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M E M O R A N D U M

May 29, 1984

To: Claude Sappington, Eastern Regional Office

From: John Bernhardt, Water Quality Investigations Section

Subject: High Mercury Levels at Northport

As you may recall, some concern developed when we learned that mercury levels at NASQAN site 12400520, Columbia River at Northport, had increased to 7.0 ug/L last November. We were notified in late January, and elected to have some followup sampling, including sediments, performed before taking further action. The mercury data from 1982 to date for this station are summarized below:

Date Sampled	Water (ug/L) Dissolved	Water (ug/L) Total	Sediment (ug/L) (dry weight)
01/13/82	0.1	0.3	--
05/13/82	0.1	0.1	--
07/15/82	<0.1	0.2	--
11/09/82	0.2	ND	--
01/06/83	0.2	ND	--
05/27/83	0.1	ND	--
09/28/83	/0.9/	ND	--
11/16/83	/7.0/	ND	--
01/11/84	/1.2/	ND	--
03/15/84	0.2	0.3	0.08

ND = None detected.
-- = Sample not collected.
/ / = Exceeds criteria for freshwater aquatic life.

The increase in late 1983 appears to have been real, and probably reflects a single event rather than something long-term. This is supported by the fact that the concentrations follow a "bell-shaped" curve. Also, the sediment sample contained a concentration of mercury at about what would be expected for background conditions.

With respect to the water quality criteria, the February 7, 1984 Federal Register (see attachment) states that "the average concentration of active mercury (passes through .45 um membrane filter at pH = 4 with nitric acid) should not exceed 0.2 ug/L." The table above shows that the September 28 and November 16, 1983, and January 11, 1984 samples exceeded this criterion. The November concentration was quite high.

I contacted Mr. Rick Crosier (Administry of the Environment), my ambient monitoring counterpart at Nelson, British Columbia. He is not aware of any events which could have caused the mercury problem, but will check it out to the extent possible and let us know. The mining operation, Cominco, is one area he intends to look at. He also commented that the mercury concentration in the sediment sample (3/15/84) was lower than one would expect for that section of the river, considering the mining activities upstream.

I do not plan to pursue this further for now. Mr. Crosier is sending some additional information which I will review. I may come up with recommendations for further work at that point. If we detect another mercury increase similar to this one in the future, we should notify British Columbia and perform intensive surveys as required. As in the past, the problem of a 1 1/2-month lag period between USGS sample collection and when the results are available to us remains.

Please let me know if you have any additional ideas concerning this issue.

JB:cp

Attachment

cc: Dick Cunningham
Rick Crosier

attachment

10,300 μg/l were lethal to the eastern oyster.

6. Copper

Freshwater Aquatic Life. To protect freshwater aquatic life and its uses, in each 30 consecutive days:

(a) The average concentration (in μg/l) of active copper (operationally defined as the copper that passes through a 0.45 μm membrane filter after the sample is acidified to pH=4 with nitric acid) should not exceed the numerical value given by $e^{(0.905[\ln(\text{hardness})]-1.785)}$;

(b) The maximum concentration (in μg/l) should not exceed the numerical value given by $e^{(0.905[\ln(\text{hardness})]-1.413)}$; and

(c) The concentration (in μg/l) may be between $e^{(0.905[\ln(\text{hardness})]-1.785)}$ and $e^{(0.905[\ln(\text{hardness})]-1.413)}$ for up to 96 hours.

For example, at hardnesses of 50, 100, and 200 mg/l as $CaCO_3$ the criterion average concentrations of active copper are 5.8, 11, and 20 μg/l and the criterion maximum concentrations are 8.4, 16, and 29 μg/l.

Saltwater Aquatic Life. To protect saltwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of active copper should not exceed 2.0 μg/l; (b) the maximum concentration should not exceed 3.2 μg/l; and (c) the concentration may be between 2.0 and 3.2 μg/l for up to 96 hours.

7. Cyanide

Freshwater Aquatic Life. To protect freshwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of free cyanide (the sum of cyanide present as HCN and CN^-, expressed as CN) should not exceed 4.2 μg/l; (b) the maximum concentration should not exceed 22 μg/l; and (c) the concentration may be between 4.2 and 22 μg/l for up to 96 hours.

Saltwater Aquatic Life. To protect saltwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of free cyanide (the sum of cyanide present as HCN and CN^-, expressed as CN) should not exceed 0.57 μg/l; (b) the maximum concentration should not exceed 1.0 μg/l; and (c) the concentration may be between 0.57 and 1.0 ug/l for up to 96 hours.

8. Lead

Freshwater Aquatic Life. To protect freshwater aquatic life and its uses, in each 30 consecutive days:

(a) The average concentration (in μg/l) of active lead (operationally defined as the lead that passes through a 0.45 μm membrane filter after the sample is acidified to pH=4 with nitric acid) should not exceed the numerical value given by $e^{(1.34[\ln(\text{hardness})]-5.245)}$;

(b) The maximum concentration (in μg/l) should not exceed the numerical value given by $e^{(1.34[\ln(\text{hardness})]-2.014)}$; and

(c) The concentration (in μg/l) may be between $e^{(1.34[\ln(\text{hardness})]-5.245)}$ and $e^{(1.34[\ln(\text{hardness})]-2.014}$ for up to 96 hours.

For example, at hardnesses of 50, 100, and 200 mg/l as $CaCO_3$ the criterion average concentrations of active lead are 1.0, 2.5, and 64 μg/l and the criterion maximum concentrations are 25, 64, and 160 μg/l.

Saltwater Aquatic Life. To protect saltwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of active lead should not exceed 8.6 μg/l; (b) the maximum concentration should not exceed 220 ug/l; and (c) the concentration may be between 8.6 and 220 μg/l for up to 96 hours.

9. Mercury

Freshwater Aquatic Life. To protect freshwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of active mercury (operationally defined as the mercury that passes through a 0.45 μm membrane filter after the sample is acidified to pH=4 with nitric acid) should not exceed 0.20 μg/l; (b) the maximum concentration should not exceed 1.1 μg/l; and (c) the concentration may be between 0.20 and 1.1 μg/l for up to 96 hours. These values are based on tests on divalent inorganic mercury and will be too high if a substantial portion of the active mercury is methylmercury. These values will also be too high if bioaccumulation is greater in a field situation than in laboratory tests. In addition, the value of 0.20 μg/l may not protect some salmonids and centrarchids from chronic toxicity and at that level, bioaccumulation in some species will be at the FDA action level of 1.0 mg/kg.

Saltwater Aquatic Life. To protect saltwater aquatic life and its uses, in each 30 consecutive days: (a) The average concentration of active mercury should not exceed 0.10 μg/l; (b) the maximum concentration should not exceed 1.9 μg/l; and (c) the concentration may be between 0.10 and 1.9 μg/l for up to 96 hours. These values are based on tests on divalent inorganic mercury and will be too high if a substantial portion of the active mercury is methylmercury. These values will also be too high if bioaccumulation is greater in a field situation than in laboratory tests.

10. Summary of Revisions to "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Life and Its Uses"

This draft revised version of the National Guidelines provides clarifications, additional details, technical and editorial changes from the guidelines published at 45 FR 79341–79347, November 28, 1980. These modifications are the result of comments received on the previous Guidelines and also reflect advances in aquatic toxicology and related fields. The major technical changes are:

1. The acute data required for freshwater animals has been changed to include more tests with invertebrate species.

2. The Final Acute Value is now defined in terms of Family Mean Acute Values rather than Species Mean Acute Values previously defined. A Family Mean Acute Value is the geometric mean of all the Species Mean Acute Values available for species in the family. On the average, species within a family are toxicologically much more similar than species in different families, and so the use of Family Mean Acute Values will prevent data sets from being biased by an overabundance of species in one or a few families.

3. The Final Acute Value is now calculated using a method that is not subject to the bias encountered with the previous method. In addition, it is not influenced by one very low value as the previous method was.

4. The criterion consists of two numbers: The criterion average concentration and the criterion maximum concentration.

a. The criterion average concentration is now used as a 30-day average, rather than as a 24-hour average.

b. Excursions over the average are limited to allow only one 96-hour episode in any 30 days.

c. Instead of being equal to the Final Acute Value, the criterion maximum concentration is now obtained by dividing the Final Acute Value by 2. The Final Acute Value is intended to protect 95 percent of a group of diverse species, unless an important species is more sensitive. However, a concentration that would severely harm 50 percent of the fifth percentile or 50 percent of a sensitive important species cannot be considered to be protective of that percentile or that species, especially because this concentration may exist for 96 hours on twelve different occasions every year. Dividing the Final Acute