

### 6.5.3.8 MBR Cleaning Operation

The membranes require cleaning to maintain peak performance. There are two types of cleaning methods: maintenance cleans and recovery cleans. Maintenance cleans are scheduled through SCADA and are automatically initiated by the MBR system PLC as scheduled by the operator on a weekly basis. Recovery cleans are operator initiated and only are performed seasonally.

There are two chemicals that can be used to clean the membranes. These chemicals are sodium hypochlorite and citric acid. The hypochlorite is used to remove organic contaminants from the membranes. The citric acid is used to remove inorganic contaminants from the membranes such as calcium carbonate, manganese and iron compounds.

#### MBR Process Control Screens

The MBR cleaning systems are controlled through SCADA by the MBR control system PLC located in the MBR building. The access to this control system is discussed in the following sections. The operator must access a number of screens to set up the cleaning cycles. The timers for each of the cleaning cycles are accessed through the plant setpoints screen.

The maintenance clean schedule is accessed and set on the maintenance clean schedule screens for each of the individual MBR basins. A maintenance schedule can also be manually started on the

#### MBR Process Main Screen

The automatic operation of the MBR process is controlled through the SCADA system on the membrane main screen (**Figure 6.5.3.8-1**). The screen is accessed by clicking on the **MBR**. The screen is accessed by clicking on the **MBR button <1>** on the top of the screen.

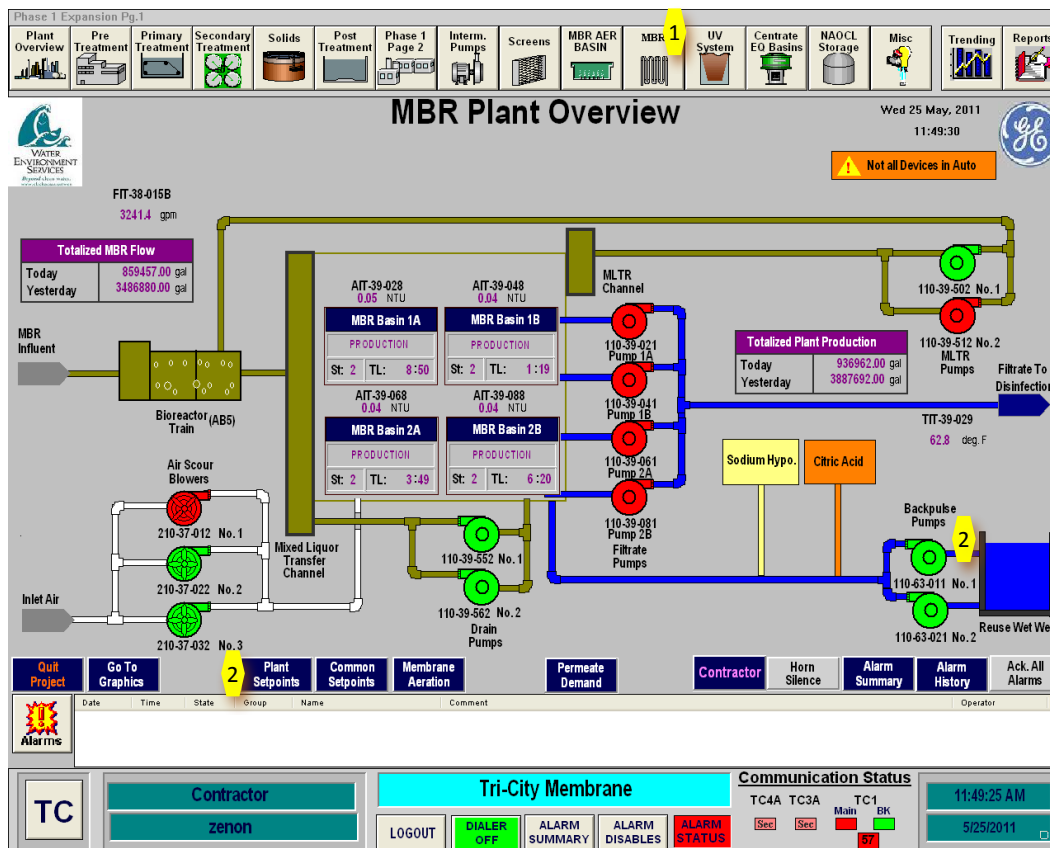


Figure 6.5.3.8-1 – Membrane System Control Panel

### MBR Cleaning Setpoint Entry

The MBR cleaning setpoints for both maintenance cleans and recovery cleans are set through the plant setpoints menu. The plant setpoints menu is accessed from the MBR system main screen or any of the four MBR basin screens by clicking on the **Plant Setpoints button <2>** as shown in **Figure 6.5.3.8-1**. Clicking on this button provides a popup box with five input screen options as shown on the popup box as shown in **Figure 6.5.3.8-2**. These options are:

- Plant Setpoints
- Maintenance Clean Setpoints
- Neutralization Setpoints
- Recovery Clean Setpoints
- Flow Demand Triggers

Clicking on each of these buttons puts up an input box to input the variables for each of these functions. Each of the input boxes is restricted to a specific range of values to ensure the values that are entered are appropriate.

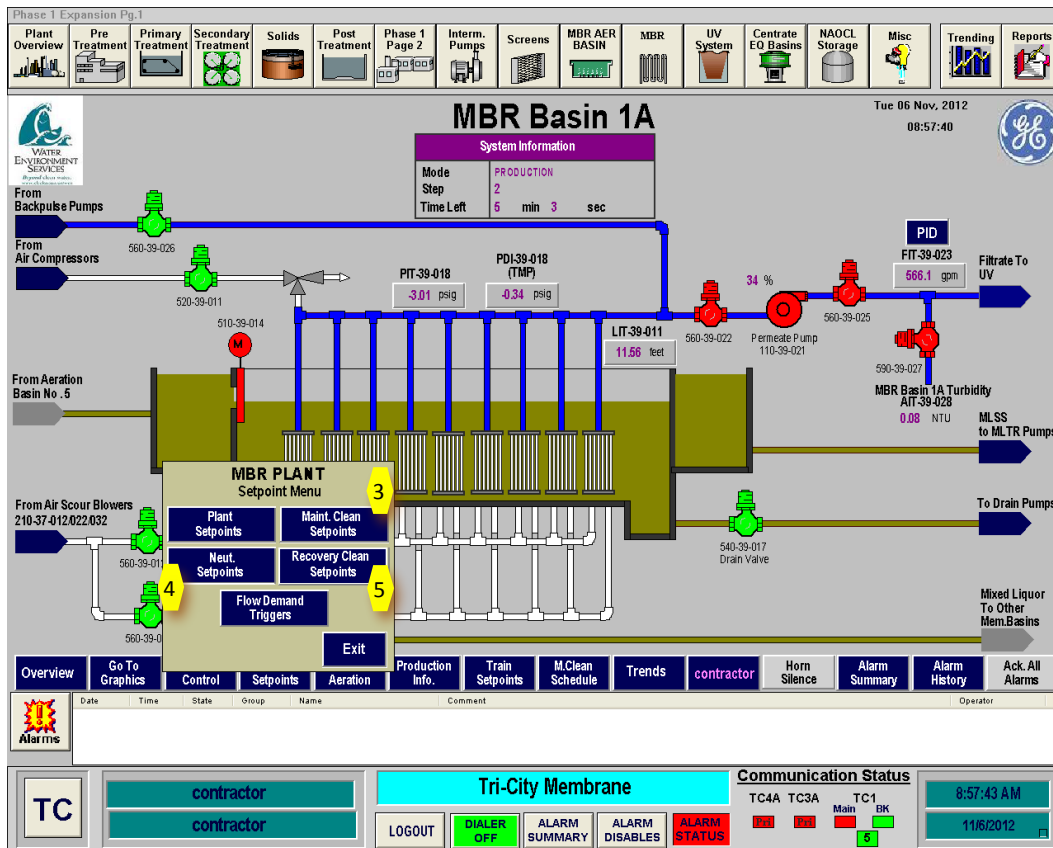


Figure 6.5.3.8-2 – MBR Plant Setpoint Menu

### Maintenance Clean Setpoints

Clicking on the **Maintenance Clean Setpoints button <3>** gives the Maintenance Clean Setpoint popup box shown in **Figure 6.5.3.8-3**. Clicking on the highlighted box will give a popup keyboard for input of the setpoint. These setpoints are common to all of the MBR basins. These timers determine the duration for each of the cleaning steps during maintenance clean. A description of each of these setpoints is provided in the provided in the GE Process Controls Descriptions manual provided in Section 6.5.2.1.

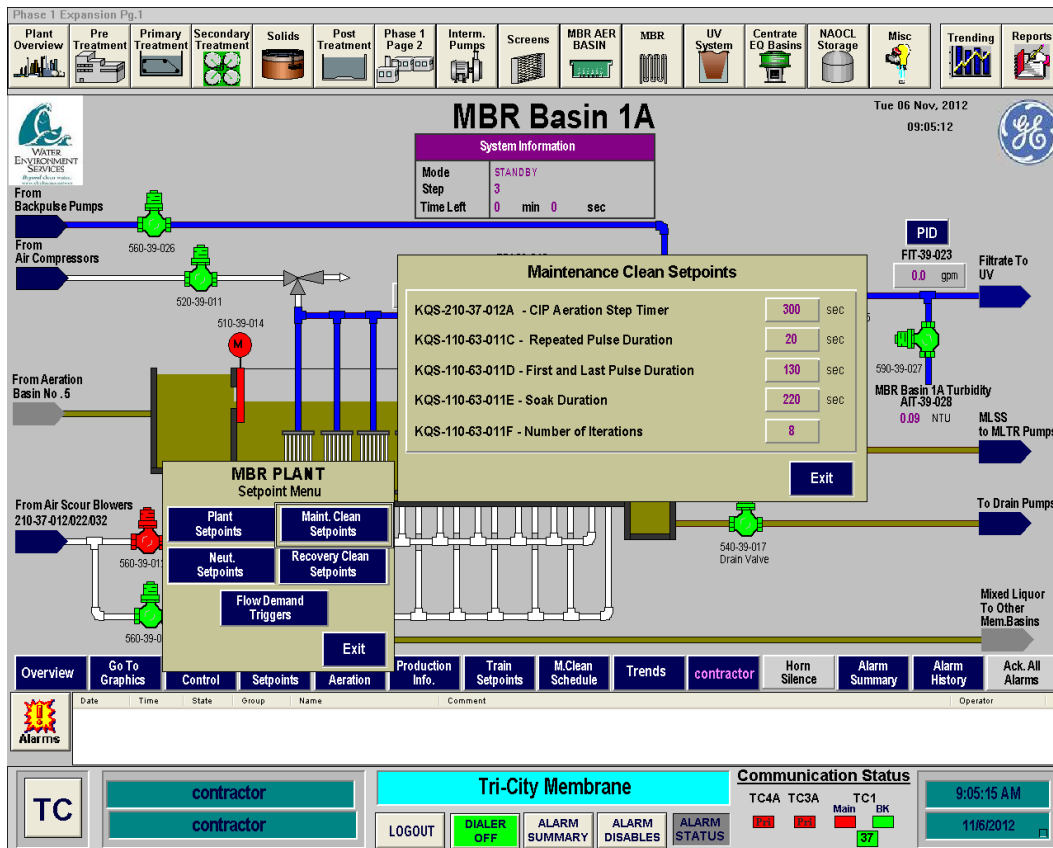


Figure 6.5.3.8-3 – Maintenance Clean Setpoints Input Box

### Neutralization Setpoints

Clicking on the **Neut. Setpoints** button <4> gives the Neutralization Setpoint popup box shown in **Figure 6.5.3.8-4**. Clicking on the highlighted box will give a popup keyboard for input of the setpoint. These setpoints are common to all of the MBR basins. These timers determine the duration for neutralization step of the recovery clean. A description of each of these setpoints is provided in the provided in the GE Process Controls Descriptions manual provided in Section 6.5.2.1.

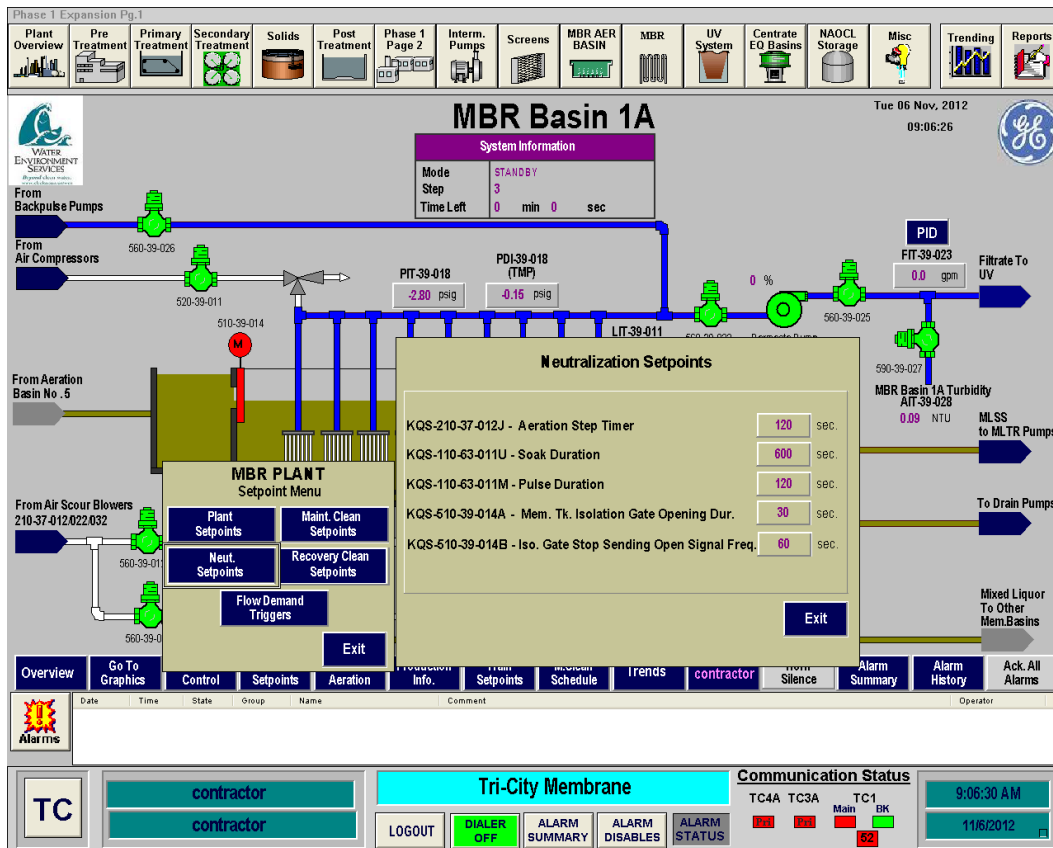


Figure 6.5.3.8-4 – Neutralization Setpoints Input Box

#### Recovery Clean Setpoints

Clicking on the **Recovery Clean Setpoints** button <5> gives the Recovery Clean Setpoint popup box shown in **Figure 6.5.3.8-5**. Clicking on the highlighted box will give a popup keyboard for input of the setpoint. These setpoints are common to all of the MBR basins. These timers determine the duration for each step of the recovery clean. A description of each of these setpoints is provided in the provided in the GE Process Controls Descriptions manual provided in Section 6.5.2.1.

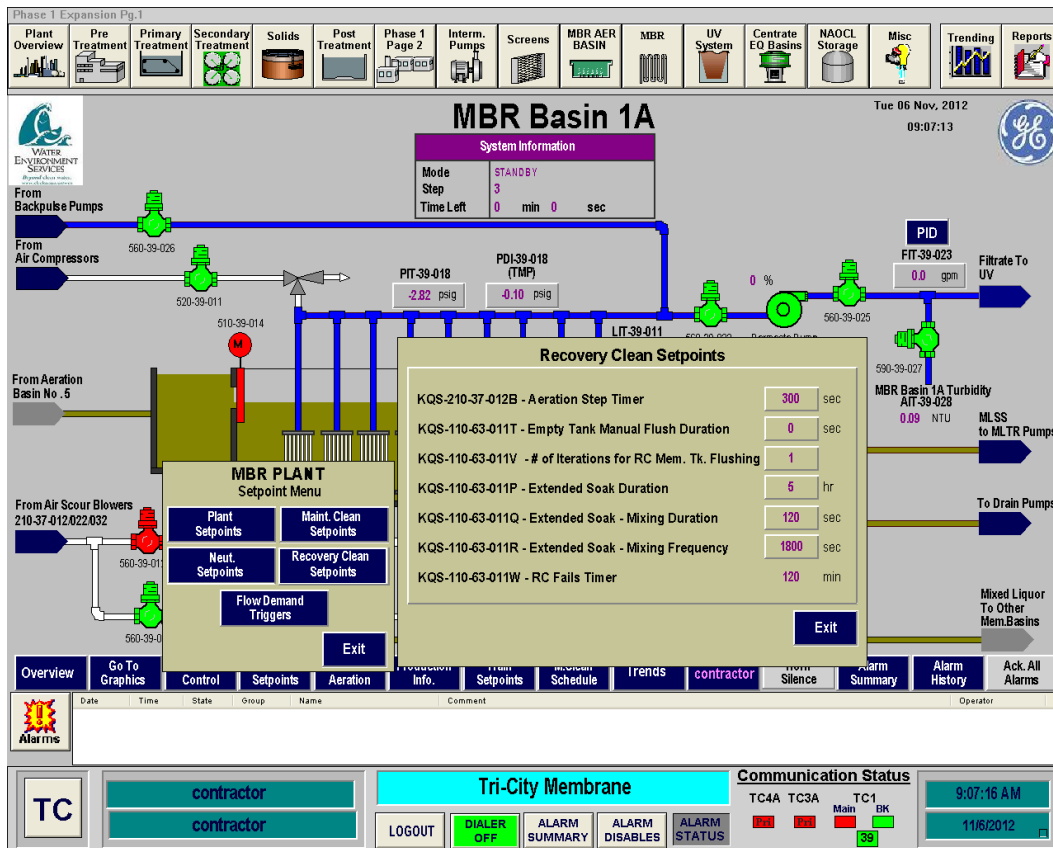


Figure 6.5.3.8-5 – Recovery Clean Setpoints Input Box

## Cleaning Cycle Scheduling

The MBR basins are placed in service through the SCADA system. The basins can only be operated in Automatic mode. To start the basin, all equipment associated with the basin must be in AUTO. This includes the filtrate pump, each of the valve, the influent gate, the air scour blowers, the MLTR pumps, the air compressors and the backpulse pumps, if being used.

### Manual Initiation of Cleaning Cycles

To place a MBR basin in service go to the MBR basin control screen for the desired basin. Once on that screen, go to the select the **Mode Control button <3>** as shown in **Figure 6.5.3.1-2**. This will bring up the basin Modes of Control popup box (**Figure 6.5.3.1-3**). On this control box, select the **ON button <4>** to place the MBR basin in service. When this button is selected, the basin will go through an automatic startup sequence and being processing flow.

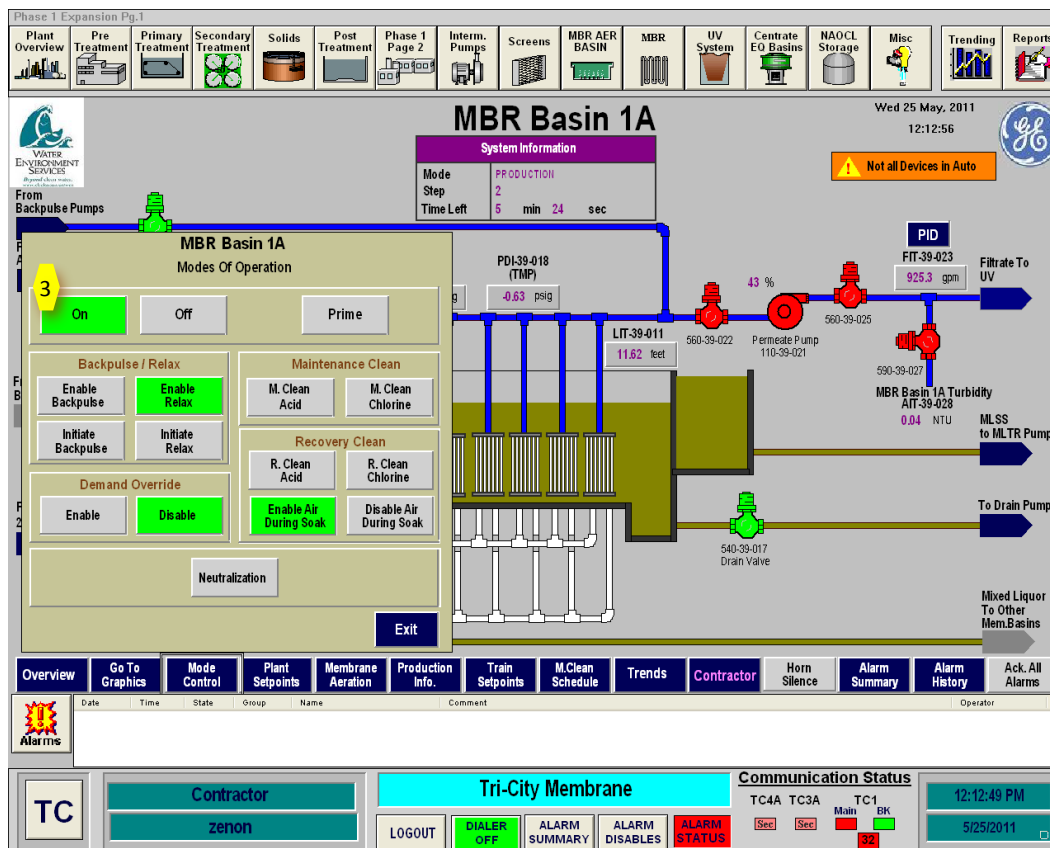


Figure 6.5.3.1-3 – MBR Basin Modes of Operation Popup Box

#### Maintenance Clean Scheduling

Clicking on the **M.Clean Schedule** button <14> located on the bottom of the MBR Basin screen (Figure 6.5.3.1-2) gives the Maintenance Clean Schedule popup box shown in Figure 6.5.3.1-15. This box is specific to each basin. This box provides for inputting the maintenance clean schedule for the basin. The maintenance clean scheduling provides for the operator to input the day of the week, time of day, the chemical to be used and the ability to enable or disable the specific day. On the screen shown in Figure 6.5.3.1-15, Basin 1A is scheduled for a hypochlorite maintenance clean on every Monday at 9:30 AM.

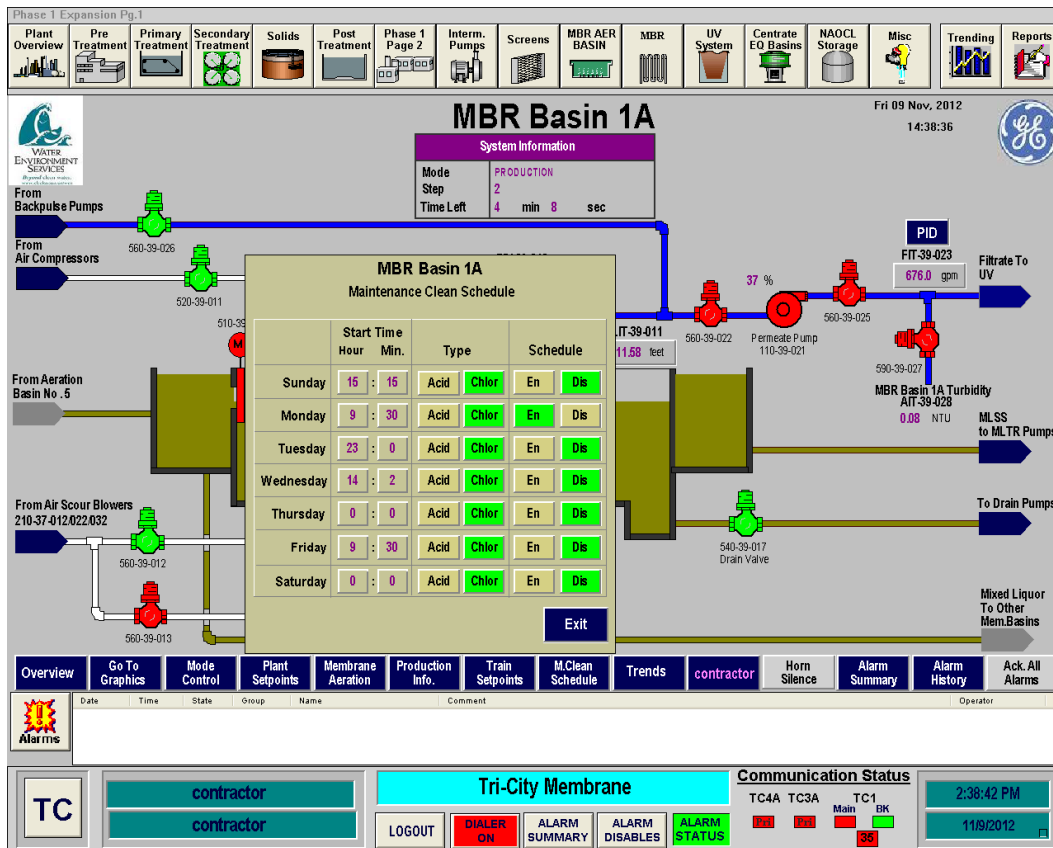


Figure 6.5.3.1-15 – Maintenance Clean Schedule Screen

### MBR Chemical Selection

To place a MBR basin in service go to the MBR basin control screen for the desired basin. Once on that screen, go to the select the **Mode Control button <3>** as shown in **Figure 6.5.3.1-2**. This will bring up the basin Modes of Control popup box (**Figure 6.5.3.1-3**). On this control box, select the **ON button <4>** to place the MBR basin in service. When this button is selected, the basin will go through an automatic startup sequence and being processing flow.

### Manual Initiations of Clean

### Scheduled Maintenance Clean



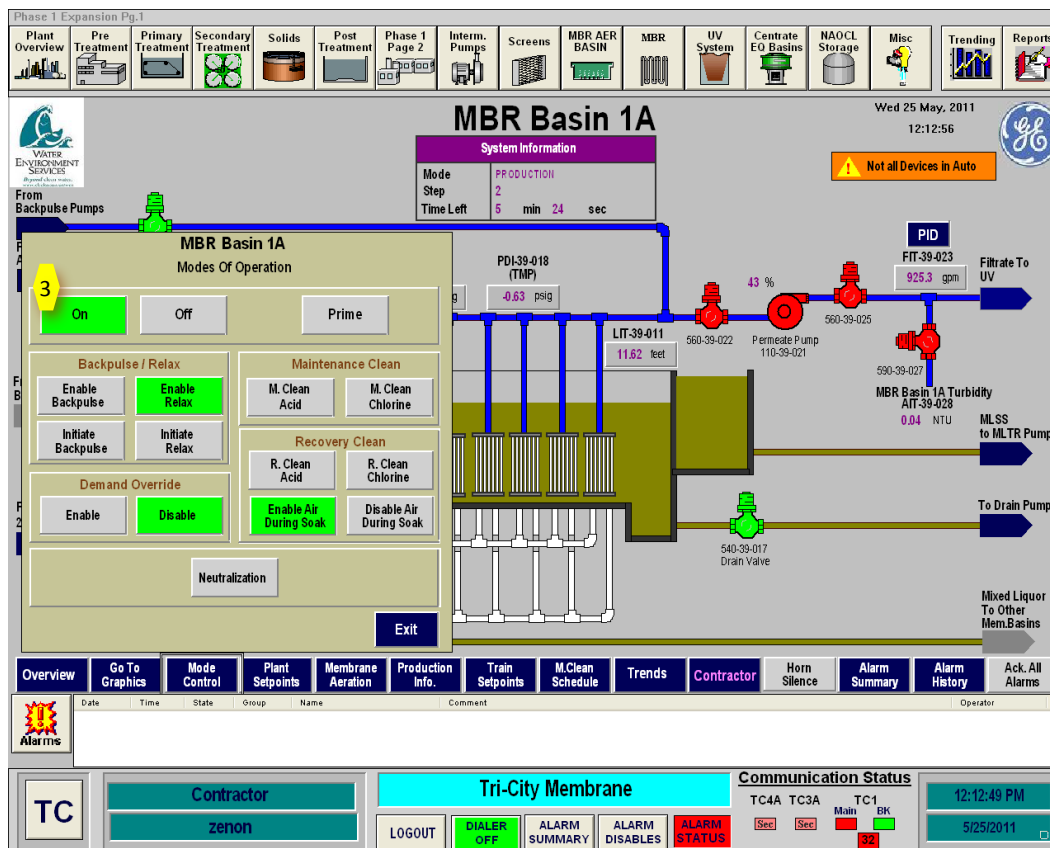


Figure 6.5.3.1-3 – MBR Basin Modes of Operation Popup Box

## Chemical Feed Pumps

The control screen for the cleaning chemicals is accessed through the individual MBR Basin screens. The MBR Basin screen can be accessed by selecting the Backpulse Pump icon <2>.

The next step is to click on the one of the arrows for the chemical systems on the Backpulse Pump screen as shown in **Figure 2**. Clicking on the Sodium Hypochlorite From Chemical Pumps arrow will move to the Sodium Hypochlorite Screen and clicking on the Citric Acid From Chemical Pumps arrow will move to the Citric Acid Screen.

## Citric Acid Feed System

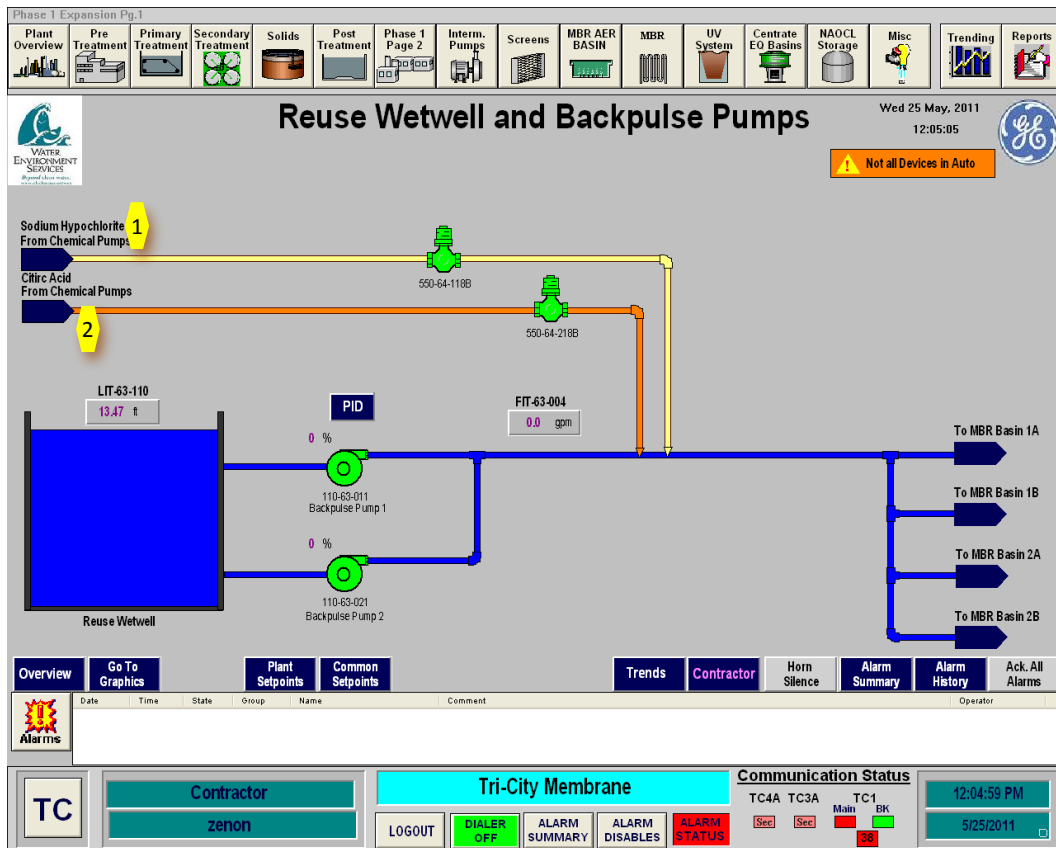


Figure 6.5.3.8-3 – Backpulse Pump Control Screen

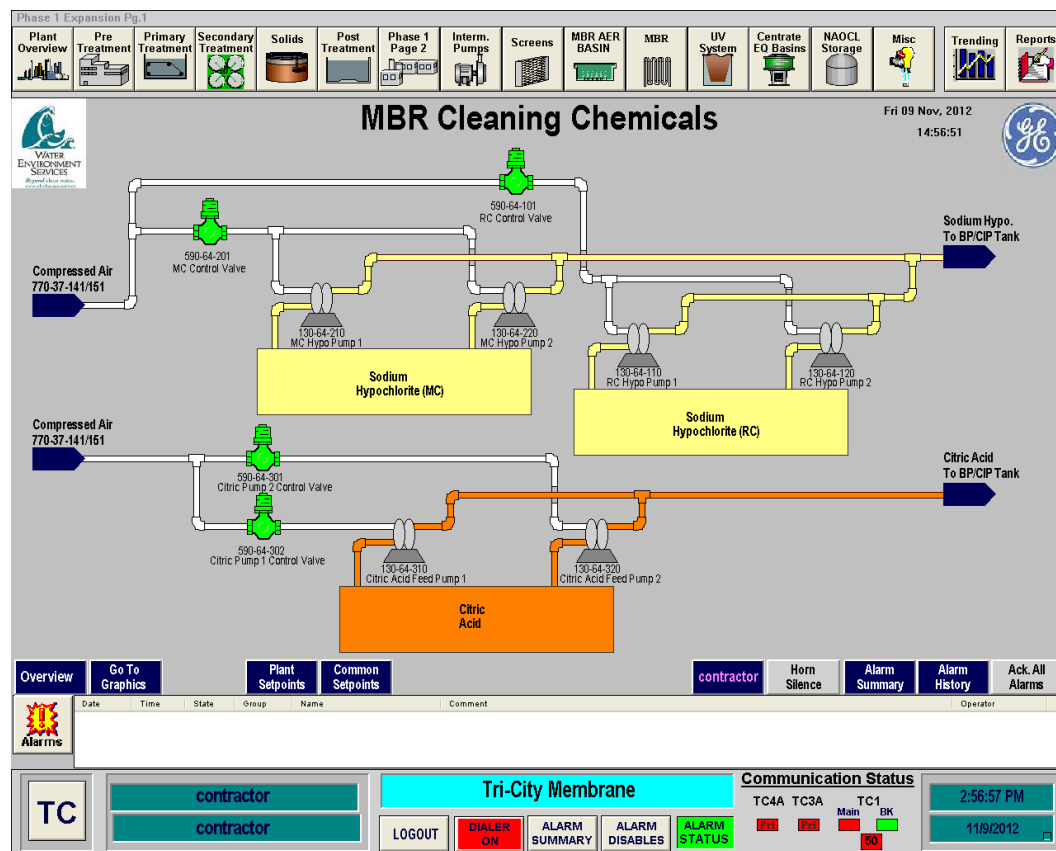


Figure 6.5.3.8-3 – MBR Basin Modes of Operation Popup Box

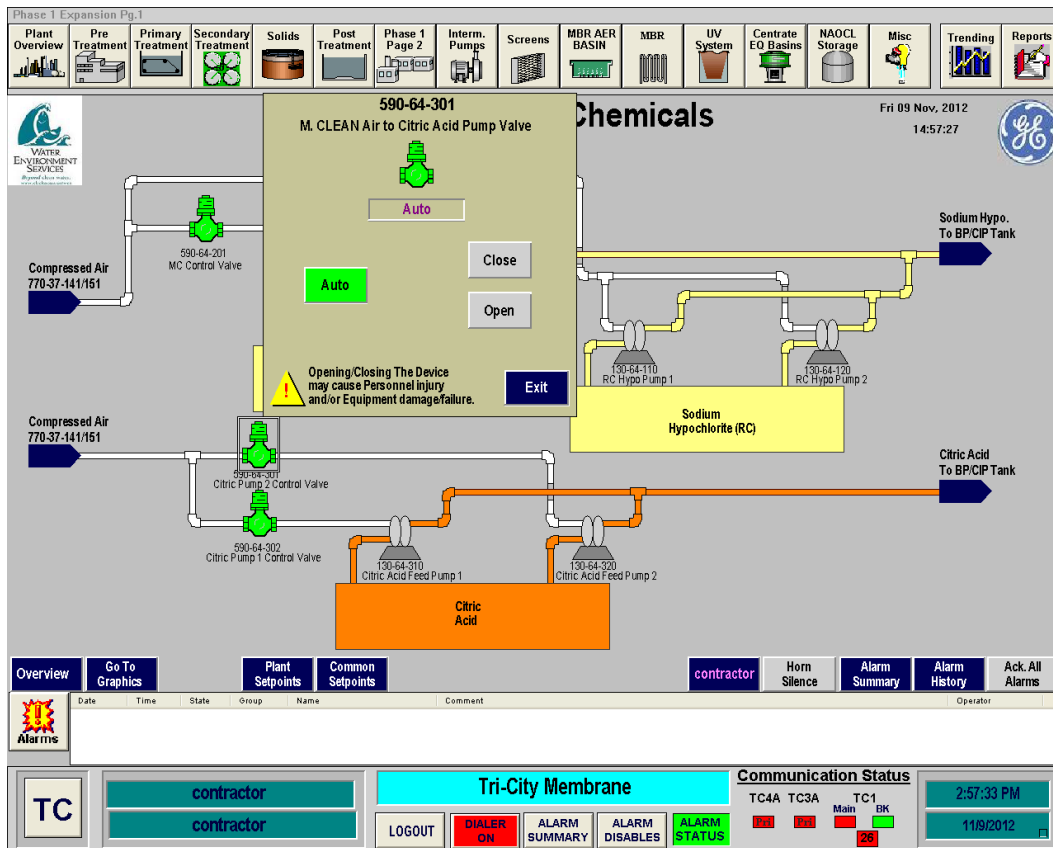


Figure 4 – MBR Basin Modes of Operation Popup Box

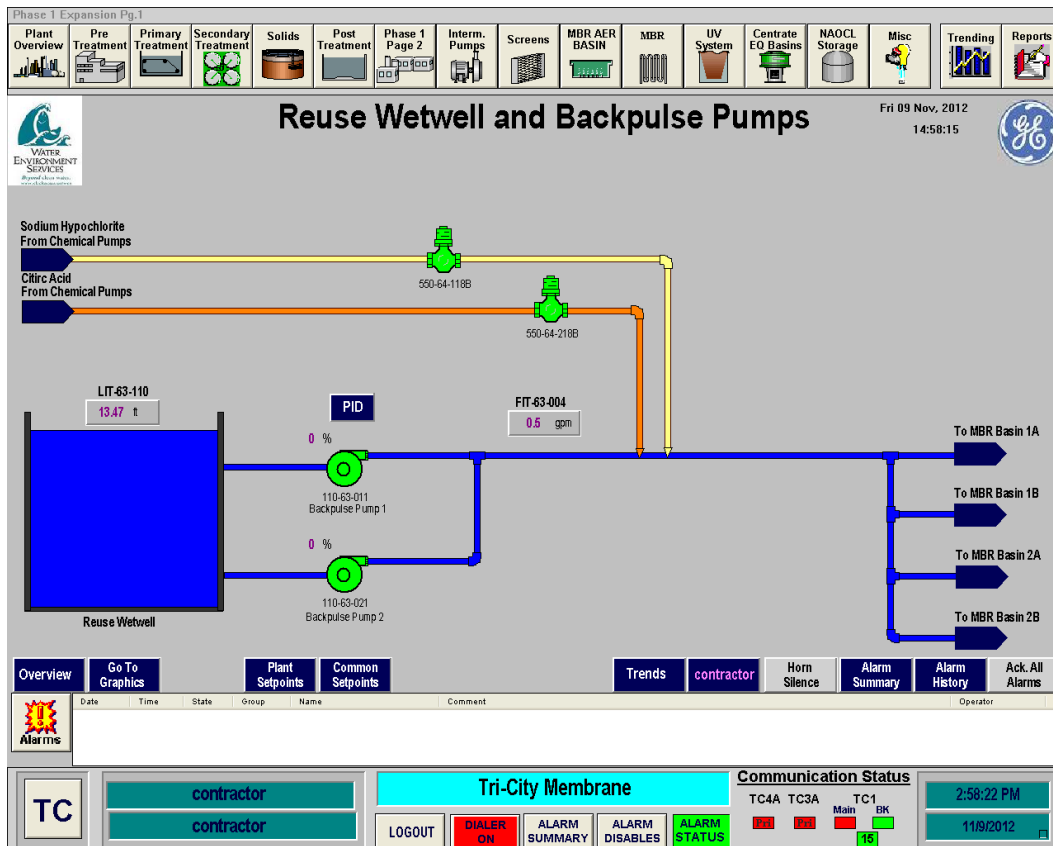


Figure 6.5.3.8-5 – MBR Basin Modes of Operation Popup Box

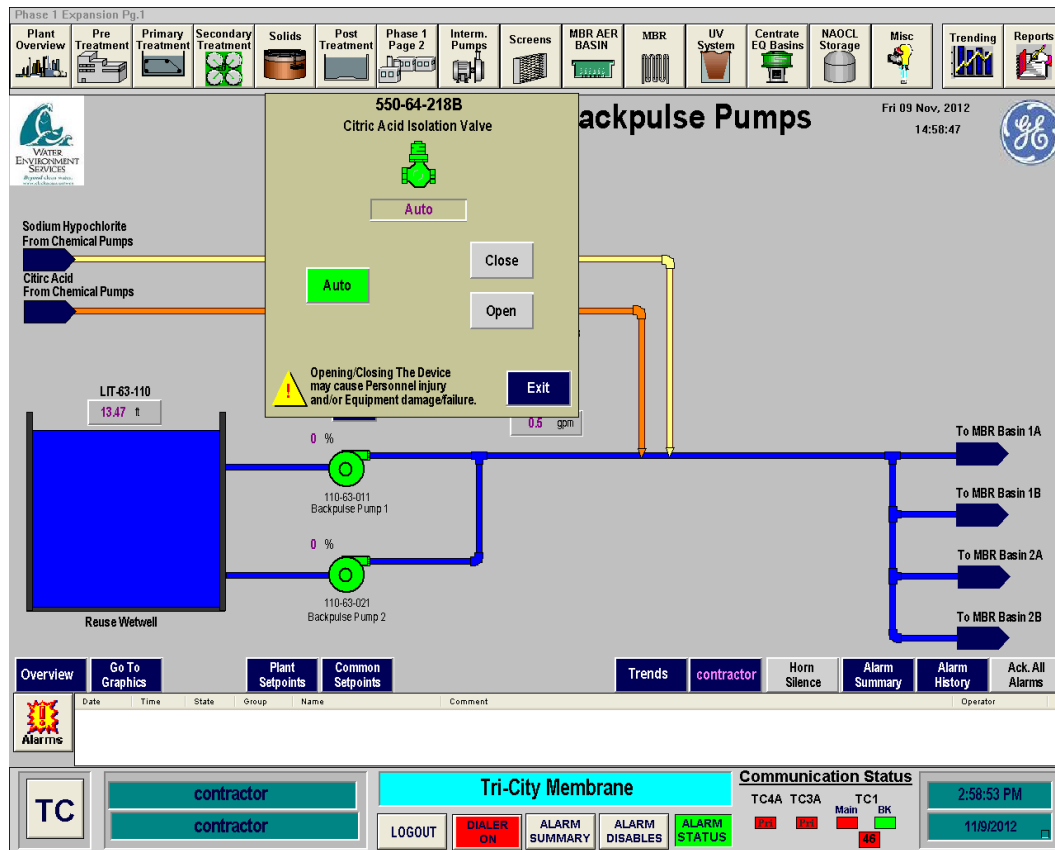


Figure 6.5.3.8-5 – Citric Acid Isolation Valve Popup Box

*Sodium Hypochlorite Feed System*

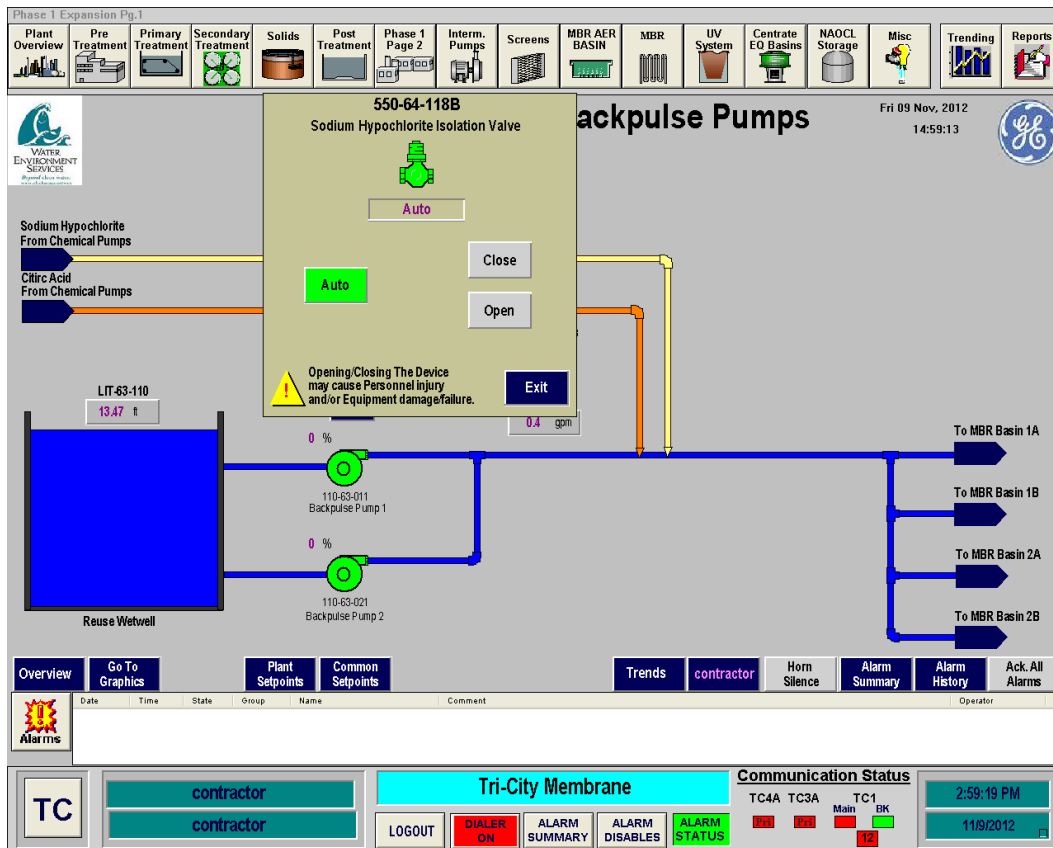


Figure 6.5.3.9-5 – Sodium Hypochlorite Isolation Valve Popup Box

## MBR Basin Startup Sequence

To start up an MBR basin in Automatic Mode, follow the following sequence. This sequence is for a cold startup of the system. If the system is operating, confirmation that the equipment is off may not be necessary.

Step	Action	Location
	Confirm Equipment is in Off	
1	Confirm Intermediate Pumps are OFF	SCADA Main Screen
2	Confirm Fine Screen Influent and Effluent Gates are Closed	SCADA Main Screen
3	Confirm Fine Screens are in Off Position in SCADA	SCADA Main Screen
4	Confirm Fine Screens are in OFF Position at Local Control Panel	Next to Fine Screens
5	Confirm Drum Screens are in Off Position in SCADA	SCADA Main Screen
6	Confirm Drum Screens are in Off Position at Local Control Panel	Fine Screen Electrical Room
	Ready Equipment	
NOTE	Confirm Aeration Basin influent gate is open	AB#5 or AB#4
1	Close Breaker on MCC for Gates	Fine Screen MCC
2	Close Breaker in MCC for Fine Screens	Fine Screen MCC
3	Close Breaker in MCC for Drum Screens	Fine Screen MCC

4	Select Fine Screen Channel to be placed into operation	
5	Place Fine Screen Channel Influent Gate into Remote	Fine Screen Influent Channel
6	Place Fine Screen Channel Effluent Gate into Remote	Fine Screen Effluent Channel
NOTE	Confirm that a LOCK appears at above each gate on SCADA. This confirms both gates are open and will allow Intermediate Pumps to operate	
7	Place Fine Screen in Remote at Local Control Panel	Next to Fine Screen
8	Confirm the sluice is directed to the desired Drum Screen by confirming the manual gate isolates the Drum Screen not to be used	Fine Screen Sluice Channel
9	Place Drum Screen in Remote at Local Control Panel	Fine Screen Building Electrical Room MCC
10	Place Fine Screen Channel Influent Gate Into AUTO	SCADA Fine Screen Control Screen
11	Place Fine Screen Channel Effluent Gate into AUTO	SCADA Fine Screen Control Screen
12	Place Drum Screen in AUTO	SCADA Fine Screen Control Screen
13	Place Drum Screen Spray Valve in AUTO	SCADA Fine Screen Control Screen