

SECTION 16910
CONTROL DESCRIPTION

I. SYSTEM DESCRIPTION

The existing potable water well is being replaced with a new Well House. Additionally, some of the water lines and connections to the treatment plant buildings are also being replaced.

The Well House Control Panel and Distributed Process Control System (DPCS) HMI will be configured and programmed by the Owner.

- All code is to be written in ladder logic. Any other code types (Sequential Function, Function Block, Structured Text, etc.) will not be accepted unless approved by Process Control Group.
- If using AB ControlLogix PLC, all Tags must be scoped at the Global/Controller level.
- Use the Process Control Group supplied abbreviation list for tag naming and I/O identification.
- Any code written that deliberately tries to overly complicate the program flow and readability will not be accepted.
- All PLC controllable field devices (i.e., if the device has at a minimum an HOA switch, open/start command, and feedback status) will have its own device in ladder. Common device logic that passes and receives I/O statuses is Not acceptable.
- It should be assumed that any PLC supplied will be integrated into plant control system and customer permissives should be accommodated in logic.
- No software Remote / Local mode on OIT. There should be a mechanical HOA switch on front of control panel wired to PLC as input status.

A. WELL PUMPS

One low flow constant speed well pumps will supply potable water to the treatment plant via two (2) hydropneumatics tanks and one of (2) water softeners. Hypochlorite will be introduced for disinfection prior to exiting the well house and entering the potable water distribution network. During periods of high flow, the larger high flow variable speed pump will be operational, the two (2) smaller well pumps will cease operation, and the water softeners, along with the hypochlorite system, will be bypassed.

B. CHEMICAL FEED

The chlorine residual analyzer along with the potable water low flow transmitter will be used to regulate the speed of the sodium hypochlorite feed pump to maintain a predetermined chlorine residual.

II. EQUIPMENT AND DESIGNATIONS

A. Well Pumps	Two (1 low flow and 1 high flow)
B. Residual Chlorine Analyzer	One
C. pH Analyzer	One
D. Magnetic Flow Meters	Two (1 low flow and 1 high flow)

E. Level Transmitter	One (well level)
F. Sodium Hypochlorite Feed Pump	One

III. RELATED EQUIPMENT OPERATION

A. None

IV. POWER AND CONTROL CONFIGURATION

The Well House Control Panel will house the PLC that contains the control program.

Control and Monitoring will be available as follows:

CONTROL/INDICATION LOCATION	@ Equipment /Process	@ MCC	I/O to or from Well House CP
LOW FLOW WELL PUMP			
Local-Off-Remote (LOR) Select		X	
Remote Status			DI
Start-Stop			DO
Run Status		X	DI
Starter Overload		X	DI
HIGH FLOW WELL PUMP			
Local-Off-Remote (LOR) Select		X	DI
Start-Stop		X	DO
Speed Control		X	AO
Speed Indication		X	AI
Run Status		X	DI
VFD Failure		X	DI
INSTRUMENTS AND ANALYZERS			
Well Level Transmitter			AI
Potable Water High & Low Flow Transmitters	X		AI's
Potable Water Pressure Transmitter	X		AI
pH Indicating Analyzer	X		AI
Chlorine Residual Analyzer	X		AI
SODIUM HYPOCHLORITE FEED PUMP			
Local-Off-Remote (LOR) Select	X		
Speed Control			AO
POWER MONITORING			

CONTROL/INDICATION LOCATION	@ Equipment /Process	@ MCC	I/O to or from Well House CP
Power Failure		X	AI
Power Indication		X	AI
Surge Protection Failure		X	DI
Control Panel			
Power Failure			
Surge Protection Failure			AI
Power Supply 1 Failure			DI
Power Supply 2 Failure			DI
UPS Failure			DI
UPS Battery Replacement			DI
On UPS			DI

A. POWER DISTRIBUTION

The low flow well pumps will be powered from MCC-WH and the high flow well pump will be powered from a VFD also located in the Well House.

Low Flow Well Pumps Equipment Summary

The low flow well pumps will be Full Voltage Non-Reversing (FVNR) starters. The motor starters will have provisions for locking out the motors in the de-energized state with the following controls and indications.

1. Control power transformer.
2. I/O blocks.
3. LOCAL-OFF-REMOTE (LOR) three position selector switch.
4. RUN and STOPPED indicating lights.
5. STARTER OVERLOAD indicating light and reset pushbutton.

High Flow Well Pump Equipment Summary

The high flow well pump will be on a Variable Speed Drive (VFD). The VFD will have provisions for locking out the motor in the de-energized state with the following controls and indications.

1. Control power transformer.
2. I/O blocks.
3. LOCAL-OFF-REMOTE (LOR) three position selector switch.
4. RUN and STOPPED indicating lights.
5. LCD/LED VFD status, control, and diagnostics display.
6. % speed control.
7. % speed indication.

Low Flow DPCS Input/Output Summary:

The following information at a minimum will be transmitted to the DPCS system from the motor starters:

1. LOR selector switch status.
2. Run status.
3. Starter Overload.

The DPCS system will transmit to the starters the following:

1. Start-Stop command.

High Flow DPCS Input/Output Summary:

The following information at a minimum will be transmitted to the DPCS system from the VFD:

2. LOR selector switch in AUTO.
3. Run status.
4. VFD failure.
5. % speed indication

The DPCS system will transmit to the VFD/bypass starters the following:

1. Operate at % speed.
2. Start-Stop command.

V. DESCRIPTION OF OPERATION

A. WELL PUMPS

Control Modes:

Each well pump can be operated locally at the Motor Control Center (MCC), Variable Frequency Drive (VFD), or through the Distributed Process Control System (DPCS). A LOCAL-OFF-REMOTE selector switch will be provided on the MCC motor starter bucket and on the VFD.

Each of the well pumps will have the following control modes:

Local/Manual Mode:

In Local mode, an operator will select the Local position from the LOCAL-OFF-REMOTE selector switch to run a well pump. The high flow well pump will also allow an operator to adjust the speed of the pump from the front of the VFD. In the Off position, a well pump will not run. Local operations should only be used for testing and maintenance purposes.

DPCS Auto Low Flow Mode:

A well pump can only be operated in Auto Mode when the LOCAL-OFF-REMOTE switch is in the REMOTE position.

In software DPCS Auto, the low-speed pumps will operate when the potable water pressure drops below an operator-adjustable low pressure (initially set at 50 psi) and will shut off when the pressure increases to an operator-adjustable high pressure (initially set at 80 psi).

DPCS High Flow Mode:

High flow mode will be initiated when the potable water pressure drops to low-low pressure (initially set at 30 psi). The low flow pumps will shutdown and the high flow pumps will start with the speed adjusted to maintain a constant pressure (initially set at 80

psi). The pump will continue to run until the potable water flow drops to an operator adjustable flow (initially set at 100 gpm). The mode will then automatically switch back to low flow mode operation.

DPCS Manual Mode:

Not Used

Interlocks and Alarms:

Regardless of operating mode, a well pump will be shut down for any of the following abnormalities:

1. Motor overload
2. VFD failure.
3. High-high potable water pressure (initially set at 100 psi).

The DPCS will provide Alarms and Indications regardless of the operating mode:

1. Motor overload.
2. VFD failure.
3. Instrument or analyzer failure as indicated by an analog signal less than 4 mA
4. Potable water pressure high-high or low-low.
5. High flow pump operating.

B. SODIUM HYPOCHLORITE FEED PUMP

Control Modes:

The Sodium hypochlorite feed pump can be operated locally at the pump or through the DPCS. Operation of the pump locally will be through a graphical display on the pump.

Local/Manual Mode:

In Local mode, an operator can select Local operation through the graphical display and adjust the speed of the pump.

DPCS Auto Mode:

In software DPCS Auto, the pump will be flow paced from the low flow transmitter with feedback trim from the residual chlorine analyzer.

DPCS Manual Mode:

Not Used

Interlocks and Alarms:

Regardless of operating mode, the pump will be shut down for any of the following abnormalities:

1. None

The DPCS will provide Alarms and Indications regardless of the operating mode:

1. Low or high chlorine residual

END OF SECTION

