2.4 OPERATOR INTERFACE (LOCAL OPERATOR HMI)

A. HMI programs provide graphic representation of local processes and control over machinery.

B. Screens shall include equipment status indications. Include analog instruments such as indicators, manual loading stations, controllers, etc., as shown.

C. Graphical Operations

1. Display Information:

a. The HMI software shall display information necessary to support all requirements specified, including: operator commands; alarm notification; system graphics as specified and as shown, incorporating dynamic data and curve plotting.

b. Video displays shall be color at highest resolution supported by hardware. Install operating system drivers as necessary. They shall be fully windowed and shall use a mouse for control. Use colors, function keys, and navigational controls consistently.

2. System Graphics Implementation: System graphics displays shall be hierarchical displays which integrate dynamic data into the display. System graphics shall reflect actual system configuration. Each system schematic shall be included as a separate display. Different colors, textures, and use of inverted video shall be used for various components and dynamic data. The displays shall include standard and/or custom symbols. Data associated with a display shall be updated within 5 seconds of the digital status change or the analog change in excess of the analog change differential. Any dynamic data which is not current, due to PLC communications failure, PLC failure, or point out of service, shall be highlighted or flagged.

3. Trending: Provide on-screen trending displays that are user definable that operate from either previously collected historical trend groups (named file) or from a group of real-time variables. Provide facilities for user selection of colors, time (horizontal), and measurement (vertical) scales. Accommodate real-time sampling intervals as short as 1 second. Real-time trends shall show alarm setpoints. Historical trend displays shall have time-scale panning controls.

4. System Menus and Displays

a. The user shall be able to call up the following displays by dedicated function key, pull down menu or by icon and shall be

able to page forward and backward on linked multiple page displays. The system menu and index displays shall also contain icons which can be used to call up subsequent displays.

b. System Menu (list of all graphics and menus).

1) Index (list of all PLCs).
2) Alarm Summary (list of all uncleared alarms).
3) Abnormal Summary (list of all devices not in normal state; keeps track of alarm conditions which have been cleared).
4) Data Communications Summary (listing of availability for each communication channel, by statistically processing the number of transmission errors, outages, and other abnormal conditions for each channel).

c. Navigation to any system graphics shall be no more than three push buttons away from any other screen.

D. Command Function

1. Command Input (Buttons): Command buttons shall utilize full words and acronyms selected to allow operators to use the system without extensive training or data processing backgrounds. The system shall prompt the operator.

2. Command Input Errors: The system shall supervise operator inputs to ensure they are correct for proper execution. Operator input assistance shall be provided whenever a command cannot be executed because of operator input errors.

3. Special Functions: The system shall support the following special functions by using a mouse, in addition to all other commands specified. The system shall support the following special functions by using a mouse, in addition to all other commands specified.

a. Start/Enable shall manually start equipment and enable monitoring and control of points.

b. Stop/Disable shall manually stop equipment and disable monitoring and control components.

c. Display Diagram shall display diagrams of specific utility systems, unit processes, facilities or interlocks required for operations.

d. Auto/Override shall override automatic operation of a point or return a point to automatic operation

4. Level of Addressing: Four levels of addressing for identification shall be provided as follows:

   a. Point: The individual sensor or control device within a unit.

   b. Unit: The unit that a point is associated with, such as a pump.

   c. Sub-System: The sub-system that a point is located in or near.

   d. System: The system that a sub-system is located in or near.

5. System Access Control: A minimum of 30 passwords shall be configured into the control system software. The system shall maintain an ASCII disk file logging all operators logged onto the system, alarm acknowledgments, commands issued and all database modifications for each password. Each password shall be definable as to the functions that the operator can perform.

2.5 SECURITY

A. Using operator interface and operating system software, the Instrumentation Supplier shall implement a security system to restrict access to parts of system. A minimum of 30 passwords shall be configured into the control system software. The system shall maintain an ASCII disk file logging all operators logged onto the system, alarm acknowledgments, commands issued and all database modifications for each password. Each password shall be definable as to the functions that the operator can perform. Provide following as a minimum:

   1. Programmer - Access to all facilities including changing displays and logic.

   2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

   3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

   4. Observer - Access to displays only.

2.6 ALARMING

A. Alarm Management: For each process or system event classed as an alarm provide facilities for displaying and logging on system, acknowledgment, and purging of stale messages. Alarm events are derived from discrete inputs, analog

trip values, logic combinations and computations as needed. Display both alarm events and returns to normal. Provide date/time stamps for events, descriptive message, and event type code. Use color combinations to distinguish following alarm states: Alarm-Unacknowledged, Alarm-Acknowledged, Normal-Unacknowledged, and Normal-Acknowledged.

B. The software shall notify an operator of the occurrence of an alarm condition. The control system alarm history shall be stored in an ASCII file and shall be recallable by the operator using the report generator. Alarm messages shall take precedence over other functions. A minimum of the most recent 25 system alarms shall be directly available at the operator interface. Operator acknowledgment of one alarm shall not be considered as acknowledgment of any other alarm nor shall it inhibit reporting of subsequent alarms. Alarm data to be displayed and stored shall include: identification of the alarm; date and time to the nearest second of occurrence; device or sensor type; limit exceeded (if analog); engineering units; current value or status; alarm class; and alarm messages.

C. Digital Alarms: Digital alarms shall be subject to immediate reporting, within the alarm response time, at the HMI

D. Analog Alarms: These alarms shall be subject to immediate reporting, within the alarm response time, at the HMI. The control panel analog readings shall be compared to predefined high and low limits, and alarmed to the HMI each time a value enters or returns from a limit condition. The program shall automatically change the high or low limits, or both, of any analog point, based on time scheduled operations as specified, allowing for a time interval before the new alarm limit becomes effective. For those applications where setpoint adjustments are made, the alarm limit shall be keyed to a finite deviation traveling with the setpoint

E. Alarm Messages: Assignment of messages to a point shall be an operator editable function. Secondary messages shall be assignable by the operator for display to provide further information, such as telephone lists or maintenance functions, and shall be editable by the operator.

F. Alarm Classes: Classes of alarms, which will be identified for each item, include Class 1 and Class 2 alarm conditions. Class 1 (Critical) shall include display and audible alarm at occurrence and at return-to-normal. Acknowledgment of Class 1 alarms by the operator shall be required at occurrence and at return-to-normal. Class 2 (informational) shall include display and audible alarm at occurrence and at return-to-normal. No acknowledgment of Class 2 alarms is required unless otherwise shown

G. Critical process alarms shall be derived from an actual field device connected to respective local process control panel or controller and not from the HMI programming software by calculation or other means. This should, however, not

be interpreted to mean that that the HMI shall be excluded from performing supervisory alarm handling functions.

H. The System Integrator shall work to eliminate all nuisance equipment and process alarms during system commissioning, to the satisfaction of Engineer and Owner. At the completion of the work, the System Integrator shall provide the Engineer and Owner certification that all instruments and control systems have been commissioned and are operating in accordance with the Drawings and Specifications.

2.7 REPORTING

A. Software shall be provided to generate and format standard and custom reports for displaying and storing on disk. Reports shall use database values and parameters, values calculated using the real time static database or historical data base; with the reports subsequently stored on hard disk or CD drive. Dynamic operation of the system shall not be interrupted to generate a report. The report shall contain the time and date when the sample was taken, and the time and date when the report was printed.

B. Develop reports and data entry facilities to support management and regulatory reporting requirements of facility. Include monthly ADEM reporting forms.

C. Provide following data management functions:

1. Collection files shall be closed at 00:05 of first day of each calendar month and a new file started. Establish a file naming convention based on file type (analog, historical, or motor), month, and year. Provide operator screens for managing file space:

a. Backing up to archive medium.

b. Restoration from archive.

c. Deleting archive files.

d. Display/print of archive catalog.

e. Forcing early closure of collection file.

f. Create export file.

2. Analog Points: Scan each analog point as listed below. Every hour, store minimum, maximum, and average values in a journal file. Do not store values that are out of range, out of service, or not valid for any other reason.

Device Type	Timed Every	Triggered		
		On Update	Absolute	Percent
Analytical	15 Min	Yes	-	3
Flow	15 Min	Yes	-	5
Level	30 min	Yes	-	3
Pressure	30 Min	Yes	-	5
Setpoint	1 day	Yes	-	-
Speed	30 Min	Yes	-	3
Temperature	30 Min	Yes	-	3
Total	30 min	Yes	-	5
Valve	30 min	Yes	-	3

1) The point shall be logged every time period and whenever the value changes by triggered amount.
2) Triggered amount is percent of present valve (if absolute and percent are blank then whenever value changes).

3. Historical Trend Data Collection: Establish data collection tables for up to 20 groups of up to 6 process points each with a collection interval of 1 minute. Provide facilities for defining and changing trend groups. Removal and archiving of closed trend files shall be accomplished using operating system's standard backup/restore programs. Do not store values that are out of range, out of service, or not valid for any other reason.

4. Motor Run Times: For each monitored motor, store daily values for running time. Run times may be developed either by scanning points every minute or by providing PLC timer logic. Daily accumulated run times are to be stored at 00:01 of each day and then reset. Close running time data collection file at 00:05 on first day of each month.

5. Data Export: Provide collected data file export facilities for use by management reporting programs and third-party data analysis programs such as dBase IV and spreadsheets. Export files shall be ASCII encoded, fixed record and field length with carriage control. Export files shall be made from closed collection files on user demand.

D. The reports shall be developed, with data being stored locally on the server. The reports are generally described in Attachment A.

PART 3 - EXECUTION

3.1 SOURCE QUALITY CONTROL

A. Conduct preliminary testing prior to factory checkout by executing programming for this Project. Use simulated/emulated input and output devices as necessary to verify correct interpretation. Exercise inputs to test logic for correct function and proper response of outputs. Verify correct interface of PLC logic with programs used for HMI and data collection activities.

3.2 SYSTEM REQUIREMENTS

A. Performance Requirements: Programmable logic controllers (PLCs) shall complete execution of all rungs with a cycle time not to exceed 250 mS. Operator interface functions shall have a 2-second response time or better. Adjust timing and operating system parameters of PLCs and computers as necessary.

B. Final Control Element Response: Proper stroke response in magnitude (± 5%) and direction will constitute correct operation.

C. Analog Control Loops: This requirement includes all loop elements (signal conditioners, etc.) up to and including the local operator and remote operator computer interfaces. Each transmitter and signal transducer shall have an accuracy of + or – 0.5 percent (of reading). Signal simulation will be an acceptable substitute for primary element excitations.

3.3 FACTORY TEST

A. The Instrumentation Supplier shall notify Engineer and Owner in writing at least 14 days before the proposed testing date and in no case shall notice be given until after the Contractor has received written approval of the test procedures from the Engineer. If the factory acceptance test (FAT) is concluded unsuccessfully, the test shall be repeated. The instrumentation supplier shall reimburse Owner and Engineer for all expenses incurred in connection with attending repeated factory or site testing necessitated by system failure or inadequate preparation.

B. The Instrumentation Supplier shall prepare a testing procedure to be approved by Owner and Engineer that shall demonstrate that the system conforms to the Specifications. The testing procedure shall be submitted at least 30 days in advance of testing. The testing shall be conducted by Instrumentation Supplier and witnessed by Owner and Engineer.

C. Factory Test Setup: Assemble and integrate the factory test setup to prove that performance of the system satisfies all requirements of the Drawings and Specifications, including system communications requirements in accordance with the approved test procedures. The factory test shall take place during regular daytime working hours on weekdays. Equipment used shall be the same equipment that is to be delivered to the site

D. Factory Test Procedure: Test procedures shall define the tests required to ensure that the system meets technical, operational, and performance requirements. The test procedures shall define location of tests, milestones for the tests, and identify simulation programs, equipment, personnel, facilities, and supplies required. The test procedures shall provide for testing all control system capabilities and functions specified and shown. The procedures shall cover actual equipment and shall consist of detailed instructions for test setup, execution, and evaluation of test results. The test reports shall document results of the tests. Reports shall be delivered to the Engineer within 7 days after completion of each test. The procedures shall include the following:

E. Factory Acceptance Testing: After system assembly and debugging at the Instrumentation Supplier's facility the system shall be subjected to a factory acceptance test (FAT) before the system is shipped to the site.

1. The entire system, including all peripherals and associated software, shall be factory tested under simulated operating conditions. Both normal operating sequences and fault conditions shall be simulated. The results shall be noted on the displays and the logging printer for hard copy. All basic functions shall be demonstrated, including I/O processing, communications, alarm handling, HMI display functions, alarm logging, report generation, and historical data storage, as well as the specific functions listed herein. The system shall operate continuously for at least a 72 hours without faults. This operational test may run concurrently with the demonstration of hardware and software functions. The test procedure shall also include at a least four-hour period for discretionary tests to be conducted by Engineer and Owner.

2. Software Test. All system software modules specified herein shall be demonstrated. Software tests shall include running all diagnostics, debugging routines, and system test routines. The operating system, advanced process control language compiler, and all associated drivers shall be fully tested and operable for the system test. Software "patches" or changes to bypass failed or flawed modules during the test will not be acceptable.

F. Factory Test Report: Original copies of data produced during the factory test, including results of each demonstration procedure, shall be delivered to the

Engineer at the conclusion of the test, prior to Engineer approval of the factory test. The report shall be arranged so that commands, responses, and data acquired are correlated to allow logical interpretation of the data.

G. The Instrumentation Supplier is responsible for supplying computer and software for the FAT.

3.4 SOFTWARE INSTALLATION

A. The Instrumentation Supplier shall load software required for an operational control system, including databases (for points specified and shown), operational parameters, and system, command, and application programs. Adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

B. System Software Configuration: System software shall be configured by the Instrumentation Supplier. Configuration services shall consist of system database, report formats, operator interface graphic and tabular display screen formats, password and security implementation, and programming of control units to provide a fully functioning system. The Instrumentation Supplier shall fully configure the system using data provided herein or supplied by the Engineer and/or the Owner after award of the Contract.

1. Tuning of software programs shall be accomplished in such a manner that the program operates at its highest performance level. These programs include, but are not limited to Microsoft Office, all PLC ladder logic, Wonderware, and others.

2. Software used for programming the PLCs shall be provided by the Instrumentation Supplier for his own use. PLC programming software used under this Contract shall be Siemens SIMATIC STEP 7 (TIA Portal). Two (2) copies of the PLC programming software shall be turned over to the Owner. Under no condition shall the Instrumentation Supplier provide any part of the software code locked out to the Owner. ALL CODE SHALL BE MODIFIABLE BY THE OWNER.

3. The Instrumentation Supplier shall verify network condition during construction, and after construction.

3.5 FIELD TESTING AND ADJUSTING EQUIPMENT

A. Provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Owner and Engineer will witness the site acceptance test (SAT) and written permission shall be obtained from the Engineer before proceeding with the testing. Original copies of data produced, including results of each test

procedure, during the SAT shall be turned over to the Engineer at the conclusion of each phase of testing prior to approval of the test. The test procedures shall cover actual equipment and functions specified for the Project.

B. Testing, Adjusting and Commissioning:

1. After successful completion of the FAT as specified, the Contractor will be authorized to proceed with the installation of the system equipment, hardware, and software. Once the installation has been completed, the Contractor and Instrumentation Supplier shall test, adjust, and commission each control loop and system in accordance with NIST SP 250 and shall verify proper operation of each item in the sequences of operation, including hardware and software. Calibrate field equipment, including control devices, adjust control parameters and logic (virtual) points including control loop setpoints, gain constants, constraints, and verify data communications before the system is placed online. Calibrate each instrumentation device connected to the control system control network by making a comparison between the reading at the device and the display at the workstation, using a standard at least twice as accurate as the device to be calibrated. Check each control point within the control system control network by making a comparison between the control command at the central station and field-controlled device. Deliver trend logs/graphs of all points showing that stable control has been achieved. Points on common systems shall be trended simultaneously. One log shall be provided showing concurrent samples taken once a minute for a total of 4 hours. One log shall be provided showing concurrent samples taken once every 30 minutes, for a total of 24 hours. Verify operation of systems in the specified failure modes upon control system network failure or loss of power, and verify that systems return to control system control automatically upon a resumption of control system network operation or return of power. Deliver a report describing results of functional tests, diagnostics, calibrations and commissioning procedures including written certification that the installed complete system has been calibrated, tested, adjusted and commissioned and is ready to begin the SAT. The report shall also include a copy of the approved SAT procedure.

3.6 SITE ACCEPTANCE TEST

A. Provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Owner and Engineer will witness the Site Acceptance Test (SAT), and written permission shall be obtained from the Owner before proceeding with the testing. Original copies of data produced, including results of each test procedure, during SAT shall be turned over to the Engineer at the conclusion of each phase of testing prior to approval of the test. The test procedures shall cover actual equipment and functions specified for the Project.

B. The Instrumentation Supplier shall prepare a testing procedure to be approved by Owner and Engineer that shall demonstrate that the system conforms to the Drawings and Specifications. The testing procedure shall be submitted at least 30 days in advance of testing. The testing shall be conducted by Instrumentation Supplier and Contractor and witnessed by Owner and Engineer. The test procedure shall describe all tests to be performed and other pertinent information such as specialized test equipment required and the length of the SAT. The test procedures shall explain, in detail, step-by-step actions and the expected results, to demonstrate compliance with all the requirements of the Drawings and Specifications. The test procedure shall be site specific and based on the inputs and outputs, required calculated points and the sequence of control. Demonstrate that the completed control system complies with all Contract requirements. All physical and functional requirements of the Project including communication requirements shall be demonstrated and shown. Demonstrate that each system operates as required in the sequence of operation. The SAT as specified shall not be started until the Contractor's has completed initial testing to verify proper operation of the various systems and components. Upon successful completion of the SAT, deliver test reports and other documentation as specified to the Engineer.

3.7 ENDURANCE TEST

A. The Instrumentation Supplier and Contractor shall use an endurance test to demonstrate the overall system reliability of the completed system. The endurance test shall be conducted in phases. The endurance test shall not be started until the Engineer notifies the Contractor in writing that the SAT has been satisfactorily completed, training as specified has been completed, outstanding deficiencies have been satisfactorily corrected, and that the Contractor has permission to start the endurance test. The Contractor shall provide an operator to man the system 8 hours per day during daytime operations, including weekends and holidays, during Phase I endurance testing, which shall be in addition to any Owner's personnel that may be made available. The Owner may order termination of testing at any time when the system fails to perform as specified. Upon termination of testing the Contractor and Instrumentation Supplier shall commence an assessment period as described below for Phase II. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation, as specified, to the Engineer prior to acceptance of the system.

B. Phase I (Testing): The test shall be conducted 24 hours per day, 7 days per week, for 10 consecutive calendar days, including holidays, and the system shall operate as specified. No repairs shall be made during this phase of testing unless authorized by the Owner and Engineer in writing.

C. Phase II (Assessment): After the conclusion of Phase I, the Contractor and Instrumentation Supplier shall identify failures, determine causes of failures,

repair failures, and deliver a written report to the Engineer. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed. After delivering the written report, a test review meeting shall be held to present the results and recommendations to the Owner and Engineer. The meeting shall not be scheduled earlier than 5 business days after receipt of the report by the Engineer. As a part of this test review meeting, the Contractor and Instrumentation Supplier shall demonstrate that failures have been corrected by performing appropriate actions. The Owner and Engineer reserve the right to cancel the test review meeting if no failures or deficiencies occur during the Phase I testing. Based on the Contractor's report and the test review meeting, the Owner will determine if retesting is necessary and will identify the restart point. The Owner and Engineer reserve the right to require that the Phase I test be totally or partially rerun. After the conclusion of any retesting, the Phase II assessment shall be repeated as if Phase I had just been completed.

3.8 OPERATOR TRAINING

A. Field training oriented to the specific system shall be provided for designated personnel. A copy of the training manual for each trainee plus two (2) additional copies shall be delivered to the Engineer. Manuals shall include an agenda, the defined objectives for each lesson, and a detailed description of the subject matter for each lesson. Furnish audiovisual equipment and other training supplies and materials. Copies of the audiovisuals shall be delivered with the printed training manuals. The Owner reserves the right to videotape training sessions for later use. A training day is defined as 8 hours of classroom instruction, excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. Approval of the Contractor's training schedule shall be obtained at least 30 days before the training.

B. General Operator Training: Immediately following the equipment demonstration testing and signoff, preliminary operator training shall be provided at the project site for three (3) consecutive training days. Upon completion of this course, each student, using appropriate documentation, should be able to perform elementary operations with guidance and describe the general hardware architecture and functionality of the system. This course shall include: day-to- day monitoring and/or control of the facilities; general system architecture; functional operation of the system, including workstations; operator commands; application programs, control sequences, and control loops; database entry and modification; reports generation; alarm reporting; diagnostics; and historical files. The training program shall provide operators with sufficient knowledge to move from screen to screen within the system, understand the contents of group and detailed point displays, react to and acknowledge alarms, adjust control setpoints and alarm limits, configure and print shift reports, print preconfigured reports on demand, control equipment connected to the system, and react to and resolve minor system errors.

C. Maintenance Training (specifically focuses on hardware): Following the general operator training, a minimum period of two (2) training days shall be provided by a representative of the Instrumentation Supplier which shall focus on maintenance of the equipment. The training shall address: physical layout of each piece of hardware, calibration procedures, preventive maintenance procedures, schedules, troubleshooting, diagnostic procedures and repair instructions.

END OF SECTION

ATTACHMENT 40 96 35 A
GENERAL REQUIREMENTS FOR HMI SCREENS, CONTROL PROGRAMMING, AND HISTORIAN FUNCTIONS

1. GENERAL HMI SCREEN REQUIREMENTS

A. Overview Screen: An overview screen shall be provided that schematically depicts the raw water intake/pumping facilities and the overall water treatment plant. The overview screen shall allow the operator to select detailed screen views of individual unit operations and processes. The overview screen shall display the following values obtained from various instruments:

- Guntersville Lake water level
- Raw water flow and discharge pressure at raw water pump station
- Disinfectant contact basin and clearwell water levels
- Finished water pH, turbidity, and chlorine concentration
- Finished water flow and discharge pressure
- Elevated backwash water storage tank water level
- Spent backwash water storage tank water level
- Spent backwash water outfall flow

The overview screen shall also allow the operator to determine which facilities operating; however, it is not necessary to display detailed information since such information is addressed in the unit operation and process screen views. More specifically, the overview screen shall allow the operator to determine which flocculators, settling basins, filters, and GAC contactors are operating at any given time. Also, the overview screen shall indicate if an alarm condition is present within a unit operation or process; however, it is not necessary to display details of the alarm on the overview screen.

B. Unit Operation and Process Screen Views: Each screen shall schematically depict the facilities included in the system to be displayed. Isometric views or renderings are not required. The screens shall be structured to maximize clarity and allow the operator to easily ascertain component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

C. Security: Password protection to limit access to HMI screens, setpoint adjustments, and control functions shall be provided. A master matrix of screens, setpoints, and control functions shall be provided and this matrix shall allow the plant supervisor to designate access to various monitoring and control functions.

2. GENERAL CONTROL PROGRAMMING REQUIREMENTS

A. Standard ladder logic and loop programming techniques shall be used when automatic control is provided. Printed code shall be provided to the Owner with a written description of the logic involved in the particular control function.

B. When a motor or other device is under automatic control it shall not be permitted to start or otherwise function when an alarm condition is present. Programming shall require the alarm condition to be both cleared and acknowledged by the operator before normal operation can resume.

C. When a setpoint is established for automatic control and feedback is available, proportional-intergral-derivitive (PID) control shall be provided unless specified otherwise. Under this control method an adjustable deadband shall be provided along with provisions to allow the operator to adjust values for the various constants associated with PID control.

3. GENERAL HISTORIAN REQUIREMENTS

A. The SCADA system shall automatically record and store the following data:

- Run times for each motor monitored by the SCADA system
- All flows measured by instruments (instantaneous rates & totalized volumes)
- Chemical feed rates, dosages, and daily usage
- All measured process parameters such as pH, temperature, turbidity, streaming current, and residual chlorine
- Filter and GAC contactor run times (separate by unit number)
- Instantaneous power draw and daily energy consumption (segregate values for raw water pumps and water treatment plant)
- Generator run time and energy production
- Emergency eyewash/shower status

Data within the historian module shall be presented in tabular and graphical formats and be readily exportable to Microsoft Excel.

B. All alarms shall be recorded and presented in a tabular format. Information shall include the cause for alarm and times of occurrence, clearance, and acknowledgement.

4. OTHER GENERAL REQUIREMENTS

A. In addition to the programming needed to comply with the various requirements set forth in the Specifications, the Instrumentation Supplier shall provide 160 hours of on-site services for programming that will be directed by the Owner and Engineer. The 160 hours shall be measured based on an 8-hour work day. Under no circumstance shall this programming allowance be used for correction of defects or testing. The programming shall be provided in two (2) separate visits by the individual responsible for the initial programming. The first visit will be approximately 60 days before substantial completion and the second visit will be approximately 60 days after start-up. This work is to allow the Owner and Engineer to make refinements deemed necessary to provide optimal monitoring and control. All costs for the programming work, including lodging, travel, and meals, shall be included in the Contractor's bid.

END OF SECTION

ATTACHMENT 40 96 35 B
RAW WATER INTAKE & PUMP STATION PROCESS & ELECTRICAL CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Raw water intake, pump station, and related electrical sub-station.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Electrically operated gates (3)
   - Raw water pumps (3 initially, 6 @ build-out)
   - PAC feed system (located at WTP)

   B. Control Panels, PCLs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - RWI-LCP-1 (raw water intake control panel)
   - RWI-HMI-1 (raw water intake HMI)
   - VFD mounted HMI (3 units)

   C. Instruments

   - River level ultrasonic level sensor/transmitter (1 unit for monitoring river level)
   - Pump chamber ultrasonic level sensor/transmitter (1 unit per pump chamber, 3 units total)
   - Pump chamber low level flow switches (1 switch per pump chamber, 3 switches total)
   - Intake slide gate operator limit switches (2 switches per gate, 6 switches total)
   - Intake slide gate operator torque switches (1 switch per gate, 3 switches total)
   - Raw water pump motor bearing thermal sensors (2 devices per motor, 6 devices initially, 12 devices @ build-out)

- Raw water pump motor winding thermal sensors (3 devices per motor, 9 devices initially, 18 devices @ build-out)
- Raw water pump motor vibration sensor (2 devices per motor, 6 devices initially, 12 devices @ build-out)
- Raw water pump discharge header pressure transducer/transmitter (2 units)
- Raw water pH/temperature probe (1 unit)
- Raw water turbidimeter (1 unit)
- Raw water magnetic flow meter (1 unit @ WTP)
- PAC feed system instrumentation (integral to packaged PAC feed system)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing screens, gates, pump chambers, raw water pumps, valves and instruments. Display the following:

- Positions of all local-off-remote switches.
- Gate positions, individual pump operating status (on/off & speed), raw water flow rate, pump discharge pressure, raw water temperature, raw water pH, raw water turbidity, river water level, and pump chamber water levels.
- Remote PAC feed system status, PAC feed rate, and PAC dosage.
- Alarm conditions necessitating shutdown including low water level, high motor bearing temperature, high motor winding temperature, excessive motor vibration, high discharge pressure, low discharge pressure, high water level in the filter influent channel, and variable frequency drive (VFD) fault.
- Alarms related to high torque conditions for the gate operators.

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

B. Provide a sub-screen accessible from the basic facility screen described above schematically depicting the sub-station, switchboards, and variable frequency drives. Display the following:

- Primary voltage and current
- Frequency
- Secondary voltage and current

- Standby generator operating status
- Power draw and daily energy consumption

4. Functional Control Descriptions:

A. Gates: When the local-off-remote switches on the gate operators are in the remote position intake gate operation will be accomplished manually at the HMI stations located at the intake and WTP. Each HMI shall allow the operator to select the position of each gate and the gates shall travel to the desired positions unless a torque overload condition is detected within the motor actuator, which will automatically stop the operator's motor and provide a contact closure to indicate an alarm condition at the HMIs. When the local-off-remote switches on the gate operators are in the local position, intake gate operation will be accomplished by using the pushbuttons located on each motor operator.

B. Raw Water Pumps: When the local-off-remote switches on the raw water pump VFDs are in the remote position raw water pump operation shall be accomplished manually at the HMI stations located at the intake and WTP. Each raw water pump shall have an adjustable minimum speed which is set at the HMIs. These speeds will be the "start-up speeds" that will occur when a pump is called to run by the operator. Once a pump is started the speed of the unit shall be manually adjusted by the operator at the HMIs. Under normal conditions pumps shall remain in operation until the operator decides to shut down one or more of the pumps using the HMIs. When a pump is shut down from an HMI the pump's speed shall gradually decrease from its current operating speed down to its minimum speed over a specific time interval, which is adjustable by the operator at the HMIs. Once the minimum speed is attained, the pump shall be turned off. This gradual decrease in pump speed (ramp-down) is provided to mitigate check valve slamming and water hammer. Automatic safety shut down of each pump shall be included so that if high pump motor bearing temperature, high pump motor winding temperature, excessive pump vibration, low pump chamber water level, low discharge pressure, or high discharge pressure conditions are detected, the appropriate pump, or group of pumps, will be deactivated immediately without the ramp-down feature described above. The low water level shutdown condition shall be detected by the float switches in the pump chamber rather than the level transducers. When a low level condition is detected in a particular chamber only the pumps associated with that chamber shall be disabled. Also, if a high water level is detected by a float switch in the filter influent channel, the pumps shall be shut down. Pump shut-down due to a VFD fault shall be a feature provided within the VFDs rather than RWI-LCP-1. When the local-off-remote switches on the raw water pump VFDs are in the local position, raw water pump operation shall be accomplished manually at the individual VFDs. Selector switches and push buttons shall allow the pumps to be controlled locally. Once the local-off-remote switch is selected to local, the start button can be depressed and the pump will go through the startup sequence. A speed potentiometer on the

front of the VFD may be used to adjust the pump's speed, while a stop button is used to start the shutdown sequence.

5. OTHER INFORMATION

A. System Connection:

1. The raw water system will be connected to the main plant control system via a fiber optic network connection to CNSWTCH#1. Information shall be retrieved by the visualization software directly from RWI-LCP-1. Alarms shall be configured to monitor both network and PLC health.

2. The system shall be configured to run without a working WTP-LCP-1 or CNSWTCH#1 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40 96 35 C
PAC FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Packaged PAC feed system.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - PAC feed system

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - System mounted control panel and PLC
   - System mounted HMI

   C. Instruments

   - PAC feed system instrumentation (integral to packaged PAC feed system)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the entire PAC feed system and related piping. Display the following:

   - PAC feed system status, PAC feed rate, and PAC dosage

   The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

   A. The supplier of the PAC system will provide a standard control panel and the necessary equipment and instrumentation to address automatic operation of the equipment. All automatic control for the PAC system will be provided by the local control panel. Under normal operation, the PAC feed system will be started and stopped using the HMI stations at the WTP. Also, the PAC feed rate and/or dosage will be adjusted via the HMI stations.

5. OTHER INFORMATION

A. System Connection:

1. The system will be connected to the main plant control system via a fiber optic Profibus connection (segment c) to WTP-LCP-1. Information shall be mapped into the main processor where it shall be retrieved by the visualization software. Alarms shall be configured to monitor both network and PLC health.

2. The system shall be configured to run without a working WTP-LCP-1 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 D
ALUM FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Alum storage tanks and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Alum storage tanks (2)
   - Alum metering pumps (2)

   B. Control Panels, PLCs, and HMIs

   - 23-MP-1A (Integral speed control)
   - 23-MP-1B (Integral speed control)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Alum storage tank liquid level sensor/transmitter (2 units)
   - Alum metering pump instrumentation (integral to each pump)
   - Drain sump float switches (3 units)
   - Raw water magnetic flow meter (1 unit)
   - Raw water pH probe (1 unit)
   - Raw water turbidimeter (1 unit)
   - Post coagulant pH probe (1 unit)
   - Post coagulant streaming current detector (1 unit)
   - Settled water turbidimeters (2 units)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the alum storage tanks, metering pumps, and related pumping. Display the following:

- Positions of all local-off-remote switches
- Storage tank liquid levels
- Leakage alarm as detected by sump float switches
- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat and fault)
- Raw water flow rate
- Chemical feed rate
- Chemical dosage
- Raw water temperature, pH, and turbidity
- Post coagulant pH and streaming current
- Settled water turbidity (each basin)
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature or fault and provide contact closures to indicate an alarm condition on the plant control system. When the local-off-remote switches on individual control modules are in the local position metering pump operation will be accomplished by using local keypads on the individual control panels.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) pumps to be sent to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 E
SODIUM HYPOCHLORITE FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Sodium hypochlorite storage tanks and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment:

   - Sodium hypochlorite storage tanks (2)
   - Sodium hypochlorite metering pumps (6)

   B. Control Panels, PLCs, and HMIs

   - TB-24-MB-1 (Local terminal box, adjacent to 24-MP-1A and 1B)
   - TB-24-MB-2 (Local terminal box, adjacent to 24-MP-2A and 2B)
   - TB-24-MB-3 (Local terminal box, adjacent to 24-MP-4A and 4B)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Sodium hypochlorite storage tank liquid level sensor/transmitter (2 units)
   - Sodium hypochlorite metering pump instrumentation (integral to each pump)
   - Drain sump float switches (3 units)
   - Raw water magnetic flow meter (1 unit)
   - Finished water magnetic flow meter (1 unit)
   - Disinfectant contact basin chlorine analyzer (1 unit)
   - Finished water chlorine analyzer (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the sodium hypochlorite storage tanks, metering pumps, and related pumping. Display the following:

- Positions of all local-off-remote switches
- Storage tank liquid levels
- Leakage alarm as detected by sump float switches
- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat, fault and leak detection)
- Raw and finished water flow rates
- Chemical feed rate for each application point
- Chemical dosage for each application point
- Disinfectant contact basin chlorine concentration
- Finished water chlorine concentration
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature, fault, or leak within the pump head and provide contact closures to indicate an alarm condition on the plant control system. When the local-off-remote switches on individual control modules are in the local position metering pump operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) metering pumps to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 F
SODIUM HYDROXIDE FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Sodium hydroxide storage tank and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, and INSTRUMENTS

   A. Equipment

   - Sodium hydroxide storage tank (1)
   - Sodium hydroxide recirculation pump (1)
   - Sodium hydroxide metering pumps (4)

   B. Control Panels, PLCs, and HMIs

   - TB-25-MB-1 (Local terminal box, adjacent to 25-MP-1B and 1C)
   - TB-25-MB-2 (Local terminal box, adjacent to 25-MP-2A and 2B)
   - Sodium hydroxide recirculation panel (load B1-3 from MCCB1, two (2) combination starters with controls)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Sodium hydroxide storage tank liquid level sensor/transmitter (1 unit)
   - Sodium hydroxide metering pump instrumentation (integral to each pump)
   - Drain sump float switches (2 switches)
   - Raw water magnetic flow meter (1 unit)
   - Finished water magnetic flow meter (1 unit)
   - Post coagulant pH probe (1 unit)
   - Disinfectant contact basin pH probe (1 unit)
   - Finished water pH probe (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing the sodium hypochlorite storage tank, metering pumps, and related piping. Display the following:

- Positions of all local-off-remote switches
- Storage tank liquid levels
- Leakage alarm as detected by sump float switches
- Recirculation pump status (on/off)
- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat, fault and leak detection)
- Raw and finished water flow rates
- Chemical feed rate for each application point
- Chemical dosage for each application point
- Post coagulant pH
- Disinfectant contact basin pH
- Finished water pH
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Recirculation Pump: When the local-off-remote switch for the recirculation pump is in the remote position, the recirculation pump will be turned on and off normally in the main control room via the plant HMIs. When the local-off-remote switch for the recirculation pump is in the local position, the pump will be turned on and off by using a local control panel.

B. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature, fault, or leak within the pump head and provide contact closures to indicate an alarm condition at the HMIs. When the local-off-remote switches on individual control modules are in

the local position metering pump operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. Recirculation Pump: The control panel includes a disconnect, selector switches, pushbuttons, pilot lights, fuses, transformers and starters required to control two (2) recirculation pumps (one (1) pump is for future). Contact closures within the panel will connect the starter wiring to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. Metering Pumps: The termination panel will allow contact closures and 4-20 mA signals from two (2) metering pumps to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

3. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 G
CORROSION INHIBITOR FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Corrosion inhibitor storage tank and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment:

   - Corrosion inhibitor storage tank (1)
   - Corrosion inhibitor metering pumps (2)

   B. Control Panels, PLCs, and HMIs

   - 26-CP (Local terminal box, adjacent to 26-MP-1A and 1B)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Corrosion inhibitor storage tank liquid level sensor/transmitter (1 unit)
   - Corrosion inhibitor metering pump instrumentation (integral to each pump)
   - Drain sump float switches (2 units)
   - Raw water magnetic flow meter (1 unit)
   - Finished water magnetic flow meter (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the corrosion inhibitor storage tank, metering pumps, and related piping. Display the following:

   - Positions of all local-off-remote switches
   - Storage tank liquid level
   - Leakage alarm as detected by sump float switches
   - Metering pump status (on/off & speed)
   - Metering pump alarm status (overheat and fault)
   - Raw and finished water flow rates
   - Chemical feed rate
   - Chemical dosage

- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature or fault and provide contact closures to indicate an alarm condition at the HMIs. When the local-off-remote switches on individual control modules are in the local position metering pump operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) metering pumps to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 H
FLUORIDE FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Fluoride storage tank, day tank, and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment:

   - Fluoride storage tank (1)
   - Fluoride day tank (1)
   - Fluoride metering pumps (2)

   B. Control Panels, PLCs, and HMIs

   - TB-27-MB-1 (Local terminal box, adjacent to 27-MP-1A and 4B)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Fluoride storage tank liquid level sensor/transmitter (1 unit)
   - Fluoride day tank scale/transmitter (1 unit)
   - Fluoride metering pump instrumentation (integral to each pump)
   - Drain sump float switches (2 units)
   - Raw water magnetic flow meter (1 unit)
   - Finished water magnetic flow meter (1 unit)
   - Disinfectant contact basin pH probe (1 unit)
   - Finished water pH probe (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the fluoride storage tank, day tank, scale, metering pumps, and related piping. Display the following:

   - Positions of all local-off-remote switches

- Storage tank liquid level
- Day tank weight and volume
- Leakage alarm as detected by sump float switches
- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat, fault, and leak detection)
- Raw and finished water flow rates
- Chemical feed rate
- Chemical dosage
- Disinfectant contact basin pH
- Finished water pH
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature, fault, or leak within the pump head and provide contact closures to indicate an alarm condition on the plant control system. When the local-off-remote switches on individual control modules are in the local position metering pump operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) metering pumps to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 I
POLYMER FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Polymer drums and packaged polymer feed systems.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Polymer storage drums
   - Packaged polymer feed system (2)

   B. Control Panels, PLCs, and HMIs

   - 28-CP (Local terminal box, adjacent to 28-PB-1 and -2)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Polymer feed system instrumentation (integral to each system)
   - Raw water magnetic flow meter (1 unit)
   - Finished water magnetic flow meter (1 unit)
   - Raw water turbidimeter (1 unit)
   - Settled water turbidimeters (2 units)
   - Common filtered water turbidimeter (1 unit)
   - Common GAC contractor turbidimeter (1 unit)
   - Disinfectant contact basin turbidimeter (1 unit)
   - Finished water turbidimeter (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the polymer drums, dilution systems, metering pumps, and related piping. Display the following:

   - Positions of all local-off-remote switches

- Dilution system status (on/off)
- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat and fault)
- Raw and finished water flow rates
- Chemical feed rate for each application point
- Chemical dosage for each application point
- Raw water turbidity
- Settled water turbidity (2 locations)
- Common filtered water turbidity
- Common GAC contactor turbidity
- Disinfectant contact basin turbidity
- Finished water turbidity
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Polymer Feed Systems: When the local-off-remote switches on the polymer feed system control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature or fault and provide contact closures to indicate an alarm condition at the HMIs. When the local-off-remote switches on individual control modules are in the local position, polymer feed system operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) feed systems to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 J
SODIUM THIOSULFATE FEED SYSTEM PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Sodium thiosulfate storage totes and metering pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment:

   - Sodium thiosulfate storage totes
   - Sodium thiosulfate metering pumps (2)

   B. Control Panels, PLCs, and HMIs

   - TB-29-MB (Local terminal box, adjacent to 29-MP-1A and 1B)
   - WTP-RCP-5 (remote I/O to WTP-LCP-1)
   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)

   C. Instruments

   - Sodium thiosulfate storage tote liquid level sensor/transmitter (1 unit)
   - Sodium thiosulfate metering pump instrumentation (integral to each pump)
   - Backwash water magnetic flow meter (1 unit @ elevated backwash water storage tank)
   - Backwash water storage basin ultrasonic level sensor/transmitter (1 unit)
   - Ultrasonic level sensor/flow transmitter in remote structure with Cipolletti weir (1 unit)
   - Finished water chlorine analyzer (1 unit)
   - Emergency eyewash/shower flow switch (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the sodium thiosulfate storage totes, metering pumps, and related piping. Display the following:

   - Positions of all local-off-remote switches
   - Storage tote liquid level

- Metering pump status (on/off & speed)
- Metering pump alarm status (overheat, fault, and leak detection)
- Flow rate into spent backwash water storage basin as measured by the backwash water magnetic flow meter
- Liquid level in the spent backwash water storage basin as measured by the ultrasonic level sensor
- Flow rate leaving the spent backwash water storage basin as measured by the Cipolletti weir
- Chemical feed rate
- Chemical dosage
- Finished water chlorine concentration
- Emergency eyewash/shower status

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Metering Pumps: When the local-off-remote switches on the metering pump control modules are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control modules will automatically shut down the equipment in the event of an excessive motor temperature, fault, or leak within the pump head and provide contact closures to indicate an alarm condition on the plant control system. When the local-off-remote switches on individual control modules are in the local position metering pump operation will be accomplished by using local keypads on the individual control modules.

5. OTHER INFORMATION

A. System Connection:

1. The termination box will allow contact closures and 4-20 mA signals from two (2) metering pumps to be connected to WTP-RCP-5. Information shall be taken from the remote I/O rack to the main processor WTP-LCP-1 (over Profinet) where it shall be retrieved by the visualization software.

2. The system shall be configured to run without a working WTP-RCP-5 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 K
MIXING, FLOCCULATION, & SEDIMENTATION PROCESS CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Raw water static mixer, flocculation basins, and sedimentation basins.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Raw water static mixer (1)
   - Walking beam flocculators (2)
   - Telescoping sludge collectors (4)
   - Pneumatically operated sludge blow-down valves (4)
   - Raw water sample pumps (2)
   - Post coagulant water sample pumps (2)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - WTP-PEP-FL1 and WTP PEP-FL2 (flocculator control panels)
   - WTP-PEP-SD1 and WTP-PEP-SD2 (sludge collector control panels)
   - System mounted PLC
   - System mounted HMI

   C. Instruments

   - Raw water magnetic flow meter (1 unit)
   - Raw water pH/temperature probe (1 unit)
   - Raw water turbidimeter (1 unit)
   - Post coagulant pH/temperature probe (1 unit)
   - Post coagulant streaming current detector (1 unit)
   - PAC feed system instrumentation (integral to system)
   - Alum feed system instrumentation (integral to each pump)

- Sodium hydroxide feed system instrumentation (integral to each pump)
- Sodium hypochlorite feed system instrumentation (integral to each pump)
- Telescoping sludge collector position sensor devices (integral to sludge collector drives)
- Sludge blow-down valve limit switches (2 switches per valve, 8 switches total)
- Settled water turbidimeters (2 units)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing the raw water piping, including the raw water flow meter and static mixer, chemical feed piping, influent channel, gates, flocculation basins, settling basins, internal basin equipment, and sample pumps. Display the following:

- Positions of all local-off-remote switches
- Raw water flow rate
- Chemical feed rates
- Chemical dosages
- Raw water temperature, pH, & turbidity
- Post coagulant pH & streaming current
- Settled water turbidity (each basin)
- Individual walking beam flocculator status (on/off & speed)
- Individual sludge collector status (on/off, position, & speed)
- Individual sludge blow-down valve status (open/closed)
- Sample pump operating status (on/off)
- Alarm conditions necessitating flocculator shut down including motor overload and VFD fault
- Alarm conditions necessitating sludge collector shut down including motor overload and VFD fault

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Flocculators: When the local-off-remote switches on the flocculator control panels are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and control its speed. The individual control panels will automatically shut down the equipment in the event of a motor overload or VFD fault and provide contact closures to indicate an alarm condition at the HMIs. When the local-off-remote switches on individual control panels are in the local position flocculator operation will be accomplished by using local HMIs in the control panels.

B. Telescoping Sludge Collectors: Each local sludge collector control panel shall control two (2) sludge collectors and two (2) sludge blow-down valves. Position feedback from the valves shall allow the valve state to be displayed locally and in the plant control system HMIs. When the local-off-remote switches on the sludge collector control panels are in the remote position equipment operation will be accomplished manually in the main control room via the plant HMIs. The plant control system shall allow the operator to start and stop the machinery and adjust travel speed and frequency of operation. The individual control panels will automatically shut down the equipment in the event of a motor overload or VFD fault and provide contact closures to indicate an alarm condition at the HMIs. When the local-off-remote switches on individual control panels are in the local position sludge collector and blow-down valve operation will be accomplished by using local HMIs in the control panels.

5. OTHER INFORMATION

A. System Connection:

1. The system will be connected to the main plant control system via a fiber optic Profibus connection (segment a) to WTP-LCP-1. Information shall be mapped into the main processor where it shall be retrieved by the visualization software. Alarms shall be configured to monitor both network and PLC health.

2. The system shall be configured to run without a working WTP-LCP-1 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 L
CONVENTIONAL FILTER PROCESS & ELECTRICAL CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Conventional filters and elevated backwash water storage tank.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, and INSTRUMENTS

   A. Equipment:

   - Conventional sand filter equipment including underdrains, media, washwater troughs, blowers and related piping
   - Pneumatically operated filter influent valves (1 unit per filter, 4 units total)
   - Pneumatically operated filter effluent valves (1 unit per filter, 4 units total)
   - Pneumatically operated filter backwash supply valves (1 unit per filter, 4 units total)
   - Pneumatically operated filter backwash waste valves (1 unit per filter, 4 units total)
   - Pneumatically operated filter to waste valves (1 unit per filter, 4 units total)
   - Pneumatically operated backwash flow control valve (1)
   - Pneumatically operated backwash air blow-off valve (1 unit per filter, 4 units total)
   - Pneumatically operated backwash air supply valve (1 unit per filter, 4 units total)
   - Air vent solenoid valves (1 unit per filter, 4 units total)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - Individual Filter Control Consoles (remote I/O to WTP-LCP-1, 4 units)
   - System mounted HMI (4 units)

   C. Instruments

   - Raw water magnetic flow meter (1 unit)

- Settled water turbidimeters (2 units)
- Filter influent channel level measurement device - bubbler (1 unit)
- Filter influent channel high level float switch (1 unit)
- Individual filter level measurement device – ultrasonic level sensor (4 units)
- Filter headloss (differential pressure) transmitter (1 unit per filter, 4 units total)
- Filter effluent magnetic flow meter (1 unit per filter, 4 units total)
- Filter effluent turbidimeter (1 unit per filter, 4 units total)
- Common filter effluent turbidimeter (1 unit)
- Backwash water supply magnetic flow meter (1 unit)
- Elevated backwash water storage tank level (pressure) transmitter
- Pipe trench high level float switch
- Spent backwash water storage tank ultrasonic level transmitter (1 unit)
- Sodium thiosulfate feed system instrumentation (integral metering pump instrumentation)
- Spent backwash water flow meter (1 unit)
- Compressed air system pressure transmitter (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing the filters, backwash blowers, backwash water supply pump, elevated backwash water storage tank, and spent backwash water storage tank Display the following:

- Positions of all switches
- Settled water turbidity (each settling basin)
- Filter influent channel water level
- Individual filter effluent flow
- Filter status (on/off/backwashing)
- Filter run time since last backwash
- Valve positions
- Individual filter headloss
- Individual filter effluent turbidity

- Composite filter turbidity
- Backwash water flow
- Elevated backwash water storage tank level
- Backwash blower status (on/off)
- Spent backwash water storage tank level
- Spent backwash water outfall flow
- Filter influent channel high water level alarm as detected by the bubbler system
- Filter influent channel high water level alarm as detected by influent channel float switch
- High water level alarm as detected by the float switch in the pipe trench
- Valve failure alarms

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. Functional Control Descriptions:

A. Filtration Control: In the main control room the operator will select which filters will be operational and will establish the setpoint level for the filter influent channel level via the main plant HMIs.. Subsequently, the appropriate filter influent and filter to waste valves are opened. The remainder or the valves associated with the filter system will remain in the closed position. A single proportional level control loop shall use the operator entered set point and the filter influent level instrument to set a flow rate setpoint for each online filter (The output from the level control loop is the setpoint for each individual filter flow control loops). The filter to waste valves will modulate under PID control to maintain the flow rate which is controlling the level in the filter influent channel. Once the effluent turbidity is found to be acceptable, the filter effluent valves will be opened and the filter to waste valves will be simultaneously closed under a timed sequence that is adjustable by the operator. Subsequently the filter effluent valves shall modulate under cascade PID control with the outside loop being level and the inside loop being flow to maintain the setpoint level in the filter influent channel. This control logic is employed at two (2) of the Owner's water treatment plants and an example of the control logic will be provided to the Contractor as a guide to the Instrumentation Supplier. Additionally, the Instrumentation Supplier may retain the services of Mr. Michael Wilson of Wilson Controls to assist with this programming.

B. Backwash Control: The control system shall automatically notify the operator when a filter requires backwashing due to excessive run time or headloss. The setpoint values for run time and headloss shall be adjustable by the operator at the HMIs. Once the backwash notification is completed and acknowledged, the operator will select the appropriate filter for backwashing and the system will begin the backwash cycle if sufficient water is available in the elevated backwash water storage tank. If there is not sufficient water in the elevated storage tank, the operator shall be notified and the backwash sequence shall not proceed. The acceptable water level in the elevated tank shall be a setpoint that can be adjusted by the operator at the HMI. Once conditions are established for backwashing the operator shall be able to select from two (2) separate modes of backwashing as described below:

Mode 1: Concurrent Air and Water Backwashing:

- Stage 1: The filter influent valve shall be closed and the filter effluent valve shall remain open to drain the water down in the filter bay to a level approximately 6 inches above the media. Once the low level is attained, the filter effluent valve shall close. The low level setpoint shall be adjustable by the operator at the HMIs.

- Stage 2: The filter backwash drain valve shall be opened.

- Stage 3: The blow-off valve for the blower system shall fully open, and once the proper valve position is attained, a single blower shall start. Automatic blower alternation shall be provided to equalize blower operating times.

- Stage 4: The filter air supply isolation valve shall open and the blow-off valve shall slowly close. The filter bed shall be scoured with air for 1 to 4 minutes without backwash water. The time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 5: The individual filter backwash supply valve shall slowly open and the common backwash flow control valve shall also slowly open and modulate to maintain the setpoint backwash water flow for this concurrent air/water backwash stage. Once the filter bay water level reaches the bottom of the washwater troughs the blow-off valve shall slowly open, and when the open position of the blow-off valve is attained, the filter air supply valve shall close. Subsequently, the blower shall be turned off. The flow setpoint for this stage shall be adjustable by the operator at the HMIs.

- Stage 6: The backwash flow control valve shall slowly open further and modulate to provide a higher backwash flow for an adjustable time period. The setpoint for backwash water flow and time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 7: The backwash supply and flow control valves shall slowly close. Once these valves are closed the backwash drain valve shall close and the air vent solenoid valve shall be opened for a brief time period to exhaust trapped air from the chamber below the filter gullet. The time that the solenoid valve is kept open shall be adjustable by the operator at the HMIs.

- Stage 8: The filter influent and filter to waste valves shall be opened. The filter to waste valve shall modulate along with the effluent valves for the other filters to maintain the setpoint level in the influent channel.

- Stage 9: When an acceptable turbidity level is attained, as measured by the individual filter turbidimeter, the operator shall be notified at the HMI of the condition. Subsequently, the operator will acknowledge the condition and place the filter back into service in separate steps. First the operator will acknowledge the turbidity condition at the HMI. This will then allow the operator to provide the command for the filter to return to service. When this command is given at the HMI the filter effluent valve shall slowly open and the filter to waste valve shall slowly close. Subsequently, the filter effluent valve shall modulate as previously described.

Mode 2: Sequential Air and Water Backwashing:

- Stage 1: The filter effluent influent valve shall be closed and the filter effluent valve shall remain open to drain the water down in the filter bay to a level approximately 6 inches above the media. Once the low level is attained, the filter effluent valve shall close. The low level setpoint shall be adjustable by the operator at the HMIs.

- Stage 2: The filter backwash drain valve shall be opened.

- Stage 3: The blow-off valve for the blower system shall fully open, and once the proper valve position is attained, a single blower shall start. Automatic blower alternation shall be provided to equalize blower operating times.

- Stage 4: The filter air supply isolation valve shall open and the blow-off valve shall slowly close. The filter bed shall be scoured with air for 2 to 5 minutes without backwash water. The time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 5: The blow-off valve shall slowly open, and when the open position of the blow-off valve is attained, the filter air supply valve shall close. Subsequently, the blower shall be turned off.

- Stage 6: The individual filter backwash supply valve shall slowly open and the common backwash flow control valve shall also slowly open and modulate to maintain a relatively low setpoint backwash water flow rate. The flow setpoint and time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 7: The backwash flow control valve shall slowly open further and modulate to provide a higher backwash flow for an adjustable time period. The setpoint for backwash water flow and time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 8: The backwash supply and flow control valves shall slowly close. Once these valves are closed the backwash drain valve shall close and the air vent solenoid valve shall be opened for a brief time period to exhaust trapped air from the chamber below the filter gullet. The time that the solenoid valve is kept open shall be adjustable by the operator at the HMIs.

- Stage 9: The filter influent and filter to waste valves shall be opened. The filter to waste valve shall modulate along with the effluent valves for the other filters to maintain the setpoint level in the influent channel.

- Stage 10: When an acceptable turbidity level is attained, as measured by the individual filter turbidimeter, the operator shall be notified at the HMI of the condition. Subsequently, the operator will acknowledge the condition and place the filter back into service in separate steps. First the operator will acknowledge the turbidity condition at the HMI. This will then allow the operator to provide the command for the filter to return to service. When this command is given at the HMI the filter effluent valve shall slowly open and the filter to waste valve shall slowly close. Subsequently, the filter effluent valve shall modulate as previously described.

C. If a high water level condition with filter influent channel is detected by a float switch, the raw water pumps shall shut down and the operator shall be notified of this alarm condition via the HMIs. Also, if a high water level condition in the filter gallery pipe trench is detected by the float switch the backwash flow control valve will immediately close and the operator shall be notified of this alarm condition via the HMIs.

D. Local Control: Each local filter control console shall allow automatic filter operation in a manner that is similar to that described above so that loss of the main plant control panel or communications will not completely shut down the filtration process. Also, the local filter control console shall allow various modes of semi-automatic and manual control. Brief descriptions of minimum control requirements are provided below.

- Influent Valve: A local-remote-close-open selector switch on each filter control console shall allow the influent valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Effluent Valve - Level Control Mode: The local control console for each filter shall allow for local automatic control. When placed in local-automatic-level control mode, PID control shall modulate its output to a secondary filter flow control loop and provide water level and flow control in a manner similar to that described above for normal operation. The level signal under this mode can be provided by the bubbler system or the individual ultrasonic level sensors provided in each filter. The touch screen HMI provided on the control console shall be used for mode selection and setpoint adjustment. Also, the selector switch can be used to manually open and close the valve.

- Effluent Valve - Flow Control Modes: The local control console for each filter console shall allow for local automatic and manual control of filter effluent flow rate independent from the influent channel water level. When placed in local-automatic-flow control mode, the filter effluent flow meter shall be used in conjunction with a PID control loop to modulate the effluent valve based on an adjustable flow setpoint. When placed in local-manual mode the operator will enter the desired effluent valve position and the valve shall be fixed in that position by the local control console. When in the local mode, the control method, setpoint adjustment, and valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Filter to Waste Valve Control Modes: The local control console for each filter shall allow for local automatic and manual control of the filter to waste flow rate. In the local-automatic-flow control mode the filter effluent flow meter will be used in conjunction with a PID control loop to modulate the filter to waste valve based on an adjustable flow setpoint. The local console may also be placed in the local-manual control mode where the operator enters the desired filter to waste valve position and the valve is fixed in that position by the local control console. When in the local mode, the control method, setpoint adjustment, and valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Backwash Supply Valve: A local-remote-close-open selector switch on each filter control console shall allow the backwash supply valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Backwash Drain Valve: A local-remote-close-open selector switch on each filter control console shall allow the backwash drain valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Backwash Air Supply Valve: A local-remote-close-open selector switch on each filter control console shall allow the backwash air supply valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Air Vent Solenoid Valve: A local-remote-close-open selector switch on each filter control console shall allow the air vent solenoid valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Two (2) control stations are located near the four (4) filter control consoles. One (1) of the stations allows for control of the blowers and the pneumatically operated air blow-off valve. This station displays the status of the local-off-remote selector switches for the blowers and includes the local-remote-closed selector switch for the blow-off valve. When the blower switches are in local the station will allow the blowers to be controlled locally via pushbuttons. When the switch for the blow-off valve in in remote the valve shall be controlled from the main plant control system. The other control station shall address control of the backwash flow control valve. In the remote mode the backwash flow control valve shall be controlled by the main plant control panel. When in the local mode, the valve position shall be adjusted at the local control station.

5. OTHER INFORMATION

A. System Connection:

1. The system will be connected to the main plant control system via a fiber optic Profinet connection to WTP-LCP-1. Information shall be available in the main processor where it shall be retrieved by the visualization software. Alarms shall be configured to monitor both network and rack health.

2. The system shall be configured to run without a working WTP-LCP-1 connection, and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 M
GRANULAR ACTIVATED CARBON CONTACTOR PROCESS & ELECTRICAL CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Granular activated carbon (GAC) contactor and elevated backwash water storage tank.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, and INSTRUMENTS

   A. Equipment

   - GAC contactor equipment including underdrains, media, washwater troughs, and related piping
   - Pneumatically operated GAC contactor influent valves (1 unit per contactor, 4 units total)
   - Pneumatically operated GAC contactor effluent valves (1 unit per contactor, 4 units total)
   - Pneumatically operated GAC contactor backwash supply valves (1 unit per contactor, 4 units total)
   - Pneumatically operated GAC contactor backwash waste valves (1 unit per contactor, 4 units total)
   - Pneumatically operated filter to waste valves (1 unit per contactor, 4 units total)
   - Pneumatically operated backwash flow control valve (1)
   - Bypass weir gate (1)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - Individual GAC Contactor Control Consoles (remote I/O to WTP-LCP-1, 4 units)
   - System mounted HMI (4 units)

C. Instruments

- Raw water magnetic flow meter (1 unit)
- Combined filtered water turbidimeter (1 unit)
- GAC contactor influent channel level/flow measurement device – ultrasonic level sensor (1 unit)
- GAC contactor headloss (differential pressure) transmitter (1 unit per contactor, 4 units total)
- GAC contactor effluent magnetic flow meter (1 unit per contactor, 4 units total)
- GAC contactor effluent turbidimeter (1 unit per contactor, 4 units total)
- Common GAC contactor effluent turbidimeter (1 unit)
- Backwash water supply magnetic flow meter (1 unit)
- Elevated backwash water storage tank level (pressure) transmitter
- Pipe trench high level float switch
- Spent backwash water storage tank ultrasonic level transmitter (1 unit)
- Sodium thiosulfate feed system instrumentation (integral metering pump instrumentation)
- Spent backwash water flow meter (1 unit)
- Compressed air system pressure transmitter (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing the GAC contactors, backwash water supply pump, elevated backwash water storage tank, and spent backwash water storage tank. Display the following:

- Positions of all local-off-remote switches
- Common filtered water turbidity (GAC contactor influent turbidity)
- GAC contactor influent channel water level
- GAC contactor bypass flow as measured by the difference between the raw water flow and combined GAC contactor flow
- GAC contactor bypass flow as measured by the influent channel ultrasonic level sensor/bypass weir system
- Individual GAC contactor flow
- GAC contactor status (on/off/backwashing)

- GAC contactor run time since last backwash
- Valve positions
- Individual GAC contactor headloss
- Individual GAC contactor effluent turbidity
- Composite GAC contactor turbidity
- Backwash water flow
- Elevated backwash water storage tank level
- Spent backwash water storage tank level
- Spent backwash water outfall flow
- Filter influent channel high water level alarm as detected by the ultrasonic level sensor system
- High water level alarm as detected by the float switch in the pipe trench
- Valve failure alarms

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. Functional Control Descriptions:

A. GAC Operational Control: In the main control room the operator selects which GAC contactors will be operational and establishes the setpoint flow as a percentage of total raw water flow that should pass through the contactors via the plant HMIs. Subsequently, the appropriate GAC contactor influent and filter to waste valves are opened. The remainder or the valves associated with the GAC contactor system will remain in the closed position. The filter to waste valves will modulate under PID control to maintain the desired flow through the contactors while also maintaining equal flow through each contactor. Once the effluent turbidity is found to be acceptable, the contactor effluent valves will be opened and the filter to waste valves will be simultaneously closed under a timed sequence that is adjustable by the operator. Subsequently the contactor effluent valves shall modulate under PID control to maintain the overall combined setpoint flow while also maintaining equal flow through each contactor. Similar control logic is employed at two of the Owner's water treatment plants and an example of the control logic will be provided to the Contractor as a guide to the Instrumentation Supplier. Additionally, the Instrumentation Supplier may retain the services of Mr. Michael Wilson of Wilson Controls to assist with this programming.

B. Backwash Control: The control system shall automatically notify the operator when a GAC contactor requires backwashing due to excessive run time or headloss. The setpoint values for run time and headloss shall be adjustable by the operator at the HMIs. Once the backwash notification is completed and acknowledged, the operator will select the appropriate GAC contactor for backwashing and the system will begin the backwash cycle if sufficient water is available in the elevated backwash water storage tank. If there is not sufficient water in the elevated storage tank, the operator shall be notified and the backwash sequence shall not proceed. The acceptable water level in the elevated tank shall be a setpoint that can be adjusted by the operator at the HMI. Once conditions are established for backwashing the operator the backwash cycle shall be completed as follows:

- Stage 1: The GAC contactor influent and effluent influent valves shall be closed and the backwash drain valve open to drain the water down in the contactor bay to the top of the washwater collection launders.

- Stage 2: The individual filter backwash supply valve shall slowly open and the common backwash flow control valve shall also slowly open and modulate to maintain a relatively low setpoint backwash water flow rate. The flow setpoint and time duration for this stage shall be adjustable by the operator at the HMIs

- Stage 3: The backwash flow control valve shall slowly open further and modulate to provide a higher backwash flow for an adjustable time period. The setpoint for backwash water flow and time duration for this stage shall be adjustable by the operator at the HMIs.

- Stage 4: The backwash supply and flow control valves shall slowly close. Once these valves are closed the backwash drain valve shall close after an adjustable time delay.

- Stage 5: The GAC contactor influent and filter to waste valves shall be opened. The filter to waste valve shall modulate along with the effluent valves for the other contactors to maintain the setpoint flow value.

- Stage 6: When an acceptable turbidity level is attained, as measured by the individual GAC contactor turbidimeter, the operator shall be notified at the HMI of the condition. Subsequently, the operator will acknowledge the condition and place the contactor back into service in separate steps. First the operator will acknowledge the turbidity condition at the HMI. This will then allow the operator to provide the command for the contactor to return to service. When this command is given at the HMI the filter effluent valve shall slowly open and the filter to waste valve shall slowly

close. Subsequently, the filter effluent valve shall modulate as described above.

C. If a high water level condition in the GAC contactor gallery pipe trench is detected by the float switch the backwash flow control valve shall immediately close and the operator shall be notified of this alarm condition via the HMIs.

D. Local Control: Each local GAC contactor control console shall allow automatic filter operation in a manner that is similar to that described above so that loss of the main plant control panel or communications will not completely shut down the filtration process. Also, the local GAC contactor control console shall allow various modes of semi-automatic and manual control. Brief descriptions of minimum control requirements are provided below.

- Influent Valve: A local-remote-close-open selector switch on each GAC contactor control console shall allow the influent valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Effluent Valve - Level Control Mode: The local control console for each GAC contactor shall allow for local automatic control. When placed in local-automatic-level control mode, PID control shall modulate its output to a secondary GAC contactor flow control loop and provide water level and flow control in a manner similar to that described above for normal operation. The touch screen HMI provided on the control console shall be used for mode selection and setpoint adjustment. Also, the selector switch can be used to manually open and close the valve.

- Effluent Valve - Flow Control Modes: The local control console for each GAC contactor console shall allow for local automatic and manual control of filter effluent flow rate independent from the influent channel water level. When placed in local-automatic-flow control mode, the GAC contactor effluent flow meter shall be used in conjunction with a PID control loop to modulate the effluent valve based on an adjustable flow setpoint. When placed in local-manual mode the operator will enter the desired effluent valve position and the valve shall be fixed in that position by the local control console. When in the local mode, the control method, setpoint adjustment, and valve position shall be selected through the use of the touch screen HMI provided on the control console Also, the selector switch can be used to manually open and close the valve.

- Filter to Waste Valve Control Modes: The local control console for each GAC contactor shall allow for local automatic and manual control of the filter to waste flow rate. In the local-automatic-flow control mode the GAC contactor effluent flow meter will be used in conjunction with a PID

control loop to modulate the filter to waste valve based on an adjustable flow setpoint. The local console may also be placed in the local-manual control mode where the operator enters the desired filter to waste valve position and the valve is fixed in that position by the local control console. When in the local mode, the control method, setpoint adjustment, and valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Backwash Supply Valve: A local-remote-close selector switch on each GAC contactor control console shall allow the backwash supply valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Backwash Drain Valve: A local-remote-close selector switch on each GAC contactor control console shall allow the backwash drain valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- Air Vent Solenoid Valve: A local-remote-close selector switch on each GAC contactor control console shall allow the air vent solenoid valve to be controlled locally in a manual mode or remotely (in an automatic or manual mode). When in the local mode, valve position shall be selected through the use of the touch screen HMI provided on the control console. Also, the selector switch can be used to manually open and close the valve.

- One (1) control station is located near the four (4) GAC contactor control consoles. From this control station the backwash valve can be placed in in local or remote modes of control. In the remote mode the valve shall be controlled by the main plant control panel. In the local mode the valve position will be manual controlled at the control station.

5. OTHER INFORMATION

A. System Connection:

1. The system will be connected to the main plant control system via a fiber optic Profinet connection to WTP-LCP-1. Information shall be available in the main

processor where it shall be retrieved by the visualization software. Alarms shall be configured to monitor both network and rack health.

2. The system shall be configured to run without a working WTP-LCP-1 connection, and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 N
FINISHED WATER PUMP PROCESS & ELECTRICAL CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Disinfectant contact basin, clearwell, finished water pump chamber and finished water pumps.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment:

   - Finished water static mixer
   - Finished water pumps (3 initially, 6 @ build-out)
   - Hydraulically operated ball valves (3 initially, 6 @ build-out)
   - Air/oil accumulator system (1)
   - Sample pumps (2)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - Finished water pump check valve control panels (3 units)
   - Air/Oil accumulator control panel
   - VFD mounted HMI (3 units)

   C. Instruments

   - Disinfectant contact basin ultrasonic level sensor/transmitter (1 unit)
   - Disinfectant contact basin low level float switch (1 switch)
   - Pump chamber ultrasonic level sensor/transmitter (1 unit)
   - Pump chamber low level flow switch (1 switch)
   - Finished water pump motor bearing thermal sensors (2 devices per motor, 6 devices initially, 12 devices @ build-out)
   - Finished water pump motor winding thermal sensors (3 devices per motor, 9 devices initially, 18 devices @ build-out)
   - Finished water pump motor vibration sensor (2 devices per motor, 6 devices initially, 12 devices @ build-out)

- Finished water pump pressure switches (3 switches per pump, 9 switches initially, 18 switches @ build-out)
- Finished water pump check valve limit switches (3 switches per pump, 9 switches initially, 18 switches @ build-out)
- Finished water pump discharge header pressure transducer/transmitter (1 unit)
- Chemical feed system instrumentation (integral metering pump instrumentation for sodium hypochlorite, sodium hydroxide, fluoride, & corrosion inhibitor feed systems)
- Disinfectant contact basin (process water) pH probe (1 unit)
- Disinfectant contact basin (process water) turbidimeter (1 unit)
- Disinfectant contact basin (process water) chlorine analyzer (1 unit)
- Finished water pH probe (1 unit)
- Finished water turbidimeter (1 unit)
- Finished water chlorine analyzer (1 unit)
- Finished water magnetic flow meter (1 unit)

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic plan showing the finished water static mixer, chemical feed piping, gates, disinfectant contact chamber, clearwell, finished water pump chamber, finished water pumps, valves, air/oil accumulator system, sample pumps and instruments. Display the following:

- Positions of all local-off-remote switches
- Individual finished water pump operating status (on/off & speed)
- Individual finished water pump check valve status (position)
- Finished water flow rate and pump discharge pressure
- Disinfectant contact basin and pump chamber water levels
- Sample pump operating status
- Chemical feed rates and dosages
- Actual pH, turbidity, and residual chlorine values as measured by the process water and finished water instruments
- Alarm conditions necessitating pump shutdown including low water level, high motor bearing temperature, high motor winding temperature, excessive motor vibration, high discharge pressure, low discharge pressure and variable frequency drive (VFD) fault

- Alarms related to the pump check valves

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

B. Provide a sub-screen accessible from the basic facility screen described above schematically depicting the air/oil accumulator system and the hydraulically operated check valves. Display the following:

- Air/oil accumulator pressure
- Oil pump, compressor, & air dryer operating status (on/off)
- Individual valve position & pressure switch status
- Alarm conditions (Refer to Attachment U – Controls I/O Points)

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Finished Water Pump/Hydraulically Operated Check Valve Operation @ Normal Pump Startup: When the local-off-remote switches on the finished water pump VFDs are in the remote position pump operation (start, stop, & speed) shall be accomplished manually at the HMI stations located at the WTP. Each finished water pump shall have an adjustable minimum speed which is set at the HMIs. These speeds will be the "start-up speeds" that will occur when a pump is called to run by the operator. Once a pump is called to run at the HMI the check valve status for the pump shall be verified at the pump's VFD through a series of contact closures within the VFD and the check valve control panel. This verification process is to ensure that the valve is operable and not in a fault condition. Once the verification process is successfully completed the pump shall start and ramp up to its setpoint minimum speed building pressure between the pump and valve. Once the pressure reaches a field adjustable setpoint value, the valve shall slowly open. The rate that the valve opens (opening time) shall be field adjustable by the operator. When the valve is fully open the operator will then use the HMI to manually adjust the pump speed.

B. Finished Water Pump/Hydraulically Operated Check Valve Operation @ Normal Pump Shut Down: Under normal conditions pumps shall remain in operation until the operator decides to shut down one or more of the pumps using the HMIs. When a pump is shut down from an HMI the pump's speed shall gradually decrease from its current operating speed down to its minimum speed over a specific time interval, which is adjustable by the operator at the HMIs. Once the minimum speed is attained, a contact closure in the VFD shall signal the hydraulically operated ball valve to gradually close over an adjustable time interval. Once valve closure is verified via the valve's limit switch, the pump shall automatically shut down.

C. Safety Shut Down and Loss of Power: Automatic safety shut down of each pump shall be included to address the following conditions:

- High pump motor bearing temperature
- High pump motor winding temperature
- Excessive pump vibration
- Low water level (disinfectant contact basin or pump chamber)
- Low discharge pressure
- High discharge pressure condition
- VFD fault

If any of the above conditions are detected, the appropriate pump, or group of pumps, shall be deactivated immediately without the ramp-down feature described above. The low water level shutdown condition shall be detected by the float switches in the disinfectant contact basin or pump chamber rather than the level transducers. Under this shut down scenario, and in the event of a VFD fault or power outage, the pump check valves shall automatically close at a controlled rate that is adjustable by the operator. Pump shut-down due to a VFD fault shall be a feature provided within the VFDs rather than the WTP-LCP-1.

D. When the local-off-remote switches on the finished water pump VFDs are in the local position, finished water pump operation shall be accomplished manually at the individual VFDs. Local selector switches, pilot lights and push buttons allow the pump to start and ramp up to a minimum speed. As with automatic control the pump VFD verifies that the check valve is closed before starting the pump. As the pressure builds between the pump discharge and the check valve, a pressure switch is made and calls for the check valve to open. Speed adjustment is made from the front of the VFD. A stop button is also located on the front of the VFD and will signal to the valve to start closing. Once the valve is nearly closed the pump will shut down.

5. OTHER INFORMATION

A. System Connection:

1. The system will be connected to the main plant control system via a fiber optic Profibus connection (segment b) to WTP-LCP-1. Information shall be mapped into the main processor where it shall be retrieved by the visualization software. Alarms shall be configured to monitor both network and PLC health.

2. The system shall be configured to run without a working WTP-LCP-1 connection and shall establish a connection automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 O
BAKCWASH WATER SUPPLY PUMP & ELEVATED BACKWASH WATER STORAGE BASIN CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Finished water pump chamber, backwash water supply pump, elevated backwash water storage tank, conventional filters, and GAC contactors.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Backwash water supply pump (1)
   - Elevated backwash water storage tank (1)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - WTP-RCP-1
   - System mounted HMI (3 units)

   C. Instruments

   - Disinfectant contact basin ultrasonic level sensor/transmitter (1 unit)
   - Disinfectant contact basin low level float switch (1 switch)
   - Finished water pump chamber ultrasonic level sensor/transmitter (1 unit)
   - Finished water pump chamber low level float switch (1 switch)
   - Backwash water supply pump discharge pressure transmitter on discharge line (1 unit)
   - Pressure/level transmitter at elevated backwash water storage tank (1 unit)
   - High level float switch in elevated backwash water storage tank (1 switch)
   - Backwash water magnetic flow meter (1 unit @ elevated backwash water storage tank)
   - Conventional filter instrumentation
   - GAC contactor instrumentation

3. SCADA HMI SCREEN DESCRIPTIONS

A. Provide a schematic elevation view showing the finished water pump chamber, backwash water supply pump, elevated backwash water storage tank, backwash water magnetic flow meter and related piping and valves. Display the following:

- Positions of all local-off-remote switches
- Disinfectant contact basin water level
- Finished water pump chamber water level
- Backwash water supply pump operating status (on/off)
- Elevated backwash water storage tank liquid level
- Elevated backwash water storage tank low operating level (pump on) and high operating level (pump off) setpoints used for backwash water supply pump control
- Elevated backwash water storage tank high and low level alarm setpoints
- Backwash water flow rate as measured by the backwash water magnetic flow meter
- If a conventional filter or GAC contactor is being backwashed, display the number of the filter or contactor
- Low or high liquid level alarms for the elevated storage tank as appropriate

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. When the hand-off-remote switch on the across the line motor starter for the backwash supply pump is in the remote position the backwash water supply pump shall start and stop automatically based on elevated storage tank level setpoints established by the operator at the WTP HMIs. The when a high level condition in the elevated storage tank is detected by the high level float switch the backwash supply pump shall shut down regardless of the elevated storage tank level measurement provided by pressure/level transducer. Also, the low level float

switches in the disinfectant contact basin and pump chamber shall shut down the backwash water supply pump regardless of the level measurement provided by the various level transducers associated with the system.

5. OTHER INFORMATION

A. System Connection:

1. The system shall be hardwired to WTP-RCP-1 and WTP-RCP-2.

2. The system shall be configured to stop the backwash pump upon loss of any communications between field instruments and panels. Further, loss of connection or malfunction of WTP-LCP-1 shall result in pump shutdown. All components shall establish connections automatically.

B. Security:

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 P
SPENT BACKWASH WATER STORAGE BASIN CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Spent backwash water storage basin and outfall flow measurement structure.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Floating decant devices (2)
   - Sludge recycle pump (1)
   - Sodium thiosulfate feed system

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - Thickener Building Control Panel
   - WTP-RCP-2

   C. Instruments

   - Backwash water storage basin ultrasonic level sensor/transmitter (1 unit)
   - Ultrasonic level sensor/flow transmitter in remote structure with Cipolletti weir (1 unit)
   - Backwash water magnetic flow meter (1 unit @ elevated backwash water storage tank)
   - Conventional filter instrumentation
   - GAC contractor instrumentation

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the spent backwash water storage basin, downstream flow measurement structure, and related piping and valves. Display the following:

   - Flow rate into basin as measured by the backwash water magnetic flow meter

- Flow rate leaving the basin as measured by the Cipolletti water
- Liquid level in the basin as measured by the ultrasonic level sensor
- If a conventional filter or GAC contactor is being backwashed, display the number of the filter or contactor
- Residual chlorine concentration of finished water used for backwash
- Sodium thiosulfate feed pump status (on/off, feed rate, and chemical dosage)
- Sludge recycle pump status (on/off)
- High liquid level alarm (if high level is present)

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. There is no equipment within backwash water storage basin that requires automatic control: however, if a high level condition is detected all filter or GAC backwashing shall be automatically stopped by closing the appropriate pneumatically operated backwash valves.

B. The sludge recycle pump is controlled within the thickener building control panel. Local-off-remote switches let the pump start locally by using the start/stop push buttons and remotely from the plant's control system.

5. OTHER INFORMATION

A. System Connection

1. The system is hardwired to WTP-RCP-2, however, the weir flow is connected to WTP-RCP-3. Connection shall be established automatically.

B. Security

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 Q
GRAVITY SLUDGE THICKENER CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Gravity sludge thickener.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Gravity sludge thickener sludge collector (1)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - WTP-PEP-TCP (sludge thickener control panel)
   - WTP-RCP-2

   C. Instruments

   - Torque switches in thickener mechanism (3 switches)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the thickener tank, sludge collector mechanism, and related piping and valves. Display the following:

   - Positions of all local-off-remote switches
   - Sludge collector operating status (on/off)
   - Any alarm conditions related to the torque switches (high torque alarm, fail safe torque cut out, & high-high torque alarm)

   The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. The manufacturer of the sludge collector mechanism will provide a standard control panel and the necessary torque switches to address automatic operation of the equipment. When the local-off-remote switch on the sludge collector control panel is in the remote position the operator will use the HMIs at the WTP to turn the sludge collector mechanism on and off. Once the mechanism is running it shall remain in operation unless it is turned off by the operator or unacceptable operating conditions (torque or thermal overload) result in a shut down. When the hand-off-remote switch on the control panel is the local position, the sludge collector shall be operated from the control panel located at the thickener; however, the torque and thermal overload protection features shall remain operable to prevent equipment operation under potentially destructive conditions.

5. OTHER INFORMATION

A. System Connection

1. The system is hardwired to WTP-RCP-2. Connection shall be established automatically.

B. Security

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 R
SLUDGE PUMPING SYSTEM CONTROL &
MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Thickened sludge pumps and sludge recycle pump.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Thickened sludge pumps (2)
   - Sludge recycle pump (1)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - Thickener building control panel
   - WTP-RCP-2

   C. Instruments

   - There are no instruments associated with the thickened sludge pumps or sludge recycle pumps.

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the sludge pump building, thickened sludge pumps, sludge recycle pump and related piping and valves. Display the following:

   - Positions of all hand-off-remote switches
   - Pump operating status (on/off)
   - Sludge thickener operating status (on/off)
   - Spent backwash water storage basin liquid level

   The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Thickened Sludge Pumps: When the local-off-remote switches for the thickened sludge pumps are in the remote position each pump shall be manually started and stopped by the operator at the WTP HMIs. When the local-off-remote switches are in the local position the pumps shall be started and stopped by using pushbuttons located on the sludge pump control panel.

B. Sludge Recycle Pump: When the local-off-remote switch for the sludge recycle pump is in the remote position the pump shall be manually started and stopped by the operator at the WTP HMIs. When the local-off-remote switch is in the local position the pump shall be started and stopped by using pushbuttons located on the sludge pump control panel.

5. OTHER INFORMATION

A. System Connection

1. The system is hardwired to WTP-RCP-2. Connection shall be established automatically.

B. Security

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 S
FILTRATE PUMP STATION CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Filtrate pump station.

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment

   - Filtrate pumps (2)

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - Plant wide displays (main control room monitors)
   - WTP-PEP-SP1 (filtrate pump station control panel)
   - WTP-RCP-1

   C. Instruments

   - Filtrate pump thermal overload devices (1 device per pump, 2 devices total)
   - Filtrate pump seal leak detection devices (1 device per pump, 2 devices total)

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic plan showing the filtrate pump station and related piping and valves. Display the following:

   - Positions of all hand-off-automatic switches
   - Pump operating status (on/off)
   - Individual float switch positions
   - Any alarm conditions (high temperature, seal leak and high liquid level)

   The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. The supplier of the filtrate pumps will provide a standard control panel and the necessary float switches to address automatic operation of the equipment. All control for the filtrate pumps will be provided by the local control panel.

5. OTHER INFORMATION

A. System Connection

1. The system is hardwired to WTP-RCP-1. Connection shall be established automatically.

B. Security

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 T
POWER SYSTEM CONTROL & MONITORING REQUIREMENTS

1. MAJOR FACILITIES

   A. Switchgear MVSG-A, MVSG-B, MVSG-C, and MVSG-D

   B. Switchyard transformers XFMR-1, XFMR-3, XFMR-5, XFMR-7, XFMR-9, and XFMR-G.

   C. Motor control centers MCC-A, MCC-B, MCC-C, MCC-D, and RWI-MCC-1/2

   D. Standby generator sets

2. PROCESS EQUIPMENT, CONTROL PANELS, PLCs, HMIs, AND INSTRUMENTS

   A. Equipment: See above

   B. Control Panels, PLCs, and HMIs

   - WTP-LCP-1 (main WTP process control panel)
   - WTP-RCP-1
   - WTP-PEP-GN1 (generator control panel)

   C. Instruments

   - Main Breakers (MB and GB): CTs and PTs
   - Tie Breakers (TB): CTs and PTs
   - Feeder Breakers (FB): CTs and PTs
   - Generator Breakers (MGB): CTs and PTs

3. SCADA HMI SCREEN DESCRIPTIONS

   A. Provide a schematic showing the main switchboards for the raw water intake facility and the water treatment plant. Also, depict the standby power system in the schematic along with the louvers in the generator building. Display the following:

   - Positions of breakers
   - Voltage and current by phase
   - Instantaneous power draw and daily energy consumption for the raw water intake facility and water treatment plant

- Generator status including power generation rate and daily energy production
- Louver status
- Any alarm conditions

The HMI screen shall be structured to maximize clarity and allow the operator to easily ascertain individual component status. Combining alarm conditions to create a common alarm that does not clearly identify the specific location of the undesirable condition or failed component will not be allowed.

4. FUNCTIONAL CONTROL DESCRIPTIONS

A. Power system and generator controls are integral feature of the respective systems. Accordingly, controls for these systems are not addressed under this attachment, however, if a louver is called to open and the respective limit switch does not verify position an alarm shall be indicated in the plant HMI.

5. OTHER INFORMATION

A. System Connection: The system uses a TCP/IP communication connection to CNSWTCH#2. Information from the power monitoring system is messaged to the Siemens system through WTP-PEP-GN1. Connection shall be established automatically.

B. Security

1. Programmer - Access to all facilities including changing displays and logic.

2. Supervisor - Access to all displays, change master set points and purge stale alarm messages.

3. Operator - Access to all displays, change normal operational sequences and acknowledge alarms.

4. Observer - Access to displays only.

END OF SECTION

ATTACHMENT 40-96-35 U
CONTROLS IO POINTS

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
	Raw Water Intake (RWI-LCP-1)											
I-1101, I-1203, E-1301	Wet Well #1 Low Level Switch	LSLR-0200-RWI	DI		Normal	Alarm	RWI-LVL-W1B	RWI-LCP-1		CNSWTCH#1	40-96-35-B	
I-1101, I-1203, E-1301	Wet Well #2 Low Level Switch	LSLR-0201-RWI	DI		Normal	Alarm	RWI-LVL-W2B	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203, E-1301	Wet Well #3 Low Level Switch	LSLR-0202-RWI	DI		Normal	Alarm	RWI-LVL-W3B	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-1A Running	YIR-0210-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-1A Fault	YAIR-0211-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-1A In Remote	ZLIR-0212-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	*Raw Water Pump 10-P-1B Running*	*YIR-0213-RWI*	*DI*		*Normal*	*Running*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-1B Fault*	*YAIR-0214-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-1B In Remote*	*ZLIR-0215-RWI*	*DI*		*Normal*	*Auto*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	Raw Water Pump 10-P-2A Running	YIR-0300-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-2A Fault	YAIR-0301-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-2A In Remote	ZLIR-0302-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	*Raw Water Pump 10-P-2B Running*	*YIR-0303-RWI*	*DI*		*Normal*	*Running*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-2B Fault*	*YAIR-0304-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-2B In Remote*	*ZLIR-0305-RWI*	*DI*		*Normal*	*Auto*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-3A Running*	*YIR-0306-RWI*	*DI*		*Normal*	*Running*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-3A Fault*	*YAIR-0307-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	*Raw Water Pump 10-P-3A In Remote*	*ZLIR-0308-RWI*	*DI*		*Normal*	*Auto*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1203	Raw Water Pump 10-P-3B Running	YIR-0309-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-3B Fault	YAIR-0310-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1203	Raw Water Pump 10-P-3B In Remote	ZLIR-0311-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1203	Upblast Fan EF-1 Fault	YAIR-0312-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1203	Upblast Fan EF-2 Fault	YAIR-0313-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1203	Upblast Fan EF-3 Fault	YAIR-0314-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1203	Upblast Fan EF-4 Fault	YAIR-0315-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-5 Fault	YAIR-0400-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-6 Fault	YAIR-0401-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-1 In Remote	ZLIR-0405-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-1 Open	ZIOR-0406-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-1 Closed	ZICR-0407-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-1 Fault	YAIR-0408-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
I-1101, I-1204	Sluice Gate G-2 In Remote	ZLIR-0409-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-2 Open	ZIOR-0410-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-2 Closed	ZICR-0411-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-2 Fault	YAIR-0412-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-3 In Remote	ZLIR-0413-RWI	DI		Normal	Auto		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1204	Sluice Gate G-3 Open	ZIOR-0414-RWI	DI		Normal	Open	-	RWI-LCP-1	-	CNSWTCH#1	-	-
I-1101, I-1204	Sluice Gate G-3 Closed	ZICR-0415-RWI	DI		Normal	Closed	-	RWI-LCP-1	-	CNSWTCH#1	-	-
I-1101, I-1204	Sluice Gate G-3 Fault	YAIR-0500-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-1 Running	YIR-0501-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-2 Running	YIR-0502-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-3 Running	YIR-0503-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-4 Running	YIR-0504-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-5 Running	YIR-0505-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Upblast Fan EF-6 Running	YIR-0506-RWI	DI		Normal	Running		RWI-LCP-1		CNSWTCH#1		
I-1204	Switch Gear Fault	JAIR-0507-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 Tie Breaker Open	ZIOR-0600-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 Tie Breaker Closed	ZICR-0601-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 Tie Breaker Tripped	JAIR-0602-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 10-P-1A Breaker Open	ZIOR-0603-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 10-P-1A Breaker Closed	ZICR-0604-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 10-P-1A Breaker Tripped	JAIR-0605-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 MCC1 Breaker Open	ZIOR-0606-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 MCC1 Breaker Closed	ZICR-0607-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 MCC1 Breaker Tripped	JAIR-0608-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	*RWI-SWGR-1 10-P-1B Breaker Open*	*ZIOR-0609-RWI*	*DI*		*Normal*	*Open*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-1 10-P-1B Breaker Closed*	*ZICR-0610-RWI*	*DI*		*Normal*	*Closed*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-1 10-P-1B Breaker Tripped*	*JAIR-0611-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	RWI-SWGR-1 10-P-2A Breaker Open	ZIOR-0612-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 10-P-2A Breaker Closed	ZICR-0613-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-1 10-P-2A Breaker Tripped	JAIR-0614-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	*RWI-SWGR-1 10-P-2B Breaker Open*	*ZIOR-0615-RWI*	*DI*		*Normal*	*Open*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-1 10-P-2B Breaker Closed*	*ZICR-0700-RWI*	*DI*		*Normal*	*Closed*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-1 10-P-2B Breaker Tripped*	*JAIR-0701-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-2 10-P-3A Breaker Open*	*ZIOR-0702-RWI*	*DI*		*Normal*	*Open*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-2 10-P-3A Breaker Closed*	*ZICR-0703-RWI*	*DI*		*Normal*	*Closed*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*
I-1205	*RWI-SWGR-2 10-P-3A Breaker Tripped*	*JAIR-0704-RWI*	*DI*		*Normal*	*Alarm*		*RWI-LCP-1*		*CNSWTCH#1*	*40-96-35 T*	*FUTURE*

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
I-1205	RWI-SWGR-2 10-P-3B Breaker Open	ZIOR-0705-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 10-P-3B Breaker Closed	ZICR-0706-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 10-P-3B Breaker Tripped	JAIR-0707-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 MCC2 Breaker Open	ZIOR-0708-RWI	DI		Normal	Open		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 MCC2 Breaker Closed	ZICR-0709-RWI	DI		Normal	Closed		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1205	RWI-SWGR-2 MCC2 Breaker Tripped	JAIR-0710-RWI	DI		Normal	Alarm		RWI-LCP-1		CNSWTCH#1	40-96-35 T	
I-1101, I-1206	Sluice Gate G-1 Open	ZIOR-0800-RWI	DO		Normal	Open		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-1 Closed	ZICR-0801-RWI	DO		Normal	Closed		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-1 Stop	ZISR-0802-RWI	DO		Normal	Stop		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-2 Open	ZIOR-0803-RWI	DO		Normal	Open		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-2 Closed	ZICR-0804-RWI	DO		Normal	Closed		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-2 Stop	ZISR-0805-RWI	DO		Normal	Stop		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-3 Open	ZIOR-0806-RWI	DO		Normal	Open		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-3 Closed	ZICR-0807-RWI	DO		Normal	Closed		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Sluice Gate G-3 Stop	ZISR-0808-RWI	DO		Normal	Stop		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-1 Start / Stop	YCIR-0900-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-2 Start / Stop	YCIR-0901-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-3 Start / Stop	YCIR-0902-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-4 Start / Stop	YCIR-0903-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-5 Start / Stop	YCIR-0904-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1206	Upblast Fan EF-6 Start / Stop	YCIR-0905-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	Raw Water Pump 1 (10-P-1A) Start / Stop	YCIR-0908-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	*Raw Water Pump 2 (10-P-1B) Start / Stop*	*YCIR-0909-RWI*	*DO*		*Normal*	*Modulate*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1206	Raw Water Pump 3 (10-P-2A) Start / Stop	YCIR-0910-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1206	*Raw Water Pump 4 (10-P-2B) Start / Stop*	*YCIR-0911-RWI*	*DO*		*Normal*	*Modulate*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1206	*Raw Water Pump 5 (10-P-3A) Start / Stop*	*YCIR-0912-RWI*	*DO*		*Normal*	*Modulate*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1206	Raw Water Pump 6 (10-P-3B) Start / Stop	YCIR-0913-RWI	DO		Normal	Modulate		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	River Level	LIR-1100-RWI	AI	4-20mA		Feet		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	Wet Well #1 Level	LIR-1101-RWI	AI	4-20mA		Feet	RWI-LVL-W1A	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	Wet Well #2 Level	LIR-1102-RWI	AI	4-20mA		Feet	RWI-LVL-W2A	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	Wet Well #3 Level	LIR-1103-RWI	AI	4-20mA		Feet	RWI-LVL-W3A	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	42" RWM Pressure 1	PIR-1202-RWI	AI	4-20mA		psi	RWI-PIT-1	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	42" RWM Pressure 2	PIR-1203-RWI	AI	4-20mA		psi	RWI-PIT-2	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	Turbidity Analyzer Raw Water	AIR-1204-RWI	AI	4-20mA	0-10	NTU	RWI-TURB	RWI-LCP-1		CNSWTCH#1		

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
I-1101, I-1207	pH Raw Water	AIR-1205-RWI	AI	4-20mA	0-14	Unitless	RWI-PH	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1207	Temperature Raw Water	TIR-1206-RWI	AI	4-20mA	0-100	F	RWI-TT	RWI-LCP-1		CNSWTCH#1		
I-1101, I-1208	VFD Rate Feed Back Pump 1 (10-P-1A)	ZIR-1300-RWI	AI	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1	-	
I-1101, I-1208	*VFD Rate Feed Back Pump 2 (10-P-1B)*	*ZIR-1301-RWI*	*AI*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1208	VFD Rate Feed Back Pump 3 (10-P-2A)	ZIR-1302-RWI	AI	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1	-	
I-1101, I-1208	*VFD Rate Feed Back Pump 4 (10-P-2B)*	*ZIR-1303-RWI*	*AI*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1208	*VFD Rate Feed Back Pump 5 (10-P-3A)*	*ZIR-1304-RWI*	*AI*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1208	VFD Rate Feed Back Pump 6 (10-P-3B)	ZIR-1305-RWI	AI	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1	-	
I-1101, I-1209	Raw Water Pump 1 (10-P-1A) Speed CMD	SCIR-1400-RWI	AO	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1209	*Raw Water Pump 2 (10-P-1B) Speed CMD*	*SCIR-1401-RWI*	*AO*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1209	Raw Water Pump 3 (10-P-2A) Speed CMD	SCIR-1402-RWI	AO	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1		
I-1101, I-1209	*Raw Water Pump 4 (10-P-2B) Speed CMD*	*SCIR-1403-RWI*	*AO*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1209	*Raw Water Pump 5 (10-P-3A) Speed CMD*	*SCIR-1500-RWI*	*AO*	*4-20mA*	*0-100*	*%*		*RWI-LCP-1*		*CNSWTCH#1*		*FUTURE*
I-1101, I-1209	Raw Water Pump 6 (10-P-3B) Speed CMD	SCIR-1501-RWI	AO	4-20mA	0-100	%		RWI-LCP-1		CNSWTCH#1		
I-0701	**PAC System**											
D-0501, I-0701	Pneumatic Control Valve Command Control	ZCIR-PAC-501	AO	DDH	0-100	%	PCV-501	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1	40-96-35-C	
D-0501, I-0701	Pneumatic Control Valve Command Feedback	ZIR-PAC-501	AI	DDH	0-100	%	PCV-501	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Pneumatic Control Valve Command Control	ZCIR-PAC-502	AO	DDH	0-100	%	PCV-502	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Pneumatic Control Valve Command Feedback	ZIR-PAC-502	AI	DDH	0-100	%	PCV-502	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Open Position	ZIOR-PAC-505	DI	DDH	Normal	Open	FV-505	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Close Position	ZICR-PAC-505	DI	DDH	Normal	Close	FV-505	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Command	YIR-PAC-505	DO	DDH	Normal	Modulate	FV-505	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Open Position	ZIOR-PAC-506	DI	DDH	Normal	Open	SV-506	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Close Position	ZICR-PAC-506	DI	DDH	Normal	Close	SV-506	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Command	YIR-PAC-506	DO	DDH	Normal	Modulate	SV-506	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Open Position	ZIOR-PAC-507	DI	DDH	Normal	Open	SV-507	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Close Position	ZICR-PAC-507	DI	DDH	Normal	Close	SV-507	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Solenoid Operated Valve Command	YIR-PAC-507	DO	DDH	Normal	Modulate	SV-507	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Pressure Switch Low	PSLR-PAC-311	DI	DDH	Normal	Low	PSL-311	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
D-0501, I-0701	Flow Control Valve Command Control	ZCIR-PAC-305	AO	DDH	0-100	%	FCV-305	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Flow Control Valve Command Feed-back	ZIR-PAC-305	AI	DDH	0-100	%	FCV-305	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Pressure Switch Low	PSLR-PAC-313	DI	DDH	Normal	Low	PSL-313	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Hopper Level Switch Low	LSLR-PAC-110	DI	DDH	Normal	Alarm	LSL-110	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Cone Level Switch High	LSHR-PAC-111	DI	DDH	Normal	Alarm	LSL-111	WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	Loss of Power Alarm	JAR-PAC-112	DI	DDH	Normal	Alarm		WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
D-0501, I-0701	PAC system Fault	YAR-PAC-113	DI	DDH	Normal	Alarm		WTP-PEP-PAC	WTP-LCP-1	CNSWTCH#1		
I-2601	**Flocculation Tank 1**											
I-2601, I-2700	Drive In Remote	YIR-FL1-001	DI	DDH	Normal	Auto		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1	40-96-35 K	
I-2601, I-2700	Drive Failure Alarm	YAIR-FL1-002	DI	DDH	Normal	Alarm		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Running	YIR-FL1-003	DI	DDH	Normal	Run		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Off	YIR-FL1-004	DI	DDH	Normal	Off		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Start Command	YCIR-FL1-005	DO	DDH	Normal	Modulate		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Stop Command	YCIR-FL1-006	DO	DDH	Normal	Modulate		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Speed Control Command	SCIR-FL1-007	AO	DDH	0-100	%		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Speed Feedback	SIR-FL1-008	AI	DDH	0-100	%		WTP-PEP-FL1	WTP-LCP-1	CNSWTCH#1		
I-2700	**Flocculation Tank 2**											
I-2601, I-2700	Drive In Remote	YIR-FL2-001	DI	DDH	Normal	Auto		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1	40-96-35 K	
I-2601, I-2700	Drive Failure Alarm	YAIR-FL2-002	DI	DDH	Normal	Alarm		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Running	YIR-FL2-003	DI	DDH	Normal	Run		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Off	YIR-FL2-004	DI	DDH	Normal	Off		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Start Command	YCIR-FL2-005	DO	DDH	Normal	Modulate		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Stop Command	YCIR-FL2-006	DO	DDH	Normal	Modulate		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Speed Control Command	SCIR-FL2-007	AO	DDH	0-100	%		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Drive Speed Feedback	SIR-FL2-008	AI	DDH	0-100	%		WTP-PEP-FL2	WTP-LCP-1	CNSWTCH#1		
	Sludge Collector Control 1 (Sedimentation Basin 1)											
I-2601, I-2700	Cable Drive 1A Home Sensor	YIR-SD1-001	DI	DDH		Home		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1	40-96-35 K	
I-2601, I-2700	Cable Drive 1A End Sensor	YIR-SD1-002	DI	DDH		End		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1A E-Stop	YAIR-SD1-003	DI	DDH		Alarm		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1A In Remote	ZIR-SD1-004	DI	DDH		Auto		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1A Position Feedback	ZIR-SD1-005	AI	DDH	0-100	%		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1A Start	YCIR-SD1-006	DO	DDH		Start		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Dive 1A Stop	YCIR-SD1-007	DO	DDH		Stop		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1A Position Control	ZCIR-SD1-008	AO	DDH	0-100	%		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B Home Sensor	YIR-SD1-009	DI	DDH		Home		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B End Sensor	YIR-SD1-010	DI	DDH		End		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		

Sheet #	Description	ISA Tag	Type	Signal	Range/ Off Status	Units/ On Status	Field Wiring Data				Specification Responsible for Signal Source	Remarks
							ISA Signal Source	Source/ Panel Location	Field FTC	SCADA Panel		
I-2601, I-2700	Cable Drive 1B E-Stop	YAIR-SD1-011	DI	DDH		Alarm		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B In Remote	ZIR-SD1-012	DI	DDH		Auto		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1B Position Feedback	ZIR-SD1-013	AI	DDH	0-100	%		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B Start	YCIR-SD1-014	DO	DDH		Start		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Dive 1B Stop	YCIR-SD1-015	DO	DDH		Stop		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1B Position Control	ZCIR-SD1-016	AO	DDH	0-100	%		WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	VFD Drive Speed 1A	ZCIR-SD1-017	AI	DDH				WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	VFD Drive Speed 1B	ZCIR-SD1-018	AI	DDH				WTP-PEP-SD1	WTP-LCP-1	CNSWTCH#1		
	Sludge Collector Control 2 (Sedimentation Basin 2)										-	-
I-2601, I-2700	Cable Drive 1A Home Sensor	YIR-SD2-001	DI	DDH		Home		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1	40-96-35 K	
I-2601, I-2700	Cable Drive 1A End Sensor	YIR-SD2-002	DI	DDH		End		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1	-	
I-2601, I-2700	Cable Drive 1A E-Stop	YAIR-SD2-003	DI	DDH		Alarm		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1	-	
I-2601, I-2700	Cable Drive 1A In Remote	ZIR-SD2-004	DI	DDH		Auto		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1	-	
I-2601, I-2700	Sludge Valve 1A Position Feedback	ZIR-SD2-005	AI	DDH	0-100	%		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1A Start	YCIR-SD2-006	DO	DDH		Start		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Dive 1A Stop	YCIR-SD2-007	DO	DDH		Stop		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1A Position Control	ZCIR-SD2-008	AO	DDH	0-100	%		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B Home Sensor	YIR-SD2-009	DI	DDH		Home		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B End Sensor	YIR-SD2-010	DI	DDH		End		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B E-Stop	YAIR-SD2-011	DI	DDH		Alarm		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B In Remote	ZIR-SD2-012	DI	DDH		Auto		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1B Position Feedback	ZIR-SD2-013	AI	DDH	0-100	%		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Drive 1B Start	YCIR-SD2-014	DO	DDH		Start		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Cable Dive 1B Stop	YCIR-SD2-015	DO	DDH		Stop		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	Sludge Valve 1B Position Control	ZCIR-SD2-016	AO	DDH	0-100	%		WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	VFD Drive Speed 1A	ZCIR-SD1-017	AI	DDH				WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
I-2601, I-2700	VFD Drive Speed 1B	ZCIR-SD1-018	AI	DDH				WTP-PEP-SD2	WTP-LCP-1	CNSWTCH#1		
	Electrical Room (WTP-LCP-1)											
I-8000	Generator #5 Warning	YAIR-0200-1XXX	DI		Normal	Alarm		WTP-LCP-1				
I-8000	Generator #5 Shutdown	YIR-0201-1XXX	DI		Normal	Shutdown		WTP-LCP-1				
I-8000	Generator #5 Not In Auto	ZIR-0202-1XXX	DI		Normal	Manual		WTP-LCP-1				
I-8000	Generator #5 Ready to Load	YIR-0203-1XXX	DI		Normal	Ready		WTP-LCP-1				
I-8000	ATS Alarm	YAIR-0204-1XXX	DI		Normal	Alarm		WTP-LCP-1				
I-8000	ATS Manual Mode	ZIR-0205-1XXX	DI		Normal	Manual		WTP-LCP-1				
I-8000	ATS Logic Enabled	YIR-0206-1XXX	DI		Normal	Enabled		WTP-LCP-1				
I-8000	FACP System Trouble	YAIR-0301-1XXX	DI		Normal	Alarm		WTP-LCP-1				