

DIESEL EMISSION PROJECT AT ILLAWARRA COAL AIMS TO LIMIT EMPLOYEE EXPOSURE TO DIESEL PARTICULATES

Our Illawarra Coal operation is located near Wollongong in New South Wales, Australia, about 80 kilometres south of Sydney. The operation comprises four underground coal mines – Appin, Dendrobium, Elouera and West Cliff – together with two coal preparation plants and logistical services. Diesel vehicles are used in the operation of the coal mines. Since it became known that exposure to diesel exhaust particulate has the potential to cause serious health effects, we have been undertaking extensive research and have developed a strategy to effectively manage diesel particulate levels within our mines.



► Raw exhaust analyser at Elouera Colliery

In 1988, the United States National Institute for Occupational Safety & Health (NIOSH) released a Current Intelligence Bulletin on diesel particulate, which proposed that occupational exposure to this contaminant could lead to lung cancer. At that time, Illawarra Coal was in the process of changing to rubber-tyred diesel vehicles for mining operations. Workforce concern about the increased use of diesel equipment was high. The NIOSH findings posed a potential threat to the future use of diesel vehicles at Illawarra Coal operations and at other mines within our Carbon Steel Materials division.

Initial research

A research project commenced in May 1990 and was originally based at Tower Colliery, which was part of the Illawarra Coal operation until it closed in 2002. Tower was chosen as it had the largest proportion of rubber-tyred diesel vehicles within the division. A project committee was formed, consisting of mine management, workforce representatives, engineering personnel and external specialists in aerosol sampling, fuel quality and occupational hygiene.

As its first task, the committee conducted a workplace monitoring exercise to establish the level of worker exposure to diesel particulate and so quantify the extent of the problem. Between August 1990 and February 1993, some 204 personal diesel aerosol particulate samples were collected at Tower Colliery, covering all job descriptions associated with diesel activity. These results indicated lower exposures than those reported in US coal mines, but they were still considered significant.

Funding was obtained from the Australian Coal Association Research Program to extend the sampling program to eight collieries in New South Wales to establish whether the levels of worker exposure were consistent across the underground coal mining industry. At the same time, a range of control technologies had been identified and evaluation commenced. The control technologies evaluated included fuel quality, ventilation, engine design, disposable exhaust filters, engine decoking and water conditioner cleanliness. In total, over the period from 1993 to 1997, a total of 558 diesel particulate samples were collected in the evaluation of various control techniques for operational use.

Improving control techniques

In the period from 1997 to the present, work has continued on improving those control techniques that have been found to be suitable, resulting in reduced operating costs and an improved work environment. More recently, maintenance practices have been targeted, using raw exhaust diesel particulate monitoring techniques developed by the research group. The exhausts of 66 engines within the diesel fleet of the four Illawarra Coal mines were analysed, with seven engines found to be abnormal. Subsequent investigation found issues with exhaust systems and fuel injectors. Testing after repairs indicated significant reductions in raw exhaust diesel particulate levels.

Implementing a diesel particulate management strategy

As a result of this project, Illawarra Coal has developed a strategy to effectively manage diesel particulate levels within its operations. This strategy is based on the following conclusions;

- There is no one simple solution to the problem.
- A multi-faceted approach is necessary, with the focus being on restricting particulate release to the working environment. This includes the use of good-quality fuel, the use of raw exhaust monitoring to highlight maintenance issues and the use of disposable exhaust filters.
- Limitation of vehicle numbers in mine production panels reduces exposure and does not affect production if appropriately managed.
- The use of underground diesel test stations to monitor gaseous emissions provides a means of identifying engines requiring maintenance and improves employee confidence.
- There is a need to continue to liaise with original equipment manufacturers (OEMs) to supply low-emission engines in the future (albeit that it is anticipated that particulate filters will still be required for some time to come).

The strategy has been effective in controlling employee exposure to diesel particulates. Monitoring over a 12-month period at Elouera Colliery, using the approach outlined above, indicated that employee exposures averaged less than half the recommended exposure standard proposed by a committee convened by the NSW Minerals Council. The tripartite committee comprised representatives from government, trade unions and mine operators.

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ILLAWARRA COAL continued

Operators at Elouera Colliery, particularly those involved in long-distance driving, have recently commented that 'fume taste doesn't appear to exist'; 'convoy travel is not a problem like it used to be'; 'the sore eyes and throats don't pop up as often'; and 'blue haze doesn't appear as much in panels'. Summing up, Victor Borg, mechanical services leading hand at Elouera, says, 'It was not uncommon for operators to regularly complain about excessive diesel fumes. As we have gradually introduced new technologies into Elouera, it seems that complaints are rare. I'm sure that if we reverted back to standard street fuel and removed the exhaust canisters that our problems would reoccur'.

The procedures developed for our four underground mines at Illawarra Coal have applications at other mining operations; however, experience has demonstrated that an appropriate solution must be identified for each organisation and there must be substantial management input and commitment to the improvement process.