#3260

Greetings,

My name is Charlie Carlson and I am a current student studying Biology and Biochemistry at Duquesne University. I am writing to voice my support for the proposed deletion of manganese from Table 3 in § 93.70 and subsequent addition of manganese to Table 5 in § 93.8. Along with this, I am writing in support of the second alternative point of compliance (near point of discharge. I hope that you will consider the more stringent standard of 0.3 mg/L. Beyond this, I am writing to voice my concerns about the potential effects to aquatic life and human health if the point of compliance is not maintained at point of discharge.

As an example, I point to Manganese (Mn) toxicity studies on *ceriodaphnia dubia* and *hyalella azteca* which can be viewed as model organisms for the wider variety of crustaceans in our waterways. In a prior study by Lasier et al., *H. azteca* was found to have an acute LC50 of 4.0 mg/L of Mn and *C. dubia* was found to have a chronic IC50 value of 3.9 mg/L of Mn in relation to reproductive inhibition (Lasier et al. 2000). If there is a lack of regulation on Mn levels at discharge sites, they could damage populations of zooplanktonic crustaceans like these which form the base of freshwater food webs. Even with concentrations at half or a quarter of the LC50 and IC50 values, zooplankton are known to be efficient at biomagnification of dilute pollutants and could likely affect the health of aquatic ecosystems.

After a look through Peter Samuel Reimer's thesis statement for the University of British Columbia, he compiles the lowest acute Mn concentrations for different freshwater species after an in-depth literature review (Reimer, 1999). I have included an image of the figure below. The crustacean, *daphnia magna*, is of concern with the lowest acute value of 0.8 mg/L Mn. Beyond this, many trout can be predicted to have acute ranges between 2 and 5mg/L Mn considering our local stream harness values. There is also prior research indicating that manganese has deleterious effects on gas exchange at the gills in freshwater fish and mussels (Aliakbar, 2014) (de Oliveira, 2019). I am concerned that if point of compliance is lifted from the discharge sites, levels of manganese will far exceed toxic levels in some Pennsylvania's streams.

Moreover, the concern for human health must be addressed. With documented studies on the negative impacts on cognitive development in adolescents (Sanders, 2015) (Haynes, 2015), I feel that it is the EQB's duty to do everything possible to protect residents within the region. If compliance is moved to water intakes, how does the board plan to protect the publics' exposure while utilizing the waterways for recreation, fisheries, and agricultural irrigation? I urge you to not adopt the mining industry's plea to move the point of compliance to public water supply intakes, due not only to aquatic environmental concerns, but also concerns for human health.

Dr. Elizabeth Dakin from Duquesne University has been sampling in the southern half of the Allegheny for the past 7 years as a partner in the Three Rivers QUEST program and has recorded 7 times where levels of Mn were above the EPA's lifetime health advisory of 0.3 mg/L. around 6% of her measurements over the years have exceeded 0.3 mg/L. With no limitations on Mn discharge into our streams, Mn concentration will continue to increase in our surface waters. With an enforced level of 0.3 mg/L at site of discharge, we can afford some level of safety to both human health and aquatic health in surface waters of the Commonwealth.

Lastly, I want to express my concern over putting the financial burden on the public if the point of compliance is moved. I see no reason why residents of the watershed should have to pay for the pollution caused by specific industrial point sources. Again, I urge you to reject the alternative point of compliance at the public water intakes. I understand that often times the board must weigh the impact on economic growth with concerns over environmental health, but

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this is now an issue of human health as well and I think regulatory changes should strongly consider the best available scientific research. I would like to conclude by sincerely thanking you for taking the time to consider my comments.

Regards,

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TABLE 4.10: ACUTE DATA FROM ALL STUDIES		
Water Hardness (mg/L $CaCO_3$)	Mn Concentration (mg/L)	Toxicity Test
25	2.4*	Coho – Early Life 96 Hour LC50
	3.6	Hyalella Azteca – 96 Hour LC50
	5.8	Chironomid Tentans - 96 Hour LC50
	0.8	Daphnia Magna – 48 Hour LC50
34	3.77*	Brown Trout – Early Life 96 Hour LC50
38	4.83	Rainbow Trout – Early Life 96 Hour LC50
	3.8*	Brown Trout – 96 Hour LC50
47.6	2.1*	Rainbow Trout – 96 Hour LC50
100	13.1	Coho – Early Life 96 Hour LC50
	20.7	Rainbow Trout – 96 Hour LC50
	22.2	Hyalella Azteca – 96 Hour LC50
	42.2	Chironomid Tentans – 96 Hour LC50
	28.7	Daphnia Magna –48 Hour LC50
	8.29*	Selenastrum Capricornutum – 72 Hour IC50
250	17.4	Coho – Early Life 96 Hour LC50
	12.7*	Rainbow Trout – 96 Hour LC50
	31.0	Hyalella Azteca – 96 Hour LC50
	94.3	Chironomid Tentans – 96 Hour LC50
	76.3	Daphnia Magna –48 Hour LC50
454	49.9	Brown Trout – 96 Hour LC50