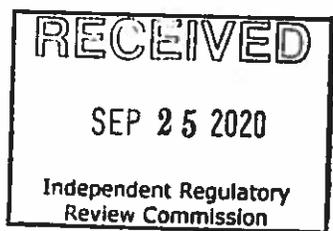




September 25, 2020

Environmental Quality Board



Re: Proposed Rulemaking, PA Bulletin, Doc. No. 2-992
 Water Quality Standard for Manganese and Implementation

Dear Board Members:

ANCR Resources, Inc. (ACNR) has reviewed the draft human health criterion for manganese set forth in the above-referenced notice of proposed rulemaking. ACNR has grave concerns regarding the draft manganese criterion, due to both the lack of scientific support for the proposal and the tremendous risk posed by treating effluent to meet the unnecessarily stringent criterion. ACNR advocates the development of water quality standards that are robust and protective of human health and the environment. The Environmental Quality Board (Board) makes several misrepresentations of fact in the Notice of Proposed Rulemaking. In addition, the Board makes scientific errors in calculating the proposed manganese human health criterion. Finally, the Board does not consider all the salient information in its discussion of the point of compliance for the manganese criterion. Each of these points will be addressed separately below.

Determination of Reference Dose

The chronic Reference Dose (RfD) is defined by US EPA as "(a)n estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure for a chronic duration (up to a lifetime) to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from a NOAEL, LOAEL, or benchmark dose, with uncertainty factors generally applied to reflect limitations of the data used."

In setting the proposed manganese criterion, the Board cites a 1995 IRIS publication establishing a RfD of 0.14 mg/kg-day. This dose is not based upon a true NOAEL determined by a scientific

study, but instead is based upon empirical evidence of levels known to be safe for human consumption.

Moreover, the evidence of neurotoxicity is related to a single epidemiological study where manganese in drinking water ranged in three areas from 3.6 µg/l to 2300 µg/l. The neurological scores in the highest exposure group (Area C) were considered significantly different from the lowest exposure group (Area A). However, the Area C concentration (at least 1.6 mg/l) is much higher than either the current or proposed Pennsylvania manganese criterion.

Based on the 1985 IRIS publication, the Board applies a modifying factor of 3 to the NOAEL in calculating the proposed manganese human health criterion. However, EPA discontinued the use of modifying factors in 2004, based on the recommendations set forth in *A Review of the Reference Dose and Reference Concentration Processes* (EPA/630/P-02/002F). In making its recommendations, the Reference Dose/Reference Concentration (RfD/RfC) Technical Panel stated, "There are only seven cases in IRIS for which an MF has been applied... The rationale for these varies considerably but in all cases appeared to be for reasons that could be considered under other UFs. ... In view of these factors, the Panel recommends that use of the MF be discontinued." (p. 4-46 and 4-47).

US EPA has discontinued use of the modifying factor for the manganese RfD in its own calculations. For example, the US EPA Regional Screening Level (RSL) for Resident Tapwater (May 2020) uses a RfD of 0.14 mg/kg-day for manganese from the IRIS 1995 publication without the use of the modifying factor.

Re-calculation without the use of the modifying factor yields a manganese human health criterion of 0.93 mg/l, which is not materially different than the current manganese criterion of 1 mg/l. The use of the modifying factor is the sole basis of the lower criterion proposed by the Board.

More recent work by the World Health Organization (WHO) confirms the use of a NOEAL without a modifying factor. *Manganese in Drinking-water; Background document for development of WHO Guidelines for Drinking-Water Quality* (WHO/SDE/WSH/03.04/104/Rev/1) states:

A review of typical Western and vegetarian diets found average adult manganese intakes ranging from 0.7 to 10.9 mg/day (Greger, 1999; IOM, 2002). The upper range manganese intake value of 11 mg/day from dietary studies is considered a

no-observed-adverse effect level (NOAEL). It is not believed that this amount of manganese in the diet represents an overexposure to the element (IOM, 2002).

(p. 14). For a 70-kg individual, the upper range manganese intake value correlates to a RfD of 0.16 mg/kg-day.

Calculation of Human Health Criteria

The Board uses the calculation methodology set forth in the *EPA Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (EPA-822-B-00-004, October 2000)(the Methodology). The calculation methodology assumes a Relative Source Contribution (RSC) of 0.2. This represents the percentage of total exposure typically accounted for by drinking water. "The drinking water program usually takes a conservative approach to public health by applying an RSC factor of 20 percent to the RfD when adequate exposure data do not exist, assuming that the major portion (80 percent) of the total exposure comes from other sources, such as diet." (Methodology, p.1-7).

Accordingly, the calculation of the manganese human health criterion contains a substantial measure of conservatism regarding the portion of human exposure attributable to drinking water source. Even without this conservatism, the amount of manganese attributable to drinking water is small. If the 95th percentile water consumption rate of 2.4 L/day is used, a person would obtain only 2.4 mg/day manganese exposure from drinking water at the current manganese criterion of 1 mg/l. This is a small fraction of the NOAEL for manganese of 10-11 mg/day. It is roughly equivalent to the manganese concentration in a One A Day multivitamin for men of 2 mg. We find it strangely ironic that the Board is attempting to limit the manganese provided by drinking water to a level substantially lower than a common nutritional supplement. The current criterion of 1 mg/l is adequately protective of human health and does not need to be revised.

Point of Compliance for Human Health Criteria

The Board is also soliciting comments on the point of compliance for the manganese criterion. Two alternatives are considered: (1) at the point of discharge, and (2) at the point of intake. The Board is attempting to circumvent the requirements of Act 40 directing the Board to propose a regulation that moves the point of compliance for manganese from the point of discharge to any downstream public water supply intake.

To be clear, the Board is setting Pennsylvania policy regarding the point of compliance for all human health criteria, not just manganese. Hiding this important policy decision in the context of a pollutant known to affect a limited subset of NPDES permittees is disingenuous and dangerous. The same logic would apply for all human health criteria – any discharge has the potential to increase treatment costs for a public water supply intake. This should be handled through a separate rulemaking process and not be hidden in a proposed revision to the manganese human health criterion. It is a major policy decision that affects all Pennsylvanians.

Ironically, both proposals provide equal protection to the public water supply intake. Regardless of the point of compliance, the goal is to ensure that the human health water quality criteria are met at the point of intake of the public water supply. Using the second alternative advocated by the Legislature and ACNR limits any exceedances of the human health criteria to a specified distance above the public water supply intake.

The Board's analysis of the two alternatives is silent on the very important concept of mixing. Most industrial discharges are located a substantial distance from the nearest public water supply intake. Mixing is a recognized construct in the NPDES permitting program. Many permittees rely on a permitted mixing zone for compliance with water quality-based effluent limitations. If the human health criteria are applied at the point of discharge, these mixing zones arguably will no longer be allowable, as all State waters are treated as a public water supply. ACNR is unaware of any rulemaking effort to classify all Pennsylvania streams as drinking water supplies. The use of "point of compliance" should not be allowed to circumvent this importantly regulatory consideration, which could have far-reaching consequences.

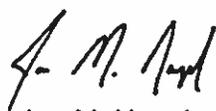
Manganese is ubiquitous. It is commonly discharged to surface waters from earth disturbing activities. Its effective treatment is difficult and dangerous. While manganese has low toxicity to aquatic life, its treatment and removal can be highly dangerous for fish and invertebrates due to the tremendous increase in pH required for manganese removal. This is evident based on review of an Eh-pH diagram for manganese as compared to iron. Removal of manganese from mine drainage requires either high pH (generally greater than 9.0) or strong oxidation combined with near-neutral pH. Because of the difficulties in obtaining strong oxidation sufficient to remove manganese, pH adjustment is the primary form of manganese removal.

Treating Mn manganese to achieve a limit of 1 mg/l requires significant caustic addition to achieve high pH levels in treatment ponds. High pH levels in the discharge can cause a more significant adverse harm to the receiving stream's aquatic life than a manganese concentration in the discharge of up to 2 mg/l, which is the best available technology (BAT) standard. Therefore, the current point of compliance at or prior to the public water supply intake prevents treatment activities at the point of discharge that could overall cause harmful effects on the water chemistry of the receiving streams.

Conclusion

For the reasons set forth herein, ACNR requests that the Board retain its current manganese human health criterion of 1 mg/l, as it is fully protective of human health and the environment, and that the point of compliance for the manganese criterion remains at the point of intake, as directed by the Pennsylvania Legislature. ACNR appreciates the opportunity to comment on the proposed rulemaking.

Sincerely,



Jon M. Nagel
Manager of Environmental Compliance