

1 **Chapter 12**  
2 **Suppression Chemicals and Delivery Systems**

3 **Policy for Use of Fire Chemicals**

4 Use only products qualified and approved for intended use. Follow safe handling  
5 procedures, use personal protective equipment recommended on the product  
6 label and Safety Data Sheet (SDS).

7 A current list of qualified products and approved uses can be found on the  
8 Wildland Fire Chemical Systems (WFCS) website at  
9 <https://www.fs.fed.us/rm/fire/wfcs/index.htm>.

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

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

15 **Types of Fire Chemicals**

16 **Long-Term Retardant**

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

24 Recommended coverage levels and guidelines for use can be found in the 10  
25 Principles of Retardant Application, NFES 2048, PMS 440-2 pocket card.  
26 Retardant mixing, blending, testing, and sampling requirements can be found at  
27 the WFCS website Lot Acceptance and Quality Assurance page  
28 <https://www.fs.fed.us/rm/fire/wfcs/laqa.htm>.

29 **Fire Suppressant Foam**

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

35 **Wet Water**

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

**1 Water Enhancer (Gel)**

2 Water enhancers, such as firefighting gels, are added to water to improve the  
3 viscosity and adhesion of water. They are not effective once the water has  
4 evaporated. These products may be used in structure protection within the  
5 wildland interface or on wildland fuels. They are fully approved for use in  
6 helicopter bucket and engine application. Many are also approved, at specific  
7 mix ratios, for use in SEATs, and fixed tank helicopters. See the QPL for  
8 specific uses for each product.

**9 Safety Information****10 Personnel Safety**

11 All qualified wildland fire chemicals meet minimum requirements (June 2007)  
12 in regard to aquatic and mammalian toxicity (acute oral toxicity, acute dermal  
13 toxicity, primary skin irritation, and primary eye irritation). Specifications for  
14 long-term retardants, fire suppression foams, and water enhancers can be found  
15 on the WFCS website.

16 Personnel involved in handling, mixing, and applying fire chemicals or solutions  
17 shall be trained in proper procedures to protect their health and safety and the  
18 environment. Approved fire chemicals can be irritating to the eyes. Personnel  
19 must follow the manufacturer's recommendations; including use of PPE, as  
20 found on the product label and product SDS. The SDSs for all approved fire  
21 chemicals can be found on the website  
22 <https://www.fs.fed.us/rm/fire/wfcs/msds.htm>.

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

25 Containers of any fire chemical, including backpack pumps and engine tanks,  
26 should be labeled to alert personnel that they do not contain only water and the  
27 contents are not potable.

28 Slippery footing is a hazard at storage areas, unloading and mixing sites, and  
29 wherever applied. Because all fire chemical concentrates and solutions  
30 contribute to slippery conditions, all spills must be cleaned up immediately,  
31 preferably with a dry absorbent pad or granules. Firefighters should be aware  
32 that fire chemicals can conceal ground hazards. Wildland fire chemicals can  
33 penetrate and deteriorate leather boots, resulting in wet feet and potentially  
34 ruined leather.

**35 Aerial Application Safety**

36 Personnel and equipment in the flight path of intended aerial drops should move  
37 to a location that will decrease the possibility of being hit with a drop.

38 Personnel near aerial drops should be alert for objects (tree limbs, rocks, etc.)  
39 that the drop could dislodge. The Incident Response Pocket Guide (*IRPG*)  
40 provides additional safety information for personnel in drop areas.

- 1 During training or briefings, inform all fire personnel of environmental
- 2 guidelines and requirements for fire chemicals application and avoid contact
- 3 with waterways.
- 4 Avoid dipping from rivers or lakes with a helicopter bucket containing residual
- 5 fire chemicals without first cleaning/washing down the bucket.
- 6 Consider setting up an adjacent reload site and manage the fire chemicals in
- 7 portable tanks or terminate the use of chemicals for that application.

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

10 This policy is an expansion and update for the 2000 and 2009 updated  
 11 Guidelines for Aerial Delivery of all wildland fire chemicals, including  
 12 retardant, foam, and water enhancers, which were established and approved by  
 13 the Forest Service (FS) and the Department of the Interior (DOI). The policy  
 14 includes additional avoidance areas (both aquatic and terrestrial) for aerial  
 15 delivery of fire chemicals as designated by individual agencies and includes  
 16 additional FS reporting requirements.

17 This policy does not require the helicopter or airtanker pilot-in-command to fly  
 18 in such a way as to endanger his or her aircraft, other aircraft, or structures or  
 19 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 (ft.) 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, 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 application of all wildland fire chemicals into 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, it is advised that a resource advisor be consulted prior to application to determine best action or the potential for environmental effects. See reporting section below for requirements.

20 **Definition of Waterway**

21 Any body of water (including lakes, rivers, streams, and ponds) whether or not it  
 22 contains aquatic life.

**1 Definition of Waterway Buffer**

2 300 ft. distance on either side of a waterway.

**3 Definition of Additional Mapped Avoidance Areas**

4 On FS lands, there may be areas requiring additional protection outside of the  
5 300-foot waterway buffer. This may include certain dry intermittent or  
6 ephemeral streams, areas designated for resource protection, as well as areas for  
7 the protection of TEPCS terrestrial habitats and population areas.

- 8 • *FS* – Maps are available at <https://www.fs.fed.us/fire/retardant/index.html>.

**9 Guidance for Pilots**

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

- 13 • All Aircraft: When approaching a waterway or other avoidance areas, the  
14 pilot shall terminate application of wildland fire chemical approximately  
15 300 feet before reaching the area. When flying over a waterway, the pilot  
16 shall not begin application of wildland fire chemical until 300 feet after  
17 crossing the far bank or shore. The pilot shall make adjustments for airspeed  
18 and ambient conditions such as wind to avoid the application of wildland  
19 fire chemicals within the 300-foot buffer zone. Riparian vegetation may be  
20 an indicator of waterways and pilots should confirm to the extent possible  
21 that no water is present before dropping.
- 22 • Prior to fire retardant application, all aerial supervision and/or pilots shall  
23 be briefed on the locations of all TEPCS or other avoidance areas in the  
24 vicinity.
- 25 • If operationally feasible, pilots or the aerial supervision shall make a ‘dry  
26 run’ over the intended application area and/or coordinate with ground  
27 resources to identify avoidance areas and waterways in the vicinity of the  
28 wildland fire.
- 29 • Pilots will be provided avoidance area maps and information at all briefings  
30 (if not dispatched from one geographic area/unit and delivering to another  
31 geographic area).

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

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

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

- 37 • When alternative line construction tactics are not available due to terrain  
38 constraints, congested area, life and property concerns or lack of ground  
39 personnel, it is acceptable to anchor the wildland fire chemical application  
40 to the waterway. When anchoring a wildland fire chemical line to a  
41 waterway, use the most accurate method of delivery in order to minimize

- 1 placement of wildland fire chemical in the waterway (e.g., a helicopter  
2 rather than a heavy airtanker).
- 3 • Deviations from the policy are acceptable when life or property is  
4 threatened and the use of wildland fire chemical can be reasonably expected  
5 to alleviate the threat.
  - 6 • When potential damage to natural resources outweighs possible loss of  
7 aquatic life, the unit administrator may approve a deviation from these  
8 guidelines.

### 9 **Reporting Requirements of Aerially Delivered Wildland Fire Chemicals** 10 **Into Waterways, Waterway Buffer Areas and Mapped Avoidance Areas**

11 During training or briefings, inform field personnel of:

- 12 • Environmental guidelines for fire chemical application;
- 13 • Requirements for avoiding contact with waterways;
- 14 • Additional mapped avoidance areas as designated by individual agency; and
- 15 • Their responsibility for upward reporting in the event of application, for  
16 whatever reason, into avoidance areas.

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

- 20 • They should inform their supervisor;
- 21 • The information will be forwarded to incident management and the agency  
22 administrator, usually through the resource advisor;
- 23 • The incident or host authorities must immediately contact specialists within  
24 the local jurisdiction; and
- 25 • Notifications and reporting will be completed as soon as possible.

26 Procedures have been implemented for the required reporting. All information,  
27 including reporting tools and instructions are posted on the websites at  
28 <https://www.fs.fed.us/rm/fire/wfcs> and <https://www.fs.fed.us/fire/retardant/>.

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

**1 Endangered Species Act (ESA) Emergency Consultation**

2 The following provisions are guidance for complying with the emergency  
3 section 7 consultation procedures of the ESA for wildland fire chemicals. These  
4 provisions do not alter or diminish an action agency's responsibilities under the  
5 ESA.

6 Where T&E species or their habitats are potentially affected by application of  
7 wildland fire chemicals, the following additional procedures apply and shall be  
8 documented in initial or subsequent fire reports:

- 9 • As soon as practicable after application of wildland fire chemical near  
10 waterways or other avoidance area as designated by agency, determine  
11 whether the application has caused any adverse effects to a T&E species or  
12 their habitat. This can be accomplished by the following:
  - 13 ○ Ground application of wildland fire chemical outside a waterway is  
14 presumed to avoid adverse effects to aquatic species and no further  
15 consultation for aquatic species is necessary;
  - 16 ○ Aerial application of wildland fire chemical outside 300 ft. (or in any  
17 additional buffer areas beyond 300 ft. established on NFS lands for  
18 certain species) of a waterway is presumed to avoid adverse effects to  
19 aquatic species and no further consultation for aquatic species is  
20 necessary;
  - 21 ○ Aerial application of wildland fire chemical within 300 ft. (or in any  
22 additional NFS lands buffer areas) of a waterway requires that the unit  
23 administrator determine whether there have been any adverse effects to  
24 T&E species within the waterway. If no adverse effects to aquatic T&E  
25 species or their habitats, no additional requirement to consult on aquatic  
26 species with FWS or NMFS is required; and/or
  - 27 ○ Application of wildland fire chemical within other avoidance areas as  
28 designated by agency requires the agency administrator to determine  
29 whether there have been any adverse effects to T&E species. If there  
30 are no adverse effects to species or their habitats there is no additional  
31 requirement to consult with FWS or NMFS.
    - 32 ■ *FS – Note: the FS has completed consultation with regulatory*  
33 *agencies (FWS and NOAA) for aerial delivery of fire retardant*  
34 *(only) in National Forest System lands; please refer to*  
35 *<https://www.fs.fed.us/fire/retardant/> for additional information and*  
36 *re-initiation of consultation requirements.*

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

**1 Operational Guidelines for Invasive Species**

- 2 Refer to Chapter 11 for guidance on minimizing potential transmission of
- 3 invasive species.

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