

## Redundant Fiber to Current Repeater

A utility company needed to upgrade the stack emissions monitoring systems used on their coal fired power plants. The new probes required more power and had more output signals than the previous system. Also, it was desired that the new system have built-in redundancy for power and communications, something standard emissions analyzers did not provide. They approached a variety of monitoring system providers, but none of them had a system flexible enough to meet their needs. Some of which were:

- High reliability and overall system availability (Redundant: power to probes; communication links)
- Initially use fiber optic, but have an option for wireless (Radio) if desired in the future
- Make the system easy to use and maintain (minimal training to service personnel)
- Easily expand channels with out running more wire



Based on these needs, ioSelect developed a system that is now deployed at a number of the utility's facilities and has been proven to exceed all the utility company's requirements.

The installation consists of two enclosures with mostly ioSelect standard products (ioPro-8AI-I-ISO, ioPro-16DI, ioPro-8AO-I, ioPro-4RO, CommsPak Fiber to 485 Converter, and PowerPak 24VDC Power Supplies), configured and integrated in a unique way:



*Stack Unit:* This unit provides redundant 24VDC power to the emission probes and contains ioPro IO units to redundantly read the 4 to 20mA outputs from the probes. Also, redundant DI units monitor various status points. Up to 20 channels can be supported



*Control Unit:* This unit is connected to the Stack Unit via redundant fiber optic cables. It contains a redundant power supply to an IOS Controller with custom software to read the redundant IO, process the data, and output the results as 4 to 20 mA outputs to the emission analyzer. Error logging and reporting is done via an intuitive user interface on enclosed LCD display. An error output is provided that feeds into the overall plant monitoring system for trouble notification.

A wireless system was desired (Fiber or Radio) due to lightning concerns. In the previous wired 4 to 20 mA systems lightning strikes (and near misses) caused unacceptable outages. Fiber was chosen initially because it was considered less risky in the short term.

The system ioSelect created allows the utility to simply install two units and begin taking readings immediately. One at the top of the stack to be monitored and one below (at the base of the stack or in a convenient area close to this (monitoring shack). All calibrations are done with a standard 4 to 20 mA loop connection (it is like the units do not exist). Since this is an Environmental Protection Agency (EPA) mandated application it was important to the utility that single points of failure be eliminated as much as possible, since there are significant fines involved if data is missing. Therefore, all "High Risk" components are duplicated and the system will continue to run and provide good data even if one of the redundant parts totally fails. Also, all failures or data inconsistencies will generate notifications that will be displayed and logged when these events occur.

The ioPro IO modules used in the utility's units have robust 1500V isolation and have been proven to be reliable in these harsh environments. Also, in the case of a direct lightning hit they can be quickly replaced by setting the front mounted DIP switch to the same settings at the failed unit and plugging it in (No configuration software required).

This system is currently being deployed (3 of the estimated 20 coal power plants stacks have been upgraded as of 11/2007) and has exceeded expectations. The system has been easy to install and use by standard maintenance personnel. Also, it currently has a perfect operational record.