

**FINAL-FORM RULEMAKING  
ENVIRONMENTAL QUALITY BOARD  
[ 25 PA. CODE CHS. 93 and 96 ]**

**Water Quality Standard for Manganese and Implementation**

The Environmental Quality Board (Board) amends 25 Pa. Code Chapter 93 (relating to water quality standards). The amendments delete manganese from Table 3 at § 93.7 (relating to specific water quality criteria) and add a new manganese criterion to Table 5 at § 93.8c (relating to human health and aquatic life criteria for toxic substances). This final-form rulemaking fulfills the Commonwealth's obligations under State and Federal laws to review and revise, as necessary, water quality standards that are protective of surface waters.

This final-form rulemaking was adopted by the Board at its meeting of **DATE, 2022**.

*A. Effective Date*

This final-form rulemaking will be effective upon publication in the *Pennsylvania Bulletin*. Subsequent approval by the United States Environmental Protection Agency (EPA) of water quality standards is required to implement the Federal Clean Water Act (CWA) (33 U.S.C.A. §§ 1251—1388). If the EPA were to not approve the water quality standards in this final-form rulemaking, those standards would remain applicable for state-only permits.

*B. Contact Persons*

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*C. Statutory and Regulatory Authority*

This final-form rulemaking is being made under the authority of sections 5(b)(1) and 402 of The Clean Streams Law (CSL) (35 P.S. §§ 691.5(b)(1) and 691.402), which authorize the Board to develop and adopt rules and regulations to implement the CSL (35 P.S. §§ 691.1—691.1001). Additional authority for this final-form rulemaking includes section 1920-A(b) of The Administrative Code of 1929 (71 P.S. § 510-20(b)), which grants to the Board the power and duty to formulate, adopt and promulgate rules and regulations for the proper performance of the work of the Department. Sections 101(a)(2) and 303 of the CWA (33 U.S.C.A. §§ 1251(a)(2) and 1313) establish requirements for water quality standards, which states must meet to implement the CWA in the Commonwealth. Section 101(a)(3) of the CWA declares the national

policy that the discharge of toxic pollutants in toxic amounts be prohibited (33 U.S.C.A. § 1251(a)(3)).

#### *D. Background and Purpose*

Section 303(c)(1) of the CWA requires that states periodically, but at least once every three years, review and revise as necessary, their water quality standards. This final-form rulemaking constitutes this Commonwealth's review of its water quality standard for manganese.

The Commonwealth's water quality standards are codified primarily in Chapters 93 and 16 (relating to water quality toxics management strategy-statement of policy). The water quality standards consist of designated and existing uses of the surface waters of the Commonwealth, along with the specific numeric and narrative criteria necessary to achieve and maintain those uses, and an antidegradation policy. Thus, water quality standards are instream water quality goals that are implemented by imposing specific regulatory requirements on individual sources of pollution, such as treatment requirements, best management practices (BMPs) and effluent limitations.

Act 40 of 2017 (71 P.S. § 510-20(j)) (Act 40) directed the Board to propose a regulation that would move the point of compliance for manganese from the point of discharge to the nearest downstream potable water supply withdrawal.

In addition to Act 40, the Board is required to consider other environmental statutes, like the CSL and the Pennsylvania Safe Drinking Water Act (SDWA) (35 P.S. §§ 721.1—721.17) when developing regulations. For instance, section 4(1) of the CSL (35 P.S. § 691.4(1)) declares that clean, unpolluted streams are absolutely essential if this Commonwealth is to attract new manufacturing industries and to develop the Commonwealth's full share of the tourist industry. Similarly, section 4(3) declares that an objective of the CSL is to prevent pollution and restore streams that are presently polluted (35 P.S. § 691.4(1)). Sections 4(4) and 5(b)(1) of the CSL (35 P.S. §§ 691.4(4) and 691.5(b)(1)) state that the Department has the duty to formulate regulations that prevent and eliminate water pollution. Section 1 of the CSL (35 P.S. § 691.1) defines "pollution" as "contamination of any waters of the Commonwealth such as. . .to render such waters harmful, detrimental or injurious to public health. . . , or to domestic, municipal, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life. ..."

In adopting rules and regulations under section 5(a) of the CSL (35 P.S. § 691.5(a)) to carry out the purposes of the act, the Department needs to consider, where applicable, the following: (1) water quality management and pollution control in the watershed as a whole; (2) the present and possible future uses of particular waters; (3) the feasibility of combined or joint treatment facilities; (4) the state of scientific and technological knowledge; and (5) the immediate and long-range economic impact upon the Commonwealth and its citizens.

Where a pollutant found in discharges to surface waters is toxic to human health or aquatic life, the Commonwealth's regulations require development of appropriate water quality criteria to control pollution. Section 93.8a (relating to toxic substances) specifically requires that "[t]he waters of this Commonwealth may not contain toxic substances attributable to point or nonpoint

source waste discharges in concentrations or amounts that are inimical to the water uses to be protected.”

Section 303(c) of the CWA and 40 CFR Part 131 (relating to water quality standards) require states to develop water quality standards that consist of designated uses, water quality criteria to protect those uses and antidegradation requirements. Such standards must “protect the public health or welfare and enhance the quality of water” (33 U.S.C.A. § 1313(c)). In addition, such standards must take into consideration water uses including public water supplies, propagation of fish and wildlife, recreational purposes, agricultural purposes and industrial purposes. Section 101(a)(3) of the CWA declares the National policy that the discharge of toxic pollutants in toxic amounts be prohibited (33 U.S.C.A. § 1251(a)(3)).

Section 2 of the Pennsylvania SDWA (35 P.S. § 721.2) declares that an adequate supply of safe, pure drinking water is essential to the public health, safety and welfare and that such a supply is an important natural resource in the economic development of the Commonwealth. Moreover, section 5 of the Pennsylvania SDWA (35 P.S. § 721.5) requires the Department to develop a safe drinking water program necessary to assume enforcement responsibility of the Federal SDWA (42 U.S.C.A. §§ 300f —300j-27). On November 30, 1984, the Department assumed responsibility under the Federal SDWA. See 50 FR 342 (January 3, 1985). In this Commonwealth, public water suppliers must achieve the Secondary Maximum Contaminant Level (SMCL) for manganese of 0.05 mg/L in finished water based on the Federal standard found at 40 CFR 143.3 (relating to secondary maximum containment levels).

Manganese was initially evaluated by the Department in 1967 to address public water system concerns in specific surface waters of this Commonwealth. Although the Potable Water Supply use was a statewide protected water use in 1967, the manganese Potable Water Supply criterion of 1.0 mg/L was adopted only for a very limited number of surface waters. The criterion was intended to protect select public water systems from requiring expensive treatment process upgrades to remove manganese from their surface water sources as necessary to satisfy existing expectations for potable drinking water quality.

In 1979, the Department reevaluated the manganese criterion of 1.0 mg/L and adopted the criterion for statewide protection of the Potable Water Supply use. The original rationale for the 1.0 mg/L criterion was primarily based upon a 1967 testimony from the Wilkesburg Joint Water Authority. In 1979, the Department considered additional scientific literature, statewide water quality data and the EPA’s water quality criteria recommendations (EPA Red Book, 1976), which indicated that manganese was not expected to be harmful to aquatic life or humans at levels expected to occur naturally in surface waters (that is, less than 1.0 mg/L). In the 1979 reevaluation, the Department noted in the rationale that there were some discrepancies between the scientific literature and the testimony provided in 1967. The Department’s historical records clearly indicate that the Potable Water Supply criterion for manganese was adopted to protect the Potable Water Supply use and facilitate potable water supply treatment; it was not established to protect human health from toxic effects of manganese which, at the time, were assumed to be nonexistent.

Since manganese had not been comprehensively reexamined following the statewide adoption of the 1.0 mg/L Potable Water Supply criterion in 1979, the Department completed a thorough

review of the available scientific data and literature on the toxic effects of manganese in preparing this rulemaking to determine the appropriate water quality criteria necessary to support and maintain all of the protected water uses identified in § 93.3 (relating to protected water uses). The Department also published an advance notice of proposed rulemaking (ANPR) in the *Pennsylvania Bulletin* soliciting scientific data and other information necessary to prepare the rulemaking documents required by law and to support the Board's adoption of proposed regulations. See 48 Pa.B. 605 (January 27, 2018).

For this final-form rulemaking, the Department evaluated over 80 peer-reviewed publications relevant to the toxic effects of manganese on human health, including publications in the fields of epidemiology, genetics, epigenetics and animal toxicity studies. The Department also reviewed information available through the EPA including the EPA's Integrated Risk Information System (IRIS) and the *Health Effects Support Document for Manganese* (EPA 822-R-03-003, 2003). Additional manganese studies and data were evaluated both in response to public comments received on the proposed rulemaking and based on the Department's own initiative. The manganese criterion in this final-form rulemaking did not change from the criterion in the proposed rulemaking as a result of the additional evaluation. The available data continue to demonstrate that the fetus, neonate, infant and child are particularly susceptible to the neurotoxic effects of manganese, which can significantly impact normal neurological development. The Department's updated review of scientific literature continues to support the need for a more stringent manganese criterion to protect human health.

Based on the Department's recommendation, the Board is revising the Chapter 93 water quality standard for manganese by deleting the existing manganese numeric water quality criterion of 1.0 mg/L from Table 3 at § 93.7 which was established for the protection of the Potable Water Supply use and adding a manganese criterion of 300 µg/L (or 0.3 mg/L) to Table 5 at § 93.8c designed to protect human health from the neurotoxicological effects of manganese. The adoption and implementation of a human health criterion in all surface waters in accordance with this final-form rulemaking will provide adequate protection not only to human health but to the other protected water uses, including aquatic life and livestock, from the toxic effects of manganese.

These regulatory revisions will update the regulations to be consistent with the current toxicological data and science on manganese and the Board's current policy on the point of compliance for toxic substances. This final-form rulemaking may affect persons who discharge wastewater into surface waters of this Commonwealth or otherwise conduct activities which may introduce manganese into surface waters of this Commonwealth.

In addition to examining the proper manganese water quality criterion, the Board requested public comment on two alternative points of compliance for this new toxic criterion. It was necessary to propose two alternatives to fully evaluate and understand the potential impacts to all water uses, from the point of discharge to the point of potable water supply withdrawal, and to be prepared to finalize a point of compliance that is protective of all water uses. The General Assembly mandated that the Board promulgate proposed regulations under the CSL, or other laws of the Commonwealth, that require the manganese criterion to be met consistent with the exception in 25 Pa. Code § 96.3(d). This obligation was satisfied by proposing "The First Alternative Point of Compliance," as described in the Preamble and the proposed Annex. The

statutory mandate to develop this rulemaking did not provide the Board with an analysis of potential impacts to water users or other information necessary to satisfy the requirements of the Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.15). Therefore, it was necessary to collect information on two alternatives so the Board would be in a position to choose the one that satisfies its obligations and does not conflict with statutory and regulatory requirements relating to manganese.

The Department discussed this final-form rulemaking with the Water Resources Advisory Committee (WRAC) on November 18, 2021, the Mining and Reclamation Advisory Board (MRAB) on January 20, 2022, the Aggregate Advisory Board on February 2, 2022, and the Public Water Systems Technical Assistance Center (TAC) Board on February 8, 2022. WRAC voted to approve the Department's recommendation, as presented in Annex A, for consideration by the Board. In addition, the Department presented a regulatory review to the Agricultural Advisory Board on December 9, 2021, that included the draft final water quality standard for manganese.

#### *E. Summary of the Final-Form Rulemaking and Changes from Proposed to Final-Form Rulemaking*

##### *Amendments to the manganese criterion in Chapter 93*

Based on the Department's review and recommendation, the Board is adopting a numeric water quality criterion of 300 µg/L (or 0.3 mg/L) for manganese designed to be protective of human health. This criterion is being added to § 93.8c Table 5 – Water Quality Criteria for Toxic Substances.

Concurrently, the Board is deleting the existing Potable Water Supply criterion for manganese of 1.0 mg/L from § 93.7 Table 3 since the numeric human health criterion is more stringent and includes the Potable Water Supply use; the Potable Water Supply use is afforded appropriate protection from elevated levels of manganese when the human health criterion is applied in accordance with Department policy and regulations.

The Board published a proposed rulemaking in the *Pennsylvania Bulletin* at 50 Pa.B. 3742 (July 25, 2020) that included two alternative points of compliance for the manganese criterion and sought public review and comment on each point of compliance. The first alternative, consistent with Act 40, proposed to change the point of compliance for manganese in Chapter 96 from “be[ing] achieved in all surface waters” (under § 96.3(c)) to being met “at the point of all existing or planned surface potable water supply withdrawals” (under § 96.3(d)). The second alternative, to be consistent with all other toxics criteria in Table 5 and with statutory provisions of the CSL, proposed to maintain the current point of compliance for manganese, in all surface waters (that is, at the point of discharge), as stated in § 96.3(c). Based on the overwhelming public support for the second alternative, the Department's comprehensive review of the manganese water quality criterion, including the appropriate point of compliance, and all applicable laws, this final-form rulemaking maintains the point of compliance for the human health manganese criterion in all surface waters in accordance with § 96.3(c).

### *Amendments to the proposed rulemaking*

No changes have been made between the proposed rulemaking and this final-form rulemaking for the revisions to Chapter 93.

The proposed amendments to Chapter 96 have been deleted in this final-form rulemaking. The proposed rulemaking included two point-of-compliance alternatives: 1) at the point of any existing or planned potable water supply withdrawal; and 2) at the point of discharge. In Chapter 96, this final-form rulemaking includes only one of the proposed point-of-compliance alternatives for the new manganese criterion. This alternative retains the existing language in § 96.3(d). Since this final-form rulemaking maintains the point of compliance for the manganese criterion at the point of discharge in accordance with § 96.3(c), the proposed changes to § 96.3(d) have been deleted from this final-form rulemaking.

The proposed rulemaking was adopted by the Board at its December 17, 2019, meeting, and was published at 50 Pa.B. 3742 (July 25, 2020) with a provision for a 60-day public comment period that ended on September 25, 2020. The Board held three virtual public hearings, for the purpose of accepting comments on the proposed rulemaking, on September 8, 9 and 10, 2020. The comments received on the proposed rulemaking are summarized in Section F of this Preamble.

The Department has considered all public comments received on the proposed rulemaking in preparing its recommendations to the Board for this final-form rulemaking.

### *F. Summary of Comments and Responses on the Proposed Rulemaking*

As a result of the public hearings and public comment period, the Board received comments from 957 commentators and testimony from 13 members of the public, including the Independent Regulatory Review Commission (IRRC) and EPA Region 3. Generally supportive comments for the proposed rulemaking, including maintaining the point of compliance for the manganese criterion at the point of discharge, were received from 924 commentators. Comments that opposed the proposed manganese criterion, requested movement of the point of compliance, or both, were received from 34 commentators.

Comments were submitted on many aspects of the proposed rulemaking including the following general topics: 1) naturally occurring and wastewater discharges of manganese in the environment; 2) support for the proposed criterion of 0.3 mg/L; 3) opposition to the proposed criterion of 0.3 mg/L; 4) the toxic effects of manganese on aquatic life and other protected water uses; 5) the toxic effects of manganese on human health; 6) statutory authority including the CSL, CWA, RRA, and Act 40; 7) manganese removal treatment processes; 8) support for the point of compliance at the point of discharge; 9) opposition to moving the point of compliance to the point of downstream potable water supply withdrawal; 10) support for moving the point of compliance to the point of downstream potable water supply withdrawal; 11) potential economic impacts to public water systems resulting from the first alternative point of compliance (Act 40); 12) potential impacts to the mining industry resulting from the second alternative point of compliance; and 13) other potential impacts of the second alternative point of compliance, such as effects on remining and watershed restoration projects.

A brief overview of these major comment topics and the Department's responses are summarized as follows. A complete summary of the comments submitted to the Board and the Department's responses to those comments is available in the Comment and Response document that accompanies this final-form rulemaking.

### *Manganese in the environment*

The Board received comments from 84 commentators concerning the persistent nature of manganese in the environment. Comments from 524 commentators noted that discharges of manganese primarily result from mining operations and other such earth disturbance activities.

Some commentators stated that the Department did not examine background levels of manganese in surface waters of the Commonwealth and suggested that background levels frequently exceed the 0.3 mg/L criterion due to manganese being a very common, naturally-occurring element at the earth's surface. Several commentators also stated that most of the manganese being discharged from active mining sites would not be in dissolved form. Thus, any manganese present in the discharge would not be toxic, would quickly settle out of the water and would be unlikely to travel a far distance from the discharge location. One commentator also suggested that all future earth disturbance activities would have the reasonable potential to violate the 0.3 mg/L manganese criterion since manganese is so abundant in rocks and soils, and thus, the proposed rulemaking would have the potential to significantly impact National Pollutant Discharge Elimination System (NPDES) permitting of earth disturbance activities.

The Department evaluated the background levels of manganese in surface waters of the Commonwealth during the development of the proposed rulemaking and this final-form rulemaking by examining more than 35,000 manganese sample results collected from surface waters across this Commonwealth. Sample locations included Water Quality Network (WQN) stations, continuous instream monitoring (CIM) sites and other monitoring locations, such as surface waters in the vicinity of public water system withdrawals. Prior to the proposed rulemaking, the Department evaluated a dataset of more than 20,000 surface water sample results collected at hundreds of locations within this Commonwealth. The Department analyzed this dataset to determine the average, natural background concentration of manganese in surface waters of this Commonwealth. The public water system samples were collected as a part of routine monitoring and assessment activities. A summary of the Department's analysis is available as Appendix A in the Comment and Response document that accompanies this final-form rulemaking. The Department also evaluated an additional dataset of approximately 600 water quality samples provided by The Pennsylvania State University. The Department's comprehensive evaluation demonstrated that the natural background levels of manganese in surface waters of this Commonwealth are generally below 0.3 mg/L. The Department agrees that levels of manganese measured in some waters were above the 0.3 mg/L criterion; however, further examination of those watersheds revealed strong trends between elevated levels of manganese and presence of human activities in the watershed. Thus, observations of elevated levels of manganese are generally a strong indication that a waterbody has been impacted by human activity and that the measured levels are not representative of the natural, background levels that would otherwise exist. The Department agrees that manganese is a common, naturally-occurring element in rocks and soils, but it is not generally naturally-occurring in surface waters of this Commonwealth at the levels suggested by the regulated community. The

commentators' suggestion that background (that is, natural background) instream manganese levels frequently exceed the 0.3 mg/L is not supported by the available statewide data.

Although it is recognized that dissolved metals are typically more toxic to aquatic life than non-dissolved (that is, total or particulate) metals, the proposed and final-form criterion is for the protection of human health. Therefore, it is not relevant whether the instream manganese concentrations are in the form of particulate or dissolved manganese as all forms of manganese have the potential to be toxic to humans. In addition, many factors affect the behavior of manganese in the aquatic environment, such that particulate forms of manganese may redissolve in a stream upon discharge under certain instream conditions.

Regarding impacts on permitted earth disturbance activities, unless environmental due diligence warrants it, soil sampling for manganese is not expected of Chapter 102 applicants. Where environmental due diligence has identified a concern, the Department's *Erosion and Sediment Pollution Control Program Manual* (Document ID No. 363-2134-008) and *Pennsylvania Stormwater Best Management Practices Manual* (Document ID No. 363-0300-002) include recommendations for managing earth disturbance activities in areas of known soil contamination or hazardous geologic conditions including, but not limited to, mineral hazards.

*Addition of a human health toxics criterion for manganese to Table 5 and deletion of the Potable Water Supply criterion for manganese from Table 3*

The Board received comments from 911 commentators in support of adding a human health toxics criterion of 0.3 mg/L for manganese to Table 5 and deleting the current Potable Water Supply criterion for manganese of 1.0 mg/L since the criterion was not developed to protect human health from neurotoxicological effects and is not supported by the current peer-reviewed science. Supportive commentators primarily acknowledged and concurred with the Department's evaluation of the peer-reviewed scientific literature and data on manganese toxicity in developing the criterion recommendation.

The Board received and acknowledged comments from 30 commentators opposing the addition of a human health toxics criterion.

The Board received comments from 20 commentators stating that the current 1.0 mg/L Potable Water Supply criterion is adequate to protect human health. However, no scientific data or literature was submitted by any of these commentators to support this claim, and the Department did not identify any scientific studies or information to support 1.0 mg/L as protective of human health during its review.

*Toxic effects of manganese on aquatic life and other protected water uses*

The Board received comments from 718 commentators stating that manganese is toxic to aquatic life including macroinvertebrates, fish and freshwater mussels. Several commentators pointed to recent toxicology and environmental studies on aquatic organisms that demonstrated negative impacts on freshwater mussels and other invertebrates associated with elevated manganese. One commentator noted the negative impacts of elevated manganese in irrigation water on agriculture. Based on consultations with various state agency experts and studies the Department

reviewed, the Department generally agrees that elevated levels of manganese can be toxic to aquatic life and negatively impact other protected water uses, including Livestock Water Supply and Irrigation.

The Board also received comments from 10 commentators stating that the manganese criterion of 0.3 mg/L is overly protective of aquatic life and the other water uses based on the available toxicity data and other states' criteria. A few commentators cited to several toxicity studies and stated that aquatic species can tolerate higher levels of manganese, including levels greater than the current Federal effluent limitation guideline (ELG) for the coal mining industry of 2 mg/L. Several commentators noted that the EPA has not established manganese water quality criteria for the protection of aquatic life. Other commentators stated that manganese treatment and removal is highly toxic and dangerous for fish and invertebrates because it requires the wastewater to have a high pH which can also cause aluminum to redissolve.

When sufficient information is available to develop numeric water quality criteria for pollutants, the Department generally develops a single water quality criterion to protect the most sensitive statewide water use, which provides protection to all of the protected water uses. If new information indicates that another protected water use is more sensitive, then a new criterion is developed to protect the most sensitive protected use. The development of separate manganese criteria to protect aquatic life or other protected water uses is unnecessary at this time because the human health criterion, applied in all surface waters, protects all water uses.

While it is not uncommon for states to examine other states' criteria, each state must develop and adopt water quality criteria that are appropriate for the protection of their surface waters and protected water uses. The Department is aware that some states have adopted hardness-based aquatic life criteria for manganese. The Department is also aware that metals criteria development is generally moving away from hardness-based equations to more complex modeling, such as the biotic ligand model and multiple linear regression models. The commentators referenced aquatic life criteria adopted by Colorado, Illinois, Wyoming and New Mexico. The Department did not pursue the development of an aquatic life criterion. Criteria would also need to follow current criteria development recommendations, including any guidance and recommendations from the EPA. Regardless of whether or not the EPA has published specific numeric criteria recommendations for a pollutant, the Department is obligated to protect statewide water uses including protections for human health and must implement the general water quality criteria in § 93.6.

While it is recognized that many types of mining activities are regulated by Federal ELGs which limit the discharge of manganese to a 30-day average of 2.0 mg/L, the Federal ELGs allow the mining industry to discharge up to 4.0 mg/L as a daily maximum and 5.0 mg/L as an instantaneous maximum; these higher concentrations of manganese are not protective of aquatic life or the aquatic environment. Furthermore, non-mining dischargers of manganese are not held to the mining ELGs and do not have ELGs or other laws in place to limit the amount of manganese released at the point of discharge. For these industries, no water quality-based effluent limitation would be developed under the first alternative point of compliance in the proposed rulemaking unless a potable water supply withdrawal existed downstream of the discharge and within such a distance that would result in a reasonable potential to violate the criterion.

Regarding the dangers of manganese removal treatment, the water quality standards regulations found in Chapter 93 contain criteria for many pollutants, including pH and aluminum. For the protection of aquatic life, in-stream concentrations of aluminum may not exceed 750 µg/L as an acute criterion, and pH must be maintained between 6 and 9. Permitted discharges must comply with permit conditions (for example, effluent limitations) designed to meet these water quality criteria, and effluent limitations should be included in any NPDES permit where reasonable potential to exceed these water quality criteria has been demonstrated. If wastewater treatment processes would result in unacceptable pH levels or unacceptable concentrations of aluminum in the effluent, additional treatment would be required for the wastewater discharge to comply with permit limits designed to meet the in-stream water quality criteria for pH or aluminum before the effluent can be discharged to the waters of this Commonwealth.

#### *Toxic effects of manganese on human health*

The Board received comments from 712 commentators acknowledging the neurotoxic effects of manganese based on the available peer-reviewed scientific literature and data on manganese toxicity.

The 30 commentators opposing the addition of a human health criterion to Table 5 stated that manganese, a common component of the human diet, is an essential nutrient that is critical for good health. Commentators also noted that the EPA has not classified manganese as a toxic substance or regulated it under either the Federal Water Quality Standards or Safe Drinking Water regulations. Opposing commentators stated the proposed criterion of 0.3 mg/L was overly conservative and not based on sound science. A handful of the commentators pointed to several physiologically-based pharmacokinetic (PBPK) models and other studies that have been published over the past five years. The commentators stated that these studies were not considered by the Department, and that the studies refute the need for a more stringent manganese criterion to protect human health.

The Department recognizes and agrees that manganese is an essential micronutrient and found in the human diet. However, when levels exceed those necessary for good health, manganese can negatively affect the nervous system, and early life stages, including infants and children, are especially vulnerable. The Department reviewed some of the available PBPK models during the development of the proposed rulemaking, including studies by Schroeter et al. (2011 and 2012) and Yoon et al. (2011) and reviewed the other studies, including Song et al. (2018) and Yoon et al. (2019), in response to information and comments provided to the Department immediately prior to and upon publication of the proposed rulemaking. The Yoon et al. (2019) and Song et al. (2018) studies were generally completed by the same group of researchers. In connection to these PBPK model studies, the Department also reviewed Foster et al. (2015). The Department identified a number of limitations and concerns with the available PBPK models for manganese, particularly with respect to neonates and infants. These limitations and concerns are discussed in detail in the Comment and Response document that accompanies this final-form rulemaking. The Department also noted that all of the currently available PBPK model studies on manganese, including the research study by Foster et al. (2015), were funded by a single source, the Afton Chemical Company. The Department believes additional studies by independent research groups should be conducted to validate these models and any associated animal studies. Additional study and validation help to ensure that the reported results are credible and reproducible. Both

the World Health Organization (WHO) and Health Canada noted that independent replication or validation studies have not been completed for these human PBPK models. Afton Chemical is the leading producer of methylcyclopentadienyl manganese tricarbonyl (mmt®), which is a manganese-based fuel additive. The Department's review of these PBPK studies does not change its manganese criterion recommendation.

After publication of the proposed rulemaking and in addition to the studies by Song and Yoon, the Department reviewed additional scientific studies and data on manganese toxicity, including: WHO, (2020); Valcke et al., (2018); Vaiserman, (2015); Signes-Pastor et al., (2019); Shih et al., (2018); Sen et al., (2011); Schullehner et al., (2020); Scher et al., (2021); Stroud et al., (2014); Wahlberg et al., (2018a and 2018b); Maccani et al., (2015); Tarale et al., (2016); Neal and Guilarte, (2013); Mora et al., (2014); Monk et al., (2016); Leyva-Illades et al., (2014); Kwakye et al., (2015); Kumar et al., (2014); Kullar et al., (2019); Jenkitkasemwong et al., (2018); Bromer et al., (2013); Broberg et al., (2019); Bock et al., (2008); Aydemir et al., (2020); Aschner and Aschner, (2005); Health Canada, (2019); Dearth et al., (2014); Appleton et al., (2017); Qiao et al., (2015); Woolfe et al., (2002); Weber et al., (2002); and Miranda-Morales et al., (2017). These studies have been added to a references section in this Preamble and to the literature references in the Department's criterion rationale document and Comment and Response document. For a complete list of all references relied upon for this rulemaking, refer to the criterion rationale document and Comment and Response document. The available data continues to support a link between manganese in water and negative neurodevelopmental outcomes in children. Furthermore, the Department consulted with toxicologists at EPA and Drexel University (Hamilton et al., 2022) on the development of the 0.3 mg/L manganese water quality criterion. Both entities support the Department's criterion development approach and the 0.3 mg/L manganese criterion. Drexel's analysis is provided in a report appended to the Regulatory Analysis Form for this rulemaking (Hamilton et al., 2022).

*Statutory authority including the CSL, CWA, RRA and Act 40*

The Board received comments from 118 commentators stating that Act 40 is inconsistent with the CSL and CWA, which prohibit the discharge of toxic substances in toxic amounts. Five commentators noted that the second alternative point of compliance, which maintains compliance for the criterion at the point of discharge, is consistent with Article 1, Section 27 of the Pennsylvania Constitution. Additionally, four commentators stated that Act 40 is a constitutionally infirm statute.

Alternatively, the Board received comments from three commentators stating that the proposed rulemaking and second alternative point of compliance are inconsistent with the CWA and the RRA and from 15 commentators stating that the proposed rulemaking does not comply with Act 40. Commentators stated that Act 40 provided clear direction to the Board to move the point of compliance for the manganese criterion to be consistent with the exceptions in § 96.3(d). Commentators assert that Act 40 did not authorize or direct the Board to propose a second alternative point of compliance or reevaluate manganese as a toxic substance. Commentators further maintained that the Board failed to promulgate regulations within 90 days as directed by Act 40.

The Board agrees that the Commonwealth's water quality standards regulations must, and do, comply with Act 40, the CSL, CWA, the Commonwealth Documents Law (CDL), the Commonwealth Attorneys Act and the RRA. In addition, the Board must adopt water quality standards that support, and do not conflict with, obligations under other statutes, such as the Pennsylvania SDWA. This final-form regulation does not conflict with the SDWA.

Act 40 obligated the Board to propose regulations that move the point of compliance for manganese, consistent with the exceptions in § 96.3(d). The proposed rulemaking included language consistent with that mandate. Additionally, the proposed rulemaking included a second alternative point of compliance based on other legal considerations, such as compliance with the Pennsylvania SDWA. The preamble to the proposed regulations provided public notice of, and described in great detail, the two alternatives that would be considered by the Board for promulgation as a regulation. Based on the public comments received, the public had clear notice of the Board's intentions. Furthermore, the Regulatory Analysis Form (RAF), prepared by the agency to meet requirements of the RRA, was prepared in a manner that includes analyses based on both alternative points of compliance.

The CDL allows for changes between the proposed regulation and final-form adoption as long as the modifications to the proposed text do not enlarge its original purpose. *See* 45 P.S. §§ 1201 and 1202. The presentation of two alternative points of compliance in the proposed regulation provided the public the opportunity to comment on both, and for one alternative to be chosen for this final-form rulemaking; thus, the modification to adopt one alternative does not enlarge the original purpose of the proposed text. While Act 40 did not direct the Board to evaluate the manganese criterion, Act 40 did direct the Board to adopt a change in the implementation of the manganese criterion. Any proposed change in criteria implementation necessitates a comprehensive review of the criterion and all protected water uses to ensure adequate water quality protections will continue to exist for all surface waters and uses, as required by the CWA (33 U.S.C.A. § 1313(c)(2)(A)) and its implementing regulations (40 CFR § 131.6(c)).

To comply with the CWA, the Department submits water quality standards to the EPA for their review and approval. The Department consulted with experts at the EPA throughout the criterion development and rulemaking process. The current data indicates that manganese consumed in water can act as a developmental neurotoxin and negatively impact human health. Human health water quality criteria are not equivalent to Potable Water Supply criteria. Human health criteria are developed to protect any water uses related to ingestion of water, ingestion of aquatic organisms, or other waterborne exposure from surface waters. Such water uses include protection of sources of drinking water (that is, the Potable Water Supply use). *See EPA's Water Quality Standards Handbook*. The EPA's recommended approach for deriving these criteria is *The Methodology for Deriving Ambient Water Quality for the Protection of Human Health* (2000), which provides states with scientifically sound options for developing their own human health criteria in the absence of CWA Section 304(a) criteria recommendations established by the EPA. Furthermore, section 101(a)(3) of the CWA declares the National policy that the discharge of toxic pollutants in toxic amounts be prohibited (33 U.S.C.A. §1251(a)(3)). The manganese criterion in this final-form rulemaking was developed in accordance with the CWA and the EPA's regulations and guidance.

### *Manganese removal treatment processes*

The Board received comments from one commentator regarding passive treatment processes and technologies. The commentator has extensive experience in designing and installing passive treatment systems to address pollutants in mining discharges and provided data demonstrating that such systems are capable of consistently achieving manganese discharge levels of 0.3 mg/L or less when properly designed and operated.

Several commentators noted that manganese removal using chemical addition is challenging if aluminum is also present in the wastewater. The Board recognizes these potential challenges for some wastewater discharges.

### *First alternative point of compliance for the manganese criterion*

The Board received and acknowledged comments from 26 commentators in support of the first alternative point of compliance, which would move the compliance point from the point of discharge to the point of any existing or planned potable water supply withdrawals, consistent with Act 40.

### *Second alternative point of compliance for the manganese criterion*

The Board received and acknowledged comments from 911 commentators in support of the second alternative point of compliance, which maintains compliance at the point of discharge (that is, in all surface waters) in accordance with § 96.3(c). Commentators support this alternative as being protective of public health and the environment. Commentators indicated that, under the second alternative point of compliance, all water uses are protected, and discharges of manganese are regulated regardless of whether or not a downstream potable water supply withdrawal is existing or planned. Several commentators noted the Board's duties and responsibilities to protect public health and the environment.

The Board also received and acknowledged comments from many of these same commentators, a total of 718 commentators, opposing movement of the point of compliance from the point of discharge to the point of any existing or planned potable water supply withdrawals.

### *Potential economic impacts to public water systems resulting from the first alternative point of compliance (Act 40)*

The Board received comments from 315 commentators expressing concerns for the potential economic impacts on public water systems that would result from moving the point of compliance to the point of any existing or planned potable water supply withdrawal. Many commentators stated that the first alternative point of compliance shifts the burden and costs of treatment to public water systems and their customers. Some commentators noted that the EPA requires states to address levels of manganese in drinking water above 0.3 mg/L, due to the EPA health advisory level, which includes a 10-day limit of 0.3 mg/L for infants. The EPA also requires states to implement corrective actions, including public notification. Thus, even with the change in the manganese criterion from 1.0 mg/L to 0.3 mg/L, public water systems would be

challenged to comply with SDWA requirements if they received source water with manganese levels at 0.3 mg/L.

The Department's Bureau of Safe Drinking Water determined that approximately 280 of 340 surface water treatment plants in this Commonwealth would need to evaluate treatment changes if the manganese compliance point were moved. Sequestration is a treatment process commonly used by public water systems in this Commonwealth to address the organoleptic and aesthetic concerns associated with manganese and to achieve the mandatory SMCL of 0.05 mg/L. Sequestration is not an acceptable treatment method once source water levels of manganese reach or exceed 0.3 mg/L. Sequestration only binds manganese into complexes that prevent taste and staining issues and does not result in physical removal of the manganese from the water. Since the manganese is still present, it will become bioavailable upon ingestion. Therefore, when levels reach or exceed the EPA health advisory level of 0.3 mg/L, manganese must be removed from the potable water supply. Treatment techniques to remove manganese may include chemical addition, sedimentation, filtration or other related treatment processes.

Several public water systems submitted public comments on the proposed rulemaking and provided cost estimates for additional monitoring and treatment associated with increased manganese in source waters.

Pennsylvania American Water indicated that 16 water treatment plants would be challenged if confronted with increased levels of raw water manganese. This commentator noted that eight facilities have a higher probability of being impacted and would be impacted to the point of requiring treatment plant modifications. The total capacity of the eight treatment plants is approximately 40 million gallons per day (MGD). Estimated costs for plant upgrades ranged between \$1-\$1.5 million per MGD, equating to an overall one-time capital investment in the range of \$40-\$60 million. In addition, Pennsylvania American Water anticipates an annual increase in chemical and monitoring costs in the range of 5% to 10% (that is, \$700,000 to \$1.4 million) for the eight treatment plants requiring upgrades.

If source water levels of manganese increase, the Reading Area Water Authority stated that the Authority would need to add an alternative treatment process to remove the manganese with a capital cost of \$2.1 million and a 20-year operating cost of \$15.8 million. Additional projected costs include \$540,000 per year in increased treatment chemical costs and \$6,530 annually for increased monitoring following a start-up cost of \$13,000.

The City of Lancaster's Department of Public Works also submitted general cost information during the ANPR. This facility estimated that extra monitoring including testing equipment, testing chemicals and training for personnel, would cost tens of thousands of dollars. New infrastructure, including piping, pumps, chemicals, safety training and protective gear would cost tens of millions of dollars. This public water system also anticipated paying millions of dollars in lost efficiency with respect to plant performance and increased membrane filter replacement.

In addition, the Department collaborated with Drexel University to evaluate manganese removal treatment options and costs for public water systems. As stated in Drexel University's analysis (Hamilton et al., 2022), Kohl and Medlar (2006) studied the capital costs of manganese removal water treatment and produced various estimates that ranged from \$750,000 per MGD to \$2

million per MGD for manganese control. The cost figure of \$1.5 million per MGD provided by Pennsylvania American Water is within the range estimated by Kohl and Medlar (2006). The Board generally agrees with the potential economic impacts to public water systems resulting from the first alternative point of compliance identified in these comments.

*Potential economic impacts to the mining industry resulting from the second alternative point of compliance*

The Board received comments from 24 commentators regarding the potential economic impacts on the mining industry that would result from maintaining the point of compliance in all surface waters (that is, at the point of discharge).

Several companies responsible for mining wastewater treatment submitted public comments and provided cost estimates for additional monitoring and treatment that could be required to achieve the new manganese criterion of 0.3 mg/L.

Pennsylvania Coal Alliance submitted a report from Tetra Tech that estimated the annual costs to the mining industry associated with achieving a water quality criterion of 0.3 mg/L at the point of discharge. Total annual conventional treatment costs were projected to increase by \$44 to \$88 million and capital costs were projected to be upwards of \$200 million. Of that total amount, increased alkaline chemical costs would be between \$15 and \$40 million annually depending upon the chemical used (that is, lime versus sodium hydroxide). Increased sludge handling fees would be \$5 to \$10 million annually, and increased one-time capital costs for tanks and chemical feed systems would be \$20 to \$40 million. If aluminum is also present in the wastewater discharge, additional costs could be incurred.

The New Enterprise Stone & Lime Company stated that six of their 51 NPDES permits would require additional treatment to comply with a water quality standard of 0.3 mg/L. Anticipated combined costs for all six permits were estimated at \$320,000 for capital investments (that is, expansion of existing treatment tanks and new treatment equipment) and \$450,000 in annual operating costs. This commentator also noted that additional staff may be necessary, and land availability issues could limit expansion of treatment systems.

Shenango, LLC holds seven NPDES permits for postmining discharges and indicated that two of the seven NPDES permits must comply with manganese effluent limitations based on the 1.0 mg/L manganese potable water supply use criterion. If the 0.3 mg/L human health criterion is adopted and implemented at the point of discharge, they expect all seven permits will require treatment to remove manganese. This commentator stated that the addition of manganese effluent limitations to the five remaining permits would necessitate the installation of additional treatment systems at a cost of approximately \$650,000, which is generally equivalent to the present-day capital cost for all seven systems. Shenango, LLC operates passive treatment systems and expressed concern over the lack of land area to install larger, or additional, treatment ponds at some discharge locations.

Talon Energy Supply, LLC owns and operates the Rushton acid mine discharge (AMD) treatment plant, which treats pumped water from a flooded underground deep mine complex. If new effluent limitations are imposed at this facility based on a water quality criterion of 0.3

mg/L, the commentator anticipates needing to replace the existing clarifier system at an overall capital cost of \$30 million, including more than \$9 million for new clarifiers and more than \$20 million for microfiltration. Estimated annual operating costs would be expected to exceed \$2 million.

The Board responses to the potential economic impacts to the mining industry resulting from the second alternative point of compliance are summarized in Section G regarding benefits, costs and compliance.

*Other potential impacts of the second alternative point of compliance, such as effects on remining and water restoration projects*

The Board received comments from 15 commentators expressing concern for the potential impacts of the proposed rulemaking on remining and surface water restoration projects if a more stringent manganese criterion is adopted and implemented at the point of discharge.

Commentators stated the proposed regulation would have detrimental effects on the Department's programs implementing Chapter 87, Subchapter F (relating to surface coal mines: minimum requirements for remining areas with polluttional discharges) and Chapter 88, Subchapter G (relating to anthracite surface mining activities and anthracite bank removal and reclamation activities: minimum requirements for remining areas with polluttional discharges) by disincentivizing mining operators from treating legacy AMD. Commentators speculated that the proposed rulemaking would force many mining companies into bankruptcy and increase the number of bond-forfeitures. Commentators also stated that the proposed rulemaking would negatively impact earth disturbance activities and Chapter 102 permits.

The Department's Bureau of Clean Water continues to work with the Department's Office of Active and Abandoned Mine Operations to understand and minimize any impact of this final-form rulemaking on remining and abandoned mine land (AML) restoration projects. The Department does not anticipate a significant impact to remining efforts when permits for these activities are authorized under the existing remining regulations.

The Department also does not expect this final-form rulemaking to lead to an increase in AML discharges as a result of bond forfeiture. Commentators have claimed that the costs associated with manganese treatment will increase the number of bond-forfeitures; however, no commentators provided data or information to the Department to support these claims. In 1998, the Department evaluated permit sites for occurrences of post-mining discharges of pollutants and determined that only 17 of approximately 1,700 permits issued since 1987 (roughly 1%) resulted in discharges of pollutants. The Department also noted the discharges on the failed sites were much less severe in quantity and quality than historical AML discharges. Furthermore, the Department has received no specific information from the mining industry or other groups which demonstrates that a significant portion of the mining companies operating in this Commonwealth are likely to declare bankruptcy, shut down their companies or forfeit their bonds as a result of this final-form rulemaking.

While bond forfeitures do occur and manganese treatment may play a role in bond forfeiture, there are many factors that influence whether or not a company forfeits a bond. The Department

is not aware of any bond forfeitures that have occurred in this Commonwealth based solely on manganese treatment requirements. Additionally, significant changes in the bonding program have occurred since the cessation of the Alternative Bonding System, which has generally resulted in bonds that are adequately funded to maintain treatment systems after forfeiture.

Regarding stormwater-related permits, the Department discussed the alternative points of compliance internally with relevant programs and externally with the Pennsylvania Department of Transportation (PennDOT). PennDOT did not identify or express any potential concerns with the proposed water quality criterion or maintenance of the point of compliance at the point of discharge. This final-form rulemaking is not expected to impact the Department's current implementation practices for stormwater permitting or otherwise affect the Department's existing stormwater management programs. Stormwater discharges that contain problematic levels of manganese are currently, and would continue to be, addressed by DEP on a case-by-case basis rather than through policy changes made to the entire stormwater management program.

The Board responses to the other potential economic impacts resulting from the second alternative point of compliance are summarized in Section G regarding benefits, costs and compliance.

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### *G. Benefits, Costs and Compliance*

#### *Benefits*

Overall, this Commonwealth’s residents and visitors and its natural resources benefit from providing the appropriate level of protection to preserve the integrity of existing and designated uses of surface waters in this Commonwealth. Protecting water quality provides economic value to present and future generations in the form of a clean water supply for human consumption, wildlife, irrigation and industrial use. It also protects aquatic life and provides for recreational opportunities such as fishing (including fish consumption), water contact sports and boating.

All of this Commonwealth’s residents and visitors, both present and future, will benefit from having clean water that is protected and maintained. Any reduction in the total toxic load in this Commonwealth’s waterbodies is likely to have a positive effect on the human health of its residents. This will translate into a yet unknown economic benefit through avoided cleanup or remediation costs that would have been incurred later in time, as well as avoided costs for the treatment and caring for persons with diseases and disabilities that can be reasonably attributed to environmental contaminants in surface water.

By implementing a human health water quality criterion in all surface waters of this Commonwealth, users downstream will not have to bear the costs associated with remediating discharges from upstream users before the water can be used. For example, lower levels of manganese in surface waters may reduce the costs incurred by downstream surface water users who have to pre-treat water for industrial or commercial use (such as food processing and manufacturing facilities) and public water systems who have to treat water that is high in manganese at their intakes to meet Federal SDWA and Pennsylvania SDWA standards. The availability of clean water also cuts down on the costs to consumers for purchasing household pretreatment/water filtration systems and bottled water (*see “The Real Cost of Bottled Water,” San Francisco Chronicle, Feb. 18th, 2007, which estimates the cost of bottled water to be anywhere between 240 and 10,000 times more expensive than tap water*). An additional benefit to greater reliance on tap water is the reduction of containers that need to be recycled or disposed in landfills.

The Pennsylvania Fish and Boat Commission (PFBC) supports this final-form rulemaking and provided public comment indicating that manganese is one of several heavy metals that act on

aquatic organisms as metabolic poisons. Depending on the water quality of the stream, manganese settles on stream beds as a black, sticky coating that interferes with the colonization, abundance and diversity of stream dwelling aquatic insects which are very important in the aquatic ecosystem. This black coating can also negatively affect an individual's desire or ability to boat, fish or otherwise enjoy a surface water of this Commonwealth. The Department agrees that a reduction of toxins in this Commonwealth's waterways is likely to increase recreational fishing and ecotourism throughout the state. Additionally, cleaner rivers and fish may lead to increased birding and wildlife viewing opportunities, as the benefits of cleaner water and less contaminated fish work themselves up the food chain, resulting in substantial economic benefits. Persons who recreate on the waters and who fish, both for sport and consumption, will benefit from better water quality protection. Recreational uses are statewide protected water uses in this Commonwealth and include fishing, boating, water contact sports and aesthetics.

There are also economic benefits to be gained by having clearly defined remediation standards for surface waters. Under the Commonwealth's Land Recycling and Environmental Remediation Standards Act, liability relief is available, by operation of law, if a person demonstrates compliance with the environmental remediation standards established by the law. Surface water quality criteria are used to develop remediation standards under the law. Persons performing remediation depend upon these criteria to obtain a liability relief benefit under the law. An article in the Duquesne University Law Review discusses the importance of liability limitation as "vital to the participation in the remediation process" ("*COMMENT: Pennsylvania's Land Recycling Program: Solving the Brownfields Problem with Remediation Standards and Limited Liability*," Creenan, James W. and Lewis, John Q., Duquesne University Law Review, 34 *Duq. L. Rev.* 661 (Spring 1996)). The article recognizes that "liability protection provides the missing ingredient—financial incentive—for undertaking the cleanup of an industrial site." Industrial land redevelopers will benefit from these regulations by having financial certainty when choosing a surface water cleanup standard and by being eligible for liability relief under state law.

It is important to realize these numerous benefits and to ensure opportunities and activities continue in a manner that is environmentally, socially and economically sound. Maintenance of water quality ensures its future availability for all uses. All users of surface water will benefit from the development of a human health criterion for manganese that must be met in all surface waters.

#### *Compliance costs*

Since the water quality criterion for manganese of 0.3 mg/L in this final-form rulemaking must be met in all surface waters, compliance and treatment costs for the regulated wastewater community, including the mining industry, may increase. The expenditures necessary to meet new effluent limitations may exceed that which is required under existing regulations. The Board solicited economic impact information from the regulated community through an advance notice of proposed rulemaking and the proposed rulemaking public comment period. The Department also collaborated with the Pennsylvania State University (PSU) to evaluate and better understand the potential impacts of the rulemaking, including the costs associated with treatment of coal mine drainage.

As noted in the summary of the public comments received on the proposed rulemaking and in the RAF, one commentator, through an analysis completed by Tetra Tech, estimated that overall costs to the mining industry to achieve compliance with the 0.3 mg/L criterion could range between \$44 and \$88 million in annual costs (that is, for active treatment systems using chemical addition for manganese removal) and upwards of \$200 million in capital costs.

While the PSU report (Burgos, 2021) generally corroborates the cost estimates found in the Tetra Tech report, the PSU report also highlights several limitations of the Tetra Tech evaluation and provides a more robust analysis. The Tetra Tech evaluation generally assumed that every NPDES discharge permit for mining operations would require installation of treatment systems and that the treatment system utilized by every facility would be chemical precipitation water softening, which is generally the most expensive treatment option. Data from permitted mining discharges have been analyzed by the Department and by Cravotta and Brady (2015) and demonstrate that not all 706 mining permits will be affected by the regulation either due to low levels of manganese in the influent wastewater to be treated or due to manganese levels of the treated wastewater effluent already being at or below 0.3 mg/L. Cravotta and Brady (2015) analyzed discharge data from 42 permitted facilities, which included 48 different coal mine drainage discharges. Of those 48 discharges, 14 treated discharges had manganese levels below 0.3 mg/L and an additional 11 treated discharges had manganese levels below 1.0 mg/L.

The PSU analysis takes a more balanced and comprehensive approach to the evaluation of costs based on different percentages of permits potentially affected (for example, 50% and 75% versus 100%) as well as consideration of the most cost-effective treatment options for different sizes of mining operations based on flow and other water quality characteristics. PSU noted that chemical precipitation water softening was never the most cost-effective treatment option for any category of discharge. It is also important to recognize that chemical precipitation water softening is not currently utilized by all mining facilities, and there is no reason to assume that all facilities would utilize this treatment option if this final-form regulation is approved.

The PSU analysis indicates that total costs to the mining industry if 75% of permits are affected are in the range of \$137—\$143 million in capital costs and \$33—\$46 million in annual operating costs. The ranges decrease to \$91—\$95 million in capital costs and \$22—\$31 million in annual operating costs if only 50% of permits are affected. These costs estimates were generated by PSU using the Office of Surface Mining Reclamation and Enforcement's (OSMRE) AMDTreat software, which is the same software used by Tetra Tech and the mining industry to estimate treatment costs. The different treatment systems evaluated by PSU included limestone manganese removal beds, oxidative precipitation using chemicals followed by either a limestone removal bed or sand filter, coprecipitation and sorption, and chemical precipitation water softening. The PSU report also noted that actual costs may be substantially lower than these refined costs estimates (that is, below the low range of these costs estimates) if sites are able to utilize existing treatment infrastructure or if the relatively few deep mines with larger flows are able to remove dissolved manganese using the coprecipitation and sorption option.

Furthermore, the PSU analysis indicates that, on an equal flow rate basis, capital costs for both the drinking water industry and the coal industry would be similar and, on an equal manganese load basis, annual operating costs for both industries would be similar.

The regulatory amendments in this final-form rulemaking will be implemented through the Department's permit and approval actions as new and renewed permits are issued. Persons with existing permitted discharges or proposing to add new discharge points to a stream could be adversely affected upon permit renewal or permit issuance if they need to provide a higher level of treatment to meet the new manganese standard established by this final-form rulemaking. For example, increased costs may take the form of engineering, construction or operating costs for point source discharges. Monitoring and treatment costs are facility- and site-specific and depend upon the size of the discharge in relation to the size of the receiving stream plus many other factors. In fact, the Pennsylvania Coal Alliance noted similar challenges in estimating the economic impact of the proposed rulemaking on the mining industry stating “the wide range [\$44—\$88 million] is due to generalizations and more refined estimates would require better understanding of flow, chemistry and treatment at each NPDES permit location.” For these reasons and given that there are currently over 1,300 NPDES permits in this Commonwealth containing manganese requirements, any evaluation performed at this time by the Department to determine the exact economic impact of this final-form rulemaking on the regulated community would be speculative. Economic impacts would primarily involve higher monitoring and treatment costs for permitted discharges to streams to comply with the water quality criterion for manganese. It is important to recognize that the initial costs resulting from the installation of technologically advanced wastewater treatment processes may be offset by potential savings from and increased value of improved water quality through more cost-effective and efficient treatment over time.

#### *Compliance assistance plan*

This final-form rulemaking has been developed as part of an established program that has been implemented by the Department since the early 1980s. All surface waters in this Commonwealth are afforded a level of protection through compliance with the water quality standards, which prevent pollution and protect existing water uses.

These amendments will be implemented through the Department's permit and approval actions. For example, the NPDES permitting program bases effluent limitations on the water uses of the stream, and the water quality criteria developed to maintain those uses. These effluent limits are established to assure water quality is protected and maintained.

#### *Paperwork requirements*

This final-form rulemaking should not impose new paperwork requirements on the Commonwealth, local governments, political subdivisions or the private sector. This final-form rulemaking will be implemented in accordance with existing Department regulations.

#### *H. Pollution Prevention*

The Federal Pollution Prevention Act of 1990 (42 U.S.C.A. §§ 13101—13109) established a National policy that promotes pollution prevention as the preferred means for achieving state environmental protection goals. The Department encourages pollution prevention, which is the reduction or elimination of pollution at its source, through the substitution of environmentally-friendly materials, more efficient use of raw materials and the incorporation of energy efficiency

strategies. Pollution prevention practices can provide greater environmental protection with greater efficiency because they can result in significant cost savings to facilities that permanently achieve or move beyond compliance.

Water quality standards are a major pollution prevention tool because they protect water quality and designated and existing uses. These amendments will be implemented through the Department's permit and approval actions. For example, the NPDES program will establish effluent limitations in permits based on the more stringent of technology-based or water quality-based limits. Water quality-based limits are determined by the designated or existing uses of the receiving stream and the water quality criteria necessary to achieve and maintain the designated and existing uses.

### *I. Sunset Review*

The Board is not proposing to establish a sunset date for these regulations because they are needed for the Department to carry out its statutory obligations. The Department will continue to closely monitor these regulations for their effectiveness and recommend updates to the Board as necessary.

### *J. Regulatory Review*

Under section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on June 30, 2020, the Department submitted a copy of the notice of proposed rulemaking, published at 50 Pa.B. 3274 (July 25, 2020), and a copy of a Regulatory Analysis Form to the Independent Regulatory Review Commission (IRRC) and to the Chairpersons of the House and Senate Environmental Resources and Energy Committees.

Under section 5(c) of the Regulatory Review Act, IRRC and the House and Senate Committees were provided with copies of the comments received during the public comment period, as well as other documents requested. In preparing this final-form rulemaking, the Department has considered all comments from IRRC, the House and Senate Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P.S. § 745.5a(j.2)), on **DATE**, 2022, this final-form rulemaking was deemed approved by the House and Senate Committees. Under section 5.1(e) of the Regulatory Review Act, IRRC met on **DATE**, 2022, and approved this final-form rulemaking.

### *K. Findings of the Board*

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P.L. 769, No. 240) (45 P.S. §§ 1201 and 1202), referred to as the Commonwealth Documents Law, and regulations promulgated thereunder at 1 Pa. Code §§ 7.1 and 7.2 (relating to notice of proposed rulemaking required; and adoption of regulations).

(2) A 60-day public comment period was provided as required by law. In addition, the Board held three public hearings. All comments were considered.

(3) This final-form rulemaking does not enlarge the purpose of the proposal published at 50 Pa.B. 3724 (July 25, 2020).

(4) These regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in section C of this order.

(5) These regulations are reasonably necessary to maintain the Commonwealth's water quality standards and to satisfy related CWA requirements.

*L. Order of the Board*

The Board, acting under the authorizing statutes, orders that:

(a) The regulations of the Department, 25 Pa. Code Chapter 93, are amended to read as set forth in Annex A.

(b) The Chairperson of the Board shall submit this final-form regulation to the Office of General Counsel and the Office of Attorney General for approval and review as to legality and form, as required by law.

(c) The Chairperson shall submit this final-form regulation to the Independent Regulatory Review Commission and the Senate and House Environmental Resources and Energy Committees as required by the Regulatory Review Act.

(d) The Chairperson of the Board shall certify this final-form regulation and deposit it with the Legislative Reference Bureau, as required by law.

(e) This final-form regulation shall take effect immediately upon publication in the *Pennsylvania Bulletin*.

RAMEZ ZIADEH, P.E.,  
*Acting Chairperson*