

Portland Engineering has extensive experience working with water treatment systems. For example, PEI served as the System Integrator and General Contractor for a 75 MGD Water Treatment Plant in expansion in Oregon. PEI provided complete design-build support for a comprehensive control system upgrade of an existing water treatment facility. This extensive project required system-wide control system replacement for the water treatment plant including new programmable logic controllers (PLC), operator interfaces, filter level instrumentation, pressure transmitters, and feedback transmitters. The plant's telemetry system, consisting of 27 sites across 120 square miles, was replaced and integrated into the central plant control system.

The client identified several systems in need of improvement and upon being awarded the project, PEI identified numerous areas of concentration. Much of the control system equipment was outdated with limited availability of spare parts. Antiquated equipment made obtaining necessary technical support for the facility exceedingly difficult. Compounding these problems was an extremely slow control system, taking minutes for updates to reach the HMI from the field. The client needed the latest industry standard control components and historians and we provided precise solutions for these problems.

PEI engineers designed the control architecture and 25 control panels, provided all components, hired the electrical contractor for installation, and managed construction. We devised a framework that provided a redundant control system in the event of a primary controller failure. Our system architecture provided full redundancy, from the process I/O up to the PLC, radically minimizing the possibility of a plant outage. We performed extensive operational readiness testing (ORT) on each plant subsystem using the installed equipment and a simulator program we developed specifically for this project. All process controls were verified, witnessed, and documented. This procedure further ensured that the various system controls were fully functional prior to startup and commissioning. All PLC controllers at remote sites provided local control and monitoring of the system while sending information to the master site.

To facilitate smooth system integration, we involved a team of four operators to help design the HMI system including standards development, graphical layout, and navigation. We developed a panel design standards document with input from the electrical and instrumentation maintenance personnel. Our engineers then disassembled the existing system and created all new control strategies and functionality for the water plant from scratch. Our design incorporated specific control enhancements requested by plant operators and technical staff, significantly improving efficiency.

PEI developed a completely new operator interface system employing Wonderware InTouch connected to the PLC control system via a redundant Ethernet network. Included in the project was the installation of a new historian data acquisition and reporting system using Wonderware InSQL and Active Factory reporting tools. A web server was installed to allow plant personnel to create and view reports and trends for historical data via a web browser. We provided the plant with redundant Allen-Bradley ControlLogix 1756-L55M2 controllers with 1757-SRM redundant modules. Each subsystem of the water plant was connected to the redundant PLC processors via remote ControlLogix I/O chassis over redundant ControlNet coax cables.

During this project, the water treatment plant was required to remain operational with only brief shutdowns. The pacing of this project required significant flexibility on the part of the PEI integration schedule to complete the project. All WTP plant controls had to be completed prior to the seasonal peak in water demand. Because PEI established a plan of implementation for all installation services, we were able to upgrade the facility sequentially with only four hours of scheduled plant outage time. We devoted our resources, established residency in Forest Grove, and invested long days to ensure our client's needs were met and satisfied.

PEI provided all design, controls, programming, and start-up services and we subcontracted the electrical and mechanical installation.