Volume II:

OPERATIONS, MAINTENANCE, AND MONITORING PLAN

Former Carborundum Facility
2040 Cory Drive
Village of Sanborn, Town of Wheatfield, Niagara County, New York

Submitted to:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation
270 Michigan Avenue
Buffalo, New York 14203

Submitted by:

Atlantic Richfield Company

A BP affiliated company

4850 East 49th Street
MBC 3-147
Cuyahoga Heights, Ohio 44125

Prepared by:

PARSONS

40 LA RIVIERE DRIVE SUITE 350

BUFFALO, NY 14202

September 2006
Revised March 2007 / August 2013

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Volume II: Operations, Maintenance, and Monitoring Plan

MANUAL OF STANDARD OPERATING PROCEDURES FOR GROUNDWATER TREATMENT SYSTEM FORMER CARBORUNDUM FACILITY

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PARSONS

40 La Riviere Drive Suite 350
Buffalo, NY 14202
Phone: (716) 541-0730
Fax: (716) 541-0760

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INTRODUCTION

This manual contains the standard operating procedures (SOPs) for the operation of the groundwater treatment system at the Former Carborundum Site in Sanborn, New York. This manual should be updated as necessary, with all updates recorded in Table 1 of this section.

This manual contains the following eleven SOPs and appendix:

1. SOP-1 System Start-Up
2. SOP-2 Flow Meter (Totalizer) Operation and Reading
3. SOP-3 Granular Activated Carbon System Operation
4. SOP-4 Compliance Sampling From Effluent Outfall 01A
5. SOP-5 System Shut Down
6. SOP-6 Accidental Spill Prevention Plan
7. SOP-7 Routine Operation, Maintenance, And Recordkeeping
8. SOP-8 Lockout / Tagout Procedure
9. SOP-9 Pumping Well Pump Repairs
10. SOP-10 Alarms and Corrective Actions
11. SOP-11 Flow Measurement

LIST OF ABBREVIATIONS

CC	Carbon Contactor
DMR	Discharge Monitoring Report
GAC	Granular Activated Carbon
GPM	Gallons Per Minute
HOA	Hand - Off - Automatic Switch Type
HMI	Human Machine Interface
IM	Integrity Management
MCC	Motor Control Center
MCP	Motor Circuit Protectors
PLC	Programmable Logic Controller
psi	Pounds Per Square Inch
RPM	Revolutions per Minute
SOP	Standard Operating Procedure
SPDES	State Pollution Discharge Elimination System
VWCC	Vault Water Collection & Conveyance

TABLE 1
UPDATES TO FORMER CARBORUNDUM FACILITY, SANBORN, NY
MANUAL OF STANDARD OPERATING PROCEDURES FOR GROUNDWATER REMEDIATION SYSTEM

Date	Affected Sections	Reason For Change
3/31/07	1,5,6,7,8,10	Tray Stripper On-line
11/18/10	3, 4, 7	Update GAC Sys Op and Compliance Sampling from Effluent Outfall 01A SOPs
8/16/13	All	OM&M Manual Update

SOP-1
SYSTEM START-UP

1.1 PURPOSE

The purpose of this SOP is to define how to start up the groundwater treatment system.

1.2 RELATED SECTIONS

1. SOP-2 FLOW METER OPERATION (TOTALIZER) AND READING
2. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
3. SOP-4 COMPLIANCE SAMPLING FROM EFFLUENT OUTFALL 01A
4. SOP-5 SYSTEM SHUT DOWN
5. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN
6. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
7. SOP-8 LOCKOUT/TAGOUT PROCEDURE

1.3 STANDARD OPERATING PROCEDURE

1.3.1 System Start-up After a Prolonged Shut Down

To start up the process equipment from a complete shut down and for initial startup or after a prolonged down-time, perform the following:

Groundwater Extraction Wells

1. Power Source
   - Turn well local (at well control panel) HOAs to the OFF position.
   - Turn ON well power supply circuit breaker at plant MCC.
   - Verify with voltmeter incoming voltage is 480V at well control panel surge arrestor terminals.
   - Turn well panel circuit breakers (motor circuit protectors) to the ON position
   - Test load voltages with a voltmeter at the two motor starters, and the control voltages, per the schematic diagram for the well panels. Load voltages should be 480V.
2. Mechanical System
   - Verify that mechanical checks are complete, including checking that piping, valves, gages, etc., are in operating position.
   - Close strainers and sample taps, and be sure plugs/caps are applied for leak prevention.
   - Check panel grounds, conduit entrances, clearance around panel and conduits.
3. Pump Operation
   - Turn local HOA for each pump to HAND mode, one pump at a time. This will start each well pump.

- Check discharge rates from each well.

4. Three Phase Pumps, Phase Rotation Check (Initial Startup of New Pumps Only).
   - Using pump operation procedure (number 3 above), test and note well flow rate.
   - Turn pump HOA to the OFF position, turn power OFF, then switch two power leads at the load side of the motor starter.
   - Turn power and pump ON again and check flow rate. Compare to previous flow rate.
   - Connect power to provide the highest flow rate (with proper pump rotation).
5. Instrumentation and Controls
   - Check all control components for correct installation, tightness, cleanness, and complete wiring.
   - Verify the PLC is set-up with the correct well pump on/off control levels.
   - Turn pumps local HOA switches to AUTO.
   - Verify well pumps operate correctly within level setpoints where possible (some wells do not always reach lower setpoint (PW-4, PW-1).
   - Leave well pumps HOAs in AUTO and operate well remotely.

Treatment Plant

1. Power Source
   - Turn process motor starters and HOA switches at the MCC to OFF.
   - For motors with power feed only, turn motor feeder circuit breaker at MCC to the ON position.
   - For motor with starter cubicles in the MCC, open cubicle and turn starter motor circuit protectors (MCPs) to the ON position. Safety Note – This will energize starter components and control circuits.
   - Test voltage at top of starter terminals, operation of MCPs, and control voltages. Voltages should be 480V.
   - Check that all wiring is tight and that push-to-test lights work.
2. Mechanical System
   - Verify that the mechanical checks are complete, including checking that piping, valves, gages, etc., are in operating position.
   - Check panel grounds, conduit entrances, clearance around panel and conduits.
   - Set all valves to direct system flows as required.
3. Pump Operation (Initial Startup of New Pumps Only)
   - Verify process pump rotation by "bumping" pump in HAND (MCC HOA switch) and by visual check of rotation.
   - After verification, operate in HAND (only if water/process allows) to verify smooth running, vibration level, water leaks, etc.

4. Instrumentation and Controls
    - Check all control components for correct installation, tightness, cleanness, and component wiring.
    - Calibrate and test all instrumentation per manufacturer specifications.
    - Test devices and controls against the control schematics. Verify PLC logic and operations (inputs/outputs/logic).
    - Test all subsystems, including tank/stripper level control schemes. Verify setpoints on PLC screen for pump start.
    - Test all alarm input points and the alarm annunciator functions.
    - Turn blower and process motors HOA switches to AUTO at the MCC. Verify READY light is lit.
    - Confirm there is sufficient water in the Equalization Tank (T-801), and operate system without groundwater extraction wells on to verify system operation.

1.3.2 Normal System Start-up

To start up the process equipment from a brief shut down (for example, for minor repair), perform the following:

Groundwater Extraction Wells

1. Power Source
    - Check that all groundwater well pumps are in MANUAL mode and OFF on the PLC HMI computer.
    - Turn each well HOA switch to the OFF position.
    - Turn ON well power supply circuit breaker at plant MCC and then at the local well panel circuit breakers (MCPs).
2. Mechanical System
    - Verify that mechanical checks are complete for proper water flow through treatment system.
    - Close strainers and sample taps, be sure plugs/caps are applied for leak prevention.
    - Open valves to pressure gauges.
3. Pump Operation
    - Turn local HOA switch for each pump to HAND mode.
    - Check discharge rates from each well.
    - Turn local HOA switch for each pump to AUTO mode for PLC control.
4. Instrumentation and Controls
    - Turn blower (B-801) MCC HOA switch to AUTO and press START on the PLC HMI computer.

Treatment Plant

1. Power Source
   - Check that blower (B-801) is running.
   - MCC motor starter breakers for process pumps (P-803B, P-803C, P-805B, P-805C, P-810A, P-810B) should be OFF (lever down) and HOA switches in OFF (O) position.
   - In the Control Room, turn process pumps in the MANUAL mode to the OFF position on the PLC HMI computer.
   - Turn ON MCC process pump motor starter breakers (lever up, be sure to seat firmly).
   - Turn HOA at MCC starters to AUTO. (If starter pulls in when not desired, turn HOA to OFF, change PLC computer control to OFF, and then put MCC HOA in AUTO).
2. Mechanical System
   - Set all valves to desired treatment system flow directions.
   - Close sample taps and open valves to pressure gauges, be sure plugs/caps are applied for leak prevention.
3. Treatment System Control
   - Verify PLC HMI computer displays the groundwater component status. Verify all tank and stripper component status. On PLC, verify all lead and lag level setpoints. Select lead and lag pumps.
   - Set mode of process pumps to AUTO on PLC HMI computer.

The PLC will sequentially start the process motors and extraction wells, depending on the individual motor control mode (HAND or AUTO) selected. The operator should always verify the operation by watching the displayed values for tank/stripper level and flow changes as the blower and/or pumps begin operation.

The operator should directly inspect the equipment operating after the initial control sequences are complete. By observing the equipment, noting process parameters on all local indicating gauges, listening to the motors and process flow, and observing pipes and valves for leaks or problems, the operator will verify the proper operation.

At the PLC computer, the operator should scan each display to continue verifying motor operation and level control until system operation is stable.

SOP-2
FLOW METER (TOTALIZER) OPERATION AND READING

2.1 PURPOSE

The purpose of this section is to describe how to properly operate and read the flow meters (totalizers). There are mechanical totalizers at each well head and immediately prior to the Equalization Tank (Tank 801). Additionally, at the SPDES outfall, a mechanical flow meter with electronic PLC feedback has been installed for reporting purposes.

2.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-4 COMPLIANCE SAMPLING FROM EFFLUENT OUTFALL 01A
3. SOP-5 SYSTEM SHUT DOWN
4. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN
5. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

2.3 STANDARD OPERATING PROCEDURE

Each of the totalizers are read a minimum of once a week, and the information is recorded in the log book and in the flow tracking spreadsheet. Readings are recorded to the nearest gallon. The data collected from the SPDES outfall flow meter is reported in the monthly discharge monitoring reports (DMRs) provided to NYSDEC. The flow is used to calculate the discharge of analytes in pounds per day. Flow data collected from the well heads is used to track the discharge from each of the recovery wells and the annual pounds of chlorinated solvent recovered from the groundwater system.

2.3.1 Care and Maintenance of Flow Meters

The flow meters are not adjustable. Maintenance of the meters is minimal. In the event that a flow meter is suspected of faulty operation, the system (or the well, depending on the meter in question) should be shut down, and the meter in question should be removed and inspected. Mechanical meters may at times become clogged or impeded by material becoming stuck in the impellers used to measure the water flow. If this is the case, the meter should be cleaned, checked for proper operation, and reinstalled. If the problem cannot be identified, the meter should be sent for repair or replaced. For the flow meters to operate properly, they must be installed correctly. Manufacturers specifications should be followed to allow an adequate distance of straight pipe prior to and after the flow meter (this typically will be dependent on the diameter of the pipe the flow meter is installed in). Flow meters must also be installed in the proper orientation (vertically or horizontally) as per the manufacturers' instructions.

2.3.2 Collecting Flow Meter Measurements

Flow meters should be read in as short of a time frame as possible when the system is operational. This provides a snapshot in time of the flow at all of the flow meters. The sum of the flow from each of the recovery wells should equal the flow at the flow meter immediately prior to the Equalization Tank (Tank 801). Both of these flows should equal the flow at the

SPDES discharge. In the event that the system is shut down, a round of meter readings should be completed prior to restarting the system. Flow meter measurements should be recorded to the nearest gallon.

SOP-3
GRANULAR ACTIVATED CARBON SYSTEM OPERATION

3.1 PURPOSE

The purpose of this section is to describe the granular activated carbon (GAC) treatment system that is used as a "polishing treatment" for groundwater following treatment in a tray air stripper. This section also provides procedures for evaluating when the GAC in a carbon contactor requires changing. This section includes a discussion of the Low Profile Air Stripper (S-801A), the Carbon Feed Pumps (P-805A & P-805C) which pump the stripper effluent to the activated carbon contactors (LC-801A and LC-801B), and the pre-filters (U-801A/B and U-802A/B) that are used to remove sediment prior to water entering the Air Stripper.

3.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-4 COMPLIANCE SAMPLING FROM EFFLUENT OUTFALL 01A
3. SOP-5 SYSTEM SHUT DOWN
4. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

3.3 STANDARD OPERATING PROCEDURE

3.3.1 Pumps P-805A and P-805C

There are two pumps (P-805A and P-805C), a lead and a lag pump, in a parallel configuration between the tray air stripper and the GAC contactor units. Each of the pumps may be throttled back using a flow valve. The pumps have historically been operated at approximately 200 gpm. With the downsizing of the Groundwater Treatment System (GWTS), the new flow rate is expected to be 100 gpm or less. Prior to pumps P-805A and C, the water has passed through the pre-filters (F-801A & B and F-802A & B (50 micron bag filters)) and the Air Stripper (S-801C). Pumps P-805A and P-805C alternate operation so that pump run time is equally balanced between the two pumps.

A pressure transducer and transmitter is installed on a bottom outlet of the stripper sump that communicates the stripper sump level to the PLC. There are four level setpoints in the PLC to control the operation of the pumps. The lowest level setpoint turns OFF both pumps. The first high switch turns ON the lead pump and the second high switch turns ON the lag pump. The high-high switch is the high alarm which triggers an alarm at the PLC, located in the control room, and locks out (turns OFF) the Filter Feed Pumps P-803B and P-803C. When the high-high condition no longer exists, the Filter Feed Pumps are re-enabled by the PLC. The following procedures should be followed on an ongoing basis.

1. If necessary, adjust the throttling valve located on the outlet side of each pump to maintain the flow at approximately 100 gpm or less. The reason to throttle the outlet of the pumps is to slow the flowrate so the pumps do not excessively short-cycle.
2. On a daily basis, verify which pump (either P-805A or P-805C) is the lead pump. The designation as lead pump should be switched between the two pumps

approximately every two weeks to extend pump life. Note the switch from lead to lag pump in the operations log.

3. Per the Sanborn IM Plan schedule and inspection procedures, verify the operation of both pumps including:
   - Verify operation of lead and lag pump by turning OFF the lead pump using the local switch mounted on the Equalization Tank (T-801), and observing that the lag pump comes on when the level reaches the second high switch. This should be done for two pump cycles so that the lag function of both pumps are checked and confirmed to be operational.
   - Verify the operation of the high-high level alarm and cutoff by turning OFF both pumps at the local hand switch. When the water level reaches the high-high setpoint, the alarm on the PLC HMI should come in and the Filter Feed Pumps (P-803B, P803C) should all shut OFF and stay disabled until the high-high level condition in the stripper sump clears.

3.3.2 GAC Contactors (LC-801A and LC-801B)

The carbon contactors (LC-801A and B) are plumbed in series, and each carbon contactor can hold a maximum of 10,000 pounds of GAC. Pressure gauges are installed at the inlet and outlet of both of the carbon contactors. The difference of the pressure before and after the carbon contactors is used to monitor the head loss buildup in the carbon contactors. The maximum recommended operating pressure for the carbon contactor is 75 psig. If this pressure is exceeded, each vessel is equipped with a rupture disk that will burst at 75 psig and short circuit water back to T-801. Backwashing operations should be initiated when either one of the following occur:

- Operating pressure of a carbon contactor increases by more than 15 psig from its initial operating pressure, or
- Flooding occurs in the tray stripper sump before an increase of more than 15 psig.

This section describes operation of the system.

1. At least weekly, monitor and record the pressure gauge readings on the daily inspection form.
2. On a weekly basis, vent any accumulated air in the carbon contactors by opening the air vent valves located at the top of each column. Any water that is released is discharged into tank T-801.
3. On a semi-annual basis, sample the influent and the effluent from the lead carbon contactor for select VOC concentrations. Change-out of the GAC in the lead carbon contactor is required when either: 1) VOC breakthrough occurs; or 2) pressure drop across the bed does not drop after backwashing. Note that only one carbon contactor at a time will require change-out. The GAC in the lead carbon contactor will be replaced, and this carbon contactor will become the lag carbon contactor, while the existing lag carbon contactor will become the lead carbon contactor. The piping for the GAC system was designed to allow switching of the lead/lag role of the carbon contactors.

Procurement of new carbon may require about a week or two to get on a delivery schedule. The actual change-out takes a few hours and is done by the carbon vendor with the use of site supplied potable water and compressed air. To perform a GAC change-out on the lead carbon vessel, the following procedures should be followed.

- Order and have available 10,000 pounds of GAC.
- Either shut down the entire treatment process following a Normal Shut down as discussed in SOP-5, or, keep the treatment system running by directing the water flow through the carbon contactor that is not being changed out.
- Drain the selected carbon contactor by opening the bottom drain valve. Attach a hose to the drain valve and direct to the containment sump.
- The GAC should be removed from the site for regeneration or proper disposal. Have the GAC removed from the carbon contactor by a contracted company using proper equipment (e.g. vacuum). Generally, removal is done by the carbon vendor when fresh carbon is delivered.
- New carbon must have water added for transport via hose in a slurry. This is done in the delivery truck by the carbon vendor using site supplied potable water.
- Refill the carbon contactor with the new GAC. Again, this process is done by the carbon vendor.
- Reconnect any piping that was disconnected prior to GAC replacement.
- Backwash the new GAC to remove fines generated from the transport processes.
- Shut down the treatment process. Orient valves to redirect flow such that the contactor that just had the carbon replaced is now the lag vessel and the previous lag vessel is now the lead vessel.

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SOP-4
COMPLIANCE SAMPLING FROM THE EFFLUENT OUTFALL 01A

4.1 PURPOSE

The purpose of this section is to describe procedures for the collection of samples in accordance with the site "State Pollution Discharge Elimination System (SPDES) permit" (see Appendix E of OM&M Manual). This SOP has been updated to reflect the discharge permit that was issued by the New York State Department of Environmental Conservation (NYSDEC) effective April 1, 2012 through March 31, 2017.

4.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER (TOTALIZER) OPERATION AND READING
3. SOP-5 SYSTEM SHUT DOWN
4. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

4.3 STANDARD OPERATING PROCEDURE

The discharge permit defines one monitoring location, outfall 01A. Outfall 01A is after the Effluent Tank (Tank 802) and is immediately prior to the point the treatment system discharge leaves the treatment building. After outfall 01A, treated discharge water exits the building and flows to Cayuga Creek. Samples are collected weekly at 01A using:

1. An automated ISCO sampler for 24 hour composite samples
2. Grab samples
3. Lab composites of grab samples

The ISCO automated sampler provides composite samples by collecting aliquots of discharge water that are collected every three hours over a 24-hour period. The ISCO sampler is operated within a refrigeration unit that keeps samples below 4 degrees Celsius after collection. Discharge samples collected at 01A that are required to be collected as a grab sample (not composited over 24-hours) are collected directly from a sample port at outfall 01A. Grab samples are collected by opening the valve and filling the sample bottles. Prior to collecting the sample, the sample tap is flushed for approximately 30 seconds by opening the valve and allowing the sample to flush the tap.

4.3.1 Permit Monitoring Requirements

A summary of required chemical analytical samples and analysis for the treatment plant is provided in the OM&M Manual. Samples are collected from the treatment plant on the following schedule:

- Weekly: Select VOCs are sampled using grab samples in 40 mL VOA vials. Six VOA vials are filled (no air bubbles) every two hours such that there are four sets of samples taken total (24 VOA vials total). Three VOA vials to be labeled 01A and three labeled 01A Lab Composite for each sample set. The result on the COC

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is that there are three VOA vial grab samples every two hours (four sets total) and twelve VOA vials (three collected every two hours) for an 8-hour lab composite. Record the 01A flowmeter totalizer at the start and end of the 8-hour composite sampling period in the control room logbook and in the SPDES Sampling Field Form (shown below). Select VOCs include: chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, 1,1,1-trichloroethane, and trichloroethene.

pH must be taken in-house weekly using a grab sample. The pH meter is to be calibrated prior to measurement and the calibration recorded in the calibration logbook located on the lab bench. pH (and temperature) are to be recorded in the control room logbook, on the SPDES In-House Testing excel file (shown below - located on control room computer under the My Documents folder, then under the SPDES In-House Testing folder), and in the SPDES Sampling Field Form (also to be included with weekly hardcopy of COC, bottle order form and FedEx shipping receipts).

- Include PDF of SPDES In-House Testing spreadsheet and PDF of SPDES Sampling Field Form.
- Semi-monthly: Vinyl chloride (included with VOC samples, just need to note on COC to include in the analysis), oil and grease (grab sample, 2x1.0 mL), total suspended solids and biological oxygen demand (5-day) (24-hour composite, 1x1L), and total phenolics (24-hour composite, 1x250mL).
- Monthly: Total residual chlorine and temperature (same requirements as for pH in-house testing), and metals to include total cadmium, total chromium, total and dissolved copper, total iron, total lead, total mercury, total arsenic, total cyanide, and total and dissolved zinc (24-hour composite. 2x250mL).
- Quarterly: Total nickel and total silver (24-hour composite, included with total metals sample, just need to note on COC to include analyses). This analysis is to be done in March, June, September and December.

4.3.2 Sampling Handling

Procedures for compliance sample handling are as follows:

1. Arrange with the contract laboratory to have pre-preserved sample bottles, chain-of-custody forms, sample coolers, and packaging materials delivered to the treatment plant. The contract lab is Lancaster Laboratories and the project manager is Kaitlin Plasterer (717) 656-2300 x1815.
2. Select the sample days for each month. Try to move the sample day around within each week to avoid sampling on the same day each week. The lab can accept Saturday deliveries.
3. Before sample day, fill in the sample location (01A), date, time, and sampler's initials on the bottle labels using permanent ink. Cover the label with clear plastic packaging tape that encircles around the bottle and overlaps at least 2 inches.

4. Start the ISCO 24-hour composite sampler the day before you plan to collect the samples. Be sure to record the 01A effluent flow totalizer readings at the start of the sampling and again at the end. Record these totalizer readings in the control room logbook and in the SPDES Sampling Field Form:
5. Collect the samples as described above for grab and composite samples and on the schedule described above.
6. Complete the chain-of-custody form. See example below:

Insert PDF of COC example

7. Pack the samples in the laboratory-provided coolers using laboratory-provided packaging materials. Follow packaging instructions provided by the laboratory (shown below). The samples should be maintained at $4^{o}C$ or less using wet ice (ice that is at the melting point).

Insert PDF of Lab Sample Packaging Directions

8. Sample cooler must be delivered via FedEx Express. The closest local drop-off point for FedEx Express is OfficeMax at 8329 Niagara Falls Blvd., Pine Plaza, Niagara Falls, NY 14304. **Coolers must be dropped-off before 6:00 PM.**
9. If sample chain of custody does not have carbon copies, make a photo copy of the COC - be sure to sign the "relinquish by" box and time dropped off for delivery. Save the COC with the Bottle Order form (included with cooler each week), the SPDES Sampling Field Form (be sure to sign), the shippers copy of the FedEx shipping label, and the receipt from FedEx drop-off representative. Staple this package together and file in the appropriate folder in the control room. These records must be retained for five years.

4.3.3 Discharge Monitoring Report (DMR) Preparation

In accordance with the facility's SPDES discharge permit requirements, a monthly discharge monitoring report must be prepared and submitted to NYSDEC. The report must contain analytical results, monthly flows, and other information for the previous month specifically listed in the SPDES permit. The report is due by the 28th of the month, following sample results (i.e. 28th of February for the January results). A cover letter indicating either that no exceedences occurred during the month or any exceedences that occurred and reason is included with a form provided by NYSDEC. The form provided by NYSDEC allows entry of the analytical data. Some of the data entered must be averaged and some data must be converted from concentration to average pounds per day discharged. A representative of Elm Holdings, Inc. is required to sign off on the forms prior to providing them to NYSDEC.

SOP-5
SYSTEM SHUT DOWN

5.1 PURPOSE

The purpose of this section is to describe the shut down of the groundwater extraction wells and treatment system from an operating condition. Two categories of shut down are described.

Automatic Shut down applies to shut downs due to process protective equipment failures causing the control system to stop operation.

Manual Shut down applies to shut down by the operator for repairs to the system or in the event of an emergency.

5.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER (TOTALIZER) OPERATION AND READING
3. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-4 COMPLIANCE SAMPLING FROM EFFLUENT OUTFALL 01A
5. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
6. SOP-8 LOCKOUT / TAGOUT PROCEDURE

5.3 STANDARD OPERATING PROCEDURE

5.3.1 Automatic Shut Down

The PLC control system for the treatment plant is designed to stop the operation of the plant if there is a malfunction that would cause untreated water to be discharged from the air stripping system or the overflow of any tanks. During an automatic shut down, the operator is to execute following procedures:

1. Note the alarm on the PLC HMI screen to identify the source of the problem.
2. Acknowledge the alarm on the PLC HMI screen.
3. Confirm the source of the problem.
4. Verify the required corrective action and proceed with making the system operational again.
5. Verify, prior to restart, the desired pump control modes at the PLC computer.
6. Reset PLC alarms once the acknowledged alarm condition clears.
7. Monitor the PLC HMI until the system is operating normally.

5.3.2 Manual Shut Down

A manual system shut down will require the operator to decide the extent and speed of the shut down required. Either a normal or emergency manual shut down may be required. During a manual shut down, the following procedures should be enacted:

Emergency Shut Down

For an emergency shut down, either the control system or the 480V power system may be used. Even during an emergency, the control system is the preferred method of shut down.

Emergency Shut Down Using the Power System

1. Open the main 480V circuit breaker. **Safety Note:** This will turn off the lighting, causing the emergency lights to come on.

Emergency Shut Down Using the MCC

1. Turn off the required motors at the MCC cubicle by turning the HOA switch to the OFF position.
2. Open (switch off) the required motor starter circuit protectors.
3. Open (switch off) the required circuit breakers.

Normal Shut Down

1. At the PLC HMI, select the well control display and turn each well off by placing it in manual and then selecting the STOP button. If the Filter Feed Pumps are running, allow them to pump down and shut off normally.
2. At the PLC HMI, shut off the Filter Feed Pumps, P-803B and P-803C.
3. At the PLC HMI, shut off the Carbon Feed Pumps, P-805A and P-805C.
4. At the PLC HMI, shut off the Effluent Pumps, P-810A and P-810B.
5. At the PLC HMI, shut off the air stripper blower. The blower for the air stripper should be shut off last to allow a few minutes for the trays to dry out.
6. Lock-out and tag the circuits, as required.
7. In the event that the system is to remain off for an extended period of time when there is potential for freezing temperatures, the MCC breakers must remain on to the wells. Next, the HOA switches should be turned to the OFF position for the recovery wells at the local control panel in the well sheds. This action will shut off the well pumps while allowing shed heaters to remain operational.

SOP-6
ACCIDENTAL SPILL PREVENTION PLAN

6.1 PURPOSE

The purpose of this section is to have an accidental spill prevention plan to eliminate or minimize the accidental discharge of untreated groundwater. With regards to this facility, the accidental spill prevention plan will address the accidental discharge of only untreated groundwater. Spill Prevention Plans typically address chemicals used at the treatment facility; however, no chemicals are used at this site to treat groundwater.

6.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
3. SOP-5 SYSTEM SHUT DOWN
4. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

6.3 STANDARD OPERATING PROCEDURE

6.3.1 Accidental Discharge of Untreated or Partially Treated Groundwater

This section describes the conditions that could result in the accidental discharge of untreated or partially treated groundwater. For each scenario, a discussion of spill prevention measures is presented.

Prior to proceeding, it is helpful to discuss the treatment facility's fail-safe measures. The following presents a list of the facility's treatment alarms and the alarm action that is to be taken. The following are the possible alarm reactions:

PLC HMI Alarm Display: Alarms will show on the PLC HMI and remain active until acknowledged.

VWCC Consolidation Sump (T-001): High Level Alarm (LAHH-203) alarms PLC HMI while independent High-High Level Float Switch (LSHH-203) shuts down Vault Pumps (P-001, P-002 and P-003).

VWCC Equalization Tank (T-002): High Level Alarm (LAHH-207) alarms PLC HMI while independent High-High Level Float Switch (LSHH-222) shuts down Consolidation Sump Pumps (P-004 and P-005).

Equalization Tank (T-801): High Level Alarm (LAH-202) shuts down all recovery wells (P-1, P-2, P-3, PW-1, PW-3, and PW-4) and the VWCC system Tank 002 transfer pumps P-006 and P-007. High-High Level Alarm (LAHH-219 float switch) is a redundant independent backup in the event the High Level Alarm fails.

Low Profile Air Stripper (S-801): High High Level Switch (LSHH-302) will activate the "lag" Carbon Feed Pump. If the water level in the Air Stripper sump does not drop

below the High High Level Switch within 1 minute after activation, the P-803B and P-803C Pumps are shut down.

Effluent Tank (T-802): High Level Alarm (LAH-402) shuts down Carbon Feed Pumps (P-805A, P-805C). High High Level Alarm (LAHH-223 float switch) is a redundant independent backup in the event the High Level Alarm fails.

Autodialer: Calls out a list of personnel in the event of a critical alarm. Upon receiving and acknowledging the alarm, the VNC system is used to identify the specific alarm and take appropriate action.

In addition to these alarms, the treatment facility is equipped with separate secondary containment. The secondary containment consists of a berm within which all treatment system units conveying groundwater are contained (Tanks T-801, T-802, T-002; Pumps P-803B/C, P-805A/C, P-801A/B, P-006, P-007; Filters U-801A/B, U-802A/B, U-001, U-002, U-003, U-004; Carbon Units LC-801A/B; and Air Stripper S-801A).

6.3.1.1 Process Overflow or Leak

Any water on the floor in the treatment area discharges to the Containment Sump, which automatically pumps back to the Equalization Tank (Tank T-801). In the event the leak overwhelms the building sump, and/or the sump pump does not operate, a building sump high alarm will trip which will turns off all recovery wells and process equipment and autodials an alarm condition. At this point, all flow into the treatment facility will be turned off, and the process will remain shut down until the operator responds to the alarm.

6.3.2 Spill Prevention

All treatment plant operators are trained in spill prevention and are 40-hour OSHA certified, with up-to-date annual 8-hour Refresher Training/Certification. Some or all of the operators also have training in the following areas: first aid, CPR, confined space entry, and hazard communication.

6.3.3 Spill Control and Clean-Up

To control and clean-up a spill, the following procedure and equipment should apply:

1. Any spills of groundwater within the containment area will be directed to the containment sump. Spill areas will be thoroughly flushed with water, and that water discharged to the Equalization Tank (T-801) for subsequent treatment in the process.
2. In the event the spill escapes the building, then external spill notification must be performed. The project manager is responsible for performing external spill notification. If any spill escapes the building via the connection to the SPDES outfall system without being properly treated, then the notification procedure spelled out in the facility's SPDES permit shall be performed.
    - Any discharge that leaves the building through other means (overflow of building containment curbing) should be reported to NYSDEC. In this case, NYSDEC notification number is 1-800-457-7362 or 518-457-7362.

SOP-7
ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

7.1 PURPOSE

The purpose of this section is to describe the routine scheduled tasks that are to be performed by the treatment plant operator. Record keeping procedures are also described. In addition, an Operator's Notebook is maintained at the site to record all other events, actions, and occurrences.

7.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER (TOTALIZER) OPERATION AND READING
3. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-4 COMPLIANCE SAMPLING FROM EFFLUENT OUTFALL 01A
5. SOP-5 SYSTEM SHUT DOWN
6. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN

7.3 STANDARD OPERATING PROCEDURE

7.3.1 Operator's Notebook

The operator is responsible for maintaining a permanent record of all activities that occur at the treatment facility. Each day should be dated, and a time entered for each entry. The following occurrences should be described along with a description of any corrective action that was taken, or a discussion of the outcome from the occurrence:

1. Alarms noted and actions taken
2. Scheduled maintenance items (See Section 7.3.2)
3. Spills or leaks
4. Process upsets
5. Treatment plant shut downs
6. Recovery well problems (level switches, pumps, in-line flowmeter)
7. PLC/HMI problems
8. Supplies ordered
9. Other maintenance or repairs performed
10. Unusual weather problems

7.3.2 IM Program Inspection & Maintenance Plan

Appendix E contains the IM Program Inspection & Maintenance Plan. Inspections are required at various frequency and are tracked monthly on Attachment III of the plan. The plan requires filling out inspection forms as required by the schedule. This documentation is to be saved on site and periodically scanned and uploaded to ENFOS. Any deficiencies and corrective actions are to be tracked in the Corrective Action Log located in Appendix E.

7.3.3 Maintenance Schedule

The following items should be performed at the indicated frequencies. All items should be recorded in the Operator's Notebook. For non-routine maintenance issues, reference Volumes III and IV for manufacturer's product information.

7.3.3.1 Daily (each site visit)

1. Read and record all information on the Daily Inspection Log.
2. Record all maintenance that needs to be performed and all maintenance completed in the Operator's Notebook.
3. Check process for proper operation and verify no leaks of process water.
4. Bleed air from bag filters when 803 pumps are running by opening air release valves for approximately 30 seconds.
5. Check PLC HMI for alarms or unusual operating conditions.
6. Check for proper treatment system and VWCC pump operation.
7. Observe recovery well cycling on the PLC HMI.
8. Record all incidents and occurrences in treatment plant Operator's Notebook.
9. Keep floor broom clean.
10. Keep eyewash and safety shower free of any obstructions.
11. Inspect building exterior for security breaches and evidence of vandalism.
12. Turn off all interior lights before leaving for the day.

7.3.3.2 Weekly

1. Collect weekly SPDES samples (see Section 4.3.2. for procedures).
2. Check operation of all pumps.
3. Flush water through eye wash and emergency shower for 1 minute each.
4. Exercise and confirm the operation of the floor sump pump by filling the sump with potable water until pump comes on.
5. In cold weather months, verify the building heating system is operating properly by checking building temperature and observing the cycling of the two radiant heating systems.

7.3.3.4 Monthly

1. Complete IM Plan required inspections.
2. Complete discharge monitoring report and send to Parsons.

7.3.3.5 Annually

1. Drain and clean accumulated sediment from Equalization Tank (T-801), if needed.
2. Have the potable water back flow prevention valve tested by a certified technician (Master Plumber, Town of Sanborn, County of Niagara).
3. Have fire extinguishers inspected by a certified technician.

7.3.3.6 As-Needed

1. Change the GAC pre-filters when the filter inlet pressure is about 70% of the Filter Feed Pump (P-803B/C) outlet pressure.
2. Order supplies (pH meter calibration buffers, supplies for total residual chlorine meter, bag filters, disposable gloves).
3. Order garbage bags, spill supplies, paper towels, hand soap, disposable gloves, etc.

4. Have process waste characterized and disposed off-site.
5. Turn on well shed and building heaters when potential for freezing temperatures exists.

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SOP-8
LOCKOUT / TAGOUT PROCEDURE

8.1 PURPOSE

The purpose of this section is to describe the procedures for the proper lockout and tagout of equipment prior to performing work on the equipment. This procedure was developed in accordance with 29 CFR 1910.147 and Parsons Energy Isolation Defined Practice.

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on equipment. It shall be used to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the equipment or release of stored energy could cause injury.

When the energy isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard which require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer must provide full employee protection and additional training and more rigorous periodic inspections are required.

8.1.1 Compliance With This Program

All personnel responsible for operation and maintenance of the treatment plant are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a piece of equipment which is locked out to perform servicing or maintenance, shall not attempt to start, energize or use that equipment.

8.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER (TOTALIZER) OPERATION AND READING
3. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-5 SYSTEM SHUT DOWN

8.3 STANDARD OPERATING PROCEDURE

Four (4) lockout/tagout procedures are attached to this SOP. They are:

1. SOP-8-1 Air Stripper Feed Pumps P-803B and P-803C
2. SOP-8-2 Pumps P-805A and P-805C
3. SOP-8-3 Pumps P-810A and P-810B
4. SOP-8-4 Air Blower B-801A

8.3.1 Standard Lockout Procedure

The general procedure to be followed is described below. Each of the attached procedures contain this information.

1. Notify all affected employees that servicing or maintenance is required on a piece of equipment and that the equipment must be shut down and locked out to perform the servicing or maintenance. Also note in the Operator's Notebook.
2. The authorized employee shall refer to the attached procedure to identify the type and magnitude of the energy that the equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
3. If the equipment is operating, shut it down by the normal stopping procedure (depress stop button, open switch, close valve, etc.). These shut downs are indicated in the specific procedures.
4. De-activate the energy isolating device(s) so that the equipment is isolated from the energy source(s).
5. Lock out the energy isolating device(s) with assigned individual lock(s).
6. Stored or residual energy (such as that in capacitors, springs, elevated equipment members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate. In the event that the equipment is able to be operated, immediately notify the project manager, do not proceed with the remainder of the lockout/tagout, and stop all work on this process.
8. Caution: Return operating control(s) to neutral or "OFF" position after verifying the isolation of the equipment.
9. The equipment is now locked out.

8.3.2 Restoring Equipment to Service

When the servicing or maintenance is completed and the equipment is ready to return to normal operating condition, the following steps shall be taken.

1. Check the equipment and the immediate area around the equipment to ensure that nonessential items have been removed and that the equipment components are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and reenergize the equipment.
    - NOTE: The removal of some forms of blocking may require re-energization of the equipment before safe removal.

5. Notify affected employees that the servicing or maintenance is completed and the equipment is ready for use.
6. Refer to specific procedures contained in SOP-1 and other SOPs for detailed startup instructions.

SOP-8-01
LOCKOUT / TAGOUT FOR:
AIR STRIPPER FEED (FILTER FEED) PUMPS P-803B AND P-803C

FOR: PUMPS P-803B and P-803C

Date Issued/Revised: March 5, 2013

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

1. **General Description**: Pumps P-803B and P-803C are secured to the treatment plant floor adjacent to the Equalization Tank (T-801) and the water filters (F-801A/B and F-802A/B). One of the two pumps functions as a lead pump while the other functions as a lag pump. Selection of lead and lag pump is switched periodically to balance operating hours between both pumps. Untreated groundwater enters the pumps from tank T-801. All flow sources to Tank T-801 must be de-energized and the outlet valve is closed to insure no flow to the pumps.
2. **Manufacturer**: The P-803 pumps are built by Aurora Pumps. The pumps are frame mounted 3x4x9A-inch 460V with 10 HP motors. The pumps each have a capacity of 250 gpm.

OPERATOR CONTROLS

1. On/Off power disconnect at each pump.
2. MCC panel in electrical room with HOA switch for each pump.
3. PLC HMI control by using MANUAL then STOP on HMI.
4. Incoming Flow Sources to Tank T-801: MCC control and PLC HMI control.

ENERGY SOURCE/LOCATION/MAGNITUDE

1. Main electrical disconnects are located in the electrical room MCC panel (480V). There are two disconnects.
2. Incoming Flow Sources Main electrical disconnects are located 50 feet away in the electrical room in the MCC. The following circuit breakers are located in the MCC and are appropriately labeled (480V):
    - P-2, P-3, P-4 and PW-4 (480V feed to remote electric room)
    - PW-1
    - PW-3
    - P-006
    - P-007

SHUT DOWN PROCEDURES

Notify all affected employees before shut down procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

Incoming Flow Sources: Before de-energizing the pumps, the incoming flow sources should be stopped and the preceding process equipment (Tank T-801) should be allowed to finish gravity draining.

All incoming flow sources to P-803B and P-803C should have valves positioned so that flow will not go to the pumps. Normally, the only flows that will go to the pumps is from Tank T-801. Main electrical disconnects should be turned to off at the MCC panel. Lock and tag the following circuit breakers:

- P-2, P-3, P-4, PW-4
- PW-1
- PW-3
- P-006
- P-007
- P-803B
- P-803C

The floor sump will also normally discharge to Tank T-801. This is de-energized by turning the circuit breaker for the sump pump off. Lock the panel circuit breakers off, and tag the locking devices.

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

Try to turn on P-803B and P-803C at the local disconnect and at the MCC by turning the HOA switch to on.

START-UP PROCEDURES:

1. Notify all affected employees before startup.
2. Adjust valve positions as needed.
3. Remove personnel and tools from work area around equipment.
4. In the electrical room, remove tags and locks from the electrical disconnect switches.
5. Throw the electric disconnect switches to the on position and restart the equipment in accordance with SOP-1.

AFFECTED AND AUTHORIZED EMPLOYEES

Affected & Authorized Employees Include: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUT DOWN OR START-UP OF THIS EQUIPMENT.

Approvals / Title	**Date**
Project Manager	
Health & Safety Rep.	
Operator	

SOP-8-02
LOCKOUT / TAGOUT FOR:
PUMPS P-805A AND P-805C

FOR: PUMPS P-805A and P-805C

Date Issued/Revised: March 5, 2013

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

1. **General Description:** Pumps P-805A and P-805C are secured to the treatment plant floor adjacent to the carbon reactors (LC-801A and LC-801B) and the air stripper (S-801A). One of the two pumps functions as a lead pump while the other functions as a lag pump. Selection of lead and lag pump is switched periodically to balance operating hours between both pumps. Incoming flow is from the tray air stripper (S-801).
2. **Manufacturer:** The P-805 pumps are built by Aurora Pumps. The pumps are frame mounted 2x3x11-inch 460V with 3HP motors. The pumps each have a capacity of 200 gpm.

OPERATOR CONTROLS

1. On/Off power disconnect at each pump.
2. MCC panel in electrical room with HOA switch for each pump.
3. PLC HMI control by using MANUAL then STOP on HMI.
4. Incoming Flow Sources MCC control and PLC HMI control.

ENERGY SOURCE/LOCATION/MAGNITUDE

1. Main electrical disconnects are located in the electrical room MCC panel (480V). There are two disconnects.
2. **Incoming Flow Sources** Main electrical disconnects are located 50 feet away in the electrical room in the MCC. The following circuit breakers are located in the MCC and are appropriately labeled (480V):
    - B-801
    - P-803B
    - P-803C

SHUT DOWN PROCEDURES

Notify all affected employees before shut down procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

Incoming Flow Sources: Before de-energizing the pumps, the incoming flow sources should be stopped, and the preceding process equipment (stripper S-801) should be allowed to finish gravity draining.

All incoming flow sources to P-805A and P-805C should have valves positioned so that flow will not go to the pumps. Normally, the only flows that will go to the pumps is from Stripper S-801. Main electrical disconnects should be turned to off at the MCC panel. Lock and tag the following circuit breakers:

- P-805A
- P-805C
- P-803B
- P-803C
- B-801

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

Try to turn on P-805A and P-805CB at the local switches and at the MCC panel by turning the HOA switch to the ON position.

START-UP PROCEDURES:

1. Notify all affected employees before startup.
2. Adjust valve positions as needed.
3. Remove tools from work area around equipment, and have personnel leave the area.
4. In the electrical room, remove tags and locks from the electrical disconnect switches.
5. Throw the electrical disconnect switches to the on (up) position, and restart the equipment in accordance with SOP-1.

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUT DOWN OR STARTUP OF THIS EQUIPMENT

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	**Date**
Project Manager	
Health & Safety Rep.	
Operator	

SOP-8-03
LOCKOUT / TAGOUT FOR:
PUMPS P-810A AND P-810B

FOR: PUMPS P-810A and P-810B

Date Issued/Revised: March 5, 2013

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

1. **General Description**: Pumps P-810A and P-810B are secured to the treatment plant floor adjacent to the Effluent Tank (T-802). One of the two pumps functions as a lead pump while the other functions as a lag pump. Selection of lead and lag pump is switched periodically to balance operating hours between both pumps. Incoming flow is from the Effluent Tank (T-802).
2. **Manufacturer**: The P-810 pumps are built by Aurora Pumps. The pumps are direct coupled 3x4x9A, 460V with 5HP motors. The pumps each have a capacity of 200 gpm.

OPERATOR CONTROLS

1. On/Off power disconnect at each pump.
2. MCC panel in electrical room with HOA switch for each pump.
3. PLC HMI control by using MANUAL then STOP on HMI.
4. **Incoming Flow Sources:** No operator controls, other than MCC.

ENERGY SOURCE/LOCATION/MAGNITUDE

1. Main electrical disconnects are located in the electrical room MCC panel (480V). There are two disconnects.
2. **Incoming Flow Sources**: Main electrical disconnects are located 50 feet away in the electrical room in the MCC. The following circuit breakers are located in the MCC and are appropriately labeled (480V):
   - P-805A
   - P-805C

SHUT DOWN PROCEDURES

Notify all affected employees before shut down procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

Incoming Flow Sources: Before de-energizing the pumps, the incoming flow sources should be stopped and the preceding process equipment (Effluent Tank, T-802) should be allowed to finish gravity draining.

All incoming flow sources to P-810A and P-810B should have valves positioned so that flow will not go to the pumps. Normally, the only flows that will go to the pumps is from Effluent

Tank T-802. Main electrical disconnects should be turned to off at the MCC panel. Lock and tag the following circuit breakers:

- P-810A
- P-810B
- P-805A
- P-805C

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

Try to turn on P-810A and P-810B at the local power disconnect and at the MCC panel by turning the HOA switch to on.

START-UP PROCEDURES:

1. Notify all affected employees before startup.
2. Adjust valve positions as needed.
3. Remove tools from work area around equipment, and have personnel leave the area.
4. In the electrical room, remove tags and locks from the electrical disconnect switches.
5. Throw the electrical disconnect switches to the on position, and restart the equipment in accordance with SOP-1.

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUT DOWN OR STARTUP OF THIS EQUIPMENT

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	**Date**
Project Manager	
Health & Safety Rep.	
Operator	

SOP-8-04
LOCKOUT / TAGOUT FOR:
AIR BLOWER (B-801)

FOR: AIR BLOWER (B-801A)

Date Issued/Revised: July 27, 2006

AREA: Groundwater Treatment Building, Blower Room

EQUIPMENT IDENTIFICATION

1. **General Description**: Rotron Model DR808D89MX, 900 cfm, 5HP, 21" x 19" x 21"
2. **Manufacturer**: Rotron

OPERATOR CONTROLS

1. On/off switch on the blower.
2. MCC panel starter disconnect.

ENERGY SOURCE/LOCATION/MAGNITUDE

Main electrical disconnect is located 50 feet away, in the electrical room, circuit B-801.

SHUT DOWN PROCEDURES

Notify all affected employees before shut down procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

Throw the main electrical disconnect switch in the MCC panel to the OFF position. Lock the circuit breaker off, and tag the locking device.

ATTEMPT TO RESTART THE EQUIPMENT (TRY)

Attempt to re-start the pump by turning it on using the on/off switch.

START UP PROCEDURES:

1. Notify all affected employees before start-up.
2. Remove tools from work area around equipment, and have personnel leave the area.
3. In the electrical room, remove tags and locks from the electrical disconnect switch. Throw the electric disconnect switch to the on position. Follow procedures in SOP-1 for proper operation.

AFFECTED AND AUTHORIZED EMPLOYEES

1. Affected & Authorized Employees Include: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUT DOWN OR STARTUP OF THIS EQUIPMENT.

Approvals / Title	**Date**
Project Manager	
Health & Safety Rep.	
Operator	

SOP-9
PUMPING WELL PUMP REPAIRS

9.1 PURPOSE

The purpose of this section is to describe the procedures required to complete repairs to well pumps.

9.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER OPERATION (TOTALIZER) AND READING
3. SOP-5 SYSTEM SHUT DOWN
4. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN
5. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
6. SOP-8 LOCKOUT / TAGOUT PROCEDURE

9.3 STANDARD OPERATING PROCEDURE

Occasionally during normal operation, pumps will need to be de-energized to work on the well or a particular section of pipe. Other pumps on the system may continue to operate during these periods. This operation should be accomplished as follows:

1. From the PLC HMI, place the well of concern in MANUAL, then STOP.
2. Electrically isolate the submersible pump at the well of concern by tuning the HOA switch on the pump motor starter to "Off," then opening the power disconnect switch, and locking/tagging out (see SOP-8).
3. Close the manual valve in the pipeline from the well to be isolated.
4. To bring a well that has been shut down back on line, open the manual valve and follow the procedures described in SOP-1.

Occasionally during operation, the operator will be required to make adjustments to the system to maintain proper hydraulic control of the groundwater levels. The system set points will be adjusted to increase or decrease pumping well water levels according to instructions given by the project manager.

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SOP-10
ALARMS AND CORRECTIVE ACTIONS

10.1 PURPOSE

This section describes the alarms and corrective actions to take when an alarm condition occurs. All alarms come in to the PLC HMI and display on the PLC HMI screen in text just below the process graphic on the Overview main screen. Alarms vary from the informational that only display on the PLC HMI to those that activate the automatic telephone dialer system to contact personnel who will respond to these conditions. See Section 4.2.5 for an alarms description.

10.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP
2. SOP-2 FLOW METER OPERATION (TOTALIZER) AND READING
3. SOP-3 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-5 SYSTEM SHUT DOWN
5. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN
6. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
7. SOP-8 LOCKOUT / TAGOUT PROCEDURE
8. SOP-9 PUMPING WELL PUMP REPAIRS

10.3 STANDARD OPERATING PROCEDURE

Groundwater Extraction Well High Level Alarm

High level alarm indicates either the pump failing to run, failing to pump, or failing to pump at a high enough rate to control the well level at prescribed settings. If the pump is determined to be functioning properly, corrective actions include recording the incident and immediately notifying the Project Manager. This will allow reassessment of the site conditions and potential re-adjustment of the well's water elevation or high level alarm set point.

A low-level condition may be the result of decreased groundwater flow into the well and/or high pumping rates. This alarm condition causes the automatic shut down of the pump in the well where the low water level was detected. The shut down protects the pump motor and impeller from damage. Again, corrective actions include recording the incident and immediately notifying the Project Manager. This will allow reassessment of the site conditions and potential re-adjustment of the well's water elevation set point.

Loss of Radio Telemetry for Groundwater Extraction Wells

Check the electrical box in the well house (in the remote electric room for P-3 and P-4) to see if the telemetry system has power. Check antenna connection for tightness. Sometimes resetting the power re-establishes communication with the control room receiver in the MCP.

Influent/Equalization Tank (T-801) Water Level, High and Low Level Alarms

High level alarm indicates either the filter feed pumps (P-803B, P-803C) failing to run, failing to pump, or failing to pump at a high enough rate to control the well level at prescribed

settings. The 803 pumps should both be running in this alarm condition. If the pump is determined to be functioning properly, corrective actions include checking electrical conditions and making sure both P-803B and P-803C are in AUTO mode on HOA switches on the MCC starter and in AUTO on the PLC HMI.

A low-level alarm condition may be the result of a filter feed pump failing to stop at the normal low setpoint, or a leak in the system. This alarm condition causes the automatic shut down of the pump in the well where the low water level was detected. The shut down protects the pump motor and impeller from damage.

Filter Feed Pumps (P-803B, P-803C) Failure to Start Alarms

The PLC monitors the pump starter contactor only. When the PLC send a start signal to the motor starter, then motor start relay then closes the contacts to allow power to the motor. A condition that would cause this alarm would be loss of power to the MCC, breaker arm on the starter in off position, starter relay failure, or blown starter fuse.

Air Stripper Reservoir High and Low Water Level Alarms

The stripper sump high level alarm will shut down the filter feed pumps (P-803B, P-803C) to prevent flooding of the stripper which will cause loss of treatment of volatile chemicals. The stripper high level alarm can be the cause of the following: failure of carbon feed pumps (P-805A, P-805C); carbon filter beds pressure drop too high (backwashing needed); flow rate from filter feed pumps too high or flow rate from carbon feed pumps too low; failure of carbon feed lag pump to start.

The stripper low level alarm will shut down the carbon feed pumps (P-805A, P-805C) to prevent damage to the pumps. The causes of this condition could be: failure of carbon feed pumps to shut down normally on their low level setpoint; leak in the stripper sump connections or piping to carbon feed pumps.

VWCC Vaults (1,2,3) and Tanks (T-001, T-002) High Level Alarms

The VWCC vaults use a pressure sensing level transducer to monitor vault levels. The vault pumps have an internal level float that controls on/off operation of the pump. A high level alarm in the vaults could be caused by the following: pump malfunction – sometimes the float can get hung up on debris; clogged pump inlet; water entering vault at a rate in excess of pump capability; level sensor out of place or covered with debris.

Tanks T-001 and T-002 have a redundant high level float switch that will bring in a high level alarm. The troubleshooting in both cases must focus on the transfer pumps responsible for maintaining the tank levels. For tank T-001, this would be pumps P-004 and P-005. For tank T-002, this would be pumps P-006 and P-007. Check to see that the pumps have power and are in AUTO on the MCC HOA switch and the PLC HMI. Also see if downstream interlock has locked the pumps out.

VWCC Pre-filter Differential Pressure and Alarm

The VWCC filters consist of a parallel pair of bag filters where only one pair is in operation at a time. There are pressure transducers on the inlet and outlet of the filter pairs that monitor differential pressure across the filters. As the filters become plugged, the differential pressure increases until a setpoint of 12.0 psi is achieved for at least five seconds (to prevent pump start

pressure spike from triggering alarm). When the alarm condition is reached, the automatic valves on the filter pair inlets switch to bring on the new set of filters. The filters in the plugged set must be replaced, then the alarm interlock acknowledged on the PLC HMI.

Air Stripper Blower Air Low Flow Rate Alarm

The blower is equipped with a pressure transducer on the blower to monitor operation. In the event the flow falls below the set pressure, the filter feed pumps (P-803B, P-803C) will shut down to stop untreated groundwater from being sent through the stripper when the air flow is inadequate to perform the removal of volatile chemicals. The only control of the stripper is the ON/OFF switch on the MCC starter panel and the PLC HMI has ON/OFF control. Make sure these are in the on position and the local disconnect is ON.

Air Stripper Transfer Pump (P-805A, P-805C) Failure to Start Alarms

The PLC monitors the pump starter contactor only. When the PLC sends a start signal to the motor starter, the motor start relay then closes the contacts to allow power to the motor. A condition that would cause this alarm would be loss of power to the MCC, breaker arm on the starter in off position, starter relay failure, or blown starter fuse.

Effluent Tank High and Low Level Alarms

High level alarm indicates either the effluent pumps (P-810A, P-810C) failing to run, failing to pump, or failing to pump at a high enough rate to control the water level at prescribed settings. The 810 pumps should both be running in this alarm condition. If the pump is determined to be functioning properly, corrective actions include checking electrical conditions and making sure both P-810A and P-810B are in AUTO mode on HOA switches on the MCC starter and in AUTO on the PLC HMI.

A low-level alarm condition may be the result of a pump failing to stop at the normal low setpoint, or a leak in the system. This alarm condition causes the automatic shut down of the pump in the well where the low water level was detected. The shut down protects the pump motor and impeller from damage.

Effluent Pump (P-810A, P-810B) Failure to Start Alarm

The PLC monitors the pump starter contactor only. When the PLC sends a start signal to the motor starter, the motor start relay then closes the contacts to allow power to the motor. A condition that would cause this alarm would be loss of power to the MCC, breaker arm on the starter in off position, starter relay failure, or blown starter fuse.

Containment Area Drain Sump/Building Drain Sump High Level Alarms

The containment area and building sumps have fixed level conductivity probes that provide a high level alarm. The first response is to make sure the sump pump is functioning. The sump pumps use an external float switch that can be activated with a rod through the grating to test the pump. If the pump is not functioning, check to see if there is power at the twist-lock plug where the pump connects. If no power at the twist-lock outlet, check the 120V breaker panel to see if the breaker is on. If the pump is getting power, but it will not run, unplug the pump, close the outlet valve and pull the pump. Replace with new pump.

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SOP-11
FLOW MEASURMENT

11.1 PURPOSE

The purpose of this SOP is to define how to measure flow from all extraction wells, flow into the Equalization Tank (T-801). This SOP will help to determine if a potential leak has occurred in the underground piping system at the site.

11.2 RELATED SECTIONS

1. SOP-2 FLOW METER OPERATION (TOTALIZER) AND READING
2. SOP-5 SYSTEM SHUT DOWN
3. SOP-6 ACCIDENTAL SPILL PREVENTION PLAN
4. SOP-7 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
5. SOP-8 LOCKOUT/TAGOUT PROCEDURE

11.3 STANDARD OPERATING PROCEDURE

11.3.1 Data Collection

1. A reading (in gallons) of the totalizer at each extraction well should be collected and recorded. The date and time of measurement collection should be recorded.
2. The totalizer immediately prior to the Equalization Tank (T-801) should be read and the measurement recorded. The date and time of measurement collection should be recorded.
3. The totalizer after the SPDES outfall (directly after Effluent Tank (T-802) pumps P-810A/B) should be read and the measurement should be recorded. The date and time of measurement collection should be recorded.
4. On the PLC HMI, select FLOW TOTALS, for the VWCC system, record Today, Yesterday, and Current Total.
5. Steps 1 and 2 above should be completed every week (at a minimum).
6. Steps 3 and 4 should be completed during each site visit.

11.3.2 Data Evaluation

1. Enter the data in to the flow data tracking spreadsheet on the control room PC in the My Documents folder. The spreadsheet is designed to predict flows forward to fill in days where totalizer readings are not taken.
2. First, the gallons pumped by each extraction well since the previous measurement should be determined. For each extraction well, subtract the previous totalizer reading from the current totalizer reading to find the number of gallons pumped from that well during the determined time period.
3. The number of gallons that entered the influent tank since the previous reading is determined next. Subtract the previous totalizer reading from the current totalizer reading for the influent totalizer. The sum of the gallons pumped from the six extraction wells should approximately equal the total number of gallons since the last reading at the influent totalizer.

4. The gallons discharged from the treatment system since the last totalizer readings is determined next. Subtract the last totalizer reading from the current totalizer reading at the totalizer at the SPDES outfall. This number should approximately equal the number of gallons pumped to the influent tank which is the sum of the gallons pumped from the extraction wells plus gallons from the VWCC system during the same time period.

11.3.3 Discussion

1.
2. In the event that a large difference is identified between the number of gallons pumped from the extraction wells and the number of gallons entering the influent tank, it is possible that the underground piping has a leak somewhere. The ground surface along all underground piping should be visually assessed to see if any surface evidence of a leak is present, for example a puddle or wetness not attributable to other factors. Any above ground portions of the line should also be directly visually assessed. It is also possible that one or more of the flow meters are not reading accurately. Totalizers should be checked for proper function and repaired or replaced as appropriate.
3. If the total gallons entering the influent tank does not equal the total gallons discharged at the SPDES, it is likely the result of inaccurate flow meters. In the event that a leak in the system occurred between the influent and effluent of the building, it is within the containment system and would flow to the sump which would return the water to the influent tank. There will always be an offset of a few thousand gallons between the meters due to retention of groundwater in the treatment system. It is possible that a small amount of water is lost during air stripping and while the water is in the influent and effluent tanks due to evaporation. Weekly samples are also collected from the effluent tank. Sample volume is estimated at less than one gallon per week.