

Pipeline Safety and the Ogallala Aquifer



As discussed below, it is not possible for a crude oil spill to threaten the viability of the Ogallala Aquifer. Rather, the impact of a potential oil spill on the aquifer would be limited to a very small area. TransCanada would be responsible for clean-up. Remediation would be required to meet state and federal standards and would ensure the protection of human health and the environment. In the highly unlikely event that groundwater wells were adversely impacted, TransCanada would be responsible for providing an alternative water supply.

Pipelines are safe and the chance of a significant spill is remote, yet TransCanada is ready to respond to limit volume and impacts

Pipelines are the safest, most reliable, economical and environmentally favorable way to transport oil and petroleum products, as well as other energy liquids, throughout the U.S. Nearly every gallon of gasoline or diesel fuel used in Nebraska is transported via pipeline. In addition to demands for petroleum for transportation, petroleum hydrocarbons are used by many other industries to produce valuable materials, including, drugs and pharmaceuticals, plastics, chemicals, and construction materials. Pipelines are a vital part of our country's infrastructure and have been quietly serving the nation for decades.

Leaks from pipelines are rare¹ and tend to be small². In addition, Keystone incorporates proven design features and construction methods, as well as a state of art integrity management program . Overall, the approach helps ensure Keystone operates safely in the area of the Ogallala Aquifer. However, TransCanada also is prepared to respond to limit any release from the Keystone System and to clean-up if a leak were to occur³.

Upon detection of a leak, pumps would be immediately secured from the Operations Control Center and valves would be closed to isolate the affected section of pipe and to limit spill volumes. TransCanada personnel would be mobilized to the spill site immediately to begin emergency containment and begin clean-up. Additional actions would include the notification to landowners and appropriate public agencies of potential groundwater impacts. Even for a spill in the area of a shallow aquifer, prompt clean-up would limit the ability of crude-oil contaminants to dissolve in water.

Clean-up of any release from the Keystone Pipeline System is required by state⁴ and federal law. In addition to complying with state and federal law, prompt clean-up of a spill avoids jeopardizing TransCanada's ability to continue to operate the Keystone Pipeline System.

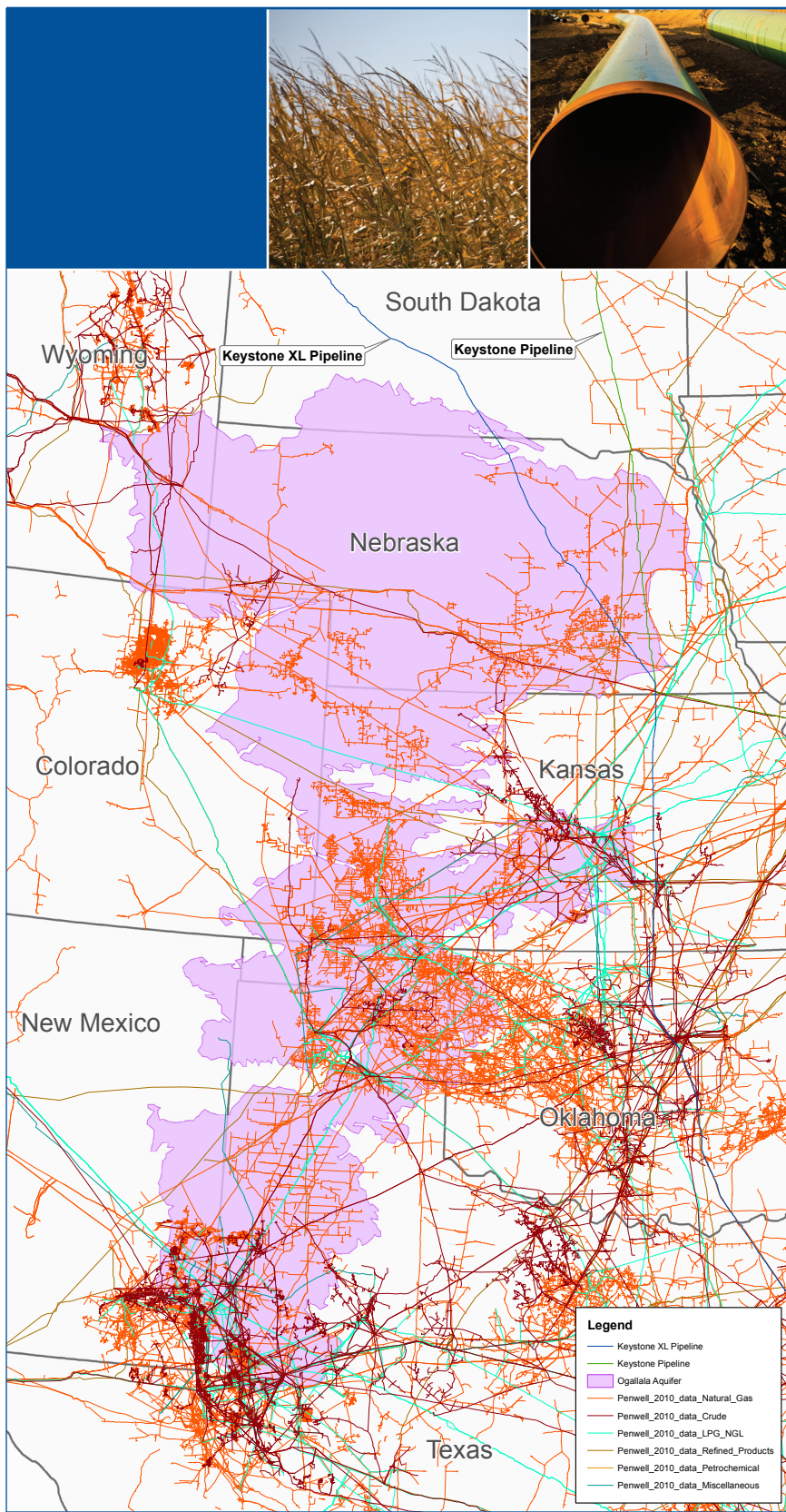
Keystone does not threaten the viability of the Ogallala Aquifer

The Keystone XL pipeline would cross the Ogallala Aquifer for some 250 miles. To help put this number in perspective, there are currently almost 21,000 miles of pipelines crossing Nebraska, including almost 3,000 miles of hazardous liquid pipelines. Many miles of these pipelines co-exist with the Ogallala Aquifer. In addition, oil wells have been drilled and are in production within areas overlying the Ogallala Aquifer, including in western Nebraska⁵.

Not all portions of the aquifer are equally vulnerable to contamination. From a technical standpoint, the vulnerability of groundwater is a function of soil type and surficial geology overlying the aquifer; depth to groundwater; presence or absence of overlying confining layers; and the proximity and number of water wells. Some portions of the Ogallala Aquifer are confined, meaning there are protective materials such as clays and glacial till which protect the aquifer from surface contamination. In other areas these protective confining layers do not exist.

Assuming a spill from Keystone were to occur in an area where the Ogallala Aquifer is vulnerable, properties of crude oil and its behavior in soils and aquifers limits the area impacted by a spill. Crude oil has a high affinity for soils and, after the initial dispersal that occurs during the spill event, crude oils do not tend to migrate substantially through soils. If the oil came in contact with groundwater, constituents within crude oil may dissolve and mobilize but that process takes time and, even then, the ability of these contaminants to move through groundwater is limited. Groundwater contains naturally occurring subsurface microbes that break down hydrocarbons, limiting dispersal of petroleum products. Studies have shown

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that within groundwater, movement of dissolved constituents typically is confined to approximately 300 feet from the source, due to this natural attenuation^{6,7}.

Consequently, even if a spill occurred in an area with shallow groundwater, and even if the oil remained in contact with the water for long enough that contaminants would dissolve into the water, impacts would be limited to a very localized area. It is not possible to contaminate the entire Ogallala Aquifer.

If, despite Keystone's comprehensive operations protection measures; integrity management and emergency response programs, a groundwater aquifer were affected, TransCanada would work cooperatively with state and federal agencies to identify the appropriate, site-specific methods for clean-up, groundwater monitoring, and remediation methods. The selection of clean-up and remediation methodologies are based on site-specific conditions, including weather conditions, presence of sensitive receptors, soil permeability, hydrogeology and aquifer characteristics. Clean-up would be conducted to ensure the protection of human health and the environment and to meet state and federal standards. In the highly unlikely event that groundwater wells were adversely impacted, TransCanada would be responsible for providing an alternative water supply.

1. According to the Association of Oil Pipelines, spills along hazardous liquid pipeline rights-of-way have fallen from two incidents per thousand miles in 1999-2001 to 0.8 incidents per thousand miles in 2005-2007, a decline of 60 percent.
2. Based on historical data available from the Pipeline Hazardous Materials Safety Administration, when pipeline leaks do occur, they are small. Most pipeline leaks are three barrels or less; 80% of spills involve less than 50 barrels; and less than 0.5 percent of spills total more than 10,000 barrels.
3. Requirements for response are detailed in 49CFR194.
4. Nebraska Environmental Protection Act, §81-1501 et seq.
5. According to the Nebraska Energy Office, crude oil has been produced in Nebraska since 1939. In 2009, Nebraska produced more than 6,000 barrels of crude oil per day from 18 different counties. Seventeen of these counties are located in western Nebraska and are underlain by the Ogallala Aquifer.
6. Newell, C.J. and J.A. Connor. 1998. Characteristics of Dissolved Petroleum Hydrocarbon Plumes, Vers. 1.1.1. Prepared by Groundwater Service, Inc. for the American Petroleum Institute Soil and Groundwater Technical Task Force, December 1998. 8 pp.
7. In addition to natural limitations on the spread of petroleum contaminants in groundwater as described above, the movement through groundwater, to the limited extent it does occur, tends to occur slowly. Movement of contaminants is always slower than the flow of groundwater itself. According to Gutentag et al. (1984), average groundwater flow in the Ogallala Aquifer is approximately one foot per day.