for a detailed explanation.

In some cases **nyb** offers silencers for the fan inlet and/or outlet that can be used to attenuate sound power emanating through the fan inlet or outlet. Specific ratings are available to determine the revised sound levels resulting from the use of such silencers.

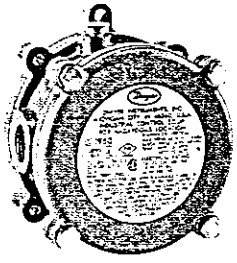
Though methods are available for estimating values of sound pressure levels by octave band or the single number dBA at points some distance from the fan, these result merely in estimates based on ideal situations that do not take into effect background noise, other sound producing equipment in an installation, the effective building configuration and construction and/or the effects of ductwork configuration and physical construction.

Specifications demanding guaranteed pressure levels in any form, either adjacent to the fan or at other points in the installation or system, can only be met through qualified analysis of the total system and physical environs by professional Acoustical Consultants or trained Acoustical Engineers - a professional service that is clearly beyond the responsibility of the fan manufacturer.

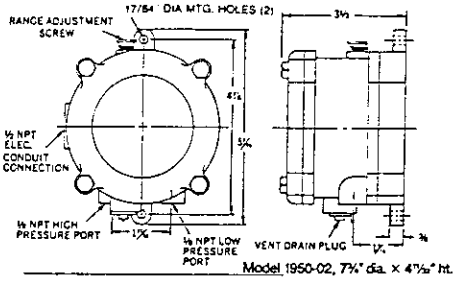
Consequently, **nyb** offers these sound power level ratings, as tested and rated in accordance with AMCA Publication 300 and 301, as the only qualified tool for meaningful evaluation by the purchaser or his agent. This constitutes and exception to any specification for sound data or guarantees in any form other than sound power level ratings.

Series 1950 Explosion-Proof Differential Pressure Switches

Compact, Low cost, Explosion-proof and Weatherproof.



Patent No. 3,566,060



Model 1950-02, 7¾" dia. x 4⅞" ht.

Model 1950 Explosion-Proof Differential Pressure Switch combines the best features of the popular Dwyer series 1900 with an integral explosion-proof and weather-proof housing, making it an exceptional value for either application. It is C.E., U.L. and C.S.A. Listed, F.M. approved for use in Class I Groups C and D, Class II Groups E, F, and G and Class III hazardous atmospheres (NEMA 7 & 9). Weather-proof features include a drain plug and O-ring seal in cover. Electrical connections are easily made by removing front cover. For convenience the set point adjustment screw is located on the outside of the housing. Twelve models offer set points from .03 to 20" (.8 to 508 mm) w.c. and from .5 to 50 psi (3.4 to 345 kPa). The unit is very light and compact – about half the weight and bulk of other explosion-proof or weather-proof switches with separate enclosures.

PHYSICAL DATA

Temperature Limits: -40°F to 140°F (-40°C to 60°C). 0°F to 140°F (-18°C to 60°C) for 1950P-8, 15, 25, and 50 -30°F to 130°F (34°C to 54°C) for 1950-02
Maximum Surge Pressure: 1950-10 psi (.7 bar), 1950P - 50 psi (3.4 bar) 1950P-50 only - 90 psi (6.2 bar)
Rated Pressure:1950 - 45" (.1 bar) w.c., 1950P - 35 psi (2.4 bar), 1950P-50 only - 70 psi (4.8 bar)
Pressure Connection: ⅛" NPT(F).
Electrical Rating: 15 amps, 125, 250, 480 volts. 60 Hz. AC. Resistive ⅛" H.P. @125 volts, ¼" H.P. @ 250 volts, 60 Hz. A.C.
Wiring Connections: 3 screw type; common, norm. open and norm. closed.
Conduit Connection: ½" NPT(F).
Set Point Adjustment: Screw type on top of housing. Field adjustable.
Housing: Anodized cast aluminum.
Diaphragm: Molded fluorosilicone rubber. 02 model, silicone on nylon.
Calibration Spring: Stainless steel.
Installation: Mount with diaphragm in vertical position.
Weight: 3¼ lbs. (1.5 kg) 02 model, 4 lbs., 7 oz. (2 kg)

SERIES 1950 SWITCHES — STOCKED MODELS, OPERATING RANGES AND DEAD BANDS

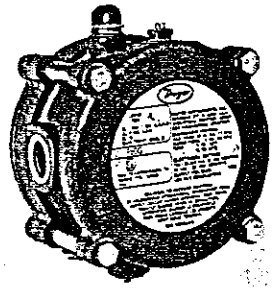
Model Number	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950-02	.03 to .10	.025	.05
1950-00	.07 to .15	.04	.05
1950-0	.15 to .50	.10	.15
1950-1	.4 to 1.6	.15	.20
1950-5	1.4 to 5.5	.30	.40
1950-10	3 to 11	.40	.50
1950-20	4 to 20	.40	.60

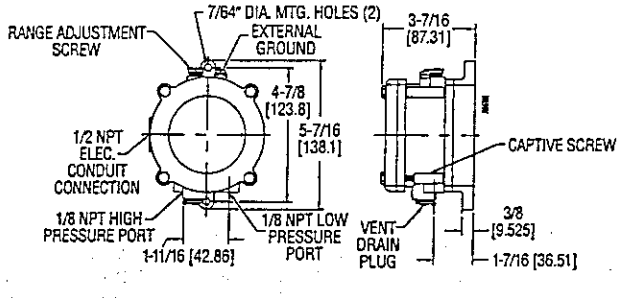
Model Number	Range, PSID	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950P-2	0.5 to 2	.3	.3
1950P-8	1.5 to 8	1.0	1.0
1950P-15	3 to 15	.9	.9
1950P-25	4 to 25	.7	.7
1950P-50	15 to 50	1.0	1.5

CAUTION: For use only with air or compatible gases. Applications with hazardous atmospheres and a single positive pressure may require special venting.

Model 1950G Integral Explosion-Proof Pressure Switch

Explosion-Proof, Weatherproof, Compatible with Natural Gases





The Model 1950G Explosion-Proof Switch combines the best features of the popular Dwyer Series 1950 Pressure Switch with the benefit of natural gas compatability.

Units are rain-tight for outdoor installations, and are U.L. listed for use in Class I, Groups A, B, C, & D; Class II, Groups E, F, & G and Class III atmospheres, CENELEC approved for EExd IIB & Hydrogen T6, and CSA & FM approved for Class I, Div 1, Groups B, C, D; Class II, Div 1, Groups E, F, G and Class III atmospheres. The 1950G is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.

Easy access to the SPDT relay and power supply terminals is provided by removing the top plate of the aluminum housing. A supply voltage of 120 or 240 VAC is required. A captive screw allows the cover to swing aside while remaining attached to the unit. Adjustment to the set point of the switch can be made without disassembly of the housing.

PHYSICAL DATA

Temperature Limits: 0°F to 140°F (17.7° to 60°C). Note: Setpoint drift may occur with ambient temperature changes.
Rated Pressure: 45 IN. w.c.
Maximum Surge Pressure: 10 psi.
Pressure Connections: ⅛" NPT(F).
Electrical Rating: 10A, 120/240 VAC, 28 VDC Resistive 50mA, 125 VDC.
Supply Voltage: 120/240 VAC.
Wiring Connections: Internal Terminal Block.
Conduit Connections: ½" NPT(F).
Set Point Adjustment: Screw type on top of housing. Field adjustable.
Housing: Anodized cast aluminum.
Diaphragm: Buna-N. **Weight:** 3¼ lbs.
Calibration Spring: Stainless Steel.
Installation: Mount with diaphragm in vertical position.
Response Time: Switch response time may be as much as 10-25 seconds where applied pressures are near set point.

STOCKED MODELS

Model Number	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950G-00	.07 to .15	.04	.06
1950G-0	.15 to .50	.06	.11
1950G-1	.4 to 1.6	.11	.29
1950G-5	1.4 to 5.5	.4	.9
1950G-10	3 to 11	.9	1.8
1950G-20	4 to 20	1.2	3.0

Dwyer Instruments, Inc. P.O. Box 373/Michigan City, Indiana 46361/Phone 219 879-8000/Fax 219 872-9057 • U.K. Phone (01494)-461707 • Australia Phone (02) 9756-5355

Madison

E54633
E150881
(Nos. 2A551 & 4YM34 only)

Made In U.S.A.

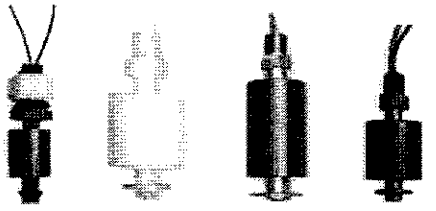
LR56150
LR26414-1
(No. 2A551 only)

Liquid Level Controls

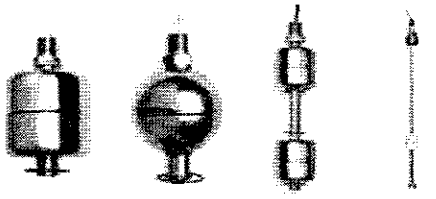
Used for alarm circuits that control motor starters, contactors, solenoids, and relays. Magnetically-activated dry reed switch has 22-gauge, 24" leads. User selectable, normally open or normally closed switch operation. No. 4YM30 control is normally open operation only.

POLYPROPYLENE

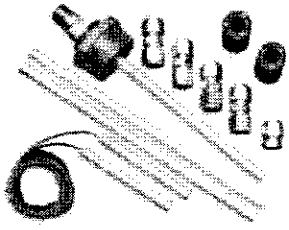
Used for general purpose applications and highly acidic conditions. All controls are constructed of FDA approved materials and have seamless formed floats. No. 2XC13 mounts inside or outside of tank; No. 4YM37 mounts inside of tank.



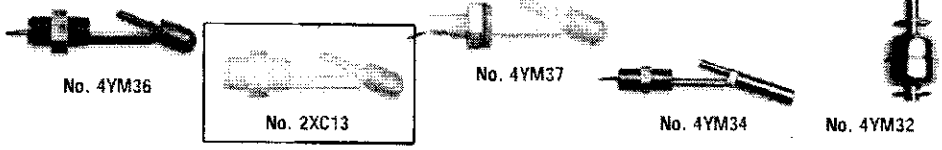
No. 4YM29 No. 2A554 No. 2A553 No. 4YM35



No. 2A551 No. 4YM33 No. 3AY51 No. 3VU50



No. 3VU48



No. 4YM36 No. 2XC13 No. 4YM37 No. 4YM34 No. 4YM32

BUNA N BRASS

Excellent for low specific gravity fluids. Use with lubricating/hydraulic oils and solvents. Controls are not NSF approved.

BUNA N PBT

Polybutylene Terephthalate switch is ideal for small diameter fuel and lubricating oil applications. Not for water over 65°C. Mounts inside or outside of tank. Not NSF approved.

316 STAINLESS STEEL (SS)

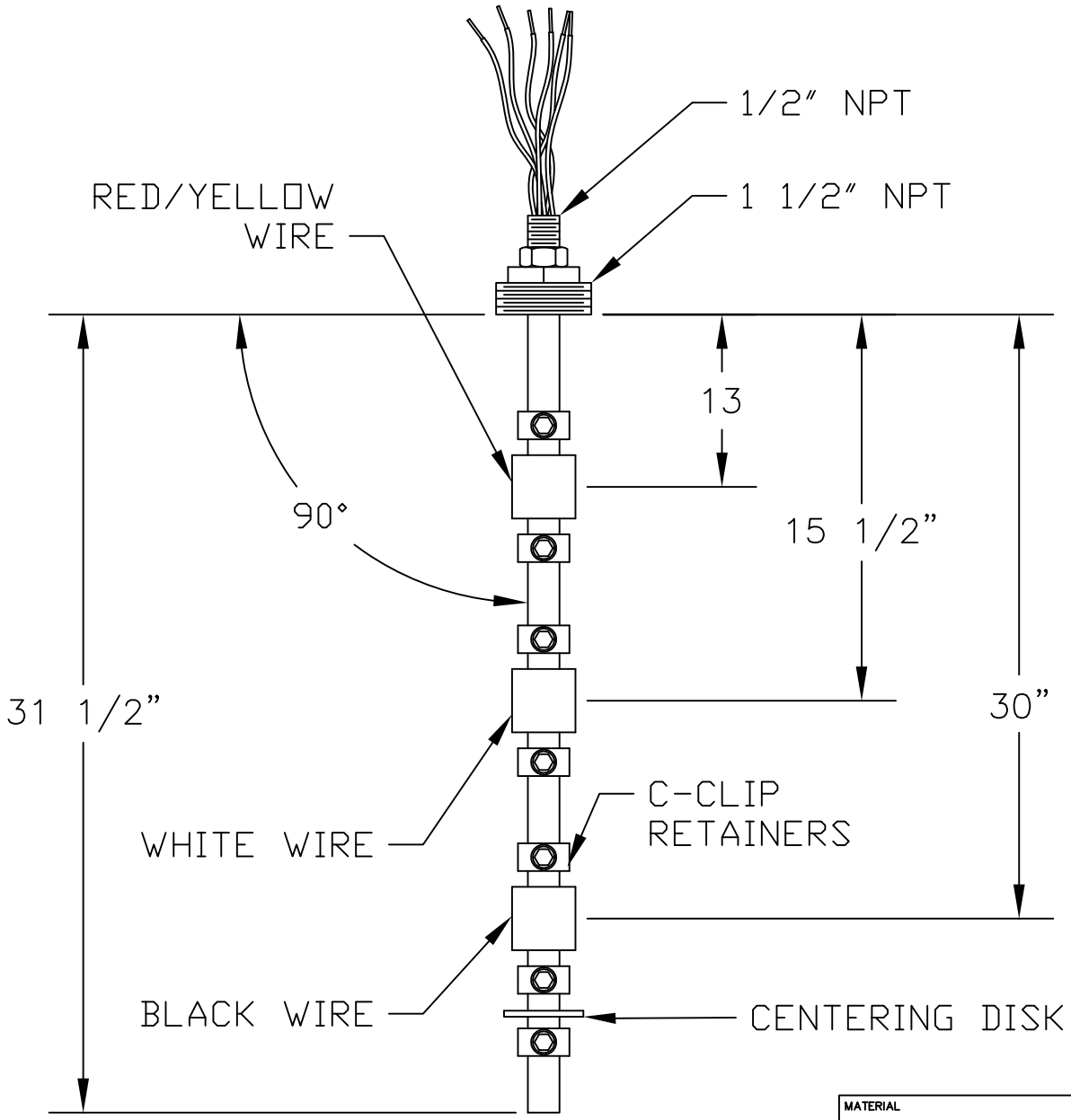
316 SS stainless steel is highly polished for use in high temperature, high pressure, and corrosive conditions, such as food processing. No. 2A551 is rated for hazardous locations. No. 4YM33 is specifically designed for high current conditions. No. 4YM34 is for mounting from inside tank or outside tank with conduit connector, and is rated for hazardous locations. No. 4YM32 is for small diameter applications.

MULTI-LEVEL & CONTINUOUS

Highly accurate, reliable, and easy to install on tanks or vessels containing most liquids. Multi-level indication: high/low, or pump on/pump off. No. 3VU50 Continuous Level Switch is field repairable—excellent for sealed/pressurized tanks. Nos. 3VU47, 3VU48, and 3VU49 switches can be customized—cut to length and actuation points set.

Float Material	Stem Material	Dimensions (In.) Overall Length	Stem Length	Float Length	Float Dia.	Fitting (NPT)	Max. Temp. (°C)	Max. Pressure (psi)	Watts (Resistive)	Madison Model	Stock No.		Each	Shpg. Wt.
VERTICALLY MOUNTED														
Subminiature														
Polypropylene	Polypropylene	1.88	1.25	0.63	0.58	3/8-16 THD	105	50	15	M3326	4YM29		$15.45	0.1
Polypropylene	Polypropylene	1.88	1.25	0.63	0.58	3/8-16 THD	105	50	15	M3326-NO	4YM30		15.45	0.1
Standard														
Polypropylene	Polypropylene	2.25	1.63	1	1	1/8	105	100	30	M8000	2A554		12.54	0.1
Polypropylene	Polypropylene	3.38	2.63	2	1.5	1/4	105	100	60	M8800	2A552		43.25	0.1
Buna N	Brass	3.38	2.63	2	1.5	1/4	105	150	60	M4300	2A553		31.20	0.2
Buna N	PBT	2.25	1.63	1	1	1/8	105	150	30	M7000	4YM35		15.18	0.1
316 SS	316 SS	3.38	2.63	2	2.13	1/4	200	200	60	M5600	2A551		45.50	0.3
316 SS	316 SS	2.25	1.63	1	1.13	1/8	200	300	30	M5000	4YM31		43.20	0.1
316 SS	316 SS	3.38	2.63	2	2	1/4	200	500	100	M5600-PR	4YM33	✓	71.90	0.3
Multilevel Controls, 3/4" to 5" Sensing Range														
Polypropylene	Polypropylene	7.25	6.75	1	1	1/4	105	25	30	M8085	3VU46	✓	52.05	0.2
316 SS	316 SS	8.25	7.25	2	2.125	1/2	200	200	60	M5605	3AY51	✓	144.50	2.0
Multilevel Controls, 1" to 35" Sensing Range														
316 SS	316 SS	Adjustable	Adjustable	2	2.125	2	200	200	60	ML5555	3VU47	✓	410.75	4.1
Buna-N	Brass	Adjustable	Adjustable	2	1.25	2	105	150	60	ML4444	3VU48	✓	219.25	4.1
Polypropylene	Polypropylene	Adjustable	Adjustable	2	1.5	2	105	100	60	ML8888	3VU49	✓	274.00	1.7
Continuous-Level Switch, 4-20 mA output, 1-1/2" pipe plug, 1" resolution														
Polypropylene	316 SS	20.625	16	2	1.5	1½	85	100	—	C3975-1000	3VU50	✓	152.00	1.4
HORIZONTALLY MOUNTED														
PBT	PBT	2.75	2.75	—	—	1/2 x 1/2	105	100	30	M7700	4YM36		20.00	0.1
Polypropylene	Polypropylene	2.75	2.75	—	—	1/2 x 1/2	105	100	30	M8700	2XC13		17.36	0.1
Polypropylene	Polypropylene	4.02	2.84	—	—	5/8-11 THD	105	100	30	M8790	4YM37		17.36	0.1
316 SS	316 SS	4.5	4.5	—	—	1/2 x 1/2	200	300	30	M5920	4YM34	✓	134.65	0.3
316 SS	316 SS	4.57	2.96	1	1.13	3/8-24 THD	200	300	30	M5010	4YM32		42.10	0.1

🚚 = Shipped Directly from Manufacturer ✓ = Extended Warranty Available ★ = New Item



NOT TO SCALE

REVISIONS				
REV	ECO	DESCRIPTION	DATE	DRN
A	266	HIGH – HIGH TO NORMALLY CLOSED	1/1/98	SHS
B	–	ADDED 4 1/2" OVERALL FOR UNION	5/27/98	SHS
C	–	ADDED 1/4" OVERALL	1/11/02	SHS
D	–	C CLIP TO LOC COLLARS	5/27/03	SHS
E	–	TITLE WAS 26 3/4"	10/09/03	DP

NOTES:

1. TOP SWITCH IS NORMALLY CLOSED.
2. ALL OTHER SWITCHES ARE NORMALLY OPEN.
3. FLOATS TO BE BUNA FLOATS.

MATERIAL: 316SST

TOLERANCES UNLESS NOTED OTHERWISE

DECIMAL	FRACTIONAL	ANGLES
.03	1/32	1°

	APPROVAL	DATE
DRFT	DM	94/06/19
HATCHING	*	
DIMSCALE	1	
LTSCALE	1	

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

CARBONAIR
ENVIRONMENTAL SYSTEMS
MINNEAPOLIS, MINNESOTA

TITLE: LEVEL CONTROL SWITCH – 31 1/2"

SIZE	DWG. NO.	REV
A	135768	E

SCALE	EQUIP. NO.	SHEET
1=3	*	1 OF 1

ULTRATECH INDUSTRIES, INC.

ULTRAPROBE FIAMP

Fan Inlet Airflow Measuring Probes

APPLICATIONS

ULTRATECH ULTRAPROBE Fan Inlet Airflow Measuring Probes (FIAMP) provide accurate, repeatable measurement of air movement through fan inlets. Lightweight, rugged construction coupled with ease of installation and economical pricing make these devices particularly applicable to the HVAC trade. Durable, quality construction ensures long-term, trouble-free operation. ULTRAC FIAMPs are compatible with manometers, differential pressure gauges, and differential pressure transmitters used for airflow indication and control.

ULTRAPROBE FIAMP

Designed for complete installation from outside the fan, this device is recommended when proper duct locations are not available. The sensor is effective at measuring gas and air flow, particularly dirt-filled, sooty or solid-bearing flows, when installed with ULTRATECH's purge-type flow or pressure transmitter systems.

Gas velocities often vary significantly across a fan inlet. Because single- point flow measuring devices read the velocity at one point only, errors in flow measurement are common. The ULTRAPROBE FIAMP has total and static pressure measuring points which are distributed for equal-area averaging of flows, resulting in improved accuracy and reliability.

DESCRIPTION

ULTRAPROBE Fan Inlet Airflow Measuring Probes are designed per standard duct traverse requirements. These probes are designed to match the balancer's industry standard Pitot tube, including the method of static pressure measurement and distance between the total pressure and static pressure sensing holes.

The ULTRAPROBE FIAMPs use multiple averaging Pitots to determine total velocity and static pressure measurements. The FIAMP's unique construction eliminates nonessential hardware that can cause buildup of dirt and foreign matter on the measuring assembly.

FIAMPS are available for most type of fans where a minor obstruction will not interfere with the fan's operation. All feature a sensor assembly that allows for duct expansion and contraction.

P.O. Box 465 Garner, North Carolina 27529 TELEPHONE 1-800-656-2004 or 919-779-2004 FAX 919-779-5768

SUGGESTED SPECIFICATIONS

Fan Inlet Airflow Measuring Probes shall be of the multiple averaging Pitot/static sensor type with sensors distributed for equal-area averaging of flows. They shall be installed for a total Pitot traverse of the fan inlet. Internal Pitot/static sensors shall be constructed of aluminum with hard anodized finish. Instrument connections shall be 1/4" NPT Female.

The fan inlet airflow measuring probe shall be ULTRAPROBE FIAMP, as manufactured by ULTRATECH INDUSTRIES, INC., Garner, NC, U.S.A.

SPECIFICATIONS FOR STANDARD UNITS

ACCURACY: +/- 2% (Note: field calibration may be required)
TEMPERATURE: Maximum operating 400^{0}F
MINIMUM DESIGN FLOW: 400 fpm
MAXIMUM DESIGN FLOW: 12,000 fpm
PITOT/STATIC SENSORS: Aluminum with hard anodized finish
PROCESS CONNECTIONS: 1/4-in. NPT Female

ORDERING INFORMATION

ULTRAC FIAMP ____ - ____ - ____

SERIES

8 - Round

DIAMETER (Smallest Inlet Diameter)

CONSTRUCTION SPECIFIERS

C - Compression fittings for process connections
Z - Special (specify)

LP SERIES LOW PRESSURE

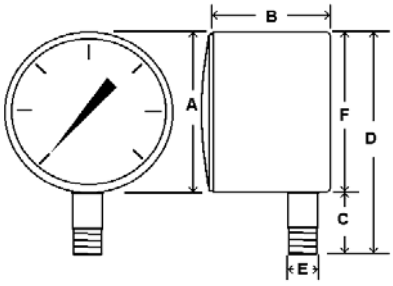
SPECIFICATIONS

- Chrome plated case
- Black steel case (u-clamp panel mnt)
- Brass internals and connection
- Dry non-fillable
- +/- 1.5 % accuracy

FEATURES

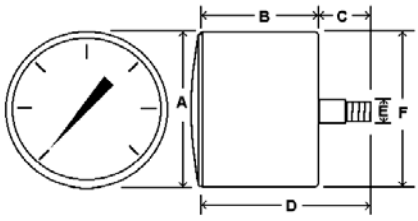
- 2 1/2"dial size with twist lock plastic lens
- zero adjustment screw on back of case
- 1/4"mnpt bottom or back connection
- Capsule type diaphragm to measure low pressures

LP1



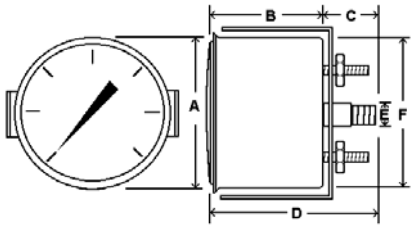
	2 ½"		4"	
	IN	MM	IN	MM
A	2.60"	66	3.98"	101
B	1.70"	44	2.21"	56
C	.85"	22	1.56"	40
D	3.45"	87.5	5.49"	139
E	1/4"NPT		1/4" OR 1/2" NPT	
F	2.60"	66	3.98"	101
G				

LP2



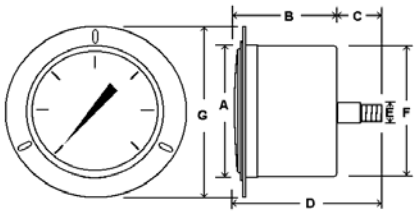
	2 ½"		4"	
	IN	MM	IN	MM
A	2.62"	66.5	----	----
B	1.92"	49	----	----
C	.84"	21.5	----	----
D	2.75"	71	----	----
E	1/4"NPT		----	----
F	2.60"	66	----	----
G			----	----

LP3



	2 ½"		4"	
	IN	MM	IN	MM
A	2.84"	72	----	----
B	1.88"	48	----	----
C	.84"	21.5	----	----
D	2.74"	69.5	----	----
E	1/4"NPT		----	----
F	2.60"	66.2	----	----
G	2.84	72	----	----

LP4



	2 ½"		4"	
	IN	MM	IN	MM
A	2.61	66	----	----
B	1.89	48	----	----
C	.875	22.2	----	----
D	2.74	69.5	----	----
E	1/4"NPT		----	----
F	2.67	68	----	----
G	3.44	87.4	----	----

AVAILABLE RANGES:

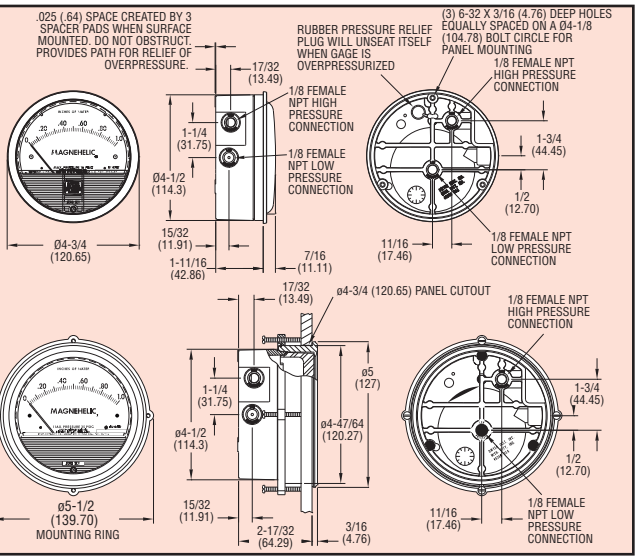
200-0"wc Vacuum (2"Minor inc)
160-0"wc Vacuum (2"Minor inc.)
100-0"wc Vacuum (1"Minor inc.)
60-0"wc vacuum (1"Minor Inc.)
30-0"wc vacuum (.5"wc minor)
0-10"wc (.5"wc minor inc.)
0-15"wc (.2"wc minor inc.)
0-30"wc (.5"wc minor inc.)
20 oz./35"wc (.5"wc minor inc.)
35 oz./60"wc (1"wc minor inc.)
0-60"wc (1"wc minor inc.)
0-100"wc (2"wc minor inc.)
0-160"wc (5"wc minor inc.)
0-200"wc (5"wc minor inc.)
0-3 psi (.05 psi minor inc.)
0-5 psi (.1 psi minor inc.)
0-10 psi (.2 psi minor inc.)

NOTE: OTHER RANGES AVAILABLE UPON REQUEST, PLEASE CALL WITH ANY INQUIRIES

Series 2000

Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%



Select the Dwyer® Magnehelic® gage for high accuracy – guaranteed within 2% of full scale – and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® gage movement, it quickly indicates low air or non-corrosive gas pressures – either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

The Magnehelic® gage is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

Note: May be used with hydrogen. Order a Buna-N diaphragm. Pressures must be less than 35 psi.

Flush, Surface or Pipe Mounted

Mounting
A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional **A-610** Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1-1/4″ - 2″ pipe. Although calibrated for vertical position, many ranges above 1″ may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4-9/16″ hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.

Vent Valves
In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

High and Medium Pressure Models
Installation is similar to standard gages except that a 4-13/16″ hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available for all models. Because of larger case, the medium pressure and high pressure models will not fit in a portable case size. Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.
ⓘ See Note.

SPECIFICATIONS
Service: Air and non-combustible, compatible gases (natural gas option available).
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of full scale (±3% on - 0, -100 Pa, -125 Pa, 10MM and ±4% on - 00, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20″ Hg to 15 psig† (-0.677 to 1.034 bar); MP option: 35 psig (2.41 bar); HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. See Overpressure Protection Note on next page.
Temperature Limits: 20 to 140°F* (-6.67 to 60°C).
Size: 4″ (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8″ female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Standard Accessories: Two 1/8″ NPT plugs for duplicate pressure taps, two 1/8″ pipe thread to rubber tubing adapter and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)

*Low temperature models available as special option.
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

OPTIONS AND ACCESSORIES

Transparent Overlays
Furnished in red and green to highlight and emphasize critical pressures.

Adjustable Signal Flag
Integral with plastic gage cover. Available for most models except those with medium or high pressure construction. Can be ordered with gage or separate.
Add suffix **-ASF** to end of gage model number

LED Setpoint Indicator
Bright red LED on right of scale shows when setpoint is reached. Field adjustable from gage face, unit operates on 12-24 VDC. Requires MP or HP style cover and bezel.
ⓘ See Note.
Add suffix **-SP** to end of gage model number

Quality design and construction features

Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

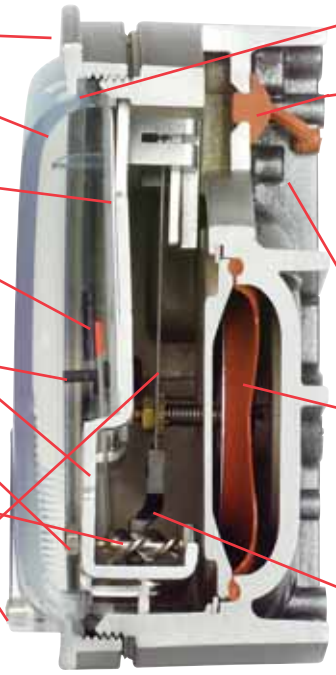
"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.



O-ring seal for cover assures pressure integrity of case.

OVERPRESSURE PROTECTION

Blowout plug is comprised of a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (1.7 bar). To provide a free path for pressure relief, there are four spacer pads which maintain 0.023 inch clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.

The blowout plug should not be used as a system overpressure control. High supply pressures may still cause the gage to fail due to over pressurization, resulting in property damage or serious injury. Good engineering practices should be utilized to prevent your system from exceeding the ratings or any component.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Series 2000 Magnehelic® Gage — Models and Ranges

Page VI shows examples of special models built for OEM customers. For special scales furnished in ounces per square inch, inches of mercury, metric units, square root scales for volumetric flow, etc., contact the factory.

Model	Range Inches of Water
2000-00N†••	.05-0-.2
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2012	0-12
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2120	0-120
2150	0-150
2160	0-160
2180*	0-180
2250*	0-250
Zero Center Ranges	
2300-00†••	0.125-0-0.125
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

Model	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%
• • Accuracy +/-4%
*MP option standard
**HP option standard

Model	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-15MM	0-15
2000-25MM	0-25
2000-30MM	0-30
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
2000-125MM	0-125
2000-150MM	0-150
2000-200MM	0-200
2000-250MM	0-250
2000-300MM	0-300
Zero Center Ranges	
2300-6MM†••	3-0-3
2300-10MM†•	5-0-5
2300-20MM†•	10-0-10
Model	**Range, Pa**
2000-60NPA†••	10-0-50
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
2000-1000PA	0-100 x 10
Zero Center Ranges	
Model	**Range, Pa**
2300-60PA†••	30-0-30
2300-100PA†•	50-0-50
2300-120PA	60-0-60
2300-200PA	100-0-100
2300-250PA	125-0-125
2300-300PA	150-0-150
2300-500PA	250-0-250
2300-1000PA	500-0-500

Model	Range, kPa
2000-0.5KPA	0-0.5
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-2.5KPA	0-2.5
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-2KPA	1-0-1
2300-2.5KPA	1.25-0-1.25
2300-3KPA	1.5-0-1.5

Dual Scale Air Velocity Units
For use with pitot tube

Model	Range in W.C./ Velocity F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2005AV	0-5.0/2000-8800
2010AV	0-10/2000-12500

Dual Scale English/Metric Models

Model	Range, In. W.C.	Range, Pa or kPa
2000-OOD†••	0-.25	0-62 Pa
2000-OD†•	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2005D	0-5.0	0-1.25 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa
2015D	0-15	0-3.7 kPa
2020D	0-20	0-5 kPa
2025D	0-25	0-6.2 kPa
2050D	0-50	0-12.4 kPa
2060D	0-60	0-15 kPa

ACCESSORIES

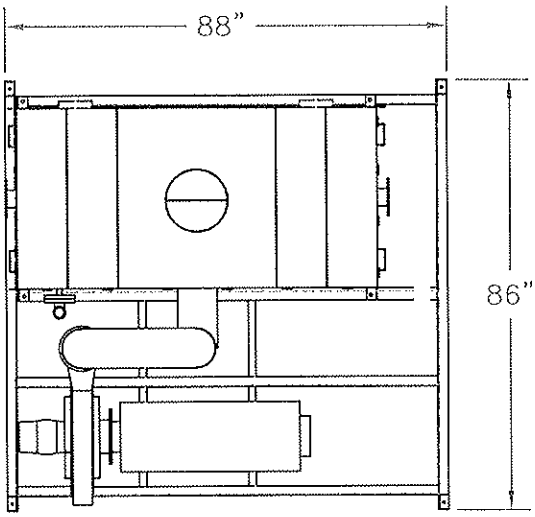
A-299, Surface Mounting Bracket
A-300, Flat Flush Mounting Bracket
A-310A, 3-Way Vent Valve
A-321, Safety Relief Valve
A-432, Portable Kit
A-448, 3-piece magnet kit for mounting Magnehelic® gage directly to magnetic surface
A-605, Air Filter Kit
A-610, Pipe Mount Kit

OPTIONS — To order, add suffix: I.E. 2001-ASF
ASF, Adjustable Signal Flag
HP, High Pressure Option
LT, Low Temperatures to -20°F
MP, Med. Pressure Option
SP, Setpoint Indicator
Scale Overlays, Red, Green, Mirrored or Combination, Specify Locations

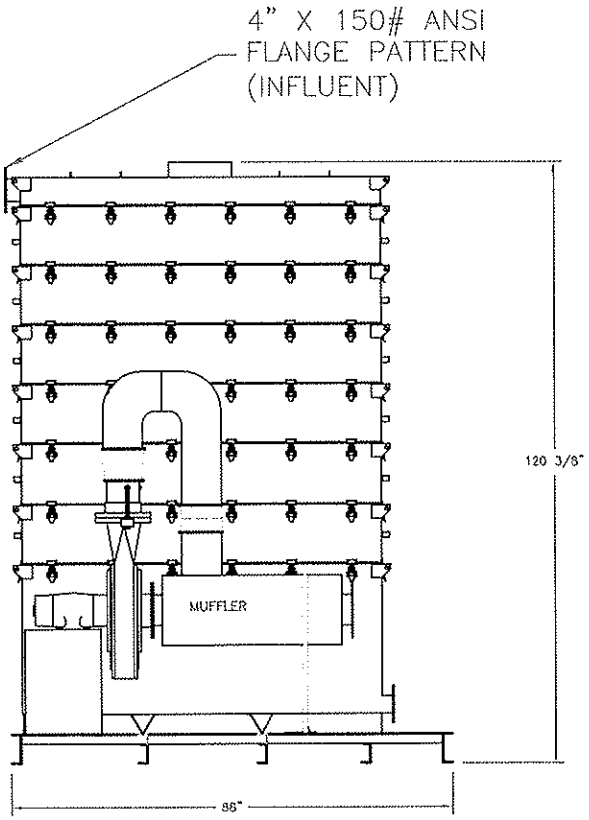
STAT 180 FOR PUMP DOWN

NOTE:

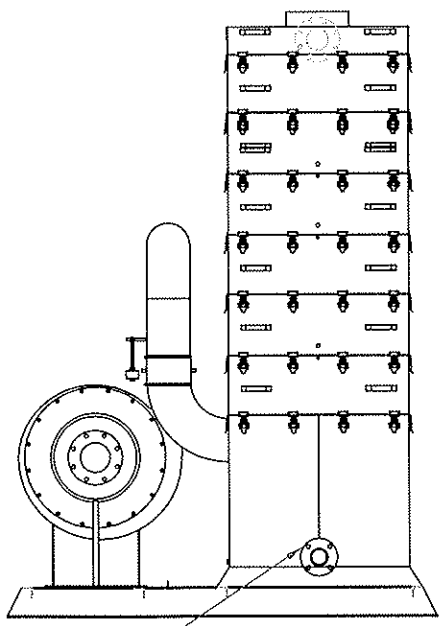
1. STAT 180 CONSTRUCTED OF 304 GRADE STAINLESS STEEL.
2. ADJUST OVERALL HEIGHT BY 11 7/8" FOR EACH AERATION TRAY ADDED OR DELETED. INFLUENT FLANGE ON THE SAME SIDE AS EFFLUENT WITH ODD NUMBER OF TRAYS.



PLAN



ELEVATION



END VIEW

3" X 150# ANSI
FLANGE PATTERN
(PUMP OUT EFFLUENT)

Sales Drawing #214511-A
2-11-11

APPENDIX F

CARBON SYSTEM MANUFACTURER INFORMATION

PG Series Polyglass Adsorbers

PG180, PG500, PG750, PG1100, PG1400, PG2200, PG5000

Applications

Siemens Water Technologies offers a full line of polyglass liquid phase adsorbers engineered to remove contaminants from high pressure liquid streams while providing maximum corrosion resistance. These adsorbers are manufactured with fiberglass reinforced resin and an inner polyethylene liner. The PG series adsorbers can be utilized by industrial, municipal, or commercial users in a variety of applications.

- Decolorization
- Product Purification
- Process Water Filtration
- Groundwater Remediation
- Wastewater Treatment
- Drinking Water Treatment

Installation, Startup and Operation

Siemens Water Technologies can provide a total service package that includes utilizing OSHA trained personnel providing on-site carbon changeouts, packaging and transportation of spent carbon for recycling at our reactivation facilities.

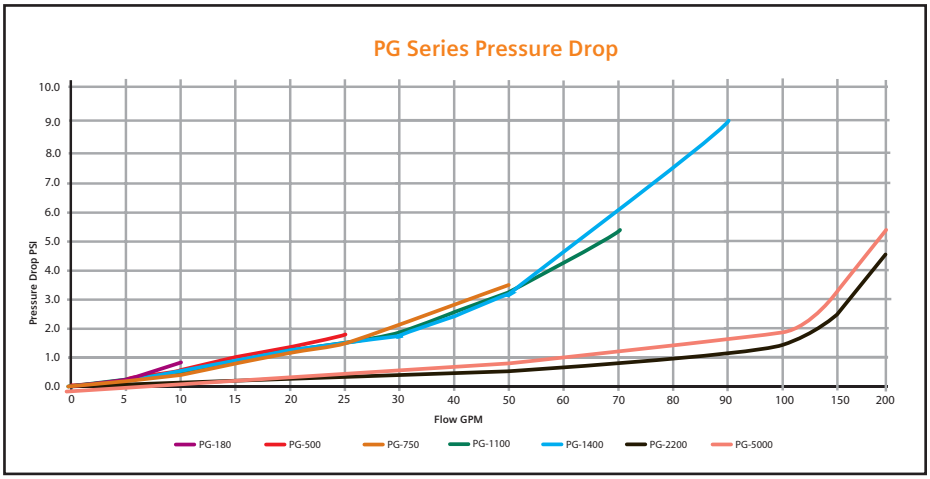
At the time of purchase or rental of the adsorbers, arrangements should be made for the reactivation of the spent carbon. Siemens Water Technologies will provide instructions and assistance on how to obtain acceptance of the spent carbon at our reactivation facilities. Spent carbon cannot be accepted for reactivation until the acceptance process is completed.

Benefits & Design Features

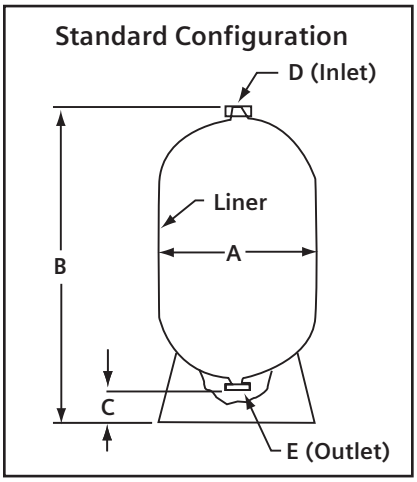
- Durable, Fiberglass Reinforced Resin construction – provides strength for high pressure applications and protection from corrosive environments
- Polyethylene liner and Polypropylene Internal Fittings – provides excellent internal protection against corrosive liquids
- Optional Transport Frame provided for easy transport and installation
- Optional Carbon Fill and Discharge piping (Schedule 80 PVC) provided for slurry carbon transfer
- Available for Purchase or Rental
- Approved for the transport of hazardous spent carbon (when supplied with optional Transport Frame)
- Maximum Working Pressure of 150 psig (1034 kPa)
- Temperature Limit of 140°F (60 C)

Dimensions and Capacities									
Adsorber	A inches	B inches	C inches	D inches	E inches	Max. Flow (GPM)	Approximate Carbon Fill (lbs.)	Empty Shipping Weight (lbs.)(See NOTE)	Est. Operating Weight (lbs.)
PG180	24	60	12	3	3	10	180	54	414
PG500	30	89	10	3	3	35	500	225	1225
PG750	36	91	11	3	3	50	750	280	1780
PG1100	42	89	11	3	3	65	1100	600	2800
PG1400	48	93	11	3	3	90	1400	660	3460
PG2200	63	109	27	3	3	175	2200	1500	5900
PG5000	63	169	27	3	3	200	5000	2100	12100

Note: *PG adsorbers without Transport Frame must ship empty of carbon. If Transport Frame is included, units may ship filled with carbon. Approximate weight of units with Transport Frame are 350 lbs. higher than empty shipping weights shown above.*
Note: *Standard vessels are furnished with FNPT inlet and outlet fittings. Other optional fittings can be provided as required.*



Pressure drop in psi through vessel filled with 8x30 carbon



Safety Note: Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.

Siemens makes no warranties as to completeness of information. Users are responsible for evaluating individual product suitability for specific applications. Siemens assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products. All information presented herein is believed reliable and in accordance with accepted engineering practice.

Siemens
Water Technologies
2430 Rose Place
Roseville, MN 55113
800.525.0658 phone

SIEMENS Water Technologies

Rev. 2 – 10/13/09

PG SERIES
PG180 / PG500 / PG750 / PG1100 / PG1400 / PG2200
Installation and Start-Up Instructions

IMPORTANT: Read all instructions prior to start-up

FOR WATER USE ONLY. 150 PSIG MAX. OPERATING PRESSURE

The Siemens Water Technologies **PG SERIES** carbon adsorbers have been designed for easy and rapid installation. Final installation requires the connection of the **PG SERIES** to the process outlet through the use of pipes or flexible hoses. The following instructions must be followed prior to system start-up:

1. Place the **PG SERIES** adsorber in an area close to the contaminated water source and accessible to maintenance personnel. The **PG SERIES** adsorber either ships with or without a support frame. Units provided with the frame are self-supporting and therefore require no special stand or support pad. Freestanding units with no frame will require suitable foundation to stage the vessel. The area chosen for locating the **PG SERIES** adsorber should be level, flat and capable of supporting an operating weight as shown in the table below. All on-site carbon transfers are conducted through top flange connection and require a minimum of five (5) feet overhead access.

2. If the **PG SERIES** adsorber is provided without the frame, then the adsorber will ship empty and will need to be filled with carbon on-site. The adsorber can be dry filled with carbon through the top flange connection. Care must be taken in installing the carbon so that the collection system at the bottom of the tank is not damaged. The best method to protect the internals is to add a water cushion to cover the internals prior to filling with carbon.

3. For units provided with the support frame, remove protective shipping plugs from inlet and outlet and save them for future storage and shipping.

4. Connect to the inlet and outlet connections. Be sure that the outlet has a vertical section that extends to a height equal to, or greater than, the top of the **PG SERIES** adsorber**.** This will assure that the **PG SERIES** adsorber is full of water during operation. Also, due to the FRP construction of the adsorber vessel, the **PG SERIES** adsorber is very sensitive to vacuum pressures, and a vacuum breaker MUST be provided to ensure that the vessel does not go under vacuum. A vacuum breaker designed to relieve a vacuum of 1 psi is recommended, with the breaker located a minimum of 30 inches above the liquid level in the adsorber. The safest installation should include one vacuum breaker on the adsorber inlet line, and a second breaker in the anti-siphon loop piping on the adsorber effluent line. Siemens Water Technologies can provide these vacuum breakers upon request; please contact your Technical Sales Representative for more details.

Siemens Water Technologies Corp. 2430 Rose Place Roseville, MN 55113 Tel: 800.525.0658 www.siemens.com/es

5. A. Carbon Soaking

Fill the **PG SERIES** adsorber (through the outlet is preferred) with uncontaminated water and allow the carbon to soak for at least 24 hours. This is an important step in removing the air contained within the pores of the activated carbon matrix. Removal of trapped air makes all the pore volume and surface area of the activated carbon available for adsorption of contaminants. A poorly "conditioned" bed that contains trapped air can be a major factor leading to premature bed breakthroughs, high carbon usage rates, and over pressurization.

B. Initial Backflushing

Initial backflushing helps in removing any small air bubbles that have a tendency to cling to the surface of the carbon particles and are difficult to remove by soaking alone. This is performed by flowing water through the **PG SERIES** adsorber in an upflow direction.

Due to its nature, granular activated carbon will always have fine particles that are associated with and loosely adhered to the external surface of the larger granular activated carbon particles. Backflushing will remove these carbon fines.

Backflush the **PG SERIES** adsorber with **uncontaminated water** at the rates shown in the table below. Backflushing will require at least 3 carbon bed volumes of water and will take about 15-20 minutes to complete depending on the water flow rate.

The water that is discharged will initially contain carbon fines but will soon become clear. Care should be taken to remove these fines so they do not enter the **PG SERIES** adsorber upon start-up. Note: If the fines have not cleared within this period, then continue backflushing until the fines clear.

6. Siemens Water Technologies Corp. strongly suggests that the completed installation include a pressure relief valve and a particulate filter upstream of the **PG SERIES** adsorber**.** For information regarding these devices, please call your Siemens Water Technologies Corp. Technical Sales Representative. Siemens Water Technologies Corp., a full service company, offers this equipment as an option.

7. The **PG SERIES** adsorber is designed for continuous use with little or no maintenance. Occasional backflushing with clean uncontaminated water as described above under item 4B may be required to remove particulate buildup on the carbon.

   We recommend backflushing only if experiencing an unacceptable pressure drop through the **PG SERIES** adsorber. Under no circumstances should the inlet pressure exceed the design pressure of 150 psig.

8. Once operational, the **PG SERIES** adsorber will continue to remove contaminants with little or no maintenance, until the carbon is spent. Contact your Technical Sales Representative for service, removal, and/or reactivation of spent carbon. Units provided with a support frame can be returned for reactivation with the vessel and frame serving as the shipping container. Units provided without the support frame will require exchange of the carbon on-site.

NOTE: Studies conducted have shown that low oxygen content exists in adsorbers containing wet carbon. Laboratory experiments conducted since that time also have revealed that commercial activated carbons in a wet or moist condition will lower the oxygen content of an isolated space.

CONNECTION SIZES

On all PG series adsorbers, both the inlet and outlet connections are 3" FNPT fittings. Other optional fittings can be provided as required.

OPERATING CONDITIONS

	PG180	PG500	PG750	PG1100	PG1400	PG2200
Flow, gpm (max)	10	35	50	65	90	175
Pressure, psig (max)	150	150	150	150	150	150
Temperature (^{o}F)	140	140	140	140	140	140
Carbon Fill (lbs.)	180	500	750	1100	1400	2200
Backflush Rate (gpm) (8x30 carbon, 55°F)	20	30	50	95	100	150
Empty Shipping Weight (lbs.) – see NOTE	54	225	280	600	660	1500
Operating Weight approx. (lbs.)	414	1225	1780	2800	3460	5900

NOTE: shipping weight is for empty adsorber without transport frame. Units provided with a transport frame can ship with carbon – add 350 lbs. shipping weight for the frame, plus carbon weight.

FOR ADDITIONAL INFORMATION, PLEASE CONTACT YOUR NEAREST CARBON SERVICE BRANCH AT:

866-613-5620