MINNESOTA
PUBLIC UTILITIES COMMISSION

Staff Briefing Papers

Meeting Date	February 21, 2019	Agenda Item 1*
Company	Northern States Power Company d/b/a Xcel Energy (Xcel, Company)	
Docket Nos.	**E-002/GR-15-826** **In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Electric Service in the State of Minnesota** **E-002/RP-15-21** **In the Matter of Xcel Energy's 2016-2030 Integrated Resource Plan**	
Issues	What action should the Commission take regarding the Prairie Island Report?	
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✓ **Relevant Documents**	**Date**
Public Utilities Commission - Order Asking Commissioner of Commerce to Seek Funding for Specialized Technical Professional Investigative Services under Minn. Stat. § 216b.62, Subd. 8 (Docket Nos. E-002/GR-15-826 & E-002/RP-15-21)	April 15, 2016
Public Utilities Commission – Findings of Fact, Conclusions, and Order (Docket No. E-002/GR-15-826)	June 12, 2017

✓ **Relevant Documents**	**Date**
Minnesota Department of Commerce – Independent Investigation of Cost Overruns and Cost Estimates for Xcel Energy's Prairie Island Nuclear Power Plant (Prairie Island Report)[1]	December 13, 2018

[1] The Prairie Island Report is dated November 1, 2018 and was submitted by the Department of Commerce on December 13, 2018.

Table of Contents

I. Statement of the Issues

What action should the Commission take regarding the Prairie Island Report?

II. Background

At the outset of Xcel's 2015 rate case,[2] the Commission ordered development of the record as it related to Xcel's Prairie Island nuclear power plant life-cycle management (LCM) costs and whether such costs should be recovered on a provisional basis until such time as the Commission could review their prudency. Additionally, in its April 15, 2016 Order Asking Commissioner of Commerce to Seek Funding for Specialized Technical Professional Investigative Services under Minn. Stat. § 216b.62, Subd. 8, the Commission authorized the Department of Commerce (Department) to engage an expert to aid in this effort.

On June 12, 2017 the Commission issued its Findings of Fact, Conclusions, and Order (June 12, 2017 Order) which adopted the settlement (Settlement) of the 2015 rate case. The Settlement acknowledged that Xcel's proposed rate increases included Prairie Island LCM and other nuclear capital costs; however, the Settling Parties agreed that no expert review of these costs was needed at that time. Instead, the Settling Parties proposed that the Department retain a nuclear expert in Xcel's next resource-planning proceeding to examine the continued cost-effectiveness of the Company's nuclear fleet and to evaluate the Company's planned capital and operations and maintenance (O&M) expenses, with the understanding that Xcel will continue to carry the burden of demonstrating the reasonableness of future rate increases.

On December 13, 2018, the Department filed the Independent Investigation of Cost Overruns and Cost Estimates for Xcel Energy's Prairie Island Nuclear Power Plant (Prairie Island Report or Report) that was prepared by Global Energy & Water Consulting, LLC (Global).[3]

III. Potentially Relevant Statute

> Minn. Stat. § 216B.62, Subd. 8. Audit investigation costs; account, appropriation.
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> The audit investigation account is created as a separate account in the special revenue fund in the state treasury. If the commission, in a proceeding upon its own motion, on complaint, or upon an application to it, determines that it is necessary, in order to carry out its duties imposed under this chapter or chapter 216, 216A, 216E, 216F, or 216G, to conduct an investigation or audit of any public utility operations, practices, or policies requiring specialized technical professional investigative services for the inquiry, the commission may request the commissioner of commerce to seek authority from the commissioner of management and budget to incur costs reasonably attributable to the specialized services. If the investigation or audit is approved by the commissioner of management and budget, the commissioner of commerce shall carry out the

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[2] Notice of and Order for Hearing, December 22, 2015, Docket E-002/GR-15-826.

[3] Global Energy & Water Consulting, LLC is the same consultant that was used in the Monticello Prudence Review, Docket E-002/CI-13-754.

investigation in the manner directed by the commission and shall render separate bills to the public utility for the costs incurred for such technical professional investigative services. The bill constitutes notice of the assessment and demand for payment. The amount assessed must be paid by the public utility to the commissioner of commerce within 30 days after the date of assessment. Money received under this subdivision must be deposited in the state treasury and credited to the audit investigation account, and is appropriated to the commissioner of commerce for the purposes of this subdivision.

IV. Global Energy & Water Consulting, LLC's Prairie Island Report

A. Introduction

The scope of Global's engagement was to review the decisions, actions, and costs of Xcel during the Life Cycle Management (LCM) and Extended Power Uprate (EPU) projects not in a rate case context but to substantiate the relationship between Xcel's decisions and how these decisions may have affected costs and schedules for both projects.

As shown in Table 1, Xcel's 2015 Multi-Year Rate Plan (MYRP) included significant increases in capital and operation & maintenance (O&M) costs above the (escalated) dollars approved in Xcel's EPU and additional dry cask storage projects in Dockets E-002/CN-08-509 and E-002/CN-08-510, respectively.

Table 1: Capital Costs Through 2020 Exceeding Amounts Estimated by Xcel in Certificate of Need Proceedings
(Total Company $, in millions)

	Prairie Island Excess Capital Costs	Monticello Excess Capital Costs[4]	Total
Spent Fuel	$38.13	$36.48	$74.61
Other Costs	$302.60	$15.10	$317.70
Total	$340.73	$51.58	$392.31

In addition to proposed costs included in the MYRP, Xcel, in its 2015 Integrated Resource Plan (IRP),[5] estimated that, between 2021 and 2034, Prairie Island's capital costs were expected to exceed earlier estimates by $600 to $900 million.

Since the Settlement did not preclude Xcel from requesting, in a future rate case, recovery of net costs[6] exceeding earlier CN estimates, the Department determined it to be appropriate for the specialized nuclear consultant to continue to review the overall cost overruns and decisions made by Xcel.

[4] These cost overruns are in addition to those previously addressed in Docket E-002/CI-13-754.

[5] Docket E-002/RP-15-21.

[6] Net of accumulated depreciation.

Global's goal was to rebuild a decision-tree that resembled Xcel's at the time decisions to enter into the EPU/LCM and dry cask storage projects were made. Global explained that this approach avoids 20/20 hindsight and reflects the knowledge and information available to the Company at the time those decisions were made. However, on a going forward basis, 20/20 hindsight on events to date could provide benefits for upcoming decisions.

To achieve its goal, Global visited Prairie Island, had discussions with Xcel's operational and management personnel, submitted numerous Information Requests, reviewed extensive documentation provided by Xcel and, from the 2008 period forward to this docket, reviewed documentation included in these two dockets addressing rates and IRPs.

B. Purpose and Approach

As indicated in the Commission's June 12, 2017 Order, the Settlement did not provide for deferral of any Prairie Island costs; however, it did not prelude Xcel from requesting, in its next rate case, recovery of the revenue requirements associated with the then-current rate base amount. The Order specified that the burden would continue to be on Xcel to demonstrate the reasonableness of charging its ratepayers for any costs beyond the levels approved in Xcel's 2008 CNs.[7]

During the review and analysis of the capital and O&M spending at Prairie Island, Global determined that Xcel has had difficulty forecasting costs for major projects. Global also found that, at the time cost estimates for proposed projects are developed, Xcel has not taken advantage of the concept of using appropriate contingencies when the cost and budgeting knowledge base lacks sufficient engineering and planning activities.

Additionally, there is a much larger budgeting issue to consider in Xcel's next IRP: the expiration of Prairie Island's Units 1 and 2 operating licenses in 2033 and 2034, respectively. Given Xcel's disclosure of significant cost increases expected for Prairie Island and the Commission's request for examination of the cost-effectiveness of continuing to operate the facilities to these dates, extra information will be required in the next IRP before decisions regarding the two units' future are made. Global noted that, if Xcel intends to seek a license extension for any of the units, it is important to know about any such plans as soon as possible.

C. Facilities and Corresponding Costs

1. Extended Power Uprate Costs

In its 2007 IRP,[8] Xcel proposed to increase capacity at both the Monticello and Prairie Island nuclear plants. At the time, for Prairie Island, the EPU would have added 171 MW and cost $291 million. Subsequently, in its 2008 Certificate of Need (CN) filing,[9] Xcel revised the capacity increase to 164 MW (82 MW for each unit) and increased the capital costs to $322 million. Xcel the estimated installed cost of the additional 164 MW to be $2,011/kW. The petition also

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[7] Dockets E-002/CN-15-09 and E-002/CN-15-10.

[8] Docket No. E-002/RP-07-1572.

[9] Docket No. E-002/CN-08-509.

identified that, even if the EPU was not undertaken, Xcel expected to spend an estimated capital investment of $600 million for large capital investments including "the Unit 2 steam generators, additional spent fuel storage costs, and relicensing costs." Xcel also expected that, in order to keep the Prairie Island "systems operating well", it would need to annually spend $20 million for LCM.

For the EPU, Xcel did not expect significant modifications to the Reactor, Nuclear Steam Supply System, or Emergency Core Cooling Systems; however, Xcel listed five main activities that would require major modifications. Global had two observations regarding these major projects. First, Xcel did not include the addition of new low-pressure turbines as a sixth major item until their December 1, 2011 IRP filing in Docket No. E-002/RP-10-825 that they included any narrative regarding the sixth major item: addition of new low-pressure turbines. In response to Information Request (IR) 726(c), Xcel in its 2008 CN Strategist modeling included $100 million in unescalated costs for the low pressure turbine installation. Additionally, an April 30, 2008 White Paper by Westinghouse prepared for Prairie Island's Initial Funding Report indicated that no initial funding project study was performed. Global was unclear as to why Xcel did not request that Westinghouse (or another entity) investigate the low pressure turbine project and provide some form of a recommendation to be considered in the CN proceeding. Leaving this action item as unresolved does not explain the overall necessity of addressing low-pressure turbines for the project and the consequences of failure to address this aspect of the EPU project prior to filing the 2008 CN for the EPU.

Global's second observation was that, even if Xcel had not pursued an EPU, it still would have been necessary for the Company, as part of its LCM responsibilities, to undertake some of the capital projects identified for the EPU, to replace (but not upgrade) aging equipment. While Xcel mentioned a few LCM upgrades, it did not distinguish such costs between the LCM and EPU. Further, Xcel acknowledged that the Company did not provide a complete list of items that would need to be replaced even if the EPU did not proceed.

Given that the EPU and LCM were two different regulatory proceedings, Xcel, in its filing to extend Prairie Island's lives, should have identified the costs of replacing worn-out equipment, and then identified incremental costs of upgrading the size of equipment or timing for the installation for the EPU. Such an approach would have given a more accurate picture regarding extending the lives of the Prairie Island units as opposed to upgrading the facilities. Under such an approach, would have been simple to identify capital costs that were abandoned once the Company decided not to pursue the EPU. Even though there is not sufficient information available to identify which capital costs are due to the LCM as opposed to the EPU, it is likely that the majority of the capital costs would have been assigned to the LCM.

On April 2, 2012, Xcel filed a Notice of Changed Circumstances in the CN docket ceasing the EPU entirely. The Commission's May 8, 2015 Findings of Fact, Conclusions and Order in Xcel's 2013 rate case[10] authorized the Company to recover $78.9 million in cancelled Prairie Island project costs, including $66.1 million related to the EPU. In response to IR 731, Xcel stated that the EPU's cancellation resulted in avoided costs totaling $121 million. For clarity, Global stated that

[10] Docket No. E-002/GR-13-868.

Xcel should identify the status (whether installed or not and, if not, whether Xcel has any plans to install in the future) of each of the individual components Xcel identified in its original EPU CN petition in Docket E-002/CN-08-509 and corresponding costs making up the $121 million total that the Company expected to incur for the EPU but will now avoid.

2. Life Cycle Management Costs

Global explained that a clearly articulated definition of Prairie Island's LCM should include typical and sometimes atypical capital and O&M projects warranted to maintain the safe, reliable and efficient operation of the facility. While LCM projects are not necessarily routine, they are confined to projects that are required to continue operations without materially changing the current design basis or electric output.

Regardless of accounting, capital or O&M, Prairie Island has important small projects that are simply too numerous to identify due to their relatively small cost when compared to the more major cost items; however, Global noted Xcel's use of arbitrary costs "splits" when assigning costs. The handling of these splits raised two concerns with the accounting for EPU and LCM projects:

1. Under generally accepted accounting principles, splits using assumptions made by project team members does not provide a reasonably auditable cost trail. It also relies almost exclusively on the project management team's understanding and decisions at the time they were made. Understanding and accounting for such treatment is lost over time. Clearly, this approach is not the best way to handle such splits.
2. Global also described the difficulty of tracking both costs and technical objects of the EPU and LCM projects. Based on Xcel's methodology for reassigning costs away from EPU to LCM and the commingling of LCM projects with EPU projects, the lack of adequate transparency hampers the ability of a third party review to track the history and decision-making of the Company from a regulatory point of view.

3. Attributable to both the EPU and the LCM

Global explained that, regardless of whether an LCM project is to be installed, constructed or initiated within the same outage as an EPU project, LCM work should not ever be characterized as attributable to both. However, this principle does not preclude the LCM project from providing benefits to an EPU. Global added that this principle should not be confused with the accounting methodology used to capture EPU or LCM costs. The accounting for and the characterization of EPU and LCM costs are two wholly separate activities. In both cases, the accounting records are of a capital budgeting nature but, to allow the Commission to reach determinations based on an adequate record, it is important for Xcel to track such significant and separable capital projects carefully, regardless of whether any two projects are included within the same work-order or the same bill from a vendor.

D. Xcel's Identification of Causes and Sizes of Cost increases

1. Extended Power Uprate

Global explained this Report's purpose is not to recommend any cost disallowance. However, it would have been better if Xcel had been more transparent about the work at the Prairie Island facilities throughout the process of seeking CNs and deciding not to pursue the EPU. To address these issues, the report offers recommendations on a going-forward basis.

Global stated that, during the development of the 2008 CN, Xcel lacked an adequate process to identify reasonable costs estimates for significant capital projects and this continued with each budget review cycle, including when Xcel filed its Changed Circumstances Petition. During the preparation of budget documentation to support the original CN, Xcel used high level cost estimates, without use of appropriate contingencies, which Global considered not to be sufficiently accurate to use for Strategist alternative planning purposes or for the Application itself. Based on Xcel's statements made in its Changed Circumstances Petition,[11] the Company did not include the engineering, analysis, and design work necessary for the NRC licensing process prior to submitting its CN application.

While it certainly would not have been necessary to have all of the analysis complete, Xcel should have undertaken sufficient engineering analysis to develop reasonable cost and timing analyses or, in the alternative and according to industry standards, it should have estimated costs that included a significant contingency.

In Global's opinion, Xcel should have had a much more detailed understanding of the EPU costs prior to running Strategist options and prior to the CN Application or it should have included a significant cost contingency. Such an approach would have allowed for a more reasonable comparison between Xcel's proposals and available alternatives at that time. Instead, Xcel's $34 million (10%) contingency understated the EPU cost and gave an unfair advantage to the Company's proposal when compared to other resources. Global noted that it appears that Xcel has recently been attempting to improve its procedures to preclude such future occurrences, but those processes were not in place in 2008.

Based on its analysis, Global concluded that, Xcel did not identify the cost increase drivers for the cost increases or the magnitude of their impact on the EPU project in a reasonably accurate manner, even up to the actual filing of the Changed Circumstances Petition. However, Global pointed out that, over the last 3 to 4 years, Xcel appears to have made substantial improvements in its budgeting process and financial accountability. Examples of changes that, prospectively, should result in better performance are: establishing joint engineering teams utilizing Prairie Island and Monticello personnel to address problems or projects at each Plant, establishing closer working relationships between plant and general office engineering teams, and establishing teams of engineering, plant personnel and contractor personnel to scope and budget projects. Additionally, Xcel has improved third-party contractor accountability by implemented specific terms and conditions such as letters of credit, liquidated damage provisions, risk-sharing mechanisms and establishing fixed-price terms.

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[11] Xcel's March 30, 2012 Changed Circumstances Petition, Docket No. E002/CN-08-509, page 4.

2. Addition on Storage Casks to Extend Lives of Prairie Island Facility[12]

Extending the Prairie Island licenses for an additional twenty years required capital additions related to on-site independent spent fuel storage installations (ISFSI). Once again pricing escalation between the 2008 CN modeling and the 2015 Rate Case was indicative of the same or similar Xcel general budgeting difficulties. In the 2008 CN, for 2008 through 2034 period, Xcel estimated total ISFSI costs, including licensing, to be $155 million. Xcel's most recent (2015 rate case) dry cask storage cost estimate, without relicensing costs, was $355 million. While, at the time, Xcel may not have fully understood industry changes affecting dry cask storage capital costs, even a 50% contingency would not have been high enough to capture the most current anticipated costs. Therefore, Xcel underestimated drivers and magnitudes of the drivers impacting the dry cask storage project. Moreover, in addition to 2016-2019 costs proposed in the 2015 rate case, Xcel's 2015 resource plan indicated that 2021-2034 Prairie Island costs are expected to be $600 to $900 million higher.

E. Xcel's Responses to Changes in Regulatory Requirements of the NRC

Xcel provided details of the activities, decisions, and costs associated with the NRC compliance requirements for meeting the nuclear safety requirements proposed by the NRC's Near Term Task Force following Japan's Fukushima Dai-ichi Plant accident in 2011 and other compliance issues that have been identified by the NRC. Since 2008 these costs have amounted to $214.4 million and Global estimated that, from 2008 until 2015, only $121.6 million appear to be attributable to the Fukushima accident. Also, while some items could reasonably be attributed to the Fukushima accident for the period 2008-2015, Xcel should provide further information in its next rate case to demonstrate that, but for the NRC's requirements stemming from the Fukushima accident, the Company would not have undertaken such projects for ordinary LCM work and provide the NRC requirements to support that assertion.

[12] Docket No. E-002/CN-08-510.

As summarized in Table 2, in its 2015 rate case, Xcel forecasted, for the 2016-2020 time period, $89.1 million in continuing NRC-required compliance costs.[13]

Table 2: Xcel's Estimated NRC Costs for 2016-2020, Excluding AFUDC

NRC Compliance Requirement	Code, Document, or Finding Requirement	Total Cost 2016-2020
Fire Protection	NFPA 805 Requirements	$51,432,064
External Events - Fukushima Requirements	NRC 2011 & Related Orders	$10,140,000
Security Upgrades including Cybersecurity	NRC 10 CFR 73 & Inspection Requirements	$9,852,989
Tornado Missile/Projectile Protection	NRC Regulatory Issue 2015-06	$7,000,000
16 KV Bus Modification	Commitment made in 2/3/14 response to NRC Request for Additional Information	$8,046,303
Steam Generator Water Level	NRC Regulatory Guide Section 1.97	$2,600,000
Total 2016 - 2020		$89,071,356

Global's analysis of costs, along with comparisons with information readily available through public sources and the NRC, indicated that Xcel's actual and estimated compliance costs for NRC requirements appear to be within reason. However, Global warned that, other than to compare the magnitude of these costs, actual compliance costs can be difficult to benchmark particularly for site-specific requirements such as site security including physical plant, force-on-force, and personnel. Cyber security has also become a challenge for nuclear plants. Global noted that security may continue to be challenging from a cost perspective and intellectual technology for the foreseeable future.

Although nuclear plant operators *must* comply with NRC requirements, the NRC does not specifically stipulate the type of technology required for compliance with the specific requirements. However, the NRC does require the Company to submit their plan(s) for compliance for approval and further provides for the NRC to inspect the final deployed technology, procedure, or construction. Since Xcel is not required to submit budget or cost data to the NRC for these compliance requirements, it is important for Xcel to regularly update the Commission and the Department of the planned schedules, budgets, and completion dates.

F. Xcel's Prairie Island Cost Estimates Through 2034

Xcel prepares its non-outage O&M budget much the same way many utility and non-utility industries prepare O&M budgets. The near term (5 years) is planned with the knowledge of the previous 5-year actuals and includes any specific project costs that may not be recurring. These 5-year budgets are reviewed or "truth tested" through iterations between functional areas of the plant that are responsible for managing these budgets and through the management of the nuclear organization itself. Longer term budgets are developed based on escalation of the

[13] Scott Weatherby's Supplemental Direct Testimony, Docket No. E002/GR-15-826, SLW-1, Schedule 8, page 1.

annual budget amounts in the short term budget. Xcel's escalation rate in its 2015 rate case was approximately 4%.

O&M costs are typically driven by internal labor costs and external labor costs such as security and contract labor. In order to provide needed regulatory and safety improvements, Prairie Island's staffing levels have increased. At the same time, the current staff is aging towards retirement and the Company is experiencing high levels of turnover, particularly in senior positions. In both cases, Xcel is working diligently to attract new talent and to maintain their existing talent base. This is a particularly difficult situation in that experienced nuclear staff are not readily available unless incentives and competitive pay is offered to prospective employees. The industry's human resource needs has resulted in employment competition; therefore Xcel must be prepared to offer commensurate competitive pay, incentives, and signing bonuses. The competition for talent has resulted in upward cost pressures that are likely to continue for the next several years.

Another driver of higher O&M costs is Xcel's goal to reduce its dependency on contract labor. This reduction in contract labor will likely produce upward pressures on O&M budgeting by increasing personnel and might appear to be counterproductive to the O&M budget. However, that strategy is good in that, over time, it increases the overall nuclear knowledge base and capabilities within the Company, and reduces costs of overseeing contractors and costs of errors by contract personnel.

Global pointed out that, for the 2009-2015 timeframe, Xcel's annual non-fuel O&M ("Non-outage") increases were 5.5% whereas the 2016-2020 5-year O&M Budget was for an annual 1.7% increase. However, in its 2015 IRP, Xcel's forecasted annual increase in O&M costs was 3.5% or more than twice as high as the 1.7% indicated in the rate case.

In the 2015 rate case, Xcel stated its goal of achieving an overall O&M forecast increase that falls within a 0-2% range; however, Xcel's response to the Department's IR 1165 showed normalized annual forecasted budget increases of 3.5% for the 2021-2033 period.

Another issue that greatly impacts the O&M budget process is that of the Third Party Inspections and Evaluations which take place on a regularly defined cycle (typically every 2 years). The Third Party inspections are performed by a team of highly knowledgeable professionals from the nuclear industry with no specific connection to the plant or the Company. In other words, this is an autonomous, independent inspection with a very strong focus on identifying problems and issues at the plant that are affecting the ability of the plant to perform at a continuously high level that would support a grading of excellent. The linkage between Third Party findings and the O&M budget is one that is extremely difficult for anyone other than the Company to fully understand. As a result, unless the regulators request to review these reports and the Company's mitigation strategy, the specific resolution and its associated costs are unavailable to the Commission or the Department. Not until this review has the Commission or the Department been made aware of the importance of these assessments and reviews.

In addition to the direct O&M impact of the Third Party Inspection and Evaluation, in some cases, the failure of the organization to recognize problems, resolve conflicts, or possess the necessary training and skills resulted in unit deratings, or unit trips affecting the ability of the plant to produce energy. In such cases, the Company either had to utilize more expensive reserve units or to purchase additional resources on the short-term spot market. In either case, the resulting price of energy to the ratepayer was higher than it otherwise would have been had the Prairie Island units kept running. Regardless of the reasoning for the reduction in energy production, without a significant "fault-tree" analysis and subsequent cost analysis the effects of the lost energy could be a direct pass-through of costs to Xcel's ratepayers via the fuel adjustment clause. These issues tend to mount up over time and could create a significant budget variance that would be nearly impossible to track without prior knowledge of the Third Party review. For example, the October 2015 Third Party Report identified that, in June 2014, Xcel manipulated valves in the wrong sequence, causing a feedwater transient while the unit was operating at power and required a load reduction in load at the plant. To remedy such an occurrence fully, refresher training, possible procedure revisions, and certainly increased work scrutiny during subsequent outages or preventative maintenance assignments is required. Additionally, since the incident resulted in a load reduction at Prairie Island, it resulted in the need to find additional energy resources within the Company or from off-system purchases.

The Third-Party Inspectors' July 2017 inspection identified similar instances where outages of Prairie Island were due to oversights or errors by Xcel personnel. Examples included Prairie Island Engineers not preventing:

- A malfunction of the main feedwater regulator valve positioner because of lack of thoroughness in cause evaluation resulted in the unit derating to 15% power (loss of 85% of power) for approximately 2.5 days
- Overheating on the Unit 1 Iso-phase Bus duct system due to inadequate grounding resulted in the unit being derated to 50% power for 12 days.

Additionally, in support of the discussion above regarding the need for greater clarity in Xcel's proposed LCM costs, the 2017 inspection identified an issue that appears to have its nexus as far back as the beginning of the LCM program that seems to have continued. Namely, the 2017 Third-Party Inspection noted that engineers have not submitted LCM plans for important systems and; therefore, Long Range Plans are based on incomplete information.

Global asked Xcel for clarity as to how much of these O&M costs are attributable to the Third Party findings and, based on Xcel's response to Information Request No. 2138, Global concluded that Plant Availability has steadily improved. O&M costs have decreased and the resulting benefit is the reduction of Power Costs to $29.69 in 2017, the lowest since 2010. These benefits evidently accrued as a result of the Company's commitment to performance standards and the results of the Third Party inspections.

Global noted and agreed with comments made by the Third Party Inspectors at the outset of their 2017 report, which supported and acknowledged that Xcel has made significant changes in policies and procedures to address the cultural difficulties of the past. However, the Third Party Inspectors also noted that Xcel needs to do more to ensure that the Company's engineers identify risks early on and prevent such risks from becoming larger problems and that mid-level managers and supervisors need further development to address performance issues quickly and effectively to ensure that the Company performs efficiently.

The sheer number and magnitude or significance of the identified issues in the Third Party Report indicate that a significant level of O&M dollars is being focused on resolving these issues; however, it does not appear that Xcel has made the Commission or the Department aware of these issues or added costs during previous submittals. Therefore, the budget as reflected in filed documentation, IRPs or other formal processes may not identify these costs, causing continual budget variances from actuals due to the increased O&M costs.

Based on information received from Xcel, the actual magnitude of these variances is difficult to ascertain. Xcel indicated that there were no increases in O&M costs, but clearly the time Xcel spent addressing the issues identified by Third-Party Inspectors meant that other O&M work could not be done. Nonetheless, it is hoped that the work done in addressing the concerns identified by the Third-Party Inspectors will reduce future O&M costs, compared to what those costs might otherwise have been.

As Prairie Island continues to age the O&M budget will require continued focus. Global recommended that Xcel annually report a comparison between Prairie Island's actual versus budgeted annual costs for fuel, other O&M and capital costs.

G. Conclusions and Recommendations (Prairie Island Report, pp. 48-56)

CONCLUSION #1: Compliance costs typically are not discretionary in the budgeting process. Issues identified by NRC and Third-Party Inspectors are elevated to the "immediate response" level and do not give the Company discretion to address or not. These costs are going to be necessary in order to maintain the operating license. Likewise, new security, cyber and force-on-force, are not discretionary either. For these reasons Global makes the following recommendation:

RECOMMMENDATION #1: Due to the nature of "compliance costs," their irregular timing, and the costs associated with these types of projects, Global recommends that there be established a mechanism whereby Xcel informs the Commission at the time of determination that a compliance issue is "discovered." At that point Xcel should submit to the Commission a non-binding project description, which includes project scope with specifics, compliance criteria, schedule, and budget. The project scope, compliance criteria, schedule, and budget should be updated with the Commission on an annual basis or sooner if significant changes warrant an update sooner than annually. Such reporting can be structured so that a project that is budgeted for more than $5 Million in any one calendar year or $10 Million in total cost must be reported. (These figures are for informational purposes only. They should be negotiated and agreed upon between Xcel and the Commission.)

By the time one of these projects reaches the operational stage it can be as many as 10 years with multiple millions of dollars spent prior to any knowledge of accounting treatment within a rate case. The burden of proof to show that recovery of the costs would be reasonable would still be on Xcel, to be adjudicated in a formal rate case. While this recommendation is made with specific reference to compliance issues, it would also be a good idea if this level of documentation were to be provided for any nuclear capital project. This Recommendation could be formalized within the Commission's "changed circumstance" provision.

It may not be necessary for the Commission to take specific action on such filings. However, since nuclear costs are so high for any work and the history of the nuclear industry to meet budget and schedules is less than exemplary, the Commission and the Department could benefit to have this reporting on all nuclear projects. This information should be made available for any Prairie Island and Monticello projects.

<u>CONCLUSION #2</u>: The EPU's initial capital budget was $330 million; however, it included projects that were defined as LCM and EPU. Also, the budget estimate was prepared well before any reasonable engineering design had been completed. As a result, the budget provided to the Commission and the Department was significantly confusing and impossible to track without being embedded within the accounting, engineering and operations functions of Xcel. As such, Global concludes that capital budgeting for major projects has been a challenge for Xcel both at Prairie Island and Monticello. In particular, the long lead-time capital projects appear to present the most problems. Global's analysis points to three critical failures in Xcel's budgeting process:

1. Xcel brings to the Commission their application for CN well before they have considered detailed engineering design. Without an appropriate contingency to reflect the development level of the costs, Xcel's estimates of costs are grossly inaccurate. This issue was a problem for Monticello and Prairie Island. More and better attention to scoping of the capital projects and establishing more realistic schedules for filing with the Commission would greatly improve cost estimate accuracy.

2. It is clear from the CN application that Xcel continues to struggle with the use of proper cost estimate contingencies. Perhaps Xcel feels compelled to provide cost estimates with the smallest contingencies because it helps to justify the project. However, such an approach would not be reasonable if it results in choosing projects that are not sufficiently scoped. It would be particularly concerning if the standard or practice were that, once the CN is approved any cost increases would be difficult to disapprove as long as it is within the original scope of the project that is too broadly stated.

3. If the original budget had included a proper contingency it may have impacted the overall decision to move forward with the project or may have resulted in Xcel's projects not being selected as reasonable resources. The appropriate contingency would have provided a more accurate estimate of final costs.

<u>RECOMMMENDATION #2</u>: Global recommended that, to assist the Commission and the Department in their functions to protect the public interest, Xcel provide better written communications, documentation and appropriate contingencies to reflect the level of development of proposed projects' estimates, especially those related to nuclear approvals and cost recovery analysis.

Nuclear costs by their nature are extremely expensive and the schedules for deployment can be affected by external factors such as the earthquake and subsequent tsunami and nuclear accident that occurred in Fukushima, Japan and affected the NRC approval process. Thus, Xcel must engage in a more transparent reporting process to provide reasonable information for the Commission's and the Department's knowledge.

Specifically, Global recommends that Xcel's policies and procedures be modified to require Xcel to present initial budget estimates in CN dockets only after a minimum of 60% engineering design has been completed. Correspondingly, budget estimates should have a minimum of 50% contingencies and this 50% contingency should be included in all financial pro-formas and planning models. Such an approach would provide for a more reasonable estimate of costs and expose Xcel and its ratepayers to less risk of cost increases due to factors that are within Xcel's control, namely gaining a better understanding up front about project scope.

Additionally, if, in the execution of the project, there is a 15% change in the budget estimate or a schedule delay that may cause upward budget pressure, Xcel should be required to file a revised budget with full and concise explanation of the causal actions and the resultant impacts. This recommendation's objective is to have a fully informed Commission and Department throughout a capital initiative, not just at the time of rate case docket.

Global noted that Xcel appears to have partially addressed this issue through the addition of personnel more familiar with cost estimating and project scope definition. Global supported these changes.

<u>CONCLUSION #3</u>: Xcel refers to numerous benchmarking studies and comparison studies it employs during various stages of projects and regulatory filings. Benchmarking can be an extremely helpful tool if used correctly and if the results are understood within the framework of the benchmark analysis. However simply benchmarking against a set of costs or a set of work products may not be helpful or even accurate unless the benchmark is against similar base data with similar operating characteristics and goals. Xcel refers to these benchmarks almost as if they are indicative that Xcel is doing all the right things. However, such benchmarking provides little useful information without disclosure of all relevant underlying facts. For example, a benchmarking study result is sensitive to the method of retrieval of data, the definition and size of the population of the benchmarked subject (in this case, industry pressurized water reactor nuclear plants), the regulatory requirements and other factors.

Moreover, benchmarking does not absolve Xcel of its responsibility to demonstrate that any cost overruns are reasonable to charge to ratepayers. If Xcel chooses to use any benchmarking studies to justify or support their efforts, Xcel must also provide all relevant underlying facts affecting costs of such facilities to the Commission and Department for validation and for any meaning to be ascribed to such studies.

<u>RECOMMMENDATION #3</u>: If Xcel provides any Benchmarking Study to attempt to justify its performance, the Commission should, before giving any weight to such information, at a minimum, require the Company to produce complete copies of such studies and supporting documentation. No benchmarked results should be accepted as accurate or representative without collaboration by the Commission and the Department.

<u>CONCLUSION #4</u>: In addition to on-going safety and reliability projects necessary for normal plant operation, considerable capital expenditures have or will accrue as a result of the LCM

and some small costs associated with the now abandoned EPU. These capital costs will position Prairie Island to operate until its licenses' expirations in 2033 and 2034. What will happen to Prairie Island at that point in time is unknown. For example, the method of decommissioning has yet to be determined. Furthermore, if Xcel were to request a second life extension it is unknown whether the NRC would approve such a license and what approval requirements would be needed.

For example, solely from a technical perspective, it is unclear how the 60 years of operations will have impacted the Prairie Island infrastructure and whether its structural integrity would support a second license extension. The same questions will apply to Monticello when its license expires in 2030. Between now and then, it will be necessary for Xcel to determine whether it would be reasonable to request a second life extension and it will be necessary for the NRC to determine the safety, integrity and reasonableness as to whether to grant any such requests.

At the same time, it will be necessary to assess appropriate courses of action if Xcel does not request or the NRC does not grant second life extensions for any or all of the three nuclear generation facilities. It is expected that discussion of some of these questions will occur in Xcel's upcoming 2019 IRP. As of 2019, they are 11 years away from needing to have a solution implemented for Monticello, 14 years for Prairie Island 1 and 15 years for Prairie Island 2. It is likely to take longer than 10 years for the NRC to address the technical details of this issue in any detail for any nuclear facility for which Xcel may request a second life extension.

<u>RECOMMMENDATION #4</u>: Xcel's upcoming IRP is the first such planning period to extend beyond 2030, as it should cover the period 2019 through 2034. Thus, Xcel will need to approach this planning process to determine: 1) whether a second life extension for some or all of the nuclear generation facilities is the best alternative for the Xcel generation fleet; 2) what alternative(s) would there be to Prairie Island 1, 2 or both; 3) would the NRC approve of another life extension and what analysis and filing requirements would be necessary; 4) if the NRC would approve of a further extension of life, what would Xcel have to do to gain NRC approval; and 5) what issues would need to be addressed locally if any additional life extensions are requested. Xcel should address such questions in its upcoming resource plan and should maintain clear communications in this process.

<u>CONCLUSION #5</u>: Global's review of the Third Party Inspection Reports and the latest NRC Integrated Inspection Report dated November 28, 2017 indicates that there have been material issues with the work culture regarding performance and compliance. In general, Global's findings memorialize a number of critical issues and concerns identified by the Third Party Inspector concerning operating culture and management directions at Prairie Island. Nonetheless, Global notes that, while these two reports covered the 2015 inspection and the 2017 inspection, the Third Party Inspectors noted significant improvements from 2015 to 2017.

It does appear from Global's one-on-one interviews with Prairie Island managers in April 2017 and with the conclusions in the Third Party reports that Xcel has taken a strong approach to abating the issues of the past and moving forward with skills training, addressing employee technical abilities, instilling responsible workplace habits, and engaging all employees, both Xcel and Contract, with an appreciation for "ownership" in plant operations and safety. The overall success of Xcel's programs will take time to fully appreciate the success and effort and the benefit to Xcel and the Minnesota ratepayers.

While Global supports Xcel's improvements to date, there is still a significant level of improvement necessary to return Prairie Island to a level of Excellence rating. Each identified issue in the Third Party Reports must be addressed and resolved in order for the Prairie Island plant to return to a position of Excellence within the nuclear fleet industry.

The importance of understanding the results, conclusions, and recommendations of the Third Party review directly impacts not only Prairie Island's O&M budget but its the O&M Budget as well. Typically, these issues are unknown to the Commission or the Department because they are developed within a confidential environment.

For example, while the Third Party inspectors were clear to point out Xcel had progressed significantly from previous inspections to improve the operating performance of staff and labor, there continue to be concerns and recommendations for improvements. Xcel has accepted these recommendations and is moving forward at a strong pace to resolve the concerns. However, in the time since Global's review of the Third Party Reports, the NRC published a November 28, 2017 Integrated Inspection Report identifying several items, four of which are summarized below. While none of the results were classified as "a finding" or constituted a significant safety issue they nevertheless are noteworthy simply as an indicator of continuing issues with appropriate monitoring and training.

Prairie Island 3rd Quarter Inspection Report – 1 finding, non-cited; 3 Xcel findings, all non-cited.

a. Meteorological tower procedures did not include removal of trees that could impair the correct operation of sensors.

b. Xcel failed to provide an alternative shutdown capability for 17 Valves credited in the Shutdown Analysis that could have been rendered unavailable for manual operator action following a postulated fire in the control or relay rooms.

c. Xcel failed to assure that testing required to demonstrate that three safety injection system actuation relays would perform satisfactorily in service was identified and performed in accordance with written test procedures (that is, three safety injection system actuation relays had not been tested following replacement during planned maintenance.)

d. Control room operators did not evaluate Unit 2 'A' Component Cooling, Auxiliary Feedwater, and Cooling Water supported system limiting condition for operations (LCO) while the 121 Safeguards Chilled Water support system LCO was not met. As a result, the appropriate Conditions and Required Actions were not entered during Unit 2 'B' Component Cooling and Auxiliary Feedwater supported system maintenance and testing activities for which a loss of safety function existed.

<u>RECOMMMENDATION #5</u>: As the future unfolds for Prairie Island, it is recommended that Xcel maintain a more proactive communications path with the Commission and the Department.

Over the years, Xcel has not identified the issues or resolutions of issues raised by the NRC and the Third Party Inspectors. Instead, the Company has requested recovery of higher costs from ratepayers, without adequate justification.

Xcel entered into a contractual relationship with ratepayers at the time of the approval and construction of Prairie Island 1 & 2 that effectively established that Xcel would provide for the safe and efficient operation of Prairie Island 1 & 2 to provide electric power at reasonable costs. However, it is clear that Xcel exceeded those costs. The history of these projects is that, at the time of the CNs, Xcel did not conduct reasonable due diligence (e.g. not fully analyzing the cost-effectiveness of low pressure turbines) on behalf of ratepayers and did not include contingencies to reflect the low level of analysis of the Prairie Island projects.

This information, along with the findings of the NRC and the Third Party Inspectors emphasizes that Xcel's cultural paradigm at that time was not fully supportive of Xcel's long-term goals to provide reliable service at reasonable rates. It appears that Xcel is in the process of changing that culture, yet more work is needed. As such, Global concludes that Xcel will need to demonstrate in the future why ratepayers should pay for either higher capital or higher O&M costs, especially those directly attributable to the resolution of the issues identified by the NRC and the Third Party Inspections. These issues need not be addressed at this time, but should be addressed in any future rate proceeding.

Finally, this report provided further clarity about costs of the Prairie Island plant, but more information would be helpful for future proceedings. For instance, it would be helpful for Xcel to identify the components of Xcel's estimated $187 million in costs that were avoided due to not proceeding with the EPU. Xcel identified $66 million in avoided costs in its 2013 rate case, so identifying the components of the remaining $121 million in avoided costs would provide a better understanding regarding Prairie Island costs for its remaining life.

In addition, while Global confirmed that some components could reasonably be attributed to improvements stemming from the Fukushima accident, Xcel, in its next rate case, should provide further information to demonstrate that, but for the NRC's requirements stemming from the Fukushima accident, the Company would not have undertaken such projects for ordinary LCM work and provide the NRC requirements to support that assertion.

V. Staff Analysis

Global has provided a thorough, comprehensive analysis of Prairie Island's *retrospective* costs and the Report provides insight into Xcel's management of that nuclear plant. While the Report can be a useful 'road map" in Xcel's upcoming 2019 IRP and rate case filings, neither the Department nor the Commission will necessarily have the nuclear expertise to properly evaluate Xcel's cost reasonableness in those proceedings. Therefore, to assist with the analysis in both proceedings, the Commission may want to proactively authorize the Department to retain an independent third party expert (such as Global).

Since, pursuant to Minn. Stat. § 216B.62, Subd. 8, the contracting process may take several months, the Commission may want to request that the Department begin the process as soon as possible with the goal of having that third party expert ready to begin its work shortly after each proceeding's initial filing.

If the Commission authorizes the use of a third party, Staff recommends that, as part of the engagement's scope, the third party quantify the financial impact of any findings that result in a recommended conclusion that attributes fault to Xcel. For instance, to correct the LCM issue (i.e., the incomplete Long Range Plan) identified by the 2017 Third-Party Inspection would require additional costs; therefore, if a similar situation was identified in either upcoming proceeding, then an assessment of the reasonableness of any associated costs would help the Department and the Commission in their respective evaluations regarding whether ratepayers should bear those costs.

Additionally, Staff notes that some of Global's recommendations may help better inform the Department's and the Commission's evaluation in other proceedings; therefore, the Commission may want to order Xcel to incorporate these recommendations in any other applicable future proceeding.

Global's recommendation #1 proposes that this recommendation apply to both the Prairie Island and Monticello nuclear plants; however, Global does not include this proposal with its other recommendations. Given that some issues identified by Global in this report are similar to issues that arose during the Monticello Prudence Review,[14] if the Commission adopts any of Global's recommendations, the Commission may want to make these recommendations applicable to both nuclear facilities.

Global's Report mentions that no nuclear project should ever be both an EPU *and* LCM. In addition to Prairie Island, this issue was also present in the Monticello Prudence Review. Although, it was not included in their formal recommendations, Global suggested that, whenever a similar situation arises, absent an EPU, Xcel should initially identify what part of the work (and its associated costs) would have still been done regardless and classify those costs as LCM. Other remaining costs would then be classified as EPU. Absent a formal recommendation from Global, the Commission may want to adopt the standard that no future work can be classified as both EPU and LCM.

Finally, embedded in the Report but not included as a formal recommendation, is Global recommendation that Xcel annually report a comparison between Prairie Island's actual versus budgeted annual costs for fuel, other O&M and capital costs. As with some other Prairie Island-only recommendations, the Commission may want to not only adopt this recommendation but also make it applicable to the Monticello nuclear facility. If the Commission adopts this recommendation then Staff proposes that these annual filings be made in a new docket each year.

[14] Docket E-002/CI-13-754.

VI. Decision Options

Prairie Island Report

1. Accept Global's Prairie Island Report.

2. Reject Global's Prairie Island Report and request the Department to have prepared a more comprehensive report and specify what additional information should be included in that report.

Global's Recommendations

3. Adopt one or more the five Global recommendations, as listed above. (Global)

4. If any of Global's recommendations are adopted, specify that they apply to both the Prairie Island and Monticello nuclear facilities and in any other applicable future proceeding involving these two facilities. (Staff)

5. Take no action.

EPU/LCM Standard

6. Adopt Global's recommendation that no future projects be classified as both EPU *and* LCM. (Global, Staff)

7. Take no action.

Annual Compliance Filing - Actual vs. Budget

8. Order Xcel to file, no later than April 1 of each year, an annual report comparing Prairie Island's actual versus budgeted annual costs for fuel, other O&M and capital costs. (Global)

9. Order Xcel to file, no later than April 1 of each year, an annual report comparing Prairie Island's and Monticello's actual versus budgeted annual costs for fuel, other O&M and capital costs. (Staff)

10. Order that the compliance filing be made in a new docket each year. (Staff)

11. Take no action.

Hiring of a Consultant and Scope of Work

12. Authorize the Commissioner of the Department of Commerce to seek authority from the Commissioner of Management and Budget to incur costs for specialized technical professional investigative services under Minn. Stat. §216B.62, subd. 8, to continue

investigating the causes of cost increases related to Xcel's Prairie Island and Monticello nuclear facilities and to assist the Department in Xcel's upcoming IRP and rate case. (Staff)

13. If use of a consultant is authorized then, as part of the scope of the work, include an assessments of Xcel's costs associated with any issues developed or uncovered as part of the consultant's work. (Staff)

14. Take no action.