BEFORE THE

PUBLIC SERVICE COMMISSION OF THE STATE OF NORTH DAKOTA

Otter Tail Power Company Environmental Cost Recovery Rider Tariff	)))	Case No. PU-13-79
Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc. Environmental Cost Recovery Rider Rates	))))	Case No. PU-13-83
Otter Tail Power Company Environmental Cost Recovery Rider Rates	)))	Case No. PU-13-84
Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc. Environmental Cost Recovery Rider Tariff	))))	Case No. PU-13-85

OAH File No. 20130326

DIRECT TESTIMONY

OF

MARK A. ROLFES, P.E.

ON BEHALF OF

OTTER TAIL POWER COMPANY

and MONTANA-DAKOTA UTILITIES CO.

August 26, 2013

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Mark A. Rolfes, P.E. My business address is 215 South Cascade Street, Fergus Falls, Minnesota 56537.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am the Manager, Generation Development for Otter Tail Power Company ("Otter Tail").

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND CURRENT RESPONSIBILITIES.

A. I have a Bachelor of Science Degree in Mechanical Engineering from North Dakota State University. I am a Professional Engineer licensed in Minnesota and South Dakota. I have worked in the power generation business for over 36 years and for Otter Tail for my entire professional career. I have particular experience with coal-fired generation as the manager of the Big Stone and the Hoot Lake coal-fired plants. I have also been extensively involved in the development of new power generation projects. I have served on the Governor's Citizens' Advisory Committee on Hazardous Waste Management in South Dakota and represented Otter Tail on numerous Electric Power Research Institute and Edison Electric Institute committees.

Currently, I am the project manager for the Big Stone Air Quality Control System ("AQCS") project, with overall responsibility for project development, construction, and

commissioning of the project. My main focus on the project is to supervise the engineering, construction, and commissioning work and assist with regulatory compliance activities.

Q. FOR WHOM ARE YOU PROVIDING TESTIMONY?

A. I am providing testimony on behalf of Otter Tail and Montana-Dakota Utilities, Co. ("Montana-Dakota").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to inform the Commission of the current status of the project and to explain why we believe the expenditures for the project are reasonable and prudent. In doing this I will update the Commission on the progress and explain changes in the budget and the project's current schedule.

Q. WOULD YOU BRIEFLY DESCRIBE THE BIG STONE PLANT?

A. The Big Stone Plant is located in Grant County, South Dakota. It is jointly owned by Otter Tail, NorthWestern Energy, and Montana Dakota. The plant went into commercial operation on May 1, 1975. It is a cyclone-fired unit that currently burns Powder River Basin coal and has a net output of 475 megawatts. Currently it uses a pulse jet fabric filter for control of particulates, a simple over-fire air system for nitrogen oxide control, and it has no controls for sulfur dioxide.

Q. BRIEFLY DESCRIBE THE AIR QUALITY CONTROL SYSTEM PROJECT AND THE TECHNOLOGY THAT IS BEING IMPLEMENTED.

A. The Air Quality Control System project is being installed on Big Stone to comply with the South Dakota State Implementation Plan ("SIP"). The South Dakota SIP is described in detail in Mr. Mark Thoma's Direct Testimony. Construction began on the project in late March 2013. The project consists of installing equipment for the control of sulfur dioxide, nitrogen oxide, particulate matter, and mercury. For the control of sulfur dioxide, an Andritz Environmental Solutions designed dry scrubber is being installed. The South Dakota SIP allows the installation of either semi-dry or dry technology for the sulfur dioxide removal. Through our evaluation and bidding process, we selected the dry technology. For the nitrogen oxide removal, we are installing a selective catalytic reduction unit ("SCR") that is being designed by engineering firm Sargent & Lundy and the catalyst is being provided by Haldor Topsoe, a catalyst vendor. Also a separated over-fire air ("SOFA") is being installed on the boiler and this is being designed by Babcock & Wilcox, the boiler manufacturer. For particulate control, the dry scrubber will be followed by a pulse jet fabric filter designed to handle the gas stream from the circulating dry scrubber. It is important to have the baghouse and the scrubber designed together because the ash flow into the baghouse from a circulating dry scrubber is much greater than from a semi-dry scrubber. The final piece of technology for the project is the activated carbon injection system that is being installed for the control of mercury. Activated carbon will be injected into the gas stream to collect mercury and it will be captured in the baghouse.

In addition to these technologies, all of the balance-of-plant supporting equipment necessary for this equipment to operate is being installed. This includes things such as two very large induced draft fans, all of the piping to support these systems, the electrical, fire protection, etc., to make all of these systems work together.

Q. CAN YOU EXPLAIN WHAT IS MEANT BY A CYCLONE-FIRED BOILER?

A. The prevalent design of the large utility size boilers is a pulverized coal-fired design. In the pulverized coal boilers, coal is ground into a fine powder and is then conveyed into the boiler with air and burned in a fire ball in the furnace area of the boiler releasing heat. A cyclone boiler is constructed differently. The actual combustion takes place in large cyclones or burners on the side of the boilers. These large burners are basically barrels sitting on their side that are approximately 10 feet in diameter with limited openings from the cyclones into the furnace. Coal is conveyed by air into one end of the cyclone where it spins violently and burns in the cyclone with the products of combustion then entering into the furnace. Because of this design, there are a number of advantages and disadvantages with the cyclone. The main advantage is that coal can be handled in larger size pieces, normally up to a quarter of an inch, as opposed to powder for a pulverized coal unit. Because of this it can also burn a wider variety of fuels. Cyclone boilers have been used to burn refuse, tire derived fuel, and biomass fuel. The cyclone design burns hotter so more of the ash will go out of the bottom of the cyclone in a molten state and there is less fly ash that goes up into the boiler. The main disadvantage of a cyclone

boiler is that combustion temperatures are much higher than a pulverized coal unit and this causes the production of higher amounts of nitrogen oxide.

Q. CAN YOU VERY BRIEFLY SUMMARIZE HOW THE PROJECT IS PROGRESSING?

A. The project is currently on schedule and on budget. Construction started in late March 2013. Commercial Operation is scheduled for October 1, 2015.

Q. CAN YOU SUMMARIZE WHAT HAS HAPPENED FROM THE TIME THAT THE ADVANCED DETERMINATION OF PRUDENCE WAS APPROVED AND UP TO THE DATE THIS TESTIMONY IS BEING FILED?

A. Following the approval of the Advanced Determination of Prudence by the North Dakota Commission, critical vendors were given a full notice to proceed. This fully engaged their design and eventually their manufacturing capabilities. Since that time, we have continued the detailed design engineering and procurement of materials. Today, almost all procurements are under contract. Over half of the material for the project has been received on site. Our general work contractor, Graycor, was selected. They mobilized and began on site work late in March 2013. To date, they have concentrated on foundation work and have started erecting the first structural steel. Graycor is a well-known contractor for projects of this type. For example, they served as contractor on an AQCS project for Xcel Energy's Allen S. King Plant and Alliant Energy's Edgewater Plant.

Q. WHAT IS THE MOST SIGNIFICANT PROCUREMENT THAT WAS COMPLETED DURING THIS TIME FRAME?

A. The most significant procurement was the selection and completing the contract for Graycor, the general work contractor. The general work contractor is the entity that is responsible for buying all of the material that the owners do not provide. This includes things such as concrete, small bore piping, and miscellaneous steel. The general work contractor is also responsible for erecting all of the equipment, structures, and facilities with the exception of the work on the boiler. The work on the boiler is performed under a separate contract that we have entered into with Babcock & Wilcox, the original boiler manufacturer. The general work contract was completed in January 2013, and the contractor mobilized in March.

Q. CAN YOU BRIEFLY OUTLINE WHAT IS EXPECTED TO HAPPEN ON THE PROJECT FOR THE PERIOD FROM NOW UNTIL THE PROJECT IS IN COMMERCIAL OPERATION?

A. We will be completing the foundation work this fall. Structural steel erection has already commenced. We will be continuing with structural steel erection through the fall and into winter. Erection of the baghouse has just started and will also continue. Construction will continue through all of 2014. Late in 2014 systems will start to be turned over to Otter Tail for checkout and commissioning in preparation for startup. In approximately March 2015, the unit will come off line for a three-month period. During

that period, the new SCR and FGD system will be tied in, that is physically connected to the existing unit. This requires the old duct work to be demolished and replaced with new. Also, the final control system tie-ins and needed boiler work will be done. We will go through the final commissioning checkout and startup, and when the unit returns to service, we will begin the startup and tuning of the equipment. We will then go through testing to verify that the equipment is performing as designed. Warranty periods will begin and the intention is that in the late fall of 2015 the equipment will be turned over for commercial operation.

Q. IS THE COMMISSION BEING APPRISED OF PROGRESS ON THE PROJECT?

A. Yes. As part of the Commission's Order approving Advanced Determination of Prudence for the project, Otter Tail and Montana-Dakota are required to file periodic progress reports with the Commission. The most recent report was filed on July 12, 2013.

Q. WHAT WAS THE PROJECTED COST FOR THE AQCS SYSTEM, INCLUDING THE ACTIVATED CARBON INJECTION, AT THE TIME OF THE ADVANCED DETERMINATION OF PRUDENCE HEARING?

A. At the time of the hearing, the projected cost at completion was approximately $489 million dollars. Later the regulations for mercury control were finalized and Activated Carbon Injection ("ACI") was added to the project. This increased the projected cost to approximately $491 million dollars. At the time of the hearing we had estimated the

stand alone cost for an ACI system at approximately $5 million dollars, but by doing it in conjunction with the AQCS we estimated an increase in cost of only $2.1 million dollars to the total project costs. Completion is in 2015, thus the projection included escalation of costs.

Q. HAS THIS PROJECTION CHANGED?

A. Yes, it has.

Q. WHAT IS THE CURRENT PROJECTION?

A. The current projection of cost at completion of the project is $405 million dollars, which is a reduction of approximately $86 million dollars from the projection at the time of the Advanced Determination of Prudence hearing.

Q. WHY HAS THERE BEEN A CHANGE IN THE PROJECTION OF COST ESTIMATES FOR THE PROJECT?

A. At the end of 2012, we were at a position in the project where most of the procurement activity was completed and much of the project was under contract. This gave us more information about actual costs than we had when the budget was put together. For that reason, we did a re-budgeting of costs considering all of the known contracts and revised projections of future costs. Based on that knowledge, we submitted a revised budget to the owners on March 1, 2013, which they subsequently approved.

Q. CAN YOU ELABORATE ON WHY THE ESTIMATED COST IS PROJECTED TO BE CONSIDERABLY LOWER?

A. The $86 million reduction, or approximately 17.5% of the original budget, is attributable to several things, but mainly four large categories for which costs have changed. The first category, which accounts for approximately 45% of the reduction, is a consequence of changes in the design of the equipment. As we began detailed design work, we worked very hard to find cost-effective changes to design that would not adversely affect the performance or operability of the system. For example, we were able to make slight changes in the boiler performance requirements that allowed us to eliminate planned modifications to the economizer hopper area. This resulted in considerable savings. Another example is that we were able to engineer a way to use the existing 13.8 kV switchgear for the Plant instead of adding additional switchgear equipment. Because of this change, we were able to eliminate a separate substation feed for the project, and this eliminated the need for a 230 kV tie to the existing substation and a separate substation that included transformers and breakers. This and other engineering work has allowed us to save money by a more efficient design.

The next major category of cost reduction relates to the project delivery method, timing, and market conditions. These factors account for about 35% of the cost reduction. As stated in the ADP, we are currently in what could be referred to as a "buyer's market." We have a number of vendors that are very interested in supplying much of the equipment and material for the project. To take advantage of this timing, the Plant

owners chose a single general work contractor approach as the project delivery method (other possible methods would have been Engineer, Procure & Construct ("EPC"), multiple prime contracting, etc.). Using a single work contractor approach, with a target pricing concept, allows us to get to the market sooner and, consequently, we have seen reduced prices for material and services.

The third category of cost savings, which accounts for approximately 13% of the cost projection reduction, is the result of the Big Stone owners' approach to project construction management. After selecting a project delivery method that uses a single general work contractor, the owners agreed that Otter Tail could serve as the construction manager rather than contracting with a third party to do that work. By Otter Tail taking on the construction manager role, the Plant owners were able to further reduce costs.

The fourth category of cost reduction is a consequence of the reduction in overall project costs. Because of the overall reductions, the contingency amount for the project is also reduced; this reduction accounts for about 7 percent of the budget reduction.

Q. IN THE PREVIOUS ANSWER YOU SAID THAT A "TARGET PRICING" CONCEPT ALLOWED YOU TO GET TO THE MARKET EARLIER. PLEASE EXPLAIN WHAT TARGET PRICING IS AND HOW IT ALLOWED YOU TO GET TO THE MARKET EARLIER, AS WELL AS ANY OTHER ADVANTAGES TO THIS APPROACH.

A Target pricing is the concept that at the time of bidding, engineering design is not completely done. The contractors will bid on quantities of work based on design at the time of bid release. Each quantity will have a unit price. Then at the actual issuing of drawings for construction ("IFC"), the difference is trued up based on the unit pricing for the difference between the issue for bid and IFC. This allows going to the market before design is complete. The total contract price is then referred to as a target price. The contractor then has an incentive or penalty associated with actual cost being above or below the target price. There is a graduated sharing of the risk and reward depending on the difference from the target price. There is a cap on the owners' sharing of the risk side of the equation. This provides an incentive for the contractor to efficiently use his labor and material at the same time it reduces the level of contingency a contractor needs to include in its bid. It also caps the owners' liability for overruns.

Q. YOU INDICATED THAT OTTER TAIL WILL SERVE AS THE CONSTRUCTION MANAGER. DOES OTTER TAIL HAVE THE CAPABILITIES TO SUCCESSFULLY MANAGE CONSTRUCTION OF THIS LARGE PROJECT?

A. Historically, Otter Tail has not done this type of management effort, but because of the careful selection of the single general work contractor and the quality of the project team that we have put together, the Big Stone owners agreed that Otter Tail is capable to successfully manage this project. To ensure Otter Tail's project management team has the depth of experience and expertise appropriate to successfully manage the project, the

project team is comprised of approximately 50 percent Otter Tail employees and 50 percent contractors. The Otter Tail employees bring many years of operating and plant experience, plus knowledge of the project owners and the area. For the remaining personnel we contracted with numerous service providers to bring into the management team specific individuals with the necessary project management expertise. The project management team has been very fortunate to get a number of individuals with many years of construction management experience. By blending our talents and their talents, we have formed a team that is well positioned to successfully manage this project.

Q. CAN YOU BRIEFLY EXPLAIN HOW RISK IS MANAGED FOR THE AQCS PROJECT?

A. Good project management is largely about the mitigation and management of risk. In the case of a large project like the AQCS project, we have taken the approach of first identifying potential risks. For example, there are risks associated with the uncertainty of labor availability, quality of labor, and availability of certain materials. There are also many typical project-related risks such as the risk of casualty losses and contractor performance risks. Our risk management approach includes the evaluation of reasonable measures that can be taken to eliminate or transfer those risks when possible; and for the risks that can't reasonably be eliminated or transferred, the project management team considers what measures can be taken to mitigate or otherwise manage those risks.

With respect to risks associated with market conditions, we constantly monitor market conditions to respond proactively on our procurements. So far we've been very successful in doing that. Another risk is the availability and quality of the labor. This is a risk that we cannot completely mitigate, but we have taken efforts to be in contact very early with potential suppliers and with the trade organizations to monitor their work load and the availability of labor, and to make sure that our project is part of their planning. We continue to work with them to mitigate these labor-related risks wherever possible.

In our procurements for the project, there is a separate risk analysis done for each major procurement. We look at the risk exposures associated with each contract. Commercially reasonable terms are negotiated to address contractor performance, liability, indemnification, insurance requirements, and other aspects of risk associated with the transaction. In all of our major contracts we have included liquidated damages provisions as part of those contracts. These provisions do not entirely eliminate contract-related risks, but they provide a commercially reasonable incentive for vendors to manage risks within their control. Additional contractual provisions are considered that may, in appropriate circumstances, transfer other risks to the contract vendor. For example, we've endeavored to have vendors retain the responsibility for labor and commodity price escalation by providing a firm price for the work or material they are supplying.

Our risk management efforts also employ insurance products. As I mentioned, our contracts contain terms with appropriate insurance requirements for suppliers and vendors. The project has also procured builder's risk insurance to cover the construction. We have worked with Willis, the insurance advisors who have historically assisted the Plant owners in the procurement of appropriate insurance products. With the assistance of Willis, we have evaluated the cost effectiveness of various insurance products that could cover risks associated with the project. One cost-effective solution we developed was to take builder's risk insurance from the same provider as the property insurance provider for the existing plant. This accomplished two things: it prevented a double deductible if there was an incident caused by the project's builder that affected the existing operating plant; and, by having the same insurance carrier, it eliminated the possibility that the property insurer and the builder's risk insurer might dispute accountability for a covered loss.

To summarize our risk management approaches, generally, we identify risks and then summarize and evaluate the risks to assess the owners' options for eliminating, transferring, mitigating or managing the risks. The risk summary is reviewed monthly for any change condition. We monitor market conditions carefully and respond appropriately to mitigate risks associated with labor availability, quality of labor, and availability of certain materials. We negotiate with our contractors and suppliers to arrive at commercially reasonable contract terms, and we utilize cost-effective and commercially reasonable insurance products to further cover project risk exposures. As

indicated, it is not possible to eliminate or transfer all risks for a project of this size, complexity, and duration. Our approaches to risk management provide a commercially reasonable approach to mitigate and manage those risks that cannot be eliminated or transferred in their entirety.

Q. IS PROCUREMENT OF MATERIALS AND SERVICES A LARGE PORTION OF THE COST OF THE PROJECT?

A. Yes, it is over 70% of the entire project cost.

Q. BECAUSE THESE PROCUREMENTS MAKE UP SUCH A LARGE SHARE OF THE PROJECT COST, WHAT EFFORTS AND MEASURES ARE TAKEN TO ENSURE THAT PROCURED PRODUCTS AND SERVICES ARE REASONABLY PRICED?

A. Our procurements began with the hiring of Sargent & Lundy to be our project engineer. The selection was done on a competitive basis with proposals from a number of major engineering firms. As part of the evaluation process, similar projects to ours done by engineering firms were visited and we talked directly to the owners of those projects to get feedback on the performance of their selected engineers. Though all firms evaluated were reputable and capable of doing this project, Sargent & Lundy was selected because of cost and experience. Sargent & Lundy has done more of these projects than any other firm and provided a lower cost. Since hiring Sargent & Lundy, major procurements have been a joint effort between Otter Tail's strategic sourcing department, Sargent & Lundy's

procurement department and Nixon Peabody, a law firm with extensive experience in project procurements.

With the exception of the distributed control system for the facility, all procurements have been made through a bidding process. Because the project will be integrated into an existing computer control system, the distributed control system was a sole sourced procurement. For all other procurements, detailed specifications and terms and conditions were assembled for vendor solicitations. The bids were analyzed for cost, technical performance, and commercial terms.

Q. CAN YOU PROVIDE A DETAILED EXPLANATION OF ONE OF THE LARGER PROCUREMENTS?

A. A good example of one of our procurements is the general work contract. As I indicated earlier, this is the largest contract for the project. As outlined before, detailed specifications were put together for this contract. When it was completed, the specifications and contract language were approximately 2,100 pages. Work on this contract began more than a year in advance of it being let for proposals. It began by putting together a long list of potential bidders. We then evaluated these vendors for their capability and experience and came up with a shorter list of seventeen companies. From these seventeen companies, we solicited additional information to further reduce the list. This information included their experience, their safety record, their financial strength, etc. From this list we then narrowed it down to seven potential bidders and later down to

six because of the inability of one of the contractors to completely bond the project. After we had the list of six, all vendors came in and provided presentations on how they would address our project. After these presentations, the request for proposals were submitted and bids were received. All bids were evaluated for their cost, their technical issues, and commercial terms. We then brought in all vendors individually to make presentations and answer questions on their proposals. From that, the lowest evaluated cost bidder was selected and we began negotiations for commercial and technical issues with them, resolved open issues, and entered into a contract. This process took over one year.

Q. IS THIS TYPICAL OF ALL THE OTHER CONTRACTS.

A. This was a more expansive process because it was for the largest contract related to the project, but the basic activities described have also been followed for the other contracts.

Q. ALONG WITH CONSTRUCTION MANAGEMENT, THERE IS THE STARTUP AND COMMISSIONING EFFORT. HOW IS OTTER TAIL PROPOSING TO HANDLE THE STARTUP AND COMMISSIONING?

A. The startup and commissioning portion of the project is being handled in a very similar way to the construction management. We are looking for management for this effort to come from the existing core group that is managing the construction effort. Then the people to accomplish this will again be a mixture of Otter Tail employees, plant employees, and outside contractors. The plant employees provide the knowledge of the

integration of this equipment and the outside contractors have the construction commission experience that we do not have.

Q. IS THIS ORGANIZATION IN PLACE?

A. We are well into establishing this organization though it is not complete. We have contracted with Sargent & Lundy to provide key experience field people and we are working with the Plant to identify the staffing resources. We hope to have this organization determined by the end of 2013. Early 2014 will be spent in preparation with the team actually being formed at the end of summer 2014 to begin the commissioning work as systems are completed.

Q. CAN YOU BRIEFLY SUMMARIZE YOUR TESTIMONY?

A. The current Big Stone AQCS project is on schedule and on budget. The budget has been reduced by $86,000,000 to $405,000,000. We have a long way to go, but the project is on track and is being managed consistent with prudent utility practice. The expenditures are being done in a prudent and reasonable manner in the best interest of our customers. We have evaluated the risk for the project and are appropriately mitigating and managing those risks. We have procured equipment, material, and services in a competitive manner and have established procedures and monitoring to insure that the project continues on course and on plan and have knowledge of where we are so corrective actions can be taken if situations arise.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.