

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 air tanker, 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, portable
33 pumps, helicopters, and SEATs. Some agencies also allow application of foam
34 from fixed-wing water scoopers. See the QPL for specific uses for each product.

1 Wet Water

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

4 Water Enhancer (Gel)

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

12 Safety Information**13 Personnel Safety**

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

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

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

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

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

1 **Aerial Application Safety**

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

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

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

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

Aerial Delivery Policy	Ground Delivery Policy
<ul style="list-style-type: none"> • Avoid aerial application of all wildland fire chemicals within 300 feet (ft.) of waterways. • Additional mapped avoidance areas may be designated by individual agency. • 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. 	<ul style="list-style-type: none"> • Avoid application of all wildland fire chemicals into waterways¹

¹ 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.

1 **Definition of Waterway**

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

4 **Definition of Waterway Buffer**

5 300 ft. distance on either side of a waterway.

6 **Definition of Additional Mapped Avoidance Areas**

7 On FS lands, there may be areas requiring additional protection outside of the
8 300-foot waterway buffer. This 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.fed.us/fire/retardant/index.html>.*

12 **Guidance for Pilots**

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

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

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

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

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

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

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

21 During training or briefings, inform field personnel of:

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

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

- 30 • They should inform their supervisor;
31 • The information will be forwarded to incident management and the agency
32 administrator, usually through the resource advisor;
33 • The incident or host authorities must immediately contact specialists within
34 the local jurisdiction; and
35 • Notifications and reporting will be completed as soon as possible.

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

39 The FS has additional reporting requirements for threatened, endangered,
40 proposed, candidate and FS listed sensitive species for aerially delivered fire

1 retardant only. This requirement resulted from the Forest Service's acceptance
2 of Biological Opinions received from the National Marine Fisheries Service
3 (NMFS) and the U.S. Fish and Wildlife Service (FWS), and the *2011 Record of*
4 *Decision (ROD) for Nationwide Aerial Application of Fire Retardant on*
5 *National Forest System Lands*. The procedures, reporting tools, and instructions
6 can be found at the same websites listed above.

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

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

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

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

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

9 **Operational Guidelines for Invasive Species**

10 Refer to Chapter 11 for guidance on minimizing potential transmission of
11 invasive species.

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