MVA Technical Guidance Note

Ventilation of Underground Mines Code of Practice

Draft as of Feb 2012

Note: Text in red italics are direct quotes from the draft (February 2012) Ventilation Code of Practice ("CoP").

What is a CoP?

This Code of Practice (this Code) on ventilation of underground mines is an approved code of practice under section 274 of the Work Health and Safety Act (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulations (the WHS Regulations).

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks which may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and Regulations. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

Compliance with the WHS Act and Regulations may be achieved by following another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety than the code.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice.

Applicability of the CoP

The CoP applies to both coal and metalliferous mines (although some specific issues in the CoP are less (or not) applicable to specific types of mines with specific hazards present).

In providing guidance, the word 'should' is used in this Code to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

The words 'must', 'requires' or 'mandatory' indicate that these legal requirements exist, which must be complied with.

The CoP applies to all activities during the life of the mine, such as exploration; construction; operation; decommissioning and final mine closure.

If you are planning a new mine, you should use this Code to determine what standard of ventilation needs to be provided. The extent of expertise required will depend on the nature and complexity of the ventilation system. Expert advice could be provided by ventilation engineers, hygienists, or related professionals.

The hazards which are controlled by ventilation include:

- oxygen content
- oxidisation
- toxic and asphyxiant gases
- flammable gases
- airborne dust
fumes
products of combustion
humidity
temperature, and
some naturally occurring radioactive materials (NORMs).

Scope of the Ventilation Control Plan

An operation must prepare a Ventilation Control Plan (VCP) to effectively control these hazards and this must be prepared using a risk management process. The VCP must be developed in consultation with the workers and other persons at the mine.

The Ventilation Control Plan minimises the risk of these hazards by providing for the systems, processes and procedures to establish and maintain a safe atmosphere in an underground mine and should address the following matters;

- roles, responsibilities and competencies
- design and planning
- inspection, measuring and monitoring
- fans
- ventilation control devices
- auditing and review, and
- reference to standards

Air monitoring must be conducted in accordance with the risk assessment, and records must be kept for at least 7 years.

The CoP then goes on to discuss a number of specific airborne hazards in a mine including:

- Oxygen
- Carbon dioxide
- Carbon monoxide
- Methane
- Hydrogen sulphide
- Nitrous fumes
- Hydrogen
- Ammonia
- Radon
- Dust
- Diesel particulate matter (DPM)
- Temperature, humidity and velocity
- Spontaneous combustion

The CoP quotes WH&S regulations as follows:

Regulation 9.2.18 requires the mine operator to ensure a ventilation control plan is prepared. It must describe all control measures implemented in relation to ventilation at the mine, including by cross referencing relevant sections of the WHS management system for the mine.

Regulation 9.2.28 requires the mine operator to ensure the following:
- ventilation circuits at the mine do not allow uncontrolled airflows to recirculate
- plant and structures that regulate airflow are maintained in good working order
- dead-end openings are not worked unless adequate auxiliary ventilation is provided, and
- no work area at the mine is ventilated with contaminated air.

The air supplied to the ventilation system must be obtained from the purest source available.

The VCP (required under the CoP) is itself required to address a large number of specific issues. Some of the more significant of these include:

- Change management (changes to the ventilation system and properly reviewed beforehand)
- Ensure all ventilation control devices at the mine are properly constructed and maintained
- Audit the operation and effectiveness of the ventilation system at intervals not exceeding two years
- Procedures to ensure defects in the ventilation are reported (to management)
- The VCP must include trigger levels for hazards (where appropriate)
- The VCP must address "Upset/abnormal conditions" impacting on ventilation such as:
  - Fires in the underground workings, including:
• The VCP should include (where the relevant hazard is present) procedures for:
  o Re-entry after blasting
  o Restricting access to sumps, bins or chutes
  o Starting and stopping fans
  o Restoration of ventilation after a disruption
  o Restoration of ventilation to unventilated areas
  o Action to be taken when ventilation fails
  o Handling and storing explosives (ammonia)
  o Applying shotcrete (ammonia)
  o Handling cement (ammonia)
  o Roadway maintenance (dust)
  o Testing vehicle emissions (DPM)
  o Limiting access of vehicle emissions (DPM)
  o Working in hot and humid conditions (heat stress)
  o Trigger levels for work/rest cycles or withdrawal (heat stress)
• A plan of the ventilation system must be prepared and kept up to date showing:
  o the direction, course and volume of air currents, and
  o the position of all air doors, stoppings, fans regulators and other ventilating plant and structures at the mine,
• The VCP recommends 0.06 m$^3$/s per kW rated (maximum) total diesel engine power in that area
• The VCP recommends a minimum wind speed of 0.3 m/s in an airway
• Where there is a risk that wet bulb temperature may exceed 27 degrees Celsius, a working in heat management plan should be established. Where the wet bulb temperature exceeds 34 degrees Celsius work should be stopped, other than work to reduce the temperature
• The Ventilation Control Plan should include a reference to standards and management plans that were referred to or consulted during the development

The audit of the ventilation at the mine should be carried out by a suitably qualified person. The Ventilation Control Plan must be reviewed:

After each audit, if any non conformances are identified
Following an incident where ventilation has been identified as a contributing factor
When the ventilation system has been found to be inadequate
Following changes to the mine operating system which may affect the ventilation system

It must be emphasised that the above is a brief summary of selected key aspects of the CoP not a comprehensive review and also that, at the time of writing (February 2012), the CoP was still a draft.

For further information, see the MVA TGN: Ventilation Management Plan, Trigger Action Response Plans (TARPs), Standard Operating Procedures (SOPs) and MVA TGN: Guide to Ventilation Impacts of New Australian Harmonised WH&S Regulation for Mines (Chapter 9)