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## Chapter 12 Suppression Chemicals & Delivery Systems

### Policy for Use of Fire Chemicals

Use only products qualified and approved for intended use. Follow safe handling procedures ~~and~~, use personal protective equipment recommended on the product label and *Material Safety Data Sheet* (MSDS).

A current list of qualified products and approved uses can be found on the Wildland Fire Chemical Systems ([WFCS](http://www.fs.fed.us/rm/fire/wfcs/)) website:

- <http://www.fs.fed.us/rm/fire/wfcs/index.htm>
- Link to appropriate Qualified Products List ([QPL](#))

Refer to local jurisdictional policy and guidance related to use of wildland fire chemicals for protection of historic structures.

~~Quality control maintenance~~ Products must be blended or mixed at the proper ratio prior to being loaded into the aircraft. Quality control and safety requirements dictate that mixing or blending of wildland fire chemicals be accomplished by ~~standard approved methods. Products must be blended or mixed at the proper ratio prior to being loaded into the aircraft~~ approved methods.

### Types of Fire Chemicals

#### Long-Term Retardant

Long-term retardants contain fertilizer salts that change the way fuels burn. They are effective even after the water has evaporated. Retardants may be applied aerially by large air ~~tanker~~ stanker, single engine ~~airtankers~~ (SEATs) ~~airtanker (SEAT)~~ and helicopter bucket. Some products are formulated specifically for delivery from ground sources. See the ~~Qualified Products List~~ QPL for specific uses for each product.

~~Principles of application and~~ Recommended coverage levels ~~are~~ and guidelines for use can be found in the *10 Principles of Retardant Application*, NFES 2048, PMS 440-2 pocket card. Retardant mixing, blending, testing, and sampling requirements can be found at the ~~Wildland Fire Chemical Systems~~ WFCS website Lot Acceptance and Quality Assurance page: <http://www.fs.fed.us/rm/fire/wfcs/laqa.htm>.

#### Fire Suppressant Foam

Fire suppressant foams are combinations of wetting and foaming agents added to water to improve the effectiveness of the water. They are ~~not~~ no longer effective once the water has evaporated. Foam may be applied by engines, portable pumps, helicopters and SEATs. Some agencies also allow application

1 of foam from fixed-wing water scoopers. See the [Qualified Products List QPL](#)  
2 for specific uses for each product.

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6 Technical guidelines for equipment operations and general principles of foam  
7 application are discussed in *Foam vs. Fire, Class A Foam for Wildland Fires,*  
8 *NWCG, PMS 446-1, NFES 2246, 2nd ed., October 1993,* and *Foam vs. Fire,*  
9 *Aerial Applications, NWCG, PMS 446-3, NFES 1845, October 1995. ~~Chapter~~  
10 ~~14 contains equipment used for application of wildland fire suppressant foams.~~*

11

### 12 **Wet Water**

13 Using foam concentrates at a mix ratio of 0.1 percent will produce a wet water  
14 solution.

15

### 16 **Water Enhancer (including Gel)**

17 Water enhancers, such as fire fighting gels, are products added to water to  
18 improve one or more of the physical properties of water. They are not effective  
19 once the water has evaporated. These products may be used in structure  
20 protection within the wildland interface or on wildland fuels. They are fully  
21 approved for use in helicopter bucket and engine application. Many are also  
22 approved, at specific mix ratios, for use in SEATs, [and fixed tank helicopters.](#)  
23 See the [Qualified Product List QPL](#) for specific uses for each product.

24

### 25 **Safety Information**

26

#### 27 **Personnel Safety**

28 All qualified wildland fire chemicals meet minimum [\(June 2007\)](#) requirements  
29 [within](#) regard to aquatic and mammalian toxicity, acute oral toxicity, acute  
30 dermal toxicity, primary skin irritation, and primary eye irritation ~~in accordance~~  
31 ~~with the current (June 2007).~~ Specifications for long-term retardants, fire  
32 suppression foams, and water enhancers, ~~which~~ can be found on the WFCs  
33 website.

34

35 Personnel involved in handling, mixing, and applying fire chemicals or solutions  
36 shall be trained in proper procedures to protect their health and safety and the  
37 environment. [Approved fire chemicals can be irritating to the eyes.](#) Personnel  
38 must follow the manufacturer's recommendations, including use of PPE ~~(i.e.~~  
39 ~~goggles, gloves, eyewash kits on site),~~ as found on the product label and product  
40 [Material Safety Data Sheet \(MSDS\).](#) The MSDSs for all approved fire  
41 chemicals can be found on the web site at  
42 <http://www.fs.fed.us/rm/fire/wfcs/msds.htm>. ~~Approved fire chemicals can be~~  
43 ~~irritating to the eyes. Anyone involved with or working in the vicinity of fire~~  
44 ~~chemical concentrates should use protective splash goggles.~~

45

- 1 Human health risk from accidental drench with fire chemicals can be mitigated  
2 by washing with water to remove any residue from exposed skin.  
3
- 4 Containers of any fire chemical, including backpack pumps and engine tanks,  
5 should be labeled to alert personnel that they do not contain ~~plain~~only water, and  
6 ~~that the contents~~ mustare not ~~be used for drinking purposes~~potable.  
7
- 8 Slippery footing is a hazard at storage areas, unloading and mixing sites, and  
9 wherever applied. Because all fire chemical concentrates and solutions  
10 contribute to slippery conditions, all spills must be cleaned up immediately,  
11 preferably with a dry absorbent pad or granules. ~~Personnel applying any~~  
12 ~~wildland fire chemical should stand in untreated areas.~~ Specific to foam, it can  
13 ~~form a thick blanket that~~ Firefighters should be aware that fire chemicals can  
14 conceal ground hazards. Wildland fire chemicals can penetrate and deteriorate  
15 leather boots, resulting in wet feet and potentially ruined leather.  
16
- 17 **Aerial Application Safety**  
18 ~~The safety precautions associated with ground crews near retardant drops also~~  
19 ~~apply to aerial drops of all fire chemicals.~~  
20
- 21 Persons and equipment in the flight path of intended aerial drops should move to  
22 a location that will decrease the possibility of being hit with a drop.  
23
- 24 Persons near aerial drops should be alert for objects (tree limbs, rocks, etc.) that  
25 the drop could dislodge.  
26
- 27 During training or briefings, inform fieldall fire personnel of environmental  
28 guidelines and requirements for fire chemicals application and avoid contact  
29 with waterways.  
30
- 31 Avoid dipping from rivers or lakes with a helicopter bucket containing residual  
32 fire chemicals without first cleaning/washing down the bucket. ~~Set~~  
33
- 34 Consider setting up an adjacent reload site and manage the fire chemicals in  
35 portable tanks, or terminate the use of chemicals for that application.  
36
- 37 **Policy for Delivery of Wildland Fire Chemicals near Waterways**  
38 Avoid aerial application of wildland fire chemicals within 300 feet of waterways  
39 and any ground application of wildland fire chemicals into waterways. The  
40 policy has been adopted from the *2000 Guidelines for Aerial delivery of*  
41 *Retardant or Foam near Waterways* which were established and approved by the  
42 FS, BLM, NPS, and FWS. It has been expanded to include all wildland fire  
43 chemicals, including water enhancers.  
44 This policy was updated in 4/09 and can be found at  
45 [http://www.fs.fed.us/rm/fire/wfcs/Application\\_Policy-MultiAgency\\_042209-](http://www.fs.fed.us/rm/fire/wfcs/Application_Policy-MultiAgency_042209-)  
46 UPDATE.pdf

### Exceptions:

- When alternative line construction tactics are not available due to terrain constraints, congested area, life and property concerns or lack of ground personnel. It is acceptable to anchor the wildland fire chemical application to the waterway. When anchoring a wildland fire chemical to a waterway, use the most accurate method of delivery in order to minimize placement of wildland fire chemicals in the waterway (e.g., a helicopter rather than a heavy airtanker).

When potential damage to natural resources outweighs possible loss of aquatic life, the unit administrator may approve a deviation from these guidelines.

### **Definition of Waterway**

Any body of water including lakes, rivers, streams and ponds whether or not they contain aquatic life.

~~This policy does not require the helicopter or airtanker pilot in command to fly in such a way as to endanger his or her aircraft, other aircraft, or structures or compromise ground personnel safety.~~

### **Guidance for Pilots**

To meet the 300-foot buffer zone guideline, implement the following:

- **Medium/Heavy Airtankers:** When approaching a waterway visible to the pilot, the pilot shall terminate the application of wildland fire chemical approximately 300 feet before reaching the waterway. When flying over a waterway, pilots shall wait one second after crossing the far bank or shore of a waterway before applying wildland fire chemical. Pilots shall make adjustments for airspeed and ambient conditions such as wind to avoid the application of wildland fire chemical within the 300-foot buffer zone.
- **Single Engine Airtankers:** When approaching a waterway visible to the pilot, the pilot shall terminate application of wildland fire chemical approximately 300 feet before reaching the waterway. When flying over a waterway, the pilot shall not begin application of wildland fire chemical until 300 feet after crossing the far bank or shore. The pilot shall make adjustments for airspeed and ambient conditions such as wind to avoid the application of retardant within the 300-foot buffer zone.
- **Helicopters:** When approaching a waterway visible to the pilot, the pilot shall terminate the application of retardant or foams 300 feet before reaching the waterway. When flying over a waterway, pilots shall wait five seconds after crossing the far bank or shore before applying the wildland fire chemical. Pilots shall make adjustments for airspeed and ambient

1 conditions such as wind to avoid the application of wildland fire chemicals  
2 within the 300-foot buffer zone.

3  
4 **Exceptions:**

- 5 ● ~~When alternative line construction tactics are not available due to terrain~~  
6 ~~constraints, congested area, life and property concerns or lack of ground~~  
7 ~~personnel, it is acceptable to anchor the wildland fire chemical application~~  
8 ~~to the waterway. When anchoring a wildland fire chemical to a waterway,~~  
9 ~~use the most accurate method of delivery in order to minimize placement of~~  
10 ~~wildland fire chemicals in the waterway (e.g., a helicopter rather than a~~  
11 ~~heavy airtanker).~~
- 12 ● ~~Deviations from the policy are acceptable when life or property is~~  
13 ~~threatened and the use of wildland fire chemical can be reasonably expected~~  
14 ~~to alleviate the threat.~~
- 15 ● ~~When potential damage to natural resources outweighs possible loss of~~  
16 ~~aquatic life, the unit administrator may approve a deviation from these~~  
17 ~~guidelines.~~

18 This policy does not require the helicopter or airtanker pilot-in-command to fly  
19 in such a way as to endanger his or her aircraft, other aircraft, structures or  
20 compromise ground personnel safety.

21  
22 **Reporting Requirements of Wildland Fire Chemicals into Waterways:**

23 ~~During training or briefings, inform field personnel of environmental guidelines~~  
24 ~~for fire chemical application and the requirements for avoiding contact with~~  
25 ~~waterways. All field personnel should also be provided with the following~~  
26 ~~reporting process and requirements. Notify incident management and the agency~~  
27 ~~administrator promptly of Any fire chemicals aerially applied into a waterway or~~  
28 ~~within 300 feet of a waterway. require prompt upward reporting to incident~~  
29 ~~management and agency administrator. Notifications will also be made for any~~  
30 ~~spills or ground applications of fire chemicals into waterways or with potential~~  
31 ~~to enter the waterway.~~

32  
33 ~~If anyone believes it is believed that fire chemicals may have been introduced~~  
34 ~~into a waterway they, personnel should immediately inform their supervisor.~~  
35 ~~The information will be forwarded to incident management and the agency~~  
36 ~~administrator, usually through the resource advisor. The incident or host~~  
37 ~~authorities must immediately contact appropriate regulatory agencies and~~  
38 ~~specialists within the local jurisdiction. Initial notifications of wildland fire~~  
39 ~~chemical mishaps will be reported as soon as possible to Wildland Fire~~  
40 ~~Chemicals Systems in Missoula, Montana at phone 406 829 6718 (if no answer~~  
41 ~~please leave message) or to individuals listed on website referenced below.~~  
42 ~~Also include the date, location, and extent of the introduction.~~

43  
44 ~~Procedures have been implemented for the required reporting. Initial~~  
45 ~~notifications of wildland fire chemical mishaps will be reported as soon as~~  
46 ~~possible to the WFCs Fire Chemical Project Leader in Missoula, Montana at~~

1 [phone 406-329-4859 \(if no answer please leave message\) or to individuals listed](tel:406-329-4859)  
2 [on website referenced below. Include the date, location, and extent of the](#)  
3 [introduction.](#)

4  
5 All information, including reporting form and instructions, are posted on the  
6 web site at: <http://www.fs.fed.us/rm/fire/wfcs/report.htm>.

- 7 • *FS - Additional Reporting Requirements for Threatened and Endangered*  
8 *Species. Reporting is also required for all introductions of wildland fire*  
9 *chemicals into habitat for those Threatened and Endangered species*  
10 *identified by the U.S Fish and Wildlife Service (FWS). The list and other*  
11 *information can be found at <http://www.fs.fed.us/fire/retardant/index.html>.*  
12 *This requirement resulted from the Forest Service's acceptance of*  
13 *Biological Opinions received from the National Marine Fisheries Service*  
14 *(NMFS) and the U.S. Fish and Wildlife Service (FWS). When wildland fire*  
15 *chemicals adversely affect any threatened, endangered, or proposed species,*  
16 *or designated or proposed critical habitat, regardless of the 300' waterway*  
17 *buffer zone, the Forest Service Line Officer must initiate emergency*  
18 *consultation with the FWS and/or NMFS. The FS unit should coordinate*  
19 *with the local FWS or NMFS office to monitor, determine significance of*  
20 *effects, and design appropriate responsive measures. The procedures,*  
21 *reporting form and instructions can be found at the same website as listed*  
22 *above.*

#### 23 24 **Endangered Species Act (ESA) Emergency Consultation**

25 The following provisions are guidance for complying with the emergency  
26 section 7 consultation procedures of the ESA with respect to aquatic species.  
27 These provisions do not alter or diminish an action agency's responsibilities  
28 under the ESA.

29  
30 Where aquatic threatened & endangered (T&E) species or their habitats are  
31 potentially affected by aerial application of wildland fire chemical, the following  
32 additional procedures apply:

- 33 • As soon as practicable after the aerial application of wildland fire chemical  
34 near waterways, determine whether the aerial application has caused any  
35 adverse effects to a T&E species or their habitat. This can be accomplished  
36 by the following:
  - 37 ➤ Aerial application of wildland fire chemical outside 300 ft of a  
38 waterway is presumed to avoid adverse effects to aquatic species and  
39 no further consultation for aquatic species is necessary.
  - 40 ➤ Aerial application of wildland fire chemical within 300 ft of a  
41 waterway requires that the unit administrator determine whether there  
42 ~~have~~has been any adverse effects to T&E species within the waterway.
- 43 • These procedures shall be documented in the initial or subsequent fire  
44 reports:
  - 45 ➤ If there were no adverse effects to aquatic T&E species or their  
46 habitats, there is no additional requirement to consult on aquatic species

- 1 with Fish and Wildlife Service (FWS) or National Marine Fisheries  
2 Service (NMFS).
- 3 ➤ If the action agency determines that there were adverse effects on T&E  
4 species or their habitats then the action agency must consult with FWS  
5 and/or NMFS, as required by 50 CFR 402.05 (Emergencies).  
6 Procedures for emergency consultation are described in the *Interagency*  
7 *Consultation Handbook*, Chapter 8 (March, 1998). In the case of a long  
8 duration incident, emergency consultation should be initiated as soon as  
9 practical during the event. Otherwise, post-event consultation is  
10 appropriate. The initiation of the consultation is the responsibility of  
11 the unit administrator.  
12
- 13 Ground application of a wildland fire chemical into a waterway also requires  
14 determining whether the application has caused any adverse effects to a T&E  
15 species or their habitat. The procedures identified above also apply.  
16
- 17 Each agency is responsible for ensuring that their appropriate agency specific  
18 guides and training manuals reflect these standards.