Smith Mountain Power Plant

Remote alarming capability improves operator effectiveness

SMITH MOUNTAIN HYDRO

American Electric Power (AEP), America's largest generator of electricity, takes pride in its level of efficiency and the resulting reliability and operational economies achieved in its power plants. Smith Mountain Hydro is a hydro-electric pump storage power plant located on the picturesque Roanoke river near Roanoke, Virginia, USA. The Smith Mountain power plant has the capacity to generate 605 megawatts of power through five generating units. The dam itself is 235 feet high and is 816 feet wide. At its completion in 1966, the plant was a state of the art power generation facility, costing more than $66 million.

Power is generated primarily during weekdays, when demand for electricity is at its highest. Water is pumped back into the feeder lake on nights, holidays, and weekends, based on operational economics.

THE CHALLENGE

The Smith Mountain system consists of approximately 500 alarms including, pump failures, voltage regulator failures and extreme temperatures.

Previously, large panel mounted annunciators were used to alert operators of fault or alarm conditions. The alarms were displayed as a series of large grids with lights and descriptive text engraved on the windows. When an alarm would activate, the light in the window would flash and an audible alarm would sound until an operator acknowledged the alarm. All of the alarms were hard wired into one of seven panels.

A central monitoring station in Roanoke, 45 miles away, is responsible for observing all of AEP's hydro plants. When an alarm at the plant is triggered, a signal is sent to the central monitoring station. In the past, this signal did not give any details; it only indicated that an alarm existed.

THE CHALLENGE

American Electric Power's existing system at Smith Mountain Power Plant consisted of a manual alarming annunciator that did no more than indicate that an alarm existed. Personnel were then required to discover what triggered each alarm – a costly and labor intensive procedure.

THE SOLUTION

Install an Ethernet-based alarm annunciator and a CitectSCADA monitoring and control system in the Smith Mountain plant with the aim of providing operators with more detailed information about remote alarms.

CONCLUSION

Plant operators in remote locations can now access more information than ever before via CitectSCADA, enabling them to better determine whether to alert plant personnel on a routine or emergency basis. This has improved overall plant efficiency.

CaseStudy

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ROBERT GALLIMORE,
AEP Production Services Leader.

Local plant personnel had to respond to find out what triggered the alarm and to remedy any problems. This procedure was costly, time and labor intensive, and annoying to all involved.

AEP OBJECTIVES

While planning the new alarm system AEP's goals included: more detailed information for the remote monitoring system, a reduction in nuisance alarms and a record of historical data.

THE SOLUTION

AEP chose to install a new SCADA system and an Ethernet-based alarm annunciator in the Smith Mountain plant. The new system utilizes CitectSCADA software, Sixnet EtherTrak I/O modules, Sixnet RemoteTrak Serial I/O modules, and a Sixnet intelligent Ethernet Switch. Open Modbus TCP is the communication protocol used over the network.

CitectSCADA, a Windows-based SCADA system, was built from the ground up to be a networked system capable of handling thousands of I/O points from hundreds of I/O devices. It is also designed to be a data storage system as well as an operator interface.

The CitectSCADA system was implemented to provide the operator with more information about the remote alarms. With the new annunciator system, operators at the plant and the monitoring station in Roanoke share the same information regarding alarm status. A client PC at the plant indicates the alarm status. The operator can acknowledge the alarm either on the PC or at a hard wired pushbutton on the control panel. Simultaneously, the central monitoring station sees the status of each alarm point. "The system meets all of our expectations and is working very well. We plan to implement similar systems at other plants," states Robert Gallimore, AEP Production Services Leader.

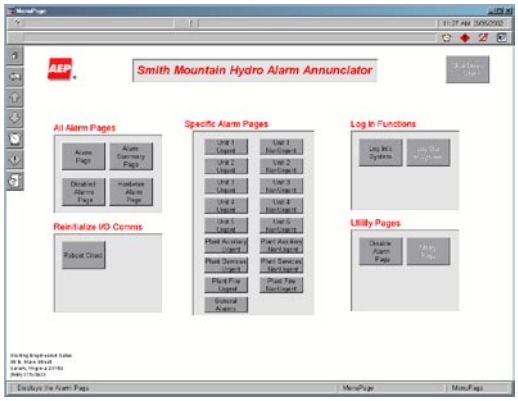
"We are also considering expanding the system at Smith Mountain to include analog process variables as well."

BENEFITS

Using CitectSCADA, operators not only see what alarms are tripped in the remote location, they know the sequence in which the trips occurred. This feature is important because often one alarm will trigger others to follow.

A history of all alarms can be stored in the system at Smith Mountain Power Plant, and this information can be accessed at a later date. The alarm history information is saved in both plain text and DBF files, allowing management to periodically review the logged alarm data to find problem areas that need to be addressed.

Alarms can be disabled based on the unit or system with which the alarm is associated. For example, if Generating Unit 2 is down for maintenance, all of the alarms for Generator 2 are disabled during the period of the shutdown. This disable feature eliminates nuisance alarms, which is advantageous because when a system has excessive nuisance alarms, real alarms may be missed.



ABOVE: The new alarms annunciator screen.

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