

6.5.1 MBR System Overview

The MBR system receives flow from the MBR aeration basins and separates the solids from the MLSS to produce a high quality effluent. The MBR basins are plug flow basins with space for up to 10 cassettes of hollow fiber media. There are 9 cassettes installed in each basin. GE Zenon provided the membrane system.

Process Overview

The MBR basins are located in the MBR building. There are two MBR basins each with two process trains. Each train has an ADWF capacity of 1.0-mgd and a peak flow capacity of 2.5-mgd. The main SCADA screen for the membrane system is shown on **Figure 6.5.1-1**.

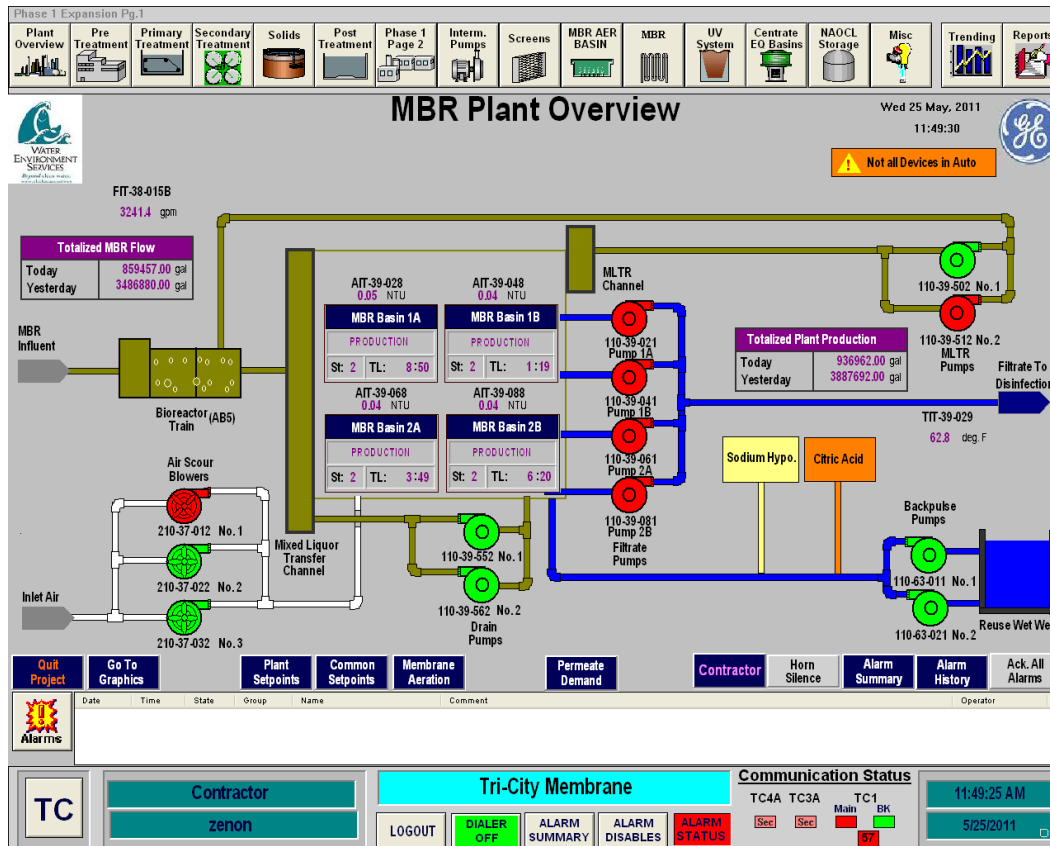


Figure 6.5.1-1 – Membrane Basin Main SCADA Screen

MBR Process Components

The membrane process is made up of a number of components that operate interactively to provide automatic operation of the membrane facility. These components are:

- MBR Basins
- MBR Permeate Pumps
- MLTR Pumps
- MBR Backwash Pumps
- MBR Drain Pumps
- MBR WAS Pumps

MBR Basins

There are four MBR basins in the MBR building. Only two of the MBR basins have the piping and membranes installed. The other two basins are for the first expansion of the system.

Each MBR basin is divided into two process trains. Each process train is controlled and operates as a separate unit. The only interface between the two trains is that they share air and filtrate piping. Each MBR train has been designed to hold 10 membrane cassettes. Each basin currently has nine cassettes installed. Seven of the cassettes are full with 48 membrane modules and the remaining two have 26 membrane modules. The extra space was provided to increase the capacity or reduce the flux rate, if needed.

MBR Permeate Pumps

There are four permeate pumps that draw flow through the membrane fibers in the membrane basins. One permeate pump is dedicated to each MBR process train. There is no installed permeate pump. A spare permeate pump has been provided as a spare to provide the necessary redundancy. The permeate pumps deliver the filtrate to the UV system.

MLTR Pumps

The Mixed Liquor Transfer Return (MLTR) pumps pump the overflow from the MBR basins back to the head of the aerobic zone of the MBR aeration basin. The pumping rate for these pumps is determined as a multiplier of the MBR plant influent flow. The pump controller checks the MBR aeration basin influent flow every 15-minutes and applies the multiplier to set the pumping rate. The multiplier is an operator input on the Common Set-points input box.

MBR Backwash Pumps

The MBR backwash pumps are located in the lower level of the UV Building. These pumps take filtrate from the non-potable wet well. These pumps provide three functions to the membrane system. The first is to provide backpulse water, if that cleaning option is selected. The second is to provide clean water to the membrane basins during a recovery clean and the third is to provide backwash water during the maintenance cleaning cycle.

MBR Drain Pumps

The MBR drain pumps are located in the membrane gallery. These pumps drain the membrane train during a recovery clean.

MBR WAS Pumps

The MBR WAS pumps pump the waste activated sludge from the membrane system to the solids building for thickening. The pumps are on VFDs and are controlled through GBT control panel. The pumps pump from the WAS pit located between the mixed liquor transfer channel and the MLTR channel. The system has been designed to waste mixed liquor from three sources. The system can waste from the surface of the mixed liquor transfer channel to remove foam from the incoming MLSS, from the surface of the MLTR channel to remove foam from that channel and from the midpoint of the MLTR channel.

The MBR WAS pumps can also pump to the primary effluent box feeding the intermediate pumps. This feature allows for the MLSS to be sent to the fine screens to remove any debris that has accumulated in the system.

MBR System Controls

The MBR system is controlled through a dedicated PLC located in the MBR building. The MBR controls are accessed through the main SCADA screen for the membrane system is shown on **Figure 6.5.1-2**. The screen is accessed by clicking on the **MBR button <1>** on the top of the screen. The control screen for each of the MBR basins is accessed by clicking on the **MBR Basin button <2>**. The other systems within the MBR system are accessed by clicking on the pump or blower icon for the respective system. System setpoints are accessed by clicking on the buttons along the bottom of the screen.

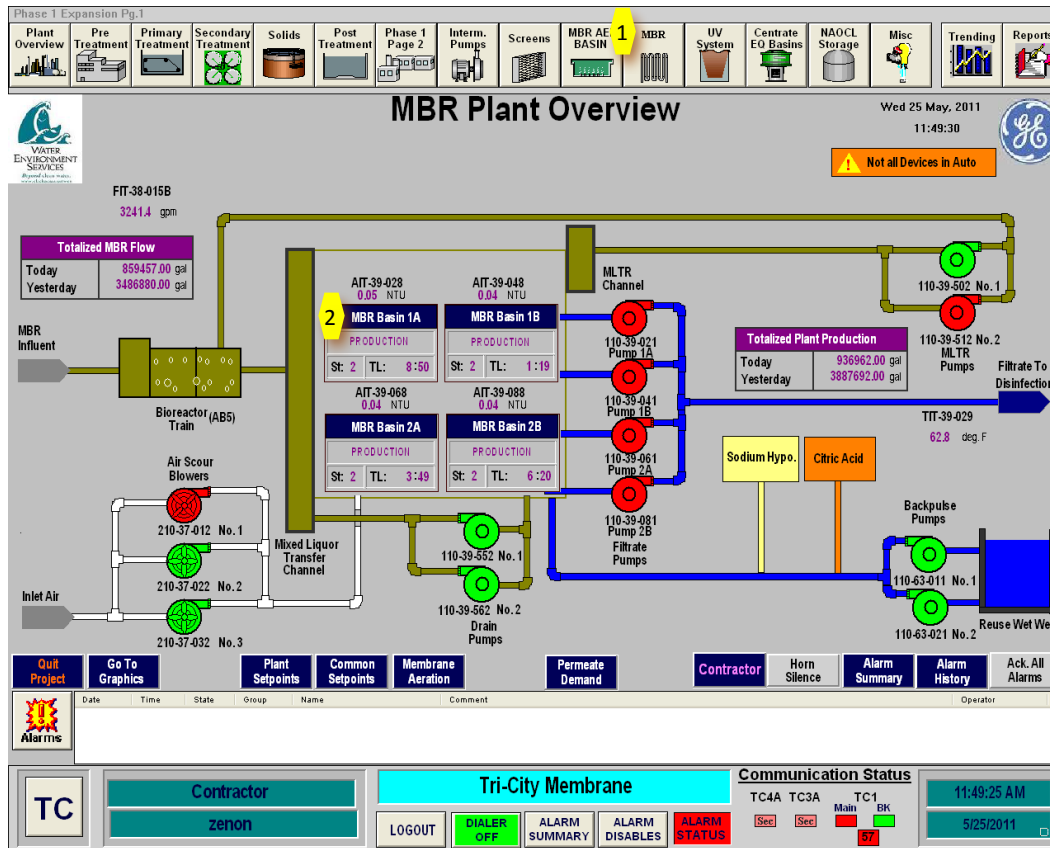


Figure 6.5.1-2 – Membrane Basin Main SCADA Screen

MBR Building Sustainable Features

The MBR building has been designed with several sustainable features to provide for economic expansion of the system as well as minimize energy use. In addition, the MBR building has an educational display that provides a description of membrane treatment and a touch and feel membrane module.

Phased Expansion

The MBR process currently has four basins. Two basins have been equipped with membrane equipment and the other two are available for the next expansion. The MBR building has been designed with knock-out walls for the addition of two more basins to the west and the addition of six more basins on the south side of the building. This will provide an ultimate capacity of an ADWF of 24-mgd and a peak design flow of 60-mgd.

MBR Building Electrical Rooms

The MBR Building electrical rooms have been designed and constructed to meet the requirements of the build-out conditions for the MBR process. The electrical rooms were constructed slab-on-grade, so all of the conduits for future electrical equipment have been installed in the slab. The substation room was constructed for the addition of a second substation.

MBR Blower Building

The blower building was designed as part of the Phase I Liquids Expansion, but was deleted from the project in value engineering. As part of the cost saving measures, the MBR air scour blowers and air compressors were placed in the MBR electrical substation room. The MBR blower building will be constructed during the Phase II Liquids Expansion and the MBR air scour blowers and air compressors will be moved to the new blower building. The air piping for the MBR air scour blowers has been designed to tie in to the new system when the blowers are moved to the new blower building. In addition, the MBR electrical building was designed to tie into the new blower building and the HVAC equipment to be enclosed to provide the desired visual mitigation for neighboring development.

MBR Building Master Plan

The MBR Building can is designed for a peak capacity of 60-mgd with 12 membrane basins and 24 membrane trains. All of the MBR system piping has been sized for the build-out flows and the connections have been provided to minimize shutdowns during future construction.

The MBR building has been designed to be expanded to the west with the addition of four additional MBR basins. The MBR building been designed with knock-out walls to accommodate the expansion to the west. The MBR gallery has been sized to accommodate the addition of 12 new MBR basins to the south. The filtrate pipe from the south MBR basins will be installed in the new gallery between MBR aeration basins #3 and #4. This line will tie into the existing filtrate pipe prior to the UV disinfection control valves. The electrical room and substation room have been laid out for the future electrical equipment required for the MBR build-out facility.