

STATE OF NORTH DAKOTA
PUBLIC SERVICE COMMISSION

**Northern States Power Company
Advance Prudence – Monticello Nuclear Extension
Application**

**Case No. PU-23-64
OAH No. 20230081**

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**STATE OF NORTH DAKOTA
COUNTY OF BURLEIGH**

Shelly A. Bauske deposes and says that:

she is over the age of 18 years and not a party to this action and, on the **28th day of March 2024**, she sent electronically to the parties listed below, the following:

- **Direct Testimony of Richard A. Polich, P.E.**

The emails were addressed as follows:

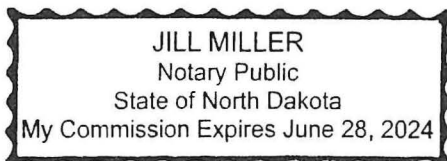
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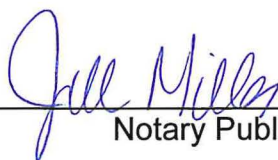
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To the best of affiant's knowledge each email address shown is the respective addressee's last reasonably ascertainable email address.

Subscribed and sworn to before me
this **28th day of March 2024**.







Notary Public

SEAL

CC: regulatory.records@xcelenergy.com
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27 PU-23-64 Filed 03/28/2024 Pages: 42
Affidavit of Service, Email - Prefiled Direct
Testimony of Richard A. Polich, P.E.

Public Service Commission



Public Service Commission

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March 28, 2024

Public Service Commission
Attention: Steve Kahl
600 East Boulevard Avenue, Dept 408
Bismarck, ND 58505-0480

In re: Northern States Power Company
Advance Prudence – Monticello Nuclear Extension
Application
Case No. PU-23-64

Dear Mr. Kahl,

Enclosed for filing in the above referenced matter please find the original copy of the following public document:

1. Direct Testimony of Richard A. Polich, P.E.

Respectfully,

A handwritten signature in black ink, appearing to read "Brian Johnson".

Brian Johnson
Special Assistant Attorney General Bar ID 07397
North Dakota Public Service Commission
600 East Boulevard Avenue Dept. 408
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**BEFORE THE
NORTH DAKOTA PUBLIC SERVICE COMMISSION**

**In the Matter of the Application of Northern States Power Company
for an Advance Determination of Prudence for the
Monticello Nuclear Generating Plant Life Extension**

Case No. PU-23-064

DIRECT TESTIMONY

OF

RICHARD A. POLICH, P.E.

ON BEHALF OF THE
NORTH DAKOTA PUBLIC SERVICE COMMISSION
ADVOCACY STAFF

March 28, 2024

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1 **I. Introduction**

2 **Q. Please state your name and place of employment.**

3 A. My name is Richard A. Polich. I am employed by GDS Associates, Inc.
4 ("GDS"), and my office is located at 1850 Parkway Place, Suite 800,
5 Marietta, Georgia 30067.

6 **Q. What position do you hold?**

7 A. I hold the position of Managing Director.

8 **Q. On whose behalf are you submitting this testimony?**

9 A. I am submitting this testimony on behalf of North Dakota Public Service
10 Commission Advocacy Staff ("Staff").

11 **Q. What is your educational background?**

12 A. I graduated from the University of Michigan - Ann Arbor in August 1979
13 with a Bachelor of Science Engineering Degree in Nuclear Engineering,
14 and a Bachelor of Science Engineering Degree in Mechanical
15 Engineering.

16 In May 1990, I received a Master of Business Administration from the
17 University of Michigan - Ann Arbor.

18 **Q. Please describe your work experience.**

19 A. In my role as both employee and consultant, I have had over 46 years of
20 work experience in the energy sector, performing duties and services for a

1 myriad of companies and organizations, and representing the interests of
2 private and public constituencies throughout the country.

3 In May 1978, I joined Commonwealth Associates, Inc., located in Jackson,
4 Michigan, as a Graduate Engineer and worked on several plant
5 modification and new plant construction projects.

6 In May 1979, I joined Consumers Power Inc. (now called Consumers
7 Energy), located in Jackson, Michigan, as an Associate Engineer in the
8 Plant Engineering Services Department.

9 In April 1980, I transferred to the Midland Nuclear Project and progressed
10 through various job classifications to Senior Engineer. I also participated in
11 the initial design evaluation of the Midland Cogeneration Plant.

12 In July 1987, I transferred to the Market Services Department as a Senior
13 Engineer and reached the level of Senior Market Representative. While in
14 this department, I analyzed the economic and engineering feasibility of
15 customer cogeneration projects.

16 In July 1992, I transferred to the Rates and Regulatory Affairs Department
17 of Consumers Energy as a Principal Rate Analyst. In that capacity, I
18 performed studies relating to all facets of development and design of
19 Consumers Energy's retail gas and electric rates and electric wholesale
20 rates. During this period, I was heavily involved in the development of
21 Consumers Energy's Direct Access program and Consumers Energy's

1 Retail Open Access program. I also participated in the development of
2 Consumers Energy's revenue forecast.

3 In March 1998, I joined Nordic Energy, LLC ("Nordic"), located in Ann
4 Arbor, Michigan, as Vice President in charge of marketing and sales. My
5 responsibilities included all aspects of obtaining new customers and
6 enabling Nordic to supply electricity to those customers. In May 2000, my
7 responsibilities shifted to Operations and Regulatory Affairs. My
8 Operations responsibilities included management of supply purchases,
9 transmission services, and development of new power projects. My
10 Regulatory Affairs responsibilities included overseeing regulatory and
11 legislative issues for the company.

12 In March 2003, I formed Energy Options & Solutions, based in Ann Arbor,
13 Michigan, as a consulting concern focusing on providing engineering
14 services and regulatory support. Through my work with Energy Options &
15 Solutions, I gained extensive experience consulting in the areas of project
16 development and economic analysis with renewable energy companies
17 across the country, including: Noble Environmental Power located in
18 Centerbrook, Connecticut; Third Planet Windpower, LLC located in Palm
19 Beach Gardens, Florida; TradeWind Energy, LLC located in Lenexa,
20 Kansas; Windlab Developments USA located in Canberra, Australian

1 Capital Territory, Australia; and Matinee Energy Inc. located in Tucson,
2 Arizona, among others.

3 Other examples of my consulting work have included evaluation of the
4 Arkansas Weatherization Assistance Program for the Arkansas Energy
5 Office, and providing the West Michigan Prosperity Alliance with an
6 evaluation of the business opportunities for Western Michigan businesses
7 in the renewable energy business sector.

8 In 2007, I served as primary author of the report on the economic impacts
9 of renewable portfolio standards and energy efficiency programs for the
10 Department of Environmental Quality – State of Michigan.

11 In 2011, I joined KEMA, Inc. (“KEMA”) located in Burlington,
12 Massachusetts, as a Service Line Leader responsible for developing its
13 renewable energy consulting business. While at KEMA, I performed
14 multiple renewable energy studies for the Electric Power Research
15 Institute, including a renewable energy options study for the country of
16 Saint Maarten (a constituent country of the Kingdom of the Netherlands). I
17 also assisted Lake Erie Energy Development Corporation in its successful
18 application to the U.S. Department of Energy for a multi-million dollar grant
19 to develop an offshore wind project in Lake Erie.

20 In 2013, I joined CLEAResult located in Little Rock, Arkansas, as Director
21 of Operations. My primary responsibility involved supporting program

1 operations in assisting the company's Arkansas unit to successfully meet
2 a 400% increase in energy efficiency goals that it managed for Entergy. I
3 was also responsible for managing the company's natural gas energy
4 efficiency programs in the State of Oklahoma.

5 In 2015, I joined the Georgia office of GDS Associates, Inc., a consulting
6 group focusing on utility engineering and consulting services, as Managing
7 Director in its Generation Services area.

8 A copy of my Curriculum Vitae is attached hereto and incorporated herein
9 as Exhibit PSC-1.

10 **Q. Do you have any professional registrations?**

11 A. Yes, I am a registered Professional Engineer in Michigan.

12 **Q. Have you published any papers?**

13 A. Yes, I have authored the following publications:

- 14 • Engineering and Economic Evaluation of Offshore Wind Plant
15 Performance and Cost Data, 2011, Produced for the Electric Power
16 Research Institute, KEMA, Inc.
- 17 • Island of Saint Maarten Sustainable Energy Study, 2012, Produced for the
18 Cabinet of Ministry VROMI, KEMA Inc.
- 19 • A Study of Economic Impacts from the Implementation of a Renewable
20 Portfolio Standard and an Energy Efficiency Program in Michigan, 2007,
21 Produced for the Michigan Department of Environmental Quality

- 1 • Alternative and Renewable Energy Cluster Analysis, 2007, Produced for
2 the West Michigan Strategic Alliance and The Right Place

3 **Q. Have you testified in any other regulatory proceedings?**

4 A. Yes, I have testified in multiple regulatory proceedings in various states
5 and the Federal Energy Regulatory Commission. I have also testified in
6 one civil arbitration case. A list of regulatory proceedings in which I have
7 testified is contained in Exhibit PSC-2.

8 **II. Testimony Purpose and Summary**

9 **Q. What is the purpose of your testimony?**

10 A. The North Dakota Public Service Commission (“Commission”) hired GDS
11 Associates, Inc. (“GDS”) to provide an analysis, recommendations, and
12 testimony concerning Northern States Power’s (“NSP”) request for
13 Advanced Determination of Prudence (ADP) on the proposed life
14 extension of the 671 MW Monticello Nuclear Generation Plant (Monticello)
15 beyond its current 2030 retirement date. My testimony provides the results
16 of GDS’s assessment of NSP’s application, assessment of Monticello life
17 extension, the impact of Monticello life extension on North Dakota
18 ratepayers, and recommendations to the Commission.

19 **Q. Please summarize your testimony.**

20 A. My testimony finds that NSP’s economic assessment of Monticello’s life
21 extension fails to include the full life cycle cost of Monticello through the

1 new 2050 end of life of the plant. In addition, NSP discusses various
2 economic metrics which purport to demonstrate the economic benefits of
3 Monticello life extension, which are not applicable to North Dakota and
4 include multiple changes in NSP's generation portfolio which do not
5 provide benefit to North Dakota ratepayers. As such it is impossible to
6 determine the exact impact of only extending Monticello's life through
7 2050 as compared to NSP's current generation resource costs. NSP's
8 economic analysis of Monticello life extension based on North Dakota
9 criteria still incorporates retirement of multiple NSP generation resources
10 due to NSP's and Minnesota's reduced carbon emission goals and not
11 due to obsolescence or need to retire fossil generation assets. An
12 example of this is the retirement of Sherco 3 coal plant which had
13 significant investment to repair the steam turbine-generator in 2013, due
14 to the catastrophic failure in 2011. In a recent Minnesota regulatory
15 proceeding, NSP claimed the investments made in Sherco 3 were a
16 benefit to ratepayers because the repairs extended the life of the plant.
17 Thus, NSP's analysis based on adjustments to comply with North Dakota
18 conventions, does not result in proper economic analysis based on the
19 best options for North Dakota ratepayers.

20

1 The total cost of Monticello Subsequent License Renewal is estimated at
2 only \$25 million. Other capital investments include the cost of spent
3 nuclear fuel storage and these costs should be recovered from the
4 Department of Energy, as NSP has done historically. Capital costs that
5 NSP will incur over the period of Monticello’s life extension should be
6 consistent with the periodic capital investments incurred due to plant
7 operation. With Monticello’s high capacity factor, the reliability its
8 synchronous generator provides NSP’s electric grid, and the unknown
9 impact of fossil generation retirement on MISO capacity markets, there
10 appears to be benefit to North Dakota ratepayers of Monticello life
11 extension.

12
13 The cost of Monticello life extension is an inexpensive insurance option to
14 the changes in the power industry and gives the Commission an
15 opportunity to observe the economic impact of those changes. Thus, it is
16 my recommendation that the Commission approve NSP’s proposed
17 Monticello life extension and periodically review the economics of
18 Monticello’s continued operation to determine if it remains prudent to
19 include its cost in North Dakota ratebase. I have also included additional
20 recommendations for the Commission to consider in future rate case
21 proceedings in Section VIII of this testimony.

1 **Q. What are your other key Commission recommendations in this**
2 **proceeding?**

3 A. Based on review of NSP’s testimony filed in its application and NSP’s
4 discovery responses, it is recommended that the Commission approve
5 NSP’s application with the following conditions.

6 **Q. How is your testimony organized?**

7 A. I have organized my testimony into the following sections:

8 1. **NSP’s ADP Application** – Presents finding regarding NSP’s ADP
9 Application and justification for Monticello life extension based on North
10 Dakota rate payer impacts.

11 2. **Monticello Life Extension Assessment** – Presents finding regarding
12 proposed life extension process, Monticello history, and spent fuel
13 storage issues.

14 3. **Monticello Projected Capital Expenditures** – Presents findings
15 regarding proposed Monticello capital expenditures and North Dakota
16 ratepayer impacts.

17 4. **Future Rate Proceedings Recommendations** – Recommendations
18 for adjustments to rate base and Monticello capital costs allowances.

19 **Q. Have you prepared any Exhibits?**

20 A. Yes, the following is a list of Exhibits included with my testimony:

21 **EXHIBIT DESCRIPTION**

- 1 PSC-1 Richard A. Polich Curriculum Vitae
- 2 PSC-2 Regulatory Proceedings Testimony List
- 3 PSC-3 NSP Discovery Response PU23-NDPSC-1-2-011.
- 4 PSC-4 NSP Discovery Response PU23-NDPSC-1-3-7.

5

6 **III. NSP's ADP Application**

7 **Q. Please summarize NSP's ADP application for Monticello life**
8 **extension?**

9 A. NSP is requesting Commission approval to extend the service life of
10 Monticello from its current nuclear operating license expiration date of
11 September 8, 2030, to September 8, 2050, a 20-year life extension.
12 Monticello is a single unit, 671 MW electric generating plant, powered by a
13 nuclear boiling water reactor that began service in 1971. According to
14 NSP Witness Mr. Allen D. Kruger, NSP is projecting a \$97 million capital
15 investment in Monticello for the cost of a Subsequent License Renewal
16 (SLR) with Nuclear Regulatory Commission (NRC) and to expand the
17 Independent Spent Fuel Storage Facility (ISFSF). Mr. Krug's testimony
18 provides Background on Monticello plant's recent operating history.¹

¹ See Mr. Allen D. Kruger's Testimony, pages 2 – 9, North Dakota Public Service Commission Case PU-23-064, dated February 3, 2023.

1 **Q. What economic analysis does NSP provide in its Monticello ADP**
2 **Application to support the life extension of Monticello?**

3 A. NSP's primary resource for economic justification of Monticello life
4 extension is based upon the 2020-2034 Upper Midwest Integrated
5 Resource Plan (2020 IRP) filed with the State of Minnesota Public Utility
6 Commission² (MPUC) and a Monticello specific "Alternate Plan"³. The
7 2020 IRP only provides modeling results through the end of 2040 and
8 does not include analysis through for the full Monticello extended life. NSP
9 also performed a North Dakota Alternate Plan (ND Alternate Plan)
10 analysis, which also only provides modeling of the Monticello life
11 extension through 2040 according to Ms. Mandich's testimony. Thus, none
12 of NSP's models include an economic analysis for the full Monticello life
13 extension period.

14 **Q. Please provide an overview of the progression of NSP's 2020-2034**
15 **Upper Midwest Integrated Resource plans filed with the MPUC.**

16 A. NSP presents the results of four separate modeling exercises in its
17 testimony. The number of models presented is due in part to NSP's
18 change in modelling tools from Strategist to EnCompass. NSP claims that

² *In the Matter of the 2020-2034 Upper Midwest Integrated Resource Plan of Northern States Power d/b/a Xcel Energy*, Minnesota Public Utilities Commission Docket No. E-002/RP-19-368.

³ See Ms. Farah L. Mandich Testimony, Pages 16 – 23, North Dakota Public Service Commission Case PU-23-064, dated February 3, 2023.

1 EnCompass allows it to better account for renewable resources and
2 duration limited resources. A summary of the modeling prepared by NSP
3 is presented below:

- 4 • Strategist modeling based on the 2019 IRP filing (“2020 IRP”)
- 5 • Encompass modeling based on a Supplemented Resource Plan
6 prepared in June of 2020 (“2020 IRP Supplement”). This
7 supplemented Resource Plan incorporated changes to model
8 inputs which accounted for the passage of time and further analysis
9 requirements.
- 10 • EnCompass modeling with updates based on response to
11 stakeholder feedback on 2020 IRP Supplement (“2020 IRP
12 Alternate”)

13 **Q. What scenarios has NSP included in its filing?**

14 A. NSP include the following 15 scenarios in the initial filing and the 2020 IRP
15 Supplement:

- 16 • Scenario 1 – Base Case
- 17 • Scenario 2 – Early Retirement of King
- 18 • Scenario 3 – Early Retirement of Sherco 3
- 19 • Scenario 4 – Early Retirement of Coal
- 20 • Scenario 5 – Early Retirement of Monticello

- 1 • Scenario 6 – Early Retirement of Prairie Island
- 2 • Scenario 7 – Early Retirement of all Nuclear
- 3 • Scenario 8 – Early Baseload
- 4 • Scenario 9 – Early Retirement of Coal, Extension of Monticello
- 5 • Scenario 10 – Early Retirement of King, Extension of Monticello
- 6 • Scenario 11 – Early Coal, Extension of Prairie Island
- 7 • Scenario 12 – Early Retirement of Coal, Extension of all Nuclear
- 8 • Scenario 13 – Extension of Monticello
- 9 • Scenario 14 – Extension of Prairie Island
- 10 • Scenario 15 – Extension of all Nuclear

11 The 2020 IRP Alternate only included Scenario 9 and an “Alternate Plan”
12 which was produced in preparation for a June 2020 IRP process.

13

14 NSP also included an IRP analysis based on North Dakota considerations
15 toward the cost of carbon that was based on the 2020 IRP Alternate (2020
16 ND IRP”). This analysis only compared the MPUC adopted scenario, which
17 NSP calls the “Alternate Plan” to a case in which Monticello is retired in
18 2030 and replaced with gas peakers. This analysis also excluded the

1 consideration of externality values in capacity expansion or production cost
2 modeling, such as carbon costs and societal impact cost. The changes in
3 generation resources between the MPUC plan and the 2020 ND IRP are
4 shown in Ms. Mandich’s testimony’s Table 2.⁴

5 In summary, I will be using the following abbreviations for the key NSP IRP
6 cases in the remainder of my testimony:

- 7 1. 2020 IRP Supplemental – This was the June 2020 update to NSP’s
8 original 2020 IRP filing. This is the only analysis that appears to
9 include a comparison of Monticello life extension (Scenario 13)
10 economics to NSP’s Reference Case economics.
- 11 2. 2020 IRP Alternative – This was the update NSP completed in 2021
12 that included updates from stakeholder responses to the 2020 IRP
13 Supplemental. This analysis only compares the economic results of
14 NSP’s Preferred Case from the 2020 IRP Supplemental, which
15 includes a Monticello extension through 2040 and early coal
16 retirements, to an updated case called the “Alternate Case”, which
17 among other changes removes the combined cycle and replaces

⁴ Ms. Mandich Testimony, page 17, Table 2.

1 Sherco site with solar resources and adds tie-lines to re-utilize the
2 interconnection.

3 3. 2020 ND IRP – In this analysis, NSP starts with the Alternate Case
4 from the 2020 IRP Alternative study, modifies it to remove without
5 consideration of externality values in capacity expansion or
6 production cost modeling, consistent with North Dakota law, creating
7 the “Alternate Plan – ND Scenario”. This plan was then modified by
8 retiring Monticello in 2030 to produce the “Monticello Replacement
9 1” case. Ms. Mandich’s testimony provides a summary of the
10 generation resource differences under in on page 17, Table 2.

11 **Q. Please explain your concerns, if any, about the scenarios included in**
12 **the NSP’s analysis.**

13 A. My main concern regarding NSP’s analysis is that it incorporates
14 scenarios from the IRP filing from the June 2020 IRP Supplemental filing
15 and assumptions from the 2016-2030 IRP cycle. The 2020 IRP is now
16 over four years old. Out of the fifteen scenarios, three of them assume that
17 either Monticello is retired in 2026, that Prairie Island is retired in 2025, or
18 both units are retired on those dates. These retirement dates are no
19 longer reasonable or achievable, and therefore their inclusion as
20 alternatives to the NSP’s 2020 IRP Supplement are of limited value.

21

1 Further, the NSP screens out any scenario in which the Prairie Island unit
2 life is extended (Scenarios 11, 12, 14 and 15) when choosing its preferred
3 plan, as it felt there was value in deferring a decision on Prairie Island
4 license extensions until for a future resource planning process. In
5 discovery, NSP stated it is proposing to extend the life of the Prairie Island
6 units in the 2024 North Dakota IRP. This leaves a total of six alternatives
7 to the Base Case.

8
9 None of the economic analysis presented by NSP goes beyond 2045.
10 Thus, the full economic impact of Monticello life extension was not
11 provided by NSP in the 2020 ND IRP analysis. In the discovery process,
12 NSP, in response to a question stated that they did not include any
13 modeling beyond 2040 (Exhibit PSC-4).

14
15 If the purpose is to determine how the cost of extending Monticello
16 compares to other options available to the Commission, rather than
17 deciding on whether the extension of Monticello in isolation is prudent, it is
18 concerning that so few of the Scenarios provided by NSP are relevant,
19 and those that are provided, include costs that cannot be considered
20 under North Dakota law.

1 **Q. How does NSP compare the various scenarios?**

2 A. NSP provides both present value of societal cost (PVSC) and present
3 value of revenue requirements (PVRR) analysis of the 15 planning
4 scenarios. The calculation of PVSC is required by Minnesota and includes
5 negative externality of emissions. The PVSC calculation excludes carbon
6 costs and all externalities when modeling production costs, but still
7 considers carbon costs in the capacity expansion step. Inclusion of costs
8 of carbon dioxide and emissions are prohibited for consideration under
9 North Dakota law.

10 **Q. How does NSP use the 2020 IRP Supplement to illustrate the**
11 **economic benefits of Monticello life extension?**

12 A. Mr. Krug uses the 2020 IRP Supplement PVRR results for the Scenario 9
13 – Early Retirement of Coal, Extension of Monticello (Preferred Case) to
14 show that the Monticello life extension is economical. The PVRR metric
15 NSP used in the 2020 IRP Supplement, is a calculation applying NSP's
16 6.47% weighted cost of capital to the net present value calculation of total
17 projected company PVRR over the period of 2020-2045⁵. The \$46 million
18 of economic benefits of Monticello life extension discussed by Mr. Krug is
19 calculated by comparing the Preferred Case PVRR, which bundles

⁵ Mr. Krug Testimony, page 18, lines 20 -24.

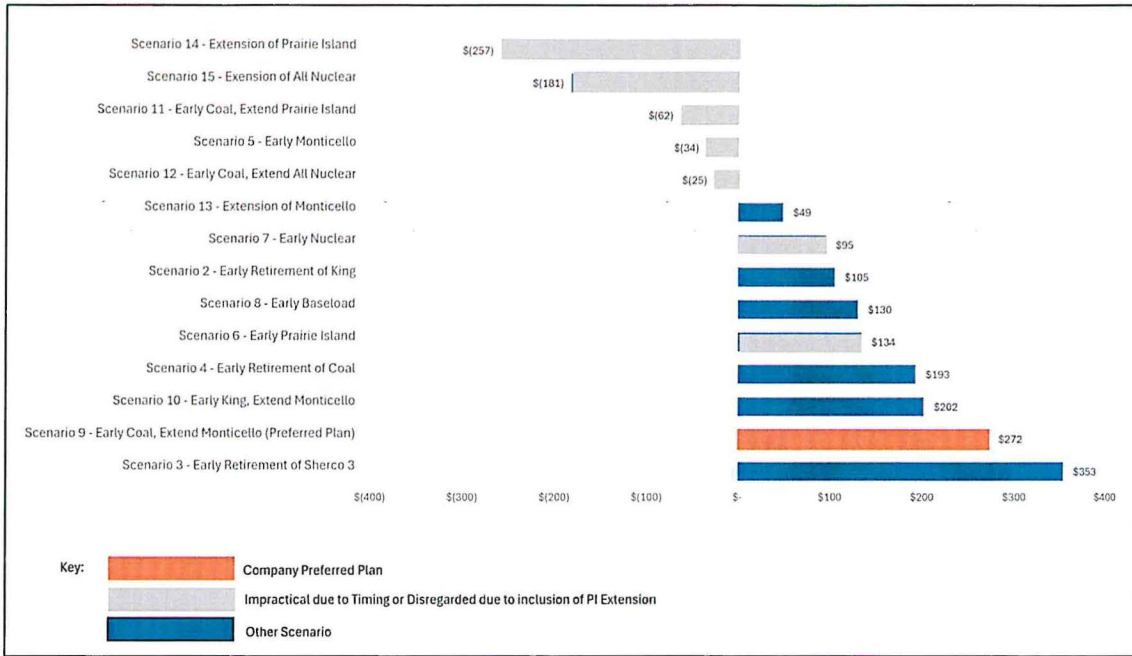
1 multiple generation resource changes, to the Base Case PVRR. Review
2 of NSP's Excel spreadsheets contained in Discovery Response 1-1-004
3 appears to include a Monticello life extension case (Scenario 13)
4 (Scenario 13), which indicates a Monticello life extension PVRR is about
5 \$970,000 higher than the Base Case.⁶

6 **Q. What are the results of NSP's 2020 IRP Supplement economic**
7 **analyses?**

8 A. NSP compares the PVRR of each scenario to a Reference Case based on
9 its 2016-2030 Resource Plan to determine whether cost savings or
10 increases will occur. A negative PVRR delta is produced if a scenario
11 creates savings relative to the Reference Case, where a positive PVRR
12 delta represents increased costs. The comparisons provided by NSP for
13 the 2020 IRP Supplement EnCompass Model are shown below. Scenarios
14 that were deemed impracticable due to the passage of time or because
15 they include extension of Prairie Island are shown in grey, and NSP's
16 Preferred Plan, Scenario 9, is shown in orange.

⁶ NSP Discovery Response 1-1-004, Xcel Spreadsheet PU-23-064-1-2-012 Attachment A_EO – Base PVSC PVRR June 2020 Supplemental IRP (Trade Secret), spreadsheet tab “PVSC-PVRR Total”, dated February 17, 2024.

In the Matter of the Application of Northern States Power Company for an Advance Determination of Prudence for the Monticello Nuclear Generating Plant Life Extension – Case No. PU-23-064



1

2 **Figure 1 - 2020 IRP Supplement PVRR Comparison to Reference Case**

3 NSP's comparison of scenario outputs from the 2020 IRP Supplemental
 4 model shows a PVRR cost of \$96 million for Scenario 9 against the
 5 against the Reference Case and a PVRR savings of \$46 million for the
 6 Alternate plan. The Company states that Minnesota has approved the
 7 Alternate Plan.

8 **Q. How did NSP use the 2020 ND IRP Alternate Plan from the 2020 IRP**
 9 **to illustrate the economic benefits of Monticello life extension?**

10 **A.** The ND Alternate Plan is a comparison of the Alternate Plan - ND
 11 Scenario to retirement of Monticello in 2030 and replacing it with other
 12 generation resources. The resource planning model used by NSP
 13 replaced Monticello with approximately 730 MW of natural gas fueled

1 combustion turbines, 750 MW of wind generation, and 200 MW of solar
2 generation.⁷ Table 2 of Ms. Mandich’s testimony indicates there the
3 changes included reduction of 50 MW of battery storage, a 200 MW
4 increase in wind generation, a 50 MW increase in solar generation, and an
5 increase of 748 MW of simple cycle combustion turbines to replace
6 Monticello’s generation. Ms. Mandich states that the ND Alternate Plan
7 shows:

8 *“Ultimately, Table 2 above shows that under North Dakota planning*
9 *assumptions, the Company’s proposed extension of the Monticello*
10 *Plant to 2040 results in \$145 million in additional costs on a PVRR*
11 *basis.”⁸*

12 Ms. Mandich goes on to discuss other benefits of Monticello life extension
13 but does not quantify those benefits. NSP includes additional analysis
14 based on Environmental Performance and Risk/Reliability sensitivities.⁹
15 NSP also includes fuel and market price sensitivities that result in
16 Monticello life extension PVRR ranging from a savings of \$144 million to a
17 \$355 million in additional cost. Below is the results table from Ms.

⁷ Ms. Mandich testimony, page 16, lines 16 – 21.

⁸ Ms. Mandich Testimony, page 19, lines 8-10.

⁹ See Ms. Mandich Testimony, Table 2, titled “*Summary Results of North Dakota Monticello Scenarios*”.

In the Matter of the Application of Northern States Power Company for an Advance Determination of Prudence for the Monticello Nuclear Generating Plant Life Extension – Case No. PU-23-064

1 Mandich’s testimony.

Category	Measure	Alternate Plan <i>(as presented in IRP)</i>	Alternate Plan - ND Scenario <i>(as presented in IRP)</i>	Monticello Replacement 1 <i>(fully optimized replacement)</i>
	Incremental resources (MW) selected to replace Monticello capacity and energy relative to the Alternate Plan – ND Scenario, through 2034	n/a	n/a	<ul style="list-style-type: none"> • Battery: (50) • CT: 748 • Wind: 200 • Solar: 50 <p><i>Plus fewer market sales and additional market purchases</i></p>
	2020-2045 PVRr (\$ million), delta from Alternate Plan – ND Scenario	n/a	n/a	(145)
Environmental Performance	Carbon reduction from 2005 levels, 2031 (percent)	86	80	78
	Total carbon serving customers, 2031 (million tons)	3.82	5.53	6.16
	Total carbon-free generation, 2031 (percent)	82	77	72
Risk and Reliability	Firm capacity-to-annual (summer) peak demand ratio, 2034	0.58	0.72	0.72
	Firm capacity-to-winter peak demand ratio, 2034	0.75	0.93	0.93

2
3 **Table 1 - 2020 North Dakota IRP Results**

4 **Q. What are your concerns with NSP’s 2020 ND IRP analysis?**

5 A. The selection of generation resources in the Monticello Replacement I
6 scenario adds 948 MW of new generation to replace Monticello’s 671 MW
7 capacity, which is 41.2% higher than Monticello’s capacity. The additional

1 748 MW of combustion turbine capacity (11.5% higher than Monticello
2 capacity) alone would be sufficient to replace Monticello capacity.

3

Generation Resource	Difference between 2020 ND IRP Alternative Plan ND Scenario vs. Monticello Replacement 1 (MW)
Battery Storage	-50
Combustion Turbine	748
Wind	200
Solar	50
TOTAL CAPACITY CHANGE	948

4 **Table 2 - Difference in Capacity in 2020 ND IRP Analysis**

5 I understand that IRP modeling is intended to produce the most economic
6 package of generation resources, but I fail to see how a capacity increase
7 of 41.2% of Monticello’s capacity can be economical. I understand that the
8 generation resources NSP selected included significant intermittent
9 capacity, such as wind and solar. It appears that this analysis still favors
10 carbon free generation resources because it does not include any natural
11 gas combined cycle (NGCC) generation. With Monticello’s high
12 cooperating capacity, NGCC would be a natural replacement for
13 Monticello generation.

1 **Q. What information did NSP provide on Monticello Capital**
2 **investments?**

3 A. As mentioned earlier, Mr. Krug discusses \$97 million of capital investment
4 associated with ISFSF expansion and SLR. NSP states the total cost of
5 ISFSF for the 2030 - 2050 period to be about \$298 million based on NSP
6 Discovery Response 1-2-11 (Exhibit PSC-3). NSP has not identified any
7 other capital investments in Monticello, needed to operate the plant
8 between 2030 and 2050. Review of the 2020 IRP analysis included in
9 discovery responses find capital expenditures in the Monticello life
10 extension only scenario, Scenario 13, to be 4.6% higher than the
11 Reference Case (Scenario 1).

12 **Q. What reliability benefits has NSP identified due to Monticello life**
13 **extension?**

14 A. According to NSP witness Mr. Andrew W. Seibenaler, Monticello will
15 provide reliability and system balancing benefits to the NSP system and
16 Midwest Independent System Operator (MISO). According to Mr.
17 Seibenaler:

1 “...the high capacity factor and accredited capacity of the Plant,
2 with predictable and planned fuel outages, helps the Company
3 maintain reliable operations and meet our obligations to MISO.”¹⁰

4 Monticello historically has provided reliable operation and has operated at
5 a capacity factor of 95 percent for the last three years. The plant is not
6 subject to fuel supply issues and weather conditions as other fossil fueled
7 base load capacity. Monticello also strengthens system voltage because it
8 is a synchronous generator and can provide reactive power. NPS
9 contends that if Monticello were retired, the types of generation replacing
10 Monticello could cause transmission congestion.¹¹

11 **IV. Monticello Plant Assessment**

12 **Q. What material have you reviewed to determine if NSP’s operation of**
13 **Monticello and plant conditions life extension?**

14 **A.** I have reviewed NRC Monticello Inspection Reports since 2019,
15 Monticello’s outage history over the last five years, plant performance, and
16 operating history.

¹⁰ Mr. Andrew W. Seibenaler’s testimony, page 2, lines 17-19, North Dakota Public Service Commission Case PU-23-064, dated February 3, 2023.

¹¹ Ibid, page 10 lines 13 – 22.

1 **Q. What is your assessment of Monticello’s record regarding NRC**
2 **performance?**

3 A. In my review of the 44 or so NRC inspection reports, covering the period
4 of 2009 through 2024, NSP has done an excellent job in operating
5 Monticello in accordance with NRC regulations. None of the inspection
6 reports contain any findings above low safety significance, and NRC
7 “green” designation and all items contained in the reports were non-cited
8 violations. The inspection reports contain a few instances in which
9 inspectors found issues which had not been initially addressed by NSP’s
10 team and brought to the NRC’s attention.

11
12 The only concern raised in the NRC reports, which I feel needs continued
13 NSP attention, is adherence to plant procedures and ensuring personnel
14 understand the technical implications of actions. Continuous training and
15 education of plant staff is important, and it appears NSP does a good job
16 of this based upon the NRC findings. Making sure the plant has a
17 corporate culture that supports questioning of actions when uncertainty
18 arises is a major factor in making correct decisions. One instance in the
19 NRC November 13, 2023 Integrated Inspection report discusses and
20 instance in the full impact of a minor valve packing leak on over plant

1 safety, is an example of plant personnel not assessing the full implication
2 of an event (Exhibit PSC-4).¹²

3 **Q. What is your assessment of Monticello’s plant performance and**
4 **operating history for the last five- seven years?**

5 A. NSP’s witnesses discuss Monticello’s plant performance over the last
6 three years, which is based on a comment regarding the last six months
7 being in 2022 on page 9, line 26 of Ms. Prochaska’s testimony means the
8 three year period would be 2019 – 2021. Using information obtained from
9 S&P Capital IQ, the average capacity factor between 2017 and 2023 is
10 92.9%. This period includes four years with refueling outages and four

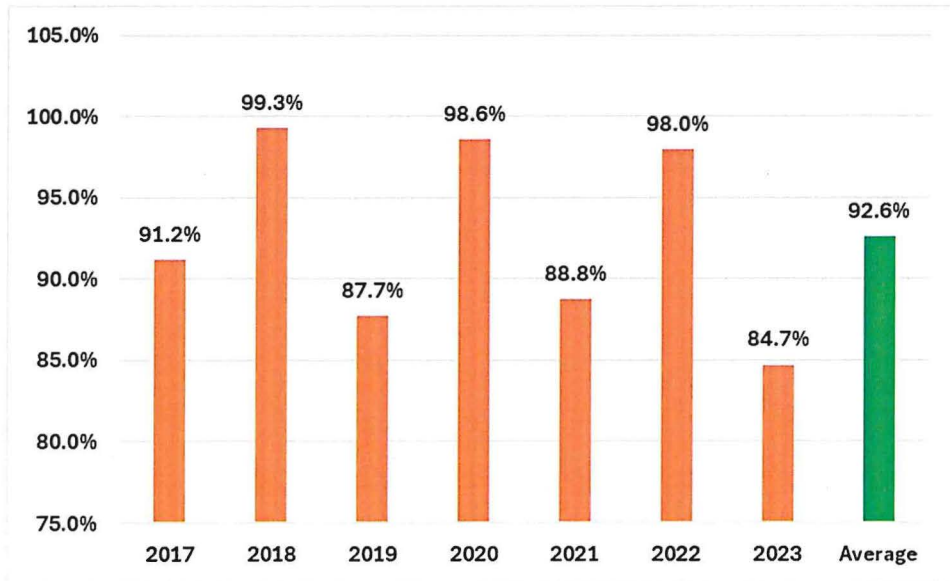


Table 3 - Monticello Capacity Factor

¹² Nuclear Regulatory Commission Integrated Inspection Report 05000263/2023003 AND 07200058/2023001, dated November 13, 2023. See Inspection Results section, Finding labeled “Failure to Meet Technical Specification Limiting Condition for Operation 3.6.1.3, Condition E, for Individual Main Steam Isolation Valve Leakage”.

1 years of full operations. This high of a capacity factor indicates the plant
2 high plant availability with few forced outages or derates, especially in
3 non-outage years in which the capacity factor exceeds 98%.

4 **Q. Have you reviewed any Monticello outage reports?**

5 A. Yes. There are critical components with a nuclear plant that are import to
6 the ability for it to operate another 20 years. The NRC will perform a
7 thorough review of the health of those components which are part of the
8 nuclear safety related systems as part of the SLR process, to ensure they
9 are capable of life extension. NSP has an Aging Management Program
10 (AMP) which has reviewed Monticello systems and components, which
11 may be near end of life.¹³ It is my opinion the Monticello AMP's program is
12 properly addressing aging infrastructure.

13
14 Monticello is a boiling water reactor, which produces steam with
15 temperature and pressure conditions that result in condensation in the
16 steam turbine. This can cause a failure of steam turbine blades and other
17 components caused by structural failure of the parts. These failures can
18 be caused by erosion from water droplets in the steam and by stress

¹³Ms. Prochaska's testimony, pages 41 – 47.

1 corrosion cracking in the metal. Stress corrosion cracking caused the
2 catastrophic failure of the Sherco 3 steam turbine in 2011.

3
4 I reviewed Monticello turbine maintenance reports provided by NSP in
5 Discovery Response 1-4-010, to determine how MSP has maintained
6 Monticello's steam turbine and turbine components and the ability for the
7 steam turbine to last through the end of 2050. Based on the inspection
8 reports, I feel NSP has performed well in regard to Monticello's steam
9 turbine maintenance and the unit should be able to operate through 2050.

10 **V. Monticello Projected Capital Expenditures**

11 **Q. What categories of Capital expenditures do you expect Monticello to**
12 **incur through 2050?**

13 A. I would place expected Monticello Capital expenditures into four
14 categories. The first capital cost category would be the cost of securing
15 the SLR. The second capital cost category would be associated with
16 ISFSF. I would place AMP related capital investments in their own
17 category because at this point in time they are linked to Monticello life
18 extension. The fourth category is annual capital associated with plant
19 maintenance and refurbishment due to wear and tear on equipment.

1 **Q. Do you feel NSP has included all the capital costs associated with**
2 **securing an extension of its operating license through the SLR**
3 **process?**

4 A. Yes, to the extent they can. There is always a chance in NRC proceedings
5 of surprises that create additional studies or exploration and result in
6 additional capital costs. NSP appears to have a good relationship with the
7 NRC and the inspection reports indicate NSP's approach to plant safety is
8 sound. Thus, I feel the SLR cost shown in Mr. Kruger's Table 1, of \$25
9 million is adequate.¹⁴

10 **Q. Do you feel NSP has included all Monticello capital expenditures**
11 **associated with spent fuel storage through 2050?**

12 A. No. As discussed on page 12, NSP only included \$72.1 million of the
13 estimated \$298 million ISFSF funds needed to store all spent nuclear fuel
14 based on operating the plant through 2050. Although this is a significant
15 increase in the ISFSF capital costs over the amount NSP has included in
16 its ADP filing, the impact on North Dakota ratepayers would be negligible.
17 This is due to the fact that the Department of Energy (DOE) is responsible
18 for all spent nuclear fuel storage costs and NSP should be reimbursed for
19 all ISFSF capital costs. Unfortunately the process set up by the DOE

¹⁴ Mr. Kruger's testimony, page 11.

1 requires utilities with nuclear plants to spend the funds to construct, store
2 and maintain nuclear spent fuel and then file a lawsuit to recover the costs
3 from DOE. Thus, NSP will initially incur the spent fuel costs, then recover
4 them from DOE, and then reimburse ratepayers.

5 **Q. Do you feel NSP has included all Monticello capital expenditures**
6 **associated with its operation through 2050?**

7 A. No. The only Monticello operating capital investments discussed in NSP's
8 ADP application are associated with the AMP activities, which is estimated
9 to be around \$2.0 million per year. NSP's application does not address
10 any other capital expenditures that will occur during Monticello's operation
11 through 2050. The 2020 IRP analysis and ND Alternative Plan analysis all
12 include Projected Monticello capital expenditures but only through 2045
13 Thus, NSP has not identified the full amount of capital expenditures
14 associated with operation of Monticello through 2050.

15 **VI. Impact of Monticello Life Extension on North Dakota**

16 **Ratepayers**

17 **Q. Did you review the load forecast prepared by NSP Energy which is**
18 **used in support of its Integrated Resource Planning efforts?**

19 A. I did. I reviewed documentation of NSP's methodologies and data sources
20 used to develop long-term load forecasts and scenarios used for IRP
21 planning purposes.

1 **Q. Did you identify any concerns with the load forecast that would**
2 **impact your opinion in this case?**

3 A. I did not. I conclude that NSP is generally using industry standard data
4 sources and methods to produce its long-term load forecast. I also
5 conclude the data sources and general assumptions framing the load
6 forecast meet or exceed industry standards.

7 **Q. Can you provide more details on your review of the load forecast?**

8 A. Yes. I shall cover specific elements of the load forecasts in the following
9 discussion.

10 **Q. What general methodology does NSP use for load forecasting?**

11 A. NSP deploys a “bottom-up” forecasting approach, meaning that it projects
12 energy sales at the jurisdictional (state) and sector (Residential,
13 Commercial, Industrial) level. NSP uses econometric and other statistical
14 modeling approaches to develop its sales forecasts. It then aggregates
15 sales and applies loss factors to get energy requirements. NSP’s demand
16 model is based initially on a regression model that related energy to
17 demand (load factor model) with adjustments made for energy efficiency,
18 beneficial electrification, and large load impacts on demand.

19 NSP also makes several post-modeling adjustments to the forecasts
20 prepared by their models. These adjustments include adjustments to
21 reflect energy efficiency impacts, impacts of rooftop solar and distributed

1 energy resources, impacts from beneficial electrification, and adjustments
2 to reflect large load expansions, contractions, and additions or losses.

3 **Q. Do these approaches meet or exceed industry standard approaches?**

4 A. Yes, they do. It is noteworthy that NSP is making a good faith attempt to
5 incorporate the difficult-to-predict impacts that elements such as vehicles
6 and beneficial electrification can have on future load requirements.

7 **Q. What did you review with regard to NSP's input data sources?**

8 A. NSP relies upon economic projections from HIS Global Insight and draws
9 from national databases for other economic and weather-related
10 assumptions. These data sources are used in the industry by many utility
11 load forecasts.

12 **Q. How did NSP develop load forecast scenarios?**

13 A. In prior load forecasts, NSP had used a Monte Carlo simulation approach
14 to develop forecast ranges around the base case forecast. In the current
15 forecast, NSP chose a discrete scenario approach, citing the relative large
16 impacts that data centers, beneficial electrification, and electric vehicles
17 can have on ranges. The discrete scenarios used are reasonable and the
18 resultant scenario forecasts produce a reasonable range of outcomes.

1 **VII. Recommended Commission Action on NSP’s ADP Request**

2 **Q. Has NSP provided a compelling economic case for the Monticello’s**
3 **proposed life extension through 2050?**

4 A. No. I feel NSP failed to incorporate the full impacts of Monticello life
5 extension for the entire 20-year life extension. None of NSP’s economic
6 analysis include the impact of Monticello’s life extension through the
7 period between 2040 and 2050. The PVRR benefit of \$46 million
8 discussed in Mr. Kruger’s and Ms. Mandich’s testimony is associated with
9 the MPUC approved plan which incorporates multiple generation resource
10 changes other than just the Monticello life extension. This PVRR benefit
11 should not be used to identify the Monticello’s life extension economic
12 benefit because of the other generation resource change impacts on
13 costs. Scenario 13 of NSP’s 2020 IRP appears to provide the closest
14 economic assessment of only Monticello’s life extension, and it indicates
15 the economic impact to be neutral.

16
17 NSP’s ND Alternate Plan analysis appears to indicate that Monticello’s life
18 extension will increase PVRR by \$145 million over the MPUC adopted
19 plan. The sensitivity analyses associated with fuel and markets indicates a
20 range of PVRR impact from \$144 million benefit (high fuel and market
21 price case) to \$355 million higher cost (low fuel and market price). If

1 NSP's ADP for Monticello life extension were only based on this analysis, I
2 would recommend the Commission reject NSP's request because the
3 analysis shows that Monticello's life extension is more probable to cause
4 an increase in North Dakota ratepayer rates over the life extension period
5 then other alternatives included in NSP's ND Alternate Plan.

6 **Q. Do you feel that Monticello's life extension would be imprudent for**
7 **North Dakota ratepayers?**

8 A. No, I feel Monticello can provide value to North Dakota ratepayers and
9 that it will prove to be a prudent and economical source of energy for
10 North Dakota. NSP makes the point that investments in Monticello over
11 the last several years have improved plant operations and provides
12 ratepayer benefits. Unfortunately, proper economic analysis dictates that
13 sunk costs are not a reason to continue operation and incur future costs
14 unless the asset continues to be used and useful. I do feel NSP's position
15 on Monticello's reliability benefits are an important benefit to the reliability
16 of the electric grid. With the amount of synchronous generation being
17 retired in MISO, grid stability is going to be a major issue. Although
18 improvements in inverter technology have made it possible for inverters to
19 produce reactive power and other ancillary services, having major sources
20 of synchronous generation on the grid simplifies the ability to maintain grid

1 stability. Monticello provides large synchronous generation stability, a
2 highly reliable source of power, and does so without carbon emissions.

3

4 I am also concerned that NSP's ND Alternate Plan analysis did not include
5 the potential impact on MISO capacity and energy markets from early
6 retirement of baseload coal generation that has been announced
7 throughout MISO's northern service area. As recently as MISO's
8 2022/2023 Planning Resource Auction indicated capacity shortfalls for the
9 MISO North/Central Regions, causing capacity prices to reach the cost of
10 building new generation. MISO's analysis found the North central region
11 was short 4,458 of capacity and including imports remained 1,230 MW
12 short of needed capacity. This caused the price of capacity to increase
13 from \$5.00/MW-day (\$1,825/MW annually) to \$236.66/MW-day (\$86,381/
14 MW annually), over 4,700% increase. Over 10,000 MW of generation is
15 scheduled to be retired in MISO before 2030 and even more after 2030. If
16 newly proposed Environmental Protection Agency carbon emission rules
17 or similar future rules are enacted, retirement of fossil generation will be
18 significantly impacted.

19

20 In summary, Monticello's life extension is valuable because it provides the
21 opportunity to continue utilization of an existing generation resource North

1 Dakota ratepayers have relied upon for many years. It is also an
2 inexpensive insurance plan compared with the current technologies, such
3 as inverter-based generation, battery storage, demand side management
4 attempting to replicate the attributes of baseload generation already in the
5 ground. Thus, I feel approval of Monticello’s life extension is a prudent
6 Commission decision.

7 **Q. What is your overall recommendation for the Commission on the**
8 **prudence of Monticello life extension?**

9 A. The Commission should approve the life extension of Monticello at this
10 time with the provision that if future economic analysis determines the
11 plant is no longer economical to operate, it should be removed from the
12 North Dakota ratebase. The economic analysis should be performed as
13 part of the North Dakota IRP process. The analysis should compare
14 Monticello cost to that of comparable generation resources that provide
15 similar reliability and operating capacity factor on a total cost basis.

16

17 **VIII. Future Rate Proceedings Recommendations**

18 **Q. What recommendations for the Commission do you suggest**
19 **regarding Monticello costs treatment in future rate proceedings?**

20 A. Based on the review of NSP’s filing and the analysis discussed in this
21 testimony, the following are recommendations for Commission action in

1 future NSP rate proceedings to ensure North Dakota customers are not
2 harmed by various aspects of Monticello Life Extension:

3 1. The total cost of Monticello Subsequent License Renewal is capped
4 at \$25 million when calculating North Dakota ratepayer portion of
5 the total costs.

6 2. North Dakota ratepayers should not pay any cost of ISFSF
7 expansion costs and other spent nuclear fuel costs. These costs
8 are ultimately refunded by DOE and NSP should include recovery
9 of any costs associated with spent fuel storage, including interest,
10 return on investment, taxes, etc., in the costs to be recovered from
11 DOE.

12 3. Any capital costs associated with enabling Monticello to operate at
13 lower load levels should not be incorporated in North Dakota rates
14 unless NSP can demonstrate economic benefit to North Dakota
15 ratepayers. If Monticello is required to operate at lower loads due to
16 renewable generation resources, this is not a benefit to North
17 Dakota customers because these resources are being added
18 based on meeting Minnesota goals for reducing NSP's carbon
19 emissions from power generation sources.

20 4. The Commission should periodically review the economics of
21 continued Monticello operation to determine if it is the most

1 economical alternative for North Dakota ratepayers. As the amount
2 of renewable generation increases, MISO hourly market prices will
3 significantly change. In addition, the impact of fossil generation
4 retirements on MISO capacity prices is unknown at this time. BY
5 periodically reviewing Monticello economics, the Commission can
6 determine if Monticello continues to be an economic resource.

7 **Q. Does this conclude your testimony?**

8 **A. Yes, it does.**