



## Safe Hearing Aid for Underground Coal Miners

*Ajay Maira, Electrical Manager, Low Current Branch, TestSafe Australia & Paul deGruchy, Department of Mineral Resources*

Swift action by two New South Wales government agencies has enabled coal miners with hearing defects to continue in their employment. Recently Paul Degruchy of DPI became aware that a hearing impaired mine worker would not be able to continue working underground unless he possessed an intrinsically safe hearing aid. Unfortunately Paul also discovered that a previously approved intrinsically safe analogue hearing aid had become obsolete and due to small sales would not likely be replaced. He immediately linked with

TestSafe's Ajay Maira to seek a solution.



Ajay, an electrical engineer and Manager of TestSafe's Low Current Branch, is an expert in the field of intrinsic safety, a type of protection used to protect electrical equipment from becoming an ignition source in hazardous areas.

It was quickly agreed that testing of a range of hearing aids would be done free-of-charge to overcome the situation.

The nub of the problem is that for an industrial manufacturer even though the product is highly valued by the recipient, market demand is small and the cost of testing hearing aid options is a deterrent.

An approach was made to a local manufacturer, Starkey Laboratories, and the Managing Director, Mr David Malcolm, supplied free of charge, various component items to the DPI to enable test and evaluation of the product. Important data was also obtained on the critical components that TestSafe would need to perform an assessment of the equipment.

Underground coal mines are dark, damp, confined spaces, and due to the presence of coal dust and methane, can be very hazardous in the event of an explosion or fire. The Department of Primary Industries (DPI) regulates the use of equipment in mines, and TestSafe, provides testing and certification of electronic equipment that may be used in such hazardous areas.

Testing commenced and the circuit of the hearing aid was examined to identify the key components on which intrinsic safety depends. Of note were the miniature cell that powers the hearing aid, the capacitance of the circuit, and the inductance of the audio 'receiver'. TestSafe electrical engineer, Garry Jeffery, quickly did the required testing on the cells, to determine both the maximum power they could possibly deliver, and also the temperature they could reach in event of a short circuit fault. The circuit indicated use of only low voltages, so the capacitance in the circuit was established as non-ignitable. The inductance of the 'receiver' was protected by its inherent resistance, and a calculation sheet showed which receivers were in compliance with the

energy requirements of Group I equipment used in coal mines.

Ajay Maira then completed the project with a comprehensive report showing compliance with the required Intrinsic Safety Standards. This confirmed that the design of three types of hearing aids



*The first recipient of the recently approved intrinsically safe digital hearing aid, Mr David Ham, with Paul de Gruchy, MSO Electrical Engineering, DPI.*

were suitable for use in a hazardous zone of an underground coal mine. On the basis of the report, DPI issued its Approval for the use of these hearing aids.

For further information ask your Audiologist, or contact Starkey Laboratories directly. The three approved hearing aid options are, Sequel SQ4 702; Axent AX 703; and Arista ARS 704. The approved units come with a copy of the approval document and are marked with the approval number MDA Ex ia 3256.