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October 6, 2017

SENT VIA EMAIL TO: Paula.Wilson@deq.idaho.gov
ORIGINAL TO FOLLOW VIA CERTIFIED MAIL #7016 3010 0000 5992 1705
RETURN RECEIPT REQUESTED

Ms. Paula Wilson
Rules Coordinator
Idaho Department of Environmental Quality
1410 Hilton
Boise, ID 83706

Dear Ms. Wilson:

The Department of Environmental Quality (Department) has proposed statewide and site-specific selenium criteria for aquatic life. The J.R. Simplot Company (Simplot) has a number of operations in Idaho that will be affected by this rule, including phosphate mining operations and remediation associated with historical mining practices. Simplot has been very involved in studies examining the toxicity thresholds of selenium on *Oncorhynchus clarki bouvieri* (Yellowstone cutthroat trout) and *Salmo trutta* (brown trout). Simplot has also applied for a site-specific criterion for selenium for certain waters in southeastern Idaho. Thus, this rulemaking is of interest and significance to Simplot. Simplot has the following comments on the Department's proposed rule.

State-Wide Criteria

Importance of a Fish Tissue (Egg-Ovary) Based Standard

The 2016 EPA National Criterion integrates many years of research on selenium and its effects on aquatic biota. As recognized in EPA's criterion document, organisms in aquatic environments accumulate selenium primarily through their diets, and not directly through water. The best science also indicates that selenium toxicity manifests itself in the form of effects to young developing fish primarily through transfer to the eggs. Thus, EPA developed a chronic criterion reflective of the reproductive effects based on selenium concentrations in fish egg-ovary tissues.¹ Adoption of an egg-ovary criterion for this bioaccumulative metalloid, which represents the current state-of-the-science, should allow for a more accurate interpretation of when and where potential effects occur due to selenium concentrations (compared to the 1987 water quality based criterion still in use by the state). The adaptation of a fish tissue (egg-ovary) criterion by the Department

¹ EPA. 2016. Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater, 2016"; p. xii.

represents the use of “best science” as required by Idaho statute (Idaho Code § 39-107D(2)).

Non-Sturgeon Waters Criterion

Simplot agrees with the Department’s proposal to include a non-sturgeon waters criteria. The approach has merit given that sturgeon are only found in select drainages statewide. By proposing a non-sturgeon criteria for selenium, the Department is recognizing that many of the State’s waterways simply do not contain sturgeon, and therefore, the sturgeon criteria are not particularly applicable where sturgeon are not present. While the geographic scope of the non-sturgeon criteria is large, it does appear to fit within the State’s rules for establishing a site-specific criteria as well as the intent of the language provided in Stephen et al. (1985). Based on the Department’s presentation on June 13th, 2017 it appears that the non-sturgeon criteria are both applicable and scientifically defensible. Sturgeon are not a surrogate for other sensitive species where they are not present based on the species deletion process described. Further, the use of the 4th field (8 digit) HUCs to expand the watersheds beyond where sturgeon are found and accommodate waters that may flow into sturgeon bearing waters, while conservative, appears to be adequately protective. The resulting chronic criterion elements proposed by the State for non-sturgeon waters appear to also be protective given the species known to be present.

Site Specific Aquatic Life Criteria for Selenium: Subsections of Salt River Basin

The proposed rule contains site-specific criteria for two subsections of the Salt River Basin (Sage Creek watershed and a segment of Crow Creek). Simplot proposed to the Department in April 2017 the establishment of site specific criteria for these waters. This proposal was modified in August 2017 to incorporate information that was developed during the negotiated rulemaking process.

Appropriateness of Site-Specific Criteria.

As described earlier in these comments, Simplot has been very involved in studies examining the toxicity thresholds of selenium on *Oncorhynchus clarki bouvieri* (Yellowstone cutthroat trout) and *Salmo trutta* (brown trout) and has performed extensive monitoring of selenium in fish tissues and other features of the aquatic environment (invertebrates, sediments, etc.). Based on this extensive research and monitoring, Simplot proposed to the Department site-specific criteria for several water segments adjacent to the Smoky Canyon Mine.

A site-specific criterion for selenium is especially appropriate, as the research done shows the importance of site-specific conditions.²

² Chapman (ed) et al. 2010. Ecological Assessment of Selenium in the Aquatic Environment. CRC Press. p.5.

“Traditional methods for predicting effects based on direct exposure to dissolved concentrations do not work for selenium; site-specific factors are highly important in determining whether selenium toxicity will occur.Selenium concentrations in eggs are the best predictors of effects in sensitive egg-laying vertebrates. The vulnerability of a species is the product of its propensity to accumulate selenium from its environment as affected by its diet and by site-specific factors controlling the transfer of selenium into and within the food web, its propensity to transfer selenium from its body into its eggs, and its sensitivity to selenium in its eggs.”

Below are comments in response to several topics that arose during the rulemaking process in regards to these site-specific criteria.

Protectiveness of the Egg-Ovary Criterion Element

Simplot's studies looking at toxicological effects of selenium on brown and cutthroat trout have been reviewed considerably, especially, the brown trout studies. This included EPA having a couple of peer review of Simplot's brown trout work. One reviewer had the following comment:

“...this study has been vetted to a degree that I have never before encountered.”³

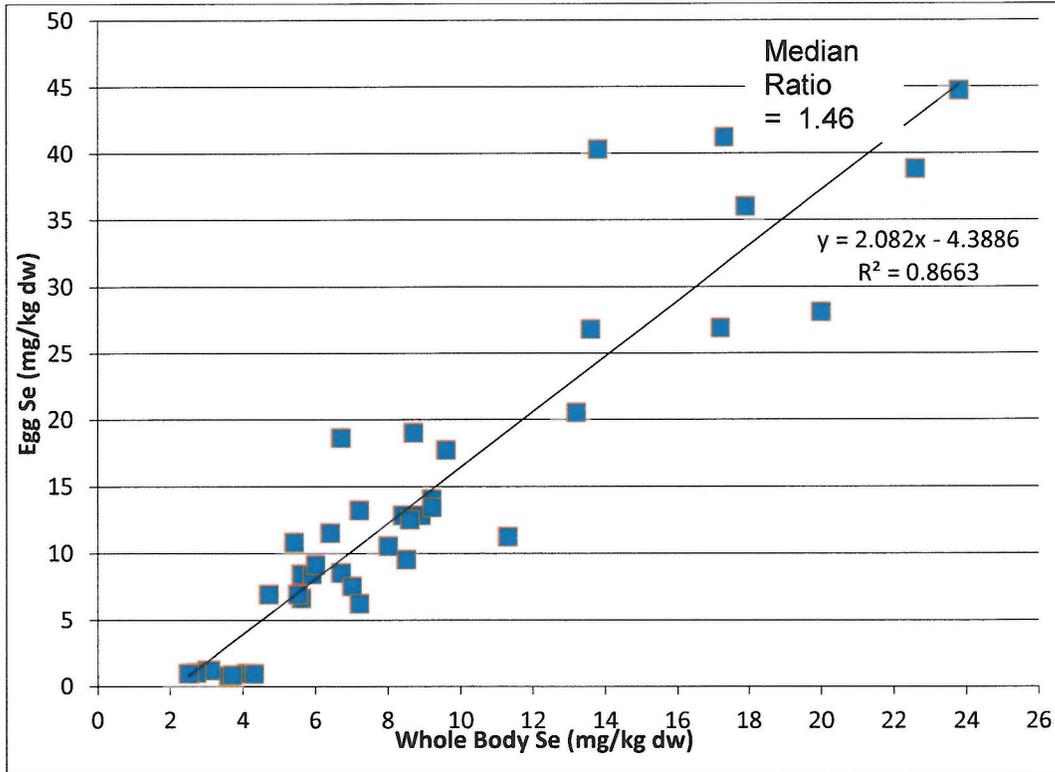
EPA derived a chronic effects value for brown trout based on the Simplot study of 21 mg/kg (dry weight). The brown trout value was used by EPA in calculating the National recommended criterion as it has been determined to be one of the most sensitive species in regards to selenium toxicity. Simplot, in accounting for the assemblage of species in the area of the site-specific criterion, took a conservative approach to calculate the proposed criterion which resulted in a value of 19.9 mg/kg dw selenium in egg tissue.

Calculation of the Whole Body Fish Tissue Criterion Element.

While the egg-ovary selenium concentrations provide the best dose-response relationships for exposure effects, whole body fish tissue or muscle tissues can serve as a suitable surrogate for evaluating effects on a species-specific basis as long as appropriate egg/ovary to whole body or muscle tissue conversion factors are available. Simplot used the data from its extensive monitoring to derive a relationship between egg-ovary concentrations and whole body fish tissue concentrations for the most sensitive species at the site: brown trout. Figure 1 shows actual brown trout fish whole body and corresponding egg selenium values. The “curve” for this comparison is relatively linear with an R² value of 0.87, indicating a strong positive relationship of egg to whole body selenium concentrations for brown trout.

³ GLEC. 2014. External Peer Reviewer Comments on Review of Draft EPA Report, “Analysis of the Brown Trout Selenium Toxicity Study Presented by Formation Environmental and Reviewed by U.S. Fish and Wildlife Service. Prepared for USEPA, Washington, D.C.

Figure 1
Relationship of Egg/Ovary and Whole Body Fish Tissue Concentrations



The question has been asked whether the derivation of a whole body tissue criterion should be done using a species sensitivity distribution [SSD] that relies on the four most sensitive species to derive a criterion. Such an approach may be practical when species assemblages and sensitivities are unknown as well as when egg-ovary data is not available.

Using the SSD whole body criterion derivation described above, the most sensitive species is rainbow trout, whereas for the egg/ovary criterion derivation, the most sensitive species is brown trout.⁴ The whole body value derived using the SSD approach (12.24 mg/kg) is lower than the associated whole body value for brown trout from USEPA 2016,

⁴ Rainbow trout may be the “most sensitive” in regards to a whole body value due to an anomaly in how EPA calculated the whole body toxicity threshold. The whole body value for rainbow trout is derived from an egg value of 24.5 mg/kg dw (converted from the wet weight value of 9.5 mg/kg selenium) based on edema effects (a sub lethal effect that may or may not be related to selenium). The weight wet to dry weight conversion uses a moisture value of 61.2% which is somewhat low even for egg tissues. Simplot’s brown trout egg data averaged 69% moisture while the Yellowstone cutthroat trout egg data averaged 72% moisture. Use of a sub lethal endpoint and a questionably low percent moisture ultimately drives the egg selenium EC10 value and any subsequent whole body values down. This artifact of the data from a non-site specific study should not drive the criterion when site-specific data are available.

which is 13.2 mg/kg dw (the no effect whole body concentration associated with the no effect egg/ovary concentration for brown trout).

Simplot's whole body criterion derivation is simple. Apply the site-specific and species specific conversion factor to the egg-ovary criterion which results in a whole body criterion. The SSD approach was already used for the egg-ovary criterion derivation to account for differing species sensitivities resulting in a criterion of 19.9 mg/kg dw egg which is less than the most sensitive species EC10 (e.g., brown trout – 20.5 mg/kg dw egg). Converting 19.9 mg/kg dw egg to a whole body concentration using the conversion factor of 1.46 yields a whole body criterion of 13.6 mg/kg dw.

Some may question whether this whole body tissue criterion is protective of other species. For this Site, it is known based on all of the available data that two trout species are predominant: brown trout and Yellowstone cutthroat trout. Brown trout outnumber Yellowstone cutthroat trout by a wide margin. Yellowstone cutthroat trout are native and an important management species. Brown trout are non-native and a recreationally important species. Based on both egg/ovary data and whole body tissue data, brown trout are more sensitive than Yellowstone cutthroat trout, thus a whole body criterion based on protecting brown trout is also protecting Yellowstone cutthroat trout.

Based on monitoring data from 2006 to 2017, only one cutbow (rainbow trout/ cutthroat trout hybrid) has been found at this Site. Brown trout is the predominant trout species in Hoopes Spring, Sage Creek, and lower Crow Creek where the site-specific criteria is to be applied. Using the SSD approach for this site negates the breadth of work Simplot has compiled to fully characterize this Site and its species assemblage. It further negates the primacy of the egg/ovary criterion developed for this Site in favor of literature derived values from different locations. There are likely few locations in the US where more data has been collected for a site or local region to fully characterize the species.

When species are unknown or not fully characterized and/or species sensitivities are unknown, the SSD approach may be applicable. However, in a setting where all species present have been well documented over numerous years, and ranges of species sensitivities are known, then the site-specific data should be used for the criterion calculation. This is especially true when definitive data are available to identify the most sensitive species based on the egg/ovary concentrations, which is the most representative of toxicity and has the best relationship to effects.

Simplot's derivation of the site-specific whole body tissue criterion is based on:

- a. protecting all the species present;
- b. paired egg/ovary and whole body tissue selenium concentration data from the Site;⁵
- c. the toxicity test data using the most sensitive species present for the Site (brown trout);

⁵ Which as shown in Figure 1, there is a very strong relationship between egg-ovary and whole body fish tissue concentrations.

Simplot Comments: Selenium Water Quality Criteria

- d. the most sensitive effects threshold (survival based on egg/ovary concentrations);
- e. effects data derived directly from the Site (wild fish from the Site); and
- f. applying the whole body criteria derived for brown trout to the same species that will be used as the compliance monitoring target species (e.g., brown trout).

Using the SSD approach in this site-specific criterion process for whole body interjects non site specific data that was already considered as part of the egg/ovary criterion development process and weakens the site-specific data. Simplot recommends that brown trout whole body criterion be calculated from the brown egg/ovary criterion based on the site-specific conversion factor developed for brown trout.

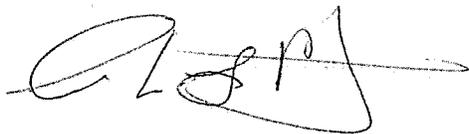
Protection of Downstream Waters

The proposed water column criterion value for the segment of Crow Creek immediately upstream of the Idaho/Wyoming state line is 4.1 micrograms per liter (ug/L). At this time, the State of Wyoming water quality criterion for selenium is 5 (ug/L). Thus the proposed water quality criterion value is more stringent than the current Wyoming standard and will be protective of downstream uses in Wyoming.

Besides these comments, Simplot incorporates by reference the comments submitted to the Department on May 5, June 26 and August 1. These comments address a number of topics that arose during the rulemaking process. Simplot also incorporates by reference our site-specific criteria proposal of August 23, 2017.

Please contact me at (208) 780-7365 if you have any questions.

Sincerely,



Alan L. Prouty
Vice President, Sustainability & Regulatory Affairs