

This document provides an addendum to the 30 April 2021 *Nationwide Aerial Application of Fire Retardant on National Forest System Land, Biological Assessment for Species within NOAA Fisheries Jurisdiction*. It includes information on Fortress FR-200 LLX, and additions/changes to the April 30 document as described.

Chemical Properties

Fortress FR-200 LLX is a magnesium chloride-based liquid concentrate. When mixed the product is:

- 10 % active ingredient
- 88.8 % water
- 0.2 % thickeners
- 1.0 % other (color, corrosion inhibitors)

At 2 gallons per 100 square foot, application results in approximately 0.018 pounds of magnesium chloride per square foot. At 8 gallons per 100 square foot approximately 0.074 pounds of magnesium chloride per square foot would be applied. The fish toxicity test was performed on rainbow trout (approximately 60-days post hatch) in soft water. The result for Fortress FR-200 was an $LC_{50} = 3,672$ mg/L. Retardants on the current Qualified Products List have LC_{50} values ranging from 2454 mg/L to 255 mg/L. Fortress FR-200 has a lower aquatic toxicity than current qualified products.

Toxicity to mammals was determined to be as follows:

- **Table 1**
- **Summary of Mammalian Toxicity Tests**
- **FRS FR-200 LLX**

	Concentrate	Mixed
Acute Oral Toxicity	$LD_{50} > 5000$ mg/Kg	$LD_{50} > 5000$ mg/Kg
Acute Dermal Toxicity	$LD_{50} > 2020$ mg/Kg	$LD_{50} > 2020$ mg/Kg
Primary Eye Irritation – Single –washed Eyes (24 hrs)	Practically non-irritating Irritation score: 2.0 Toxicity category: IV	Non-irritating Irritation score: 0.0 Toxicity category: IV
Primary Dermal Irritation	slightly irritating score: 0.5 Toxicity category: IV	Non-irritating score: 0.0 Toxicity category: IV

These toxicity values are lower than those consulted on for the 2011 nationwide biological assessment (USDA Forest Service 2011).

Changes/Addendums to the April 2021 Biological Assessment

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The Qualified Products List is maintained on the [Wildland Fire Chemicals](#) website and will be updated as products are added or removed. Table BA-1 lists the long-term retardants on the September 5, 2020

Qualified Products List with a summary of their aquatic toxicity and active retarding ingredients. Fortress FR-200 has completed all laboratory testing and will be listed on the QPL as Conditionally Qualified once Section 7 consultation is completed. A Conditional Qualification indicates the product is ready for an Operational Field Evaluation.

Table BA-1. Amounts of retardant active ingredients reaching the ground at specified coverage levels .

Retardant	Fish Toxicity (of concentrate)	4 GPC Coverage Level		8 GPC Coverage Level	
		LC ₅₀ (mg/L)	lbs NH ₃ /ft ²	lbs P2O5/ft ²	lbs NH ₃ /ft ²
Fully qualified products	LC₅₀ (mg/L)	lbs NH₃/ft²	lbs P2O5/ft²	lbs NH₃/ft²	lbs P2O5/ft²
Phos-Chek LC-95A-R	386	0.0095	0.0301	0.0190	0.0602
Phos-Chek LC-95A-Fx	399	0.0095	0.0273	0.0191	0.0546
Phos-Chek LC-95-W	465	0.0095	0.0276	0.0191	0.0553
Phos-Chek MVP-Fx	2,024	0.0053	0.0199	0.0105	0.0399
Phos-Chek 259-Fx	860	0.0070	0.0203	0.0140	0.0406
Phos-Chek LCE20-Fx	983	0.0073	0.0208	0.0147	0.0415
Interim qualified products	LC₅₀ (mg/L)	lbs Mg/ft²	lbs Cl- /ft²	lbs Mg/ft²	lbs Cl- /ft²
Fortress FR-100	1,762	0.0093	0.0270	0.0185	0.0541
Fortress FR-200 LLX	3,672	0.0094	0.0275	0.0188	0.0549

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An ecological risk assessment (Auxilio Management Services 2021) that includes FR-200 LLX and corrects an error in the last assessment was completed in June. While evaluating estimated risks across products, an error in calculating the amount of FR-100 hypothetically applied for modeling purposes was identified. As a result, the estimated risks were overstated for the FR-100 product. The Ecological Risk Assessment for Retardants has been revised to correct this error and the resulting estimated risks for the FR-100 product. There were no risks of runoff-related exposure from any of the products assessed. For freshwater mussels, runoff from retardant-treated areas is not expected to result in water concentrations of ammonia that would pose a risk.

Each retardant assessed posed a risk to one or more aquatic species if retardant is dropped into the stream of a small drainage at the application rates normally used for wildland fire fighting on National Forest System lands. The potential risks to individual species are specific to ecoregion. Appendix F includes a map and description of Bailey’s ecoregion for reference. Table BA-16 displays the ecoregions where risks were identified, with ecoregions listed by their identifier number. One retardant, Phos-Chek® LCE20-Fx, poses a risk to daphnia (aquatic invertebrates), in ecoregions 131, 232, and M262, if that retardant is dropped into the stream of a large drainage.

Table BA-2. Ecoregions where risks to aquatic species from accidental application of mixed (diluted) retardant to a small stream are indicated.

Retardant	Tadpole	Daphnia	Rainbow trout
Phos-Chek® MVP-Fx	131, 232, M262	131, 212, 232, M242, M262	131, 212, 232, M242, M262, 315, 342

Phos-Chek® MVP-F	131, 232, M262	none	131, 232, M262
Phos-Chek® 259-Fx	none	212, 232, M242, 315, 342	131, 212, M212, 231, 232, 234, 242, M242, 342, M262, M313, 315, M331, M332
Phos-Chek® LC-95A-Fx	none	212, M242, 232, 131, M262	M313, M331, M332, 242, 234, M212, 231, 342, 315, 212, M242, 232, 131, M262
Phos-Chek® LC-95A-F	none	none	131, 212, 232, M242, M262, 315, 342
Phos-Chek® LC-95A-R	none	none	131, 212, 232, M242, M262, 315, 342
Phos-Chek® LC-95W	none	none	131, 212, 232, M242, M262, 315, 342
Phos-Chek® LCE20-Fx	none	131, 212, M212, 231, 232, 234, 242 M242, M262, M313, 315, 331, M331, M332, 342	131, 212, 232, M242, M262
Fortress® FR-100 ¹	none	131, 232, M262	none
Fortress® FR-200 LLX	none	131, 232, M262	none

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Appendix B

Table 2. Nutrients Delivered at Specified Coverage Levels				
Ammonia and Phosphate concentrations				
Retardant	4 GPC Coverage Level		8 GPC Coverage Level	
	lbs NH ₃ /ft ²	lbs P ₂ O ₅ /ft ²	lbs NH ₃ /ft ²	lbs P ₂ O ₅ /ft ²

Phos-Chek LC-95A-R	0.0095	0.0301	0.0190	0.0602
Phos-Chek LC-95A-Fx	0.0095	0.0273	0.0191	0.0546
Phos-Chek LC-95-W	0.0095	0.0276	0.0191	0.0553
Phos-Chek MVP-Fx	0.0053	0.0199	0.0105	0.0399
Phos-Chek 259-Fx	0.0070	0.0203	0.0140	0.0406
Phos-Chek LCE20-Fx	0.0073	0.0208	0.0147	0.0415
Magnesium and Chloride concentrations				
	lbs Mg/ft²	lbs Cl⁻ /ft²	lbs Mg/ft²	lbs Cl⁻ /ft²
Fortress FR-100	0.0093	0.0270	0.0185	0.0541
Fortress FR-200 LLX	0.0094	0.0275	0.0188	0.0549