THE "MILLENNIUM BUG" – POSSIBLE IMPLICATIONS FOR SAFETY AND HEALTH

Most mine operators and managers will be aware of the business implications of the so-called "Millennium Bug" and the fact that date changes over the 1999-2000 interface may cause problems with computer systems. However, some may not have considered the safety and health implications of the same "bomb" and how it may affect microprocessors and Process Logic Control (PLC) or monitoring devices used in the mining industry.

The difficulties likely to be encountered include:

- those microprocessors which use only two digits for date calculations, i.e. 98, 99, 00 etc may generate unanticipated errors after the year 2000 if one date is subtracted from another during a programmed process (i.e. producing an unexpected negative result);
- some microprocessors will interpret 01-01-00 as 1 January 1900 – a Monday rather than a Saturday;
- a lack of recognition in some microprocessors that the year 2000 is a leap year (new century years are not normally leap years, only those divisible by both 4 and 400), which may result in the incorrect identification of days of the week after 28 February 2000; and
- some two-digit date systems may also be confused by the earlier date change to the year 1999 as some control systems use '99' as a special in-built control code, e.g. security code, override control code etc

Aside from general commercial inconvenience, some system, plant and equipment failures and malfunctions could have safety and health implications.

Such implications may include:

- shut downs of key systems, plant or equipment;
- failure of systems, plant or equipment to respond correctly to pre-programmed situations, in particular, the execution of emergency action;
- unsafe action being taken by systems, plant or equipment; and
- lack of action being taken by systems, plant and equipment.

Key systems, plant and equipment warranting further consideration and investigation include:

Fire detection systems, alarms and automatic fire extinguishers

Emergency lighting, access lighting etc

Environmental control systems (waste treatment, atmospheric emission control)

Security and safety lock-off systems

Process control and monitoring systems

Transportation control and signalling systems (including railways and mine winders)

Pumps and level control systems

Temperature control (including chemical and food storage)

Communications equipment

Emergency systems

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The safety and health significance of problems, which could arise, may vary from near misses and minor accidents, illness or discomfort to potentially catastrophic outcomes such as fatalities or complete loss of process control with major internal and external consequences for the organisation. Such potential consequences warrant a detailed and considered program of review, analysis and testing so that any effects may be predicted, quantified and controlled. The use of a risk analysis matrix is recommended:

PROBABILITY	**CONSEQUENCE**			
	Catastrophic	**Critical**	**Marginal**	**Negligible**
Frequent	HIGH	HIGH	HIGH	Moderate - Low
Probable	HIGH	HIGH	Moderate - High	Moderate - Low
Occasional	HIGH	Moderate - High	Moderate - Low	Low
Remote	Moderate - High	Moderate - High	Moderate - Low	Low
Improbable	Moderate - Low	Moderate - Low	Moderate - Low	Low

QUALITATIVE RISK MATRIX

High consequence, high probability potential events obviously warrant action to curtail any adverse effects, but mine operators should not lose sight of the fact that the insidious nature of the "millennium bug" can mean that a relatively simple and seemingly inconsequential fault may have the most devastating results. The only answer is care, consideration of what may happen and planning for the worst.

All mining enterprises are strongly encouraged to begin contingency planning now and to undertake the necessary review and test-work on existing equipment and software well in advance of any potentially troublesome time-changes. The necessary remedial action should be identified and incorporated into maintenance and replacement planning and budgets.

Any purchases of new equipment or software should be made in the full knowledge of the potential for problems and suppliers should be closely questioned regarding year 2000 changeover compliance and required to demonstrate compliance where necessary. Care should also be taken to ensure that account is taken of the compatibility of equipment and component combinations from multiple suppliers, as system design is largely reliant upon the information provided to the designer by the manufacturers and suppliers of the elements which make up the system.

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