

***2022 Treatment Plant***

***Process Name***

***PLC Name***

**REVISION HISTORY**

**Control Narrative Template Version**

|  |
| --- |
| **Standards Release Date** |
| January 2022 |

This table is to show which version of the SCADA Standards was used as the starting point for the development of the Control Narrative. This table is not to be removed at any point.

**Control Narrative Revision History**

|  |  |  |
| --- | --- | --- |
| **Date** | **Revision By:**  Name of person and company | **Description of Revisions** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

*Text in Italic and highlighted in yellow are Instructions to the Consultant and are to be removed when the narrative is written.*

*Text Highlighted in green reference other sections in the narrative. The consultant needs to verify all these references when the narrative is complete and remove the green highlighting*

**TABLE OF CONTENTS**

[1 Deviations from the SCADA Standards 8](#_Toc92268478)

[2 Process Overview 8](#_Toc92268479)

[2.1 PLC’s that Control the Process 8](#_Toc92268480)

[2.2 Process Overview 8](#_Toc92268481)

[3 Network and Control System Overview 10](#_Toc92268482)

[3.1 Plant Communications Network Overview 10](#_Toc92268483)

[3.2 Remote Communications 11](#_Toc92268484)

[3.3 Plant PLC’s 11](#_Toc92268485)

[3.4 SCADA Work Stations and Thin Clients 11](#_Toc92268486)

[3.5 Panel View Interface 12](#_Toc92268487)

[4 Standardized Control Configuration 13](#_Toc92268488)

[4.1 Control Hierarchy 13](#_Toc92268489)

[4.2 Analogs 14](#_Toc92268490)

[4.2.1 Analog Alarms 14](#_Toc92268491)

[4.2.2 Analog Pop-Up 14](#_Toc92268492)

[4.3 Analog Statistical Calculations 16](#_Toc92268493)

[4.4 Pump / Motor Device Driver 17](#_Toc92268494)

[4.4.1 Pump / Motor Device Virtual Points 17](#_Toc92268495)

[4.4.2 Pump / Motor Device Alarms 17](#_Toc92268496)

[4.5 Pump / Motor Control 18](#_Toc92268497)

[4.6 Valve Device Driver 21](#_Toc92268498)

[4.6.1 Valve Device Virtual Points 21](#_Toc92268499)

[4.6.2 Valve Device Alarms 21](#_Toc92268500)

[4.6.3 Valve Device Control 22](#_Toc92268501)

[4.7 Rain Gauge 25](#_Toc92268502)

[5 Process Equipment and Instrumentation 26](#_Toc92268503)

[5.1 Equipment 26](#_Toc92268504)

[5.2 Instrumentation 26](#_Toc92268505)

[6 Control Philosophy 29](#_Toc92268506)

[6.1 Modes of Operation 29](#_Toc92268507)

[6.2 Interlocks 30](#_Toc92268508)

[6.3 Auto Control 31](#_Toc92268509)

[6.4 Auto Control of Aeration Blowers and Inlet Valves 31](#_Toc92268510)

[6.5 Aeration Blower Capacities 31](#_Toc92268511)

[6.6 Aeration Blower and Inlet Valve Position Combinations: 31](#_Toc92268512)

[6.7 Aeration Blowers Control Parameters 32](#_Toc92268513)

[6.8 Aeration Blowers Duties 33](#_Toc92268514)

[6.8.1 Manual Duty Rotation 33](#_Toc92268515)

[6.8.2 Automatic Pump Duty Rotation 33](#_Toc92268516)

[6.9 Aeration Blowers Control Sequence Popup 35](#_Toc92268517)

[6.10 Air Flow Calculations 36](#_Toc92268518)

[7 Alarm Management 37](#_Toc92268519)

[7.1 Alarms 37](#_Toc92268520)

[7.2 Critical Alarms 38](#_Toc92268521)

[7.3 Alarm Groups 38](#_Toc92268522)

[7.4 Auto Dialer 38](#_Toc92268523)

[7.5 Autodialer Alarms and the Autodialer 39](#_Toc92268524)

[8 Fault Response 42](#_Toc92268525)

[8.1 Alarm / Fault Response. 42](#_Toc92268526)

[8.2 PLC Faults 42](#_Toc92268527)

[8.2.1 Minor PLC Fault 42](#_Toc92268528)

[8.2.2 Major PLC Fault or Catastrophic Failure 42](#_Toc92268529)

[8.3 PLC Control Panel Power Failure. 42](#_Toc92268530)

[8.4 UPS Failure 43](#_Toc92268531)

[8.5 HMI to PLC Communication Failure 43](#_Toc92268532)

[8.6 PLC to PLC Communication Failure 43](#_Toc92268533)

[8.6.1 PLCA to PLCX Communication Failure 43](#_Toc92268534)

[8.6.2 PLCA to PLCY Communication Failure 43](#_Toc92268535)

[8.6.3 PLCA to PLCZ Communication Failure 43](#_Toc92268536)

[8.7 Power Failure 44](#_Toc92268537)

[9 PLC to PLC Data Exchange 45](#_Toc92268538)

[9.1 PLC SEI1 Reading Boolean Bits from PLC SEY1 45](#_Toc92268539)

[10 Standby Power 46](#_Toc92268540)

[11 Historical Logging and Trending 47](#_Toc92268541)

[11.1 Trending 47](#_Toc92268542)

[11.1.1 Historian Plant Trend Window 47](#_Toc92268543)

[11.1.2 InTouch Trends Window 48](#_Toc92268544)

[12 Reporting 49](#_Toc92268545)

[12.1 InTouch Report Window 49](#_Toc92268546)

[13 Building Services Subsystem 50](#_Toc92268547)

[13.1 Equipment 50](#_Toc92268548)

**LIST OF TABLES**

[Table: 1‑1 Deviations from the SCADA Standards 8](#_Toc86673663)

[Table 4.1‑1 Control Hierarchy 13](#_Toc86673664)

[Table: 5.1‑1 Equipment List 28](#_Toc86673665)

[Table: 5.2‑1 Discrete Instrumentation 28](#_Toc86673666)

[Table: 5.2‑2 Blower 1 Motor Current 28](#_Toc86673667)

[Table: 5.2‑3 Blower 1 Motor Current 29](#_Toc86673668)

[Table: 5.2‑4 Blower 2 Motor Current 30](#_Toc86673669)

[Table: 5.2‑5 Blower 3 Motor Current 30](#_Toc86673670)

[Table: 5.2‑6 Aeration Tank 1 Air Flow Meter 30](#_Toc86673671)

[Table: 5.2‑7 Aeration tank 2 Air Flow Meter 31](#_Toc86673672)

[Table: 5.2‑8 Aeration tank 3 Air Flow Meter 31](#_Toc86673673)

[Table: 6.1‑1 Modes of Operation 31](#_Toc86673674)

[Table: 6.2‑1 Hardwired and Software Interlock Summary 32](#_Toc86673675)

[Table: 6.5‑1 Aeration Blower Capacities 33](#_Toc86673676)

[Table: 6.6‑1 Aeration Blower (One Large & Two Small) and Inlet Valve Position 33](#_Toc86673677)

[Table: 6.6‑2 Aeration Blower (Two Large, One Small) and Inlet Valve Position 33](#_Toc86673678)

[Table: 7.1‑1 Alarms Generated by the HMI 39](#_Toc86673679)

[Table: 9.1‑1 PLC SEI1 BOOL Read Data Table from PLC SEY1 47](#_Toc86673680)

[Table: 11.1‑1 Trend Groups and Tags 49](#_Toc86673681)

[Table: 13.1‑1 Equipment List – Building Services 52](#_Toc86673682)

**LIST OF APPENDICES**

[Appendix A1 Hardwired I/O 53](#_Toc86675056)

[Appendix A2 PROCESS ALARMS 54](#_Toc86675057)

[Appendix A3 PROCESS SET POINTS AND PROGRAM VARIABLES 55](#_Toc86675058)

# Deviations from the SCADA Standards

*Include in this section any deviations from the SCADA Standards and the reasons for the deviation.*

Table: 1‑1 Deviations from the SCADA Standards

| **DEVIATION** | **REASON FOR DEVIATION** |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |

# Process Overview

## PLC’s that Control the Process

*List and describe all the PLC’s that control this process*

The Aeration Process is controlled by the following PLC’s:

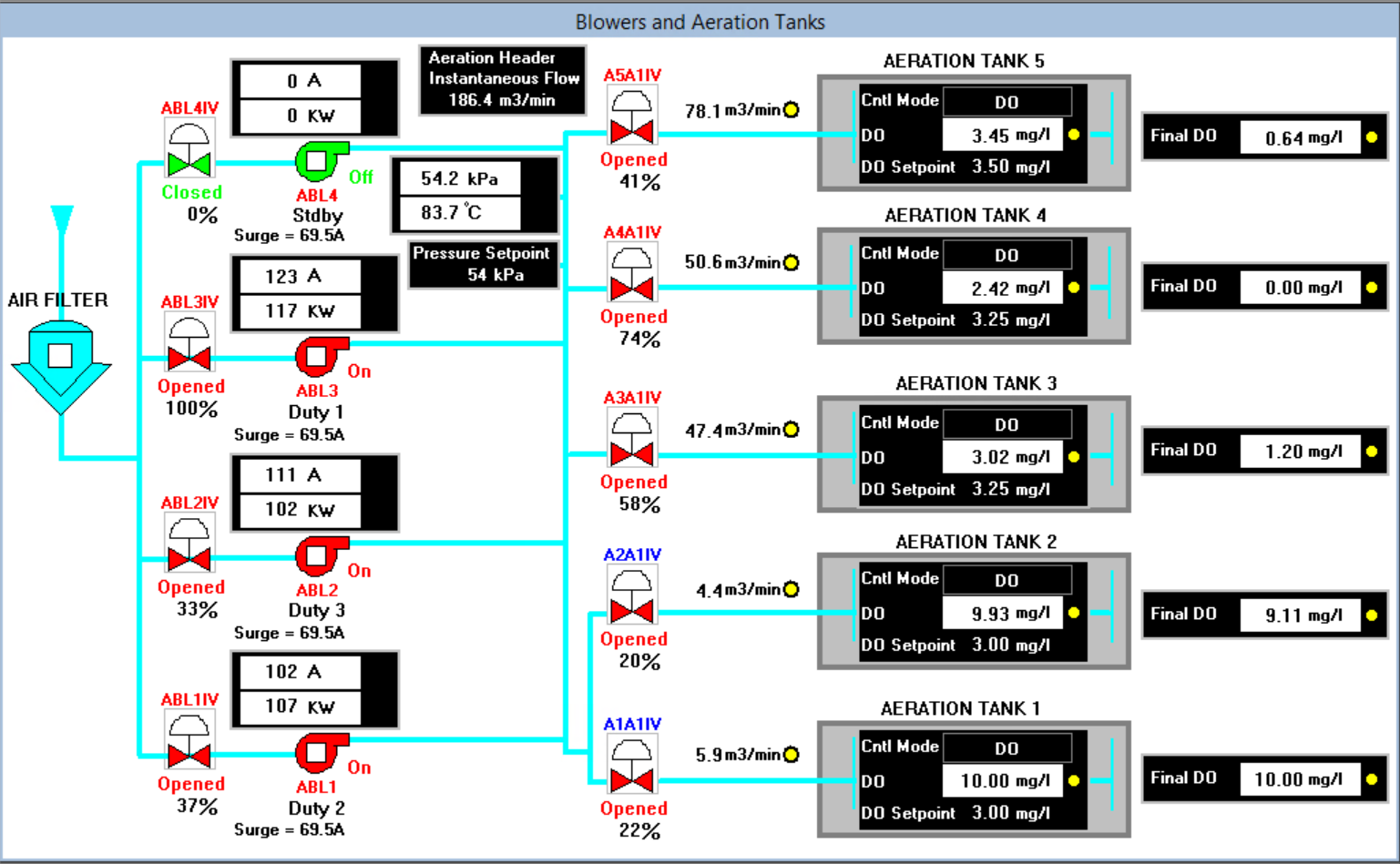
SEI1 and SEM1

This control narrative is for the PLC SEM1, which controls the DO Levels in the Aeration Tanks, Aeration Blowers & Inlet Valves.

## Process Overview

The dissolved oxygen control system at the Oakville South East WWTP consists of blowers, blower inlet modulating valves, air control valves at the aeration tanks, pressure transmitters and airflow transmitters, as well as dissolved oxygen transmitters. The process is designed to supply oxygen into the process for the biological treatment of the wastewater. Each aeration tank has its own inlet valve to control the air supplied to the tank and thus control the Dissolved Oxygen (DO) content. The blowers are controlled based upon the pressure in the common header into Plant B. The inlet valves for the blowers modulate to maintain an operator adjustable pressure set point to ensure the supply of air to the aeration tanks is present. Each of the major components is described below.

HMI Screen: 2.2‑1 Process Overview Screen

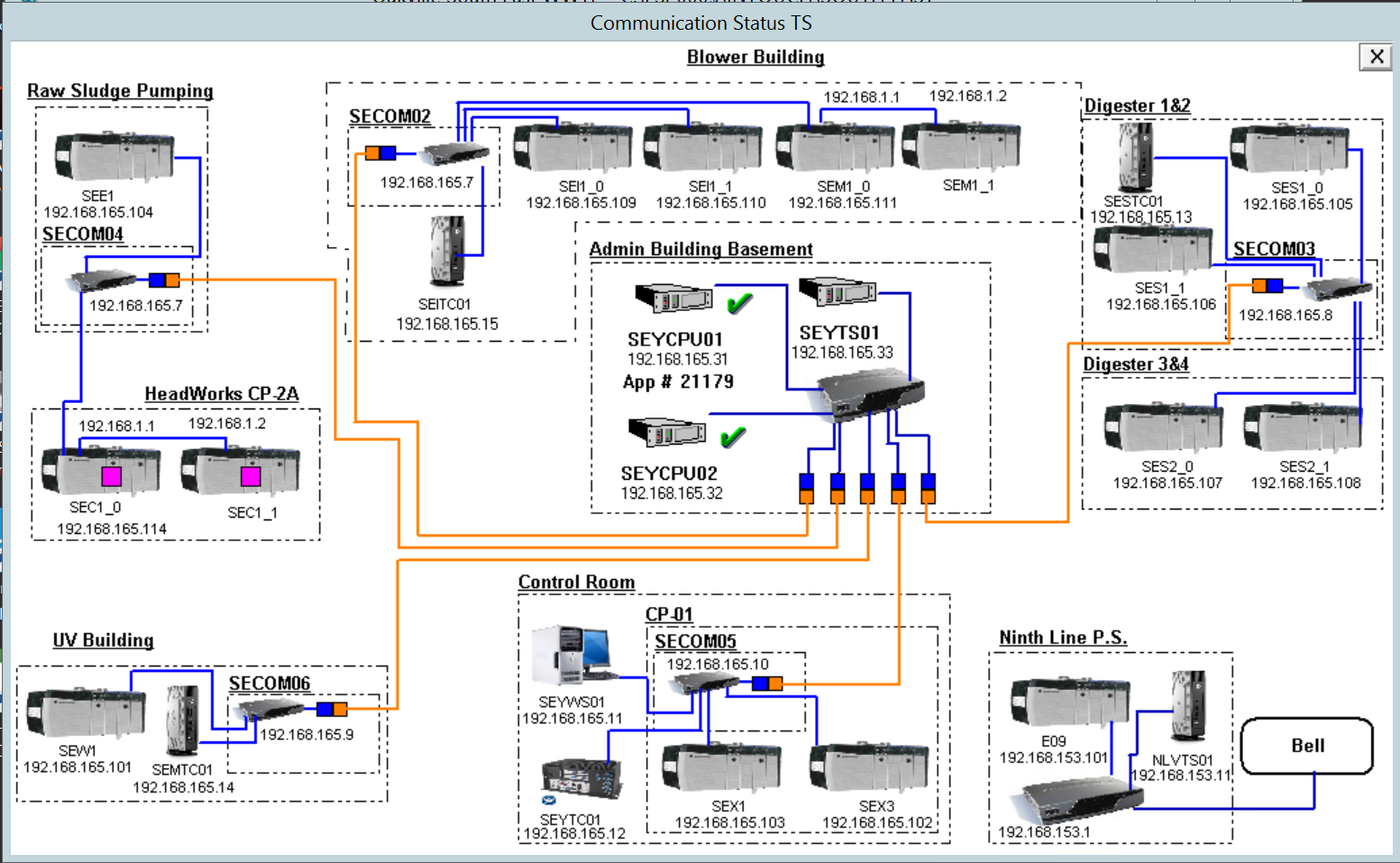
Update the Process Overview HMI window with the appropriate windows from the project

# Network and Control System Overview

Aeration PLC SEM1 is connected to NDE SECNDE01 which is connected to the core switch via a fibre optic cable. The PLC is polled by the 2 I/O servers, SEYCPU01 and SEYCPU02.

## Plant Communications Network Overview

HMI Screen: 3.1‑1 : Plant Communications Network Overview Screen



*Update the Communications Map with the appropriate windows from the project*

The Plant Comm. Map screen provides information on the health of the communication network at the OKSE WWTP and monitors the following connections:

* 1. InTouch application to the OI.ABCIP driver
  2. HMI application to the plant PLC ControlLogix controllers

If a device stops communicating, a magenta box will flash on its icon indicating that communications has been lost.

The aeration system at the Oakville South East: Plant does not communicate with any remote facilities or locations.

## Remote Communications

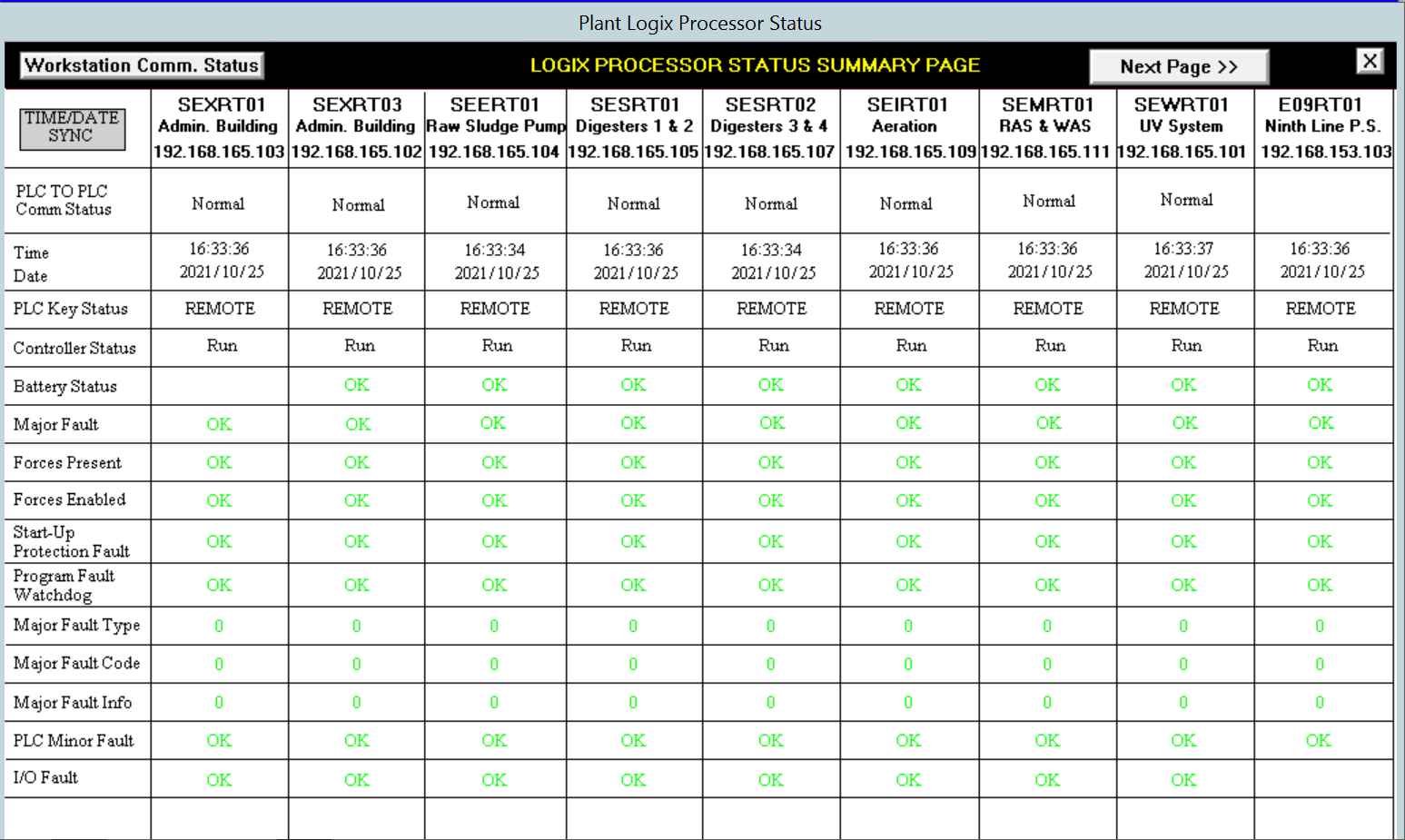
Include in this section describe any communications links the Plant has with Remote facilities or location

## Plant PLC’s

*If a new PLC is added as a result of the work the consultant is doing then the consultant must update the window below or the next related window with the new PLC that is being added and update this window in the narrative.*

The aeration system is controlled by PLC SEM1. The points monitored on this PLC are displayed on HMI window Plant Logix Process Status.

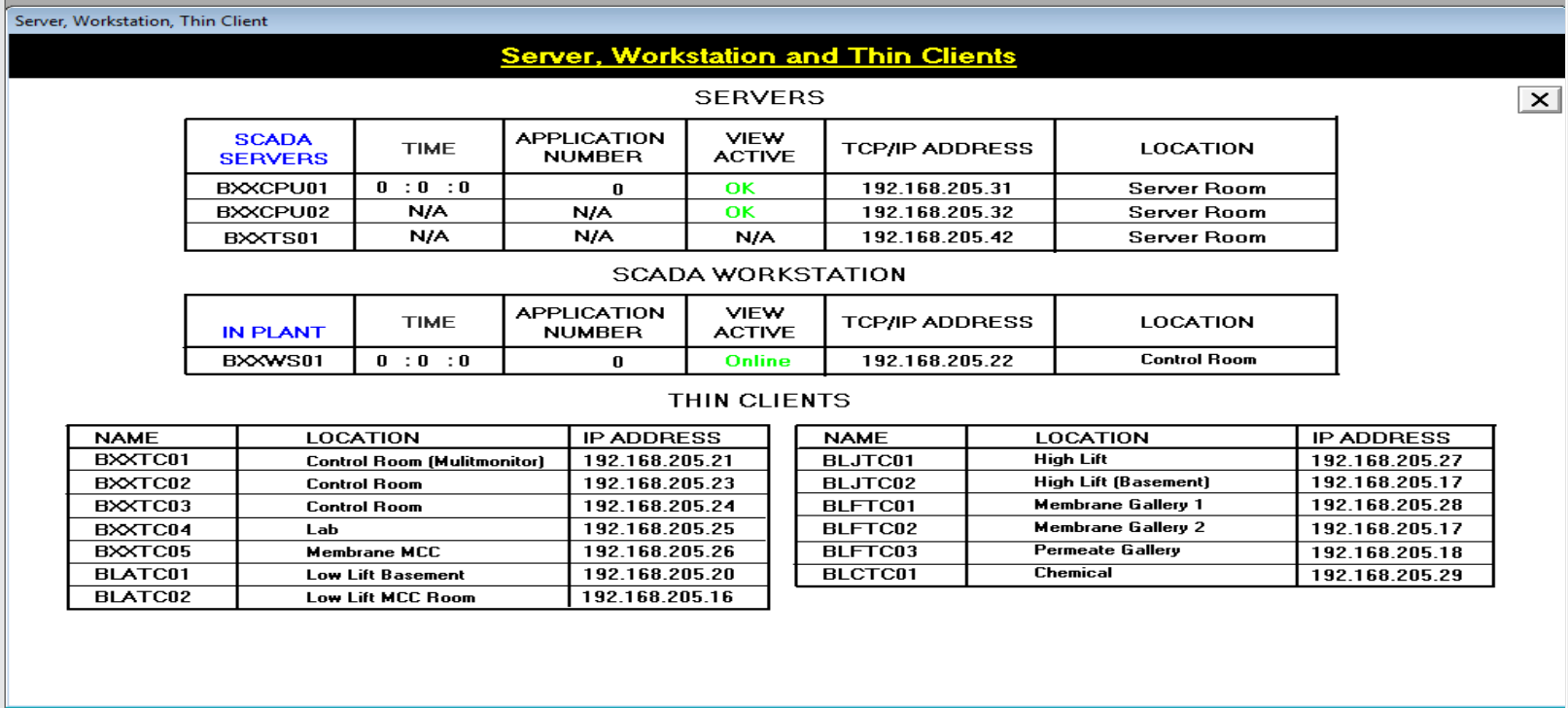
HMI Screen: 3.3‑1 : Plant Logix Processor Status



## SCADA Work Stations and Thin Clients

*Consultant to indicate whether there is a work station or thin client present at this station and update the graphic below and the narrative accordingly.*

HMI Screen: 3.4‑1 : Sever, work station, thin client



## Panel View Interface

*Consultant to indicate If there is a PanelView interface present, describe the interface and include the IP address of the PanelView*

*Everything is section 4 is universal and apply to all standard devices. The intent is to state it once here and not have to repeat it for each instance of equipment. Exceptions or deviations from these standards should be documented in the section for the specific device. This section should never have to be changed when writing a narrative with the exception of the section on Backup Control in Table 4.1 below.*

# Standardized Control Configuration

## Control Hierarchy

The control hierarchy to be implemented in the Sewage Pumping Station is based upon the control standards and hierarchy described in the SCADA Design Standards Manual. The hierarchy is based upon the following levels: LOCAL, PLT-MAN, and PLT-AUTO. The hierarchy is described in the following Table.

Table 4.1‑1 Control Hierarchy

| ***Level*** | ***Description*** |
| --- | --- |
| LOCAL/  REMOTE | The selection of LOCAL or REMOTE mode of operation is typically made by an Operator at the device, MCC, or area control panel by means of a two-position selector switch. In LOCAL mode the device can be controlled through the use of pushbuttons in the field. In REMOTE, operation of the devices is passed to the SCADA system and the mode is selected by the Operator using the HMI. Switching from REMOTE to LOCAL will provide a bumpless transfer of device operation. Switching from LOCAL to REMOTE may cause the device to operate if the device is in PLT-AUTO and required to start/stop by the PLC automatic device logic. |
| PLT-MAN/  PLT-AUTO | The selection between PLT-MAN and PLT-AUTO is based upon the last selection made at any of the workstations in the SCADA network or the local Operator Interface. Switching from PLT-AUTO to PLT-MAN will provide a bumpless transfer of the device operation. Switching from PLT-MAN to PLT-AUTO may cause the device to operate if the device is required to start/stop by the PLC automatic device logic. |
| BACKUP CONTROL | Backup control is available for the sewage lift pumps. They will operate outside of the PLC control automatically. This is done to provide redundant control in parallel with PLC control through the use of a hardwired level sensing device with relays that correspond to wetwell level hardwired into the pump circuit. Backup AUTOMATIC control is only active when a device is in REMOTE and the hardwired control operation range is set outside the normal operating range of the PLC such that they would not normally interfere with each other.  *Backup control is not normally applied to devices controlled by the SCADA system but there are a few exceptions One is wastewater lift pumps and another is bar screens at wastewater plants. If there is a device covered by this narrative, then the consultant is to describe the back up control system. If there are no devices that have back up control, the just state “No devices associated with this PLC/process have back up control schemes”* |

## Analogs

The section below describes how all analog signals will be configured. Any exceptions will be dealt with in the specific section for the device(s) that have the exceptions.

### Analog Alarms

Analog alarms indicate a condition when a measured value has exceeded or fallen below an Operator defined setpoint. The following virtual alarm points will be provided for each analog signal:

1. HiHi;
2. Hi;
3. Lo;
4. LoLo; and
5. Signal Error Alarm.

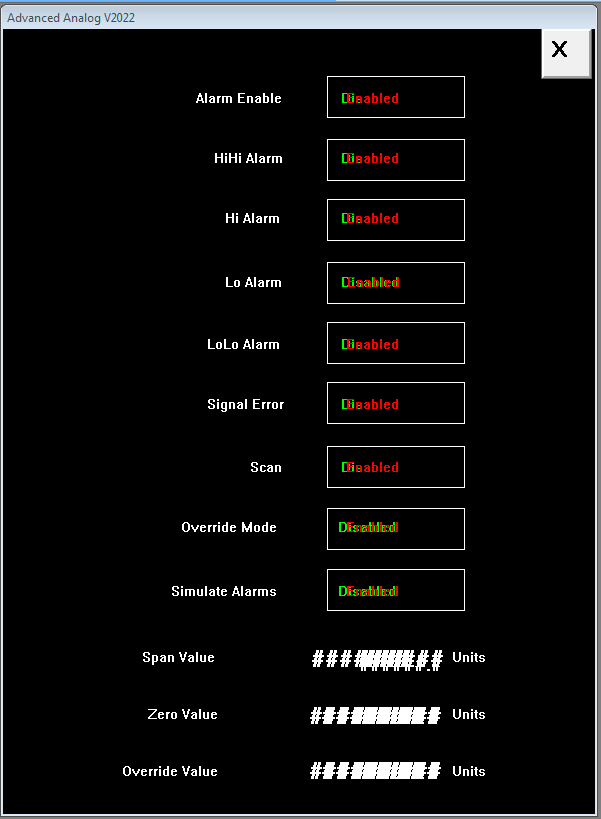
### Analog Pop-Up

Each analog in the system has an associated display and configuration dialog box, the dialog box gives expanded information regarding the Analog and allows the Operator to be able adjust the Alarm threshold limits for the Analog.

Pop-Up: 4.2.2‑1 Analog Instrument Dialog Box



Pop-Up: 4.2.2‑2 Advanced Analog Instrument Dialog Box



Each analog in the system has alarm limits that trigger analog alarms whenever the analog value passes through a threshold setpoint. The four analog thresholds or alarm limits are HiHi (High-High), Hi (High), Lo (Low) and LoLo (Low-Low). Each of these will generate an analog limit alarm that will be indicated on the analog pop-up. Along with these four standard analog alarms is a fifth alarm - signal error that indicates transmitter that the 4-20mA signal from the instrument has fallen below 3.95 mAs or risen above 20.5mAs. In certain circumstances it is not required or desirable to have all of the above-mentioned analog alarms active. In addition to the data entry field for the analog alarm limits there are enable / disable button that allow the Operator to enable or disable specific alarms. Once an associated analog alarm with a critical priority has been disabled, an entry will be made to the disabled critical alarm summary such that the Operator will be fully aware of all disabled critical analogs alarm in the system.

Once an analog display is selected, the alarm limits pertaining to that analog will be shown in a display pop-up. On this display the Operator can adjust the alarm limits to suit the normal operations of the process. The following list summarizes the information displayed on the analog pop-up:

1. Device Tag;
2. Current device reading along with engineering units;
3. Acknowledge push button (to clear return-to-normal alarms); and
4. Advanced push button (to control the operation of the analog alarms for this particular analog instrument.

When the advance push button is pressed, a configuration screen will be displayed that allows the Operator to control the operation of the alarm system for the selected analog device. The following information can be adjusted by the Operator from the advanced screen:

1. Alarm Enable (disable all alarms for this analog);
2. HiHi Alarm (disable only the high high alarm limit for this analog);
3. Hi Alarm (disable only the high alarm limit for this analog);
4. Lo Alarm (disable only the low alarm limit for this analog);
5. LoLo Alarm (disable only the low low alarm limit for this analog);
6. Signal Error (disable limit checking for this analog);
7. Scan (disable processing of this analog);
8. Override (overrides the current analog value with the entered override value); and
9. Engineering Units (set the engineering span for this analog).

The Operator must have sufficient security rights in order to affect any changes on the above mentioned above-mentioned screens. The ‘X’ button at the top right of each of these screens will dismiss close the screen window to allow the Operator to view the original process screen.

## Analog Statistical Calculations

*There are provisions in the analog driver in the PLC program to calculate the analog values listed below. However, HMI tags are to be created only for those signals that need to be displayed in the HMI or those that need to be logged in the Historian. Analog statistical calculations need to be reviewed for each analog signal and a determination made as to what values are required. Totals are only required for flows:*

The following values are calculated in the analog driver portion of the PLC program. HMI tags will only be created for those tags that are listed in the tables in Section 5 of this narrative:

1. Total Today;
2. Total Yesterday;
3. Maximum Today;
4. Maximum Yesterday;
5. Minimum Today; and
6. Minimum Yesterday.

## Pump / Motor Device Driver

The Pump / Motor Devices will be configured as follows:

### Pump / Motor Device Virtual Points

Unless noted otherwise, the following virtual points will be provided for each Pump / Motor device that is controlled through the PLC.

1. PLT-AUTO Status;
2. PLT-MAN Status;
3. Control Mode;
4. PLT-MAN Start Request;
5. PLT-MAN Stop Request;
6. Alarm Reset;
7. Runtime Reset;
8. Runtime;
9. PLT-MAN Speed set point (If applicable); and
10. PLT-MAN Stroke set point (If applicable).

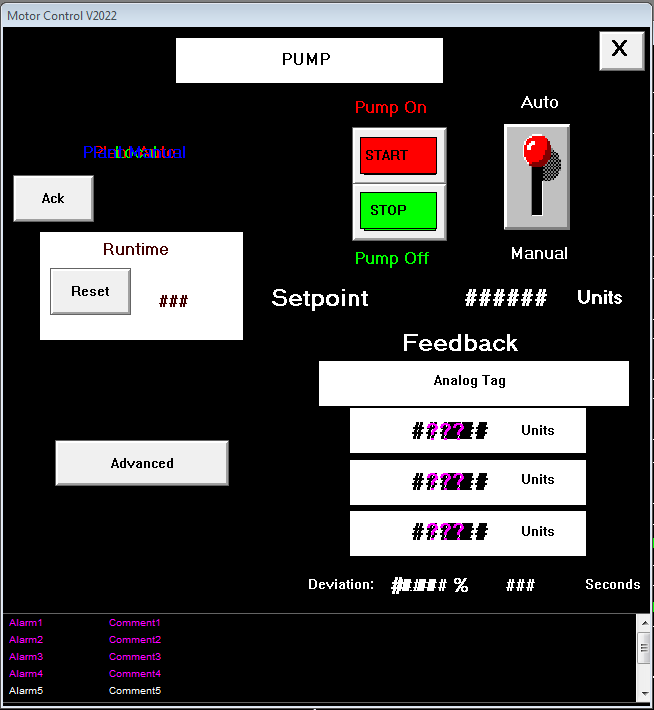
### Pump / Motor Device Alarms

The following virtual alarm points are to be provided for each pump/motor device that can be monitored and/or controlled through the SCADA system:

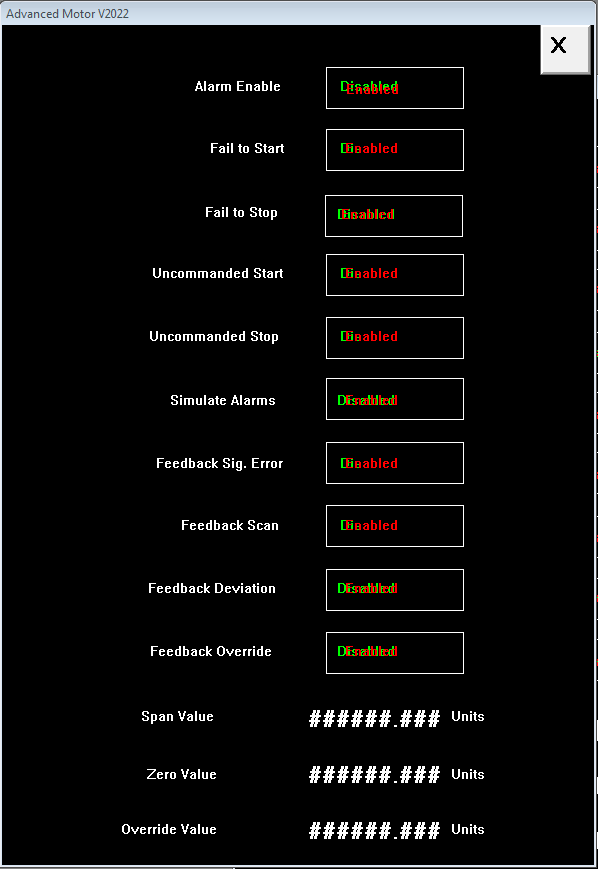
1. Fail to Start;
2. Fail to Stop;
3. Uncommanded Start;
4. Uncommanded Stop;
5. Speed Deviation Alarm (variable speed only); and
6. Stroke Deviation Alarm (if applicable).

## Pump / Motor Control

Pop-Up: 4.5‑1 Pump / Motor Control Dialog Box



Pop-Up: 4.5‑2 Advanced Pump / Motor Control Dialog Box



The pump device control dialog box allows the SCADA Operator to control the operating mode, operations and alarming of any controlled pump device in the system.

The pump control dialog box has the following information links:

1. Pump name;
2. Current pump operating mode (Plant Manual / Plant Auto / Local);
3. Pump status (Pump On / Pump Off); and
4. Pump alarm summary.

The pump control dialog box has the following control links:

1. Manual / Auto mode selector;
2. Start / Stop pump request;
3. Speed set point (if applicable);
4. Speed deviation alarm limit and delay control (if applicable);
5. Alarm acknowledge request;
6. Pump runtime reset request;
7. Advanced push button (to control the operation of the virtual alarms and speed feedback for this particular device); and
8. X – Close control dialog box.

All device control request links on the pump control dialog box relate to the manual operation of the pump are only visible when the pump is in the Plant Manual mode. These links are invisible when the pump is either in Local mode or in Plant Auto mode.

The device alarm summary for a pump will show any alarms related to the operation of the pump. This is accomplished by displaying only alarms in the alarm group related to the pump in question. The alarm list will include any alarms generated by or related to the operation of the pump.

When the advanced push button is pressed, a configuration screen will be displayed that allows the Operator to control the operation of the alarm system for the selected motor device. The following information can be adjusted by the Operator from the advanced screen:

1. Alarm Enable (disable all virtual alarms for this device);
2. Fail to Start (disable only the fail to start alarm for this device);
3. Fail to Stop (disable only the fail to stop alarm for this device);
4. Uncommanded Start (disable only the uncommanded start alarm for this device);
5. Uncommanded Stop (disable only the uncommanded stop alarm for this device);
6. Simulate Alarms (only visible to users with contractor-level access. Simulates each virtual alarm in turn after a five-second delay);
7. Feedback Sig. Error (only visible for VFD devices. Disable processing of the speed feedback for this device);
8. Feedback Scan (only visible for VFD devices. Disable processing of the speed feedback for this device);
9. Feedback Deviation (only visible for VFD devices. Disable the setpoint deviation alarm for this device);
10. Feedback Override (only visible for VFD devices. Overrides the current speed feedback with the entered override value); and
11. Engineering Units (only visible for VFD devices. Set the engineering span for the speed feedback).

The Operator must have sufficient security rights in order to affect any changes on the above-mentioned screens. The ‘X’ button at the top right of each of these screens will dismiss the screen to allow the Operator to view the original process screen.

## Valve Device Driver

The Valve Devices will be configured as follows:

### Valve Device Virtual Points

Unless noted otherwise, the following virtual points will be provided for each Valve device that is controlled through the PLC.

1. PLT-AUTO Status;
2. PLT-MAN Status;
3. Control Mode;
4. PLT-MAN Open Request (If applicable);
5. PLT-MAN Close Request (If applicable);
6. Alarm Reset; and,
7. PLT-MAN Position Set point (If applicable).

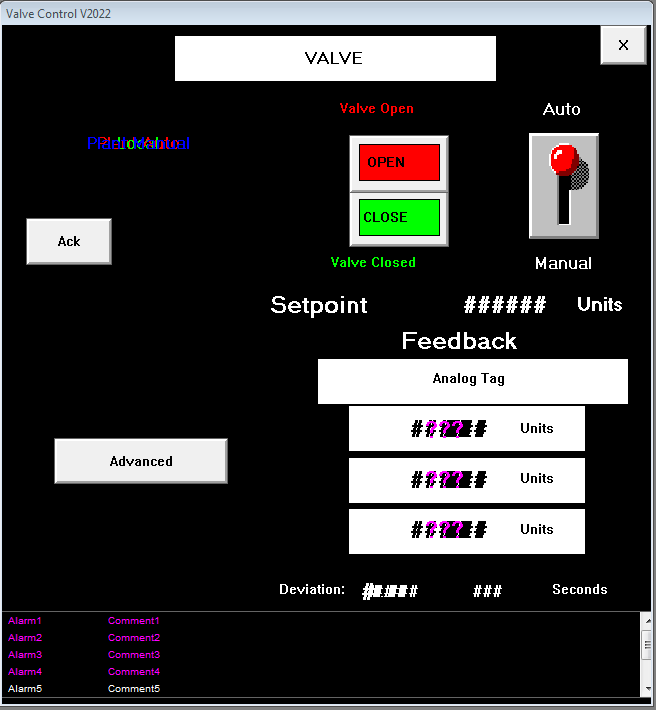
### Valve Device Alarms

The following virtual alarm points are to be provided for each valve device that can be monitored and/or controlled through the SCADA system:

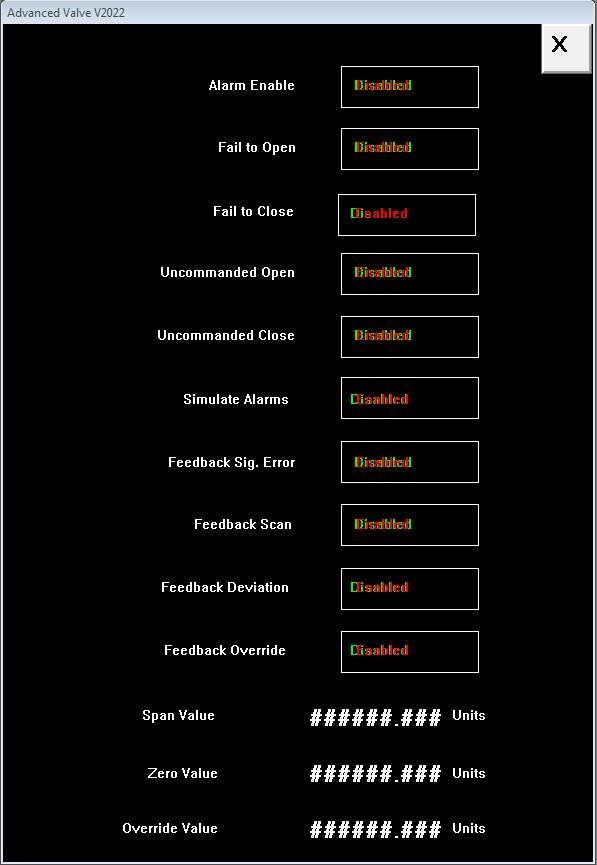
1. Fail to Open;
2. Fail to Close;
3. Uncommanded Open;
4. Setpoint Deviation; and,
5. Uncommanded Close.

### Valve Device Control

Pop-Up: 4.6.3‑1 Valve Control Dialog Box



Pop-Up: 4.6.3‑2 Advanced Valve Control Dialog Box



The standard valve device control dialog box allows the SCADA Operator to control the operating mode, operations and alarming of any controlled valve device in the system.

The valve control dialog box has the following information links:

1. Device name;
2. Current device operating mode (Plant Manual / Plant Auto / Local);
3. Valve status (Valve Open / Valve Closed); and
4. Device alarm summary.

The valve control dialog box has the following control links:

1. Manual / Auto mode selector;
2. Open / Close valve request;
3. Position Setpoint (if applicable);
4. Position deviation alarm limit and delay control (if applicable);
5. Alarm acknowledge request;
6. Advanced push button (to control the operation of the virtual alarms and position feedback for this device); and,
7. X – Close control dialog box.

All device control request links on the valve control dialog box relate to the manual operation of the valve are only visible when the valve is in the Plant Manual mode. These links are invisible when the valve is either in Local mode or in Plant Auto mode. Additionally, discrete valve controls, such as the Open and Close push buttons are only visible to discrete valves. Similarly, valve position setpoint, feedback, and deviation set points are only visible to modulating valves equipped with analog position feedback.

The device alarm summary for a valve will show any alarms related to the operation of the valve. This is accomplished by displaying only alarms in the alarm group related to the valve in question. The alarm list will include any alarms generated by or related to the operation of the valve.

When the advanced push button is pressed, a configuration screen will be displayed that allows the Operator to control the operation of the alarm system for the selected valve. The following information can be adjusted by the Operator from the advanced screen:

1. Alarm Enable (disable all virtual alarms for this device);
2. Fail to Open (only visible for discrete valves. Disable only the fail to open alarm for this device);
3. Fail to Close (only visible for discrete valves. Disable only the fail to close alarm for this device);
4. Uncommanded Open (only visible for discrete valves. Disable only the uncommanded open alarm for this device);
5. Uncommanded Close (only visible for discrete valves. Disable only the uncommanded close alarm for this device);
6. Simulate Alarms (only visible to users with contractor-level access. Simulates each virtual alarm in turn after a five-second delay);
7. Feedback Sig. Error (only visible for modulating valves. Disable processing of the position feedback for this device);
8. Feedback Scan (only visible for modulating valves. Disable processing of the position feedback for this device);
9. Feedback Deviation (only visible for modulating valves. Disable the setpoint deviation alarm for this device);
10. Feedback Override (only visible for modulating valves. Overrides the current position feedback with the entered override value); and
11. Engineering Units (only visible for modulating valves. Set the engineering span for the position feedback).

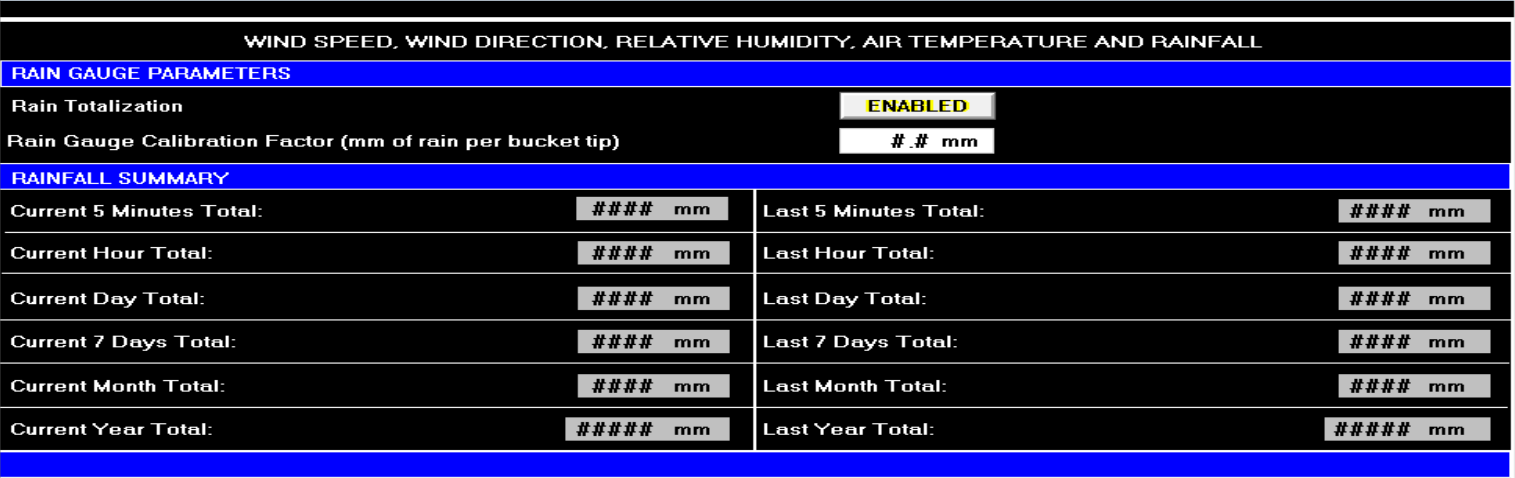
The Operator must have sufficient security rights in order to affect any changes on the above-mentioned screens. The ‘X’ button at the top right of each of these screens will dismiss the screen to allow the Operator to view the original process screen.

## Rain Gauge

*If there is no rain gauge remove this section.*

The HMI window below is used to enable and disable the rain gauge totalization and to calibrate the rain gauge that is installed at this wastewater pumping station. Rain fall is totalized every 5 minutes, every hour, every day, every 7 days and for the year. There are no alarms associated with the rain gauge.

Pop-Up: 4.8‑1 Rain Gauge Control Dialog Box



# Process Equipment and Instrumentation

## Equipment

The major equipment associated with the aeration system is summarized in the following table

Equipment Description

Table: 5.1‑1 Equipment List

|  |
| --- |
| **EQUIPMENT DESCRIPTION** |
|
| Air Filter |
| Aeration Blower 1 |
| Aeration Blower 1 Modulating Inlet Valve |
| Aeration Blower 2 |
| Aeration Blower 2 Modulating Inlet Valve |
| Aeration Blower 3 |
| Aeration Blower 3 Modulating Inlet Valve |
| Aeration Blower 4 |
| Aeration Blower 4 Modulating Inlet Valve |
| Aeration Tank 1 Air Inlet Valve |
| Aeration Tank 2 Air Inlet Valve |
| Aeration Tank 3 Air Inlet Valve |
| Aeration Tank 4 Air Inlet Valve |
| Aeration Tank 5 Air Inlet Valve |

## Instrumentation

The major instrumentation associated with the aeration process is summarized in the following tables.

*This table should only include discrete instrumentation. This is not a list of alarms. Do not include alarms that come from devices that are instrumentation such as UPS, transformers, generators etc.*

Table: 5.2‑1 Discrete Instrumentation

|  |
| --- |
| **DISCRETE INSTRUMENTS DESCRIPTION** |
| Air Filter Differential Pressure Switch |
|  |

Table: 5.2‑2 Blower 1 Motor Current

|  |
| --- |
| **ANALOG INSTRUMENT DESCRIPTION** |
| Aeration Blower 1 Motor Current |
| Aeration Blower 1 Power |
| Aeration Blower 2 Motor Current |
| Aeration Blower 2 Power |
| Aeration Blower 3Motor Current |
| Aeration Blower 3 Power |
| Aeration Blower 4 Motor Current |
| Aeration Blower 4 Power |
| Aeration Tank 1 Air Flow Meter |
| Aeration Tank 2 Air Flow Meter |
| Aeration Tank 3 Air Flow Meter |
| Aeration Tank 4 Air Flow Meter |
| Aeration Tank 5 Air Flow Meter |
| Aeration Header Air Flow |
| Aeration Header Air Pressure |
| Aeration Header Air Temperature |
| Aeration Tank 1 Dissolved Oxygen Meter |
| Aeration Tank 2 Dissolved Oxygen Meter |
| Aeration Tank 3 Dissolved Oxygen Meter |
| Aeration Tank 4 Dissolved Oxygen Meter |
| Aeration Tank 5 Dissolved Oxygen Meter |

*Most analog instrument do not require the values to be totalized or minimums and maximums displayed such as level transmitters, speed indicators or motor current. The consultant is to prepare a table as shown below only for the instruments that require a totalized value or minimums and maximums to be displayed on the HMI.*

The tables below show only those instruments that will have totalization tags or minimum and maximum tags displayed on the HMI.

Table: 5.2‑3 Blower 1 Motor Current

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | No | No |
| Total Yesterday | No | No |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

Table: 5.2‑4 Blower 2 Motor Current

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | No | No |
| Total Yesterday | No | No |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

Table: 5.2‑5 Blower 3 Motor Current

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | No | No |
| Total Yesterday | No | No |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

Table: 5.2‑6 Aeration Tank 1 Air Flow Meter

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | Yes | Yes |
| Total Yesterday | Yes | Yes |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

Table: 5.2‑7 Aeration tank 2 Air Flow Meter

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | Yes | Yes |
| Total Yesterday | Yes | Yes |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

Table: 5.2‑8 Aeration tank 3 Air Flow Meter

|  |  |  |
| --- | --- | --- |
| **STATISTICAL TAG** | **REQUIRED (YES/NO)** | **LOGGED (YES/NO)** |
| Total Today | Yes | Yes |
| Total Yesterday | Yes | Yes |
| Maximum Today | No | N/A |
| Maximum Yesterday | No | N/A |
| Minimum Today | No | N/A |
| Minimum Yesterday | No | N/A |

# Control Philosophy

*Describe the various modes of Operation and when they are used.*

## Modes of Operation

The modes of operation for the major equipment associated with the Aeration process area are summarized in the following table. Local Manual and Remote operation is through operation of local pushbuttons and controls at the device itself or from the equipment MCC panel. Remote operation of equipment is through the SCADA system.

Table: 6.1‑1 Modes of Operation

| **EQUIPMENT**  **DESCRIPTION** | **LOCAL MANUAL** | **LOCAL AUTO** | **PLANT**  **MANUAL** | **REMOTE**  **(PLANT AUTO)** | **HARDWIRED**  **CONTROL** |
| --- | --- | --- | --- | --- | --- |
| Aeration Blower 1 | √ |  | √ | √ |  |
| Aeration Blower 2 | √ |  | √ | √ |  |
| Aeration Blower 3 | √ |  | √ | √ |  |
| Aeration Blower 4 | √ |  | √ | √ |  |
| Aeration Blower 1 Modulating Inlet Valve | √ |  | √ | √ |  |
| Aeration Blower 2 Modulating Inlet Valve | √ |  | √ | √ |  |
| Aeration Blower 3 Modulating Inlet Valve | √ |  | √ | √ |  |
| Aeration Blower 4 Modulating Inlet Valve | √ |  | √ | √ |  |
| Aeration Tank 1 Air Inlet Valve | √ |  | √ | √ |  |
| Aeration Tank 2 Air Inlet Valve | √ |  | √ | √ |  |
| Aeration Tank 3 Air Inlet Valve | √ |  | √ | √ |  |
| Aeration Tank 4 Air Inlet Valve | √ |  | √ | √ |  |
| Aeration Tank 5 Air Inlet Valve | √ |  | √ | √ |  |

## Interlocks

*Describe any hardwired devices that control the equipment. For example: a high pressure discharge switch that is wired into the pump control wiring etc.*

Hardwired interlocks are intended to prevent damage to the equipment. The following interlocks are hardwired in the blower control circuit. And will shut down the blower when the interlock activates

1. Overload Fault;

2. Blower Ready Signal;

4. High Temperature Fault;

5. High Vibration Fault

6. Emergency Stop.

Table: 6.2‑1 Hardwired and Software Interlock Summary

|  |  |  |
| --- | --- | --- |
| **INTERLOCK DESCRIPTION** | **HARDWIRED** | **SOFTWARE** |
|
| High Temperature Outlet | √ |  |
| Surge | √ |  |
| Blower Inlet Valve Closed (Limit Switch) | √ |  |
| Overload | √ |  |
| Blower Ready Signal |  |  |
| Blower Vibration Fault |  |  |

## Auto Control

*Customize - Describe Auto Control of the Process*

## Auto Control of Aeration Blowers and Inlet Valves

*Customize - Describe Auto Control of the Aeration Blowers and Inlet Valves*

To establish a rational sequence for Blower and Blower inlet valve operation, it is useful to……

## Aeration Blower Capacities

Table: 6.5‑1 Aeration Blower Capacities

| **Blower** | **Blower Size** | **Maximum Air Flow** | **Minimum Air Flow** |
| --- | --- | --- | --- |
| ABL1 | 112 kW | 77 | 45 |
| ABL2 | 112 kW | 77 | 45 |
| ABL3 | 75 kW | 51 | 21 |
| ABL4 | 75 kW | 51 | 21 |

The capacities when operating in various combinations are presented in the following Tables...

## Aeration Blower and Inlet Valve Position Combinations:

Table: 6.6‑1 Aeration Blower (One Large & Two Small) and Inlet Valve Position

| **Operating Condition** | **Blower s Running** | **Option 1** | | **Option 2** | |
| --- | --- | --- | --- | --- | --- |
| **Valve Position** | **Air Flow (m3/min)** | **Valve Position** | **Air Flow (m3/min)** |
| 1 | No. 1 | Minimum | 45 | Minimum | 45 |
| 2 | No. 1 | Maximum | 77 | Maximum | 77 |
| 3 | No. 1  No. 3 | Minimum | 65 | Maximum | 97 |
| Minimum | Minimum |
| 4 | No. 1  No. 3 | Maximum | 128 | Maximum | 128 |
| Maximum | Maximum |
| 5 | No. 1  No. 3  No. 4 | Minimum | 85 | Maximum | 148 |
| Minimum | Maximum |
| Minimum | Minimum |
| 6 | No. 1  No. 3  No. 4 | Maximum | 179 | Maximum | 179 |
| Maximum | Maximum |
| Maximum | Maximum |

Table: 6.6‑2 Aeration Blower (Two Large, One Small) and Inlet Valve Position

| **Operating Condition** | **Blower s Running** | **Option 1** | | **Option 2** | |
| --- | --- | --- | --- | --- | --- |
| **Valve Position** | **Air Flow (m3/min)** | **Valve Position** | **Air Flow (m3/min)** |
| 1 | No. 1 | Minimum | 45 | Minimum | 45 |
| 2 | No. 1 | Maximum | 77 | Maximum | 77 |

Examination of the air flows resulting from Option 1 indicates that ………

On Falling Discharge Header Pressure

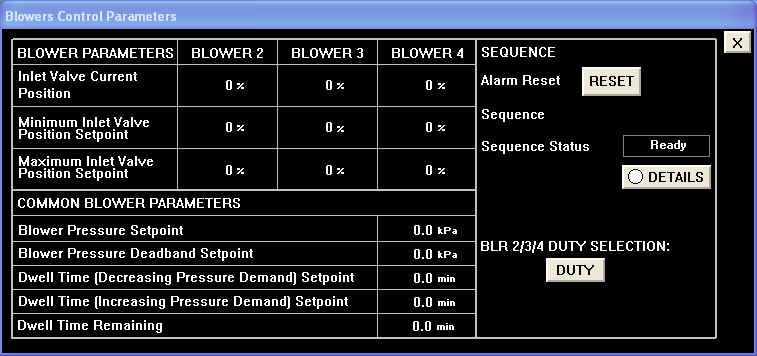
The Duty 2 Blower will be started whenever the Duty 1 Blower inlet valve is opened to …..

On Rising Discharge Header Pressure the Duty 4 Blower will be stopped whenever the Duty 1, Duty 2, Duty 3, and Duty 4 Blower inlet valves are closed to the minimum setpoint Aeration Blowers and Inlet Valves HMI Interface.

## Aeration Blowers Control Parameters

*Customize - Describe Control Parameters*

Pop-Up: 6.7‑1 Blower Control Parameters



For each blower inlet valve, there is ability to enter the minimum and maximum position setpoint (in %). The current inlet valve position is also displayed for monitoring purposes.

The Blower Pressure Setpoint (in kPA) is provided to enter the desired pressure that the blower system is to achieve.

The Blower Pressure Dead-band Setpoint (in kPA) is provided to prevent unnecessary starting/stopping of blowers.

The Dwell Time for decreasing and increasing pressure (in minutes) is the time required before the next step is taken in the sequence. This is to prevent unnecessary starting/stopping of blowers. The Dwell Time Remaining (in minutes) is provided for monitoring only when the dwell time is active.

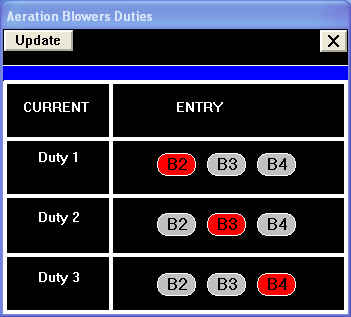
The assignment of duties to the Aeration Blowers can be accessed from the Aeration Blowers Duties popup.

## Aeration Blowers Duties

### Manual Duty Rotation

Under normal operating conditions, the duty table can be updated manually by the Operator to set a designated pump in a specific duty in the duty table. The Operator selects the desired duties and presses the Update button. The PLC error checking logic will fill in the custom logic here. If they are, Error Entry will flash on the Pumping Station Duty Pump Select pop-up. The Operator will then have to correct the duty selection and press the Update button again.

Pop UP: 6.8.1‑1 Aeration Blowers Duties



### Automatic Pump Duty Rotation

When the duties are rotated automatically by the PLC and all blowers are in PLT-AUTO and none of the blowers have failed, then each blower will move up one position in the duty table. The blower assigned to duty 1 will be moved to duty 3

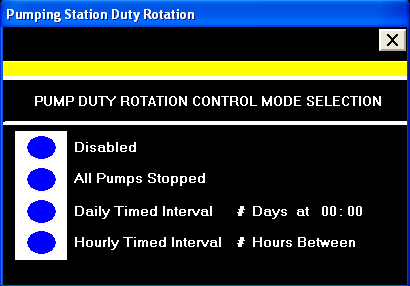
When the duties are rotated automatically by the PLC and all pumps are in PLT-AUTO and none of the blowers have failed, then each blower will move up one position in the duty table. The blower assigned to duty 1 will be assigned to duty 3.

The Operator can choose to disable the automatic duty rotation by selecting “Disabled” on the Pumping Station Duty Rotation pup-up. This mode prevents the blowers from rotating under all circumstances including on a blower failure. The Operator can choose to have the blower duties rotated automatically. This is done by selecting one of the 3 automatic modes for duty rotation. Those modes are:

1. Disabled
2. All Blowers Stopped,
3. Daily Timed Interval or
4. Hourly Timed Interval.

All blowers must be in PLT-AUTO for the automatic rotation to occur.

Pop-Up: 6.8‑2 Pumping Station Duty Rotation



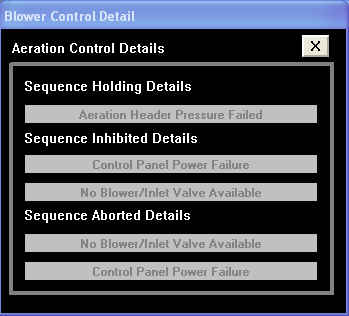
1. Disabled Mode: In this mode the blower duty does not automatically rotate even on a blower failure.
2. All Blowers Stopped Mode: Duty is rotated at the moment when all blowers are stopped.
3. Daily Timed Interval: Duty rotation will be based on a time interval setpoint that is entered from the HMI. The Operator can select a time setpoint between 0-10 days as well as the time of day (0-23 hours and 0-59 minutes). In this mode, when the interval time has elapsed, the blower selected as Duty 2 will change to Duty 1 and the Duty 1 blower will change to Duty 3 immediately; and Duty 3 will become Duty 2.
4. Hourly Timed Interval: Duty rotation will be based on a time interval setpoint that is entered from the HMI. The Operator can select a time setpoint between 0-24 hours in one hour increments. In this mode, when the interval time has elapsed, the blower selected as Duty 2 will change to Duty 1 and the Duty 1 blower will change to Duty 3 immediately; and Duty 3 will become Duty 2. The timer restarts immediately from the last time the mode was selected and/or upon completion of a duty rotation.

## Aeration Blowers Control Sequence Popup

*Consultant to customize this section as per how the process will operate.*

The Blowers Control Detail popup can be accessed from the “Details” button of the Blowers Control Parameters popup and allows the status of the Blowers Control sequence to be monitored.

Pop-Up: 6.9‑1 Blower Control Detail



All Blower Control Sequence Holding Details are displayed. If any of these conditions are active, the sequence will be held (i.e. Blowers stopped) until the hold condition is no longer active. At this time, the sequence will resume operation.

All Blower Control Sequence Inhibited Details are displayed. If any of these conditions are active, the sequence will be stopped (if previously running) or prevented from starting (if previously stopped).

All Blower Control Sequence Aborted Details are displayed. If any of these conditions are active, the sequence will be aborted and the system will be stopped (if previously running) or prevented from starting (if previously stopped). The sequence will need to be reset using the pushbutton from the popup.

## Air Flow Calculations

*Consultant to customize this section as per how the process will operate.*

The air flow to Plant A and Plant B is combined into a Total Plant Air Flow. …..

# Alarm Management

There are 5 main components within the SCADA system that play a role in alarm management. They are the process PLC, the InTouch application, the plant auto dialer PLC and the auto dialer. Each component has a different role in the determination, annunciation, communication, acknowledgement and resetting of alarms.

1. The primary purpose of the process PLC is to examine certain conditions as dictated by the programming and make the determination if an alarm exists.
2. The HMI (InTouch application) has many purposes, which include the annunciation, display and filtering of alarms and their states, a tool to allow the Operator to acknowledge alarms, determine if an alarm is critical or not, and a tool to allow the Operator to enable and disable Raw Alarms, Call-out alarms and the Auto dialer itself.
3. The plant Auto dialer PLC passes alarms to the auto dialer and acknowledges alarms sent to the auto dialer.
4. The Auto dialer is the device that annunciates the alarms to the Operators via the phone line.

## Alarms

*Alarm priorities are to be assigned by referring to Section 2 of the Region’s standards and the HMI tag template Excel Spread sheet that is in Section 6- HMI Programming.*

Almost all alarms are generated by the PLC. The alarms listed below are not generated by the PLC and are generated by the HMI instead.

Table: 7.1‑1 Alarms Generated by the HMI

|  |
| --- |
| **Alarms Generated by the HMI** |
|  |
|  |

*Consultant to list and describe any alarms that are generated in the HMI and not in the PLC*

All alarms generated by the PLC have a Raw Alarm component and the Dial-out component. Both components can be enabled or disabled using the alarm enable and disable windows in the HMI Section 7.5 for more information Alarm conditions are first evaluated at the raw alarm state. If the PLC determines that a raw alarm exists, it is annunciated on the HMI. If the dial-out alarm is enabled the alarm will be sent to the auto dialer PLC and then to the auto dialer to call out to the operations staff as per the auto dialer programming. If an alarm condition exists but the raw alarm is disabled, nothing will be annunciated on the HMI and the alarm will not be passed to the auto dialer PLC

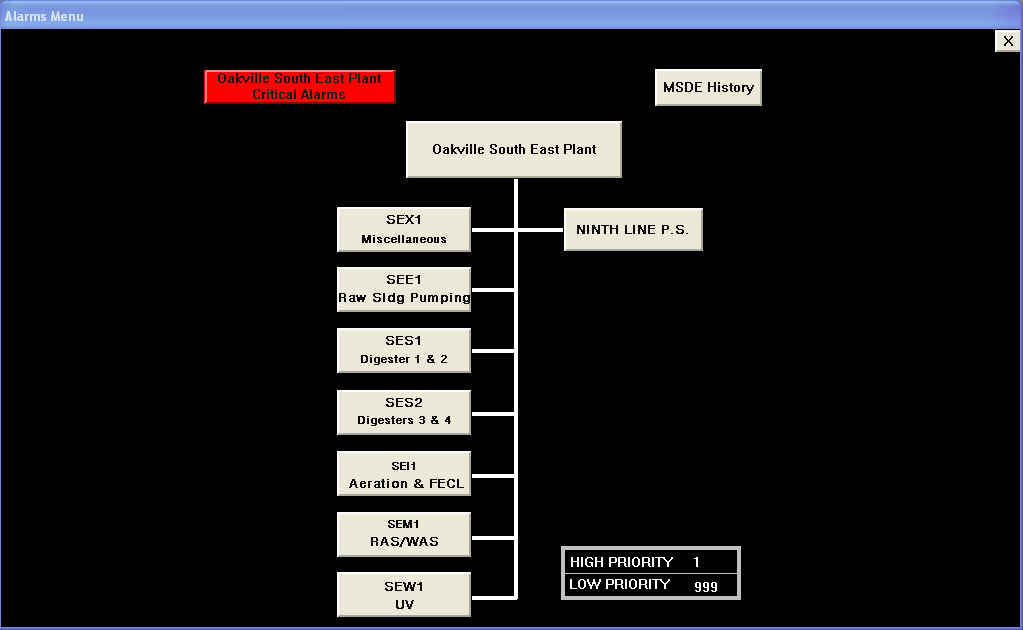
## Critical Alarms

Alarm priority determination is carried out at the HMI level and not in the PLC. When the tag in the InTouch application is created, one of the fields that must be filled-in is the Alarm Priority. These priorities range from 1 to 999. The Region’s standard is that all alarms with a priority of 9 or less are considered Critical Alarms. The alarm priority setting has no impact on the raw alarm or the call out alarm.

## Alarm Groups

The graphic below shows the organization of the alarm groups.

HMI Screen: 7.3‑1 Navigation for the Alarms Grouping

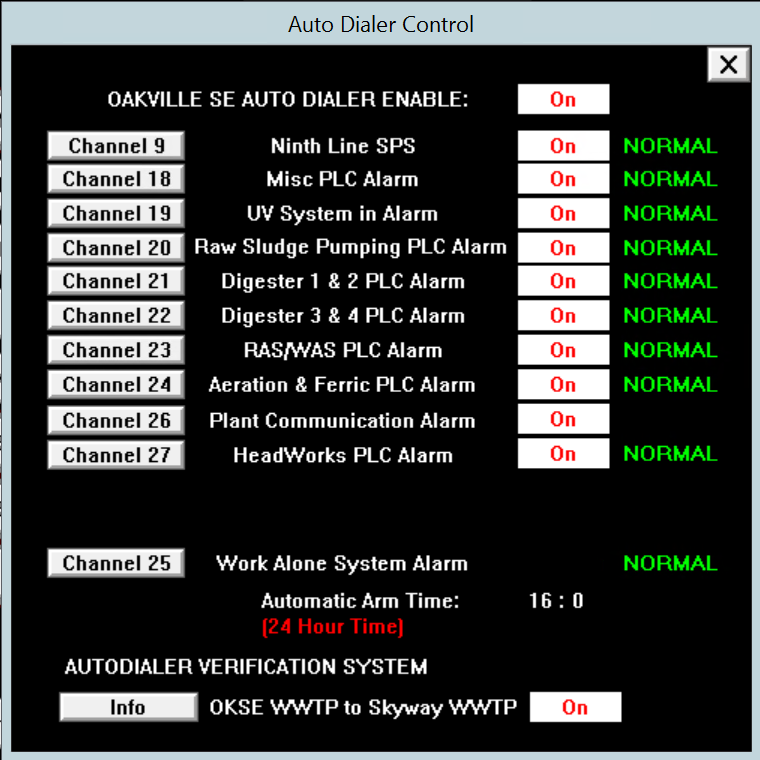


*The graphic below shows the organization of the alarm groups.*

## Auto Dialer

PLC SEXRT03 is the PLC that controls the auto dialer. Clicking on the Auto Dialer Control button on the options menu brings up the Auto Dialer Control window. From this window, the channel can be disabled. Disabling the channel will prevent any alarms that are associated with this channel from being sent to the auto dialer PLC which prevents the alarm from being a call out

Pop-Up: 7.4‑1 Auto Dialer Control

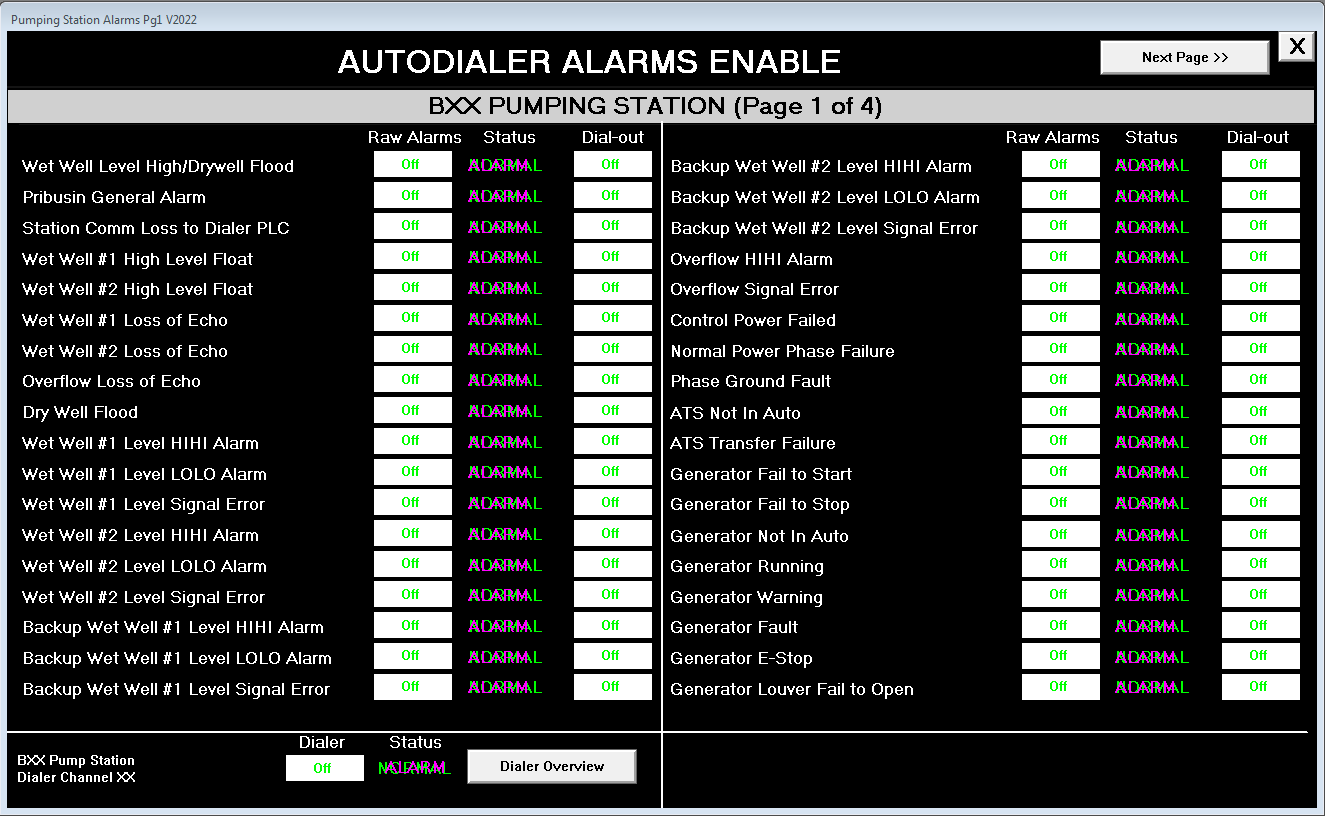


*Update the window and replace the example above*

## Autodialer Alarms and the Autodialer

Clicking on the Auto Dialer Control button on the options menu brings up the Auto Dialer Control window. Clicking on the appropriate channel brings up the appropriate auto dialer enable/disable window.

HMI Screen: 7.5‑1 Auto Dialer Control

*Update the appropriate window and replace the example above.*

In cases where there are more than one alarms enable screen for a given process area, a “Next Page” button is provided at the top right of the screen to advance to the next page. On subsequent pages, there is ability for the user to return to the previous page through the “Previous Page” button provided at the top left of the screen.

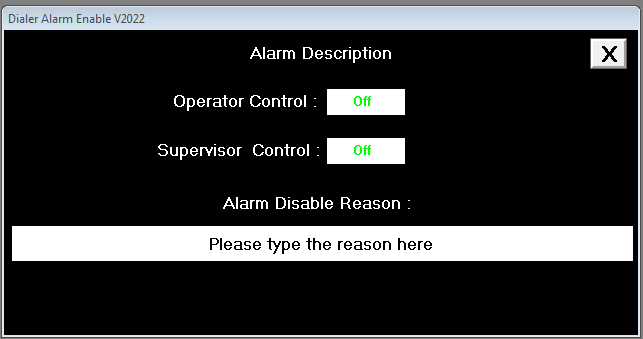
The alarms enable screens are used to enable and disable both the raw alarm and the dial-out alarm. Enabled state is represented by the “on” text and disabled state is represented by the “off” text on the screen. The “alarms” column disables the raw alarm and the “dial-out” column disables the alarms dial-out capability. Disabling the raw alarm will disable the alarm in the PLC logic, SCADA, and dial-out. Disabling the dial-out will only disable the dial-out ability of the alarm. When the dial-out is disabled, the raw alarm (if active) will continue to display on SCADA.

The status column shows the raw alarm status. “Normal” will be displayed if the alarm is not active or disabled as a raw alarm. “Alarm” will be displayed if the alarm is active.

Disabling or enabling of virtual analog device raw alarms is available from the alarms enable screen. The virtual alarms must be cleared before the alarm is disabled or it will remain in place.

Virtual alarms for a device (pump, valve, etc.) do not have individual raw alarms that can be disabled/enabled.

Pop-Up: 7.5‑1 Dialer Alarm Enable Pop-up



The Operator Control will disable the Dial-Out and can be activated by used with Operator access and above.

Supervisor Control will disable the Dial-Out and can only be activated by users with Supervisor access and above. If an alarm is disabled by a Supervisor, it cannot be re-enabled by an Operator. Disabling the Supervisor Control will turn the Dial-Out Enable/Disable button yellow.

Operators and Supervisors can also type a reason the alarm was disabled. This reason is stored per alarm and is not required to disable the Dial-Out.

# Fault Response

***Describe the fault response to the Alarms/Faults - Customize***

***For each major piece of equipment and instrumentation there is to be a fault response section which describes how a fault for the piece of equipment will be determined and how the system will respond. when the fault is detected. The response can be through hardwired control or how the PLC program will respond. The following things need to be considered for these typical major pieces of equipment.***

***Actuators: will the actuator go fully opened, fully closed or maintain last state.***

***Pumps/Devices: will the pump stay running or shut off. If it is a VFD controlled pump, will the pump maintain its current speed, go to full speed, go to minimum speed or shut off.***

***Flow Meter Failure: if a flow meter that is being used for process control fails, how does the system respond?***

## Alarm / Fault Response.

The section below describes how various Alarms and Faults are responded to.

## PLC Faults

There are minor PLC faults and major PLC Faults. A major PLC fault causes the PLC to stop processing logic while a minor one does not. See below how the system will respond when a minor or major fault occurs.

### Minor PLC Fault

There are a variety of minor PLC faults that can occur. If any of them occur, an alarm will be annunciated on the SCADA system. The PLC will take no further action.

### Major PLC Fault or Catastrophic Failure

If a Major PLC Fault or Catastrophic Failure occurs**,** a PLC*{X} to PLC*{Y} Communication Alarm will be annunciated by the SCADA system. The PLC will be non-functional and will not be able to take any actions.

*Consultant needs to determine which equipment will maintain last state and which will not. Every piece of equipment must be analysed and a decision made on what the response will be when the PLC shuts down. The response of each piece of equipment must be detailed in this section of the narrative. For every modulating actuator determine if on the loss of a 4-20mA signal from the PLC to the actuator, the actuator will remain in last state, go closed or go fully open and document accordingly.*

## PLC Control Panel Power Failure.

When power is lost to the control panel that the PLC resides in, the PLC and related instrumentation will continue to function as it will be powered by the UPS. The PLC program assumes that power has been lost to the equipment it is controlling and therefore the program prevents the PLC from trying to control the equipment. A Control Panel *{Name of PLC Here}* Power Failure Alarm will be annunciated on the SCADA system. No further action will be taken by the PLC. If power is not restored, the UPS will eventually run out and the PLC will shut down. At that point a PLC*{X} to PLC*{Y} Communication Alarm will be annunciated by the SCADA system. *{Consultant needs to determine which equipment will maintain last state and which will not. Every piece of equipment must be analysed and a decision made on what the response will be when the PLC shuts down. The response of each piece of equipment must be detailed in this section of the narrative. For every modulating actuator determine if on the loss of a 4-20mA signal from the PLC to the actuator, the actuator will remain in last state, go closed or go fully open and document accordingly.}*

## UPS Failure

When the UPS fails, the PLC will lose power as the power or the PLC comes from the UPS. This will cause a Major PLC Fault or Catastrophic Failure. See section 8.4 for the response to this failure.

## HMI to PLC Communication Failure

When an HMI to PLC communication failure occurs, an alarm will be annunciated on the HMI. No further action will occur.

Describe the response if it is different then what is above.

## PLC to PLC Communication Failure

*This section is to be used only when this PLC reads information from another PLC. If another PLC reads information from this PLC then a communications failure would be covered in that PLCs narrative. For example the auto dialler PLC reads information from every PLC so if the auto dialler PLC has a communication fault then the response would be in the auto dialler PLCs narrative. For every PLC that this particular PLC reads from, there will need to be a separate fault response described as the response may be very different for each PLC.*

PLCA communicates with the following PLCs. PLC X, PLCY and PLC Z. See the specific fault response for each PLC.

### PLCA to PLCX Communication Failure

PLCA reads the DO of tanks 1 through 4 from PLCX. If the flow is unknown, then the PLC does not know if the speed of the blower should be increased or decreased so the PLC will hold all of the blowers at their current state until the communication is restored. An alarm will be annunciated on the HMI.

### PLCA to PLCY Communication Failure

PLCA reads the status of blowers 3 and 4 from PLCY. If the status is unknown, then the PLC does not know whether to start or stop blowers 1 and 2 so the PLC will hold all of the blowers at their current state until the communication is restored. An alarm will be annunciated on the HMI.

### PLCA to PLCZ Communication Failure

An alarm will be annunciated on the HMI. No further action will be taken by the PLC.

## Power Failure

In the event of a power failure all blowers would stop. An alarm will be generated by the SCADA system and sent to the auto dialer if the appropriate alarms are enabled.

*Consultant to determine and document if the equipment would start back up when the power is restored.*

# PLC to PLC Data Exchange

*PLC to PLC data is only exchanged through data reads and not data writes*

*Set up the following Data Exchange Tables between the PLC’s that need to Exchange Data.*

## PLC SEI1 Reading Boolean Bits from PLC SEY1

The following is the data exchanged between PLC SEI1 polling PLC SEY1.

Table: 9.1‑1 PLC SEI1 BOOL Read Data Table from PLC SEY1

|  |  |
| --- | --- |
| **PLC Name:** | SEI1 |
| ***This Controller*** |  |
| **Message Type** | CIP Data Table Read |
| **Data Table Address** | MSG\_SEY1\_BOOL\_3 |
| **Size in Elements** | 1 |
| ***Target Device*** |  |
| **Message Time Out** | N/A |
| **Data Table Address** | MSG\_SEY1\_BOOL\_3 |
| **Ethernet IP Address** | 192.168.207.101 |
| **Local/Remote** | Local | MultiHop: No |
| **SEI Address** | **SEY1 Address** | **Data** |
| MSG\_SEI\_BOOL\_3.0 | MSG\_SEY1\_BOOL\_3.0 | Spare |
| MSG\_SEI\_BOOL\_3.1 | MSG\_ SEY1\_BOOL\_3.1 | Spare |
| MSG\_SEI\_BOOL\_3.30 | MSG\_ SEY1\_BOOL\_3.30 | Spare |
| MSG\_SEI\_BOOL\_3.31 | MSG\_ SEY1\_BOOL\_3.31 | Communication Heartbeat |

# Standby Power

*This section only applies if there is a stand-by power system and it is monitored by this particular PLC. If it is not monitored by this particular PLC, then if should not be included in this PLC’s control narrative. If the stand-by power system only backs up certain pieces of equipment or if there is an interlocking scheme in place that prevents multiple devise from running on the stand-by generator, those need to be described here.*

*For the control narrative for standby power see the narrative in Section 8 Wastewater Pumping Stations, Appendix 8A Type III IV WWPS Standard Control Narrative (4 Pumps)*

# Historical Logging and Trending

*Note some InTouch applications use Historian Client (Active Factory) Trending exclusively where other facilities use Active Factory Trending and In Touch trending. The consultant needs to determine if the application they are working on has Historian Client (Active Factory)trending only or both. If it has both the narrative must show both.*

*This section is to show what the HMI windows will look like when the project is complete.*

## Trending

*The purpose of this section is to indicate the trend groups that will be created or modified and the tags that will be in the new or modified trend groups.*

Unless noted otherwise, historical data logging and trending will be provided for the following list of signals:

1. Analog signals;
2. Equipment runtimes;
3. Equipment Running Status;
4. Any Analog signal statistical calculations determined by operations needed to be logged.

Below are the trend groups and their associated tags. These trend groups and tags are the same for both the Historian Trends and the InTouch Trends.

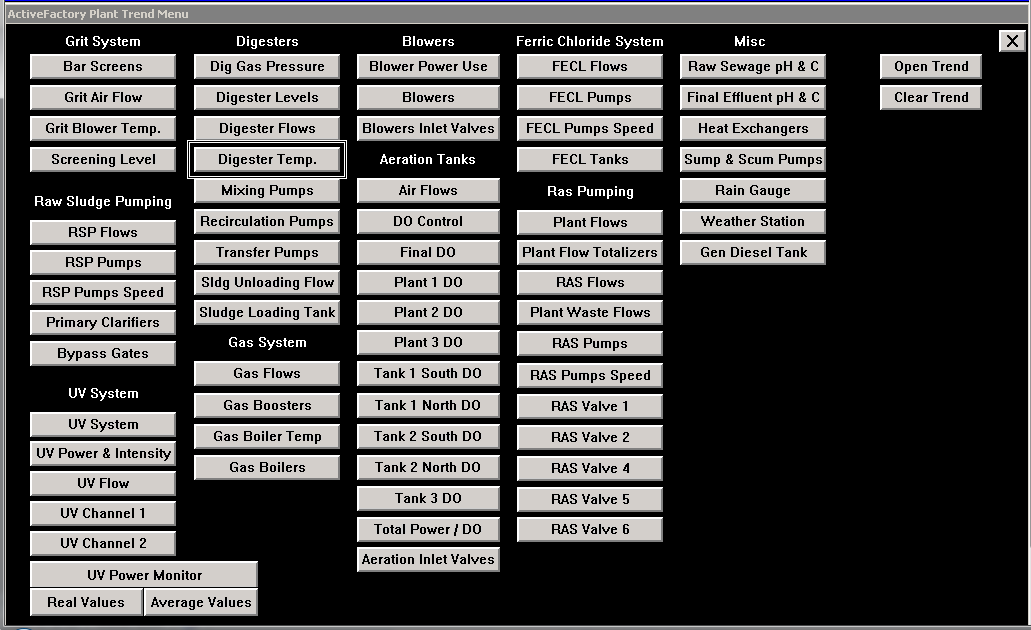
Table: 11.1‑1 Trend Groups and Tags

|  |  |
| --- | --- |
| **Trend Group Name/Button** | **Tags in the Trend Group** |
| Blower Speeds | Blower #1 Speed Feedback |
| Blower #2 Speed Feedback |
| Blower #2 Speed Feedback |
| Blower #2 Speed Feedback |
| Tank #1 Valves, Air flow and D.O. | Tank #1 Air Inlet Valve Position |
| Tank #1 Air Flow |
| Tank #1 Dissolved Oxygen Probe #1 |
| Tank #1 Dissolved Oxygen Probe #2 |

### Historian Plant Trend Window

This is the window that is used to select the Historian Trend Group that will be displayed.

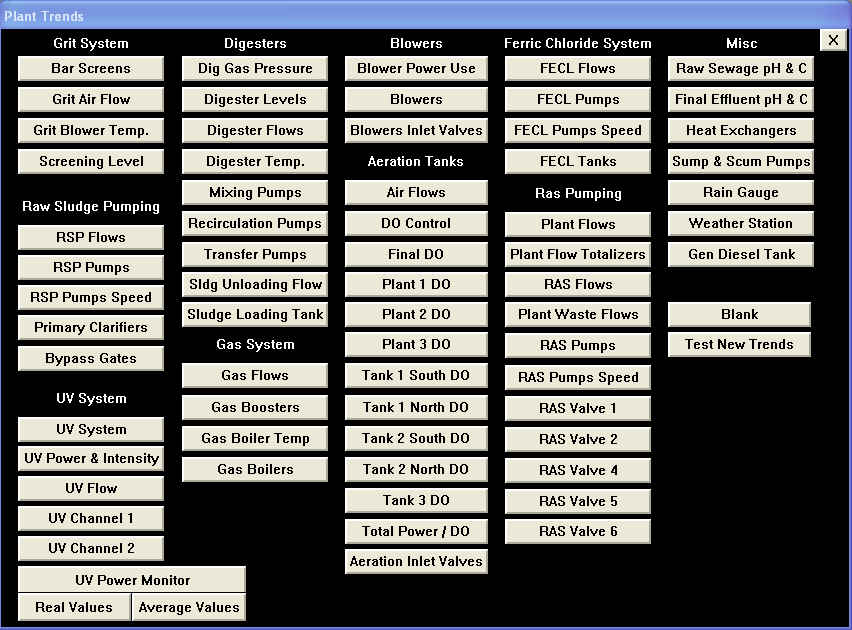
HMI Screen: 11.1.1‑1 Auto Dialer Control



### InTouch Trends Window

This is the window that is used to select the InTouch Trend Group that will be displayed.

HMI Screen: 11.1.2‑1 Auto Dialer Control



# Reporting

*This section is to show what the reporting will look like after the project is complete. Make sure that the modified daily reports still print properly.*

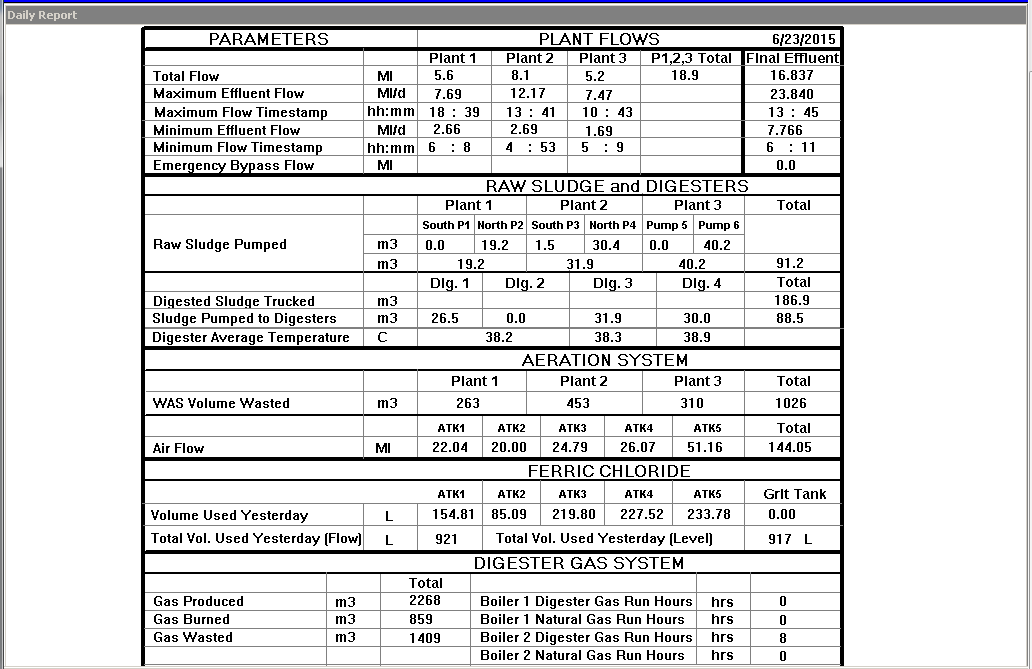
*Reporting is very different from InTouch application to InTouch application so the consultant needs to spend some time researching how the reporting works in each InTouch application and then documenting how the reporting will function after the project is complete. Refer to section 7 of the SCADA Standards Manual for information on the reporting in each InTouch application.*

*The example given below if from the Oakville South East WWTP and is a sample only. It is not to be followed for every plant.*

## InTouch Report Window

Clicking the “Reports” button will open the **Daily Report Window** for the plant. The daily report displays all important process statistics information for the plant.

HMI Screen: 12.1‑1 ‑2 Daily Reports Window



# Building Services Subsystem

*Typically these are monitored only Alarms and require no Control Action, if any Control Action is required then it should be described in this section.*

*List all the alarms associated with building services systems.*

## Equipment

The major equipment associated with Building Services subsystem of the Aeration System is summarized in the following table.

Table: 13.1‑1 Equipment List – Building Services

|  |
| --- |
| **EQUIPMENT DESCRIPTION** |
| Station Security System Armed |
| Station Security System Illegal Entry |
| Station Security System Dead man Alarm |
| Station High Temperature |
| Station Low Temperature |
| Station Flood Switch |
| Station Fire Detector |
| Eyewash Flow Switch |
| Generator Room Fire Detector |

**APPENDICES**

**I/O LISTING**

The following table details the I/O associated with the equipment and instrumentation associated with the processes identified in this narrative *(To be completed during detailed design phase)*.

Appendix A1 Hardwired I/O

| **PLC** | **RACK** | **SLOT** | **POINT/ CHAN.** | **TYPE** | **TAG NAME** | **DESCRIPTION** | **EVENT LOG** | **ALARM**  **PRIORITY** | **TREND** | **RANGE** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |

**ALARM SET POINTS**

The following table lists all the alarm set points….

Appendix A2 PROCESS ALARMS

| **DESCRIPTION** | **ALARM**  **PRIORITY** | **RAW**  **ENABLE/DISABLE** | **DIALLER**  **CHANNEL #** |
| --- | --- | --- | --- |
|
| Aeration Discharge Header Pressure Hi Hi Alarm | 90 | TBD | TBD |

**PROCESS SETTINGS**

The following table lists all the process set points and program variables….

Appendix A3 PROCESS SET POINTS AND PROGRAM VARIABLES

| **DESCRIPTION** | **TAGNAME** | **UNITS** | **SIG. DIGITS** | **INPUT RANGE** | | **DESCRIPTION** |
| --- | --- | --- | --- | --- | --- | --- |
| **MIN** | **MAX** |
| Duty 1 Start Evaluation | DUTY\_FOUR\_PUMP\_1\_2 | TBD | TBD | TBD | TBD | Operator |