Attachment 1

LEAD CONCENTRATIONS IN LAKE MICHIGAN AND POTENTIAL IMPACTS ON PUBLIC WATER SUPPLY

During the discussion of the SEWRPC white paper on lead in drinking water at the December 18, 2018 EJTF meeting, Ms. McNeely asked whether lead released from plumbing materials such as lead water supply service lines would pass through sewage treatment works and be released into receiving waters. She further asked whether this could potentially contaminate water sources, such as Lake Michigan, that water utilities rely upon.

Some available data address these questions. As part of its surface water quality monitoring network, the Milwaukee Metropolitan Sewerage District (MMSD) regularly collects and analyzes water samples from 41 locations in the Milwaukee Outer Harbor and Lake Michigan. These monitoring locations include the sites where effluent from their wastewater treatment is discharged and the site of a Milwaukee Water Works water supply intake. At several MMSD monitoring sites, lead is included in the analysis. In addition, water utilities annually publish reports on the chemical composition of the water that they pump into their distribution systems. Some utilities also report on the chemical composition of their source water.

LEAD CONCENTRATIONS AT MMSD WATERWATER TREATMENT FACILITY OUTFALLS

MMSD's sampling locations include a site in the outer harbor at the location of the outfall from which treated wastewater is discharged from MMSD's Jones Island facility. At this site, MMSD collects samples from three depths: one near the surface, another in the middle of the water column, and a third near the bottom of the harbor. Data from the period 1998 through 2004 indicate that lead is sometimes present in water near the Jones Island outfall. Concentrations of lead in 219 samples collected at this site ranged from below the limit of detection to 0.066 milligrams per liter (mg/l). The mean concentration of lead in these samples was 0.0017 mg/l. In general, the concentrations of lead tended to increase with depth. This is reflected in the fact that median concentration of lead increased from 0.00074 mg/l in samples collected at the surface to 0.0014 mg/l in samples collected at the bottom. Given that the outfall is located near the bottom of the harbor, this pattern suggests that effluent from the outfall may be contributing lead to the Lake. The concentrations of lead detected at this site could also reflect contributions from the Milwaukee River or release of lead from sediments in the Harbor.

MMSD also collects samples at the site where the outfall from its South Shore wastewater treatment facility discharges into Lake Michigan. The concentrations of lead detected in 46 samples collected during the period 1998 through 2004 ranged from below the limit of detection to 0.0028 mg/l, with a mean of 0.00038 mg/l. The maximum and mean concentrations of lead detected near this outfall is about an order of magnitude lower than those observed in the water near the outfall from the Jones Island facility. These differences in concentration may be related to the configuration and operation of MMSD's conveyance system. While MMSD has flexibility in routing sewage to either of its treatment plants, wastewater originating in the combined sewer area is generally treated at the Jones Island facility. The South Shore facility generally treats wastewater originating in the separate sewer area. This means that wastewater treated at Jones Island often consists of a mixture of sanitary sewage and stormwater. The stormwater component of this mixture may contain lead from such sources as flaking exterior paint or legacy lead from automotive fuels that was deposited in soils and sediment. As a result, while the data suggest that effluent from the wastewater treatment plants may be contributing lead to Lake Michigan, it is not clear that leaching of lead from plumbing materials, including lead water service lines, constitutes a major source of this lead.

LEAD CONCENTRATIONS IN LAKE MICHIGAN

MMSD's water quality sampling data from other locations in Lake Michigan suggest that lead discharged from these outfalls is diluted rapidly in the Lake. As previously discussed, the mean concentration of lead

at MMSD's sampling station at the Jones Island outfall in the outer harbor was 0.0017 mg/l. The mean concentration of lead in samples collected during the same period about 0.5 mile away at the main entrance to the outer harbor was 0.0011 mg/l.

Lower lead concentrations were observed farther out into the Lake. Lead was only occasionally detected in water samples at these stations. The mean lead concentration at an MMSD sampling station located about one mile east of the entrance to the harbor was 0.00063 mg/l. MMSD also monitors water quality at the site of the Milwaukee Water Works' intake for the Linnwood water treatment plant. This site is located about six miles to the northeast of the harbor entrance. The mean concentration of lead at this site was 0.00038 mg/l.

LIKELY IMPACTS ON PUBLIC WATER SUPPLY

It should be noted that the mean concentration of lead reported at the site of the Linnwood treatment plant intake is about one-fortieth of the 0.015 mg/l action level for lead set by the Federal Lead and Copper Rule. This suggests that lead concentrations in the Lake are very low and not having an effect on the drinking water provide by water utilities that use the Lake as a source of water supply. This is confirmed by the results of chemical analyses reported by the utilities. For example, the Milwaukee Water Works reported in its 2017 Consumer Confidence Report that the maximum concentrations of lead detected in samples of both the raw water captured prior to treatment and the finished water pumped into their distribution system were below the limit of detection. Similarly, the Kenosha Water Utility reported that lead concentrations in samples of finished water produced by its treatment plant were below the limit of detection.

SUMMARY

Water samples collected in the Milwaukee outer harbor and Lake Michigan near the outfalls from MMSD's wastewater treatment plants suggest that there may be some release of lead from plumbing materials such as lead water service lines into Lake Michigan; however, the data do not rule out the possibility that other potential sources are responsible for these contributions of lead. The concentrations of lead in water in Lake Michigan are considerably lower than the action level set by the Federal Lead and Copper Rule. The Milwaukee Water Works reports that the concentration of lead in the raw water that they withdraw from Lake Michigan is below the limit of detection. Similarly, both the Milwaukee Water Works and the Kenosha Water Utility report that the concentration of lead in the treated water that they pump into their distribution systems is below the limit of detections.

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