FSEEE Forest Service Employees for Environmental Ethics

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Hunter Jones, Fire Chemicals Branch Chief

USDA Forest Service

National Technology and Development Program (NTDP)

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Submitted via email to: hunter.jones@usda.gov

Re: Comments on the Information Collection: Qualified Products Lists for Fire Chemicals for Wildland Fire Management (OMB Control No. 0596–0182); *91 Fed. Reg. 23,939 (May 4, 2026)*

Dear Mr. Jones:

Forest Service Employees for Environmental Ethics (FSEEE) respectfully submits these comments in response to the Forest Service's notice and request for comment concerning the reinstatement of the information collection titled "Qualified Products Lists for Fire Chemicals for Wildland Fire Management," published at 91 Fed. Reg. 23,939 (May 4, 2026). FSEEE is a national nonprofit organization of Forest Service employees, other public land professionals, and concerned citizens dedicated to holding the agency to the highest environmental and ethical standards in its stewardship of the National Forests.

FSEEE writes because the information collection at issue is not a mere paperwork formality. The data the agency collects—and, critically, the data it declines to collect—determines which fire chemicals are placed on the Qualified Products List (QPL) and, in turn, which chemicals are dispersed by the millions of gallons across National Forest System lands and the waters that flow through them. Recent independent laboratory analysis has revealed that long-term fire retardants currently qualified on the QPL contain toxic heavy metals at concentrations that, in the case of the most widely used product, exceed federal drinking-water Maximum Contaminant Levels by factors of hundreds to thousands and exceed federal and state hazardous-waste thresholds. The agency's current information-collection methodology failed to detect these contaminants. That failure is the central subject of these comments.

The agency itself has now acknowledged the gap. Following publication of the University of Southern California (USC) laboratory study, Metals in Wildfire Suppressants (Schammel, Gold & McCurry, 2024), the Forest Service entered into an Interagency Agreement with the U.S. Geological Survey (Agreement No. 24-IA-11132543-023) to characterize the metals and inorganic constituents in its retardant formulations

and their bioavailability in the environment. As Deputy Director Adam Mendonca's declaration and its Exhibit C confirm, the agency has recognized that additional testing is necessary. These comments urge the agency to formalize that recognition by building appropriate testing into the QPL information collection itself, so that no product reaches the QPL without adequate vetting in the first instance.

We organize our comments under the four areas on which the agency has invited comment.

1. Whether this collection of information is necessary for the stated purposes and the proper performance of the functions of the Agency, including whether the information will have practical or scientific utility

FSEEE agrees that the collection of information is necessary. Indeed, it is not only necessary but legally compelled, and the current collection is inadequate to satisfy the agency's obligations. The Forest Service does not collect QPL information in a legal vacuum. It qualifies and then procures chemicals that it disperses onto lands and into waters that are protected by a comprehensive body of federal and state environmental law. If the information collection does not capture whether a candidate product contains constituents that would cause the agency to violate these laws when the product is applied, the collection lacks the very practical and scientific utility the Paperwork Reduction Act requires. The presence of Superfund-level heavy metals in a qualified product—undetected by the current collection—demonstrates the point concretely.

The agency's legal obligations include, but are not limited to, the following. For each, we identify the governing requirement and the liability the agency risks if it qualifies and applies products that have not been sufficiently vetted for heavy-metal content.

Clean Water Act (CWA), 33 U.S.C. § 1251 et seq.

The CWA prohibits the discharge of any pollutant from a point source into navigable waters without a National Pollutant Discharge Elimination System (NPDES) permit. 33 U.S.C. §§ 1311(a), 1342. "Pollutant" expressly includes chemical wastes and is broad enough to encompass the metals-laden retardant slurry at issue here. In 2023, the U.S. District Court for the District of Montana held, in litigation brought by FSEEE, that the Forest Service had discharged aerial fire retardant into navigable waters without an NPDES permit in violation of the Clean Water Act, although the court declined to enjoin continued use while the agency pursued a permit. The agency's liability under the CWA turns on what is actually in the retardant. Heavy metals such as cadmium, chromium, and lead are classic CWA pollutants with stringent aquatic-life criteria. An information collection that does not quantify these constituents leaves the agency unable to establish, or even to know, whether its discharges will meet water-quality-based effluent limitations.

Liability: CWA civil penalties accrue per violation, per day, and the Act authorizes citizen suits, 33 U.S.C. § 1365. Each unpermitted discharge of a metals-laden pollutant is an independent violation exposing the agency to injunctive relief, penalties, and fees.

Endangered Species Act (ESA), 16 U.S.C. § 1531 et seq. — Section 7

Section 7(a)(2) requires every federal agency to ensure that its actions are not likely to jeopardize the continued existence of any listed species or destroy or adversely modify designated critical habitat, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). 16 U.S.C. § 1536(a)(2). The agency must use "the best scientific and commercial data available."

Consultation must be reinitiated when new information reveals effects of the action that were not previously considered. 50 C.F.R. § 402.16.

The "new information" trigger: The discovery of high-level heavy metals in qualified retardants constitutes precisely the kind of "new information" that requires reinitiation of consultation. The existing Biological Opinions supporting retardant use rely on toxicity and baseline science that is, in substantial part, thirty years old or older, and evaluate ammonia and cyanide rather than the persistent, bioaccumulative metals identified by the USC study. Those Opinions did not, and could not, account for the bioaccumulation of cadmium in fish or the sublethal effects of chromium exposure, because the underlying information collection never detected these metals. An information collection that omits elemental analysis effectively guarantees that the agency's Section 7 consultations proceed on an incomplete record.

Liability: The ESA authorizes citizen suits, 16 U.S.C. § 1540(g). Unlawful "take" of listed species carries civil and criminal penalties, and a failure to consult on the basis of the best available science is independently actionable under the ESA and the Administrative Procedure Act. FSEEE has already filed suit against the agency under the ESA concerning the effects of retardant.

Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq.

RCRA governs the "cradle-to-grave" management of hazardous waste. Under 40 C.F.R. § 261.24, a solid waste that leaches heavy metals above specified regulatory thresholds using the Toxicity Characteristic Leaching Procedure exhibits the characteristic of toxicity and is a "characteristic hazardous waste." The USC study measured cadmium at 14,400 µg/L (ppb) and chromium at 72,700 µg/L (ppb) in Phos-Chek LC-95W. These concentrations far exceed the thresholds that trigger management as hazardous waste, and the study's authors concluded that this product could legally be characterized as hazardous waste under both federal and California regulations.

The conflict: If a retardant is legally a hazardous waste by virtue of its metal content, the agency cannot simply spray it across the open landscape without implicating RCRA's storage, handling, and disposal requirements. Notably, the agency's current TCLP screening evaluates only eight metals under weak-acid conditions designed to mimic landfill behavior—a method that, as the USGS agreement acknowledges, is not designed to capture the full environmentally available fraction of metals in a formulation.

Liability: RCRA imposes substantial civil penalties per day of violation and authorizes citizen suits, 42 U.S.C. § 6972, including for imminent and substantial endangerment to health or the environment.

Safe Drinking Water Act (SDWA) — Lead and Copper Rule, 42 U.S.C. § 300f et seq.

The SDWA protects public drinking-water supplies. Under the Lead and Copper Rule (1991), the EPA sets an "action level" of 15 ppb for lead; exceedance requires corrective action. The USC study found 63 ppb of lead in Phos-Chek LC-95W—more than four times the federal action level. The SDWA also prohibits tampering with a public water system. 42 U.S.C. § 300i-1.

Liability: Where retardant drops occur within source-water protection areas—the watersheds that feed municipal intakes—the introduction of lead and other regulated contaminants above SDWA thresholds could expose the agency to liability for contaminating or tampering with a public water supply, independent of the agency's CWA status. An information collection that never measures lead cannot alert the agency to this exposure.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq.

CERCLA imposes strict, and in appropriate cases joint and several, liability for the release of hazardous substances and for the costs of cleaning up contaminated sites. Cadmium, chromium, lead, arsenic, copper, and antimony are all designated CERCLA hazardous substances under 40 C.F.R. § 302.4, Table 302.4. CERCLA and its implementing regulations also require immediate notification to the National Response Center whenever a designated hazardous substance is released to the environment in a quantity that equals or exceeds its reportable quantity (RQ) within any 24-hour period. 42 U.S.C. § 9603; 40 C.F.R. § 302.6.

The reportable quantities for the metals found in qualified retardant are strikingly low relative to the concentrations and volumes at issue. The RQs for these metals are:

- Arsenic — 1 pound (0.454 kg) per 24-hour period;
- Cadmium — 10 pounds (4.54 kg) per 24-hour period;
- Lead — 10 pounds (4.54 kg) per 24-hour period; and
- Chromium, copper, and antimony — 5,000 pounds (2,270 kg) each per 24-hour period.

These thresholds are readily approached during ordinary fire operations. Using the concentrations independently measured in Phos-Chek LC-95W (see Point 2, Table 1), applying on the order of 83,000 gallons of that retardant within a 24-hour period would introduce cadmium in excess of its 10-pound reportable quantity, and roughly 125,000 gallons would exceed the 1-pound reportable quantity for arsenic[1]—application volumes that are entirely plausible during a single large fire. Whether any particular incident constitutes a reportable release depends on site-specific facts, and the agency may contend that certain releases fall within statutory or regulatory exclusions. But that is precisely the point: the agency cannot even undertake the RQ analysis, or discharge its notification duty, when it does not measure—and therefore does not know—the metal content of the product it is applying. An information collection that omits elemental analysis leaves the agency structurally unable to determine when a CERCLA reporting obligation has been triggered.

Liability: Because CERCLA liability is strict and may attach retroactively, a statutory exemption from one program (such as a Clean Water Act permitting exemption) does not extinguish CERCLA responsibility for the costs of responding to contamination that retardant application creates. The USC study estimated that fire-retardant application contributed on the order of 380,000 kilograms (approximately 838,000 pounds) of toxic metals to the environment between 2009 and 2021. The agency's potential response-cost and natural-resource-damage exposure is therefore substantial—and, again, it cannot even quantify that exposure without collecting the metals data the current information collection omits.

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[1] *Illustrative calculation.* A reportable quantity (RQ) is a mass threshold, whereas the measured data are concentrations, so the applied volume required to reach an RQ is estimated as volume = RQ ÷ concentration. Cadmium: 10 lb (≈ 4,536 g) ÷ 0.0144 g/L (14,400 µg/L) ≈ 315,000 L ≈ 83,000 gallons. Arsenic: 1 lb (≈ 454 g) ÷ 0.000962 g/L (962 µg/L) ≈ 472,000 L ≈ 125,000 gallons. These figures are illustrative and order-of-magnitude only. They assume the concentrations measured in Phos-Chek LC-95W and that the applied mass is released within a single 24-hour period; they do not resolve site-specific questions such as how a dispersed aerial application is aggregated, dilution in receiving waters, or the availability of any statutory or regulatory exclusion. The point is not that any particular drop is unlawful, but that the volumes required to reach these thresholds fall within the range of a single large fire's daily retardant use—and that the agency cannot perform this analysis at all without measuring the metal content of its products.

The fertilizer exclusion does not shield these releases. The agency may respond that CERCLA's definition of "release" excludes "the normal application of fertilizer," 42 U.S.C. § 9601(22)(D); 40 C.F.R. § 302.3, and that long-term retardant is an ammonium-phosphate product akin to a fertilizer. That reliance would be misplaced, for three reasons.

First, the exclusion is narrow and purpose-specific: it addresses fertilizer applied to promote plant growth at ordinary agronomic rates. Coating wildland fuels and building containment lines by discharging thousands of gallons of chemical slurry from aircraft—to retard combustion rather than to nourish crops—bears none of the hallmarks of normal fertilization. The purpose, method, setting, and application rate all differ from the practice the exclusion was written to cover, and because CERCLA is a remedial statute its exclusions are construed narrowly.

Second, the exclusion reaches the fertilizer, not the toxic metals carried with it. The cadmium, chromium, arsenic, and other metals identified in the USC study are not fertilizer and serve no agronomic purpose; they are unintended impurities from the mined phosphate ore and undisclosed additives such as corrosion inhibitors. Even if the ammonium-phosphate base were treated as fertilizer, the exclusion does not reach the separate hazardous substances co-released with it. A product that simultaneously qualifies as a characteristic hazardous waste under RCRA—as the metals data indicate Phos-Chek LC-95W does—is not fertilizer being applied "normally."

Third, and most fundamentally, whether the exclusion applies is a fact-specific inquiry the agency cannot even conduct without the metals data the current collection omits. The exclusion is, in any event, specific to CERCLA's definition of "release": it offers no shelter under the Clean Water Act, RCRA, the Safe Drinking Water Act, the Endangered Species Act, or state hazardous-waste law. The vetting failure these comments describe is not cured by a fertilizer label.

State Hazardous Waste and Water-Quality Laws (e.g., California Title 22)

Many western states maintain hazardous-waste programs at least as stringent as their federal counterparts, and several reach further. California is the clearest example: under its Soluble Threshold Limit Concentration (STLC) standard, cadmium is limited to 1,000 ppb, so the retardant's measured 14,400 ppb exceeds that threshold more than fourteenfold, and chromium (72,700 ppb) and vanadium (119,000 ppb) likewise exceed their California STLCs of 5,000 ppb and 24,000 ppb—vanadium being one of several metals California regulates that federal law does not. The same cadmium and chromium concentrations also exceed the federal RCRA toxicity-characteristic regulatory levels (1.0 mg/L and 5.0 mg/L, respectively) that other western states administer and enforce through their own EPA-authorized hazardous-waste programs, including Oregon and Washington—the latter's Dangerous Waste Regulations (Chapter 173-303 WAC) reaching beyond the federal program. A product that qualifies as hazardous waste under the law of the state in which it is applied cannot be freely dispersed onto that state's lands and waters.

Liability: Because a federal CWA exemption does not automatically preempt state hazardous-waste or water-quality law, states that administer their own EPA-authorized programs can enforce those standards directly—exposing the agency to state penalties, cleanup obligations, and citizen suits independent of federal law. The agency operates National Forests across numerous such states, and its information collection should enable it to determine compliance with the law of each state in which a product will be applied.

Public-Land Management Mandates

Three organic statutes reinforce the necessity of adequate information. The Organic Administration Act of 1897, 16 U.S.C. § 551, directs the Secretary to regulate the occupancy and use of the National Forests to protect them against destruction. The Multiple-Use Sustained-Yield Act of 1960, 16 U.S.C. §§ 528–531, requires management of the forests for multiple uses—including water, wildlife, and fish—without impairment of the productivity of the land. The National Forest Management Act of 1976, 16 U.S.C. § 1600 et seq., requires the agency to maintain the diversity and viability of native species and to protect soil and water resources. Applying products laden with persistent, bioaccumulative metals—without collecting the information necessary to know they are present—is in tension with each of these mandates, which together direct the agency to sustain, not degrade, forest soils, waters, and aquatic life.

Conclusion on Point 1. The information collection is necessary, but as presently constituted it lacks practical and scientific utility because it does not capture the data the agency needs to comply with the foregoing laws. A collection that permits products with hazardous-waste-level heavy metals to reach the QPL undetected does not perform the agency's functions; it undermines them. To have genuine utility, the collection must be expanded as described under Point 2.

2. The accuracy of the Agency's estimate of the burden of the collection of information, including the validity of the methodology and assumptions used

FSEEE's comments on Point 2 address the validity of the methodology and assumptions underlying the collection—the aspect of this factor most consequential to the public interest. The current methodology is not valid to accomplish the collection's stated purpose of ensuring that qualified products are "effective, nontoxic, and noncorrosive," because it does not test for the toxic constituents that are in fact present.

A. The current methodology failed to detect Superfund-level heavy metals.

The most direct evidence that the current methodology is invalid is that it allowed aerial fire retardant containing hazardous-waste-level toxic heavy metals to be qualified and then dispersed across National Forests, including into waterways. Proper elemental analysis of the retardant would have revealed the presence of these metals before qualification. It did not, because the collection does not require such analysis. The methodology's central assumption—that reviewing a manufacturer's disclosed ingredient list and safety data sheets, screening against "Chemicals of Concern" lists, and running acute toxicity tests will identify all constituents of environmental concern—is false. Metals that enter the product as impurities from mined phosphate ore or from corrosion inhibitors are not necessarily disclosed as "ingredients," and therefore escape a review keyed to the manufacturer's recipe.

B. The third-party risk assessment must include ICP-MS elemental analysis.

To be valid, the risk assessment conducted by the agency's third-party reviewer must include Inductively Coupled Plasma Mass Spectrometry (ICP-MS) testing capable of detecting heavy metals at the parts-per-billion level. ICP-MS is the established industry-standard technique for trace-metal quantification and is neither novel nor experimental. Its omission from the current collection is the specific methodological defect that allowed the metals to go undetected.

The USC laboratory study (Schammel, Gold & McCurry, 2024) applied ICP-MS—validated against ICP triple-quadrupole mass spectrometry and against EPA Method 200.8 at an external laboratory—to fourteen

fire-suppression products. In Phos-Chek LC-95W, the uncolored form of Phos-Chek's widely used LC95 long-term retardant line, the study measured chromium at 72,700 ppb (727 times the EPA drinking-water Maximum Contaminant Level) and cadmium at 14,400 ppb (2,880 times the MCL). It also measured, among other metals, lead at 63 ppb, arsenic at 962 ppb, copper at 2,660 ppb, vanadium at 119,000 ppb, manganese at 16,100 ppb, and thallium at 412 ppb—with individual metals ranging up to roughly 2,880 times their corresponding MCLs. The study concluded that concentrations of chromium, cadmium, and vanadium exceeded California STLC hazardous-waste thresholds, such that the product could legally be characterized as hazardous waste under both federal and California law. The full results for this product are set out in Table 1.

Table 1. Toxic metals measured in Phos-Chek LC-95W (a QPL-listed long-term fire retardant) compared to federal and California regulatory thresholds.

Metal	CAS No.	EPA drinking-water limit (ppb)	CA hazardous-waste STLC (ppb)	Phos-Chek LC-95W (ppb)	Multiple of EPA limit
Cadmium	7440-43-9	5	1,000	**14,400***	**2,880×**
Vanadium	7440-62-2	50†	24,000	**119,000***	**2,380×**
Chromium	7440-47-3	100	5,000	**72,700***	**727×**
Manganese	7439-96-5	50†	15,000	16,100	**322×**
Thallium	7440-28-0	2	7,000	412	**206×**
Antimony	7440-36-0	6	15,000	767	**128×**
Arsenic	7440-38-2	10	5,000	962	**96×**
Lead	7439-92-1	15‡	5,000	63	**4.2×**
Copper	7440-50-8	1,300‡	25,000	2,660	**2.0×**
Barium	7440-39-3	2,000	100,000	282	**0.14×**

*Concentrations in µg/L (ppb) from Schammel, Gold & McCurry (2024), Table 1; values reflect the concentration present after any manufacturer-recommended dilution. CAS No. is the Chemical Abstracts Service Registry Number identifying the elemental form of each metal. * Exceeds the California Soluble Threshold Limit Concentration (STLC) hazardous-waste threshold; these metals are also federally regulated at the same concentrations, supporting characterization of the product as hazardous waste. † No EPA MCL established; value shown is the California Notification Level. ‡ Regulatory value shown is an EPA action level rather than an MCL. The other QPL-listed long-term retardant tested (Komodo) also exceeded EPA limits for multiple metals.*

Sources: measured concentrations, Schammel, Gold & McCurry (2024). EPA drinking-water Maximum Contaminant Levels and action levels, National Primary Drinking Water Regulations, 40 C.F.R. Part 141. California vanadium and manganese Notification Levels, California State Water Resources Control Board, Division of Drinking Water. California Soluble Threshold Limit Concentrations (STLC), 22 Cal. Code Regs. § 66261.24. CAS Registry Numbers, EPA List of Hazardous Substances and Reportable Quantities, 40 C.F.R. § 302.4 (Table 302.4), and EPA SW-846 Method 6020B.

The significance of these concentrations lies in the well-established toxicity of the metals involved, several of which are persistent, bioaccumulative, carcinogenic, or all three. Table 2 summarizes the principal environmental and human-health concerns associated with toxic levels of the metals detected. These concerns—particularly the sublethal, bioaccumulative, and developmental harms—are exactly the effects that the agency's current acute-only toxicity testing, discussed in subsection F below, is incapable of detecting.

Table 2. Principal environmental and human-health concerns associated with toxic levels of the metals detected in QPL-listed fire retardants.

Metal	Principal environmental and human-health concerns at toxic levels
Cadmium	Classified as a human carcinogen; accumulates in the kidney and liver; damages fish gills and impairs reproduction; environmentally persistent and bioaccumulative.

Metal	Principal environmental and human-health concerns at toxic levels
Chromium	Hexavalent chromium is a known human carcinogen; causes organ and gill damage in fish; persists in sediments where aquatic organisms feed and spawn.
Arsenic	Classified as a human carcinogen (skin, lung, and bladder); toxic and persistent in aquatic systems; accumulates in sediments and biota.
Lead	Potent neurotoxin with no recognized safe exposure level, especially for children; bioaccumulative; impairs the nervous and blood systems of aquatic life.
Vanadium	Toxic to aquatic organisms at elevated concentrations; associated with respiratory and developmental effects in mammals.
Thallium	Acutely toxic and neurotoxic; bioaccumulative; harmful to aquatic organisms even at low concentrations.
Antimony	Possible human carcinogen; associated with cardiac and gastrointestinal toxicity; toxic to aquatic organisms.
Manganese	Neurotoxic at elevated exposures, including developmental neurological effects associated with drinking-water exposure.
Copper	Highly toxic to fish; impairs the olfactory sense of salmonids, disabling predator avoidance and homing—a sublethal effect that a 96-hour LC50 test cannot detect.

The copper entry is illustrative of the broader point developed in subsection F: metals cause serious, ESA-relevant harm—olfactory impairment, reduced growth, impaired reproduction, and bioaccumulation—at concentrations and over timeframes that acute mortality testing does not capture.

C. The findings implicate the qualified retardant class as a whole, not a single formulation.

A threshold question is whether the tested product, Phos-Chek LC-95W, is representative of the aerial retardants the QPL governs. It is. LC-95W is a fully qualified long-term retardant on the Forest Service's own Long-Term Retardant Qualified Products List for aerial applications under Forest Service Specification 5100-304d, and the Forest Service lists it among its "Aerial Long-Term Retardant Concentrates." The agency has publicly acknowledged that it has used LC-95W in aerial firefighting and that the product is approved for both aerial and ground application, having passed the QPL's existing safety tests, including the TCLP.[2] The manufacturer has suggested that LC-95W differs from the colored product most often dropped and has not been applied aerially; but the facts that matter for this comment are that the agency qualified LC-95W for aerial use through the very process at issue, and that the process did not detect the metals the USC study later found.

More fundamentally, the objection misapprehends where the metals originate. The Phos-Chek LC95 line is offered in red (LC95A-R), fugitive-colored (LC95A-Fx), and uncolored (LC95W) forms that share the same ammonium polyphosphate base and differ only in their color package. The heavy metals are not constituents of the dye; they enter the product through the mined phosphate salts that form the retardant's active ingredient and through the corrosion inhibitors added to protect aircraft and storage tanks—chromium and cadmium being well-known aluminum corrosion inhibitors. Measuring the uncolored formulation is therefore a scientifically sound way to quantify the metals present in the components shared with the colored aerial variants.

[2] See U.S. Forest Service, Wildland Fire Chemical Systems, Long-Term Retardant for Wildland Fire Management—Aerial Applications (Qualified Products List), qualified under Forest Service Specification 5100-304d (listing Phos-Chek LC-95-W as a fully qualified aerial product; e.g., editions of Dec. 8, 2022 and Dec. 5, 2023), and Fish Toxicity—Long-Term Retardants (rev. Jan. 22, 2025) (classifying Phos-Chek LC-95-W among "Aerial Long-Term Retardant Concentrates"). The Forest Service publicly acknowledged using LC-95W in aerial firefighting, and confirmed its approval for both aerial and ground application, in coverage of the USC study; the manufacturer, by contrast, stated that LC-95W is chemically different from the colored aerial product and has not been used aerially. See "Study finds wildfire retardant is laden with toxic metals," FireRescue1 (Nov. 23, 2024).

The same contamination pathway extends to the retardants in current bulk use. The aerial long-term retardants the Forest Service now procures in largest volume—Phos-Chek MVP-Fx and LCE20-Fx, along with 259-Fx—are, like LC-95W, ammonium phosphate-based products. The agency's own Interagency Agreement with USGS states that these current suppressants rely on "mined, natural phosphate salts [that] have previously been found to contain selenium, arsenic, cadmium, and chromium," and it is precisely those current products that USGS is now testing. The agency thus does not treat the LC-95W findings as irrelevant to today's formulations; it has commissioned analysis of the current formulations for the same metals. Finally, because the manufacturer reformulates its products frequently and the QPL and procurement lists change from year to year, no comment tied to one formulation could remain current for long. That is the point: the remedy FSEEE urges—ICP-MS, STLC, and acid-digestion testing at qualification and at each requalification—is formulation-independent, and would guard against undetected metals in whatever product, present or future, the agency places on the QPL.

D. The agency itself has recognized the need for this testing.

This is not a contested scientific proposition. The agency has already conceded the point. As set forth in the Declaration of Adam Mendonca and its Exhibit C—the Interagency Agreement between the Forest Service and the U.S. Geological Survey (Agreement No. 24-IA-11132543-023)—the Forest Service, after reviewing the USC study, "determined that additional information on heavy metals was needed" and engaged the USGS Columbia Environmental Research Center to characterize the metals in its formulations. The agreement's scope of work commits the USGS to quantify some forty-nine metals plus total mercury in bulk retardant formulations using ICP-MS (a method similar to EPA Method 6020B), and, for dry concentrates, to perform acid digestion (a method similar to EPA Method 3050B) to access the environmentally available fraction of metals. The agreement further acknowledges that the agency's existing evaluation relies only on eight metals extracted under the TCLP—"weak acid conditions designed to mimic landfill behaviors"—and that this is insufficient to assess environmental harm.

To be sure, the agreement questions aspects of the USC study's sample collection and metals quantification. But whatever the merits of that critique, the agency's response is the telling fact: rather than dismiss the finding, the Forest Service commissioned rigorous, peer-reviewed ICP-MS and acid-digestion testing of the very metals the study identified—something an agency that regarded the concern as illusory would not have done.

In short, the agency recognizes both the impact of these toxic heavy metals and the need to better quantify and remedy them. FSEEE urges the agency to close the loop by incorporating this same testing into the QPL information collection itself, rather than treating it as an after-the-fact research project layered on top of products that are already qualified and in use.

E. STLC and acid-digestion testing should accompany ICP-MS.

Consistent with the USGS agreement and with California hazardous-waste methodology, the collection should require Soluble Threshold Limit Concentration (STLC) testing and acid-digestion analysis in addition to ICP-MS. STLC testing quantifies the soluble, leachable fraction that determines hazardous-waste status under state law; acid digestion accesses the environmentally available fraction relevant to real-world exposure. Together with ICP-MS total-recoverable measurements and analysis of both filtered (bioavailable) and unfiltered fractions at use-level dilution, these tests would allow the agency to determine, before qualification, whether a product would be characterized as hazardous waste and whether its

application would exceed drinking-water or aquatic-life thresholds. This testing is what ensures compliance with the laws identified under Point 1.

F. Aquatic and mammalian toxicity testing must use contemporary methodologies.

The validity problem extends beyond elemental analysis to the toxicity testing itself. In assessing mammalian and aquatic toxicity as part of the third-party review—and in the agency's consultations with NOAA/NMFS and the USFWS—the collection must apply contemporary scientific methodologies. For aerial fire retardant, the agency has relied on the 96-hour Lethal Concentration 50 (LC50) test, which measures only whether more than half of exposed fish remain alive after four days. The LC50 test does not assess whether the surviving fish are impaired, wasting, or otherwise compromised and unlikely to survive much longer. It is blind to sublethal, behavioral, developmental, reproductive, and bioaccumulative effects—precisely the effects that heavy metals cause and that the ESA is designed to prevent.

The consequences of relying on the LC50 alone are illustrated by the agency's own funded research. Dietrich et al. (2014), a study supported by the Forest Service Wildland Fire Chemical Systems program and authored by NMFS scientists, exposed juvenile Chinook salmon to the qualified retardants Phos-Chek LC-95A and 259F and then subjected survivors to a seawater challenge simulating ocean entry. The study found that salmon exposed at the smolt stage suffered delayed mortality upon entering seawater—mortality that occurred after the 96-hour window had closed and that the acute LC50 therefore did not capture. The authors concluded that accidental retardant drops during salmon outmigration "would have adverse impacts that extend beyond the acute mortality that occurs within the immediate drop and dilution areas," and that LC-95A is "more toxic to Chinook salmon than the acute LC50s would suggest." A fish that is counted as a "survivor" at hour 96 but dies upon reaching the ocean is a mortality the current methodology never sees.

Modern federal practice has already moved beyond the mortality-only frame. Recent NMFS Section 7 consultations—including the 2023 Biological Opinions on EPA's approval of cadmium and selenium water-quality criteria for North Carolina (NMFS Tracking No. OPR-2022-02170) and for Maryland and Delaware (NMFS Tracking No. OPR-2022-03042)—evaluate a weight of evidence that includes not only the LC50 but also fractional-effect and no- and lowest-observed-effect endpoints (e.g., EC10, LOEC, NOEC) and behavioral and neurological effects, because the purpose of consultation is to determine whether listed species are likely to be adversely affected, not merely whether they die within four days. The 2014 NMFS Biological Opinion on EPA's approval of Idaho's water-quality standards for toxic substances (May 7, 2014) reached a jeopardy conclusion for Snake River Chinook salmon, sockeye salmon, and steelhead, its analysis of copper reflecting sublethal effects such as olfactory impairment that mortality-based tests do not detect. The best available science for protecting listed species is thus a weight-of-evidence approach spanning acute mortality, chronic and sublethal effects, behavioral and neurological impairment, and bioaccumulation. A collection that relies primarily on a 96-hour LC50 does not meet that standard.

Conclusion on Point 2. The methodology and assumptions underlying the current collection are insufficient. To ensure that qualified products are genuinely "nontoxic," the collection must require (i) ICP-MS elemental analysis, together with STLC and acid-digestion testing, to detect and quantify heavy metals before qualification; and (ii) aquatic and mammalian toxicity assessment using contemporary, lethal-and-sublethal endpoints in consultation with NMFS and USFWS. The agency's own USGS agreement supplies the template; the collection should adopt it.

3. Ways to enhance the quality, utility, and clarity of the information to be collected

The quality, utility, and clarity of the collected information would be substantially enhanced by transparent, standardized reporting that places the test results in their proper regulatory context. Data that sits unexplained in a technical file has limited utility; data expressed against the legal standards that govern the agency's conduct is immediately usable by decision-makers, cooperating agencies, and the public.

Specifically, FSEEE recommends the following:

- **Publicly disclose results against regulatory benchmarks.** For every product evaluated, the agency should publicly disclose how the results of the ICP-MS, STLC, and acid-digestion testing compare to EPA and applicable state standards for drinking water and for the protection of aquatic life. Reporting each metal as a multiple of its corresponding Maximum Contaminant Level, aquatic-life criterion, and hazardous-waste threshold—as the USC study did—converts raw concentrations into information a reader can act on, and makes clear at a glance whether a product approaches or exceeds a legal limit.
- **Disclose the methodologies used in ESA consultations.** The agency should disclose which toxicity methodologies and endpoints were used during its consultations with NOAA/NMFS and USFWS for ESA purposes—for example, whether the assessment relied solely on 96-hour LC50 data or incorporated EC10, LOEC, chronic, behavioral, and bioaccumulation endpoints. Disclosure of methodology allows the public and cooperating agencies to evaluate whether the "best available science" standard has been met and enhances the scientific credibility and clarity of the record.
- **Report both bulk and use-level, filtered and unfiltered fractions.** Consistent with the USGS scope of work, results should be reported for the bulk formulation and at operational use-level dilution, and for both filtered (bioavailable) and unfiltered fractions, so that readers can distinguish tank-strength concentrations from the concentrations and bioavailable fractions that reach the environment.

Conclusion on Point 3. Transparent disclosure of test results against EPA and state drinking-water and aquatic-life standards, and of the methodologies used in ESA consultations, would materially improve the quality, utility, and clarity of the collected information at little additional cost.

4. Ways to minimize the burden of the collection of information on respondents, including the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology

The additional testing FSEEE recommends can be implemented without imposing an unreasonable burden, and modern information technology can further reduce the burden of compiling and communicating the results. ICP-MS, STLC, and acid-digestion testing are routine analytical services; the USGS cost breakdown in Exhibit C reflects modest per-formulation analytical costs, and under the existing QPL structure the manufacturer bears the cost of the third-party risk assessment. Because only a small number of respondents submit a small number of products each year, the incremental burden of adding elemental analysis to an evaluation that already spans sixteen to eighteen months is limited and is justified many times over by the legal and environmental risk it averts.

To minimize burden further, the agency should take advantage of automated and electronic techniques to compile and present the results. In particular, artificial-intelligence tools can be used to compile testing results and ESA consultation findings into succinct, comprehensive reports that are accessible to the average layperson. An AI-assisted reporting workflow could automatically ingest laboratory data, compare each analyte against the applicable EPA and state benchmarks, flag exceedances, and generate a plain-language summary alongside the underlying technical tables. This would reduce the manual effort required of both respondents and agency staff, improve consistency across evaluations, accelerate public disclosure, and advance the clarity objectives described under Point 3—all while lowering, rather than raising, the net administrative burden.

Conclusion on Point 4. The recommended testing is modest in per-product cost and is borne by respondents under the existing framework, while automated and AI-assisted reporting can reduce the burden of compiling and communicating results and make them accessible to the public.

Conclusion

The QPL information collection is necessary and important, but in its current form it does not collect the information the agency needs to lawfully and safely carry out its mission. The current collection protocol permitted retardants bearing hazardous-waste-level heavy metals to be qualified and dispersed across the National Forests and their waters, undetected. The agency has already acknowledged the gap by commissioning USGS to perform the very ICP-MS and acid-digestion analyses that the collection omits. FSEEE respectfully urges the Forest Service to build that testing—ICP-MS elemental analysis, STLC and acid-digestion testing, and contemporary lethal-and-sublethal aquatic and mammalian toxicity assessment in consultation with NMFS and USFWS—into the QPL information collection itself, and to disclose the results transparently against EPA and state standards. Doing so will give the collection the practical and scientific utility the Paperwork Reduction Act requires and will bring the agency's fire-chemical program into alignment with the environmental laws it is bound to obey. Doing so will help the Forest Service achieve the noble ambition expressed in its motto, "Caring for the Land, Serving People."

FSEEE appreciates the opportunity to comment and welcomes the opportunity to provide any of the studies referenced herein or to discuss these recommendations further.

Respectfully submitted,



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