

Air Quality Monitoring and Control

By

Larry Terwisscha, Technical & Customer Relations Manager

Karen Perlbachs, General Manager

Abstract: A large oil and gas company, committed to protect and improve the environment, needed to balance the considerations for safety, health and environmental issues with production, sales and quality assurance standards. To accomplish its goals, the company also needed a flexible system for air quality monitoring and control that would allow nodes to be added to the network as the facility expanded.

The Need

The primary project objective was to design and install an automated system that could continuously monitor the quality of air in the region for the refinery's emissions of SO₂, HCT, NO_x, CO and H₂S and report the data back to a Master central control station. Each station would be equipped with the latest technology of environmental monitoring devices and license-free wireless communications equipment that would provide the necessary information permitting the initiation of the proper steps to prevent untoward emissions and improve the conditions of the atmospheric field.

Selecting the Equipment.

The oil company had a list of requirements for the installation which included data transfer methods and devices. The project specifications for the communication equipment required:

- Ethernet Protocol
- License-free 902-928 MHz modem communication
- Easy mounting and installation
- Diagnostics capability
- Transmission range of at least 10 Km
- Robust & reliable industrial grade units
- 24/7 operation
- Extended temperature range to 0 to 140° F (0 to 60°C)
- Resistance to humid environments (0 to 95%)
- User-friendly operation

Meeting the Specs. The consulting engineer on the project was already familiar with Data-Linc's broad product line and knew, when he spec'd them, they would meet the stated requirements. He also had first-hand confirmation of Data-Linc's reputation for quality, data rate, range,

reliability, ease of installation, commitment to product backward compatibility and customer service. He proposed using Data-Linc license-free FHSS* Ethernet modems from the SRM (SmartSpectrum Radio Modems) Family.

The network equipment included:

- Three analyzers each for SO₂, HCT, NO_x, CO and H₂S
- Four Ethernet radios- one Master, three Remotes
- One to four omni-directional antennas
- Up to three Yagi antennas (for distances over 35 miles if needed)
- Four Industrial STD BUS Industrial Computers

The Network Architecture

The Master SRM Ethernet modem at the central control location communicates with the Remote SRM wireless Ethernet modems to transfer data back to central control where it is displayed on the monitor. At each remote location, an STD BUS industrial computer communicates every ten minutes with the atmospheric equipment. This PC deploys Visual Basic™ to collect and process data for final input into Microsoft Excel™ that further processes the data to produce historical graphics. All data in the network can be viewed and archived at the central office. The result is a system that monitors and controls emissions. This flexible network design allows easy accommodation of new sites and additional monitoring equipment. Additionally, various government organizations are able to access and integrate their own equipment into the network.

* Frequency Hopping Spread Spectrum, a robust data transfer technology

When the system was up and running, the engineer's comment was, "The Data-Linc radio's perform flawlessly. The system is 100%."

The Design Advantage

Communication robustness and reliability:

The SRM modems operate in harsh environments 24/7 with exceptional reliability. They support ranges up to 35 miles with line of sight, an RF data rate of up to 188 Kbps and operate in conditions where temperatures range from -40 to +167°F (-40 to 75°C) with non-condensing humidity of 95%.

Flexibility: Data-Linc's commitment to backward compatibility ensures that updates to the SRM Family of modems will be able to communicate with previously installed SRM legacy modems, as well as updated future SRM6xxx products. This makes the network expandable as sites are added or if additional

monitoring is required. The SRM Family modems are available for serial and Ethernet connectivity in both the 900 MHz and 2.4 GHz ISM bands.

Ease of Installation and Operation:

All Data-Linc modems and cables are factory configured for easy installation. A customer mantra has become, "You plug 'em in and they work." To offer greater confidence, the SRM modems are compatible with LincView™ OPC, Data-Linc's powerful RF network management tool that allows access to RF data for every modem in the network with a user-friendly graphic interface.

Conclusion

Data-Linc assisted the oil company to meet its objectives to protect and improve the environment and the bottom line. The result was a well-designed, flexible system for air quality monitoring and control that meets current needs and allowed for future growth- a win/win/win.

