



BANFF, KOOTENAY & YOHO NATIONAL PARKS OF CANADA

Fire Suppressant and Retardant use in the 2003 Wildfires

The wildfires burning in Kootenay National Park will create dramatic changes in the landscape. Fire control operations also have the potential to impact park ecosystems (e.g. water withdrawal from streams and lakes, chemical and fuel spills, cat guard construction). Parks Canada is working to ensure that these potential environmental impacts are minimized. Fire suppressants and fire retardants are two categories of fire control requiring special monitoring.

Short-term Suppressants

Fire suppressants, such as water and foam, are applied directly to the burning fuel or onto combustibles at great risk, to extinguish the flaming, glowing and smouldering stages of combustion.

Water

Water suppresses fire in two ways: by cooling, which slows or prevents ignition, and by blocking oxygen reaching wet fuel surfaces. Water is best used in initial attack, such as attending to lightning strikes, or direct attack of the fire perimeter and on troublesome hot spots. Water, from rivers and lakes, remains the main fire suppressant used. It is applied by helicopter bucketing, airplane water bombing and through hoses and sprinklers.

Fire Suppressant Foam

Foam is a wetting agent containing detergents and other additives, which allows water to penetrate surfaces more easily, resulting in a more efficient use of water (a precious resource in the mountain parks). Fire suppressant foam is effective for several hours and is best used in direct support of ground firefighters. The frothy foam adheres to surfaces better than straight water and also has some insulating capability. Foam loses its effectiveness when water evaporates. Foam is mostly used for facility protection.

Fire suppressant foam has been used for facility protection at Kootenay Park Lodge.



Dropping long-term retardant on a fireguard Aug 16, 2003. Gord Irwin. © Parks Canada

Long-term Retardants

Fire retardants reduce the flammability of combustibles. Long-term retardants are used directly on fire, or indirectly, such as laying down a continuous line of retardant parallel to the fire line. It is especially important when retardant lines are expected to hold for long periods of time.

These fire retardants are made from mixing water with chemicals into a thick slurry using specialized equipment. The primary ingredients in long-term retardants are fertilizer salts of ammonia and phosphorus, and clay. The orange colour comes

from a small amount of iron oxide (rust) whose purpose is to make it easier for pilots to see where retardant has been applied. The retardant is spread by helicopters or air tankers and adheres to combustible surfaces.

While wet, the retardant cools the fire but after the water evaporates the retardant is still effective. When flames reach a treated tree, the heat bonds the retardant with the wood cellulose and blocks oxygen from interacting with the fuel. Treated trees are very slow to ignite. Long-term fire retardant has been used to increase the effectiveness of fireguards at the north end of Kootenay National Park.

The Impact of Fire Suppressant and Retardants on the Environment

The fire retardant products being used by Parks Canada are among the most “environmentally friendly” available. Parks Canada is monitoring all retardant use to better understand their short term and long term effects on the environment.

Water

Water is the among the least environmental damaging of the fire containment tools used by Parks Canada but still has environmental impacts including:

- disturbance of water sources through withdrawal of large volumes of water
- damage to vegetation and soil caused when large quantities of water is dropped from height
- sediment run-off may increase siltation in streams.

Fire Suppressant Foams

Traditional foams appear to be slightly more toxic to aquatic life than retardants. The product being used by Parks Canada does not contain any components that have been shown to be hazardous and is considered to be of low environmental concern. Overall these chemicals may leave less permanent effects on ecosystems than some physical measures used to combat fire.

Long-term Fire Retardants

Long-term fire retardants used by Parks Canada are considered to be non-toxic to terrestrial organisms and of low to moderate toxicity to aquatic organisms. The toxic component of retardants in aquatic systems is ammonia (from the fertilizer salts) which fish are sensitive to. The greatest impact to aquatic ecosystems occurs when retardant is accidentally dropped into a watercourse.

Some fire retardants contain sodium ferrocyanide, a compound that increases the toxicity of the product. **The fire retardant used in Kootenay National Park, does not contain ferrocyanide.**

Fire retardants are not believed to persist in the environment for long periods of time. They are

taken up by vegetation and soils. Following a rainfall, there may be an increase in nitrogen and phosphorus in the run-off from areas where the retardant was applied. In our nutrient-limited mountain streams and lakes, this may result in measurable changes in water quality, algal growth and numbers and types of invertebrates

Mitigations

Parks Canada uses suppressant and retardant products that are among the most environmentally friendly available. Fire suppressants foams and long-term retardants will be used sparingly where they contribute significantly to fire control. Where possible Fire retardant products containing sodium ferrocyanide will not be used.

The key to reducing the impact of retardants and foams on aquatic ecosystems is accuracy.

Parks Canada has applied suppressant foam from land rather than air to ensure that the foam goes only where it should. The use of fire suppressant foams will be limited to facility protection.

Parks Canada will apply long-term fire retardant primarily by helicopters as they have far greater accuracy than airplanes. Pilots have been asked not to drop the retardant within 30 m of water bodies and to also take wind speed into account during drops (high winds can cause the chemicals to drift).

Fire operation personnel and aquatic specialists are working to address environmental effects related to the fire operations. A monitoring program is currently being implemented to gather more information about the effect of the fire on aquatic ecosystems and to monitor for changes in water quality downstream of areas where retardant was applied

A rehabilitation plan is being prepared to address rehabilitation of impacted sites at the conclusion of fire operations. Short-term erosion control measures are planned at the Vermillion River.

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