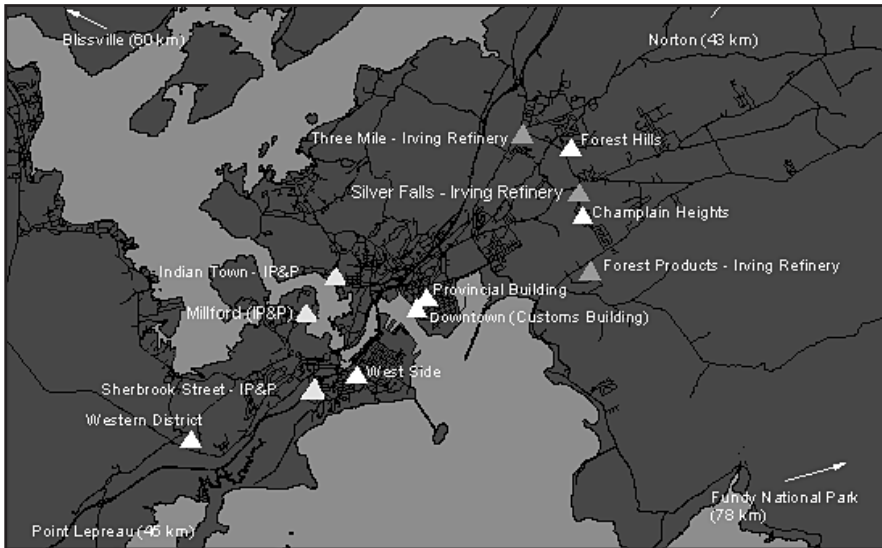


Environmental Monitoring



Map of St. John, NB, EIS system.

PRODUCT:

- **TeleSAFE 6000 SCADA Controller**

COMMUNICATIONS:

- **Radio**
- **Leased Line**
- **Dial-up**

IMPORTANT FACTORS:

- **Proven products**
- **Easy to implement**
- **Industry standard protocols**

Air Quality Monitoring System uses TeleSAFE for Control

■ The Application

RKM Engineering Services Ltd. of Toronto, Ontario, has designed a comprehensive Environmental Information System (EIS) to provide the solution for data acquisition, data management and reporting requirements in Environmental Monitoring applications.

The Environmental Information System provides a network to gather data on parameters relating to air quality, water quality, and water resources. The acquired information is then processed and presented to the user at a central site in the form of real-time data reports and/or using alarm annunciation. Also, by using high resolution color graphic displays such as site maps, real-time data is displayed providing immediate visual reports of the system status. This central system accumulates the information from the remote sites, then produces historical reports in the format required by regulating agencies.

■ The Problem

A typical EIS consists of a number of remote site locations, where a remote terminal unit acquires data from a number of sensors or instruments, and a central site where the data is presented. The data being gathered

includes air quality parameters (SO₂, NO, NO₂, O₃, H₂S), water quality parameters (pH, turbidity, conductivity, flow) and meteorological parameters (temperature, wind direction and speed, precipitation, humidity, solar radiation, barometric pressure).

■ The Solution

In designing the system, RKM Engineering evaluated a number of data loggers before settling on the TeleSAFE 6000 SCADA Controller from Control Microsystems. Since the typical requirement of an Air Monitoring Station is about 8 AI to connect to the outputs of various instruments, a few DI for out-of-service status, intruder alarms, etc., and 4 to 8 DO for controlling the auto-calibration cycles of some of the instruments, the TeleSAFE 6000 SCADA Controller also proved to be the perfect fit. The TeleSAFE's expandability to 24AI plus appropriate numbers of DI/DO allows for using the same, but expanded, system for larger stations.

The internal temperature sensor of the TeleSAFE also came in handy for representing the shelter temperature, which must be

maintained between 20°C and 30°C for EPA qualification of the instruments. In addition, the fact that the TeleSAFE uses the industry standard Modbus[®] protocol and that it is well respected in industrial applications, certainly helped in making the product more attractive to the application.

The TeleSAFE 6000 SCADA Controller uses a BASIC program, designated AQDL (produced by RKM Engineering), to process, validate and average the data for storage and on-site reporting. AQDL can also transmit the data to the central site, on request, using dial-up, leased lines, or even a radio[®] link. The use of the Modbus[®] protocol helps ensure reliable data transfer over noisy remote communication links.

"The reliability and performance of the TeleSAFE 6000 RTU is of critical importance to the system..."

All parameters are processed in a manner appropriate to their characteristics, e.g. pH is averaged logarithmically, wind utilizes vector-averaging and includes computation of standard deviation of wind direction, precipitation is totaled, etc. Other processing functions are developed as required. Auto calibration scheduling and

processing with validation and result reporting, an important feature for quality control of air quality data, is also performed by the TeleSAFE AQDL program.

The central system hardware consists of a personal computer using multi-tasking software. With add-on boards, the system can support up to two 32 ports for user reporting, remote displays, and various communication links. Various program modules are available for generation of historical reports (monthly matrix, multi-parameter daily report, browser, calibration results), real time reporting, alarming, graphic map displays, remote and central configuration control, trending, editing, and export to popular spreadsheet programs. Perhaps the most powerful feature for air quality systems is the display of a wind vector on site maps, facilitating correlation of remote pollution readings with the polluting sources (stacks). Selection of reports and parameters is extremely convenient, requiring a minimum of key strokes or mouse clicks.

RKM Engineering Services Ltd. is currently developing a new WindowsNT based client/server system for Environment New Brunswick (ENB). The ENB system initially collects data from their Saint John EIS, which itself collects data from 15 other province and industry-owned TeleSAFEs. Eventually, ENB will hook up to the other industry-owned EIS systems throughout the province of New Brunswick. The system is monitoring such items as Suspended Particulates, O3, CO, NOx, IQUA, SO2, NO2, WD, WS, H2S, TRS. The IQUA (Air Quality Index) is computed at the EIS level. All others are analog input channels to the RTUs.

The most important final product of the network is the Air Quality Index. This information is provided to the media, and is also available on the World Wide Web. When the IQUA exceeds 50 for any location, or is expected to do so, an Air Quality Advisory is issued to the general public. Such a situation is a health hazard, especially for people with respiratory problems, and is thus very important information to the people living in the area.

In gathering and processing this data, the Environment New Brunswick system benefits from several of the TeleSAFE 6000 SCADA Controller features. The TeleSAFE has two communication ports, one for local reporting and diagnostics, the other for central communication. Using the second COM port, remote site configuration as well as actual programming can be downloaded from the central station, eliminating the need to replace PROMs to make software enhancements. In addition, since data storage capacity can be user configured, the system makes automatic use of all unassigned data storage memory for the hourly averages, allowing for almost three months of hourly averages for four channels.

The system also features auto calibration scheduling of air analyzers, with reporting of value, noise and error of zero and span measurements, with optional auto correction, independent for zero and span.

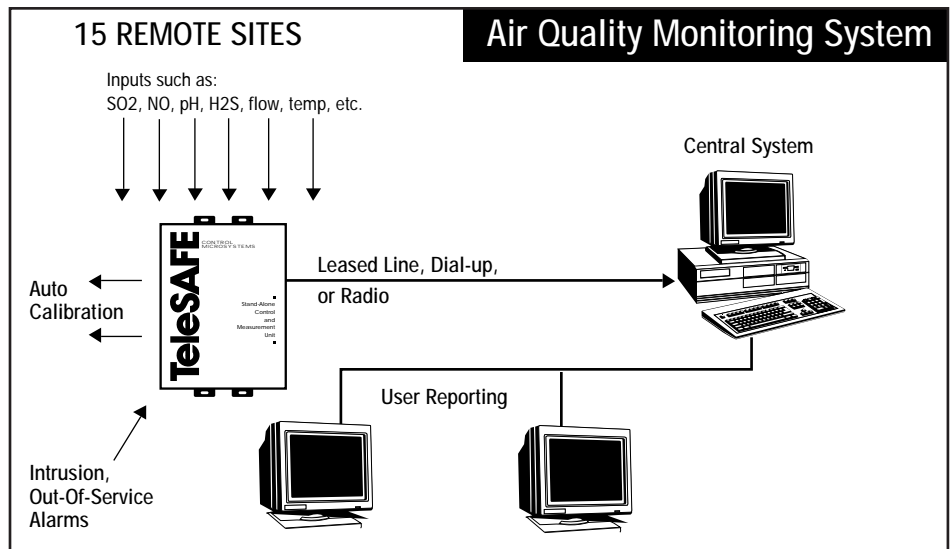
The EIS system is programmed in C, and thus uses industry standard graphic and database application libraries, providing for a map of the system to be displayed at the central station, with automatic updating of real-time data. This data is displayed in user selectable colors, different for normal and alarm values. Alarm values are dealt with

through voice annunciation and through the calling of alarm phone numbers with appropriate voice alarm messages or numerical paging.

■ The Result

Since the installation of the system in 1992, the network has grown with the addition of TeleSAFE SCADA Controllers. Some of those were replacements of the other manufacturers' controllers, others were new stations. All of the original RTUs have been replaced by TeleSAFE 6000 SCADA Controllers from Control Microsystems. The TeleSAFEs have proven to be very reliable and Environment New Brunswick is very pleased with their performance.

As will be clear, the system and its component products, provide a very important function to the local population. The reliability and performance of the TeleSAFE is of critical importance to the system and helps minimize the impact of poor air quality on those who live in the area. In addition, industry is bound by various emission control orders and monitoring ensures their compliance with these orders. Therefore, without the system, there would probably be a higher incidence of Air Quality violations.



Special thanks to Rob Muylwyk of RKM Engineering for submitting this article. Rob can be reached at rkmeng@bbs.maloca.com. You can also find information on the sites as well as regularly updated IQUA values at http://www.gov.nb.ca/enviro/m/air/air_main.htm. RKM can also be reached at 1-416-925-7654.

For more information on this application, please contact:

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