

CASE STUDY *Environmental Compliance Monitoring for Lihir Gold Limited, Papua New Guinea*

Lihir Gold Limited (LGL) is a major gold producer in the Australasian region and operates one of the world's largest open cut gold mines and processing facilities on the island of Lihir, approximately two hours North East of Port Moresby, Papua New Guinea.

Since 1999, Ecowise has assisted LGL to monitor and report on environmental conditions, within the mining lease area and around the Lihir group of islands, for compliance, operational and resource purposes.

The project involves system design, supply, installation, maintenance and operation of the monitoring stations, along with data management and staff training. The initial network of stand alone monitoring stations has steadily evolved into a fully integrated environmental monitoring network.

In the last three years most of the monitoring sites have been upgraded with Campbell Scientific dataloggers and a 450 MHz radio telemetry system. The network was further enhanced with the addition of telemetry to three SO₂ gas stations, which monitor the processing plant emissions.

The system comprises a network of four automatic weather stations (AWS), six rainfall stations, nine stream gauging and water quality (WQ) stations and six freshwater gauging stations.

Water Quality Stations are located around the mine pit to monitor long term effectiveness of drainage design, for both geothermal water (being pumped to the surface) and rainfall run-off over the stockpile. Due to the volcanic nature of the area, acid rock drainage is a significant problem that needs constant monitoring.

Each station is custom designed and constructed by the Ecowise Instrument Group specifically for the LGL application. The stations, irrespective of their application, are similar in design to improve operation and maintenance by local staff.

Moisture is a constant problem in PNG. A double enclosure design has been adopted to minimise the ingress of water and damage to sensitive equipment damage by insects and geckos.

A suite of standard programs, developed for the Campbell Scientific dataloggers at each station, reduces the time required to establish or upgrade a station. Standard program variable names and a consistent data format ensure that the time required for system configuration, operation and maintenance is minimised.

A dedicated computer, running Campbell Scientific LoggerNet and Real Time Monitoring & Control (RTMC) software, provides automated data collection and monitoring of the entire network. Remote control functions are also possible at selected sites (e.g. for auto sampler operation). LoggerNet initiates automatic data processing by HYDSYS software for easy data management by LGL staff.

RTMC Web Server software produces regular (every minute) updates of station data to the Lihir intranet (which is available for all Lihir staff via a web page) in an easy to understand format. RTMC also generates email alarms when critical conditions are met. The emails are sent to key mine site personnel to warn of potential life-threatening or operational problems. Examples of these alarms include:

Project Summary

Application Type

A network of 22 meteorological, air quality, hydrological and water quality stations linked to monitoring and control software

Location

Lihir Island, New Ireland Province, approx 1200kms NE of Port Moresby, Papua New Guinea

Contracting Agency

Lihir Gold Limited (LGL)

Measured Parameters

Meteorological: Wind Speed, Wind Direction, Air Temperature, Relative Humidity, Barometric Pressure, Solar Radiation, Rainfall

Air Quality: SO₂

Hydrological: Water Level & Flow

Water Quality: Water Temperature, pH

Communications

450 MHz (UHF) Radio Telemetry



Water Quality stations around the pit provide information crucial to the safe and efficient operation of the mine.



A double enclosure station design has improved equipment reliability.

- high rainfall intensities, to warn of possible mine pit landslips
- low flow conditions downstream of the primary water storage during times of pumping
- flooding of the road causeway, that would affect traffic flow between the town and mine site
- long term cumulative rainfall totals, for initiation of low flow condition procedures
- 240 volt power failures at the Air Quality sites.

A large component of the project is the ongoing training and mentoring of the LGL Hydrographic staff. This includes management of data processing and archival. Regular training courses are held covering all aspects of network operation and management.



Training of local staff is a regular feature of the project.



After collection by LoggerNet the data is displayed using web pages generated by RTMC Web Server. These are available to all LGL staff via a link on the Lihir intranet.

