



Dangerous Goods Safety Bulletin No. 0209

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Subject: Fire suppression measures for fixed underground explosives magazines

Background

A poorly designed and installed fire suppression system in a fixed underground magazine can result in a failure to extinguish an accidental outbreak of fire in the magazine. This can lead to an explosion of products in the magazine and present a major air-blast hazard to persons working in the mine.

The Dangerous Goods Safety (Explosives) Regulations 2007 require that fixed underground magazines for the storage of explosives comply with Australian Standard AS 2187.1:1998 *Explosives – Storage, transport and use – Storage*, clause 2.6.2.

Clause 2.6.2.6 of AS 2187.1:1998 describes firefighting systems for underground fixed magazines.

Applicable references to fire protection deluge systems are Australian Standard AS 2118.3:1997 *Automatic fire sprinkler systems – Deluge* and National Fire Protection Association Code NFPA 15, 2007 *Standard for water spray fixed systems for fire protection*.

Issues

- Clause 2.6.2 of AS 2187.1:1998 does not clearly describe the requirements for firefighting systems for underground fixed magazines.
- The design of a fire suppression system needs to address and minimise risk.

Recommendations

1. The following interpretations are to be applied for the terminology used in AS 2187.1:1998.
 - *Remotely or automatically operated* – includes manual operation, provided that the manual operation point is at a safe distance and located upwind, outside of the magazine, and such that the operator can escape. Some fire protection systems cannot be manually overridden (see below).
 - *Have pipelines and control valves that are fire-resistant, clearly marked and accessible from ground level* – includes fire suppression systems that incorporate fire-resistant pipelines and control valves extending at least 10 m beyond the perimeter of the magazine (e.g. PVC or plastic pipes may be used to transport water to the desired location, so long as all piping within a 10 m boundary of the magazine is fire-resistant). Manual release valves are to be positioned on the ventilating air intake side. Stainless steel piping may be suitable in areas where hypersaline water results in corrosion problems.
 - *Be of a sprinkler type where a diesel-powered vehicle can enter the underground magazines* – includes deluge systems, but is not limited to the definition of “sprinklers” as specific to the fire protection industry. The term “sprinkler type” should be understood as simply meaning a scattering of small drops or particles.

Fire sprinkler systems (e.g. closed bulb wet sprinkler systems) are not recommended as these devices are individually activated by a rise in temperature. Fires involving explosives can build quickly and “get ahead” of sprinkler systems, rendering them ineffective. Furthermore, such sprinkler systems cannot be manually overridden, nor can they be remotely activated.

Deluge systems are considered appropriate fire suppression systems for installation within underground fixed explosives magazines. Fires require oxygen, heat and fuel to burn. As the

chemical format of explosives contains oxygen and fuel, it is difficult to effectively remove or suppress these components and extinguish the fire. Deluge systems, however, deliver sufficient water to cool the explosives, thereby removing one of the key requirements for sustaining a fire.

2. When designing and implementing a fire suppression system for underground fixed magazines, appropriate measures must be taken to mitigate risk, such as ensuring:
 - personnel are trained in the use of the fire suppression system and can operate it in an emergency (e.g. training, instruction plates for operation of the system affixed at the manual operation point);
 - the system is reliable (i.e. system components are appropriate for a damp environment, minimise electrical components);
 - system components are rated for fire protection use;
 - the system incorporates a minimum number of valves and such valves are only to be operated by authorised persons;
 - pipework is sized to meet the water quantity supply requirement and installed in accordance with proper engineering principles;
 - any applicable standards are followed for the installation of the system;
 - the system is regularly inspected and maintained; and
 - a reliable and sufficient quantity of water is available at all times and is generally independent of other pumping arrangements.

The Dangerous Goods Safety (Explosives) Regulations 2007 provide for “alternative safety measures” to comply with certain standards. A definition of this term is available within the regulations, but may be summarised as a measure that results in a level of risk equal to or lower than that set by the standard. For fire suppression systems, the requirement is to extinguish fire in an underground fixed explosives magazine.

Licensees are reminded of their duty to assess and minimise risk from dangerous goods, as required by the *Dangerous Goods Safety Act 2004*.



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