

PUBLIC SERVICE COMMISSION  
STATE OF NORTH DAKOTA

TRANSCANADA KEYSTONE PIPELINE, LP ) CASE NO. PU-06-421  
30-INCH OIL PIPELINE/CAVALIER TO )  
SARGEANT COUNTIES SITING APPLICATION)

**PROPOSED FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER**

**APPEARANCES**

Commissioners Susan E. Wefald, Tony Clark and Kevin Cramer

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As Procedural Hearing Officer

**PRELIMINARY STATEMENT**

On April 11, 2007, TransCanada Keystone Pipeline, LP (Keystone) filed an application for a certificate of public convenience and necessity (PCN) under N.D.C.C. Chapter 49-03.1 to construct and operate the Keystone Pipeline in Cavalier, Pembina, Walsh, Nelson, Steele, Barnes, Ransom, and Sargent Counties of North Dakota. Approximately 218 miles of the crude oil pipeline is located in North Dakota.

On April 11, 2007, Keystone filed an application for a waiver of procedures and time schedules, and consolidated applications for a certificate of corridor compatibility and a route permit authorizing construction of approximately 218 miles of 30-inch crude oil pipeline and associated facilities in Cavalier, Pembina, Walsh, Nelson, Steele, Barnes, Ransom, and Sargent Counties of North Dakota. The proposed corridor and route are shown on the attached map. (Case No. PU-06-421)

On May 2, 2007, the Commission issued a Notice of Filing and Notice of Hearing setting forth the issues to be considered for the Keystone Application. Public hearings were scheduled

for Monday, July 23, 2007 at 1:00 p.m. CDT in Barnes County in Valley City and for Tuesday, July 24, 2007 at 1:00 p.m. CDT in Park River.

On May 2, 2007, the Commission issued a Notice of Filing and Notice of Hearing, determined that the Application was complete and waived the procedures set forth in N.D.C.C. Section 49-22-08 and 49-22-08.1 to allow for a single consolidation application for Corridor Certificate and Route Permit.

On May 2, 2007, the Commission in its Notice of Hearing identified the following issues to be considered:

1. Will the location, construction and operation of the proposed pipeline produce minimal adverse effects on the environment, natural resources and upon the welfare of the citizens of North Dakota?
2. Is the proposed pipeline compatible with the environmental preservation and the efficient use of resources?
3. Will the proposed pipeline corridor and route minimize adverse human and environmental impact while ensuring continuing system reliability and integrity and ensuring that energy needs are met and fulfilled in an orderly and timely fashion?
4. Is it appropriate for the Commission to waive the procedures as requested in the application including the request for a single consolidated application for Corridor Certificate and Route Permit?

On June 21, 2007, Gary R. Leistico and Nicholas R. Delaney, Attorneys at Law, on behalf of the Dakota Resource Council, filed a request to postpone the hearings until completion of the Environmental Impact Statement (EIS) and the related comment period. As an alternative, the Dakota Resource Council demanded that the Commission's approval of the Application and Permit be postponed until after the completion of the EIS and related comment period, after which the Dakota Resource Council would demand an additional hearing to discuss environmental related concerns.

On June 27, 2007, the Commission denied Dakota Resource Council's request to postpone the hearing scheduled for July 23, 2007 until the completion of the EIS, and denied Dakota Resource Council's alternative demand that the Commission's approval of the application be postponed until after completion of the EIS and related comment period.

On July 17, 2007, the Commission moved the place of the scheduled hearing to the Valley City Auditorium located at 320 Central Avenue South, in Valley City, North Dakota and kept the same location for the hearing in Park River, North Dakota.

At the Public Hearing in Valley City the Commission received the following exhibits:

T-1	TransCanada Power Point Presentation;
T-2	Application for Corridor and Route, with Appendices and Supplemental filings;
RS-1	Illustration;
RS-2	Map;
RS-3	Photographs;
RS-4	Minot Daily News clippings;
MN-1	Videotape;
MN-2	Map;
MN-3	WEB Water Development Association literature.

At the continued hearing in Park River the Commission received the following exhibits:

JC-1	Aerial map;
JC-2	Aerial map;
JC-3	Aerial map;
TB-1	Water Supply Investigation for the City of Park River cover sheet;
FB-1	Aerial map;
DO-1	Statement/newspaper article;
T-26	CV Brian Thomas;
T-27	TransCanada Keystone Emergency Response Plan;
I-1	DNV Volume Study Keystone Pipeline;
PM-1	Easement and ROW Agreement Paul Mathews;
RS-5	Photographs

The hearing was continued to September 5-6, 2007 at the Public Service Commission Chambers in Bismarck. At this hearing the Commission received the following exhibits:

T-3	Resume of Dean Cowling;
T-4	TransCanada's proposed Tree and Shrub Mitigation specifications;
T-5	Public Service Commission staff Tree and Shrub Mitigation specifications;
T-6	Curriculum Vitae of Michael Koski;
T-7	Aerial depiction of Whittenberg residence;
T-8	Aerial depiction of Mathews residence;
T-9	Map of Fordville Aquifer area with eastern water reroute concept;
T-10	Fordville Alternative Route Concept Comparison;
T-11	Map of Lake Ashtabula Reroute Concept;
T-12	Ashtabula Alternative Route Concept Comparison;
T-13	CV Scott Ellis;

- T-14 18 written waivers of 500-foot landowners within avoidance area;
- T-15 CV of LA Buster Gray;
- T-16 Bures reroute;
- T-17 Zacharias reroute;
- T-18 Map existing pipeline residential area Houston, Texas;
- T-19 CV Heidi Tillquist;
- T-20 Photographs Bemidji Spill Site;
- T-21 Water Flow Map Fordville Aquifer area;
- T-22 Travel Time Chart Fordville Aquifer;
- T-23 Water Flow Maps Sheyenne River-Lake Ashtabula;
- T-24 Travel Time Chart Sheyenne River-Lake Ashtabula;
- T-25 CV Meera Kothari

The Commission received the following late filed exhibits:

- T10a Revised Fordville Aquifer alternate route comparison chart showing acres of wetlands crossed
- T28 Directional drilling plan for placement of pipeline in the Pembina Gorge
- T29 Chart of estimated noise levels for pipeline pump stations relative to locations of residences and business
- T30 GIS layers created or utilized for the Keystone Project in North Dakota
- T31 Report of outreach to ND Department of Parks and Recreation re pipeline location
- T32 Report of follow-up of landowners' testimony of improper conduct of TransCanada agents for easement acquisition
- T33 Report identifying areas requiring right-of-way in excess of fifty feet
- T34 Report of available data regarding pipeline spills in North Dakota, including miles of pipeline, size of spill, and barrels per day of spill
- T35 Copies of all correspondence with state agencies identified by N.D. Admin. Code §§ 69-06-01-05 and 69-06-04-01(3)
- T36 Report on use of external leak protection system
- T37 Map showing easement acquisitions for pipeline right-of-way five miles north and south of Lankin, North Dakota

Having allowed all interested persons an opportunity to be heard and having reviewed and considered all testimony and evidence presented the Commission makes the following:

#### FINDINGS OF FACT

1. TransCanada is one of North America's leading energy infrastructure companies with more than 24 billion dollars in assets and with more than 50 years of construction and operating experience as it relates to pipelines.

2. TransCanada has more than 36,000 miles of pipeline in North America and relationships with over 40,000 landowners across North America.
3. The Keystone Pipeline project involves the construction and operation of a pipeline and related facilities for the purpose of transporting Canadian crude oil from the Western Canadian Sedimentary Basin to markets in the United States. The project would commence at the crude oil supply hub near Hardisty, Alberta, Canada, and extend to Wood River and Patoka, Illinois. Initially, the pipeline would have a nominal capacity to transport 435,000 barrels of oil per day (bpd). Subsequently, the pipeline will be extended to a terminal at Cushing, Oklahoma (Cushing Extension) and the nominal capacity will be expanded to 591,000 bpd. The length of the proposed facility in the United States is approximately 1,078 miles from the Canadian border to Patoka and an additional 294 miles for the Cushing Extension. The pipeline will enter North Dakota at the Canadian/North Dakota border in Cavalier County and will extend in a southerly direction passing through eight counties, exiting the state at the South Dakota border in Sargent County. The length of the pipeline in North Dakota will be approximately 218 miles.
4. The Keystone Pipeline project is an approximately 1,800 mile pipeline with about 1,400 miles in the United States.
5. The Keystone project in the State of North Dakota constitutes approximately 218 miles of 30-inch crude oil pipeline, five pumping stations, a total of 13 main line valves and four check valves.
6. The Keystone Pipeline is designed for a maximum allowable operating pressure of 1,440 psi.
7. The United States (US) economy consumes 20 million barrels of oil every day, and the U.S. demand for petroleum products continues to increase.
8. Keystone is the only alternative to meet the increased demand for crude oil within the time frame required.
9. TransCanada has secured a total of 495,000 barrels per day of firm long-term contracts.
10. The long-term contracts clearly demonstrate that Keystone is required to meet U.S. energy needs.
11. Direct and indirect economic benefits of the proposed Keystone Pipeline Project were fully explained in the Application for Public Convenience and Necessity Case No. PU-07-152 and included increased demand for crude oil in the U.S., ease of current pipeline

- bottlenecks in North Dakota and surrounding areas, which have caused depressed prices for western North Dakota crude oil, temporary influx of workers during construction, and purchase of supplies, as well as property tax payments to the State.
12. The Keystone Pipeline project utilizes a conversion of a natural gas line in Canada running from Alberta, Canada to a point north of eastern North Dakota. The use of this converted gas line has both economic and environmental benefits.
  13. Keystone is required to obtain a Presidential Permit from the United States Department of State (DOS). DOS is responsible for preparing an Environmental Impact Statement for the entire project, as required by the National Environmental Policy Act. (NEPA)
  14. The route selection process for a project such as Keystone involves numerous iterations.
  15. The first step is to identify the project objectives. In the case of Keystone, the objective is to move crude oil from a major supply source in Alberta, Canada to delivery points in the States of Illinois and Oklahoma.
  16. The next step is to identify control points. There are two main control points for locating the pipeline route through North Dakota. The use of the existing natural gas line in Canada defines where the project enters North Dakota, and the suitable crossing of the Missouri River at Yankton, South Dakota serves as a control point at the South Dakota border.
  17. The route development process also involves identification of constraints and opportunities.
  18. Keystone established a study area for the pipeline, collected environmental data, such as wetland, species data and soil information.
  19. In determining its corridor and route, Keystone sought to avoid or minimize sensitive environmental features, such as wetlands.
  20. Keystone sought input from professionals and state agencies, as well as public comment to refine the initial route option. The proposed route and corridor was developed with input from numerous sources, including agencies, landowners, the public in general, and as a result of extensive studies.
  21. The proposed route of the Keystone Pipeline does not cross any of the exclusion areas as defined by the North Dakota Public Service Commission.
  22. The Keystone Pipeline crosses one avoidance area in the Tetrault Woods State Forest associated with the Pembina River crossing. The pipeline will not impact this avoidance

area because Keystone will use Horizontal Directional Drilling (HDD) to place the pipeline under the forested areas of the State Forest and the Pembina River.

23. Nineteen residences are located within the 500 foot avoidance area of the Keystone Pipeline. Of these, 18 owners have signed written waivers of these avoidance areas.
24. The one residence (Wittenberg) where a waiver has not been obtained is located 425 feet from the pipeline. See Ex. T-7. The pipeline is located across a county road from the residence and does not cross property owned by the residence owner. The pipeline can not be moved further than 425 feet to the west of the residence because of a pond. Re-routing even further to the west would require the route to be moved a significant distance, add additional length, and impact additional landowners. Moving the pipeline 500 feet or more to the east of the residence would route the pipeline through the actual property of the residence owner, add additional length, involve more road crossings, and impact additional landowners.
25. The owner of this residence did not testify against the location of the pipeline at the hearings. The residence owner has not agreed to have the pipeline put 500 feet east of his residence, which would be located on his property, and has not answered phone calls or responded to mailed inquiry.
26. There is no reasonable alternative for the route location at the Wittenberg area.
27. Keystone has prepared a reroute on the Bures property to avoid possible burial mounds. Mr. Bures is satisfied that the proposed reroute will avoid the cultural resource issues that he was concerned about.
28. Keystone has prepared a reroute on the Zacharias property to the west, which according to Mr. Zacharias, would be less likely to encounter cultural resource artifacts.
29. The I-29 corridor was considered for possible location of the Keystone Pipeline. Keystone rejected the options of locating the pipeline within the I-29 right-of-way or adjacent to the I-29 right-of-way.
30. According to the North Dakota Department of Transportation Policy Manual, location of the Keystone Pipeline within the I-29 right-of-way would not be permitted.
31. Location of the pipeline route adjacent to the I-29 right-of-way was rejected because I-29 includes numerous overpasses and interchanges which would require the project to deviate away from the corridor at frequent locations, increasing the length and impact of the pipeline; interstate highways tend to connect areas of development, which would result in the need for further deviation from the corridor, increasing length and impact;

and the I-29 corridor is not consistent with control points for the project route, including the U.S./Canada border crossing location and the Missouri River crossing point.

32. Keystone is proposing an open cut crossing for the Sheyenne River. The U.S. Army Corps of Engineers and the North Dakota State Health Department have to approve the method that Keystone uses to cross the Sheyenne River.
33. Aligning the Keystone Pipeline route and corridor adjacent to the existing Alliance Pipeline route would increase the length of the Keystone Pipeline by over 100 miles, which would increase the number of landowners affected and have a greater environmental impact.
34. The proposed route and corridor across the entire State of North Dakota minimize the impact to the environment and to the landowners of the State of North Dakota.
35. Construction of the Keystone Project will involve approximately 500 construction workers working on two spreads. One crew will start at the Canadian Border and work southerly approximately 130 miles and the second crew will start northeast of Valley City and work southerly to the South Dakota border.
36. Keystone estimates that with decent weather conditions, the pipeline crew will move approximately one-and-one-half mile per day, and landowners will be impacted on their land for approximately 8-12 weeks.
37. The typical construction right-of-way for the Keystone Pipeline will be 110 feet wide made up of a 50-foot permanent easement and a 60-foot wide temporary work space that will revert back to the landowner once construction is completed.
38. The Keystone Project will require additional work space in areas where there are large excavations, river and stream crossings, highways and railroads.
39. The Keystone Project will require 20-30 acre pipe yards for the storing of pipe, to be located approximately every 30 miles along the pipeline. Keystone tries to find land that has previously been used for some type of commercial use: if that type of land cannot be found, Keystone looks to farmland or other land.
40. The Keystone Project will have two or three 20-acre contractor yards in North Dakota.
41. Keystone Pipeline has prepared a detailed Construction Mitigation and Reclamation Plan (CMR Plan) that describes procedures for crossing agricultural, cultivated lands, wetlands, streams and the procedures for restoring or reclaiming and monitoring those features crossed by the project. The CMR Plan is a summary of the commitments that Keystone has made for environmental mitigation, restoration and post monitoring

compliance, and the adoption of these procedures minimizes the impact associated with the project.

42. Keystone's CMR Plan is a compilation of mitigation requirements that minimizes the impacts to land during construction. It covers all types of land the pipeline crosses including wetlands, water bodies, grassland, and pastureland. It also covers noise and dust control during construction, management of weeds, fire prevention and spill prevention and containment during construction.
43. The CMR Plan also covers dust control, control of noxious weeds, topsoil removal, storage and replacement, erosion and sediment control and reclamation.
44. Keystone will use ripping tools or para-plows to relieve compaction along the right-of-way, to return the agricultural land to the same compaction as adjacent land, and to return agricultural fields to their previous productivity.
45. The CMR Plan provides that Keystone will restore the land to the best of its ability to its original productivity.
46. FERC, the agency that predominantly regulates gas pipelines, typically requires topsoil to be removed up to a depth of 12 inches.
47. To the extent practical, all effects of pipeline construction will be mitigated. All lands disturbed will be returned to their current land uses. No permanent direct or indirect adverse effects are anticipated.
48. Keystone will bore the pipeline beneath any paved or well-maintained road.
49. The Keystone Pipeline Project does not cross public water supply wetlands or surface water supply in lakes.
50. Keystone must obtain a Clean Water Act Section 404 Permit from the Corps of Engineers, as well as a Section 401 Water Quality Certificate from the State of North Dakota. These permits will ensure protection of wetlands and other water bodies.
51. The North Dakota Health Department (DOH) division of water quality is responsible for water quality in the state.
52. Jim Horner, a geologist with DOH who deals with water quality testified that he was comfortable and satisfied with the location of the Keystone Pipeline Project from a groundwater perspective.

53. Michael T. Sauer is a senior scientist from the division of water quality DOH. Sauer administers the Clean Water Act Section 401 program for the state. Section 401 is a water quality certification process that applies to the Section 404 permitting process administered by the U.S. Corps of Engineers.
54. A Section 404 permit cannot be issued to the Keystone Pipeline Project without a Section 401 water quality certification from the DOH. Anything DOH puts into the Section 401 certification relative to water quality is transcribed verbatim into the Section 404 permit, as a condition of the 404 permit.
55. Clean Water Act Section 401 deals with surface water components, river crossings, wetland crossings and considers the construction methods used in river crossings.
56. DOH does not have the Section 404 application from the U.S. Corps of Engineers. Once the Section 404 application is complete it is put out for public review and review by other agencies.
57. DOH has the ability to change the route of the Keystone Pipeline Project with a denial of the 401 certificate. DOH will be looking closely at the Sheyenne River crossing relative to water quality, and ecological community structure dynamics on the river.
58. The North Dakota Game and Fish Department has indicated that it does not believe that the Keystone Pipeline Project will have any significant effects on wildlife or wildlife habitat, including rare or protected species provided best management practices are implemented.
59. Keystone, consistent with consultations with the U.S. Fish and Wildlife Service (USFWS) and consistent with discussions with the North Dakota Game and Fish Department, surveyed all the areas identified as being potential habitat for species on the endangered species list.
60. Keystone will be obtaining either a concurrence letter or a biological opinion from the USFWS. Keystone is not applying for a "take permit" and does not anticipate USFWS including a take permit in its opinion.
61. Seventy percent (70%) of the project surface disturbance will occur on agricultural lands that are annually tilled. These are lands that are already taken out of native habitat status.
62. Irreversible and irretrievable commitments of natural resources are anticipated to be minimal for the proposed project. Surface water will be used short term for hydrostatic testing but no extended consumptive use of water resources. All areas of natural vegetation within the right-of-way will be reclaimed, and no agricultural lands will be

taken permanently out of production except for land used to install above ground facilities, (i.e. pump stations and valves).

63. Impact to animal health and safety will be minimized through sound construction and operation practices.
64. Impact to plant life would be limited to the disturbed portions of the right-of-way.
65. Keystone will allow trees and shrubs to regenerate along the construction right-of-way and down to an approximate 30 foot strip over the permanent right-of-way.
66. Keystone has identified five locations where more than 110 feet of tree clearance may be needed for extra work space (EWS) in tree areas. This EWS would be limited to 25 feet beyond the standard 110-foot construction right-of-way.
67. Keystone will inventory trees and shrubs in a wood lot and riparian areas by using a sampling method. Trees in a shelter belt or narrow wind break 30 feet or less would be actually counted for the inventory.
68. As recommended by the North Dakota State Forester, Keystone has proposed to inventory trees in wind break and shelter belt areas that are 1-inch diameter at breast height and in non-wind break and non-shelter belt areas to inventory trees that have a 3-inch diameter at breast height.
69. Keystone agrees to inventory for replacement of all shrubs in areas where the topsoil is disturbed and not preserved.
70. Keystone needs 25-35 feet to weld and place the pipe on skids and to have equipment to travel along and pick up the pipe and place it in the ditch.
71. All the dirt that comes out of the trench (spoil) needs to be placed in the easement area.
72. Due to these construction and safety concerns, Keystone cannot safely limit the tree cuts to 50 feet width in wood lot areas. Keystone agrees to limit the width of construction right-of-way through these woody areas (in excess of 50 feet in length) to 85 feet where practical.
73. The proposed alignment of the Keystone Pipeline Project where it crosses the Pembina River is east of the area generally considered the Pembina Gorge. The pipeline will be horizontally directionally drilled under the river. The depth of the pipeline will be a minimum of 35 feet under the river and 40 feet under the trees.

74. The proposed facility will not affect any noise sensitive land uses, have no visual effect on adjacent areas, no impact on any extraction or storage resources and no permanent impact on wetlands.
75. Keystone will manage the sound levels of the five pump stations in North Dakota to EPA guidelines of 55 dBa at the nearest noise sensitive area. No residences or businesses are located within the 55 dBa perimeters from the pump station.
76. The proposed facility would have no impact on communication facilities.
77. The Keystone Pipeline Project in North Dakota requires easements across approximately 519 tracts of land. As of September 12, 2007, Keystone has acquired 344 easement agreements representing 66% of the total easements required in North Dakota.
78. Keystone's land agents have contacted landowners for environmental survey permission, cultural resource survey permission, civil survey permission and land acquisition.
79. Keystone conservatively estimates that in excess of 1,500 landowner contacts have been made with North Dakota landowners. Nine of these contacts have resulted in complaints. Keystone has investigated all of these complaints and has filed with the Commission the follow up actions that have been or will be taken by Keystone to address these complaints.
80. Keystone has written letters of apology to two landowners when survey crews inadvertently went on the landowner's property without permission and has implemented procedures to minimize the potential for miscommunication between landowners and survey crews.
81. Keystone has received survey permissions from 95 percent of the landowners in North Dakota.
82. Keystone takes landowner relations very seriously because pipelines will continue to be a neighbor with the landowners after construction.
83. If in the future a landowner wishes to develop land that is subject to a Keystone Pipeline easement, the landowner can build up to the 50-foot permanent easement (25 feet either side of center of the pipeline).
84. Keystone conducted a threat analysis as part of the environmental review process under the National Environmental Policy Act (NEPA), using industry lists and the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) guidelines, and determined the applicable threats to the Keystone pipeline. Keystone then developed

safeguards as part of the project design, construction, and operations to protect against each of these potential threats.

85. Keystone considered manufacturing defects. To safeguard against such defects, Keystone qualifies all pipe mills and steel manufacturers using a formal qualification process consistent with the industry and international standards to which quality control is managed in the industry.
86. The pipe is engineered with stringent chemical requirements. Each batch of pipe is mechanically tested to prove its strength, fracture control and fracture propagation property.
87. Pipe in the mill is hydrostatically tested for seam defects. Pipe seams are inspected using ultrasonic instruments and visually inspected. Coating is applied in the mill and the coating plants have similar quality control procedures.
88. Keystone considered construction damage. To safeguard against such damage, Keystone will follow applicable industry guidelines for overland transportation and barging over water. The pipe is examined selectively once offloaded from railcars using ultrasonic techniques. The pipe welds which are joined in the field are non-destructively inspected. One hundred percent of the girth welds are inspected.
89. An electronic device called a holiday detector or jeep will traverse along the pipe to check for any nick or damage to the coating and repair it before the pipe is put into the trenches. Any defects in the coating are repaired prior to lowering the pipe into the ditch.
90. The pipe is again hydrostatically tested once placed in the ditch. At the completion of construction, Keystone will fill the pipeline with water and hydrostatically test the pipeline for leaks and for the integrity of the pipeline as constructed. The pipeline is tested to 125% of its maximum operating pressure. Any pipe that is failed under hydrostatic testing is removed and replaced and the pipeline is again tested.
91. Once construction is complete, Keystone will run an in-line inspection tool (caliper pig) to check for dents or ovalities. Any defects found will be removed.
92. Keystone considered corrosion damage. To safeguard against external corrosion damage, a fusion bond epoxy (FBE) coating is applied to the pipe. In addition, the pipeline has a cathodic protection system that impresses current onto the pipeline to protect it from corrosion in the event any coating is damaged and not repaired or missed during the repair process. In the 28 years that TransCanada has been using FBE coating, there have been no leaks on this type of pipeline using FBE coating coupled with cathodic protection.
93. To protect against internal corrosion, Keystone's tariff will restrict the amount of solid and water that is acceptable in the crude oil transported. In addition, Keystone is

designed to transport crude oil in turbulent flow so that the oil will move at a velocity at which water drop out is minimal and there is no stagnant water in the pipeline.

94. Keystone also uses cleaning tools during the life of the pipeline and periodically inspect the pipeline to push out any standing water that may remain at low points. To mitigate against internal and external corrosion, Keystone uses in-line inspection tools outfitted with sensors that can detect metal loss on internal and external pipe walls.
95. Keystone considered mechanical damage, which is damage that results from contact with the pipeline. Keystone will utilize high-strength carbon steel, that is engineered with puncture resistance.
96. The pipeline will be buried at four feet, which drastically reduces the likelihood of contact with the pipeline.
97. Keystone will conduct air patrols per code requirements, which is 26 times a year, not to exceed three weeks apart, to monitor for third-party activity. Keystone will participate in the State One-Call program, install marker signs, and implement a public awareness program.
98. Keystone considered hydraulic damage. There are two safeguards in place for the overpressure protection of the pipeline. The SCADA system controls the valves and brings pressure, temperature, and other data to the control center. Also, operator training serves to protect against overpressure of the pipeline.
99. Keystone is using the State One Call System to locate existing utilities, waterlines and septic systems, fiber optic cables, sewer lines and other utilities. Keystone works with these utilities and will enter into agreements concerning inspection and methods of crossing these utilities.
100. Three years after the pipeline has been placed into operation, Keystone will conduct an in-line inspection to ensure the integrity of the pipeline it manages, and will investigate any anomalies found by this inspection.
101. Normal farming practices would not impact the pipeline, because it is designed to manage any stress of equipment crossing the pipeline.
102. Check valves close virtually instantaneously at a detection of a pressure loss. The automated block valves close within three minutes of an emergency shutdown.
103. Pipelines are the safest method of transporting crude oil. To transport 435,000 barrels would require 7,000 trucks to transport the oil every day.

104. There are approximately 2,124 miles of hazardous liquid pipelines in North Dakota. Approximately 1,024 miles of the total are crude oil pipelines.
105. There have been 14 pipeline incidents in the last 20 years related to crude oil facilities in North Dakota. Eight occurred at pump stations, one occurred at a tank farm and five occurred on the pipeline. There is a clear correlation between older pipeline vintage and pipeline failure incidents.
106. Since the implementation of DOT PHMSA integrity management rule for hazardous liquid pipelines in 2001, only one incident has occurred in North Dakota, and that was caused by third-party damage.
107. The Keystone Pipeline Project will have a SCADA system (Supervisory Control and Data Acquisition) system. It is comprised of three components: (i) equipment installed at the pump stations and valve sites; (ii) a communications link so the equipment can speak to the host system in the control center in Calgary; and (iii) the host system installed in the operations control center in Calgary that allows the operator to remotely control and operate the pipeline.
108. The host system is a fully redundant system. There is one operating system plus a "hot standby" system that can be utilized in the event of trouble with the primary system.
109. Within the host system are automatic systems that ensure that the line cannot be over-pressurized at any time. There are also protective features in the local systems installed at the pump stations to ensure that, in the event of a communications failure, the local equipment will take over and ensure that the line cannot be over-pressurized.
110. Keystone will have a number of complimentary leak detection systems available within the operations control center, which is manned on a 7-day a week basis, 24 hours a day.
111. The first system consists of the operators monitoring the system. They monitor the flow information coming back from the remote locations and typically are capable of detecting leaks very rapidly down to a level of 25 to 30 percent of the pipeline flow rate.
112. The second system is a software based, volume-balance system that looks at the volume going into the system and out of the system and compares the two. This system is capable of detecting leaks down to a limit of about five percent.
113. The third part of the leak detection system is a computational pipeline monitoring system that breaks the pipeline down into smaller segments bounded by flow measurement equipment. It measures volume into and out of a segment every few seconds and looks for discrepancies. Any discrepancies are added up quickly and an alarm will sound.

114. Keystone estimates that leaks at the 1.5 to 2 percent threshold will be detected by the computational monitoring system within 140 minutes. Very small leaks, which could be measured in drips per hour, may take up to 90 days to detect. Leaks just below the 1.5 percent threshold would be discovered much sooner than 90 days.
115. The final system used to detect leaks is direct observation, which includes aerial patrols, ground patrols, public and landowner awareness programs, design to encourage reporting of leaks and other events that may suggest a threat to the integrity of the pipeline.
116. Control center operators monitor the volume balance system, and if they notice a discrepancy that is not large enough to trigger an automatic alarm, they will take action to verify such as shutting down the pipeline and isolating it into segments to determine if a segment is losing pressure.
117. Leaks that are small in nature will come to the surface due to the fact that the dirt placed over the top of the pipeline has not been compacted to the same degree as the virgin ground on either side. Small leaks don't leave the right-of-way, but migrate to the surface following the path of least resistance.
118. Keystone's leak detection system meets or exceeds the requirements of 49 CFR Part 194 and 49 CFR Part 195.
119. Keystone has prepared a preliminary Emergency Response Plan (ERP) as prescribed by 49 CFR Part 194 and contained in Appendix A of the application (July 6<sup>th</sup> supplemental filing).
120. Keystone will prepare and submit a completed ERP to PHMSA (Pipeline Hazardous Materials Safety Administration) for review in the first quarter of 2009, prior to the commencement of operations.
121. Under the ERP, Keystone will have first responders (Keystone employees or contract personnel), on call 24 hours a day 365 days per year, located at various points along the Keystone Pipeline Project, typically near High Consequence Areas.
122. Under the ERP Keystone will deploy site specific emergency response equipment at various points along the Keystone Pipeline Project.
123. Under the ERP the pipeline is divided into three response zones. Response zone one begins at the Canada/U.S. border and proceeds to a point just in the southern part of South Dakota where response zones two and three then cover the balance of the system.
124. Keystone maintains a 24-hour response or contact phone number which is posted on all of the right-of-way signs, facility signs, published within all of Keystone's public

awareness materials and provided annually to all property owners along the pipeline route.

125. Under the ERP, spill detection and on-scene spill mitigation procedures are identified which would include the SCADA system which will continuously monitor the pipeline conditions and update information provided to the OCC operator.
126. If there was a leak from the Keystone Pipeline Project, DOH would be involved in the assessment and abatement of the leak, and require the leak to be cleaned up, excavation, and whatever else is required.
127. The Keystone Project will be monitored 24-hours a day, 365-days a year. It will have a computer system that will detect changes in pressure along the pipeline and ensure that all of the facilities are working properly.
128. Preliminary spill analysis was done for the Keystone Pipeline Project by DNV Energy, a recognized industry expert.
129. DNV estimated the chance of a leak for the Keystone Pipeline to be no more than one every 7 to 11 years over the entire length of the pipeline.
130. Using the most conservative frequency interval of 7 years, the DNV estimate equates to a spill of no more than one in 42 years on the 218 miles of pipeline in North Dakota.
131. Approximately 80% of the aquifers along the entire Keystone Pipeline Project are overlain by low permeability soils and confining materials that would inhibit the infiltration of crude oil to the aquifers.
132. Additionally, the majority of aquifers are more than 50 feet deep, so the majority of aquifers crossed by the pipeline have a low susceptibility to contamination and the chance of a spill occurring at a location that could impact an aquifer is very low.
133. Studies show that if a spill does happen to reach an aquifer, the extent of contamination is actually quite small in area.
134. At the Bemidji, Minnesota spill, where 10,000 barrels (42,000 gallons) were released, the BTEX, (benzene, toluene, ethyl benzene and xylene), plume moved 170 yards from the crude oil source over a 20-year period.
135. In 500 sites with BTEX contamination, the EPA found that BTEX moves much slower than the groundwater because of natural attenuation, i.e. microbes eating the hydrocarbons.

136. At these 500 sites 75% of BTEX plume moved less than 250 feet from the source of contamination and in 80% of the cases the plume was stable or decreasing in size.
137. Since 2002, the median-sized oil spill (half spills more and half spills less) reported to PHMSA is 12 barrels or 500 gallons.
138. At the Bemidji spill vegetation across the majority of the site looks just like the non-contaminated right-of-way. Where vegetation is sparse, topsoil had been stripped and never replaced.
139. Most spills are small. In order for the oil spill to get out of the trench and mobilize itself to get into a stream channel, it would have to be a large spill, (thousands of barrels.).
140. Keystone evaluated the risk of a spill from the proposed Keystone Pipeline route to the Fordville Aquifer.
141. This analysis included evaluation of terrain, stream flow, overland transport, sub-surface transport, combined with probability of spill.
142. The margin of the Fordville Aquifer at its closest point is approximately three linear miles away from the Keystone Pipeline route.
143. The groundwater wells in the Fordville Aquifer are 6.5 miles from the Keystone Pipeline.
144. The depth of the groundwater in the Fordville Aquifer is 0 to 30 feet and averages 20 feet.
145. The soils in the area are permeable with infiltration rates of 0.4 to 12.6 feet per day.
146. There is a 200 foot in elevation from the pipeline over the three miles to the margin of the aquifer. This calculates to a 1.3% slope and is relatively flat. This slope will not significantly enhance overland transport.
147. If a spill occurred, most spills would be contained in the pipeline trench or slightly adjacent to it.
148. There is a check valve in the Fordville Aquifer area around mile post marker 49.
149. If a very large spill occurred, the oil could come out of the trench and move following the terrain downhill. The overland movement is limited to a few hundred feet and no more than a half mile, because the crude oil adheres to soils and vegetation. Because of the distance oil would have to travel between the pipeline and the Fordville Aquifer, overland transport is eliminated as a viable exposure route.

150. Transport down a dry stream channel was eliminated as a viable route, since oil would only have to travel the three and one-half river miles to reach the margin of the aquifer. If a spill reached a dry channel, oil would adhere to soils and vegetation. Even with a large spill volume, the movement of oil would be limited to no more than one-half mile. As a result, the chance of a spill reaching the aquifer via a dry stream channel is highly improbable.
151. The entire Middle Branch and the North branch of the Forest River across the majority of the Fordville Aquifer are gaining stream reaches, meaning that groundwater from the Fordville Aquifer is pushing up from below and flowing into these streams.
152. In the area of the gaining stream reaches, the chance of a spill is no more than once in 4,800 years. If a spill occurred and it was large enough to get to a flowing stream channel, and if it reached the Fordville Aquifer, it would float on the water. Dissolved constituents from the oil could not enter the aquifer itself since it is a gaining stream reach (i.e., water from the aquifer is entering the stream). In addition, there would be time for emergency response teams to get there, contain, and start cleanup.
153. In a gaining stream reach, there is no chance for the contaminants to push down and get into the aquifer itself.
154. The northern portion of the North Branch of the Forest River is a losing stream reach, where water from the stream enters the Fordville Aquifer. There are 1.9 miles of pipe where a hypothetical oil spill could potentially transport oil to the margin of the aquifer, assuming water was flowing at the time of the spill. Using the most conservative spill frequency, a spill is estimated in the losing stream reach to occur no more than once in 8,300 years.
155. For a spill to reach the losing stream reaches, it would have to be large enough to get to the river channel, then be transported downstream to the margin of the Fordville Aquifer which would take two hours. It is five miles to the surficial portion of the aquifer, and ten miles to the wells. However, the public wells are not along the stream channel where a hypothetical oil spill would be contained. Consequently, for the public wells to become contaminated, the oil's dissolved constituents (e.g. BTEX compounds) would need to be transported subsurface in the aquifer for miles to reach the well intakes. Crude oil and its constituents would not move that far.
156. Only five percent of the recharge of the Fordville Aquifer comes from the upper reaches of the North Branch of the Forest River. Because it is such a small fraction of the total recharge, any contaminants would be diluted.

157. Trace metals in the crude oil are complexed with the crude oil itself, meaning that they prefer to be with the hydrocarbons with which they are bound. Therefore, their toxicity is lower since they are less bioavailable than free elements.
158. Crude oil floats on top of surface water and groundwater. Typically, oil is confined by the soils and materials around it. The crude oil would not move great distances. It has a high affinity to soil, and it is hard for crude oil to move in the soil.
159. The crude oil itself would not migrate substantially. The dissolved constituents, such as the BTEX compounds would likely move only hundreds of feet. Consequently, in the event of a spill, crude oil would not likely be transported three miles to reach the aquifer, nor would the constituents be capable of reaching the public water wells. Therefore, subsurface transport is eliminated as a viable exposure route.
160. If the BTEX contamination got into the aquifer, the compounds movements would be limited to hundreds of feet, not miles. The contaminants will not reach the public water wells.
161. Considering a combined chance of a spill occurring in the 1.9 miles, feeding into the losing stream portion of the North branch of the Forest river, the spill would have to be large enough to get out of the trench and would have to get into a flowing intermittent stream, be transported all the way downstream, and then dissolved constituents would have to get into the Fordville Aquifer in sufficient concentrations is highly improbable. The chance of these constituents then traveling miles from the stream channel to reach the public wells is highly improbable.
162. Jim Horner, North Dakota Department of Health – Groundwater Quality, concurred with Keystone's spill risk analysis witness, Heidi Tillquist, in her testimony concerning the location of the Keystone Pipeline in the Lake Ashtabula and Fordville Aquifer areas.
163. Horner agreed that the location of the Keystone Pipeline in the Fordville area is safe in its present location and that Horner is not concerned about the risk of the Keystone Pipelines to the Fordville Aquifer.
164. At the public hearings in Valley City and Park River, some members of the public suggested that the pipeline route should be moved either to the east of the Fordville Aquifer or further to the west.
165. Keystone looked at a route concept to the east of the Fordville Aquifer.
166. The east route concept involved a route length of 160 miles, was 15 miles longer than the proposed Keystone Pipeline route, involved more road crossings, more stream crossings and approximately 2 more miles (29 more acres) of wetland crossings.

167. The west route concept involved a route 8-9 miles west of the current proposed Keystone location. The western route concept is three miles longer than the currently proposed Keystone Pipeline route and involves over ten times the quantity of wetlands (2.7 more miles and 43 more acres of wetlands).
168. Both the eastern and western route concepts in the Fordville area would affect a greater number of landowners and are inferior from an environmental impact standpoint to the proposed Keystone route alignment.
169. The Fordville alternative route concepts would have a greater environmental impact than the proposed Keystone Route.
170. The proposed Keystone Pipeline alignment in the Fordville area represents the minimal environmental impact and minimal impact to the landowners.
171. Keystone has acquired easements from 230 of the 358 property owners or 64% of the easements along the section of the proposed Keystone right-of-way that would be affected by the eastern route concept.
172. Keystone has acquired easements from 70 of the 118 tracts of land or 59% of the easements along the proposed Keystone right-of-way that would be affected by the western reroute concept.
173. The western route concept in the Fordville Aquifer area would only decrease the risk of a spill reaching the Fordville Aquifer slightly.
174. A leak would have to be thousands of barrels in order to get out of the pipeline trench, start moving across the ground, get into the channel and then get downstream in sufficient volumes to cause any adverse effects downstream. That size of spill would be capable of being detected and would trigger the emergency response plan.
175. Regardless of whether the proposed Keystone Route or the western route concept is used, there is not any way for the contaminants within the oil to traverse the distance to get to the public water intakes.
176. The western route concept in the Fordville area would have a known environmental impact that will occur on the wetlands. The known impact on wetlands has a greater weight than a rare, hypothetical event, which conservatively would be expected to occur no more than once in 8,300 years and even then would be highly improbable to get to the public wells.

177. The total proposed Keystone route alignment through the State of North Dakota crosses approximately 14.7 miles (197 acres) of wetlands. This amounts to approximately 6% of the total construction disturbance.
178. The Keystone pipeline is safe where it is proposed to be located in the Fordville area. It does not pose a significant threat to the Fordville Aquifer, so moving it is not going to significantly change the overall assessment.
179. At the direction of the Commission, Keystone engaged Richard Kuprewicz of Accufacts, Inc., an independent pipeline consulting firm, to provide a review of external leak detection systems and a recommendation for pipeline leak detection in the vicinity of the Fordville Aquifer.
180. Accufacts reported that Keystone's current design approach using internal computer-based leak detection (computational pipeline monitoring CPM) is more appropriate for the location. A CPM leak detection system is better suited to identify high-rate pipeline releases that even though a low probability might reach the boundaries of the Fordville Aquifer in unusual conditions.
181. In Accufacts' opinion, external leak detection systems are not warranted in the Fordville Aquifer area because the pipeline is not located in an "ultra-sensitive area."
182. Less than 0.1% of the approximately 200,000 miles of liquid transmission pipeline in the United States currently incorporate real-time computer-based external leak detection systems.
183. The use of external vapor detectors is not a general practice that is used in the pipeline industry.
184. Accufacts concluded that because of the various factors, (e.g., distance from Keystone Pipeline, low gradient of terrain between the pipeline and aquifer, soil conditions, as well as characteristics of the crude oil blends), low rate or a seepage leak is not a legitimate threat to the Fordville Aquifer.
185. The western reroute concept in the Fordville area has not been refined into an actual route. If the Commission required Keystone to adopt the western reroute concept as an actual reroute, thereby requiring Keystone to move a 50-mile segment of the pipeline route eight miles to the west, a number of issues would arise which would have a significant on the Keystone project schedule.
186. The so-called western reroute is only a concept at this time and that there has not been any routing work done on what is currently only a line on a map. In order to develop an

actual route in this area, Keystone would have to follow the route development steps testified to by witness Koski.

187. This work could not start until issuance of the Commission's decision in this case, which is anticipated in November.
188. The work would start with the collection of data on the new 50-mile segment and the development of an initial route proposal based on that data. Keystone would have to solicit agency and public input on the initial route proposal and engage in further route refinement based on that input. This route refinement process would take two to three months.
189. Keystone would be required to undertake cultural surveys, wetland surveys, and civil surveys, as well as updating its risk and consequence analysis and rerunning its hydraulic analysis. The additional surveys and studies would then have to be incorporated into further route refinement. This work would probably take on the order of another three months.
190. The cultural surveys and other studies could not be done in the winter and would probably not commence until April 2008.
191. When all of this work was completed, presumably Keystone would have to file the new route proposal with the Public Service Commission for review.
192. The reroute would be submitted to the Department of State along with the studies and surveys. The magnitude of the proposed reroute would likely trigger a supplemental NEPA process that could take six to nine months.
193. At the public hearing in Valley City a suggestion was made to move the pipeline to the east further away from the Sheyenne River and Lake Ashtabula.
194. Shifting the pipeline one and one half to two miles to the east puts the pipeline in the drainage system of the Maple River which drains into the Sheyenne. It would also move the Pipeline closer to shallow aquifers and involves crossing one and a half more miles of wetlands.
195. The Sheyenne River Alternative Route Concept would have a greater environmental impact than the proposed Keystone Route.
196. The proposed Keystone Pipeline alignment in the Sheyenne River-Lake Ashtabula area minimizes the impact to the landowners and to the environment.

197. In the Sheyenne River-Lake Ashtabula area the pipeline is over two and one-half linear miles away from the water body, so sub-surface transport is not a viable route for crude oil to reach the Sheyenne River or Lake Ashtabula. The terrain is flat to the Sheyenne River, so overland transport is not a viable route for the crude oil. All of the intermittent streams, except for one stream that is right at the Sheyenne River, are at least 1.6 miles away from the river and, when dry, would not be a viable route for crude oil to reach the Sheyenne River.
198. The overall pipe that could contribute to a spill reaching the river is 2.8 miles. This results in a conservative risk of a spill reaching the river at once every 5,400 years.
199. The Keystone Pipeline is located in the Sheyenne River-Lake Ashtabula area it is on a terrace where the slope is zero.
200. The spill frequency figures considered any size spill. In order to get to the river a large spill of thousands of barrels would need to occur. To calculate the risk associated with a large spill, it would add a couple zeros to the already big frequency interval numbers.
201. The Keystone Pipeline is safe where it is proposed to be located in the Sheyenne River and Lake Ashtabula area. The risks to the Sheyenne River and Lake Ashtabula are low. In discussing the proximity of the Keystone Pipeline to Lake Ashtabula, Jim Horner concurred with the testimony of Heidi Tillquist, that the pipeline is safe at its present location. Mike Sauer testified that he will be looking very closely at the Sheyenne River crossing relative to water quality.

From the foregoing Findings of Fact, the Commission now makes its:

#### **CONCLUSIONS OF LAW**

1. The Commission has jurisdiction over the applicant, Keystone, and over the subject matter of this application under North Dakota Century Code Chapter 49-22.
2. The pipeline proposed by Keystone is a transmission facility as defined in North Dakota Century Code Section 49-22-03.
3. Keystone's proposed pipeline is of such length, location and purpose that it will minimize adverse effects upon the environment, and upon the welfare of the citizens of North Dakota, while ensuring continuing system reliability, integrity and efficient use of natural resources.
4. Keystone's proposed route is compatible with preservation of the environment and efficient use of resources.
5. It is appropriate for the Commission to issue Keystone a Corridor Certificate and Route

Permit.

From the foregoing Findings of Fact and Conclusions of Law, the Commission issues its:

### **ORDER**

The Commission Orders:

1. Keystone's application for a waiver of procedures and time schedules as requested in the application, including the request for a single consolidated application for Corridor Certificate and Route Permit, is granted.
2. Certificate of Corridor Compatibility Certificate Number \_\_\_\_ designating a transmission facility corridor is issued to Keystone.
3. Route Permit Certificate Number \_\_\_\_ designating a transmission facility route is issued to Keystone.
4. A preconstruction conference shall be held prior to commencement of any construction, which must include a Keystone representative, its construction supervisor, and a representative of Commission Staff to ensure that Keystone fully understands the conditions set forth in this Order.
5. Keystone shall comply with the rules and regulations of all other agencies having jurisdiction over any phase of the proposed pipeline, and that it shall obtain all other necessary licenses and permits, and shall provide copies of all licenses and permits to the Commission that apply to North Dakota prior to construction of the pipeline.
6. Keystone shall inform the Commission of its intent to start construction on the pipeline prior to the commencement of construction, and once construction has started, it shall keep the Commission updated on construction activities on a weekly basis.
7. The pipeline shall be buried to a minimum depth from the ground surface to the top of the pipe of 48 inches in rangeland, 48 inches for cultivated land, 48 inches at the bottom of the ditch for road crossings, and 72 inches across undeveloped section lines, except in areas of consolidated rock, where after obtaining approval from Commission Staff, the pipeline will be buried to a minimum depth of 36 inches.
8. Keystone shall construct and operate the pipeline in the manner described in Keystone's application as revised at the hearing and in late filed exhibits and supplemental materials, and in accordance with all applicable safety requirements.
9. Keystone shall prepare and implement an Emergency Response Plan which will be in place prior to putting the pipeline into operation.

10. Keystone shall promptly report to the Commission the presence in the permit area of any critical habitat of threatened or endangered species, or of bald or golden eagles which Keystone becomes aware of and which were not previously reported to the Commission.
11. All cultural resource mitigation plans must be submitted to the North Dakota Historic Preservation Office (SHPO) for approval prior to the start of any fieldwork and construction activity. If any cultural resource, paleontological, archeological, historical, or grave site is discovered during construction, it must be marked, preserved and protected from further disturbances until a professional examination can be made by the State Historical Society, a report of such examination is filed with the Commission, and clearance to proceed is given by the Commission.
12. All crossings of graded roads shall be bored unless the responsible governing agency specifically permits Keystone to open cut the road.
13. All pre-existing roads and lands used during construction must be restored to a condition that will accommodate their previous use, and areas used as temporary roads or working areas during construction must be restored as close as practical to their original condition.
14. Construction must be suspended when weather conditions are such that construction activities will cause irreparable damage, unless adequate protection measures approved by the Commission are taken.
15. To the extent available, in agricultural lands, at least 12 inches of topsoil or topsoil to the depth of cultivation, whichever is greater, over and along trench areas where cuts will be made, must be stripped and segregated from the topsoil. Any area on which excavated subsoil will be placed must also be stripped of topsoil if requested by the landowner. After backfilling is completed, any excess subsoil must be placed over the excavation area, blending the grade into existing topography. Topsoil must be replaced over areas from which it was stripped only after the subsoil is replaced.
16. Reclamation and cleanup along the right-of-way must be continuous and coordinated with construction, subject to seasonal weather considerations.
17. Reclamation, fertilization, and re-seeding are to be done by Keystone according to the Natural Resources Conservation Service recommendations, unless otherwise specified by the landowner.
18. Keystone's obligation for reclamation and maintenance of the right-of-way will continue throughout the life of the pipeline, as outlined in Section 4.15 of the Construction Mitigation and Reclamation Plan attached to the application as Appendix G.
19. The width of clear cuts through shelter belts shall be kept at a maximum of 50 feet, the width of clear cuts through extended lengths of wooded areas shall be kept to a maximum of 85 feet where possible.

20. Keystone must obtain approval from the Commission or from Commission Staff prior to any changes in the pipeline route or structure locations.
21. Keystone shall provide the Commission with a copy of the pipeline alignment drawings with alignment data showing the pipeline as built (hard copy and electronic versions), and an electronic version of the as-built pipeline that can be imported into ESRI GIS mapping software, within 6 months of the completion of the construction.
22. The authorizations granted by the corridor certificate and route permit are subject to modification by order of the Commission if deemed necessary to further protect the public or the environment.
23. Keystone shall comply with the Tree and Shrub Mitigation specifications attached as Exhibit 1 to this Order.
24. Keystone shall file for Commission approval the crossing method it intends to use in crossing the Sheyenne River, including in the filing of the method Keystone determines to be most appropriate, as well as an analysis of other crossing methods.
25. After the corridor and route certificates have been issued and all costs of hearings, publication, and any other related expense have been paid from the application fee, the Commission shall refund all but \$\_\_\_\_\_ of the remaining application fee. If the balance of the application fee at the time is less than \$\_\_\_\_\_, the Commission shall retain the entire amount. When construction and reclamation are complete and when the Commission has concluded that Keystone's tree mitigation project is satisfactory, the remaining balance of the application fee shall be refunded.

## PUBLIC SERVICE COMMISSION

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**Tony Clark**  
Commissioner

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**Susan E. Wefald**  
President

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**Kevin Cramer**  
Commissioner

## Tree and Shrub Mitigation Specifications

### Inventory

1. Trees and shrubs as described in item 2 will be inventoried utilizing the following plot sample method:
  - a) Aerial photographs along the project route will be utilized to identify windbreak/shelterbelt, woodlot and riparian area locations for random field plot sampling.
  - b) Ten to twenty percent (10% - 20%) of the locations for each category (windbreak/shelterbelt, woodlot, riparian) area will be randomly selected for field plot sampling.
  - c) At each selected sampling location, two sample plots will be established. Within each sample plot, all trees and shrubs will be identified, measured and recorded.
  - d) The data from the sample plots for each category will be extrapolated to the total acreage of the windbreak/shelterbelt, woodlot or riparian areas to be cleared to determine the types and quantity of trees and shrubs to be replaced.
  - e) At narrow windbreak/shelterbelt sample locations (30 feet or less in width), trees and shrubs will be counted.
2. Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (e.g., *Caragana arborescens*, *Elaeagnus angustifolia*, *Rhamnus cathartica*, *Tamarix chinensis*, *T. parviflora*, *T. ramosissima*, *Ulmus pumila*), shall be inventoried before cutting. The inventory shall record the location, number, and species of trees and shrubs.
3. In windbreaks and shelterbelts, trees that are 1 inch diameter at breast height ("dbh") or greater, and shrubs anticipated to be cleared shall be inventoried for replacement.

4. In non-windbreak and non-shelterbelt areas, trees anticipated to be cleared that are 3 inch diameter at breast height ("dbh") or greater shall be inventoried for replacement.

5. In non-windbreak and non-shelterbelt areas, shrubs anticipated to be cleared in that portion of the permanent right-of-way where shrubs will not be allowed to re-grow (maintained corridor) shall be inventoried for replacement.

6. In all areas outside the maintained corridor, shrubs shall be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil shall be preserved and replaced after construction. Shrubs shall be allowed to regenerate naturally where native topsoil is preserved and replaced. In the event that topsoil is disturbed and not preserved and replaced, shrubs anticipated to be cleared in those areas shall be inventoried for replacement.

#### **Clearing**

7. Trees and shrubs shall be selectively cleared, leaving mature trees and shrubs intact where practical.

8. The width of construction right of way clear cuts through woody areas shall be limited to 85 feet or less where practical.

9. If trees or shrubs are cleared from areas outside of the inventory areas, the number of trees or shrubs cleared from those areas shall be noted on the inventory.

#### **Replacement**

10. Prior to tree/shrub replacement, documentation identifying the number and variety of trees removed as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings shall be filed with the North Dakota Public Service Commission (NSPSC) for approval.

11. Tree replacement shall be on a 2 to 1 basis with 2-year-old saplings. Shrub replacement shall be on a 2 to 1 basis with stem cuttings.

12. Trees and shrubs shall be replaced by the same species or similar species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.

13. Tree and shrub replacement shall not be conducted in the 20 to 30 feet of the permanent maintained corridor to facilitate visual inspections of the right-of-way in accordance with U.S. Department of Transportation safety regulations.

14. Keystone will advise each landowner in writing of their right to elect to have replacement trees/shrubs planted off the ROW on the landowner's property in accordance with this Tree and Shrub Mitigation Specifications document. Landowners will be provided with 60 days to elect to exercise this right by advising Keystone in writing of that election. If a landowner does not so exercise his or her right within 60 days, the landowner shall be deemed to have waived the right.

15. At the conclusion of the project, documentation identifying the actual number, variety, type, location and date of the replacement plantings shall be filed with the NDPSC.

16. Tree/shrub replacements planted by Keystone shall be inspected once a year for three years, on or about the anniversary of the plantings. On or shortly before October 1 of each year, a report shall be submitted to the NDPSC documenting the condition of replacement planting. If the survival rate is less than 75 %, the commission may order additional plantings.