BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of American Transmission Company LLC, as an Electric Public Utility, for a Certificate of Public Convenience and Necessity to Construct and Operate the Mill Road-Granville Transmission Line Project, Consisting of Two New 138 kV Transmission Lines, Rebuilding Two Existing Double-Circuit 345/138 kV Transmission Lines, and Constructing the 345 kV Mill Road Substation Located Primarily in the City of Milwaukee, Milwaukee County, and the City of Brookfield and the Village of Menomonee Falls, Waukesha County, Wisconsin.	Docket No. 137-CE-212

DIRECT TESTIMONY OF PATRICK GERUM IN SUPPORT OF THE APPLICATION

INTRODUCTION

Q: Please state your name, employer, title, and business address.

A: My name is Patrick M. Gerum and I am employed by ATC Management, Inc., the corporate manager of American Transmission Company LLC (collectively, ATC). My job title is Consultant Transmission Planning Engineer. My business address is W234 N2000 5 Ridgeway Parkway Court, Waukesha, WI 53188.

Q: On whose behalf are you testifying in this proceeding?

A: I am testifying on behalf of ATC in support of its Application (Application) for a Certificate of Public Convenience and Necessity (CPCN) and Utility Permit from the Public Service Commission of Wisconsin (PSCW or Commission) and the Wisconsin Department of Natural Resources (WDNR) for the Mill Rd to Granville Transmission Line Project (Project).

Q: Please describe your educational and professional background as it relates to this proceeding.

A: I have been employed by ATC since January 2009 and have worked within the Transmission Planning group in various roles during this time. Prior to ATC, I worked for Wisconsin Electric Power Company (We Energies) from January 1992 to January 2009 in different roles such as System Engineer at the Point Beach Nuclear Plant, Transmission Planning Engineer, and as a Project Engineer in the Wholesale Energy and Fuels Department. I graduated from the University of Wisconsin – Madison in 1991 with a Bachelor of Science degree in Electrical Engineering. Prior to attaining my Engineering degree, I performed 6 years of duty in the United States Nuclear Navy as an Electrician. I am a registered Professional Engineer in the State of Wisconsin.

Q: What are your responsibilities at ATC?

A: In my current role at ATC, I am the Zone Planning Engineer for "Zone 5", which consists of six Wisconsin counties in the southeastern portion of ATC, in which the proposed Project is located. Specifically, in my current role at ATC, I perform reliability-based studies to develop short and long-term transmission system reinforcements to meet all applicable mandatory NERC reliability standards. Additionally, I perform reliability studies associated with new load interconnection requests. For this specific Application, I am the lead transmission planner that performed the reliability studies. I am also a core member of the project team that developed the preferred solution and the Planning Scoping Document (PSD) for this Project.

Q: What is the purpose of your direct testimony?

A. The purpose of my testimony is to describe the need for the Project, the planning analysis that ATC conducted, and the reasons that ATC selected the Project as the preferred transmission alternative for meeting the stated need for the Project.

Q: Was the planning analysis that ATC conducted for the Project prepared by you or at your direction?

A. Yes. I was the lead Transmission Planner in the preparation of the Project need analysis that is discussed in Ex.-ATC-Application-Application: Section 2.0 and Ex.-ATC-Application-Appendix D: Exhibit 1.

SUMMARY OF THE PROJECT NEED

Q: Please describe the Project.

A: The Project consists of several new additions and improvements to existing elements of the transmission system. Specifically, the Project will involve the new construction of several transmission elements, including approximately 6.5 miles of new 138 kV transmission line (to replace the Granville to Tamarack 138 kV line (3444)), a new "Mill Road" Substation with a 345 kilovolt (kV) six position ring bus, a 138 kV five position ring bus, and a 345 kV/138 kV autotransformer. Additionally, the Project will require the rebuilding of the existing double-circuit portion of the Granville to Arcadian 345 kV line (9911) and the Granville to Tamarack 138 kV line (3444) as double-circuit 345 kV transmission lines, as well as modifications to the existing Granville, Butler, and Tamarack Substations, modification of the existing Granville to Arcadian 345 kV line (9911) and the Cypress to Arcadian 345 kV line (L-CYP31) and modifications to the following existing 138 kV transmission lines:

- Germantown to Bark River 138 kV line (2661);

- Tamarack to Sussex 138 kV line (36341);
- Granville to Tosa 138 kV line (3443);
- Granville to Butler 138 kV line (3453);
- Butler to Bluemound 138 kV line circuit 1 (5051); and
- Butler to Bluemound 138 kV line circuit 2 (5061).

The Project will improve the transmission system to meet NERC TPL Reliability Standards and will support new generator interconnections in the region and reliably serve new and existing load under system intact and contingency conditions within the study area including service to a large new data center in southeastern Wisconsin.

Q: Please explain why the Project is needed.

A: The existing transmission facilities in the western Milwaukee area have unique characteristics that contribute to limitations on the surrounding transmission system. The 345 kV network in the western Milwaukee area creates an hourglass shape, with three 345 kV lines to the north and three 345 kV lines to the south of this geographic area. In the area between those lines, there are two 345 kV circuits and associated 138 kV facilities running in parallel, which have a relatively low capability to support high power flows during contingency situations. Given these circumstances, ATC has monitored the conditions of this area of the transmission system for many years. The unique conditions in this region have led ATC to propose the Project. Furthermore, according to numerous analyses performed by ATC and the Midcontinent Independent System Operator, Inc. (MISO), the Project will provide substantial reliability benefits, relieve congestion issues, and facilitate the interconnection of additional load and generation to the transmission system.

The planning analysis that the Applicants conducted in this docket focuses on the multiple benefits that the Project will provide to the State of Wisconsin. In order for Wisconsin customers to realize these benefits, the Mill Rd to Granville Project needs to be constructed.

Q: Please describe the study area for ATC's planning analysis.

A: The "full" study area is the geographic area in which ATC conducted its analysis, including, for example, facility monitoring and evaluated contingencies. This full study area is shown in Ex.-ATC-Application-Appendix D: Exhibit 1, as well as Ex.-ATC-Application-Appendix D: Figure D. Key generators within study area include the Germantown natural gas-fired generating facility, the Port Washington natural gas-fired generating facility, the Valley natural gas-fired generating station, the Oak Creek coal-fired generating station, and the Elm Road coal-fired generating facility. ATC further defined a "focused" study area, which is the western Milwaukee geographic area, where ATC evaluated transmission system alternatives that could be implemented to meet the needs of the Project. The focused study area consists of one of the highest load densities in Wisconsin and has a peak load of approximately 1 GW. Major substations within the focused study area include Granville, Arcadian, Sussex, Tamarack, and Butler

SUMMARY OF THE PROJECT NEED

Q: Describe the factors that are driving the need for the Project.

A: The Project is needed for several reasons, each of which I discuss below. First, the Project is needed to support system reliability of the transmission system. Recent MISO MTEP analyses have observed issues with overloaded transmission facilities in this area. A significant amount of new load associated with a new data center is expected to come online starting in 2025 through 2027 and beyond, which will exacerbate these issues. As

demonstrated in recent MISO MTEP annual assessments and the steady state reliability power flow analysis, without reinforcements, the transmission system facilities in the western Milwaukee area are expected to exceed thermal limits in single-event and multi-event contingency situations. In other words, the western Milwaukee area needs transmission system reinforcements to comply with NERC TPL reliability standards.

Second, the Project is needed to facilitate the interconnection of additional generation resources from MISO Definitive Planning Process (DPP) 2020 cycle. Various system limitations shown in the DPP 2020 System Impact Study report have demonstrated that the Project is needed to support the interconnection of new generators, most of which are located in Wisconsin.

Third, the Project is needed to support new load interconnections. In particular, We Energies has submitted multiple new large load interconnection requests associated with a new data center in the EITM zone in southeast Wisconsin, the load for which is scheduled to come online starting in 2025, which will further stress the facilities in this area. The NERC TPL reliability issues already occur in the Project area without the new We Energies load interconnections in southeast Wisconsin; therefore, the issues are exacerbated by any load additions in southeast Wisconsin.

Fourth, the Project will enhance transfer capability in the study area. The western Milwaukee area has experienced historical economic congestion because of its limited local and regional transfer capability. The transmission system reinforcements associated with the Project will help alleviate this local congestion.

In sum, the transmission system in the western Milwaukee area needs reinforcements to comply with NERC TPL reliability standards, support the interconnection of new

renewable generation in Wisconsin, provide adequate and reliable service to a large new data center in southeastern Wisconsin, and improve transfer capability.

Q: What analyses did ATC perform to evaluate the system need?

A: ATC evaluated the performance of the system by conducting several analyses, including the following:

- A steady state power flow analysis that assessed the Project's performance under NERC Reliability Standard TPL-001-5; and
- A sensitivity analysis.

I discuss below the purpose of each of these analyses along with a summary of the results of each. A more detailed discussion of the results of these analyses is included in Ex.-ATC-Application-Appendix D: Exhibit 1 at Section 3.

Q: What is the purpose of the steady state power flow analysis?

A: Reliable operation of the transmission grid requires operating the system within prescribed thermal and voltage limitations. Equipment on the transmission system, such as transmission line conductors or transformers, are designed to operate at or below certain thermal limits and within certain voltage limits. If equipment is operated beyond its emergency thermal or voltage limits, this can compromise system reliability and/or cause equipment damage. Without reinforcements, the transmission system facilities in the western Milwaukee area are expected to exceed thermal limits in single-event and multi-event contingency situations, as demonstrated in recent MISO MTEP annual assessments and in ATC's steady state reliability power flow analysis as described in Ex.-ATC-Application-Appendix D: Exhibit 1 at Section 3.

ATC performed power flow analyses using the Power System Simulator for Engineering (PSSE) for building the reliability models and Transmission Adequacy and Reliability Assessment (TARA) from PowerGem for the power flow analysis included in the Project Support Document (PSD) in Ex.-ATC-Application-Appendix D: Exhibit 1. The reliability and load interconnection studies utilized the MISO MTEP23 series models. The generation interconnection studies utilized MISO's MTEP 2020 cycle DPP models.

ATC conducted single and multiple contingency steady state analysis of the system before any system alternatives were added. The basic purpose of the steady state analysis was to evaluate the transmission system performance under multiple scenarios to comply with the NERC TPL-001 reliability standards.

Q: What were the results of the steady state needs analysis?

A: ATC's steady state reliability analysis indicates that there are system limitations on the transmission system that need to be resolved to meet NERC reliability requirements. The analysis resulted in several single event contingencies that need to be addressed. The analysis identified that there were single event contingency thermal overloads up to 140% in the 2028 Summer Peak and Shoulder models, as well as the 2033 Summer Peak model. The steady state analysis also identified that there were multiple event contingencies that resulted in thermal overloads up to 167% in the same three study models as discussed in the single event analysis results.

Based on these results, the western Milwaukee area needs transmission system reinforcements to comply with NERC TPL reliability standards and support the interconnection of new generation and load.

Q: What is the purpose of the sensitivity analysis?

A: The purpose of sensitivity analyses is to evaluate highly probable scenarios that could have a potential high impact to facilities in the study area. For this study, ATC conducted a sensitivity analysis using the 2028 Shoulder model to simulate a planned maintenance outage scenario of a single Elm Road generator, which is the largest generating unit in the study area.

Q: What were the results of the needs related sensitivity analysis?

A: The sensitivity analysis identified several single event limitations as well as many multiple event limitations, which resulted in thermal overloads and voltage violations. The worst thermal overload in the sensitivity analysis was 175% of the rating.

ANALYSIS OF TRANSMISSION SYSTEM ALTERNATIVES

Q: What transmission system electrical alternatives did ATC study in its analysis?

A: ATC studied two electrical transmission alternatives to determine the best solution to meet the Project's stated need. Both alternatives have similar 345 kV components, namely the new 345/138 kV Mill Road substation, and the Mill Road to Granville double circuit 345 kV line. The key difference is in the 138 kV scope of the Granville to Bluemound transmission corridor, such that Alternative 1 (ATC's preferred solution) uses a flow control device at the Butler Substation, whereas Alternative 2 would require rebuilding several miles of 138 kV facilities along the transmission corridor between the Granville and Bluemound Substations.

<u>Project scope included in both Alternative 1 and 2</u>

- Build new 345/138 kV Substation Mill Road with transformer,
- Build Mill Road – Granville 345kV double circuit lines,
- Reconfigure Tamarack – Butler 138 kV lines,

- Loop in 138 kV lines into the Mill Road substation,
  - Tamarack – Sussex 138 kV line (36341),
  - Germantown – Bark River 138 kV line (2661),
- Loop in 345 kV lines into the Mill Road substation,
  - Granville to Arcadian 345 kV line (9911), and
  - Cypress to Arcadian 345 kV line (L-CYP31).

Alternative 1 (Preferred): Reconfiguration and flow control at the Butler Substation.

- Install a flow control device at the Butler Substation,
- Install a flow control device on Mill Road – Sussex 138kV line, and
- Re-terminate multiple lines at Butler SS.

Alternative 2: Rebuild of the 138 kV facilities in the Granville – Bluemound transmission corridor.

- Construct a new Granville – Butler 138 kV line,
- Rebuild the Granville – Butler 138 kV line (3453),
- Rebuild the Granville – Tosa 138 kV line (3443),
- Rebuild the Butler – Bluemound 138 kV line (5051),
- Rebuild the Butler – Bluemound 138 kV line (5061), and
- Rebuild the Tosa – Milwaukee County tap – Bluemound 138 kV line (5041) but excluding the Milwaukee County tap – Milwaukee County portion of the line.

Q: How did ATC evaluate the performance of these alternatives?

A: ATC evaluated the performance of the alternatives by conducting several analyses, including the following:

- Steady state power flow analysis that assessed the alternatives' performance under NERC Reliability Standard TPL-001-5;
- Sensitivity analysis;
- System losses; and
- Economic analysis.

I discuss below the purpose of each of these analyses along with a summary of the results of each. A more detailed discussion of the results of these analyses is included in Ex.-ATC-Application-Appendix D: Exhibit 1 at Section 4.

Q: Based on the steady state analysis performed, do the alternatives address the identified needs?

A: ATC conducted a steady state analysis with each of the alternatives under single and multiple contingencies. The basic purpose of the steady state analysis was to evaluate how each of the alternatives impacted thermal and voltage limitations on the transmission system under multiple scenarios to comply with the NERC TPL-001 reliability standards. ATC's steady state reliability power flow analysis shows that both alternatives perform similarly to meet the NERC TPL reliability requirements and adequately address the system needs in the focused study area.

Q: What is the purpose of the system losses analysis?

A: The purpose of the system loss analysis is to evaluate the consumption of real power losses during power system operation. Line losses contribute to inefficiencies in the energy system and lead to higher electricity costs for consumers. ATC performed system loss studies on the 2028 Summer Peak and Shoulder modeling scenarios.

Q: What were the results of this system losses analysis?

A: The analysis showed that implementing either alternative results in a reduction of system losses in both the ATC system and entire Eastern Interconnection System.

Q: What is the purpose of the economic analysis?

A: The purpose of performing an economic analysis is to verify that the preferred project alternative does not negatively impact the wholesale energy market, called a "No Harm Test". Additionally, ATC analyses the congestion post-project for additional upgrades or adjustments based on economics.

This study evaluates the Project's economic performance based on the MISO MTEP23 PROMOD Future 2A (F2A) planning models. This economic study considered pre-existing studies (*e.g.*, reliability issues, asset renewal projects, or potential generation interconnection projects) and included their preliminary solutions in the model in-order to evaluate the potential impact on system congestion. Then economic-only projects or adjustments to existing projects could be recommended based on reduction of congestion and increased economic benefits.

Q: What were the results of the economic analysis?

A: The economic study confirmed the preferred project reduced historical congestion in the focused study area, which provides economic benefits. The economic analysis did not recommend any adjustments to the scope of the preferred Project. Any congestion that continues with the Mill Road – Granville project in the focused study area will be mitigated with additional future planned projects.

Q: How do the studied alternatives compare and is the need for the Project affirmed?

A: ATC's steady state reliability power flow analysis shows that the two alternatives perform similarly to meet the NERC TPL reliability requirements and adequately address the

system needs in the focused study area. Although both alternatives are effective solutions, there is a significant difference in overall cost, constructability, schedule risk, and environmental and community impacts. The cost estimate for the preferred Project is $424 million and the cost estimate for the Alternative is $659 million. A more detailed discussion of the alternative comparison is included in Ex.-ATC-Application-Appendix D: Exhibit 1 at Section 5.

The preferred Project would provide considerable relief from local constraints associated with the current "hourglass" configuration of the western Milwaukee area transmission system, which addresses the NERC TPL reliability needs and enables the interconnection of new generation and load. The preferred Project is lower cost, requires less new right-of-way, has less public and environmental impact, and has a greater ability to achieve the required in-service date. Additional benefits for the Project include providing operational flexibility, increasing transfer capability, and reducing local congestion and system losses.

OTHER OPTIONS CONSIDERED

Q: Were any other options considered to address the need for the Project?

A: The Project is the only viable alternative to reliably serve the load additions. ATC determined that a viable alternative for addressing the Project's stated needs should include improvements on both 138 kV and 345 kV facilities. ATC rejected other solution options, such as a no-build option and non-transmission options. These analyses are described in Ex.-ATC-Application-Appendix D: Exhibit 1 at Sections 4 and 7.4.

Q: Why did ATC reject a no-build option?

A: ATC's steady state reliability analysis of the existing transmission system indicates that many contingency events can occur during all times of the year that will result in various thermal or voltage limitations, requiring a solution per NERC reliability standards. These

identified limitations also impact the capability to interconnect new generation and new loads proposed in the southeast Wisconsin area. A no build option would not address these needs.

Q: Are combustible or noncombustible renewable energy resources, nonrenewable resources, or nuclear resources a viable option to the Project?

A: No. ATC is a transmission-only utility that is precluded from owning electric generation resources, and therefore, ATC cannot develop noncombustible or combustible renewable energy resources to address the needs described in Section 2.1 of the PSD. Further, and as discussed in Ex.-ATC-Application-Appendix D: Exhibit 1 at Section 3.1, MISO's Definitive Planning Phase (DPP) studies indicate that the Project is a required network upgrade for various new generation resources that are being proposed throughout Wisconsin.

In any event, the amount of noncombustible renewable energy generation needed to address the Project need would not be viable and could not be constructed in sufficient time to meet the targeted in-service date. There are presently no noncombustible renewable energy resources in the MISO generation interconnection queue of the right capacity and in the right location to address the need for the Project. In fact, as evidenced by the DPP study results described earlier, many new proposed renewable generators in Wisconsin are exacerbating the need for the Project. Accordingly, noncombustible or combustible renewable energy resources are not cost effective or technically feasible alternatives to the Project. In addition, new generation resources are not a technically feasible or cost-effective alternative to the Project.

Further, new nuclear generation is one of the most capital-intensive forms of generation and can take more than a decade to permit, site, and construct. New nuclear generation is not a cost-effective alternative to the Project and could not be constructed in time to meet the targeted in-service date.

REGIONAL COORDINATION

Q: Who leads regional transmission planning, and how is that planning conducted?

A: MISO is the regional entity that the Federal Energy Regulatory Commission (FERC) approved as the Transmission Planning Coordinator for ATC's service territory. MISO is a non-profit, member-based organization with regional transmission planning responsibility for the area in which this Project is proposed. The Applicants construct and own various transmission assets within the MISO area, and coordinate with MISO to operate the system, where MISO determines which generation plants are dispatched based on economics and transmission constraints. As operator of the regional transmission grid, MISO has a role to play with regards to regional transmission planning.

Q: Has MISO reviewed and approved the Project.

A: MISO's review of projects varies depending on project drivers, system needs, required in-service dates, and viability of potential alternatives. MISO analyzes projects to verify the need and to ensure projects do not cause harm or create system issues. ATC initially submitted a preliminary version of the Project to MISO as an MTEP Appendix B project on October 26, 2023 (MTEP ID#24919) as ATC first identified the need for the Project in MISO's MTEP23 annual reliability assessment. On July 5, 2024, ATC submitted a group of projects to MISO's Expedited Project Review (EPR) process to support the load addition within the Electronics Information Technology Manufacturing (EITM) zone. During the

EPR process, ATC worked with MISO to identify the Mill Road – Granville Project as a required network upgrade to support the load addition. MISO reviewed and approved the Project on October 16, 2024, to be included in Appendix A for MTEP25.

Q: Is the Project proposed to increase the transmission import capability into Wisconsin?

A: No. The Project is driven by the need to meet NERC TPL Reliability Standards, support generator interconnections in the region, and reliably serve new and existing load. It is not proposed to increase the transmission import capability into Wisconsin.

CONCLUSION

Q: Please summarize why you think the Project is needed.

A: This Project is needed to address the NERC TPL-001 reliability requirements and enable interconnections for new generation and load. This Project also provides system benefits such as increased local transfer capability and system loss reduction. Therefore, the Mill Road - Granville Transmission Line Project needs to be constructed.

Q: In your opinion, will the Project satisfy the reasonable needs of the public for an adequate supply of electric energy?

A: Yes. As I have mentioned, the Project will improve the transmission system to meet NERC TPL Reliability Standards. Additionally, the project will enable the MISO DPP 2020 queue generator interconnections and reliably serve existing loads under system intact and contingency conditions within the study area, including service to the proposed large new data center in southeastern Wisconsin.

Q: In your opinion, will the Project substantially impair the efficiency of utility services, provide facilities in excess of probable future requirements, or (when operated) add

to the cost of service without proportionally increasing the value or available quantity of service?

A: No. The Project will not impair the efficiency of utility services, nor provide facilities in excess of probable future requirements. As I discussed earlier, of all the alternatives the Applicants studied, the preferred Project provides the greatest net benefits to Wisconsin customers. It is the solution that has the greatest ability to achieve the required in service date and the most efficient means of improving the reliability of the transmission system and enabling new load and generation to be interconnected to the transmission system in Wisconsin.

Q: In your opinion, will the Project have a material adverse impact on competition in the relevant wholesale market?

A: No. In fact, the Project will reduce local congestion resulting in improved access to local resources and therefore competition in the ATC service area.

Q: In your opinion, will the Project provide usage, service or increased regional reliability benefits to the wholesale and retail customers or members in this state, and are the benefits of the Project reasonable in relation to its costs?

A: Yes, for all the reasons I discussed previously in my testimony.

Q: Does this conclude your pre-filed direct testimony?

A: Yes.