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**Snowy Mountains Hydro-electric Authority**  
**MEMO**

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**To: Rob Evans**  
**From: David Wright - Investigations Officer, Telecommunications**  
**Date: April 5, 2000**  
**Subject: Pyrogen Fire Suppressant**

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**1. INTRODUCTION**

Today Pyrogen Australia set up for us a demonstration of their fire suppressant system in a 200 litre wooden box containing a running computer, some enclosed relays and a PABX circuit card. The suppressant (Pyrogen MAG-02 unit) was in a container some 120 mm long and 25 mm in diameter. As the suppressant is particulate in nature, the demonstration was designed to gauge the amount of residue left on and in the equipment.

**2. PRODUCT DESCRIPTION**

**a. Physical**

The Pyrogen device consists of a metal housing containing a solid aerosol-generating chemical (plasticised nitrocellulose, potassium nitrate and other additives), a solid chemical coolant, an activation device and an end-plate discharge outlet.

**b. Activation**

The devices can be activated electrically (automatically or manually) or thermally (automatically).

**c. Extinguishing Agent**

- i. The aerosol-generating chemical surface-burns, producing, a controlled amount of heat and aerosol, which is the actual extinguishing agent .
- ii. The extinguishing aerosol consists of micron-sized solid particles of potassium carbonate and potassium bicarbonate and gases (carbon dioxide and nitrogen) which are expelled into the atmosphere.
- iii. The hot aerosol is expelled through a layer of the solid chemical coolant (mainly, magnesium sub-carbonate) which decomposes to magnesium oxide and carbon dioxide, absorbing much of the heat. At a distance of 300 mm the temperature is no more than seventy degrees Celsius.
- iv. The micron-sized particles stay in suspension for around half an hour, after which time they agglomerate due to the action of gravity and settle.

**d. Action in the Fire Zone**

In the fire zone, the potassium carbonates particles (solid fraction of the aerosol) dissociate into potassium radicals. Potassium radicals attach themselves to "chain

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Distribution:

carriers", small molecular fragments that propagate a fire reaction, thus removing them from the fire zone and closing the chain. The extinguishing action of potassium radicals is similar to that of bromine radicals in Halons.

**e. Cleanup**

The release leaves a fine, pH-neutral powder residue which can be most effectively cleaned up with a vacuum cleaner.

**f. Danger to Personnel and Equipment**

- i. The chemical residues are not dangerous to personnel. However, as a matter of course, they should be cleaned off equipment as soon as possible.
- ii. Although the chemicals are water soluble, they are not noticeably hygroscopic.
- iii. Because the extinguishant does not significantly deplete oxygen levels, there is little danger to personnel accidentally caught in a discharge. Prolonged breathing of the aerosols can cause coughing and other breathing difficulties so that prompt evacuation is recommended.
- iv. After discharge, the air is filled with the micron-sized powder, similar in appearance to dense, white smoke so there would probably be a degree of disorientation.

**3. TEST RESULTS**

The computer continued to work, with frequent floppy disk access, for the full half hour while confined in the box with the agent. A 3.5" floppy disk is the most sensitive item in the computer to contamination by dust.

The computer was still working correctly five days later.

Examination of the computer showed an extremely fine film of white dust, invisible until it was gathered together by rubbing with the finger. There were no other visible signs of contamination.

The PABX circuit card showed signs of heavier residue and a slightly greasy film on the surface facing the discharge. Pyrogen's chemist, Julia Berezovsky, tells me this is larger particles of undecomposed chemical due to the card being less than the manufacturer's recommended minimum clearance from the discharge outlet. The underside of the card shows no signs of residue whatever.

**4. RECOMMENDATIONS**

This extinguishment method would appear to be ideal for communications sites, particularly small ones such as Black Jacks and Big Talbingo where the simplicity of the system would make it cost-effective and easy to install.

