AMERICAN TRANSMISSION COMPANY

10-YEAR TRANSMISSION SYSTEM ASSESSMENT
2002 ASSESSMENT UPDATE

February 2003

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EXECUTIVE SUMMARY

This report is the update of the 2002 10-Year Assessment Report on the transmission facilities owned and service territory encompassed by American Transmission Company LLC (ATC). ATC's Initial Assessment report was issued in June 2001, an Updated Assessment report for 2001 was issued in February 2002, and ATC's 2002 Assessment was issued in August 2002. This Update describes changes to the 2002 Assessment through 2011, based on information provided by the local distribution companies, the latest transmission service requirements, interconnection requests, recent analyses conducted by ATC, input from various stakeholders at ATC-sponsored meetings and other developments. The 2003 10-Year Assessment report and Planning Zone meetings will cover material directly responsive to stakeholder input and requests received in 2002. The purpose of this 2002 Update report is to refresh the general content of the 2002 Assessment report in the interim.

This 2002 Update provides further foundation for continued public discussions on the transmission planning process, identified transmission needs and limitations, possible resolutions to those needs, and coordination with other public infrastructure planning processes.

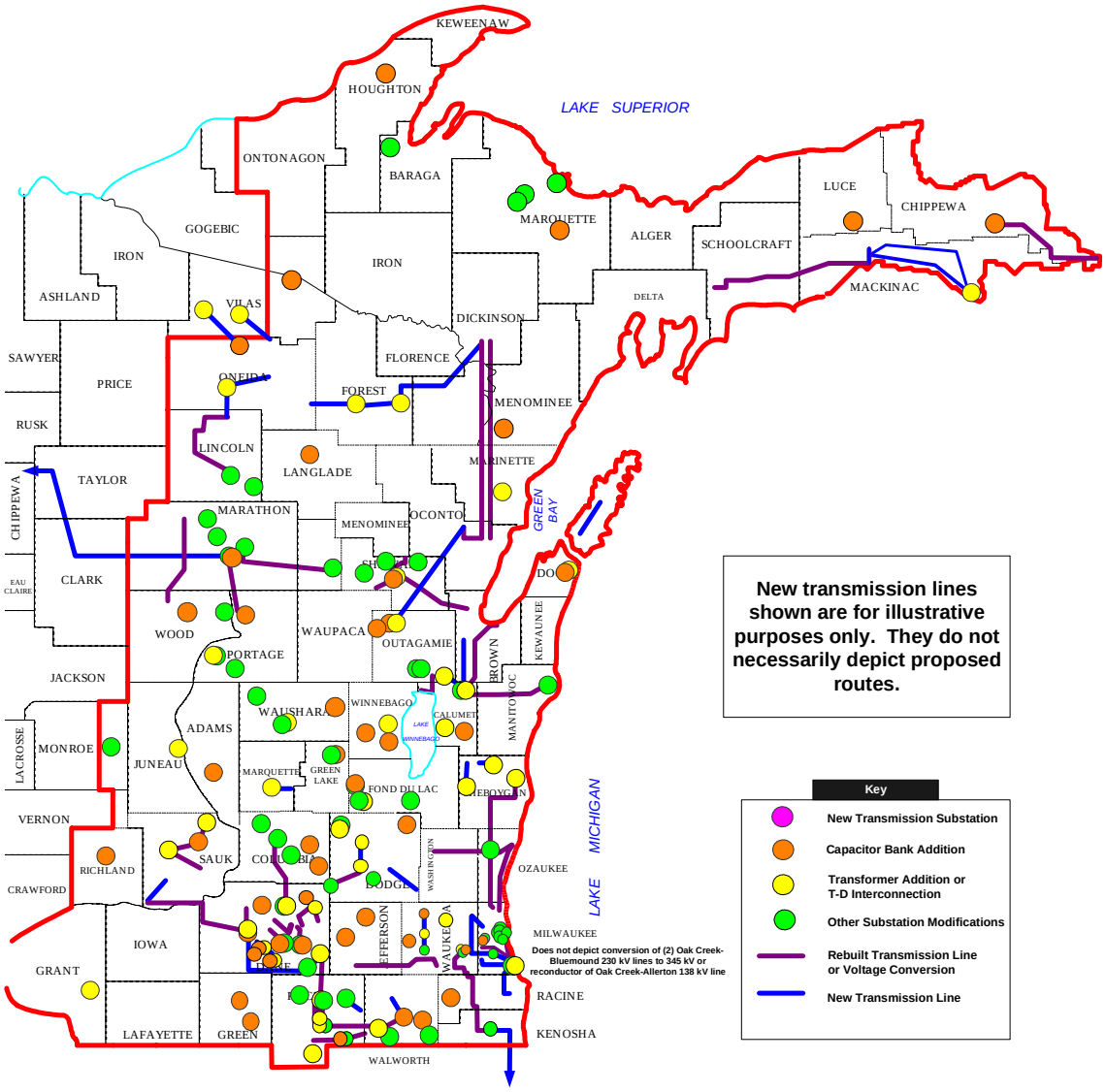
In total, this 2002 Update anticipates the following:

Table ES-1
Summary of American Transmission Company's
2002 Transmission System Assessments

	2002 Assessment	2002 Update
	(July 2002)	(February 2003)
New Transmission Lines Requiring New Right-of-Way		
345 kV	7 lines / 225 miles	7 lines / 225 miles
161 kV	---	---
138 kV	11 lines / 119 miles	13 lines / 128 miles
115 kV	4 lines / 51 miles	4 lines / 51 miles
69 kV	5 lines / 45 miles	5 lines / 45 miles
Existing Transmission Lines to be Rebuilt, Reconductored or Uprated		
345 kV	7 lines / 144 miles	5 lines / 102 miles
138 kV	35 lines / 610 miles	40 lines / 683 miles
115 kV	4 lines / 98 miles	4 lines / 98 miles
69 kV	11 lines / 44 miles	12 lines / 49 miles
New Transformers to be Installed		
(# of transformers / total capacity)	46 transformers / 12,030 MV A	44 transformers / 11875 MVA
New Capacitor Banks to be Installed		
(# of installations / capacity)	54 installations / 995 MVAR	47 installations / 960 MVAR

In addition, there are a number of potential alternative solutions identified in the Assessment and this 2002 Update for which ATC believes additional analyses are warranted. In these instances, potential alternative solutions have been identified to provide a basis for further discussion with customers and stakeholders.

Figure ES-1
PROPOSED TRANSMISSION SYSTEM ADDITIONS
2002 THROUGH 2011



Section I

ATC's PUBLIC PLANNING PROCESS

Introduction

ATC's public planning process is an important part of its overall operations. Customer and stakeholder input drive ATC processes and decisions. ATC conducted Planning Zone meetings in 2001 and 2002 to describe its planning process and solicit input on the process and on potential projects and associated right-of-way needs identified in its 2001 Assessment and Update and 2002 Assessment. More than 15,000 individuals and organizations were invited to attend. The Planning Zone meetings conducted during 2002 were as follows:

All ATC System	September 5	Appleton, Wis.
Zone 1 (north-central Wisconsin)	October 16	Rhinelander, Wis.
Zone 2 (Upper Peninsula of Michigan and northern Wisconsin)	October 15	Manistique, Mich.
Zone 3 (south-central/southwest Wisconsin and South Beloit, Illinois)	September 26	Janesville, Wis.
Zone 4 (northeast Wisconsin)	October 17	Green Bay, Wis.
Zone 5 (southeast Wisconsin)	September 12	Oak Creek, Wis.

At these meetings, customers and stakeholders provided comments and expressed a wide range of opinions regarding the 2002 Assessment Report and information presented by ATC. This input has been summarized in this 2002 Update (see Section II) and is being taken into account in the development of 2003 planning activities.

Although specific new transmission facilities are identified in this report to address certain needs and/or limitations, ATC will continue to solicit input on such proposed facilities from all interested parties before determining the ultimate solution for which ATC would pursue regulatory or other approval. While several projects planned for the next few years are considered preferred alternatives by ATC, projects planned beyond 2006, in general, should be considered as proxy solutions for resolving identified needs, and as a basis for additional discussion and refinement.

The needs and limitations identified in this Assessment are based on a current set of operational conditions, growth forecasts, proposed new generation and load interconnections, technical analyses, customer/stakeholder inputs and regulatory rules and requirements. Over time, new needs will appear and other needs may change. Transmission system conditions are fluid, and it is recognized that the transmission planning process must be able to respond to and incorporate changing needs and conditions. This process is iterative by nature, and with this assessment the ongoing cycle of needs identification, analysis, public input and solution development continues. In addition, federal policy on planning, construction and pricing of transmission is currently undergoing significant discussion.

Transmission Planning Approach

The fundamental underpinnings of ATC's approach to transmission planning are customer need and public input. ATC intends to propose transmission options to resolve customer needs as expressed through load growth forecasts, new load interconnection requests, long-term transmission service requests, generation interconnection requests, need for improved operational reliability, need for resolution of local and regional congestion, need for replacement of old facilities, need for increased operational efficiency, and so on. To facilitate acceptance and implementation of any proposed plans, ATC believes the public, including all stakeholders, must be invited to participate in an open, iterative, and interactive public planning process.

To design the most efficient and effective ways of meeting customer needs, ATC has developed a process encompassing four levels of planning:
Base – Individual Issue
Second – ATC Planning Zone
Third – ATC System
Fourth – Regional/National.

Needs and potential solutions are developed at each level and then vetted against those at the next level, until the most effective overall plans addressing the combined needs are developed. ATC performs the first three levels of planning for its area, and then works with the Midwest Independent System Operator (MISO) to incorporate resolution of fourth level issues identified through the broader regional planning process facilitated by MISO[1]. ATC is also an active participant in MAIN and NERC reliability assessments of regional and eastern interconnection transmission systems.

The results of ATC's ongoing planning activities are presented in its 10-Year Transmission System Assessment reports, issued approximately every six months to respond to the most current mix of needs and issues. The purpose of these reports is to illustrate identified needs and potential solutions and provide the foundation for public discussion and participation in shaping the ultimate plans to be proposed. ATC then periodically holds public meetings and other communication activities to inform and interact with interested stakeholders, including customers, public officials, regulators, environmental groups and other members of the public. The purpose of these meetings is to present identified needs and justification for projects in each area, facilitate identification of the most acceptable routes for any new transmission, allow for development and consideration of any additional alternatives which interested entities may want to propose to address identified needs, and receive public input to incorporate into future revisions of proposed plans. Communications activities are ongoing as the overall planning process continues through subsequent iterations.

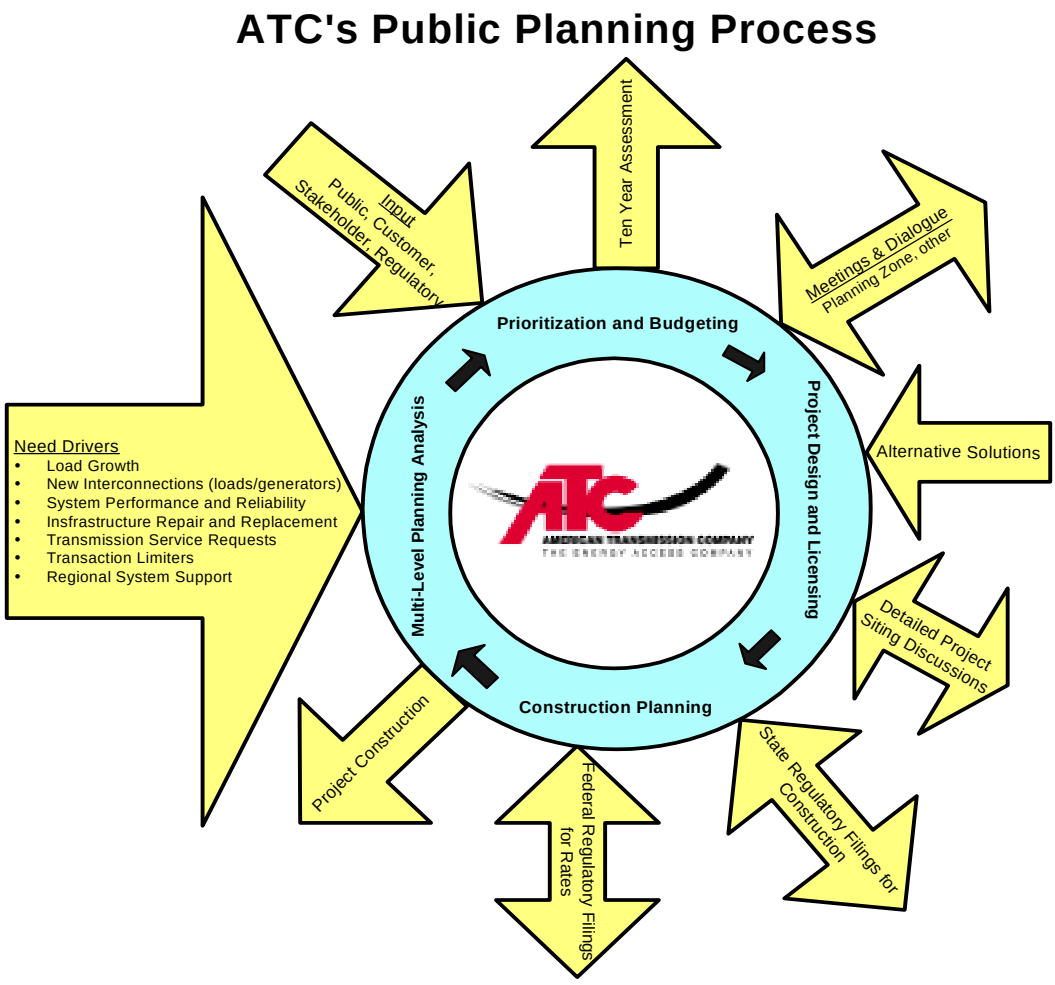
The planning, permitting and construction cycle for transmission takes longer than for most other alternative solutions. If identified needs are addressed effectively through alternative solutions, ATC will defer or cancel proposed transmission projects. If the needs remain, ATC will proceed with its projects, which have been effectively tailored

[1] MISO is in the process of producing its first regional expansion plan, expected to be released in spring 2003.

through this iterative public input process. Public communication and discussion related to specific projects become more focused and targeted as necessary regulatory filing dates approach.

ATC strives to achieve its objectives of providing reliable service and an adequate transmission infrastructure to meet its customers' needs. This planning approach will make this achievement possible by facilitating development of the most effective mix of projects to meet those needs in a timely fashion. Public participation in this process is vital to its success, as the best plans do no good unless they can actually be implemented, and implemented in time. Communicating openly, early and often is the best way to achieve public awareness and acceptance of needs and solutions, and to illustrate responsiveness to public concerns which may otherwise prevent or delay necessary projects.

The figure below depicts ATC's planning process. The blue circle represents ongoing, continuous core ATC activities. Against that backdrop, there are constantly changing inputs and outputs which affect and shape the core activities, and ensure that ultimate project construction is responsive to the current mix of needs and influences.

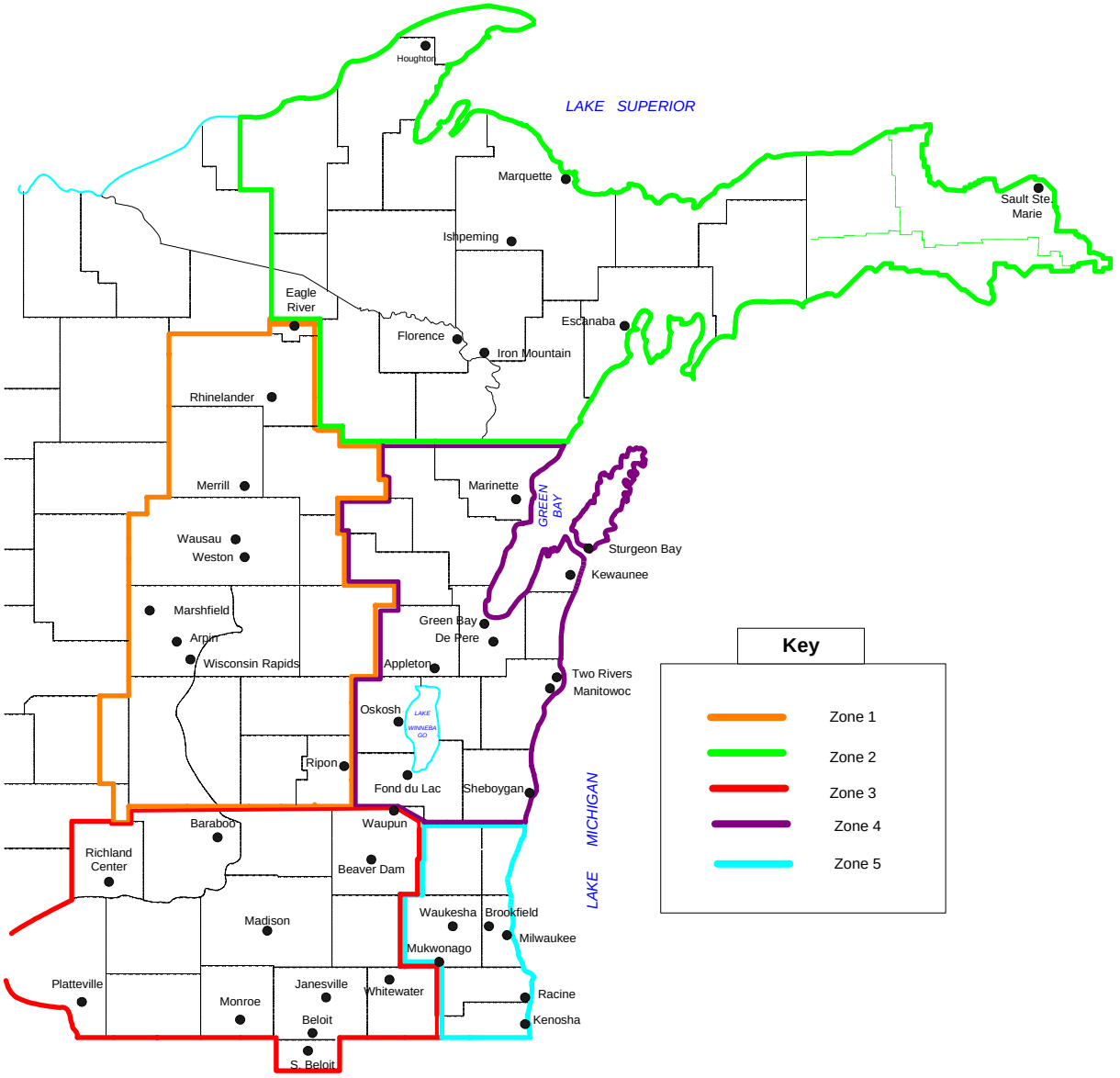


ATC Planning Zones

ATC utilizes the concept of planning zones in its Assessments of the transmission system within its service territory. Five planning zones have been defined representing distinct areas within which needs are compiled and assessed. As described above, zone level planning is one of four levels at which transmission system needs are assessed. ATC's five planning zones are shown in Figure I-1.

Figure I-1
ATC Planning Zones

Planning Zones were created to track locational energy issues. ATC has five zones: North CentralWisconsin, Michigan's Upper Peninsula and Northern Wisconsin, South Central/Southwest Wisconsin and North Central Illinois, Northeast Wisconsin and Southeast Wisconsin.



Section II

CUSTOMER AND STAKEHOLDER INPUT

Introduction

As described in Section I of this 2002 Update, ATC conducted a statewide meeting and five planning zone meetings during the fall of 2002 to describe its 2002 Assessment and to solicit feedback on ATC's public planning process as well as the Assessment. In addition, ATC has received comments on the 2002 Assessment from a number of its customers. This section of the 2002 Update summarizes the feedback from the statewide and zone meetings and from ATC customers. A more expansive list of feedback from the statewide and zone meetings is provided in Appendix B. While ATC acknowledges the supportive or complimentary comments received and will strive to continue to do those things that all or most customers or stakeholders indicated were valuable, the focus of that information is on those comments that constituted suggestions for improving the Assessment or the meetings themselves.

At these meetings, ATC conducted breakout sessions with smaller groups to solicit responses to the following questions:

What is your overall reaction to ATC's public planning process?

1) Positive/neutral/negative – why?
2) What element of the process is most important to you?
3) How can the process incorporate/coordinate with your processes?
4) Is anything missing?

Given that not much transmission has been built recently, what is your reaction to expansion of the transmission system?

1) Positive/neutral/negative – why?
2) Any perceived benefits/costs driving reactions?

Area of highest concern (e.g., system expansion or planning process)?

1) Is that area of concern being addressed?

What information would you like to have to effectively participate in the planning process?

1) How would you like to receive this information? When? How often?
2) What is your reaction to the current Assessment report?
3) Do you need more information about the current state regulatory processes for siting approvals?

In addition, ATC solicited comments via comment cards and meeting evaluation forms. Key suggestions from all of those media have been incorporated into the summary provided below.

Key Customer/Stakeholder Input

Following are suggestions from customers and stakeholders gathered at the statewide and zone meetings and from written comments.

- Hold a basic "Transmission 101" course in advance (one hour) prior to the Zone meetings
- Along with the invitation, ATC should send a meeting agenda with a list of topics to be covered
- Continue small group breakout sessions. Consider allotting more time for these sessions.
- Publish a newsletter with project progress updates
- Make detailed project information available, including scope and costs
- Use local media outlets to encourage more involvement from the general public
- Educate the public on the current state of the transmission system and its needs, possibly by using a depiction of the ATC system utilizing PowerWorld software.
- Present alternative solutions to transmission (i.e. local and distributed generation, possible distribution fixes, etc.)
- Establish better communications between planners and local stakeholders, earlier on in the process of planning a project

Planned Changes/Additions to the 2003 Assessment

Based on the comments received from stakeholders and customers, ATC is planning to incorporate the following changes and additions to the 2003 Assessment:

- Include estimates of capital costs of planned facilities by year.
- Enhance the information provided regarding redispatch costs.
- Address the issue of lost opportunity costs (of power transactions) due to transmission limitations.
- Provide project listings in alternative formats (e.g., by zone)
- Provide geographical references to substation names.
- Incorporate findings from ongoing transfer capability analyses.
- Incorporate findings from ongoing dynamic stability analyses.

In addition, ATC will be modifying its approach to the statewide and zone planning meetings for 2003 based on comments received. More details will be provided in the 2003 Assessment report.

Section III

CHANGES TO THE 2002 ASSESSMENT

This section describes the changes to the planned transmission facility additions and modifications since the 2002 Assessment was issued. These changes are based on information provided by the local distribution companies, the latest transmission service requirements, interconnection requests, recent analyses conducted by ATC and input from various stakeholders at ATC-sponsored meetings. In addition, an update on projects requiring regulatory approval is provided.

Regulatory Update – Transmission Projects Approved Since January 2002

ATC filed several applications during 2001 and 2002 with the Public Service Commission of Wisconsin (PSCW) to construct transmission projects. During 2002 and early 2003, the PSCW granted certificates of approval to implement the following projects:

- Rebuild the Saukville-Granville double circuit 138 kV line (Milwaukee/Ozaukee counties)
- Reconductor the Whitewater-Mukwonago 138 kV line (Walworth/Jefferson/Waukesha counties)
- Convert the Kirkwood-Reedsburg-Kilbourn 69 kV line to 138 kV (Sauk County)
- Confirmed the previous approval provided to WPS to rebuild the Pine-Eastom 46 kV line and convert the line to 115 kV operation (Lincoln County)
- Rebuild the Port Washington-Saukville 138 kV double circuit line, the Port Washington-Saukville 138 kV single circuit line and the Port Washington-Rangeline 138 kV double circuit line (Ozaukee/Milwaukee counties)
- Construct a 138 kV switchyard at the Riverside generation site (Townline Road Substation) and a double circuit 138 kV line between Townline Road and Rock River substations (Rock County)
- Rebuild the Rock River-Janesville 138 kV double circuit line (Rock County)

In addition, the PSCW also granted a CPCN for ATC to interconnect the proposed Fox Energy plant in Kaukauna to the Point Beach-North Appleton 345 kV line, construct a 345 kV line from the Fox Energy generation site to Forest Junction and add a 345/138 kV transformer at Forest Junction (Calumet/Outagamie counties). However, since no transmission service for the output of this proposed generator has been granted, this generator does not meet the criterion ATC utilizes for including the generator and associated transmission reinforcements in its plans (see below). As such, these projects have not been included in the specific proposed projects listed in Section IV of this report.

Proposed New Generation

In its 2002 Assessment, ATC utilized the following criteria to establish which proposed new generation would be modeled in both the 2003 and 2009 cases:

Those generation projects for which, at the time the models were developed, (i) ATC has completed a generation interconnection study, a transmission service impact study and, if required, a transmission service facility study, and (ii) the generation developer or a customer of the developer has accepted the transmission service approved by ATC.

The criteria above result in the following proposed generation projects being included in the applicable powerflow models:

Plant Name/IC No.	Zone	Capacity	Assumed In-service
IC029	3	150 MW	2004
IC004	3	453 MW	2004
IC014	1	600 MW	2005
IC002	5	500 MW	2005
IC002 site retirements	*5*	*-320 MW*	*2005*
IC002	5	500 MW	2008
IC012	5	650 MW	2007
IC012	5	650 MW	2009
	Net Increase:	3,183 MW	

The list of generators above reflects one change from the 2002 Assessment. IC029 recently met the criteria for inclusion. The transmission facilities identified in studies to interconnect and provide transmission service to IC029, and all of the other generators above, have been included in the tables summarizing planned transmission additions in Section IV.

Transmission Projects

The following transmission projects represent changes to those listed in the 2002 Assessment. They are highlighted in the tables summarizing planned transmission additions in Section IV.

Zone 1

- ***Arrowhead-Weston schedule and reauthorization***
  (Wood/Portage/Marathon/Clark/Taylor/Rusk/Sawyer/Washburn/Douglas counties)
  In the 2002 Assessment report, ATC reported that the earliest possible in-service date for this project would be late 2005. ATC now believes the earliest possible in-service date will be late 2007. In addition, ATC has reviewed the capital cost estimates for this project and found that they are likely to be considerably higher than those approved by the PSCW in the CPCN Order for the project. As such, ATC filed a petition in December with the PSCW to reauthorize the project CPCN Order with the revised capital cost estimate developed by ATC. ATC requested hearings on this petition to occur this spring.

- ***Arrowhead-Weston construction plans*** (Wood/Portage/Marathon/Clark/Taylor/Rusk/Sawyer/Washburn/Douglas counties)
  The Arrowhead-Weston 345 kV line will utilize the right-of-way of the existing Stinson-Stone Lake 161 kV line in northwest Wisconsin. A double circuit line consisting of a portion of the Arrowhead-Weston circuit and the Stinson-Stone Lake circuit will be constructed along this right-of-way. This will require that the existing Stinson-Stone Lake line be removed prior to construction of the new double circuit line. The Stinson-Stone Lake line is critical to reliability in northwest Wisconsin. While this line is out of service, an additional transmission source is needed in this area to maintain reliable transmission system operation. To provide this source, ATC is planning to begin construction of the Arrowhead-Weston line from the Weston Substation and proceed north to Stone Lake and add a 345/161 kV transformer and associated substation facilities at Stone Lake. This plan will provide the necessary transmission source at Stone Lake until the new Stinson-Stone Lake line can be energized. ATC, along with Exel Energy and Dairyland Power Cooperative, is currently evaluating the feasibility of making the 345/161 kV interconnection at Stone Lake permanent.

- ***Arrowhead-Weston reactive support*** (Wood/Portage/Marathon/Clark/Taylor/Rusk/Sawyer/Washburn/Douglas counties)
  The reactive support requirements for the Arrowhead-Weston 345 kV line was inadvertently omitted from the 2002 Assessment. An initial analysis conducted by ATC identified the need for four 15 MVAR capacitor banks to be installed at the Weston 115 kV bus. In order to obtain the targeted transfer capability for the Arrowhead-Weston 345 kV line, the reactive requirements have now changed to include:
  - two 40 MVAR capacitor banks at the Weston 115 kV bus,
  - three 52 MVAR capacitor banks at the Rocky Run 115 kV bus,
  - two 25 MVAR capacitor banks at the Arpin 138 kV bus,
  - two 25 MVAR capacitor banks at the Arpin 115 kV bus,
  - one 65 MVAR capacitor bank at the Arrowhead 345 kV bus.

- ***Rhinelander Loop short-term plans*** (Lincoln/Oneida counties)
  Part of the short-term solution for the Rhinelander Loop was to install a second 115 kV line between the Skanawan and Highway 8 Substations. The plans for the area now include a new 115 kV line between the Eastom and Highway 8 Substation on new right-of-way. This new line route will incorporate a proposed transmission-distribution interconnection request by WPS at Lake Nokomis. This proposed line route also provides additional benefits to the Rhinelander Loop by significantly reducing the duration and risk of construction related outages by allowing the existing system to stay intact while construction is taking place. This proposed route also diversifies the line routes feeding into the upper portion of the Rhinelander Loop.

- ***Rhinelander Loop interim plans*** (Langlade County)
  The interim solutions for the Rhinelander Loop have been revised for summer 2003 to include the addition of a 16.3 MVAR capacitor bank at the Summit Lake Substation and three new 115 kV circuit breakers. The capacitor bank and circuit breakers will offset the need for additional temporary diesel generation to be sited at the Piehl and Venus Substations while the short-term solutions for the Rhinelander Loop are being implemented.

- ***Metomen area reinforcements*** (Green Lake/Winnebago counties)
  Metomen area reinforcements listed in the 2002 Assessment included a second 138/69 kV transformer at the Metomen Substation and uprating or rebuilding several 69 kV lines in the Ripon and Berlin area. These projects are currently being re-evaluated since a more robust solution may be needed for the area. Studies are being conducted to determine the effectiveness of a 138 kV source into the Berlin area. Possible alternatives include converting the existing 69 kV line between Metomen and Berlin to 138 kV or rebuilding the existing 69 kV line with double circuit 138 kV and 69 kV structures with a 138/69 kV transformer at Berlin.

Zone 2

- ***Hiawatha-Indian Lake line***
  There were three projects listed in the 2002 Assessment that were devised to address both reliability issues in the Upper Peninsula of Michigan and transmission service limitations to moving power to and through the Upper Peninsula:
  1) the Plains-Stiles 138 kV line reinforcement (Marinette/Oconto counties)
  2) a second 138 kV circuit from Hiawatha to Straits and (Mackinac County)
  3) the Hiawatha-Indian Lake 69 kV line conversion to 138 kV (Schoolcraft/Mackinac counties)

  While these three projects would provide reliability benefits in those areas, the primary impetus behind these three projects was to address chronic transmission service limitations and provide a 'conduit' for transferring power into, out of and through the upper peninsula.

  The Hiawatha-Indian Lake project would involve rebuilding one of the 69 kV circuits between Hiawatha and Indian Lake to double circuit 138 kV and adding a second 69 kV circuit between Indian Lake and Manistique. This project would replace an aging transmission line in poor condition, provide reliability benefits to the Manistique area and provide a portion of the 'conduit' through the Upper Peninsula. This project is closely tied operationally to both the Plains-Stiles double circuit 138 kV line and the second Hiawatha-Straits line. In fact, implementing the Hiawatha-Indian Lake project at 138 kV would require that reinforcements to the Plains-Stiles line and to facilities east of Hiawatha be implemented.

The full benefits associated with the Hiawatha-Indian Lake project would only be realized once the other two 'conduit' projects are completed. Each of these projects represent significant financial commitments. ATC has not yet completed its analysis of the other two conduit projects. Until those analyses are complete, ATC believes it would be imprudent to proceed with the Hiawatha-Indian Lake project. As such, the decision to proceed with that project as originally planned has been deferred until the analysis of the 'conduit' in its entirety is completed. ATC expects to resolve this matter in the coming months and will report its findings in the 2003 Assessment. In the meantime, ATC is evaluating various short-term measures to increase Wisconsin-Michigan transfer capability and is proceeding with constructing a second 69 kV circuit from Indian Lake to Manistique. This project is scheduled to be completed in 2004.

- ***Munising-Blaney Park line*** (Schoolcraft/Alger counties)
  Similarly, ATC is currently evaluating the feasibility of rebuilding the Munising-Blaney Park 69 kV line and converting this line to 138 kV operation. This project has the potential to provide a variety of benefits including improved reliability in central Upper Peninsula and replacing aging line facilities.

Zone 3

- ***Blackhawk-Colley Road 138 kV line*** (Rock County)
  The scope for this project calls for the reconductoring of this 138 kV line with a 795 ACSR conductor to achieve a 382 MVA emergency rating. Terminal equipment at Colley Road substation will also be replaced to achieve this rating. This project is required to eliminate transmission service limitations on this line and facilitate imports into ATC's service territory. The project schedule will be coordinated with other work in the area and with other Colley Road substation work in early 2003.

- ***Colley Road to Brick Church 138 kV line*** (Rock/Walworth counties)
  The scope of work for this project is to uprate/replace the terminal equipment at Colley Road substation in order to achieve an emergency rating of 287 MVA. This is needed to support the Walworth County loads served by this line. The present rating of 143 MVA on this line has been identified as a limitation for doing transmission system maintenance in the Walworth County area. The work is scheduled to be completed by spring of 2003.

- ***Blount-Ruskin line*** (Dane County)
  ATC had originally planned to rebuild this line. Current plans call for this line to be reconductored on existing structures with 336 ACSR conductor. The present three terminal line will be eliminated with the addition of a new termination at Ruskin substation. This work is required to maintain transmission service for proposed generation in the Madison area which is scheduled to be in service in 2004. This project will be needed by 2005.

- ***North Randolph substation*** (Dodge County)
  This plan, involving a new 345 kV bus and 345/138 kV transformer at the North Randolph substation, is being reviewed and compared with another alternative to solve problems in the area. This reevaluation is precipitated by two T-D interconnection requests received by ATC subsequent to publishing the 2002 Assessment. The line extensions associated with these T-D requests are being considered as a part of a broader strategy to relieve area problems.

- ***Turtle-Bristol line rebuild*** (Rock/Walworth counties)
  This project has been revised as follows:
  - rebuild from West Darien Tap to 138 kV standards, operated at 69 kV
  - remove the segment of line from West Darien Tap to Bristol once the West Darien-Delavan line (see below) is completed
  - conversion to 138 kV is still being evaluated

- ***West Darien-Southwest Delavan-Delavan line*** (Walworth County)
  This project is being proposed, in part, to serve the proposed Southwest Delavan substation. This project would involve construction of approximately five miles of new transmission line at 138 kV but operated at 69 kV until the Turtle-West Darien Tap line is converted to138 kV operation (see above).

- ***Reconductor Christiana-Kegonsa 138 kV line*** (Dane County)
  Because of the high generation redispatch associated with taking this line out of service, ATC plans to implement this project using live line construction. The emergency rating of this line will increase from 319 MVA to 478 MVA. This project was proposed to support load serving needs in the Madison area, to allow approval of transmission service requests associated with the Riverside generation and to minimize generation redispatch during future construction outages in Dane County. This project is scheduled to be in service by summer 2003.

Zone 4

- ***Canal capacitor addition*** (Door County)
  ATC is in the process of confirming peak load levels in Door County that originally precipitated the need for this project. The project has been deferred until 2004 while this data confirmation is being conducted.

- ***Canal 138/69 kV transformer replacement*** (Door County)
  Similarly, the Door County peak load confirmation directly affects this project. This project has been deferred while the data confirmation is being conducted.

- ***Crivitz 138/69 kV transformer replacement*** (Marinette County)
  Upon more detailed analysis, this project has been revised from replacing the existing Crivitz transformer with a larger transformer to adding a second transformer at the Crivitz Substation.

- ***Edgewater 138/69 kV transformer replacements*** (Sheboygan County)
  This project has been deferred due to the planned conversion of the 69 kV line serving Plymouth substation #1 to 138 kV operation. The moving of the Plymouth substation #1 load to the 138 kV system relieves the loading on the Edgewater 138/69 kV transformers.

- ***Highway V- Preble 138 kV line*** (Brown County)
  As a result of survey work recently done, the Highway V- Preble line was determined to have the potential for clearance issues. Impending potential overloads and an addition T-D interconnection at Preble have necessitated raising the conductor clearance and as a result, the amount of power the line can safely carry. ATC is in the process of investigating ways to raise the line clearances so that this line can operate safely at higher power flow levels.

- ***Howard's Grove Substation*** (Sheboygan County)
  Upon more detailed analysis, this project has been revised from constructing a new 138 kV line from a tap of the Forest Junction-Cedarsauk 138 kV line to the new Howard's Grove substation to constructing a new 138 kV line from Erdman to the new Howard's Grove substation.

- ***Mullet River 69 kV line & transformer*** (Sheboygan County)
  This need for this project has been deferred due to the planned conversion of the 69 kV line serving Plymouth substation #1 to 138 kV operation. Moving the Plymouth substation #1 load to the 138 kV system relieves the Mullet River 138/69 kV transformer and the Mullet River-N Mullet River 69 kV line loading.

Zone 5

- ***Lannon Junction substation*** (Waukesha County)
  This project is being further evaluated along with other alternatives to provide a more comprehensive solution for this area. The Waukesha/Washington/Jefferson county area has been shown to be in need of voltage support. The extent of the problem is such that the proposed Lannon Junction substation alone provides insufficient support.

- ***Saukville-St. Lawrence line*** (Ozaukee/Washington County)
  This line rebuild project was originally proposed to be rebuilt by 2004 in response to line structure condition concerns and in anticipation of the generation expansion at Port Washington. The need to rebuild the line to accommodate Port Washington generation is not projected to arise until the second phase of that project is completed,

currently scheduled for 2008. The line rebuild project has been deferred until 2008. In the interim, those structures requiring replacement will be designed to match the rebuilt line standards.

Other Developments

- ***Northern Zone Umbrella Plan Analyses – Status***

As discussed in the 2002 Assessment, within the northern zones in ATC's service territory there are a number of issues in each zone for which potential solutions would necessarily affect adjacent northern Zones. That conceptual discussion began to provide a basis from which to evaluate alternatives within Zones 1, 2, and 4 for their ability to fit into potential regional solutions. Since the July Assessment, ATC has begun to analyze some potential plans affecting all three northern Zones. Nineteen separate potential system reinforcements have been proposed and 161 different combinations of the 19 separate potential system reinforcements are being evaluated. These potential system reinforcements consist of varying amounts of 138 kV and 345 kV projects. Programs have been written to aid in the evaluation and an initial screening of the potential reinforcements is underway. More detailed information on the status of this analysis will be provided in the 2003 Assessment.

- ***Southern Zone Umbrella Plan Analyses – Status***

Within the southern zones in the ATC service territory, there are a number of issues for which potential solutions would necessarily affect adjacent southern zones. The purpose of this section is to provide a preview of issues and potential alternative solutions within Zone 3 and 5 that will be detailed in the 2003 Assessment. This section provides an overview of the issues and solutions within these two zones that can be combined to develop an umbrella plan for the entire southern region of the ATC service territory. While this discussion focuses on these two zones, it does not intend to exclude other ATC zones or transmission systems adjacent to the ATC system and will be coordinated with other plans within ATC's multi-level planning analysis.

The goal in this section of the assessment is to begin to develop a conceptual umbrella plan to resolve needs and issues within Zones 3 and 5. As a crucial first step in achieving this goal, this section contains the following information:

- relevant needs and issues throughout the region
- possible future scenarios
- facilities likely to be common to any plan alternatives
- two conceptual umbrella plans that could meet all of the issues and needs

The conceptual umbrella plans listed are not considered ultimate proposals, but are meant to be a starting point for crafting a preferred expansion plan and also for beginning to assess the value of individual reinforcements beyond meeting local needs. Many significant technical, environmental, or political issues have not been sufficiently addressed in the umbrella plans listed. However, ATC expects that future assessments

will develop this conceptual plan into a more refined umbrella plan that includes significant issues even beyond the region defined by Zones 3 and 5. We emphasize that while initial analysis of the system has been conducted to determine some of the issues and some of the individual reinforcements, neither of the conceptual plans listed, nor any other conceptual plans under consideration, have been completely analyzed.

Issues

There are several general issues that are likely to require enhancements to the transmission system in the region:

- Load growth requiring new or expanded distribution substations
- Potential generation additions or retirements
- Transmission line and substation equipment condition
- Excessive thermal loading of lines, transformers and other substation equipment
- Lines derated because of inadequate clearances
- Generator and voltage dynamic instability
- Long, heavily loaded network lines
- Low voltages
- System limitations resulting in transmission loading relief or operating procedure implementation

From these general issues, a number of more specific issues have been compiled to guide the crafting of the conceptual plan. The more specific issues include:

1. Provide additional import capability for the ATC system
2. Remove the adverse effects of the loss of Wempletown-Paddock 345kV line
3. Investigate the possibility of rerouting the Whitewater-Mukwonago 138kV line, including to another another substation other than Mukwonago
4. Provide the need of the Central South-Eastern South transfer capability
5. Remove overloads on lines and substation equipment and improve voltage profiles for various single contingencies in and around the Madison, Janesville and Lake Geneva areas and throughout south-central and southwest Wisconsin
6. Ensure stability of proposed generation in southeast Wisconsin
7. Address dynamic stability limitations at Pleasant Prairie, Paris, Concord, and Germantown power plants
8. Mitigate the poor condition (including low clearances) of some facilities by removal or rebuild

Future Scenarios

As a starting point for this analysis, ATC developed power flow models simulating 2009 summer peak and shoulder peak conditions. These models contain the following assumptions:

- Include all three phases of Oak Creek (a.k.a. Elm Road) generation expansion
- Include both phases of Port Washington generation expansion
- Include Riverside generation
- Exclude Walnut generation
- Exclude Badger generation

- Include Milwaukee area reinforcements associated with Port Washington
- Include Milwaukee area reinforcements associated with Oak Creek except new line to Illinois or Madison or Beloit area
- Include Janesville and Madison area reinforcements associated with Riverside
- Include Arrowhead-Weston line and associated reinforcements
- Include 600 MW of new generation at Arpin but no new 345 kV outlets from Arpin/Rocky Run area
- Include generation in northern Illinois that is in-service or under construction

Alternate Future Scenarios:

- Exclude proposed generation in southeast Wisconsin and increase imports
- Include Walnut generation and associated reinforcements
- Exclude Walnut generation and associated reinforcements, exclude Blount generation and increase imports
- Include another 1,000 MW of generation at Byron and exclude CE transmission reinforcements
- Include another 1,000 MW of generation at Byron and a new Byron-Pleasant Valley 345 kV line

Figure III-1
Conceptual 345kV Umbrella Plan for Southern Zones

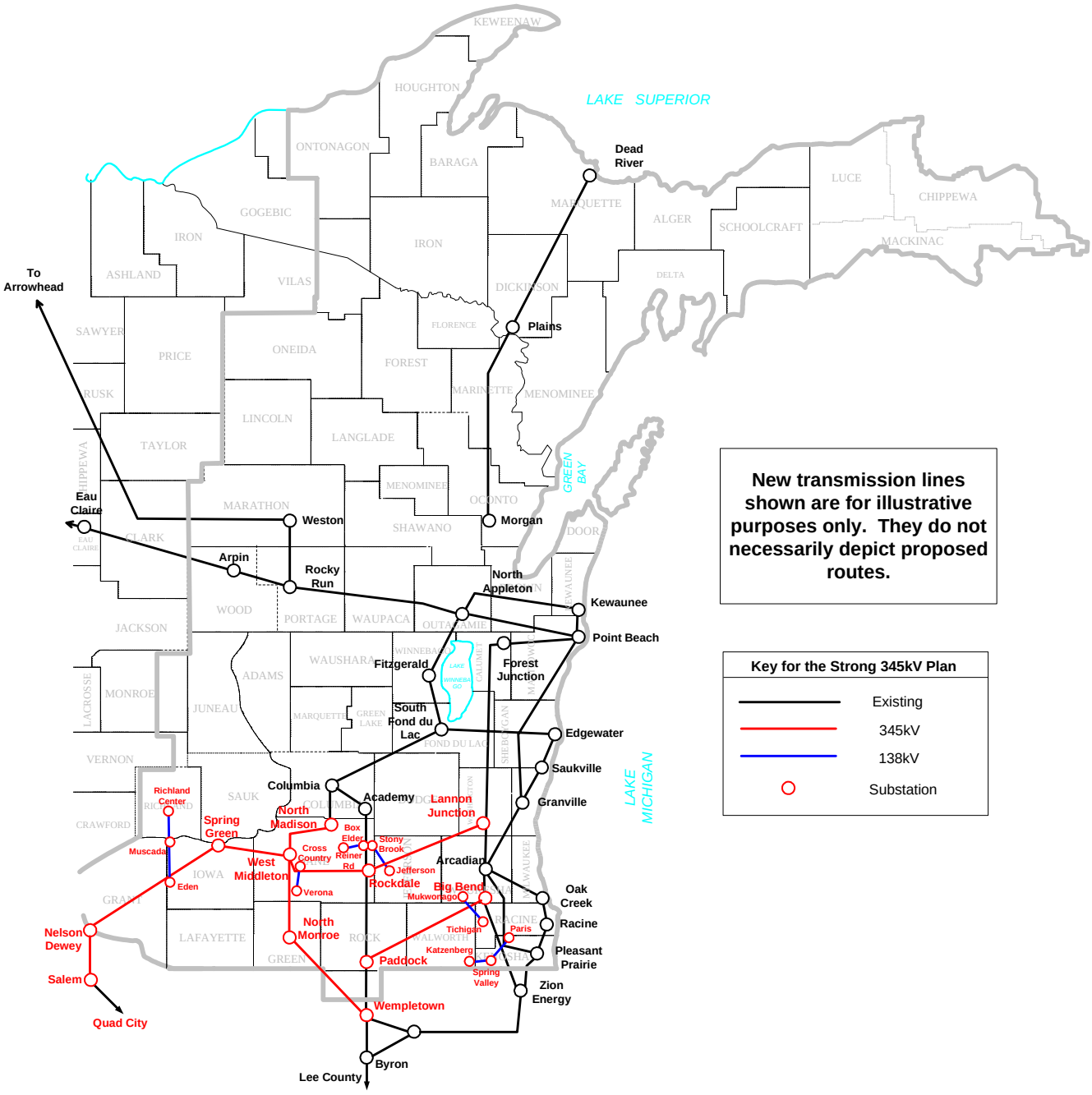
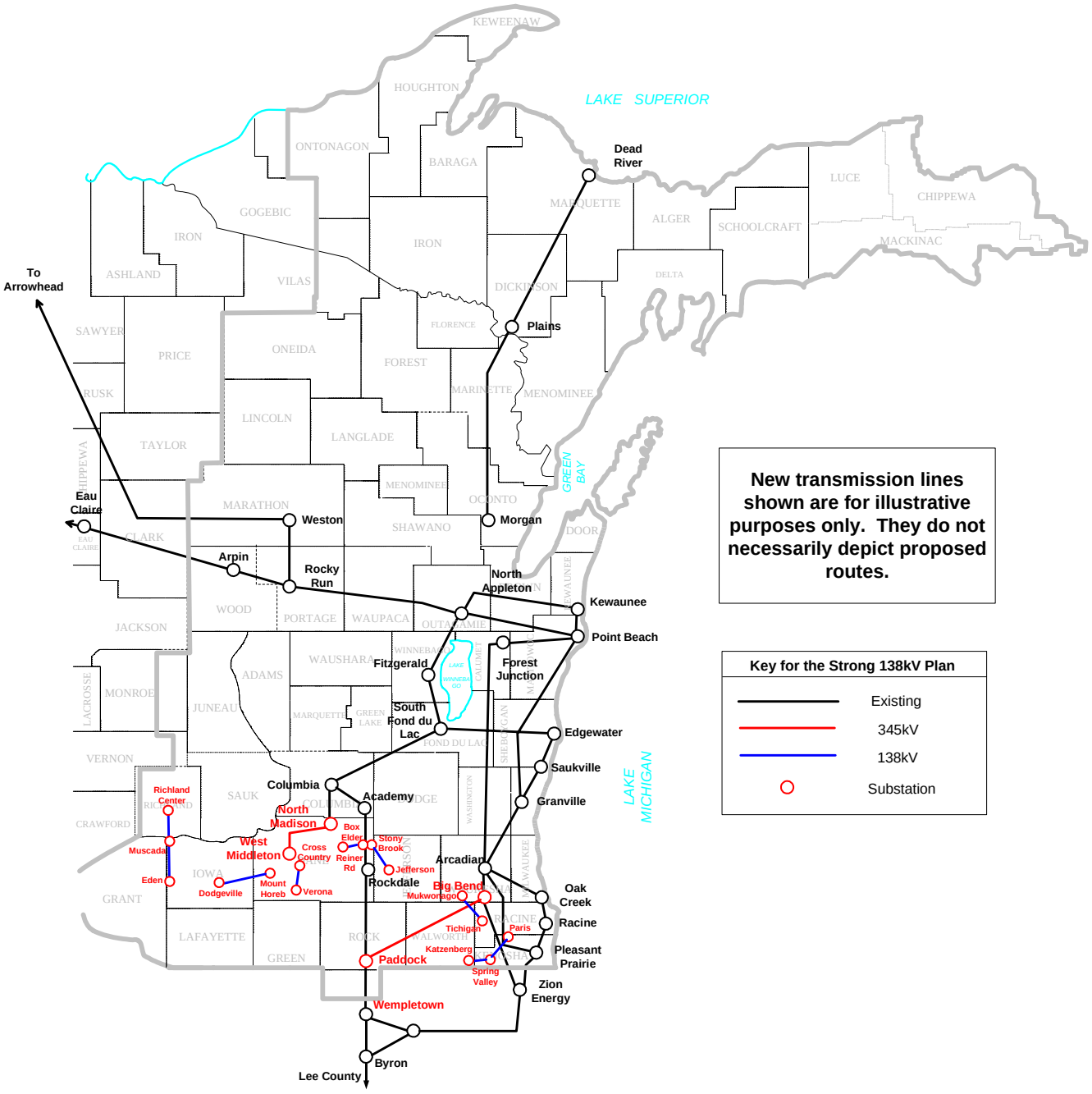


Figure III-2
Conceptual 138kV Umbrella Plan for Southern Zones



Umbrella Plans

Two umbrella plans are described below by the major reinforcements that might make up the plan. At this time, the two plans represent the upper and lower bounds for a number of alternatives that might be considered in the future. It is left to future assessments to refine the plans and develop comparative attributes from which to define the preferred umbrella plan. The list of reinforcements should not be considered exclusive. There are very likely other reinforcements that will be required. Additional analyses and stakeholder input will be required to determine the performance and to adjust these conceptual ideas into a technically, environmentally, and politically acceptable plan. The development of the plan attempted to look at the transmission system from the view of developing a robust plan to handle many scenarios over the planning horizon.

The list given below contains the facilities common to any plan alternatives. To be classified as a common facility only means that work needs to be done on the same facility regardless of the plan's alternatives. However, the common facility might actually be constructed or operated at a different voltage or rating in some variation of the plan.

Facilities That Are Common To All Alternatives

- Convert North Madison-Columbia 138kV line to 345kV line (Zone 3)
- Convert Kirkwood-Reedsburg-Kilbourn 69kV line to 138kV line (Zone 3)
- Construct the second East Campus-Walnut 69kV line (Zone 3)
- Rebuild Blount-Ruskin and Blount-Ruskin Tap 69kV line (Zone 3)
- Rebuild and convert Kegonsa-McFarland-Femrite 69kV line to 138kV line (Zone 3)
- Rebuild Femrite-Royster 69kV line (Zone 3)
- Convert Sycamore-Reiner-Sprecher 69kV line to 138kV line (Zone 3)
- Convert Academy-South Beaver Dam 69kV line to 138kV line (Zone 3)
- Reconfigure 69/138 kV circuits between Rock River and Janesville to create Rock River-Janesville and Rock River-Sunrise 138 kV circuits (Zone 3)
- Rebuild Janesville-Riverside 138kV line (Zone 3)
- Rebuild Russell-Janesville 138 kV line (Zone 3)
- Reconductor Russell-Rockdale 138 kV line (Zone 3)
- Reconductor West Middleton-Pheasant Branch 69 kV line (Zone 3)
- Construct Butler-Tamarack (Carmen) 138 kV line on new 345 kV structures installed with Brookdale-Granville line (Zone 5)
- Restring Bluemound-Butler 138 kV line (KK5051) on new 345 kV structures installed with Brookdale-Granville line (Zone 5)

The list given below presents the two conceptual umbrella plans that would be comprehensively tested in the future study. It is intended to highlight the plans for line routes and substation sites that might be needed. Note that not all possible plans are listed in this section.

Conceptual 345 kV Plan

- Construct North Madison – West Middleton 345kV line
- Construct Rockdale - West Middleton 345kV line
- Construct West Middleton-North Monroe-Wempletown 345 kV line

- Construct West Middleton-Spring Green-Nelson Dewey-Salem 345 kV line
- Construct Paddock-Big Bend 345 kV line
- Construct Rockdale - Lannon Jct. 345 kV line
- Convert Rock River-Turtle-Bristol-Elkhorn 69 kV line to 138 kV line and reconfigure Sugar Creek-North Lake Geneva Tap-Burlington 138 kV line
- Construct Cross Country-Verona 138 kV line
- Construct Eden-Dodgeville-Darlington 138 kV line
- Construct Eden-Muscada-Richland Center and Move phase shifter from Lone Rock to Richland Center
- Construct Stony Brook-Lake Mills-Jefferson 138 kV line
- Construct Box Elder-Reiner Road 138 kV line
- Convert North Lake Geneva-Katzenberg 69 kV line to 138 kV line
- Construct Katzenberg-Spring Valley-Paris 138 kV line
- Construct Tichigan-Mukwonago 138 kV line
- Construct Whitewater-Fort Artkinson 138 kV line (potential reroute of Whitewater-Mukwonago 138 kV line)
- Uprate Sauk Ville-Pleasant Valley-St. Lawrence 138 kV line

Conceptual 138 kV Plan

- Construct North Madison – West Middleton 345 kV line
- Construct Paddock-Big Bend 345 kV line
- Convert West Middleton-Spring Green 69 kV line to 138 kV
- Construct Eden-Muscoda-Richland Center 138 kV line but operate as 69 kV
- Construct North Madison-Kirkwood 138 kV line
- Construct West Middleton-Stagecoach-Mount Horeb-Dodgeville-Eden 138 kV line
- Construct Dodgeville-Darlington 138 kV line
- Construct Cross Country-Verona-North Monroe 138 kV line
- Convert Rock River-Turtle-Bristol-Elkhorn 69 kV line to 138 kV line and reconfigure Sugar Creek-North Lake Geneva Tap-Burlington 138 kV line
- Construct Stony Brook-Lake Mills-Jefferson 138 kV line
- Construct Box Elder-Reiner Road 138 kV line
- Convert North Lake Geneva-Katzenberg 69 kV line to 138 kV
- Construct Katzenberg-Spring Valley-Paris 138 kV line
- Construct Tichigan-Mukwonago 138 kV line
- Construct Whitewater-Fort Artkinson 138 kV line (Reroute for Whitewater-Mukwonago 138kV line)
- Uprate Saukville-Pleasant Valley-St. Lawrence 138 kV line

Note that the conceptual umbrella plans listed are not considered proposals, but are meant to be a starting point for developing a better developed umbrella plan and for beginning to assess the value of individual reinforcements beyond meeting local needs. Many different conceptual plans will be tested to assess which is the most effective plan in addressing the identified issues and needs.

Section IV

SUMMARY OF PLANNED FACILITY ADDITIONS IN THE 2002 ASSESSMENT UPDATE

Summary of Proposed Additions, 2003-2011

The facilities proposed by the ATC based on this 2002 Update are listed in Tables IV-1 through IV-14, and shown graphically in Figures IV-1 through IV-5. In addition, alternatives for some the primary alternatives shown in Tables IV-1 through IV-14 are listed in Table IV-15. Also, portions of the plan in the 2002 Assessment that are not included in this Update are listed in Table IV-16.

In each of these tables, there is a column indicating the planned in-service year for each particular facility and a column indicating the year the facility is needed per ATC's planning criteria and other practices. There are numerous facilities for which the year it is needed precedes the planned in-service year. There are a variety of reasons for this, including:

- The preferred alternative to address a particular need may take several years to implement.
- The need may have existed previously, but had been addressed with operating procedures that are becoming less effective or ineffective.
- The preferred alternative to address a particular need may need to be implemented in phases, and not all phases have been implemented.
- New data or information became available that affected the nature of the need or limitation, which necessitated a corresponding change in the alternative to be implemented, introducing a delay in implementation.
- The need for a project was based on load or generation development that was uncertain.
- Stakeholder input necessitated a change in the alternative to be implemented, introducing a delay in implementation.

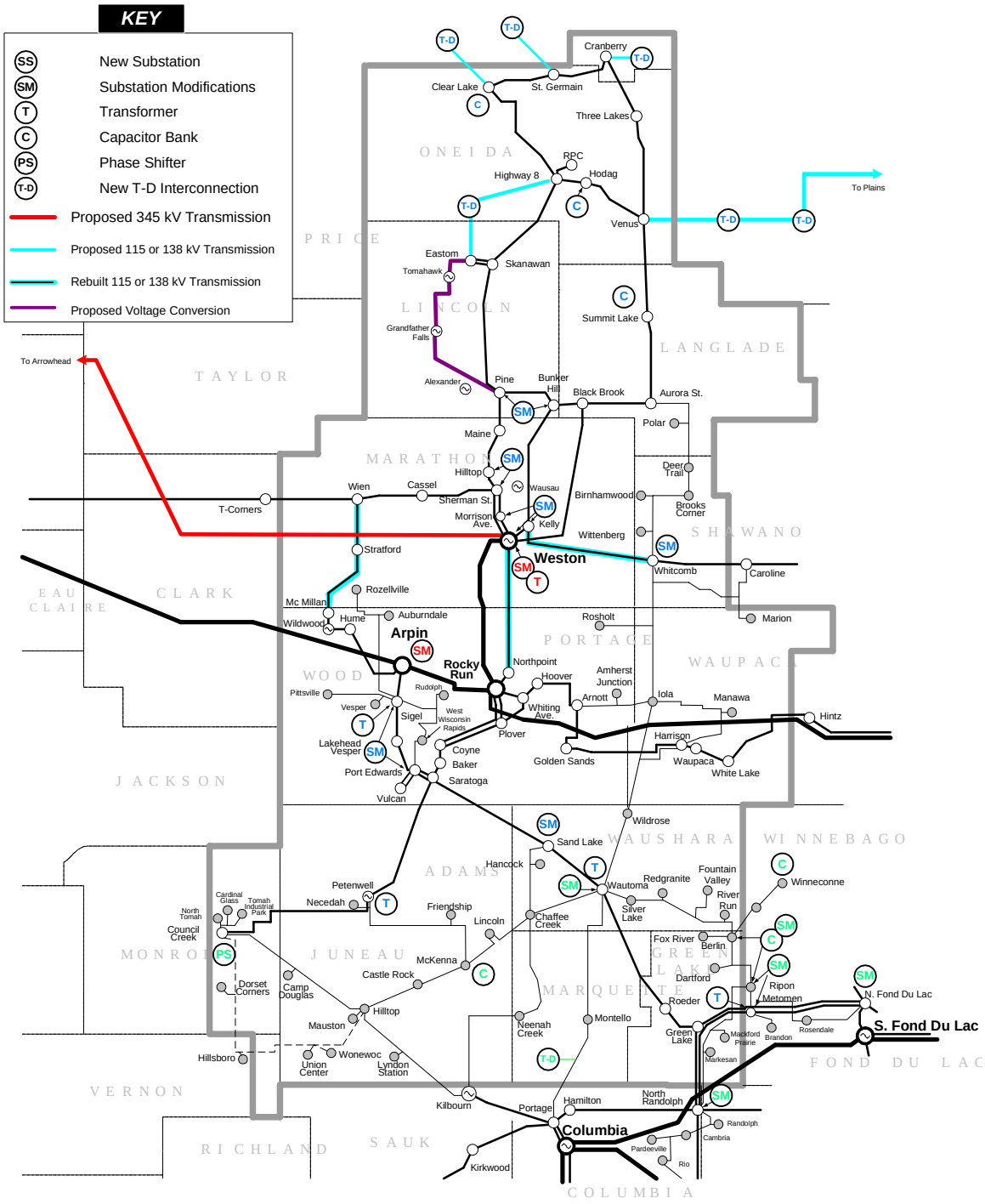
Tables IV-1 through IV-10 show the facilities planned by year for years 2003-2011, respectively. Table IV-11 provides a list of *proposed transmission lines* for years 2003-2011. Since ATC intends to solicit public input on the identification of ultimate solutions through its iterative planning process, these particular projects may be modified in the future. Table IV-12 provides a list of *proposed transmission line rebuilds, reconductoring and uprates on existing right-of-way* for 2003-2011. Table IV-13 provides a list of *proposed new substations and transformer additions* (excluding transmission-to-distribution transformers) for 2003-2011. Table IV-14 provides a list of *other proposed substation equipment additions or replacements* for 2003-2011. Table IV-15 lists potential alternatives to some of the projects listed in Tables IV-1 through IV-14. Tables IV-15 through IV-19 list the proposed additions by planning zone.

Within the above tables, the need for each project is identified. Need categories include the following:

Reliability: Facility (line, transformer, substation equipment) normal rating is exceeded under normal system conditions or emergency rating is exceeded

	under single contingency conditions, or bus voltage is not within 5% of nominal voltage under normal system conditions or is not within 10% of nominal voltage under single contingency conditions. (see Appendix B) Impending overload or voltage violations are noted as appropriate.
New generation:	Facility has been identified as necessary to accommodate new generation in generation interconnection studies or related transmission service studies conducted by ATC.
Service limitation:	Facility has been identified by ATC Operations or ATC Transmission Service as a chronic cause for interrupting, curtailing, limiting or denying transmission service in real time.
T-D interconnection:	Facility is required to interconnect to a new or expanded transmission-distribution substation needed by a distribution company served by ATC.
Condition:	Facility has been identified by ATC Maintenance as being in need of repair or replacement.
Stability:	Facility has been identified by ATC Stability and Special Studies as needed to ensure ATC dynamic stability criteria is met (see Appendix B), or will improve stability response of generation.
Import capability:	Facility will enhance import capability of the ATC transmission system.

Figure IV-1
Zone 1 - Proposed Transmission System Additions



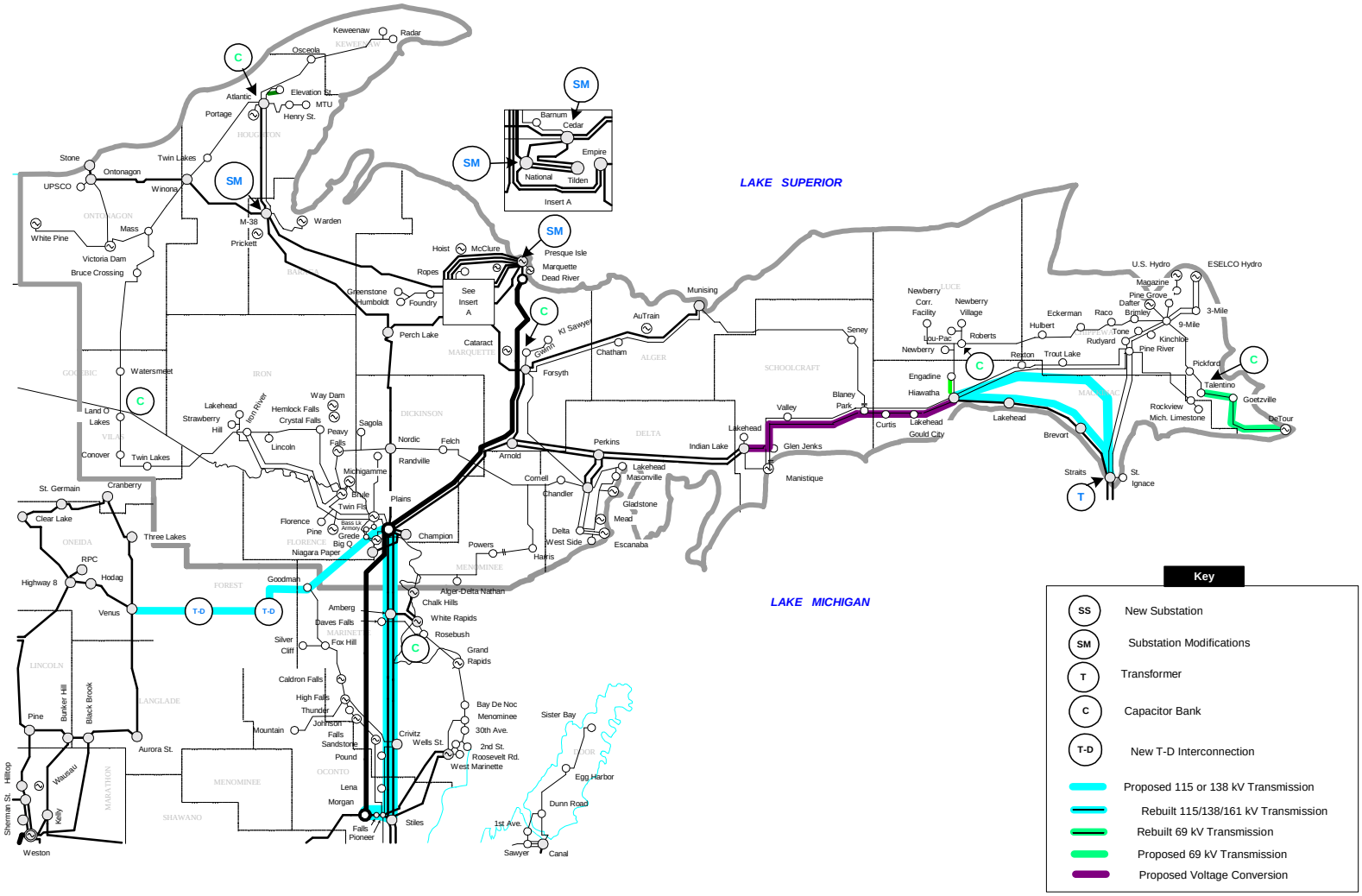


Figure IV-2

Zone 2 - Proposed Transmission System Additions

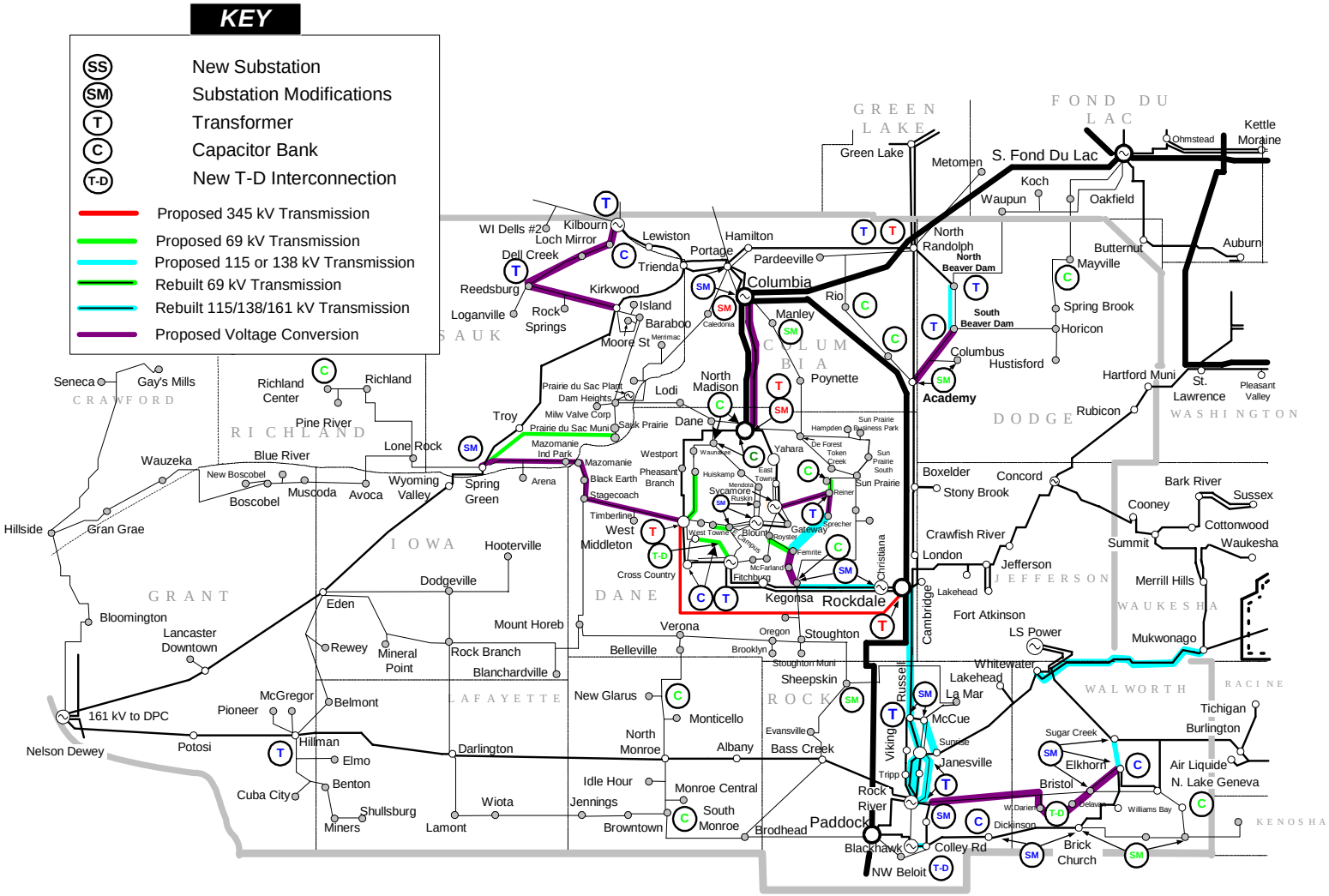


Figure IV-3
Zone 3 Proposed Transmission System Additions

Figure IV-4
Zone 4 Proposed Transmission System Additions

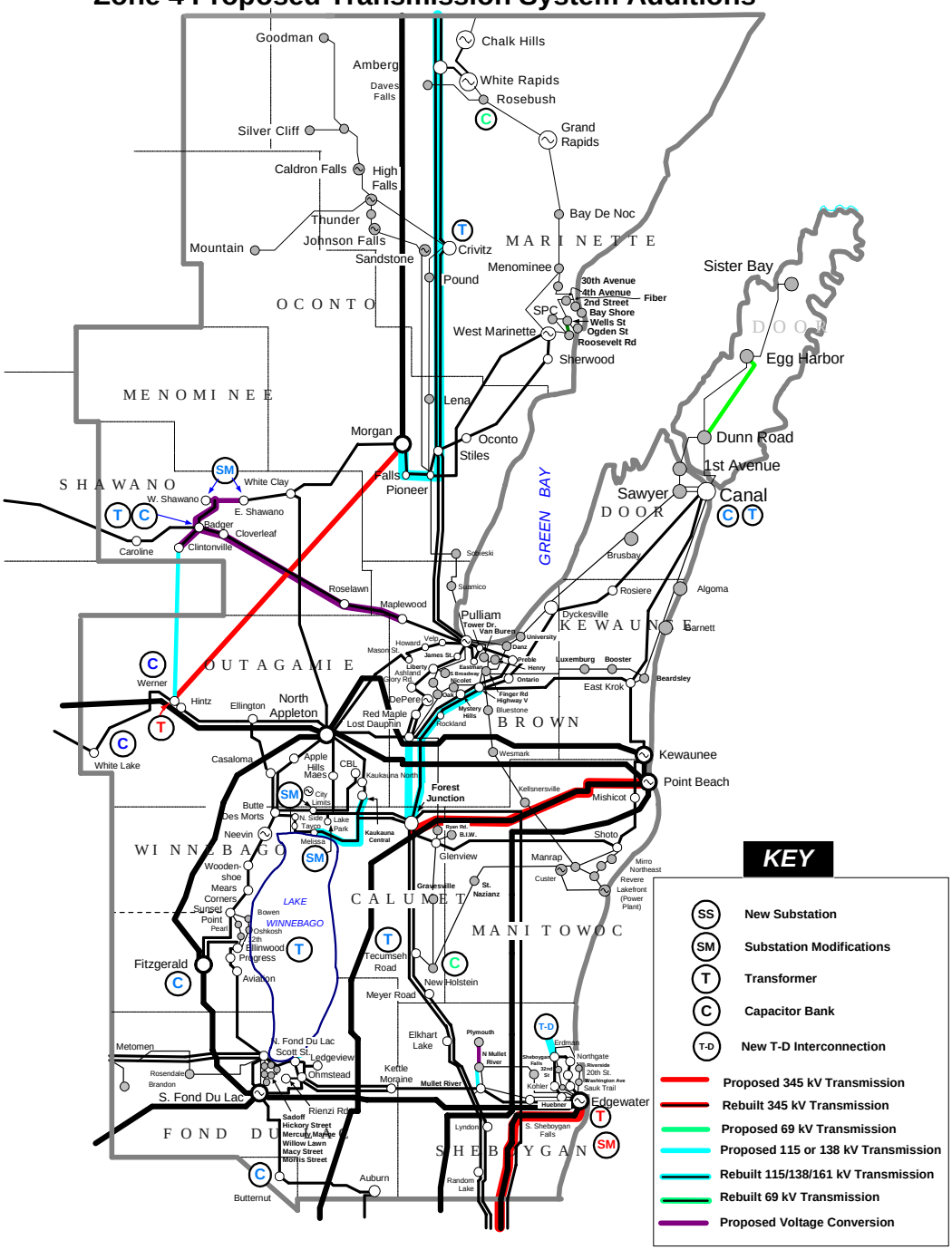


Figure IV-5
Proposed Transmission System Additions

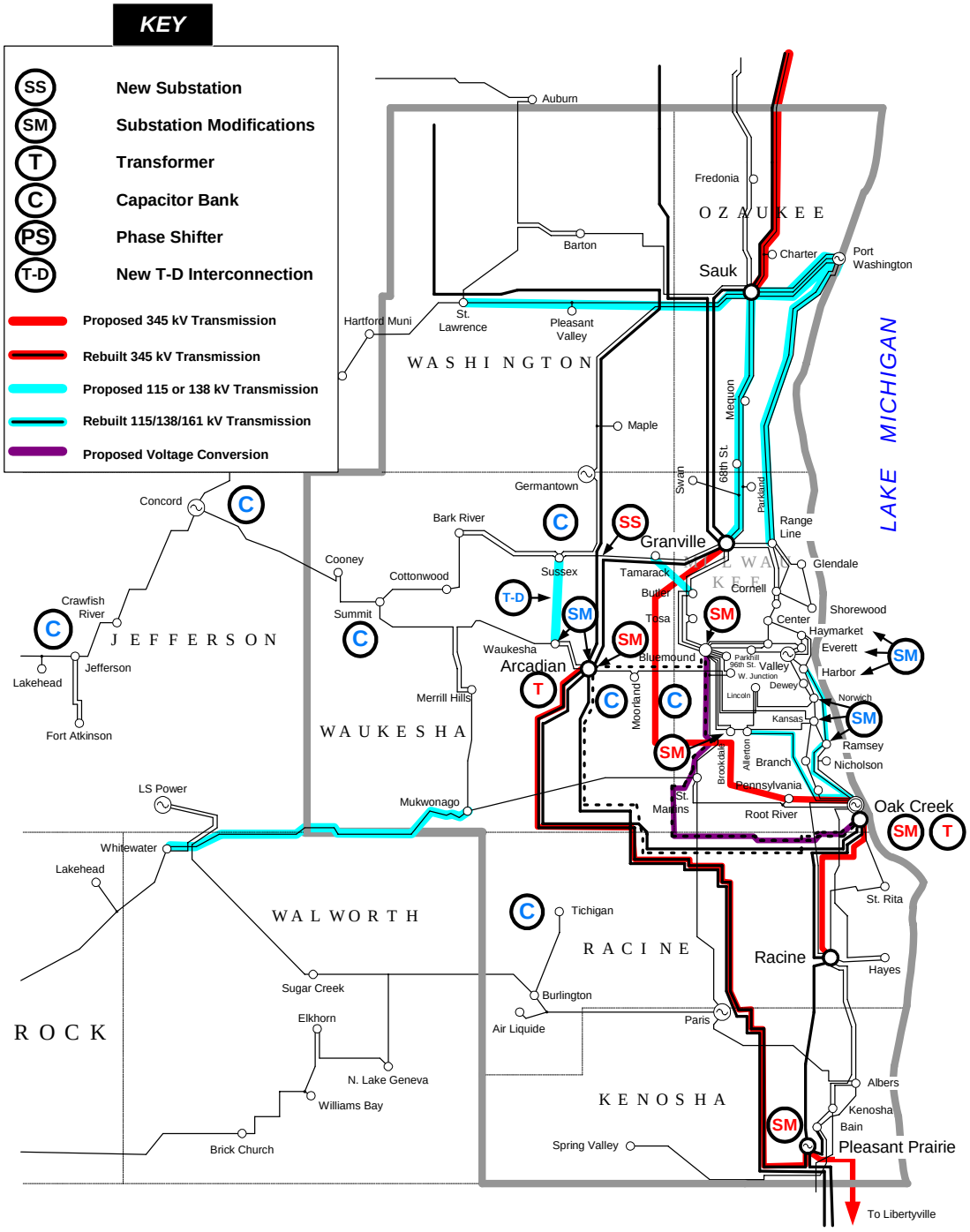


Table IV-1

Transmission System Additions for 2002

Planned Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install 8 MVAR capacitor bank at Hodag 115 kV	2002	2002	1	reliability
Replace 138/69 kV transformer at Russell	2002	2002	3	reliability
Install 345/138 kV, 500 MVA transformer at Rockdale	2002	2002	3	reliability, service limitation
Install 138/69 kV transformer at Kilbourn	2002	2002	3	reliability
Uprate Academy-Columbus 69 kV line terminal equipment	2002	2002	3	reliability
Expand the 345 kV switchyard at Columbia	2002	2002	3	reliability, stability
Replace 138/69 kV transformer at North Beaver Dam	2002	2002	3	reliability
Construct a Sunrise-McCue 138 kV line	2003	2002	3	reliability, new generation
Uprate Russell-McCue 138 kV line terminal equipment	2002	2002	3	reliability, new generation
Install 28.8 MVAR capacitor bank at Werner 138 kV	2002	2002	4	reliability
Install 28.8 MVAR capacitor bank at White Lake 138 kV	2002	2002	4	reliability
Install 28.8 MVAR capacitor bank at Badger 115 kV	2002	2002	4	reliability
Construct second Roosevelt-Wells 69 kV line	2002	2002	4	reliability
Install 2-16 MVAR capacitor banks at New Holstein 69 kV	2002	2002	4	reliability
Install 2-28 MVAR capacitor banks at Sussex 138 kV	2002	2002	5	reliability

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-2

Proposed Transmission System Additions for 2003

Planned Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Uprate Port Edwards-Sigel 138 kV line terminal equipment	2002	2003	1	reliability
Construct an Endeavor-Wautoma/Portage Tap 69 kV line	2003	2003	1	T-D Interconnection
Uprate Whitcomb 115/69 kV transformer	2002	2003	1	reliability
Install 11.3 MVAR capacitor bank at Summit Lake 115 kV	2003	2003	1	reliability
Replace a breaker at Aurora Street 115 kV (line A313) Highway 8 115 kV	2003	2003	1	reliability
Replace a breaker at Highway 8 115 kV (line D56)	2003	2003	1	reliability
Construct Elevation Tap-Elevation 69 kV line	2003	2003	2	T-D Interconnection
Install 2-7.2 MVAR capacitor banks at Atlantic 69 kV	2003	2003	2	reliability
Install 5.4 MVAR capacitor bank at Talentino 69 kV	2003	2003	2	reliability
Install 5.4 MVAR capacitor bank at Gwinn 69 kV	2003	2003	2	reliability
Install 5.4 MVAR capacitor bank at Land o Lakes 69 kV	2003	2003	2	reliability
Uprate Cedar-M38 138 kV line – scope TBD	2003	2003	2	reliability
Uprate Cedar-Freeman 138 kV line – scope TBD	2003	2003	2	reliability
Uprate Freeman-Presque Isle 138 kV line – scope TBD	2003	2003	2	reliability
Uprate Presque Isle-Cedar 138 kV line – scope TBD	2003	2003	2	reliability
Install 5.4 MVAR capacitor bank at Roberts 69 kV	2003	2003	2	reliability
Reconductor Whitewater-Mukwonago 138 kV line	2003	2003	3 & 5	condition, reliability, new generation, service limitation
Uprate Dickinson-Brick Church 138 kV line terminal equipment	2003	2003	3	reliability, operations support
Reconductor Christiana-Kegonsa 138 kV line	2003	2003	3	reliability, service limitation
Reconductor Colley Road-Blackhawk 138 kV line	2000	2003	3	service limitation
Uprate Colley Road-Brick Church 138 kV line terminal equipment	2002	2003	3	reliability
Uprate Kegonsa-Christiana 138 kV line	2002	2003	3	reliability
Uprate McCue-Sheepskin 69 kV line terminal equipment	2003	2003	3	reliability, new generation
Construct 138 kV switchyard at Rock Co. generation site	2003	2003	3	reliability, new generation

Table IV-2

Proposed Transmission System Additions for 2003 (continued)

Planned Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Construct 138 kV double circuit line from Rock Co. generation site to Rock River	2003	2003	3	reliability, new generation
Reconnect NW Beloit 69 kV load to Paddock-Blackhawk 138 kV line	2003	2003	3	reliability
Construct second East Campus-Walnut 69 kV line	2003	2003	3	reliability
Construct a 345 kV ring bus at Forest Junction, loop existing Point Beach-Arcadian 345 kV line into Forest Junction, install two 345/138 kV, 500 MVA transformers	2003	2003	4	reliability
Install second 138/69 kV transformer at Crivitz	2003	2003	4	reliability
Rebuild the Forest Junction-Highway V 138 kV double circuit line	2003	2003	4	reliability
String a 138 kV circuit from Forest Junction to Lost Dauphin on existing structures	2003	2003	4	reliability
Construct 138 kV line from Mullet River to N Mullet River and convert N Mullet River to Plymouth Sub #1 from 69 kV to 138 kV	2003	2003	4	reliability
Convert Maplewood-Roselawn-Cloverleaf-Badger and Clintonville-Badger-Shawano West from 115 kV to 138 kV	2003	2003	4	reliability
Relocate Maplewood 138/115 kV transformer to Badger	2003	2003	4	reliability
Convert the normally open Shawano East-Shawano West 34.5 kV bus tie to 138 kV and operate normally closed	2003	2003	4	reliability
Rebuild Granville-Saukville double circuit 138 kV line	2003	2003	5	reliability, service limitation

Defined in 2002 10-Year Assessment

Revised in scope from 2002 10-Year Assessment

New to this 2002 10-Year Assessment Update

Table IV-3
Proposed Transmission System Additions for 2004

Planned Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install 69 kV phase shifter at Council Creek	2002	2004	1	reliability, service limitation
Convert Pine-Grandfather-Tomahawk-Eastom 46 kV lines to 115 kV	2001	2004	1	reliability
Uprate North Randolph-Ripon 69 kV line terminal equipment	2002	2004	1	reliability
Install 5.4 MVAR capacitor bank at Ripon 69 kV	2003	2004	1	reliability
Install additional 5.4 MVAR capacitor bank at Berlin 69 kV	2004	2004	1	reliability
Construct Hiawatha-Engadine 69 kV line	2003	2004	2	reliability
Rebuild DeTour-Talentino Tap 69 kV line	2002	2004	2	reliability
Replace current transformer at Cedar SS for Cedar-National 138 kV	2002	2004	2	reliability
Rebuild and convert one Hiawatha-Indian Lake 69 kV circuit to double circuit 138 kV: BEING RE-EVALUATED	2004	2004	2	reliability, service limitation
Rebuild Turtle-Bristol 69 kV line to 138 kV and operate at 69 kV	2004	2004	3	condition, reliability, new generation
Convert Kirkwood-Reedsburg 69 kV line to 138 kV	2003	2004	3	reliability
Construct 138/69 kV switchyard at Artesian; install 2-138/69 kV transformers	2003	2004	3	reliability
Construct 69 kV switchyard at Tokay	2004	2004	3	T-D interconnection
Reconfigure 69/138 kV circuits between Rock River and Janesville to create Rock River-Janesville and Rock River-Sunrise 138 kV circuits	2004	2004	3	reliability, new generation
Construct Fitchburg-Tokay-Westowne 69 kV underground line	2004	2004	3	T-D interconnection
Uprate Portage-Columbia double circuit 138 kV line terminal equipment	2003	2004	3	reliability
Rebuild Russell-Janesville 138 kV line	2004	2004	3	new generation
Reconductor Russell-Rockdale 138 kV line	2004	2004	3	new generation
Install a second 138/69 kV transformer at North Randolph	2004	2004	3	reliability
Install a second 138/69 kV transformer at Hillman	2004	2004	3	reliability
Install 24 MVAR capacitor bank at Dickinson 138 kV	2004	2004	3	reliability
Install 24 MVAR capacitor bank at Elkhorn 138 kV	2004	2004	3	reliability

Table IV-3
Proposed Transmission System Additions for 2004 (continued)

Planned Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install 24 MVAR capacitor bank at new Loch Mirror (Birchwood) 138 kV	2004	2004	3	reliability
Install 10.8 MVAR capacitor bank at Rio 69 kV	2004	2004	3	reliability
Install 10.8 MVAR capacitor bank at Burke 69 kV	2004	2004	3	reliability
Install additional 5.4 MVAR capacitor bank at Mayville 69 kV	2004	2004	3	reliability
Install additional 5.4 MVAR capacitor bank at New Glarus 69 kV	2004	2004	3	reliability
Install additional 10.8 MVAR capacitor bank at South Monroe 69 kV	2004	2004	3	reliability
Reconductor Blount-Ruskin 69 kV line	2003	2004	3	reliability, new generation
Reconductor Blount-Ruskin Tap 69 kV line	2003	2004	3	reliability, new generation
Rebuild Kegonsa-McFarland-Femrite 69 kV line to 138 kV	2004	2004	3	reliability, new generation
Rebuild Femrite-Royster 69 kV line	2004	2004	3	reliability, new generation
Install 16.3 MVAR capacitor bank at Kegonsa 69 kV	2004	2004	3	new generation
Install 20.4 MVAR capacitor bank at North Madison 69 kV	2004	2004	3	new generation
Install 24.5 MVAR capacitor bank at Cross Country 138 kV	2004	2004	3	new generation
Install 12.2 MVAR capacitor bank at Waunakee 69 kV	2004	2004	3	new generation
Install 10.8 MVAR capacitor bank at Tokay	2004	2004	3	new generation
Replace 138/69 kV transformers at Fitchburg with 187 MVA units	2003	2004	3	reliability, new generation
Uprate Edgewater-Cedarsauk 345 kV line	2003	2004	4	reliability
Uprate Point Beach-Forest Junction 345 kV line	2003	2004	4	reliability
Install 16 MVAR capacitor bank at Canal 138 kV	2003	2004	4	reliability
Rebuild the Morgan-Falls-Pioneer-Stiles 138 kV line	2003	2004	4	service limitation, facility condition
Replace 345/138 kV transformer at Edgewater	2004	2004	4	reliability
Uprate Pleasant Prairie-Arcadian 345 kV line	2003	2004	5	service limitation, reliability
Rebuild Port Washington-Range Line double circuit 138 kV line	2004	2004	5	new generation

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-4
Proposed Transmission System Additions for 2005

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Construct 345 kV switchyard at Weston	2002	2005	1	service limitation, reliability, import capability & Weston stability
Construct Weston-Stone Lake 345 kV line	1997	2005	1	service limitation, reliability, import capability & Weston stability
Uprate Bunker Hill-Pine 115 kV line terminal equipment	2005	2005	1	reliability
Reconductor Wien-McMillan 115 kV (ATC,MEWD)	2005	2005	1	reliability
Uprate Metomen-N Fond du Lac 69 kV line terminal equipment	2005	2005	1	reliability
Connect double circuit 345/138 kV line from IC014 generation site to Arpin	2005	2005	1	new generation
Uprate Weston-Kelly 115 kV line - scope TBD	2005	2005	1	new generation, reliability
Replace 138/69 kV transformer at Sigel	2005	2005	1	new generation, reliability
Replace 138/69 kV transformer at Petenwell	2005	2005	1	new generation, reliability
Uprate Port Edwards-Sand Lake 138 kV - scope TBD	2005	2005	1	new generation, reliability
Construct Clear Lake-Arnett Road 115 kV line	2005	2005	1	T-D interconnection
Construct 138 or 115 kV line from Venus to new Crandon and Laona	2005	2005	1	T-D interconnections
Construct Eastom-Lake Nokomis 115 kV line	2005	2005	1	T-D interconnection
Construct Lake Nokomis-Highway 8 115 kV line	2004	2005	1	reliability
Install second 138/69, 63 MVA transformer at Straits	2003	2005	2	reliability
Install new line from West Darien to Southwest Delavan to Delavan at 138 kV, operate at 69 kV	2005	2005	3	T-D interconnection
Rebuild Janesville-Riverside 138 kV line	2005	2005	3	reliability
Convert Columbia-North Madison 138 kV line to 345 kV	2005	2005	3	reliability, new generation
Reconfigure 345 kV bus at North Madison and replace existing transformers with 500 MVA units	2005	2005	3	reliability, new generation
Convert Kilbourn-N. Reedsburg 69 kV line to 138 kV	2004	2005	3	reliability
Construct S. Reedsburg-N. Reedsburg 138 kV line	2004	2005	3	reliability
Replace two existing Canal 138/69 kV transformers	2003	2005	4	reliability
Uprate Kaukauna Central Tap-Melissa 138 kV line - scope TBD	2005	2005	4	reliability

Table IV-4
Proposed Transmission System Additions for 2005 (continued)

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Replace Ellinwood 138/69 kV transformer	2005	2005	4	reliability
Construct a new Lannon Junction substation at intersection of Granville-Arcadian 345 kV, Forest Junction-Arcadian 345 kV, Sussex-Tamarack 138 kV and Sussex-Germantown 138 kV lines; install a 345/138 kV, 500 MVA transformer	2005	2005	5	reliability & Germantown generation stability
Construct a Waukesha-Duplainville-Sussex 138 kV line	2005	2005	5	T-D interconnection
Rebuild Port Washington-Saukville double circuit 138 kV line	2005	2005	5	new generation
Rebuild Port Washington-Saukville single circuit 138 kV line	2005	2005	5	new generation

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-5
Proposed Transmission System Additions for 2006

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Uprate Wautoma-Berlin 69 kV line terminal equipment	2006	2006	1	reliability
Install additional 6.3 MVAR capacitor bank at McKenna 69 kV	2006	2006	1	reliability
Rebuild Plains-Amberg-Stiles double circuit 138 kV line	2006	2006	2 & 4	reliability, service limitation, condition
Construct a 345 kV switchyard at North Randolph; install a 345/138 transformer	2006	2006	3	reliability
Reconductor West Middleton-Pheasant Branch 69 kV line	2006	2006	3	reliability
Install 138 kV bus at Kegonsa	2006	2006	3	reliability, new generation
Convert Academy-South Beaver Dam 69 kV line to 138 kV	2006	2006	3	reliability
Construct South Beaver Dam-North Beaver Dam 138 kV line	2006	2006	3	reliability
Uprate McCue-Sheepskin 69 kV line terminal equipment	2006	2006	3	reliability
Convert Kegonsa-McFarland-Femrite 69 kV line to 138 kV	2006	2006	3	reliability, new generation
Construct Sprecher-Femrite 138 kV line	2006	2006	3	reliability, new generation
Install 138/69 kV transformer at Reiner	2006	2006	3	new generation
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2006	2006	3	reliability
Construct 138 kV line from Erdman to Howards Grove	2006	2006	4	T-D interconnection
Uprate Lake Park-City Limits 138 kV line terminal equipment	2006	2006	4	reliability
Install 16 MVAR capacitor bank at Canal 138 kV	2006	2006	4	reliability

Defined in 2002 10-Year Assessment

Revised in scope from 2002 10-Year Assessment

New to this 2002 10-Year Assessment Update

Table IV-6
Proposed Transmission System Additions for 2007

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Construct a Laona-Goodman-Plains 138 kV line	2007	2007	1 & 2	reliability
Install reactive support for Arrowhead-Weston 345 kV line	2007	2007	1	achieve transfer capability associated with Arrowhead-Weston
Construct Stone Lake-Arrowhead 345 kV line	2007	2007	1	service limitation, reliability, import capability & Weston stability
Replace existing 345/115 kV transformer at Weston with two 500 MVA units	2002	2007	1	service limitation, reliability, import capability & Weston stability
Rebuild Weston-Northpoint 115 kV line	2007	2007	1	achieve transfer capability associated with Arrowhead-Weston
Rebuild Kelly-Whitcomb 115 kV line	2007	2007	1	achieve transfer capability associated with Arrowhead-Weston
Uprate Weston-Morrison-Sherman St. 115 kV line - scope TBD	2007	2007	1	reliability
Uprate Weston-Sherman St. 115 kV line - scope TBD	2007	2007	1	reliability
Install second 138/69 kV transformer at Metomen	2007	2007	1	reliability
Uprate Metomen-Ripon 69 kV line - scope TBD	2007	2007	1	reliability
Install additional 8.0 MVAR capacitor bank at Hodag 115 kV	2007	2007	1	reliability
Install additional 5.4 MVAR capacitor bank at Berlin 69 kV	2007	2007	1	reliability
Construct second Hiawatha-Straits 138 kV line	2007	2007	2	reliability
Install a second 138/69, 47 MVA transformer at Rock River	2005	2007	3	reliability
Install a second 138/69 kV transformer at Janesville	2007	2007	3	reliability
Construct Elkhorn-Sugar Creek 138 kV line	2007	2007	3	reliability
Install 10.8 MVAR capacitor bank at Lake Geneva 69 kV	2007	2007	3	reliability
Install 10 MVAR capacitor bank at Jefferson 138 kV	2007	2007	3	reliability
Install 2-13 MVAR capacitor banks at Concord 138 kV	2007	2007	3	reliability
Construct a second Dunn Rd-Egg Harbor 69 kV line	2007	2007	4	reliability
Construct a 345/138 kV switchyard at a new Werner West SS; install a 345/138 kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138 kV lines into Werner West	2004	2007	4	reliability
Construct Clintonville-Werner West 138 kV line	2006	2007	4	reliability
Construct Morgan-Werner West 345 kV line	2004	2007	4	reliability, service limitation
Replace Tecumseh 138/69 kV transformer	2007	2007	4	reliability

Table IV-6
Proposed Transmission System Additions for 2007 (continued)

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2007	2007	4	reliability
Install 28.8 MVAR capacitor bank at Fitzgerald 138 kV	2007	2007	4	reliability
Expand Oak Creek 345 kV switchyard to interconnect one new generator, unit #7 plus two 345 kV lines and 138 kV switchyard to accommodate new St. Martins line	2007	2007	5	new generation
Reconductor Oak Creek-Ramsey6 138 kV line	2007	2007	5	new generation
Reconductor underground segment of Ramsey5-Harbor 138 kV line	2007	2007	5	new generation
Reconductor Oak Creek-Allerton 138 kV line	2007	2007	5	new generation
Construct a 345/138 kV switchyard at Brookdale to accommodate two 345 kV lines, a 500 MVA 345/138 kV transformer and 4-138 kV lines plus two 138-/26.2 kV transformers	2007	2007	5	new generation
Construct an Oak Creek-Brookdale 345 kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV, and 5 mi. 138 kV	2007	2007	5	new generation
Construct a Brookdale-Granville 345 kV line converting/ reconductoring 5.6 mi. 138 kV, rebuilding 7mi. 138 kV double circuit tower line and converting/ reconducting 3 mi. 138 kV on existing 345 kV structures	2007	2007	5	new generation
Construct Oak Creek-St Martins 138 kV circuit #2 installing 4 mi new structures and conductor, plus 12.6 mi conductor on existing towers	2007	2007	5	new generation
Relocate West Junction tap to 96th St-Brookdale 138 kV line (KK5063)	2007	2007	5	new generation
Construct Butler-Tamarack (Carmen) 138 kV line on new 345 kV structures installed with Brookdale-Granville line	2007	2007	5	new generation
Restring Bluemound-Butler 138 kV line (KK5051) on new 345 kV structures installed with Brookdale-Granville line	2007	2007	5	new generation
Construct 345 kV Bluemound switchyard to accommodate 1-345 kV line and a 500 MVA 345/138 kV transformer	2007	2007	5	new generation

Table IV-6
Proposed Transmission System Additions for 2007 (continued)

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Convert/reconductor Oak Creek-Bluemound 230 kV line K873 to 345 kV	2007	2007	5	new generation
Install two 345 kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	2007	2007	5	new generation
Replace seven 138 kV overdutied breakers at Bluemound	2007	2007	5	new generation
Reconnect Oak Creek unit #7 to 345 kV switchyard	2007	2007	5	new generation
Replace substation equipment at both Arcadian 138 kV and Waukesha 138 kV associated with KK9942	2007	2007	5	new generation
Replace Oak Creek 230/138kV transformer with a 500 MVA unit	2007	2007	5	new generation
Install 3-75 MVAR capacitor banks at Bluemound 138 kV	2007	2007	5	reliability
Install 20 MVAR capacitor bank at Summit 138 kV	2007	2007	5	reliability
Install 20 MVAR capacitor bank at Tichigan 138 kV	2007	2007	5	reliability
Install 50 MVAR capacitor bank at Moorland 138 kV	2007	2007	5	reliability

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-7
Proposed Transmission System Additions for 2008

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install 5.4 MVAR capacitor bank at Winneconne 69 kV	2008	2008	1	reliability
Construct St. Germain-Boulder Junction 115 kV line	2008	2008	1	T-D interconnection
Uprate Sherman Street-Hilltop 115 kV line - scope TBD	2008	2008	1	reliability
Convert Turtle-Bristol 69 kV line to 138 kV	2008	2008	3	reliability
Install 4 MVAR distribution capacitor bank at Fall River 69 kV	2008	2008	3	reliability
Install 5.4 MVAR capacitor bank at Rosebush 69 kV	2008	2008	4	reliability
Reconductor Pleasant Valley-Saukville 138 kV line	2008	2008	5	reliability
Reconductor Pleasant Valley-St Lawrence 138 kV line	2008	2008	5	reliability
Reconductor Cornell-Range Line 138 kV line	2008	2008	5	reliability
Replace two existing 345/138 transformers at Arcadian with 500 MVA units	2008	2008	5	reliability, new generation
Uprate Kansas-Ramsey5 138 kV line	2008	2008	5	new generation
Uprate Oak Creek-Ramsey5 138 kV line	2008	2008	5	new generation
Uprate Kansas-Moorland 138 kV line	2008	2008	5	new generation

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-8
Proposed Transmission System Additions for 2009

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install additional 7.2 MVAR capacitor bank at Clear Lake 115 kV	2009	2009	1	reliability
Reconductor Reiner-Burke Tap 69 kV line	2009	2009	3	reliability
Uprate Columbia-Manley Sand 69 kV line terminal equipment	2009	2009	3	reliability
Uprate Brick Church-Zenda 69 kV line terminal equipment	2009	2009	3	reliability
Reconductor Colley Road-Clinton 69 kV line	2009	2009	3	reliability
Construct Rockdale-West Middleton 345 kV line	2009	2009	3	reliability
Install a 345 kV bus and 345/138 kV 500 MVA transformer at West Middleton	2009	2009	3	reliability
Rebuild and convert West Middleton-Spring Green 69 kV line to 138 kV	2009	2009	3	reliability
Construct Spring Green-Prairie du Sac 69 kV line	2009	2009	3	reliability
Install 16 MVAR capacitor bank at Canal 138 kV	2009	2009	4	reliability
Install second 500 MVA 345/138 kV transformer at Oak Creek	2009	2009	5	new generation
Construct a Pleasant Prairie-Libertyville (CE) 345 kV line	2009	2009	5	new generation
Expand 345 kV switchyard at Oak Creek to interconnect one new generator	2009	2009	5	new generation

Defined in 2002 10-Year Assessment

Revised in scope from 2002 10-Year Assessment	
New to this 2002 10-Year Assessment Update	

Table IV-9
Proposed Transmission System Additions for 2010

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Install a second 138/69, 47 MVA transformer at Wautoma	2010	2010	1	reliability

Defined in 2002 10-Year Assessment
Revised in scope from 2002 10-Year Assessment
New to this 2002 10-Year Assessment Update

Table IV-10
Proposed Transmission System Additions for 2011

Proposed Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category
Expand Oak Creek 138 kV switchyard to reconnect units #6 and #9	2011	2011	5	new generation
Expand 345 kV switchyard at Bluemound to accommodate three additional 345 kV lines and two additional 500 MVA 345/138 kV transformers	2011	2011	5	new generation
Reconnect Oak Creek unit 8 to 345 kV switchyard	2011	2011	5	new generation
Convert and reconductor Oak Creek-Bluemound 230 kV line K862 to 345 kV and loop into Arcadian 345 kV substation	2011	2011	5	new generation
Construct Oak Creek-Racine 345 kV line with 4 mi new structures and conductor, plus convert 9.6 mi. 138 kV line KK812 to 345 kV	2011	2011	5	new generation
Reroute Brookdale-Granville 345 kV line into expanded Bluemound 345 kV switchyard	2011	2011	5	new generation
Replace 22-138 kV overdutied breakers at Harbor, Everett and Haymarket Substations	2011	2011	5	new generation
Expand Oak Creek 345 kV switchyard to interconnect three new generators, unit #8 and two 345 kV lines, plus installation of eight 345 kV series breakers for stability purposes	2011	2011	5	new generation

Defined in 2002 10-Year Assessment

Revised in scope from 2002 10-Year Assessment

New to this 2002 10-Year Assessment Update

Table IV-11
Identified Needs and Proposed Transmission Lines Requiring New Right-of-Way

Identified Need	Potential Solutions	Approx. Line Mileage		System Need Year	Projected In-Service Year	Planning Zone
		Total	New ROW			
Accommodate new generation	Construct a Sunrise-McCue 138 kV line	6.06	6.06	2003	2002	3
T-D interconnection request	Construct an Endeavor-Wautoma/Portage 69 kV line	4	4	2003	2003	1
Accommodate new generation	Construct 138 kV double circuit line from Rock Co. generation site to Rock River	0.75	0.75	2003	2003	3
Relieve low voltages under contingency	Construct a Hiawatha-Engadine 69 kV line	0.2	0.2	2003	2004	2
T-D interconnection request	Construct Fitchburg-Tokay-Westowne 69 kV underground line	5.5	5.5	2004	2004	3
Improve transfer capability, improve dynamic and voltage stability performance, eliminate need for operating guides, reduce service limitations	Construct Weston-Stone Lake 345 kV line	140	73.4	1997	2005	1
T-D interconnection request	Construct Clear Lake- Arnett Road 115 kV line	15	15	2005	2005	1
Relieve overloads, improve voltages	Construct Lake Nokomis-Highway 8 115 kV line	16	16	2004	2005	1
T-D interconnection request	Construct Eastom-Lake Nokomis 115 kV line	5	5	2005	2005	1
T-D interconnection requests	Construct 138 or 115 kV line from Venus to new Crandon and Laona Substations	25	25	2005	2005	1
T-D interconnection request	Construct West Darien-Southwest Delavan-Delavan 138 kV line initially operated at 69 kV	5	5	2005	2005	3
Relieve overloads under contingency	Construct S. Reedsburg-N. Reedsburg 138 kV line	0.75	0.75	2004	2005	3
T-D interconnection request, improve voltages	Construct a Waukesha-Duplainville-Sussex 138 kV line	8	8	2005	2005	5
Relieve overloads under contingency	Construct South Beaver Dam-North Beaver Dam 138 kV line	6	6	2006	2006	3
Relieve overloads under contingency, accommodate new generation	Construct a Femrite-Sprecher 138 kV line	2	2	2006	2006	3
T-D interconnection request	Construct 138 kV line from Erdman to Howards Grove	5	5	2006	2006	4
Improve transfer capability, improve dynamic and voltage stability performance, eliminate need for operating guides, reduce service limitations	Construct Stone Lake-Arrowhead 345 kV line	70	36.6	1997	2007	1
Relieve overloads under contingency, accommodate new generation	Construct an Elkhorn-Sugar Creek 138 kV line	3	3	2007	2007	3
Relieve overloads under contingency	Construct Clintonville-Werner West 138 kV line	16	16	2006	2007	4
Relieve overloads under contingency	Construct Morgan-Werner West 345 kV line	47	47	2004	2007	4

Table IV-11
Identified Needs and Proposed Transmission Lines Requiring New Right-of-Way (continued)

Identified Need	Potential Solutions	Approx. Line Mileage		System	Projected	Planning
		Total	New ROW	Need Year	In-Service Year	Zone
Relieve overloads under contingency, improve voltages	Construct a second Dunn Rd-Egg Harbor 69 kV line	13	13	2007	2007	4
Accommodate new generation	Construct an Oak Creek-Brookdale 345 kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV, and 5 mi. 138 kV	25.2	4	2007	2007	5
Accommodate new generation	Construct Oak Creek-St Martins 138 kV circuit #2 installing 4 mi new structures and conductor, plus 12.6 mi conductor on existing towers	16.6	4	2007	2007	5
Improve load serving capability in Rhinelander area	Construct a Laona-Goodman-Plains 138 kV line	46	46	2007	2007	1 & 2
T-D interconnection request	Construct St. Germain-Boulder Junction 115 kV line	15	15	2008	2008	1
Relieve overloads under contingency	Construct Rockdale-West Middleton 345 kV line	35	35	2009	2009	3
Relieve overloads under contingency	Construct Spring Green-Prairie du Sac 69 kV line	22	22	2009	2009	3
Accommodate new generation	Construct a Pleasant Prairie-Libertyville 345 kV line	29.67	22	2009	2009	5
Accommodate new generation	Construct Oak Creek-Racine 345 kV line with 4 mi new structures and conductor, plus convert 9.6 mi. 138 kV line KK812 to 345 kV	13.6	4	2011	2011	5

Table IV-12
Proposed Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on Existing Right-of-Way

Identified Need	Lines to be Rebuilt/Reconductored on Existing ROW	Approx. Mileage of Rebuilt, Reconductored or Uprated Lines	System Need Year	Projected In-Service Year	Planning Zone
Relieve overloads under contingency	Construct second Roosevelt-Wells 69 kV line	3	2002	2002	4
T-D Interconnection request	Construct Elevation-Elevation Tap 69 kV line	0.5	2003	2003	2
Relieve overloads under contingency	Uprate Cedar-M38 138 kV line – scope TBD	56.44	2003	2003	2
Relieve overloads under contingency	Uprate Cedar-Freeman 138 kV line – scope TBD	8.68	2003	2003	2
Relieve overloads under contingency	Uprate Freeman-Presque Isle 138 kV line – scope TBD	8.9	2003	2003	2
Relieve overloads under contingency	Uprate Presque Isle-Cedar 138 kV line – scope TBD	16.65	2003	2003	2
Relieve overloads under contingency	Construct second East Campus-Walnut 69 kV line	1.3	2003	2003	3
Relieve overloads under contingency	Convert Maplewood-Roselawn-Cloverleaf-Badger and Clintonville-Badger-Shawano West 115 kV lines to 138 kV	41	2003	2003	4
Relieve overloads under contingency, lower system losses	String a 138 kV circuit from Forest Junction to Lost Dauphin on existing structures	13	2003	2003	4
Relieve overloads under contingency; replace aging facilities	Rebuild the Forest Junction-Highway V 138 kV double circuit line	22.22	2003	2003	4
Relieve overloads under contingency, reduce service limitations, support area construction outages (Dane County)	Reconductor Christiana to Kegonsa 138 kV circuit	9.82	2003	2003	3
Reduce service limitations	Reconductor Colley Road to Blackhawk 138 kV circuit	1.29	2000	2003	3
Relieve overloads under contingency, lower system losses	Construct 138 kV line from Mullet River to N Mullet River and convert N Mullet River to Plymouth Sub #1 from 69 kV to 138 kV	0.9	2003	2003	4
Relieve overloads under contingency; reduce service limitations, replace aging facilities	Rebuild Granville-Saukville 138 kV lines	18	2003	2003	5
Relieve overloads under contingency; reduce service limitations, replace aging facilities	Reconductor Whitewater-Mukwonago 138 kV line	22	2003	2003	3 & 5
Relieve overloads under contingency	Convert Pine-Grandfather-Tomahawk-Eastom 46 kV lines to 115 kV	30	2001	2004	1
Relieve overloads under contingency	Rebuild DeTour-Talentino Tap 69 kV line	19	2002	2004	2
Relieve overloads under contingency; reduce service limitations, replace aging facilities	Rebuild and convert one Hiawatha-Indian Lake 69 kV circuit to double circuit 138 kV	40	2004	2004	2
Relieve overloads under contingency, accommodate new generation, replace aging facilities	Rebuild Turtle-Bristol 69 kV line to 138 kV and operate at 69 kV	29	2003	2004	3
Relieve overloads under contingency	Convert Kirkwood-Reedsburg 69 kV to 138 kV	15.15	2003	2004	3
Relieve overloads under contingency, accommodate new generation	Reconductor Blount-Ruskin 69 kV line	2.19	2003	2004	3

Table IV-12
Proposed Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on Existing Right-of-Way (continued)

Identified Need	Lines to be Rebuilt/Reconductored on Existing ROW	Approx. Mileage of Rebuilt, Reconductored or Uprated Lines	System Need Year	Projected In-Service Year	Planning Zone
Relieve overloads under contingency, accommodate new generation	Reconductor Blount-Ruskin Tap 69 kV line	2.19	2003	2004	3
Accommodate new generation	Reconfigure 69/138 kV circuits between Rock River and Janesville to create Rock River-Janesville and Rock River-Sunrise 138 kV circuits	20	2004	2004	3
Accommodate new generation	Rebuild Russell-Janesville 138 kV line	6.3	2004	2004	3
Accommodate new generation	Reconductor Russell-Rockdale 138 kV line	16.52	2004	2004	3
Relieve overloads under contingency, accommodate new generation	Rebuild Kegonsa-McFarland-Femrite 69 kV line to 138 kV	5.9	2004	2004	3
Relieve overloads under contingency, accommodate new generation	Rebuild Femrite-Royster 69 kV line	3.52	2004	2004	3
Relieve overloads under contingency; reduce service limitations, replace aging facilities	Rebuild the Morgan-Falls-Pioneer-Stiles 138 kV line	10.69	2003	2004	4
Accommodate new generation	Rebuild Port Washington-Range Line double circuit 138 kV line	21	2004	2004	5
Relieve overloads and low voltages under contingency	Reconductor Wien-McMillan 115 kV (ATC, MEWD)	20	2005	2005	1
Relieve overloads under contingency	Convert Kilbourn-N. Reedsburg 69 kV line to 138 kV	18.41	2004	2005	3
Relieve overloads under contingency, accommodate new generation	Convert Columbia-North Madison 138 kV line to 345 kV	17.41	2005	2005	3
Accommodate new generation	Rebuild Janesville-Riverside 138 kV line	9.52	2005	2005	3
Relieve overloads under contingency	Uprate Kaukauna Central Tap-Melissa 138 kV line - scope TBD	8.6	2005	2005	4
Accommodate new generation	Rebuild Port Washington-Saukville double circuit 138 kV line	5	2005	2005	5
Accommodate new generation	Rebuild Port Washington-Saukville single circuit 138 kV line	5	2005	2005	5
Relieve overloads under contingency	Reconductor W. Middleton-Pheasant Branch 69 kV line	4.65	2006	2006	3
Relieve overloads under contingency	Convert Sycamore-Reiner-Sprecher 69 kV line to 138 kV	6.5	2006	2006	3
Relieve overloads under contingency	Convert Academy-South Beaver Dam 69 kV line to 138 kV	12.8	2006	2006	3

Table IV-12
Proposed Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on Existing Right-of-Way (continued)

Identified Need	Lines to be Rebuilt/Reconductored on Existing ROW	Approx. Mileage of Rebuilt, Reconductored or Uprated Lines	System Need Year	Projected In-Service Year	Planning Zone
Relieve overloads under contingency, accommodate new generation	Convert Kegonsa-McFarland-Femrite 69 kV to 138 kV	5.9	2006	2006	3
Relieve overloads under contingency; reduce service limitations, replace aging facilities	Rebuild Plains-Amberg-Stiles double circuit 138 kV line	131	2006	2006	2 & 4
Improve import capability	Rebuild Kelly-Whitcomb 115 kV line	24	2007	2007	1
Improve import capability	Rebuild Weston-Northpoint 115 kV line	24	2007	2007	1
Relieve overloads under contingency	Construct second Hiawatha-Straits 138 kV line	25	2007	2007	2
Accommodate new generation	Relocate West Junction Tap to 96th St-Brookdale 138 kV line (KK5063)	Not Applicable	2007	2007	5
Accommodate new generation	Reconductor Oak Creek-Ramsey6 138 kV line	0.8	2007	2007	5
Accommodate new generation	Reconductor underground segment of Ramsey5-Harbor 138 kV line	5.72	2007	2007	5
Accommodate new generation	Reconductor Oak Creek-Allerton 138 kV line	5.41	2007	2007	5
Accommodate new generation	Convert and reconductor Oak Creek-Bluemound 230 kV line K873 to 345 kV	29	2007	2007	5
Accommodate new generation	Construct a Brookdale-Granville 345 kV line converting/ reconductoring 5.6 mi. 138 kV, rebuilding 7mi. 138 kV double circuit tower line and converting/ reconducting 3 mi. 138 kV on existing 345 kV structures	15.6	2007	2007	5
Accommodate new generation	Restring Bluemound-Butler 138 kV line (KK5051) on new 345 kV structures installed with Brookdale-Granville line	5.41	2007	2007	5
Accommodate new generation	Construct Butler-Tamarack (Carmen) 138 kV line on new 345 kV structures installed with Brookdale-Granville line	4.12	2007	2007	5
Relieve overloads under contingency	Convert Turtle-Bristol 69 kV to 138 kV	29	2008	2008	3
Aging facilities and relieves a minor overload under contingency	Reconductor Pleasant Valley-Saukville 138 kV line	12	2008	2008	5
Aging facilities and relieves a minor overload under contingency	Reconductor Pleasant Valley-St Lawrence 138 kV line	7	2008	2008	5
Accommodate new generation	Reconductor Cornell-Range Line 138 kV line	2.43	2008	2008	5
Relieve overloads under contingency	Reconductor Colley Road-Clinton 69 kV line	6.25	2009	2009	3

Table IV-12
Proposed Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on Existing Right-of-Way (continued)

Identified Need	Lines to be Rebuilt/Reconductored on Existing ROW	Approx. Mileage of Rebuilt, Reconductored or Uprated Lines	System Need Year	Projected In-Service Year	Planning Zone
Relieve overloads under contingency	Rebuild and convert West Middleton-Spring Green 69 kV line to 138 kV	5.71	2009	2009	3
Relieve overloads under contingency	Reconductor Reiner-Burke Tap 69 kV line	0.98	2009	2009	3
Interconnect new generation to the transmission system	Reroute Brookdale-Granville 345 kV line into new Bluemound 345 kV switchyard	Not Applicable	2011	2011	5
Accommodate new generation	Convert and reconductor Oak Creek-Bluemound 230 kV line K862 to 345 kV and loop into Arcadian 345 kV SS	39	2011	2011	5

Table IV-13
Proposed New Substations, Transformer Additions and Replacements

Identified Need	Proposed Additions or Replacements	Transformer Capacity (MVA)		System Need Year	Projected In-Service Year	Planning Zone
		Install	Replace			
Relieve overloads under contingency	Replace 138/69 kV transformer at North Beaver Dam	100	47	2002	2002	3
Relieve overloads under contingency	Install 345/138, 500 MVA transformer at Rockdale	500	0	2002	2002	3
Relieve overloads under contingency	Install 138/69 kV transformer at Kilbourn	47	0	2002	2002	3
Relieve overloads under contingency	Replace 138/69 kV transformer at Russell	100	33	2002	2002	3
Relieve 69 kV overloads under contingencies	Reconnect NW Beloit 69 kV load to Paddock-Blackhawk 138 kV line	Not Applicable	Not Applicable	2003	2003	3
Relieve overloads under contingency	Construct a 345 kV ring bus at Forest Junction, loop existing Point Beach-Arcadian 345 kV line into Forest Junction, install two 345/138 kV, 500 MVA transformers	1000	0	2003	2003	4
Relieve overloads under contingency	Relocate Maplewood 138/115 kV transformer to Badger	112	112	2003	2003	4
Relieve overloads under contingency	Install a second 138/69 kV transformer at North Randolph	47	0	2004	2004	3
Relieve overloads under contingency	Construct 138/69 kV switchyard at Artesian; install 2 138/69 kV transformers	200	0	2003	2004	3
Relieve overloads under contingency	Install a second 138/69 kV transformer at Hillman	47	0	2004	2004	3
Relieve overloads under contingency, accommodate new generation	Replace 138/69 kV transformers at Fitchburg with 187 MVA units	374	202	2003	2004	3
T-D interconnection	Construct a 69 kV switchyard at Tokay	Not Applicable	Not Applicable	2004	2004	3
Relieve overloads under contingency	Replace two existing Canal 138/69 kV transformers	168	112	2003	2005	4
Relieve overloads under contingency	Install second 138/69 kV transformer at Crivitz	33.6	0	2003	2003	4
Relieve overloads under contingency	Replace 345/138 kV transformer at Edgewater	500	223	2004	2004	4
Improve Weston stability response	Construct 345 kV switchyard at Weston	Not Applicable	Not Applicable	2002	2005	1
Accommodate new generation, relieve overloads under contingency	Replace 138/69 kV transformer at Sigel	60	47	2005	2005	1
Accommodate new generation, relieve overloads under contingency	Replace 138/69 kV transformer at Petenwell	47	33	2005	2005	1
Relieve overloads under contingency	Install second 138/69, 63 MVA transformer at Straits	63	0	2003	2005	2
Relieve overloads under contingency, accommodate new generation	Reconfigure 345 kV bus at North Madison and replace the existing transformers with 500 MVA units	1000	510	2005	2005	3
Relieve overloads under contingency	Replace Ellinwood 138/69 kV transformer	64	44.8	2005	2005	4
Relieve overloads under contingency	Construct a new Lannon Junction substation at intersection of Granville-Arcadian 345 kV, Forest Junction-Arcadian 345 kV, Sussex-Tamarack 138 kV and Sussex-Germantown 138 kV lines; install a 345/138 kV, 500 MVA transformer	500	0	2005	2005	5

Table IV-13
Proposed New Substations, Transformer Additions and Replacements (continued)

Identified Need	Proposed Additions or Replacements	Transformer Capacity (MVA)		System Need Year	Projected In-Service Year	Planning Zone
		Install	Replace			
Relieve overloads under contingency	Construct a 345 kV switchyard at North Randolph; install a 345/138 kV transformer	500	0	2006	2006	3
Accommodate new generation	Install 138/69 kV transformer at Reiner	100	0	2006	2006	3
Relieve overloads under contingency	Replace existing 345/115 kV transformer at Weston with two 500 MVA units	1000	300	2002	2007	1
Relieve overloads under contingency	Install a second 138/69 kV transformer at Metomen	47	0	2007	2007	1
Relieve overloads under contingency	Install a second 138/69 kV transformer at Rock River	47	0	2005	2007	3
Relieve overloads under contingency	Install a second 138/69 kV transformer at Janesville	100	0	2007	2007	3
Relieve overloads under contingency	Construct a 345/138 kV switchyard at a new Werner West SS; install a 345/138 kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138 kV lines into Werner West	500	0	2004	2007	4
Increase rating/relieve overload under contingency	Replace Tecumseh 138/69 kV transformer	70	44.8	2007	2007	4
Accommodate new generation	Construct a 345/138 kV switchyard at Brookdale to accommodate two 345 kV lines, a 500 MVA 345/138 kV transformer and 4-138 kV lines plus two 138-26.2 kV transformers	500	0	2007	2007	5
Accommodate new generation	Replace Oak Creek 230/138kV transformer with a 500 MVA unit	500	360	2007	2007	5
Accommodate new generation	Construct 345 kV Bluemound switchyard to accommodate 1-345 kV line and a 500 MVA 345/138 kV transformer	500	365	2007	2007	5
Relieve overloads under contingency, accommodate new generation	Replace two existing Arcadian 345/138 kV transformers with 500 MVA units	1000	600	2008	2008	5
Relieve overloads under contingency	Install a 345 kV bus and 345/138 kV 500 MVA transformer at West Middleton	500	0	2009	2009	3
Accommodate new generation	Install second 345/138 kV transformer at Oak Creek SS	500	0	2009	2009	5
Relieve overloads under contingency	Install a second 138/69, 47 MVA transformer at Wautoma	47	0	2010	2010	1
Accommodate new generation	Expand 345 kV switchyard at Bluemound to accommodate three additional 345 kV lines and two additional 500 MVA 345/138 kV transformers	1000	685	2011	2011	5

Table IV-14
Proposed Substation Equipment Additions and Replacements

Identified Need	Proposed Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
Relieve low voltages under contingency	Install 8 MVAR capacitor bank at Hodag 115 kV	8	2002	2002	1
Relieve overloads under contingency	Uprate Academy-Columbus 69 kV line terminal equipment	Not Applicable	2002	2002	3
Interconnect new generation to the transmission system	Expand the 345 kV switchyard at Columbia	Not Applicable	2002	2002	3
Increase rating/relieve overload under contingency, accommodate new generation	Uprate Russell-McCue 138 kV line terminal equipment	Not Applicable	2002	2002	3
Relieve low voltages under contingency	Install 2-16 MVAR capacitor banks at New Holstein 69 kV	32	2002	2002	4
Relieve low voltages under contingency	Install 28.8 MVAR capacitor bank at Badger 115 kV	28.8	2002	2002	4
Relieve low voltages under contingency	Install 28.8 MVAR capacitor bank at Werner 138 kV	28.8	2002	2002	4
Relieve low voltages under contingency	Install 28.8 MVAR capacitor bank at White Lake 138 kV	28.8	2002	2002	4
Relieve low voltages under contingency	Install 2-28 MVAR capacitor banks at Sussex 138 kV	56	2002	2002	5
Interconnect new generation to the transmission system	Uprate Port Edwards-Sigel 138 kV line terminal equipment	Not Applicable	2002	2003	1
Relieve overloads under contingency	Uprate Whitcomb 115/69 kV transformer	Not Applicable	2002	2003	1
Relieve low voltages under contingency	Install 11.3 MVAR capacitor bank at Summit Lake 115 kV	11.3	2003	2003	1
Relieve overloads under contingency	Replace a breaker at Aurora Street 115 kV (line A313)	Not Applicable	2003	2003	1
Relieve overloads under contingency	Replace a breaker at Highway 8 115 kV (line D56)	Not Applicable	2003	2003	1
Relieve low voltages under contingency	Install 2-7.2 MVAR capacitor banks at Atlantic 69 kV	14.4	2003	2003	2
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Talentino 69 kV	5.4	2003	2003	2
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Gwinn 69 kV	5.4	2003	2003	2
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Land o Lakes 69 kV	5.4	2003	2003	2
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Roberts 69 kV	5.4	2003	2003	2
Increase rating/relieve overload under contingency	Uprate Kegonsa-Christiana 138 kV line	Not Applicable	2003	2003	3
Relieve overloads during maintenance outages in the Walworth County area	Uprate Colley Road-Brick Church 138 kV line terminal equipment	Not Applicable	2002	2003	3
Accommodate new generation, increase rating/relieve overload under contingency	Uprate McCue-Sheepskin 69 kV line terminal equipment	Not Applicable	2003	2003	3
Interconnect new generation to the transmission system	Construct 138 kV switchyard at Rock Co. generation site	Not Applicable	2003	2003	3
Increase rating/relieve overload under contingency	Convert the normally open Shawano East-Shawano West 34.5 kV bus tie to 138 kV and operate normally closed	Not Applicable	2003	2003	4

Table IV-14
Proposed Substation Equipment Additions and Replacements (continued)

Identified Need	Proposed Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
Increase rating/relieve overload under contingency	Install 69 kV phase shifter at Council Creek SS	Not Applicable	2002	2004	1
Increase rating/relieve overload under contingency	Uprate North Randolph-Ripon 69 kV line terminal equipment	Not Applicable	2002	2004	1
Relieve low voltages under contingency	Install additional 5.4 MVAR capacitor bank at Berlin 69 kV	5.4	2004	2004	1
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Ripon 69 kV	5.4	2003	2004	1
Increase rating/relieve overload under contingency	Replace current transformer at Cedar SS for Cedar-National 138 kV	Not Applicable	2002	2004	2
Increase rating/relieve overload under contingency	Uprate Dickinson-Brick Church 138 kV line terminal equipment	Not Applicable	2003	2003	3
Increase rating/relieve overload under contingency	Uprate Portage-Columbia double circuit 138 kV line terminal equipment	Not Applicable	2003	2004	3
Relieve low voltages under contingency	Install 24 MVAR capacitor bank at Dickinson 138 kV	24	2004	2004	3
Relieve low voltages under contingency	Install 24 MVAR capacitor bank at Elkhorn 138 kV	24	2004	2004	3
Relieve low voltages under contingency	Install 24 MVAR capacitor bank at new Loch Mirror (Birchwood) 138 kV	24	2004	2004	3
Relieve low voltages under contingency	Install 10.8 MVAR capacitor bank at Rio 69 kV	10.8	2004	2004	3
Relieve low voltages under contingency	Install 10.8 MVAR capacitor bank at Burke 69 kV	10.8	2004	2004	3
Relieve low voltages under contingency	Install additional 5.4 MVAR capacitor bank at Mayville 69 kV	5.4	2004	2004	3
Relieve low voltages under contingency	Install additional 5.4 MVAR capacitor bank at New Glarus 69 kV	5.4	2004	2004	3
Relieve low voltages under contingency	Install additional 10.8 MVAR capacitor bank at South Monroe 69 kV	10.8	2004	2004	3
Interconnect new generation to the transmission system	Install 16.3 MVAR capacitor bank at Kegonsa 69 kV	16.3	2004	2004	3
Interconnect new generation to the transmission system	Install 20.4 MVAR capacitor bank at North Madison 69 kV	20.4	2004	2004	3
Interconnect new generation to the transmission system	Install 24.5 MVAR capacitor bank at Cross Country 138 kV	24.5	2004	2004	3
Interconnect new generation to the transmission system	Install 12.2 MVAR capacitor bank at Waunakee 69 kV	12.2	2004	2004	3
Interconnect new generation to the transmission system	Install 10.8 MVAR capacitor bank at Tokay	10.8	2004	2004	3
Relieve low voltages under contingency	Install 16 MVAR capacitor bank at Canal 138 kV	16	2003	2004	4
Relieve overloads under contingency	Uprate Point Beach-Forest Junction 345 kV line	Not Applicable	2003	2004	4

Table IV-14
Proposed Substation Equipment Additions and Replacements (continued)

Identified Need	Proposed Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
Increase rating/relieve overload under contingency	Uprate Edgewater-Cedarsauk 345 kV line	Not Applicable	2003	2004	4
Relieve overloads under contingency	Uprate Pleasant Prairie-Arcadian 345 kV line	Not Applicable	2003	2004	5
Increase rating/relieve overload under contingency	Uprate Metomen-N Fond du Lac 69 kV line terminal equipment	Not Applicable	2005	2005	1
Increase rating/relieve overload under contingency	Uprate Bunker Hill-Pine 115 kV line terminal equipment	Not Applicable	2005	2005	1
Increase rating/relieve overload under contingency, accommodate new generation	Uprate Port Edwards-Sand Lake 138 kV line - scope TBD	Not Applicable	2005	2005	1
Increase rating/relieve overload under contingency, accommodate new generation	Uprate Weston-Kelly 115 kV line - scope TBD	Not Applicable	2005	2005	1
Interconnect new generation to the transmission system	Connect double circuit 345/138 kV line from IC014 generation site to Arpin	Not Applicable	2005	2005	1
Relieve low voltages under contingency	Install additional 6.3 MVAR capacitor bank at McKenna	6.3	2006	2006	1
Increase rating/relieve overload under contingency	Uprate Wautoma-Berlin 69 kV line terminal equipment	Not Applicable	2006	2006	1
Increase rating/relieve overload under contingency	Uprate McCue-Sheepskin 69 kV line terminal equipment	Not Applicable	2006	2006	3
Interconnect new generation to the transmission system	Install 138 kV bus at Kegonsa	Not Applicable	2006	2006	3
Increase rating/relieve overload under contingency	Uprate Lake Park-City Limits 138 kV line terminal equipment	Not Applicable	2006	2006	4
Relieve low voltages under contingency	Install 16 MVAR capacitor bank at Canal 138 kV	16	2006	2006	4
Import capability	Install reactive support for Arrowhead-Weston 345 kV line	Multiple installations	2007	2007	1
Relieve low voltages under contingency	Install additional 8.0 MVAR capacitor bank at Hodag 115 kV	8	2007	2007	1
Increase rating/relieve overload under contingency	Uprate Weston-Morrison-Sherman St. 115 kV line - scope TBD	Not Applicable	2007	2007	1
Relieve low voltages under contingency	Install additional 5.4 MVAR capacitor bank at Berlin 69 kV	5.4	2007	2007	1
Increase rating/relieve overload under contingency	Uprate Weston-Sherman St. 115 kV line - scope TBD	Not Applicable	2007	2007	1
Increase rating/relieve overload under contingency	Uprate Metomen-Ripon 69 kV line - scope TBD	Not Applicable	2007	2007	1
Relieve low voltages under contingency	Install 10.8 MVAR capacitor bank at Lake Geneva 69 kV	10.8	2007	2007	3

Table IV-14
Proposed Substation Equipment Additions and Replacements (continued)

Identified Need	Proposed Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
Relieve low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138 kV	28.8	2007	2007	4
Relieve low voltages under contingency	Install 28.8 MVAR capacitor bank at Fitzgerald 138 kV	28.8	2007	2007	4
Interconnect new generation to the transmission system	Expand Oak Creek 345 kV switchyard to interconnect one new generator, unit #7 plus two 345 kV lines and 138 kV switchyard to accommodate new St. Martins line	Not Applicable	2007	2007	5
Relieve low voltages under contingency	Install 10 MVAR capacitor bank at Jefferson 138 kV	10	2007	2007	3
Relieve low voltages under contingency	Install 2-13 MVAR capacitor banks at Concord 138 kV	26	2007	2007	3
Relieve overloads under contingency	Replace substation equipment at both Arcadian 138 kV and Waukesha 138 kV associated with KK9942	Not Applicable	2007	2007	5
Accommodate new generation & load growth	Install 3-75 MVAR capacitor banks at Bluemound 138 kV	225	2007	2007	5
Load growth	Install 20 MVAR capacitor bank at Summit 138 kV	20	2007	2007	5
Load growth	Install 20 MVAR capacitor bank at Tichigan 138 kV	20	2007	2007	5
Load growth	Install 50 MVAR capacitor bank at Moorland 138 kV	50	2007	2007	5
Interconnect new generation to the transmission system	Reconnect Oak Creek unit #7 to 345 kV switchyard	Not Applicable	2007	2007	5
Interconnect new generation to the transmission system	Install two 345 kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	Not Applicable	2007	2007	5
Interconnect new generation to the transmission system	Replace seven 138 kV overdutied breakers at Bluemound	Not Applicable	2007	2007	5
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Winneconne 69 kV	5.4	2008	2008	1
Relieve overloads under contingency	Uprate Sherman Street-Hilltop 115 kV line - scope TBD	Not Applicable	2008	2008	1
Relieve low voltages under contingency	Install 4 MVAR distribution capacitor bank at Fall River 69 kV	4	2008	2008	3
Relieve low voltages under contingency	Install 5.4 MVAR capacitor bank at Rosebush 69 kV	5.4	2008	2008	4
Accommodate new generation	Uprate Kansas-Ramsey5 138 kV line	Not Applicable	2008	2008	5
Accommodate new generation	Uprate Oak Creek-Ramsey5 138 kV line	Not Applicable	2008	2008	5
Accommodate new generation	Uprate Kansas-Moorland 138 kV line	Not Applicable	2008	2008	5
Relieve low voltages under contingency	Install additional 7.2 MVAR capacitor bank at Clear Lake 115 kV	7.2	2009	2009	1
Increase rating/relieve overload under contingency	Uprate Brick Church-Zenda 69 kV line terminal equipment	Not Applicable	2009	2009	3
Relieve overloads under contingency	Uprate Columbia-Manley Sand 69 kV line terminal equipment	Not Applicable	2009	2009	3
Relieve low voltages under contingency	Install 16 MVAR capacitor bank at Canal 138 kV	16	2009	2009	4

Table IV-14
Proposed Substation Equipment Additions and Replacements (continued)

Identified Need	Proposed Additions or Replacements	Capacitor Bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
Interconnect new generation to the transmission system	Expand Oak Creek 345 kV switchyard to interconnect one new generator	Not Applicable	2009	2009	5
Relieve low voltages under contingency	Install 10.8 MVAR capacitor bank at Waunakee 69 kV	10.8	2010	2010	3
Interconnect new generation to the transmission system	Expand Oak Creek 345 kV switchyard to interconnect three new generators, unit #8 and two 345 kV lines, plus installation eight 345 kV series breakers for stability purposes	Not Applicable	2011	2011	5
Interconnect new generation to the transmission system	Reconnect Oak Creek unit #8 to 345 kV switchyard	Not Applicable	2011	2011	5
Interconnect new generation to the transmission system	Reconnect Oak Creek units #6 and #9 to 138 kV switchyard	Not Applicable	2011	2011	5
Interconnect new generation to the transmission system	Replace 22-138 kV overdutied breakers at Harbor, Everett and Haymarket Substations	Not Applicable	2011	2011	5

Table IV-15

Alternative Solutions to Proposed Additions

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
Convert Pine-Grandfather-Tomahawk-Eastom 46 kV system to 115 kV and construct new Lake Nokomis-Highway 8 115 kV line	1.) Weston-Venus 345 kV line. 2.) Venus-Crandon-Laona-Goodman-Dunbar 115 kV line. 3.) Venus-Crandon-Laona-Plains 138 kV line. 4.) Convert Plains-Conover to 138 kV with a new Conover-Cranberry 138 kV line. 5.) Convert Winona-Conover to 138 kV with a new Conover-Cranberry 138 kV line 6.) Generation in upper portion of Rhinelander Loop.	2004	1
Construct new Lake Nokomis-Highway 8 115 kV line	1.) Rebuild as double circuit 115 kV lines on existing center line. 2.) Construct a new 115 kV line parallel to the existing line. 3.) Construct new Eastom-Highway 8 115 kV line incorporating new WPS T-D interconnection request (Lake Nokomis area) into routing of the line.	2005	1
Laona-Goodman-Plains 138 kV line	1.) Weston-Venus 345 kV line. 2.) Weston-Venus-Plains 345 kV line. 3.) Convert Plains-Conover to 138 with a new Conover-Cranberry 138 kV line. 4.) Convert Winona-Conover to 138 kV with a Conover-Cranberry 138 kV line. 5.) Laona-Goodman-Dunbar 115 or 138 kV line. 6.) Generation in upper portion Rhinelander Loop	2007	1
Construct Clear Lake-Highway D 115 kV line and construct St. Germain-Boulder Junction 115 kV line. Both lines to be radial.	1.) Loop new T-D substations with a Clear Lake-Hwy D-Boulder Junction-Conover 115 kV line. 2.) Loop new T-D substations with a Clear Lake-Hwy D-Boulder Junction-St. Germain 69 kV line. 3.) Construct new 69 kV radial lines and 115/69 kV xfmrs at Clea Lake and St. Germain. 4.) Construct a new 115 kV line from Clear Lake west to NSP's system to incorporate new Hwy D and possible DPC T-D interconnect (Butternut).	2005	1
Construct Eastom-Lake Nokomis 115 kV line (radial).	1.) Include new Lake Nokomis T-D interconnection request in the routing of a Eastom-Highway 8 115 kV line which is described as an alternate to the Lake Nokomis-Highway 8 115 kV line.	2005	1
Install capacitor banks at Ripon, Berlin, and Winneconne. Uprate Metomen-Ripon 69 kV line and install 2nd 138/69 kV transformer at Metomen.	1.) Reconfigure N. Randolph-Ripon 69 kV line to N. Randolph-Metomen & Metomen-Ripon 69 kV lines, 138-69 kV double circuit from Metomen to Berlin with new 138/69 kV xfmr at Berlin.	2005	1

Table IV-15

Alternative Solutions to Proposed Additions (continued)

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
Uprate Weston-Sherman St., Weston-Morrison-Sherman St., and Sherman St.-Hilltop 115 kV lines	1). Convert WPS's 46 kV system from Maine-Brokaw-Strowbridge-Wausau Hydro-Townline-Kelly to 115 kV. 2.) Convert WPS's 46 kV system from Sherman St.-Wausau Hydro-Strowbridge-Townline-Kelly to 115 kV	2007	1
Install 69 kV phase shifter at Council Creek	1.) Install a new 161/138 kV transformer at Monroe County and convert DPC's Monroe County-Council Creek 69 kV system to 138 kV.	2004	1
Construct a 0.2 mile Hiawatha to Engadine 69 kV line to relieve low voltages under contingency by removing load from the end of a 71 mile, 69 kV line.	Add capacitor bank near Newberry SS.	2003	2
Add a Second 138/69 kV transformer at Straits	Replace the Straits 138/69 kV transformer with a larger size	2004	2
Uprate Cedar-Freeman 138 kV line Uprate Cedar-M38 138 kV line Uprate Freeman-Presque Isle 138 kV line Uprate Presque Isle-Cedar 138 kV line	Alternative solutions to be defined after Scope of the uprates is developed.	2003	2
Construct second Hiawatha-Straits 138 kV line	Limit flows with a Phase Shifter and add 138 kV capacitors at Brevort or Lakehead	2007	2
Rebuild and convert one Hiawatha-Indian Lake 69 kV circuit to double circuit 138 kV	Rebuild at 69 kV and Limit flows with a Phase Shifter	2004	2
Rebuild Plains-Amberg-Stiles double circuit 138 kV line	Upgrade West Marinette-White Rapids-Chandler to a higher voltage	2006	2 & 4
Convert North Madison 69 kV line through Sun Prairie to Reiner to 138 kV	Reconfigure Sun Prairie 69 kV system, install second 138/69 kV transformer at North Madison	2005	3
Construct a new 345 kV line from Rockdale to West Middleton	Uprate Christiana to Fitchburg 138 kV line to 319 MVA	2004	3
Construct a new 345 kV line from Rockdale to West Middleton	Reconductor Kegonsa to Christiana 138 kV line	2005	3
Construct a new 345 kV line from Rockdale to West Middleton	1.) Convert Kegonsa to Femrite to 138 kV, close the 138 kV loop from Femrite to Sprecher, convert the Sycamore to Sprecher line to 138 kV 2.) Install Rockdale to Sprecher/Femrite 138 kV double circuit	2008	3
Construct a new 345 kV line from Rockdale to West Middleton	1.) Construct a new 345 kV line from North Madison to West Middleton 2.) Rockdale to Sprecher/Femrite 138 kV double circuit 3) Numerous 138 kV and 69 kV capacitor banks, reconductor Kegonsa to Christiana, reconductor Fitchburg to Christiana, add a second 138/69 kV transformer at North Madison, add a third 345/138 kV transformer at North Madison, reconductor or uprate North Madison to Sycamore 138 kV line, install a second 138/69 kV transformer at Kegonsa, reconductor all three East Campus to Blount 69 kV lines, reconductor Blount to Gateway 69 kV line.	2009	3
Convert 69 kV line from West Middleton to Spring Green to 138 kV and Construct a new 345 kV line from Rockdale to West Middleton	Install several capacitor banks on 69 kV buses and on 138 kV buses	2008	3

Table IV-15

Alternative Solutions to Proposed Additions (continued)

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
Install line between Spring Green and Prairie du Sac to off load this line	Install parallel transformers at Portage and North Madison	2009	3
Construct a Mullet River-North Mullet River 138 kV line and convert the North Mullet River-Plymouth Sub#1 69 kV line to 138 kV	1.) Construct a second Mullet River-North Mullet River 69 kV line, add a second Mullet River 138/69 kV transformer and replace two Edgewater 138/69 kV transformers 2.) Tap the Forest Junction-Cedarsauk 138 kV line to Sheboygan Falls and add a 138/69 kV transformer	2003	4
Replace Canal 138/69 kV transformers 1 and 2	1.) Add a third 138/69 kV transformer at Canal 2.) Add generation to the 69 kV system in Door County 3.) Construct a Canal-Dunn Rd 138 kV line and add a 138/69 kV transformer at Dunn Rd	2003	4
Add a 16 MVAR capacitor bank at Canal 138 kV in 2003, 2006 and 2009 for a total of 48 MVAR	1.) Construct a 138 kV line from Egg Harbor to Menominee under the bay of Green Bay and operate at 69 kV 2.) Construct a 138 kV line from Sister Bay to Escanaba under the bay of Green Bay and operate at 69 kV 3.) Add generation to the 69 kV system in Door County	2003	4
Add a second 138/69 kV transformer at Crivitz	Replace the Crivitz 138/69 kV transformer with a larger size	2003	4
Replace Ellinwood 138/69 kV transformer	1.) Add a second Ellinwood 138/69 kV transformer 2.) Add 138 kV conductor for Ellinwood-Sunset Point 138 kV on existing structures	2005	4
Construct a 138 kV line from Erdman to Howard's Grove	1.) Construct 138 kV line from Forest Junction-Cedarsauk to Howard's Grove 2.) Construct a 69 kV line from Erdman to Howard's Grove	2006	4
Construct the Morgan-Werner West 345 kV line and construct a 345/138 kV switchyard at a new Werner West SS; install a 345/138 kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138 kV lines into Werner West	1.) Construct a 345 kV line from Morgan to N. Appleton, add a fourth 345/138 kV transformer at N. Appleton, uprate the Melissa-Tayco 138 kV line, uprate Butte des Morts 138 kV bus, uprate Casaloma-Ellington-N Appleton 138 kV line, uprate Ellington 138 kV bus and uprate Fitzgerald 345/138 kV transformer. 2.) Add a fourth 345/138 kV transformer at N. Appleton, uprate the Melissa-Tayco 138 kV line uprate Butte des Morts 138 kV bus, uprate Casaloma-Ellington-N Appleton 138 kV line, uprate Ellington 138 kV bus, uprate Point Beach-Forest Jct 345 kV line, uprate Lost Dauphin-Mystery Hills 138 kV, uprate Highway V-Preble-Tower Dr 138 kV line, uprate Glory Rd-De Pere 138 kV line, uprate Kewaunee 345/138 kV transformer, uprate Fitzgerald 345/138 kV transformer and add a 14.4 MVAR capacitor bank at Apple Hills 138 kV	2006	4
Construct Clintonville-Werner West 138 kV line	1.) Construct Clintonville-Manawa 138 kV line and convert Manawa-Harrison 69 kV to 138 kV	2007	1 & 4
Construct a second Dunn Rd-Egg Harbor 69 kV line	1.) Construct a new 138 kV line from Dunn Rd to Egg Harbor 2.) Add generation to the 69 kV system in northern Door County	2007	4

Table IV-15

Alternative Solutions to Proposed Additions (continued)

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
Install two 345 kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	Reconfigure 345 kV lines on bus sections 3 and 4. Reconfigure Pleasant Prairie 345 kV straight bus into ring bus. Construct a 345 kV bus at Bain SS.	2007	5
Construct Pleasant Prairie-Libertyville 345 kV line	Construct Big Bend-Paddock 345 kV line	2009	5

Table IV-16
Proposed Additions Removed From Plan Since Last Assessment

Formerly Planned Additions	Projected In-Service Year	Planning Zone	Reason for Removal
Uprate Caroline transformer	2003	1	Another project alternative selected
Uprate Dunn Road-Egg Harbor 69 kV line terminal equipment	2003	4	Terminal equipment limits were found to be greater than those assumed
Construct a second Mullet River-N Mullet River 69 kV Line	2002	4	Another project alternative selected
Install second 138/69 kV transformer at Mullet River	2002	4	Another project alternative selected
Replace two existing Edgewater 138/69 kV transformers	2003	4	Another project alternative selected
Construct 138 kV line from Forest Junction-Cedarsauk to Howards Grove	2006	4	Another project alternative selected
Install 14.4 MVAR capacitor bank at Aurora Street 115 kV	2006	1	Another project alternative selected

Appendix A

Updated Transmission-Distribution Interconnections

ATC has received numerous requests from distribution companies for new T-D interconnections. These interconnections generally take on three different types of projects:

1. Constructing new T-D substations. Typically, these new interconnections involve constructing a new T-D substation adjacent to an existing transmission line and looping the transmission line into the new substation. In some instances, the new substation may not be able to be sited adjacent to the transmission line and requires that ATC construct a transmission line to the new substation site. Since this type of interconnection is a way for a distribution company to redistribute load between the two existing substations, it typically does not materially affect transmission system performance. In some instances, however, the optimum site for the new substation, from a distribution planning perspective, is such that a new transmission line from two substations that were not previously interconnected is warranted, forming a new network line, which can materially affect transmission system performance.

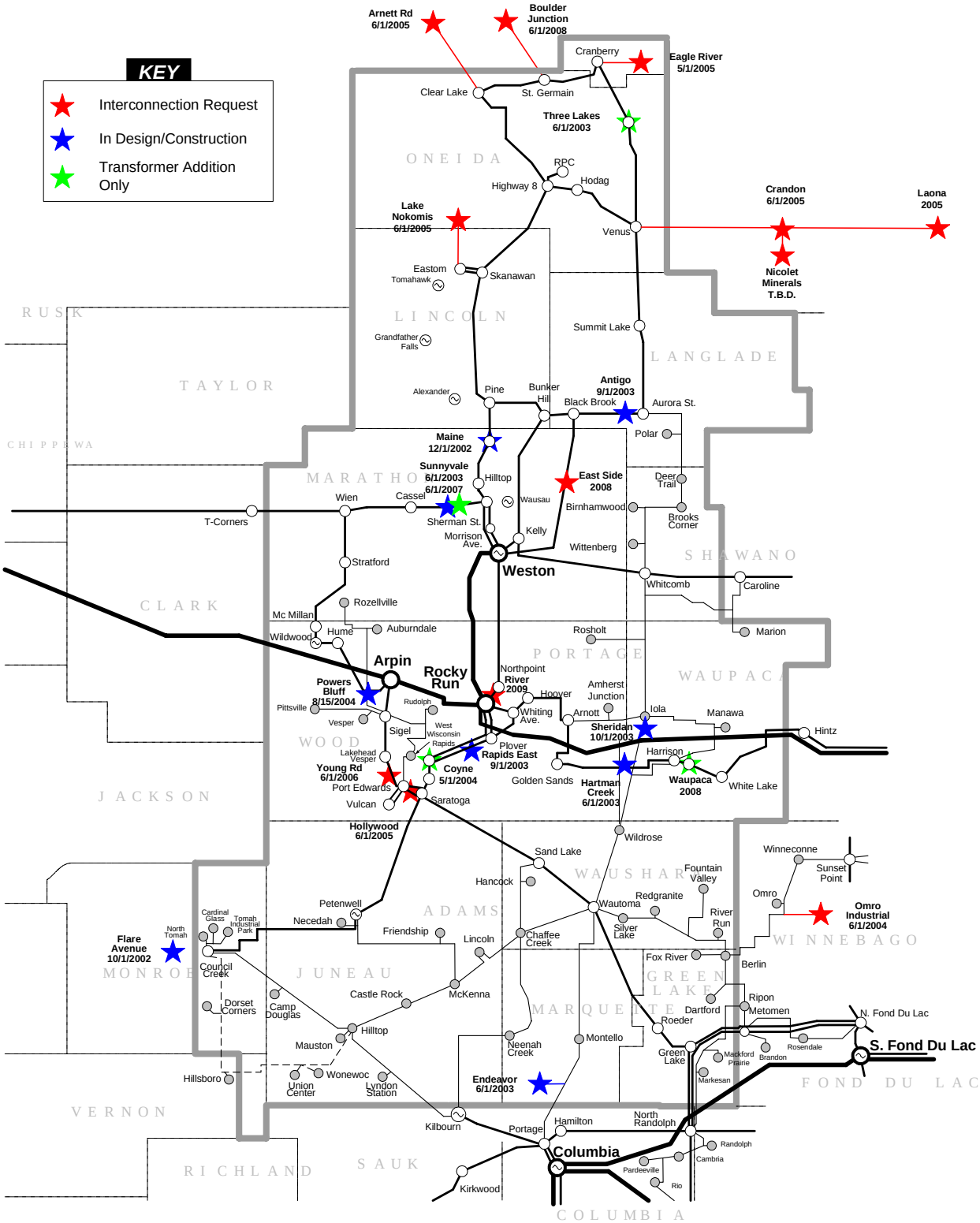
2. Adding T-D transformers at existing substations. These new interconnections involve expanding an existing T-D substation to accommodate a new T-D transformer. Typically, this type of interconnection is a way for a distribution company to improve reliability by providing redundancy, lower the loading on existing T-D transformers and meet increasing customer demand.

3. Replacing existing T-D transformers at existing substations. These are not technically new interconnections since no expansion is required at the existing T-D substation – it's merely a means of increasing transformer capacity. This type of project is a way to reliably serve increasing customer demand.

In some instances, the reason for a new T-D interconnection request is driven by a large new customer load, such as a new industry with a large demand for electricity. In these instances, there may be a need for other transmission system reinforcements to reliably serve the new load.

All of the T-D interconnection requests that are being implemented, designed or evaluated by ATC are shown in Figures A-1 through A-5 for Zones 1-5, respectively. A corresponding list of these interconnection requests is available on ATC's web site.

Figure A-1
Transmission-Distribution Interconnection Requests - Zone 1



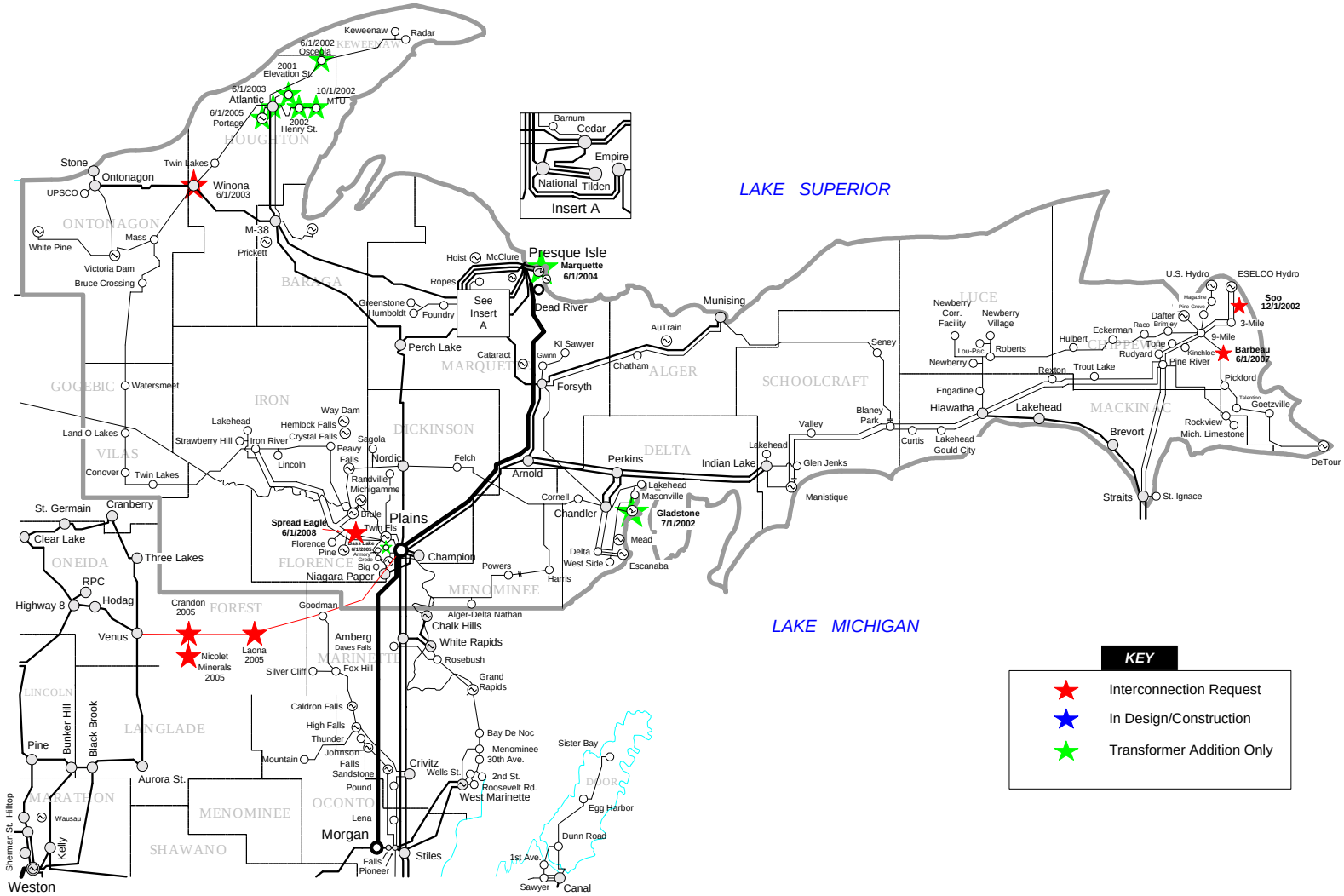


Figure A-2
Transmission-Distribution Interconnection Requests - Zone 2

Figure A-3
Transmission-Distribution Interconnection Requests - Zone 3

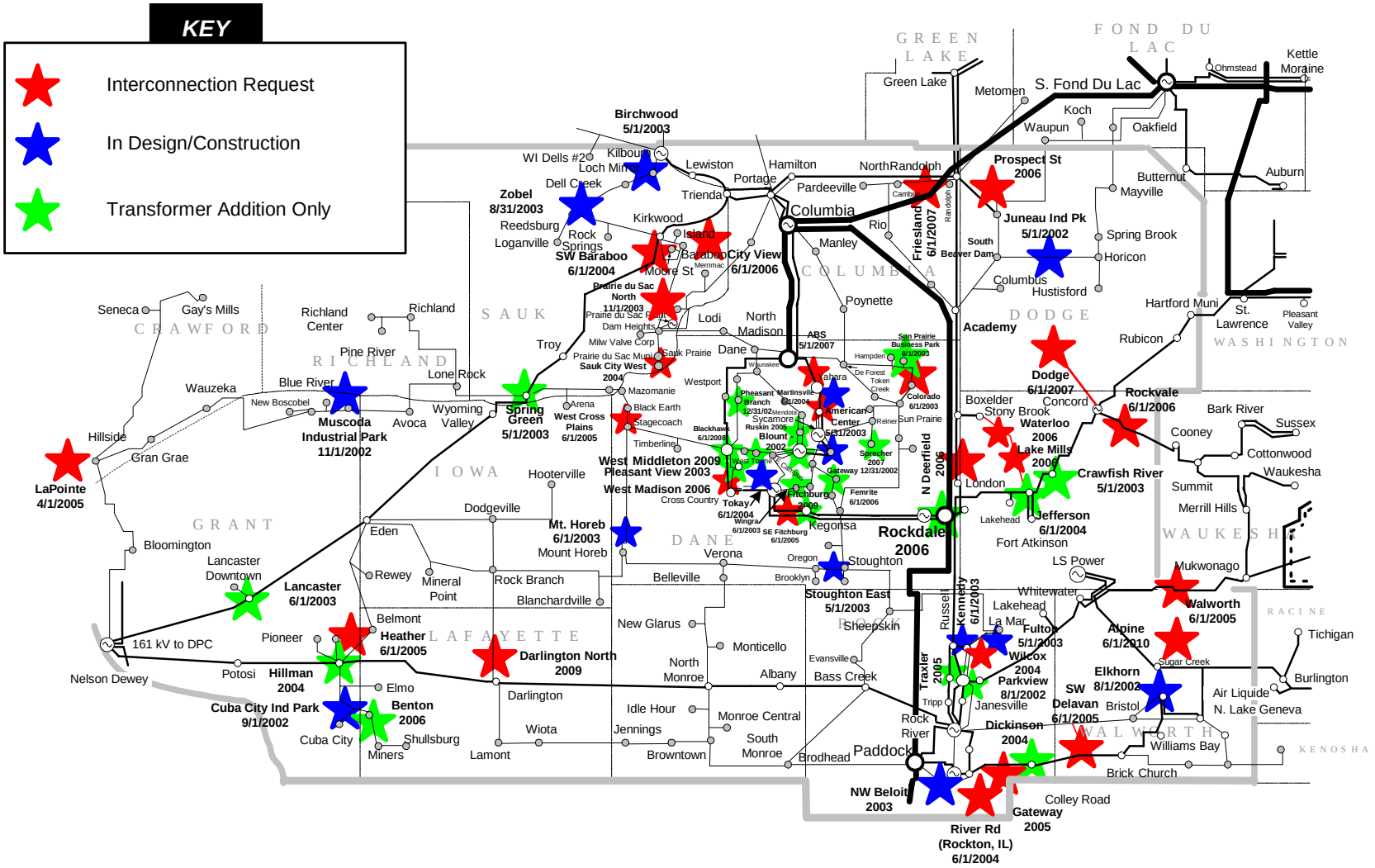


Figure A-4
Transmission-Distribution Interconnection Requests - Zone 4

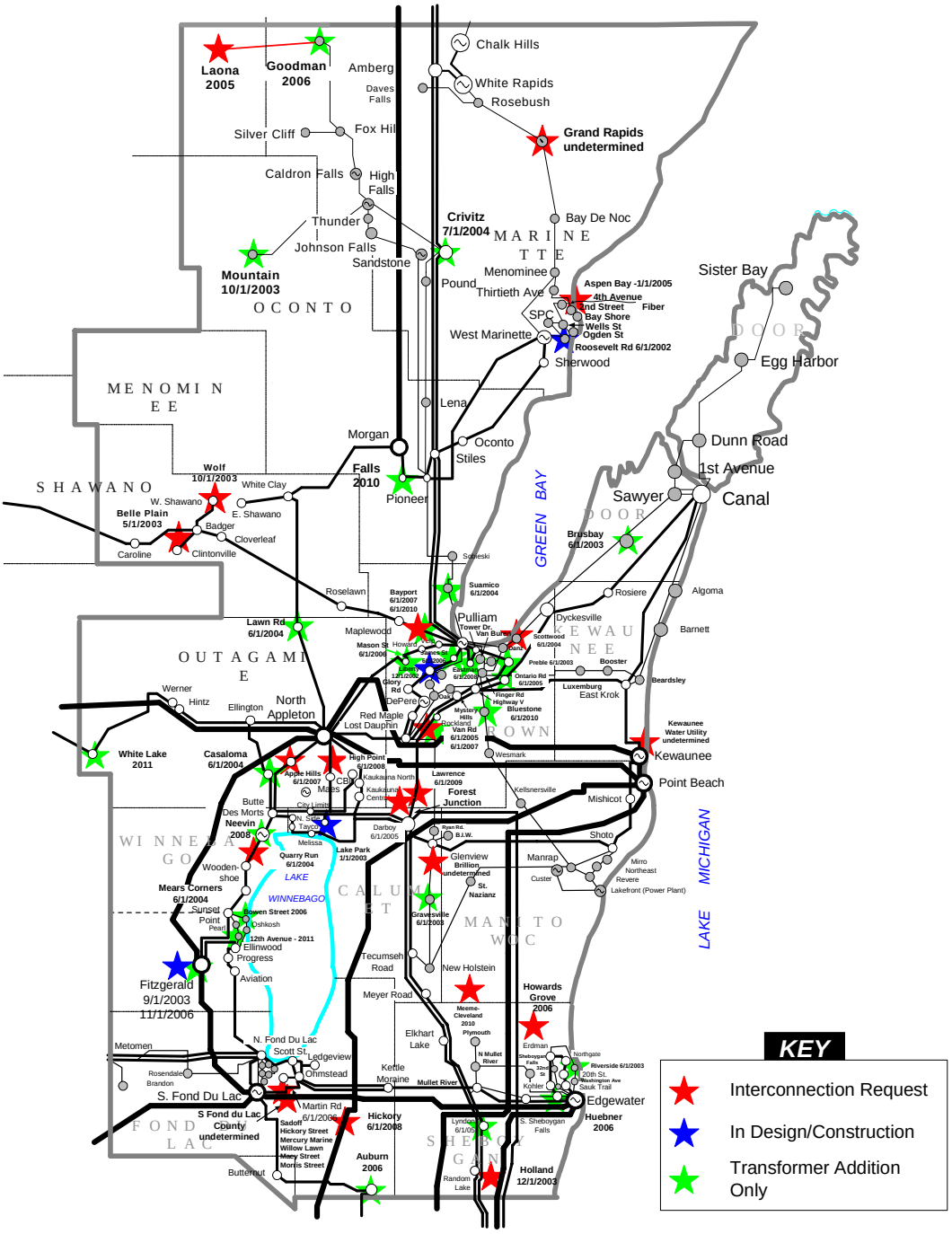
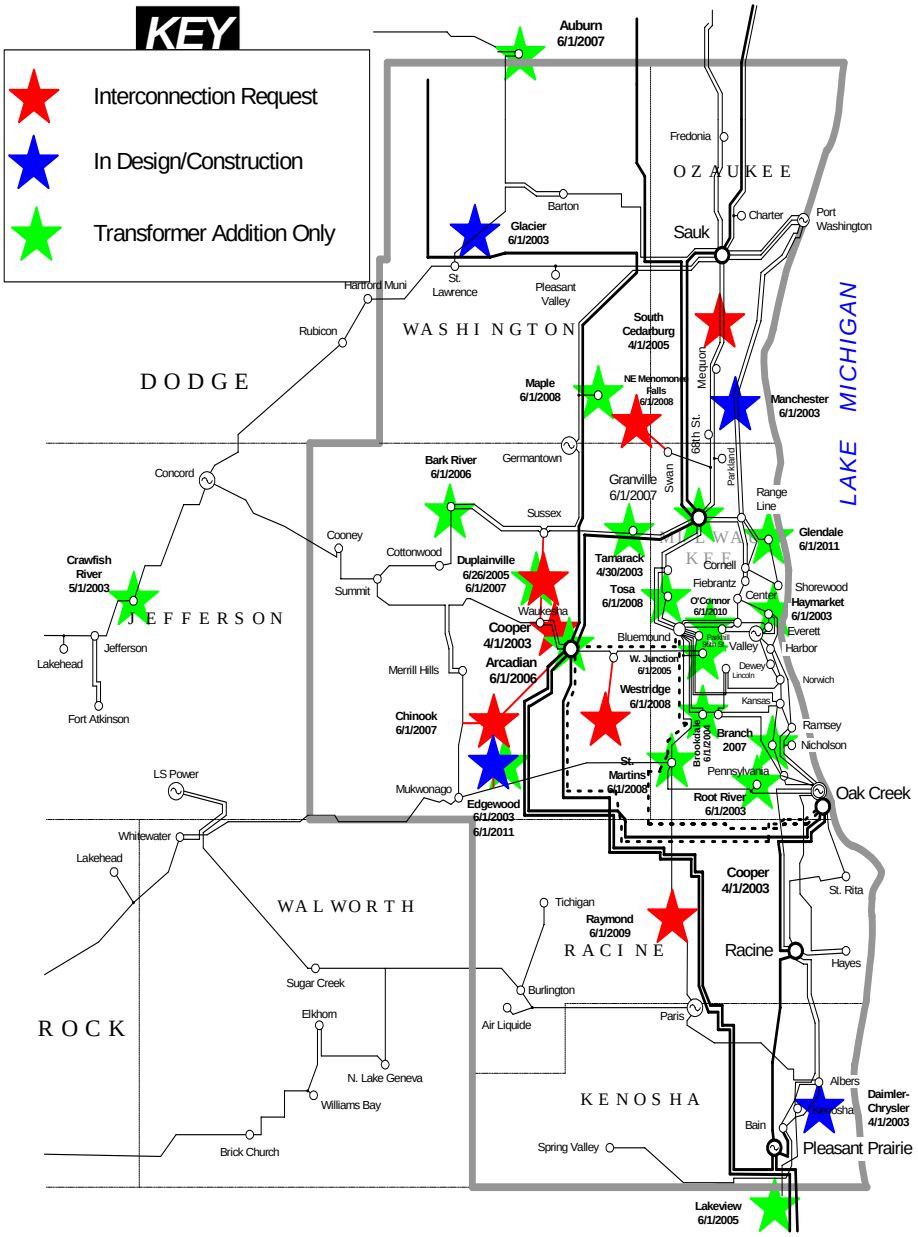


Figure A-5
Transmission-Distribution Interconnection Requests - Zone 5



Appendix B

ATC Full Transmission System Public Planning Meeting
Appleton, Wis.
September 05, 2002

Responses to small group questions

1) ***Overall reaction to Public Planning Process?***

a. Positive/Negative/Neutral – Why?

- *the process is necessary, but cumbersome*
- *pleased that the public is brought into the planning process*
- *the process is slow*
- *the multi-tiered approach is beneficial*
- *the process is behind the times*
- *public discussion is good and getting better*
- *need sensitivity analysis for different generation*

b. What element is most important to you (or those you represent)?

- *that the public perceive the critical needs of the transmission system; more education*
- *explain the risks/consequences of ignoring these needs*
- *loop flow issues*
- *how do we ensure Wisconsin benefits and does not pay too much*

c. How can it best incorporate/coordinate with your processes?

- *stakeholders need a better understanding of constraints*
- *exchange ideas with local planning groups in separate meetings*
- *include issues/threats at the federal level and provide a method for feedback*

d. Anything missing?

- *it is difficult to determine what plans are certain, as in, What will or will not be built in response to the noted system problems?*
- *prioritization and timeline of projects/ solutions to recognized problems*
- *what is the short-term plan?*
- *a standing citizen advisory committee*
- *make more information available to the* public
- *Right-of-way plans to accommodate new transmission facilities*
- *cost-benefit analysis*
- *Locational marginal pricing to quantify benefits*
- *more coordination between transmission and distribution*

2) ***Given that not much transmission has been built recently, what is your <u>reaction to expansion</u> of the transmission system?***

a. Positive/Negative/Neutral – Why?

- *it is good because load must be served*
- *reliability is increased*
- *it is long overdue*
- *"good luck"*
- *what is the relation to PSCW Strategic Energy Assessment?*
- *understandable terms are needed*
- *too little, too late*
- *good idea, it's about time*

b. Any perceived benefits/costs driving reactions?

- *it is difficult to determine the correlation between who pays and who benefits for any given system expansion*
- *price differential*
- *many times the public is unaware of the needs for reinforcing the transmission system because there are very few outages that impact them*
- *avoid California situation*
- *who determines level of improvement needed? (Cadillac vs. Chevy)*
- *load isn't discussed, translate overloads into local need because money is what drives the plan*

3) ***<u>Areas of highest concern</u> (re: transmission or transmission planning process)?***

a. For each – is it currently being addressed?

- *getting projects completed*
- *money available*
- *maintaining the existing system*
- *help bringing in more sources*
- *public needs to be aware of the need and to be kept informed*
- *use existing right-of-way*
- *underground alternatives*
- *describe problems in real terms*
- *needs do not seem real because impacts are not seen*
- *environmental and other impacts*
- *what is the environmental screening process?*
- *reliability*
- *relieve congestion*
- *who provides annual growth rates?*
- *other technologies entering the market*

4) ***<u>What information would you like</u> to have in order to effectively participate in the planning process?***

- *available capital*
- *being open and transparent in the options process (Power World)*
- *budget allocations*
- *project priorities*
- *how are costs encompassed by rates?*
- *educate the public on the needs/ drivers for planning*
- *quantify uncertainty*
- *annual load projections for specific regions*
- *explain the responsibilities of transmission, distribution, generation and regulating entities*
- *explain the responsibility of MISO, MAIN, MAPP, FERC*
- *need to communicate with local governments*
- *what are our priorities?*
- *more information on what is currently being done*
- *what is the cost and impact on customers*
- *compare Wisconsin's transmission facilities to other states in the region*

b. How would you like to receive this info? When/how often?

c. Reaction to current summary/full assessment reports?

d. Do you need more information about the current state regulatory processes for siting approvals?

- *yes, more information on transmission right-of-way would help*

<u>Large group comments and questions</u>

- *what is the difference between old planning methods and new methods in the deregulated environment?*
- *what are the planning initiatives in Door County?*
- *compare ATC's treatment of initiatives for new generation versus new transmission*
- *what is ATC's role with FERC and SMD formation?*
- *what is ATC's role with MISO?*
- *using existing corridors for the Arrowhead – Weston Line*

<u>Comment cards and meeting evaluation form notes</u>

<u>Topical questions/ comments:</u>

- *how long does it take to complete a Generator Interconnection Study?*
- *how long does it take to get a Transmission Service request completed?*
- *when will the Chicago/Illinois constraint be relieved?*
- *do the 10-Year assessment's generation and transmission upgrades meet or exceed the forecasted load growth?*
- *at the end of the ten year period, will ATC's network customers be able to purchase from generator inside the ATC system and be granted firm service?*
- *identify the specific power plants assumed in load flow studies*
- *discuss a specific project process from beginning to completion*
- *the general public needs to be made aware of the ramifications of doing nothing to improve the transmission system*
- *involve the general public more*

- *"Keep in touch with the needs of all concerned. Great Job thus far!"*
- *"Be more open with providing information to customers!"*
- *make meetings low-key and simple*
- *provide answers to the questions raised by the small groups*
- *show the decision making process from plan to project*
- *unsure of the value for general meeting versus individual zone meetings*
- *"Good overview of entire system. Planning zone meetings can provide more in-depth detail."*
- *identify most severe problems, repercussions, and timeframes*
- *provide a summary of projects under construction within the next year*
- *the summary reports are a good idea, please continue them*
- *quick discussion of terms, acronyms and relationships (FERC, MISO, MAIN, MAPP, etc.)*
- *follow-up with items raised in small groups*

Logistical comments:

- *the planning circle is difficult to see from the back, a handout would be nice*
- *Power World was a nice feature*
- *coffee should be available at the beginning of the meeting*
- *the small group portion was helpful*
- *make agenda items available via internet prior to meetings*
- *include more basic information in handouts*
- *appreciated time allotted for group discussion*
- *allow more time for small groups*
- *good balance of information with feedback and discussion time*

Meeting Comments
Zone 1
Rhinelander, Wis. ▪ Oct. 16, 2002

Responses to small group questions

1. What is your overall reaction to ATC's Public Planning Process?

a. Is it positive, negative, neutral; why?

- *Input from many segments is good*
- *Comprehensive*
- *Good forum, continue public forums*
- *This year's documents are better than last year's*
- *Larger transmission lines are a concern*
- *Disappointed that Arrowhead – Weston discussion took so much time*
- *Impressed that ATC is looking for comments*
- *Good organization of the whole planning concept; it is pro-active*
- *Overall process is good, but it took a long time to react to Rhinelander problems*
- *Positive, the decisions are data-driven*
- *Positive, communication between ATC and local communities/entities aids good planning*
- *Neutral, look at total solution/energy plan and not only transmission*

b. What element is most important to <u>you</u> (or those you represent)?

- *Keep the process dynamic*
- *Make sure that everyone is involved who needs to be*
- *Reliability from an industrial perspective*
- *Stability issues*
- *Antigo 345kV*
- *Stray voltage in the Waupaca area*
- *Use of farm land versus forested areas*
- *Overall power reliability*
- *Public input*

c. How can it best incorporate/coordinate with your processes?

- *Involve persons issuing permits early in the process*
- *Have meetings like this more often*
- *Incorporate local government planning processes*
- *Communicate plans with general public – integrated planning*
- *Public should be involved before projects are proposed*
- *Broaden information and put out for general public*

d. Anything missing?

- *Inter-zone presentations are needed*
- *Strengthen purpose and need in environmental area*
- *Lack of integrated planning, What's best for the state of Wisconsin?*
- *Wisconsin needs an energy policy*
- *Landowners are left out*
- *Real-life PowerWorld demonstration*
- *The needs are immediate, but the solutions are a long way off*
- *Timeframes for upgrades are too far off*

2. ***Given that not much transmission has been built recently, what is your <u>reaction to expansion</u> of the transmission system?***

   a. *Positive/Negative/Neutral – Why?*

   - *Agree with the plan*
   - *Take action on the plans*
   - *Growth of the system is not fast enough*
   - *Wish things could stay as they are*
   - *Good justification of existing needs*
   - *Look at upgrading existing facilities rather than new lines on new right of way*
   - *Use existing corridors and upgrades*
   - *Positive, have a broad overall plan that encompasses the state, not only regions (zones)*
   - *Positive, the aging transmission system needs attention*
   - *Long-range plans are integrated with short-term/immediate needs*
   - *Neutral, realizing the ideals of the public planning process model is difficult*
   - *Positive, but the process is too political and slow*

   b. *Any perceived benefits/costs driving reactions?*

   - *Arrowhead – Weston is needed*
   - *Arrowhead – Weston is not needed*
   - *There are areas that need reinforcement*
   - *Does planning look at loss of load?*
   - *Need to solve problems now*
   - *Surprised it takes so long to build infrastructure. What will industry do in the meantime?*
   - *The Housing industry, hundreds of new houses*
   - *The public is unaware of what is going on in Northern Wisconsin in regards to electric power*
   - *ATC looks at supply-side fixes and not DSM solutions (distributed generation)*
   - *Utilities have the responsibility to serve*
   - *Electricity provides money to pay rate increases via jobs*
   - *Unreliable service is very costly*
   - *Lack of integrated planning; Are we getting the biggest bang for the buck?*
   - *Good to use railroad corridors*
   - *Upgrades needed for economic survival*
   - *Coordinate so there are no surprises*
   - *Look at alternatives to transmission, integrated planning and community support on a case by case basis*
   - *Need a broad energy plan*
   - *The system needs reliability upgrades*
   - *Mistrust exists*

3. ***What areas are of highest concern to you? (re: transmission or transmission planning process)***

   - *Public education*
   - *Instability of existing Rhinelander system*
   - *Expedite projects*
   - *How is condemnation dealt with?*
   - *That ATC considers comprehensive plans not only transmission*
   - *Integration*
   - *ATC's ability to listen to all stakeholders*
   - *Give the public facts*
   - *Reliability*
   - *Take the lead in conservation and exploring other alternatives*
   - *Where does electricity go?*

- *Keep the public informed and give them facts*
- *Landowner rights*
- *Safety - Lines don't fall; people don't get hurt*
- *ATC must make up for past non-action*
- *Assurances that ATC picks the right projects*
- *The general public is uninformed*
- *More advertising*
- *More presentations throughout the area; the public needs to know there is a problem*
- *Tape the meetings or presentations and air them on public access television*
- *Power quality and outages*
- *Are ATC's processes going to be any different than the prior utilities?*
- *Meeting the growing demand for power*
- *Alternatives; i.e. local generation versus transmission*
- *Reliability now and capacity later*
- *Balancing the public education portion of the planning process with actually completing system upgrades*

5) ***<u>What information would you like</u> to have in order to effectively participate in the planning process?***

- *Keep the information in lay terms*
- *Notify the DNR early – have a scoping meeting with the DNR*
- *Update project status on ATC web site*
- *Project information*
- *Feedback/focus groups to help ATC*
- *Better definition of the stakeholder groups and their roles*
- *Truth*
- *Real system PowerWorld display to educate people with real concerns*
- *Reliability and availability data*
- *Demand, solutions (multiple), impacts and timelines on proposed solutions*
- *ATC's priorities for decision making; i.e. project sequence*

How would you like to receive this info? When/how often?

- *Local newspapers and media outlets*
- *Face to face public meetings are beneficial*
- *Put all available planning information on the internet, including power flows*
- *Email with updates*

Reaction to current summary/full assessment reports?

- *The reports have good information*

Do you need more information about the current state regulatory processes for siting approvals?

<u>Large group questions and comments</u>

- *What issues exist with obtaining DNR permits for the Arrowhead – Weston line?*
- *Needs are not understood for local zoning approval*
- *Does ATC objectively consider non-transmission alternatives?*
- *Least cost solutions discussed for Marathon County*
- *Generation (redispatch?) out of economic order, i.e. temporary diesel generation (Venus)*
- *What are acceptable voltage fluctuations?*
- *The solutions are too far away when considering frequent outages*
- *A family farm will be cut in half in Marathon County by new transmission lines*

- *Compliments to ATC on it's planning process, particularly for sponsoring the zone meetings to allow opportunity for public input.*
- *Questions about a proposed Manitoba Hydro project that would extend transmission lines down from Canada thru MN and WI*
- *Why is ATC not actively working with other transmission entities to develop a state/regional or national energy plan?*

Comment cards

Topical questions/comments:

- *What is being done to address the low voltage problem in Door County?*
- *What is the timetable for remediation of this problem?*
- *Why stop the proposed new Door County line in Egg Harbor? – Based on current growth in Northern Door County, wouldn't extending the line to Sister Bay SS make more sense?*
- *A new line corridor will only become harder to secure as the interior of the Door Peninsula develops.*
- *The DOT does not get the same push back that the utilities get*

Logistical comments:

- *ATC needs to provide for the color blind*

Meeting Comments
Zone 2
Manistique, Mich. ▪ Oct. 15, 2002

Responses to small group questions

1. What is your overall reaction to ATC's Public Planning Process?

a. Is it positive, negative, neutral; why?

- *The process is open and positive*
- *Giving contact names for specific issues is a good start*
- *What will ATC do with the public input? – Will ATC walk the talk?*
- *Inform invitees of topics to be discussed ahead of time for better participation in the meetings*
- *Concerned with responses to outages and maintenance*
- *There is no power to support business development*
- *How do these plans meet local needs?*
- *The process needs to be regular; it is something to build on*
- *Frustration with short-term needs and long-term solutions*
- *Is this a better process for ultimate customers to communicate with ATC?*
- *An increased ability to export power from the UP may mean less availability of power within the UP?*
- *Positive, there is depth and involvement of others; it is a good start*
- *Information sharing is good*
- *ATC is over-optimistic on time frames for completion of projects*
- *Every agency received an invitation to planning meeting*
- *The public planning process provides important insight for local community growth plans (i.e. industry siting and infrastructure)*
- *The high level thought process discussion is helpful and more substantial information would be appreciated in the future*
- *It is good to bring the public into the process*
- *This provides insight on the system's capabilities and weaknesses*

b. What element is most important to <u>you</u> (or those you represent)?

- *We need to know ATC's finalized, concrete plans and their timelines for system improvements*
- *Iterate the connection between local, regional, state, political and business leaders*
- *Timely implementation of the construction plans is needed*

c. How can it best incorporate/coordinate with your processes?

- *ATC should send out follow-up information*
- *Integrate ATC's decision making process with local decision making*
- *View the Michigan PSC web site to learn about its communication process*
- *Give information updates regularly on ATC's plans*
- *ATC commitment to projects would help customer planning*

d. Anything missing?

- *It could have taken place earlier*
- *Good plan, but there are a lot of loose ends*
- *Education on the positives and negatives of ATC's planned projects/solutions*

2. ***Given that not much transmission has been built recently, what is your <u>reaction to expansion</u> of the transmission system?***

   a. *Positive/Negative/Neutral – Why?*

   - *It is good*
   - *"Yes"*
   - *Agree, improvement is needed*
   - *Expansion is needed to make a whole system*
   - *Quantify how much improvement to the system ATC's plans provide*
   - *Possible negative repercussions to local industry if more power leaves the UP because transfer capacity is increased*
   - *Positive, ATC has a large view and coordinated planning process*
   - *Positive, without ATC resources to accomplish these projects may not exist*

   b. *Any perceived benefits/costs driving reactions?*

   - *"Who pays?"*
   - *Improved reliability*
   - *Potential for economic benefit*
   - *The connection between Wisconsin and the UP needs to be improved*
   - *What are the rate and reliability impacts of this plan?*
   - *ATC should be looking at distributed generation*
   - *"Cost sharing?"*
   - *Prioritization of needs in terms of project timing*
   - *Constraints limit local options*

4. ***What areas are of highest concern to you?*** *(re: transmission or transmission planning process)*

   - *Rate impact*
   - *Are ATC's priorities in line with other's?*
   - *ATC needs to contact local distribution company operators to gather their concerns and views on system problems*
   - *Transient problems (i.e. voltage sags)*
   - *Establishing effective lines of communication*
   - *Power quality*
   - *Costs*
   - *Timing*
   - *Reliability*
   - *Environmental issues – not addressed in ATC's Report*
   - *Assignment of costs / Cost sharing – How will this be done?*
   - *Are there public forums for line siting?*
   - *Things are more complicated with deregulation - separated generation and transmission*
   - *Safety*
   - *Handling impacted (by system improvements) parties' concerns on the front-end of the planning process*
   - *Cost to end users*
   - *Environmental impact*
   - *Immediate needs exist, but the solutions may be far off*
   - *Underground options*
   - *Finishing projects on schedule*
   - *We are in 'catch-up mode'*
   - *ATC's priorities between Wisconsin and the UP, does ATC regard Wisconsin needs more highly?*
   - *More curtailments and costs*

5. What information would you like to have in order to effectively participate in the planning process?

- *Delineate what the ATC preferred plan is*
- *ATC needs to solicit input better*
- *More one to one contact*
- *More information in written reports*
- *Current venue works well, but the zone configuration does not make sense*
- *A mixture of large and small group meetings (maybe town level?)*
- *More detail on the local level*
- *Estimates of total cost*
- *When do ATC's plans become confirmed?*
- *More communication with ATC in between zone meetings (i.e. a quarterly newsletter?)*
- *Local ATC staff availability has been very helpful*
- *Standard Market Design issue updates*
- *An ATC phone/email directory*

How would you like to receive this info? When/how often?

- *A quarterly ATC newsletter*

Reaction to current summary/full assessment reports?

Do you need more information about the current state regulatory processes for siting approvals?

Large Group questions and comments

- *New generation coming on-line soon at Escanaba*
- *Will ATC honor previous utility agreements in regards to the use of defoliant?*
- *How does the Weston 4 addition affect ATC's plans, specifically the Plains – Stiles rebuild?*
- *What siting assistance does ATC provide to potential generators for optimal positioning to remedy system problems?*
- *There is a need for additional system capacity, rather than self generation, to increase business productivity*
- *Does ATC have a disaster plan?*
- *What is the estimated transfer capacity increase for the Plains – Stiles rebuild?*
- *Discuss the Plains – Goodman – Rhinelander loop 138kV line*
- *Can ATC safely operate with increased risk when there is an outage for a line to be rebuilt?*
- *How are entities made aware of increased transfer capacity as a result of system upgrades?*
- *How are customers notified of decreased capacity during outages?*
- *Has ATC been in contact with other entities regarding a possible submarine line from Canada to Keweenaw?*

Comment cards

Topical questions/comments:

- *"Are there other successful models for ATC in other states, nations, regions. Are we at the leading edge of this process?"*
- *What are we learning from other utilities (Natural Gas, Broadband) that already use the generation/transmission/distribution business model?*

Logistical comments:

- *Use city or township names rather that substation names or provide a local translation guide*

Meeting Comments
Zone 3
Janesville, Wis. ▪ Sept. 26, 2002

Responses to small group questions

1. What is your overall reaction to ATC's Public Planning Process?

a. Is it positive, negative, neutral; why?

- *Public outreach is important*
- *Information needs to be shared early in the planning process*
- *The maps are presented well with good use of color*
- *The data given on the website is too dense*
- *Very impressive and revealing*
- *Educational*
- *How much of this is the public aware of?*
- *ATC is working towards a better system*
- *The process is thorough and inclusive*
- *Reaction is positive*

b. What element is most important to you (or those you represent)?

- *Public trust must be reinforced through information sharing*
- *Explain the projects in terms of communities they affect and stages in years to completion*
- *Industries are very concerned; service interruptions will dictate where they locate*

c. How can it best incorporate/coordinate with your processes?

- *Local communities and utilities need to coordinate plans to develop necessary infrastructure for the electrical system and growing communities*
- *Getting the word out in the local community will help to move projects forward, especially in the Madison area*
- *Invitations to attend these meetings should be all inclusive and request a response*
- *Need more citizen input early in the process (i.e. grassroots campaign, local government)*

d. Anything missing?

- *How does ATC coordinate plans with MISO?*
- *Where does ATC stand on the issue of Standard Market Design?*
- *Rather than just giving substation names, describe area using generally known terms or landmarks*
- *Overlay ATC maps with maps containing more geographical information*
- *A summary of projects completed within the last year in each specific zone*
- *Prices associated with proposed projects*
- *ATC needs to engage the people who benefit from the strengthening of the transmission system in this process, not just the detractors*
- *Descriptions of alternative solutions and the pros and cons of each are missing*
- *New technological developments*
- *PowerWorld demonstration would be better if it was a real circumstance - It would show possible effects on system reliability*

2. ***Given that not much transmission has been built recently, what is your <u>reaction to expansion</u> of the transmission system?***

   a. *Positive/Negative/Neutral – Why?*

   - *It is about time*
   - *Wisconsin's transmission system is skimpy*
   - *Discuss growth*
   - *Hopeful that it is not too little, too late*
   - *Are the 10-Year plan's timelines realistic?*
   - *The use of existing corridors may not always be the best environmental option*
   - *Improvements are overdue*
   - *Municipalities need this information early*

   b. *Any perceived benefits/costs driving reactions?*

   - *The general public does not understand, plans need to be related to a real situation*
   - *More information on the reasons behind rebuilding is needed*
   - *Getting public approval must not override meeting system needs – everyone cannot be pleased and the needs for reliable service cannot be denied*
   - *Do solutions that cost more have better results in terms of reliability?*
   - *There ought to be federal subsidies for wind power*
   - *Prioritization of projects would make sense*
   - *Coordination of effort is key to accomplish all the work associated with the completing the projects and ensuring continued service*

3. ***What areas are of highest concern to you?*** *(re: transmission or transmission planning process)*

   - *There is a lot of public misunderstanding regarding transmission purposes, needs and impacts*
   - *Timeliness of project completion and getting everything done*
   - *In-state capacity shortage*
   - *Restoration of site after construction is completed*
   - *Long-term system reliability*
   - *Walworth county is one of the fastest growing counties in Wisconsin, transmission must keep up*
   - *Work with those in agricultural areas who are affected by plans*
   - *Better education and dissemination of information*
   - *Reliability data needs to be made available for the public*
   - *Separate reliability information from mechanical and electrical*
   - *Meeting peak loads*
   - *Regional planning with other entities (i.e. DOT, Gas pipelines, Railroad, etc.)*

4. ***What information would you like to have in order to effectively participate in the planning process?***

   - *Larger maps with more detail*
   - *Show out of state lines*
   - *Smaller meetings with ATC to discuss plans*
   - *Project costs*
   - *This information needs to get to average citizens*
   - *Who ATC contacts on local levels and issues discussed regarding the planning process*

How would you like to receive this info? When/how often?

Reaction to current summary/full assessment reports?

Do you need more information about the current state regulatory processes for siting approvals?

Comment cards and meeting evaluation form notes

Topical questions/comments:

- *Show PowerWorld model for Zone 3 and how line outages affect reliability (i.e Madison 345kV line)*
- *Identify broad corridors for new right-of-way on maps*
- *Cost comparison between alternative plans for future plans*
- *There are problems interpreting the contract between ATC and distribution utilities on bearing costs and responsibilities*
- *Have community level meetings on specific projects, especially those involving new right-of-way*
- *Cover specific projects at future meetings*
- *Keep everyone updated regularly*
- *Focus on near-term projects (within next 2 years) at meetings as well*
- *Compare current plans versus plans from last year's assessment*
- *Show real-world effects of not doing specific projects*
- *Future meetings could discuss impact issues (i.e. EMF vs. stray voltage, aesthetics, impacts on natural resource*
- *"This is a great format to keep in touch with the issues. In this e-mail age, it's refreshing to hear ideas in person."*

Logistical comments:

- *Bring more detailed maps or aerial photos*
- *Try to get more local and individual involvement. This would give the public more ownership in the process and give ATC more specific feedback*
- *Poll outside to people in public. Expand beyond the utilities*
- *Offer an Electricity 101 course maybe an hour prior to these meetings to help people better understand the content.*
- *Get more information to the media prior to the zone meetings to get more public participation*
- *Allow more time for group discussions*
- *Hand out the Power Point slides so people can follow along and take notes*
- *Small groups were good*
- *Introductions at the beginning were helpful*
- *Have more meetings with homogeneous groups (meetings for utilities, meetings for wholesalers, meetings for economic development committees, etc.) – not exclusive groups, but making the meetings more audience oriented*

Meeting Comments
Zone 4
Green Bay, Wis. ▪ Oct. 17, 2002

Responses to small group questions

1. What is your overall reaction to ATC's Public Planning Process?

a. Is it positive, negative, neutral; why?

- *It is going well, ATC and the utilities are working together*
- *Good to see overall view and the need for facilities to be built*
- *Positive*
- *The more information, the better*
- *Proactive approach*
- *The meetings are good*
- *ATC is making an effort to get the information out*
- *Good process, an extension of MISO*
- *The planning process is well structured*
- *How is the input generated?*
- *Interesting to understand what's going on*
- *Impressed with the inclusive process*
- *Positive step in the right direction*
- *Good to have transmission oversight*
- *A step in the right direction but 5 years behind*
- *Organized*
- *One owner of transmission is better than multiple owners*

b. What element is most important to you (or those you represent)?

- *Cost versus reliability*
- *Coordination with local communities*
- *Openness and a range of options*
- *Labor – what does it mean for workforce development*
- *Rate impacts*
- *The more opportunities for involvement, the better*
- *Local upgrades*

c. How can it best incorporate/coordinate with your processes?

- *Have public planning meetings early in the planning process*
- *Linking projects with local distribution company projects*
- *Local government needs to know future plans and Right Of Way issues*
- *Plug into economic development efforts*

d. Anything missing?

- *Want to see more applications to the commission*
- *ATC does not identify generation projects until they are in ATC's process. Is ATC looking at generation assets properly?*
- *Generation issues*
- *No residential representation*
- *Local paper information*
- *Would like more detail*

2. ***Given that not much transmission has been built recently, what is your <u>reaction to expansion</u> of the transmission system?***

   a. *Positive/Negative/Neutral – Why?*

   - *New transmission is needed for industry*
   - *Want to see more applications to the commission*
   - *Want to see more generation alternatives*
   - *Positive, want constantly updated data*
   - *This is sorely needed*
   - *Watching the opposition to Arrowhead-Weston is frustrating, was the process different in the past?*
   - *Start soon*
   - *Communicate the need*

   b. *Any perceived benefits/costs driving reactions?*

   - *The current network is fragile*
   - *Important land is lost to new transmission lines from a community planning perspective*
   - *Using existing corridors is key*
   - *Need reliability and flexibility*
   - *Can't promote growth without transmission expansion*
   - *There are tough trade-offs; no one wants transmission in their backyards, but they still use electricity*
   - *Inevitable due to growth*
   - *What are alternative sources of energy?*
   - *It is good to get information to people early*
   - *Way overdue*
   - *Creation of a comprehensive Right Of Way plan that includes other development plans*

3. ***What areas are of highest concern to you? (re: transmission or transmission planning process)***

   - *Enough for the future*
   - *Siting and construction*
   - *The future of the Kewaunee and Point Beach plants*
   - *Reliability*
   - *Public input*
   - *Environment*
   - *The balance between cost and reliability*
   - *Siting of transmission for least impact*
   - *Import and Export capabilities – economic concerns*
   - *Improving export capabilities could raise energy prices*
   - *Reduce service limitations*
   - *Overall economics (i.e. What is the local cost impact if we export to high cost markets?)*
   - *Link transmission growth to community growth*
   - *Continuing public opposition to plans after they are well developed and have been approved by the Public Service Commission*
   - *The planning process is long*
   - *Reliability, with consideration of aging facilities*
   - *Costs of the process*
   - *From the independent power producer point of view, ATC is the foster child of the utility industry; Former utility workers bring a utility slant to issues*
   - *It seems like it takes a long time to get transmission lines built*
   - *Timing – the need is now*
   - *ATC must prioritize system needs*

- *What is the cost?*
- *Reliability and timing to make fixes*
- *How to deal with generation development*
- *How to maintain flexibility*
- *The aging inadequate infrastructure is in jeopardy*
- *May drive other impacts; i.e. plant development, gas prices, etc.*
- *Environmental impact*

4. What information would you like to have in order to effectively participate in the planning process?

- *Smaller, general based meetings*
- *Environmental information about affected areas*
- *Respect for property owners' rights and concerns*
- *Updates on project progess*
- *The state of infrastructure*
- *Supply and demand*
- *Time to implement reinforcements in response to development*
- *Realism/ feasibility of plans*
- *Updates on progress*
- *More in-depth information*
- *PowerWorld demonstrations*
- *Education on the need for electricity*
- *ATC contacts*
- *More information*

How would you like to receive this info? When/how often?

- *The internet*
- *Semi-annual newsletter and meetings to cover topics*
- *Local/town community meetings*
- *Geographic maps indicating environmentally affected areas*
- *Two-way communication between ATC and public over the internet*
- *Newsletters*
- *More planning meetings*
- *Get the topical information out before the meetings take place*
- *Cable TV*
- *More public forums*
- *Videos*
- *Partner with providers*

Reaction to current summary/full assessment reports?

- *The Summary Report is good. Better than the previous utilities' advanced plans*
- *"You're shipping power to Illinois"*
- *There is a huge difference between what the industry knows and what the public hears*

Do you need more information about the current state regulatory processes for siting approvals?

Large group questions and comments

- *Is ATC a holding company?*
- *Is ATC for profit?*
- *Is ATC's growth distributed to the original contributors proportionately?*
- *Is stray voltage a common occurrence and is it from transmission?*
- *What factors influence the timeline of implementing planning solutions?*
- *How does day to day operations handle changing system conditions?*

- *Does ATC own or operate susbstations?*
- *What are the events in an outage/ end user interruption?*
- *How efficient is ATC at providing reliable service/*
- *How is the public informed of projects requiring new right-of-way? Does it come before seeking approval through the Public Service Commission?*
- *What are the timelines for the Plains – Amberg project? What is the public appeal process?*
- *What are ATC's thoughts on a new EMF study from California?*
- *Are ATC's maps publicly available?*
- *What is the long-term viability of the Point Beach and Kewaunee plants?*

Meeting Comments
Zone 5
Milwaukee, Wis. ▪ Sept. 12, 2002

Responses to small group questions

1. What is your overall reaction to ATC's Public Planning Process?

a. Is it positive, negative, neutral; why?

- *It is a good process and facilitates sharing of different viewpoints.*
- *Helps people understand why projects are suggested.*
- *The planning process is great as long as shareholders are kept informed.*
- *Explaining technical information in non-technical terms is challenging.*
- *Potential participants may be intimidated by technical information.*
- *Information on ATC's process is not necessary; the actual plans are what people care about.*
- *More focus on specific/definite projects is required.*
- *More detailed information would be helpful.*

b. What element is most important to you (or those you represent)?

- *A process with public input and opportunity for discussion is the key.*

c. How can it best incorporate/coordinate with your processes?

- *Work with the Department of Natural Resources and other agencies for process refinement and general input.*

d. Anything missing?

- *Use corridor maps for small group discussions.*
- *Definitions of required regulatory applications.*
- *Identification of alternate sites for projects.*

2. Given that not much transmission has been built recently, what is your reaction to expansion of the transmission system?

a. Positive/Negative/Neutral – Why?

- *Long term planning is crucial and saves money.*
- *ATC should also identify generation locations in addition to new transmission sites.*
- *Inform the Electrical Union of long-term project plans to ensure qualified technician availability.*
- *Environmental concerns dictate that facility upgrades take place in the most appropriate corridor.*

b. Any perceived benefits/costs driving reactions?

- *More transmission strengthens the distribution system.*
- *Little new transmission in Zone 5 demonstrates that WE Energies did a good job with their portion of the transmission system.*

3. What areas are of highest concern to you? (re: transmission or transmission planning process)

- *The interface between ATC, utilities, government and environmental is critical at the local and regional levels.*
- *Identify liaisons between utilities and local government and other agencies.*
- *That proposed projects are completed on time.*
- *ATC's plans to handle all the additional generation.*
- *OASIS requests; maybe ATC could work on smaller requests first.*

4. What information would you like to have in order to effectively participate in the planning process?

- *If maps were included with the invitations, people would be more likely to participate.*
- *Include the most up-to-date information on service limitations.*
- *The summary report is good, but a different line coloring scheme would be easier to decipher.*
- *Use GIS land base maps for report/assessment.*
- *Reflect changes as updates are added and possibly provide history.*

How would you like to receive this info? When/how often?

Reaction to current summary/full assessment reports?

Do you need more information about the current state regulatory processes for siting approvals?

Questions and comments from large group

- *When, if at all, does ATC plan for transmission rates to go down as result of ATC's formation?*
- *How many transmission service requests cannot be fulfilled due to service limitation?*
- *This year's 10-Year Assessment is much more useful than previous versions and a good tool for the public.*
- *How do ATC's projections for load growth compare with the projections used in the PSC Energy Assessment?*
- *Why rebuild at 138kV rather than 345kV?*
- *Does ATC consider new generation as a solution to system limitations as well as new transmission fixes? Is this part of the planning process?*
- *Who would a potential new generator contact when considering options (ATC?, PSCW?) ?*
- *What are ATC's plans for building new transmission lines on new right-of-way rather than rebuilding existing facilities, especially in the light of system needs for alternate paths and redundancy to uphold reliability?*
- *Has ATC incorporated Calpine's Zion plant in its plans?*

Comment cards and meeting evaluation form notes

Topical questions/comments:

- *What is the status of the Arrowhead – Weston project?*
- *Focus on projects rather than the planning process.*
- *Present other options (i.e. generation) to key transmission problems.*
- *Add a session for municipalities to explain how they can "dovetail" their processes with ATC's. Also, explain what the municipality's authority is relative to state and federal law.*
- *ATC is "slow on providing transmission studies for my clients on past projects due to work load. May need to hire more folks to transmission studies."*

- *Please provide more information on alternatives available; if generation supplies change, how would the planning process change?*

Logistical comments:

- *Provide copies of overhead slides on paper or in electronic form.*
- *It was too cold.*

Appendix C

SUMMARY OF SYSTEM LIMITS AND CONSTRAINTS FROM 2002 ASSESSMENT

This Appendix contains, for reference, the performance criteria limits that were exceeded and other constraints as identified in ATC's 2002 Assessment. These limitations and constraints provide the foundation for the alternative solutions included in the 2002 Assessment. This Appendix contains the following tables:

C-1 lists transmission facilities for which loading relief requests (service limitations) were made by ATC system operators during 2001. Those facilities that had either ten or more service limitations requested or that had at least one service limitation Level 5 (the most severe, requiring curtailment or interruption of transactions with firm transmission service) were considered chronic limiters and are highlighted in the table. This table was referred to as Table IV-2 in the 2002 Assessment.

C-2 lists the specific performance criteria limits that were exceeded based on the 2003 summer peak analysis in the 2002 Assessment. This table was referred to as Table IV-1 in the 2002 Assessment.

C-3 lists the specific performance criteria limits that were exceeded based on the 2009 summer peak analysis in the 2002 Assessment. This table was referred to as Table IV-3 in the 2002 Assessment.

TABLE C-1

Summary of Transmission Loading Relief Incidents

		# of Days* at service limitation level 3, 4, or 5			
Limiting Element	Contingent Element	3	4	5	Total Days
Albers - Paris 138 kV	Wempletown - Paddock 345 kV	20	1		21
Albers - Paris 138 kV		1			1
Blackhawk - Colley Road 138 kV	Paddock - Rock River 138 kV	8	1	3	12
Butler - Granville 345 kV	Arcadian - Granville 345 kV	1			1
Christiana - Kegonsa 138 kV	Christiana - Fitchburg 138 kV	1			1
Eau Claire - Arpin 345 kV		5	5		10
Ellington - Hintz 138 kV	North Appleton - Rocky Run 345 kV	1			1
Green Lake - Roeder 138 kV	North Appleton - Rocky Run 345 kV	1		8	9
Kewaunee 345/138 kV Transformer	Point Beach - North Appleton 345 kV			5	5
Kewaunee 345/138 kV Transformer		2			2
Manistique - Hiawatha 69kV		2	203		205
Mukwonago - Whitewater 138 kV	South Fond du Lac - Columbia 345 kV	1	1		2
North Appleton - Apple Hills 138 kV	North Appleton - Ellington 138 kV	1			1
North Appleton - Lost Dauphin 138 kV	Kewaunee 345/138 kV Transformer	35	5	6	46
North Appleton - Lost Dauphin 138 kV	North Appleton - White Clay 138 kV		2		2
North Appleton - White Clay 138 kV	Stiles - Pulliam 138 kV	1			1
North Appleton 345/138 kV Transformer #1	North Appleton 345/138 kV Transformer #3		2		2
Paddock - Blackhawk 138 kV	Paddock - Rock River 138 kV	4			4
Paddock 345/138kV Transformer	Paddock - Rockdale 345 kV	22			22
Pleasant Prairie - Racine 345kV	Wempletown - Paddock 345 kV	1			1
Rockdale 345/138 kV Transformer #1	Rockdale 345/138 kV Transformer #2	1			1
Rockdale 345/138 kV Transformer #2	Paddock 345/138 kV Transformer	1			1
Rockdale 345/138 kV Transformer #2	Rockdale 345/138 kV Transformer #1	1			1
Rocky Run - North Appleton 345 kV		6			6
Russell - Rockdale 138 kV	Paddock - Rockdale 345 kV	8			8
Stiles - Amberg 138 kV	Morgan - Plains 345 kV	14	67	4	85
Stiles - Pioneer 138 kV	North Appleton - White Clay 138 kV	7	2	1	10
Wempletown - Paddock 345kV		7			7

Note: * -Sum of number of days is based on determining the highest service limitation level for a given day so that each day is counted once
Level 3: non-firm transmission service curttailments

Level 4: transmission system reconfiguration/redispatch

Level 5: firm transmission service curttailments/redispatch

TABLE C-2
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS - 2003

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Pine-Eastom 115 kV line overload	119%		various outages	Summer peak
1	Eastom-Highway 8 115 kV line overload	111%		various outages	Summer peak
1	Summit Lake-Aurora St 115 kV line (impending) overload	98%		various outages	Summer peak
1	Bunker Hill-Black Brook 115 kV line overload	110%		Weston-Black Brook 115 kV line outage	Summer peak
1	Arpin 345/138 kV transfomer overload	111%		Arpin-Rocky Run 345 kV line outage	Summer peak
1	Arpin-Sigel 138 kV line overload	101%		Arpin-Rocky Run 345 kV line outage	Summer peak
1	Sigel 138/69 kV transfomer overload	114%		various outages	Summer peak
1	Port Edwards-Lakehead Vesper 138 kV line overload	163%		Arpin-Rocky Run 345 kV line outage	Summer peak
1	Wautoma-Silver Lake 69 kV line overload	103%		various outages	Summer peak
1	Metomen 138/69 kV transfomer overload	107%		various outages	Summer peak
1	Metomen-Rosendale-N Fond du Lac 69 kV line overload	117%		various outages	Summer peak
1	N Randolph-Markesan Tap 69 kV line overload	113%		various outages	Summer peak
1	Whitcomb 115/69 kV transformer overload	114%		various outages	Summer peak
1	Caroline 115/69 kV (impending) transformer overload	98%		Whitcomb 115/69 kV transfomer outage	Summer peak
1	Petenwell 138/69 kV transformer overload	113%		McKenna-Lakehead Adams 69 kV line outage	Summer peak
1	Council Creek 138/69 kV transformer overload	126%		Eau Claire-Arpin 345 kV line outage	Summer peak
1	Rhinelander loop 115 kV bus voltages		< 90%	various outages	Summer peak
1	Sand Lake, Wautoma 138 kV bus voltages		90 - 92%	Port Edwards-Sand Lake 138 kV line outage	Summer peak
1	Roeder 138 kV bus voltage		92%	Green Lake - Roeder 138 kV line outage	Summer peak
1	Berlin area 69 kV bus voltages		< 90%	various outages	Summer peak
1	Council Creek 138 kV bus voltage		84%	Council Creek-Petenwell 138 kV line outage	Summer peak
1	Petenwell to McKenna 69 kV bus voltages		90 - 92%	various outages	Summer peak
2	Radar, Keweenaw, Keweenaw Tap 69 kV bus voltages		91%	Atlantic 138/69 kV transformer outage	Summer peak
2	Straits 138/69 kV transformer overload	128-134%		various outages	Summer peak
2	Brevort, Hiawatha, Lakehead 138 kV & Detour 69 kV bus voltages		87-92%	Lakehead-Brevort-Straits 138 kV line outage	Summer peak
2	Engadine,Newberry,Roberts,Lou-Pac 69 kV bus voltages		90-91%	Engadine-Hiawatha 69 kV line outage	Summer peak
2	Detour, Goetzville, Pickford, Pine River, Straits, St Ignace,Rockview,Talentino, Mich Limestone 69 kV bus voltages		86-91%	Straits 138/69 kV transformer outage	Summer peak
2	Hiawatha 138 kV bus voltage		89%	Hiawatha-Lakehead 138 kV line outage	Summer peak

TABLE C-2
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2003 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
2	Engadine-Hiawatha 69 kV line (Impending) overload	97%		Manistique-Indian Lake 69 kV line outage	Summer peak
2	Valley, Blaney Park, Manistique 69 kV bus voltages		79-90%	Manistique-Indian Lake 69 kV line outage	Summer peak
2	Radar, Keweenaw, Keweenaw Tap 69 kV (impending) bus voltages		91%	Atlantic-M38 138 kV line outage	Summer peak
2	Presque Isle-Freeman 138 kV line overload	105%		Presque Isle-Cedar 138 kV line outage	Summer peak
2	Cedar-M38 138 kV line overload	121%		Perch Lake-M38 138 kV line outage	Summer peak
2	Winona, Warden 69 kV & M38 138 kV bus voltages		91-92%	Perch Lake-M38 138 kV line outage	Summer peak
3	Rock River 138/69 transformer overload	107%		Blackhawk- Colt Industries Tap line outage / Blackhawk 138/69 transformer outage	Summer peak
3	Paddock 138/69 transformer overload	99%		Colley Road 138/69 transformer outage	Summer peak
3	North Madison 345/138 transformer overload	98%		Outage of adjacent 345/138 transformer	Summer peak
3	Blount-Ruskin 69 kV line overload	121%		Blount-Ruskin Tap 69 kV line outage	Summer peak
3	Blount-Ruskin Tap 69 kV line overload	121%		Blount-Ruskin 69 kV line outage	Summer peak
3	Portage - Columbia 138 kV line overload	106%		Portage-Columbia 138 kV line outage	Summer peak
3	Columbia 200 MVA transformer 1 and 3 overloads	98%		Columbia 345/138 kV, 400 MVA transformer outage	Summer peak
3	North Randolph 138/69kV transformer overload	119%		Fall River Tap-Academy 69 kV outage	Summer peak
3	Oakfield 69 kV bus voltage		91%	South Fond du Lac-Oakfield 69 kV line outage	Summer peak
3	Fox Lake and North Beaver Dam 138 kV bus voltages		82%	North Randolph-Fox Lake 138 kV line outage	Summer peak
3	Lancaster and Eden 138 kV bus voltages		87%	Lancaster-Nelson Dewey 138 kV line outage	Summer peak
3	Dickinson 138 kV bus voltage		91%	Colley Road-Dickinson 138 kV line outage	Summer peak
3	Idle Hour 69 kV bus voltage		88%	Rockdale-Cambridge Tap 138 kV line outage	Summer peak
3	Cambridge, London, etc. 138 kV bus voltages		88%	Rockdale-Cambridge Tap 138 kV line outage	Summer peak
3	Kegonsa 138 kV bus voltage		90%	Kegonsa-Christiana 138 kV line outage	Summer peak
3	Lewiston and Kilbourn 138 kV bus voltages		81%	Lewiston-Kilbourn 138 kV line outage	Summer peak
3	Hillman 138/69 kV transformer overload	111%		Longhollow-Terr Tap 69 kV line outage	Summer peak

TABLE C-2
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2003 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	East Campus to Walnut 69 kV line overload	115%		West Middleton-Blackhawk 138 kV line outage	Summer peak
3	Royster to Pflaum Tap 69 kV line overload	101%		Nine Springs-Fitchburg 69 kV line outage	Summer peak
3	West Middleton to Blackhawk 69 kV line overload	99%		East Campus- Walnut 69 kV line outage	Summer peak
3	East Campus to Blount 69 kV line overload	98%		East Campus-Blount 69 kV line outage	Summer peak
3	Fitchburg 138/69 kV transformer overload	101%		Fitchburg 138/69 kV transformer outage	Summer peak
3	Pflaum 69 kV bus voltage		91%	Royster-Pflaum Tap 69 kV line outage	Summer peak
3	Royster to Femrite 69 kV line overload	103%		North Madison-Yahara River 138 kV line outage, etc.	Summer peak
3	Kegonsa to McFarland 69 kV line overload	111%		North Madison-Yahara River 138 kV line outage, etc.	Summer peak
3	Reiner, Burke, Sprecher 69 kV bus voltages		86%	various outages	Summer peak
3	Academy to Columbus 69 kV line overload	101%		North Randolph-Fox Lake 138 kV line outage	Summer peak
3	Kegonsa to Christiana 138 kV line overload	106%		Christiana-Fitchburg 138 kV line outage	Summer peak
3	McCue 138/69 kV transformer overload	111%		Janesville 138/69 kV transformer outage	Summer peak
4	S Sheboygan Falls 138/69 kV transformer overload	112-96%		various outages	Summer peak
4	Mullet River 138/69 kV transformer overload	116-97%		various outages	Summer peak
4	Edgewater 138/69 kV transformer #2 overload	103-97%		various outages	Summer peak
4	Edgewater 138/69 kV transformer #1 overload	102-96%		various outages	Summer peak
4	Canal 138/69 kV transformer #1 overload	101%		Canal 138/69 kV transformer #2 outage	Summer peak
4	Canal 138/69 kV transformer #2 overload	102%		Canal 138/69 kV transformer #1 outage	Summer peak
4	Sister Bay 69 kV bus voltage		90-92%	various outages	Summer peak
4	Canal 138 kV bus voltage		89%	Canal-East Krok 138 kV line outage	Summer peak
4	Crivitz 138/69 kV transformer overload	107%		Pioneer 138/69 kV transformer outage	Summer peak
5	Pleasant Prairie-Bain 345kV line overload	176%		Pleasant Prairie 345 kV bus tie outage	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS - 2009

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Skanawan-Pine 115 kV line overload	103%		various outages	Summer peak
1	Bunker Hill-Black Brook 115 kV line overload	112%		Weston-Blackbrook 115 kV line outage	Summer peak
1	Kelly-Bunker Hill 115 kV line overload	100%		various outages	Summer peak
1	Bunker Hill-Pine 115 kV line overload	141%		various outages	Summer peak
1	Weston-Blackbrook 115 kV line overload	110%		various outages	Summer peak
1	Weston-Kelly 115 kV line overload	124%		various outages	Summer peak
1	Weston-Sherman St. 115 kV line overload	133%		various outages	Summer peak
1	Weston-Morrison Ave. 115 kV line overload	124%		Weston-Sherman St. 115 kV line outage	Summer peak
1	Morrison Ave.-Sherman St. 115 kV line overload	121%		Weston-Sherman St. 115 kV line outage	Summer peak
1	Hilltop-Sherman St. 115 kV line overload	107%		various outages	Summer peak
1	Arpin 345/138 kV transfomer overload	126%		Arpin-Rocky Run 345 kV line outage	Summer peak
1	Arpin-Sigel 138 kV line overload	108%		Arpin-Rocky Run 345 kV line outage	Summer peak
1	Sigel 138/69 kV transfomer overload	117%		various outages	Summer peak
1	Plover-Whiting Ave 115 kV line overload	104%		Rocky Run-Whiting Ave. 115 kV line outage	Summer peak
1	Wein-Stratford 115 kV line overload	122%		various outages	Summer peak
1	Stratford-McMillan 115 kV line overload	120%		various outages	Summer peak
1	Wautoma 138/69 kV transformer overload	111%		various outages	Summer peak
1	Metomen 138/69 kV transformer overload	127%		various outages	Summer peak
1	Metomen-Ripon 69 kV line overload	104%		various outages	Summer peak
1	NW Ripon Tap-Ripon 69 kV line overload	103%		various outages	Summer peak
1	Petenwell 138/69 kV transfomer overload	117%		McKenna-Lakehead Adams 69 kV line outage	Summer peak
1	Whitcomb 115/69 kV transformer overload	107%		various outages	Summer peak
1	Whitcomb-Wittenberg 69 kV line overload	126%		various outages	Summer peak
1	Whitcomb-Rosholt Tap 69 kV line (impending) overload	98%		Whiting Ave-Hoover 115 kV line outage	Summer peak
1	Brooks Corner-Deer Trail 69 kV line overload	101%		Blackbrook-Hogan St 115 kV line outage	Summer peak
1	Rhinelander loop 115 kV bus voltages		< 90%	various outages	Summer peak
1	Arpin to McMillan 115 kV bus voltages		< 90%	various outages	Summer peak
1	Sand Lake, Wautoma 138 kV bus voltages		90 - 92%	various outages	Summer peak
1	Roeder 138 kV bus voltage		92%	Green Lake - Roeder 138 kV line outage	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
1	Berlin Area 69 kV bus voltages		< 90%	various outages	Summer peak
1	N Randolph to Ripon 69 kV bus voltages		90 - 92%	N Randolph-Markesan Tap 69 kV line outage	
1	Petenwell 138 kV bus voltage		92%	Saratoga-Petenwell 138 kV line outage	
1	Council Creek 138 kV bus voltage		82%	Council Creek-Petenwell 138 kV line outage	Summer peak
1	Petenwell to McKenna 69 kV bus voltages		< 90%	various outages	Summer peak
2	Powers 69 kV bus voltage		92%	Amberg-White Rapids 138 kV line outage	Summer peak
2	Radar, Keweenaw, Keeweenaw Tap 69 kV bus voltages		92%	Atlantic 138/69 kV transformer outage	Summer peak
2	Sawyer, Gwinn 69 kV bus voltages		90-91%	Forsyth-Gwinn 69 kV line outage	Summer peak
2	Mass, Bruce Crossing, Watersmeet, Land O Lakes, Conover, Twin Lakes 69 kV bus voltages		88-92%	UPP Mass-Mass 69 kV line outage	Summer peak
2	Presque Isle-Empire 138 kV line (impending) overload	100%		Presque Isle-Freeman 138 kV line outage	Summer peak
2	Bruce Crossing, Watersmeet, Land O Lakes, Conover, Twin Lakes 69 kV bus voltages		87-90%	Mass-Bruce Crossing 69 kV line outage	Summer peak
2	UPP Tap 69 kV bus voltage		92%	Iron River-UPP Tap 69 kV line outage	Summer peak
2	Straits-Pine River 69 kV line (impending) overload	97%		Straits-Brevort 138 kV line outage	Summer peak
2	Detour 69 kV bus voltage		92%	Talentino 69 kV bus tie outage	Summer peak
2	Radar, Keweenaw, Keeweenaw Tap 69 kV bus voltages		91%	Atlantic-M38 138 kV line outage	Summer peak
2	Presque Isle-Freeman 138 kV line overload	112%		Presque Isle-Cedar 138 kV line outage	Summer peak
2	Cedar-M38 138 kV line overload	111%		Perch Lake-M38 138 kV line outage	Summer peak
2	Winona, Warden, M38, Osceola, Radar, Keweenaw, Keeweenaw Tap, Stone 69 kV & M38, Ontonagon 138 kV bus voltages		91-92%	Perch Lake-M38 138 kV line outage	Summer peak
2	Presque Isle-Freeman 138 kV line overload	102%		Presque Isle-National 138 kV line outage	Summer peak
2	National-Tilden 138 kV Ckt 2 line (impending) overload	98%		National-Tilden 138 kV Ckt 1 line outage	Summer peak
2	McGulpin-Straits 138 kV line 9901 overload	102%		McGulpin-Straits 138 kV line 9903 outage	Summer peak
2	McGulpin-Straits 138 kV line 9903 overload	102%		McGulpin-Straits 138 kV line 9901 outage	Summer peak
2	Hiawatha, Lakehead 69 kV bus voltages	92%		Morgan-Plains 345 kV line outage	Summer peak
3	Colley Road-Clinton 69 kV line overload	109%		various outages	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Nine Springs, Pflaum 69 kV bus voltages		88-90%	Royster-Pflaum Tap 69 kV line outage	Summer peak
3	Mazomanie 69 kV bus voltage		91%	Arena-Mazomanie 69 kV line outage	Summer peak
3	Waunakee 69 kV bus voltage		90%	Waunakee-Waunakee Tap 69 kV line outage	Summer peak
3	Lake Delton, Kirkwood, Rock Springs, Loch Mirror, Dell Creek, Kilbourn, Lewiston, 138 kV bus voltages		82-90%	Trienda-Lewiston 138 kV line outage	Summer peak
3	Numerous Madison City 69 kV bus voltages--Mendota, Huiskamp, Ruskin, East Campus, Walnut, East Towne, Wingra, etc.		88-90%	Yahara River-Sycamore 138 kV line outage, Columbia-North Madison 345 kV line outage, Kegonsa-Christiana 138 kV line outage, Sycamore-Blount 138 kV line outage	Summer peak
3	Fall River and Doyleston 69 kV bus voltages		88%	Academy-Fall River 69 kV line outage	Summer peak
3	Lake Geneva, Katzenburg, Twin Lakes, South Lake Geneva 69 kV bus voltages		85%	North Lake Geneva-Lake Geneva 69 kV line outage	Summer peak
3	Dickinson, Brick Church, Williams Bay 138 kV bus voltages		87-90%	Dickinson-Brick Church and Colley Road-Dickinson 138 kV line outages	Summer peak
3	Burke, Sun Prairie, Token Creek 69 kV bus voltages		83-91%	Reiner-Burke Tap 69 kV line outage	Summer peak
3	Monticello, Verona 69 kV bus voltages		91%	North Monroe-Monticello 69 kV line outage	Summer peak
3	Lancaster, Mazomanie, Pine River 69 kV bus voltages		89%	Nelson Dewey-Lancaster 138 kV line outage	Summer peak
3	Lancaster, Eden, Wyoming Valley, Spring Green 138 kV bus voltages		83-88%	Nelson Dewey-Lancaster 138 kV line outage	Summer peak
3	Cambridge and London 138 kV bus voltages		91%	Cambridge-Rockdale 138 kV line outage	Summer peak
3	Richland Center, etc. 69 kV bus voltages		85-89%	Richland Center-Richland Center Tap & Dayton-Richland Tap 69 kV line outages	Summer peak
3	Kegonsa-Christiana 138 kV line overload	123%		Christiana-Fitchburg 138 kV line outage	Summer peak
3	North Madison 138/69 kV (impending) transformer overload	98%		Reiner-Sycamore 138 kV line outage	Summer peak
3	North Madison 345/138 kV transformer overload	100%		Outage of adjacent 345-138 kV transformer	Summer peak
3	Christiana-Fitchburg 138 kV line overload	112%		Kegonsa-Christiana 138 kV line outage	Summer peak
3	North Madison-Yahara River 138 kV line overload	106%		Kegonsa-Christiana 138 kV line outage	Summer peak
3	Yahara River-Sycamore 138 kV line overload	102%		Kegonsa-Christiana 138 kV line outage	Summer peak
3	Brick Church-Zenda 69 kV line overload	107%		North Lake Geneva-Lake Geneva 69 kV line outage	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
3	Janesville 138/69 kV transformer overload	102%		McCue 138/69 kV transformer Outage	Summer peak
3	McCue-Milton Lawns 69 kV line overload	119.50%		Outage of Janesville 138-69 kV transformer	Summer peak
3	Kegonsa 138/69 kV transformer overload	105%		Kegonsa-Colliday Point 138 kV line outage	Summer peak
3	McCue 138/69 kV transformer overload	106%		Janesville 138/69 kV transformer outage	Summer peak
3	McCue-Harmony and Harmony-LaMar 69 kV line overloads	103%		Kegonsa 138/69 kV transformer outage and Kegonsa-North Stoughton 69 kV line outage	Summer peak
3	Reiner-Burke Tap 69 kV line overload	102%		North Madison 138/69 kV transformer outage	Summer peak
3	Dane-North Madison 69 kV line overload	103%		Yahara River-Sycamore 138 kV line outage	Summer peak
3	Merimac-Caledonia 69 kV line overload	107%		Island-Kirkwood 69 kV line outage	Summer peak
3	Columbia-Manley Sand 69 kV line overload	111%		North Madison 138/69 kV transformer outage	Summer peak
3	Columbia 138/69 kV transformer (impending) overload	98%		Portage 138/69 kV transformer outage	Summer peak
3	Nine Springs-Fitchburg 69 kV line overload	113%		Royster-Pflaum Tap 69 kV line outage	Summer peak
3	East Campus-Blount 69 kV line overload	121%		East Campus-Blount 69 kV line outage	Summer peak
3	Royster- Pflaum 69 kV line overload	124%		Nine Springs-Fitchburg 69 kV line outage	Summer peak
3	Dickinson-Brick Church (impending) 138 kV line overload	96%		Colley Road-Enzyme 69 kV line outage	Summer peak
3	Blount-Ruskin 69 kV line overload	120%		Waunakee-Waunakee Tap 69 kV line outage	Summer Peak
3	Gateway-Sycamore 69 kV line overload	121%		Sycamore-Blount 138 kV line outage	Summer Peak
4	Egg Harbor 69 kV bus voltage		88-91%	various outages	Summer peak
4	Sister Bay 69 kV voltage		85-91%	various outages	Summer peak
4	Tecumseh 138/69 kV transformer overload	100-97%		various outages	Summer peak
4	Rosebush 69 kV bus voltage		91%	White Rapids-Rosebush 69 kV line outage	Summer peak
4	Dave's Falls 69 kV bus voltage		90%	White Rapids-Rosebush 69 kV line outage	Summer peak
4	Ellinwood 139/69 kV transformer overload	116%		Fitzgerald-Sunset Point 138 kV line outage	Summer peak
4	Butte des Morts 138 kV bus tie 1-2 overload	101-99%		various outages	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
4	Ellington-Casaloma 138 kV line (impending) overload	98%		Casaloma-Butte des Morts 138 kV line outage	Summer peak
4	Ellington 138 kV bus tie 2-3 (impending) overload	97%		Casaloma-Butte des Morts 138 kV line outage	Summer peak
4	N. Appleton 345/138 kV transformer #2 (impending) overload	99%		N. Appleton 345/138 kV transformer #1 outage	Summer peak
4	N. Appleton 345/138 kV transformer #2 (impending) overload	98%		N. Appleton 345/138 kV transformer #3 outage	Summer peak
4	N. Appleton 345/138 kV transformer #3 (impending) overload	96%		N. Appleton 345/138 kV transformer #2 outage	Summer peak
4	Point Beach-Forest Junction 345 kV line (impending) overload	98%		Kewaunee 345/138 kV transformer T-10 outage	Summer peak
4	Edgewater 345/138 kV transformer T-21 overload	112%		Edgewater 345/138 kV transformer T-22 outage	Summer peak
4	Auburn 138 kV bus voltage		89-91%	various outages	Summer peak
4	Butternut 138 kV bus voltage		88-91%	various outages	Summer peak
4	N. Appleton 345/138 kV transformer #1 (impending) overload	99%		N. Appleton 345/138 kV transformer #2 outage	Summer peak
4	Casaloma 138 kV bus voltage		91%	Casaloma-Butte des Morts 138 kV line outage	Summer peak
4	Ellington-N. Appleton 138 kV line overload	119%		Casaloma-Butte des Morts 138 kV line outage	Summer peak
4	Kaukauna Central Tap-Melissa 138 kV overload	136-96%		various outages	Summer peak
4	Melissa-Tayco 138 kV line overload	108%		Butte des Morts 138 kV bus tie 1-2 outage	Summer peak
4	Apple Hills 138 kV bus voltage		92%	N. Appleton-Apple Hills 138 kV line outage	Summer peak
4	Wooden Shoe 138 kV bus voltage		91%	various outages	Summer peak
4	Lost Dauphin-Mystery Hill 138 kV line overload	104-97%		various outages	Summer peak
4	Highway V-Preble 138 kV line overload	108-97%		various outages	Summer peak
4	Tower Drive-Preble 138 kV line overload	105-98%		various outages	Summer peak
4	Ontario 138 kV bus voltage		92%	Highway V-Ontario 138 kV line outage	Summer peak
4	Canal 138 kV bus voltage		85-91%	various outages	Summer peak
4	Kewaunee 345/138 kV transformer T-10 (impending) overload	99%		Point Beach-Forest Junction 345 kV line outage	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
4	Glory Road-DePere 138 kV line (impending) overload	95%		Lost Dauphin-Mystery Hill 138 kV line outage	Summer peak
4	Rosiere 138 kV bus voltage		90-92%	various outages	Summer peak
4	Fitzgerald 345/138 kV transformer overload	101-96%		various outages	Summer peak
4	Sunset Point 138 kV bus voltage		92.0%	Quarry Run-Neevin 138 kV line outage	Summer peak
4	Mears Corners 138 kV bus voltage		91-92%	various outages	Summer peak
4	Lake Park-City Limits 138 kV line overload	106%		N. Appleton-Apple Hills 138 kV line outage	Summer peak
5	Arcadian6-Waukesha6 138 kV line overload	113%		Arcadian4 - Waukesha4 138 kV line outage	Summer peak
5	Arcadian 345/138 kV transformer overload	98%		Arcadian 345/138 kV transformer #1 outage	Summer peak
5	Kansas-Norwich 138 kV line overload	106%		various outages	New generation
5	Kansas-Ramsey 138 kV line overload	112%		various outages	New generation
5	Oak Creek-Ramsey 138 kV line overload	120%		various outages	New generation
5	Moorland-Kansas 138 kV line overload	101%		Arcadian-Moorland 138 kV line outage	New generation
5	Bluemound 230 kV bus voltage		89%	Bluemound-Oak Creek 230 kV line outage	New generation
5	Oak Creek 230/138 kV transformer overload	115%		various outages	New generation
5	Germantown and Maple 138 kV bus voltages		88%	Germantown-Lannon 138 kV line outage	Summer peak
5	Jefferson, Fort Atkinson, Crawfish River 138 kV bus voltages		78%	Jefferson-Lakehead-Rockdale 138 kV line outage	Summer peak
5	Oak Creek 345/138 kV transformer overload	100%		various outages	New generation
5	Bluemound 230 kV, Merrill Hills 138 kV and Mukwonago 138 kV bus voltages		89%	various outages	Summer peak
5	Moorland 138 kV bus voltage		89%	various outages	Summer peak
5	Tichigan, N. Lake Geneva, Sugar Creek 138 kV bus voltages		89%	various outages	Summer peak
5	Mukwonago 138 kV bus voltage		89%	various outages	Summer peak
5	Edgewood 138 kV bus voltage		89%	Edgewood-St. Martins 138 kV line outage	Summer peak
5	Auburn, Barton, Butternut 138 kV bus voltages		89%	various outages	Summer peak
5	Cooney, Cottonwood, Summit 138 kV bus voltages		86%	Bark River-Cottonwood 138 kV line outage	Summer peak

TABLE C-3
PERFORMANCE CRITERIA LIMITS EXCEEDED AND OTHER CONSTRAINTS – 2009 (continued)

Planning Zone	Criteria Exceeded/Need	% of Facility Rating	% of Nominal Bus Voltage	Cause	Condition
5	Parkland, Swan, 68th St 138 kV bus voltages		87%	Saukville-Granville 138 kV line outages	Summer peak
5	Root River 138 kV bus voltage		89%	Oak Creek-Root River 138 kV line outage	Summer peak
5	Hartford and Rubicon 138 kV bus voltages		89%	Hartford-St. Lawrence 138 kV line outage	Summer peak
5	Concord, Fort Atkinson, Jefferson, Hartford, St. Lawrence 138 kV bus voltages		78%	Rockdale-Lakehead-Jefferson 138 kV line outage	Summer peak