MINUTES OF THE SEVENTEENTH MEETING
SEWRPC REGIONAL WATER SUPPLY PLANNING ADVISORY COMMITTEE

DATE: February 19, 2008

TIME: 9:30 a.m.

PLACE: Lower Level Conference Room
Regional Planning Commission Offices
W239 N1812 Rockwood Drive
Waukesha, Wisconsin

MEMBERS PRESENT

Kurt W. Bauer, Chairman	Executive Director Emeritus, SEWRPC
Robert P. Biebel, Secretary	Special Projects Environmental Engineer, SEWRPC
Julie A. Anderson	Director, Racine County Division of Planning and Development
Kenneth R. Bradbury	Hydrogeologist/Professor, Wisconsin Geological and Natural History Survey
Douglas S. Cherkauer	Professor of Hydrogeology, University of Wisconsin-Milwaukee
Lisa Conley	Representative, Town and Country Resource Conservation and Development, Inc.
Michael P. Cotter	Director, Walworth County Land Use and Resource Management Department
Charles A. Czarkowski	Regional Water Program Expert, Wisconsin Department of Natural Resources, Southeast Region
Daniel S. Duchniak	General Manager, Waukesha Water Utility, City of Waukesha
Franklyn A. Ericson	Manager, Environmental Operations & Central Services, S.C. Johnson & Son, Inc.
Thomas M. Grisa	Director of Public Works, City of Brookfield
Terrence H. Kiekhaefer	Director of Public Works, City of West Bend
Mark Lurvey	Agricultural Business Operator
George E. Melcher	Director, Kenosha County Department of Planning and Development
Matthew Moroney	Executive Director, Metropolitan Builders Association of Greater Milwaukee
Paul E. Mueller	Administrator, Washington County Planning and Parks Department
Michael P. Rau	General Manager, We Energies-Water Services
Edward St. Peter	General Manager, Water Utility, City of Kenosha
Dale R. Shaver	Director, Waukesha County Department of Parks and Land Use
James Surfus	Senior Environmental Engineer, Miller Brewing Company
Daniel S. Winkler	Director of Public Works and Utilities, City of Lake Geneva
Steven N. Yttri	General Manager, Water and Sewer Utility, City of Oak Creek

MEMBERS EXCUSED OR OTHERWISE ABSENT

Thomas J. Bunker	Representative, Water and Wastewater Utility, City of Racine
Charles P. Dunning	Hydrologist, U.S. Geological Survey
David Ewig	Water Superintendent, City of Port Washington
Jeffrey A. Helmuth	Hydrogeologist Program Coordinator, Wisconsin Department of Natural Resources, Madison

Andrew A. Holschbach	Director, Ozaukee County Planning, Resources, and Land Management Department
Eric J. Kiefer	Manager, North Shore Water Commission
Thomas J. Krueger	Water and Wastewater Utility Director, Village of Grafton
Carrie M. Lewis	Superintendent, Milwaukee Water Works, City of Milwaukee
Jeffrey Musche	Administrator/Clerk, Town of Lisbon
George A. Torres	Director, Milwaukee County Department of Transportation & Public Works

GUESTS

Daniel R. Butler	Engineer, Ruekert & Mielke, Inc.
David J. Hart	Hydrogeologist, Wisconsin Geological & Natural History Survey
Randall R. Kerkman	Administrator, Town of Bristol
Peter R. Schoephoester	Geographic Information Specialist, Wisconsin Geological and Natural History Survey
Steven H. Schultz	Department Head, Water Supply and Wastewater Treatment, Ruekert & Mielke, Inc.
Jodi Habush Sinykin	Midwest Environmental Advocates
Ben W. Wood	Engineer, Strand Associates, Inc.

STAFF

Joseph E. Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Kenneth R. Yunker	Deputy Director, Southeastern Wisconsin Regional Planning Commission

CALL TO ORDER AND ROLL CALL

Chairman Bauer called the meeting to order at 9:30 a.m. Roll call was taken by circulating an attendance signature sheet, and a quorum declared present.

CONSIDERATION OF MINUTES OF THE MEETING OF NOVEMBER 27, 2007

Chairman Bauer noted that copies of the minutes of the November 27, 2007, meeting of the Committee had been provided to all members of the Committee for review prior to the meeting, and asked that the Committee consider approval of those minutes.

Chairman Bauer reminded the Committee members that all of the revisions which the Committee directed to be made in the materials reviewed at that meeting were intended to be fully documented in the minutes, or in attachments thereto. He noted that approval of the minutes would constitute approval of the SEWRPC staff memorandum entitled "Conceptual Framework for Existing and Future Condition Alternative Plans to Be Considered Under the Regional Water Supply Planning Program for Southeastern Wisconsin, Revised December 19, 2007;" the first portion of Chapter VIII, "Alternative Plans: Description and Evaluation," pages 1 through 17; and Appendix I, "Methodology for Analyzing Water Supply System Capacities and for Developing System-Level Alternative Plans," revised December 19, 2007. He noted that the approvals would be subject to any comments received today on the minutes and the attachments thereto.

Mr. Yttri referred to the second full paragraph on page 3 of the minutes and indicated that the response to Mr. Sullivan's questions on the capacity-related comments of Table 1 of the SEWRPC staff memorandum entitled "Conceptual Framework for Existing and Future Condition Alternative Plans to Be Considered under the

Regional Water Supply Planning Program for Southeastern Wisconsin," Revised August 31, 2007, had required further discussion and consideration after the meeting. He noted further, that it was agreed to make changes to Table 1 as a result of that follow-up discussion. He indicated that the minutes failed to reflect this. Mr. Biebel agreed and indicated this would be clarified in the minutes of today's meeting.

[Secretary's Note: In order to clarify the minutes of the November 27, 2007, meeting, it is noted that following the August 21, 2007, Advisory Committee meeting, the bases for the capacity comments as set forth in Table 1 of the August 31, 2007, staff memorandum were discussed further by Messrs. Yttri and Biebel in a telephone conversation. In that discussion, it was agreed to add a footnote to the capacity comment abbreviations EX-00 and EX, as they apply to existing customer utilities of the City of Oak Creek Water Utility to indicate that the Oak Creek Utility water treatment plant was designed to be expanded to a capacity of 48 mgd. The footnotes were included in the revised version of the staff memorandum attached to the November 27, 2007, minutes and in the revised memorandum attached to these minutes.]

Ms. Conley referred to page 12 of the minutes and noted that while the planning effort did discuss means of enhancing the use of rainwater in the context of water conservation measures, the planning report to date has not discussed rainwater as a source of supply, nor has there been a quantification on the amounts of rainwater available and the amounts lost. Mr. Biebel responded that rainwater may be a source of supply if rainwater harvesting systems are used. However, groundwater, which is recharged by rainwater, is the typical source of supply within the Region. He noted that a great deal of attention was being given in the work to that source of supply and the impacts of alternative plans on it. He noted that there would be an opportunity to consider rainwater harvesting under the high-level water conservation subalternative to be considered after the initially preferred alternative plan is considered. Chairman Bauer noted that there was a detailed discussion on precipitation in Chapter II of the report. He suggested that Ms. Conley and Mr. Biebel together review that section of Chapter II to determine if it should be expanded to address Ms. Conley's concern.

[Secretary's Note: Following the meeting, the precipitation section of Chapter II was expanded by Mr. Biebel and Ms. Conley to more-specifically quantify the amounts of precipitation in relationship to groundwater recharge potential. The revised precipitation section is attached hereto as Exhibit A.]

Mr. Duchniak referred to the last paragraph on page 2 of the minutes. He noted that that paragraph referred to the SEWRPC staff memorandum dated December 19, 2007, which conceptually described the alternative plans to be considered. Mr. Duchniak pointed out that under Alternative Plan 4, as described on page 6 of the memorandum, a number of communities, including the City of Waukesha, were to be connected to a Lake Michigan supply. He noted that there was no specific information on the method of providing the required return flow and asked what was envisioned. Mr. Biebel responded that it was proposed to provide the return flow by a pipeline discharging to Lake Michigan. It was recognized, he said, that the City of Waukesha had been evaluating providing the return flow by pipeline discharging to one of the streams tributary to Lake Michigan, such as the Root River or the Menomonee River. A brief discussion ensued, upon the conclusion of which, it was agreed to modify the staff memorandum concerned to indicated that under Alternative Plan 4, the means of providing the required return flow would be considered under two subalternatives—one with a pipeline discharging to Lake Michigan and one with a pipeline discharging to a stream tributary to Lake Michigan.

[Secretary's Note: The first partial paragraph on page 7 of the December 19, 2007, staff memorandum has been expanded to include text on the means for the return flow to be considered under subalternatives, one providing for a pipeline discharge to Lake Michigan, and one pipeline discharging to a tributary stream. The added text is included in the revised version of the staff memorandum attached to these minutes.]

Mr. Biebel asked Mr. Duchniak to share any information developed by the City in this report. Mr. Duchniak indicated that he would do so.

Mr. Grisa referred to the several references to Lake Michigan return flow in the December 19, 2007, staff memorandum. He noted that there were a number of options which could be considered for providing all or portion of the required return flow. He cited as an example return flow comprised of the increased amount of surface runoff due to development in areas served by Lake Michigan water and located east of the subcontinental divide. He recommended that the plan description include text which leaves open such options for more-detailed local evaluation. A brief discussion ensued, upon the conclusion of which it was agreed to revise the December 19th staff memorandum to indicate that there were other options for utilities to consider in providing the required return flow component of a Lake Michigan supply plan.

[Secretary's Note: In order to recognize that all or portions of the required return flow may be provided in a number of innovative ways, the first partial paragraph on page 7 of the December 19, 2007, staff memorandum concerned was revised. The revised memorandum is attached to these minutes.]

Mr. Rau referred to the second full paragraph on page 5 of Chapter VIII. He noted that the basic costs were stated to have an accuracy of minus 30 to plus 50 percent. However, there were other factors noted which tended to make the costs more accurate. He noted that the expected composite accuracy was not stated. Mr. Biebel noted that in system-level planning for sewerage system conducted under the regional water quality management planning alternative plan, cost estimates which were found to be within 10 percent of each other were considered to be the same. After further discussion, it was agreed to revise the text of the chapter to address the expressed concern.

[Secretary's Note: The text of the second full paragraph on page 5 of Chapter VIII has been expanded to identify a specific range for which the estimated costs of the alternative plans may be expected to differ. The additional text is included in the revised version of Chapter VIII transmitted with these minutes.]

In answer to a question by Mr. Rau, Mr. Biebel indicated that the cost analyses would include a credit for any anticipated reduction in individual home treatment costs in areas which are converted from a groundwater to a Lake Michigan supply.

[Secretary's Note: The cost tables and related text in Chapter VIII have been revised to include a credit to reflect the potential disconnection of water softeners in areas served by either public or private groundwater supplies which are changed to a Lake Michigan supply. In cases where the area is served by individual wells and there is a need to install new local distribution systems, the saving in water softener costs are reflected in footnotes since these would be an offsetting cost of the distribution system. Neither the cost of the distribution system nor the savings in water softening is reflected directly in the cost tables. These costs and savings are common to all alternative plans. In cases where the areas are served by public systems using groundwater which is converted to a Lake Michigan supply, no offsetting distribution system costs are involved and the savings in water softening costs are included directly in the alternative plan costs with explanatory footnotes. The revised tables are included in the revised version of Chapter VIII transmitted with these minutes.]

Mr. Yttri referred to Table I-1 of Appendix I. He noted that the columns indicating year 2000 and year 2035 surplus maximum day capacities were based upon a comparison of the reliable plant capacity, defined as the capacity with one unit out of service, to the maximum day demand. He indicated that the text in the fourth paragraph on page 8 describing the reliable capacity implied that redundant plant units were required under

Chapter NR 811 of the *Wisconsin Administrative Code*. Mr. Biebel indicated that such an interpretation was not intended. After further discussion, it was agreed to revise the appropriate section of the text and to footnote the table column in order to clarify this matter.

[Secretary's Note: In order to clarify the intent of the use of reliable capacity in evaluating the existing systems, the fourth full paragraph on page 8 of Appendix I was revised. In addition, a footnote was added to the two columns in Table I-1 relating to "Surplus Maximum Day Supply Capacity." The revised text and table are included in the revised copy of Appendix I transmitted with these minutes.]

Mr. Yttri referred to Table VIII-1 of Chapter VIII and indicated he was uncomfortable with the relatively high operation and maintenance costs which were indicated for the City of Oak Creek facilities. He noted that such costs were not included for other utilities, even though they would be operating and maintaining existing facilities. Mr. Yttri questioned the logic of including such costs for new facilities, but not existing facilities. He indicated that, accordingly, his approval of the minutes would have to be qualified to exclude Table VIII-1. Mr. Biebel indicated that the intent was to quantify the capital and the operation and maintenance costs for all new facilities associated with each alternative plan, including the development of 50-year present worth costs. He indicated it would be impractical to include such costs for all of the existing facilities included under each of the alternative plans. Because each utility typically had a number of existing facilities, often constructed at different times, the development of the replacement costs based upon service lives needed for the present worth analysis would be a detailed and extensive process. More importantly, he noted that the vast majority of the existing facilities and their capital and operation and maintenance costs would be common to all alternatives and the comparison between alternatives would be masked because of the large present worth value of the capital and operation and maintenance costs associated with existing facilities. Accordingly, he indicated it was intended to account only for the costs attendant to those existing facilities which varied under the alternative plans. He indicated that the approach represented a fair and technically sound method for evaluating the costs of alternative plans. He noted further that for the recommended plan, the operation and maintenance costs of all existing facilities would be included, along with the capital and the operation and maintenance costs of all new facilities in order to present complete costs for the recommended plan. Mr. Yttri indicated he was not yet convinced of the fairness of the approach. It was generally agreed that Messrs. Yttri and Biebel would discuss this matter further.

[Secretary's Note: Following further telephone discussion on this matter, Mr. Yttri indicated that he would have to reserve judgment in this matter pending presentation and review of the costs for all of the alternative plans.]

Mr. Duchniak referred to the text summarizing the groundwater-surface water impacts of Alternative Plan 1 on pages 16 and 17 of Chapter VIII. He recommended that the text be expanded to address the topic of surface water quality. Mr. Biebel responded that such a text would have be to largely qualitative in character, since no surface water quality modeling or analyses were proposed to be made under the alternative plan preparation and analysis. He acknowledged that there could be some value in qualitatively presenting information on surface water quality, for example, related to the issue of chloride loadings on surface water due to the need for softening groundwater. After further discussion, it was agreed to add text to the groundwater-surface water impacts section of Chapter VIII.

[Secretary's Note: The requested text has been added in the section under the heading "Evaluation of Environmental and Other Impact," on page 8, and to the section under the heading "Surface Water Impacts," on pages 16 and 17. The added text is included in the revised version of Chapter VIII transmitted with these minutes.]

In answer to a question by Mr. Grisa, Mr. Biebel indicated that Table VIII-1 included capital and operation and maintenance costs for all new wells needed under Alternative Plan 1, but not for existing wells.

There being no further corrections or additions, the minutes of the meeting of November 27, 2007, were approved as amended, on a motion by Mr. Yttri, seconded by Mr. Ericson, and carried unanimously.

CONSIDERATION OF TECHNICAL REPORT ENTITLED *GROUNDWATER RECHARGE IN SOUTHEASTERN WISCONSIN ESTIMATED BY A GIS BASED WATER-BALANCE MODEL*

Chairman Bauer then asked the Committee to consider Agenda Item 3. He noted that all Committee members had received a copy of the technical report entitled *Groundwater Recharge in Southeastern Wisconsin Estimated By a GIS Based Water-Balanced Model,* dated July 11, 2007 and January 8, 2008, for review prior to the meeting. He noted that the report was one of three technical reports being prepared by the Wisconsin Geological and Natural History Survey, the University of Wisconsin-Milwaukee, and the U.S. Geological Survey in support of the regional water supply planning program. The second of the three reports, he said, is to be considered under Agenda Item 4, while the third report is under preparation and relates to an evaluation of the urban development densities which can be supported by private wells under varying assumptions related to the hydrogeologic setting and to the type of sewer system used. He noted that the three reports were intended to be published as SEWRPC technical reports.

Chairman Bauer reported that Dr. Kenneth R. Bradbury, a Committee member, Dr. David Hart, and Mr. Peter R. Schoephoester of the Wisconsin Geological and Natural History Survey, the authors of the groundwater recharge report, were in attendance. He then asked Dr. Hart to review the groundwater recharge report with the Committee on a page-by-page basis. The following comments were made, questions asked, and actions taken during the review.

Mr. Biebel pointed out that larger-scale maps illustrating the findings of groundwater recharge area analyses for each county were displayed along the south wall of the room.

Mr. Shaver noted that on page 8 it was indicated that model inputs included the Natural Resources Conservation Service (NRCS) hydrologic soil groups and other NRCS data as a basis for estimating the infiltration potential and available water storage capacity of the soils. He indicated that use of the NRCS data as a basis for estimating the water-holding capacity of the soils, was reasonable. He indicated, however, that if the data for the A and B soil horizon were being used as a basis for estimating infiltration rates, that could potentially bias the model due to the possible site-specific conditions, such as the locations of clay lenses below the A and B soil layers. Dr. Hart responded that in the absence of site-specific soil boring data, the NRCS hydrologic soil group data were considered to be the best data available for use in the modeling as representing the infiltration characteristics of the soil materials above the water table.

In answer to a question by Mr. Moroney, Dr. Hart indicated that the effects of the presence of agricultural drain tiles were not specifically taken into account in the modeling. Mr. Biebel noted that such tiles would generally be used in areas with poorly drained soils, and thus, with relatively low infiltration rates. He noted some large farm tracts were shown on the infiltration maps as having a low infiltration capacity. He noted that these farm tracts were covered by soils having low infiltration category, and that these likely included tiled farm fields.

Dr. Hart referred to the last sentence in the first full paragraph on page 8 and noted that the word “less” should be changed to “more” and the word “more” should be changed to “less.”

Mr. Grisa asked how the timing of the rainfall events was accounted for. Dr. Hart indicated that the model was operated with daily rainfall input data and that antecedent moisture conditions were considered in the model.

Mr. Shaver recommended, and it was agreed that the sources of the figures be included for consistency with other reports.

In answer to a question by Mr. Grisa, Dr. Hart indicated that the land use data used in the modeling represented year 2000 land use conditions. He indicated further that 1997 climate data was used as that year was considered as

a good representation of a typical year. Mr. Grisa indicated surprise and noted that there were two major floods in that year. Mr. Shaver recommended, and it was agreed, that the climate year data be checked for the climate and weather data used.

[Secretary's Note: The text on page 7 has been revised to indicate the basis for using climate year 1969 as the basis for the modeling. After review and discussion with the WDNR and USGS staff, the typical climate year was revised to 1969. This is consistent with the climate year used for the Source Loading and Management Model (SLAMM) used for estimating pollutant runoff. The revised text is included in the revised version of the technical report transmitted with these minutes.]

Mr. Ericson referred to Figure 5, and noted that Figure 5a was more detailed than Figures 5b and 5c. He questioned the basis for this. Dr. Hart responded that Figure 5a was based upon modeling using 30 meter by 30 meter grid cells which were then aggregated and smoothed to create polygons about 80 acres in size. He indicated Figures 5b and 5c were developed on a subwatershed basis.

Dr. Cherkauer referred to Figure 6b and recommended that the legend be expanded to indicate that the white areas represented areas for which USGS baseflow estimates were not available.

Mr. Grisa asked if the modeling accounted for the potential increased contributions to groundwater from stream flows supplemented by sewage treatment plant effluent. Dr. Hart indicated in the negative, noting that the model only considered precipitation-related infiltration. Dr. Bradbury indicated that increased infiltration along streams, the flows of which were augmented by sewage treatment plant effluent, probably represent a relatively minor increase to the infiltration because of the limited area and hydraulic head variation involved.

Ms. Conley asked the significance of the black line on Figure 8. Dr. Bradbury indicated that the line represented the location of the deep aquifer divide in the year 2000, based upon the high points of the potentiometric surface in that year. Dr. Hart indicated groundwater in the deep aquifer west of the divide flowed to the west, and groundwater east of the divide flowed to the east. Dr. Bradbury indicated that the deep aquifer groundwater divide has moved westward over the last 75 years due to pumping. Mr. Grisa questioned whether or not the divide would move easterly if the groundwater recharge areas were protected and the deep aquifer pumping was reduced. Mr. Biebel indicated that the predevelopment divide was east of the current location near the Jefferson-Waukesha county line. Dr. Cherkauer noted that the boundary would be simulated in the regional model for the recommended plan. He noted that augmenting recharge would stabilize the boundary. After further discussion, it was agreed to add text after the first partial paragraph on page 16 to explain the relationship of recharge to the deep aquifer divide.

[Secretary's Note: The text on page 16 has been expanded to include information on the deep aquifer groundwater divide and its relationship to recharge and pumping. The expanded text is included in the revised version of the technical report transmitted with these minutes.]

Mr. Shaver noted that a number of means were available for maintaining and increasing infiltration within recharge areas, including the use of lower-density, conservation subdivision development, and stormwater management policies which require maintaining the natural—or predevelopment—infiltration characteristics. Mr. Biebel agreed, noting that the document being reviewed was a technical report, and that it was intended that the information presented could be used in developing recommendations that could be incorporated into the recommended water supply plan.

In answer to a question by Ms. Conley, Dr. Bradbury indicated that the recharge analyses assumed moderately leaky lake bottoms. Dr. Cherkauer indicated this was a sound assumption, as relatively few lakes had sealed bottoms.

Ms. Conley referred to the example of the source water or contributing recharge area delineation included in the report beginning on page 17. She asked if those types of delineations would be available for all important groundwater-dependent surface waters. Dr. Bradbury responded in the negative, indicating the intent of the report was to develop and demonstrate the methodology to be used for delineating the contributing areas. He indicated that development of such areas would take considerable effort. Mr. Biebel indicated that the application of the methodology in second-level planning efforts could be a recommendation of the final plan.

Mr. Shaver referred to the analyses on land use impacts for a portion of the Town of Genesee. He recommended that the climate data year for the rainfall component of the methodology be checked with the Source Loading and Management Model (SLAMM) which was developed by the Wisconsin Department of Natural Resources (WDNR) and used for estimating runoff pollutant loadings. Dr. Hart indicated he would investigate the feasibility of such a comparison.

[Secretary's Note: The authors of the report reran the model utilizing 1969 climate data as the basis for the precipitation record. That is the year of the climate data used in the SLAMM model analyses. The results of the revised analysis were very similar to the results obtained using 1997 as the climate year. Based upon the analyses conducted and the discussion with Mr. Roger Bannerman, WDNR, Water Resource Management Specialist, and Mr. Steve Corsi, USGS, Research Hydrologist, it was concluded that the 1969 climate year would be most appropriate. This provides consistency with the nonpoint source pollution loading analyses being conducted throughout the State.]

Mr. Winkler asked if the methodology used for determining the contributing groundwater source areas should be considered in revising the wellhead protection areas defined by the utilities. Mr. Czarkowski indicated that such modeling could be used to improve the wellhead protection area delineations. Dr. Bradbury noted that recharge is only one factor in delineating wellhead protection areas, and that while the modeling could and should be used in any redelineation of wellhead protection areas, other factors involved should also be considered.

Dr. Cherkauer noted that in the comparison of the Soil Water Balance model results described beginning on page 10, the Precipitation Runoff Modeling System data were empirical data confirmed with the Precipitation Runoff Modeling System model, rather than model output. Dr. Hart agreed and indicated he would clarify the report in this regard.

There being no further questions or comments, the technical report entitled *Groundwater Recharge in Southeastern Wisconsin Estimated By a GIS Based Water-Balanced Model,* dated July 11, 2007 and January 8, 2008, was approved as amended on a motion by Mr. Melcher, seconded by Mr. Moroney, and carried unanimously.

Mr. Biebel referred to the larger-scale display maps posted along the south wall of the room illustrating the recharge areas defined in the report, with the addition of an overlay showing the SEWRPC environmental corridors. He noted that, in many cases, the highest recharge category areas correlated with the environmental corridor areas. The intent, he said, would be to include these recharge maps in the planning report, together with recommendations for any needed corridor modifications. The inclusion of such recommendations in the planning report, he noted, had been requested by Mr. Mueller at the November 30, 2005, meeting of the Committee and that request was endorsed by the Committee at the meeting, for consideration at the proper time.

CONSIDERATION OF TECHNICAL REPORT ENTITLED *GROUND WATER BUDGET INDICES AND THEIR USE IN ASSESSING WATER SUPPLY PLANS FOR SOUTHEASTERN WISCONSIN*

Chairman Bauer then asked the Committee to consider Agenda Item 4. He noted that all Committee members had received a copy of the technical report entitled *Ground Water Budget Indices and Their Use in Assessing Water Supply Plans for Southeastern Wisconsin,* dated January 2008, for review prior to the meeting. He noted that this

was the second of the previously referenced three technical reports relating to groundwater which were being prepared under the regional water supply planning program. He noted that Dr. Douglas S. Cherkauer, a Committee member, was the author of the report, and then asked Dr. Cherkauer to review the report with the Committee on a page-by-page basis. The following questions were raised, comments made, and action taken in the course of the review.

Dr. Cherkauer noted that the groundwater indices report was intended to provide detailed descriptions of the indices, their use in evaluation of plans, and to present the indices for the first alternative plan. He indicated that indices would be developed for the other alternative plans and the report would be expanded to include those when the information becomes available. Mr. Biebel indicated that it was intended that the additional expanded report text would be submitted to the Committee for review.

Mr. Shaver referred to Figure 4 and noted the purple shaded areas where the demand to supply ratio was greater than one. He asked if those areas were influenced by shallow wells. Dr. Cherkauer replied in the affirmative indicating by example the Cedarburg-Grafton area in Ozaukee County.

Mr. Grisa noted that the demand to supply ratio and the human impacts ratio developed for the years 2000, 2005, and 2035 were developed by comparing conditions from each of those years to predevelopment conditions. Mr. Grisa noted that in the development of the objectives to be met by the plans the year 2005 current conditions was intended to serve as the base year for the comparison. Mr. Biebel agreed, indicating that the indices were designed to be constructed by comparing both 2005 and 2035 conditions to predevelopment conditions. However, for purposes of comparing alternative plans and for assessing the attainment of the plan objectives, the plans would be evaluated by comparing the indices for 2035 with those of 2005.

In answer to a question by Mr. Grisa, Dr. Cherkauer indicated that groundwater contributions from losses or gains attributable to sanitary sewer systems were not factored into the analyses.

Mr. Ericson asked why the color scale was different between Figures 3 and 4. Dr. Cherkauer indicated that it was because of the large differences in drawdown between the shallow aquifer and the deep aquifer. He noted, for example, that Figure 4 would include only small areas of green if the same color scale as in Figure 3 were used.

Mr. Duchniak referred to Figure 4 and noted that there was no indication of a demand to supply ratio problem in Walworth County. He asked how the Lake Geneva situation factored into that finding. Mr. Winkler responded that all the spent water was returned to the groundwater system via seepage cells after being processed at the City wastewater treatment plant. Mr. Biebel added that much of that returned flow is discharged to a small stream after flowing through the shallow aquifer system for about 2,000 feet. Mr. Duchniak asked if the recharged effluent comprised recharge for the City's wells. Mr. Winkler indicated that most of the recharged water probably was not tributary to the City's wells and, in any case, was not expected to become tributary for a long time into the future. Dr. Cherkauer responded that the groundwater recharge from the Lake Geneva seepage cells was considered in the analyses for the indices.

Mr. Grisa again reminded the Committee that the analyses of the baseflow reduction index does not include consideration of the return of sewage treatment plant effluent to surface waters. He indicated that such return could be important for maintaining baseflow in certain streams and that under certain of the alternative plans, that component of baseflow could be removed to the detriment of the stream ecology. Dr. Cherkauer referred to Figures 5 and 6 of Chapter VIII, noting that those figures indicated the areas were baseflow reductions of 10 percent and 25 percent had occurred along with an overlay indicating streams with significant wastewater treatment plant effluent inputs. He pointed out that the majority of the affected streams were not those with effluent inputs. He also noted that the discharge of effluent into streams results in a different thermal condition than occurs when the stream receives groundwater discharges and, thus, is not a true offset for losses in groundwater discharge inputs. Ms. Conley added that the discharge of wastewater treatment plant effluent to stream usually exports the water from the places where it is derived. Dr. Cherkauer agreed, but indicted one way to avoid that would be to put wells near the river downstream of the location were the effluent is discharged.

Mr. Shaver referred to Figure 9 and indicated that the evaluation of alternatives might be to compare them on the basis of the areas with greater than a 10 percent reduction in baseflow. He recommended that the scale be adjusted to illustrate that 10 percent reduction value. Dr. Cherkauer agreed and indicated he would revise the figure accordingly.

Mr. Winkler referred to Table 2 and noted that it appeared that the Waukesha County indices values skewed the regional totals for the deep aquifer indices. Dr. Cherkauer agreed that that was the case, but that it was appropriate as it reflected actual conditions.

Mr. Shaver referred to Tables 3 and 4. He suggested that table titles be revised to drop the word "future" and to add a colon followed by "2005 and 2035" at the end in order to be more consistent with the conventions being used in the other water supply reports. The change was duly noted.

Mr. Shaver asked if the baseflow reduction indices were calculated considering perennial or both perennial and intermittent streams. Dr. Cherkauer indicated that only perennial streams were simulated in the models being used.

Chairman Bauer indicated that the indices being developed by Dr. Cherkauer should provide an excellent basis for comparing some of the aspects of the alternative plans. He indicated that this was a unique methodology which has moved the state-of-the-art ahead. Mr. Biebel agreed and indicated that both of the reports presented illustrated analytical techniques which have not been here to fore applied nationally and raised the bar for such evaluations.

There being no further questions or comments, on a motion by Mr. Winkler, seconded by Mr. Shaver, and carried unanimously the portions of the technical report entitled *Ground Water Budget Indices and Their Use in Assessing Water Supply Plans for Southeastern Wisconsin*, dated January 2008, up through page 18 was approved as amended.

DATE AND TIME OF NEXT MEETING

After brief discussion, it was agreed that the next meeting of the Advisory Committee would be tentatively scheduled to be held at the Commission offices on Tuesday, April 22, 2008, beginning at 9:00 a.m. Chairman Bauer noted that for the next meeting the portions of Chapter VIII describing the remaining alternative plans was expected to be completed in draft from.

[Secretary's Note: The date of the next meeting was subsequently revised to May 20, 2008.]

ADJOURNMENT

There being no further business to come before the Committee, on a motion by Mr. Melcher, seconded by Mr. Duchniak, and carried unanimously, the meeting was adjourned at 12:15 p.m.

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#135024 V1 - RWSP MINUTES 02/19/08
KWB/RPB/pk
04/21/08

Exhibit A

SEWRPC Planning Report No. 52

A REGIONAL WATER SUPPLY PLAN FOR SOUTHEASTERN WISCONSIN

Chapter II

DESCRIPTION OF THE STUDY AREA

Precipitation

Precipitation within the Southeastern Wisconsin Region takes the form of rain, sleet, hail, and snow. It ranges from gentle showers of trace quantities to destructive thunderstorms. Major rainfall and snowmelt events can cause property and crop damage, inundation of poorly drained areas, and stream flooding.

Annual precipitation in the Region averages about ~~31~~ 32 inches, with the greatest amount concentrated in the six months of the growing season. The wettest months are June and July with about three to four inches, and the driest month is February with amounts of about one inch (Figure 8). ~~Between 70 to 80 percent of the average precipitation is lost by evapotranspiration, and 20 to 30 percent runs off in streams. Nearly two-thirds of the streamflow, however, is contributed by groundwater.~~

Of the average of 32 inches of precipitation, it is estimated that 70 to 80 percent is lost to evapotranspiration. Of the remaining precipitation water, part runs off and part becomes groundwater. Recharge of the shallow aquifer in the most of the area in the counties which utilize groundwater as the primary source of supply—Ozaukee, Walworth, Washington, and Waukesha Counties—is estimated to range from about three to six inches per year. Assuming an average of four inches per year of precipitation is recharged to the groundwater system in the areas of the four counties concerned, that equates to about 350 million gallons per day (mgd). The estimated daily use of groundwater during 2005 in the areas of the four counties concerned was about 71 mgd. This indicates that on an average annual basis, there is adequate recharge to satisfy the water supply demands on the shallow aquifer system of the areas concerned for years to come on an areawide basis. However, the availability on a localized basis will vary depending upon usage, pumping system configuration, and groundwater flow patterns. Furthermore, the conclusion on availability of shallow aquifer recharge does not consider the need for recharge to support groundwater supplies which result in discharge to surface waters. These issues are addressed further in Chapter VIII. The situation is different for the deep aquifers where withdrawals of groundwater cause supply-

demand imbalance in areas of concentrated use of groundwater, resulting in a declining potentiometric surface and mining of groundwater. Further analyses of the availability and sustainability of the aquifers is provided in Chapter VIII.

Precipitation and snowfall data for six representative precipitation observation stations in southeastern Wisconsin located on the Lake Michigan shoreline at Port Washington, Milwaukee, and Kenosha and inland at West Bend, Waukesha, and Lake Geneva are presented in Table 20 and Figure 8. The long-term annual precipitation and its departure from the long-term average for the stations located at Milwaukee and Waukesha are shown in Figure 9. One of the stations with the longest period of precipitation record is at Waukesha, starting in 1897 (Figure 9). These data, which encompass periods of record ranging from 57 to over 100 years for the various observation stations, illustrate the temporal and spatial variations in the type and amount of precipitation that normally occur within the Region.

Precipitation data indicate that Lake Michigan does not have as pronounced an effect on precipitation within the Region as it does on temperature. A minor Lake Michigan effect is evident in a rainfall reduction of up to about 0.5 inch per month in late spring and summer in the eastern areas of the Region relative to the western areas. This may be attributable to cool lake waters maintaining a cooler lower atmosphere, which inhibits convective precipitation.

The influence of Lake Michigan as a source of moisture is reflected by slightly higher seasonal snowfalls for the entire Region relative to inland areas lying west of the Region. Minor intraregional spatial snowfall differences occur in that seasonal snowfall tends to be greatest in the topographically higher northwest portion of the Region because moisture masses moving through that area are forced up onto the higher terrain, where low temperatures normally associated with increased height induce more snowfall than that which would occur in the absence of topographic barrier.

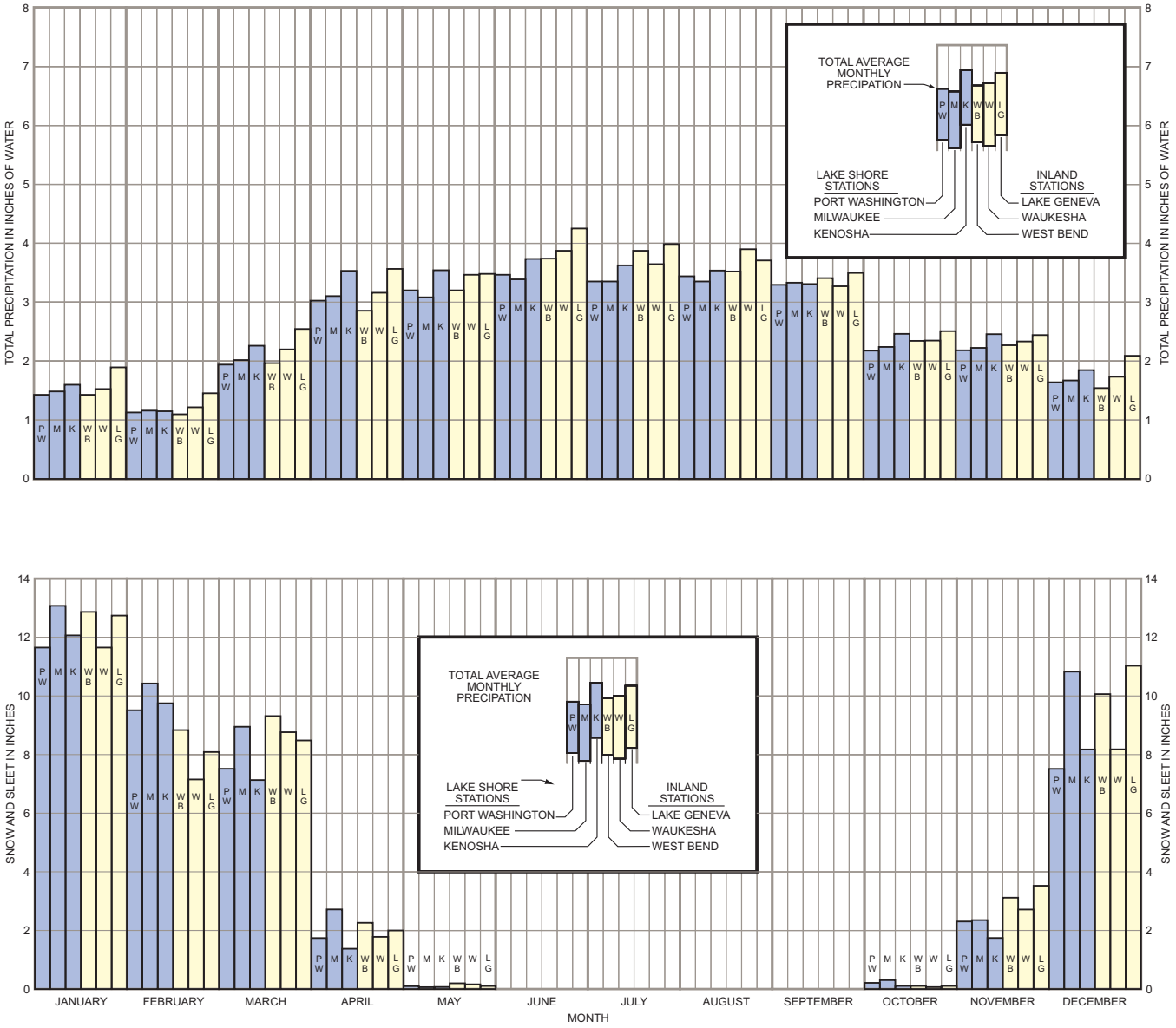
Extreme precipitation data for southeastern Wisconsin, based on observations for stations located throughout the Region for the 115-year period from 1870 to 1985, are presented in Table 21. The minimum annual precipitation within southeastern Wisconsin, as determined from the tabulated data for the indicated observation period, occurred at Waukesha in 1901, when only 17.30 inches of precipitation occurred, or 55 percent of the average annual precipitation of 31.30 inches for southeastern Wisconsin (Table 22). The maximum annual precipitation within southeastern Wisconsin occurred at Milwaukee in 1876, when 50.36 inches of precipitation was recorded, equivalent to 161 percent of the average annual precipitation.

Even though southeastern Wisconsin is located in a humid climatic zone with plentiful precipitation, drought periods—defined as prolonged and abnormal moisture deficiencies—are quite common and may cause problems

for agriculture and water supplies in the Region by depleting soil moisture, lowering groundwater and lake levels, and reducing streamflow. If drought conditions are defined as 85 percent or less of normal annual precipitation, there were at least 10 drought years at all stations in the Region during the last 60 years (Table 22). The most serious droughts occurred in 1958, 1962, and 1963—below 75 percent of normal at most stations. The wettest year on record occurred in 2000, when rainfall exceeded 135 percent of normal precipitation at several stations (Table 22).

Figure 8

PRECIPITATION CHARACTERISTICS AT SELECTED LOCATIONS IN THE SOUTHEASTERN WISCONSIN REGION



Source: National Climatic Data Center and SEWRPC.

Table 20

PRECIPITATION CHARACTERISTICS AT SELECTED LOCATIONS IN THE REGION

Month	Observation Station[a]												Regional Summary	
	Lakeshore Locations						Inland Locations							
	Port Washington		Milwaukee		Kenosha		West Bend		Waukesha[b]		Lake Geneva[c]			
	1940-2004	1894-2004[d]	1940-2004	1940-2004	1945-2004	1945-2004	1940-2004	1930-2004	1940-2004	1930-2004	1945-2003	1945-2003		
	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet	Average Total Precipitation	Average Snow and Sleet
January	1.43	11.7	1.48	13.1	1.60	12.1	1.43	12.9	1.52	11.7	1.91	12.7	1.56	12.3
February	1.13	9.5	1.17	10.4	1.15	9.8	1.08	8.9	1.23	7.1	1.45	8.1	1.20	9.0
March	1.92	7.5	2.02	9.0	2.26	7.1	1.95	9.3	2.20	8.7	2.53	8.5	2.15	8.3
April	3.03	1.7	3.10	2.7	3.54	1.4	2.86	2.3	3.16	1.8	3.57	2.0	3.21	2.0
May	3.20	0.1	3.08	0.1	3.53	0.1	3.20	0.2	3.45	0.2	3.49	0.1	3.32	0.1
June	3.46	0.0	3.39	0.0	3.73	0.0	3.75	0.0	3.87	0.0	4.24	0.0	3.74	0.0
July	3.35	0.0	3.35	0.0	3.61	0.0	3.87	0.0	3.64	0.0	3.98	0.0	3.63	0.0
August	3.44	0.0	3.35	0.0	3.53	0.0	3.51	0.0	3.88	0.0	3.70	0.0	3.57	0.0
September	3.28	0.0	3.33	0.0	3.30	0.0	3.40	0.0	3.27	0.0	3.50	0.0	3.35	0.0
October	2.17	0.2	2.23	0.3	2.46	0.1	2.35	0.1	2.34	0.0	2.52	0.1	2.34	0.1
November	2.18	2.3	2.21	2.4	2.46	1.7	2.27	3.1	2.32	2.7	2.44	3.5	2.31	2.6
December	1.64	7.5	1.67	10.8	1.84	8.2	1.54	10.1	1.73	8.2	2.08	11.0	1.75	9.3
Yearly Average	30.24	40.2	31.83	48.6	33.01	39.6	31.21	46.7	33.08	40.4	34.63	45.9	32.21	43.6

[a] *Observation stations were selected both on the basis of the length of record available and geographic location within the Southeastern Wisconsin Region. Port Washington, Milwaukee, and Kenosha are representative of areas where precipitation would be influenced by Lake Michigan, whereas West Bend, Waukesha, and Lake Geneva are typical of inland areas having precipitation that is not generally influenced by Lake Michigan. Kenosha and Lake Geneva are representative of southerly areas in the Region, whereas Port Washington and West Bend typify northern locations.*

[b] *Precipitation and snow and sleet data for Waukesha are not available for the period between 1988 and 1991.*

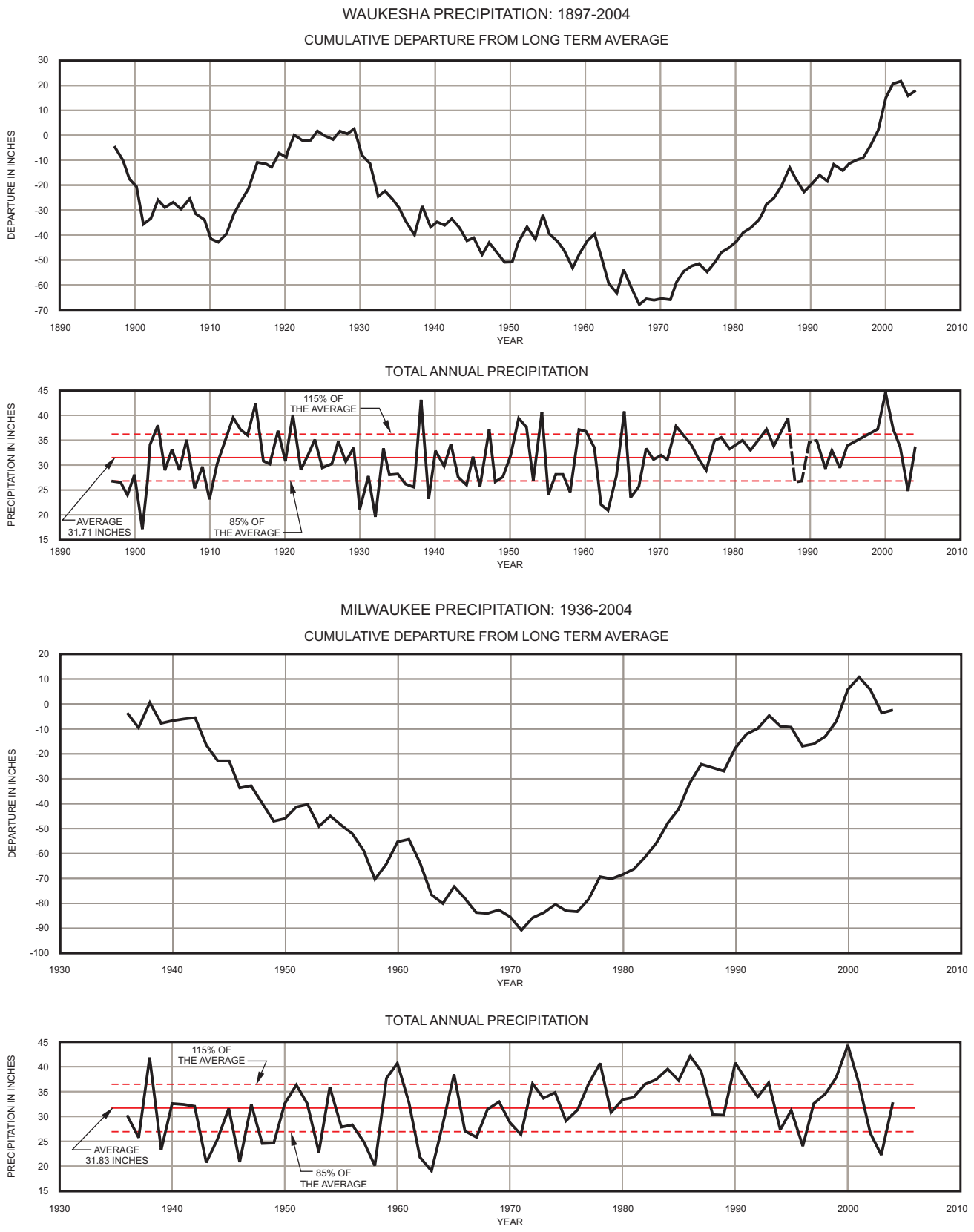
[c] *Data collection at the Lake Geneva observation station ended June, 2003.*

[d] *Snow and sleet data for Port Washington are based upon the periods 1894 to 1950 and 1960 to 1988; data are not available for the period 1951 to 1959.*

Source: National Climatic Data Center and SEWRPC.

Figure 9

MILWAUKEE AND WAUKESHA ANNUAL PRECIPITATION DATA



Source: National Climatic Data Center, University of Wisconsin-Extension, Wisconsin Geological and Natural History Survey, and SEWRPC.

Table 21

EXTREME PRECIPITATION PERIODS IN SOUTHEASTERN WISCONSIN: SELECTED YEARS, 1870 THROUGH 2004

Observation Station		Period of Precipitation Records, Except Where Indicated Otherwise	Total Precipitation						
			Maximum Annual		Minimum Annual		Maximum Monthly		
Name	County		Amount	Year	Amount	Year	Amount	Month	Year
Mitchell Field	Milwaukee	1870-2004	50.36	1876	18.69	1901	10.03	June	1917
Racine	Racine	1895-2004	48.33	1954	17.75	1910	10.98	May	1933
Waukesha	Waukesha	1892-2004	44.73	2000	17.30	1901	11.41	July	1952
West Bend	Washington	1922-2004	41.43	1984	19.72	1901	13.14[a]	August	1924
West Allis[b]	Milwaukee	1954-2004	42.85	1960	17.49	1963	9.63	June	1954
Mt. Mary College	Milwaukee	1954-2004	42.26	2004	18.50	1963	10.17	June	1968

[a]*Based on the period 1895 through 1959 in* A Survey Report for Flood Control on the Milwaukee River and Tributaries*, U.S. Army Engineer District, Chicago, Corps of Engineers, November 1964.*

[b]*Based on the periods 1954 to 1987 and 1998 to 2004.*

Source: U.S. Army Corps of Engineers, National Weather Service, National Climatic Data Center, and SEWRPC.

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