

BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF DERRIC ILES
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009

BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA
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Q. State your name.

A. Derric Iles.

Q. State your employer.

A. State of South Dakota, Department of Environment and Natural Resources.

Q. State the program for which you work.

A. Geological Survey Program.

Q. State the program roles and your specific job with the department.

A. The mission statement of the Geological Survey Program concisely describes the role of the Geological Survey Program. That mission statement is provided below.

To conduct geologic studies, hydrologic studies, and research; and to collect, correlate, preserve, interpret, and disseminate information, leading to a better understanding of the geology and hydrology of South Dakota. Special emphasis is placed on ground-water quantity and quality and other natural resources of economic value. The Survey has no regulatory authority; instead, it provides information and interpretations on natural resources and related issues, and assists agencies and individuals in making well-informed decisions.

I am the State Geologist and Administrator of the Geological Survey Program. In that capacity, I plan, organize, and direct the activities of the Geological Survey Program. I administer the activities conducted by Program employees who use their technical and scientific expertise to locate, describe, map, and evaluate the natural resources of South Dakota. I also provide advice and expertise to the South Dakota Department of Environment and Natural Resources, other governmental agencies, consultants, and the public.

Q. Explain the range of duties you perform.

A. My duties include the following.

- Collection and analysis of data.
- Preparation and review of technical reports and maps.
- Coordination and implementation of projects and contracts related to the Geological Survey Program.
- Providing technical advice to DENR's regulatory Programs, upon request, related to permit applications or appeals.
- Providing advice and guidance to Geological Survey personnel and to entities and individuals external to the Geological Survey.
- Providing work direction to Geological Survey personnel.
- Planning of long-range Geological Survey Program activities.
- Securing the cooperation and coordination of external individuals and entities for the betterment of activities performed by Geological Survey personnel.
- Tracking agency performance and maintaining acceptable progress and productivity.
- Maintaining an adequate inventory of supplies and parts needed for the day-to-day operations of the Geological Survey Program.
- Assessment of the need for purchase of capital assets necessary to maintain productivity and to meet expected project demands.

Q. On whose behalf was this testimony prepared?

A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities Commission (Staff).

Q. Are there any geological and/or hydrological sensitive areas crossed by the Keystone XL pipeline?

A. Yes.

Q. Please briefly summarize each.

A. Geologically Sensitive Area – Paleontological Resources

Page 37 of the permit application refers to the fossil (paleontological resource) potential of two geologic units: the Ludlow Formation of the Fort Union Group and the Hell Creek Formation. I concur with statements in the application indicating that there is high potential for encountering fossil resources in these two geologic units, however; only a small length of the proposed pipeline route in South Dakota is directly underlain by the Ludlow Formation. The permit application also refers to the Fox Hills Sandstone and the Pierre Shale as having potential for containing fossils. I concur with this as well.

Additionally, there is the possibility that fossils could be encountered in other geologic units along the proposed pipeline route. For example, the Valentine Formation of the Ogallala Group is known to have vertebrate fossils. There is no way to know the locations of all fossil resources in advance of construction activities.

Hydrologically Sensitive Area – Surface Water

Drainages containing a surface flow of water are hydrologically sensitive. The permit application states on page 44 that “A total of 12 perennial streams and rivers, 109 intermittent streams, and 182 ephemeral streams will be crossed in South Dakota during the construction of the Project.” Flowing surface water would have the potential to carry sediment disturbed during construction in a downstream direction.

Hydrologically Sensitive Area – Ground Water

The area comprised by sediments of the High Plains aquifer is hydrologically sensitive. This aquifer is mentioned on page 46 of the permit application and, along the proposed pipeline route, occurs only in Tripp County. I examined the records of 21 wells that have locations near and along the proposed pipeline route in the area of Tripp County that contains the High Plains aquifer. These well records were obtained from a database maintained by the Water Rights Program, Department of Environment and Natural

Resources. These records indicate sand or sandy sediments beginning at depths from land surface ranging from 0 to 11 feet and extending to depths ranging from 16 to 55 feet. The static water levels listed in those records ranged from 4 to 25 feet below land surface. These thicknesses of sand or sandy sediment and static water levels along the proposed pipeline route are consistent with a 2004 South Dakota Geological Survey publication titled "Hydrogeologic Assessment of the High Plains Aquifer in Tripp and Gregory Counties, South Dakota" that shows the saturated thickness of the aquifer along the proposed pipeline route to be less than 50 feet. The High Plains aquifer sediments along the proposed pipeline route occur at or very near land surface, have a shallow depth to water (the water table in this case), and are generally permeable. The quality of water in the High Plains aquifer, such as the water distributed by the Tripp County Water User District, is often very good.

A comparison of the proposed pipeline route with the surface geology shown on the Geologic Map of South Dakota (published in 2004 by the South Dakota Geological Survey) shows that the proposed pipeline route crosses the following ten geologic units (listed in alphabetical order):

- Alluvium
- Eolian deposits (part of the High Plains aquifer where in contact with Ogallala Group)
- Fox Hills Sandstone
- Hell Creek Formation
- Ludlow Formation of the Fort Union Group
- Ogallala Group (part of the High Plains aquifer)
- Pierre Shale
- Terrace deposits (part of the High Plains aquifer where in contact with Ogallala Group)

- Tongue River Formation of the Fort Union Group
- White River Group (part of the High Plains aquifer)

The four geologic units crossed by the most miles of the proposed pipeline route, in order from most to fewest miles, are the Pierre Shale, the Hell Creek Formation, Terrace deposits, and the Fox Hills Sandstone. Approximately 65 percent of the proposed pipeline route in South Dakota is directly underlain by the Pierre Shale or the Hell Creek Formation.

The descriptions provided on the Geologic Map of South Dakota for the ten geologic units listed above indicate that all of the units contain portions which would be considered permeable. Examples of the descriptive words or phrases to which I refer in the unit descriptions are silty sandstone, clay- to boulder-sized clasts, sandstone and pebble conglomerate, cross-bedded sandstone, silt to medium-grained sand, sandstone, conglomerate, and gravel. Detailed geologic maps are not available to determine whether these particular portions of the geologic units, and to what extent these portions, may be present along the proposed pipeline route. These more permeable portions may be a minor component of a given geologic unit or may be totally absent in a particular area. For example, the Pierre Shale which underlies more of the proposed pipeline route than any of the other geologic units is not generally considered an aquifer but its description on the Geologic Map of South Dakota states that it contains "minor sandstone." Thus, there is a possibility that some portions of geologic units crossed by the pipeline, combined with the presence of a shallow water table, could be interpreted as a hydrologically sensitive area; especially if a user of the shallow ground water is located in a down-gradient direction where it could be reasonably expected that an impact might be observed from activities related to the pipeline.

Q. Can the Applicant mitigate the risks associated with crossing those sensitive areas?

A. Yes.

If so, please explain

Geologically Sensitive Area – Paleontological Resources

If paleontological resources are encountered on lands under the jurisdiction of the Office of School and Public Lands, South Dakota Codified Law 5-1-20 requires that “Any person who discovers any scientifically significant paleontological resources on lands under the jurisdiction of the commissioner of school and public lands shall promptly report the discovery to the commissioner.” Such paleontological resources are the property of the state and their disposition is controlled by the state.

If paleontological resources are encountered on private land, it is my understanding that the land owner is the owner of the paleontological resource. In this situation, it is my recommendation that landowners consult with staff at the Museum of Geology at the South Dakota School of Mines and Technology regarding the documentation, handling, and disposition of the paleontological resource.

Hydrologically Sensitive Area – Surface Water

The water-crossing-construction methods to be used in pipeline construction are outlined on pages 44 through 46 of the permit application. The permit application indicates forethought of how to mitigate impacts to the environment during construction, a willingness to comply with permit requirements that may be imposed during construction, and a willingness to utilize best management practices aimed at minimizing soil erosion and sedimentation. If the applicant properly constructs, operates, inspects, and maintains the pipeline, it is my opinion that the risks can be adequately mitigated.

Hydrologically Sensitive Area – Ground Water

If the applicant properly constructs, operates, inspects, and maintains the pipeline, it is my opinion that the risks can be adequately mitigated.