Ventilation Air Capture – Safety Reviews at Past Project Sites

Experience at ventilation air methane (VAM) oxidation projects conducted to date provides insight into the safety aspects of such systems and how regulatory authorities handled safety issues. Two projects to capture and beneficially use VAM have been implemented. The Thoresby Colliery in Nottinghamshire, UK, used MEGTEC's Vocsidizer thermal flow-reversal reactor to demonstrate its efficacy in a VAM-to-energy conversion application. The Appin Colliery in New South Wales, Australia, used gob gas to fuel internal combustion (IC) engines that, in turn, power generators to make electricity for on-site use. Ventilation air from the mine augments the gob gas and serves as combustion air in the IC engines.

At Thoresby, the VAM capture system withdrew ventilation air from the main mine ventilation outflow exiting the evasé. The extractor fan was located near the evasé, but there was no physical connection between the evasé and the demonstration system's air intake. CMOP was told that because there was no such physical connection, and because the system did not affect the in-mine air flow, the Mines Inspectorate did not need to be involved, and no formal certification or approval was required.

At the Appin power production project, the air intake also was designed so that it did not affect the mine's ventilation system. In addition, because the main mine ventilation fan linked to a continuous methane monitor designed to shut down the fan if methane levels exceed 1.25 percent, the highest methane concentration that could enter the project's air collection system is likewise 1.25 percent, thereby precluding flame propagation into the ventilation shaft. Because the New South Wales Mines Department's jurisdiction terminated at the discharge flange of the main mine ventilation exhaust fan, equipment downstream would not be subject to the Mines Department's rules, and the project was not subject to formal review and approval by the Mines Department. Also, tests determined that there was no reduction in the mine's ventilation fan performance even if airflow into the project's collection hood stopped. Because the project was able to demonstrate that it would have no effect on the mine ventilation system, no ongoing inspections or certifications are required.

Thus, in both the UK and Australia projects, the ventilation air collection system was not physically connected to the main mine ventilation evasé. In both cases, because the projects were able to demonstrate that they would cause no degradation in the mine's ventilation system performance, there apparently was no concern regarding safety.

It should be mentioned that, in both cases, the system used only a portion of the overall VAM flow, and therefore hood design was relatively simple. In a case where all (or nearly all) of the VAM flow is to be used, hood design may have to differ significantly from the approach applied in the above examples.

In addition, MEGTEC currently is conducting a demonstration of its Vocsidizer to process VAM in Australia with BHP, owner of several coal mines globally. The BHP demonstration unit is a rebuilt reactor rated at about 4.5 cubic meters per second, and includes a heat exchanger consisting of two sections of water tubes placed less than one quarter of the way into the reactor on each side. As of April, 2001, regulatory authorities had given the project a verbal go-ahead to connect the oxidizer to the ventilation system, but before that connection was made the first part of the demonstration proceeded with simulated VAM (i.e., a mixture of gob gas and ambient air). The early data on simulated VAM show that the heat recovery is very efficient. Subsequently the project started to operate with actual VAM, the results of which should be available by late Spring 2001.