SUMMARY NOTES OF THE APRIL 26, 2023, MEETING OF THE TECHNICAL ADVISORY COMMITTEE FOR *A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

INTRODUCTION

The April 26, 2023, meeting of the Technical Advisory Committee (TAC) for *A Chloride Impact Study for the Southeastern Wisconsin Region* (Study) was convened online at 10:03 a.m. The meeting was called to order by Committee Chair Thomas M. Grisa, Director of the City of Brookfield Department of Public Works. Mr. Grisa welcomed the attendees to the meeting. Attendance was taken using the online software.

Members Present

Thomas M. Grisa, Chairman.....Director, Department of Public Works, City of Brookfield
Laura K. Herrick, Secretary..... Chief Environmental Engineer, SEWRPC
Benjamin Benninghoff.....Natural Resource Basin Supervisor, WDNR
Mandy Bonneville.....Deputy Director/County Conservationist, Walworth County
Brian Cater.....Interim Director of Public Works/City Engineer, City of Kenosha
Cody Churchill.....Winter Maintenance Engineer, Wisconsin Department of Transportation
David J. Hart.....Hydrogeologist, WGNHS
Craig Helker.....Water Resources Biologist – Southern District, WDNR
Richard Hough..... Director of Public Works, Walworth County
Matthew T. Magruder.....Environmental Research Manager, MMSD
Cheryl Nenn..... Riverkeeper, Milwaukee Riverkeeper
Neal O'Reilly.....Director, Department of Conservation and Environmental Science, UWM
Charles Paradis..... Assistant Professor, Department of Geosciences, UWM
Scott M. Schmidt.....Chief Public Works Officer/County Surveyor, Washington Co. Hwy. Dept.
Kurt Sprangers..... Engineer in Charge, Environmental Engineering Section, DPW, City of Milwaukee
David Strifling..... Director, Water Law and Policy Initiative, Marquette University Law School

Guests and Staff Present

Sabrina Belmares..... Clerk II, Racine County Highway Department
Joseph Boxhorn.....Principal Planner, SEWRPC
Karin Hollister..... Principal Engineer, SEWRPC
Zijia Li.....Engineer, SEWRPC
Aaron Owens.....Senior Planner, SEWRPC
Thomas Slawski.....Chief Biologist, SEWRPC

REVIEW OF AGENDA

Mr. Grisa asked Ms. Herrick, Chief Environmental Engineer of the Southeastern Wisconsin Regional Planning Commission (SEWRPC), to begin the agenda discussion items. Ms. Herrick introduced the presenters and briefly reviewed summary notes from the November 9, 2022, TAC meeting. There were no comments from TAC members. Ms. Herrick introduced the agenda of the meeting to review Chapters 1, 2, and 4 of SEWRPC Technical Report No. 62 *Impacts of Chloride on the Natural and Built Environment*.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 62 CHAPTER 1

Mr. Boxhorn acknowledged himself and Mr. Li as the main authors of chapters 1, 2, and 4 of this report, and thanked graphic artists, Ms. Megan Deau and Ms. Alexa Carzoli for their work on the figures. Mr. Boxhorn reviewed the preliminary draft of Chapter 1, as an introduction to the report, with a discussion of

general notes for the report. Mr. Boxhorn pointed out that this report is primarily a literature review. TAC members offered no comments or questions on this chapter.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 62 CHAPTER 2

Mr. Boxhorn continued to review the preliminary draft of Chapter 2 on the physical and chemical impacts of chloride on the natural environment.

Mr. Boxhorn described the chloride pathways figure and the hydrologic cycle which is the primary driver of these pathways for chlorides to enter the environment. Mr. O'Reilly commented that in addition to chlorides splashing onto lawns and roadway shoulders, cars can also mobilize residual road salt into the air, allowing chlorides to travel long distances and deposit across the landscape. The chloride containing particles can also affect plants, buildings, roadways, and people with asthma. Mr. O'Reilly provided a website link from Nordic Roads on residual salt (https://nordicroads.com/residual-salt/). Mr. Boxhorn responded that the report discusses that highway walls can increase the height at which aerosolized chlorides can be lofted into the atmosphere, but more text can be added to the report on this subject.

[Secretary's Note: The text prior to the bullet points in the first full paragraph on page 6 was revised to read (added text is shown in bold. This text will not be in blood in the final report):

"The third example of factors impacting chloride movement is how salt and chloride applied to roads can be mobilized to the atmosphere in sprays **and aerosols** generated by moving vehicles. This mobilization of salt into the air from roads has been measured as a plume up to 49 feet high. Following this the salt can be transported **a considerable distance** through the air and deposited nearby on vehicles, soils, vegetation, **buildings, infrastructure,** or the surface of waterbodies. Several factors affect the distance from the road that spray containing salt will migrate, including:"]

Mr. Hart commented that the groundwater representation on the hydrologic cycle figure looks like an underground river and does not show proper interactions with rivers or lakes, which may be confusing to the public. Mr. Hart will provide some example figures used by the Wisconsin Geological and Natural History Survey.

[Secretary's Note: Mr. Hart provided several examples of figures that do not promote misconceptions regarding groundwater. Commission staff modified the hydrologic cycle figure.]

Mr. Magruder provided a general comment regarding wastewater treatment pathways in relation to Chapter 2 later in the presentation. He remarked that it may be worth noting that metal salts are used at various points throughout the liquid and solids handling process in wastewater treatment. Mr. Boxhorn responded that there is no discussion related to salts in wastewater treatment in Chapter 2, however the Commission Staff may include a discussion on this subject in the mass balance report, Technical Report No. 65. Mr. Magruder added that the Milwaukee Metropolitan Sewerage District uses both ferric and ferrous chlorides in wastewater treatment dependent primarily on cost. These salts are used for many purposes including flocculation, odor control, phosphorus and hydrogen sulfide removal, and sludge conditioning prior to manufacturing Milorganite. Mr. Magruder offered to meet with Commission Staff to discuss further.

[Secretary's Note: A meeting was scheduled between Commission staff and MMSD staff to discuss the use of metal salts in wastewater treatment processes.]

Mr. Boxhorn next reviewed the impacts of chloride on soil. These impacts include the breakdown of the soil structure and the release of heavy metals. He noted that some estimates from literature were presented in this chapter, but these estimates might not be used for mass balance computations since better data may be available specific to the study region. TAC members offered no comments or questions on this section.

Mr. Boxhorn reviewed the impacts of chloride on groundwater such as the acidification of groundwater and the release of heavy metals. He noted that since groundwater moves relatively slowly, chlorides in the groundwater can accumulate and persist for a long time. TAC members offered no comments or questions on this section.

Mr. Boxhorn reviewed the impacts of chloride to streams and lakes such as the negative effects of saline layers, release of heavy metals and nutrients, and prolonged stratification of lakes. Mr. O'Reilly asked if the Commission plans to show any trend graphs for chloride concentrations in the local lakes using data such as that from the U.S. Geological Survey (USGS). Mr. Boxhorn responded that the lake trends data and other chloride trends information will be covered in Technical Report No. 63.

Mr. Boxhorn concluded with discussing impacts of chloride on wetlands including the negative effects of heavy metal release, reduced solubility of gases in the water, and effects on the nitrogen and carbon cycles. TAC members offered no comments or questions on this section.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 62 CHAPTER 4

Mr. Li reviewed the preliminary draft of Chapter 4 on the mechanisms and impacts of chloride on infrastructure and the built environment. Mr. Li discussed the layout of the chapter and noted the specific focus of this chapter on the impacts of road salt as the source of chloride. Mr. Li reviewed the mechanisms of chloride-induced metal corrosion and corrosion inhibitors.

Mr. Li asked staff from the Wisconsin Department of Transportation (WisDOT) and the communities about their use of corrosion inhibitors in road salt applications. Mr. Churchill responded that the use of agricultural byproducts, mainly in the form of beet juice, in road salt applications by WisDOT has decreased since 2014 due to the optimization of its usage from field experience. Today, the most common agricultural byproduct is added to salt brine applied for pre-treatment and anti-icing of roadways. The agricultural byproduct can constitute up to five percent of the salt brine. The agricultural byproducts have the added benefit of causing the salt brine to stick to the pavement longer. Mr. Churchill also commented that WisDOT typically uses calcium chloride ($CaCl_2$) during cold weather when temperatures are between 0 and 15°F because sodium chloride (NaCl) is less effective below 15°F. Mr. Grisa commented that the City of Brookfield does not use beet juice due to its release of phosphorus into the environment.

[Secretary's Note: Mr. Schmidt and Mr. Grisa commented in emails after the meeting that their communities do not apply corrosion inhibitors in their road salt applications.]

Ms. Nenn asked whether the corrosion inhibitors are accounted for in the total phosphorus TMDL for the Milwaukee River basin. No one in attendance was able to answer this question.

[Secretary's Note: Commission staff investigated this question. The water quality models used to develop the TMDL were based upon models used to develop the Commission's 2007 update of the regional water quality management plan for the Greater Milwaukee watersheds. The procedure used to calibrate these models adjusted

model parameters to better represent instream water quality conditions during the calibration. While phosphorus in corrosion inhibitors was not explicitly modeled, it is implicitly accounted for due to adjustments made to the models as part of the calibration.]

Mr. O'Reilly asked whether the Report would discuss the use of ferrocyanides as anti-clumping agents. Mr. Boxhorn responded that this topic will be addressed in Chapter 3 of Technical Report No. 62 on the biological impacts of chloride.

Mr. Li reviewed the various mechanisms of chloride-induced deterioration of concrete, concrete durability improvements, and the damaging effects of chloride on steel reinforcement in concrete. TAC members offered no comments or questions on this section.

Mr. Li noted that care should be taken when using cost estimates presented in this chapter due to the most recent study being over 20 years old. Mr. Li discussed the damages to motor vehicles caused by chlorides and presented estimates of costs on both a nationwide and regional basis. Mr. Li noted the significant improvements to anticorrosion in the automotive industry.

Mr. O'Reilly mentioned that foot traffic carrying road salt into buildings may negatively impact interior surfaces and increase cleaning costs. Mr. Li responded that Commission staff will investigate this impact further for potential inclusion in the chapter.

Mr. Li reviewed the impacts of chloride on highway bridges, including estimates of costs on both a nationwide and a regional basis using statistics from the 2022 National Bridge Inventory. Mr. Li noted the anticorrosion measures used in construction and maintenance of bridges have improved over time but warned that regional bridge infrastructure is aging. Mr. Li asked whether the communities employ any anticorrosion measures in local bridge construction or maintenance. TAC members offered no comments or questions on this section.

[Secretary's Note: Mr. Schmidt commented in an email after the meeting that Washington County uses epoxy coated rebars in bridge construction and applies a surface sealer to the bridge every three years. Mr. Grisa also commented in an email after the meeting that the City of Brookfield uses epoxy coated rebars in bridge construction, paints steel railings, and other industry standard practices.]

Mr. Li reviewed the impacts of chloride on other highway components, buildings, water distribution systems, power distribution systems, and railway traffic control signaling. Mr. Li asked whether the communities have discovered corrosion in drinking water, wastewater, or stormwater pipes that may be related to salt. TAC members offered no comments or questions on this section.

[Secretary's Note: Mr. Schmidt commented in an email after the meeting that Washington County has not done any assessment of corrosion on County infrastructure but assumes corrosion would be present in stormwater sewers. Mr. Grisa also commented in an email after the meeting that the City of Brookfield has observed corrosion on corrugated metal pipes used for stormwater sewers and on bolts used for joints, fittings, and connections on water main and water services. Mr. Sprangers stated in a post meeting email that the City of Milwaukee is currently replacing a corroded metal culvert under N. 60th St along Lincoln Creek.]

Mr. Li concluded the discussion of Chapter 4 by reviewing the cost-benefit of road salting. Mr. Li noted that the economic benefits presented do not factor in commerce, human life, and safety, but if included, the benefits of road salting will likely outweigh the costs. Mr. Grisa commented that the Salt Institute would have more information on this topic but noted that they are in the salt selling business, therefore bias should be noted. Mr. Li responded that Commission staff will investigate information available from the Salt Institute for potential inclusion in the chapter.

Ms. Nenn expressed interest in a separate conversation with a subgroup to discuss the implications of this research on monitoring. Mr. Boxhorn offered to discuss this topic with Ms. Nenn separately.

[Secretary's Note: Commission staff is working to schedule a meeting with Ms. Nenn to discuss this topic.]

NEXT STEPS FOR THE PLAN

Ms. Herrick reviewed the next steps for the Study. Work will continue with research and report writing, regression and loading analyses, and information gathering for state-of-the-art practices.

Ms. Herrick announced that comments for Technical Report No. 62 Chapters 1, 2, and 4 are due by May 19, 2023. The next TAC meeting is anticipated to be in summer 2023 and will include a review of the entire Technical Report No. 61 (field monitoring). She indicated that meeting agendas, presentations, and summary notes along with draft chapters will all be posted on the SEWRPC project website at www.sewrpc.org/chloridestudy.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 11:42 a.m.

Respectfully submitted,

Laura Herrick
Recording Secretary

ATTACHMENT

Attachment A – Meeting presentation (268145)

#268021 – PR-57 SUMMARY NOTES CHLORIDE TAC APR 26, 2023
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LKH/JEB/ZL
4/28/23, 5/1/23, 5/8/23