

**SUMMARY NOTES OF THE SEPTEMBER 8, 2015
MEETING OF THE TECHNICAL ADVISORY COMMITTEE FOR
A ROAD SALT IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION**

INTRODUCTION

The September 8, 2015, meeting of the Technical Advisory Committee for *A Road Salt Study for the Southeastern Wisconsin Region* was convened at the offices of the Southeastern Wisconsin Regional Planning Commission at 1:38 p.m. The meeting was called to order by Committee Chair Thomas M. Grisa, Director of the City of Brookfield Department of Public Works. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

Technical Advisory Committee Members

Thomas M. Grisa, Chair	Director, Department of Public Works, City of Brookfield
Steve Corsi (attended by telephone)	Research Hydrologist, Chemistry, U.S. Geological Survey
Dave Heil (for Peter Chladil)	Superintendent, Waukesha County Highway Department
Matthew T. Magruder	Environmental Research Manager, Milwaukee Metropolitan Sewerage District
Maureen McBroom	Stormwater Specialist—Division of Water, Wisconsin Department of Natural Resources
Sean Moore	Milwaukee County Highway Maintenance Division, Milwaukee County Department of Transportation
Cheryl Nenn	Riverkeeper, Milwaukee Riverkeeper
Michael Parsen (for Kenneth Bradbury)	Hydrogeologist, Wisconsin Geological and Natural History Survey
David Simpson	Director of Public Works/City Engineer, City of Muskego
John Walker	Director, Wisconsin Water Science Center, U.S. Geological Survey
Thomas A. Wiza	Director, Engineering and Public Works, City of Cedarburg

Staff and Guests

Joseph E. Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Michael G. Hahn	Deputy Director, Southeastern Wisconsin Regional Planning Commission
John Jansen	Geologist, Leggett, Brashears & Graham, Inc.
Laura L. Kletti	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Kenneth R. Yunker	Executive Director, Southeastern Wisconsin Regional Planning Commission

Mr. Grisa welcomed the attendees to the meeting and thanked them for their participation.

OVERVIEW OF ANTICIPATED PROSPECTUS REVIEW AND STUDY DEVELOPMENT PROCESS

Mr. Yunker thanked the members of the Committee for assisting the Commission in its consideration of a prospectus for a potential road salt study. He explained that the role of the Technical Advisory Committee is to determine whether there is a need for the proposed study, assess whether the proposed work program for the study is appropriate, and to refine the proposed work program. He emphasized that the Commission wants input from the Committee on the proposed study.

Mr. Grisa asked Mr. Hahn to review the chapters of the draft prospectus. Mr. Hahn thanked the Committee for their participation, noting that their help is invaluable to Commission staff. He stated that the draft prospectus is a work in progress and that he is seeking comments from Committee on the document. He added that the Commission staff will prepare summary notes of this and subsequent Committee meetings. He explained that these notes will summarize the discussion and describe modifications that will be made to the draft prospectus in response to the discussion.

REVIEW OF PRELIMINARY DRAFT CHAPTER I, “INTRODUCTION,” OF *PROSPECTUS FOR A ROAD SALT IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

Mr. Hahn reviewed preliminary draft Chapter I of the prospectus. He stated that the prospectus has its origin in concerns expressed by two Commissioners regarding the environmental impacts of the use of salt in winter road maintenance. He indicated that the proposed study will not develop a plan, noting that it is intended as a study that will inventory the use of road salt in winter maintenance, assess the impacts of this use on the environment, identify alternative means of achieving desired levels of winter road maintenance, and formulate recommendations for the abatement of the undesirable environmental impacts of road salt. He noted that in developing recommendations, the study will seek to balance the environmental effects of road salt use with the public safety concerns associated with winter road maintenance.

Mr. Grisa commented that Chapter I does not show how safety is balanced against the environmental impacts. Mr. Hahn replied that this is addressed in subsequent chapters of the prospectus.

Mr. Simpson moved and Mr. Magruder seconded that the Technical Advisory Committee approve preliminary draft Chapter I of the prospectus. No other questions or comments were offered on Chapter I and the chapter was unanimously approved by the Committee.

REVIEW OF PRELIMINARY DRAFT CHAPTER II, “PURPOSE OF THE PROSPECTUS,” OF *PROSPECTUS FOR A ROAD SALT IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

Mr. Hahn reviewed preliminary draft Chapter II of the prospectus. Mr. Hahn stated that this one-page chapter sets forth the purpose of the prospectus. No question or comments were offered on the chapter.

Ms. Nenn moved and Mr. Wiza seconded that the Committee approve preliminary Chapter II of the prospectus. The chapter was unanimously approved by the Technical Advisory Committee.

REVIEW OF PRELIMINARY DRAFT CHAPTER III, “NEED FOR STUDY,” OF *PROSPECTUS FOR A ROAD SALT IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

Mr. Hahn then reviewed preliminary draft Chapter III of the prospectus. Mr. Hahn stated that the current policy of providing snow-and-ice free pavement through enhanced winter road maintenance practices originated in the

1950s. He noted that the use of road salt increased as a result of this policy. Mr. Hahn summarized the impacts of road salt, including impacts to property and infrastructure, such as damage to motor vehicles, roadway pavements, and bridges, and impacts to the environment, such as damage to roadside vegetation, changes to soil structure and fertility, and contamination of surface and ground water.

Mr. Hahn stated that there is a fairly substantial body of existing data on chloride concentrations in surface waters. He pointed out that Figures 2 and 3 in the prospectus, which were developed under previous Commission planning efforts, present examples of these data and show trends in chloride concentrations from two rivers in the Region.

Mr. Grisa noted that Figure 2 shows that a greater number of extreme concentration values were observed in samples collected from the Milwaukee River during the period 1975 through 1986 than in subsequent periods. He asked what might account for this difference. Mr. Hahn suggested that it might reflect more efficient application of salt by counties and municipalities. Mr. Boxhorn noted that existing data were collected over a 50-year period and that the lack of extremes in more recent data may reflect better precision in analytic techniques.

Mr. Corsi commented that some of the historical data may have been collected for specific projects with different focuses from one another. He noted that differences among projects such as year round sampling versus warmer season sampling could account for some of the differences in the numbers of extremes observed in Figures 2 and 3. Mr. Boxhorn replied that the data shown in Figures 2 and 3 do not include sampling conducted during the months of December, January, and February. He explained that much of the data shown in these figures were collected by the Milwaukee Metropolitan Sewerage District (MMSD) and that after 1986 they did not regularly conduct sampling during winter months.

Ms. Nenn stated that Milwaukee Riverkeeper, as part of the University of Wisconsin-Extension (UWEX) Water Action Volunteers (WAV) program, has been sampling for chloride in Milwaukee area watersheds since 2010. She noted that as part of this effort, sampling is conducted during winter months. She indicated that the data show higher concentrations of chloride during times when runoff is entering streams. She added that the data show greater impairments in smaller tributary streams than in the mainstem of the Milwaukee River. She indicated that the data from this sampling program are available in the Wisconsin Department of Natural Resources (WDNR) SWIMS database.

Mr. Walker suggested that differences in sample sizes could also account for the differences in the numbers of extreme concentrations shown in Figures 2 and 3. He asked whether the samples sizes for the different periods shown in the graphs were the same. Mr. Boxhorn replied that the samples sizes were not the same, noting that fewer samples were collected during the periods 1987-1993 and 1994-1997 than in the periods 1975-1986 and 1998-2004.

[Secretary's Note: Following the meeting, SEWRPC staff reviewed the data shown in Figure 2. For the sites shown in the figure, samples sizes for the period 1975-1986 ranged between 215 and 248 samples, sample sizes for the period 1987-1993 ranged between 113 and 129 samples, samples sizes for the period 1994-1997 ranged between 44 and 80 samples, and sample sizes for the period 1998-2004 ranged between 70 and 80 samples. These differences are large enough that differences in sample size may account for some of the differences between periods in the numbers of extreme values shown.]

Mr. Heil noted that Figure 2 included data through 2004. He asked whether more recent data were available and suggested that more recent data could show differences from the trend shown in the figure due to recent changes in deicing practices. Mr. Hahn replied that the proposed study would extend the data set. He noted that there was no original data collection for the prospectus.

Mr. Hahn indicated that Figure 3 shows a similar increasing trend in chloride concentrations in the Root River. He explained that the higher concentrations shown at upstream locations of the River are related to flow conditions at these sites.

Mr. Hahn summarized the results of a recent study by the U.S. Geological Survey (USGS) that examined trends in chloride concentrations at 30 sites on 19 streams, including several that are located in or originate in the Southeastern Wisconsin Region. He explained that the study found that chloride concentrations had increased over time in most of the streams that were located in the northern United States that were examined, including the Des Plaines, Fox, Kinnickinnic, Menomonee, Milwaukee, Rock, and Root Rivers.

Mr. Hahn stated that Figure 4 shows trends in chloride concentrations from nine lakes in the Region. He noted that these data also show increasing concentrations.

Mr. Hahn said that Figure 5 shows indirect evidence that chloride may be accumulating in groundwater. He explained that the high concentrations of chloride observed in the Root River during the 2012 drought likely reflect high concentrations in baseflow to the River. Mr. Magruder suggested the text be revised to clarify that the data shown in Figure 5 are from surface water samples. Mr. Hahn replied that the text would be revised.

[Secretary's Note: The third paragraph on page 17 of the draft prospectus was revised to read as follows (text in bold is included here, and in similar subsequent Secretary's Notes, to indicate language changed or added onto the text. Text will not be bold in the report):

“Monitoring data also suggest that chloride may be accumulating in groundwater. Figure 5 shows chloride concentrations in **surface water** samples collected from the Root River at the monitoring station located at the intersection of W. National Avenue and W. Oklahoma Avenue over the period 2005 through mid-2012. As described below, the high concentrations of chloride observed **in surface water** during 2012 may be the result of the drought conditions that affected southeastern Wisconsin during the late spring and summer of that year.”]

Mr. Boxhorn stated that high chloride concentrations in surface waters during the 2012 drought were observed at other MMSD monitoring stations. Mr. Magruder concurred with this, noting that similar trends were seen at other stations along the Root River and at stations along the Menomonee River. Mr. Walker asked what the sampling frequency is at these stations. Mr. Magruder replied that monthly sampling is conducted at the Root River stations. Mr. Moore suggested examining these data for correlations between chloride concentration and winter deicing events. Mr. Hahn replied that this would be done in the proposed study.

Mr. Hahn stated that the needs to be met by the study are summarized on pages 19 and 20 of the draft prospectus. Relative to the need for baseline and historical data related to applications of salt on private parking lots, drives, walks, and other privately-maintained impervious surfaces, Mr. Grisa stated that it would be desirable to have the private sector represented on this Committee. Mr. Yunker replied that during the formation of this Committee, the Commission staff contacted the Building Owners & Managers Association of Wisconsin and asked them to designate a representative to this Committee. He continued that they responded that they were unable to participate. He added that it is possible that they would participate during the study phase.

Mr. Corsi noted that one of the states in the northeastern United States studied private applications of road salt, and he suggested that reviewing the methods they used might be helpful in designing the proposed study. He indicated that he would provide contact information for the relevant agency to SEWRPC staff.

[Secretary's Note: Following the Technical Advisory Committee meeting, Mr. Corsi sent contact information for the staff member at the New Hampshire Department of

Environmental Services who led the study of private applicators to the Commission staff via electronic mail.]

Ms. Nenn stated that Milwaukee Riverkeeper has received a grant from the Fund for Lake Michigan to address road salt use by the private sector. She suggested that private applications could represent as much as 50 percent of the chloride load. She indicated that part of the work under that project involves identifying private applicators in the Milwaukee River basin. She added that other work to be done under this grant includes organizing a workshop for contractors, giving about 50 presentations on deicing best practices to groups such as business improvement districts, and conducting additional water quality monitoring for chloride concentrations and specific conductance. Mr. Hahn noted that the information gathered from this work may be of great value for the chloride study.

Mr. Yunker suggested that different facilities may have different levels of need for bare pavement during winter. He noted that different levels of clearing may be applicable to state trunk highways, county trunk highways, and municipal arterials, collectors, and land access streets.

Mr. Parsen suggested that the proposed study should also address snow storage areas, noting these areas could be a source of impacts.

[Secretary's Note: The last paragraph on page 30 was revised to read as follows:

“Information will be collected on the various types of anti-icing and de-icing agents applied over the past 20 years. **As part of this effort, information will also be collected on the use of related snow and ice control practices that have the potential to affect surface and/or groundwater quality. Examples of these types of practices include the use and location of snow storage areas.**”]

Mr. Moore stated that the Wisconsin Department of Transportation (WisDOT) sets standards for interstate and state trunk highways and that these standards include a bare pavement policy. Mr. Grisa asked whether WisDOT is represented on the Technical Advisory Committee. Mr. Hahn replied that they were invited to participate. He indicated that the Commission staff will follow up with them.

[Secretary's Note: WisDOT has appointed a representative to the Committee.]

Mr. Hahn stated that the proposed study will include an examination of the state of the art of winter road maintenance. He noted that this will be published either as an appendix to the study report or as a separate document.

Ms. McBroom asked whether the alternative means for reducing the use of road salt to be evaluated in the proposed study includes outreach to road salt applicators. Mr. Yunker replied that the study will include the formulation of recommendations related to outreach. Mr. Hahn indicated that this would be clarified in the report.

[Secretary's Note: List item 7 on page 20 of the draft prospectus was revised to read:

“The evaluation of alternative means for reducing the use of road salt in winter road maintenance and for abating the adverse effects of such use on the specific groundwater and surface water resources of the Region identified as exhibiting, or apt to exhibit in the foreseeable future, significant adverse effects from the use of road salts in winter road maintenance practices. **This evaluation should include the development of recommendations for reducing the use of road salt in winter road maintenance and for abating the adverse effects associated with such use.**”]

Mr. Yunker explained that voting to approve draft Chapter III of the prospectus with revisions indicates agreement that a study is needed. He continued that it does not indicate agreement with the proposed work program, funding, or funding source. He noted that agreement with these will be determined by approval of subsequent draft chapters. Mr. Walker asked how comments that the Technical Advisory Committee makes regarding the draft prospectus will be documented. Mr. Hahn replied that the Commission staff will draft detailed summary notes of each meeting which will document the comments made by the Committee and the revisions made to the draft prospectus in response to the comments. He noted that the summary notes for the meeting will be presented to the Committee for review at the Committee's next meeting. Mr. Yunker added that making the revisions to the draft prospectus will be subject to approval of the summary notes by the Committee.

Mr. Heil commented that we know that using road salt affects surface water and groundwater. He added that the costs associated with winter road maintenance provide strong incentives for counties and municipalities to reduce the amount of salt applied to roads. He asked what the proposed study would add. Mr. Hahn replied that the proposed study would provide a survey of conditions in the Region, identify those areas experiencing the greatest impacts related to road salt application, detail the impacts of salt on less developed areas of the Region, provide data on impacts to groundwater, and give an indication of what future conditions might be. Mr. Yunker added that the proposed study will determine how much of a problem currently exists as a result of salt applications, how much of a problem there is likely to be in the future, and how quickly the problem is likely to grow.

Mr. Heil noted that winter maintenance standards differ among road types based on daily traffic volumes, with roads with high traffic conditions receiving a higher level of service than rural roads. He noted that, based on this, different counties are providing different levels of service with a result that progress is being made in lowering the amount of salt applied. Mr. Hahn replied that the proposed study would seek to obtain this information regarding county and municipal anti-icing and deicing practices and levels of service and would look for assistance in doing this from members of this Committee. He noted that Commission staff has followed efforts by counties and municipalities to refine their winter road maintenance practices. He emphasized that the study will also need to obtain information on private applications. Mr. Grisa noted that items 6 and 7 on page 20 of the draft prospectus lay out options through which the differences in standards and levels of service could be addressed. He noted that there may be differences among areas in the Region as to how workable certain practices are.

Mr. Yunker stated that questions arise regarding potential impacts of road salt application related to proposed development and highway projects and the resultant effects on lakes and other surface waters. He noted that the answers to these questions are currently not available.

Mr. Corsi stated that the proposed study would improve our knowledge about the use of road salt and the associated effects in the Region. He explained that the study would fill data gaps and synthesize the data. He asked whether the study's results would provide more motivation for communities and private entities to address the problem. He said that if the study would not motivate communities and private entities to address the problem, the money for a study might be better spent on training for applicators.

Ms. McBroom noted that little is known about private road salt application practices, including who is doing the applying, how much is being applied, or where it is being applied. She suggested that it would also be helpful if the study included an analysis of the legal aspects of private winter deicing practices. Ms. Nenn concurred as to the importance of developing information on private application of road salt. She indicated that many of the private applicators are landscapers and that their winter earnings may be dependent on how often they apply salt. She noted that when the temperature gets too low, salt is ineffective for deicing. She emphasized the importance of educating applicators and the public about the relationship between temperature and salt effectiveness.

Mr. Hahn stated that the proposed study will try to get specific information regarding private application. He noted that some states in the northeastern United States have attempted to deal with the legal issues. Mr. Magruder said that the State of New Hampshire has done so. He suggested that the study develop specific advice

on application rates as a deliverable. Mr. Hahn replied that on some of these issues, the study may defer to the expertise of public works departments.

As an additional means of developing data on private salt application, Mr. Moore suggested contacting salt vendors. Mr. Grisa added a suggestion to reach out to retailers such as major hardware store chains. Mr. Hahn replied that the proposed study will delve into the issue of private applications of road salt as much as possible, and that an effort would be made to contact and obtain information from salt vendors.

[Secretary's Note: These suggestions are addressed in the revision to the first paragraph on page 33 as set forth below under the section describing the review of Chapter IV of the prospectus.]

Mr. Magruder moved and Mr. Walker seconded that the Committee approve preliminary Chapter III of the prospectus. The chapter was approved unanimously by the Technical Advisory Committee.

REVIEW OF PRELIMINARY DRAFT CHAPTER IV, "WORK PROGRAM," OF PROSPECTUS FOR A ROAD SALT IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION

Mr. Hahn reviewed preliminary draft Chapter IV of the prospectus. He indicated that the study is proposed to use a five-step process.

Mr. Walker asked how the Commission staff will get the needed cooperation from public and private sector applicators for the study. Mr. Hahn replied that the study will obtain data through a telephone-based survey with written follow up. He added that staff will meet with municipal representatives, if it will be helpful. Mr. Grisa pointed out that Commission staff lacks the authority to demand this information. Mr. Hahn acknowledged this, but noted that the Commission has good relationships with the municipalities of the Region.

Ms. McBroom noted that the WDNR had a summer intern who compiled information on winter road maintenance practices from communities permitted under the Wisconsin Pollutant Discharge Elimination System for discharges from municipal separate storm sewer systems (MS4). She suggested that these data may be helpful for the study and indicated that she would provide the data.

[Secretary's Note: Ms. McBroom provided the data and a summary report to Commission staff via electronic mail on September 28, 2015.]

Mr. Hahn stated that the first step of the process would be to develop a detailed study design. He explained that this design would be documented in a series of staff memoranda that would set forth the methods and procedures to be followed in accomplishing each of the work steps of the study. He indicated that the second step would be the formulation of a set of objectives and standards that can serve as a basis of comparison with existing and forecast water quality conditions in order to assess the potential existence and severity of pollution problems.

Mr. Hahn said that the third step of the process would be to compile inventory data needed for the study.

Mr. Yunker suggested that seeking data from salt vendors be added to the information to be sought on private facility salt use on page 33.

[Secretary's Note: The first paragraph on page 33 was revised to read:

"Quantities Used

Because of the large number and widely distributed characteristics of the facilities concerned, it will not be practical to obtain use data directly for the owner or operator

of each facility. Instead, personal interview surveys of the major snow and ice control firms which provide winter maintenance services to private facilities within the Region will have to be conducted to obtain needed data on quantities and application rates and practices. **The data obtained from these interviews will be supplemented with information from personal interview surveys of the distributors and vendors that supply salt to snow and ice control firms and to the public.** It should be possible to collect these data by telephone call and personal interview follow-up.”]

Mr. Hahn stated that the analysis of surface water quality data will focus on collation and collection of instream and in-lake data on specific conductance and chloride concentration. He indicated that Milwaukee Riverkeeper’s volunteer monitoring program would be added to the possible sources of these data listed in the draft prospectus

[Secretary’s Note: Footnote 3 on page 34 was revised to read:

*“Possible sources of existing specific conductance and/or chloride concentration data include the U.S. Geological Survey National Water Information System, the U.S. Environmental Protection Agency Storage and Retrieval (STORET) database, the WDNR Surface Water Information System (SWIMS) database, the University of Wisconsin-Extension (UWEX) Water Action Volunteers Program (WAV), the Wisconsin Citizen Lake Monitoring Network (CLMN), **Milwaukee Riverkeeper’s volunteer stream monitoring program**, and the Milwaukee Metropolitan Sewerage District water quality sampling program.*

The first paragraph on page 35 was revised to read:

Historical Surface Water Quality Data

Possible sources of existing specific conductance and/or chloride concentration data include the U.S. Geological Survey (USGS) National Water Information System, the U.S. Environmental Protection Agency (USEPA) Storage and Retrieval (STORET) database, the WDNR Surface Water Information System (SWIMS) database,⁷ **Milwaukee Riverkeeper’s volunteer stream monitoring program**, and the Milwaukee Metropolitan Sewerage District water quality sampling program. The Wisconsin Citizen Lake Monitoring Network (CLMN) may be another source of specific conductance and/or chloride data, and the availability of such data would be determined under the proposed study.”

The text of footnote number 7 on page 35 was not changed.]

Mr. Hahn stated that the study proposes to collect specific conductance data from streams and lakes using data loggers to fill gaps in the existing data. He noted that regression equations developed by the USGS can be used to infer chloride concentration from specific conductance. Ms. McBroom asked whether monitoring of seepage lakes will be included in this data collection. Mr. Hahn responded that an attempt will be made to have monitoring sites in each type of lake.

Mr. Corsi commented that care should be taken in the selection of monitoring sites. He explained that lakes and deeper, slower moving streams can stratify chemically and this can result in salt concentrations varying with depth. Mr. Hahn replied that in order to address this it may be necessary to increase the number of data loggers that would be deployed as part of the study. He added that as part of this, loggers may be deployed so as to obtain vertical profiles of specific conductance at these types of sites.

[Secretary’s Note: The following sentences were added after the first partial sentence on page 39:

“To account for the effects of thermal and/or chemical stratification in lakes and deeper streams, it may be necessary to deploy multiple loggers in some of these waterbodies.”]

Mr. Parsen noted that the stream gages located on the Scuppernong River and Paradise Springs Creek in southwestern Waukesha County are located a couple hundred feet downstream of springs. He explained that this presents a unique opportunity to simultaneously monitor surface water and groundwater and compare the chloride concentrations in each.

Mr. Heil stated that samples are collected quarterly from groundwater monitoring wells that are located adjacent to landfills, and that it may be possible to obtain data from these wells from the WDNR’s solid waste section.

[Secretary’s Note: Data from these monitoring wells are available from the WDNR Groundwater and Environmental Monitoring System (GEMS) database. The first paragraph on page 40 was revised as follows:

“It is proposed to obtain available WDNR records on chloride concentrations in well water throughout the Region, **including available records on chloride concentrations in water in wells used to monitor landfills and hazardous waste facilities. The WDNR’s Waste and Materials Management Program has collected environmental monitoring data from licensed landfills since the mid-1970s. These data are available through the Department’s Groundwater and Environmental Monitoring System (GEMS) database. The records contained in the GEMS database cover analytical data for groundwater samples from monitoring wells at solid waste facilities, private drinking water supply wells around landfills, and a few hazardous waste facilities that have monitoring wells. In addition, the GEMS database contains records for surface water monitoring from landfills. While these data may not be representative of aquifer conditions, they may give insight as to contribution of chloride from landfills to surface and groundwater.**”

The remainder of the first paragraph on page 40 was retained, but was made a separate paragraph, beginning with: “Recent data on chloride concentrations...”]

In reference to the section on climatological data on page 47 of the draft prospectus, Mr. Walker asked when the Commission staff obtained the downscaled mid-century climate projections from the Climatic Research Center in the University of Wisconsin Nelson Institute for Environmental Studies. Mr. Hahn replied that these projections were obtained within the last five years. Mr. Walker noted that the Climatic Research Center has been downscaling projections from more recent general circulation modelling efforts. He asked whether the proposed study would use these projections. Mr. Hahn said that Commission staff would attempt to obtain these downscaled projections and use them as part of the study.

[Secretary’s Note: The last sentence in the first partial paragraph on page 48 was revised to read as follows:

“That information, **or appropriate updated information**, may be applied in assessing mid-century conditions under the proposed study.”]

In reference to the discussion of analyses related to land use and transportation system data, Mr. Hahn stated that the proposed study will base existing conditions on latest existing land use and transportation system data which reflect 2010 conditions. He added that planned conditions will be based upon the update of the regional land use

and transportation plans that the Commission is currently developing. He noted that these updated plans, which have a design year of 2050, are anticipated to be completed by the end of 2015.

Ms. Nenn asked whether surface waterbodies examined by the proposed study would include the Milwaukee River estuary and Lake Michigan. Mr. Hahn replied that the study would address the estuary to the extent that data are available, but that addressing Lake Michigan is beyond the study scope.

Mr. Hahn stated that the subsection on description of the state-of-the-art of winter road maintenance on page 53 would be revised to include obtaining information from private sector entities. Mr. Grisa asked whether the description of the state-of-the-art of winter road maintenance will examine whether the use of alternative deicers such as beet juice will result in the trading one pollutant for another. Mr. Corsi added that some alternative deicers could have potential impacts on the amounts of biochemical oxygen demand and dissolved organic carbon in waterbodies. He noted that this could lead to less-recognized impacts such as the growth of biofilms. Mr. Hahn replied that the description of the state-of-the-art would examine alternative deicers. Mr. Moore asked whether the description of the state-of-the-art would also examine alternative road technology and road surface technology. Mr. Hahn replied that it would examine this.

Mr. Wiza noted that some municipalities are currently applying a variety of alternative deicers such as soy sauce manufacturing byproducts, paper mill byproducts, and beet juice to roads. He said that it would be helpful to municipal staffs to have a review of the environmental impacts of these. Mr. Hahn replied that the proposed study would include this information to the extent possible.

Mr. Simpson suggested reviewing similar studies from other parts of the country. Mr. Parsen suggested conducting a formal review of both the scientific and gray literature on deicing practices and impacts. Mr. Hahn replied that this would be done.

[Secretary's Note: The third paragraph on page 53 was revised to read:

“A description of the state-of-the-art of winter road maintenance will be prepared. This will include information on the technologies involved in the various winter road maintenance practices, the performance of those practices, **the environmental impacts associated with those practices**, and the attendant costs. Information will be obtained through surveys and interviews of municipal public works staff **and employees of private snow and ice control firms** and through a search of the technical literature on winter road maintenance. **The literature review will include both the scientific literature and the gray literature.**”]

Mr. Yunker asked whether counties and municipalities have road salt use data and whether they have calculated road salt use on a per capita basis. Mr. Grisa replied that the City of Brookfield has calculated this and compared the per capita costs to costs of other services such as telephone or cable television service. Mr. Heil commented that good comparisons can be made by expressing of salt applications as the amount applied per lane mile.

Mr. Yunker stated that about 40 percent of the Region utilizes groundwater as a source of water supply. He noted that the residences in these areas use water softeners year around and that the salt from this softener use gets discharged either to wastewater treatment plants in areas served by sanitary sewerage systems or directly to groundwater in areas using onsite wastewater treatment systems. He indicated that this will need to be examined. As an illustration that there are other large sources of chloride delivered to streams and lakes of the Region besides that used on roads, Mr. Grisa said that the mass of salt annually discharged from the Fox River Water Pollution Control Center is similar to the average amount of salt annually applied to roads in the City of Brookfield. He estimated that this amount is about 4,400 tons per year. Ms. Nenn noted that salt used in the chemical industry and this salt may also be contributing to the amounts discharged from wastewater treatment

plants. Mr. Hahn replied that the study will examine the potential sources of chloride and identify those which are important in producing impacts.

Mr. Hahn stated that this Technical Advisory Committee will be kept together during the study. He noted that it is envisioned that the study will be a four-year project. Mr. Heil asked whether the study could be completed with a shorter schedule, perhaps by having different staff simultaneously working on different elements. Mr. Hahn replied that the schedule was developed with knowledge of the Commission staff's current workload and staffing levels. Mr. Yunker added that the schedule was also spread out for funding purposes. He noted that it will take time to develop the complex elements of the study.

Mr. Walker commented that weather varies from year to year. He noted that because of this, it will be important for the study to put the single baseline year into historical context. Mr. Hahn answered that this would be done.

[Secretary's Note: The following footnote was added after the second sentence in the first full paragraph on page 49:

“To place this baseline year into historical context, weather and climate conditions during this year should be compared to those during the 20-year period for which deicing application data will be sought.”]

Mr. Corsi stated that the relationship between specific conductance and chloride concentration can vary from site to site, especially in relation to the amount of hardness in the water. He emphasized the importance of validating this relationship at certain sites or types of sites. Mr. Hahn asked whether the ideal approach would be to simultaneously collect specific conductance and chloride samples at each site. Mr. Corsi said that it would. He noted that there are additional, unpublished data from Wisconsin related to the specific conductance/chloride relationship. He explained that these data were collected through the UWEX WAV program and were intended for publication; however, the program director has left the State. He indicated that he has the data and will contact her to ask whether she would be willing to release it.

[Secretary's Note: See below in the section responding to comments from the U.S. Environmental Protection Agency for a discussion of refined and expanded approaches to instream and in-lake monitoring.]

Mr. Parsen commented that the proposed study may also provide an opportunity to use existing groundwater models to evaluate the lag time that might occur between the implementation of changes in deicing practices and changes in the associated environmental impacts. He also suggested examining alternative application techniques for wellhead protection areas and to rank areas for the use of these techniques. Mr. Hahn replied that this would be considered.

Mr. Simpson moved and Mr. Magruder seconded that the Committee approve preliminary Chapter IV of the prospectus. The chapter was approved unanimously by the Technical Advisory Committee.

DATE AND TIME OF NEXT COMMITTEE MEETING

Mr. Hahn said that October 21 was being considered for the next meeting date and that the Committee members would be contacted regarding their availability for the next meeting.

Mr. Grisa thanked the members of the Committee for their participation.

ADJOURNMENT

Mr. Wiza moved that the meeting be adjourned. The meeting was adjourned by unanimous consent at 3:33 p.m.

COMMENTS ON THE DRAFT PROSPECTUS PROVIDED BY MR. STEVE CORSI FOLLOWING THE SEPTEMBER 8, 2015, MEETING OF THE TECHNICAL ADVISORY COMMITTEE

Following the meeting of the Technical Advisory Committee, Mr. Corsi provided additional comments on the draft prospectus via electronic mail.

[Secretary's Note: A copy of Mr. Corsi's comments is attached as Exhibit A.]

Several of Mr. Corsi's comments identified technical issues related to monitoring concentrations of chloride and/or specific conductance in surface water and groundwater that will be important to consider during detailed design of the proposed study.

Mr. Corsi suggested that it would be helpful to develop a model of the fate and transport of salt in the environment. He indicated that such a model should be calibrated using data on weather patterns, road salt applications, and chloride concentrations in streams and groundwater.

[Secretary's Note: Development of a fate and transport model is beyond the scope of the proposed study. The literature review for the study will examine fate and transport of deicers in the environment.]

Mr. Corsi reported that staff from WisDOT indicated to him that while road salt application data were available for years prior to 2006, these data are less reliable than subsequent data.

[Secretary's Note: All data obtained as part of the proposed study will be reviewed and evaluated for completeness, applicability, and validity. As part of assembling the inventories for the study, data gaps will be identified. Depending on the number and magnitude of any data gaps identified, specific methods may be developed to account for them. These will be documented during the detailed study design.]

Mr. Corsi commented that the regression relationship between specific conductance and chloride should be optimized by site. He indicated that this could be done by collecting chloride samples and measuring specific conductance concurrently several times at each monitoring site. He noted that the samples should ideally be collected to represent the full range of chloride concentrations for each site. He indicated that this is desirable for the calibration of the regression model. He also indicated that it may be best to develop separate regression models for high values and low values of specific conductance.

[Secretary's Note: See below in the section responding to comments from the U.S. Environmental Protection Agency for a discussion of refined and expanded approaches to instream and in-lake monitoring.]

Mr. Corsi reiterated comments he made during the Technical Advisory Meeting regarding the potential impacts of alternative deicers containing high amounts of dissolved organic carbon on instream dissolved oxygen concentrations and biofilm development. He noted that examples of such deicers include beet juice, cheese brine, pickle juice, and any waste products from food sources or that contain sugars. He indicated that it would be beneficial for the proposed study to include a review of available data on the environmental impacts of alternative deicers.

[Secretary's Note: As previously noted, the description of the state-of-the-art of winter road maintenance will include a discussion of alternative deicing practices and the environmental impacts associated with those practices.]

COMMENTS ON THE DRAFT PROSPECTUS PROVIDED BY MR. MICHAEL PARSEN FOLLOWING THE SEPTEMBER 8, 2015, MEETING OF THE TECHNICAL ADVISORY COMMITTEE

Following the meeting of the Technical Advisory Committee, Mr. Parsen provided additional comments on the draft prospectus via electronic mail. He indicated that the Wisconsin Geological and Natural History Survey (WGNHS) is currently updating the Wisconsin Springs Inventory. He noted that this study will include performing a suite of chemical and physical measurements on the springs. He added that this project will examine spring in southeastern Wisconsin during 2016. He suggested that collection of additional measurement on these springs by WGNHS staff or collaborators during their visits could help fill data gaps for the proposed study at relatively low cost.

[Secretary's Note: A copy of Mr. Parsen's communication is attached as Exhibit B. The Commission staff will work with the WGNHS staff to identify the sites to be sampled within the Region under the Wisconsin Springs Inventory, and to determine the feasibility and cost of monitoring for additional parameters of interest to the regional road salt study.]

COMMENTS ON THE DRAFT PROSPECTUS PROVIDED BY MR. ROBIE ANSON, NUTRIENT AND WATER QUALITY STANDARDS COORDINATOR, U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 5, FOLLOWING THE SEPTEMBER 8, 2015, MEETING OF THE TECHNICAL ADVISORY COMMITTEE

Following the meeting of the Technical Advisory Committee, Mr. Anson provided comments from U.S. Environmental Protection Agency (USEPA) Region 5 staff on Chapters I through IV of the draft prospectus.

[Secretary's Note: A copy of the comments submitted by Mr. Anson is attached as Exhibit C.]

Mr. Anson noted that the Minnesota Pollution Control Agency (MPCA) has recently made available for public review a chloride total maximum daily load and a chloride management plan for the Twin Cities region. He suggested that Commission staff review these documents and, possibly, discuss them with MPCA staff.

[Secretary's Note: As part of ongoing development of the prospectus for the proposed study, the Commission staff has obtained and reviewed the MPCA chloride TMDL and chloride management plan for the Twin Cities metropolitan area. Information from these documents will be considered in the detailed design of the proposed study and incorporated into the study as appropriate.]

Mr. Anson noted that many communities in the northern United States are working to balance the need for safe winter travel with preserving water quality. He suggested sharing the results of the study with communities outside of the Southeastern Wisconsin Region.

[Secretary's Note: Chapter V of the draft prospectus indicates that the findings and recommendations of the proposed study would be documented as a SEWRPC technical report. SEWRPC reports are available for download from the Commission's website. Thus the results of the website will be available communities outside of the Region.]

Mr. Anson noted that some communities have identified opportunities to recycle salt brine generated through salt truck washing for use as a salt pre-wetting agent or as a brine to be applied to roadways. He provided internet links to examples and analysis of wash water recycling.

[Secretary's Note: As part of the proposed study, practices such as this will be reviewed in the description of the state-of-the-art of winter road maintenance.]

Mr. Anson noted that the ability of publicly-owned wastewater treatment plants in at least two Wisconsin communities has been compromised by road salt due, in part, to either highly concentrated runoff from salt storage facilities and salt spreader truck wash water being discharged into the collection system to these plants. He emphasized that it will be important for the proposed study to consider secondary impacts of road salt use and the ways in which communities may be able to prevent generation of (and/or recycle) highly-concentrated salt brines.

[Secretary's Note: As part of the proposed study, practices such as this will be reviewed in the description of the state-of-the-art of winter road maintenance.]

Mr. Anson noted that recent toxicological studies have found that the toxicity of chloride to aquatic organisms can be affected by hardness and ionic composition of the water in which chloride exposure occurs. He suggested that any additional samples collected for this study should be analyzed for hardness and concentrations of major ions such as sulfate, potassium, calcium, and magnesium in addition to concentrations of chloride.

[Secretary's Note: At those sites for which historical and current water quality data exist, the proposed study will obtain and collate the available data on hardness and other water quality constituents that are known to affect the toxicity of chloride to aquatic organisms.

Based on Mr. Anson's suggestion, and on previously noted comments made by USEPA and USGS staff, it was decided to revise the prospectus as indicated below to call for expanding the data collection under the proposed study to include collection and chemical analysis of surface water samples. These samples will be collected from the sites and depths at which the specific conductance data loggers will be deployed, and will be analyzed for concentrations of chloride, total hardness, sodium, potassium, sulfate, magnesium, and calcium. Expansion of the number of parameters analyzed will provide all the major constituents that contribute to specific conductance, and should allow the development of better relationships between specific conductance and chloride concentrations using multiple regression approaches.

This expansion of the data collection efforts will extend the time for the surface water quality data inventory by six months, increasing that total time to two years as indicated on the revised study schedule, which is attached as Exhibit D, and which replaces Figure 6 in the original draft prospectus. The estimated overall study duration would remain four years. In addition, the expanded sampling program is estimated to add approximately \$290,000 to the total study cost, increasing the total cost to \$1.719 million. The attached Exhibit E, which replaces Table 5 in the original prospectus, sets forth the revised total cost and cost apportionment among the recommended funding agencies.

The first paragraph on page 34 of the draft prospectus was revised to read:

“Surface Water

The analysis of surface water quality data will focus on the collation and collection of instream and in-lake water data on specific conductance or chloride concentrations.^{3,4} **The collation of existing data will also include collation of data for those water quality constituents known to affect the toxicity of chloride to aquatic organisms.”**

The following paragraphs were added after the last bullet point on page 39:

“The collection of new specific conductance data will be supplemented by collection of water samples from the stream and lake locations and depths at which the specific conductance data loggers are deployed. The samples will be sent to the Wisconsin State Laboratory of Hygiene (WSLH) for chemical analysis for concentrations of chloride, total hardness, sodium, potassium, and sulfate. WSLH analysis procedures for total hardness include determination of concentrations of magnesium and calcium. Collection of these data will enable the validation and refinement of the regression relationships between specific conductance and chloride on a site-specific basis.

Samples will be collected over a two-year period. In those waterbodies in which one logger is deployed, 20 samples will be collected. In those waterbodies in which multiple loggers are deployed, 20 samples will be collected at the site of one logger, and 10 samples at each other logger site. To validate the regression relationship, it is important that the samples collected at a site encompass the entire range of chloride and specific conductance values that occur there. To ensure that this range is obtained, some of the sampling will be conducted in response to specific events such as runoff events related to spring snowmelt.”]

Mr. Anson noted that recent studies have demonstrated that potassium and magnesium are toxic to aquatic organisms and that this toxicity is independent of any chloride associated with these ions. He suggested that because communities may use deicing compounds such as potassium acetate and magnesium chloride, it would be useful to evaluate whether these compounds present different or greater risks to the environment and whether these concerns warrant the development of specific procedures or guidelines regarding their use.

[Secretary’s Note: The proposed study will include a description of the state-of-the-art of winter road maintenance. This description will include a review of environmental impacts of different practices, including toxicological effects of alternative winter deicing compounds. As determined by the findings of the study, the recommendations may include guidelines regarding the use of specific deicing practices.]

Mr. Anson stated that a Wisconsin county has used waste cheese brine as a road salt pre-wetting agent. He noted that this repurposes wastewater that would otherwise be discharged into surface waters or applied to land and may represent a strategy for reducing expenditures associated with procurement of road salt. He suggested that the study investigate whether this approach can be replicated with spent brine from food processing facilities and other entities that generate salty wastewater.

[Secretary’s Note: As previously noted, the description of the state-of-the-art of winter road maintenance will include a discussion of alternative deicing practices.]

Mr. Anson noted that USEPA’s experience has been that stakeholders may not always fully appreciate the prevalence and severity of water quality and ecological impacts related to road salt and chlorides. He suggested expanding the discussion of chloride-related impacts presented on page 9 of the draft prospectus and expanding the discussion of observed concentrations of chloride in Wisconsin waters presented on pages 13 through 16 of the draft prospectus.

[Secretary’s Note: The following paragraph was added after the first paragraph on page 13. With the addition of the footnotes in this paragraph, subsequent footnotes in Chapter III were renumbered:

“Additional data are available indicating that chloride concentrations have increased over time in other streams in Southeastern Wisconsin, such as Oak Creek and Lincoln Creek,⁸ the Milwaukee outer harbor,⁹ the nearshore Lake Michigan area,¹⁰ 31 additional Southeastern Wisconsin lakes,¹¹ and shallow groundwater at several monitoring wells in Southeastern Wisconsin.¹² Similar increases have been documented at other location in Wisconsin, including the Yahara lakes¹³ and public water supply wells in the Madison area.¹⁴

⁸*SEWRPC Technical Report No. 39, op. cit.*

⁹*Ibid.*

¹⁰*Ibid.*

¹¹*Jeffrey A. Thornton, Thomas M. Slawski, and Hebin Lin, “Salinization: The Ultimate Threat to Temperate lakes, with Particular Reference to Southeastern Wisconsin (USA),” Chinese Journal of Oceanology and Limnology, Volume 33, pages 1-15, 2015.*

¹²*Ibid.*

¹³*Richard C. Lathrop, “Chloride and Sodium Trends in the Yahara Lakes,” Resource Management Findings, No. 12, Wisconsin Department of Natural Resources, June 1988; Rick Wentz and Kristi Sorsa, Road Salt 2013: Where’s the Balance? Public Health Madison and Dane County, January 3, 2014.*

¹⁴*Rick Wentz and Kristi Sorsa 2014, op. cit.’]*

Mr. Anson commented that the discussion of toxic impacts of chloride in the draft focuses on acute toxic effects. He suggested that the proposed study highlight the impacts of chronic exposures to lower levels of chlorides and examine the degree to which surface waters exceed the state’s chronic water quality criterion for chloride.

[Secretary’s Note: The following paragraph was added after the first partial paragraph on page 16. With the addition of the footnotes in this paragraph, subsequent footnotes in Chapter III were renumbered:

“Acute toxicity is not the only toxic effect associated with chloride. Chronic exposures to elevated concentrations of chlorides have been shown to produce sublethal toxic effects in aquatic organisms. Examples of effects that have been reported include reductions in reproduction by water fleas,¹⁸ oligochaete worms,¹⁹ rotifers,²⁰ ciliates²¹ and clams;²² changes in the time needed to reach maturity in water fleas²³ and frogs;²⁴ reduced survival of fathead minnow eggs;²⁵ immobilization of zooplankton,²⁶ and reduced rates of seed germination on aquatic plants.²⁷

Increases in chloride concentration can result in major changes to the structure and functioning of aquatic ecosystems. This can impact the biological communities present. For example, experimental additions of chlorides to a stream site resulted in reduced algal diversity and lower algal biomass relative to what was present at an upstream control site.²⁸ Similar changes have been documented in lakes. For example, increased chloride loading related to commercial and residential

development resulted in chloride concentrations in Third Sister Lake in Michigan increasing from 19 milligrams per liter (mg/l) to 260 mg/l over an eight-year period. This concentration change led to reduced mixing in the lake and anoxia in bottom waters. Several biological changes accompanied this, including reduced rates of primary production, lower diversity of benthic invertebrate species, and markedly reduced densities of benthic invertebrates.²⁹

¹⁸K.E. Biesinger and G. M. Christensen, "Effects of Various Metals on Survival, Growth, Reproduction and Metabolism of *Daphnia magna*," Journal of the Fisheries Research Board of Canada, Volume 29, pages 1691-1700, 1972; W.J. Birge, J.A. Black, A.G. Westerman, T. W. Short, D.M. Bruser, and E.D. Wallingford, "Recommendations on Numerical Values for Regulating Iron and Chloride Concentrations for the Purpose of Protecting Warmwater Species of Aquatic Life in the Commonwealth of Kentucky," University of Kentucky, Lexington Kentucky, 1985; U.M. Cowgill and D.P. Milazzo, "The Sensitivities of Two Cladocerans to Water Quality Variables," Archiv für Hydrobiologie, Volume 120, pages 155-196, 1990; J.R.F. Elphick, K.V. Bergh, and H. C. Bailey, "Chronic Toxicity of Chloride to Freshwater Species: Effects of Hardness and Implications for Water Quality Guidelines," Environmental Toxicology and Chemistry, Volume 30, pages 239-246, 2011; and E.C. Freitas and O. Rocha, "Effects of Sodium and Potassium on Life History Parameters of Freshwater Cladoceran *Pseudosida ramosa*," Journal of the Brazilian Society of Ecotoxicology, Volume 7, pages 85-91, 2012

¹⁹Elphick and others, 2011, op. cit.

²⁰Ibid.

²¹D.L. Cronkite, A.N. Gustafson, and B.F. Bauer, "Role of Protein Synthesis and Ninhydrin-positive Substances in Acclimation of *Paramecium tetraurelia* to high NaCl," Journal of Experimental Zoology, Volume 233, pages 21-28, 1985.

²²G.L. Mackie, "Effects of Pollutants on Natalivity of *Musculium secures* (*Bivalvia: Pisiidiidae*)," The Nautilus, Volume 92, pages 25-33, 1978.

²³Freitas and Rocha, 2012, op. cit.

²⁴I. Gomez-Mestre and M. Tejedo, "Local Adaptation of an Anuran Amphibian to Osmotically Stressful Environments," Evolution, Volume 57, pages 1889-1899, 2003; and D. Sanso and S.J. Hecnar, "Effects of a Road Deicing Salt (NaCl) on Larval Wood Frogs (*Rana sylvatica*)," Environmental Pollution, Volume 140, pages 247-256, 2006.

²⁵Birge and others, 1985, op. cit.

²⁶B.G. Anderson, "The Apparent Thresholds of Toxicity to *Daphnia magna* for Chloride when Added to Lake Erie Water," Transactions of the American Fisheries Society, Volume 78, pages 96-113, 1948.

²⁷J.W. Teeter, "Effects of Sodium Chloride on Sago Pondweed," Journal of Wildlife Management, Volume 29, pages 838-845, 1965.

²⁸M.D. Dickman and M.B. Gochbauer, "Impacts of Sodium Chloride on the Microbiota of a Small Stream," *Environmental Pollution, Volume 77, pages 109-126, 1978.*

²⁹T.B. Bridgeman, C.D. Wallace, G.S. Carter, R. Carvajal, L.C. Schiesari, S. Aslam, E. Cloyd, D. Elder, A. Field, K.L. Schulz, P.M. Yurista, and G.W. Kling, "A Limnological Survey of Third Sister Lake, Michigan with Historical Comparisons," *Lake and Reservoir Management, Volume 16, pages 253-267, 2000.*"

In reference to the data sources used to assess chloride concentrations in surface waters, Mr. Anson suggested that it may be fruitful to review effluent data for dischargers permitted under the Wisconsin Pollutant Discharge Elimination System (WPDES).

[Secretary's Note: The prospectus addresses collation of chloride concentrations and total discharges from wastewater treatment plants in the first full paragraph on page 45.

The following paragraph was added after the third full paragraph on page 45:

"It is also proposed to obtain effluent monitoring data submitted to the WDNR from facilities permitted to discharge to surface water or groundwater under the Wisconsin Pollutant Discharge Elimination System. While these data may not be representative of conditions within the receiving waters, they may be useful for estimating the magnitude of contributions of chloride to these waters from municipal wastewater treatment plants and industrial dischargers."

Mr. Anson noted that the WDNR is a participant in the National Aquatic Resource Surveys (NARS), which target lakes, streams, rivers, wetlands, and coastal waters on a rotating basis. He suggested that if data from NARS are not available through the USEPA STORET or WDNR SWIMS databases, these data be obtained and included in the data used to characterize chloride concentrations in surface waters.

[Secretary's Note: The Commission staff contacted WDNR staff to ask whether the NARS data are available through SWIMS. WDNR staff indicated that all Wisconsin NARS data, except the wetland data, are available through SWIMS.]

Mr. Anson noted that MPCA has published a report that discusses groundwater quality and road salt-related concerns.

[Secretary's Note: The Commission staff obtained a copy of the MPCA report, *The Condition of Minnesota's Groundwater, 2007-2011*, August 2013, and will examine it as part of the literature review in the proposed study.]

Mr. Anson noted that concerns with elevated chloride concentrations in private and municipal drinking water wells have prompted McHenry County, Illinois to address road salt use. He added that the County has produced a groundwater protection plan, a snow and ice policy, and training materials for salt applicators.

[Secretary's Note: The Commission staff has obtained copies of the reports and other materials from McHenry County. These will be examined as part of the literature review in the proposed study.]

Mr. Anson suggested that it may be useful to collect data regarding best management practice (BMP) use at facilities used to store, handle, and transfer road salt; store and maintain equipment used to apply road salt; and wash equipment used to apply road salt.

[Secretary's Note: As previously noted, the proposed study will include a description of the state-of-the-art of winter road maintenance. Identification of deicing BMPs, including storage, handling, and transfer of road salt and storage, maintenance, and cleaning of salt application equipment will be conducted as part of this description. The proposed study will seek to obtain information from State, county, and municipal agencies responsible for winter road maintenance regarding the practices they use related to storage and handling of road salt and storage, cleaning, and maintenance of application equipment. The following paragraph was inserted after the third paragraph on page 31:

“Salt Storage and Equipment Storage and Maintenance Practices

Data on practices related to the storage, transfer, and handling, of salt and related deicers and data related to the cleaning, storage, and maintenance of equipment used to transport and apply deicers will be obtained from the agencies responsible for winter road maintenance. These data will contribute to an assessment of the use of best management practices related to deicer storage and use in the Region.”]

Mr. Anson noted that there is presently considerable interest in developing water quality criteria for chloride that would protect aquatic organisms from chloride toxicity. He indicated that to the extent that it would be helpful for developing surface water objectives and standards related to human health and the maintenance of healthy freshwater aquatic communities, USEPA could provide scientific information that could inform the development of such objectives and standards.

[Secretary's Note: The Commission staff has requested that USEPA provide available scientific information to inform the development of objectives and standards related to protection of freshwater aquatic organisms from chloride toxicity.]

Relative to the proposed description of the state-of-the-art of winter road maintenance, Mr. Anson noted that New Hampshire Department of Environmental Services and the Minnesota Pollution Control Agency have developed websites devoted to road salt-related concerns, including information on technologies and BMPs for reducing road salt use. He provided links to these websites.

[Secretary's Note: As part of developing the description of the state-of-the art of winter road maintenance, the materials on the websites noted by Mr. Anson will be reviewed and the information incorporated as appropriate.]

As part of the development of objectives and standard during the study development process, Mr. Anson suggested that the proposed study review any conditions regarding road salt application and winter road maintenance that are included in Wisconsin MS4 permits and compare and contrast those conditions to similar elements included by other states with a view of highlighting any areas in which Wisconsin MS4 permits might be modified to reduce the impact of road salt on surface- and groundwater resources.

[Secretary's Note: The following paragraph was added after the third paragraph on page 53:

“In addition to winter road maintenance techniques, the description of the state-of-the-art of winter road maintenance will review regulatory requirements related to winter road maintenance. Examples of issues to be addressed in this review include permit conditions related to winter road maintenance in municipal separate storm sewer system permits and training programs and certification programs for winter road and parking lot maintenance personnel.”]

Mr. Anson suggested that it may be advantageous to look at other frameworks or models in addition to conditions in MS4 permits for addressing deicing and chloride issues.

[Secretary's Note: The description of the state-of-the-art of winter road maintenance will review all existing approaches for addressing deicing and chloride issues.]

Mr. Anson noted that pages 30 through 33 of the draft prospectus discuss obtaining data on public and private anti-icing and deicing practices and quantities of salt used per year. He suggested that information should also be requested on whether other deicing chemicals were used and, if they were, what quantities were applied.

[Secretary's Note: The proposed study will examine the use of alternative deicers in the Region, including inventorying the quantities applied. Several changes were made to clarify this in the text of the draft prospectus. The second paragraph on page 30 was revised to read (note that the section heading is bold in the draft prospectus):

“State, County, and Municipal Road Maintenance Practices

An inventory will be conducted of 1) current and historical road anti-icing and deicing practices at the State, county, and municipal levels, and 2) salt **and other deicing and anti-icing compound** use by public agencies in winter road maintenance within the Region. This inventory will address the quantities of road salt **and other deicing and anti-icing compounds** applied and the distribution of the salt **and associated chloride** throughout the transportation system. It should be possible to collect the needed data by mail survey with, as necessary, telephone call and personal interview follow up.”

The first paragraph on page 31 was revised to read:

“Quantities Used

Data on the quantities of road salt **and other deicing and anti-icing compounds** used in winter road maintenance operations will also be obtained from the agencies responsible for maintenance. The quantities of road salt **and other deicing and anti-icing compounds** used in a designated base, or bench mark, year must be collated by the geographic areas for which each of the road maintenance agencies is responsible. At least 20 years of historical data should also be collected for each of the agencies and geographical areas concerned, along with pertinent changes in the service areas, in order to facilitate trend analyses. In addition to the two decades of historic data, and attempt **will** be made to obtain data on road salt **and other deicing and anti-icing compounds** used in 1965, a year in which the Commission conducted its first inventory of water quality conditions within the Region, obtaining accurate data on the chloride content of the streams and watercourses studied.² It should be possible to collect the needed data by mail survey with, as necessary, telephone call and personal interview follow up.”

The text of Footnote number 2 on page 31 was not changed.

The first sentence of the second paragraph on page 31 was revised to read:

“In order to permit analysis of the relationship of road salt **and other deicing and anti-icing compounds** used to stream and inland lake water quality and to ground water quality, data on the distribution of the road salt **and other deicing and anti-icing compounds** used will be required.”

The fourth paragraph on page 31 was revised to read (note that the section heading is bold in the draft prospectus):

“Private Facility Salt Use

An inventory of current and historical salt **and other deicing and anti-icing compound** use by private agencies in the winter maintenance of private parking areas and attendant walkways and driveways will be required. As is the case for public facility road salt, **deicing, and anti-icing compound** use, the inventory of such use on private facilities will have two components.”

The second paragraph on page 33 was revised to read:

“Distribution

To establish the distributive use of road salt **and other deicing and anti-icing compounds** in winter maintenance of private facilities, and inventory of automobile and truck parking and of bus, taxi, and truck terminal areas and of ancillary private walkways and driveways will be required. It should be possible to use the Commission’s latest land use inventory to identify the location of all parking and loading areas providing accommodation for ten or more vehicles. This could be done using computer assisted technology. Having identified the location of parking and loading areas, the areal extent of the impervious areas concerned can then be determined by aerial photo interpretation using the Commission’s latest large-scale, digital orthophotography. This distributive data will have to be compiled for the same geographic areas as those used in the compilation of data for the use of road salt **and other deicing and anti-icing compounds** by public agencies.”]

Mr. Anson noted several other potential sources that may contribute chloride to wastewater treatment plants or private onsite waste water treatment systems.

[Secretary’s Note: The third full paragraph on page 46 was revised to read:

“The proposed study will include an inventory of chloride concentrations in sewage treatment plant influent and/or effluent, and in cases where concentrations are relatively high, additional inventories will be conducted as necessary to determine whether chemical manufacturing, food processing operations, **or other activities or factors that could generate influent containing chloride** contribute wastewater flow to the sewage treatment plant in question. **Examples of potential sources of contributions of chlorides to wastewater treatment plants include wash water from salt spreader trucks, runoff from salt storage areas, wastewater from car washes, hauled sanitary wastewater, wastewater from laundries, wastewater from potable water treatment at municipal drinking water facilities, reverse osmosis reject water, and infiltration and inflow into sanitary sewers.**”]

Mr. Anson noted that the draft prospectus proposes to delineate areas for analysis of data based on several factors. He suggested that that it may be advantageous to also consider locations of stormwater drain outfalls as a factor in the delineation of these areas. He also suggested permitted wastewater outfalls and storm sewer outfalls among the layers represented on the base maps assembled as part of the study.

[Secretary’s Note: While the procedures for delineating the analysis areas will be developed during the detailed design phase of the proposed study, it is likely that these areas will be on the order of subwatersheds or large portions of subwatersheds. At this scale, considering the presence of individual stormwater drain outfalls is unlikely to be informative for

delineation purposes. To account for the presence of these outfalls and the fact that they may convey snowmelt containing chlorides from deicers into surface waters, it is proposed to add the presence and locations of MS4 systems to the factors to be considered in delineating analysis areas. It should be noted that the prospectus indicates that the proposed study will map and consider locations of permitted wastewater treatment plant outfalls. The third and fourth bullet points on page 49 were revised and a fifth bullet was added as follows:

- Locations of potentially impacted lakes, stream, or rivers;
- Locations of sewage treatment plant discharges; **and**
- **Locations of areas served by municipal separate storm sewer systems.]**

Mr. Anson suggested that it may be important for the prospectus to consider the likely users of the information produced by the study and discuss with potential users what types of work product would be most useful for them. He also noted that information produced by the study will be of value to a diverse cross section of the population and that the appropriate form of work product may differ depending upon the user.

[Secretary's Note: To fully document the proposed study, it will be important to assemble the study findings and recommendations and the methods and analyses that they are based on in one document. Because of this, one work product of the proposed study will be a report in the Commission's technical report series. Reports in this series are intended to make available to various public and private agencies within the Region valuable information assembled by the Commission staff during the course of its planning activities. Additional work products will be developed to make the findings and recommendations of the study available to a diverse audience. Examples of such products include an executive summary of the technical report, newsletters, and a page on the Commissions website presenting key findings and recommendations. The following paragraph was added to the draft prospectus after the last paragraph on page 53:

“Additional documentation will be provided to make the findings and recommendations of the study available to a diverse audience. This additional documentation may take the form of an executive summary of the study, newsletters, and a dedicated page on the SEWPRC website.”]

ADDITIONS TO THE DRAFT PROSPECTUS MADE BY SEWRPC STAFF FOLLOWING THE SEPTEMBER 8, 2015 MEETING OF THE TECHNICAL ADVISORY COMMITTEE

Following the September 8, 2015 meeting of the Technical Advisory Committee, the Commission staff became aware of a potential source of additional groundwater chemistry data that could be used to characterize conditions in the shallow aquifer.

[Secretary's Note: The last sentence of the first paragraph on page 40 was revised to read:

“The municipal well data on groundwater chemistry will be supplemented with information from observation wells established by the USGS **and information from private wells that has been submitted to the Center for Watershed Science and Education at the University of Wisconsin-Stevens Point.**”]

EXHIBIT A

Comments Provided by Steve Corsi, U.S. Geological Survey

General Comments

The authors have done a very nice job summarizing the situation, gathering pertinent data, and referencing relevant work. They look to have a good grasp of the issues at hand and where some of the important data/analysis gaps are.

Some notes on the concepts within the document and thoughts that may be useful:

Streams

1. Periods of peak concentrations can be short-lived due to the flashy nature of road salting events. Sampling during the actual salting event is important to catch peak concentrations.
– Continuous conductance stations illustrate this well.
2. Seasonal concentrations vary dramatically. Samples collected during the winter, during road salt application periods will be much higher than other time periods. It is critical to sample the actual time periods when deicing is active rather than waiting until a day or more after the storm. Continuous sensors are ideal for this.
3. Some historical sampling programs focused on "open water" periods that will underestimate annual maximum concentrations.
4. Concentrations can be stratified due to density of saline water, especially in deeper streams.

Lakes

1. Most lake monitoring projects are conducted in the open water season and collect surface samples or maybe vertically integrated samples.
2. Maximum concentrations are likely to happen in winter or early spring when there is ice cover and not necessarily during the sampling period.
3. Concentrations are likely to be stratified with depth. Maximum concentrations are likely to be at the bottom of the lake due to the density of saline water.
4. The benthic area is resident to many organisms that are important to the food web of lakes. The concentration just above the lake bed is, therefore, very important to define.

Groundwater

1. Seasonal effects could be important in the shallow groundwater system especially. Sampling only once a year may not be adequately representative of average concentrations.
2. Increasing shallow groundwater concentration (the reservoir of salt for baseflow) will likely be a very important issue to understand.
– Inventory of usage over the past 40 years would be of great use to help understand this. We did it on a national scale using road salt sales for the 2015 publication with many general assumptions, but it needs to be done on a local/watershed scale to really get a better understanding of how influential the application -> stream transport process is played out.
– A model of the fate and transport of salt would also help understand this much better. Include weather patterns, road salt applications, in-stream concentrations, groundwater concentrations as calibration.
3. Not sure what data is currently available historically in relevant areas. Looks like SEWRPC has done a good job of finding data sources.

Inventory

1. A conversation with the state DOT indicated that road salt application data before 2006 is available, but not super reliable. They indicated that there is quite a bit of uncertainty in those data. Data after 2006 is better.

EXHIBIT A (continued)

Comments from Meeting

A question from the participants: when will this situation result in toxic levels and what does the future look like: Answer: Some streams are at toxic levels now. Levels are on the rise in all of the urban streams, and even some rural streams. When they reach toxic levels will vary by stream.

Monitoring program: It is important to define the details about exact monitoring methods to handle timing of peak concentrations and vertical density gradients in lakes and deeper streams.

The regression of SC -> CI should be optimized by site. This could be done by collecting CI samples and measuring SC concurrently a number of times for each monitoring site. This data probably exists already for many of the sites where SEWRPC has gathered data for the prospectus. For the new sites, samples should ideally be collected to represent as close to the full range of CI concentrations for that site as possible to calibrate the regression model for each site. Often times, it is best to use two regression. One for high SC (greater than ~3000 uS/cm) and one for low SC.

It would be beneficial to include an effort to gather data that is available on the environmental impact of alternative deicers. Currently, it appears that some places are using the alternative deicers without much information on the potential adverse effects.

– The alternative deicers with high dissolved organic carbon (and therefore high BOD) will have potential to reduce D.O. to unacceptable levels. Also, these deicers are a great food source for bacteria, and excessive biofilms are likely to form on streambeds in where receiving waters receive these alternative deicers on a regular basis through the winter.

– These types of deicers may include the following, but work should be done to confirm this:

Beet juice

Cheese brine

Pickle juice

Generally, any waste products from food sources or sugars.

EXHIBIT B

Comments Provided by Michael Parsen, Wisconsin Geological and Natural History Survey

From: Parsen, Michael [mailto:michael.parsen@wgnhs.uwex.edu]
Sent: Thursday, September 10, 2015 10:14 AM
To: Hahn, Michael G. <MHAHN@SEWRPC.org>
Subject: Road Salt meeting follow up - Springs monitoring in SE Wisconsin

Hi Michael,

I attended the Road Salt TAC meeting on Tuesday as an alternate for Ken Bradbury here at the WGNHS.

I was good meeting you and your team and interesting to learn more about the study.

In addition to the recommendations I made Tuesday, I wanted to share that we're currently working on a project to update the Wisconsin Springs Inventory. For this project Sue Swanson (Hydrogeologist, Beloit College) is collaborating with several WGNHS scientists to track down and visit existing springs and perform a suite of physical and chemical measurements. Over the past year, the project has focused on central and western Wisconsin but will be headed to the southeastern portion of the state during 2016.

Considering that springs are great integrators of groundwater conditions and may provide unique "windows" into the sodium and chloride concentrations of the extensive groundwater reservoir within SE Wisconsin, our ongoing springs study may represent an opportunity for future collaboration. Since our staff will already be visiting and evaluating springs within SE Wisconsin, collection of additional measurements would be a natural extension of this work and could help fill data gaps for the road salt study at relatively low cost/effort.

Feel free to contact me directly should you have any questions or are interested in discussing in more detail.

Best regards,

Mike

Mike Parsen
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EXHIBIT C

Comments Provided by Robie Anson, U.S. Environmental Protection Agency

General Comments

1. The Minnesota Pollution Control Agency (MPCA) recently made available for public notice a chloride total maximum daily load (TMDL) and a chloride management plan for the Twin Cities region. Both documents are available at the following website:
<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impairedwaters-and-tmdls/tmdl-projects/special-projects/metro-area-chloride-project/road-salt-and-waterquality.html>. It may be beneficial to review these materials and, possibly, to make contact with MPCA staff and/or others who have played a role in developing these documents, to better understand their approach and the challenges they have faced.
2. Given that many communities in the northern United States are working to balance the need for safe winter travel with preserving water quality, it may be fruitful to reach out to, and share the results of this study with, communities outside of the southeastern Wisconsin area.

Communities in Indiana, for example, have identified opportunities to recycle salt brine generated through salt truck washing for use as road salt pre-wetting agent and/or brine to be applied directly to roadways and may be able to provide insight to the Southeastern Wisconsin Regional Planning Commission (SEWRPC). Please see the following website for examples of low-cost wash water recycling approaches: http://rebar.ecn.purdue.edu/Salt-Wash-Reuse/HTML_case_studies.htm and the following website for a more detailed analysis of wash water recycling: <http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1601&context=jtrp>.

EPA has worked with Wisconsin Department of Natural Resources (WDNR) wastewater engineers to identify at least two communities in Wisconsin where road salt use compromises the ability of publicly-owned treatment works (POTWs) to meet water quality-based effluent limits for chloride. These two facilities (and possibly others) discharge high levels of chloride, in part, because highly-concentrated ($\geq 20,000$ mg Cl-/L) runoff from road salt storage facilities and salt spreader truck wash water are discharged through the collection system to the wastewater treatment plant. As SEWRPC moves forward with this study, it will be important to consider secondary impacts of road salt use and ways in which communities may be able to prevent generation of (and/or recycle) highly-concentrated salt brines.

3. Recent toxicological studies have found that chloride toxicity to aquatic organisms is affected, at least in part, by hardness and ionic composition (*i.e.*, concentrations of sulfate, potassium, calcium, magnesium, etc.) of the water in which chloride exposure occurs. To the extent that additional data are generated as part of this study, it would make sense to collect information on hardness and ionic composition of waters of interest, in addition to chloride concentration itself. Snapshot data on chloride, hardness, and ionic composition will help to identify potentially toxic conditions, while longer-term data sets may provide insight on the ways in which regular road salting impacts water chemistry, which may impact the degree to which surface waters support aquatic organisms.

Additionally, recent studies have demonstrated that potassium and magnesium are toxic to aquatic organisms (independent of chloride). To the extent that municipalities may choose to use salts such as potassium acetate and magnesium chloride to improve winter road conditions (*e.g.*, at temperatures where sodium chloride may not be effective), it may make sense to evaluate whether these compounds present different or greater risks to the environment and whether these concerns warrant the development of specific procedures and/or guidelines regarding their use.

4. EPA is aware that Polk County, Wisconsin has effectively used waste cheese brine as a road salt pre-wetting agent in winter road maintenance activities. To the extent that this repurposes wastewater that would otherwise be discharged to Wisconsin surface waters (or land-applied) and represents an effective way to maintain safe winter driving conditions, it may be worth investigating whether this model can be replicated with spent brine from food processing facilities and/or other entities that generate salty wastewater, such as salt spreading truck wash facilities, car washes, etc. Also, to the extent that this approach renders road salt more effective/efficient, it may represent a strategy for reducing expenditures associated with the procurement of road salt.
5. It may be useful to explicitly consider what constitutes a 'successful' project, to identify measures of success up-front, and to build in opportunities to evaluate the project as it progresses. To that end, anticipated end users may be able to provide input on what they believe would constitute success.

EXHIBIT C (continued)

Specific Comments

1. In EPA's experience, stakeholders may not always fully appreciate the prevalence and severity of road salt-/chloride-related water quality and ecological impacts. It may therefore be helpful to expand upon the discussion of road salt-/chloride-related impacts presented on page 9 and on the concentration of chloride observed in specific Wisconsin waters on pages 13 – 16. Specific examples of chloride-related impacts to fisheries and/or other fauna or flora might aid in stimulating increased concern and action.
2. Much of the discussion of toxic impacts on aquatic organisms on pages 13 – 16 is focused on acute toxic effects of chloride. Given that chronic exposure to lower concentrations of chloride can produce important sub-lethal effects (e.g., impacts to growth and/or reproductive capacity), it may make sense to highlight the impacts of lower-level chloride exposure and to examine the degree to which Wisconsin surface waters exceed the state's chronic water quality criterion for chloride (395 mg/L). It may also make sense to, to the extent possible, document any specific ecological effects that have been observed in these waters.
3. On page 10, the prospectus highlights a variety of data sources to be used to identify chloride concentrations in surface waters. To assess chloride concentrations in headwater and other small streams, it may be fruitful to review effluent data for Wisconsin Pollutant Discharge Elimination System- (WPDES-) permitted dischargers. POTWs receiving wastewater from government-owned public works facilities where salt truck washing occurs, storm drains close to salt storage facilities, car washes, and other sources, including hauled sanitary wastewater and water softeners, can discharge effluent that exceeds Wisconsin's chronic chloride criterion and frequently comprise a significant percentage of the water that flows in these waterbodies.

In addition, WDNR is an active participant in EPA's National Aquatic Resource Surveys (NARS). These surveys are held annually and target lakes, rivers & streams, coastal waters, and wetlands on a rotating basis. Within each survey, waters are targeted both probabilistically and for reference purposes. To the extent that these data are not available through STORET and/or WDNR's SWIMS database, this may represent another source of surface water data. Tim Asplund, EPA's NARS contact at WDNR, may be able to clarify whether WDNR uploads these data into the STORET and/or SWIMS databases. Please see

http://water.epa.gov/type/watersheds/monitoring/aquaticsurvey_index.cfm for additional information on NARS and some data collected under the program.

4. On page 18, the prospectus discusses chloride accumulation in groundwater as a result of road salt use. EPA is aware of at least one situation in Wisconsin in which road salt storage in close proximity to a municipal drinking water well resulted in elevated chloride concentration in groundwater and the municipal drinking water supply, prompting the municipality to seek to close the well.

In addition, MPCA discusses groundwater quality and road salt-related concerns at

<http://www.pca.state.mn.us/index.php/view-document.html?gid=19743>.

Last, concerns related to elevated chloride concentration in private and municipal drinking water wells prompted efforts to address road salt use in McHenry County, Illinois. EPA assisted the County with the production of training materials for a salt applicators workshop. Because the County is heavily dependent on groundwater for drinking water, County officials have been aggressively working with road salting crews in recent years. Below are links to the McHenry County Groundwater Protection Action Plan, Snow and Ice Policy, information related to the salt applicators workshop, and the County's winter operations website:

<https://www.co.mchenry.il.us/home/showdocument?id=8084>

<https://www.co.mchenry.il.us/home/showdocument?id=24455>

<https://www.co.mchenry.il.us/county-government/departments-j-z/planningdevelopment/divisions/water-resources/snow-and-ice-removal>

<https://www.co.mchenry.il.us/county-government/departments-j-z/transportation/winter-operations>

5. On pages 19, 30, and 48, the prospectus discusses assembling an accurate set of baseline data with respect to winter road maintenance practices, surface water, and groundwater conditions. It may be useful to collect data regarding best management practice (BMP) use at facilities used to store and handle/transfer road salt, store and maintain equipment used to apply road salt, and wash equipment used to apply road salt. In addition, assuming that communities in the region use magnesium, potassium, and calcium chloride to maintain road conditions, it may be useful to collect surface water and groundwater data on magnesium, potassium, and calcium cations, in addition to sodium, to establish baseline conditions. As mentioned earlier, these cations can contribute to (or, in the case of calcium, may ameliorate) salt-related toxic effects in aquatic communities.

EXHIBIT C (continued)

6. On page 20, the prospectus mentions that SEWRPC hopes to produce surface water objectives and standards related to human health and to the maintenance of healthy freshwater aquatic communities. EPA notes that there is presently considerable interest developing chloride water quality criteria that protect freshwater aquatic organisms from chloride toxicity. To the extent that it would be helpful, EPA could provide recent scientific information that may inform SEWRPC's efforts.
7. Also on page 20, the prospectus sets a goal to assemble a description of state-of-the-art winter road maintenance technologies and practices. New Hampshire has invested effort into identifying approaches to minimize road salt impacts on its freshwater resources. The New Hampshire Department of Environmental Services has a website devoted to road salt reduction at <http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/> and has collected information on technologies and BMPs for reducing road salt at <http://des.nh.gov/organization/divisions/water/wmb/was/salt-reduction-initiative/tech-assist-bmpractices.htm>.

As noted above, MPCA also has a website devoted to road salt-related concerns at <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impairedwaters-and-tmdls/tmdl-projects/special-projects/metro-area-chloride-project/road-salt-and-waterquality.html>.

8. On page 23, the prospectus discusses developing objectives and standards for stormwater and snowmelt runoff. During the course of the study, it may be useful to review any conditions regarding road salt application/winter road maintenance included in Wisconsin MS4 permits, compare and contrast those conditions to similar elements included by other states, and highlight any areas in which Wisconsin MS4 permits might be modified to reduce the impact of road salt on surface- and groundwater resources.

It may also be advantageous to look at other frameworks or models for addressing deicing/chloride issues, in addition to MS4 permits, and to consider ways in which coordinating with the Wisconsin Department of Transportation, county and/or municipal public works departments, and private contractors might aid in efforts to reduce impacts of road salt use.

9. On pages 23 – 24, the prospectus discusses assembling general base maps of the study area. It may be helpful to include permitted wastewater outfalls and storm sewer outfalls among the layers represented on these maps, as both can convey chloride-/ion-rich water and may impact receiving water quality. To the extent that water quality data exist for specific waterbody segments, these maps may help in evaluating whether segments are impacted by stormwater, wastewater, or both.
10. On pages 30 – 33, the prospectus discusses obtaining data on road and private property antiicing and de-icing practices and quantities of salt used per year. It may also be useful to request information on whether salts other than sodium chloride (or other products) were/are used and, if so, the quantities used.
11. On page 45, the prospectus lists sources of chloride to POTWs and private wastewater treatment facilities. As noted above, wash water from salt spreader trucks, runoff from salt storage areas, wastewater from car washes, and hauled sanitary waste may contribute to chloride in wastewater treatment plant influent. In addition, municipal drinking water facilities (where water is softened), reverse osmosis reject water, inflow and infiltration (e.g., from leaky manholes), and waste from laundries can contribute to chloride levels in wastewater.
12. On page 49, the prospectus discusses delineating areas for analysis based on several factors, including the presence of wastewater treatment plant outfalls. It may be advantageous to also consider stormwater drain outfalls, since they may also convey chloride-rich snowmelt into surface waters.
13. On page 53, the prospectus describes anticipated work products. It may be important to consider the likely users of the information and to speak with those potential users to see what type(s) of work products would be most useful to them, prior to determining the form(s) that any work products may take. In addition, it is likely that the information produced by the study will be of value to a diverse cross-section of the population, and the appropriate form in which the information is presented may change depending upon the user.

EXHIBIT D

Figure 6

TIMING OF MAJOR WORK ELEMENTS OF PROPOSED ROAD SALT STUDY

Work Element	Year One												Year Two												Year Three												Year Four											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Detailed Study Design and Study Organization	■	■																																														
Formulation of Objectives and Standards			■	■																																												
Inventory																																																
Mapping					■																																											
State, County, and Municipal Road Maintenance Practices					■	■	■	■	■	■	■																																					
Private Facility Salt Use												■	■	■	■	■	■																															
Climatological Data																	■																															
Surface Water Quality Data	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																									
Groundwater Quality Data																		■	■																													
Land Use Data												■																																				
Natural Resource Base Data																				■																												
Other Sources of Salt Contamination of Surface Water and Groundwater																					■	■																										
Analyses and Forecasts																								■	■	■	■	■	■																			
Climatological, Surface Water, Groundwater, and Water Quality Data																								■	■	■	■	■	■																			
Existing and Planned Land Use and Transportation System Data and Road Salt Application Data																															■	■	■	■														
Natural Resource Base																																																
State-of-the-Art of Winter Road Maintenance																																																
Study Findings and Recommendations																																																
Publication of Report																																																

EXHIBIT E

Tables 4 and 5

RECOMMENDED FUNDING STRATEGY FOR SOUTHEASTERN WISCONSIN REGIONAL ROAD SALT IMPACT STUDY

Agency	Year 1	Year 2	Year 3	Year 4	Total
SEWRPC	\$167,418	\$167,418	\$119,083	\$119,083	\$ 573,002
WisDOT	\$167,417	\$167,416	\$119,083	\$119,083	\$ 572,999
WDNR	\$167,417	\$167,416	\$119,083	\$119,083	\$ 572,999
Total	\$502,252	\$502,250	\$357,249	\$357,249	\$1,719,000

Source: SEWRPC.

#227823 – ROAD SALT PROSPECTUS TAC MTG SUMMARY NOTES 09/08/2015
200-1000
MGH/JEB/kmd
09/29/15, 10/06/15, 10/12/15