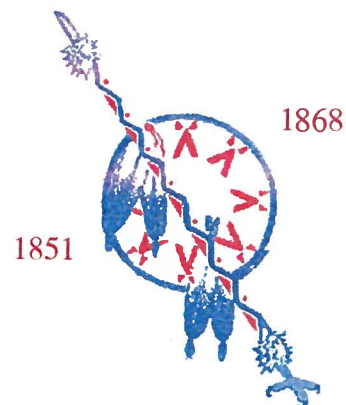


Oglala Sioux Tribe

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December 3, 2016

Jo-Ellen Darcy
Assistant Secretary of the Army for Civil Works
U.S. Army Corps of Engineers
108 Army Pentagon, Room 3E446
Washington, D.C. 20310-0108

Re: Easement for Dakota Access Pipeline

Dear Assistant Secretary Darcy:

On behalf of the Oglala Sioux Tribe (Tribe), I am writing to you to in response to your November 14, 2016 letter to Standing Rock Sioux Tribe (SRST), Energy Transfer Partners, L.P. and Dakota Access, LLC. In that letter, you clearly stated that the Army is mindful of the history of the Great Sioux Nation's repeated dispossessions and that respect and great caution are required in considering the concerns raised by the Standing Rock Sioux Tribe regarding the proposed crossing of Lake Oahe by the Dakota Access Pipeline (DAPL). We appreciate your statements and that the Army has determined that additional discussion and analysis is warranted on this most important topic. As previously conveyed the invitation to provide input must extend to all tribes of the Oceti Sakowin (Seven Council Fires or Great Sioux Nation). We, therefore, hereby submit input from our Tribe, a part of the Oceti Sakowin. As the Corps' timeline for any decision on the easement remains unclear, we submit this letter at this time as preliminary input which we reserve the right to supplement as discussions with the Corps per its November 14th letter continue.

The Great Plains Tribal Chairman's Association voted unanimously on November 17, 2016, to call upon the President, the Secretary of the Army, and the Secretary of the Interior to deny an easement for the DAPL to cross the Missouri River at Lake Oahe. We point out the continuing bold and disrespectful behavior of Dakota Access, LLC. Not only has it refused to heed the calls of the United States to voluntarily halt construction near the Lake Oahe site, it has now filed suit against the United States—the very entity from which it requires an easement—asserting that it has free reign to move forward. As discussed below, the risk of a spill that could result from the issuance of an easement to the treaty and statutory rights of the Tribe is so great that it cannot reasonably be mitigated. This letter sets forth why a denial of the easement is warranted and the right path for the Army Corps of Engineers to take.

The Tribe has both treaty-based and statutory rights to the waters of Lake Oahe, which are considered sacred by the Tribe and the Oceti Sakowin. The Corps has an independent duty to consider the risk that granting the easement would pose to these rights. The risk assessment it has conducted to date has been wholly inadequate and fails to assess the risk to these rights. As discussed in more detail in Part II of this letter and in the attached independent analysis prepared by Richard White, P.E. of EarthFax Engineering, among other things, the Corps' risk assessments:

- Fail entirely to consider the risks and impacts a spill would have on the treaty and statutory rights of the Tribe and its rights in the Mni Wiconi Project and fail entirely to consider whether proposed mitigation measures would adequately address those risks;
- Make faulty assumptions and fail to properly define a worst case discharge scenario;
- Dramatically underestimate the volume of oil that would result from a spill under even the most conservative scenarios;
- Fail to measure the risk of a spill against the correct legal standard for water quality, including inexplicably using a benzene concentration level that is 3,363 times higher than the applicable legal standard;
- Fail to recognize that a release under the most conservative estimates would render the waters of Lake Oahe unfit for human consumption and require remediation that would take months or even years to complete;
- Fail to demonstrate how mitigation measures would reduce risk and instead only discusses mitigation concepts; and
- Fail to consider the cost a spill would have on water treatment facilities that currently do not have the capacity to treat for benzene or hydrocarbon contamination or the costs associated with providing drinking water to the individuals who would be without drinking water in the event of a spill.

As detailed below, the risks of a spill to the waters of the Lake and to all of its water users are so great they cannot reasonably be mitigated. Engineering cannot solve every problem or mitigate every risk. Sometimes the only reasonable solution is not to proceed with a proposed alternative. This is such a scenario. In this case, the easement should be denied.

I. The Corps Has an Independent Legal Obligation to Consider and Assess the Risk the Easement Poses to the Tribe's Treaty and Statutory Rights to the Waters of Lake Oahe and Other Trust Resources

The Corps has legal obligations under Section 185 of the Mineral Leasing Act and under the National Environmental Policy Act to assess and consider the risks that granting the

easement would have on the Tribe's treaty and statutory rights to the waters of Lake Oahe and other trust resources. Because the Tribe's treaty and statutory rights to the water are implicated, the Corps has an independent duty to consider the easement's impact on its treaty rights.

A. The Mineral Leasing Act

The Mineral Leasing Act (MLA), 30 U.S.C. § 181 et seq., requires federal agencies to meet certain requirements before they grant rights-of-way over federal lands for oil pipelines or certain other uses. The MLA imposes an independent requirement on federal agencies to assess risks and consider stipulations to insure projects do not violate water quality standards, damage property rights, present hazards to health and safety, or threaten the interests of individuals who rely on the biotic resources of the area for subsistence. *Id.* § 185(h)(2). The MLA's obligations are independent of, and supplemental to, an agency's duties under NEPA. By requiring agencies to take measures to protect against hazards, the MLA requirements impose substantive duties far beyond NEPA's requirement to merely assess risks.

In addition, under Section 185(k), agencies are required to provide the public—including local government entities—an opportunity to comment on pending rights-of-way applications.

B. NEPA

NEPA requires that federal agencies consider potential environmental impacts prior to approving federal actions. NEPA's implementing regulations and federal courts require assessment of all foreseeable direct and indirect impacts, including cumulative impacts and potentially catastrophic impacts.

NEPA requires federal agencies to carry out an Environmental Impact Statement (EIS) before approving proposals for major federal actions significantly affecting the quality of the human environment. 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1501.4. When determining whether an EIS is required, an agency may prepare a less detailed Environmental Assessment (EA). 40 C.F.R. §§ 1501.3, 1501.4(b), 1508.9(a). However, the EA must discuss the need for the proposal, the alternatives to the proposal, the environmental impacts of both the proposal and the alternatives, and the agencies and persons consulted. *Id.* § 1508.9(b). Based on its findings in the EA, the agency may determine that it is required to prepare a full EIS, or it may instead issue a Finding of No Significant Impact (FONSI) that sets forth its reasons for why the action will not have a significant effect on the human environment. *Id.* §§ 1501.4(c), (e), 1508.13.

When a court reviews the adequacy of a FONSI, it considers whether the agency: has accurately identified the relevant environmental concerns; has taken a hard look at environmental consequences; is able to make a convincing case for its FONSI; and has shown that, even if there is an impact of true significance, safeguards in the project reduce the impact to a minimum and therefore an EIS is unnecessary. *Sierra Club v. Mainella*, 459 F. Supp. 2d 76, 106 (D.D.C. 2006). The EA's hard look must also consider a project's "cumulative impact." 40 C.F.R. § 1508.7; *see also id.* §§ 1508.25(a), 1508.27(b)(7).

When examining projects that could affect water resources, courts have required agencies to take the requisite hard look at possible impacts on the water caused by the project combined with other associated activity as well as possible impacts on the water caused by a catastrophic event such as a spill, even when risk of such an event is low. *See, e.g., Gov. of Province of Manitoba v. Salazar*, 691 F. Supp. 2d 37, 47–50 (D.D.C. 2010) (holding Bureau of Reclamation failed to take hard look at impacts on river water levels caused by project combined with other existing withdrawal projects and impacts of possible water contamination) (“When the *degree* of potential harm could be great, *i.e.*, catastrophic, the *degree* of analysis and mitigation should also be great.”); *Sierra Club*, 459 F. Supp. 2d at 106–08 (finding National Park Service failed to take hard look at impacts caused by project combined with adjacent surface drilling activities and existing oil and gas operations and impacts of possible spills when determining whether to permit directional downhole drilling activities).

C. The Corps’ Fiduciary Duty to Consider Impacts on Treaty Rights

The Corps, like all other federal agencies, is responsible for carrying out the United States’ trust responsibility to tribes. This requires the Corps to fulfill its fiduciary duty to consider and protect treaty rights and trust resources when permitting a project.

The Supreme Court has repeatedly affirmed “the undisputed existence of a general trust relationship between the United States and the Indian people.” *United States v. Mitchell*, 462 U.S. 206, 225 (1983). Additionally, where statutes give the federal government responsibility for managing Indian resources for the benefit of Indians, “[t]hey thereby establish a fiduciary relationship and define the contours of the United States’ fiduciary responsibilities.” *Mitchell*, 436 U.S. at 225. The United States is judged by “the most exacting fiduciary standards” in fulfilling trust and treaty obligations. *Seminole Nation v. United States*, 316 U.S. 286, 297 (1942). Treaties are the “supreme law of the land,” U.S. Const., art VI, cl. 2, and “[i]n carrying out its treaty obligations with the Indian tribes, the Government is more than a mere contracting part ... it has charged itself with moral obligations of the highest responsibility and trust.” *Seminole Nation*, 316 U.S. at 296.

Responsibility for fulfilling trust and treaty obligations runs across all agencies, and courts have stated that “[i]n carrying out its fiduciary duty, it is the federal government’s, and subsequently the Corps’, responsibility to ensure that Indian treaty rights are given full effect.” *Nw. Sea Farms, Inc.*, 931 F. Supp. at 1520. The Corps, therefore, has a fiduciary duty to take treaty rights into consideration when making permitting decisions. *Nw. Sea Farms, Inc. v. U.S. Army Corps of Eng’rs*, 931 F. Supp. 1515, 1519–20 (W.D. Wash. 1996); *see also Muckleshoot Indian Tribe v. Hall*, 698 F. Supp. 1504, 1522–23 (W.D. Wash. 1988).

Only Congress has the authority to modify or abrogate Indian treaty rights. *See Menominee Tribe v. United States*, 391 U.S. 404, 412–13 (1968); *Nw. Sea Farms, Inc.*, 931 F. Supp. at 1520. Therefore, even taking a small portion of or limiting access to a protected treaty right requires denial of a permit request unless congressional approval is obtained. *Muckleshoot Indian Tribe*, 698 F. Supp. at 1511–15; *see also Nw. Sea Farms, Inc.*, 931 F. Supp. at 1520, 1522.

The Corps, therefore, must reject permits that have more than a *de minimis* impact on tribal treaty rights. See, e.g., *Nw. Sea Farms, Inc.*, 931 F. Supp. at 1519–21, 1522 (stating, in response to argument of *de minimis* impacts on treaty rights, that court must examine whether project affects rights exercised in manner contemplated and protected by treaty). In a recent May 9, 2016 Corps permitting decision, the Corps employed the *de minimis* analysis to reject permit requests.¹ This decision stands as an example of the Corps employing the proper legal analysis required when determining whether to issue a permit that may infringe on treaty rights. In its analysis of whether effects rose past the level of *de minimis*, it considered likely future uses of the treaty rights as well as cultural and spiritual beliefs and practices associated with the treaty rights. When considering whether proposed mitigation measures reduced impacts to a *de minimis* level, the Corps found that regulation on the time and manner of exercise of the treaty rights would itself be an inappropriate limitation unless designed to protect and conserve the treaty resource or sanctioned by Congress.

D. The Tribe has Treaty and Statutory Rights That Must be Considered

1. Treaty Rights

The Oglala Sioux Tribe is a sovereign Indian Nation and part of the Oceti Sakowin (Seven Council Fires or Great Sioux Nation). The seven divisions of the Oceti Sakowin, and bands within these seven divisions, signed many treaties with the United States. In 1851, the United States signed the Treaty of Fort Laramie with the Teton and Yankton divisions of the Oceti Sakowin. See Treaty of Fort Laramie, 11 Stat. 749 (Sept. 17, 1851).

The United States sought the 1851 Treaty to facilitate westward migration, ensuring passage from the Missouri basin to the West Coast. In this Treaty, the United States agreed to “bind themselves to protect the [] Indian nations against the commission of all depredations by the people of the said United States.” *Id.* at art. 3. The Treaty recognized 60 million acres as the territory of the Great Sioux Nation “commencing the mouth of the White Earth River, on the Missouri River; thence in a southwesterly direction to the forks of the Platte River; thence up the north fork of the Platte River to a point known as the Red Butte, or where the road leaves the river; thence along the range of mountains known as the Black Hills, to the headwaters of Heart River; thence down Heart River to its mouth; and thence down the Missouri River to the place of beginning.” *Id.* at art. 5. The Treaty also recognized rights outside of the territories demarcated for the Great Sioux Nation, stating at article 5 that “[i]t is, however, understood that, in making this recognition and acknowledgement, the aforesaid Indian nations do not hereby abandon or prejudice any rights or claims they may have to other lands; and further, that they do not surrender the privilege of hunting, fishing, or passing over any of the tracts of country heretofore described.” *Id.*

After violating certain terms of the 1851 Treaty by allowing incursions by non-Indians settlers beyond the bounds set in the Treaty, war broke out between the United States and the

¹ Army Corps of Engineers, Memorandum for Record, re Gateway Pacific Terminal Project and Lummi Nation’s Usual and Accustomed Treaty Fishing Rights at Cherry Point, Whatcom County (May 9, 2016), available at <http://www.nws.Corps.army.mil/Portals/27/docs/regulatory/NewsUpdates/160509MFRUADeMinimisDetermination.pdf>.

Great Sioux Nation. The United States sought to end this war by signing the Fort Laramie Treaty of 1868 with several bands of the Great Sioux Nation, including the Oglala. 15 Stat. 635 (Apr. 29, 1868). Within the previously recognized 60 million acre treaty territory, the 1868 Treaty further demarcated a 26 million acre reservation "for the absolute and undisturbed use and occupation" of the signatory tribes. Fort Laramie Treaty of 1868, art. 2. That reservation was called the Great Sioux Reservation and included all of present-day South Dakota west of the low water mark of the east bank of the Missouri River, and adjacent lands in North Dakota. *Id.* The 1868 Treaty affirmed a permanent homeland for the Great Sioux Nation, reserving to the Nation, without limitation, rights to water, natural resources, self-government, and all other rights necessary to make the Great Sioux Reservation a livable homeland. Significantly, the United States Supreme Court in *Winters v. United States*, 207 U.S. 564 (1908), recognized that the federal government when creating an Indian reservation impliedly reserves for the tribe water rights necessary to carry out the purposes for which the land was set aside and that these water rights are paramount to later perfected water rights under state law.

Further, although we reject the Act of March 2, 1889, because the United States never obtained the required three-fourths of adult male signatures to make it a valid act under Section 28 of the Act, we note that it provided that the specified "tract of land, being a part of the Great Reservation of the Sioux Nation, in the Territory of Dakota, is hereby set apart for a permanent reservation for the Indians receiving rations and annuities at the Pine Ridge Agency, in the Territory of Dakota." 25 Stat. 888 § 1 (Mar. 2, 1889). Thus, Congress recognized our rights to water, natural resources, self-government, and all other rights necessary to make the reservation a livable homeland. *See, e.g., Winters*, 207 U.S. at 564, 576–77.

The Oglala Sioux Tribe has treaty rights, property rights, and religious rights in the area of the DAPL's proposed crossing of Lake Oahe. Front and center with regard to the DAPL, the Oglala Sioux Tribe has vested property rights to the natural flow of the Missouri River in its 1851 Treaty territory under the Winters Doctrine and in the waters of the Missouri River under its 1868 Treaty to make the Great Sioux Reservation a livable homeland per the Winters Doctrine. It is worthy of notice that the Tribe's water rights in the Missouri River have been, and are currently, used for recreation in the Corps taking areas along Lake Oahe, including fishing.

Additionally, the Oglala Sioux Tribe has other rights under its treaties, including but not limited to those set forth here. The Oglala Sioux Tribe also has un-extinguished, vested property rights to fish in the Cannon Ball River and Missouri River (outside the boundaries of the Standing Rock Reservation) under Article 5 of the 1851 Treaty. Also, Article 5 of the 1851 Fort Laramie Treaty (11 Stat. 749) provides in pertinent part that the Teton Sioux bands, including the Oglala Band (now the Oglala Sioux Tribe), "do not surrender the privilege of . . . fishing, or passing over any of the tracts of country heretofore described," which includes all of the Oglala Sioux Tribe's 1851 Treaty territory (emphasis added). Thus, the Oglala Sioux Tribe and its members have the right to "pass over" the Corps' lands presently occupied by the Water Protectors under Article 5 of the 1851 Treaty. Also, our tribal members have the right of access to sacred sites on Corps' lands along the Cannon Ball River and Missouri River (including lands within the Corps taking areas), and the freedom to worship through ceremonial and traditional rights, and use and possession of sacred objects at such sacred sites under the 1978 American Indian Religious Freedom Act (42 U.S.C. § 1996).

The obligations of the United States to the Great Sioux Nation under the 1851 and 1868 Fort Laramie Treaties remain in effect today. Under the United States Constitution, treaties—including Indian treaties—are the “supreme law of the land.” U.S. Const., art. VI, cl. 2; *Worcester v. Georgia*, 31 U.S. 515, 531 (1832). The United States, including all of its subdivisions and agencies, is bound to uphold Indian treaties.

It is indisputable that the Tribe has treaty rights in the area of the DAPL’s proposed Lake Oahe crossing and in the waters of Lake Oahe and the Missouri River. Together with our sister Sioux Tribes, we own the water in the Missouri River pursuant to our treaties and the Winters Doctrine as part of our rights to our permanent reservation homelands. The Tribe has a legally recognized property right in the waters of the Missouri River: these rights are treaty rights and trust property. As such, they are to be protected by the United States acting as our trustee.

2. The Mni Wiconi Project.

Congress has recognized the Tribe’s reserved treaty water rights through the Mni Wiconi Project Act of 1988, which carries out, in part, the United States’ trust responsibility to facilitate the Tribe’s use of these rights. Pub. L. No. 100-516, *as amended*, § 2(a)(5). The Tribe also has statutorily created rights to the Mni Wiconi Project per the Act, and the Project, itself, is a trust resource belonging to the Tribe. *Id.* § 3(e). The United States as the Tribe’s trustee must protect these water rights, statutory rights, and trust resources.

The Mni Wiconi Project Act was passed to provide safe drinking water to the Pine Ridge Reservation, the Rosebud Reservation, the Lower Brule Reservation, and non-Indian water districts in southwestern South Dakota. The Project is a monumental clean-drinking water project spanning an approximate 12,500 square mile service area to provide a reliable source of potable water from the Missouri River to a population of approximately 52,000 users, many of whom live on some of the poorest Indian reservations in the United States. The United States has invested more than \$450 million in the Project to date and will continue to annually fund operations and maintenance costs.

The Project helps the United States carry out its trust responsibility to our Tribe and facilitates our use of our treaty water rights. In the Mni Wiconi Project Act, Congress specifically set forth that “the United States has a trust responsibility to ensure that adequate and safe water supplies are available to meet the economic, environmental, water supply, and public health needs of the Pine Ridge Indian Reservation.” *Id.* at § 2(a)(5). Among the purposes of the Act are to “ensure a safe and adequate municipal, rural, and industrial water supply for the residents of the Pine Ridge Indian Reservation” and to “provide certain benefits to fish, wildlife, and the natural environment of South Dakota, including the Pine Ridge Indian Reservation.” *Id.* at § 2(b)(1), (4).

The Act directed the Secretary of the Interior to “plan, design, construct, operate, maintain, and replace a municipal, rural, and industrial water system, to be known as the Oglala Sioux Rural Water Supply System.” *Id.* § 3(a).² The Act provides that the “[t]itle to the Oglala

² Section 3 of the Act provides:

Sioux Rural Water Supply System shall be held in trust for the Oglala Sioux Tribe by the United States and shall not be transferred or encumbered without a subsequent Act of Congress.” *Id.* at § 3(e). The Secretary was authorized to enter agreements to carry out her duties pursuant to the Act and entered into self-determination cooperative agreements with the Tribe under which the Tribe constructed and operates the Oglala Sioux Rural Water Supply System. *Id.* at § 3(b); *see id.* at § 3(h). The Oglala Sioux Rural Water Supply System of the Mni Wiconi Project, not only facilities our use of our water rights, it, itself, is a trust resource.

II. The Corps’ Risk Assessment to Date Has Been Inadequate and Demonstrates that the Risk of Granting the Easement is so Great that it cannot Reasonably be Mitigated and the Easement Must Be Denied

The Corps has not adequately addressed the risk of the impacts a spill at the Lake Oahe crossing site would have on the Tribe’s water rights and the Mni Wiconi Project’s statutory and trust protected water resources. The Corps has an independent duty to assess such risks under Section 185 of the Mineral Leasing Act as well as the National Environmental Policy Act (NEPA), but has not done so.

The NEPA analysis the Corps previously conducted for the DAPL is not sufficient to satisfy its risk assessment requirements for issuing an MLA easement. It entirely failed to consider important impacts of the DAPL that both NEPA and Section 185 of the MLA require the Corps to consider. For this reason, the Corps cannot rely on the EA/FONSI it prepared for the DAPL under NEPA in making its decision regarding whether to issue the easement.

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- (a) AUTHORIZATION.-- ... The Oglala Sioux Rural Water Supply System shall consist of –
- (1) pumping and treatment facilities located along the Missouri River near Fort Pierre, South Dakota;
 - (2) pipelines extending from the Missouri River near Fort Pierre, South Dakota, to the Pine Ridge Indian Reservation;
 - (3) facilities to allow for interconnections with the West River Rural Water System, Lyman-Jones Rural Water System, Rosebud Sioux Rural Water System, and Lower Brule Sioux Rural Water System;
 - (4) distribution and treatment facilities to serve the needs of the Pine Ridge Indian Reservation, including but not limited to the purchase, improvement and repair of existing water systems, including systems owned by individual tribal members and other residents on the Pine Ridge Indian Reservation;
 - (5) appurtenant buildings and access roads;
 - (6) necessary property and property rights;
 - (7) electrical power transmission and distribution facilities necessary for services to water systems facilities; and
 - (8) such other pipelines, pumping plants, and facilities as the Secretary deems necessary or appropriate to meet the water supply, economic, public health, and environmental needs of the reservation, including (but not limited to) water storage tanks, water lines, and other facilities for the Oglala Sioux Tribe and reservation villages, towns, and municipalities.

The Corps is required to consider impacts on the Tribe's treaty water rights and rights to the Mni Wiconi Project before issuing an MLA permit. The agency must consider all foreseeable direct and indirect impacts and cannot ignore any arguably significant consequences. Impacts considered must include those caused by cumulative activity associated with the project, and the Corps must take into account impacts caused by possible catastrophic events. A crude oil spill from the DAPL into the Missouri River and Lake Oahe would damage the ecology of the river basin and impair the Tribe's treaty water rights and rights to the Mni Wiconi Project.

A. The Corps' Risk Assessment to Date is Wholly Inadequate

The Corps has not conducted an independent assessment of risk as required under Section 185 of the MLA, and to the extent the EA/FONSI is relied upon to meet those requirements it is deficient in several significant ways³:

1. It dramatically underestimates the total volume of oil that would likely be released in the event of a spill.

The EA is deficient in that it concludes that the most likely spill volume is 4 bbl or less. But the data relied upon for that assumption includes spills from pipelines of all sizes, not spills from large diameter pipelines.

The EA indicates that the pipeline is designed to convey 570,000 bbl of crude oil per day. That converts to a throughput of approximately 400 bbl per minute. A recent evaluation of the Keystone project demonstrated that the average spill volume for pipelines with a diameter over 16 inches is 1,116 barrels. At a throughput of 400 bbl per minute, this represents less than three minutes of operational flow from the proposed pipeline.

With a throughput of 400 bbl per minute, a five minute spill would result in a release of 2,000 bbl, an hour long spill would result in a release of 24,000 bbl, and a 24 hour spill would result in a release of 570,000 bbl. Yet the EA inexplicably states that an hour long spill event could result in only 10,000 bbl.

2. A significant release of oil could occur even under the most conservative scenario that assumes that the block valves and spill detection systems work correctly.

Based on the conservative assumption that block valves are placed at the entry and exit points of the horizontal directional drills, that they work correctly, and that the oil in the pipeline sections below the waterline did not back up and drain as well, a spill at the Lake Oahe crossing could result in a release of 4,620 bbl. That is far more than the 4 bbl the EA assumes is typical.

³ See attached December 2, 2016, letter from Richard White of EarthFax Engineering Group, LLC, to the Oglala Sioux Tribe.

3. It ignores the applicable water quality standard for Lake Oahe.

Section 33-16-02.1 of the North Dakota Administrative Code classifies Lake Oahe as Class I water with an applicable legal standard for benzene of 2.2 µg/L (0.0022 mg/L). The EA/FONSI fails to mention, let alone consider, this standard.

Instead, it plays games with estimated benzene concentration levels that would result from a spill. First, it uses an acute aquatic organism toxicity level of 7.4 mg/L – a level that is 3,363 times higher than the applicable legal standard of 0.0022 mg/L for Lake Oahe. Not surprisingly, the contamination levels estimated by the EA fall below that standard.

But that standard is not the correct standard to use. First, as discussed above, there is an applicable legal standard for benzene that the EA should have used. All of the contamination levels estimated in the EA would far exceed the 0.0022 mg/L threshold for that standard – even using the EA’s conservative estimates. This is the standard that applies, not the acute toxicity level for aquatic organisms or even the EPA’s MCL for benzene.

Second, even if it were appropriate to use a toxicity level for aquatic organisms to calculate the effect of a spill on aquatic organisms, the standard practice would be to use a concentration known as the No Observed Adverse Effect Level (NOAEL), or the Lowest Observed Adverse Effect Level. The Los Alamos NOAEL value and NOAA chronic concentration level for benzene is 46 µg/L (0.046 mg/L), which is the standard that should have been used.

4. Even a Small Spill Would Exceed the Applicable Legal Standard for Water Quality

Presuming that the results presented in Table 3-7 of the EA are correct, a crude oil spill of approximately 12-13 bbl could result in benzene levels that exceed the applicable legal standard of 0.0022 mg/L. As discussed above, however, the pipeline will have a throughput of 400 bbl per minute. A 12-13 bbl spill could occur in a matter of seconds.

Thus, even assuming that all of the safety technology listed in the EA worked as promised, even a spill of less than a minute would result in impacts to drinking water of the Lake that would exceed the actual legal standard for the waters of the Lake.

5. It fails to address the impact of a catastrophic spill event.

The EA’s worst case discharge scenario appears to be 10,000 bbl spilled. Although the EA also includes discussion of a worst case discharge scenario in the Facility Response Plan listed in Appendix L, the relevant portions of that Plan are blacked out. As a result, it is impossible to know whether the Corps even estimated a worst case discharge scenario for the Lake Oahe crossing.

At a throughput of 400 bbl a minute, the EA’s estimate of 10,000 bbl spilled represents less than half an hour’s time. Yet we know that pipeline safety devices like block valves and

SCADA systems fail. When they do, spills can last many hours before detection and many more before crews can manually address the problem. A 24 hour spill at the Lake Oahe crossing could result in up to 570,000 bbl of crude oil being released into the waters of the Lake. The EA fails to address the impact of such a scenario because it assumes that all of the safety technology proposed will work. It is deficient in that regard.

6. It fails to consider the socio-economic impact a spill would have on downstream water users and water treatment plants.

The Mni Wiconi Project water treatment plant lacks the capacity to treat for benzene or other hydrocarbon contamination and adding that capacity would cost in the millions. We are unaware that any other tribal water treatment plant has this capacity either. The EA fails to consider the socio-economic impact a spill would have on the ability of these plants to continue to function in the event of a spill.

If forced to shut down, water users throughout North and South Dakota would be adversely affected. The EA fails entirely to consider the socio-economic ramifications a spill would have on the Indian and non-Indian people who rely on the waters of the Lake for drinking water, irrigation, and recreational uses. It also entirely fails to consider the costs associated with providing those users with alternate sources of water.

7. It fails entirely to consider the impact a spill would have on tribes' reserved treaty rights.

The DAPL would cross the Great Sioux Nation's sacred Missouri River and ancestral lands and would infringe upon the treaty rights of tribes of the Great Sioux Nation to water in the Missouri River. The Corps has not performed any analysis to determine the effects of the DAPL on the tribes' treaty water rights.

Other federal agencies have urged the Corps to uphold its trust obligations to consider tribes' treaty water rights when issuing permits associated with the DAPL. In a March 29, 2016 letter to the Corps, the Department of the Interior specifically directed it to consider tribal reserved water rights.⁴ The Environmental Protection Agency discussed threats from the DAPL to the Mni Wiconi Project in a March 11, 2016 letter to the Corps.⁵ The Advisory Council on Historic Preservation in a May 19, 2016 letter stated the Corps conducted inadequate tribal consultation and engaged in other procedural flaws in issuing permits.⁶

The Corps' NEPA analysis failed to consider the tribes' treaty water rights, and the Corps has not conducted such an analysis pursuant to Section 185 of the MLA or otherwise.

⁴ Letter from Lawrence S. Roberts, Acting Assistant Secretary – Indian Affairs, Department of Interior to Brent Cossette, U.S. Army Corps of Engineers, Omaha District 1 (Mar. 29, 2016).

⁵ Letter from Philip S. Strobel, Director, NEPA Compliance and Review Program, Environmental Protection Agency to U.S. Army Corps of Engineers, Omaha District 2 (Mar. 11, 2016).

⁶ Letter from Reid J. Nelson, Director, Office of Federal Agency Programs, Advisory Council on Historic Preservation to Lt. General Thomas P. Bostick, U.S. Army Corps of Engineers 2-4 (May 19, 2016).

It has not even conducted a *de minimis* review. In order to properly conduct such a review, the Corps must examine the DAPL's impacts on both the Tribe's treaty right to take water from the Missouri River as well as its treaty right to access that water. Impacts considered must include cultural and spiritual impacts on the Tribe as well as possible future impacts, including those that would arise if a spill took place. Additionally, the Corps must examine whether the DAPL would affect the Tribe's current manner of use, which is to provide its members with drinking water. If mitigation measures put forward would force the Tribe to alter its current manner of use, such mitigation measures themselves improperly infringe on the Tribe's treaty rights.

Provision of bottled water as a mitigation measure would alter the Tribe's current manner of use of its treaty water rights and thus improperly infringe on those treaty rights. Furthermore, such a plan is wholly impractical. The Corps has a fiduciary duty to examine the DAPL's impacts on the Tribe's treaty rights to both take and access water in the Missouri River. When the Corps does conduct such an analysis, it will find significant impacts to the Tribe's treaty rights from the DAPL. Thus, the easement under the MLA must be denied.

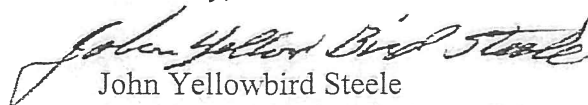
8. It fails to analyze impacts on the Mni Wiconi Project.

The Corps' NEPA analysis failed to analyze the impacts of the DAPL on the Mni Wiconi Project even though the Environmental Protection Agency specifically told the Corps that it must analyze impacts on it and other tribal water projects. Impacts include not only those on the water in the Missouri River from where the Mni Wiconi Project obtains its water for the Tribe's use, but also on the Project, itself, which is a trust resource of the Tribe. The Mni Wiconi Act specifically states that the United States has a trust duty to "to ensure that adequate and safe water supplies are available to meet the economic, environmental, water supply, and public health needs of the Pine Ridge Indian Reservation," yet, the Corps wholly failed to analyze impacts on the Project and its water supply.

III. Conclusion

The Corps' risk assessment of the DAPL is wholly lacking. It fails to analyze the DAPL's impacts on the Tribe's treaty and statutory rights. It further demonstrates that the risk of granting the easement is so great that it cannot reasonably be mitigated. The DAPL's request for an easement under the MLA must be denied. In certain circumstances, the only reasonable solution is not to proceed. This is exactly such a circumstance, especially given the treaty and trust obligations the United States owes to us.

Sincerely,



John Yellowbird Steele
President of the Oglala Sioux Tribe

cc: Lowry Crook, Principal Deputy Assistant Secretary
Sally Jewell, Secretary of the Interior
Lawrence Roberts, Assistant Secretary – Indian Affairs
Tracy Toulou, Department of Justice
Valerie Hauser, Advisory Council on Historic Preservation
Philip Strobel, Environmental Protection Agency
Karen Diver, White House Domestic Policy Council
Tracy Goodluck, White House Public Affairs and Intergovernmental Affairs
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EarthFax

December 2, 2016

President John Yellow Bird Steele and Members of the Tribal Council
Oglala Sioux Tribe
P.O. Box 2070
Pine Ridge, S.D. 57770

Subject: Review of the Dakota Access Pipeline Project
Environmental Assessment Related to
Crossings of Flow Easements and Federal Lands

Dear Mr. Steele and Members of the Tribal Council:

Pursuant to your request, I have reviewed the Environmental Assessment ("EA") concerning crossings of flow easements and Federal lands by the Dakota Access Pipeline Project. This EA was prepared on behalf of the U.S. Army Corps of Engineers, Omaha District and issued in July 2016. My review focused on the EA's discussion of issues related to the occurrence and potential impacts of spills as well as proposed measures presented in the EA to mitigate the impacts of those spills. My comments regarding the EA are outlined below.

SPILL VOLUME ESTIMATES

According to Section 3.2.2.2 of the EA, spill volumes of 4, 100, 1,000, and 10,000 barrels ("bbl") were evaluated. The EA notes that 50% of the incidents during their period of review (2002 through 2015) consisted of spills with a volume of 4 bbl or less. This was based on a review of a database maintained by the U.S. Pipeline and Hazardous Materials Safety Administration ("PHMSA").

I did not conduct an extensive independent review of the PHMSA database. However, I did review a summary published as part of the Keystone XL Project¹, which examined onshore crude oil spill data for the period of January 2002 through July 2012. The Keystone summary reached the following conclusions:

- Spill volumes from mainline pipelines tend to be larger than spills from discrete elements, other than tanks;
- Spill volumes from mainline pipeline incidents for 16-inch and larger diameter pipes tend to be larger than spills from smaller diameter pipes and similar to spill volumes from pipeline tanks; and

¹ <https://keystonepipeline-xl.state.gov/documents/organization/205578.pdf>

- The dominant causes of spills from mainline pipeline elements are corrosion, manufacturing or construction defects, and outside forces (i.e., third-party damage cause from excavation activities around the buried pipe or from agricultural practices such as deep tilling or drainage tile installation).

The Keystone summary verified that the median (50%) spill volume for all pipeline incidents during the period of interest was small (3 bbl). However, for incidents where the pipeline diameter was reported, the median spill volume during the period of interest was 30 bbl. Furthermore, when evaluating spills only from pipelines with a diameter of 16 inches or larger (i.e., the size class proposed by Dakota Access ("DA") Pipeline for crossing the Missouri River and Oahe Reservoir), the Keystone summary indicated that the median spill volume during the period of interest was 100 bbl, with an average incident volume of 1,116 bbl.

The EA indicates that the pipeline is designed to convey 570,000 bbl of crude oil per day. This converts to a throughput of approximately 400 bbl/minute, assuming constant flow. The median spill volume presented in the Keystone summary for pipelines with a diameter of 16 inches or larger (100 bbl) represents the amount of oil that will flow through the DA Pipeline in 15 seconds. The average spill volume from large diameter pipeline incidents (1,116 bbl) represents less than 3 minutes of planned operational flow for the DA Pipeline.

The spacing of block valves influences spill volumes, since properly operating valves can isolate the defective pipeline location from the remainder of the pipeline. This generally limits the discharge of oil from a spill to those pipeline sections between a block valve and the point of failure. The DA Pipeline Facility Response Plan ("FRP") presented in Appendix L of the EA provides estimates of potential spill volumes, but those estimates were redacted from the FRP. Since I could not find information in the EA regarding planned block valve spacing, I prepared planning-level estimates of potential spill volumes at the Missouri River and Oahe Reservoir crossings as follows:

- Assume that block valves are placed at the entry and exit points for the horizontal directional drills. According to Sovereign Lands Permits for the project provided in Appendix M of the EA, that would place block valves at the following locations;
 - 280 feet from the right bank of the Missouri River (24-inch pipeline),
 - 1,520 feet from the left bank of the Missouri River (24-inch pipeline),
 - 960 feet from the east bank of the full-pool shoreline of Oahe Reservoir (30-inch pipeline), and
 - 1,170 feet from the west bank of the full-pool shoreline of Oahe Reservoir (30-inch pipeline).
- Assume that pipeline failure occurs between the block valves and the river/reservoir bank.
- Assume that all oil is released only from the section of pipe between the valve and the bank. Since the lowest point on the bore will be at an elevation that is several feet below the block valve, this condition assumes that insufficient pressure will exist in the section of pipe on the water-side of the river bank to force oil to the surface. Since the

pipeline will be pressurized, this assumption likely results in a spill estimate that will be smaller than may occur in reality.

Based on these assumptions, the following spill volumes could occur at the indicated locations:

- Missouri River, right bank = 157 bbl
- Missouri River, left bank = 850 bbl
- Oahe Reservoir, east bank = 839 bbl
- Oahe Reservoir, west bank = 1,023 bbl

These values are within the range of crude oil spills that I have responded to. Therefore, I do not consider them to be excessively large.

It could be argued that the pipeline will be buried and that some of the crude that leaks would be absorbed by the soil thereby not reaching the water. While this is true, it is important to remember that the pipeline will be under pressure. As a result, there is a reasonable potential that leaks of even small quantities will result in crude oil reaching the surface above a buried pipeline.

This analysis does not account for discharge from the pipeline sections that are below water in the Missouri River and Oahe Reservoir. It also does not account for failures of the block valves or failures upstream from the block valves that result in spills that reach the water bodies. Although the Keystone summary indicates that equipment malfunction is rare, such failures should not be considered inconsequential. In fact, I have been involved in two crude oil spills that were the direct result of equipment failure.

The Keystone summary indicates that mainline valves are typically spaced on intervals of approximately 20 miles. Assuming that the pipelines or their components fail upstream from the closest block valve but in a location that could drain to the Missouri River or Oahe Reservoir, and that topographic conditions and valve spacing allows only 1 mile of pipeline to drain to the water body, the following spill volumes could result:

- 24-inch pipe (i.e., Missouri River crossing) = 2,950 bbl
- 30-inch pipe (i.e., Oahe Reservoir crossing) = 4,620 bbl

Obviously, if the length of pipeline that drains to the water is longer, the spill volume impacting the river or reservoir could be substantially higher.

The above information makes it clear that a spill volume of 4 bbl should not be considered typical. Given the large diameter of the DA Pipelines at the Missouri River and Oahe Reservoir crossings as well as the above data and calculations, the EA should have considered spill volumes well in excess of 100 bbl as a reasonable incident scenario rather than implying that a 4 bbl spill is the norm.

RIVER FLOW RATE

The spill impact analysis summarized in Table 3-7 of the EA was based on a number of conservative assumptions that are listed on page 46 of the EA. However, the effects of dilution in the water were based on average annual discharge rates of the Missouri River at nearby gaging stations rather than relying on conservatively lower discharge rates. At a minimum, the lowest mean daily discharge rates for the periods of record at the nearby gaging stations should have been used in the analysis. These discharge rates are provided below, based on data obtained from the U.S. Geological Survey web site²:

River Crossing	Discharge Rate (cfs)		Percent Difference
	Mean Annual	Mean Daily Minimum	
Missouri River	20,374	9,290	-54.4
Oahe Reservoir	22,484	19,100	-15.1

Using these more conservative discharge rates, the estimated benzene concentrations provided in Table 3-7 of the EA would have been substantially higher at each crossing than indicated (up to approximately twice as high as presented for the Missouri River crossing).

CONSTITUENTS OF CONCERN

The evaluation presented in Section 3.2.2.2 of the EA focused on benzene which, as stated therein, "is commonly considered to pose the greatest toxicity threat from crude oil spills." While this is "commonly considered" to be the case, data presented by Benville and Korn³ indicate that ethylbenzene and p-xylene are generally more toxic than benzene to the organisms tested. These authors also indicate that toxicity of toluene is similar to that of benzene.

Moles et al.⁴ found that bulk crude oil was more toxic to the tested organisms than benzene (i.e., median mortality to the tested fishes occurred at crude oil concentrations that were only 10 to 40 percent of the benzene concentrations that caused the same mortality rates). This increased toxicity may be due to the presence of multiple polycyclic aromatic hydrocarbon ("PAH") compounds in crude oil. The National Research Council⁵ reports that individual PAH compounds occur in crude oil at concentrations that are generally one-fifth to two-thirds of the magnitude of the benzene concentration. However, a review of data provided by the Savannah

² http://waterdata.usgs.gov/nwis/dvstat/?preferred_module=sw

³ Benville, P.E., Jr. and S. Korn. 1977. The Acute Toxicity of Six Monocyclic Aromatic Crude Oil Components to Striped Bass (*Morone saxatilis*) and Bay Shrimp (*Crango franciscorum*). Journal of California Fish and Game. Vol. 63, No. 4, pp. 204-209.

⁴ Moles, A., S.D. Rice, and S. Korn. 1979. Sensitivity of Alaskan Freshwater and Anadromous Fishes to Prudhoe Bay Crude Oil and Benzene. Transactions of the American Fisheries Society. Vol. 108, No. 4, pp. 408-414.

⁵ National Research Council. 1985. Oil in the Sea: Inputs, Fates, and Effects. National Academy Press. Washington, D.C.

River National Laboratory⁶ and the U.S. Environmental Protection Agency⁷ indicates that many of these PAH compounds are substantially more toxic than benzene.

Although crude oil composition varies widely between sources and few toxicity tests have been conducted with crude oil, the EA should have acknowledged that focusing on benzene would not necessarily provide the most conservative impact scenario. Quantitative assessments of individual crude-oil constituents should have also been performed to ensure that benzene was the appropriate compound on which to focus.

COMPARATIVE CONCENTRATION LIMITS

According to Section 3.2.2.2 of the EA, the spill impact assessment was based on comparisons with two concentration limits for benzene:

- A drinking water maximum contaminant level of 0.005 mg/L and
- An aquatic organism acute toxicity level of 7.4 mg/L

Neither of these is the appropriate point of comparison for benzene for this project. Regulations contained in Section 33-16-02.1 of the North Dakota Administrative Code establish a benzene limit of 2.2 µg/L (0.0022 mg/L) for Class I waters (the classification for, among other water bodies, the Missouri River, including Lake Sakakawea and Oahe Reservoir). This limit is less than half of the concentration used for comparison in the EA analysis.

The EA states that the value of 7.4 mg/L used for ecological impacts was the “lowest acute toxicity threshold for aquatic organisms” listed in EPA’s ECOTOX database. However, it does not provide other details regarding this value (i.e., what organism was tested, the type and length of the test, etc.). Based on my independent review of the ECOTOX database, I assume that the 7.4 mg/L value represents an LC50 concentration. An LC50 value is the concentration that is lethal to 50% of the organisms evaluated within the duration of a test. I should note that the lowest LC50 for benzene in my recent search of the ECOTOX database was 5.3 mg/L for a 4-day, flowing-water test performed on Rainbow trout (*Oncorhynchus mykiss*). This difference may have been due to updates to the database in the intervening review times.

Notwithstanding the lower LC50 value from my search of the ECOTOX database, an LC50 value is not usually the appropriate standard against which comparisons should be made when evaluating ecological impacts. The standard approach for an ecological risk assessment is to use a concentration known as the No Observed Adverse Effect Level (“NOAEL”). This is the concentration of a particular pollutant which test results indicate would produce no adverse effects on the tested organism. In the absence of this value, the concentration known as the

⁶ Friday, G.P. 2005. Ecological Screening Values for Surface Water, Sediment, and Soil: 2005 Update. SRC-TR-2004-00227. Savannah River National Laboratory. Aiken, South Carolina.

⁷ Regional Screening Levels (RSLs) - Generic Tables (May 2016). Downloaded from <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016>

Lowest Observed Adverse Effect Level ("LOAEL") is used in ecological risk assessments. This is the lowest concentration of a pollutant which test results indicate causes some kind of adverse effect (i.e., morphology, growth, development, etc.) on the test organism. The NOAEL and LOAEL concentrations are generally much lower than the LC50, which (as noted above) is based on a 50% organism mortality rate during the test.

Los Alamos National Laboratory maintains a database of screening levels used in ecological risk assessments based on contaminants in air, sediment, soil and water⁸. For benzene (the constituent upon which the EA focused), this database recommends a "No Effect" ecological screening level of 46 µg/L in water and a "Low Effect" ecological screening level of 460 µg/L in water. The compendium published by the Savannah River National Laboratory cited above recommends an ecological screening value of 46 µg/L in surface water. The National Oceanic and Atmospheric Administration has also produced a database of screening-level concentrations for contaminants in sediment, soil, groundwater, and surface water (fresh and marine). The NOAA-recommended ecological screening level for benzene in fresh surface water provided in this database is an acute concentration of 2,300 µg/L and a chronic concentration of 46 µg/L.

Based on the above summary, it is clear that the reference values used in the EA are inappropriate. Assuming that benzene is the appropriate contaminant of concern, more appropriate comparative limits are:

- Drinking water: 2.2 µg/L (based on the North Dakota surface water statute)
- Aquatic organisms: 46 µg/L (based on the Los Alamos NOAEL, the Savannah River screening value, and the NOAA chronic concentration)

It should be noted that the comparative concentrations provided above do not account for the effects of water temperature on ecological risk. Korn et al.⁹ found that marine species may be more susceptible to oil spills in colder water due to increased persistence of the pollutants (i.e., reduced evaporation and biodegradation rates) and potential temperature-induced stress that may act synergistically with oil-induced stress. It is reasonable to assume that similar effects would be experienced by fresh-water species. Thus, spills during winter months may reduce the concentration at which impacts occur to aquatic organisms.

Since drinking water intakes occur downstream from the Missouri River and Oahe Reservoir crossings, the critical standard against which potential impacts should be compared is the lower of the above concentrations (i.e., 2.2 µg/L). Assuming that the results presented in Table 3-7 of the EA are correct, this concentration would result from a crude oil spill of approximately 12 to 13 bbl. As indicated above, crude oil spill volumes well in excess of this amount should be

⁸ <http://www.lanl.gov/environment/protection/eco-risk-assessment.php>

⁹ Korn, S., D.A. Moles, and S.D. Rice. 1979. Effects of Temperature on the Median Tolerance Limit of Pink Salmon and Shrimp Exposed to Toluene, Naphthalene, and Cook Inlet Crude Oil. *Bulletin of Environmental Contamination and Toxicology*. Vol. 21, pp. 521-525.

considered as reasonable incident scenarios for pipelines with diameters similar to those planned at the Missouri River and Oahe Reservoir crossings.

Section 3.2.2.2 of the EA minimizes the potential impacts of a spill by indicating that “the most probable spill volume (4 barrels or less) does not yield benzene concentrations that exceed the drinking water criteria even with the ultra conservative mixing assumptions.” Even though this statement is correct, the calculated benzene concentrations provided in Table 3-7 of the EA for spills with a magnitude of 100 bbl and larger are substantially higher than the drinking water maximum contaminant level for benzene. This obvious conclusion is ignored in the EA narrative. The estimated benzene concentrations provided in Table 3-7 of the EA exceed the benzene maximum contaminant level by factors of more than 3 and nearly 4 at the Oahe Reservoir and Missouri River crossings, respectively, for a 100 bbl spill (a spill volume which, as noted above, is well within the potential for occurrence in the event of an incident). These exceedance factors increase exponential for the 1,000 and 10,000 bbl spills. The degree to which water quality standards are exceeded would have been even greater if the comparative concentration is the North Dakota Class I standard rather than the drinking water standard.

The purpose of a conservative analysis is to determine if a more detailed evaluation is needed. If impacts are not apparent under a conservative set of assumptions, a more comprehensive assessment is not necessary. However, in this case, the conservative assessment indicated that unacceptable impacts could occur under reasonable impact scenarios, especially when considering the spill volume data presented above. Therefore, a more detailed evaluation should have been conducted and/or detailed plans should have been presented to provide a greater assurance that impacts would be mitigated. Neither the more detailed evaluation nor the detailed mitigation plans was provided in the EA.

SEASONAL CONSIDERATIONS

Section 3.2.1.2 acknowledges that subfreezing temperatures during winter months will affect emergency response conditions during cleanup of a spill. My experience with multiple oil spill emergency response operations is that winter conditions create significant difficulties that are not present during other periods. Safe operations require that workers be much more careful in cold weather in order to avoid accidents. As a result, workers require more breaks and move slower due to the bundling of clothing that is protective of both cold temperatures and pollutants, daylight hours are shorter, slip-trip-fall risk increases significantly, etc. The EA should have quantified the effect of these factors on response time and the subsequent impacts to human health and the environment.

The EA further states that “pockets of oil naturally contained by the ice can be drilled to and removed using vacuum trucks.” This is an oversimplification of oil recovery operations beneath ice. Working on ice presents multiple safety concerns. The trapped oil may move. It will be difficult to determine where the largest pockets of oil occur. Ice will naturally break both on the river and on the reservoir, shifting recovery locations and increasing safety hazards. River discharge rates are generally lower during the winter (resulting in less dilution of the spill) and

the time required to recover the oil will be increased (due to entrapment beneath the ice, safety considerations, access difficulties, etc.). These conditions will increase the extent to which the oil dissolves into the water, thereby increasing the downstream impacts to human health and the environment. Thus, a winter spill likely represents the worst-case scenario.

The EA minimizing the consequences of a winter-condition spill by stating that the “ice itself often serves as a natural barrier to the spread of oil.” The paper cited in the EA¹⁰ indicates that ice conditions can both benefit and hinder spill response, depending on the timing and type of release. The EA also indicates that winter conditions will be to the advantage of emergency response actions by stating in Section 3.2.2.2 that “winter releases are predicted to have lower impacts . . . as compared to releases occurring during the warmer seasons.” Given the added difficulties of working in winter conditions, the unpredictability of ice conditions, the potential for increased contact between water and crude oil trapped beneath the ice, and other factors, it is equally likely that a winter release will have larger impacts compared to a release during other seasons of the year. Therefore, the EA should have presented a more serious, quantitative evaluation of the winter spill scenario to ensure that the adverse impacts of a spill under on those conditions were properly evaluated.

RELIABILITY AND SAFETY

Section 3.11 of the EA presents a discussion of pipeline reliability and safety, including an analysis of the risk associated with several threat categories. In the case of each category, the EA ranks the risk as low without a quantitative evaluation.

The Keystone summary cited previously provides data from the PHMSA database regarding pipeline spills during the period of January 2002 through July 2012. A comparison of the conclusions of the EA and data from the Keystone summary based on a review of 71 incidents during the indicated period of record involving mainline pipelines with diameters of 16 inches or larger is provided below:

Incident Category	EA Risk Rank	Keystone Incident Summary	
		Number	Percent of Total
Third Party Damage	Low	18	25.4
External Corrosion	Low	11	15.5
Internal Corrosion	Low	18	25.4
Pipe Manufacturing Defects	Low	15	21.1
Construction-Related Defects	Low		
Incorrect Operations	Low	1	1.4
Equipment Failure	Low	0	0.0
Natural Forces	Low	6	8.5

¹⁰ Dickens, D. 2011. Behavior of Spills in Ice and Implications for Arctic Spill Response. OTC Technology Conference.

The EA minimizes the risk of system integrity threats by stating that procedures will be implemented to minimize those threats. However, the above data clearly indicate that substantial potential exists for spills to occur in categories that were considered by the EA to be low risk. This is particularly the case for those categories highlighted in yellow. Thus, a quantitative analysis of the risk associated with failure of system components should have been provided in the EA.

Section 3.11 of the EA also states that the impact of a release will be minimized through the use of “motor operated isolation and/or check valves . . . installed on either side of the Missouri River above Lake Sakakawea and Lake Oahe which can be actuated to close as soon as a leak is detected.” It is inappropriate for the EA to imply that these valves will close immediately. For several reasons, three of which are stated below, emergency block valves do not close instantaneously upon the occurrence of a leak.

1. Pressure fluctuations are common in crude-oil pipelines. Therefore, supervisory control and data acquisition (“SCADA”) systems, which (according to the EA) will be used to monitor operations on the DA Pipeline, generally accept pressure fluctuations within a pre-defined range without reaching an alarm threshold. Hence, if a spill occurs from a pinhole and not as a result of a catastrophic failure, it has been my experience that the incident could go undetected for several days without being detected by the SCADA system. Such an incident is often identified on after a visual inspection of the area through the use of internal inspection tools. If such a pinhole occurs and results in a leak of 1 gallon per minute, 1,440 gallons (34 bbl) of crude oil would be lost in 1 day. If this spill occurs to the Missouri River or Oahe Reservoir, interpolation data provided in Table 3-7 indicates that the result would be a benzene concentration of approximately 6 µg/L (i.e., exceeding both the maximum drinking water contaminant level and the North Dakota Class I water quality standard). If such a leak occurs for a period of two weeks between visual inspections, the loss would be 480 bbl. Interpolation of data provided in Table 3-7 of the EA indicates that such a spill would result in a benzene concentration of approximately 80 µg/L in the Missouri River and Oahe Reservoir. This concentration is substantially higher than both the maximum contaminant level and the 2.2 µg/L critical concentration for these water bodies (based on North Dakota Class I water quality standard). As presented above, these spill volumes are well within the range of reasonably-possible scenarios.
2. Once a SCADA system sends an alarm, the system is not automatically shut down. Rather, an operator must evaluate the cause of the alarm and determine if a condition exists that warrants shutdown of the pipeline. Such an evaluation takes time. The American Petroleum Institute and the Association of Oil Pipe Lines¹¹ indicate that “prompt” rupture detection and response “means the alarm can be verified confidently in minutes versus seconds.” Based on a throughput of 400 bbl/ minute, 800 bbl of oil

¹¹ American Petroleum Institute and Association of Oil Pipe Lines. 2014. Liquid Petroleum Rupture Recognition and Response. Document downloaded from <http://www.aopl.org/wp-content/uploads/2014/09/Pipeline-Rupture-Recognition-and-Response-Final-w-Abstract-August-2014.pdf>

will spill if a response is instituted 2 minutes after a pipeline rupture. Data provided in Table 3-7 of the EA indicate that the benzene maximum contaminant level and Class I water-quality standard would be substantially exceeded in this time frame.

3. The probable initial response action for a rupture would be to close the motor-operated block valve. These valves do not close instantaneously. Global Asset Protection Services¹² indicates that emergency shutdown valves close within 1.0 to 1.5 seconds per inch of diameter. Assuming a high-speed valve that closes within 1.0 second per inch of diameter, the valves on the DA Pipeline segments valuated in the EA would require 24 to 30 seconds to close (depending on the location and assuming the valves are the same diameter as the pipelines at those locations). The flow through the valve will gradually decrease and the valve shuts. Thus, based on a throughput of 400 bbl/min, 80 bbl of oil will spill from a 24-inch diameter valve and 100 bbl will spill from a 30-inch diameter valve as the valves close. Data provided in Table 3-7 of the EA indicate that the benzene maximum contaminant level and the Class I water-quality standard would be substantially exceeded in this time frame.

IMPACT MITIGATION PLANS

Table 8-2 of the EA states that “in the event of a leak, Dakota Access would work aggressively to isolate the source through the use of remote-controlled shut-off valves, initiate cleanup activities, and contact appropriate federal and state authorities to coordinate leak containment and cleanup.” These actions are necessary but are not sufficient to mitigate impacts associated with oil spills of magnitudes that are well within the range of likely volumes if a spill from the DA Pipeline occurs into the Missouri River or Oahe Reservoir.

Section 3.2.1.2 of the EA indicates that “protection and mitigation measures will be implemented in cooperation with intake operators” to minimize the potential impacts of spills at the locations of those intakes. However, the EA does not present a discussion of the “protection and mitigation measures” that are planned. Since the Finding of No Significant Impact is preceded by the word “Mitigated”, these mitigation plans should have been detailed in the EA. Instead, the EA presents only general mitigation concepts.

Based on the planning-level spill volumes presented previously and the data provided in Table 3-7 of the EA, it is reasonable to assume that adverse impacts will occur to the quality of water at downstream intakes. Therefore, it is important that plans be developed and mitigation measures be in place to protect water intakes before the DA Pipeline is operated in areas that may impact the Missouri River or Oahe Reservoir.

MISCELLANEOUS CONCERNS

I also noted the following miscellaneous concerns during my review of the EA:

¹² Global Asset Protection Services, LLC. 2015. Emergency Block Valves. GAPS Guidelines No. GAP.8.0.1.3. Hartford, Connecticut.

- Section 2.3.2.4 notes that the pipeline trench will be backfilled with the “previously excavated material”. No mention is made of pipe bedding (typically a uniform sand or fine gravel). This material is standardly placed around underground piping to provide a uniform fill and minimize the potential for corrosion and physical damage to the pipe during installation and operation. If bedding material is not placed around the pipe, the potential for spill incidents is increased.
- Section 2.3.2.6 of the EA summarizes scour analyses that were performed to support decisions regarding the planned depth of installation of the pipeline beneath the beds of the Missouri River and Oahe Reservoir. The conclusion is reached from these analyses that the Oahe Reservoir crossing is at low risk of scour because deposition of sediment is much more likely than scour of the lake bed due to the ponded water condition of the reservoir. This is true only if the reservoir dam functions properly. Since a 500-year discharge event was used for the scour analyses, the potential extent of scour at this location should have been evaluated assuming that the dam is breached.
- Estimates presented in Section 2.3.2.6 of the EA indicate that the combination of bend scour and contraction scour will result in 32 to 34 feet of scour at the Missouri River crossing. This section also states that the planned depth of the pipeline below the Missouri River at this crossing is 36 feet. Hence, the estimated scour is nearly sufficient to expose the pipeline, which would increase the potential for pipeline failure. The potential for this scour scenario (bend plus contraction scour occurring at the crossing) was quantified by comparing the results of multiple calculation methods and arriving at a factor of safety against exposure of 1.4 to 2.3. However, I could not locate the calculations in the EA that served as the basis for these calculations. Therefore, it is unknown if this approach was appropriate or if these calculations took into account the relative errors of the various equations, which errors would affect the interpretation of the results. Given the potential depth of scour versus the planned depth of pipeline installation, the calculations should have been presented to allow independent review of the risk by the Corps of Engineers.
- Section 3.1.3.1 provides a discussion of landslide potential in the area of concern. This potential is qualitatively described as ranging from moderate to high. The probable depth of the landslide failure surface relative to the depth of the pipeline is also not discussed. Without this information, the potential impact of landslides on the pipeline cannot be properly quantified and assessed.
- Section 3.1.3.2 of the EA indicates that erosion control measures will be implemented “during construction in these areas with slopes greater than 25%.” No mention is made of erosion control practices that will be implemented where the ground slope is less than 25%. With the pipeline buried generally at a depth of 36 inches, erosion could be a significant factor in exposure of the pipeline, which in turn would increase the potential for corrosion and physical damage of the pipe. This in turn would increase the potential for failure of the pipeline. Thus, it is important that erosion control measures be implemented in all areas disturbed by pipeline construction, regardless of the ground slope at those locations.

- As part of a discussion about erosion control methods to be implemented, Section 3.1.3.2 of the EA indicates that “construction and operation of the Proposed Action facilities . . . would not be expected to increase the potential for significant landslide or slip events”. The implication of this statement is that the control of surface erosion will also control landslides. This is an inappropriate conclusion. Surface erosion is a shallow process that typically occurs in the upper few inches of the soil profile. Landslides are generally deep-seated, with failure surfaces that are a few to several feet below the ground surface.
- Section 3.1.3.2 of the EA also states that “the strength and ductility of a properly designed pipeline would allow it to span a considerable distance without compromising its integrity in the event of a landslide or other ground movement, such as subsidence.” This statement is true only if the pipeline was designed for such a span. Friction from adjacent soil can place substantial added forces on a pipeline during a landslide, whether those forces are caused by abrupt movements or slow movements.
- Section 3.1.5.2 of the EA indicates that topsoil will be segregated from excavated materials “in agricultural land, and if applicable, other areas where soil productivity is an important consideration.” In order to properly revegetate the disturbed area and minimize long-term erosion, it is critical that surficial soil be segregated and replaced throughout the length of the pipeline disturbance, whether the area has agricultural significance or not. My experience with the design of plans to reclaim land that has been disturbed by mining operations has shown that even poor quality surficial soils can be effectively revegetated if properly handled.
- Section 3.2.1.2 of the EA states that hydrostatic testing of the pipeline segments will be conducted prior to installation. While this is important, no mention is made of such testing after the pipeline is installed. Given the length of the bores and the bends that will be necessary to install the pipe beneath the Missouri River and Oahe Reservoir, it would be appropriate to hydrostatically test the pipeline after it is installed and before it is put into operation.
- Section 3.2.2.2 of the EA states that “dispersion, evaporation, dissolution, sorption, photodegradation, biodegradation, and natural attenuation ultimately would allow a return to preexisting conditions in both soil and groundwater” if a spill occurs and no active groundwater remediation occurs. While this statement is technically true, the time frame require for “preexisting conditions” to return to the area would likely be at least several decades unless active remediation occurs. Therefore, relying solely on these natural attenuation factors to remediate groundwater that is contaminated with a crude-oil spill would be inappropriate under most conditions.
- Section 4.2 of the EA states that operational spill-related impacts “would be avoided or greatly reduced . . . by requiring immediate cleanup should a spill or leak occur.” This statement oversimplifies efforts and minimizes the impacts that a spill could occur. As noted previously in this letter, even in the event of an “immediate” action, potential spill volumes may be in the range of hundreds to thousands of barrels. My experience has been that cleanup of the impacts associated with crude oil spills of this magnitude will require at least several months or years. Furthermore, the larger the water body, the

more difficult the cleanup effort. I was involved in the cleanup of an 800 bbl crude-oil spill into a mountain stream with a pond at the downstream end. A period of several months was required to reach a point where active remediation efforts were no longer required, even though the stream was small enough and the flow low enough that pressure washing of individual rocks in the bed and banks of the creek was performed. Furthermore, it was more than six years after the spill event before further monitoring and related actions was not required by the State. Therefore, the EA should have provided a more comprehensive quantitative evaluation of spill impacts rather than implying that a goal of "immediate cleanup" should be sufficient to resolve those concerns.

Please let me know if you have any questions regarding this matter.

Sincerely,

A handwritten signature in black ink that reads "Richard B. White". The signature is written in a cursive, flowing style.

Richard B. White, P.E.
Consulting Civil and Environmental Engineer
EarthFax Engineering Group, LLC

Richard B. White, P.E.

EDUCATION

MS, CIVIL AND ENVIRONMENTAL ENGINEERING <i>Utah State University</i>	1977 <i>Logan, Utah</i>
BS, WATERSHED SCIENCE <i>Utah State University</i>	1976 <i>Logan, Utah</i>
SAFETY AT HAZARDOUS MATERIALS SITES <i>EarthFax Engineering, Inc.</i>	1986 <i>Midvale, Utah</i>

EXPERIENCE

CONSULTING CIVIL AND ENVIRONMENTAL ENGINEER	2016-PRESENT
PRESIDENT	1982-2016
<i>EarthFax Engineering Group, LLC</i>	<i>Midvale, Utah</i>

Mr. White serves as lead engineer on many EarthFax projects, ranging from civil engineering design to environmental assessment and remediation to slope stabilization projects. He provides quality assurance/quality control and internal peer review on many of the company's projects. His core areas of expertise include:

- Assessment and mitigation of environmental impacts resulting from land development
- Design of disturbed-land reclamation plans
- Design of runoff- and sediment-control plans
- Design of stream channel stabilization plans
- Rapid engineering response to oil spills and other environmental emergencies
- Preparation of plans to remediate soil and groundwater contamination
- Interaction with regulatory agencies

Representative projects on which Mr. White has worked are summarized below.

Oil Spill Response

Mr. White has served as chief consulting environmental engineer on over 25 oil spills (crude, gasoline, and diesel) in the Intermountain/Rocky Mountain regions of the U.S. In this capacity, he has provided oversight or direct involvement in assessing the extent and magnitude of impacts, designed methods to remediate those impacts, sampled impacted media to confirm the efficacy of remediation efforts, and interacted with regulatory agencies on behalf of the clients. Selected projects are summarized below.

- Served as part of the client's team in response to a release of diesel fuel to a fresh-water reservoir in northern Utah. A cracked seam in an 8-inch diameter refined products pipeline released approximately 500 barrels of diesel into a stream channel and pond system that conveys storm water to Willard Bay, a man-made fresh-water reservoir situated along the east shore of the Great Salt Lake. Provided technical and engineering expertise during initial delineation of the spill boundaries; responsible for assessing impacts to groundwater; designed groundwater remediation methods; provided input on the design of several water control structures; reviewed mass balance calculations of

released and recovered product; and interacted with State regulatory personnel and their subcontractors on behalf of the client.

- Served on the client's emergency response team on a crude oil spill in the metropolitan area of Salt Lake City, Utah. The 800-barrel release originated from an 8-inch diameter pipeline that transports crude oil from western Colorado to refineries in the Salt Lake City area. The event occurred during a series of late spring thunderstorms in Salt Lake City that resulted in short-circuiting of an adjacent high voltage terminal, causing the pipeline to become a receptor of the electrical surge which melted a hole in the line. By the time the release was discovered and controls emplaced, the oil had traveled approximately 10 miles through Salt Lake City toward the Great Salt Lake before it was contained. Responsible for technical input on all EarthFax activities throughout the project, including design of initial response efforts, site assessments, design of remediation methods, and post-event sampling. Specific tasks performed by Mr. White included:
 - Provided technical engineering and environmental expertise to the client and other subcontractors under the Unified Command system during the emergency response and remediation phases of the project.
 - Conducted multiple Shoreline Cleanup and Assessment Technique surveys along the affected waterways to uniformly grade the magnitude of contamination and prioritize future cleanup activities.
 - Provided and reviewed design and construction inspection services for the restoration of the spill site, the impacted waterways, and adjacent properties.
 - Performed confirmation sampling during active remediation efforts and for approximately 5 years after the release to verify that human health and ecological risks in the affected area had been adequately mitigated.
- Served as part of the client's emergency response team on a second crude oil spill in the metropolitan area of Salt Lake City, Utah. This 550-barrel spill occurred approximately 6 months after the above-noted release when a nearby block valve froze during extreme winter temperatures. Approximately 4 acres of land in an adjacent arboretum and amphitheater were affected. Responsible for overseeing initial assessments to delineate the extent of contamination; for designing controls to isolate the contamination during snowmelt; for verification sampling following excavation of the impacted soil; for providing technical advice on environmental, regulatory, and waste disposal matters; for directing excavation efforts; and for providing engineering support during restoration or replacement of impacted structures.
- Served as chief engineer to assess and remediate soil contamination due to leakage from a refined product pipeline in a remote location on the western Snake River Plain in south-central Idaho. Supervised assessment efforts, calculated the quantity of spilled hydrocarbons in the soil to compare with the client's estimate of spilled product based on pipeline flow records, and designed a soil vapor extraction remediation system using multiple vertical vapor extraction points. Calculations confirmed that benzene emissions from the blowers would be below the Idaho Department of Environmental Quality emission rate standard, thus eliminating the need for surface treatment of the emissions. Supervised monitoring efforts during the cleanup process.

- Served as part of the client's emergency response team on the release of diesel fuel to a wetland area adjacent to the north shore of the Great Salt Lake. An estimated 100 barrels of diesel fuel were released through a pin-hole leak in an 8-inch diameter pipeline that conveys refined fuel products from Salt Lake City, Utah to Spokane, Washington, resulting in 22 acres of wetland and upland area being affected. Mr. White provided technical oversight or direct input on this project, including implementation of containment measures, delineating the extent and magnitude of contamination, evaluating remediation alternatives, managing remediation activities, documenting the work, and providing agency liaison. Two unique aspects of the project included responding to the release using low-impact methods (pack mules) to deploy containment booms in the sensitive wetlands and transitional wetland zones, and implementing controlled-burn activities as an acceptable remediation technology. Following completion of the controlled burn, Mr. White designed an approach to enhance bioremediation of the remaining hydrocarbon-impacted upland soil. Subsequent analyses confirmed that this approach was successful.
- Provided technical oversight during assessment and remediation of soil impacted by the release of crude oil from a 3-inch diameter underground lateral crude line that ruptured in a remote area of eastern Utah. Released traveled down an ephemeral drainage for approximately 0.5 mile toward a regionally-important river. Supervised the design of methods to contain the release before it could impact the river. Designed a passive-aeration bioremediation cell, using wind-operated turbines, to remediate approximately 9,200 cubic yards of excavated soils in this remote area. Provided oversight during sampling activities and in the interpretation of the resulting data.
- Served as chief consulting environmental engineer at the site of a crude oil spill located near an important drinking-water reservoir in northern Utah. The release occurred when a contractor for a residential development company ripped through the pipeline with a dozer, breaking the line and releasing 700 barrels of oil onto the ground before the line was shut down. Provided oversight during delineation of the spill site boundary; identification of potential above- and below-ground receptors of concern; collection of numerous soil samples from the spill site as well as background water quality samples from the nearby reservoir; and performance of a geologic study to better understand potential subsurface pathways of migration and how they might affect response activities undertaken to protect surface and groundwater resources. Assisted in the design of a permitted temporary impacted-soil storage area at the base of the spill site.
- Evaluated soil and groundwater contamination near the Trans Niger Pipeline in the Ogoniland region of Rivers State, Nigeria. Spills from these facilities (occurring from deteriorated infrastructure as well as sabotage and crude-oil theft) had created significant environmental impacts in the region. This project included a review of soil and groundwater data collected by others from 9 areas that had been previously remediated. It also included an evaluation of 133 groundwater samples collected from private wells used for domestic purposes near the pipeline. These results of these analyses were compared with risk screening levels established by the Nigerian Department of Petroleum Resources. Prepared reports summarizing the results of the above comparison and provided recommendations for future efforts.

Mine Site Assessment, Design, and Reclamation

Mr. White has developed reclamation plans for several areas disturbed by coal and mineral mining operations. Using site-specific topographic data, he has designed drainage alignments, profiles, and channel sections to efficiently convey runoff from the reclaimed slopes. He has also developed reclamation grading plans that balanced earthwork volumes, designed post-mining runoff- and sediment-control structures, developed topsoil and substitute topsoil redistribution plans, and developed revegetation plans to restore the areas to productive post-mining land uses. He has submitted this information to the appropriate regulatory agencies on behalf of his clients, and provided construction oversight during field implementation of the plans. Representative projects are summarized below.

- Designed a surface-roughening technique applicable to the semi-arid areas of the western United States referred to as "deep gouging." This method results in a variably roughened surface that retains precipitation on the immediate slope, thereby enhancing revegetation success and substantially reducing erosion potentials. Using established hydrologic calculation methods, demonstrated that sediment yields from areas reclaimed with this method are significantly reduced when compared with the same areas prior to disturbance. Using this reclamation technique, the client received the 2003 Excellence in Surface Coal Mining and Reclamation National Award, presented by the U.S. Department of Interior, Office of Surface Mining. They were cited "for outstanding performance in developing and implementing exemplary mining and reclamation methods that maintained sound environmental conditions."
- Developed a plan to reclaim land affected by molybdenum mine and mill located at an elevation of over 10,000 feet in Colorado. Expansion of the mining operation was projected to result in an affected area of over 6,400 acres, including the open-pit mine, tailings impoundments, a waste-rock disposal site, the mill site, and several ancillary facilities. Critical issues affecting the design of the reclamation plan included the high-altitude location in montane and alpine ecological zones, dealing with a short growing season and an average annual snowfall of over 20 feet, the control of acid-mine drainage, the location of the site on the continental divide at the headwaters of three major drainages, and the fact that much of the surface water from the site discharged into watersheds that provided a portion of the drinking-water supply for Denver, Colorado. Evaluated areas to be affected by the expansion project and developed topsoil salvaging plans for those areas that had not yet been disturbed. Designed reclamation channels to safely convey the peak flow from the probable maximum precipitation event around and across the tailings in a non-erosive manner. Designed a cover system for the tailings impoundments that would shed runoff in a controlled manner and minimize the potential for long-term seepage of acidic water from the tailings. The reclamation plan included demolition of site structures, placement of the demolition debris in the tailings impoundments, construction of the cover system for the tailings, recontouring of selected areas, incorporation of lime into the surface of acid-generating material, placement of topsoil, and site revegetation.
- Evaluated alternatives for reducing, controlling, and recycling waste rock at a coal mine located on Sakhalin Island in the Russian Far East. Evaluated alternatives for minimizing environmental pollution resulting from existing mine waste dumps and increasing opportunities to recycle this waste; developed a program to control and beneficially reuse solid wastes generated by the mine; and prepared a project report that outlined the

feasibility of solid-waste control and recycling at the facility. Also evaluated alternative underground mining methods to minimize the production of waste rock and assessed the coal burning efficiency of the town boiler to minimize ash production. This project was subsequently designated by the Eurasian-American Partnership for Environmentally Sustainable Economies as a Best Practice. The citation indicated that the project demonstrated "environmentally sound and economically efficient solutions to environmental problems in Central and Eastern Europe and Eurasia."

- Conducted a hydrogeologic investigation at a surface coal mine located north of Vladivostok in the Russian Far East. Large quantities of groundwater were flowing uncontrolled into the mine, creating safety hazards due to instability of pit walls and spoil piles. Furthermore, water being discharged from the mine had the potential of adversely impacting the quality of water in Khanka Lake, an important ecological preserve located downstream from the mine. Evaluated data collected at the site by the Russian Academy of Sciences, conducted field investigations, and interviewed mine personnel familiar with the local hydrogeology. Designed dewatering wells to intercept the groundwater before it could flow into the mine, thereby eliminating the safety and environmental concerns. Recommended that water pumped from the dewatering wells be delivered to nearby communities for their domestic use and that the heat from the pumped groundwater be recovered to heat mine buildings and nearby residences.
- Prepared reclamation plans for an existing uranium mine and mill in southeastern Utah. The project included the design of a suitable cover for the tailings, giving consideration to radon attenuation, and erosion control. Designed a capillary break that was installed between the tailings and the cover to minimize the potential for moisture (and accompanying contaminants) to migrate in the vadose zone between the tailings and the cover. In accordance with the requirements of the U.S. Nuclear Regulatory Commission, designed a reclamation channel to convey surface runoff resulting from the probable maximum precipitation event across the site without damaging the reclaimed tailings piles.
- Prepared a plan to reclaim land affected by waste from silver and gold mining operations near Park City, Utah. The 4,800-acre area was planned for residential, commercial, and recreational development. Over a 100-year period, large quantities of waste rock and tailings contaminated primarily with arsenic and lead had been left in diverse locations throughout the property. Since sufficient topsoil was not available to cover the exposed waste, the cover system design for the waste rock involved incorporation of mulch into the waste rock and direct revegetation of the mulched surface. Final reclamation plans also included demolition of remaining structures, construction of diversions to control runoff, and fertilizing and revegetating the reclaimed waste rock and tailings. The plan was developed to provide long-term protection of the environment under the assumed future scenarios consisting of residential, commercial, and recreational land uses.
- Designed numerous surface-runoff and sediment control facilities for surface and underground coal mines, active and inactive uranium mills, and hazardous-waste management operations. Facilities have included sedimentation ponds, diversion channels, riprapped channels, land reclamation, check dams, and culverts. State-of-the-art models have been used to determine peak design flows and to aid in design of the structures. Design considerations have included selection of the appropriate design storm, avoidance of maximum permissible flow velocities, cost-effective erosion

control, and water-surface profile analyses. Served as a liaison between the clients and the appropriate regulatory agencies.

- Conducted an investigation at the site of an active uranium mill in southeastern Utah to determine appropriate remedial actions to prevent future groundwater contamination after a plume had developed due to seepage from tailings ponds. Performed surface geophysical investigations (electrical resistivity and very-low-frequency electromagnetic) to determine the extent of contamination, bedrock lithology, and the location of major groundwater-conducting fractures. Utilized water-level and quality data from over 140 previously existing and new monitor wells to aid in defining the extent of groundwater contamination. Conducted long-term pumping tests to determine the anisotropic nature of the groundwater hydraulic system. Modeled the fractured aquifer to determine the rate of contaminant migration and the effectiveness of the proposed remedial action. Designed a remedial-action plan consisting of hydrodynamic control of contaminant migration through the operation of several groundwater recovery wells and pumping this groundwater to evaporation ponds for disposal.
- Conducted groundwater, surface water, and soil investigations at the site of an abandoned copper/lead smelter in Utah which was being considered for addition to EPA's National Priorities List. Installed multiple monitoring wells to assess groundwater hydraulic and quality conditions. Delineated and sampled areas of smelter wastes, including slag, calcine, baghouse dust, and miscellaneous waste which had accumulated during operation and demolition of the smelter. Data received from the laboratories were interpreted using geochemical and hydrologic models to determine the need for future remedial actions and the effectiveness of natural soils at attenuating the migration of inorganic contaminants from the waste sources. Developed a conceptual remedial-action plan together with work plans for remedial design. Information was also provided in support of the client's pursuit of Innocent Purchaser Defense rules.
- Designed methods to stabilize a steep-slope area of approximately 40,000 square feet that had been affected by a coal outcrop fire. The fire had originated in an adjacent abandoned underground coal mine and had resulted in denuding of the area and mass failure of several portions of the slope, including multiple rotational failure cracks with depths in excess of 25 feet and top widths in excess of 10 feet. The design consisted of creating a uniform slope in areas that had been subject to mass failure, installing gabions and anchoring the gabions to the slope using rock bolts, filling the gabions with road-base material and topsoil, and revegetating the area. Provided construction oversight and survey control during implementation of the project.
- Developed a conceptual dewatering plan for a proposed lead/zinc/silver mine that was projected to encounter significant quantities of hot saline groundwater. Previous dewatering operations in the region had pumped water to percolation ponds on an alluvial fan that was situated above a valley that relied on groundwater for irrigation of agricultural fields. Performed investigations to determine the potential of future dewatering operations to impact the valley's groundwater resources. Reviewed data from local water-supply wells to determine whether or not past impacts had occurred. Evaluated alternatives for mine-water disposal and designed a monitoring program to assess future impacts. Served as a liaison between the mining company, regulatory agencies, and legal counsel.

- Prepared a reclamation plan for an abandoned mine/mill/smelter complex in Utah. Collected soil, waste, and water samples to delineate acceptable topsoil and structural fill borrow materials and to determine requirements for isolation of waste materials. Prepared reclamation designs, giving consideration to regulatory obligations, demolition of structures, post-mining land uses, soil cover requirements, revegetation, and controlling runoff in a non-erosive manner. The reclamation plan also included plans for shaft and portal closure, backfilling and stabilization of disturbed slopes, reclamation of roads and pads, and general re-contouring of the area. Particular concern was paid to mitigating erosion that had occurred in the area since shutdown of mining operations and the beginning of reclamation. Project costs were also estimated.
- Supervised data collection and analyses to evaluate the migration of inorganic and radioactive contaminants in surface and groundwater from several inactive uranium-mill tailings piles in the western United States. Supervised drilling and monitoring-well construction. Collected soil and water samples for quality analyses. Performed field tests to determine groundwater hydraulics. Analyzed all data to determine existing conditions and probable impacts of implementing proposed remedial actions. Prepared detailed reports for each site and associated sections of environmental assessments. Assisted in preparation of remedial-action plans.
- Evaluated the extent of lixiviant migration at a uranium solution mine in Texas. Developed cost estimates for restoration of groundwater quality at the site.

Stream Channel Stabilization

Mr. White has performed and/or managed the assessment and design of over 20 projects to stabilize stream and river channels and beds at oil and gas pipeline crossings. This work has included the following:

- Developed a compendium of stream-bank and channel stabilization methods to assist a petroleum and natural gas pipeline company in controlling the impacts of their operations on the environment. The company operates approximately 2,800 miles of pipelines throughout western Canada and the western and Midwestern United States. The longest of these pipelines extends from Alberta, Canada through parts of Montana, Wyoming, Nebraska, Kansas, Missouri, and Illinois in the United States. Presented the client with 24 approaches that could be used to stabilize stream banks and channel bottoms, depending on the specifics of the site. These included “hard” approaches that rely on non-biodegradable materials such as riprap and concrete to provide stability. They also included “soft” approaches that rely on vegetation and other biodegradable materials, as well as combinations of the two general approaches. Evaluated the effectiveness, environmental consequences, and cost of each approach and provided the client with design and installation guidelines and maintenance recommendations to permit them to evaluate field conditions and, in many cases, select and implement an appropriate stabilization method without further involvement by EarthFax.
- Evaluated stream-crossing locations along the route of a proposed crude-oil pipeline that was to be constructed for approximately 90 miles from Evanston, Wyoming to Salt Lake City, Utah. Considered various alternatives for installation of the new pipeline across the streams to minimize damage, including spanning, boring, and trenching. Prepared stream-alteration permits for submittal by the client to the U.S. Army Corps of Engineers and the Utah State Engineer’s Office. Provided typical design

drawings and specifications as well as construction alternatives for completing the stream channel crossings. In specific instances, collected site-specific survey data, evaluated design discharge rates, designed open channels and erosion-protection features, and provided the client with design drawings used for construction bidding.

- Conducted an investigation of conditions at locations in Kansas and Missouri where historic pipelines had become exposed due to improper stabilization of ground during installation of a new pipeline. Examined the immediate area of concern as well as up- and downstream from that area, performed land surveys, prepared drawings and other documents to detail the design, assisted the client in obtaining stream alteration permits, and reviewed construction information to help the client with project implementation. Developed mitigation designs to stabilize the exposed pipelines while ensuring that up- and downstream areas were not adversely impacted.
- Evaluated conditions at a location in Louisiana where a stream bank adjacent to a 16-inch diameter petroleum pipeline was eroding toward the pipeline. To protect their asset, the pipeline company installed sheet piling as a retaining wall in the stream bank approximately 25 years earlier. However, the lack of a drainage layer behind the sheet piling eventually caused the piling to fail. Developed a design for stabilizing the stream bank at this location, consisting of regrading the channel bank, installing articulated concrete mats on the bank, and planting willow cuttings between the concrete blocks. This approach proved successful at keeping the bank stable during extreme flooding of the area two years after installation.

Soil and Groundwater Assessment and Remediation

Supervised environmental characterization efforts at rocket-motor production facilities, petroleum refineries, petroleum pipelines, printed-circuit facilities, abandoned smelter complexes, and other industrial facilities to determine the extent and magnitude of soil and groundwater contamination. Prepared work plans, QA/QC plans, health and safety plans, and contamination assessments. Prepared human-health and ecological risk assessments to establish remediation goals. Developed remedial-action plans to clean up past contamination. Designed remedial measures (including air stripping, vapor extraction, thermal desorption, pump-and-treat, air sparging, dual-phase extraction, excavation and off-site disposal, stabilization/solidification, bioremediation, and natural attenuation). Contaminants included explosives, inorganics, chlorinated solvents, dioxins/furans, and other organics. Selected projects are summarized below.

- Supervised and directly assisted in the performance of multi-year assessment, design, and remediation management services at a petroleum refinery located on 600 acres in northern Utah. This work involved the performance of a RCRA Facility Assessment that included detailed characterization of 28 solid-waste management units to determine the need for remediation of hazardous and non-hazardous sludges, refuse, spent refinery chemicals, tank bottoms, and waste waters; performance of bench- and pilot-scale treatability studies to determine the feasibility of various remedial alternatives; preparation of a refinery-wide numerical groundwater flow and contaminant transport model; assessments of the risk of remediation alternatives on human health and the environment; and negotiations with regulatory authorities to classify groundwater as a separate solid-waste management unit, thereby negating the need to remediate groundwater at each individual location where surface remediation was required. The majority of the solid wastes were remediated through solidification and on-site disposal in onsite closure cells, the design of which included combining wastes with widely varying acid-generation potential to support chemical stabilization of the material.

- Supervised and directly provided long-term environmental engineering services to a major propellant and rocket-motor manufacturing client in northern Utah. Contaminants of concern include explosives (nitroglycerin, HMX, RDX, perchlorates, etc.), organic solvents (TCE, TCA, DCE, Freon, etc.), and inorganics (lead, silver, chromium, etc.). Specific tasks that completed for this client have included:
 - Performed groundwater quality and hydrogeologic characterizations of the facilities and adjacent areas;
 - Assessed the extent and magnitude of off-site contamination;
 - Prepared work plans and bid documents and supervised installation of over 100 monitoring wells, deep piezometers, and observation wells under tight time schedules to meet regulatory constraints;
 - Determined the effectiveness of monitoring well purging during sampling and assisted the client in changing to low-purge sampling methods, thereby eliminating large amounts of investigation-derived waste;
 - Performed and analyzed the results of aquifer-characteristics tests in over 100 monitoring wells to assess the hydraulic conditions of the groundwater system;
 - Numerically modeled groundwater flow and contaminant transport to assist in determining the effectiveness of various remediation alternatives;
 - Performed human health and ecological risk assessments to establish cleanup criteria;
 - Modeled flow in the unsaturated zone to assess the potential for migration of contaminants from soil to the underlying groundwater;
 - Designed a solid-waste landfill for on-site disposal of non-hazardous solid waste;
 - Performed floodplain encroachment investigations;
 - Designed and implemented pilot-scales tests to anaerobically bioremediate soil and groundwater that was contaminated with perchlorates and organic solvents;
 - Conducted a remote drilling investigation of explosives-contaminated soil in six former industrial wastewater collection basins, exercising special precautionary measures due to the potentially-explosive nature of the contaminants; and
 - Designed a water treatment system to remove perchlorate from storm water prior to discharging to an adjacent wetland.
- Served as chief engineer to evaluate options for remediating legacy contamination adjacent to a drainage canal where it flows through to an oil refinery. Past waste disposal practices at the refinery resulted in hydrocarbon impacts to soils adjacent to the canal. The US EPA expressed concerns that continued seepage of oil into the canal following remediation of the sediments would re-contaminate the canal. Conducted a feasibility study under US EPA guidelines to evaluate alternative approaches to eliminate future impacts from the oil seepage. The design anticipated re-routing approximately 3000 feet of the canal to bypass the area of oil seepage. The impacted soils in the former canal bank would then be mitigated as part of a refinery-wide groundwater remediation effort. Evaluated several options for remediating the residual hydrocarbons in the canal bank, including preparation of conceptual designs and cost estimates for each option, and presented these options to the client for consideration. Prepared a Remedial Design/Remedial Action work plan for the preferred alternative, which consisted of partial excavation of the impacted soil, backfilling of the area to maintain stable conditions, and implementation of monitored natural attenuation.

- Designed a soil-vapor extraction (“SVE”) pilot-scale test for a Superfund site near Billings, Montana. Reviewed data collected from prior subsurface investigations and rendered a positive opinion on the feasibility of SVE as a remediation approach for the site. Designed the pilot test components, consisting of 14 SVE wells, vacuum pumps, air treatment systems, and monitoring apparatuses. Assisted the client with the process of obtaining proposals from contractors to install the pilot-test components and served as the project engineer during performance of the test.
- Served as chief engineer and manager of a project to evaluate and remediate the impacts of prior mining activities in an area of proposed residential development in southwestern Utah. The area had been the subject of silver and uranium mining from the late 1880s to the mid-1900s, with several areas containing waste rock, tailings, and other contamination of concern. The project included a detailed site characterization investigation, performance of a risk assessment to establish remediation goals, preparation of a detailed work plan for excavation of contaminated soil and waste rock, burial of these materials in an on-site repository, and backfilling the excavated areas with clean soil. Developed a quality assurance project plan, sampling and analysis plan, dust control plan, traffic control plan, and storm water pollution prevention plan and incorporated all of these plans into the detailed remedial action plan for review by the Utah Department of Environmental Quality. Interacted with the State during site remediation and prepared a final report describing all remediation activities. This work was conducted under the Voluntary Cleanup Program of the State of Utah.
- Evaluated alternatives for treatment and disposal of water encountered in an underground coal mine in southeastern Utah. The primary concern associated with this water was high levels of salinity. Options that were evaluated included underground injection, evaporation, beneficial reuse via irrigation, and reverse-osmosis treatment for desalination. Prepared cost estimates as well as a discussion of advantages and disadvantages for each alternative to allow the client to better evaluate their options.
- Designed treatment cells for the bioremediation of contaminated soils, using both bacterial and fungal methods. Contaminants included petroleum hydrocarbons, pesticides, wood preservatives, and dioxins/furans. Work was conducted in Utah, Wyoming, Michigan, North Carolina, and New Zealand.
- Performed statistical analyses of soil and groundwater data collected from industrial facilities. Used these data to calculate exposure point concentrations and risks associated with contaminated media.
- Designed sampling programs to assess the effectiveness of soil remediation efforts. Prepared work plans, outlining data quality objectives, conceptual site models, sampling procedures, analytical procedures, and human risk associated with residual concentrations of the contaminants of concern.
- Prepared human-health and ecological risk assessments at locations where the contaminants of concern included solvents, petroleum hydrocarbons, energetics, and inorganics.
- Supervised assessment and remediation of groundwater contamination resulting from leaking underground storage tanks in Utah and Michigan. Responsible for monitoring

well installation, soil-gas surveys, remediation system design and installation, and treatment system operation.

Hydrologic and Hydraulic Modeling

Conducted and managed the performance of detailed hydrologic and hydraulic evaluations of a drainage canal used for several decades to dispose of runoff and wastewater from multiple industries and treatment plants in northern Utah. The purpose of this project was to assess the effects on water-surface profiles during removal of hydrocarbon-impacted sediments from the canal, thereby addressing concerns of the U.S. Environmental Protection Agency and the Utah Department of Environmental Quality. Determined the magnitude of design precipitation events, developed a site-specific rainfall hyetograph, assessed land-use and environmental conditions in the 12,300-acre watershed to portray rainfall-runoff relations, and modeled hydrographs of design runoff events. To meet project needs, estimates were made of peak flows at various locations within the canal for return periods ranging from 2 to 100 years. Seasonal peak flows were also estimated for storms with 2-year return periods to assist in planning sediment removal efforts. Managed hydraulic modeling efforts to determine the elevation of the water surface at various locations in the canal during all storm events.

Supervised modeling efforts to determine groundwater impacts associated with two adjacent surface coal mines in eastern. The need for accuracy was increased by the fact that the coal seam being mined also served as a regional aquifer. Supervised the performance of field tests on existing monitoring wells to assess local groundwater hydraulic conditions. Evaluated data from several monitoring wells and private water-supply wells to determine the shape of the potentiometric surface in the overburden, coal, and underburden for an area of approximately 400 square miles around the mines. The impacts of mining were then determined three-dimensionally using a finite-difference numerical model. Sensitivity analyses were performed to assess the effects of varying model parameters on model output. The time required for water levels to recover following mining was also estimated using the model. Based on the model data and regional studies, the cumulative hydrologic impacts of mining in the region were estimated.

Modeled potential groundwater impacts due to various alternatives for control of the level of the Great Salt Lake. Modeled regional impacts of well-field operation in southwestern Michigan to determine the influence of groundwater withdrawals on the shape of a contaminant plume originating from a Superfund site. Supervised flow and contaminant transport modeling of groundwater at a petroleum refinery and two chemical manufacturing facilities in Utah.

Developed storm water runoff conveyance system master plans for two rural communities in south-central Utah. Several years previously, the towns had converted to a pressurized irrigation system, thus removing the irrigation ditches that had previously also served to control runoff in the area. Prepared master plans and conceptual design information for upgrading the towns' storm water runoff control system. Conducted hydrologic analyses to determine the capacity of the existing storm water runoff conveyance system to convey the design precipitation event. Further hydrologic analyses were then conducted to assist in designing the recommended improvements that would meet the capacity of the design precipitation event. Included in the recommendations for improvements was a site improvement cost estimate. Assisted the client with funding research and submitted successful applications for financial assistance to funding agencies.

Water Supply Development

Provided oversight on a project consisting of design engineering and construction management services to upgrade firewater systems at two oil refineries in northern Utah. The completed projects included the installation of over 30,000 feet of new pipeline, with diameters ranging up to 16 inches, to deliver over 6,000 gallons per minute of water throughout the refineries.

Evaluated the water-supply and distribution system for a rural community of approximately 750 people in southern Utah. Developed conceptual plans and preliminary cost estimates for upgrading their system to provide a long-term solution to their water needs, including rehabilitation of a backwater water-supply well, replacement of an old pipeline carrying water from the town's springs to the storage tanks, installation of additional pipes within the town limits to improve their fire-fighting capacity, and installation of an automation system to allow remote communication between the storage tank and the town center. Prepared a preliminary engineering report and assisted the town in obtaining grants and loans from funding agencies. Managed final design and construction of the required improvements. Also assisted the town in obtaining funding for a medical center and a fire station.

Designed a water-supply and -distribution system for a proposed 300-lot summer-home development. Also designed and supervised construction of water-supply wells for municipalities, recreational facilities, a surface coal mine, and an industrial facility. Yields ranged up to several thousand gallons per minute. Conducted siting investigations to locate the wells, using geophysical, photogrammetric, and geologic interpretation. Supervised drilling activities and performed pumping tests to determine the long-term yield of the wells.

Designed a water-supply well with a depth of approximately 5,400 feet to provide industrial water for a surface coal mine in eastern Wyoming. Prepared specifications for construction of the well and subcontracted the drilling services. The well was drilled to supply a yield of approximately 500 gallons per minute of water. Provided oversight of drilling and construction activities throughout the turn-key project.

Conducted hydrologic analyses to determine the adequacy of existing and proposed water supplies for use at coal-fired power plants in Utah. Examined alternative surface and groundwater sources to supplement existing supplies. Conceptually designed alternative supplies.

Miscellaneous

Provided review and certification for Spill Prevention, Control, and Countermeasure Plans for a bulk petroleum storage and distribution facility in southeastern Utah, for a manufacturing facility in northern Utah, and for a high-security data center in northern Utah. Conducted onsite inspections of the exterior and interior of single-walled tanks to ensure that the tanks met the integrity requirements of the regulations.

Evaluated alternatives for closure of an open dump that was serving as a location for the disposal of garbage generated from a large community in Nigeria. Also developed conceptual design information for construction of a secure landfill near the open dump, and provided recommendations for equipment to operate the landfill.

Designed an instrumentation network to monitor moisture and contaminant migration in the unsaturated zone at the site of a proposed low-level, high specific-activity radioactive waste

disposal site in Nevada. Developed a conceptual design of a well field capable of producing several thousand gallons-per-minute of brine in Nevada for the production of industrial salts.

MEMBERSHIPS

Utah Solid and Hazardous Waste Control Board (Member and Chair, 1995-2003)
Utah Centers of Excellence Advisory Council, Utah Office of Technology and Science (2002-present)
U.S. Department of Commerce, Environmental Technologies Trade Advisory Committee (2009-2016) - Chair of Trade Promotion Subcommittee
American Water Works Association

CERTIFICATIONS AND REGISTRATIONS

Registered Professional Engineer (Arizona, Colorado, Montana, Utah, and Wyoming)



**DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108**

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The Honorable Dave Archambault II
Chairman, Standing Rock Sioux Tribe
P.O. Box D
Fort Yates, North Dakota 58538

Kelcy Warren
Chairman and Chief Executive Officer
Energy Transfer Partners, L.P.
8111 Westchester Drive
Dallas, TX 75225

Joey Mahmoud
Executive Vice President
Dakota Access LLC
3738 Oak Lawn Avenue
Dallas, TX 75219

Dear Gentlemen:

I am writing regarding the review that the Department of the Army initiated in September regarding the proposed crossing of the Dakota Access Pipeline (DAPL) under Lake Oahe. As you know, on September 9, 2016, the Department of Justice, the Department of the Army, and the Department of the Interior stated that the Army would move expeditiously to determine whether it would need to reconsider any of its previous decisions regarding DAPL's proposed crossing at the Lake Oahe site. The Army has completed that review, accounting for information it has received from the Tribes and the pipeline company since September, and has concluded that its previous decisions comported with legal requirements.

The Army is mindful of the history of the Great Sioux Nation's repeated dispossessions, including those to support water-resources projects. This history compels great caution and respect in considering the concerns that the Standing Rock Sioux Tribe has raised regarding the proposed crossing of Lake Oahe north of its reservation. The Army recognizes that portions of Lake Oahe remain within the Standing Rock Sioux Tribe's reservation boundaries and the Tribe retains hunting and fishing rights in the lake. Additionally, the Army recognizes that the Tribe relies on Lake Oahe and the Missouri River for drinking water. We take seriously our government-to-government relationship with the Tribe. This history, the importance of Lake Oahe to the Tribe, and our government-to-government relationship call for caution, respect, and particular care regarding the proposed DAPL crossing at Lake Oahe.

As you are aware, the statute governing rights of way for pipelines through Federal lands mandates that the Army "impose requirements for the operation of the pipeline and related facilities in a manner that will protect the safety of workers and protect the public

from sudden ruptures and slow degradation of the pipeline." 30 U.S.C. §185(g). It also requires the Army to "protect the interests of individuals living in the general area of the right-of-way or permit who rely on the fish, wildlife, and biotic resources of the area for subsistence purposes," 30 U.S.C. §185(h)(2)(D). In addition, the statute authorizes the Army to subject a right-of-way to "terms and conditions" "regarding extent, duration, survey, location, construction, operation, maintenance, use, and termination," to protect the environment and public health and safety, 30 U.S.C. §185(k).

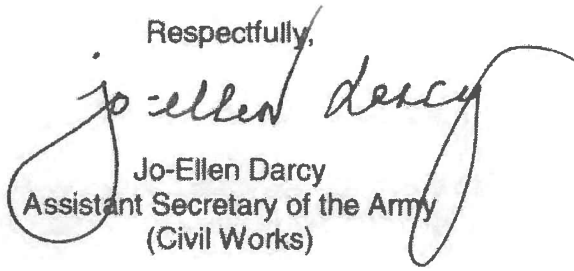
Accordingly, the Army has determined that additional discussion with the Standing Rock Sioux Tribe and analysis are warranted. The Army invites the Standing Rock Sioux Tribe to engage in discussion concerning the following topics:

- Potential conditions in an easement for the pipeline crossing, which would further reduce the risk of a spill or rupture, hasten detection and response, or otherwise enhance the protection of Lake Oahe, the Tribe's water supplies, and its treaty rights;
- With such conditions, the risk to the Tribe of a spill from the pipeline crossing Lake Oahe at the proposed location; and
- In light of such conditions, whether to grant an easement for the pipeline to cross Lake Oahe at the location currently proposed.

The Army plans to provide a framing paper to facilitate this discussion with the Standing Rock Sioux Tribe regarding these topics. While these topics are of particular interest to the Army, we welcome any input that the Tribe believes is relevant to the proposed pipeline crossing or easement. The Army will work with the Tribe on a timeline that allows for robust discussion and analysis to be completed expeditiously.

While these discussions and analysis are ongoing, construction on or under Corps land bordering or under Lake Oahe cannot occur because the Army has not made a final decision on whether to grant an easement.

Respectfully,


Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)