

# Fire retardants and health

Public health bushfire information - December 2010

## What are fire retardants?

Fire retardants are chemicals that slow the spread or intensity of a fire. They help fire fighters on the ground and are sometimes dropped from aircraft.

Short-term fire retardants are detergent chemicals mixed into foam. Long-term fire retardants are chemicals that are mixed with water to form a slurry. Fire retardants have been used in Victoria for the last thirty years.

## How do fire retardants work?

Long-term fire retardants are mixed with water before they are dispersed over the target area. When the water is completely evaporated, the remaining chemical residue retards vegetation or other materials from igniting, until it is removed by rain or erosion. Fire retardants also work by binding to the plant material (cellulose) and preventing combustion.

Gels and foams are used to fight fires by preventing the water they are mixed with from evaporating easily. They coat the fuel (grass, trees and shrubs) and prevent or slow down combustion. A slurry of gel can be pumped over the fire and it immediately cools down the intense heat and helps put out the fire.

## What are fire retardants made of?

Long-term fire retardants are essentially fertilisers (ammonium and diammonium sulphate and ammonium phosphate) with thickeners (guar gum) and corrosion inhibitors (for aircraft safety). Sometimes a red coloured pigment, made from iron oxide, is added so that those spraying can see where they have released the fire retardant. Examples of long-term fire retardants include Phos-Chek D75-F and Phos-Chek D75-R.

Short-term fire retardant foams are made from a combination of wetting agents and foaming chemicals, mixed with water. This allows the water to penetrate surfaces more easily. Their usefulness is limited against high-intensity fires, where long-term retardants have proven more successful. Examples of short-term fire retardants include Ansul Silv-Ex, Angus Forexpan S and Phos-Chek WD-881.

## What about aqua gels?

Super absorbent polymers (SAPs) can absorb high volumes of water relative to their own weight. In its concentrated powder form, SAPs can irritate eyes, airways and the skin. This does not occur after they have been mixed with water. When mixed with water the result is a gel-like substance which acts as a barrier against evaporation from heat. Gel fire retardants can be applied via aircraft or trucks as a firebreak, direct suppression or for structure protection.

## What about brominated flame retardants?

Polybrominated flame retardants (PBFs) are a category of chemicals that are widely used in household and industrial items, including computers, electronics and electrical equipment, televisions, textiles, foam furniture, insulating foams, and other building materials. They are sometimes also called fire retardants but are quite different from the chemicals described here and are not used in fighting bushfires.

## What about environmental effects?

Although not a lot of research has been done in this area, the current evidence does not suggest any significant effects on birds or mammals. However, in Australia, long-term fire retardants have been observed to cause effects on some species of

native plants (leading to low level damage to new growth). Water plants and animals are more sensitive to the effects of fire retardants; foams in particular can be moderately toxic to aquatic life. For this reason, pilots try not to apply fire retardants close to waterways.

### **What about health effects?**

Testing shows these chemicals can produce minor irritant effects. The concentrated powder may cause minor respiratory irritation to workers who are handling it. Once it is mixed into slurry this health effect does not occur. Workers are required to wear gloves, goggles and dust masks when handling the powder.

Risk assessments carried out in the United States and in Victoria demonstrated that the risk of health effects was very low, even to people who are accidentally exposed to the fire retardants during their application.

### **I live in a fire prone area – what precautions should I take if I have a water tank?**

- Disconnect your water tank to prevent contaminated water from entering it.
- Install a first flush diverter or make sure the first part of runoff after rain cannot go into your tank. This will prevent any water runoff from your roof containing fire retardant from entering your tank. It will also prevent embers, ash and other contaminants from entering your drinking water.

### **If the fire retardant does enter your water tank:**

- Do not drink the water. High levels of ammonia and sulphate in water will make it smell terrible and taste salty. It will not be suitable as drinking water for humans or animals (pets or livestock).
- The water can still be used for irrigation and fire fighting purposes.

### **Tips on cleaning up fire retardant residue:**

- If aerial fire retardant or fire fighting foam residue is present on the house and/or cars, use a mild detergent with water and brushes to scrub and dilute the dried residue and flush it from the surfaces. Rinse with clean water. A follow-up with pressure washing may help but will not replace scrubbing to remove the residue. Gloves and non-slip shoes should be worn as it may be slippery.

### **Further information**

For further information regarding fire retardants and health, contact the Environmental Health Unit of the Department of Health on 1300 761 874.

For further information regarding the use of fire retardants, contact the Department of Sustainability and Environment on 136 186 or visit the website [www.dse.vic.gov.au](http://www.dse.vic.gov.au).