

## Chapter 12

### Suppression Chemicals and 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 (PPE) recommended on the product label and Safety Data Sheets (SDS).

A current list of qualified products and approved uses can be found on the Wildland Fire Chemical Systems (WFCS) website at <https://www.fs.usda.gov/rm/fire/wfcs/>.

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

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

The use of fire chemicals mixed with on board fire chemical injection systems or blending systems are not permitted to be used on federally contracted aircraft on Federal lands. This also includes cooperator aircraft operating on fires on Federal lands.

#### Types of Fire Chemicals

##### Long-Term Retardant

Long-term retardants contain fertilizer salts that change the way fuels burn and are effective even after the water has evaporated. Retardants may be applied aerially by large airtanker, single engine airtanker (SEAT) and helicopter bucket. Some retardant products are approved for fixed-tank helicopters; others are formulated specifically for delivery from ground sources. See the Qualified Products List (QPL) for specific uses for each product at <https://www.fs.usda.gov/rm/fire/wfcs/>.

Recommended coverage levels and guidelines for use can be found in the *Incident Response Pocket Guide (IRPG, PMS 461)*. Retardant mixing, blending, testing, and sampling requirements can be found at the WFCS website Lot Acceptance and Quality Assurance page at <https://www.fs.usda.gov/rm/fire/wfcs/>.

##### Fire Suppressant Foam

Fire suppressant foams are combinations of wetting and foaming agents added to water to improve the effectiveness of the water. These foams are no longer effective once the water has evaporated. Foam may be applied by engines and portable pumps. Aerial application of foam is no longer approved on Federal jurisdictional lands. See the QPL for specific uses for each product.

1 Approved foam concentrate may be used to improve the efficiency of water,  
2 except near waterways where accidental spillage or over spray of the chemical  
3 could be harmful to the aquatic ecosystem.

#### 4 **Wet Water**

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

#### 7 **Water Enhancer (Gel)**

8 Water enhancers, including firefighting gels and elastomers, are added to water  
9 to improve drop characteristics and adhesion of water to fuel. Water enhancers  
10 are not effective once the water has evaporated. These products may be used in  
11 structure protection within the wildland interface or on wildland fuels. Mixing  
12 water enhancers outside of their qualified mix ratios is not acceptable. Water  
13 enhancers are fully approved for use in helicopter buckets and engine  
14 application. Some products are approved for use in SEATs and fixed-tank  
15 helicopters at specific mix ratios. See the QPL for specific uses for each product.

16 The use of water enhancers mixed with on-board injection systems are not  
17 allowed on Federal lands or on federally contracted aircraft. The use of water  
18 enhancers mixed through a proportioner and loaded from ground-based  
19 equipment is acceptable according to their qualified applications as specified on  
20 the QPL.

### 21 **Safety Information**

#### 22 **Personnel Safety**

23 All qualified wildland fire chemicals meet minimum requirements (Forest  
24 Service Specifications 5100-304, 5100-306, 5100-307) regarding aquatic and  
25 mammalian toxicity (acute oral toxicity, acute dermal toxicity, primary skin  
26 irritation, and primary eye irritation). Specifications for long-term retardants,  
27 fire suppression foams, and water enhancers can be found on the WFCS website.

28 Personnel involved in handling, mixing, and applying fire chemicals or solutions  
29 shall be trained in proper procedures to protect their health and safety and the  
30 environment. Approved fire chemicals can be irritating to the eyes. Personnel  
31 must follow the manufacturer's recommendations; including use of PPE, as  
32 found on the product label and product SDS. The SDSs for all approved fire  
33 chemicals can be found on the website at <https://www.fs.usda.gov/rm/fire/wfcs/>.

34 Human health risk from accidental drench with fire chemicals can be mitigated  
35 by washing with water to remove any residue from exposed skin.

36 Containers of any fire chemical, including backpack pumps and engine tanks,  
37 should be labeled potable or non-potable as appropriate.

38 Slippery footing is a hazard at storage areas, unloading and mixing sites, and  
39 wherever applied. Because all fire chemical concentrates and solutions  
40 contribute to slippery conditions, all spills must be cleaned up immediately,  
41 preferably with a dry absorbent pad or granules. Firefighters should be aware

- 1 that fire chemicals can conceal ground hazards. Wildland fire chemicals can  
 2 penetrate and deteriorate leather boots, resulting in wet feet and potentially  
 3 ruined leather.
- 4 **Aerial Application Safety**
- 5 Personnel and equipment in the flight path of intended aerial drops should move  
 6 to a location that will decrease the possibility of being hit with a drop.
- 7 Personnel near aerial drops should be alert for objects (tree limbs, rocks, etc.)  
 8 that the drop could dislodge. The *Incident Response Pocket Guide (IRPG)*  
 9 provides additional safety information for personnel in drop areas.
- 10 During training or briefings, inform all fire personnel of environmental  
 11 guidelines and requirements for fire chemicals application and avoid contact  
 12 with waterways.
- 13 Avoid dipping from rivers or lakes with a helicopter bucket containing residual  
 14 fire chemicals without first cleaning/washing down the bucket.
- 15 Consider setting up an adjacent reload site and manage the fire chemicals in  
 16 portable tanks or terminate the use of chemicals for that application.

17 **Interagency Policy for Aerial and Ground Delivery of Wildland Fire**  
 18 **Chemicals Near Waterways and Other Avoidance Areas**

- 19 This policy is an expansion and update for the 2000 and 2009 updated  
 20 Guidelines for Aerial Delivery of all wildland fire chemicals, including  
 21 retardant, foam, and water enhancers, which were established and approved by  
 22 the Forest Service (FS) and the Department of the Interior (DOI). The policy  
 23 includes additional avoidance areas (both aquatic and terrestrial) for aerial  
 24 delivery of fire chemicals as designated by individual agencies and includes  
 25 additional FS reporting requirements.
- 26 This policy does not require the helicopter or airtanker pilot-in-command to fly  
 27 in such a way as to endanger his or her aircraft, other aircraft, or structures or  
 28 compromise ground personnel safety.

Aerial Delivery Policy	Ground Delivery Policy
<ul style="list-style-type: none"> <li>• Avoid aerial application of all wildland fire chemicals within 300 feet of waterways.</li> <li>• Additional mapped avoidance areas may be designated by individual agency.</li> <li>• Whenever practical, as determined by the fire incident commander (IC), use water or other less toxic wildland fire chemical suppressants for direct attack or less toxic, approved fire retardants in areas occupied by threatened, endangered, proposed, candidate or sensitive species (TEPCS) or their designated critical habitats.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid terrestrial application of all wildland fire chemicals within 300 feet of waterways.<sup>1</sup></li> </ul>

<sup>1</sup>Delivery on the ground provides for more precise delivery of fire chemicals to target areas. Thus, delivery is allowed within the aquatic mapped avoidance areas provided chemicals do not reach the waterway. Because there is the potential for TEPCS, their designated critical habitats, or other resources such as cultural or heritage areas to occur in waterway buffers or additional mapped avoidance areas, consult a resource advisor (READ) prior to application to determine best action or the potential for environmental effects. See reporting section below for requirements.

1 **Waterway Definition**

2 A waterway is any body of water (including lakes, rivers, streams, and ponds)  
3 whether or not it contains aquatic life.

4 **Waterway Buffer**

5 A waterway buffer is an area that extends 300 feet on either side of a waterway.

6 **Additional Mapped Avoidance Areas**

7 On FS lands, there may be areas requiring additional protection outside of the  
8 300-foot waterway buffer. These areas may include certain dry intermittent or  
9 ephemeral streams, areas designated for resource protection, as well as areas for  
10 the protection of TEPCS terrestrial habitats and population areas.

- 11 • **FS** – Maps are available at [https://www.fs.usda.gov/managing-](https://www.fs.usda.gov/managing-land/fire/chemicals)  
12 [land/fire/chemicals](https://www.fs.usda.gov/managing-land/fire/chemicals).

13 **Guidance for Pilots**

14 Pilots will avoid all waterways and additional mapped avoidance areas  
15 designated by individual agencies. To meet the 300-foot waterway buffer zone  
16 or additional mapped avoidance areas guideline, implement the following:

- 17 • All aircraft: When approaching a waterway or other avoidance areas, the  
18 pilot shall terminate application of wildland fire chemical approximately  
19 300 feet before reaching the area. When flying over a waterway, the pilot  
20 shall not begin application of wildland fire chemical until 300 feet after  
21 crossing the far bank or shore. The pilot shall make adjustments for airspeed  
22 and ambient conditions such as wind to avoid the application of wildland  
23 fire chemicals within the 300-foot buffer zone. Riparian vegetation may be  
24 an indicator of waterways and pilots should confirm to the extent possible  
25 that no water is present before dropping.
- 26 • Prior to fire retardant application, all aerial supervision and/or pilots shall  
27 be briefed on the locations of all TEPCS or other avoidance areas in the  
28 vicinity.
- 29 • If operationally feasible, pilots or the aerial supervision shall make a “dry  
30 run” over the intended application area and/or coordinate with ground  
31 resources to identify avoidance areas and waterways in the vicinity of the  
32 wildland fire.
- 33 • Pilots will be provided avoidance area maps and information at all  
34 briefings (if not dispatched from one geographic area/unit and delivering to  
35 another geographic area).
- 36 • All pilots will provide GPS location tracks of aerial retardant drops to the  
37 incident management team (IMT) situation unit leader (SITL) and/or  
38 geographic information system specialist (GISS). These data will be added

1 to the National Incident Feature Service (NIFS) by the IMT GISS and made  
2 available to fire personnel.

3 **Exceptions for Aerial Delivery of Long-Term Retardant on USDA Forest**  
4 **Service Lands (2011 Record of Decision)**

- 5 • Deviations from the policy are allowed only for the protection of life or  
6 safety (public and firefighter).

7 **Exceptions for All Other Agencies and All Other Fire Chemicals**

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

21 **Reporting Requirements of Aerially Delivered Wildland Fire Chemicals**  
22 **Into Waterways, Waterway Buffer Areas and Mapped Avoidance Areas**

23 During training or briefings, inform field personnel of:

- 24 • Environmental guidelines for fire chemical application;
- 25 • Requirements for avoiding contact with waterways;
- 26 • Additional mapped avoidance areas as designated by individual agency; and
- 27 • Their responsibility for upward reporting in the event of application, for  
28 whatever reason, into avoidance areas.

29 If application of wildland fire chemical occurs or anyone believes the  
30 application may have been introduced within waterways, waterway buffered  
31 areas, or other mapped avoidance areas, the following is required as appropriate:

- 32 • Inform supervisor;
- 33 • The information will be forwarded to incident management and the agency  
34 administrator, usually through the READ;
- 35 • The incident or host authorities must immediately contact specialists within  
36 the local jurisdiction; and
- 37 • Notifications and reporting will be completed as soon as possible.

38 Procedures have been implemented for the required reporting. All information,  
39 including reporting tools and instructions, are posted on the websites at  
40 <https://www.fs.usda.gov/rm/fire/wfcs/> and [https://www.fs.usda.gov/managing-](https://www.fs.usda.gov/managing-land/fire/chemicals)  
41 [land/fire/chemicals](https://www.fs.usda.gov/managing-land/fire/chemicals).

1 The FS has additional reporting requirements for threatened, endangered,  
2 proposed, candidate and FS-listed sensitive species for aerially delivered fire  
3 retardant only. This requirement resulted from the Forest Service's acceptance  
4 of Biological Opinions received from the National Marine Fisheries Service  
5 (NMFS) and the U.S. Fish and Wildlife Service (FWS), and the *2011 Record of*  
6 *Decision (ROD) for Nationwide Aerial Application of Fire Retardant on*  
7 *National Forest System Lands*. The procedures, reporting tools, and instructions  
8 can be found at the same websites listed above.

### 9 **Endangered Species Act Emergency Consultation**

10 The following provisions are guidance for complying with the emergency  
11 section 7 consultation procedures of the Endangered Species Act (ESA) for  
12 wildland fire chemicals. These provisions do not alter or diminish an action  
13 agency's responsibilities under the ESA.

14 Where threatened and endangered (T&E) species or their habitats are potentially  
15 affected by application of wildland fire chemicals, the following additional  
16 procedures apply and shall be documented in initial or subsequent fire reports:

- 17 • As soon as practicable after application of wildland fire chemical near  
18 waterways or other avoidance area as designated by agency, determine  
19 whether the application has caused any adverse effects to a T&E species or  
20 their habitat. This can be accomplished by the following:
  - 21 ○ Ground application of wildland fire chemical outside a waterway is  
22 presumed to avoid adverse effects to aquatic species and no further  
23 consultation for aquatic species is necessary;
  - 24 ○ Aerial application of wildland fire chemical outside 300 feet (or in any  
25 additional buffer areas beyond 300 feet established on NFS lands for  
26 certain species) of a waterway is presumed to avoid adverse effects to  
27 aquatic species and no further consultation for aquatic species is  
28 necessary;
  - 29 ○ Aerial application of wildland fire chemical within 300 feet (or in any  
30 additional NFS lands buffer areas) of a waterway requires that the unit  
31 administrator determine whether there have been any adverse effects to  
32 T&E species within the waterway. If no adverse effects to aquatic T&E  
33 species or their habitats, no additional requirement to consult on aquatic  
34 species with FWS or NMFS is required; and/or
  - 35 ○ Application of wildland fire chemical within other avoidance areas as  
36 designated by an agency requires the agency administrator to determine  
37 whether there have been any adverse effects to T&E species. If there  
38 are no adverse effects to species or their habitats, there is no additional  
39 requirement to consult with FWS or NMFS.
- 40 ▪ **FS – Note:** *the FS has completed consultation with regulatory*  
41 *agencies (FWS and the National Oceanic and Atmospheric*  
42 *Administration [NOAA]) for aerial delivery of fire retardant*  
43 *(only) on National Forest System lands; please refer to*  
44 *<https://www.fs.usda.gov/managing-land/fire/chemicals> for*

1                    *additional information and reporting, monitoring, and re-*  
2                    *initiation of consultation requirements. Aerial delivery of*  
3                    *retardant on National Forest System lands should not be*  
4                    *included in emergency consultations.*

5 If the action agency determines that there were adverse effects on T&E species  
6 or their habitats then the action agency must consult with FWS and NMFS, as  
7 required by 50 CFR 402.05 (Emergencies). Procedures for emergency  
8 consultation are described in the *USFWS Endangered Species Consultation*  
9 *Handbook*, chapter 8 (March 1998). In the case of a long-duration incident,  
10 emergency consultation should be initiated as soon as practical during the event.  
11 Otherwise, post-event consultation is appropriate. The initiation of the  
12 consultation is the responsibility of the agency administrator.

### 13 **Operational Guidelines for Invasive Species**

14 Refer to chapter 11 for guidance on minimizing potential transmission of  
15 invasive species.

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