

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

19 **Types of Fire Chemicals**

20 **Long-Term Retardant**

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

28 Recommended coverage levels and guidelines for use can be found in the *IRPG*
29 (PMS 461). Retardant mixing, blending, testing, and sampling requirements can
30 be found at the WFCS website Lot Acceptance and Quality Assurance page
31 <https://www.fs.fed.us/rm/fire/wfcs/laqa.htm>.

32 **Fire Suppressant Foam**

33 Fire suppressant foams are combinations of wetting and foaming agents added
34 to water to improve the effectiveness of the water. They are no longer effective
35 once the water has evaporated. Foam may be applied by engines and portable
36 pumps. Aerial application of foam is no longer approved on Federal
37 Jurisdictional Lands. 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, including firefighting gels and elastomers, are added to water
6 to improve drop characteristics and adhesion of water to fuel. They are not
7 effective once the water has evaporated. These products may be used in
8 structure protection within the wildland interface or on wildland fuels. Mixing
9 water enhancers outside of their qualified mix ratios is not acceptable. They are
10 fully approved for use in helicopter buckets and engine application. Some
11 products are approved for use in SEATs and fixed-tank helicopters at specific
12 mix ratios. See the QPL for specific uses for each product.

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

18 Safety Information**19 Personnel Safety**

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

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

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

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

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

1 penetrate and deteriorate leather boots, resulting in wet feet and potentially
 2 ruined leather.

3 **Aerial Application Safety**

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

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

9 During training or briefings, inform all fire personnel of environmental
 10 guidelines and requirements for fire chemicals application and avoid contact
 11 with waterways.

12 Avoid dipping from rivers or lakes with a helicopter bucket containing residual
 13 fire chemicals without first cleaning/washing down the bucket.

14 Consider setting up an adjacent reload site and manage the fire chemicals in
 15 portable tanks or terminate the use of chemicals for that application.

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

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

25 This policy does not require the helicopter or airtanker pilot-in-command to fly
 26 in such a way as to endanger his or her aircraft, other aircraft, or structures or
 27 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

¹Delivery 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.usda.gov/managing-](https://www.fs.usda.gov/managing-land/fire/chemicals)*
12 *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 briefings
34 (if not dispatched from one geographic area/unit and delivering to another
35 geographic area).

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

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

1 Exceptions for All Other Agencies and All Other Fire Chemicals

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

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

17 During training or briefings, inform field personnel of:

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

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

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

32 Procedures have been implemented for the required reporting. All information,
33 including reporting tools and instructions are posted on the websites at
34 <https://www.fs.fed.us/rm/fire/wfcs> and [https://www.fs.fed.us/managing-](https://www.fs.fed.us/managing-land/fire/chemicals)
35 [land/fire/chemicals](https://www.fs.fed.us/managing-land/fire/chemicals).

36 The FS has additional reporting requirements for threatened, endangered,
37 proposed, candidate and FS listed sensitive species for aerially delivered fire
38 retardant only. This requirement resulted from the Forest Service's acceptance
39 of Biological Opinions received from the National Marine Fisheries Service
40 (NMFS) and the U.S. Fish and Wildlife Service (FWS), and the *2011 Record of*
41 *Decision (ROD) for Nationwide Aerial Application of Fire Retardant on*

1 *National Forest System Lands*. The procedures, reporting tools, and instructions
2 can be found at the same websites listed above.

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

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

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

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

40 If the action agency determines that there were adverse effects on T&E species
41 or their habitats then the action agency must consult with FWS and NMFS, as
42 required by *50 CFR 402.05* (Emergencies). Procedures for emergency
43 consultation are described in the *USFWS Endangered Species Consultation*
44 *Handbook*, Chapter 8 (March, 1998). In the case of a long duration incident,

- 1 emergency consultation should be initiated as soon as practical during the event.
- 2 Otherwise, post-event consultation is appropriate. The initiation of the
- 3 consultation is the responsibility of the unit administrator.
- 4 **Operational Guidelines for Invasive Species**
- 5 Refer to Chapter 11 for guidance on minimizing potential transmission of
- 6 invasive species.

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