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# Manufacturer Submission Procedures for Qualification Testing of Wildland Fire Chemical Products



# **Manufacturer Submission Procedures for Qualification Testing of Wildland Fire Chemical Products**

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### PREFACE

**Wildland fire chemical products must be evaluated before they can be approved for use by the Forest Service. Performance requirements are prescribed by applicable Forest Service specifications or interim requirements. The National Director of Fire and Aviation Management (F&AM), Washington, DC, approves wildland fire chemical products for operational use by the Forest Service. The Fire Chemical Qualification and Test Program is administered by:**

**Branch Chief, Fire Equipment and Chemicals  
Fire and Aviation Management  
USDA Forest Service  
P.O. Box 96090  
Washington, DC 20090-6090**

**INTRODUCTION**

This document provides information for use by a manufacturer wishing to submit a wildland fire chemical product to the Forest Service for evaluation.

The Forest Service has developed and utilizes performance-based specifications for evaluation and procurement of the following types of wildland fire chemical products:

- Long-term fire retardants
- Short-term fire retardants
- Wetting agents
- Wildland fire foam

Definitions for the various types of wildland fire chemical products and the applicable specifications or interim requirements are shown in table 1.

Other types of chemicals, not covered by existing specifications, may be submitted under a formal, research and development agreement. The manufacturer shall submit a proposal to the Fire Equipment Branch Chief. The Fire Equipment Branch Chief will review the proposal and, in consultation with technical experts at the San Dimas and Missoula Technology and Development Centers, determine appropriate testing and develop a formal work plan for the evaluation of the product (Figure 1).

This document summarizes the procedures for evaluation of wildland fire chemical products. Samples of the forms necessary to complete a submission package are included as appendices. All costs associated with the evaluation and testing of potential fire chemical products will be borne by the submitter.

*Table 1—Definitions of wildland fire chemical types and applicable specifications.*

<b><u>Wildland Fire Chemical Type</u></b>	<b><u>Definition</u></b>	<b><u>Specification</u></b>
Long-Term Retardant	A formulation that has the ability to reduce or inhibit combustion (burning) after the water it originally contained has evaporated.	5100-304 <sup>1</sup>
Short-Term Retardant	A formulation that relies on the water it contains to reduce or inhibit combustion and is ineffective once the water it originally contained has evaporated.	5100-306
Wetting Agent	A formulation which when added to plain water in amounts will materially reduce the surface tension of the water and increase its ability to penetrate and spread.	5100-305
Wildland Fire Foam	Mechanically induced bubbly water solutions. The bubble structure has a wide range of variability depending on the chemical used, solution strength, method of mixing, and amount of air incorporated.	5100-307

<sup>1</sup>Use current revision on specification as of date that tests are initiated.

**WILDLAND FIRE CHEMICALS  
QUALIFICATIONS AND TESTING FLOW CHART**

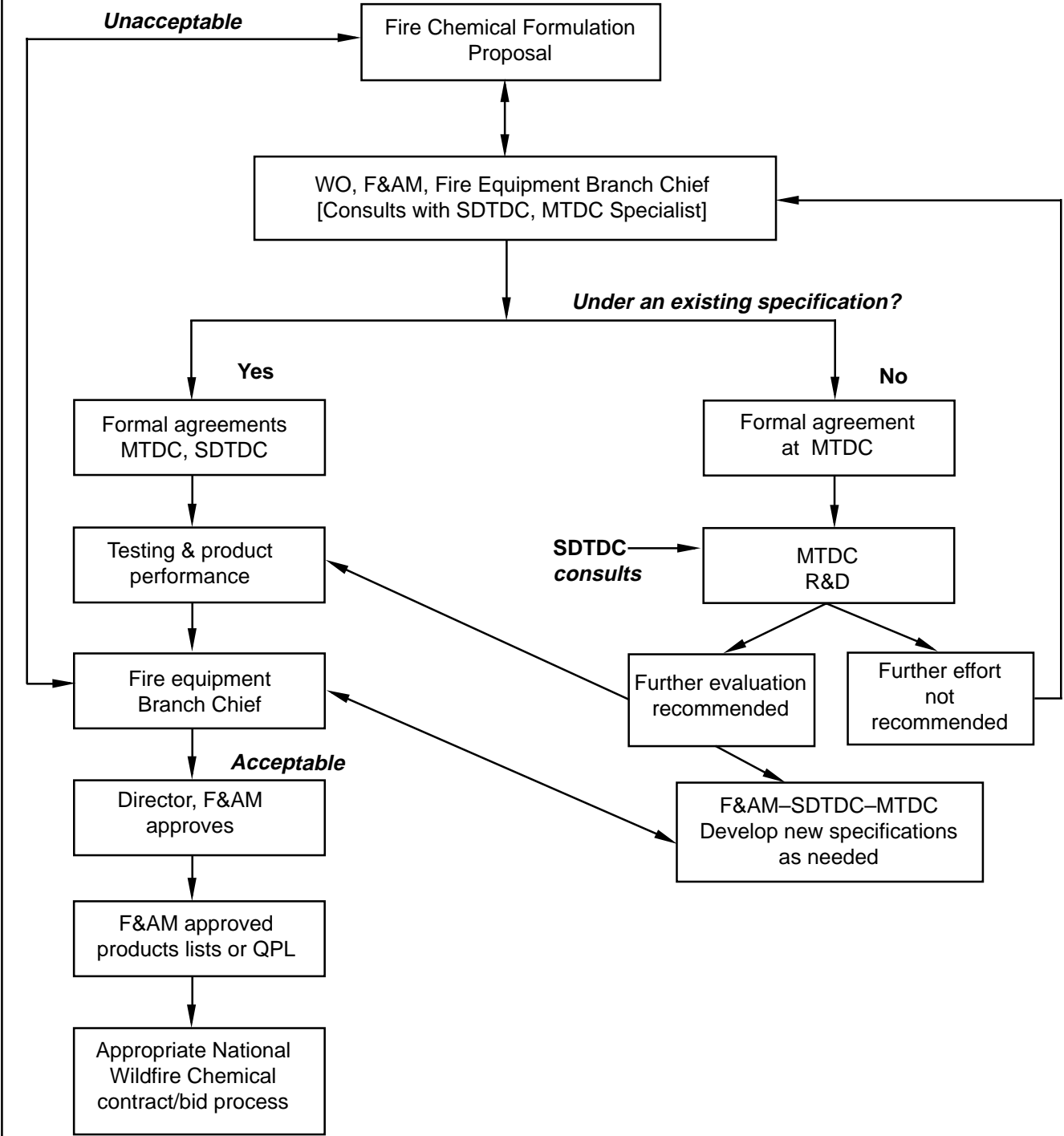


Figure 1—Wildland Fire Chemicals Qualifications and Testing Flow Chart showing formal review process.

## **INITIAL REVIEW**

A manufacturer submits a proposal for consideration of a new wildland fire chemical product. The Fire Equipment Branch Chief can be contacted at:

USDA Forest Service  
Fire & Aviation Management  
Branch Chief, Fire Equipment & Chemicals  
P.O. Box 96090  
Washington, DC 20090-6090

The Fire Equipment Branch Chief reviews the proposal. If the product fits an existing fire chemical product type, the manufacturer will be referred to the designated Forest Service testing facility personnel. The manufacturer will then communicate directly with the designated personnel to provide the necessary technical and confidential information.

If the product does not fit under an existing specification or standard, the Fire Equipment Branch Chief determines if the proposed chemical meets the Forest Service needs within the scope of the Forest Service mission. If it does, a work plan is developed in cooperation with the designated agency representative and an evaluation is initiated. If the product does not fit Forest Service needs, a letter of explanation is sent to the submitter.

The sequential steps of the formal testing and evaluation process are described below.

## **COLLECTION AGREEMENTS AND TEST FEES**

The manufacturer will enter into a separate collection agreement with each Forest Service testing facility participating in the evaluation process of a fire chemical product. Communication will then occur directly with the appropriate Forest Service testing facility personnel.

The Forest Service will provide an estimate of test fees to the manufacturer at the time the collection agreement is finalized. The estimated fees must be deposited with the Forest Service prior to any work on the respective submission and evaluation.

The Forest Service may require that an approved, independent laboratory perform some specialized tests. In this situation, payment shall be made directly by the manufacturer to the independent laboratory performing tests.

## **Submission and Review of Documents**

The manufacturer must submit several documents to the Forest Service Fire Chemicals Project Leader in Missoula for review.

- Confidential formulation disclosure sheet (appendix 1)
- Technical data sheet (appendix 2)
- Additional screening data (appendix 3)
- Material Safety Data Sheets (appendix 4) for the product and for each ingredient of the product
- Other data and information pertinent to the submitted product

All information is reviewed prior to submission of the test product. An informal risk assessment will be performed in conjunction with the review. A formal risk assessment at the submitter's expense may be required.

## **SUBMISSION OF FIRE CHEMICAL PRODUCTS**

The quantity of product needed to perform all required tests will be determined by the Forest Service based on the documentation provided by the manufacturer. This determination is based upon the type of fire chemical product and the form in which it is delivered and stored.

The manufacturer will then submit the specified quantity of the product to the location designated by the Forest Service.

## **LABORATORY EVALUATION OF PRODUCTS**

Laboratory testing will be conducted by Fire Chemicals personnel at the Missoula and San Dimas Technology and Development Centers. The Fire Chemicals Project Leaders will coordinate testing at independent laboratories.

Results of the evaluations will be provided to the manufacturer following completion of each phase of the test process.

A report containing the results of all phases of the laboratory evaluation will be sent to the Fire Equipment Branch Chief and the manufacturer. This report will contain recommendations for approval of products that have successfully completed the laboratory evaluation and recommendations for a formal operational field evaluation.

## **OPERATIONAL FIELD EVALUATION OF PRODUCTS**

The operational evaluation affords the Forest Service and its cooperators the opportunity to better understand the product's capabilities as well as to identify any problems that would limit or prevent its use for fire suppression operations.

The operational field evaluation will be conducted at a field location(s) chosen by the Forest Service based on established criteria.

The evaluation is conducted cooperatively by the host agency, the designated fire chemical evaluation team, and the manufacturer.

This evaluation will be conducted at the selected site in accordance with an approved test plan developed for the specific product.

A summary report will be prepared at the conclusion of the operational evaluation.

## **ACCEPTANCE**

The National Director, Fire and Aviation Management, will notify the manufacturer in writing of successful completion of the laboratory and operational field evaluation.

The product may be added to the Qualified Products List and included in the appropriate agency procurement process.

# CONFIDENTIAL

U.S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

## Confidential Formulation Disclosure Sheet (Fill in all applicable spaces)

Product name \_\_\_\_\_ Product identification \_\_\_\_\_ Manufacturing Co. \_\_\_\_\_  
Date submitted \_\_\_\_\_ Submitted by \_\_\_\_\_ Title \_\_\_\_\_  
Recommended use level \_\_\_\_\_ lb/gal or gal/gal of water \_\_\_\_\_  
*(Signature)*

Formulation ingredients <sup>1L</sup>	Confidential		Manufacturer and process	Quality or technical identification <sup>3L</sup>	Percent by weight in concentrate or dry product	Percent by weight in solution at recommended use-level	Patent or TM number	Remarks (see below)
	No	Yes <sup>2L</sup>						
A. Chemical(s)								
1. _____								
2. _____								
3. _____								
B. Thickening agent(s)								
1. _____								
2. _____								
C. Coloring agent(s)								
1. _____								
2. _____								
D. Corrosion inhibitor(s)								
1. _____								
2. _____								
3. _____								
E. Spoilage inhibitor(s)								
1. _____								
2. _____								
F. Other ingredients								
1. _____								
2. _____								
3. _____								

<sup>1L</sup> Give empirical formula or chemical identification and trade name. If not simple compounds, give percent of compounds, such as liquid ammonium phosphate, percent orthophosphate, percent polyphosphate, etc. Trace amounts of added nutrients or impurities should be included in technical data sheet.

<sup>2L</sup> If it is confidential, explain basis for confidentiality under remarks.

<sup>3L</sup> Chemical abstract number or other industry identification.

# CONFIDENTIAL



## APPENDIX 2

U.S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

*Technical Data Sheet*  
(Fill in all applicable spaces)

Product identification: \_\_\_\_\_

Manufacturer's recommended use level \_\_\_\_\_ lb/gal or gal/gal of water

Laboratory preparation of fire chemical (include any necessary precautions or techniques in blending, mixing, handling, or general preparation) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

### Properties

Density of concentrate \_\_\_\_\_ g/cm<sup>3</sup> at 70 °F

Density of mixed fire chemical solution \_\_\_\_\_ g/cm<sup>3</sup> at 70 °F

Percent increase or decrease in volume due to combination and mixing

Salting out temperature:

Concentrate \_\_\_\_\_ °F

Mixed fire chemical \_\_\_\_\_ °F

Freezing temperature:

Concentrate \_\_\_\_\_ °F

Mixed fire chemical \_\_\_\_\_ °F

Solubility of active salt \_\_\_\_\_ salt(s) \_\_\_\_\_ 70 °F

Viscosity at 70 °F:

Concentrate \_\_\_\_\_ centipoise

Mixed fire chemical \_\_\_\_\_ centipoise

pH (-log H<sup>+</sup>) at 70 °F:

Concentrate \_\_\_\_\_

Mixed fire chemical \_\_\_\_\_

Effect of temperature on density (g/cm<sup>3</sup>):

	Concentrate	Mixed fire chemical
50 °F	_____	_____
70 °F	_____	_____
90 °F	_____	_____

(continued on reverse)



# APPENDIX 3

## U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE

### ADDITIONAL SCREENING DATA

#### (Thickened Products)

(This form provides the government with information about the effects of water temperature and hardness on viscosity and hydration time).

Product Name \_\_\_\_\_ Date submitted \_\_\_\_\_

Product identification number \_\_\_\_\_

Manufacturing Co. \_\_\_\_\_

Signature \_\_\_\_\_ Title \_\_\_\_\_

As applicable, the following information is to be illustrated graphically and attached to this cover form:

1. Plot hydration time—retardant viscosity at 70 °F (21.1 °C) over a 48-hour period vs. time elapsed since mixing the retardant.
2. Plot retardant viscosity at 10 minutes, 1 hour, and 24 hours after mixing vs. the temperatures, from 40 °F (4.4 °C) to 100 °F (37.7 °C), of the water used to mix the retardant.
3. If the thickener is added separately, plot retardant viscosity at 70 °F (21.1 °C) at 1 hour and 24 hours after mixing vs. thickener concentration ranging from 10 to 200 percent of the usual concentration.
4. Plot retardant viscosity at 70 °F (21.1 °C) at 24 hours after mixing vs. retardant temperatures ranging from 40 °F (4.4 °C) to 100 °F (37.7 °C).
5. If mixing water hardness affects hydration, plot retardant viscosity at 70 °F (21.1 °C) at 1 hour and 24 hours after mixing vs. water hardness.
6. Plot retardant viscosity at 70 °F (21.1 °C) at 1 hour and 24 hours after mixing vs. mixing time at various mixing speeds.

Description of proposed packing and also of proposed handling and mixing procedures and equipment (e.g., 1-ton bags with batch mixer, air slide with eductor, etc.):

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# APPENDIX 4

**Material Safety Data Sheet**  
 May be used to comply with  
 OSHA's Hazard Communication Standard  
 29 CFR 1919.1200 Standard must be  
 consulted for specific requirements.

**U.S. Department of Labor**  
 Occupational Safety and Health Administration  
 (Non-Mandatory Form)  
 Form Approved  
 OMB No. 1218-0072



<b>IDENTITY</b> (As Used on Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
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**Section I**

Manufacturer's Name	Emergency Telephone Number
Address (Number, Street, City, State, and ZIP Code)	Telephone Number for Information
	Date Prepared
	Signature of Preparer (optional)

**Section II — Hazardous Ingredients/Identity Information**

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA	PEL	ACGIH	TLV	Other Limits Recommended	% (optional)

**Section III — Physical/Chemical Characteristics**

Boiling Point		Specific Gravity (H <sub>2</sub> O = 1)	
Vapor Pressure (mm Hg)		Melting Point	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	
Solubility in Water			
Appearance and Odor			

**Section IV — Fire and Explosion Hazard Data**

Flash Point (Method Used)	Flammable Limits	LEL	UEL
Extinguishing Media			
Special Fire Fighting Procedures			
Unusual Fire and Explosion Hazards			

(Reproduce locally)

OSHA 174, Sept 1985

**Section V—Reactivity Data**

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility (Materials to Avoid)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

**Section VI—Health Hazard Data**

Route(s) of Entry:                      Inhalation?                      Skin?                      Ingestion?

Health Hazards (Acute and Chronic)

Carcinogenicity:                      NTP?                      IARC Monographs?                      OSHA Regulated?

Signs and Symptoms of Exposure

Medical Conditions  
Generally Aggravated by Exposure

Emergency and First Aid Procedures

**Section VII—Precautions for Safe Handling and Use**

Steps to Be Taken in Case Material Is Released or Spilled

Waste Disposal Method

Precautions to be Taken in Handling and Storing

Other Precautions

**Section VIII—Control Measures**

Respiratory Protection (Specify Type)

Ventilation	Local Exhaust	Special
	Mechanical (General)	Other

Protective Gloves                      Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices