



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10**

1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

MAR 7 2011

OFFICE OF
WATER AND WATERSHEDS

Mr. Barry Burnell
Water Quality Programs Administrator
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706-1255

Re: Approval of Revisions to Idaho's Water Quality Standards; Acute and Chronic Cadmium Criteria for the Protection of Aquatic Life, Docket 58-0102-0503; the Low-end Hardness Cap used in the Calculation of Cadmium Aquatic Life Criteria, Docket 58-0102-0801

Dear Mr. Burnell:

The Environmental Protection Agency (EPA) has completed its review of Idaho's revised aquatic life criteria for cadmium, located at IDAPA 58.0102.210.01 of Idaho's Water Quality Standards (WQS) regulations and contained in Docket 58-0102-0503 and 58-0102-0801. This review is conducted pursuant to our authority under Section 303(c) of the Clean Water Act (CWA) and implementing regulations at 40 CFR Part 131. In accordance with these authorities, EPA approves Idaho's revised acute and chronic cadmium criteria for the protection of aquatic life and the revised low-end hardness cap used in the cadmium equation.

Today, EPA is acting only on a portion of the revisions submitted to EPA in Docket 58-0102-0503 and 58-0102-0801. The remaining portions of Docket 58-0102-0503, which EPA is not acting on at this time, include Idaho's revised human health criteria that are based on a fish consumption rate of 17.5 grams/day. EPA is continuing its evaluation of the revised human health criteria provisions. Because EPA's prior approval action, dated July 7, 2010 addressed revisions to Idaho's arsenic human health criteria contained in Docket 58-0102-0801, our action today concludes our review of all water quality standards provisions submitted to EPA in Docket 58-0102-0801.

Background

Docket 58-0101-0503

On September 7, 2005, Idaho Department of Environmental Quality (IDEQ) published a proposed rule, which included a revision to the acute and chronic cadmium criteria for the protection of aquatic life, based on a recalculation of the criteria to include newer toxicological data, as well as revisions to human health criteria. IDEQ provided an opportunity for public comment on the proposed rule from September 7, 2005 until October 7, 2005.

EPA provided comment and expressed concerns with Idaho's proposal of retaining a cap on the hardness values used in the equations for calculating cadmium criteria. In the response to

comments, IDEQ stated that they did not propose a change to the low end hardness cap for cadmium based on the November 2004 Idaho Board of Environmental Quality's decision to retain the low end hardness cap at 25 mg/l for all metals. Therefore, the pending rule was not modified to incorporate EPA's concerns regarding this issue and was subsequently adopted by the Idaho Board of Environmental Quality in November 2005. The pending rule was adopted as a final rule at the end of the 2006 Idaho legislature, effective April 11, 2006. By letter dated July 7, 2006, IDEQ submitted Docket 58-0102-0503 containing revised water quality standards to EPA for review and action under 303(c) of the Clean Water Act.

Docket 58-0102-0801

IDEQ initiated negotiated rulemaking in December 2008 on revisions to the low end limit on hardness values used in the calculation of cadmium aquatic life criteria along with revisions to arsenic human health criteria. A negotiated rulemaking meeting was held on December 17, 2008. On May 6, 2009, IDEQ proposed revising the low-end hardness cap used in the calculation of cadmium aquatic life criteria from 25 mg/L to 10 mg/L, as calcium carbonate, and proposed revising the arsenic human health criteria from 50 µg/L to 10 µg/L, and initiated a 30-day public comment period.

EPA provided comments to IDEQ in support of the 10 mg/L low-end hardness cap for cadmium. These comments were based on EPA review of relevant and acceptable quality datasets on cadmium toxicity and water hardness in several fish species commonly found in Idaho.

On September 2, 2009, the Idaho Board of Environmental Quality adopted the revisions to the low end limit on hardness values for the cadmium aquatic life criteria equations which was subsequently submitted to the Idaho legislature as a pending rule in January 2010. The pending rule was adopted as a final rule at the end of the 2010 Idaho legislature, effective March 29, 2010. By letter dated June 21, 2010, IDEQ sent the revised low end limit on hardness for the cadmium aquatic life criteria equations to EPA for review and action. As explained above, EPA approved the arsenic human health criteria in July 2010.

EPA Review and Determination

Section 303(c) (2) of the CWA requires States and authorized Tribes submit new or revised water quality standards (WQS) to EPA for review. Under Section 303(c) of the CWA and its implementing regulations found at 40 CFR 131.5, EPA is to review these WQS to ensure the adopted designated water uses are consistent with the CWA, the adopted criteria protect the designated water uses and the State has followed its own procedures for adopting such standards.

The federal water quality standards regulations at 40 CFR 131.11(a) (1) state in part that States must adopt water quality criteria that protect designated uses. Criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. Regarding toxic pollutants, 40 CFR 131.11(a)(2) requires States to review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use,

or where the level of toxic pollutants warrant concern and to adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use. Lastly, 40 CFR 131.11(b) states that in establishing criteria, States should set numerical values based on EPA's 304(a) Guidance or 304(a) Guidance modified to reflect site-specific conditions, or other scientifically defensible methods.

Acute and Chronic Cadmium Aquatic Life Criteria Equations

EPA has reviewed Idaho's WQS revisions to the equation for calculating numeric criteria for cadmium for the protection of aquatic life found in the Idaho Water Quality Standards at IDAPA 58.0102.210.01 and 210.02. In addition, EPA reviewed the draft and final report entitled, "Cadmium Risks to Freshwater Life: Predicted low-effect values in ambient waters based upon laboratory and field studies" written by Chris Mebane of the United States Geological Survey (USGS) and prepared in cooperation with IDEQ.

Idaho relied on the USGS report in adopting acute and chronic freshwater aquatic life criteria for cadmium. That work is presented in a USGS Scientific Investigation Report entitled, "Cadmium Risks to Freshwater Life: Predicted low-effect values in ambient waters based upon laboratory and field studies." The USGS report includes a methodology for deriving acute and chronic criteria for cadmium based, in part, on the approach EPA put forth in "Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and their Uses," more commonly referred to as EPA's 1985 Guidelines for Aquatic Life Criteria.

Idaho's revised equations for cadmium are as follows:

Acute Criterion Equation:

$$\text{CMC} = e^{(0.83675 \times \ln(\text{hardness}) - 3.560)}$$

Chronic Criterion Equation:

$$\text{CCC} = (e^{(0.6247 \times \ln(\text{hardness}) - 3.344)}) \times (1.101672 - ((\ln \text{hardness}) \times 0.041838))$$

Using the equation for calculating an acute and chronic cadmium criterion, the calculated acute value is 1.34 µg/l and the chronic value is 0.57 µg/l, based on a hardness of 100 mg/l.

EPA has reviewed the USGS report and applauds Idaho for investing significant resources to derive cadmium criteria which incorporate more recent toxicity data than EPA's nationally recommended 304(a) cadmium criteria. EPA believes the USGS document is an excellent piece of work. It is technically solid, well written, and exemplifies a very good alternative approach to adopting EPA's nationally recommended cadmium criteria.

EPA believes the methodology presented in the USGS report is appropriate for deriving acute and chronic cadmium criteria for Idaho. The approach generally follows EPA's 1985 Guidelines for Aquatic Life Criteria. The approach deviates somewhat from EPA's 1985 Guidelines for Aquatic Life Criteria with respect to data review and the data selection process. The USGS report includes data with different toxicological endpoints (such as inclusion of data using behavior endpoints) and inclusion of non-standard tests. In addition, the USGS report

incorporates studies that were either not available or not used in the 2001 Update of Water Quality Criteria for Cadmium, EPA's most recent recommended criteria document for cadmium. The USGS report uses a slightly different data set which includes additional amphipod studies (Hyallella, Gammarus), sculpin (Cottus) data and bull trout chronic toxicity data. EPA does not have any issues with these deviations and supports the inclusion of additional data. In addition, the USGS report contains a section which compares laboratory data to field data. This is a useful comparison even though these comparisons are not included in EPA criteria documents. In summary, none of the above differences call into question the soundness of the methodology. Therefore, EPA has determined the report presents a reasonable approach for deriving cadmium criteria using sound science.

In addition, EPA reviewed IDEQ's letter to EPA dated February 20, 2007, which explains an inconsistency between the USGS report and the IDEQ Technical Justification (July 6, 2006). We appreciate receiving this explanation and agree that the error does not change the criterion value when it is rounded to one significant figure. We support IDEQ in its efforts to correct this mistake in a future rule, as stated in your letter.

Low-end Hardness Cap of 10 mg/L in the Cadmium Equations

EPA has reviewed Idaho's WQS revisions lowering the minimum hardness allowed for use in the equations for calculating numeric acute and chronic criteria for cadmium for the protection of aquatic life from 25 mg/L to 10 mg/L as calcium carbonate. This revision is found in the Idaho Water Quality Standards at IDAPA 58.0102.210.03.c.i.

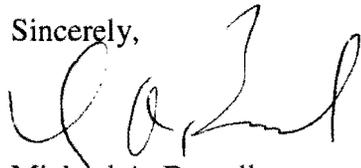
EPA Region 10 requested the assistance of EPA's national aquatic life criteria experts, Charles Delos, Office of Science and Technology, Health and Ecological Criteria Division, Washington D.C., and Charles Stephan, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Duluth, Minnesota, in reviewing several documents for relevant and acceptable quality datasets on cadmium toxicity and water hardness in several fish species commonly found in Idaho. A memo summarizing the review and findings was developed by Charles Stephan. The memo states that in the review two very useful datasets for rainbow trout from two different laboratories were found. These laboratories produced useful datasets using the rainbow trout, which is relatively sensitive to cadmium. These datasets show that the LC50 for cadmium decreases as hardness decreases at least down to the lowest tested hardness of 9.2 and 7.5 mg/L. Based on EPA's review of the data it is clear that the hardness-toxicity relationship for cadmium continues at hardness lower than 25 mg/L. However, the datasets reviewed provided test results only as low as 9.2 mg/L and 7.1 mg/L hardness. For this reason, EPA has determined it is reasonable for Idaho to base their low-end cap on hardness for Idaho's cadmium criteria on these data and to establish a low-end cap of 10 mg/L to be used in the cadmium equation.

Section 303(c)(2) of the CWA and the federal WQS regulations at 40 CFR 131.11, in part, set forth that States and authorized Tribes must adopt water quality criteria that protect applicable designated uses. EPA compared Idaho's revised criteria to EPA's 2001 updated of the ambient water quality criteria for cadmium, otherwise known as EPA's 304(a) recommended criteria. Based on our review, EPA has determined that Idaho's revised equations for calculating

acute and chronic cadmium criteria and the low-end hardness cap of 10 mg/L used in the equations are protective of aquatic life uses in Idaho and provide the same level of protection as intended by EPA's 304(a) recommended criteria. Therefore, EPA has determined that Idaho's adoption of the revised cadmium criteria equations and the low-end hardness cap used in these equations are consistent with the federal water quality standards regulation at 40 CFR 131.11. Therefore, EPA approves the revisions to IDAPA 58.01.02.210.01, 58.01.02.210.02 related to the equations for calculating acute and chronic cadmium criteria for the protection of aquatic life, and 58.01.02.210.03.c.i. related to the revised low-end hardness cap to be used in the cadmium acute and chronic criteria equations.

Please feel free to contact me at (206)553-4198 if you have questions concerning this letter or Lisa Macchio, Idaho Water Quality Standards Coordinator at (206) 553-1834.

Sincerely,



Michael A. Bussell
Director
Office of Water and Watersheds

cc: Mr. Michael McIntyre
Idaho Department of Environmental Quality

Mr. Don Essig
Idaho Department of Environmental Quality