



## Fish Toxicity <sup>1</sup>



The Forest Service has worked with the United States Geological Service (USGS) for a number of years to develop a fish toxicity test. The work focused on determining the relative sensitivity to wildland fire chemicals of fish and other aquatic species and age classes commonly used for laboratory studies. Young rainbow trout were found to be representative of the most sensitive of this group of aquatic species and as sensitive as the threatened or endangered species that had been studied.

The final test was developed to use 60 days-post-hatch (dph) rainbow trout. The fish were exposed to a series of product dilutions for 96 hours, under static conditions to determine the LC<sub>50</sub>. All dilutions were prepared using ASTM soft water as it was determined to be the best single representation of water in streams in undeveloped areas.

The LC<sub>50</sub> is the concentration of product in water that results in the death of 50 percent of the aquatic test specimens within a specified time frame, 96 hours in this case.

The LC<sub>50</sub>, expressed in milligrams of product in a liter of solution (mg/L), is the value reported in the fish toxicity summary.

The reported values are for the product concentrates unless otherwise noted. Mix ratios must be considered in addition to the LC<sub>50</sub> when estimating toxicity in the field. This is especially true when comparing products with different mix ratios.

**It is important to remember when comparing values, that the lower the LC<sub>50</sub> value, the greater the toxicity.**

It is the goal of the wildland fire agencies to apply these products in a manner that does not allow them to enter waterways. Since this is not always possible, careful selection of products can be helpful in minimizing harmful effects.

Product Performance Data on next page

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Standard Test Procedure 1.5 gives instructions for the fish toxicity test.



# Fish Toxicity<sup>1</sup>

## Aerial Long-Term Retardant Concentrates<sup>4</sup>



Product	LC <sub>50</sub> <sup>2</sup>
Phos-Chek MVP-Fx	2,024 mg/L
Phos-Chek MVP-F	2,454 mg/L
Phos-Chek 259-Fx	860 mg/L
Phos-Chek LC-95A-R	386 mg/L
Phos-Chek LC-95A-Fx	399 mg/L
Phos-Chek LC-95A-F	225 mg/L
Phos-Chek LC-95-W	465 mg/L
Phos-Chek LCE20-Fx	983 mg/L
Fortress FR-100	1,762 mg/L
Fortress FR-200	3,672 mg/L
Fortress FR-105 HV	2,960 mg/L

### Notes:

1	All tests are conducted on Rainbow Trout; 60 days-post-hatch with a 96-hr static exposure. USDA Forest Service Standard Test Procedure 1.5 gives instructions for the fish toxicity test. STP-1.5 is available at <a href="http://www.fs.fed.us/rm/fire/wfcs/tests/stp01_5.htm">http://www.fs.fed.us/rm/fire/wfcs/tests/stp01_5.htm</a>
2	<b>Lower values indicate greater toxicity.</b>
3	When there is more than one variant of the formula (typically when alternate sources of the same component are used) the test result with the greatest toxicity, i.e. lowest LC <sub>50</sub> , is reported.
4	<i>Note that toxicity data represents concentrates as submitted to the USFS and are not reflective of products as applied in the field. Additional studies would need to be conducted to list all mixed product LC<sub>50</sub> values.</i>



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## Ground Applied Pre-treatment Retardant<sup>4</sup>



Product	LC <sub>50</sub> <sup>2</sup>
Phos-Chek LC-95-W	465 mg/L
Phos-Chek LC-95A-Fx	399 mg/L
Phos-Chek Fortify	1,553 mg/L
Phos-Chek LCE20W	1,675 mg/L
Fortress FR-600	> 5,000 mg/L
Komodo	956 mg/L
Fortress FR-100	1,762 mg/L
Fortress FR-200	3,672 mg/L
Fortress FR-105 HV	2,960 mg/L
Fortress FR-700 <sup>5</sup>	> 5,000 mg/L <sup>5</sup>

### Notes:

1	All tests are conducted on Rainbow Trout; 60 days-post-hatch with a 96-hr static exposure. USDA Forest Service Standard Test Procedure 1.5 gives instructions for the fish toxicity test. STP-1.5 is available at <a href="http://www.fs.fed.us/rm/fire/wfcs/tests/stp01_5.htm">http://www.fs.fed.us/rm/fire/wfcs/tests/stp01_5.htm</a>
2	<b>Lower values indicate greater toxicity.</b>
3	When there is more than one variant of the formula (typically when alternate sources of the same component are used) the test result with the greatest toxicity, i.e. lowest LC <sub>50</sub> , is reported.
4	<i>Unless noted with footnote 5, Note that toxicity data represents concentrates as submitted to the USFS and are not reflective of products as applied in the field.</i>
5	Tested as mixed product (ready-to-use) not concentrate.