Prefiled Direct Testimony and Exhibits
Michael W. Sydow

Before the South Dakota Public Utilities Commission
of the State of South Dakota

In the Matter of the Application of
NorthWestern Corporation, d/b/a NorthWestern Energy

For Authority to Increase Electric Utility Rates
in South Dakota

Docket No. EL14-_____

December 19, 2014

TABLE OF CONTENTS

EXHIBITS

Witness Information

Q. Please state your name and business address.

A. My name is Michael W. Sydow. My business address is 600 Market Street West, Huron, South Dakota 57350.

Q. By whom are you employed and in what capacity?

A. I am NorthWestern Energy's ("NorthWestern") General Manager - Operations, South Dakota/Nebraska.

Q. Please summarize your education and employment experience.

A. I graduated from South Dakota State University, receiving a Bachelor of Science degree in Electrical Engineering in 1978. My experience is primarily in the areas of distribution, transmission, and substation engineering/operations/maintenance, business unit management (including personnel, financial accountability, safe work performance, reliability performance), and labor relations/negotiations.

Q. What are your responsibilities as General Manager - Operations South Dakota/Nebraska?

A. I am responsible for all aspects of NorthWestern's electric and natural gas distribution and transmission systems in South Dakota and Nebraska, including the systems' safe, reliable, and efficient operation; operations planning, engineering, and maintenance.

Purpose of Testimony

Q. What is the purpose of your testimony in this proceeding?

A. My testimony:

- Provides an overview of NorthWestern's South Dakota Electric distribution system;
- Identifies the South Dakota NorthWestern operations workforce and organization;
- Demonstrates NorthWestern's commitment to safe work;
- Provides overall reliability information;
- Identifies processes that guide Operations and Maintenance ("O&M") and capital investments necessary for continued reliable service; and
- Demonstrates NorthWestern Energy's commitment to future performance.

Overview of South Dakota Electric Distribution Operations

Q. Please provide a distribution system overview.

A. The South Dakota electric service territory is shown in Exhibit__(MWS-1). NorthWestern provides distribution service from Barnard to the north, Yankton to the south, Blunt to the west, and Bemis to the east. Our distribution system includes:

- Primary voltages of 2.4 kV, 4.16 kV, 7.2 kV, 12.470 kV, 14.4 kV, 24.9 kV, 19.9 kV, and 34.5 kV;
- 81 distribution substations;
- 207 distribution circuits;

- 2,356 miles of overhead distribution lines;
- 543 miles of underground distribution lines;
- 18,985 distribution transformers; and
- 62,825 electric meters.

Q. Please describe NorthWestern's South Dakota Operations/Substation workforce and organization.

A. The South Dakota Operations workforce is comprised of 67 craft workers, ten field supervisors/engineers, five distribution/substation engineers/supervisors, four system control operators, and two Operations business unit leaders.

The NorthWestern South Dakota Operations workforce is structured and positioned for efficient day-to-day service and emergency response. We augment our full-time Operations staff by using contractors who perform capital investment work and some planned or emergency maintenance. It is not cost effective to staff for the "peaks" of our operations, or to own the larger, specialized pieces of equipment that contractors offer.

Exhibit__(MWS-2) shows locations where employees are stationed, performing day-to-day O&M and capital work and responding to emergencies. This exhibit also demonstrates NorthWestern's emergency response preparedness (distance, classifications, assistance or backup potential).

As mentioned in the Prefiled Direct Testimony of Bobbi Schroeppel, NorthWestern has constructed a “replacement plan” to address Operations employee retirements projected to occur over the next five years. We have taken many factors into account in our plan such as known retirements as indicated by employees, projected retirement dates if not indicated by employees, organizational structure considerations for each location/classification up for replacement, apprenticeship versus journeyman productivity impact on work volume, lead time required for transfer of knowledge for each replacement, cost of “overlap” when both the person leaving and the replacement are working, recruiting and hiring costs, actual classification hourly rates, and head-count. We first used the plan in 2014, and eight replacement employees are in place to cover retirements that have already occurred, or will occur, in 2015.

NorthWestern uses contractors for assistance with storm recovery efforts and has the ability to request assistance from regional utilities through mutual assistance groups. For example, NorthWestern is signatory to the North Central Electric Association mutual assistance agreement, as is Montana-Dakota Utilities (“MDU”), Otter Tail Power Company (“OTP”), and Black Hills Power (“BHP”). We provided assistance according to this agreement when responding to a request from BHP for winter storm Atlas in 2013. NorthWestern is also a signatory to the Edison Electric Institute (“EEI”) agreement utilized by the Midwest Mutual Assistance Group, which is a group of utilities extending from Texas to Michigan, and Colorado to Kentucky. Under this agreement, we have responded to requests from Alliant Energy, Xcel Energy, Westar Energy, and Long Island Power Authority.

Electric Distribution System Safety and Reliability

Q How does NorthWestern address safety in the workplace?

A. NorthWestern's safety performance has improved significantly since 2005. Exhibit__(MWH-3) demonstrates declining reportable and lost time incident rates since that time. Efforts that have improved our safe work record include:

- Visiting neighboring utilities to identify best practices;
- Developing a safety plan with requirements (tasks, involvement, reviews, and accountability) for employees at all levels within the organization; and
- Making a safe work culture one of our highest high priorities and demonstrating commitment to that priority through actions that ultimately lead employees to internalize safety. Examples include:
    - Annual safety accountability reviews with each employee;
    - Creating and encouraging local safety committee activities;
    - Addressing unsafe behavior through teaching, reviewing, observing, coaching, documentation, and discipline, if necessary;
    - Reviewing every incident with management through the Managers Safety Advisory Committee, the Executive Retail Operations Safety Committee, and with the Board of Directors. As part of these reviews, we look for ways to prevent a similar event elsewhere. We

consider physical changes, process changes/improvements, tool changes, and behavioral or culture changes; and

  - Evaluating and discussing incidents with Operations personnel during safety meetings to convey the experience, to examine the steps taken to prevent reoccurrence (steps every employee can take to avoid a similar mishap), and to instill a greater understanding of hazards of the workplace.

Q. How do you measure, record, and track reliability on the system?

A. We measure, record, and track, overall reliability on the total delivery system to our customers in accordance with the Institute of Electrical and Electronics Engineers ("IEEE") Standard 1366: Guide for Electric Power Distribution Reliability Indices. Exhibit__(MSW-4) depicts NorthWestern Energy's outage, SAIDI, SAIFI, and CAIDI performance history. In simple terms, SAIDI represents the average outage in minutes for each customer served. SAIFI is the average number of interruptions that a customer would typically experience in a year. CAIDI is the average outage duration any given customer would experience. CAIDI is also typically thought of as the average restoration time. Significant items to note on the charts include:

Outages:

- The number of outages from 2007 through 2013 has declined. Tree clearance and removals, replacing failing infrastructure, and maintenance work on low performing lines and substations positively impact this.

- Major Event Days ("MEDs") were recorded in 2008, 2009, 2013, and 2014.
    - Each MED included several outages (which were at the transmission and/or distribution level).
- More outages occur at the distribution level than at the transmission level. Contributing factors to this are:
    - Multiple transmission feeders into critical substations provide redundant energy sources.
    - Transmission automation and protection schemes have the capability of isolating faulted lines or substations, preserving service continuity or returning to service more quickly.
    - System monitoring and control is enabled and performed more often at the transmission level than at the distribution level. System monitoring and control can result in reduced outage times.

<u>SAIDI</u> (System Average Interruption Duration Index – in minutes):

- South Dakota averaged 70.62 minutes without MEDs and 99.87 minutes with MEDs between 2007 and 2013.
    - EEI identifies first quartile SAIDI performance at <u>less than 102.85 minutes without MEDs, or less than 272.43 minutes with MEDs.</u>

SAIFI (System Average Interruption Frequency Index – frequency):

- The SD SAIFI without MEDs chart demonstrates that the number of customers experiencing outages is trending slightly downward.

CAIDI (Customer Average Interruption Duration Index – in minutes):

- South Dakota's two-year CAIDI average (2012 and 2013) without MEDs was 73.45 minutes. Including MEDs, the two-year average was 95.5 minutes.
    - EEI identifies first quartile CAIDI performance at less than 91.79 minutes without MEDs, or less than 119.97 minutes with MEDs.
- As the number of transmission outages decreases (see outage chart), trending indicates customers who experience outages are experiencing longer outages.
    - Automation has reduced the number of transmission outages.
    - Outages where automation is absent take longer to restore service. Drive time, access and other items can contribute to this.
- The number of distribution outage minutes for customers who experience outages has remained relatively constant.

Maintenance and Capital System Needs

Q. Please describe how NorthWestern determines and addresses O&M system needs.

A. O&M work and related expense are driven by several factors including regulation (codes, laws, rulings), reliability performance (outage experiences), preventative maintenance (checks, service, repairs), and staffing (training, benefits).

NorthWestern determines O&M system needs by:

- Identifying worst-performing lines and equipment through outage tracking;
- Identifying compliance issues through awareness training and day-to-day observations;
- Tracking equipment performance/expense;
- Identifying and assessing potential public and employee safety issues;
- Testing substation transformers (winding, oil, gas, etc.);
- Inspecting distribution lines to identify deficiencies that are subsequently addressed through priority ratings. By deficiencies, I mean conditions such as broken insulators, cracked porcelain cutouts and arrestors, broken tie wires, split cross arms, loose or missing grounds, and rotten anchor rods;
- Performing substation checks that include a check on voltage regulators. The checks can reveal control problems, internal linkage problems, or oil contamination and leaks; and
- Observing vegetation clearances to lines. Distribution lines are patrolled by area personnel inspecting proximity of vegetation from lines, and clearance work is prioritized across South Dakota to address immediate risk issues and contract crew assignments. Contract line work is

documented through detailed crew reports showing locations, number of trees addressed (trimmed or removed), cost per tree addressed, and trees per hour addressed. Significant expenditures are made to ensure acceptable vegetation clearances. There is a recognizable correlation between line clearance work/expenditures and reliability performance the year following the clearance work.

NorthWestern addresses O&M system needs by:

- Making physical changes when line clearances do not meet electric codes;
- Locating underground facilities to prevent "dig-ins" where public or employee safety is at risk. In 2013, 23,573 electric locates were requested/performed;
- Replacing pad-mounted equipment that is experiencing severe casing rust;
- Replacing line components (wire ties, insulators, porcelain cutouts, arrestors, anchors, or ground wires) on lines exhibiting poor reliability;
- Performing maintenance on substation equipment (changing contacts, filtering/changing oil, replacing bushings, replacing insulators) exhibiting wear or poor test results;
- Engineering line solutions that reduce exposure risk (vehicular, electrical contact) for the public and employees; and

- Ensuring adequate vegetation clearances for safety and reliability (tree trimming and removing).

In summary, O&M is addressed by budgeting work, forecasting work units (work units represent tasks), and balancing O&M needs with budgets. Budgeting and forecasting is summarized on detailed Planning/Forecasting spreadsheets. On these spreadsheets, activities – complete with per-unit cost, time required to perform the work, and resource allocations – are budgeted, forecasted, and tracked to plan and achieve necessary work volumes.

Q. Describe how NorthWestern determines and addresses capital system needs.

A. For capital work and expense, NorthWestern utilizes a variety of factors when considering projects. Rating factors are utilized to bring an overall rating priority to individual projects. Engineers, field personnel, and substation personnel all rank individual projects using criteria such as safety, regulatory requirement, customer need, outage restoration time, division priority, and equipment condition . The individual projects are then prioritized by rating-factor totals. Approved, supportable, and budget funding factors provide a threshold for the cumulative total. Capital projects not included in the annual planning and budget approval process (often related to significant unanticipated growth or large equipment failure) are addressed through special Board-approved funding. Most capital expenditures fall into one of three categories: 1) replacing aging and/or failing infrastructure, 2) upgrading infrastructure for performance, or 3) serving new load.

Q. Please provide a summary of major capital electric distribution projects completed during the past five years – including a discussion of why they were needed.

A. Completed projects include:

- Yankton Hilltop Substation – Increased transformer and circuit capacity to address load growth on the northern end of Yankton. Project included adding remote control and monitoring capabilities.
- Hitchcock Substation – Replaced a substation that had inadequate clearances, a rotten support structure, inadequate transformer capacity, experienced flooding, and a delta voltage. The replacement substation included adding remote control and monitoring capabilities.
- Bristol Substation – Replaced a substation that had inadequate transformer capacity, failing underground distribution feeders, inadequate clearances, and deteriorating cement. The new substation is capable of remote monitoring and control when the communications link is completed.
- Ethan Substation – Replaced a substation that had inadequate transformer capacity, inadequate clearances, and switches that could not be repaired.

- Replaced bare concentric underground cable (placed in the late 1970s) and live-front transformers at Lakeside Estates in Aberdeen. The underground cable had experienced several faults, and the live front transformers represented an outage risk due to weeds, snakes, mice, and condensation.
- Re-built the Vayland Substation and converted the town of Wessington to a distribution voltage of 12.5 kV. The old substation had rotten supports, inadequate transformer capacity, and inadequate clearances. The town of Wessington had clearance problems, poles that were rotten, wire that had experienced several breaks, and poor voltage at service points. The new substation can be isolated remotely through remotely operated switches.
- Replaced rear lot-line infrastructure with front lot-line underground infrastructure in Mitchell. Infrastructure was originally installed in blocks without alley access, was deteriorated, experiencing outages, and could not be readily accessed. Front lot-line underground construction improved access, replaced failing infrastructure, and eliminated the need for tree trimming.
- Installed new underground primary switchgear, cable, and transformers in the Menards development area in northern Yankton. The new growth created a new distribution circuit for commercial development and is looped with another distribution circuit for reliability switching.
- Re-built 23 miles of 25 kV line from Iroquois to Willow Lake. This section of line included several stretches of wire that were small, creating

significant voltage drop issues when line switching was performed (the entire line runs from Huron to Henry – approximately 70 miles). Wire size, switch condition, and pole condition all led to a multi-year rebuild and re-conductoring (re-conductoring means replacing existing wire) project. To date, NorthWestern has rebuilt and re-conductored line from Iroquois to three miles north of the Spirit Lake corner (leaving six miles to do to reach Willow Lake). Significantly improved voltage drops have been observed in Willow Lake to date.

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

A. Yes, it does.