June 6, 2011

Secretary Clinton
U.S. State Department
Washington, D.C.

Re: Comments on TransCanada Keystone XL SDEIS

Dear Secretary Clinton:

This letter is written with regard to groundwater contamination risks associated with the proposed Keystone XL pipeline in Nebraska. We appreciate the opportunity to comment on this topic. We are Nebraska-based scientists who conduct research on groundwater flow and contamination in the High Plains Aquifer System and around the world. Our objective is to explain the need for a more thorough investigation of pipeline risks to water resources in the Nebraska Sandhills.

As the State Department's SDEIS notes, the proposed pipeline route crosses 92 miles of the Sandhills region. The route through the Sandhills has drawn special attention because of the region's unique environmental conditions, which would make it particularly vulnerable to crude oil contamination in the event of a pipeline release. Briefly, these properties include: 1) very permeable sandy soils and sub-soils, 2) groundwater which is very near the surface in many locations, and 3) abundant groundwater-fed lakes and marshes. Concerns have been raised about damage to the water supply (the Sandhills is the most productive recharge zone for the Ogallala/High Plains Aquifer which is the sole water supply for numerous towns, ranches, and crop irrigation systems along the pipeline route) as well as ecosystems (the Sandhills dune/lake areas host unique aquatic settings).

Based on our experience, the special concern for the Sandhills is well-founded. Hydrologic studies in the Sandhills have already shown that all of the conditions are right for producing very short lag times between a pipeline crude oil release and water contamination (specifically: large unsaturated and saturated hydraulic conductivity values, shallow water tables, high recharge rates, low mean residence times, steep water table gradients, and abundant interaction between groundwater and surface water). Because lakes and streams in the Sandhills are fed almost exclusively by groundwater, risks are not limited to the aquifer, but extend to surface water as well.

What is less clear, in our view, are the probable rates of contaminant spreading and degradation. There is very little precedent on which to scientifically predict crude oil plume behavior in a place like the Sandhills. The State Department's SDEIS appropriately notes that most of what scientists know about crude oil behavior in aquifers comes from a single study in Minnesota conducted by the US Geological Survey (the Bemidji study of long-term plume hydrogeochemistry). The results of the Bemidji study are indeed very instructive, but it is important to note that the analogy breaks down in significant ways owing to considerable differences in aquifer structure, setting, and uses.

The uncertainty about crude oil plume behavior in waters of the Nebraska Sandhills region has practical implications. Chiefly, a better understanding of the likely fate of crude oil under various settings and release scenarios would allow better planning for emergency responders and efforts to contain contamination within a limited volume of the aquifer in the event of a release. This critical information would also help to inform longer term cleanup projects in order to optimize efforts should a pipeline release occur. For this reason, we feel that it is highly desirable to study contaminant risks in the Sandhills in a more thorough and systematic way.

Accordingly, we urge the State Department to allow scientists and engineers the time to contribute information on the following key questions, based on rigorous field data and numerical modeling:

- What percentage and geographic locations of the pipeline's proposed 92 mile route through the Sandhills would the pipeline be submerged beneath the local water table, and how would this value vary seasonally?
- How many permanent and seasonal surface water bodies would be within 1 mile of the proposed pipeline route?
- What rates of plume spreading and natural attenuation can be expected in groundwater in the Sandhills? (A careful determination should take into account variable hydrocarbon phases, viscocities and temperatures; aquifer spatial variability; natural and pumping-induced hydraulic gradients; groundwater/surface water connections; and oil transport processes including advection, diffusion, dispersion, retardation and decay)
- What medium term containment and long term remedial strategies can most effectively safeguard the aquifer, streams, lakes and wetlands in the Sandhills?

In summary, it is our judgments based on research experience in the region that insufficient information is current available to predict potential groundwater impacts, or design remediation strategies, with a satisfactory degree of precision. We recommend that such information be developed before moving forward.

We appreciate the State Department's willingness to address concerns pertaining to risks to water resources in Nebraska. According to data in the SDEIS, approximately 64% of groundwater wells within 1 mile of the proposed pipeline route are located in Nebraska, with about 10% in each of the other states. If the percentage of wetlands within 1 mile were analyzed, we suspect that a similarly highly percentage would be found – likely leading to an elevated level of concern.

Thank you for your attention to this important aspect of the environmental impact assessment. Please feel free to contact us if any additional information or clarification is desired.

Sincerely,

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