



Public-Private Contract Safeguards Malaysia's Water Quality

Well on the way to becoming a total environmental monitoring solutions provider, Alam Sekitar Malaysia Sdn. Bhd. (ASMA) has applied its expertise in air and water quality monitoring to aid the Malaysian government in safeguarding the nation's water supply. A broad contract between ASMA and Malaysia's Department of the Environment (DOE) partners the two entities in a highly efficient system that gathers long-term trend data on water quality while also maintaining an early warning system to alert officials and water treatment operators of pollution discharges in key reaches of the country's river system.

Efficiency and accuracy are twin requirements of the program, a 20-year contract that began in 1995. To ensure both, ASMA maintains a network of 1,063 manual sampling sites throughout Malaysia, as well as 15 continuous unattended monitoring stations at critical locations. The combination of manual and continuous monitoring creates a strong foundation for the program – a wide net of sample sites for periodic manual data collection, reinforced by a constant flow of continually monitored data from key sites where detailed research and rapid response to pollutant releases is vital.

At a cost of approximately USD \$50,000 plus annual operating expenses of approximately USD\$10,000 per year, a continuous monitoring station represents about 12 times the company's annual investment in a manual sampling site. However, the drinking water for most of Malaysia's 24.8 million residents is drawn from surface water, so vigilance – of both real-time quality and long-term trends – is critical, says Eng. Mohamad Nor Awang, Manager of Water Resources Monitoring and Assessment for ASMA. “[The instruments] can easily monitor discharge from an industrial area and are

capable of being interfaced with other equipment,” says Nor. “The government sees that this can continuously protect our water intakes.”

Water quality monitoring stations identify pollutants

Nine of the continuous water quality monitoring stations, each equipped with YSI 6600 multiparameter sondes, are installed upstream of drinking water treatment plant intakes. Three more installations, equipped with the same instrumentation, sit downstream of key industrial areas, and a final three stations

are sited downstream of urban areas. Every 15 minutes, each YSI 6600 sonde reads temperature, pH, conductivity, dissolved oxygen and ammonia. A YSI 6200 Data Acquisition System interfaces with the sondes, transmitting the data via GSM to ASMA and DOE offices.

Conductivity is a strong indicator of contamination from metals discharged by industrial polluters, notes Range Lee of Lab-Environ Instruments in Kuala Lumpur, Malaysia, which sells and services the instruments for the project and provides training updates for ASMA staff four times per year. Ammonia levels help scientists and regulators stay abreast of sewage discharges, and dissolved oxygen helps monitor output from food processing plants along the rivers, among other pollutant sources, says Lee. He adds that the sondes can be configured to monitor a variety of other parameters if needed.

Continuous monitoring allows ASMA and DOE to establish practical, data-based limits for the key river reaches based on long-term trend studies that track changes

caused by weather events, diurnal cycles and seasonal fluctuations. Data are integrated with GIS information and water quality models into an Integrated River Basin Management



On contract with the Malaysian government, ASMA uses 15 unattended continuous monitoring stations to safeguard drinking water supplies and collect extensive data on water quality.

system. The constant vigilance and real-time reporting of the stations also allow nearly instant response when baselines are exceeded.

“Based on these data, DOE can set limits according to criteria – a very useful tool for setting enforcement limits,” says Lee. “Anything that triggers out of the baseline values for DO, conductivity or ammonium can trigger the early warning system – any movement.” Emergency alerts can lead to a quick shutdown of intakes at water treatment plants downstream of the stations, and may trigger enforcement actions upstream, he adds. An over-limit detection by a sonde also engages an automatic sampler in the station to collect and store a water sample for laboratory analysis.

Data from the stations – as well as the manually sampled sites – arrive formatted in YSI’s EcoWatch® DCP software, which automates collection and data management. If over-limit values are detected, EcoWatch marks the data and can automatically trigger the early warning system.

Maintaining accuracy and peace of mind

From EcoWatch, data are then transferred to Excel spreadsheets and run through ASMA’s rigorous QA/QC process. The pressure for accuracy is high – ASMA’s contract with the Malaysian government requires at least 85% accuracy, a goal the company has consistently met. Once the data have been verified, they are posted to a server at ASMA’s Environmental Data Management Centre for access by DOE, local authorities, and university researchers. ASMA also uses the data to develop management guidelines for key water resources.

Accuracy starts with clean equipment. ASMA maintains each station twice per month. Technicians are assigned to specific stations so they learn the nuances of each one, says Lee, carefully checking the site and equipment, and rotating in fresh instruments that are cleaned and calibrated in the lab. ASMA maintains four extra 6600s; in emergencies, Lab-Environ supports the network with repairs and parts. “We can fix up another instrument if there’s a problem and have it in the field in 24 hours,” Lee says.

Keeping clean is a constant effort, especially in turbid river environments. Lee points out that the 6600s are equipped with automatic wipers, which clean sensors before each sample is taken. The result is a stream of highly accurate data – and the



Each of ASMA’s continuous monitoring sites is equipped with a YSI 6600 sonde that transmits temperature, pH, conductivity, dissolved oxygen, and ammonia data every 15 minutes to ASMA and Malaysia Department of the Environment offices.

peace of mind that comes with constant, reliable vigilance. “ASMA is delivering added value,” says Lee. “They cannot afford to have any downtime.”

Nor adds that the investment in continuous unattended monitoring pays off daily – and represents an important investment in continually improving the government’s understanding, management and protection of the nation’s water supply. “[Continuous unattended monitoring] is a very useful mode of monitoring for current conditions and for the future in Malaysia,” says Nor.

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