FUSEE Fire Reports

Providing information and analysis on critical wildland fire issues

Chemical Weapons: Fire Retardants

KEY POINTS

- Fire retardants include a number of toxic chemicals such as ammonia and phosphoric acid.
- Some retardants degrade into cyanide.
- Contentrated doses in lakes and streams can kill fish and other aquatic species, and create algae blooms.
- Retardants alter soil chemistry and can stimulate the growth of invasive weeds.
- Dumped at the wrong time, place, and conditions, retardants are an ineffective suppression method, and an expensive "photo-op."
- Non-toxic alternatives need to be developed and used.

A number of different toxic chemicals are used during fire suppression operations, but fire retardant is the most significant chemical in terms of quantity used and their environmental impacts. Retardant drops from low-flying air tankers makes dramatic news photos and video footage, and is arguably one of the dominant images of wildfire suppression in the public's eye.

An air tanker drops a slurry load of fire retardant

Dumped from a low-flying air-tanker or helicopter, the red-dyed mixture of chemicals and water clings to organic matter and creates a chemical reaction that makes biomass difficult to burn for a limited time, thus retarding fire spread. If it is dropped in the right places at the right times under the right conditions, retardant can cool down and slow down the rate of fire spread, but ground crews must be positioned to take advantage of the drops. If retardant is dumped at the wrong place, time, or conditions and there are no firefighters ready on the ground, retardant drops make an expensive newsmedia photo-op that is essentially futile for actual fire containment objectives.

Fire retardants are basically 80% water, 10% fertilizer, and 10% chemical additives. At temperatures above 200 degrees Fahrenheit, the fire retardant, Phos-Chek, breaks down into toxic ammonia and phosphoric acid.[1] Another popular retardant, Fire-Trol , degrades into cyanide at levels highly toxic to aquatic species, especially frogs.[2]

In still bodies of water like lakes and ponds, concentrated doses of retardant can immediately kill fish, or the nitrogen and phosphorus in retardants can lead to algae blooms that consumes oxygen and kills fish slowly over time. When dumped on the ground, the fertilizer in retardant can stimulate the growth of invasive weeds which can enter remote sites from seeds transported inadvertently by firefighters and their equipment.

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The Biscuit Fire area has been proposed by conservationists as the "Siskiyou Wild Rivers National Conservation Area," and it is home to a vast network of creeks, perennial and ephemeral streams--not all of which may be sufficiently mapped in the remote, rugged terrain. Even though there are official standards and guidelines that direct pilots to avoid dumping retardant in waterways, this demands a lot of pilots who must navigate through smoke columns, shifting winds, and mountainous terrain. In fact, reports revealed that airtankers were ordered to the Biscuit Fire when visibility was poor due to smoke conditions, and communication was not available to direct them to targets.[3]

Generally, the exact locations of retardant drops are not well document in suppression records. However, it was documented that fire retardant was dropped within some riparian areas, including heavy direct applications into Nance and Ethel Creeks which are tributaries of the lower Illinois River. These small streams have never been surveyed to see if they are fish-bearing; however, there was sufficient quantity of retardant dumped into the water that if fish were present mortality would have been likely.[4] The Biscuit Fire records indicate that in just one zone of the fire, 491,547 gallons of the fire retardant, Phos-Chek, was used at a cost of $594,776. On one day alone (August 14, 2002) over 104,664 gallons were used.[5]

In addition to toxic pollution of water, retardant drops can also cause negative impacts on soils. On the Biscuit Fire, the ammonia and aluminum in fire retardant altered the chemistry and acidified the naturally basic serpentine soils. As well, the addition of nitrogen from retardant into the otherwise nutrient-poor serpentine soils is anticipated to cause negative impacts on the rare endemic plants that have evolved with unique adaptations to those soils.[6]

Fire retardant can be a useful and effective tool for wildfire suppression, but it should be used sparingly, and only in combination with ground crews taking advantage of its short-term effects on fire spread. Above all, non-toxic alternatives need to be developed and used.

FUSEE supports a new, emerging paradigm that seeks to holistically manage wildland fire for social and ecological benefits instead of simply "fighting" it across the landscape. We seek to protect, restore, and maintain fire-adapted ecosystems, and enable fire management workers to perform their duties with the highest professional, ethical, and environmental standards. Our long-term goal is the creation of fire-adapted communities able to live safely and sustainably with fire-adapted ecosystems.

ENDNOTES

1. G.S. 2001. "Fighting Fire With Pollutants." Earth Island Journal. 15(4) Winter 2000-01,

2. Forbes, A. 2000. "Agencies Suspend Use of Retardant Products." USDA Forest Service, Washington Office Fire and Aviation Management. March 31, 2000. available at: http://www.fsx.org/fireretardlhtml.

3. Larsen, G.L. 2002. "Use of Airtankers in the Northwest." [Zone 1, Box 19, 17-30]

4. USDA Siskiyou National Forest. 2003. Biscuit Post-Fire Assessment, pg. 32.

5. USFS. 2002. "Phos-Chek Daily Recap." [Zone 1, Box 14, No. 15c-9]

6. USDA-FS. 2002. "Florence Biscuit Fire; Resource Issues and Mitigations." Siskiyou National Forest. Memorandum (July 30). [Zone 1, Box 1, No. 3]