Direct Testimony

Witness Scott Wiseman

Before the Public Service Commission of
The State of North Dakota

In the Matter of the Application of
Basin Electric Power Cooperative
For A Route Permit for The Antelope
Valley Station Raw Water Pipeline

Case No. PU-04-109
February 3, 2005

DESIGN AND CONSTRUCTION OF FACILITIES

1. Q. What is your name, business address and your occupation?

A. My name is Scott Wiseman. I am employed by Basin Electric Power Cooperative, 1717 East Interstate Avenue, Bismarck, North Dakota. My position is Senior Civil Engineer.

2. Q. What is your employment history?

A. I went to work for Basin Electric in March of 1979. In the past 25 years my responsibilities have included the civil design and construction on a variety of projects, including high voltage transmission lines and substations, railroad tracks, roads, landfills, equipment and structure foundations. I am licensed to practice as a Professional Engineer in North Dakota.

3. Q. What is your educational background?

A. I received a Bachelor of Science degree in Civil Engineering from North Dakota State University in May 1978. Since graduation, I have participated in a variety of engineering and professional development short courses and seminars, averaging approximately one per year.

4. Q. What generally have been your responsibilities in connection with the proposed AVS Water Pipeline Project?

A. My responsibilities included assisting in the assessment of the existing pipeline and the selection of a consultant to complete the detailed engineering design of the new pipeline. As the coordinator between the engineering consultant and the other Basin Electric staff involved with this project, I was involved to various degrees in the routing and design process.

5. Q. Please describe the water pipeline to be built.

A. This pipeline's purpose is to increase the reliability of the transport of raw water from Basin Electric's intake facility on

Lake Sakakawea to the Antelope Valley Station. The total length of the proposed pipeline is approximately 8.9 miles. The proposed pipeline diameter is 42 inches ID, which is the same as the existing pipeline.

The pipeline will utilize either steel or ductile iron pipe. Both options will be bid and evaluated and the best alternative used. Bell and spigot rubber gasketed joints will be utilized. Ductile iron pipe is furnished in 20-foot lengths and steel pipe is normally furnished in 30- to 50-foot lengths. If steel is used, the longer pipe lengths will be used to minimize the number of joints. Thrust restraint at horizontal and vertical angles will be accomplished using concrete thrust blocks, welded joints and/or restrained bolted joints.

For corrosion protection, both steel and ductile iron utilize cement mortar lining on the interior wall of the pipe. For external protection, steel pipe will be coated with a minimum of 80 mils of bonded dielectric material. Ductile iron pipe will utilize a double layer of polyethylene sheathing, totaling 16 mils. An impressed current cathodic protection system consisting of deep anode wells and rectifier system will also be installed to provide additional protection against corrosion.

The minimum depth of bury to the top of pipe will be seven feet. The pipe will be encased in sand extending six inches below the pipe, 15 inches beyond the sides of the pipe and 12 inches above the top of the pipe.

There are 16 blowoff (drain) valves located at the low points along the pipeline profile. There are also 13 combination air valves located at the highpoints along the pipeline. The purpose of the blowoff valves is to provide a means of dewatering the pipeline for maintenance purposes or for flushing accumulated sediment from the pipeline in the low points. The combination air release and vacuum valves provide a way to release air from the pipeline during filling and normal operations. In the event of a rapid loss of water in the pipeline, these valves will also let air into the pipe to prevent a damaging vacuum condition from occurring. The pipeline will also have three inline valves located at approximately ¼ points along the route. These valves will provide the ability to isolate and drain only one section of the pipeline should that be required for future maintenance or repair activities.

The new pipeline will branch off the existing line at the existing intake pumping station. Valves will be installed to allow either the new or existing pipeline to be used for transport of the water. The new pipeline will terminate at existing piping inside the Primary Water Treatment building on the AVS plant site.

6. Q. Mr. Wiseman, I show you what has been marked as Applicant's Exhibit _____ and ask that you identify it.

A. Exhibit _____ is the Project Vicinity Map prepared by Bartlett & West, the engineering consultant on this project.

7. Q. Why does the proposed pipeline route deviate from the existing pipeline route in some areas?

A. As Mr. Miller pointed out, the new route runs along the existing pipeline for approximately 67% of its length. Referring to the Project Vicinity Map, there are three areas where we determined that a deviation from the existing route would benefit the construction, cost, accessibility and/or reliability of the pipeline.

The first area is located two miles north of AVS where the new route makes a large curve instead of a 90-degree turn as the existing pipeline does. In this case, County Road 15 has been rebuilt to the curved alignment shown. By staying along the inside of the curve, a 90-degree fitting was eliminated and the pipeline length was reduced. Additionally, costs associated with crossing County Road 15 at this point were eliminated.

The second area consists of a segment of the route located from the intermittent creek crossing then north. In this area, the primary factor in diverging from the existing pipe route is the rough terrain and difficult access. While the proposed route is approximately 2,000 feet longer, the cost of the extra pipe is offset by the reduction in the number of appurtenances required. From the point where the proposed route diverges to the point where it returns to the original, the existing pipeline has 14 combination air vacuum valves and 12 drain valves; the proposed pipeline has only four combination air vacuum valves and two drain valves. Access to the new pipeline for inspections is also greatly improved.

The third area is located just west and south of the intake structure. Here, the proposed route diverges from the existing route for a distance of approximately 2,800 feet. The advantages with this route are the elimination of one combination air vacuum valve, two drain valves and two 90-degree fittings. Avoidance of the congestion associated with the existing AVS pipeline and Southwest Water Authority pipeline and the Oliver-Mercer electrical substation was also a significant factor in routing the new pipeline in this area.

8. Q. How will the construction of the proposed pipeline be

conducted at road and highway crossings?

A. Major road crossings include ND Highway 1806, Mercer County Road 15, an existing Coteau mine haul road and a railroad track within the AVS plant site. At these crossings, a steel casing pipe will be bored and jacked under the roadway. The water pipeline will then be installed through this casing. A new Coteau equipment haul road is proposed to be constructed in 2006 after a portion of the new pipeline has been installed. A steel casing will be installed at this crossing before the haul road is constructed. There are also a number of field entrances and gravel roads to be crossed. These will be open cut and then restored and surfaced with gravel. Where roadways are open cut, the pipe is typically installed and the trench backfilled in one day. Alternative access will be provided for local residents during periods when existing roads are blocked.

9. Q. Will there be any aboveground structures associated with the proposed pipeline?

A. Yes, there are facilities that will be above ground. The blowoff and combination air valves will be located below ground in a buried concrete manhole or vault. However, at these locations there will be a 36-inch manhole access that is essentially flush with the ground. In addition, the combination air valve manholes and inline valve vaults will also have six-inch diameter vent pipe(s) to exhaust air from the pipeline or permit air to enter the pipeline through the air valves if a significant vacuum condition were to occur. Guard posts will be installed at all manhole and vault locations. In cultivated land, there will be four guard posts equally spaced on a radius of approximately six feet. In non-cultivated land, there will be one guard post located opposite of the vent pipe at the combination valves. At the blow off valve locations, there will be two guard posts. Guard posts will be four-inch treated wood posts.

There will also be one or two rectifier systems installed as part of the cathodic protection of the pipeline. If steel pipe is used, one rectifier system is required. Ductile iron pipe will require two rectifier systems. The rectifier unit will be mounted on a six-inch wood post. There will also be a six-inch wood post installed over the anode bed on which a two-inch PVC vent pipe is mounted.

To monitor the corrosion protection on the pipeline, a number of monitoring stations will be installed along the pipeline. These will consist of a two-inch PVC pipe with wire leads inside a weatherproof enclosure and mounted on a four-inch wood post. Most of these test stations are located at manhole or vault locations. Those that are not will be located on fence lines or adjacent to non-cultivated land.

10. Q. Describe the methodology used in design, such as loadings and codes, to insure structural integrity of the proposed pipeline.

A. Basin Electric has retained an engineering consultant that has extensive expertise and experience in the design and construction observation of large diameter waterline projects. The proposed pipeline was designed to operate under similar hydraulic parameters as the existing pipeline. The line is designed to provide a flow rate up to 37,000 gallons per minute and withstand anticipated pipeline surge pressures while under full capacity. Pipeline surge refers to the rapid pressure changes that occur during transient flow conditions. Typical causes of transient flow conditions generally encountered in a pipeline system include starting or stopping of pumps, pumping station power failure and rapid opening or closing of valves. The surge analysis was modeled based on a computer analysis program developed by the engineering consultant, which has been successfully utilized on numerous similar projects.

To prevent or minimize damaging negative pressures in the pipe, combination air release and air vacuum valves will be installed at all high points. Redundant air valves will be installed at major high points along the pipeline. The pipe is laid to line and grade, which is intended to prevent minute high points in the pipeline that could entrap air. The pipeline will operate efficiently at the rated capacity by incorporating and holding true to a line and grade installation.

The pipeline is designed to support the anticipated earth cover over the top of the pipe and to resist the thrust forces developed at horizontal and vertical bends. The pipeline is also designed to accommodate anticipated traffic loads above the pipe and specifically for any heavy coal equipment loads at specific locations. The pipeline is designed to meet national industry standards, including American Water Works Association, American Society of Testing and Materials, American Welding Society and American Institute of Steel Construction.

Corrosion protection is also a crucial part of the pipeline design. Borings were taken along the route to determine physical and chemical properties of the soils. A corrosion protection and monitoring system was designed to protect the pipe, as well as allow future monitoring of the condition of the pipe to measure any potential corrosion activity on the pipeline.

11. Q. Describe construction procedures and the workforce required for construction of the proposed facility.

A. Generally, the contractor will first mobilize the job site with his equipment and set up the necessary field offices.

The first activity on the pipeline easement will be the staking of the pipeline alignment and easement limits by a survey crew. Once the easement boundaries are marked, the contractor will then begin hauling pipe from the staging area and lay the pipe sections along the pipeline route within the defined easement limits. It is anticipated that most of the pipe will be unloaded from trucks along the pipeline route as the pipe is delivered to the job.

Stripping to a maximum depth of 12 inches and stockpiling of topsoil will then proceed. This operation will likely be completed with scrapers where the terrain is suitable.

Trench excavation and pipe laying begins next. Excavation will likely be performed with a large backhoe operation. Typical trench width will be approximately six and one-half feet wide at the bottom. Trench sidewalls extend approximately four feet vertically above the trench base and then are excavated to the surface at the appropriate slope that meets safety regulations. Typical depth of the trench will be 11 to 12 feet, although deeper excavation will occur through some areas to avoid the need for additional appurtenances. Trench excavation will not be allowed to advance more than 1,000 feet ahead of the pipe-laying operation.

Sand bedding will then be placed in the trench and the pipe laid to specified lines and grade. Backfilling of the pipe will follow, staying within 500 feet of pipe-laying operations. The trench backfill will be compacted to minimize voids and settlement of the backfill.

Installation of appurtenances such as air valves and blow-offs generally lag the pipe-laying operations by several weeks. The contractor will then proceed with cleanup of the pipeline easement area. Seeding will be completed in late spring or fall. The entire pipeline will be hydrostatically tested to assure compliance with the American Water Works Association accepted leakage rates and standards. Upon the completion of pipe laying and appurtenance installation and testing, the contractor will commence with demobilizing his equipment from the job site. At the conclusion of all major work items, a pre-final inspection and a follow-up final inspection with the appropriate parties will be conducted to review the project with the contractor.

It is estimated that a peak construction workforce of 20 to 30 workers will be required for this project.

12. Q. What housing provisions are required for this workforce?

A. It would be expected that most non-local workers would stay in local hotels or motels. Some workers may bring trailers or campers and place them in trailer or camping locations in the area.

13. Q. How much time will be required to construct this project?

A. Construction is scheduled to begin in late June or July of 2005. The pipeline is expected to be in service by July of 2006. There is no construction scheduled for the winter season. We anticipate construction in 2005 will end in November, and begin again in April 2006 until complete.

14. Q. How is topsoil handled in the excavation and backfilling process?

A. Topsoil will be stripped and stockpiled separately of subsoil. In addition to the trench limits, any area on which excavated subsoils will be placed will also be stripped of topsoil. After backfilling is completed, any excess subsoil will be placed over the excavation area, blending the grade into existing topography. Topsoil will then be replaced over areas from which it was stripped.

The contractor will dispose offsite of any excavated materials deemed unsuitable for backfill. If the landowner concurs, such materials may be buried within the pipeline easement area. Rocks will be buried with a minimum of seven feet of cover. Topsoil will be stripped, stockpiled and replaced where unsuitable materials are disposed of on the easement.

15. Q. Are there any safety hazards associated with this pipeline?

A. Since the raw water conveyed by this facility is not a hazardous material, the only potential hazard associated with this pipeline would be the physical damage caused by the water itself, should a leak or rupture occur. The inherent ductile properties of steel or ductile iron greatly reduce the possibility of a major rupture occurring. If a large rupture were to occur, the loss of pressures and flows would be obvious and the pumps shut down as soon as possible. Due to the rural location of the pipeline, the potential of even a major rupture causing a safety threat to the public would be minimal. If a leak were to occur, it would more likely be at a joint or at one of the valve locations. These would not typically present any health or safety issues to the public.

16. Q. Does this conclude your direct testimony?

A. Yes.