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BELLAIRE CORPORATION

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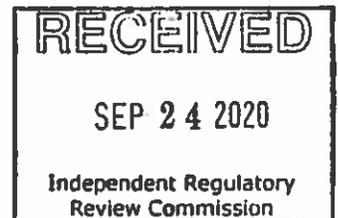
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VIA Electronic Submission

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Environmental Quality Board
Rachel Carson State Office Building
16th Floor, 400 Market Street
Harrisburg, PA 17101-2301



Re: **Water Quality Standard for Manganese and Implementation
Comments of the Bellaire Corporation**

Dear Sir or Madam:

Bellaire Corporation (“Bellaire”) appreciates the opportunity to furnish comments with respect to the proposed water quality standard for manganese. Bellaire operates a water treatment plant in Indiana County, Pennsylvania. This operation treats and discharges groundwater from inactive underground mine works in accordance with a state approved NPDES permit.

Summary of the Proposed Rule

The Environmental Quality Board (“Board”) proposes to amend Chapters 93 and 96 (relating to water quality standards; and water quality standards implementation). The proposed amendments delete manganese from Table 3 in § 93.7 (relating to specific water quality criteria) and add manganese to Table 5 in § 93.8c (relating to human health and aquatic life criteria for toxic substances).¹

The Department of Environmental Protection (“Department”) states they should consider, where applicable, the following: “... (3) the feasibility of combined or joint treatment facilities; (4) the state of scientific and technological knowledge...”²

¹ 50Pa.B. 3724, Water Quality Standard for Manganese and Implementation (July 25, 2020)

² *Id.*

The Department claims in its rationale “[c]urrent data and science demonstrate manganese is a neurotoxin to humans when levels necessary to maintain adequate health are exceeded” and “adoption and implementation of a human health criterion in all surface waters in accordance with this proposed rulemaking will also provide adequate protection to aquatic life and livestock from the toxic effects of manganese”.³

Bellaire’s comments will address the Department’s consideration of treatment facilities and the state of the scientific and technological knowledge when drafting the proposed manganese standard as well as the rationale the Department relied upon when justifying the proposed modifications.

Consideration of Treatment Facilities

Mine-Water Treatment Concerns

The Department contends the lowered manganese standard would reduce costs incurred by water treatment facilities as they treat raw intake water to meet the secondary Maximum Contaminant Level (“MCL”) currently in effect for manganese (0.05 mg/L). The Department further contends that should the first alternative point of compliance point be permitted (point of intake), water treatment facilities costs to treat raw intake water could increase.

The Pennsylvania Coal Alliance contracted with TetraTech to assess compliance costs for both mine-water discharges and drinking water treatment facilities. Pursuant to the TetraTech report, “... active mine drainage treatment involves use of caustic chemicals (e.g. lime) to raise the pH to neutralize acidity and precipitate metals including iron, aluminum and manganese. Aeration may be provided to promote the oxidation of ferrous to ferric, and its resulting precipitation as an iron oxyhydroxide. Normally a neutralization pH of 8.0±0.2 is adequate for the precipitation of iron and aluminum to effluent limits.”⁴ This statement is reflective of the treatment process at the Bellaire operation in Indiana County.

TetraTech goes on to document how mine-water treatment would have to be modified to comply with the lowered standard. Treatment to reduce manganese to concentrations capable of meeting the proposed regulatory limit will increase exponentially as dissolved manganese decreases nonlinearly with increasing pH. In addition to lime costs, there would be an increase in several other operating costs including sludge disposal from the increased calcium and magnesium precipitation that will increase sludge volumes at the higher pH needed to meet the lower proposed manganese criterion.⁵

³ *Id.*

⁴ *Review of Manganese Issue as it Relates to Surface Water Quality*, TetraTech, September 11, 2020; submitted with Pennsylvania Coal Alliance comments.

⁵ *Id.*

Additional treatment will also be required to meet the effluent pH of between 6 and 9. This will require acid addition or post-treatment aeration to lower the pH to the required effluent range. Acid addition for pH adjustment will require storage tanks and chemical feed systems with operating costs associated with acids and manpower, which will be similar in capital costs for a sodium hydroxide system used to raise pH for manganese removal.⁶

Finally, TetraTech highlights a potential issue with aluminum compliance. Aluminum that is normally precipitated in treated mine water from neutralization between pH 8 and 9 will be resolubilized at pH higher than 9.⁷ By resolubilizing at high pH, it may add additional complexity and costs to ensure discharges meet aluminum compliance criteria.

Estimated Benefits to Water Treatment Facilities

As part of the Advance Notice of Proposed Rulemaking (“ANPR”), the Department requested information on the financial and economic impact of compliance with the manganese water quality standard, including costs associated with adding manganese treatment to public water supply facilities, and manganese treatment process information. A comment from the Pennsylvania Public Utility Commission (“PUC”) states that the 1.0 mg/L standard established in Act 40 will “require a significant financial investment for affected treatment systems”.⁸ In a separate comment, Pennsylvania American Water estimates \$40-60 million in compliance costs associated with the Act 40 revision to the water quality standards.⁹ Both sets of comments assume, but do not substantiate, the adoption of Act 40 will significantly increase manganese concentrations at the point of intake into the water treatment facility.

It is apparent the Department relied heavily on the assumed increase in treatment costs to support the proposed lowering of the manganese limit to 0.3 mg/L; however, as stated in the TetraTech report, there are additional considerations that should be factored into the analysis. The previously mentioned comments from the PUC and Pennsylvania American Water do not assess the sources of manganese in their raw intake water, rather they carte blanche predict Act 40 will result in increased concentrations which will result in increased costs.

Manganese in raw intake water comes in two chemical forms, dissolved or insoluble. Insoluble forms of manganese are typically associated with high flow events that scour particulate

⁶ *Id.*

⁷ *Id.*

⁸ PUC comments dated February 26, 2018 (as found on the eComment website:

<https://www.ahs.dep.pa.gov/eComment/ViewComments.aspx?enc=DN064MT8R38NKyiRv2iU7B3ktihBXixHeoOKvt7qdZ0%3d>) (last accessed 9/15/20)

⁹ Pennsylvania American Water comments (undated) (as found on the eComment website:

<https://www.ahs.dep.pa.gov/eComment/ViewComments.aspx?enc=DN064MT8R38NKyiRv2iU7B3ktihBXixHeoOKvt7qdZ0%3d>) (last accessed 9/15/20)

manganese from stream beds and banks. Insoluble manganese is removed by conventional filtration and would not add to chemical costs.¹⁰

TetraTech assessed a worse-case scenario (i.e., no dilution from fate and transport) for treatment systems that rely on chlorination to address dissolved manganese. Their results show it is expected the regulation “would result in a maximum treatment savings of less than \$0.007 per 1,000 gallons water treated at the treatment plant. The average household cost savings created by the 0.3 mg/L water quality standard would be only about \$0.40 to \$1.00 per year.”¹¹

The final point made by TetraTech likely speaks directly to the ANPR commenter’s concerns about increased costs associated with chemical treatment of dissolved manganese. As pointed out by TetraTech, however, the source of manganese “is likely from upstream historic mining activities, but unrelated to NPDES discharge points from mining.”¹² Gross assumptions about manganese concentration increases without a fate and transport assessment of permitted NPDES discharges upstream of any particular drinking water intake is bad science at best and negligence at worst. As TetraTech points out, should the rule be finalized as promulgated, the cost of compliance with the new manganese standard from legacy sources will fall to the State of Pennsylvania and her taxpayers.¹³

Also worth pointing out are two comments currently on the docket from the Greenville Municipal Water Authority and the Moon Township Municipal Authority. Both groups oppose adoption of the new standard because of the costs associated with treating NPDES permitted, filter backwash discharges to meet the new standard.¹⁴ It is clear the Department neglected to conduct a fulsome cost/benefit analysis and merely assumed the costs of lowering the standard would transfer to dischargers rather than drinking water providers.

The State of Scientific and Technological Knowledge

Human Toxicity

The Department states it “conducted a review of the information received through the ANPR as well as an independent search of the scientific literature available on the toxic effects of manganese to aquatic life, livestock and humans.”¹⁵ The Department subsequently determined that manganese

¹⁰ *Review of Manganese Issue as it Relates to Surface Water Quality*, TetraTech, September 11, 2020; submitted with Pennsylvania Coal Alliance comments.

¹¹ *Id.*

¹² *Id.*

¹³ *Id.*

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<https://www.ahs.dep.pa.gov/eComment/ViewComments.aspx?enc=DN064MT8R38NKyiRv2iU7EeUUEs8k2WHsshurF6KWBM%3d> (last accessed 9/15/20)

¹⁵ 50Pa.B. 3724, Water Quality Standard for Manganese and Implementation (July 25, 2020)

is a neurotoxin and has the "potential to have serious adverse effects on human health as a result of short-term exposure."

The Pennsylvania Coal Alliance contracted with Gradient Corporation to assess the science the Department relied upon to promulgate the proposed rule.¹⁶ The Gradient comments make the case that many of the data and studies the Department relied upon are outdated and if the Department re-evaluated the most up-to-date science it would arrive at a different conclusion than the one to classify manganese as a toxic substance.

Pennsylvania currently has a secondary maximum contaminant level (MCL) of 0.05 mg/L, which does not address human toxicity, but rather issues with taste and color¹⁷. NACoal contracted GEI to assess the proposed rule, specifically with respect to how other State's have addressed manganese in their water quality standards. According to the review, and none of the adjacent states have adopted an in-stream standard based on the premise of human toxicity. A copy GEI's technical memorandum is included in **Attachment A**.

Aquatic Life and Livestock

The Department also makes the statement that the proposed standard of 0.3 mg/L will also provide adequate protection of aquatic life and livestock.¹⁸ NACoal contracted GEI to assess this claim (**Attachment A**). According to GEI," while this statement that the proposed criterion ""should also provide adequate protection to aquatic life and livestock"" is a true statement, it is actually overprotective of both of the mentioned designated uses".

As outlined in the attached technical memorandum, several states have developed fixed and/or hardness-based aquatic life criteria for manganese. To determine how a hardness-based aquatic life criteria would translate in Pennsylvania, hardness concentrations in the Conemaugh River, near a NACoal permitted outfall, were identified. The results of the test revealed acute and chronic manganese values of 3.5 mg/L and 1.9 mg/L, respectively. Clearly, applying the human health criterion to all waters is not necessary to protect aquatic life, given even the most stringent published acute and chronic aquatic life criteria (developed in other States) for Mn are 10x and 5x, respectively, higher than the proposed 0.3 mg Mn/L value.

Conclusion

Bellaire appreciates the opportunity to submit these comments on the proposed modification to the manganese water quality standard. The Department's proposal to adopt a human health criterion of 0.3 mg Mn/L is unnecessary and excessive. The Department did not conduct a fulsome review of the scientific literature and the proposed Mn criterion is redundant (because water suppliers are

¹⁶ *Comments on the Proposed Pennsylvania Ambient Water Quality Criterion for Manganese*, Gradient, July 28, 2020; submitted with Pennsylvania Coal Alliance comments.

¹⁷ Title 25, PA. Code, Chapter 109, Safe Drinking Water Regulations

¹⁸ 50Pa.B. 3724, Water Quality Standard for Manganese and Implementation (July 25, 2020)

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already required to meet a lower secondary MCL for manganese). Furthermore, the assumptions about costs and compliance the department relied upon are rudimentary, if not fallacious. Finally, it appears the Department relied on unsubstantiated claims made during the ANPR as justification to move forward with the proposed standard.

Should the Department finalize the proposed criteria, the cost of compliance will be borne by mining companies, general industry, drinking water providers across the state, and finally the taxpayers. These costs would all be incurred to solve a problem that does not exist. If you have any questions or concerns regarding these comments, please do not hesitate to contact me.

Very truly yours,
BELLAIRE CORPORATION

N. Rebecca McGrew

Rebecca McGrew
Manager, Regulatory and Environmental Affairs

Attachment A
GEI Technical Memorandum

Technical Memorandum

Comments on Proposed Rulemaking: Water Quality Standards for Manganese and Implementation (#7-553)

GEI Consultants, Inc. (GEI), on behalf of North American Coal is providing comments on the Pennsylvania Department of Environmental Protection (PADEP) proposed rulemaking regarding the manganese (Mn) ambient water quality criterion (AWQC).

Background – Proposed Manganese Criterion

In accordance with the October 30, 2017 amendment to Section 1920-A of the Administrative Code of 1929, otherwise known as “Act 40” (71 P.S. § 510-20(j)), PADEP is required to promulgate Mn criteria that shall be met at least 99% of the time at the point of all existing or planned surface potable water supply withdrawals unless otherwise specified as described in 25 Pa. Code § 96.3(d). In response to this mandate, PADEP proposed 1) the deletion of existing Mn numeric water quality criterion of 1.0 mg/L from Table 3 (Pa. Code § 93.7), 2) adoption of an updated Mn human health criterion of 0.3 mg/L to Table 5 (Pa. Code §93.8c), and lastly 3) the identification of a point of compliance for the proposed Mn criterion.

The proposed 0.3 mg Mn/L in Table 5 is a more stringent criterion, replacing the existing Mn criterion of 1.0 mg Mn/L as listed in Table 3. The existing Mn criterion of 1.0 mg Mn/L is specific to waters with a Potable Water Supply Designated Use. The final component of the proposed Mn rulemaking concerns two alternatives with respect to the point of compliance location. The first alternative would move the point of compliance to the water supply intake point, whereas the second alternative would maintain the current regulation for Mn criteria to be met in all surface waters (i.e., the point of compliance would be at effluent discharge).

Primary Concerns with Proposed Manganese Criterion

Here we summarize three primary technical concerns with PADEPs proposed Mn criterion: 1) the proposed criterion itself is redundant, 2) potentially moving the compliance point to the point of discharge to protect all waters is overprotective, and 3) there is no scientific basis to lower the human health based criterion to 0.3 mg/L. These concerns are largely based on our review of other state and federal Mn water quality criteria, particularly those in neighboring states in which coal mining activities

occur. We also consider studies conducted on behalf of the PA Coal Alliance to support the development of comments on this proposed rulemaking.

- *The Proposed Criterion is Redundant.*

Pennsylvania already has a water supply secondary maximum contaminant limit (MCL) that is more stringent than the proposed human health criterion. Pennsylvania, and states such as Alaska, California, Colorado, Massachusetts, Minnesota, Nebraska, New Hampshire and Wyoming have adopted a secondary MCL for drinking water of 0.05 mg Mn/L (USEPA 2020). The secondary MCL, which is based on USEPA guideline for taste and color, is a limit targeted at the primary exposure route that all public water systems in Pennsylvania are already required to meet. In other words, whether the EQB adopts the proposed human health criterion of 0.3 mg Mn/L or retains the existing 1.0 mg Mn/L for Potable Water Supply designated uses, all public water systems would still need to supply drinking water that that meets the more stringent Mn secondary MCL as written in 25 Pa. Code § 109.202(b)(1).

- *The Proposed Criterion is Overprotective of Other Uses, and So the Point of Compliance Should be Moved to the Potable Water Intake.*

If PADEP requires “that this criterion should apply in all surface waters (i.e., at the point of discharge),” as stated in their 2019 executive summary to the Environmental Quality Board (EQB; PADEP 2019) the human health Mn AWQC would be overprotective of aquatic life, livestock, recreational, and fish-ingestion uses. In the proposed rulemaking PADEP also states that “the adoption and implementation of a human health criterion in all surface waters in accordance with the proposed regulation should also provide adequate protection to aquatic life and livestock from the toxic effects of manganese” (PADEP 2020). While this statement that the proposed criterion “should also provide adequate protection to aquatic life and livestock” is a true statement, it is actually overprotective of both of the mentioned designated uses.

The USEPA has not developed nationally-recommended aquatic life criteria for Mn, so a comparison to a federal criterion is not possible. However, multiple states have developed their own aquatic life criteria, and all are substantially higher (i.e., less stringent) than the proposed PADEP criteria. For example, Wyoming has adopted acute and chronic aquatic life criteria of 3.1 and 1.5 mg/L, respectively (WAR Chapter 1, ref. # 020.0011.1.04242018). Other states have developed hardness-based aquatic life criteria to account for the ameliorative effect hardness has on Mn toxicity. Colorado (5 CCR 1002-31), Illinois (35ILCS §302.208), and New Mexico (20.6.4.900 NMAC) have developed hardness-based aquatic life criteria for Mn. The hardness-based criteria adopted in Colorado and New Mexico are the same equations, which were derived using a toxicity database developed in May 2000. The most sensitive species in the acute database is rainbow trout (*Oncorhynchus mykiss*), with a

species mean acute Mn value of 5.3 mg/L (acute value normalized to 50 mg/L hardness; ENSR 2000). The most sensitive species in the chronic database is brook trout (*Salvelinus fontinalis*), with a species mean chronic Mn value of 2.7 mg/L (chronic value normalized to 50 mg/L; ENSR 2000). As noted, these acute and chronic values are normalized to a hardness of 50 mg/L to allow for direct comparisons to other studies and represents a conservative estimate on Mn toxicity.

A more recent literature search conducted on behalf of the PA Coal Alliance identified five additional/newer toxicity studies (Tetra Tech 2020). The studies they identified acute toxicity effect thresholds ranging from 8.6 to over 1,300 mg/L, and chronic toxicity effect thresholds ranging from 4.6 to 20.7 mg/L. Therefore, the toxicity studies used to derive the aquatic life criteria in Colorado and New Mexico still represent the most sensitive species tested to date.

To further illustrate how these hardness-based aquatic life criteria would relate to PA surface waters, we identified hardness concentrations in the Conemaugh River, near the Bellaire permitted outfall. The average hardness concentration from the most recent 5 years of data from PADEP monitoring Site #810 on the Conemaugh River, results in a hardness concentration of 159 mg/L (NWQMC 2020). Applying this hardness concentration to the Colorado and New Mexico hardness-based Mn aquatic life criteria equations would result in acute and chronic Mn criteria of 3.5 mg Mn/L and 1.9 mg Mn/L, respectively. In another example, applying the same hardness value to the Illinois hardness-based equations would result in even less stringent criteria at an acute value of 5.1 mg Mn/L and a chronic value of 2.21 mg Mn/L.

Applying PADEPs proposed human health criterion to all waters thus is not necessary to protect aquatic life, given that even the most stringent acute and chronic aquatic life criteria for Mn are 10x and 5x, respectively, higher than the proposed 0.3 mg Mn/L value. Therefore, there is no need to adopt a lower Mn criterion of 0.3 mg/L to protect aquatic life because the existing 1.0 mg/L potable water supply criterion is already more stringent than is needed to protect this use.

The other designated use PADEP claims to protect from “toxic effects” is livestock. The USEPA addressed “toxic effects” of Mn to livestock in the 1972 Water Quality Criteria, stating that “it is doubtful that setting an upper limit of acceptability is necessary for manganese, but as with iron, a few milligrams per liter in water can cause objectional deposits on stock water equipment” (USEPA 1972). While the USEPA has published recommended Mn concentrations for a broader agricultural designated use, the recommended value of the 0.2 mg Mn/L is specific to land applications of irrigation water for continuous use (USEPA 1972). To summarize, the USEPA recommends keeping Mn concentrations to “a few milligrams,” not because of potentially toxic effects, but rather to minimize “objectionable deposits.”

GEI also notes that all neighboring states only apply Mn criteria at the point of potable water intake, rather than for all surface waters (i.e., discharge as the point of compliance). In West Virginia, “the manganese human health criterion shall only apply within the five-mile zone immediately upstream above a known public or private water supply used for human consumption.” (W. Va. Code § 47-2-6.2.d). In Kentucky, all streams are designated for warm water aquatic habitat and primary and secondary contact recreation. “The designation for domestic water supply is applicable only at points of intake.” (Section 401 K.A.R. 5:026). Kentucky does not have a PWS standard, an aquatic life standard, or a human health standard for manganese. Rather, it regulates mine discharges consistent with 40 C.F.R. §434. In Indiana, “all waters that are used for public or industrial water supply must meet the standards for those uses at the points where the water is withdrawn.” (327 IAC 2-1-3(3)). Indiana does not have a PWS standard or an aquatic life standard for manganese. Rather, it regulates mine discharges consistent with 40 C.F.R. §434. In Illinois, “...waters of the State shall meet the public and food processing water supply standards . . . at any point at which water is withdrawn for treatment and distribution as a potable supply or for food processing.” (35 I.LCS §303.202). In Ohio, “all surface waters within five hundred yards of an existing public water supply surface water shall be classified as ‘Public Water Supply.’” OAC 3745-1-07(B)(3)(a). Ohio does not have a PWS standard, an aquatic life standard, or a human health standard for manganese. Rather, it regulates mine discharges consistent with 40 C.F.R. §434. If the proposed rulemaking is adopted, Pennsylvania’s regulation of manganese will be at odds with every neighboring coal mining state.

- *Lowering the Proposed Criterion is Not Scientifically Justified*

Lastly, GEI reviewed a report that was prepared on behalf of the PA Coal Alliance for the proposed Mn rulemaking (Gradient 2020). In our scientific opinion, this report conclusively demonstrated that lowering the existing PA water quality criteria from 1.0 to 0.3 mg/L is not necessary to protect against adverse health effects from consumption of drinking water. The Gradient report argues that use of a “modifying factor” (MF) of 3 in the criteria derivation equation is not supported in the scientific literature. Without this MF of 3, 1.0 mg/L would adequately protect against drinking water exposures, even among different aged populations. Furthermore, Gradient conducted an independent evaluation of protective Mn concentrations for possible exposure pathways associated with recreational and fish-ingestion designated uses (Gradient 2020). In Section 4.2 of the report, Gradient derived protective Mn concentrations using standard USEPA exposure assumptions (2019) for both inadvertent water ingestion by a swimmer and fish-ingestion. Using an updated oral reference dose (RfD; see Gradient 2020 for details on RfD update), Gradient derived conservative swimming and fish-ingestion concentrations of 92 mg Mn/L for an adult and 41 mg Mn/L for a child. These recreational and fish-ingestion values are more than 2 orders of magnitude greater than the 0.3 mg Mn/L human health value proposed by PADEP. GEI agrees with the scientific basis behind the Gradient

analysis, further supporting that the proposed PADEP human health value of 0.3 mg/L is more stringent than is needed to protect these designated uses.

Conclusion

PADEP's proposal to adopt a human health criterion of 0.3 mg Mn/L that must be met at the point of discharge is unnecessary and excessive. The proposed Mn criterion is effectively redundant because water suppliers are already required to meet a secondary MCL that is 6x more stringent than the proposed criterion. GEI also agrees that there is no scientific justification for lowering the human health toxicity-based criterion from 1.0 to 0.3 mg/L.

Furthermore, requiring the Mn criterion be met in all waters is overprotective because other designated uses such as aquatic life are 5x to 10x less stringent than what is being proposed by PADEP. Therefore, with respect to the point of compliance alternatives, GEI strongly recommends adopting the first alternative in which the criteria would be met "at the point of all existing or planned surface potable water supply withdrawals" should be supported.

Please feel free to contact us should you require any additional information.



Robert Gensemer, Ph.D.
Vice President, Senior Ecotoxicologist



Daniel Guth
Ecotoxicologist

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