# STANDARD TEST PROCEDURE - 12
# OPERATIONAL FIELD EVALUATION
# (Revised November 20, 2023)

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References:

FS 5100-304d Specification for Long-Term Retardant, Wildland Firefighting
Long-Term Retardant Qualified Products List
OFE Test Plan Template

1. Abstract

1.1. This procedure outlines the requirements that must be met as elements of the Operational Field Evaluation (OFE). New products are not eligible for this stage of testing unless they are interim or conditionally qualified as part of laboratory testing as required by FS 5100-304d. This field evaluation is a requirement for all long-term retardants prior to achieving full qualification status on the Qualified Products List.

2. General Description

A long-term fire retardant undergoes 16 to 18 months of laboratory evaluation by the National Technology and Development Program of the USDA Forest Service. Following a successful completion of the laboratory evaluation, the new formulation is eligible for field testing, which is the final evaluation prior to being listed as fully qualified on the Qualified Products List.

Each OFE is intended to study product performance in the field. This may include outside teams to study product effectiveness and/or visibility.

OFEs can focus on any potential problem areas identified during the laboratory evaluation. An example might be a liquid concentrate that increases viscosity significantly during storage. Although the liquid concentrate passed the laboratory tests, additional sampling and testing would be planned to monitor the viscosity increases in the bulk storage.

The goal is to get a full fire season of use with a minimum of 200,000 gallons (757,000 liters) mixed and loaded. Ideally, this use will include multiple makes and models of airtankers as well as periods of steady use and periods of intense activity to provide a robust analysis of the product in an operational environment and of the company’s performance. The purpose of the OFE is to integrate all fully qualified products to understand the interactions of the various chemicals.

OFEs involve sampling and testing the retardant received at the base, in storage during the season and over a winter and pumped into airtankers. The Forest Service purchases all retardant used during an OFE. The manufacturer/supplier of the retardant covers all associated costs to include personnel travel, product transportation, materials, and operational time for staffing, mixing, and loading (as necessary) to perform the evaluation.

3. Requirements

For each new product that becomes interim or conditionally qualified, a product specific Test Plan (Section 5) will be included in a contract for the OFE to evaluate effectiveness and operational ease of use. The laboratory testing

phase is extensive and helps to flag potential issues with any new product. Each individual Test Plan is written to address any potential problem areas. At a minimum, these test plans will be constructed to address the following during an active fire season:

- General handling and use at the airtanker base
- Visibility and effectiveness when applied to the landscape
- Ability for contractor to meet delivery and ordering requirements
- Product performance to meet quality control standards of the Lot Acceptance and Quality Assurance Program (LAQA)
- Identify compatibility with existing equipment, products, and operations

The Test Plan will be specific depending on the type of product that is being evaluated. Results are collected by way of on-going communication with the base manager, electronic field questionnaires, and general feedback and responses provided by airtanker base personnel, airtanker vendor personnel, and all relevant aerial and ground personnel.

The company must successfully pass all elements of the OFE Test Plan to become fully qualified.

Section 4 identifies the different operational scenarios (i.e. fixed tank helicopter operations) to best suit the needs of the evaluation.

There are two (2) different types of OFEs; Full (section 3.1) and Monitored (section 3.2). In rare cases products will not require an OFE. The OFE required will be determined at the discretion of the Government and will be documented in a letter issued to the company. As needed, any OFE testing and operations may be extended to collect more data if the initial data is inconclusive or multiple unresolved issues exist from integrating the new product.

At the discretion of the Government, any OFE may be halted or terminated if safety issues exist in operating with the new product. The company will be notified as such.

Overwinter samples are included as discussed in section 3.1 and 3.2 as part of each Operational Field Evaluation (OFE). The product samples collected are stored as either a liquid concentrate or as a mixed product.

The overwinter samples collected shall:

- Start the overwinter storage no later than October 15th of each calendar year or at the discretion of the Government
- Be exposed to a minimum of six months of ‘winter’ conditions, preferably in a northern region climate
- Be removed no earlier than April 1st of each calendar year
- Be stored at an airtanker base in suitable equipment OR

- A 5-gallon carboy is collected from the base holding tank prior to closing and stored outside at one of the NTDP centers.

The stored sample is then used to collect physical characteristics measurements and both uniform and intergranular corrosion studies are performed. The results are documented and compared to acceptance limits in the current version of the FS 5100-304 specification as part of the final product evaluation.

3.1. FULL OPERATIONAL FIELD EVALUATIONS

3.1.1. Full OFEs will be conducted for formulations that are determined by the Government to be a completely new concept, a substantially new product, or a significant change of product type for the supplier. Formulations contain new types and amounts of ingredient(s) and may include new mixing, handling, and storage requirements.

3.1.2. The Fire and Aviation Management Fire Chemicals Branch Chief, in consultation with the National Technology and Development Program (NTDP), Wildland Fire Chemical Systems (WFCS) Program will identify products requiring a full operational field evaluation following successful completion of the laboratory evaluation.

3.1.3. A contract for the OFE will be negotiated with the company and the contract will include all required test procedures, payment terms, and clauses. At the discretion of the Government, test procedures may be modified if issues with the product, equipment, or operations are encountered.

3.1.4. Logistics from plant to field will be examined, including plant quality control, ability to sustain operations, and supply material as needed.

3.1.5. Time and equipment needed for mixing and handling operations will be determined.

3.1.6. Sampling and testing will be performed during all phases of base operations to assess consistency of the mixed retardant, frequency and duration of recirculation during the season and following overwinter storage. Corrosion and other laboratory tests may be performed on retained samples.

3.1.7. Operational effectiveness of the retardant may require the implementation of a special team to gather on-site data and present findings.

3.1.8. Other product characteristics such as abnormal wear on pumps or other equipment, dustiness, personnel safety will be evaluated.

3.1.9. Overwinter storage will be required. At the discretion of the Government, overwinter storage product may be used once spring sampling has been completed.

3.1.9.1. Overwinter storage can be performed in multiple ways to best suit the needs of the Government (see the Page 3 and Section 6 for Definitions)

3.1.10. A report will be prepared indicating the findings and clearly identifying if the product passes or fails to meet the terms of the test plan and acceptance criteria. If data collected is inconclusive or if additional observations are needed, a continuation of the OFE may be required to address operational or safety questions.

3.1.11. At the successful conclusion of the operational field evaluation the status of the product will be upgraded to “fully qualified” and listed on the Qualified Products List.

3.2. MONITORED OPERATIONAL FIELD EVALUATIONS

3.2.1. A monitored operational field evaluation will be conducted for products similar to existing, fully or conditionally qualified products. Formulations that contain an alternate source of ingredient(s) but do not change the type or amount of the ingredient are considered similar. Changes to color packages will be addressed on a case-by-case basis but may require a Full OFE if no other data exists on the performance of a new color.

3.2.2. The Fire and Aviation Management Fire Chemicals Branch Chief, in consultation with the NTDP, Wildland Fire Chemical Systems Program will identify products requiring a monitored field evaluation.

3.2.3. Products requiring a monitored field evaluation may be placed on the Qualified Products List as “conditionally qualified.”

A contract for the OFE will be negotiated with the company and the contract will include all final test procedures, payment terms, and clauses.

3.2.4. The OFE will be conducted in accordance with the approved test plan. This typically involves use for one season with monitoring of overall retardant characteristics and changes from the original formula. These might include variations in viscosity, foaming, or flowing of dry powders.

3.2.5. There will be an increase in frequency of sampling and routine observation of use by field personnel. Results of all LAQA testing will be closely monitored. Retardant will be sampled from base storage tanks and during loading operations.

3.2.6. The Test Plan will contain sampling guidance. This may include batch mixed samples and/or weekly storage samples that will be analyzed for conformance to product acceptance limits.

3.2.7. Overwinter storage may be required at the discretion of the Government.

3.2.8. A report will be prepared indicating the findings clearly identifying if the product passes or fails to meet the terms of the test plan and acceptance

criteria. If data collected is inconclusive or if additional observations are needed, a continuation of the OFE may be required to address operational or safety questions.

3.2.9. At the successful conclusion of the monitored operational field evaluation the status of the product will be upgraded to “fully qualified” and listed on the Qualified Products List.

3.3. FIXED-TANK HELICOPTER OPERATIONAL FIELD EVALUATION

3.3.1. Fixed-tank operations are significantly different than permanent base requirements and use. This type of operational field evaluation will be conducted for products that meet the fixed-tank helicopter requirements of the specification, this most significantly includes the magnesium corrosion resistance. This has similar requirements as a Full OFE, however the data collection and use will be focused on helicopter operations. A 200,000 gallon minimum use threshold may not be practical and instead a full field season of use will be the objective of these evaluations.

3.3.2. The Fire and Aviation Management Fire Chemicals Branch Chief, in consultation with the National Technology and Development Program (NTDP), Wildland Fire Chemical Systems (WFCS) Program will identify products requiring a fixed-tank operational field evaluation following successful completion of the laboratory evaluation.

3.3.3. A contract for the OFE will be negotiated with the company and the contract will include all required test procedures, payment terms, and clauses. At the discretion of the Government, test procedures may be modified if issues with the product, equipment, or operations are encountered.

3.3.4. Logistics from plant to field will be examined, including plant quality control, ability to sustain operations, and supply material as needed.

3.3.5. Time and equipment needed for mixing and handling operations will be determined.

3.3.6. Sampling and testing will be performed during all phases of base operations to assess consistency of the mixed retardant, frequency and duration of recirculation during the season and following overwinter storage. Corrosion and other laboratory tests may be performed on retained samples.

3.3.7. Operational effectiveness of the retardant may require the implementation of a special team to gather on-site data and present findings.

3.3.8. Other product characteristics such as abnormal wear on pumps or other equipment, dustiness, personnel safety will be evaluated.

3.3.9. Overwinter storage will be required. At the discretion of the Government, overwinter storage product may be used once spring sampling has been completed.

3.3.9.1. Overwinter storage can be performed in multiple ways to best suit the needs of the Government (see the Section 3 and the Definitions).

3.3.10. A report will be prepared indicating the findings and clearly identifying if the product passes or fails to meet the terms of the test plan and acceptance criteria. If data collected is inconclusive or if additional observations are needed, a continuation of the OFE may be required to address operational or safety questions.

3.3.11. At the successful conclusion of the operational field evaluation the status of the product will be upgraded to “fully qualified” and listed on the Qualified Products List.

3.4. EXPERIMENTAL OPERATIONAL FIELD EVALUATION

3.4.1. Certain innovative or new delivery systems and/or mixing technology that provides fire-fighters a benefit can be evaluated under this provision at the discretion of the Government. Some new concepts need to be safely evaluated prior to implementation to assure other aerial assets are not negatively impacted. Assurance that the new technology does not violate any Clean Water Act restrictions or other federal regulations needs to be considered and evaluated.

4. Evaluation

4.1. Long-Term (Permanent Base) Operations

Permanent Base operations could be situated adjacent to current interagency (i.e. DOI, USFS, CalFIRE) base infrastructure so it does not impact those facilities. This has been performed out of a secondary mixing setup so the current permanent base product and equipment are not impacted and can serve as a backup. The backup product would be available in the event of any issues with integrating the new product to the field.

4.2. Mobile Retardant Base (MRB) Operations, Fixed-Wing Helicopter Evaluations

Mobile Retardant Base Operations will be required for fixed-tank helicopter formulations as described in 3.3. These products are unique to this type of aircraft and are evaluated differently. This type of operation may not achieve the 200,000-gallon goal and will instead be evaluated over the course of a field season as defined in the Test Plan.

4.3. Other Operations (RESERVED)

New products that either meet the terms of one or more Government specifications or require additional evaluation and field exposure prior to full qualification may be required to undergo an OFE. If new types of base or aircraft

equipment are being beta-tested, this section provides the framework to allow for those types of evaluations.

5. Test Plan

5.1. A test plan is written specific to each product evaluation. This test plan shall include a section of specific requirements with performance pass/fail criteria. These metrics will be used to determine suitability of the new product into existing equipment and systems.

5.2. The written evaluation report will contain a complete, detailed summary of findings. In the event of an extended evaluation, progress reports may be necessary.

At the successful conclusion of the OFE the status of the product will be upgraded to “fully qualified” and listed on the Qualified Products List.

The company must successfully pass all elements of the OFE Test Plan to become fully qualified.

If the findings of the OFE are inconclusive, the Government may authorize an extension of the evaluation to gather more data. This is at the discretion of the Government Definitions

6. Definitions

***Mobile Retardant Base (MRB)*** – These are self-contained mixing and storage equipment provided by the retardant company or written into the OFE contract as part of contracted services.

***Overwinter samples*** – Overwinter samples are stored in government or company owned equipment at a designated permanent base during the offseason to evaluate bulk processed stability. Alternative options exist as listed in lieu of storage or availability in permanent base infrastructure (The decision to exercise these options are at the discretion of the Government):

(1) For powder concentrate products:

a. Mixed product samples may be collected from bulk mixing operations (i.e. Mobile Retardant Base) equivalent in volume to mixing 1- 2 supersacks and stored outside in a suitable container to simulate the permanent base storage.

(2) For liquid concentrate products:

a. Liquid concentrate samples may be collected from a bulk processed lot#/batch as handled for standard base deliveries (laboratory or small batch preparations do not meet this requirement). These samples are collected after suitable recirculation protocols and stored outside to simulate the permanent base storage of liquid concentrate.