DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
1616 CAPITOL AVENUE
OMAHA NE 68102-4901

REPLY TO
ATTENTION
CENWO-OC

31 August 2018

MEMORANDUM FOR RECORD

SUBJECT: Consideration of the Issues Remanded by the U.S. District Court for the District of Columbia related to the Dakota Access Pipeline Crossing at Lake Oahe, North Dakota

1. The purpose of this memorandum and enclosure is to respond to the issues remanded back to the U.S. Army Corps of Engineers for additional analysis by the U.S. District Court for the District of Columbia. *See Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs,* No. 16-1534, Memorandum Opinion (D. D.C. June 14, 2017)(ECF No. 239). On remand, the Corps was directed to "consider the impacts of an oil spill on fishing rights, hunting rights, or environmental justice, or the degree to which the pipeline's effects are likely to be highly controversial." Memorandum Opinion at 2.

2. To address these three issues, the Corps sought input from Energy Transfer Partners, the Standing Rock Sioux Tribe, the Cheyenne River Sioux Tribe, the Oglala Sioux Tribe, and the Yankton Sioux Tribe. In addition, the Corps conducted its own analysis of available information and considered materials in the administrative record and has fully considered "the impacts of an oil spill on fishing rights, hunting rights, or environmental justice, or the degree to which the pipeline's effects are likely to be highly controversial." The Corps' review on remand did not reveal "significant new circumstance[s] or information relevant to environmental concerns." 40 C.F.R. § 1502.9(c). Therefore, the Corps concludes that a formal reconsideration of the July 2016 Final Environmental Assessment and Finding of No Significant Impact or the preparation of supplemental National Environmental Policy Act documentation is not required. With respect to each of the remand issues, the Corps finds:

a. The Corps' review on remand of the potential impacts of an oil spill to hunting and fishing resources did not reveal any significant impacts because the risk of an incident is low and any impacts to hunting and fishing resource will be of limited scope and duration.

b. With respect to Environmental Justice, the Corps finds that granting Section 408 permission and conveying a right-of-way to Energy Transfer Partners to construct and operate a portion of the DAPL under federally-owned Corps-managed land does not result in disproportionately high and adverse human health or environmental effects on minority populations, including Tribes, and low-income populations. Further NEPA analysis or any new mitigation beyond the EA/FONSI and the February 8, 2017 Easement conditions is not required.

SUBJECT: Consideration of the Issues Remanded by the U.S. District Court for the District of Columbia related to the Dakota Access Pipeline Crossing at Lake Oahe, North Dakota

c. The Corps considered the comments and concerns expressed by the Tribes regarding the data and methodologies used by the Corps. While the Tribes opposed the Corps' authorizations for the pipeline's Lake Oahe crossing, they did not provide information that demonstrated that a substantial dispute exists as to the size, nature, or effect of the federal action. Accordingly, the Corps finds that the effects of the federal action here are not "likely to be highly controversial." 40 C.F.R. § 1508.27(b)(4).

3. The Corps has outlined the rationale supporting these findings in the enclosed document and in the Administrative Record.

Encl
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JOHN L. HUDSON, P.E.
Colonel, EN
Commanding

# ENCLOSURE

# ANALYSIS OF THE ISSUES REMANDED BY THE U.S. DISTRICT COURT FOR THE DISTRICT OF COLUMBIA RELATED TO THE DAKOTA ACCESS PIPELINE CROSSING AT LAKE OAHE

Contents

# I. IMPACTS ON FISHING AND HUNTING RESOURCES

A. Introduction

1. Scope of review.

The pipeline crosses Lake Oahe north of the Standing Rock Sioux Tribe Reservation. Lake Oahe provides habitat for fish and wildlife upon which tribal members from the Standing Rock and Cheyenne River Tribes, and other Tribes rely on for subsistence purposes. The U.S. District Court for the District of Columbia remanded the Corps' decisions on the Dakota Access pipeline for further explanation on the impacts of an oil spill during pipeline operations on the Tribes' fishing and hunting resources. The Corps' review here is focused on impacts to the fish and game resources themselves from an oil spill.

2. Background on Tribes and treaties

The Sioux Territory was first defined in the Fort Laramie Treaty of 1851, 11 Stat. 749. Under that treaty, the territory comprised what is now South Dakota and parts of Nebraska, Wyoming, North Dakota, and Montana. The Sioux tribes also reserved "the privilege of hunting, fishing, or passing over" any of the lands described in the treaty. Fort Laramie Treaty of 1851, Art. 5, 11 Stat. 749 (text quoted from 1851 WL 7655 (Trty.)). The second Fort Laramie Treaty, in 1868, 15 Stat. 635, established the Great Sioux Reservation. The reservation covered much of what is now western South Dakota and part of North Dakota. The 1868 Treaty provided the "absolute and undisturbed use and occupation" of the reservation lands to the Sioux tribes. 1868 Treaty, Article II, 15 Stat. 636. The 1868 treaty reserved prior Sioux treaty rights, except provisions regarding the payment of annuities. *Id.*, Art. XVII, 15 Stat. 637. In 1889, Congress enacted a statute diminishing the Great Sioux Reservation and dividing the remaining territory into six smaller reservations, including the Standing Rock Reservation, the Cheyenne River Reservation, and the Pine Ridge Reservation. 1889 Sioux Act, 25 Stat. 888, March 2, 1889. The 1889 Act expressly preserved any rights under the 1868 treaty that were "not in conflict" with the Act. 1889 Act, § 19, 25 Stat. 896. The Fort Laramie treaties provided the tribes the right to hunt and fish on reservation lands and on specified off-reservation lands. *See South Dakota v. Bourland*, 508 U.S. 679, 696 (1993) (acknowledging treaty-based hunting and fishing rights for the Sioux Tribes under the Fort Laramie treaties).

Between 1949 and 1962, Congress enacted seven statutes to carry out the Pick-Sloan Missouri River project, which authorized takings of land within the six reservations created by the 1889 Act. *Bourland*, 508 U.S. at 684. Some of the largest of the legislative takings involved the Standing Rock Sioux Tribe (SRST) and the Cheyenne River Sioux Tribe (CRST) lands for the impoundment of the Missouri River to create Lake Oahe. The relevant takings language for the Lake Oahe project provided that the SRST and the CRST retained "without cost, access to the shoreline of [Lake Oahe], including permission to hunt and fish in and on the aforesaid shoreline and [Lake], subject, however, to regulations governing the corresponding use by other citizens of the United States." Section 10, Public Law No.83-776, 68 Stat. 1191, September 3, 1954 (the 1954 Act covering the CRST); Section 10, Public Law No. 85-915, 72 Stat. 1762, 1764, September 2, 1958 (the 1958 Act covering the SRST). This right extended between "the water level of the reservoir and the exterior boundary of the takings area," which would be just south of the proposed pipeline crossing. 1958 Act, 72 Stat. 1764. In the areas taken, the 1954 Act and the 1958 Act reserved the Tribes' fishing and hunting rights on the shoreline and reservoir of Lake Oahe within the boundaries of the reservation and did not diminish those rights in any way.

3. The Tribe's Hunting and Fishing Practices

Hunting and fishing are important to the Tribes' historical and current way of life. For example, according to SRST, the *Hunkpapa Lakota*[1] of the Standing Rock Reservation are referred to as the "hunting band" by historians. Standing Rock Sioux Tribe, Impacts of an Oil Spill from the Dakota Access Pipeline on the Standing Rock Sioux Tribe at 5 (February 21, 2018) (SRST February 2018 Report). Kip Spotted Eagle, a Yankton tribal member, discussed how tribal members would historically hunt buffalo as far north as Canada and into preset-day North and South Dakota. Yankton Sioux Tribe Letter to the Corps (April 20, 2018) Attachment, Affidavit of Kip Spotted Eagle at 1 (April 19, 2018). Traditional tribal lifestyles depended on game, fish, and birds for food and ceremonial purposes. Walker Research Group, Ltd., A Cultural Assessment of Riparian Habitats on the Cheyenne River Sioux Indian Reservation at 22 -23 (March 2005). The Tribes pass on hunting to younger generations and have them maintain the culture of cooperation by butchering and distributing deer meat to elders who are no longer able to hunt. SRST February 2018 Report at 15.

Subsistence hunting is important to the SRST. *See* Declaration of Jeff Kelly, ECF 117-22 at 3 (Nov. 28, 2016)(Kelly Declaration) (citing Standing Rock Code of Justice 9-105, which recognizes "the treaty rights of all members of the Tribe to hunt and fish for subsistence purposes"); SRST February 2018 Report at 17-18. It is important for meeting dietary needs of a "large number of Tribal members." Kelly Declaration at 2. This is tied to poverty levels on the reservation. *Id.* The Tribe has a program that ensures that those unable to hunt because of their age or handicap have deer meat harvested on the Reservation. *Id.* at 3. Subsistence hunting is also rooted in tribal traditions and includes harvesting of game for cultural and religious practices, including ceremonial dances and pow-wows. *Id.* It even provides important elements for Tribal art. *Id.*

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[1] "The Standing Rock Sioux Tribe is home to the Hunkpapa and Sihasapa bands of Lakota Oyate and the Ihunktuwona and Pabaksa bands of the Dakota Oyate. The Tribe is a member tribe of the Oceti Sakonwin (Seven Council Fires), also known as the Great Sioux Nation." SRST Notice of Intent Comments at 11 (February 7 2017).

In 2015, the SRST issued 474 deer tags to Tribe members and another 134 tags to spouses or others affiliated with Tribe members.[2] Kelly Declaration at 4. The Tribe also issued another 259 deer tags to hunters so that they harvest deer for elderly or handicapped Tribal members. *Id.* In 2016, the SRST sold 1855 deer tags. SRST HCA Report at 30. Out of the 1855 licenses sold, 781 hunter harvest reports were returned and 563 hunters reported harvesting a deer. *Id.* An average of 37.37 hours was spent per hunter that hunted deer on the Standing Rock Reservation. *Id.* Hunters observed an average of 22.05 bucks, 27.18 does and 27.18 fawns during their hunt. *Id.* Of reported harvests, a total of 246 whitetail bucks, 236 mule deer bucks, 53 white tail does and 57 mule deer does were taken on the Standing Rock.Reservation. *Id.* 192 tag holders did not respond. *Id.* .

Subsistence deer hunting is also important to the CRST and provides an "important part of the diet for many Tribal members." Declaration of Chalmer Combellick, Wildlife Biologist, Cheyenne River Sioux Tribe Game, Fish, and Parks Department, at 3 (April 20, 2018). One estimate, relying on anecdotal information, was that over 75 percent of tribal members include deer meat as part of their diet. *Id.* In 2016 and 2017, the Tribe issued 1,132 and 1,172 deer tags to Tribal members. *Id.* These numbers included about 200 tags that the CRST issued based on income eligibility. *Id.*

Fishing is likewise important to the tribes and Tribal members rely on fishing for subsistence and for their culture. *See* Kelly Declaration at 2 (addressing the SRST); SRST February 2018 Letter at 16; SRST, HCA Report at 28; Combellick Declaration at 3 (addressing the CRST). The SRST issued 199 Family Fishing Permits in 2015. Kelly Declaration at 2.

Lake Oahe is where most CRST members fish. CRST April 20, 2018 Letter, Attachment 2 at 1. Popular fishing locations for CRST members include "waters near Blackfoot, South Dakota, in Bender Bay, around the confluence of Moreau River and Lake Oahe, and around the confluence of the Cheyenne River and Lake Oahe." *Id.* at 2.

4. Game Species

Numerous mammal species are resident or seasonal visitors to the Lake Oahe area, but most are not dependent on the aquatic environment. Larger species include pronghorn (*Antilocapra americana*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), and mountain lions (*puma concolor*). *See* ETP, Review of Potential Environmental Effects of Oil

[2] The SRST has "[h]unter harvest information . . . compiled each year and available through Integrated Software Technologies to . . . tribal biologists" and a "hunting system designed to gather information related to tribal member hunting experiences and their effective success." SRST, HCA Report at 27 -28. The Corps requested detailed information from the SRST on September 25, 2017. The request was for information including permitting data, summaries of harvest reports for a three-year period, and specific information on subsistence hunting. Corps Letter to SRST at 1-2 (Sept. 25, 2017). The SRST did not provide the Corps with this specific hunter harvest information for use in this analysis.

Releases on Downstream Receptors, Dakota Access Pipeline Project, Lake Oahe, North Dakota at 76(June 2018)(Downstream Receptor Report); SRST February 2018 Report at 10; SRST February 2018 Report, App. A, Standing Rock Sioux Tribe Game and Fish Department, Missouri River High Consequence Area Assessment: Establishing Baseline Ecological Information and Impacts to Hunting and Fishing from the Proposed DAPL Pipeline in the Event of an Oil Spill in the Missouri River in North Dakota at 10 (August 11, 2017)(SRST HCA Report).

Adjacent to the Standing Rock Reservation at 24. Mule deer, white-tailed deer, and pronghorn are the most common big game animals and can be found on much of the Standing Rock reservation area. SRST HCA Report at 24. Smaller species include coyote (*Canis latrans*), badger (*Taxidea taxus*), red fox (*Vulpes vulpes*), raccoon, bobcat (*Lynx rufus*), fisher (*Martes pennant*), mink (*Neovison vison*), and long-tailed weasel (Mustela frenata). Beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*) are common semi-aquatic mammals hunted for their fur. SRST HCA Report at 24; Downstream Receptor Report at 76. Figure I-1 provides an overview of species surveyed by the SRST.

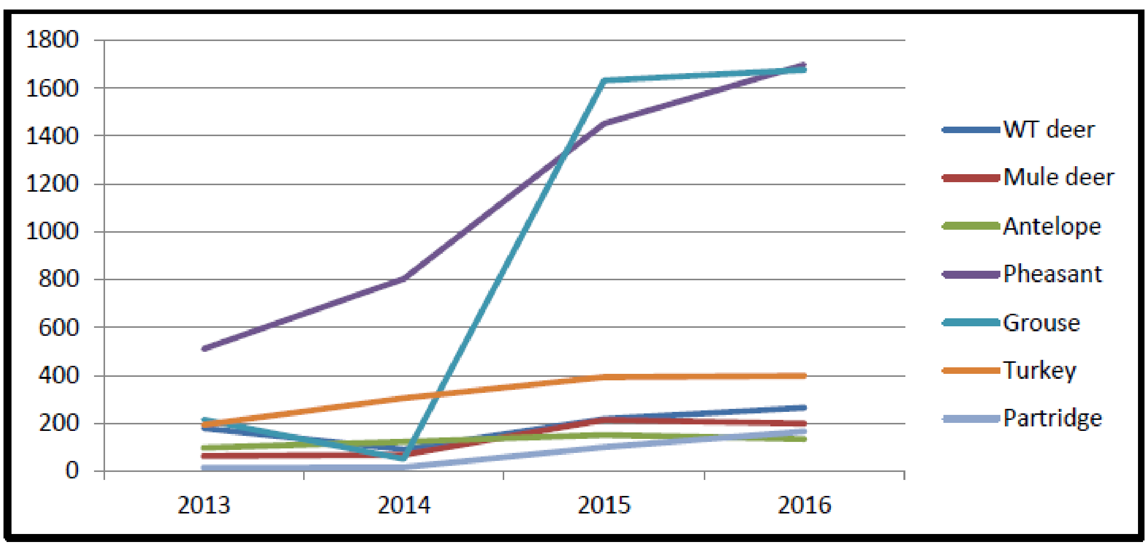


**Figure 13.** Number of animals all surveys combined (vertical axis= total Number of animals).

**Figure I-1, Number of Animals Surveyed, Source: SRST HCA Report at 30, Figure 13**.

Whitetail and Mule deer are sources of protein and are hunted by the members of the CRST. CRST Letter to Corps, Attachment 1 at 4 (April 20, 2018). Members of the CRST also hunt waterfowl including Canadian Geese, mallard and pintail duck. *Id.* Members also hunt upland game birds, including turkey, prairie chicken, grouse, and pheasant. *Id.*

Important bird game species include sharp-tailed grouse (*Tympanuchus phasianellus*), gray partridge (*Perdix perdix*), ringedneck pheasant (*Phasianus colchicus*), and wild turkey

(*Meleagris gallopavo* ). CRST Letter to the Corps, Attachment 2 at 2 (April 20, 2018). Common species hunted and used for ceremonial purposes and subsistence include: mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), pronghorn antelope (*Antilocapra americana*), beaver (*Castor canadenis*), muskrat (*Ondatra zibethicus*), weasels (*Mustelidae*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), red fox (*Vulpes vuples*), American badger (*Taxidea Taxis*), rabbits (*Leporidae*), porcupine (*Erethizon dorsatum*), common raccoon (*Procyon lotor*), and bobcats (*Felis rufus*). *Id.* at 3.

5. Fish Species

The SRST provided a survey of species of fish present in Lake Oahe, which was incorporated into Dakota Access Pipeline or Energy Transfer Partners's (ETP) reports and the Corps'review. SRST HCA Report at 17. Table I-1 lists these species.

| Scientific Name | Common Name |
|---|---|
| *Ictiobus cyprinellus* | Bigmouth buffalo |
| *Pomoxis nigromaculatus* | Black crappie |
| *Ictalurus puntatus* | Channel catfish |
| *Cyprinus carpio* | Common carp |
| *Luxilus cornutus* | Common shiner |
| *Aplodinotus grunniens* | Freshwater drum |
| *Notropis atherinoides* | Emerald shiner |
| *Pimephales promelas* | Fathead minnow |
| *Dorosoma cepedianum* | Gizzard shad |
| *Hiodon alosoides* | Goldeye |
| *Etheostoma nigrum* | Johnny darter |
| *Esox lucius* | Northern pike |
| *Lepomis gibbosus* | Pumpkinseed |
| *Cyprinella lutrensis* | Red shiner |
| *Carpiodes carpio* | River carpsucker |
| *Notropis stramineus* | Sand shiner |
| *Moxostoma macrolepidotum* | Short headed redhorse |
| *Micropterus dolomieu* | Smallmouth bass |
| *Notropis hudsonius* | Spottail shiner |
| *Sander vitreus* | Walleye |
| *Morone chrysops* | White bass |
| *Catostomus commersonii* | White sucker |
| *Perca flavescens* | Yellow perch |

**Table I-1, Fish Species, Downstream Receptor Report at 50 (citing SRST HCA Report).**

The South Dakota Department of Game, Fish and Parks produces an annual report on the fish population, angler use, and harvest information for the South Dakota portion of Lake Oahe. South Dakota Dep't of Game, Fish and Parks, Wildlife Division, Annual Fish Population and Angler Use, Harvest and Preference Surveys on Lake Oahe, South Dakota, 2015, Annual Report

No. 16-03 (April 2016).[3] In the 2016 report, covering information gathered in 2015, the Department of Game estimated the number and type of fish harvested.

Table 19. Estimated number of fish harvested, by species and month, with 80% confidence intervals (CI) during the May-July 2015 daylight period on Lake Oahe, South Dakota.

| Species | Month | | | |
|---|---|---|---|---|
| | May | June | July | Total |
| **Walleye** | 50,499 | 163,909 | 94,106 | 308,513 |
| **80% CI** | 19,902 | 37,050 | 26,993 | 49,974 |
| **Channel catfish** | 4,257 | 2,713 | 5,746 | 12,716 |
| **80% CI** | 1,169 | 1,156 | 4,745 | 5,022 |
| **White bass** | 1,114 | 1,493 | 548 | 3,156 |
| **80% CI** | 664 | 583 | 335 | 945 |
| **Smallmouth bass** | 4,233 | 11,404 | 4,067 | 19,704 |
| **80% CI** | 2,465 | 3,791 | 1,732 | 4,842 |
| **Yellow perch** | 226 | 769 | 458 | 1,453 |
| **80% CI** | 40 | 724 | 341 | 440 |
| **Northern pike** | 1,078 | 1,505 | 851 | 3,433 |
| **80% CI** | 302 | 510 | 366 | 697 |
| **Chinook salmon** | 0 | 0 | 95 | 95 |
| **80% CI** | -- | -- | 82 | 82 |
| **Other*** | 5,540 | 3,267 | 655 | 9,463 |
| **Total** | 66,947 | 185,060 | 106,526 | 358,533 |
| **80% CI** | 22,746 | 42,059 | 30,806 | 56,880 |

*Other includes black crappie, common carp, freshwater drum, goldeye, sauger, and white crappie.

**Table I-2. South Dakota Dep't of Game, Fish and Parks, Wildlife Division, Annual Fish Population and Angler Use, Harvest and Preference Surveys on Lake Oahe, South Dakota, 2015, Annual Report No. 16-03 at 33, Table 19 (April 2016).**

The Director of the Standing Rock Sioux Tribe's Department of Game, Fish and Wildlife Conservation outlined several species of fish that are caught in Lake Oahe. *See* Kelly Declaration at 1-2. According to the Director, Lake Oahe is known for walleye (*sander viteus*) fishing and other commonly caught species are smallmouth bass (*micropterus dolomieu*), white bass (*morone chrysops*), northern pike (*esox lucius*), channel catfish (*lctalurus punctatus*) and perch (*perca flavescens*). *Id.*

[3] Available at: https://gfp.sd.gov/UserDocs/nav/2015OaheAnnualFishPop.pdf (last visited July 24, 2018).

The SRST regulates fishing on Lake Oahe. The SRST sets daily and possession limits for a number of fish species including Walleye (*Sander vitreus*), Sauger (*Sander canadensis*), Northern Pike, Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass, White Bass, Crappie (*Pomoxis spp.*), Bluegill (*Lepomis macrochirus*) and other sunfish (combined), Yellow Perch (*Perca flavescens*), Muskellunge (*Esox masquinongy*) and hybrids, and Rainbow Smelt. Downstream Receptor Report at 50 (citing Standing Rock Game and Fish Dep't Website, available at: http://gameandfish.standingrock.org/proclamations/fishingsmall-gameprairie-dog/ (last visited July 24, 2018)). The SRST does not set limits for catfish or bullheads (family *Ictaluridae*), Burbot (*Lota lota*), or non-game species. *Id.* The SRST does not allow harvesting of Sturgeon (*Scaphirhynchus spp*.) and Paddlefish (*Polyodon spathula*) because they are protected species. In addition, the Tribe sets minimum size limits for Walleye, Sauger, Northern Pike, and Muskellunge and hybrids. *Id*.

Turning to the other tribe with a reservation bordering Lake Oahe, CRST members use "nearly every species of fish available" and the most popular species are catfish, northern pike, walleye, and bass. CRST April 20, 2018 Letter, Attachment 1, Ex. A at 24 and Attachment 2 at 1 (listing other common fish species). Common fish species used by CRST members for subsistence in Lake Oahe include Large Mouth Bass (*Micropterus salmoides*), Small Mouth Bass (*Micropterus dolomieu*), Walleye (*Sander vitreus*), Channel Catfish (*lctalurus punctatus*), Northern Pike (*Esox lucius*) and Yellow Perch *(Percajlavescens*). Other species include Chinook Salmon (*Oncorhynchus tshawytscha*), Sunfish (family, *Centrarchidae*), Black Crappie (*Pomoxis nigromaculatus*), Bluegill (*Lepomis macrochirus*), Bullhead (*Ameiurus nebulosus*), and several other Catfish species (*family, lctaluridae*). Combellick Declaration at 1.

B. Review of information in the Record

The July 2016 Environmental Assessment (Final EA) included an inventory of the fish and game present in the Missouri River and Lake Oahe, and it directly discussed the effects of pipeline construction on these resources. In separate sections, the Final EA discussed the consequences of an unlikely oil discharge event and the pipeline safety measures that would further minimize the risk of impacts from leaks or spills.

1. The July 2016 EA Examination of Fish and Game Species in the Project Area

The Final EA examined game and fish species, grouped into several categories. The Final EA discussed: big game species, specifically identifying pronghorn and white-tailed deer; game bird species, indicating that the project area contains the type of habitat used by ruffed grouse, sharp-tailed grouse, pheasant, woodcock, snipe, and doves; waterfowl species, including mallards, pintails, American wigeon, blue-winged teal, western grebe, California gull, Canada goose, common tern, killdeer, Wilson's phalarope, and lesser yellowlegs. Final EA at 57. With respect to aquatic organisms, the EA identifies several fish species present in the Missouri River, including cutthroat trout, brown trout, walleye, northern, and sauger. The EA observes that Lake Oahe is home to walleye, northern pike, and channel catfish. Final EA at 68.

In addition to the species listed above, the EA notes the presence of furbearers and predators, including coyote, beaver, badger, red fox, raccoon, bobcat, fisher, mink, weasel, and muskrat. It also indicates that small mammals (including pocket gopher, skunk, and white-tailed jackrabbit) and reptiles and amphibians (including the northern leopard frog, tiger salamander, western chorus frog, common snapping turtle, western painted turtle, common garter snake, and racer) are present. Final EA at 57–58.

2. The EA Evaluation of the Potential Toxicity Impacts of Oil Leaks and Spills

In the unlikely event oil is released into their habitat, fish and game could be affected through direct physical contact with crude oil; exposure to toxicity in water, as oil constituents are solubilized; and indirect impacts that result from maintenance, cleanup, or other spill response. The Final EA addressed potential toxicity effects arising from oil's constituents. In the unlikely event of a spill, the EA explains:

> Most crude oil constituents are not very soluble in water. The dissolved concentration of water soluble compounds (e.g., benzene) is not controlled by the amount of oil in contact with the water, but by the concentration of the specific constituent in the oil (Charbendeau et al., 2000; Charbeneau, 2003; Freeze and Cherry 1979). Studies of 69 crude oils found that benzene was the only aromatic or polycyclic aromatic hydrocarbon compound tested that is capable of exceeding the 0.005 ppm groundwater protection threshold values for drinking water (i.e., maximum contaminant levels (MCLs) or Water Health Based Limits) (Kerr et al., 1999 as cited in O'Reilly et al., 2001).
>
> In aquatic environments, crude oil's toxicity is a function of the concentration of its constituent compounds and their toxic effects, along with their solubility (and bioavailability) in water. Based on the combination of toxicity, solubility, and bioavailability, benzene is commonly considered to pose the greatest toxicity threat from crude oil spills (Muller, 1987). The lowest acute toxicity threshold for aquatic organisms for benzene is 7.4 ppm based on standardized toxicity tests (USEPA, 2016).

Final EA at 46. The EA evaluated benzene as the appropriate compound because "based on the combination of toxicity, solubility, and bioavailability, benzene is commonly considered to pose the greatest toxicity threat from crude oil spills." *Id.*

The EA then presents theoretical benzene concentrations for spill scenarios ranging from 4 barrels to 10,000 barrels spilled. In order to calculate benzene concentrations, the Corps assumed a one-hour release period for the entire spill volume. Final EA at 46. The Corps used several other conservative (i.e., likely exaggerated as compared to likely conditions) assumptions, including: that the entire volume of spilled crude oil reached the water body; that complete and instantaneous mixing occurred; that the entire benzene content solubilized in the water column with no evaporation or degradation loss; and that the fish or game species is exposed at the immediate spill site. *Id.* at 47. As shown in Table 3-7 from the Final EA, the Corps' modeling indicated that none of the spill scenarios would result in benzene concentrations that approach the acute toxicity threshold for aquatic organisms. *Id.*.

**Table 3-7**
**Estimated Benzene Concentrations Following a Hypothetical Crude Oil Spill at Project River Crossings**

| River Crossing | River Flow (cfs) | Acute Toxicity Threshold (ppm) | Benzene MCL (ppm) | Estimated Benzene Concentration in Surface Water (ppm) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Very Small Spill: 4 bbl | Small Spill: 100 bbl | Moderate Spill: 1,000 bbl | Large Spill: 10,000 bbl |
| Missouri River | 20,374 | 7.4 | 0.005 | 0.00075 | 0.019 | 0.19 | 1.88 |
| Lake Oahe | 22,484 | 7.4 | 0.005 | 0.00068 | 0.017 | 0.17 | 1.70 |

*Notes:*
- Adapted from Stantec, 2015
- Estimated concentration is based on release of benzene into water over a 1-hour period with uniform mixing conditions.
- Concentrations are based on a 0.28 percent by volume benzene content of the transported material (Marathon Oil 2010).
- bbl - An oil barrel defined as 42 US gallons,
- MCL - Maximum contaminant levels
- ppm – Parts per million
- cfs – Cubic feet per second
- Stream flows are measured mean discharge from the gage stations closest to the pipeline crossings located on the Missouri River at Williston (USGS Station 06330000) and Bismarck (USGS Station 06342500)(USGS 2016; 2016b).

Final EA at 47.

To summarize, the EA found that under the conservative assumptions, a large oil spill over 10,000 barrels would still not result in sufficient benzene concentrations large enough to surpass the acute toxicity threshold for aquatic organisms.

3. Record Information Indicates Risk of Spill Impacts on Fish and Game is Low

In addition to the low solubility of oil, the Record contains information on a number of other factors relevant to the risk that Lake Oahe's fish or game would be impacted in the event of a spill. First, ETP provided PHMSA-approved spill models, which were not included in the Final

EA because ETP considered them Security Sensitive Information. The USACE explained the relevant findings of these models during its consideration of the Lake Oahe Easement. Corps Response to October 28,2016 Comments from the Standing Rock Sioux Tribe, USACE_ESMT000936-47. Assuming the hypothetical "worst case" spill, these models assigned the Lake Oahe crossing a risk ranking of between 2 and 3, out of a possible 10. *Id.*

Second, the pipeline would be installed via horizontal directional drill (HDD), at a minimum depth of 92-feet below the bottom of Lake Oahe. Final EA at 19, 36. If a leak or spill occurred at these depths, overburden would restrict the volume of oil spilled, and anti-siphoning effects would likely prevent a full gravity drain-down during a spill event. Final EA at 46, 97, App. F. If pipeline released oil at this depth, fish and game would only be impacted if the oil or its constituents have a pathway into lake or to the surface. The Final EA acknowledged that crude oil spilled into soil at these depths could "migrate toward water where certain constituents can dissolve into groundwater or surface water in limited amounts." Final EA at 45. However, the Final EA further explained that "[a]s a liquid, the product would travel along the path of least resistance both laterally and vertically at a rate determined by a number of factors including volume released, soil conditions (permeability, porosity, moisture, etc.), depth to groundwater, and the speed and effectiveness of response and remediation measures." Final EA at 45. For a pipeline installed via HDD, the path of least resistance is typically the original HDD bore. USACE_DAPL0074713. Installation of the pipeline at a depth of 92 feet below the bottom of Lake Oahe "virtually eliminate[es] the ability of a spill to interact with the surface water." USACE_ESMT000937.

Finally, the Final EA evaluated, and the FONSI adopted, several safety measures intended to reduce the likelihood of a spill and to expeditiously identify and respond to pipeline leaks or spills if they do occur. As stated in the FONSI, "Dakota Access has developed response and action plans, and will include several monitoring systems, shut-off valves and other safety features to minimize the risk of spills and reduce or remediate any potential damages." FONSI at 2. These measures include construction to regulatory standards, testing prior to placing the pipeline into service, inspection and patrol commitments, presence of emergency response personnel and equipment at strategic points, constant remote oversight, and use of a Computational Pipeline Monitoring System to monitor for leaks. Final EA at 88-90. In the event of a spill or leak, the Operator would implement the Facility Response Plan, a draft of which was prepare in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan and the Mid-Missouri Sub-Area Contingency Plan, and which was made an Appendix to the EA. Final EA at 90, App. L; USACE_ESMT000944. The Department of the Army Easement to cross Lake Oahe includes a condition making the Grantee "generally responsible for commitments made and mitigation measures in the Final Environmental Assessment . . . including all Plans include[d] within Appendices thereof, even if they are not specifically made as a condition to this easement." USACE_ESMT000042.

## C. Information from Supplemental Studies

The Corps requested additional oil spill modeling and analysis from ETP to supplement the finding in the Final EA. *See* Corps Letter to ETP (Aug. 24, 2017). The Tribes also recommended that Corps require additional modeling. *See e.g.* SRST Letter to the Corps, at 5-6 (February 2018). But none of the Tribes provided the results of their preferred oil spill modeling for the Corps to consider for this analysis. ETP performed additional computational modeling of various hypothetical unmitigated spill scenarios at the Lake Oahe crossing to evaluate the potential fate and transport of crude oil from a spill. Downstream Receptor Report at i. ETP used that modeling to produce estimates of the concentrations of hydrocarbons in the water column and effects on fish and wildlife resources or "downstream receptors." *Id.* The resulting report used that modeling and a literature review to evaluate impacts of an oil spill on downstream receptors. The Corps experts at the Corps Engineering Research and Development Center reviewed the spill modeling methodology and validated it.

The Corps considered the likelihood of the occurrence of a spill and potential magnitude of a release, the fate and transport of an inadvertent release of oil into Lake Oahe and the potential impacts to hunting and fishing resources in and adjacent to Lake Oahe and their duration (permanent or temporary) based on the modeling.

### 1. Likelihood of Occurrence and Spill Magnitude

In the Final EA, the Corps found the risk that DAPL operations might result in a release with significant impacts to Lake Oahe and the surrounding area would be low, particularly in light of engineering and design considerations and HDD depths below Lake Oahe. Final EA at 92-94. Here, we update and supplement those conclusions with additional information.

In order to evaluate the likelihood of a release during DAPL operations, the Corps analyzed the frequency of reported hazardous liquid "accidents"[4] (accident frequency) per 1,000 pipeline miles. The Corps based this analysis on historical annual report data obtained from the Pipeline and Hazardous Materials Safety Administration (PHMSA) webpage. PHMSA, *Pipeline and Hazardous Materials Safety Administration Pipeline Incident Statistics* (Dec. 6, 2017) http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends. Table I-3 shows the total mileage of crude oil pipelines, as documented in PHMSA annual reports between 2004 and 2017. PHMSA, *Annual Report Mileage for Hazardous Liquid or Carbon Dioxide Systems*,

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[4] PHMSA regulations refer to releases from natural gas pipelines as "incidents" and releases from hazardous liquid pipelines as "accidents." Pursuant to 49 C.F.R. § 195.50, PHMSA requires accident reports "for each failure in a pipeline system . . . in which there is a release of the hazardous liquid or carbon dioxide transported resulting in any of the following:

a) Explosion or fire not intentionally set by the operator.
b) Release of 5 gallons (19 liters) or more of hazardous liquid or carbon dioxide, except that no report is required for a release of less than 5 barrels (0.8 cubic meters) resulting from [certain maintenance activities]."

(Aug. 1, 2018) https://cms.phmsa.dot.gov/data-and-statistics/pipeline/annual-report-mileage-hazardous-liquid-or-carbon-dioxide-systems.

| YEAR | CRUDE OIL |
|---|---|
| 2004 | 49,264 |
| 2005 | 48,732 |
| 2006 | 48,453 |
| 2007 | 49,488 |
| 2008 | 50,963 |
| 2009 | 52,737 |
| 2010 | 54,631 |
| 2011 | 56,100 |
| 2012 | 57,463 |
| 2013 | 61,087 |
| 2014 | 66,943 |
| 2015 | 73,055 |
| 2016 | 75,517 |
| 2017 | 79,029 |

**Table I-3 Total mileage of crude oil pipelines**

Table I-4, which was created using PHMSA website tools and data, shows the number of reported onshore crude oil accidents between 1998 and 2017.[5] PHMSA, *Pipeline Incident 20 Year Trends, Significant Incident 20 Year Trend*, (Dec. 6, 2017) https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends.

[5] Although this Table reflects "Incident Type: Significant," based on a review of the source data, it appears that this dataset includes all crude oil pipeline *accidents*—which have a lower reporting threshold than gas pipeline "incidents." See *infra* n.4 for clarification on this distinction.

**PHMSA Pipeline Incidents: (1998-2017)**
**Incident Type:** Significant **System Type:** HAZARDOUS LIQUID **State:** (All Column Values)
**Offshore Flag** : ONSHORE **Commodity:** CRUDE OIL

| Calendar Year | Number | Fatalities | Injuries | Total Cost Current Year Dollars | Barrels Spilled | Net Barrels Lost |
|---|---|---|---|---|---|---|
| 1998 | 65 | 0 | 0 | $40,774,906 | 92,046 | 17,316 |
| 1999 | 67 | 0 | 5 | $19,705,513 | 99,890 | 54,089 |
| 2000 | 56 | 0 | 0 | $43,363,187 | 48,188 | 12,872 |
| 2001 | 49 | 0 | 6 | $14,254,724 | 18,613 | 4,596 |
| 2002 | 42 | 0 | 0 | $36,398,370 | 19,588 | 8,542 |
| 2003 | 48 | 0 | 4 | $23,653,827 | 28,312 | 13,878 |
| 2004 | 53 | 0 | 1 | $33,340,149 | 19,677 | 9,097 |
| 2005 | 48 | 0 | 1 | $275,129,131 | 101,344 | 18,013 |
| 2006 | 42 | 0 | 0 | $14,600,021 | 83,032 | 4,606 |
| 2007 | 40 | 2 | 0 | $21,687,812 | 19,205 | 3,363 |
| 2008 | 47 | 0 | 0 | $33,940,159 | 58,732 | 36,472 |
| 2009 | 38 | 1 | 3 | $33,285,167 | 23,437 | 8,238 |
| 2010 | 46 | 0 | 0 | $1,154,790,890 | 52,313 | 6,798 |
| 2011 | 53 | 0 | 0 | $196,592,778 | 34,841 | 16,188 |
| 2012 | 60 | 3 | 4 | $47,476,717 | 14,450 | 4,293 |
| 2013 | 77 | 0 | 6 | $202,540,563 | 42,505 | 17,649 |
| 2014 | 72 | 0 | 0 | $54,769,304 | 16,666 | 1,823 |
| 2015 | 77 | 0 | 0 | $201,161,170 | 19,834 | 4,205 |
| 2016 | 72 | 0 | 4 | $84,485,606 | 41,735 | 16,206 |
| 2017 | 67 | 0 | 0 | $72,122,073 | 42,974 | 2,656 |
| **Grand Total** | **1,119** | **6** | **34** | **$2,604,072,068** | **877,382** | **260,902** |

**Table I-4, Number of reported onshore crude oil accidents between 1998 and 2017**

The Corps calculated the accident frequency per 1,000 pipeline miles for onshore crude oil pipelines using the PHMSA data from 2004 to 2017. Per 1,000 miles of crude oil pipeline, there were 0.848 accidents in 2017 and 0.953 in 2016. Each of these numbers is lower than the average of 0.957 for the 2004 to 2017 period.

PHMSA has collected additional data on the number of crude oil, refined petroleum, and biofuel pipeline accidents that impact people or the environment. *See* PHMSA, *National Pipeline Performance Measures, Accidents Impacting People or the Environment* (Dec. 7, 2017) https://www.phmsa.dot.gov/data-and-statistics/pipeline/national-pipeline-performance-measures. As shown in Figure I-2 below, this number is lower than the total number of reported accidents, with approximately 0.60 such incidents per 1,000 pipeline miles in 2017.

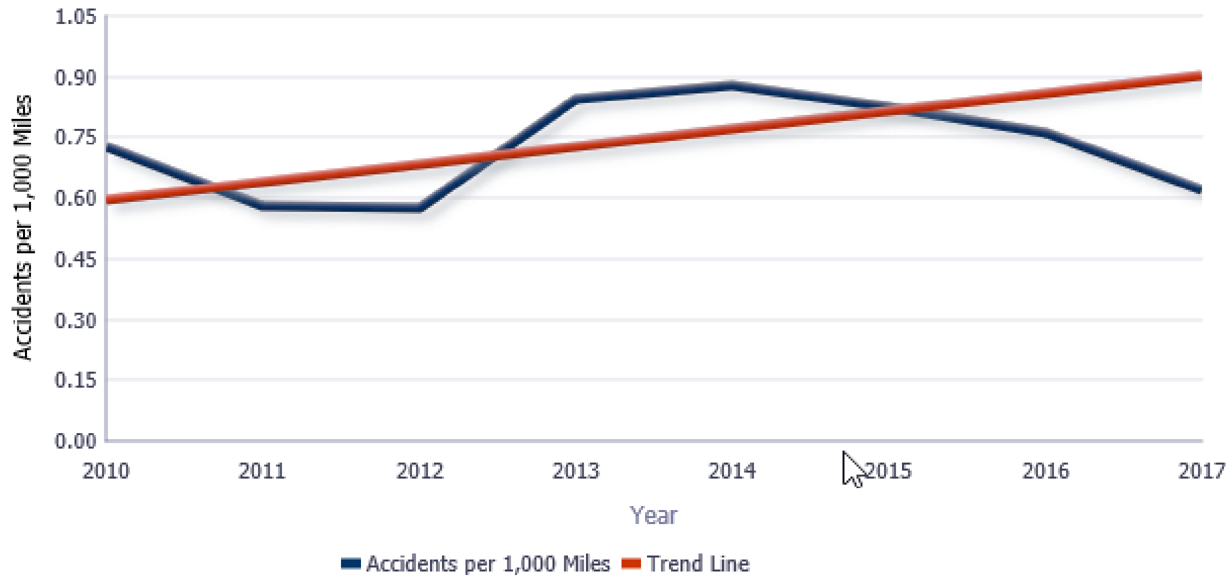



**Figure I-2, Accidents per 1,000 Miles**

PHMSA also provides data on accident causes in these same reports generated for crude oil, refined petroleum, and biofuel accidents impacting people or the environment. These data are presented in Figure I-3 below.

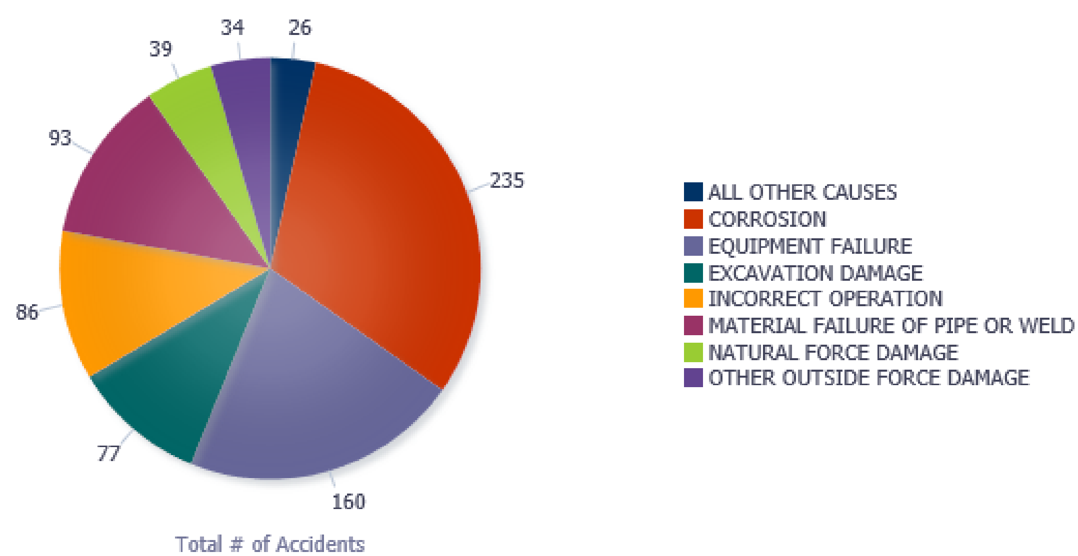



**Figure I-3, Accident Causes**

As shown in Figure I-3, the leading cause of accidents is corrosion, which caused approximately 31 percent of accidents between 2010 and 2017. These data are derived from all reported accidents at any existing pipeline—including older pipelines, which may not have been built according to current PHMSA requirements or industry standards. Newer pipelines must incorporate anti-corrosion measures, such as coating and cathodic protection (application of electric current to the pipeline), which are intended to reduce the risk of a corrosion-caused accident. 49 C.F.R. §§ 195.551-591; USACE_ESMT000037-42.

A 2017 Government Accountability Office (GAO) report states that, "[a]ccording to operators and expert stakeholders, coatings and cathodic protection are generally a cost-effective way to protect steel pipelines against external corrosion and stress corrosion cracking." United States Government Accountability Office, *Pipeline Safety: Additional Actions Could Improve Federal Use of Data on Pipeline Materials and Corrosion*, 20 (August 2017). However, GAO noted that "coatings can deteriorate over time" and that "the effectiveness of cathodic protection can be limited by 'shielding,' which occurs when the electrical current is obstructed from reaching the pipeline by obstacles such as rocks, failed coatings, or interference from nearby electric power cables." *Id.* at 19. The Corps easement imposes conditions intended to improve the efficacy of anti-corrosion measures and further reduce the likelihood of an oil release from the pipeline. For example, the easement requires that ETP use non-cathodic-shielding coatings at the DAPL Lake Oahe crossing and conduct surveys to detect corrosion and potential interference with the cathodic protection system. USACE_ESMT000037.

Aside from risk-mitigating conditions, the datasets depicted in Table I-4 and Figure I-2 above are over-inclusive for present purposes. Examination of the PHMSA 2010-to-present hazardous liquids annual report dataset, filtered for "onshore pipeline, including valve sites," reveals that many of the accidents were reported to have occurred at system elements not present at the Lake Oahe crossing—e.g., "Onshore Breakout Tank or Storage Vessel, including Attached Appurtenances," "Onshore Pump/Meter Station Equipment and Piping," and "Onshore Terminal/Tank Farm Equipment and Piping" (PHMSA Annual Report Data, 2018).[6] When filtered by accidents reported at pipelines of 16 inches or greater, designated as accidents involving a "Pipe," and designated as "Onshore Pipeline, Including Valve Sites," the annual report data show 156 reported accidents involving hazardous liquids since 2010. Moreover, the data show that the *extent* of a release for the majority of these accidents is relatively small. *Id.* For pipelines with a diameter of 16 inches or greater, the volume released in 53% of the spills was less than 4 barrels (bbls). Seventy five percent of these spills were below 105 bbls; ninety percent of the spills were below 3,000 bbls; and ninety-five percent of the spills were below 7,600 bbls. These data demonstrate that most pipeline spills are small and releases of 10,000

[6] Data obtained from PHMSA, *Gas Distribution, Gas Gathering, Gas Transmission, Hazardous Liquids, Liquefied Natural Gas (LNG), and Underground Natural Gas Storage (UNGS) Annual Report Data*, https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids (last visited August 6, 2018). The percentages in this paragraph were calculated using excel to identify the number of reported accidents involving releases less than 4 bbls, 105 bbls, 3,000 bbls, and 7,600 bbls, and then dividing those figures by the total number of accidents reported from pipelines categorized as "onshore pipeline, including valve sites."

bbls or more (considered large spills according to PHMSA) are extremely uncommon (PHMSA, 2018).

In addition, pipelines installed via HDD —the installation method used at the Lake Oahe crossing—appear to experience lower risk of release. Based upon a review of the PHMSA Reportable Incident Data for Hazardous Liquid and Gas Transmission Pipelines (2010-Present),[7] the likelihood of a failure at an HDD crossing is extremely low. Of the 3,368 reportable accidents that occurred over the past 8.5 years, only 3 were reported as involving an HDD crossing (0.09%). One was due to internal corrosion of a natural gas pipeline installed in 1957. One was due to an exposed natural gas pipeline. One resulted in a 1.7 bbl release with subsequent 0.9 bbl recovery.

In sum, the Corps' review of historical data confirms that the chance of an oil spill at the Lake Oahe crossing is low and even if there were a spill, it would be of a small amount. Even though the chance of a spill is low, the Corps evaluated possible impacts on hunting and fishing resources.

2. Fate and Transport of an Inadvertent Release of Oil into Lake Oahe

The Corps requested additional information from ETP, including an analysis of the impact of various spill scenarios at the Lake Oahe DAPL crossing and asked for the analysis to include both the worst-case scenario and a scenario that more closely correlates with the majority of spills seen in actual releases. Corps Letter to ETP (August 24, 2017).

In response, ETP provided additional computational modeling of the Lake Oahe crossing, which evaluated hypothetical unmitigated scenarios and the potential fate and transport of crude oil in Lake Oahe in the event of a release. The resulting report, Evaluation of Hydrocarbon Releases into Lake Oahe using OILMAPLand and SIMAP Trajectory, Fate, and Effects Modeling for the Dakota Access Pipeline (February 12, 2018) (Spill Model Report), modeled releases of oil at two locations along the Lake Oahe segment.

The first inadvertent release modeled was a hypothetical, full-bore rupture (FBR)[8] of a pipeline at the interface of lake-bed sediment and lake water at the center of the Lake Oahe crossing.[9] A hypothetical release at the sediment and water interface provides a conservative or larger

[7] Data obtained from PHMSA, *Pipeline and Hazardous Materials Safety Administration Pipeline Incident Statistics*, Pipeline and Hazardous Materials Safety Admin., https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids (Last visited August 6, 2018).
[8] A full-bore rupture is a "guillotine break and an opening equal to the pipeline diameter." Spill Model Report at 17.
[9] Modeling an actual release from the rupture of the pipeline as it was installed is impractical because the oil would have to rise vertically through the low permeability alluvium and glacial deposits, as well as the low permeability sediments that have accumulated at the bottom of the lake, before reaching the sediment / water interface.

estimate of the effects of a release, compared to a release from the actual pipeline, and maximizes the speed and total volume of oil entering the water column.

The second release modeled was a hypothetical FBR at the ND-380 valve site located on land adjacent to the west side of the lake. The valve site was selected to represent a FBR on the above-ground portion of the pipeline. A release from a valve site would be a more typical spill scenario.

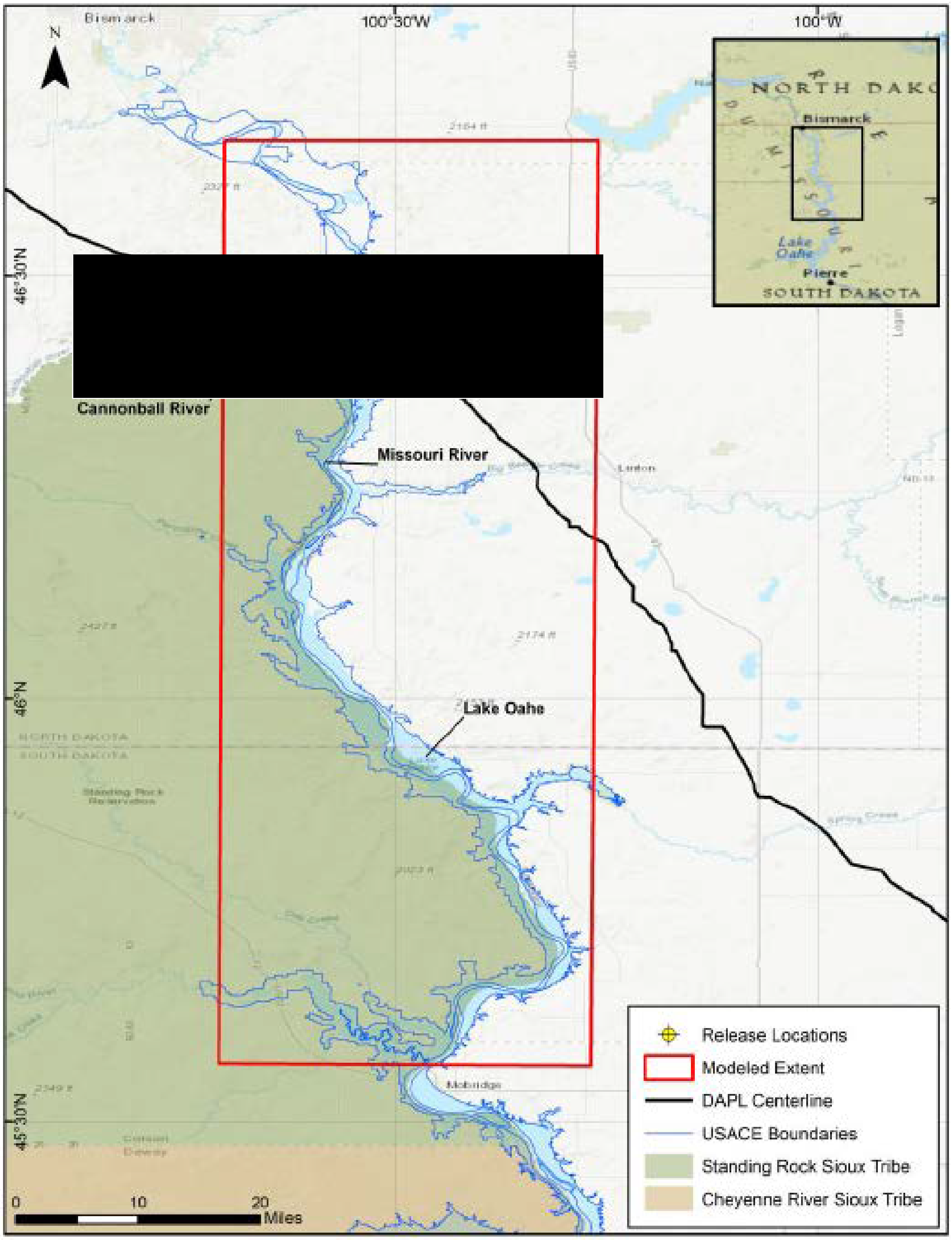



**Figure I-4, Study area, including the two hypothetical release locations. Source: Spill Model Report, DAPL: Trajectory Modeling, Figure 2-1 (February 12,**

The Spill Model Report modeled two high release volumes at each location. For the release at the bottom of the Lake Oahe crossing, a FBR volume of [redacted] bbls was used as the worst-case scenario release volume calculated in accordance with 49 CFR § 194.105 guidance. This is the estimated volume of oil that could leave the pipeline under pressure before the operator shuts down pumps, plus the volume of oil remaining in the pipeline between the next nearest valves.[10] The volume was calculated based on the as-built conditions. A second volume of [redacted] bbls was used at the Lake Oahe crossing to represent more typical spill scenarios based on a review of the PHMSA dataset for "onshore pipelines, including valve sites" from 2010 to present (PHMSA, 2017). This volume was selected as a conservative reflection of typical spills because it represents a spill volume that is greater than 90% of actual releases from pipelines 16-inch or greater. The model does not account for the 28 m (92 feet) or more of low permeability alluvium and glacial deposits separating the pipeline as-built from the lake bed and assumes the release to be directly into waterbody. For the valve site, [redacted] bbls were used as the FBR volume as this was the hypothetical worst-case release from this location calculated in accordance with 49 C.F.R. § 194.105 guidance. The 90% discharge (PD) volume of [redacted] barrels was used at the valve site to represent more typical release amounts.

The four scenarios, two locations and two volumes at each location, were modeled to determine the fate and transport of the hypothetical releases. A two-dimensional overland and downstream trajectory and fate model, OILMAPLand, was used in the EA to assess the overland flow portion of potential spills from an upland location until the spill reached the mouth of the Cannonball River at Lake Oahe. A new three-dimensional in-water oil trajectory, fate, and biological effects model, Spill Impact Model Analysis Package (SIMAP), was used to assess potential downstream effects of a release and provide data to estimate the ecological effects to beneficial uses of Lake Oahe. OILMAPLand (the original tool) models upland spills and SIMAP (the tool added here) models in-water spills.

The SIMAP modeling system is a peer reviewed three-dimensional modeling system that ETP's contractor developed to provide an understanding of the movement, behavior, and potential effects of crude oil releases into water. SIMAP originated from the oil fates and biological effects sub-models in the Natural Resource Damage Assessment Models for Coastal and Marine Environments and Great Lakes Environments, which ETP's contractor developed in the early 1990s for the U.S. Department of the Interior for use in damage assessments. *See* Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Type A Natural Resource Damage Assessment Final Rule 61, Fed. Reg. 20,559 (May 7, 1996); French, D., et al. 1996, Final Report, The CERCLA Type A Natural Resource Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME), Technical Documentation, Vol. I - V., Office of Environmental Policy and Compliance, U.S. Department of the Interior, Washington, DC, Contract No. 14-0001-91-C-11 (1996).

[10] The methodology for this calculation is described in the "Dakota Access Pipeline Project, North Dakota, Lake Oahe Crossing Spill Model Discussion, Document No.: DAPL-WGM-GN000-PPL-STY-0019, Wood Group Mustang Project No.: 10395700. May 2016.

The Spill Model Report assumed no response or mitigation of any kind for the entire model run of 10 days. Analysts performed 290 model runs for each of the four scenarios to provide a range of calculated fate and transport trajectories. The modeling investigated the influence of environmental variability (e.g., wind and water current conditions) for the modeled time period, during all seasons and over multiple years (as noted below), on trajectory and fate. The Spill Model Report delineated simulation timeframes by seasons (spring/early summer, fall, and winter – including ice cover) and characteristic flow occurring within the identified timeframes to capture the variable environmental conditions at each site. Site-specific geographic and environmental parameters were used in the modeling of each hypothetical release location including: Corps Lake Oahe cross-section data from 2007 and 2012; U.S. Geological Survey and Corps discharge data from gaging stations; Corps monthly reservoir statistics from 1967-2017, and wind data from the U.S. National Centers for Environmental Prediction Climate Forecast System Reanalysis model for the period between 2000 and 2010. While the variability in certain environmental parameters was targeted for each scenario (e.g. hydrodynamics, winds, temperature, concentration of total suspended solids, etc.), seasonally appropriate values for all modeled environmental parameters were characterized at each modeled location based upon the identified season for each hypothetical release date modeled. As an example, modeled wintertime conditions with low river flow aligned with low temperature, higher wind speeds, and low total suspended solids, which are characteristic of that specific season.

The detailed results of the modeling of the four unmitigated release scenarios are presented in the Spill Model Report. The Corps Omaha District staff, as well as environmental sciences research specialists at the U.S. Army Engineer Research and Development Center (ERDC) separately reviewed the Spill Model Report. Based on these separate reviews, the Corps adopts the methodology and results presented. This document incorporates the Spill Model Report results and provides a summary of its findings on potential impacts to hunting and fishing resources.

3. Spill Model Results

Each of the four scenarios had 290 individual model runs (97 individual trajectories modeled under springtime high river flow conditions, 96 under summer and fall with average river flow conditions, and 97 under wintertime low river flow conditions) for a total of 1,160 total model runs. Spill Model Report at iv. The Spill Model Report started each run with a different start date/time within the 10-year period of available climate data to sample the range of environmental conditions (notably winds) present over multiple years. *Id.* The Spill Model Reports randomly selected the dates and times from within 14-day intervals spanning the entire 10 years of data. *Id.*

The Spill Model Report used a stochastic or probabilistic approach to determine the footprint and associated probability of areas that may be at increased risk of oil exposure based upon the variability of meteorological and hydrodynamic conditions that might prevail during and after a release. Spill Model Report at 7. A stochastic scenario is a statistical analysis of results generated from many different individual trajectories of the same release scenario, with each trajectory starting at a randomized time within a long-term window. *Id.* Here, the Spill Model Report randomly selected individual trajectory start dates every 10 days throughout the window of environmental data coverage to ensure that the data were adequately sampled. *Id.* The Spill Model Report's use of the stochastic approach allows it to analyze the same type of release under varying environmental conditions. *Id.* The results provide the probable behavior of the potential releases based upon the variability in the environmental data over many years.

The stochastic analysis provides insight into the probable behavior of oil releases given historic wind and current data for the Lake Oahe region. Spill Model Report at 40. The Spill Model Report also used a deterministic analysis that provided individual trajectory, oil weathering information, expected concentrations or thicknesses of oil contamination, mass balance, and other information related to a single release at a given location and time. Spill Model Report at 12.

The intent of the deterministic analysis was to provide representative individual releases, based on specific parameters for each single event, to provide a range of potential biological effects that may be possible under different geographic and environmental conditions. The results of the deterministic simulations provide a time history of the fate and weathering of oil over the duration of the release (mass balance), expressed as the percentage of released oil on the water surface, on the shoreline, evaporated, entrained in the water column, and degraded. Spill Model Report at 12.

The Spill Model Report identified representative deterministic scenarios, individual trajectories, from each set of stochastic results. Spill Model Report at iv. The Spill Model Report selected individual scenarios based upon the total area of the oil at the surface at any given time, the mass of oil on shorelines, and the concentration of dissolved hydrocarbons in the water column, based upon a set of highly conservative thresholds for effects to beneficial lake use. *Id.* The thresholds were an average surface oil thickness greater than 0.01 micrometer (µm), average shore oil concentration greater than one gram per square meter ($g/m^2$), or subsurface dissolved hydrocarbon concentrations greater than one microgram per liter (µg/L). *Id.*

Table 2-2. Thresholds used to define areas and volumes exposed above levels of concern.

| Threshold Type | Cutoff Threshold* (Total Oil Unless Otherwise Specified) | Rationale/Comments (Beneficial Lake Use, Response, Ecological) | Visual Appearance | References |
|---|---|---|---|---|
| Oil Floating on Water Surface | 0.01 µm (calculated from g/m²) | **Benefical Lake Use:** A conservative threshold used in several risk assessments to determine effects on lake uses (e.g., fishing or recreational boating may be avoided when sheens are visible on the sea surface). Beneficial lake uses that would be affected by floating oil include commercial, recreational and subsistence fishing; aquaculture; recreational boating, recreation, transportation; water supply intakes; and aesthetics. | Fresh oil at this minimum thickness corresponds to a slick being barely visible or scattered sheen (colorless or silvery/grey), scattered tarballs, or widely scattered patches of thicker oil. | French McCay et al., 2011; French McCay et al., 2012; French McCay, 2016; Lewis, 2007, Bonn Agreement |
| | 10 µm (calculated from g/m²) | **Ecological:** Mortality of birds on water has been observed at and above this threshold. Sublethal effects on aquatic mammals and reptiles observed as well. | Fresh oil at this thickness corresponds to a slick being a deep brown or metallic sheen. | French et al., 1996; French McCay, 2009 (based on review of Engelhardt, 1983, Clark, 1984, Geraci and St. Aubin 1988, and Jenssen 1994 on oil effects on aquatic birds and marine mammals); French McCay et al., 2011; French McCay et al., 2012; French McCay, 2016 |
| Shoreline Oil | 1.0 g/m² | **Beneficial Lake Use/Response:** A conservative threshold used in several risk assessments. This is a threshold for potential effects on resource uses, as this amount of oil may trigger the need for shoreline cleanup on beaches, and affect shoreline recreation and tourism. Beneficial lake resources and uses that would be affected by shoreline oil include recreational beach and shore use, wildlife viewing, nearshore recreational boating, tribal lands, and subsistence uses, public parks and protected areas, tourism, lake dependent businesses, and aesthetics. | May appear as a coat, patches or scattered tar balls, stain | French-McCay et al., 2011; French McCay et al., 2012; French McCay, 2016 |
| | 100 g/m² | **Ecological:** This is a screening threshold for potential ecological effects on shoreline flora and fauna, based upon a synthesis of the literature showing that shoreline life has been affected by this degree of oiling. Sublethal effects on invertebrates on hard substrates and on sediments have been observed where oiling exceeds this threshold. Assumed lethal effects threshold for birds on the shoreline. | May appear as black opaque oil. | French et al., 1996; French McCay, 2009; French McCay et al., 2011; French McCay et al., 2012; French McCay, 2016 |
| In Water Concentration | 1.0 µg/L of dissolved PAHs; corresponds to ~100 µg/L of whole oil (THC) in the water column (soluble PAHs are approximately 1% of the total mass of fresh oil) | Water column effects for both **ecological** and **beneficial lake** resources may occur at concentrations exceeding 1 µg/L dissolved PAH or 100 µg/L whole oil; this threshold may be used as a conservative screening threshold for potential effects on sensitive organisms. | N/A | Trudel et al. 1989; French-McCay 2004; French McCay 2002; French McCay et al. 2012 |

*Thresholds used in supporting stochastic results figures. For comparison, a bacterium is 1-10 µm in size, a strand of spider web silk is 3-8 µm, and paper is 70-80 µm thick. Oil averaging 1 g/m² is roughly equivalent to 1 µm.

**Table I-5, Thresholds, Spill Model Report at 10, Table 2-2.**

The Spill Model Report identified and selected individual worst-case trajectories of interest from the collection of stochastic results for a deterministic analysis to characterize the upper bound of anticipated effects following a release. Spill Report Model at 12. The selected deterministic scenarios included the identified 95th percentile runs (i.e. the top 5% worst-case scenarios) for surface oil footprint, mass of oil on shorelines, and water column contamination identified for each release location. Therefore, very low probability spill events (FBR and 90 PD) are modeled and then used to identify even lower probability but credible "worst-cases" (i.e., highly conservative subset of all modeled scenarios) as the basis for spill planning and preparedness.

Stochastic footprints for potential surface oil exceeding a thickness of 0.01 µm had a maximum predicted downstream extent of approximately 65 miles and an upstream extent (which is possible depending on prevailing winds) of approximately four miles. Figure I-5 illustrates this distribution where the top portion shows the probability of surface oil thickness exceeding 0.01 µm and the bottom portion shows the minimum time to threshold exceedance resulting from a FBR ([redacted] bbls) at the Lake Oahe crossing (i.e., the greatest volume of release modeled).

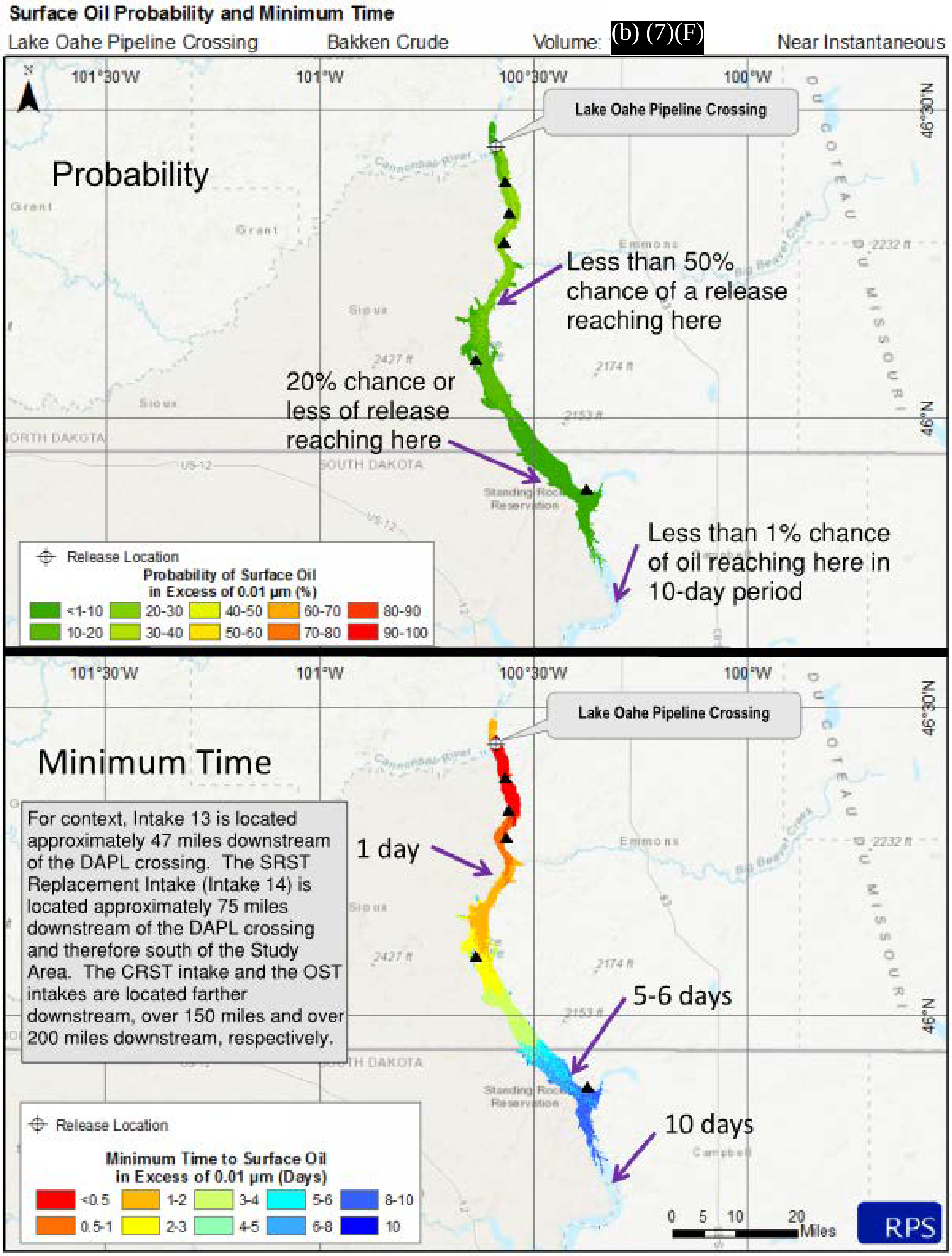



**Figure I-5. Probability of Surface Oil Thickness and Minimum Time to Threshold Exceedance**

**P**robability of surface oil thickness > 0.01 µm (top) and minimum time to threshold exceedance (bottom) resulting from a FBR ((b) (7)(F) bbls) at the Lake Oahe pipeline crossing. (This figure is representative of the probabilities associated with the four modeling scenarios.)

The screening level for potential ecological effects is 100 µm, making it 10,000 times greater than the threshold of 0.01 µm used in the model. The much smaller surface oil average thickness of 0.01 µm or greater was chosen as a conservative threshold to determine potential effects on lake uses such as fishing or recreational boating given that this is the thickness at which sheens are visible on the water surface.

The lengths (i.e., the distances along the lake) of predicted contamination for dissolved hydrocarbon concentrations exceeding 1 µg/L were slightly shorter (by approximately 10 miles) than those for surface oil exceeding a thickness of 0.01 µm. Spill Model Report at v.

While the areas of potential impact in the Spill Model Report were quite large, most of this footprint represents a relatively low probability (<10%) of surface oil thickness > 0.01 µm. Spill Model Report at v. Footprints depicting higher probability (90%) of surface oil thickness yield only a fraction of the total footprint. *Id.* The highest predicted potential (41%) for oil to contact shorelines exceeding 1 $g/m^2$ occurred in the larger volume FBR scenarios from the on-land valve site, due to its origin and initial travel path in proximity to the shore. *Id.*

For most high and average river flow modeled representative deterministic scenarios under the first model (a release from the Lake Oahe pipeline crossing at the sediment / water interface), the Spill Model predicted that by the end of the 10-day simulation period, roughly 45-46% of the released oil evaporated, 26-29% entrained into the water column within a few meters of the lake's surface, 19-21% contacted the shoreline, 4-5% degraded, and <1% adhered to suspended sediments within the water column and sank to the bottom (i.e. sunken oil). Spill Model Report at v. The Spill Model Report predicted near zero values in the water column at depths greater than 10 m (32.8 feet). *Id.* at vi. During the wintertime low river flow conditions, modeled with 100% ice cover, released oil was trapped under the ice in the top layers of the water column. *Id.* Thus, mass balance predictions differed, in that roughly 57% of the released oil was predicted to remain entrained in the water column, while 43% was predicted to degrade. *Id.*

As was the case with the modeled release from the sediment / water interface, Bakken crude oil was predicted to evaporate rapidly from a release at the above-ground valve site (the second model), with approximately 40-45% evaporating to the atmosphere within the first day. Spill Model Report at vi.

At the end of the 10-day simulations for this second model, the Spill Model Report predicted little to no oil to remain floating on the water's surface. Spill Model Report at vi. And the Spill Model Report predicted that >35% of released oil evaporated, >24% entrained into the top layers of the water column, <1% adhered to the sediments, >9% made contact with the shoreline, and >5% decayed. *Id.* In that same time, a large portion of the released oil remained less than 45 miles downstream of the release location and the Model predicted it to continue moving downstream as time progressed if left unmitigated. *Id.* The Model predicted the leading edge of the floating oil for each of the representative deterministic scenarios to extend 0-50 miles downstream of the release location. *Id.* The amount of evaporation and degradation was relatively consistent between model simulations with assumed high or average river flow conditions. *Id.* at vii.

Although >35% of the oil was predicted to evaporate within the 10-day modeled period, during high and average river flow conditions, shoreline and surface oiling is possible. Spill Model Report at vii. Furthermore, under high wind conditions, entrainment of surface oil into the top layers of the water column is possible. *Id.* A portion of this entrained oil and dissolved hydrocarbons were predicted to result in sediment oiling although the total is still <1%. Oil released from the bottom of Lake Oahe at the sediment/ water interface during low river flow winter conditions with complete ice coverage, experienced much different environmental conditions when compared to the simulations in the high or average river flow conditions. *Id.*

The wintertime low-flow scenario involved released oil trapped under the ice in the top layers of the water column resulting in a higher percentage of the released oil (roughly 57%) remaining entrained in the water column. Spill Model Report at vi. Ice cover also affects the total hydrocarbon concentration, which mainly represents whole oil droplets underwater. *Id.* However, the modeled ice cover also trapped the hydrocarbons in the immediate vicinity of the release location (minimizing its travel downstream) and prevented shoreline oiling.

The deterministic analysis provided an estimate of the oil's transport through the environment as well as its physical and chemical behavior for a specific set of environmental conditions. The stochastic analysis provided insight into the probable behavior of oil releases given the variability of historic wind and current data over a long time period (i.e. years) for the Lake Oahe region, whereas the deterministic analysis provided individual trajectory, oil weathering information, expected concentrations or thicknesses of oil contamination, mass balance (accounting for the full amount of oil released), or other information related to a single release at a given location and time (i.e. days).

The stochastic thresholds that were used in displaying the results of the spill modeling were highly conservative, meaning they were at the low end of possible thresholds. Spill Model Report at 8-9. As such, the stochastic thresholds essentially show whether there is presence or absence of oil in the associated trajectory and fate results. That a stochastic threshold is predicted to be exceeded at any single point in time within a scenario therefore does not mean there will be negative effects because the duration of any exposure matters. Spill Model Report at 83.

The stochastic and deterministic maps of water column contamination of dissolved hydrocarbons in the Spill Model Report depict the likelihood that concentrations will exceed the identified threshold at any depth within the water column; the Report's mapped results do not specify the depth at which this threshold will be exceeded. Spill Model Report at 84. The results should not be interpreted to represent that the entire water column (i.e., from surface to bottom) would experience a concentration above the threshold. It is likely that only the top few meters of the water column would experience high concentrations of a particular contaminant, which may not be where the species of concern spends a particular portion of its life cycle. For example the stochastic model results in Figure I-6 show the probability of exceeding 1 μg/L from a spill volume of (b) (7)(F) bbls, under Lake Oahe. Figure I-7 shows the composite results from a deterministic scenario for maximum total dissolved hydrocarbon concentration over the 10-day modeling period.  These figures represent the maximum concentration of hydrocarbons that the report predicted for each location at any point in time during the 10-day modeling period, as well as the maximum concentration at any depth.  This is relevant because concentrations may be higher near the surface (the top few meters), associated with floating oil and surface mixing, while concentrations in the subsurface environment may be minimal or non-existent.

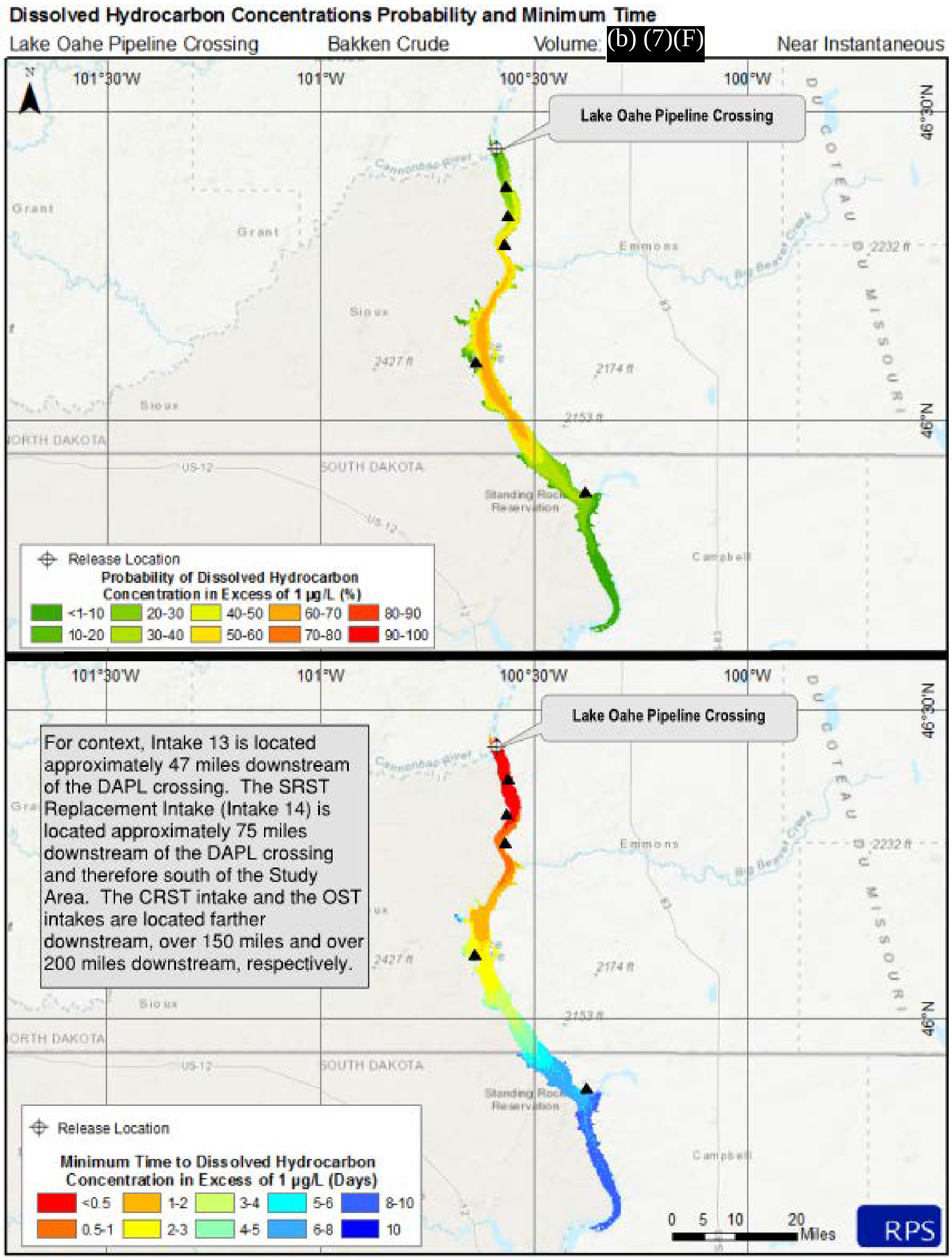



**Figure I-6. Probability of Dissolved Hydrocarbon Concentrations Above Threshold in the Water Column and Minimum Time to Threshold Exceedance**

Probability of dissolved hydrocarbon concentrations > 1 µg/L at some depth in the water column (top) and minimum time to threshold exceedance (bottom) resulting from a FBR ([redacted] bbls) at the Lake Oahe pipeline crossing.

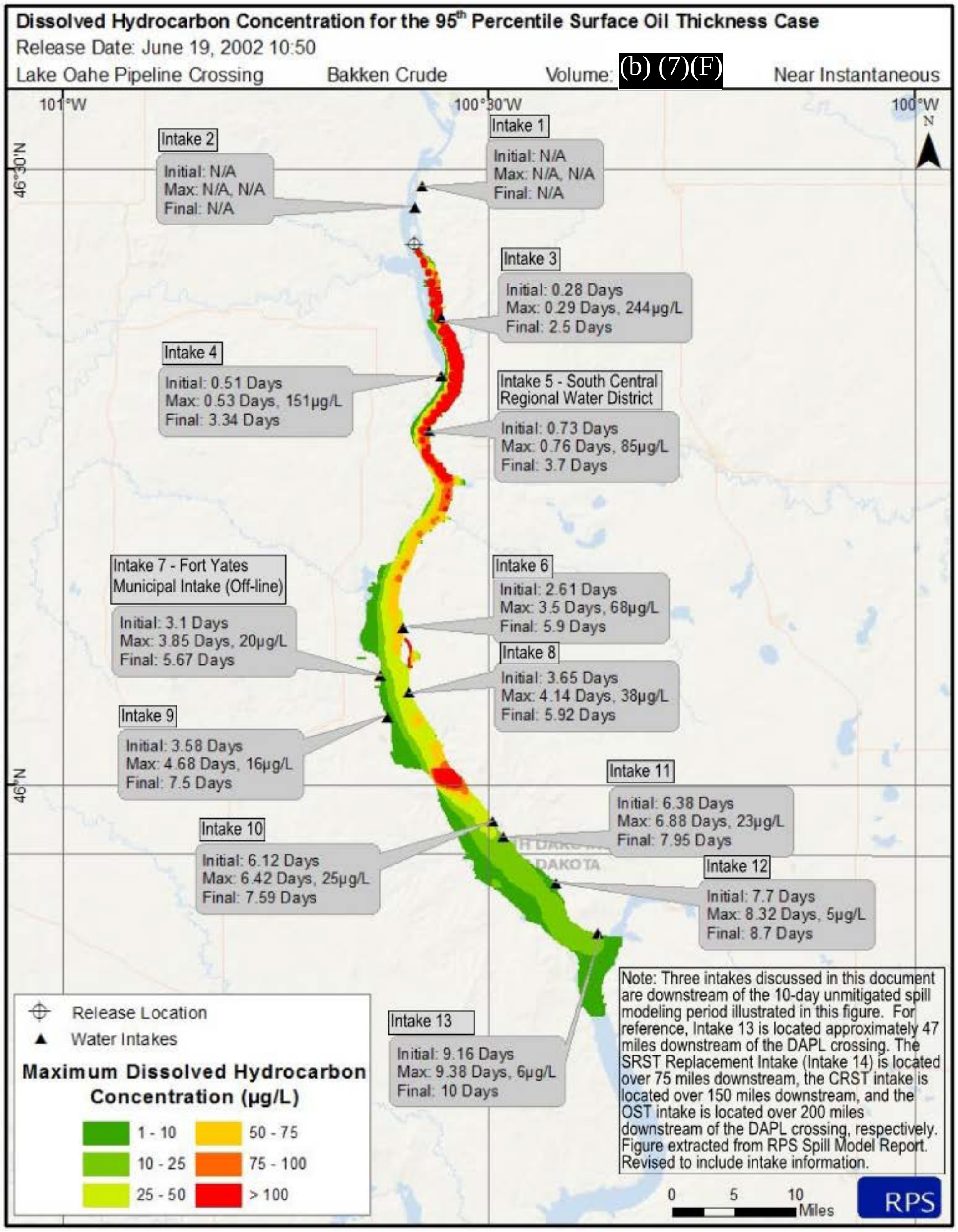



**Figure I-7. Composite of Maximum Total Dissolved Hydrocarbon Concentration Over 10 Days**
Composite of maximum total dissolved hydrocarbon concentration over 10 days for the 95th percentile FBR scenario for surface oil exposure at the Lake Oahe pipeline crossing location. This represents the maximum in water contamination that was predicted for each location. This level of exposure would not be observed at the same time. The maximum levels of exposure would not be observed at each location simultaneously.

Table I-6 lists the maximum predicted dissolved hydrocarbon concentrations (DHC) at representative water intake locations at the downstream portion of the model domain at the end of the 10-day modeling period, showing that the highest concentrations occur in the top 5-10 meters, with little to no predicted concentrations at depths below 10 meters.

| Maximum Dissolved Hydrocarbon Concentration (µg/L) in region of intake locations | | | | |
|---|---|---|---|---|
| **Depth Bin** | **26.8 Miles Downstream ((b) (7)(F) [redacted])** | **38.7 Miles Downstream ((b) (7)(F) [redacted])** | **43.0 Miles Downstream ((b) (7)(F) [redacted])** | **47.1 Miles Downstream ((b) (7)(F) [redacted])** |
| 0-5 m (0 to 16.4 ft) | 145 | 58 | 62 | 38 |
| 5-10 m (16.4 to 32.8 ft) | 74 | 2 | 61 | 18 |
| 10-20 m (32.8 to 65.6 ft) | 0 | 0 | 1 | 2 |
| 20-25 m (65.6 to 82.0 ft) | 0 | 0 | 0 | 0 |
| Maximum in water column | 145 | 58 | 62 | 38 |

**Table I-6. Predicted worst-case hydrocarbon contamination at representative locations at the downstream end of the model domain at the end of the 10-day modeling period.**

4. Potential Impacts to Hunting and Fishing Resources

The Report used the modeling described to characterize the fate and transport of hydrocarbons to provide an understanding of the potential spatial extent, associated probabilities, and potential effects (i.e. acute mortality) that could occur following a large volume release of oil under a range of environmental conditions. Accordingly, the Spill Model Report modeled potential biological effects. Spill Model Report at 164. DHC (dissolved hydrocarbon concentrations) in the water or sediment affects aquatic biota (e.g., fish, invertebrates). The biological exposure component of the SIMAP model (biological effects model) estimated the volume and area of water (and stream length, as appropriate) that would be affected by surface oil, concentrations of oil components in the water, sediment contamination, and the mass of oil on shorelines. Spill Model Report at 38. It also estimated losses resulting from acute exposure after a spill (i.e., losses at the time of the spill and while acutely toxic concentrations remain in the environment) in terms of direct mortality. *Id.*

The biological effects model in the Spill Model Report was used to predict the equivalent areas of 100% mortality for each deterministic scenario for surface and shoreline effects, as well as in-water effects at two different sensitivity thresholds including 5 µg/L of dissolved hydrocarbon mixtures (e.g. Polycyclic Aromatic Hydrocarbons (PAHs)), which represented sensitive species; and 50 µg/L of dissolved hydrocarbons, which represented average sensitivity species. Spill Model Report at 164-165, 168-172. Lethal concentration thresholds are expressed as $LC_{50}$, meaning the concentration at which 50% of exposed organisms will die when exposed for a specified duration. Spill Model Report at 39. Thus, the "snapshots" of maximum concentration of 5 µg/L depicted on maps do not correlate with 50% predicted mortality. Spill Model Report at 40. Rather, the time varying concentration and the duration of exposure determine the percentage of mortality within each given region. For the relatively short durations of exposure that are predicted for these model results (generally only minutes to several hours), a given concentration would need to be much higher than the relevant $LC_{50}$ threshold before 50% of exposed organisms would die.

The Spill Model Report assessed potential effects based upon conservative thresholds for surface floating oil, shoreline oil, and in-water contamination. Spill Model Report at ix. Metrics used to discuss results include predicted shortest time to shoreline oiling, maximum concentration of contaminants in the water column, and maximum surface area of floating oil. *Id.* The Spill Model Report selected the 95$^{th}$ percentile scenarios from the stochastic assessment as highly conservative representative deterministic model runs to assess the upper range of predicted effects possible under any condition. *Id.* Results can be used to identify shorelines and other resources that have the potential to be at risk should there be a large volume release of oil, and determine how much time may be available to protect them. *Id.*

Overall, the maximum Total Hydrocarbon Concentrations (THC) were in excess of the thresholds for predicted biological effects. Spill Model Report at viii. However, that a stochastic threshold is predicted to be exceeded at any single point in time within a scenario does not mean there will be negative effects. To ascertain the true potential acute mortality to aquatic life, it is critical to evaluate both the concentration and duration of exposure. Spill Model Report at 25. In general, the predicted acute mortality was limited in Lake Oahe due to the relatively short duration of predicted exposure (several hours or less) in a given location.

Any effects would most likely result from acute rather than chronic toxicity. If there were a significant oil build-up in the sediments, exposure could be both acute and chronic, as the concentrations could remain elevated for longer periods of time. Downstream Receptor Report at 36. However, all of the modeled scenarios showed <1% of the oil located in the sediments after the 10-day modeling period. Therefore, bioaccumulation of contaminants by sediment-dwelling organisms would also likely be limited and not lead to widespread impacts to the biological community.

The model evaluates mortality and sub lethal effects in biota from dissolved aromatic concentrations in the water or sediment. Spill Model Report at 39. Mortality is a function of duration of exposure – the shorter the exposure, the higher the concentration before effects occur. *Id.* The incipient $LC_{50}$ is the asymptotic $LC_{50}$ reached after infinite exposure time (or long enough that that level is approached). *Id.*

The results of the biological effects model provide estimates of the equivalent area (in $km^2$) of 100% mortality by behavior group for wildlife and fish/ invertebrates. Model output implies that the equivalent area of 100% mortality would be the same for a release that resulted in 100% mortality over 1 $km^2$ versus 1% mortality over 100 $km^2$. Spill Model Report at 40. In reality, however, potential acute effects following a release can vary greatly by space, time, and percent mortality.

(a) Hydrocarbons in the Water Column

For the twelve 95th percentile representative worst-case scenarios, the maximum area of potential mortality from water column exposure was nearly 30% of the modeled area based on the 5 µg/L threshold for sensitive aquatic species. This is depicted in Table I-7. For the same release scenario, the maximum area of potential mortality from water column exposure drops to approximately 2.5% of the modeled area based on the 50 µg/L threshold for aquatic species.

| Spill Location and Scenario | | Sensitive Species (5 µg/L) | | Average Species (50 µg/L) | |
|---|---|---|---|---|---|
| | | Area ($km^2$) | Percent (%) | Area ($km^2$) | Percent (%) |
| **Lake Oahe Pipeline Crossing** Total Area: 252 $km^2$ | FBR – 95th Percentile Surface Exposure | 15.2 | 6.0 | <0.1 | <0.1 |
| | FBR – 95th Percentile Water Column Exposure | 1.8 | 0.7 | <0.1 | <0.1 |
| | FBR – 95th Percentile Shoreline Exposure | 15.2 | 6.0 | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Surface Exposure | 16.7 | 6.6 | 0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Water Column Exposure | 1.7 | 0.7 | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | 17.3 | 6.8 | 0.1 | 0.1 |
| **ND-380 Valve Site** Total Area: 252 $km^2$ | FBR – 95th Percentile Surface Exposure | 3.5 | 1.4 | 1.3 | 0.5 |
| | FBR – 95th Percentile Water Column Exposure | 0.3 | 0.1 | <0.1 | <0.1 |
| | FBR – 95th Percentile Shoreline Exposure | 0.3 | 0.1 | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Surface Exposure | 0.1 | <0.1 | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Water Column Exposure | 74.7 | 29.6 | 6.3 | 2.5 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | 40.8 | 16.2 | <0.1 | <0.1 |

**Table I-7 River area ($km^2$) and percent of total modeled area (%) affected (for the modeled domain, total area listed in left hand column) by acute toxicity, expressed as equivalent area of 100% mortality for aquatic biota at two sensitivities to PAHs in oil: sensitive (5 µg/L) and average (50 µg/L).**

The time series modeling results show that concentrations above biological thresholds occur for short durations only. The 50 µg/L threshold for aquatic species of average sensitivity is exceeded for only a few hours as depicted in Figure I-8.

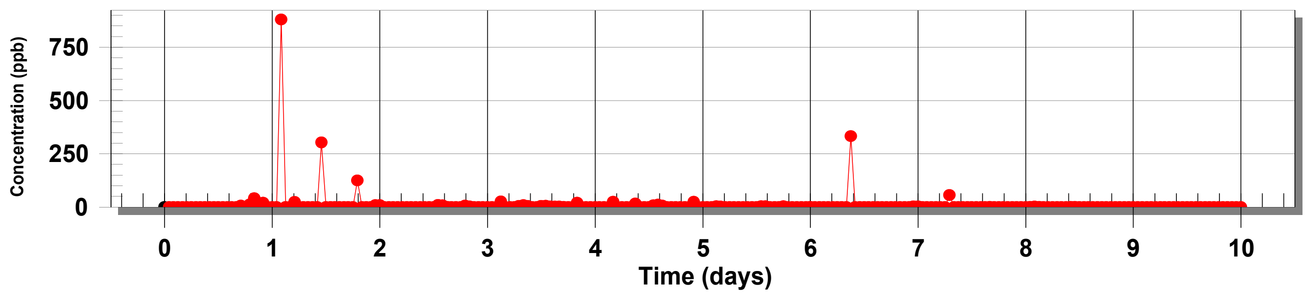



**Figure I-8. Example Downstream Time Series of Total Dissolved Hydrocarbon Concentration**
Time series of total dissolved hydrocarbon concentration for the 95th percentile FBR scenario for water column exposure at the Lake Oahe valve site, drinking water intake 4 8.08 miles from the crossing. (Note: Parts per billion or ppb are roughly equivalent to µg/L).

Toxicity is a function of concentration and duration; therefore, it is likely that although a relatively large area could be exposed to higher concentrations at some depth in the water column, the acute toxic mortality would be localized. Of the 12 deterministic scenarios selected, only two have mortalities over the equivalent of 10% of the modeled area at the most sensitive (5 µg/L) level. Only one is over the equivalent of 1% of the modeled area at the average sensitivity species (50 µg/L) level.

(b) Hydrocarbons on the Water Surface

The Spill Model Report evaluated the area of potential effects on birds as the surface of the river covered by oil above the thickness threshold for acute effects at any time during the scenario. The thickness threshold used in modeling scenarios was 10 µm. This threshold does not imply direct loss of all wildlife in the area because actual effects will differ by species depending on the percent likelihood of encountering oil, which is in part based on behavior. All twelve of the deterministic model runs of fate and transport that represent worst-case scenarios indicated that < 0.1% of the surface of Lake Oahe would have oil thickness greater than 10 µm. This is depicted in Table I-8.

| Spill Location and Scenario | | Lake Area ($km^2$) | % of Lake Area |
|---|---|---|---|
| **Lake Oahe Pipeline Crossing** Total Area: 252 $km^2$ | FBR – 95th Percentile Surface Exposure | <0.1 | <0.1 |
| | FBR – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | FBR – 95th Percentile Shoreline Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Surface Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | <0.1 | <0.1 |
| **ND-380 Valve Site** Total Area: 252 $km^2$ | FBR – 95th Percentile Surface Exposure | <0.1 | <0.1 |
| | FBR – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | FBR – 95th Percentile Shoreline Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Surface Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | <0.1 | <0.1 |

**Table I-8. Total lake area ($km^2$) and percent (%) of total lake area (for the modeled domain, total area listed in column 1) oiled above a threshold for potential acute effects on wildlife (> 10 µm).**

(c). Hydrocarbons in the Sediments

The modeling results do not show that accumulation of chemicals into consolidated sediments from a release of oil into Lake Oahe would lead to widespread impacts to the biological community. Spill Model Report at 103. As the mass balance results in Table I-9 from the spill model show, very little of the oil associated with a release would end up in the sediments, with the possible exception of particular near-shore littoral zones where wave action could lead to the incorporation of oil constituents into the sediments.

All of the scenarios showed less than 1% of the oil located in the sediments after the 10-day modeling period. Since feeding by pelagic organisms on benthic prey can then reintroduce sediment-associated contaminants into the pelagic food webs, bioaccumulation of contaminants by sediment-dwelling organisms would also likely be limited.

| Scenario | Surface (%) | Evaporated (%) | Water Column (%) | Sediment (%) | Ashore (%) | Degrade (%) |
|---|---|---|---|---|---|---|
| FBR Pipeline Crossing 95th Percentile Surface Oil Exposure | <0.01 | 46.71 | 28.55 | 0.39 | 19.94 | 4.41 |
| FBR Pipeline Crossing 95th Percentile Water Column Exposure | <0.01 | <0.01 | 57.40 | <0.01 | <0.01 | 42.60 |
| FBR Pipeline Crossing 95th Percentile Shoreline Exposure | <0.01 | 46.71 | 28.55 | 0.39 | 19.94 | 4.41 |
| 90 PD Release Pipeline Crossing 95th Percentile Surface Oil Exposure | <0.01 | 45.30 | 29.63 | 0.77 | 19.00 | 5.30 |
| 90 PD Release Pipeline Crossing 95th Percentile Water Column Exposure | <0.01 | <0.01 | 57.32 | <0.01 | <0.01 | 42.68 |
| 90 PD Release Pipeline Crossing 95th Percentile Shoreline Exposure | <0.01 | 46.80 | 26.25 | 0.74 | 21.49 | 4.73 |

**Table I-9. Summary of the mass balance information at the Lake Oahe pipeline crossing release location at the end of the 10-day simulations. All values represent a percent of the total volume of spilled oil at the last modeled time step.**

(d). Hydrocarbons on the Shoreline

For the twelve deterministic model runs of fate and transport that represent the 95th percentile worst-case of the modeled scenarios, the Spill Model Report estimates that the maximum area of oil thickness greater than 100 µm would encompass 8.3% of the modeled shoreline (66 km) for the worst-case scenario at the Lake Oahe crossing. This is depicted in Table I-10. A release of even (b) (7)(F) [redacted] bbls directly into Lake Oahe would be expected to oil less than 10% of the Lake Oahe shoreline within the modeled area under the 10-day unmitigated scenario. Under the majority of spills volume release (90 PD release) modeled at the sediment / water interface of the Lake Oahe crossing, the estimated length of shoreline affected decreased by about 50%, from 8.3% (66 km) to 4.2% (33 km), with a maximum area of oil thickness greater than 100 µm. The deterministic scenarios represent the cumulative sum of the individual worst-case of the scenarios (stacked one onto the next); the individual release model results would not have impacts of this magnitude. Example of the stochastic and deterministic modeling results for shoreline oil is shown in Figure I-10.

| **Spill Location and Scenario** | | **Total Shoreline Length (km)** | **% of Total Shoreline** |
|---|---|---|---|
| **Lake Oahe Pipeline Crossing** Total Length: 793 km | FBR – 95th Percentile Surface Exposure | 66.0 | 8.3 |
| | FBR – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | FBR – 95th Percentile Shoreline Exposure | 66.0 | 8.3 |
| | 90 PD Release – 95th Percentile Surface Exposure | 25.6 | 3.2 |
| | 90 PD Release – 95th Percentile Water Column Exposure | <0.1 | <0.1 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | 33.4 | 4.2 |
| **Lake Oahe ND-380 Valve Site** Total Length: 793 km | FBR – 95th Percentile Surface Exposure | 3.6 | 0.5 |
| | FBR – 95th Percentile Water Column Exposure | 1.4 | 0.2 |
| | FBR – 95th Percentile Shoreline Exposure | 33.0 | 4.2 |
| | 90 PD Release – 95th Percentile Surface Exposure | 17.2 | 2.2 |
| | 90 PD Release – 95th Percentile Water Column Exposure | 5.0 | 0.6 |
| | 90 PD Release – 95th Percentile Shoreline Exposure | 18.6 | 2.3 |

**Table I-10. Shoreline length (km) and (%) of total shoreline (total shoreline lengths in the modeled domain are listed in the left hand column) oiled above a threshold for potential effects to vegetation (> 100 µm).**

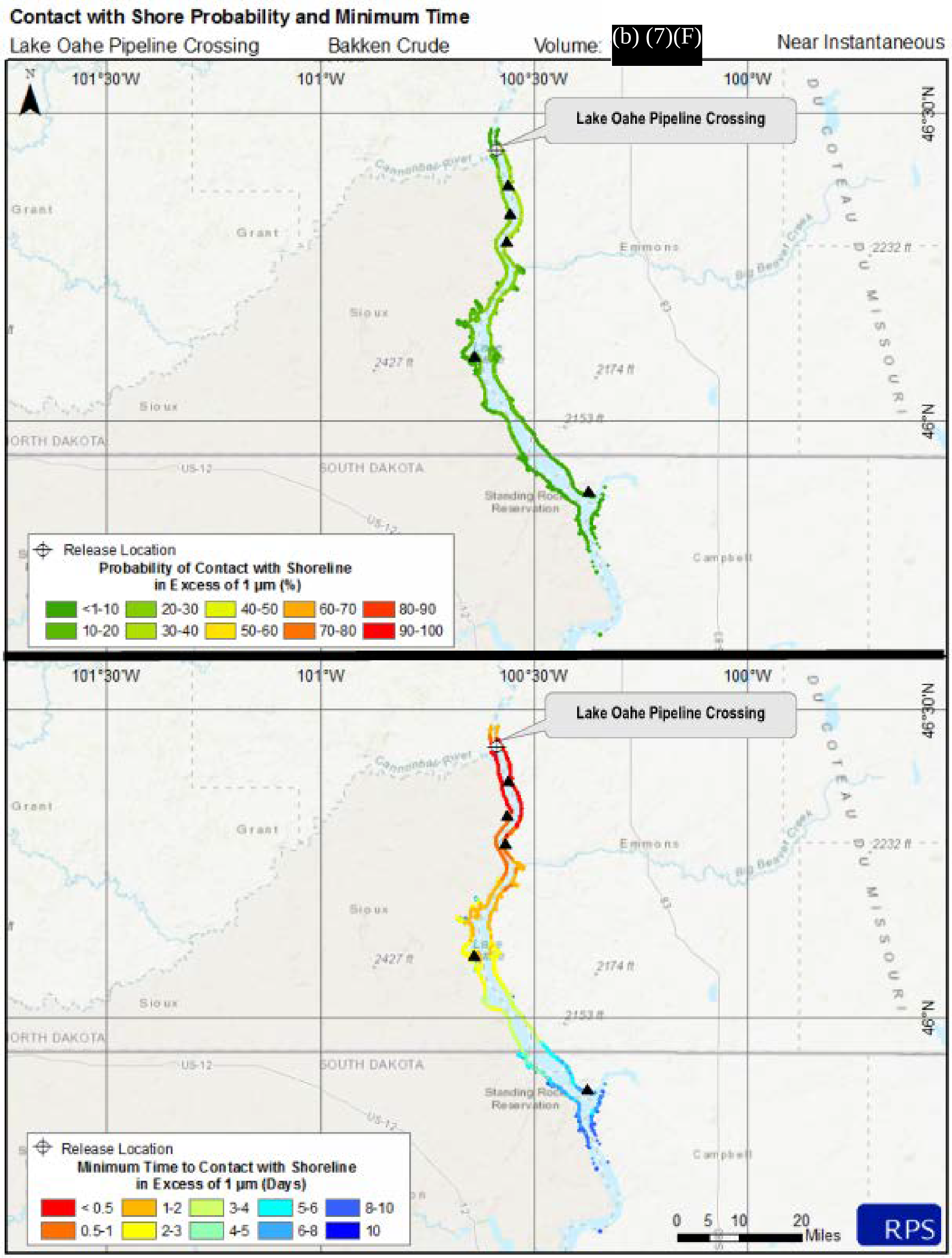



**Figure I-9. Probability of Shoreline Contact and Minimum Time to Threshold Exceedance**

Probability of shoreline contact > 1 $g/m^2$ (top) and minimum time to threshold exceedance (bottom) resulting from a FBR ([redacted] bbls) at the Lake Oahe pipeline crossing.

ETP used the results of the Spill Model Report to determine the relative impact of released oil to fish, waterfowl, and terrestrial wildlife. ETP summarized the results in the June 2018 Downstream Receptor Report. The Corps Omaha District Staff and the environmental sciences research specialists at ERDC separately reviewed the Downstream Receptor Report. Based on these separate reviews, the Corps adopts the methodology and results in the report. This document adopts the Downstream Receptor Report.

(e). Summary of Potential Impacts to Hunting Resources

An oil spill can negatively affect game species in several ways. The oil could coat their fur or plumage. When game species come into direct contact with oil they can be impacted by absorption. SRST HCA Report at 28. Game species could also ingest oil or inhale vapor. *Id.* Or, indirectly, an oil spill could alter their habitat and food quality, and availability. *See generally Id.* Game species most susceptible to the effects of an oil spill are typically birds and shoreline mammals that would come into physical contact with oil from a spill. Downstream Receptor Report at v. The extent of these potential effects would depend on the volume of material released; the size of the dispersal area; the type, age, and reproductive state of species present; climate, and the effectiveness of spill response measures implemented.

Big game and small game mammals prevalent in the Lake Oahe area are susceptible to harm from an oil spill if oil were to coat their fur. Downstream Receptor Report at 77. Aquatic mammals, such as beaver and muskrats, have fur that provides insulation and is adapted to repel water. *Id.* The adhesion of oil to the fur of these aquatic mammals minimizes these properties and can result in hypothermia or death. *Id.* and SRST HCA Report at 31.

These mammals could ingest oil following physical oiling of their fur by grooming and cleaning themselves to remove the contaminants. *Id.* The contamination of water surfaces by oil may increase the inhalation exposure to toxic components for semi-aquatic mammals that are swimming on the surface. Inhalation could affect beaver and muskrats because they need to breathe at the surface of the water. SRST HCA Report at 31. Chronic effects could result in immune system, systemic, and hematological responses with potential consequences for survival and reproduction in individuals. Downstream Receptor Report at 78. Oil spills could have indirect effects on semi-aquatic mammals by altering their habitat or food quality or availability. *Id.*

Similarly, oiling of waterfowl and upland game birds plumage could cause thermoregulatory issues. *Id.* at 64; SRST HCA Report at 31. Other direct effects include toxicological impacts, which can cause sickness or mortality. *Id.* at 95. Ingestion of oil can cause gastrointestinal irritation, ulcers, bleeding, diarrhea, and digestive complications. *Id.* Absorption of oil through the skin can lead to liver and kidney damage, anemia, immune, and reproduction system issues. *Id.* Indirect effects such as habitat impacts, food source and nutrient cycling disruptions, and alterations in ecosystem relationships are also possible in the event of a release. *Id.*

Lake Oahe is not the only source of fresh water for terrestrial vertebrates including deer. If the western shore of Lake Oahe were to become impacted by an inadvertent release of oil, it is likely that many terrestrial vertebrates would be able to utilize alternative sources of fresh water. Not including the Cannonball River, which lines the entire northern border of the SRST Reservation, there are more than 900 miles of mapped waterways and more than 3,000 ponds within the SRST Reservation based on an analysis of the National Hydrology Dataset and National Wetlands Inventory. Downstream Receptor Report at 96. Even if some deer or other wildlife species ingested oil contaminted water from Lake Oahe following a spill, oil contaminated water would likely not be above toxic thresholds. *Id.*

Behavioral responses of terrestrial game species would help to reduce potential adverse effects. Birds and mammals are mobile and generally will avoid oil-impacted areas and contaminated food. SRST HCA Report at 21; Downstream Receptor Report at 96. When unaffected alternative habitat is available nearby, the mortality of these species would be limited. Downstream Receptor Report at 96. Because of the behavioral response, and the limited total area that could be impacted as described previously in this document, the impact to hunting resources in the area from an oil spill would be minimal.

In sum, impacts to game resources would be limited. None of the models predicted a lake area with a surface oil thickness above the threshold that could potentially impact game species. Downstream Receptor Report at 96. In the event of a large rupture such as the ones modeled, the pipeline operator would work with others to respond promptly with response efforts (e.g., booming, burning, skimming and collection, as appropriate) that would reduce the volume and therefore the downstream impacts described in the Spill Model Report and the Downstream Receptor Report. Some smaller, less mobile wildlife species such as amphibians, reptiles, and small mammals have a greater potential to be directly impacted during spill response or cleanup activities, but given the limited extent of the proposed crossing, measurable impacts are not anticipated. ETP outlined this response in the Geographic Response Plan ("GRP"). *See* Geographical Response Plan, Missouri River/Lake Oahe Emmons County, North Dakota (March 2018)(filed in *Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs,* No. 16-1534 (D. D.C. April 3, 2018)(ECF No. 350-1 and 350-2)(GRP). Further, as discussed in this document, the chance of an oil spill is low. ETP could also evaluate whether temporary water sources are necessary for wildlife. Downstream Receptor Report at 96.

(f). Summary of Potential Impacts to Fishing Resources

The possibility that an oil spill could harm fishery resources is "well established." Downstream Receptor Report at 51 (citing Lee, K., et al., Expert Panel Report on the Behavior and Environmental Impacts of Crude Oil Released into Aqueous Environments, Royal Society of Canada (2015)). But very few studies have demonstrated increased mortality of fish as a result of oil spills. *Id.* (citing Langangen, O. et al., The effects of oil spills on marine fish: Implications of spatial variation in natural mortality, 119 Marine Pollution Bulletin 102-109 (2017). An oil spill has the potential to affect fish directly through acute or chronic toxicity or indirectly by altering essential habitat (Lee et al., 2015). Fish could also be impacted from spill response.

Fish are often better suited than other aquatic organisms to limit oil exposures and related impacts. Downstream Receptor Report at 51 (citing NMFS Website http://response.restoration.noaa.gov/oil-andchemical-spills/oil-spills/how-oil-spills-affect-fish-and-whales.html). Fish are generally unaffected or only briefly affected by an oil spill because most oil floats. NOAA, Website, How Oil Spills Affect Fish and Whales.[11] Sensitivity to oil varies considerably among species of fish, related to differences in physiology, eating habits, reproduction, and habitat preferences. Juvenile and adult fish are generally mobile, can be selective in the foods they ingest, and have a variety of enzymes that allow them to detoxify many oil compounds. Downstream Receptor Report at 51. Many species of fish can metabolize and excrete hydrocarbons, which facilitates elimination and may reduce bioaccumulation. *Id.* Fish can rapidly take up water-soluble low molecular weight hydrocarbons and release them from their bodies when the external concentration of hydrocarbons in the water is reduced. *Id.* (citing Hodson, P. V. Report on the Toxicity of Oil to Fish, DFO Contract #F2471-080006 (August 26, 2008).

An oil spill into Lake Oahe would likely cause a localized fish kill with very limited impacts to the immediate area surrounding the site of the spill. Downstream Receptor Report at 96. Most fish species in Lake Oahe are moderately sensitive to dissolved hydrocarbons from an oil spill. Downstream Receptor Report at 55. As discussed earlier, the spill model classified species into two categories, sensitive and average sensitivity, when assessing potential impact. *Id.* at 5. Since most of the fish species in Lake Oahe are moderately sensitive, the most appropriate threshold to uses for determining impact here is the threshold for species of average sensitivity. *Id.* The model run showing the largest area of greatest mortality for average species only encompassed 2.5% or the study area, which is 2.4 square miles. *See infra* Table I-7; Spill Model Report at 170, Table 7-4. That acute toxic mortality threshold would only be exceed for a few hours and in a localized area. *See infra* Figure I-8; Table I-7. Areas with the highest modeled dissolved hydrocarbons are generally along the east shore of Lake Oahe. Downstream Receptor Report at 55.

Ingestion of adult fish that have eaten contaminated prey, especially species like walleye, pike and catfish by tribal members that were exposed to oil could create symptoms conducive to higher mammals exhibiting oil toxicity and create human health issues. SRST HCA Report at 32. But not much is known about the impact of eating fish that have ingested oil. Downstream Receptor Report at 85. Most species of fish can metabolize and excrete hydrocarbons, so bioaccumulation is limited. *Id.* The biggest impact could be with the taste of the fish. *Id.* Given the short duration and limited effects, warnings about eating fish or a moratorium could mitigate this potential impact. *Id.* However, it is not likely that a warning or a moratorium would be necessary based on the Spill Report model levels of hydrocarbon concentrations. *Id.* If necessary, it would only be for a short time. *Id.*

In sum, even under the unmitigated worst-case discharge scenarios, impacts to fish species would be of limited scale and of temporary duration and therefore impacts to fishing in the area would also be limited. Downstream Receptor Report at 96; *see also* SRST HCA Report at 18 ("The type of oil and the timing of the release influence the severity of oil's effects on fish. Light

[11] Available at: https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/how-oil-spills-affect-fish-and-whales.html (Last visited Aug. 24, 2018).

oils and petroleum products can cause acute toxicity in fish, but the toxic event is generally over fairly quickly. Heavier oils may not affect fish at all, or, in the cases of fish in larval or spawning stages, may be quite detrimental . . .). In the event of a large rupture such as the ones modeled, the pipeline operator would work with others to respond promptly with response efforts (e.g., booming, burning, skimming and collection, as appropriate) that would reduce the volume and therefore the downstream impacts described in the Spill Model Report and the Downstream Receptor Report. ETP outlined this response in the GRP. *See* GRP. Any impact to game species from the cleanup response would likely be offset by the benefits of the response. Further, as discussed in this document, the chance of an oil spill is low.

D. Conclusion

As discussed in this document, the Corps' review on remand of the potential impacts of an oil spill to hunting and fishing resources did not reveal any significant impacts because the risk of an incident is low and any impacts to hunting and fishing resource will be of limited scope and duration.

If "significant new circumstances or information relevant to environmental concerns" comes to light after an EIS or EA is final, an agency should consider whether a supplemental EIS or EA is merited. 40 C.F.R. § 1502.9(c); *see also Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1152 (9th Cir. 1998) (standard for supplementing an EA is the same as for an EIS). When determining whether to prepare a supplemental EIS or EA an agency is to apply the "rule of reason" based on a consideration of the "value of the new information to the still pending decisionmaking process." *Marsh*, 490 U.S. at 373-374. If there is major federal action to occur and if new information shows that the remaining action will affect the quality of the human environment to a significant extent not already considered, a supplemental EIS must be prepared. *Id.* at 374. However, "a reduction in the environmental impact is less likely to be considered a substantial change relevant to environmental concerns than would be an increase in the environmental impact." *Friends of the Bow v. Thompson*, 124 F.3d 1210, 1218-19 (10th Cir. 1997); *see also Arkansas Wildlife Fed'n v. Corps*, 431 F.3d 1096, 1103 (8th Cir. 2005) (holding no supplemental EA was necessary where the Corps adequately considered the environmental impact of the proposed changes and reasonably concluded that they were not significant and that any environmental impact appears to be positive rather than negative).

The July 2016 Final EA supported a Finding of No Significant Impact (FONSI). The Corps found that pipeline crossing at Lake Oahe would not "significantly affect the quality of the human environment." FONSI at 6. The Corps' review on remand of the potential impacts to hunting and fishing resources from an oil spill did not reveal "significant new circumstance or information relevant to environmental concerns." 40 C.F.R. § 1502.9(c). Therefore, the Corps concludes that formal reconsideration of the EA/FONSI or preparation of supplemental NEPA documentation is not required with respect to this remand issue.

# II. ENVIRONMENTAL JUSTICE

A. Introduction

1. Scope of Review

The Corps conducted an environmental justice analysis consistent with the goals of the Executive Order 12898, Federal Actions to Address Environmental Justice on Minority Populations and Low-Income Populations, ("E.O. 12898"), as part of its July 25, 2016 Environmental Assessment for the Dakota Access Pipeline Project crossings of flowage easements and federal lands ("EA"). USACE_DAPL0071220 at 85-87,107. The EA evaluates the environmental effects of the Corps' decisions to grant permission under Section 14 of the Rivers and Harbors Act ("Section 408"), and to issue an easement under Section 185 of the Mineral Leasing Act, to Dakota Access, LLC for it to place a portion of its pipeline on Corps-managed federal lands at Lake Oahe in North Dakota. USACE_DAPL0071220. The U.S. District Court for the District of Columbia remanded the environmental justice elements of the EA back to the Corps, finding the EA improperly considered the environmental effects of the decisions to low-income, minority and Tribal populations under the "hard look" requirement of the National Environmental Policy Act ("NEPA"). ECF 239 at 47-54.

The Court's criticisms focused on the consideration of the potential effects of the operation of the pipeline at the point it crossed Corps-managed federal lands at Lake Oahe. *Id* at 53. Specifically, the Court questioned whether the .5 mile buffer unit of geographic analysis used in the EA was sufficient to capture the environmental effects to low-income, minority and Tribal populations from a potential pipeline spill. The Court also found that the EA lacked necessary information regarding cultural, social and economic factors specific to Tribal populations that could amplify the environmental consequences of a potential spill. In addition, the Court specified that the EA insufficiently described the potential effects of an oil spill on the water intakes relied on by those populations. *Id*.

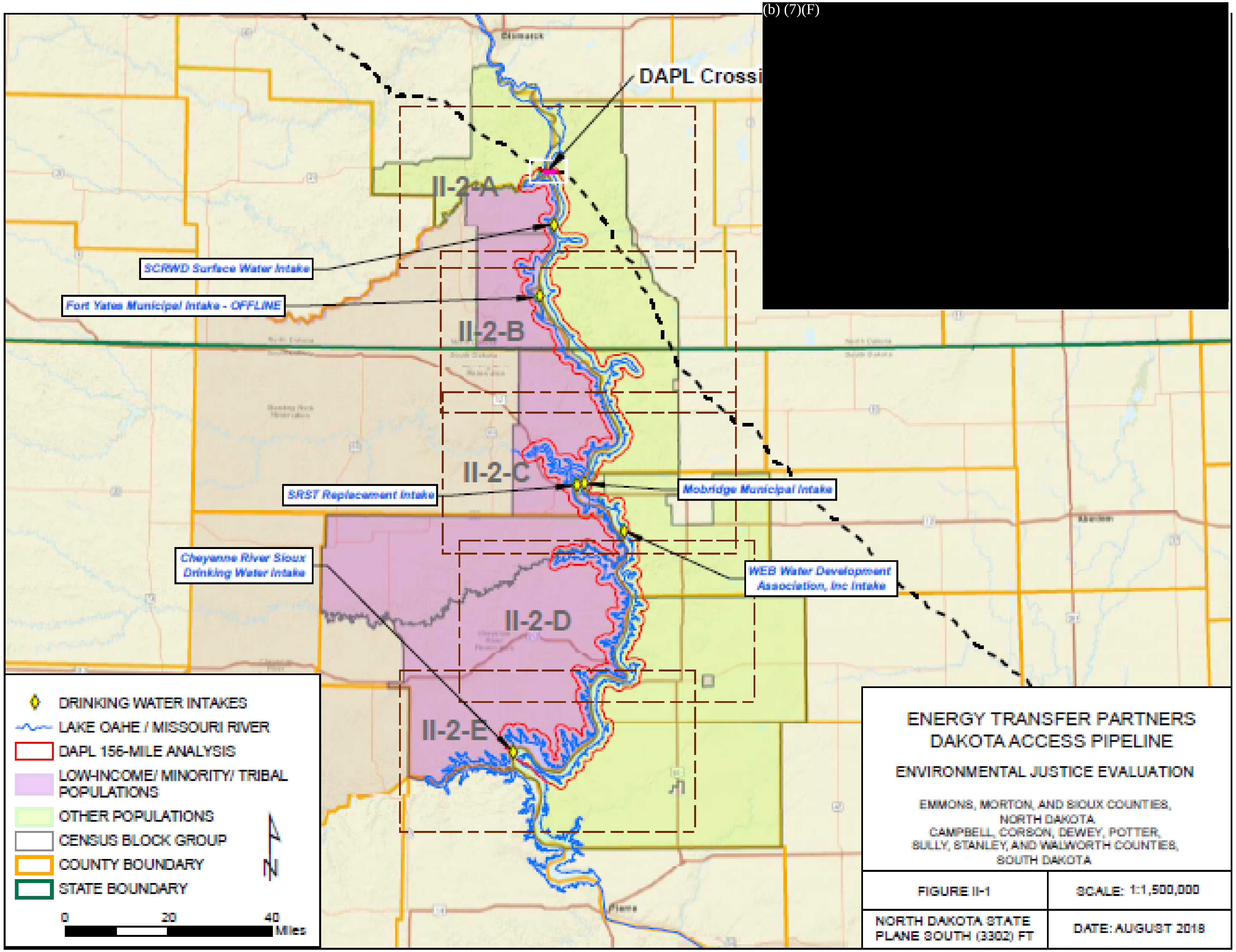
This environmental justice analysis addresses these concerns in multiple ways. First, this analysis expands the EA's geographic extent of analysis. Second, this analysis applies input provided by the Cheyenne River Sioux (CRST), Oglala Sioux (OST), Standing Rock Sioux (SRST), and Yankton Sioux Tribes (YST) through targeted Tribal outreach. Third, the analysis further considers the interrelated environmental, socioeconomic and cultural factors that may amplify the environmental effects of a potential spill on Tribal populations located along Lake Oahe. This is accomplished with sections dedicated to drinking water intake concerns, hunting and fishing concerns, and concerns regarding effects to traditional cultural, spiritual, and ceremonial practices. Finally, this analysis includes an additional review of the North Bismarck route alternative in comparison to the built alignment.

2. Overview of the specific demographic data considered

In order to better understand the potential impacts of a spill on Tribal populations, the geographic extent of analysis includes the areas adjacent to the eastern border of the SRST reservation and the CRST. This area includes the census block groups on both sides of Lake Oahe from one-half mile north of the Lake Oahe crossing south to the CRST's drinking water intake on the at the southern end of the CRST reservation. From north to south, the analysis area extends from the Lake Oahe crossing to CRST's drinking water intake – approximately 156 miles downriver. From west to east, the area extends one mile west of the west bank of Lake Oahe and one mile east of the east bank. See Figure II-1. As explained in Section II.C.1, this analysis applies the boundary intersection method to identify potentially impacted minority and low-income populations. Using this method, any census block group that intersects a one-mile buffer on either side of Lake Oahe in this 156-mile stretch is included in the main quantitative demographics data applied in this analysis. That dataset is in Table II-2 and it is graphically depicted in Figure II-1 and Figures II-2-A through II-2-E.

While the demographic information from the 156-mile analysis area is the primary dataset applied in this analysis, the Corps determined a second dataset that estimates the population demographics served by each drinking water intake within the geographic area of analysis would help inform the analysis and capture other relevant populations. This information was gathered and mapped for both the Lake Oahe crossing and the North Bismarck alternative route crossing discussed in the EA. This is useful data because individuals that rely on drinking water intakes may or may not reside within the census block groups captured by the boundary intersection method. That dataset is in Table II-4, and it is graphically depicted in Figures II-4-A and II-4-B.

There is a third dataset using the same boundary intersection method to identify low-income and minority populations below the North Bismarck alternative. This data supplements the existing analysis of the North Bismarck alternative relied on in the Final EA. That dataset is in Table II-3 and it is graphically depicted in Figure II-3.

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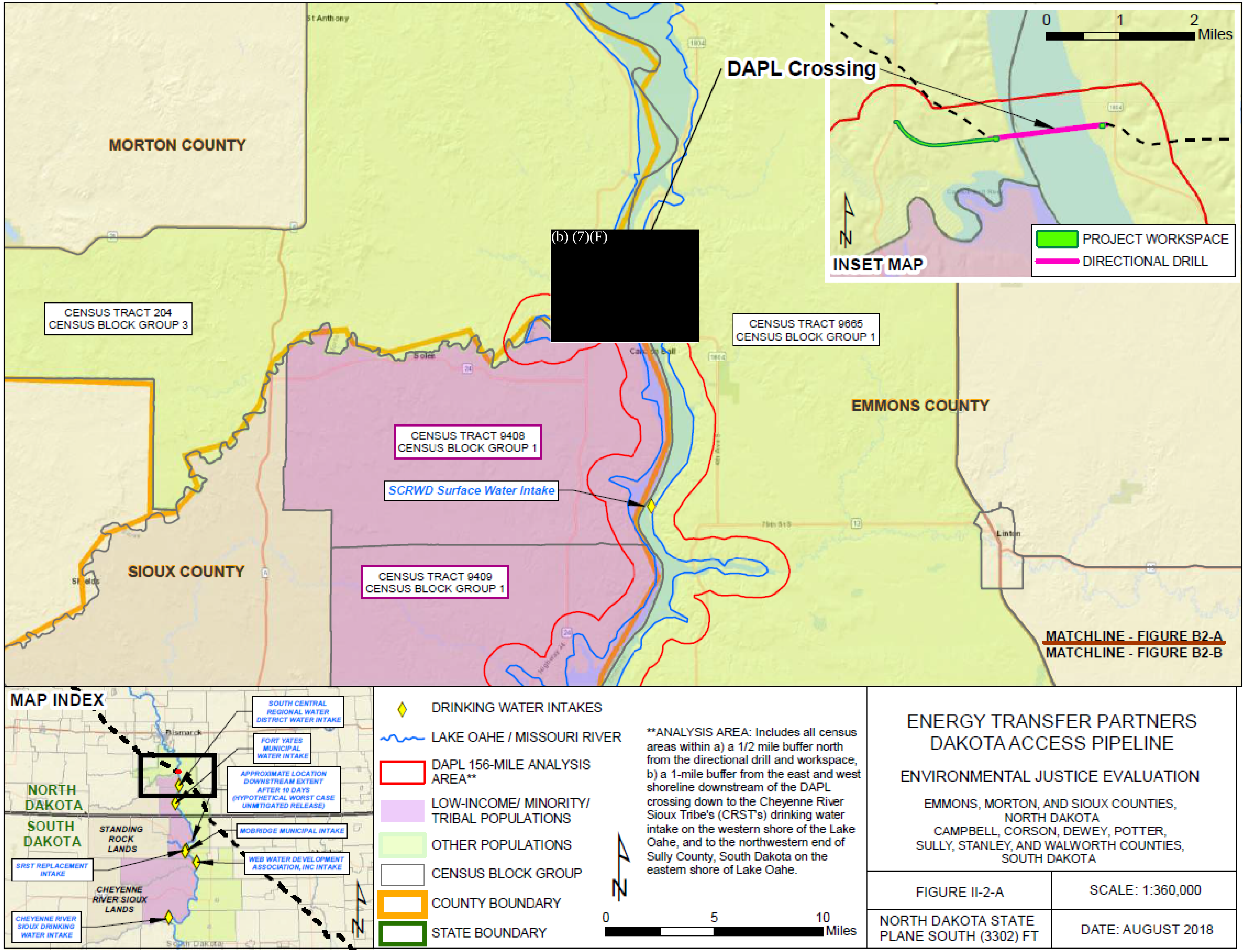


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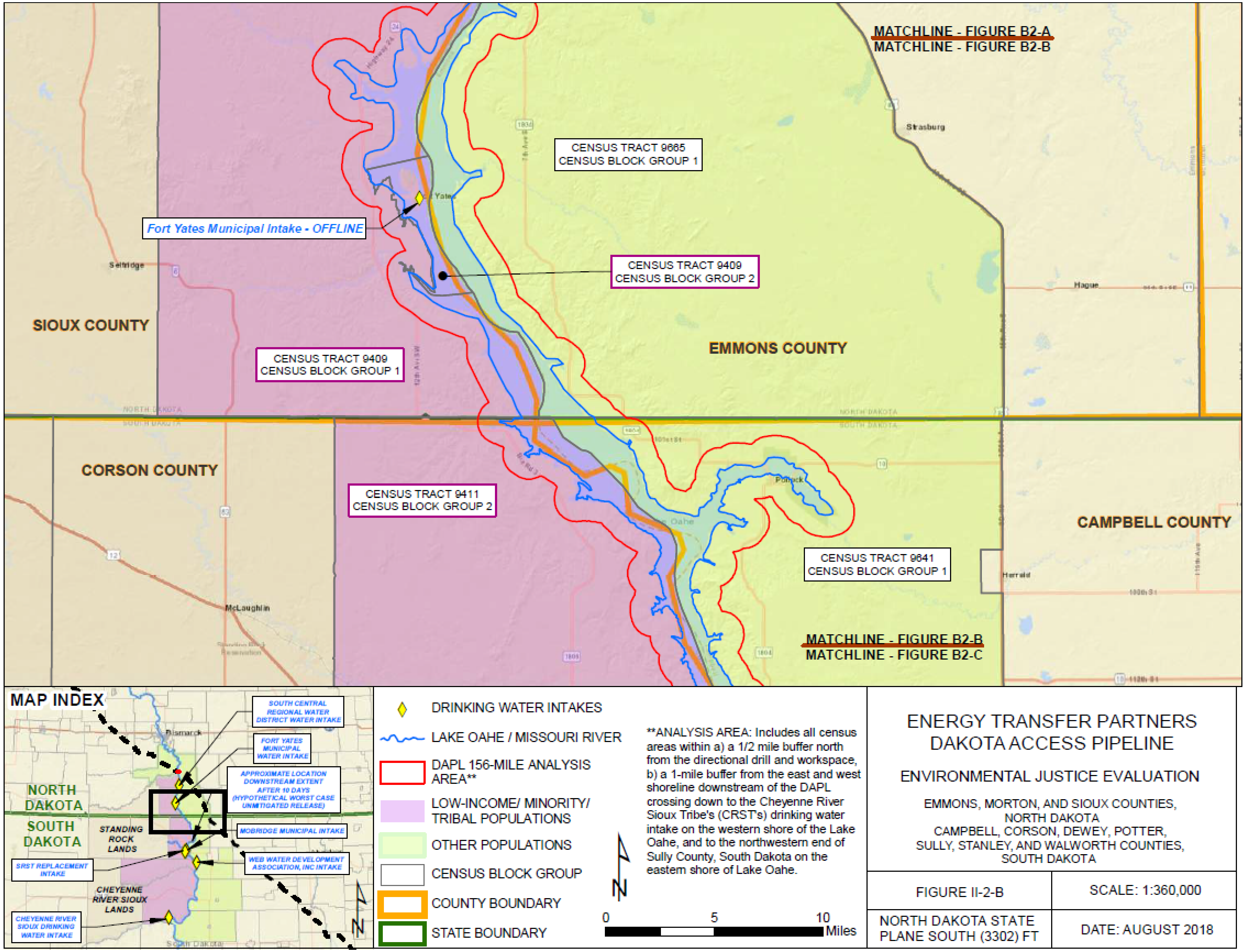


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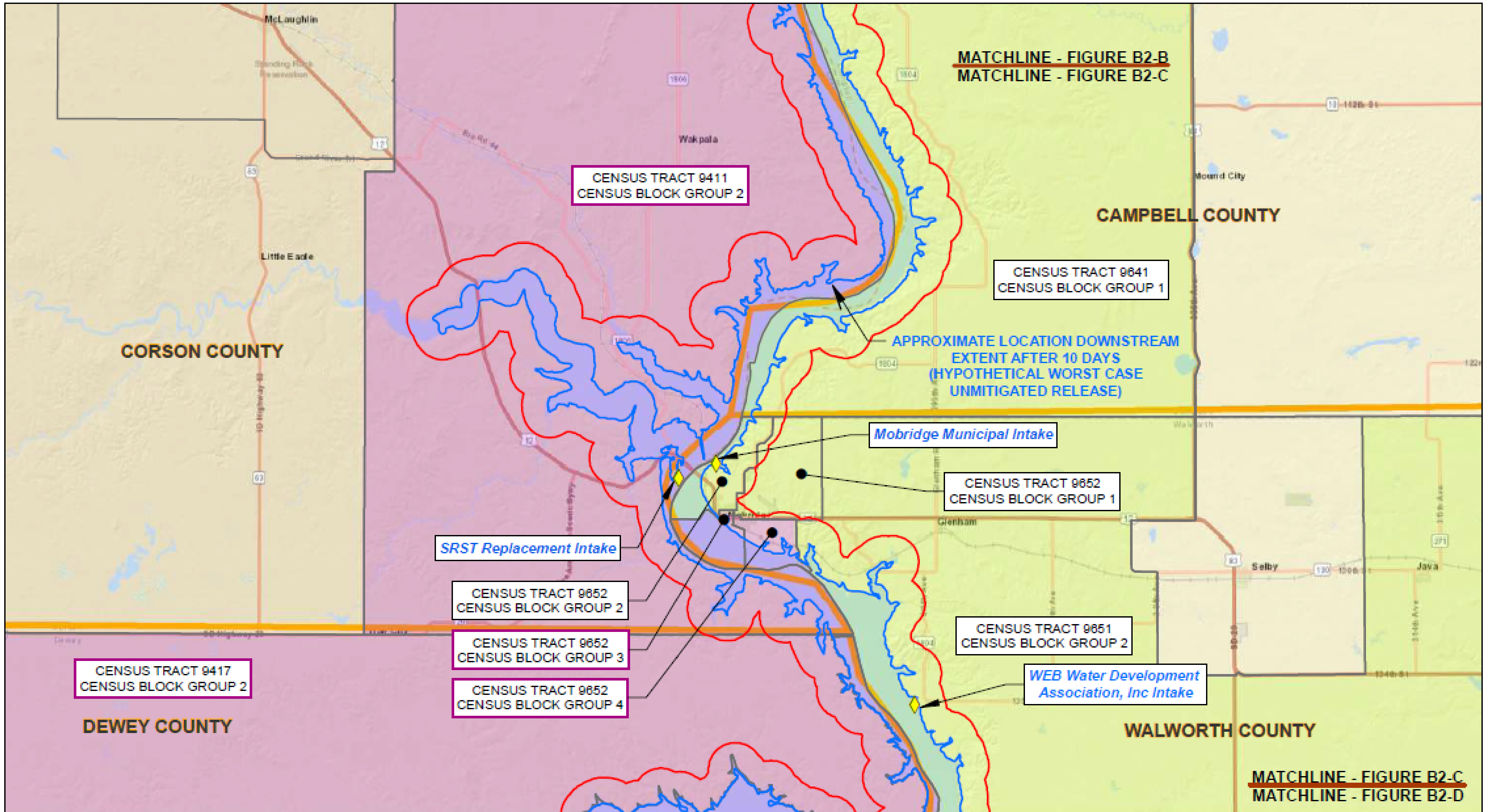


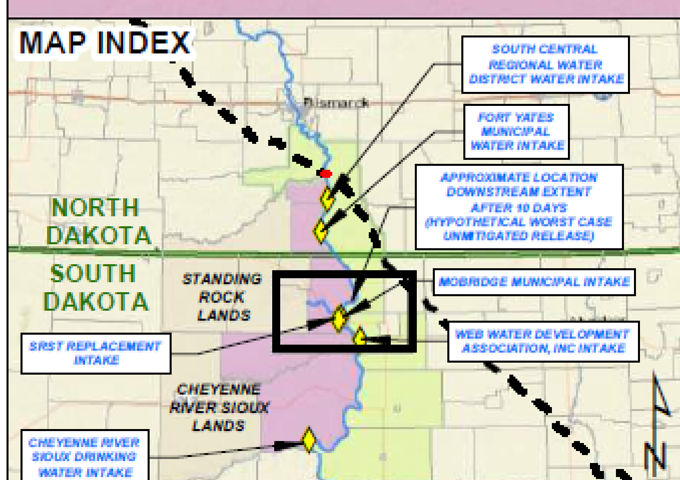


DRINKING WATER INTAKES
LAKE OAHE / MISSOURI RIVER
DAPL 156-MILE ANALYSIS AREA**
LOW-INCOME/ MINORITY/ TRIBAL POPULATIONS
OTHER POPULATIONS
CENSUS BLOCK GROUP
COUNTY BOUNDARY
STATE BOUNDARY

**ANALYSIS AREA: Includes all census areas within a) a 1/2 mile buffer north from the directional drill and workspace, b) a 1-mile buffer from the east and west shoreline downstream of the DAPL crossing down to the Cheyenne River Sioux Tribe's (CRST's) drinking water intake on the western shore of the Lake Oahe, and to the northwestern end of Sully County, South Dakota on the eastern shore of Lake Oahe.

N

0 5 10 Miles

ENERGY TRANSFER PARTNERS
DAKOTA ACCESS PIPELINE

ENVIRONMENTAL JUSTICE EVALUATION

EMMONS, MORTON, AND SIOUX COUNTIES, NORTH DAKOTA
CAMPBELL, CORSON, DEWEY, POTTER, SULLY, STANLEY, AND WALWORTH COUNTIES, SOUTH DAKOTA

| | |
|---|---|
| FIGURE II-2-C | SCALE: 1:360,000 |
| NORTH DAKOTA STATE PLANE SOUTH (3302) FT | DATE: AUGUST 2018 |

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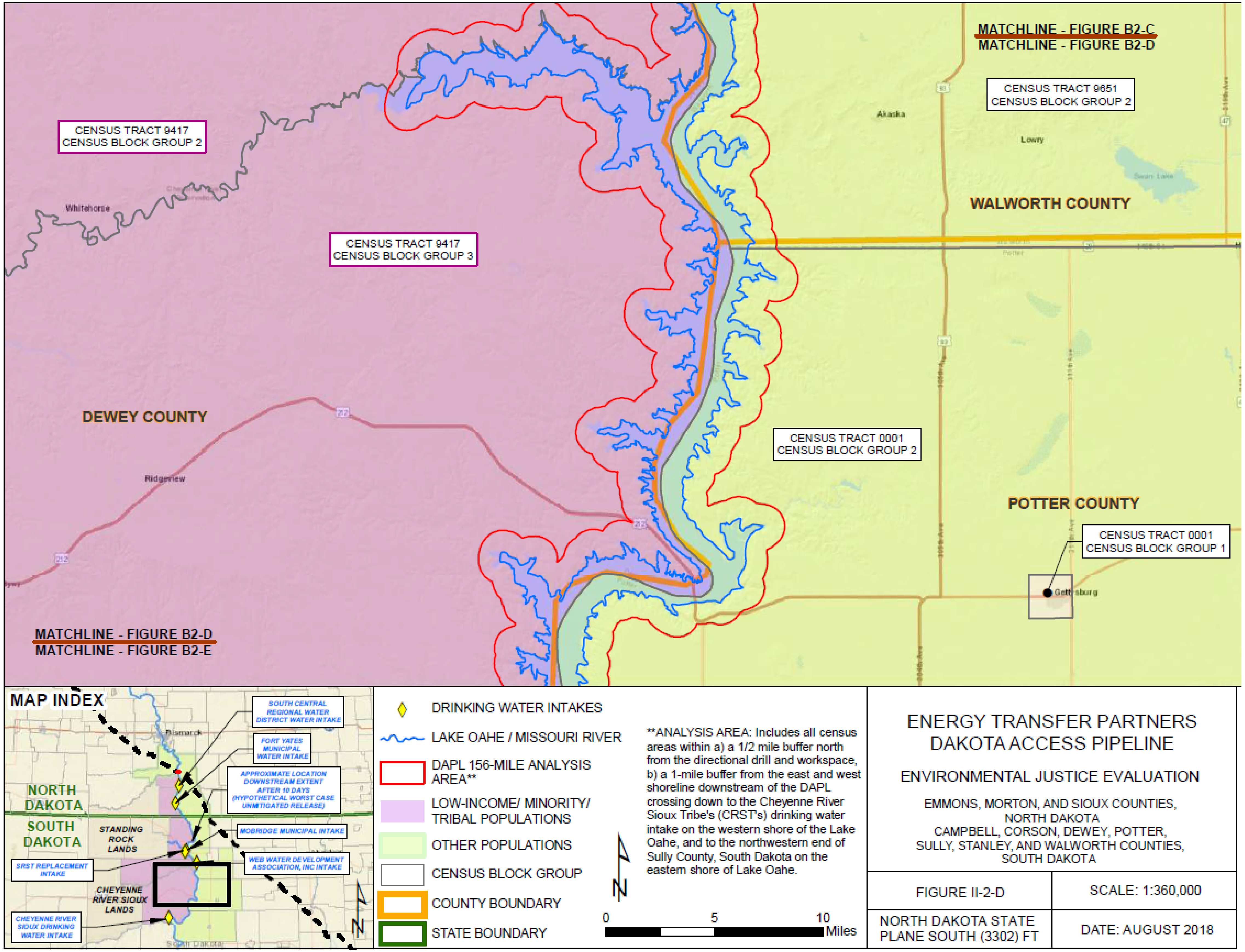


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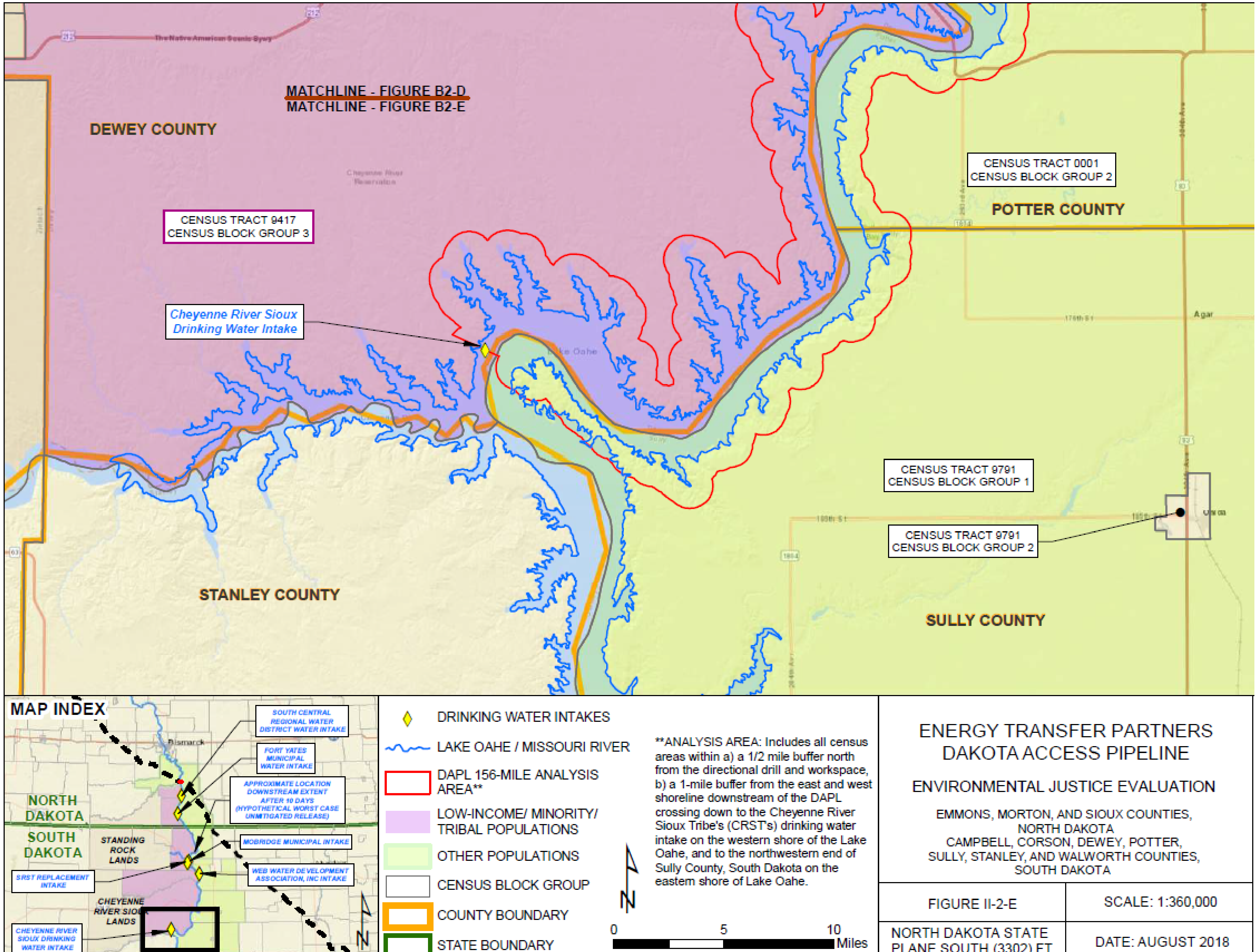


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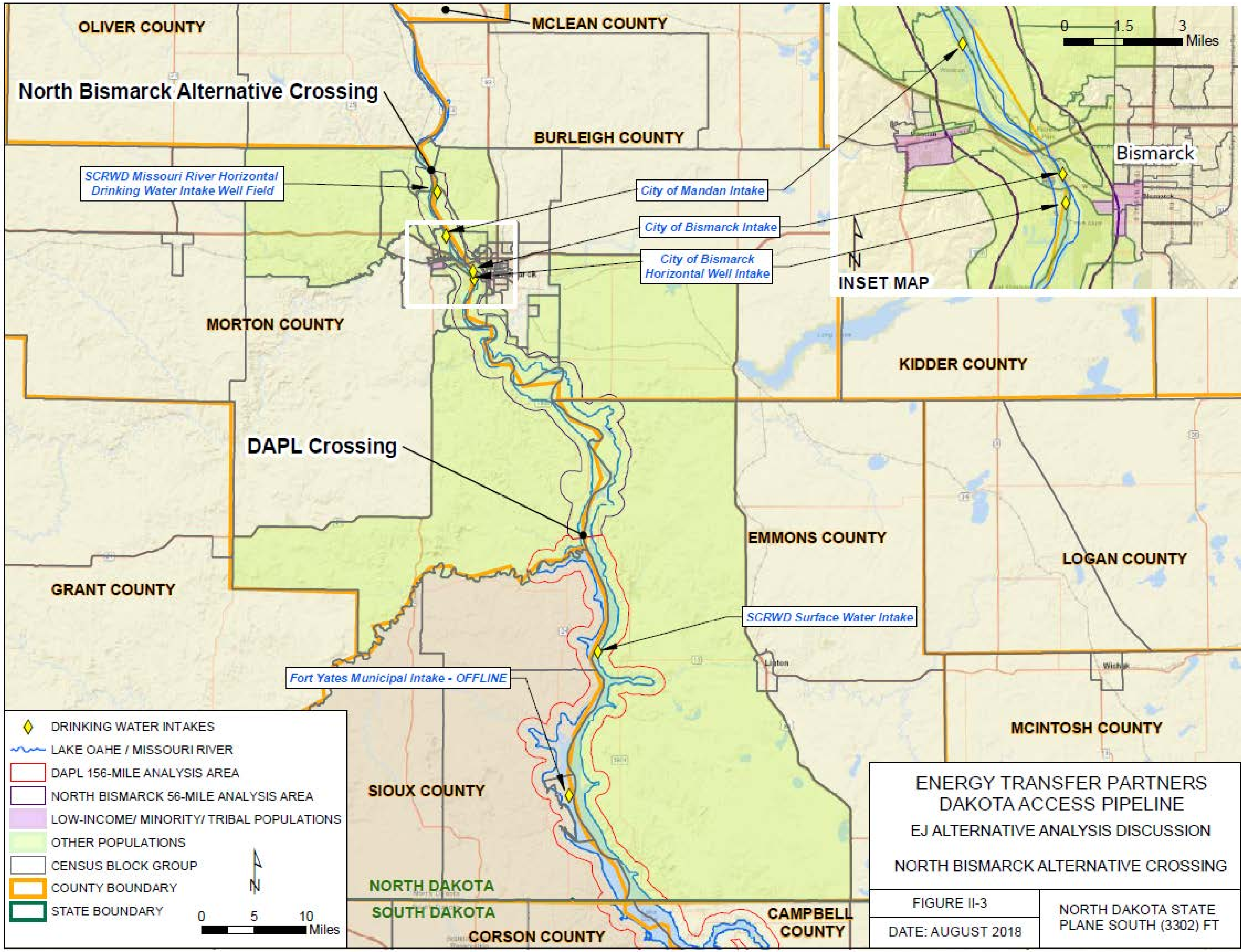


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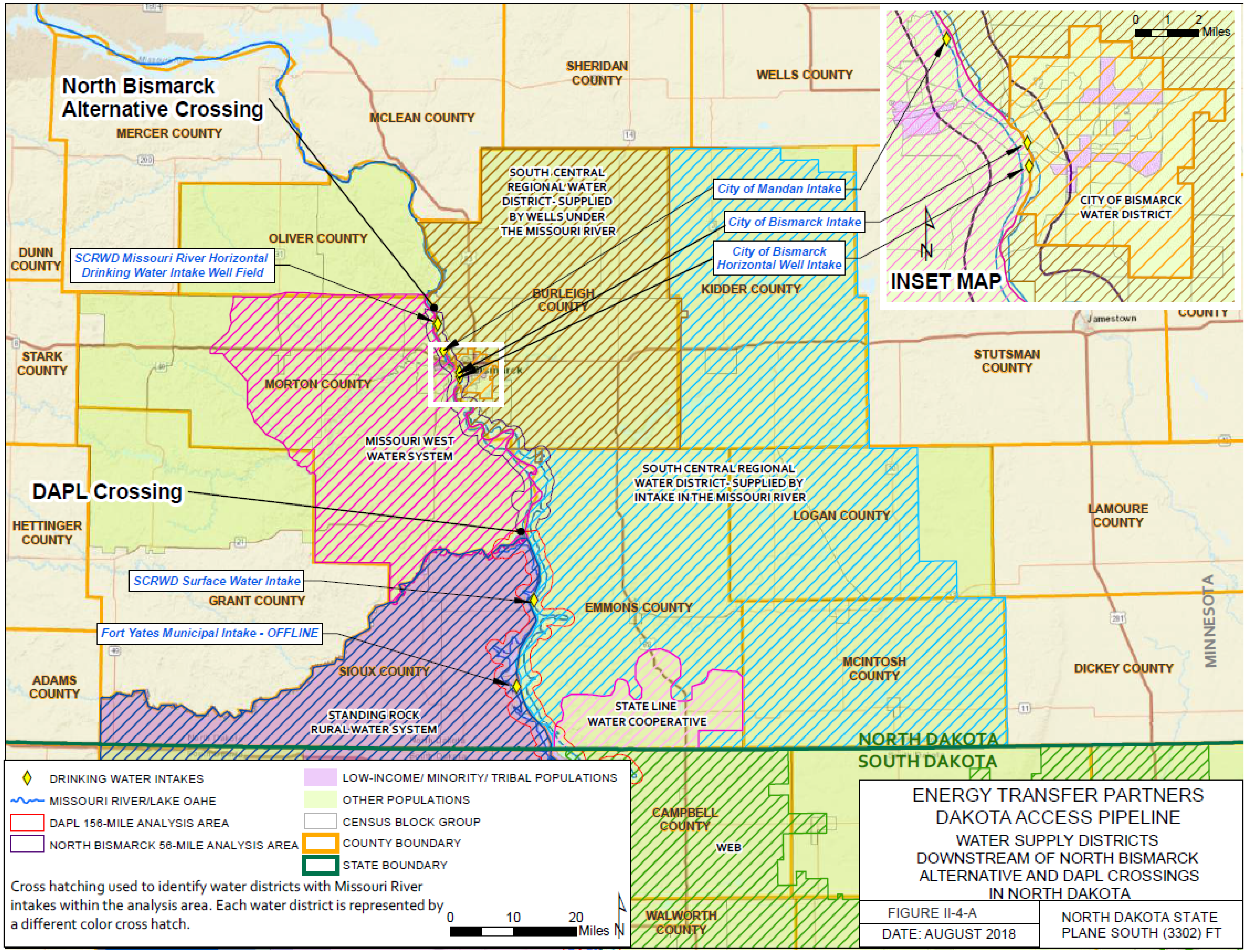


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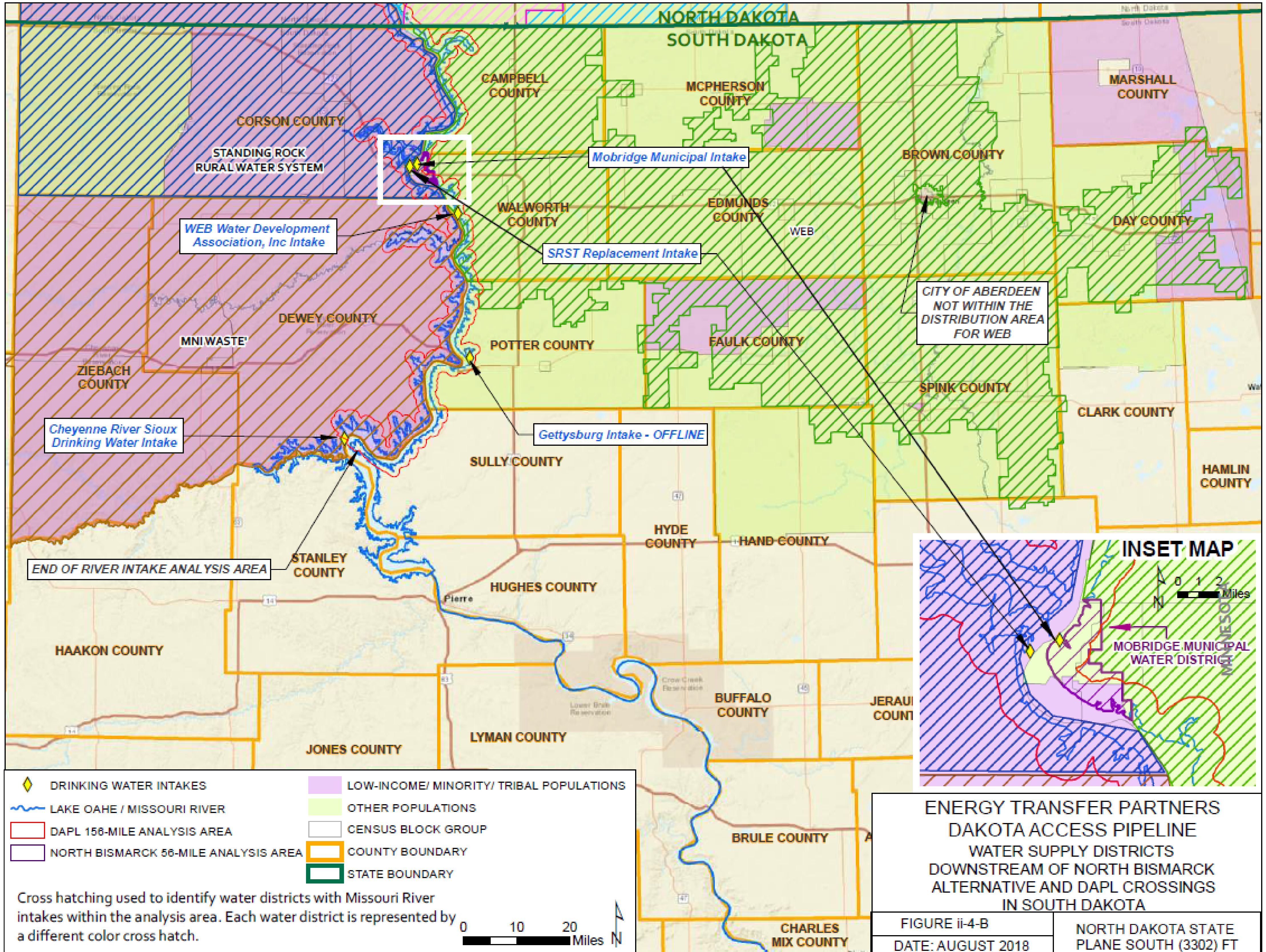


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B. Relevant Environmental Justice Guidance, Existing Record Information, and Tribal Input

1. Relevant Environmental Justice Guidance

Executive Order 12898, requires that, "[t]o the greatest extent practicable and permitted by law," federal agencies "shall make achieving environmental justice part of [their] mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of [their] programs, policies, and activities on minority populations and low-income populations." 59 Fed. Reg. 7629 (Feb. 11, 1994), § 1-101. Pursuing environmental justice is a part of the Corps mission and NEPA is the primary mechanism the DoD agencies use to further the goals of EO 12898. DoD, *Strategy on Environmental Justice,* March 24, 1995, at 4. The Council on Environmental Quality (CEQ) oversees federal agencies' compliance with NEPA, and the EA as well as this analysis apply the CEQ's relevant guidance and definitions of critical terms. USACE_DAPL0071220 at 84; CEQ, *Environmental Justice Guidance under the National Environmental Policy Act*, Dec. 10, 1997 (CEQ Guidance). The Corps applied the CEQ guidance throughout this analysis, including in its outreach process to tribal populations and in its recognition that the tribal populations and other individuals or communities may perceive and experience the effects of a potential spill differently than that of the general population. *Id* at 9, 14.

This analysis also applies insights from the Federal Interagency Working Group (IWG) on Environmental Justice *Promising Practices for EJ Methodologies in NEPA Reviews* (2016).[12] The Corps considered the IWG's suggestions of what agencies could consider when deciding what influences the extent of the affected environment. These considerations could include "1) exposure pathways (routes by which the minority or low-income population may come into contact with chemical, biological, physical, or radiological effects); 2) ecological, aesthetic, historic, cultural, economic, social, or health consequences to the community; and 3) distribution of adverse and beneficial impacts from the proposed action." IWG, *Promising Practices* at 15. As described below, this analysis used a distance-based method consistent with *Promising Practices* in setting the southward extent of the geographic area of analysis and the size of the buffer.

As in the EA, the Corps relied on the CEQ Guidance and its definitions of critical terms, and considered the use of those terms in the IWG's *Promising Practices* report. While much of the qualitative analysis focuses on Tribes and Tribal members, for the purposes of this analysis minority populations consist of those persons who identify themselves as African American,

[12] The *Promising Practices* report from the IWG provides methodologies for federal agencies regarding environmental justice reviews, but is not formal Agency guidance. Similar to EO 12898 and the CEQ Guidance, *Promising Practices* does not create any rights, obligations or private right of action. https://www.epa.gov/environmentaljustice/ej-iwg-promising-practices-ej-methodologies-nepa-reviews (last visited August 2018).

Hispanic, Asian, American Indian/Alaskan Native, Pacific Islander, one or more race, or two or more races. CEQ Guidance at 25.

2. Relevant information in the existing record and summary of information from supplemental analysis

The Final EA included an assessment of the probability and likely effects of a spill during pipeline operations that are applicable to this analysis. The Final EA also addressed the extent of the effects from a potential spill, and how those effects would be mitigated and addressed. In developing the Final EA, the Corps applied insights from an environmental justice perspective on the North Bismarck route comparison, and also considered downstream water intakes from Lake Oahe, including those of the SRST. This section summarizes that existing record information as well as the additional consideration done by the Corps on each of these subjects in the performance of this analysis.

(a). Low probability of a large spill and low probability of any spill reaching the human environment or low-income and minority populations.

As previously stated in Section I, Impacts on Hunting and Fishing Resources, the existing Final EA and the Lake Oahe Easement record indicate a low risk of spill. For example, ETP provided PHSMA-approved spill models during the Corps consideration of the Lake Oahe Easement. Assuming the hypothetical "worst case" spill, these models assigned the Lake Oahe crossing a risk ranking of between 2 and 3, out of a possible 10. Corps Response to October 28, 2016 Comments from the Standing Rock Sioux USACE_ESMT000936-47.

If a leak or spill occurred at the pipeline's constructed depth of 92-feet below the bottom of Lake Oahe, the overburden would restrict the volume of oil spilled, and anti-siphoning effects would likely prevent a full gravity drain-down during a spill event. Final EA at 46, 97, App. F. If oil were released at this depth, any minority or low-income population at any location and conducting any activity would only be physically impacted if the oil or its constituents have a pathway into the lake or to the surface. The Final EA acknowledged that crude oil spilled into soil at these depths could "migrate toward water where certain constituents can dissolve into groundwater or surface water in limited amounts." Final EA at 45. However, the Final EA further explained that "[a]s a liquid, the product would travel along the path of least resistance both laterally and vertically at a rate determined by a number of factors including volume released, soil conditions (permeability, porosity, moisture, etc.), depth to groundwater, and the speed and effectiveness of response and remediation measures." Final EA at 45. For a pipeline installed via HDD, the path of least resistance is typically the original HDD bore. USACE_DAPL0074713.

The potential environmental justice implications of the Lake Oahe crossing are primarily, though not entirely, related to concerns about physical effects to the waters of Lake Oahe from a potential spill. *See* SRST February 2018 Report at 74, 88. Installation of the pipeline at a depth of 92 feet below the bottom of Lake Oahe "virtually eliminate[es] the ability of a spill to interact with the surface water." USACE_ESMT000937. The low risk of a spill at the Lake Oahe crossing, and the even lower possibility of oil reaching Lake Oahe itself, are important contextual elements in this analysis. Nonetheless, as explained in Section I, the Corps also looked closely at a hypothetical spill scenario with an aboveground valve head release to ensure a conservative assessment. Spill Model Report, Introduction, Section 6.2.2., "ND-380 Valve."

The EA found that the risk that DAPL operations might result in a release with significant impacts to Lake Oahe and the surrounding area would be low, particularly in light of engineering and design considerations and HDD depths below Lake Oahe. Final EA at 92-94. The Corps reviewed that finding with an updated analysis. This analysis is documented above at Section I.C.1, Impacts on Hunting and Fishing Resources, Information from Supplemental Studies, Likelihood of Occurrence and Spill Magnitude. That section is briefly summarized here, and applied to this environmental justice analysis. For example, consideration of the effects of a potential spill on ceremonial and subsistence practices of Tribes of Lake Oahe is informed by the probability that such effects will occur.

In order to evaluate the likelihood of a release during DAPL operations, the Corps calculated the accident frequency per 1,000 pipeline miles for onshore crude oil pipelines using the PHMSA data from 2004 to 2017. Per 1,000 miles of crude oil pipeline, there were 0.848 accidents in 2017 and 0.953 in 2016. Each of these numbers is lower than the average of 0.957 for the 2004 to 2017 period. [13] The Corps evaluated data that PHMSA provides on the number of crude oil, refined petroleum, and biofuel pipeline accidents that impact people or the environment. *See* Table I-4 and Figure I-2. The Corps also evaluated data from PHMSA on accident causes in these same reports generated for crude oil, refined petroleum, and biofuel accidents impacting people or the environment. Figure I-3.

The leading cause of accidents is corrosion, which caused approximately 31 percent of accidents between 2010 and 2017. These data are derived from all reported accidents at any existing pipeline—including older pipelines, which may not have been built according to current PHMSA requirements or industry standards. Newer pipelines must incorporate anti-corrosion measures, such as coating and cathodic protection (application of electric current to the pipeline), which are

[13] The Corps based this analysis on historical annual report data obtained from the Pipeline and Hazardous Materials Safety Administration (PHMSA) webpage. PHMSA, Pipeline and Hazardous Materials Safety Administration Pipeline Incident Statistics (Dec. 6, 2017) http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends. Table I-3 shows the total mileage of crude oil pipelines, as documented in PHMSA annual reports between 2004 and 2017. PHMSA, Annual Report Mileage for Hazardous Liquid or Carbon Dioxide Systems, (Aug. 1, 2018) https://cms.phmsa.dot.gov/data-and-statistics/pipeline/annual-report-mileage-hazardous-liquid-or-carbon-dioxide-systems.

intended to reduce the risk of a corrosion-caused accident. 49 C.F.R. §§ 195.551-591; USACE_ESMT000037-42. The Corps easement imposes conditions intended to improve the efficacy of anti-corrosion measures and further reduce the likelihood of an oil release from the pipeline. For example, the easement requires that ETP use non-cathodic-shielding coatings at the DAPL Lake Oahe crossing and conduct surveys to detect corrosion and potential interference with the cathodic protection system. USACE_ESMT000037.

These data demonstrate that most pipeline spills are small and releases of 10,000 bbls or more (considered large spills according to PHMSA) are extremely uncommon (PHMSA, 2018).[14] This review also indicates that pipelines installed via HDD—the installation method used at the Lake Oahe crossing—appear to experience lower risk of release than pipelines installed by other methods. Based upon a review of the PHMSA Reportable Incident Data for Hazardous Liquid and Gas Transmission Pipelines (2010-Present), the likelihood of a failure at an HDD crossing is extremely low. Of the 3,368 reportable accidents that occurred over the past 8.5 years, only three were reported as involving an HDD crossing (0.09%).[15]

This information is relevant context for assessing the environmental justice implications of the crossing because it informs the likelihood that those effects will arise as a result of the Corps granting of Section 408 permission and conveying a right-of-way to Energy Transfer Partners to construct and operate a portion of the DAPL under federally-owned Corps-managed land. The low probability of a spill was a critical factor in this analysis, as it was in the Final EA.

(b). Spill Model Results Demonstrate Limited Potential Effects to Human Health and the Environment

The Corps requested additional information from ETP, including an analysis of the impact of various spill scenarios at the Lake Oahe DAPL crossing and asked for the analysis to include both the worst-case scenario and a scenario that more closely correlates with the majority of spills seen in actual releases. Corps Letter to ETP (August 24, 2017).

In response, ETP provided additional computational modeling of the Lake Oahe crossing, which evaluated hypothetical unmitigated scenarios and the potential fate and transport of crude oil in Lake Oahe in the event of a release. The resulting report, Evaluation of Hydrocarbon Releases into Lake Oahe using OILMAPLand and SIMAP Trajectory, Fate, and Effects Modeling for the Dakota Access Pipeline (February 12, 2018) (Spill Model Report), modeled releases of oil at two locations along the Lake Oahe segment.

The first inadvertent release modeled was a hypothetical, full-bore rupture (FBR) of a pipeline at the interface of lake-bed sediment and lake water at the center of the Lake Oahe crossing. A

[14] *See* page 15 and FN 6 for data source and discussion of these data.
[15] *See* page 16 for discussion of this finding.

hypothetical release at the sediment and water interface provides a conservative or larger estimate of the effects of a release, compared to a release from the actual pipeline, and maximizes the speed and total volume of oil entering the water column. The Spill Model Report notes the truly hypothetical nature of these modeled scenarios.

> It is recognized that the actual DAPL is installed at least 28 m (92 ft) below the bottom of Lake Oahe and a conservative assumption was made to model the entire volume of the release at the sediment/water interface. In reality, an inadvertent release would need to rise vertically through the low permeability alluvium and glacial deposits as well as the low permeability sediments that have accumulated at the bottom of the lake before reaching the sediment/water interface. However, the conservative assumption of a release at the sediment/water interface is the most conservative, as it maximizes the total volume of oil entering the water column and allows it to enter in the shortest duration. These two factors would maximize potential contamination within the water column. In-sediment modeling was not conducted, as it would have reduced the total volume of oil entering the water column and would have slowed the release, thereby increasing the time until waters may be impacted and would reduce predicted concentrations.

Spill Model Report at ii.

The second release modeled was a hypothetical FBR at the ND-380 valve site located on land adjacent to the west side of the lake. The valve site was selected to represent a FBR on the above-ground portion of the pipeline. Spill Model Report at 81. "For the on-land release at the valve site, oil was assumed to enter the environment as a surface release directly on the land surface that then moved downslope and downstream, unmitigated until it reached Lake Oahe through existing watercourses." Spill Model Report at iii.

Based upon the oil spill model analysis, the farthest that a hypothetical, worst-case, unmitigated release would travel after 10 days (based on 1,160 stochastic model runs) is approximately 65 miles downstream from the Lake Oahe crossing. Spill Model Report, at v. The probability of an unmitigated release traveling this far in 10 days is less than 10%. Spill Model Report at 175. This 65-mile location is still upstream of the SRST Replacement Intake (the new Tribal drinking water intake is located approximately 75.4 miles downstream of the Lake Oahe crossing – Table II-1) and even further upstream of the CRST intake, which is located more than 150 miles downstream of the Lake Oahe crossing. As reflected in Table II-1 and Figure II-5, the potential impacts to the waters of Lake Oahe from an unmitigated worst-case release would be minimal at the end of 10 days. This is the case even for a water intake located 47.1 miles downstream, which is the point of the last intake in the modeled area. Lower concentrations were predicted further downstream as more time passes, due to further evaporation, dissolution, dispersion, and degradation of the oil within the environment. Spill Model Report at 175.

Based on Tribal input that any release of oil would be considered an adverse effect, the thresholds used to evaluate potential socioeconomic or cultural impacts, such as those stemming from temporary lake closures, are much lower than the acute toxicity thresholds used in other categories of effects. *See e.g.* SRST February 2018 Letter, App. G, Declaration of Butch Thunder Hawk, at 1. A conservative thickness threshold used in several risk assessments to determine effects on lake uses is 0.01 μm. Spill Model Report, at 10. That is the threshold for a visible sheen of oil on the surface, which may deter such tribal cultural uses for a limited period of time. While this threshold does not pose a threat to ecological receptors, it could lead to lake-use closures while hydrocarbons are present. *See also* Downstream Receptor Report at 4, Table 1 (Table 2-2 from the Spill Model Report).

The time-series modeling indicates that this threshold would only be exceeded for short durations in a limited spatial area as hydrocarbons move downstream. Potential lake-use closures would be of limited scale and of temporary duration and would only be expected for a few days to a couple of weeks. Lake closures could also occur during cleanup procedures and remediation activities. Downstream Receptor Report at v.

The Spill Model Report and this analysis reaffirms the Corps' conclusions in the Final EA that a catastrophic spill is not expected. If there is a spill, there are not likely to be any significant adverse human health or environmental effects on any population from the pipeline's operation at the Lake Oahe crossing. The Final EA evaluated, and the FONSI adopted, several safety measures intended to reduce the likelihood of a spill and to expeditiously identify and respond to pipeline leaks or spills if they do occur.[16] As stated in the FONSI, "Dakota Access has developed response and action plans, and will include several monitoring systems, shut-off valves and other safety features to minimize the risk of spills and reduce or remediate any potential damages." FONSI at 2.

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[16] These measures include construction to regulatory standards, testing prior to placing the pipeline into service, inspection and patrol commitments, presence of emergency response personnel and equipment at strategic points, constant remote oversight, and use of a Computational Pipeline Monitoring System to monitor for leaks. Final EA at 88-90. In the event of a spill or leak, the Operator would implement the Facility Response Plan, a draft of which was prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan and the Mid-Missouri Sub-Area Contingency Plan, and which was made an Appendix to the EA. Final EA at 90, App. L; USACE_ESMT000944. The Department of the Army Easement to cross Lake Oahe includes a condition making the Grantee "generally responsible for commitments made and mitigation measures in the Final Environmental Assessment . . . including all Plans include[d] within Appendices thereof, even if they are not specifically made as a condition to this easement." USACE_ESMT000042.

(c). North Bismarck Alternative Route

The Final EA addressed an alternative route for the pipeline to cross Lake Oahe, labeled the North Bismarck Route. That route alternative was found to have greater potential negative environmental effects than the Lake Oahe crossing. Final EA, at 8; *see also* Final EA, Table 2-1 and 2-2. The environmental justice implications of the route alternative were also considered by the Corps. This consideration included an April 12, 2016 memorandum from Dakota Access LLC and HDR Engineering entitled "DAPL – Route Comparison and Environmental Justice Considerations." ("April 12, 2016 Route Comparison Memorandum") This memorandum found that the Lake Oahe crossing was the preferred alternative overall, and from an environmental justice standpoint. April 12, 2016 Route Comparison Memorandum, at 7. Here, the Corps will update and supplement the environmental justice comparison of the route alternative in conducting this remand analysis. The Corps reviewed the North Bismarck crossing's demographics in general and with a focus on water intakes. The results reaffirm the findings in the Final EA. The analysis finds that the Lake Oahe crossing area contains fewer potentially affected minority individuals than does the North Bismarck Alternative crossing, and that water intakes (and the minority and low-income populations that rely on them) would be at greater risk with the North Bismarck alternative. This discussion is below at Section E.

(d). Water Intakes

The Final EA addresses water intakes in detail, discloses risks, and describes mitigation measures to address these concerns. *See e.g.* Final EA at 42(discussing water intake mitigation measures). Mitigation measures are imposed on the pipeline operator in the Easement. USACE_ESMT000037. This analysis maintains that focus on water intakes throughout. For example, the Spill Model Report addressed water intakes as PHMSA defined High Consequence Areas. Based on the modeling, "Water intakes for drinking water and local agricultural use within the first 120.2 km (74.67 mi) downstream were considered as possible receptors in later analyses of potential effects." Spill Model Report, at 4. Section 7.2 of the Spill Model Report is dedicated to assessment of potential impacts to water intakes.

**Table II-1 Water intakes within the Lake Oahe model domain considered in the Spill Model Report.**

| Water Intake§ | Description/Owner | Distance Downstream from Crossing Location | |
|---|---|---|---|
| | | Miles | Kilometers |
| 1 | Upstream Intake* | 3.62 | 5.83 |
| 2 | Upstream Intake* | 2.21 | 3.56 |
| 3 | Local Agricultural Intake† | 4.44 | 7.15 |
| 4 | Tribal Agricultural Intake† | 8.08 | 13.00 |
| 5 | South Central Regional Water District Intake† | 11.32 | 18.22 |
| 6 | Unspecified Intake | 24.11 | 38.80 |
| 7 | Fort Yates Municipal Drinking Water Intake | 26.78 | 43.10 |
| 8 | Unspecified Intake | 27.87 | 44.85 |
| 9 | Tribal Farms Agricultural Intake | 29.34 | 47.22 |
| 10 | Unspecified Intake | 37.47 | 60.30 |
| 11 | Unspecified Intake | 38.67 | 62.23 |
| 12 | Unspecified Intake | 43.02 | 69.23 |
| 13 | Unspecified Intake | 47.05 | 75.72 |
| 14¥ | Standing Rock Sioux Tribe Drinking Water Intake | 75.41 | 121.36 |
| 15¥ | Cheyenne River Sioux Tribal Intake | 156 | 251.06 |

*Upstream intakes were added to account for the potential upstream transport of surface oil by wind.
†Information supplied by USACE. List of intakes may not include all agricultural intakes, but does represent the distribution of intakes along the Missouri River within the model domain.
§Although all known drinking water intakes within the model domain are represented in the analysis, it is recognized that additional agricultural / other purpose intakes may be present. What has been modeled is a representative sample. With a large geographic spread, representing the distribution of intakes along the Missouri River within the model domain, the operation of some intakes may depend on the season.
¥These intakes are located outside of the model domain and oil was not predicted to reach these locations within the modeled 10 day timeframe. Spill Model Report, at 4.

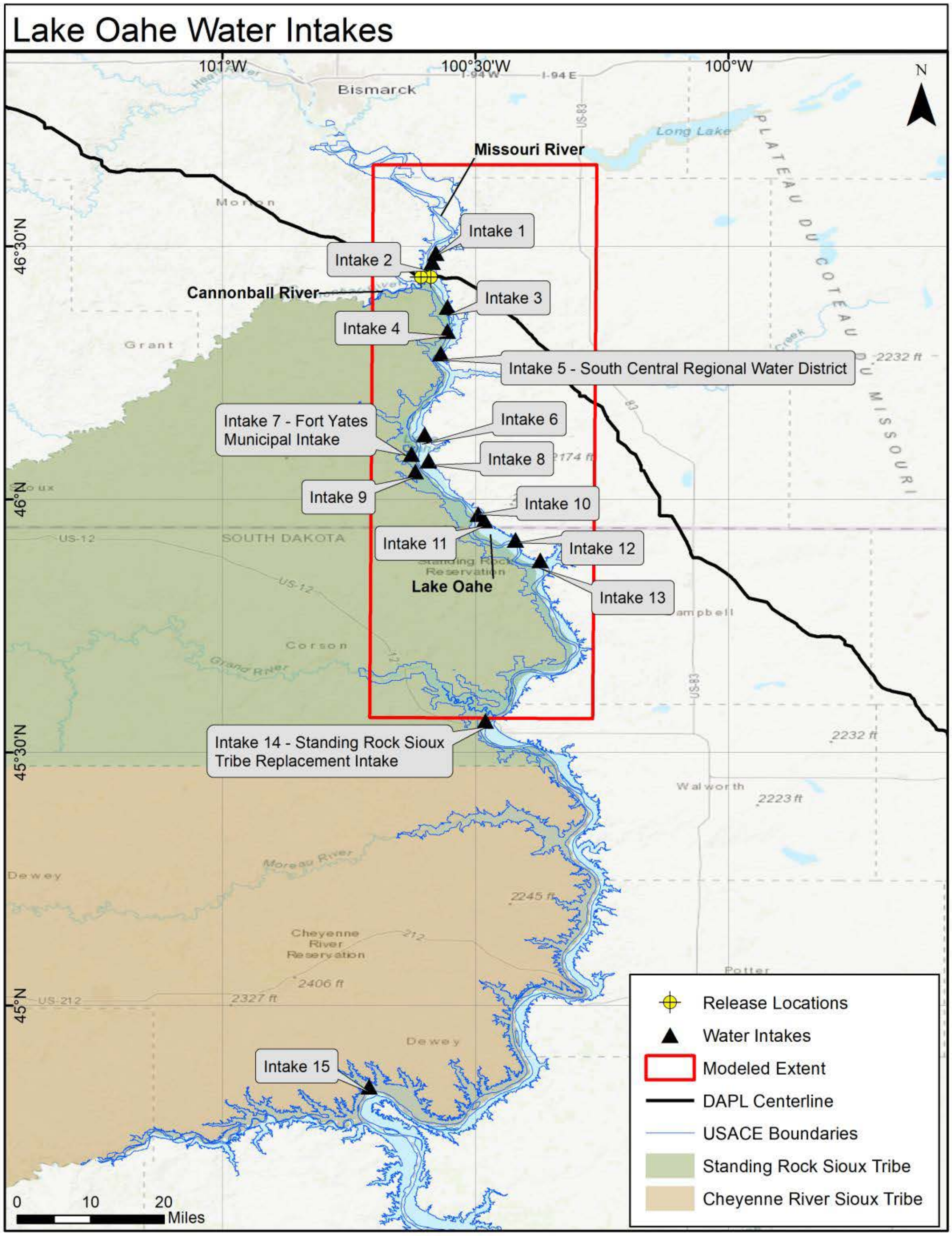


Figure II-5. Locations of water intakes within the Spill Model study area. Intakes 14 and 15 are outside of the modeled domain because oil is not expected to reach that distance within the 10-day timeframe.

As explained below in Section C.1 the Corps extended the area of analysis to the CRST drinking water intake (156 miles), despite the Spill Model Reports determination that even an unmitigated release would not reach the SRST intake in 10-days (75-miles). This analysis also estimates the populations served by all water intakes in the geographic area of analysis, as well as downriver of the North Bismarck alternative, and applies the information from the Spill Model Report and Downstream Receptor Report to those populations. Based on the modeled extent and transport of oil from a potential spill, and the location, siting and operation of the water intakes, this analysis finds that no significant potential health effects to humans are anticipated through water intake exposure. Therefore, there is no disproportionately high or adverse effects to minority or low-income populations anticipated from potential effects to water intakes.

C. Methodology and Analysis

1. Geographic Extent of Analysis

The IWG's *Promising Practices* notes that, "[o]ne of the important functions of defining the affected environment is to help agencies determine the outer boundaries (i.e., footprint) of each potentially impacted resource topic analyzed in the NEPA document." IWG, *Promising Practices* at 15. This analysis relied on advanced modeling, historical data regarding spill size and frequency, known past and present exposures and impacts to tribal populations, and substantive input from tribal communities to define the geographic extent of the potential affects used in the NEPA analysis.

The modeling effort helped inform the area potentially affected by an operational spill at the Lake Oahe crossing on human health and the environment by illustrating the extent, timing, location, and probability of surface oil and dissolved hydrocarbon concentrations along Lake Oahe. As explained above, the Spill Model Report details the results of the modeling effort and contains an analysis of oil spill trajectory, fate, and effects of a 10-day unmitigated oil spill to evaluate the ecological and human health risks resulting from hypothetical releases of crude oil into Lake Oahe from the pipeline. Spill Model Report, Introduction. Although PHMSA requires ETP to initiate response to a release within six hours, the Downstream Receptor Report and this analysis apply the spill model's use of an unmitigated release to represent a hypothetical worst-case scenario.

Based on the modeling results, the Corps considered using the 65-mile point as the downstream extent of the potentially affected area. However, as suggested by the CEQ Guidance and by the IWG in *Promising Practices,* agencies may consider unique conditions of potentially affected populations when delineating the affected environment. The CRST provided the Corps with information that prompted the Agency to extend the area of analysis to the CRST water intake, approximately 156-miles downstream of the Lake Oahe crossing. CRST stated that:

> Critically, we are completely dependent upon the waters of Lake Oahe for our drinking water. Our Reservation is not suitable for wells because of low ground water levels and poor water quality of such ground water. *Water Problems on the Standing Rock Sioux Reservation: Oversight Hearing to Received Testimony on Problems that Have Been Experienced by the Standing Rock Sioux Tribe & Tribes Situated Along the Missouri River*, 108th Cong., 2nd Sess. (2004) (statement of Dennis Breitzman, Area Manager, Dakotas Area Office, Bureau of Reclamation), available at https://www.gpo.gov/fdsys/pkg/CHRG-108shrg97093/html/CHRG-108shrg97093.htm. Almost all of our drinking water is drawn from a water intake project called Mni Waste or "good water" that pumps water directly out of Lake Oahe near the Cheyenne River, where it is treated and then piped to communities and homes all over our Reservation, which is the size of the State of Connecticut. Mni Waste serves over 14,000 residents of our reservation, including both Indians and non-Indians.

CRST April 20, 2018 submission to USACE

The SRST input also supports extending past the 65-mile mark and including the SRST reservation's shoreline boundary with Lake Oahe in the geographic extent of the Corps analysis. For example, the SRST requested that the Corps "fully examine the short-term and long-term impacts of an oil spill on the Standing Rock Reservation," and characterized their reliance on Lake Oahe along the entire shoreline. SRST February 2018 Report at 74. The SRST's report recommended setting the downstream extent of the Corps analysis at 40 miles from the Lake Oahe crossing. SRST February 2018 Report, Submission, Saha and Mohai, An Environmental Justice Analysis of Dakota Access Pipeline Routes at 5 (February 23, 2018)(Saha and Mohai)(concluding that "Because the Cheyenne River Reservation is immediately south of the Standing Rock Reservation, examination of a greater or slightly lesser distance than the forty miles we examined would not have altered the overall results and conclusions of this EJ analysis…for the purposes of this study, 40 miles downstream is a reasonable, and conservative, area to examine.").

The Downstream Receptor Report found that the most probable cause of impacts to human health from an operational spill would be through contamination of drinking water intakes. Downstream Receptor Report at 75. Given that finding, along with the input from the Tribes, the Corps decided to include the CRST drinking water intake (156.5 miles downstream) in the affected area even though the model predicts that the oil footprint would not extend that far even in a worst-case discharge scenario. Selecting the CRST intake as the outer geographic limit necessarily includes the SRST intake (75.4 miles downstream). The Corps' geographic scope determination takes into account the tribes' differing technical and scientific views regarding the likelihood of a large spill. IWG, *Promising Practices*, at 30.

The Corps' review found that choosing points along this 156 mile downstream continuum did not create material changes to the demographics in the quantitative analysis. Most of the west side of Lake Oahe downstream of the Lake Oahe crossing is within reservation lands and identified as minority populations. The general results and conclusions of the analysis would not be inflated or diluted if the downstream end of the impact area was 40 miles from the Lake Oahe crossing, as in the SRST's report's Environmental Justice submission (Saha and Mohai), or extended to the CRST drinking water intake, as was done for this analysis. Once the Corps reached that conclusion, it chose to expand the geographic extent to include the CRST intake in the analysis. This captured the concerns of the CRST and ensured the Corps considered all potentially affected minority and low-income populations.

In each of the modeled scenarios, "oil was predicted to travel predominantly to the south, downstream in Lake Oahe based upon current and wind conditions. From the stochastic analysis, there is a predicted 1-10% probability that surface floating oil may be transported as far as 4 miles to the north (i.e. upstream) of the release location by winds." Spill Model Report at 178. Based on this, the Corps maintained a .5 mile buffer going upriver from the Lake Oahe crossing to capture the potential effects of any oil that would migrate upriver due to wind conditions. Given the relatively low probability of northward oil transport, and the area of the census block groups that would be captured, .5 miles was determined to be reasonable.

The Corps chose not to extend the geographic area all the way to the Oahe Dam as the Oglala Sioux Tribe ("OST") urges. Letter from Troy Scott Weston, President, Oglala Sioux Tribe, to COL Hudson, Omaha District Commander, at 11 (Dec. 20, 2017). First, the likelihood that a discharge would reach these areas is remote at best. Spill Model Report at 174. Second, the percentages of Native American, minority, and low-income populations on both shores of Lake Oahe below the CSRT intake is small. For example, if the impact area extended only three miles south of the CRST intake, it would include one additional census block group in Stanley County (Tract 9601/Block Group 1). That census block group is 2.4% Native American, 2.4% minority, and 7.6% low-income. Likewise, if the impact area were extended all the way down to the Sully County/Hughes County border on the eastern shore of Lake Oahe (approximately 24.5 miles to the south of the CRST intake and 181 miles from the Lake Oahe crossing), the impact area would include one additional census block group in Hughes County (Tract 9780/Block Group 1). That census block group is 4.1% Native American, 8.4% minority, and 2.9% low-income. Finally, extending the impact area all the way down to the Lake Oahe dam (approximately 197 miles from the Lake Oahe crossing) would add another census block group in Hughes County (Tract 9777/Block Group 1) that is less than 1% Native American, less than 1% minority, and 7.6% low-income. Because the potentially affected minority and low-income populations are small, and because lower concentrations of oil are predicted further downstream due to evaporation, dissolution, dispersion, and degradation of the oil, the Corps determined that extending the area of analysis to the Oahe Dam would not inform this review. Downstream Receptor Report at 8.

There is no set standard for a spatial limit or footprint of an affected area. Based on the CEQ guidance, the Corps determined that a one-mile buffer is reasonable for this rural, sparsely populated area at the location of the DAPL crossing at Lake Oahe. So from east to west, the affected area extends one mile west of the west bank and one mile east of the east bank of Lake Oahe. The use of a one-mile buffer for the downstream areas below the point of a potential release allowed the Corps to capture populations whose property/residences are adjacent to the lake as well as populations who live in close proximity to Lake Oahe and could be directly or indirectly affected by a spill.

The input the Corps sought and received from the Tribes also informed this choice. Both the SRST and CRST's input focused primarily on concerns about direct, indirect, and cumulative effects arising from the presence of oil in the Lake or on the banks. SRST February 2018 Report at 1-3; CRST April 20, 2018 Letter; Ducheneaux Declaration, at 3; Combellick Declaration, *passim*. The Corps also considered input from the YST and OST. These Tribes do not reside in the established buffer, but nonetheless have concerns about potential affects to their members in the event of a spill. For example, the YST stated that "Tribal members continued to hunt, gather, and perform ceremony with water including the Missouri River in present-day North and South Dakota pursuant to the 1851 Treaty even after the Tribe's 1858 Treaty….Tribal members including myself continue to practice these subsistence activities and exercise our Treaty rights throughout our Treaty territory, including near the pipeline, to this day." Affidavit of Kip Spotted Eagle, Yankton Sioux Tribe, April 19, 2018.

As stated in the Downstream Receptor Report:

> [i]mpacts to human receptors consist of potential direct impacts to human health as well as impacts to hunting, fishing, recreation and cultural practices on, and near, Lake Oahe. Human health impacts could result from inhaling volatile chemicals, digesting contaminated fish, or drinking contaminated water. The likelihood of human impacts from a spill is considered very low for each of these potential human health pathways, based on case studies referenced in this report and the Spill Model Report.

Downstream Receptor Report at iv. The Corps' analysis of the Spill Model Report and the Downstream Receptor Report indicate that potential impacts would be limited, and of a temporary and short duration for the specific concerns related to cultural, spiritual, subsistence and medicinal practices of both resident and non-resident tribal members. It was not feasible to quantify non-resident tribal member visits and include them in the tabulation because that information either is not tracked, or was not provided to the Corps in response to our information requests. Instead, the Corps considered the substantive input from these groups when evaluating the potential effects on Native American populations overall.

The SRST report applied both a one-mile and three-mile buffer to its quantitative analysis and recognized both the benefits and limitations of the approach. Saha and Mohai state:

> Our approach follows that of well-established distance-- or proximity--based analyses that assume populations most affected generally live closest to the environmental hazard or risk source, and the one--- and three---mile buffer distances we used (on either side of the two water bodies) are distances commonly used in EJ analyses to capture affected populations (Chakraborty and Armstrong 1997; Hamilton and Viscusi 1999; Sheppard et al. 1999; Saha and Mohai 2005; Mohai and Saha 2006). Individuals living further than three miles from each water body (for example, those who use Lake Oahe and the Missouri River for drinking water, irrigation, recreation or subsistence activities conducted under treaty rights) also could be nevertheless adversely impacted by an oil spill.

Saha and Mohai, at 6.

Based on that input from the SRST, the Corps considered whether using a three-mile buffer would inform the analysis, and compared the two approaches. The Corps found that the census block groups are typically quite large and therefore the results were not materially different if it used a three-mile versus a one-mile boundary.

Overall, the SRST report supports the use of the distance-based method that the Corps applied in this analysis to define the geographic extent of the affected area and to identify potentially affected populations. Saha and Mohai, at 5. The SRST report also informed the Corps' overall approach and methodology for conducting the analysis, with the exception of the use of the areal apportionment method.[17] Saha and Mohai, at 4.

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[17] The areal apportionment involves weighting the populations of each geographic unit in the area of analysis by the percentage of the area of the unit captured by the buffer, and then aggregating the demographic characteristics of the geographic units within the area of analysis. Saha and Mohai at 6,7. This method may be useful for evaluating the siting of a project and determining potential impacts to low-income and minority populations based on chronic long-term exposures to airborne particulates from a continuous emission source (e.g., evaluation of a compressor station). Here, however, the Corps is evaluating a utility line crossing federal land; the Corps is not permitting a continuous discharge (or any known discharge) into Lake Oahe. There is a low probability of a release and subsequent impacts to downstream beneficial lake uses. Additionally, impacts from even a worst-case, unmitigated release to beneficial

While there are no significant potential health effects to humans anticipated in relation to water intakes downstream of the DAPL crossing even in the event of a worst-case spill, to ensure completeness, the Corps also looked further at potential exposure to human health via water intakes. Populations served by the intakes may not match with those captured in the boundary intersection methodology using the one-mile buffer. The best available information was reviewed about the populations served by each water intake. This included analysis of census block groups within all drinking water districts that have an intake located on the Missouri River or Lake Oahe from 1) the North Bismarck Alternative crossing to the DAPL crossing (approximately 56 miles) and 2) the DAPL crossing to the CRST intake (approximately 156 miles south of the DAPL crossing). The results of the drinking water intake distribution analysis are presented in Table II-4 and discussed in Section C.3.(c).

2. Potentially Affected Minority and Low-income populations

The methodology used for this analysis identifies low-income and minority populations using recent demographic and socioeconomic statistics from the U.S. Census Bureau. U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates.[18] U.S. Census Bureau data are available at multiple geographic levels. Data for this project was collected at the state level, county level, tract level, and block group level. For the purposes of this analysis, the census block group was selected as the appropriate level to identify low-income and minority populations due to the overall rural setting downstream from the Lake Oahe crossing, and the availability of data on populations with income below the poverty level. Census block groups in rural areas, such as those within the Dakota Access Pipeline Project analysis area, may cover a larger area because of the lower density of population.

To identify potentially affected minority and low-income populations, the Corps started with the area of analysis established in the previous section extending one mile in each direction from the east and west shorelines of Lake Oahe, and running from the Lake Oahe crossing to the CRST intake. The census block groups that fall within or intersect the analysis area were pinpointed and those that meet the CEQ Guidance's definitions are identified as minority populations. For this analysis, a minority population exists where the percentage of minorities in the geographic unit of analysis either exceeds 50% or is meaningfully greater than in the general population. CEQ Guidance at 25. IWG's *Promising Practices* recommends the additional step of a "Meaningfully Greater" analysis for minority populations in addition to the standard "Fifty Percent" analysis. IWG, at 21-25.

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lake uses, including hunting and fishing resources, were determined to be of limited scale and of temporary duration, with variations from one hypothetical release scenario to another.

[18] Download Center. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (last visited August 2018).

A meaningfully greater analysis involves comparing the demographics in the units of analysis for the project area, here, census block groups, with the demographics for a reference community to see if any of them exceed a specified threshold. *Id.* There are no set units or thresholds, and agencies are encouraged to set their own. *Id.* The Corps established these parameters based on the specific situation present in this analysis. Here, the census block group populations were compared to the coinciding state level demographics as a reference community (or group comparison), rather than the coinciding county level demographics. A statewide reference community avoids minimizing minority and low-income population comparisons in those counties that coincide with Indian reservations (e.g. Sioux county).

For the purposes of this analysis, the Corps chose thirty percent as the threshold for determining whether a minority population in a census block group is meaningfully greater than that of the reference population. This threshold represents twice the approximate averaged proportions of statewide minority populations in both South and North Dakota (i.e. 15 percent x 2).[19] If a census block group's minority population percentage is more than twice that of the combined statewide average, the Corps determined that it would be reasonable to consider that to be a meaningfully greater proportion of minorities in the census block group. CEQ Guidance, at 25-26; IWG, *Promising Practices*, at 25. As a result, any census block group with a minority population percentage in the affected area over thirty percent is identified as a minority population for the purpose of this analysis.[20]

This analysis also compares the total number of minority individuals residing within the affected environment against the total number of all individuals within the affected environment in order to determine the percentage of minority individuals residing within the affected environment. In total, there are approximately 6,756 minority individuals within the block groups that intersect the one-mile analysis buffer. The total population of those census block groups is 15,684. That means the minority population percentage within the geographic extent of analysis is 43%, which is over the meaningfully greater threshold. *See* Table II-2. The majority of these minority individuals are in the category "American Indian and Alaska Native."

This analysis used the statistical poverty thresholds set by the U.S. Census Bureau to define low-income populations.[21] The location of low-income individuals within the geographic unit of analysis for this review was attained using data from American Community Survey. For example, the population below the poverty level applied in this analysis reflects data from Table

[19] North Dakota has a total minority population of 12.95%. South Dakota has a total minority population of 16.78% Data from ACS 2011-2015, 5-year estimates.

[20] For example, a census block group with a 44% minority population would be found to be a minority population for this analysis because it exceeds the 30% threshold, even though the number of minority individuals does not reach 50%.

[21] American Community Survey https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html

B17021.[22] The U.S. Census Bureau has defined a "poverty area" as a census tract with 20% or more of its residents below the poverty threshold level and an "extreme poverty area" as one with 40% or more below the poverty level. *See* U.S. Census Bureau Report Number ACS-17, *Changes in Areas with Concentrated Poverty: 2000 to 2010;*[23] *see also* U.S. Census Bureau Statistical Brief, *Poverty Areas*, June 1995.[24] These thresholds are consistently applied in this analysis. For example, every census block group that intersects with the 1-mile boundary in the 156-mile area downstream of the Lake Oahe crossing that exceeds these thresholds is identified as a low-income population.

The minority and low-income population data is reflected in Table II-2, below, in red.

[22] Accessed at: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (last accessed, August 2018).
[23] Accessed at: https://www.census.gov/library/publications/2014/acs/acs-27.html (last accessed, August 2018).
[24] Accessed at: https://www.census.gov/population/socdemo/statbriefs/povarea.html (last accessed, August 2018).

| Table II-2. Minority and Low-Income Population Statistics for Lake Oahe Crossing (Data from ACS 2011-2015, 5-year estimates) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Geographic Area | | Total Population | Percent | | | | | | | | | | | | |
| | | | White | Black or African Am. | Am. Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Hispanic | Some Other Race | Two or More Races | Total Minority Population | Persons Below the Poverty Level | | Total Minority Population | Total Population Below the Poverty Level |
| **States** | | | | | | | | | | | | | | | |
| North Dakota | | 721,640 | 87.05 | 1.60 | 5.20 | 1.22 | 0.04 | 2.85 | 0.05 | 2.00 | 12.95 | 11.46 | | 93,482 | 82,673 |
| South Dakota | | 843,190 | 83.22 | 1.52 | 8.30 | 1.20 | 0.04 | 3.31 | 0.08 | 2.34 | 16.78 | 14.11 | | 141,491 | 119,016 |
| **Counties** | | | | | | | | | | | | | | | |
| **West Shore** | Morton (ND) | 28,985 | 91.39 | 0.65 | 3.57 | 0.14 | 0.00 | 2.29 | 0.00 | 1.96 | 8.61 | 7.99 | | 2,496 | 2,315 |
| | Sioux (ND) | 4,380 | 13.93 | 0.05 | 79.36 | 0.16 | 0.11 | 3.56 | 0.16 | 2.67 | 86.07 | 35.72 | | 3,770 | 1,564 |
| | Corson (SD) | 4,149 | 30.95 | 0.29 | 66.76 | 0.29 | 0.00 | 0.58 | 0.00 | 1.13 | 69.05 | 45.58 | | 2,865 | 1,891 |
| | Dewey (SD) | 5,579 | 21.72 | 0.04 | 75.57 | 0.00 | 0.00 | 0.91 | 0.00 | 1.76 | 78.28 | 27.83 | | 4,367 | 1,553 |
| **East Shore** | Emmons (ND) | 3,463 | 96.79 | 0.00 | 0.32 | 0.46 | 0.00 | 0.12 | 0.00 | 2.31 | 3.21 | 11.33 | | 111 | 392 |
| | Campbell (SD) | 1,548 | 94.90 | 0.00 | 3.49 | 0.78 | 0.00 | 0.19 | 0.00 | 0.65 | 5.10 | 9.06 | | 79 | 140 |
| | Walworth (SD) | 5,495 | 81.31 | 0.20 | 8.50 | 2.78 | 0.51 | 4.68 | 0.00 | 2.02 | 18.69 | 12.24 | | 1,027 | 673 |
| | Potter (SD) | 2,307 | 92.72 | 0.00 | 3.34 | 1.13 | 0.00 | 0.87 | 0.00 | 1.95 | 7.28 | 11.59 | | 168 | 267 |
| | Sully (SD) | 1,469 | 97.62 | 0.00 | 0.41 | 0.00 | 0.00 | 0.61 | 0.00 | 1.36 | 2.38 | 5.10 | | 35 | 75 |
| **Block Groups** | | | | | | | | | | | | | **County Totals:** | **14,918** | **8,871** |
| **West Shore** | Block Group 0204-3 | 934 | 92.40 | 0.00 | 1.07 | 0.00 | 0.00 | 4.82 | 0.00 | 1.71 | 7.60 | 1.51 | | 71 | 14 |
| | Block Group 9408-1 | 961 | 13.32 | 0.00 | 82.73 | 0.00 | 0.00 | 1.04 | 0.31 | 2.60 | ***86.68*** | ***42.80*** | | 833 | 411 |
| | Block Group 9409-1 | 1,710 | 5.32 | 0.00 | 88.19 | 0.18 | 0.00 | 3.22 | 0.00 | 3.10 | ***94.68*** | ***35.52*** | | 1,619 | 607 |
| | Block Group 9409-2 | 1,000 | 8.00 | 0.20 | 85.10 | 0.00 | 0.30 | 4.30 | 0.40 | 1.70 | ***92.00*** | ***37.99*** | | 920 | 380 |
| | Block Group 9411-2 | 812 | 23.28 | 0.00 | 74.01 | 0.25 | 0.00 | 0.49 | 0.00 | 1.97 | ***76.72*** | ***39.21*** | | 623 | 318 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Block Group 9417-2 | 1,384 | 55.64 | 0.00 | 41.26 | 0.00 | 0.00 | 0.00 | 0.00 | 3.11 | ***44.36*** | 17.59 | | 614 | 243 |
| | Block Group 9417-3 | 1,161 | 10.59 | 0.00 | 84.67 | 0.00 | 0.00 | 2.24 | 0.00 | 2.50 | ***89.41*** | ***27.12*** | | 1,038 | 315 |
| **East Shore** | Block Group 9665-1 | 793 | 90.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 9.08 | 9.58 | 9.96 | | 76 | 79 |
| | Block Group 9641-1 | 643 | 96.89 | 0.00 | 2.64 | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 | 3.11 | 7.78 | | 20 | 50 |
| | Block Group 9652-1 | 789 | 91.25 | 0.00 | 6.08 | 2.66 | 0.00 | 0.00 | 0.00 | 0.00 | 8.75 | 19.63 | | 69 | 155 |
| | Block Group 9652-2 | 980 | 87.55 | 0.10 | 0.92 | 0.00 | 2.86 | 8.57 | 0.00 | 0.00 | 12.45 | 3.70 | | 122 | 36 |
| | Block Group 9652-3 | 868 | 58.76 | 0.00 | 20.62 | 15.21 | 0.00 | 2.07 | 0.00 | 3.34 | ***41.24*** | 9.10 | | 358 | 79 |
| | Block Group 9652-4 | 941 | 68.44 | 0.00 | 22.95 | 0.00 | 0.00 | 4.57 | 0.00 | 4.04 | ***31.56*** | 17.28 | | 297 | 163 |
| | Block Group 9651-2 | 1,013 | 93.98 | 0.99 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 4.34 | 6.02 | 12.04 | | 61 | 122 |
| | Block Group 0001-2 | 1,020 | 97.35 | 0.00 | 1.27 | 0.00 | 0.00 | 0.78 | 0.00 | 0.59 | 2.65 | 14.67 | | 27 | 150 |
| | Block Group 9791-1 | 675 | 98.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | 0.74 | 1.19 | 5.88 | | 8 | 40 |
| | **Block Group Totals** | **15,684** | | | | | | | | | | | | **6,756** | **3,162** |

Source: U.S. Census Bureau. 2011-2015 American Community Survey (2011-2015 5-Year Estimates). Total population is based on data from Table B01003. Percent population by race is based on data from Table B03002 and Table B01003. Population below the poverty level is based on data from Table B17021. State and County totals and percentages were calculated by summation of block group data from these respective tables.

Note: totals may not sum across the table due to rounding used in data collection.

Two census block groups (Tract 204/Block Group 3 and Tract 9665/Block Group 1) are on and adjacent to the crossing of Lake Oahe. Neither has a minority population exceeding 50 percent, a minority population that is meaningfully greater than the reference population, or a poverty level greater than 20%.  Therefore, neither census block group was identified as low-income or minority for purposes of this analysis.  Overall, there are 14 census block groups located downstream of the crossing along the shores of Lake Oahe that were considered in the analysis. Of those, the Corps identified five census block groups that are considered low-income populations and minority populations for the purposes of this analysis.  These are Tract 9408/Block Group 1, Tract 9409/Block Group 1, Tract 9409/Block Group 2, Tract 9411/Block Group 2, and Tract 9417/Block Group 3.  Each of these have a minority population that exceeds 50 percent and, has a poverty level greater than 20 percent.  Each one is located on the western shore of Lake Oahe.

Three other census block groups have a minority population that is meaningfully greater than that of the reference community, meaning the percentage of minorities in the census block group exceeds the percentage of minorities in the reference population.  These are Tract 9417/Block Group 2, Tract 9652/Block Group 3, and Tract 9652/Block Group 4.  Tract 9417/Block Group 2 is located on the western shore, while the other two are located on the eastern shore of Lake Oahe.  These three census block groups were identified as minority populations for purposes of this analysis.

In addition to this demographic analysis for the Lake Oahe crossing area, the Corps also reviewed the specific demographic information for using the same methodology to identify low-income and minority populations below the North Bismarck alternative.  *See* Table II-3 and Map II-3.  A third dataset estimates the population demographics served by each drinking water intake within the geographic area of analysis.  *See* Table II-4, and Map II-4-A and B.

**Table II-3. Minority and Low-Income Population Statistics for North Bismarck Crossing Alternative**
**(Data from ACS 2011-2015, 5-year estimates) Source: U.S. Census Bureau, American Community Survey (2015 estimates).**

| | Geographic Area | Total Population | Percent | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | White | Black or African Am. | Am. Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Hispanic or Latino | Some Other Race | Two or More Races | Total Minority Population | Persons Below the Poverty Level | Total Minority Population | Total Population Below the Poverty Level |
| **State** | | | | | | | | | | | | | | |
| | North Dakota | 721,640 | 87.05 | 1.60 | 5.20 | 1.22 | 0.04 | 2.85 | 0.05 | 2.00 | 12.95 | 11.46 | 93,482 | 82,673 |
| **Counties** | | | | | | | | | | | | | | |
| West Shore | Morton (ND) | 28,985 | 91.39 | 0.65 | 3.57 | 0.14 | 0.00 | 2.29 | 0.00 | 1.96 | 8.61 | 7.99 | 2,496 | 2,315 |
| East Shore | Burleigh (ND) | 88,223 | 91.07 | 0.86 | 3.76 | 0.65 | 0.02 | 1.75 | 0.04 | 1.85 | 8.93 | 8.17 | 7,876 | 7,207 |
| East Shore | Emmons (ND) | 3,463 | 96.79 | 0.00 | 0.32 | 0.46 | 0.00 | 0.12 | 0.00 | 2.31 | 3.21 | 11.33 | 111 | 392 |
| **Block Groups** | | | | | | | | | | | | | 10,483 | 9,914 |
| West Shore | Block Group 0201-1 | 2,051 | 96.73 | 0.05 | 0.93 | 0.00 | 0.00 | 2.29 | 0.00 | 0.00 | 3.27 | 3.72 | 67 | 76 |
| West Shore | Block Group 0201-2 | 1,564 | 83.63 | 1.28 | 3.58 | 1.02 | 0.00 | 0.26 | 0.00 | 10.23 | 16.37 | ***20.52*** | 256 | 321 |
| West Shore | Block Group 0201-4 | 1,177 | 73.58 | 0.00 | 26.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 26.42 | 3.91 | 311 | 46 |
| West Shore | Block Group 0202-1 | 1,778 | 92.58 | 0.00 | 6.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 7.42 | 3.17 | 132 | 56 |
| West Shore | Block Group 0202-2 | 1,371 | 98.83 | 0.00 | 0.00 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 1.17 | 3.32 | 16 | 45 |
| West Shore | Block Group 0203-1 | 1,558 | 87.48 | 0.00 | 10.40 | 0.00 | 0.00 | 0.13 | 0.00 | 1.99 | 12.52 | 15.27 | 195 | 238 |
| West Shore | Block Group 0203-2 | 2,032 | 89.71 | 0.00 | 7.78 | 0.00 | 0.00 | 1.53 | 0.00 | 0.98 | 10.29 | ***22.93*** | 209 | 466 |
| West Shore | Block Group 0203-3 | 3,643 | 95.83 | 0.00 | 1.13 | 0.00 | 0.00 | 1.37 | 0.00 | 1.67 | 4.17 | 4.04 | 152 | 147 |
| West Shore | Block Group 0204-1 | 1,511 | 95.43 | 0.00 | 2.58 | 0.00 | 0.00 | 0.00 | 0.00 | 1.99 | 4.57 | 4.43 | 69 | 67 |
| West Shore | Block Group 0204-3 | 934 | 92.40 | 0.00 | 1.07 | 0.00 | 0.00 | 4.82 | 0.00 | 1.71 | 7.60 | 1.51 | 71 | 14 |
| East Shore | Block Group 101-3 | 1,448 | 77.28 | 0.97 | 15.81 | 0.90 | 0.00 | 3.45 | 0.00 | 1.59 | 22.72 | ***27.79*** | 329 | 402 |
| East Shore | Block Group 105-1 | 2,367 | 88.34 | 4.82 | 2.96 | 0.00 | 0.59 | 1.06 | 0.00 | 2.24 | 11.66 | 6.63 | 276 | 157 |
| East Shore | Block Group 105-2 | 1,920 | 97.45 | 0.00 | 0.73 | 0.00 | 0.00 | 0.21 | 0.00 | 1.61 | 2.55 | 13.05 | 49 | 251 |
| East Shore | Block Group 105-3 | 772 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.29 | 0 | 25 |
| East Shore | Block Group 106-1 | 1,131 | 88.24 | 0.00 | 11.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.76 | 15.51 | 133 | 175 |
| East Shore | Block Group 106-2 | 1,161 | 40.31 | 3.70 | 36.61 | 0.09 | 0.00 | 1.81 | 0.00 | 17.48 | ***59.69*** | ***51.30*** | 693 | 596 |
| East Shore | Block Group 106-3 | 2,300 | 93.83 | 0.00 | 3.61 | 0.57 | 0.00 | 2.00 | 0.00 | 0.00 | 6.17 | 4.43 | 142 | 102 |
| East Shore | Block Group 107-2 | 1,122 | 92.87 | 0.62 | 1.34 | 0.00 | 0.00 | 3.03 | 0.00 | 2.14 | 7.13 | ***20.59*** | 80 | 231 |
| East Shore | Block Group 107-3 | 1,823 | 98.03 | 0.00 | 1.32 | 0.00 | 0.00 | 0.66 | 0.00 | 0.00 | 1.97 | 0.77 | 36 | 14 |
| East Shore | Block Group 111.03-1 | 1,505 | 99.20 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 2.33 | 12 | 35 |
| East Shore | Block Group 111.03-2 | 1,887 | 87.44 | 1.59 | 6.41 | 1.80 | 0.00 | 1.96 | 0.37 | 0.42 | 12.56 | 5.11 | 237 | 96 |
| East Shore | Block Group 111.04-2 | 3,215 | 94.34 | 0.00 | 1.99 | 2.21 | 0.00 | 1.28 | 0.00 | 0.19 | 5.66 | 2.18 | 182 | 70 |
| East Shore | Block Group 111.05-1 | 3,052 | 95.48 | 0.00 | 3.01 | 0.00 | 0.00 | 0.33 | 0.00 | 1.18 | 4.52 | 2.15 | 138 | 65 |
| East Shore | Block Group 111.05-2 | 1,146 | 98.69 | 0.00 | 0.70 | 0.00 | 0.00 | 0.61 | 0.00 | 0.00 | 1.31 | 0.00 | 15 | 0 |
| East Shore | Block Group 112-1 | 1,675 | 86.69 | 0.12 | 2.09 | 0.00 | 0.00 | 0.00 | 0.00 | 11.10 | 13.31 | 8.89 | 223 | 149 |
| East Shore | Block Group 112-3 | 1,097 | 92.43 | 0.82 | 4.28 | 0.00 | 0.00 | 1.19 | 0.00 | 1.28 | 7.57 | 1.24 | 83 | 14 |
| East Shore | Block Group 112-4 | 2,129 | 88.30 | 2.68 | 0.94 | 0.00 | 0.00 | 5.31 | 0.00 | 2.77 | 11.70 | 1.92 | 249 | 41 |
| East Shore | Block Group 113-2 | 2,105 | 96.06 | 0.10 | 1.85 | 0.05 | 0.00 | 0.62 | 0.00 | 1.33 | 3.94 | 1.62 | 83 | 34 |
| East Shore | Block Group 114-2 | 1,807 | 95.57 | 0.00 | 1.72 | 0.89 | 0.00 | 0.66 | 0.00 | 1.16 | 4.43 | 2.94 | 80 | 53 |
| East Shore | Block Group 9665-1 | 793 | 90.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 9.08 | 9.58 | 9.96 | 76 | 79 |
| | | | | | | | | | | | | | **4,594** | **4,067** |

**Table II-4. Minority and Low-Income Population Statistics for Water Supply Areas Downstream of North Bismarck Alternative and DAPL Crossings (Data from ACS 2011-2015, 5-year estimates)**

| Geographic Area | | | | Total Population | Percent: White | Percent: Black or African American | Percent: American Indian and Alaska Native | Percent: Asian | Percent: Native Hawaiian and Other Pacific Islander | Percent: Hispanic or Latino | Percent: Some Other Race | Percent: Two or More Races | Percent: Total Minority Population | Percent: Persons Below the Poverty Level | Total Minority Population | Total Population Below the Poverty Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **States** | | | | | | | | | | | | | | | | |
| North Dakota | | | | 721,640 | 87.05 | 1.60 | 5.20 | 1.22 | 0.04 | 2.85 | 0.05 | 2.00 | 12.95 | 11.46 | 93,482 | 82,673 |
| South Dakota | | | | 843,190 | 83.22 | 1.52 | 8.30 | 1.20 | 0.04 | 3.31 | 0.08 | 2.34 | 16.78 | 14.11 | 141,491 | 119,016 |
| **Counties** | | | | | | | | | | | | | | | | |
| North Dakota | Burleigh (ND) | | | 88,223 | 91.07 | 0.86 | 3.76 | 0.65 | 0.02 | 1.75 | 0.04 | 1.85 | 8.93 | 8.17 | 7,876 | 7,207 |
| North Dakota | Emmons (ND) | | | 3,463 | 96.79 | 0.00 | 0.32 | 0.46 | 0.00 | 0.12 | 0.00 | 2.31 | 3.21 | 11.33 | 111 | 392 |
| North Dakota | Grant (ND) | | | 2,362 | 97.04 | 0.34 | 1.10 | 0.00 | 0.00 | 0.85 | 0.00 | 0.68 | 2.96 | 14.88 | 70 | 352 |
| North Dakota | Kidder (ND) | | | 2,430 | 94.73 | 0.00 | 0.00 | 0.00 | 0.00 | 5.02 | 0.00 | 0.25 | 5.27 | 7.62 | 128 | 185 |
| North Dakota | Logan (ND) | | | 1,945 | 96.56 | 0.31 | 0.31 | 0.31 | 0.00 | 1.44 | 0.05 | 1.03 | 3.44 | 8.08 | 67 | 157 |
| North Dakota | McIntosh (ND) | | | 2,759 | 95.83 | 0.33 | 0.51 | 0.51 | 0.00 | 0.91 | 0.00 | 1.92 | 4.17 | 11.73 | 115 | 324 |
| North Dakota | Morton (ND) | | | 28,985 | 91.39 | 0.65 | 3.57 | 0.14 | 0.00 | 2.29 | 0.00 | 1.96 | 8.61 | 7.99 | 2,496 | 2,315 |
| North Dakota | Oliver (ND) | | | 1,819 | 91.70 | 0.33 | 4.29 | 0.16 | 0.00 | 2.91 | 0.16 | 0.44 | 8.30 | 7.68 | 151 | 140 |
| North Dakota | Sioux (ND) | | | 4,380 | 13.93 | 0.05 | 79.36 | 0.16 | 0.11 | 3.56 | 0.16 | 2.67 | ***86.07*** | ***35.72*** | 3,770 | 1,564 |
| South Dakota | Brown (SD) | | | 38,060 | 89.91 | 1.51 | 3.34 | 1.86 | 0.02 | 2.25 | 0.03 | 1.09 | 10.09 | 9.82 | 3,842 | 3,737 |
| South Dakota | Campbell (SD) | | | 1,548 | 94.90 | 0.00 | 3.49 | 0.78 | 0.00 | 0.19 | 0.00 | 0.65 | 5.10 | 9.06 | 79 | 140 |
| South Dakota | Clark (SD) | | | 3,625 | 93.79 | 0.77 | 1.05 | 0.80 | 0.00 | 2.54 | 0.36 | 0.69 | 6.21 | 15.91 | 225 | 577 |
| South Dakota | Corson (SD) | | | 4,149 | 30.95 | 0.29 | 66.76 | 0.29 | 0.00 | 0.58 | 0.00 | 1.13 | ***69.05*** | ***45.58*** | 2,865 | 1,891 |
| South Dakota | Day (SD) | | | 5,618 | 87.02 | 0.00 | 9.11 | 0.46 | 0.00 | 1.94 | 0.00 | 1.46 | 12.98 | ***22.10*** | 729 | 1,242 |
| South Dakota | Dewey (SD) | | | 5,579 | 21.72 | 0.04 | 75.57 | 0.00 | 0.00 | 0.91 | 0.00 | 1.76 | ***78.28*** | ***27.83*** | 4,367 | 1,553 |
| South Dakota | Edmunds (SD) | | | 4,018 | 96.69 | 0.12 | 1.34 | 0.40 | 0.00 | 1.27 | 0.00 | 0.17 | 3.31 | 12.29 | 133 | 494 |
| South Dakota | Faulk (SD) | | | 2,359 | 94.07 | 0.00 | 1.78 | 0.13 | 0.00 | 4.03 | 0.00 | 0.00 | 5.93 | 16.37 | 140 | 386 |
| South Dakota | Hand (SD) | | | 3,375 | 97.42 | 0.00 | 0.15 | 0.30 | 0.00 | 1.39 | 0.00 | 0.74 | 2.58 | 8.17 | 87 | 276 |
| South Dakota | McPherson (SD) | | | 2,263 | 91.47 | 0.22 | 5.70 | 0.35 | 0.00 | 2.08 | 0.00 | 0.18 | 8.53 | ***22.06*** | 193 | 499 |
| South Dakota | Marshall (SD) | | | 4,701 | 83.37 | 0.62 | 8.98 | 0.04 | 0.00 | 4.83 | 0.00 | 2.17 | 16.63 | 15.15 | 782 | 712 |
| South Dakota | Potter (SD) | | | 2,307 | 92.72 | 0.00 | 3.34 | 1.13 | 0.00 | 0.87 | 0.00 | 1.95 | 7.28 | 11.59 | 168 | 267 |
| South Dakota | Spink (SD) | | | 6,570 | 95.08 | 0.21 | 1.26 | 0.00 | 0.55 | 1.98 | 0.00 | 0.91 | 4.92 | 12.54 | 323 | 824 |
| South Dakota | Walworth (SD) | | | 5,495 | 81.31 | 0.20 | 8.50 | 2.78 | 0.51 | 4.68 | 0.00 | 2.02 | 18.69 | 12.24 | 1,027 | 673 |
| South Dakota | Ziebach (SD) | | | 2,833 | 23.72 | 0.28 | 70.56 | 0.74 | 0.00 | 3.67 | 0.00 | 1.02 | ***76.28*** | ***39.55*** | 2,161 | 1,120 |
| **Block Groups** | | | | | | | | | | | | | | | 31,905 | 27,026 |
| North Dakota | Burleigh County | 380150101001 | Block Group 1, Census Tract 101 | 748 | 95.32 | 0.00 | 0.13 | 2.54 | 0.00 | 0.67 | 0.00 | 1.34 | 4.68 | ***24.63*** | 35 | 184 |
| North Dakota | Burleigh County | 380150101002 | Block Group 2, Census Tract 101 | 1,086 | 88.86 | 3.41 | 0.00 | 0.00 | 0.00 | 7.27 | 0.00 | 0.46 | 11.14 | 3.59 | 121 | 39 |
| North Dakota | Burleigh County | 380150101003 | Block Group 3, Census Tract 101 | 1,448 | 77.28 | 0.97 | 15.81 | 0.90 | 0.00 | 3.45 | 0.00 | 1.59 | 22.72 | ***27.79*** | 329 | 402 |
| North Dakota | Burleigh County | 380150102001 | Block Group 1, Census Tract 102 | 1,949 | 94.97 | 2.57 | 1.08 | 0.46 | 0.00 | 0.00 | 0.00 | 0.92 | 5.03 | 2.98 | 98 | 58 |
| North Dakota | Burleigh County | 380150102002 | Block Group 2, Census Tract 102 | 1,513 | 96.03 | 0.00 | 2.25 | 0.00 | 0.00 | 0.99 | 0.00 | 0.73 | 3.97 | 2.27 | 60 | 34 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 380150102003 | Block Group 3, Census Tract 102 | 1,055 | 91.18 | 0.00 | 8.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.82 | 15.36 | 93 | 162 |
| 380150102004 | Block Group 4, Census Tract 102 | 711 | 61.32 | 0.00 | 33.61 | 0.00 | 0.00 | 5.06 | 0.00 | 0.00 | ***38.68*** | ***62.73*** | 275 | 446 |
| 380150103001 | Block Group 1, Census Tract 103 | 1,557 | 93.90 | 0.00 | 3.08 | 3.02 | 0.00 | 0.00 | 0.00 | 0.00 | 6.10 | 6.62 | 95 | 103 |
| 380150103002 | Block Group 2, Census Tract 103 | 1,567 | 97.83 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.08 | 2.17 | 6.83 | 34 | 107 |
| 380150103003 | Block Group 3, Census Tract 103 | 903 | 95.24 | 0.00 | 0.00 | 0.00 | 0.00 | 4.76 | 0.00 | 0.00 | 4.76 | 1.00 | 43 | 9 |
| 380150103004 | Block Group 4, Census Tract 103 | 597 | 95.48 | 4.36 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.52 | 8.01 | 27 | 48 |
| 380150103005 | Block Group 5, Census Tract 103 | 714 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.03 | 0 | 79 |
| 380150103006 | Block Group 6, Census Tract 103 | 1,363 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.16 | 0 | 84 |
| 380150104001 | Block Group 1, Census Tract 104 | 1,477 | 94.38 | 0.00 | 3.39 | 0.00 | 0.00 | 1.22 | 0.00 | 1.02 | 5.62 | 7.03 | 83 | 104 |
| 380150104002 | Block Group 2, Census Tract 104 | 849 | 91.28 | 0.94 | 0.00 | 0.00 | 0.00 | 5.42 | 0.00 | 2.36 | 8.72 | 8.01 | 74 | 68 |
| 380150104003 | Block Group 3, Census Tract 104 | 1,424 | 91.78 | 3.72 | 0.00 | 0.00 | 0.00 | 3.51 | 0.00 | 0.98 | 8.22 | 1.54 | 117 | 22 |
| 380150105001 | Block Group 1, Census Tract 105 | 2,367 | 88.34 | 4.82 | 2.96 | 0.00 | 0.59 | 1.06 | 0.00 | 2.24 | 11.66 | 6.63 | 276 | 157 |
| 380150105002 | Block Group 2, Census Tract 105 | 1,920 | 97.45 | 0.00 | 0.73 | 0.00 | 0.00 | 0.21 | 0.00 | 1.61 | 2.55 | 13.05 | 49 | 251 |
| 380150105003 | Block Group 3, Census Tract 105 | 772 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.29 | 0 | 25 |
| 380150106001 | Block Group 1, Census Tract 106 | 1,131 | 88.24 | 0.00 | 11.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.76 | 15.51 | 133 | 175 |
| 380150106002 | Block Group 2, Census Tract 106 | 1,161 | 40.31 | 3.70 | 36.61 | 0.09 | 0.00 | 1.81 | 0.00 | 17.48 | ***59.69*** | ***51.30*** | 693 | 596 |
| 380150106003 | Block Group 3, Census Tract 106 | 2,300 | 93.83 | 0.00 | 3.61 | 0.57 | 0.00 | 2.00 | 0.00 | 0.00 | 6.17 | 4.43 | 142 | 102 |
| 380150107001 | Block Group 1, Census Tract 107 | 1,353 | 94.01 | 0.00 | 3.33 | 0.00 | 0.00 | 1.40 | 0.00 | 1.26 | 5.99 | 9.46 | 81 | 128 |
| 380150107002 | Block Group 2, Census Tract 107 | 1,122 | 92.87 | 0.62 | 1.34 | 0.00 | 0.00 | 3.03 | 0.00 | 2.14 | 7.13 | ***20.59*** | 80 | 231 |
| 380150107003 | Block Group 3, Census Tract 107 | 1,823 | 98.03 | 0.00 | 1.32 | 0.00 | 0.00 | 0.66 | 0.00 | 0.00 | 1.97 | 0.77 | 36 | 14 |
| 380150108001 | Block Group 1, Census Tract 108 | 2,087 | 85.48 | 0.00 | 10.11 | 0.00 | 0.00 | 0.05 | 0.00 | 4.36 | 14.52 | 19.79 | 303 | 413 |
| 380150108002 | Block Group 2, Census Tract 108 | 1,973 | 87.68 | 0.25 | 8.67 | 0.00 | 0.00 | 1.62 | 0.00 | 1.77 | 12.32 | 10.92 | 243 | 215 |
| 380150109001 | Block Group 1, Census Tract 109 | 1,879 | 92.39 | 0.00 | 1.44 | 0.00 | 0.00 | 5.48 | 0.00 | 0.69 | 7.61 | 9.12 | 143 | 171 |
| 380150109002 | Block Group 2, Census Tract 109 | 1,176 | 74.23 | 6.72 | 12.93 | 0.00 | 0.00 | 3.57 | 0.94 | 1.62 | 25.77 | 18.96 | 303 | 223 |
| 380150109003 | Block Group 3, Census Tract 109 | 1,571 | 97.20 | 0.57 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 | 1.27 | 2.80 | 1.34 | 44 | 21 |
| 380150110011 | Block Group 1, Census Tract 110.01 | 1,883 | 81.15 | 5.47 | 3.61 | 0.00 | 0.00 | 5.31 | 0.85 | 3.61 | 18.85 | ***22.16*** | 355 | 417 |
| 380150110012 | Block Group 2, Census Tract 110.01 | 2,393 | 92.77 | 0.00 | 1.50 | 5.22 | 0.00 | 0.00 | 0.00 | 0.50 | 7.23 | 8.73 | 173 | 209 |
| 380150110013 | Block Group 3, Census Tract 110.01 | 1,112 | 92.72 | 0.00 | 1.62 | 0.00 | 0.00 | 0.00 | 0.00 | 5.67 | 7.28 | 2.61 | 81 | 29 |
| 380150110021 | Block Group 1, Census Tract 110.02 | 3,308 | 87.64 | 1.27 | 0.00 | 0.21 | 0.00 | 3.42 | 0.00 | 7.47 | 12.36 | 2.12 | 409 | 70 |
| 380150110022 | Block Group 2, Census Tract 110.02 | 3,029 | 99.74 | 0.07 | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.00 | 0.26 | 0.33 | 8 | 10 |
| 380150111011 | Block Group 1, Census Tract 111.01 | 1,969 | 79.53 | 0.00 | 5.03 | 0.00 | 0.00 | 9.14 | 0.00 | 6.30 | 20.47 | 11.07 | 403 | 218 |
| 380150111012 | Block Group 2, Census Tract 111.01 | 789 | 83.40 | 1.14 | 0.63 | 9.38 | 0.00 | 2.41 | 0.00 | 3.04 | 16.60 | ***26.74*** | 131 | 211 |
| 380150111013 | Block Group 3, Census Tract 111.01 | 2,613 | 87.87 | 1.38 | 8.88 | 1.57 | 0.00 | 0.00 | 0.00 | 0.31 | 12.13 | 11.92 | 317 | 311 |
| 380150111031 | Block Group 1, Census Tract 111.03 | 1,505 | 99.20 | 0.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 2.33 | 12 | 35 |
| 380150111032 | Block Group 2, Census Tract 111.03 | 1,887 | 87.44 | 1.59 | 6.41 | 1.80 | 0.00 | 1.96 | 0.37 | 0.42 | 12.56 | 5.11 | 237 | 96 |
| 380150111041 | Block Group 1, Census Tract 111.04 | 1,604 | 94.08 | 0.00 | 0.00 | 5.36 | 0.00 | 0.00 | 0.00 | 0.56 | 5.92 | 0.00 | 95 | 0 |
| 380150111042 | Block Group 2, Census Tract 111.04 | 3,215 | 94.34 | 0.00 | 1.99 | 2.21 | 0.00 | 1.28 | 0.00 | 0.19 | 5.66 | 2.18 | 182 | 70 |
| 380150111051 | Block Group 1, Census Tract 111.05 | 3,052 | 95.48 | 0.00 | 3.01 | 0.00 | 0.00 | 0.33 | 0.00 | 1.18 | 4.52 | 2.15 | 138 | 65 |
| 380150111052 | Block Group 2, Census Tract 111.05 | 1,146 | 98.69 | 0.00 | 0.70 | 0.00 | 0.00 | 0.61 | 0.00 | 0.00 | 1.31 | 0.00 | 15 | 0 |
| 380150112001 | Block Group 1, Census Tract 112 | 1,675 | 86.69 | 0.12 | 2.09 | 0.00 | 0.00 | 0.00 | 0.00 | 11.10 | 13.31 | 8.89 | 223 | 149 |
| 380150112002 | Block Group 2, Census Tract 112 | 1,486 | 94.35 | 0.00 | 0.00 | 0.00 | 0.00 | 5.65 | 0.00 | 0.00 | 5.65 | 7.87 | 84 | 117 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 380150112003 | Block Group 3, Census Tract 112 | 1,097 | 92.43 | 0.82 | 4.28 | 0.00 | 0.00 | 1.19 | 0.00 | 1.28 | 7.57 | 1.24 | 83 | 14 |
| | | 380150112004 | Block Group 4, Census Tract 112 | 2,129 | 88.30 | 2.68 | 0.94 | 0.00 | 0.00 | 5.31 | 0.00 | 2.77 | 11.70 | 1.92 | 249 | 41 |
| | | 380150113001 | Block Group 1, Census Tract 113 | 2,723 | 95.67 | 0.00 | 0.77 | 0.00 | 0.00 | 1.84 | 0.00 | 1.73 | 4.33 | 1.29 | 118 | 35 |
| | | 380150113002 | Block Group 2, Census Tract 113 | 2,105 | 96.06 | 0.10 | 1.85 | 0.05 | 0.00 | 0.62 | 0.00 | 1.33 | 3.94 | 1.62 | 83 | 34 |
| | | 380150113003 | Block Group 3, Census Tract 113 | 1,814 | 82.86 | 0.06 | 15.49 | 0.00 | 0.00 | 0.88 | 0.00 | 0.72 | 17.14 | 17.56 | 311 | 318 |
| | | 380150114001 | Block Group 1, Census Tract 114 | 684 | 97.22 | 0.00 | 1.46 | 0.00 | 0.00 | 0.44 | 0.00 | 0.88 | 2.78 | 7.60 | 19 | 52 |
| | | 380150114002 | Block Group 2, Census Tract 114 | 1,807 | 95.57 | 0.00 | 1.72 | 0.89 | 0.00 | 0.66 | 0.00 | 1.16 | 4.43 | 2.94 | 80 | 53 |
| | | 380150115001 | Block Group 1, Census Tract 115 | 831 | 95.67 | 0.00 | 0.36 | 0.36 | 0.00 | 2.53 | 0.24 | 0.84 | 4.33 | 6.98 | 36 | 58 |
| | | 380150115002 | Block Group 2, Census Tract 115 | 771 | 96.89 | 0.00 | 0.65 | 0.00 | 0.00 | 1.04 | 0.00 | 1.43 | 3.11 | 5.71 | 24 | 44 |
| | Emmons County | 380299665001 | Block Group 1, Census Tract 9665 | 793 | 90.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 9.08 | 9.58 | 9.96 | 76 | 79 |
| | | 380299665002 | Block Group 2, Census Tract 9665 | 757 | 99.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.40 | 14.00 | 3 | 106 |
| | | 380299665003 | Block Group 3, Census Tract 9665 | 783 | 98.08 | 0.00 | 1.40 | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 1.92 | 11.40 | 15 | 89 |
| | | 380299665004 | Block Group 4, Census Tract 9665 | 1,130 | 98.50 | 0.00 | 0.00 | 1.06 | 0.00 | 0.00 | 0.00 | 0.44 | 1.50 | 10.44 | 17 | 118 |
| | Grant County | 380379659002 | Block Group 2, Census Tract 9659 | 1,430 | 98.67 | 0.00 | 0.56 | 0.00 | 0.00 | 0.49 | 0.00 | 0.28 | 1.33 | 17.52 | 19 | 250 |
| | Kidder County | 380439668001 | Block Group 1, Census Tract 9668 | 828 | 92.87 | 0.00 | 0.00 | 0.00 | 0.00 | 7.13 | 0.00 | 0.00 | 7.13 | 10.27 | 59 | 85 |
| | | 380439668002 | Block Group 2, Census Tract 9668 | 831 | 99.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.72 | 0.72 | 5.17 | 6 | 43 |
| | | 380439668003 | Block Group 3, Census Tract 9668 | 771 | 91.83 | 0.00 | 0.00 | 0.00 | 0.00 | 8.17 | 0.00 | 0.00 | 8.17 | 7.41 | 63 | 57 |
| | Logan County | 380479725001 | Block Group 1, Census Tract 9725 | 1,166 | 97.26 | 0.00 | 0.51 | 0.51 | 0.00 | 0.00 | 0.00 | 1.72 | 2.74 | 6.57 | 32 | 77 |
| | | 380479725002 | Block Group 2, Census Tract 9725 | 779 | 95.51 | 0.77 | 0.00 | 0.00 | 0.00 | 3.59 | 0.13 | 0.00 | 4.49 | 10.39 | 35 | 81 |
| | McIntosh County | 380519729001 | Block Group 1, Census Tract 9729 | 1,012 | 95.16 | 0.89 | 0.00 | 0.30 | 0.00 | 2.47 | 0.00 | 1.19 | 4.84 | 10.75 | 49 | 109 |
| | | 380519729002 | Block Group 2, Census Tract 9729 | 943 | 97.99 | 0.00 | 0.74 | 0.00 | 0.00 | 0.00 | 0.00 | 1.27 | 2.01 | 11.56 | 19 | 109 |
| | | 380519729003 | Block Group 3, Census Tract 9729 | 804 | 94.15 | 0.00 | 0.87 | 1.37 | 0.00 | 0.00 | 0.00 | 3.61 | 5.85 | 13.18 | 47 | 106 |
| | Morton County | 380590201001 | Block Group 1, Census Tract 201 | 2,051 | 96.73 | 0.05 | 0.93 | 0.00 | 0.00 | 2.29 | 0.00 | 0.00 | 3.27 | 3.72 | 67 | 76 |
| | | 380590201002 | Block Group 2, Census Tract 201 | 1,564 | 83.63 | 1.28 | 3.58 | 1.02 | 0.00 | 0.26 | 0.00 | 10.23 | 16.37 | ***20.52*** | 256 | 321 |
| | | 380590201003 | Block Group 3, Census Tract 201 | 710 | 97.89 | 0.00 | 0.70 | 0.00 | 0.00 | 0.70 | 0.00 | 0.70 | 2.11 | ***24.23*** | 15 | 172 |
| | | 380590201004 | Block Group 4, Census Tract 201 | 1,177 | 73.58 | 0.00 | 26.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 26.42 | 3.91 | 311 | 46 |
| | | 380590202001 | Block Group 1, Census Tract 202 | 1,778 | 92.58 | 0.00 | 6.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 7.42 | 3.17 | 132 | 56 |
| | | 380590202002 | Block Group 2, Census Tract 202 | 1,371 | 98.83 | 0.00 | 0.00 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 1.17 | 3.32 | 16 | 45 |
| | | 380590202003 | Block Group 3, Census Tract 202 | 1,510 | 89.14 | 0.00 | 0.40 | 0.00 | 0.00 | 10.26 | 0.00 | 0.20 | 10.86 | 4.62 | 164 | 70 |
| | | 380590202004 | Block Group 4, Census Tract 202 | 1,154 | 74.35 | 12.74 | 5.11 | 0.00 | 0.00 | 3.29 | 0.00 | 4.51 | 25.65 | 5.20 | 296 | 60 |
| | | 380590202005 | Block Group 5, Census Tract 202 | 1,761 | 92.50 | 0.00 | 0.45 | 0.00 | 0.00 | 4.60 | 0.00 | 2.44 | 7.50 | 10.91 | 132 | 192 |
| | | 380590203001 | Block Group 1, Census Tract 203 | 1,558 | 87.48 | 0.00 | 10.40 | 0.00 | 0.00 | 0.13 | 0.00 | 1.99 | 12.52 | 15.27 | 195 | 238 |
| | | 380590203002 | Block Group 2, Census Tract 203 | 2,032 | 89.71 | 0.00 | 7.78 | 0.00 | 0.00 | 1.53 | 0.00 | 0.98 | 10.29 | ***22.93*** | 209 | 466 |
| | | 380590203003 | Block Group 3, Census Tract 203 | 3,643 | 95.83 | 0.00 | 1.13 | 0.00 | 0.00 | 1.37 | 0.00 | 1.67 | 4.17 | 4.04 | 152 | 147 |
| | | 380590203004 | Block Group 4, Census Tract 203 | 1,939 | 89.89 | 0.36 | 0.98 | 0.00 | 0.00 | 3.56 | 0.00 | 5.21 | 10.11 | 1.11 | 196 | 22 |
| | | 380590204001 | Block Group 1, Census Tract 204 | 1,511 | 95.43 | 0.00 | 2.58 | 0.00 | 0.00 | 0.00 | 0.00 | 1.99 | 4.57 | 4.43 | 69 | 67 |
| | | 380590204002 | Block Group 2, Census Tract 204 | 716 | 97.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.09 | 2.09 | 5.03 | 15 | 36 |
| | | 380590204003 | Block Group 3, Census Tract 204 | 934 | 92.40 | 0.00 | 1.07 | 0.00 | 0.00 | 4.82 | 0.00 | 1.71 | 7.60 | 1.51 | 71 | 14 |
| | | 380590205002 | Block Group 2, Census Tract 205 | 834 | 95.68 | 0.00 | 3.00 | 0.24 | 0.00 | 0.00 | 0.00 | 1.08 | 4.32 | 8.08 | 36 | 67 |
| | | 380590205003 | Block Group 3, Census Tract 205 | 1,082 | 98.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 | 0.37 | 1.29 | 7.85 | 14 | 85 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 380590205004 | Block Group 4, Census Tract 205 | 798 | 98.62 | 0.00 | 0.00 | 0.50 | 0.00 | 0.75 | 0.00 | 0.13 | 1.38 | 8.19 | 11 | 65 |
| | Oliver County | 380659612001 | Block Group 1, Census Tract 9612 | 824 | 92.84 | 0.00 | 5.70 | 0.00 | 0.00 | 1.21 | 0.00 | 0.24 | 7.16 | 7.23 | 59 | 60 |
| | | 380659612002 | Block Group 2, Census Tract 9612 | 995 | 90.75 | 0.60 | 3.12 | 0.30 | 0.00 | 4.32 | 0.30 | 0.60 | 9.25 | 8.05 | 92 | 80 |
| | Sioux County | 380859408001 | Block Group 1, Census Tract 9408 | 961 | 13.32 | 0.00 | 82.73 | 0.00 | 0.00 | 1.04 | 0.31 | 2.60 | ***86.68*** | ***42.80*** | 833 | 411 |
| | | 380859408002 | Block Group 2, Census Tract 9408 | 709 | 43.86 | 0.00 | 45.42 | 0.56 | 0.28 | 6.77 | 0.00 | 3.10 | ***56.14*** | ***23.38*** | 398 | 166 |
| | | 380859409001 | Block Group 1, Census Tract 9409 | 1,710 | 5.32 | 0.00 | 88.19 | 0.18 | 0.00 | 3.22 | 0.00 | 3.10 | ***94.68*** | ***35.52*** | 1,619 | 607 |
| | | 380859409002 | Block Group 2, Census Tract 9409 | 1,000 | 8.00 | 0.20 | 85.10 | 0.00 | 0.30 | 4.30 | 0.40 | 1.70 | ***92.00*** | ***37.99*** | 920 | 380 |
| South Dakota | Brown County | 460139513002 | Block Group 2, Census Tract 9513 | 2,041 | 95.39 | 0.00 | 0.20 | 0.00 | 0.00 | 0.98 | 0.00 | 3.43 | 4.61 | 2.56 | 94 | 52 |
| | | 460139514001 | Block Group 1, Census Tract 9514 | 3,138 | 94.39 | 4.27 | 0.38 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 5.61 | 9.24 | 176 | 290 |
| | | 460139516001 | Block Group 1, Census Tract 9516 | 1,930 | 79.27 | 1.76 | 10.52 | 7.36 | 0.00 | 0.41 | 0.00 | 0.67 | 20.73 | 7.24 | 400 | 140 |
| | | 460139516004 | Block Group 4, Census Tract 9516 | 617 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.78 | 0 | 11 |
| | | 460139517001 | Block Group 1, Census Tract 9517 | 950 | 74.11 | 0.00 | 5.79 | 0.00 | 0.00 | 15.47 | 0.00 | 4.63 | 25.89 | ***21.68*** | 246 | 206 |
| | | 460139517002 | Block Group 2, Census Tract 9517 | 1,624 | 92.30 | 1.17 | 4.06 | 0.00 | 0.00 | 2.03 | 0.43 | 0.00 | 7.70 | 14.29 | 125 | 232 |
| | | 460139517003 | Block Group 3, Census Tract 9517 | 2,233 | 92.07 | 0.00 | 6.36 | 0.00 | 0.00 | 1.57 | 0.00 | 0.00 | 7.93 | ***20.02*** | 177 | 447 |
| | | 460139518001 | Block Group 1, Census Tract 9518 | 1,741 | 97.76 | 0.00 | 2.07 | 0.00 | 0.00 | 0.00 | 0.17 | 0.00 | 2.24 | 1.51 | 39 | 26 |
| | | 460139518003 | Block Group 3, Census Tract 9518 | 1,518 | 98.68 | 1.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.32 | 18.35 | 20 | 278 |
| | | 460139519001 | Block Group 1, Census Tract 9519 | 602 | 93.85 | 0.00 | 0.00 | 0.00 | 0.00 | 6.15 | 0.00 | 0.00 | 6.15 | 15.45 | 37 | 93 |
| | | 460139519002 | Block Group 2, Census Tract 9519 | 1,873 | 91.08 | 0.00 | 2.78 | 0.00 | 0.00 | 5.61 | 0.00 | 0.53 | 8.92 | 1.81 | 167 | 34 |
| | | 460139519003 | Block Group 3, Census Tract 9519 | 1,202 | 98.84 | 0.50 | 0.25 | 0.00 | 0.00 | 0.25 | 0.00 | 0.17 | 1.16 | 5.37 | 14 | 65 |
| | | 460139520001 | Block Group 1, Census Tract 9520 | 693 | 98.27 | 0.00 | 0.72 | 0.00 | 0.00 | 0.43 | 0.00 | 0.58 | 1.73 | 8.51 | 12 | 59 |
| | | 460139520002 | Block Group 2, Census Tract 9520 | 1,446 | 95.30 | 0.00 | 2.35 | 0.00 | 0.00 | 0.00 | 0.00 | 2.35 | 4.70 | 1.52 | 68 | 22 |
| | | 460139520003 | Block Group 3, Census Tract 9520 | 405 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.72 | 0 | 43 |
| | | 460139520004 | Block Group 4, Census Tract 9520 | 571 | 98.77 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.00 | 0.00 | 1.23 | 9.68 | 7 | 55 |
| | | 460139520005 | Block Group 5, Census Tract 9520 | 1,509 | 98.28 | 1.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.72 | 2.45 | 26 | 37 |
| | Campbell County | 460219641001 | Block Group 1, Census Tract 9641 | 643 | 96.89 | 0.00 | 2.64 | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 | 3.11 | 7.78 | 20 | 50 |
| | | 460219641002 | Block Group 2, Census Tract 9641 | 905 | 93.48 | 0.00 | 4.09 | 1.33 | 0.00 | 0.00 | 0.00 | 1.10 | 6.52 | 9.98 | 59 | 90 |
| | Clark County | 460259558001 | Block Group 1, Census Tract 9558 | 454 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.42 | 0 | 11 |
| | Corson County | 460319410001 | Block Group 1, Census Tract 9410 | 632 | 91.77 | 0.00 | 6.80 | 0.00 | 0.00 | 0.00 | 0.00 | 1.42 | 8.23 | 9.61 | 52 | 61 |
| | | 460319410002 | Block Group 2, Census Tract 9410 | 1,041 | 21.52 | 0.00 | 77.33 | 0.96 | 0.00 | 0.19 | 0.00 | 0.00 | ***78.48*** | ***57.31*** | 817 | 597 |
| | | 460319411001 | Block Group 1, Census Tract 9411 | 1,664 | 17.49 | 0.72 | 79.39 | 0.00 | 0.00 | 1.08 | 0.00 | 1.32 | ***82.51*** | ***54.86*** | 1,373 | 913 |
| | | 460319411002 | Block Group 2, Census Tract 9411 | 812 | 23.28 | 0.00 | 74.01 | 0.25 | 0.00 | 0.49 | 0.00 | 1.97 | ***76.72*** | ***39.21*** | 623 | 318 |
| | Day County | 460379527001 | Block Group 1, Census Tract 9527 | 606 | 98.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.16 | 1.16 | 19.06 | 7 | 115 |
| | | 460379527002 | Block Group 2, Census Tract 9527 | 1,059 | 93.58 | 0.00 | 1.79 | 0.38 | 0.00 | 3.68 | 0.00 | 0.57 | 6.42 | 14.07 | 68 | 149 |
| | | 460379528001 | Block Group 1, Census Tract 9528 | 951 | 96.11 | 0.00 | 1.58 | 1.89 | 0.00 | 0.00 | 0.00 | 0.42 | 3.89 | 16.17 | 37 | 154 |
| | | 460379528002 | Block Group 2, Census Tract 9528 | 1,051 | 94.67 | 0.00 | 2.19 | 0.38 | 0.00 | 0.00 | 0.00 | 2.76 | 5.33 | ***30.63*** | 56 | 322 |
| | | 460379529001 | Block Group 1, Census Tract 9529 | 1,367 | 74.03 | 0.00 | 22.09 | 0.00 | 0.00 | 2.41 | 0.00 | 1.46 | 25.97 | ***27.29*** | 355 | 373 |
| | | 460379529002 | Block Group 2, Census Tract 9529 | 584 | 64.73 | 0.00 | 26.20 | 0.00 | 0.00 | 6.34 | 0.00 | 2.74 | ***35.27*** | ***20.72*** | 206 | 121 |
| | Dewey County | 460419415001 | Block Group 1, Census Tract 9415 | 856 | 10.75 | 0.23 | 85.75 | 0.00 | 0.00 | 2.69 | 0.00 | 0.58 | ***89.25*** | 16.77 | 764 | 144 |
| | | 460419415002 | Block Group 2, Census Tract 9415 | 1,766 | 4.70 | 0.00 | 94.34 | 0.00 | 0.00 | 0.11 | 0.00 | 0.85 | ***95.30*** | ***41.68*** | 1,683 | 736 |
| | | 460419417001 | Block Group 1, Census Tract 9417 | 412 | 34.95 | 0.00 | 63.59 | 0.00 | 0.00 | 0.00 | 0.00 | 1.46 | ***65.05*** | ***25.24*** | 268 | 104 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 460419417002 | Block Group 2, Census Tract 9417 | 1,384 | 55.64 | 0.00 | 41.26 | 0.00 | 0.00 | 0.00 | 0.00 | 3.11 | ***44.36*** | 17.59 | 614 | 243 |
| | | 460419417003 | Block Group 3, Census Tract 9417 | 1,161 | 10.59 | 0.00 | 84.67 | 0.00 | 0.00 | 2.24 | 0.00 | 2.50 | ***89.41*** | ***27.12*** | 1,038 | 315 |
| | Edmunds County | 460459621001 | Block Group 1, Census Tract 9621 | 1,252 | 96.49 | 0.40 | 2.56 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 3.51 | 19.97 | 44 | 250 |
| | | 460459621002 | Block Group 2, Census Tract 9621 | 1,007 | 98.41 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.59 | 5.94 | 16 | 60 |
| | | 460459622001 | Block Group 1, Census Tract 9622 | 731 | 92.61 | 0.00 | 0.55 | 0.82 | 0.00 | 6.02 | 0.00 | 0.00 | 7.39 | 12.04 | 54 | 88 |
| | | 460459622002 | Block Group 2, Census Tract 9622 | 1,028 | 98.15 | 0.00 | 0.19 | 0.29 | 0.00 | 0.68 | 0.00 | 0.68 | 1.85 | 8.75 | 19 | 90 |
| | Faulk County | 460499611001 | Block Group 1, Census Tract 9611 | 879 | 98.86 | 0.00 | 0.80 | 0.00 | 0.00 | 0.34 | 0.00 | 0.00 | 1.14 | 6.31 | 10 | 55 |
| | | 460499611002 | Block Group 2, Census Tract 9611 | 773 | 83.18 | 0.00 | 4.53 | 0.39 | 0.00 | 11.90 | 0.00 | 0.00 | 16.82 | ***33.68*** | 130 | 260 |
| | | 460499611003 | Block Group 3, Census Tract 9611 | 707 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.04 | 0 | 64 |
| | Hand County | 460599756001 | Block Group 1, Census Tract 9756 | 710 | 98.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85 | 0.00 | 0.99 | 1.83 | 6.06 | 13 | 43 |
| | McPherson County | 460899631001 | Block Group 1, Census Tract 9631 | 790 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.38 | 0 | 129 |
| | | 460899631002 | Block Group 2, Census Tract 9631 | 642 | 98.75 | 0.00 | 0.00 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 | 1.25 | 6.57 | 8 | 42 |
| | | 460899631003 | Block Group 3, Census Tract 9631 | 831 | 77.74 | 0.60 | 15.52 | 0.00 | 0.00 | 5.66 | 0.00 | 0.48 | 22.26 | ***38.86*** | 185 | 323 |
| | Marshall County | 460919508002 | Block Group 2, Census Tract 9508 | 1,661 | 93.80 | 0.00 | 2.23 | 0.00 | 0.00 | 1.81 | 0.00 | 2.17 | 6.20 | ***20.29*** | 103 | 337 |
| | | 460919508003 | Block Group 3, Census Tract 9508 | 1,720 | 95.52 | 1.45 | 0.47 | 0.00 | 0.00 | 0.41 | 0.00 | 2.15 | 4.48 | 5.76 | 77 | 99 |
| | Potter County | 461070001002 | Block Group 2, Census Tract 1 | 1,020 | 97.35 | 0.00 | 1.27 | 0.00 | 0.00 | 0.78 | 0.00 | 0.59 | 2.65 | 14.67 | 27 | 150 |
| | Spink County | 461150001001 | Block Group 1, Census Tract 1 | 948 | 91.14 | 1.48 | 2.95 | 0.00 | 3.80 | 0.63 | 0.00 | 0.00 | 8.86 | 7.70 | 84 | 73 |
| | | 461150001002 | Block Group 2, Census Tract 1 | 960 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.65 | 0 | 54 |
| | | 461150002001 | Block Group 1, Census Tract 2 | 785 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.29 | 0 | 81 |
| | | 461150002002 | Block Group 2, Census Tract 2 | 1,109 | 92.25 | 0.00 | 2.25 | 0.00 | 0.00 | 1.35 | 0.00 | 4.15 | 7.75 | ***27.58*** | 86 | 306 |
| | | 461150002003 | Block Group 3, Census Tract 2 | 938 | 99.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.21 | 2.86 | 2 | 27 |
| | | 461150003001 | Block Group 1, Census Tract 3 | 668 | 92.66 | 0.00 | 4.04 | 0.00 | 0.00 | 3.29 | 0.00 | 0.00 | 7.34 | 17.93 | 49 | 120 |
| | | 461150003002 | Block Group 2, Census Tract 3 | 1,162 | 91.22 | 0.00 | 0.26 | 0.00 | 0.00 | 7.31 | 0.00 | 1.20 | 8.78 | 14.46 | 102 | 168 |
| | Walworth County | 461299651001 | Block Group 1, Census Tract 9651 | 904 | 86.73 | 0.00 | 0.88 | 0.00 | 0.00 | 12.39 | 0.00 | 0.00 | 13.27 | 9.79 | 120 | 89 |
| | | 461299651002 | Block Group 2, Census Tract 9651 | 1,013 | 93.98 | 0.99 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 4.34 | 6.02 | 15.40 | 61 | 156 |
| | | 461299652001 | Block Group 1, Census Tract 9652 | 789 | 91.25 | 0.00 | 6.08 | 2.66 | 0.00 | 0.00 | 0.00 | 0.00 | 8.75 | 19.63 | 69 | 155 |
| | | 461299652002 | Block Group 2, Census Tract 9652 | 980 | 87.55 | 0.10 | 0.92 | 0.00 | 2.86 | 8.57 | 0.00 | 0.00 | 12.45 | 3.70 | 122 | 36 |
| | | 461299652003 | Block Group 3, Census Tract 9652 | 868 | 58.76 | 0.00 | 20.62 | 15.21 | 0.00 | 2.07 | 0.00 | 3.34 | ***41.24*** | 9.10 | 358 | 79 |
| | | 461299652004 | Block Group 4, Census Tract 9652 | 941 | 68.44 | 0.00 | 22.95 | 0.00 | 0.00 | 4.57 | 0.00 | 4.04 | ***31.56*** | 17.28 | 297 | 163 |
| | Ziebach County | 461379416001 | Block Group 1, Census Tract 9416 | 1,793 | 14.50 | 0.00 | 82.71 | 0.00 | 0.00 | 1.84 | 0.00 | 0.95 | ***85.50*** | ***51.27*** | 1,533 | 919 |
| | | 461379416002 | Block Group 2, Census Tract 9416 | 1,040 | 39.62 | 0.77 | 49.62 | 2.02 | 0.00 | 6.83 | 0.00 | 1.15 | ***60.38*** | 19.03 | 628 | 198 |
| | | | | | | | | | | | | | | | 28,439 | 24,110 |

3. Potential Impacts to Minority and Low-Income Populations

The results of the spill model were analyzed in the Downstream Receptor Report and in this environmental justice analysis together with the other information the Corps received from the Tribes. This analysis confirms the Corps' conclusion that there are no significant adverse environmental and health effects associated with the crossing because of the low probability of a spill. The extremely low risk of a spill reaching the waters of Lake Oahe remains a critical factor in this analysis, as it was in the EA.

Despite the low risks and consistent with the IWG's *Promising Practices*, the Corps undertook a comprehensive review of the potential effects of a release on the low-income and minority populations identified in the affected area. The Corps used the information to ensure that these populations would not be subject to disproportionate adverse effects, with a focus on the Tribal populations downstream of the Lake Oahe crossing.

This analysis differs from the SRST report. The most prominent example of a difference is the SRST report's conclusion that the presence of what it views as a disproportionate amount of minority or low-income populations in the affected area "clearly demonstrates an environmental injustice with the [Lake Oahe crossing]." Saha and Mohai, at 1. The report misstates how the existence of low-income or minority populations is related to the existence of disproportionate impacts, and how those concepts are related to the Corps' analysis of environmental impacts.

The mere presence of large minority or low-income populations in the affected area does not alone determine the presence of disproportionately high and adverse environmental impacts. The terms "disproportionately high" and "adverse" as used in EO 12898 and CEQ Guidance, and reflected in the methodologies of the *Promising Practices*, qualify "human health and environmental effects" as opposed to "minority populations and low-income populations". The potential adverse human health or environmental effects associated with an operational spill from the Lake Oahe crossing were analyzed by the Corps in light of the minority and low-income populations in the affected area. Those 8 populations are identified in Table II-2. This analysis correctly focuses on whether those populations are likely to experience disproportionately high or adverse impacts as compared to non-minority or low income populations.

This review focused on three categories of effects. First are the specific cultural, spiritual and ceremonial practices at or near Lake Oahe that have been identified by the SRST, CRST, OST and YST as vulnerable to the impacts of a potential spill. The second category is the subsistence and traditional hunting and fishing practices of the Tribes. The third category covers water intakes and associated human health concerns, and includes a comparison of the populations served by water intakes at site of North Bismarck Alternative crossing.

(a). Tribal cultural, spiritual, and ceremonial practices and beliefs that are vulnerable to impacts from a potential spill

The SRST, CRST, OST, and YST reported that use of the lands, waters and resources surrounding and within Lake Oahe by their members for various Tribal cultural practices would be negatively impacted by a potential spill at the Lake Oahe crossing. The SRST and CRST reservations border Lake Oahe and partially or wholly encompass six of the eight minority populations (census block groups) identified in the Corps analysis and all of the low-income populations. All four Tribes identify practices, customs, or other uses that could be affected by impacts to Lake Oahe water quality, including impacts to aquatic plants used for medicinal and spiritual purposes, or from lake closures in areas used for ceremonies. This section summarizes those concerns voiced to the Corps during this analysis. Note that concerns about impacts to water intakes and hunting and fishing are treated in their own sections of this analysis.

The Corps acknowledges that impacts to the waters and ecosystem of Lake Oahe are seen by the Tribes as extremely detrimental to their way of life. Each Tribe independently expressed this concern. For example, Carlyle Ducheneaux of the Cheyenne River Sioux Tribe, provided a declaration dated April 18, 2018 that quotes from the 2005 Cultural Assessment of Riparian Habitats on the Cheyenne River Sioux Reservation produced by Dr. Walker and the Walker Research Group, Ltd., which was also provided to the Corps by the CRST for consideration in this analysis. The Walker report was prepared for the CRST Environmental Protection Department and is based on research and interviews of Tribal members conducted from 1998 through 2002. Dr. Walker found that:

> Few Tribes in the Great Plains are more connected and dependent on their rivers than are the CRST-in this case the Missouri River, the Moreau River, and the Cheyenne River. The CRST have depended on these rivers and their tributaries, the principal water supply for the region, for both subsistence and spiritual resources from the distant past until today. Neither the Tribe's physical nor spiritual existence can be separated from these rivers. The water they provide is a basic element of life. Without continuation of healthy and adequate water flows in these river systems, life would be difficult if not impossible for the CRST.

Ducheneaux, 2018, at 2.

The SRST stated that:

> a spill could permanently alter the Tribe’s way of life. Sustainable development is a belief of the Tribe that will most certainly be compromised in the event of a spill, possibly resulting in the decimation of the Tribal way

> of life. Such an outcome is not beyond the realm of possibility and the fact that such an outcome could come to pass is a fundamental concern from an environmental justice standpoint.

SRST February 2018 Report at 87.

The OST state that:

> The Missouri River, itself, is sacred to us. Burials of our people along the River was common practice. There are identified cultural resources where our chiefs were buried. Our members participate in the annual Chiefs' Ride to honor our ancestors and renew our spirits. Offerings for the River were and still are commonplace in our people's cultural practices. Gathering traditional medicines and spirit rocks near the River are still common practices for our tribal members. The Missouri River always has been necessary for our existence as Lakota people. The River is the lifeline of our people and our people engage in cultural and spiritual practices with respect to it as we have since time immemorial.

OST President Troy Scott Weston Letter to COL Husdon, Dec. 20, 2017, at 12.

The Corps acknowledges these concerns and the low probability discharges and potential effects are explored in detail in the Downstream Receptor Report and carefully considered in this analysis. In addition, the Corps uses a much lower oil presence threshold than for other categories of effects in the Spill Model Report and the Downstream Receptor Report. Downstream Receptor Report, at v. Because any oil in the water could present a potential impairment for these cultural and spiritual values, an extremely low threshold of 0.01 μm was deemed appropriate. While this threshold does not pose a threat to ecological receptors, it could lead to lake-use closures while hydrocarbons are present. This would temporarily restrict tribal access to the lake or lakeshore, which could inhibit activities.

The Corps recognizes that many uses and benefits of Lake Oahe are unique to the Tribes, and understands that the Tribes believe these potential impacts are heightened due to the cumulative effects of the construction of the Lake Oahe reservoir itself. The SRST submitted information describing environmental justice concerns from a cumulative effects standpoint in the SRST February 2018 Report. *See also* Third Declaration of Dave Archambault II, ECF 272-3. The Archambault Declaration details the spiritual, recreational, subsistence, economic, and overall importance of Lake Oahe, particularly in the area of Cannonball, and the manner in which Lake Oahe's importance has increased due to present day and historic cultural and economic factors.

> Our elders have taught us the importance of protecting our remaining Reservation homeland – our ancestors sacrificed greatly so that we would

> still have a homeland to protect. We have a solemn obligation, on behalf of our ancestors, to ensure that the remaining lands, waters and resources of our Reservation are treated with respect and dignity and are preserved for future generations. An oil spill into Lake Oahe would be deeply felt as a failure to honor our duty to our ancestors and to protect our homeland from harm. These are uniquely Tribal impacts which are grounded in our culture, traditions and history and which go far beyond those faced by non-Tribal communities.

Archambault, ECF 272-3, at 7.

The Corps interpreted these as environmental justice concerns when they touched on traditional and cultural uses of Lake Oahe. One specific example from the SRST is gathering plants and fruits along the lakeshore. Their report states "many medicinal and culturally significant plants are found in sensitive habitats along the Missouri River. Their abundance has diminished because of the construction and operation of Oahe Dam, but they are still found within the river reach that could be affected by an oil spill from DAPL." SRST February 2018 Report at 27. Plants identified include Cottonwoods (*Salix*), Red willow (*Cansasa*), Chokecherry trees (*Prunus virginiana*), naturally-occurring fruits, riparian shrubs, and Sweet gress (*Hierochloe odorata*). SRST February 2018 Report at 26-27. These plants are identified as having many uses including ceremonies, medical treatments, and sustenance. *Id.* The Tribe provided a description of upland vegetation draws, including those of cultural importance. SRST HCA Report at 14.

The CRST also describe these uses in the Combellick Declaration. "Another important use of the rivers and tributaries on the Cheyenne River Reservation-including the Tribe's treaty rights in Lake Oahe-is the gathering of medicinal plant species for ceremonial and health-related purposes." Combellick Declaration at 3. This use was also noted by Kip Spotted Eagle, of the YST, "I have a very young daughter whom, one day, my wife and my mother will take to the Cannonball area of the Missouri River to gather these plants for medicines and for ceremony. This, too, is an invaluable cultural experience and opportunity for passing on knowledge, which is vital to our identity because we are a people of oral history." *Id.* Medicinal plants found along the Missouri River are also of extreme importance to the Yankton. *Id.* at 94.

The Corps considered the Tribe's input that these vegetation ` resources have been historically diminished and may be at increased risk. The Spill Model Report and Downstream Receptor Report considered impacts on riparian vegetation, and the Corps considered the cultural importance of these shoreline resources Section 2.2.3 of the Downstream Receptor Report states

> A large unmitigated release of oil near or in Lake Oahe would likely result in mortality of vegetation . . . However, with proper site restoration following the initial remediation activities, it is expected that the site would recover quickly. If the time of the oil on the vegetation is limited, and best

> practices for removal are applied, then the impacts would be minimized due to the rapid response and natural volatilization and degradation of the oil fractions. Non-sensitive grass species would recover quickly, although, some of the more sensitive species take a few months or a number of growing seasons to recover

Downstream Receptor Report, at 32-33.

The CRST reported many uses of Lake Oahe (besides drinking water or fishing and hunting) that they consider to be important Tribal uses, such as "…using water from the Cheyenne River for Cultural and Spiritual Purposes, […] Aesthetics, Gathering of Subsistence, Ceremonial and Medicinal foods and herbs, Recreation, firewood from the riparian areas along the Cheyenne, Moreau and Missouri Rivers, and Economic Development and Tourism." Ducheneaux, 2018, at 3. Among many other concerns, the SRST also report socioeconomic factors and request an additional cost-benefit analysis. SRST February 2018 Report at 65 - 89.

While the Corps reviewed SRST's economic arguments, many of them are outside of the scope of this analysis on remand. For example, the basis for the route selection relied on in the Final EA is not at issue in this remand. Also, it is not appropriate for the Corps to consider lost casino revenues due to the road closure during the pipeline protests because ETP did not propose to close the road for construction or operation as a component of the portion of the project for which it sought Corps approval. Local law enforcement officials closed the road due to protests. Therefore, the road closure was not caused by the Corps, nor was it a reasonably foreseeable direct, indirect, or cumulative effect of the federal action. Regarding the SRST positions regarding economic efficiency, theory, and external costs, the Corps finds its analysis is appropriate pursuant to EO 12898 and that the Tribe's critiques do not undermine the Corps analysis. The Corps nonetheless reviewed and considered the entire submittal in its analysis. SRST February 2018 Report at 75-89.

The Spill Model Report and Downstream Receptor Report finds that a large oil spill into Lake Oahe would likely cause temporary impacts to cultural practices on and near Lake Oahe. Downstream Receptor Report at 97. The Corps considered the location of the tribal populations in light of where the modeled spills are expected to have the most impact. Modeled shoreline contact for the worst case scenario affects both the eastern and western shorelines, although distribution of oil varies between the shorelines (Figure 10; Figure 6-55 in RPS [2018]). Due to prevailing winds at the time of the release, it is possible that one shoreline receives more impact from any one release. For example, northwesterly winds would push the oil more to the eastern shoreline and southwesterly winds would do the opposite. Downstream Receptor Report at 19. The Corps reviewed the Figures in the downstream receptor report, such as Figure 10, and determined that, in general, the shoreline along reservation boundaries and non-tribal land are both at risk. While tribal populations in the northerly census block groups could be considered more vulnerable for certain effects such as gathering plants for medicinal or ceremonial purposes that are uniquely valued by Tribes, the season and winds can dictate whether the oil will land on a tribal shoreline. Prevailing winds or seasonal conditions may increase or decrease effects and recovery rates. Downstream Receptor Report at 24, 30 & 80.

Impacts to the quality of water required for spiritual ceremonies, temporary degradation of habitat for plants used for medicinal and ceremonial purposes, loss of enjoyment of Lake Oahe for recreation and ceremonial use during lake closures could all be potential impacts that are unique to tribal populations. The Corps identified numerous uses of Lake Oahe that are specific to Tribal communities in the minority and low-income populations within the geographic extent of analysis. The Corps also reviewed input regarding Tribal uses of Lake Oahe that the consequences of a spill are increased by economic conditions, and historic and cumulative factors. See Archambault, ECF 272-3.

The Spill Model Report and the Downstream Receptor Report results show that potential impacts would be of a temporary and short duration. As stated previously, during the 10-day model run, no unmitigated spill scenario predicted any hydrocarbons reaching the end of the model domain, that is, 65 miles downstream of the crossing. No environmental impacts are expected beyond this point. For those areas that could be impacted, the thresholds used to evaluate potential socioeconomic impacts, such as lake closures, are lower than the environmental thresholds discussed previously. A conservative thickness threshold used in several risk assessments to determine effects on lake uses is 0.01 µm. Spill Model Report at 10. That is the threshold for a visible sheen of oil on the surface, which may deter such recreational uses of a lake as fishing or boating. While this threshold does not pose a threat to ecological receptors, it could affect cultural uses while hydrocarbons are present and even following a response action. The modeling results indicate that the 0.01µm threshold would only be exceeded for short durations in a limited spatial area, as hydrocarbons move downstream. Downstream Receptor Report, at v. Potential lake use closures would be of limited scale and of temporary duration, and only be expected for a few days to a couple of weeks. Lake closures could also occur during cleanup procedures and remediation activities. *Id.*

The Corps did not identify this as a disproportionately high and adverse impact because of the low probability of a spill, and the limited extent of the expected effects. The Downstream Receptor Report, including certain case studies, indicate short term effects to water quality and most ecological receptors. Further, in the event of a large rupture such as the ones modeled, the pipeline operator would work with others to respond promptly with response efforts that would reduce the volume and therefore the downstream impacts described in the Spill Model Report and the Downstream Receptor Report. ETP outlined this response in the Geographic Response Plan (GRP). See Geographical Response Plan, Missouri River/Lake Oahe Emmons County, North Dakota (March 2018)(filed in Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs, No. 16-1534 (D. D.C. April 3, 2018)(ECF No. 350-1 and 350-2).

(b). Tribal hunting and fishing practices susceptible to impacts from a potential spill

The Corps analyzed impacts to hunting and fishing resources that are unique to tribal populations because a large release would result in some mortality of aquatic species.

The largest estimated area of potential mortality for aquatic species for the worst-case scenarios modeled was 6.3 $km^2$ of the modeled area, based on a 50 µg/L biological threshold. Although any fish kill would be a negative consequence, this area represents only 2.5% of the modeled area. Additionally, the modeling results show that the 50 µg/L biological threshold for aquatic species in the water column would only be exceeded for a number of hours (not days) and only within specific zones within the water column, further limiting the area of potential mortality. Nonetheless, the Corps acknowledges and understands the unique importance of these resources to the Tribes' way of life, and reviewed this issue carefully. These effects are discussed in detail in Section I, above, and that analysis is incorporated and summarized here.

Tribal hunting and fishing activities represent unique values, and the potential for amplified effects in the event of a large spill. Subsistence hunting is important to the SRST. See Kelly Declaration at 3 (citing Standing Rock Code of Justice 9-105, which recognizes "the treaty rights of all members of the Tribe to hunt and fish for subsistence purposes"); SRST February 2018 Report at 17-18. It is important for meeting dietary needs of a "large number of Tribal members." Kelly Declaration at 2. This is tied to poverty levels on the reservation. *Id.* The Tribe has a program that ensures that those unable to hunt because of their age or handicap have deer meat harvested on the Reservation. *Id.* at 3. Subsistence hunting is also rooted in tribal traditions and includes harvesting of game for cultural and religious practices, including ceremonial dances and pow-wows. *Id.* It even provides important elements for Tribal art. *Id.* In the SRST Report's Summary of Findings, the Tribe states that they found that "subsistence hunting and fishing by Tribal members shall be adversely affected by an oil spill from DAPL." SRST February 2018 Report at 1. The YST, through the Affidavit of Kip Spotted Eagle, stated that "As the Tribal Historic Preservation Officer, I can affirmatively state that the continued practice of our hunting and fishing activities on our Treaty Territory and homelands is vital to preserving our history as Indigenous, Ihanktonwan (Yankton) people." Affidavit of Kip Spotted Eagle at 1 (April 19, 2018). The importance of hunting and fishing from a subsistence and cultural standpoint was expressed in all of the tribal input received by the Corps.

An oil spill can negatively affect game species in several ways. The oil could coat their fur or plumage. When game species come into direct contact with oil the can be impacted by absorption. SRST HCA Report at 28. Game species could also ingest oil or inhale vapor. *Id.* An oil spill could alter their habitat and food quality, and availability. *See generally Id.* Game species most susceptible to the effects of an oil spill are typically birds and shoreline mammals that would come into physical contact with oil from a spill. Downstream Receptor Report at v. The extent of these potential effects would depend on the volume of material released; the size of the dispersal area; the type, age, and reproductive state of species present; climate, and the effectiveness of spill response measures implemented.

Big game and small game mammals prevalent in the Lake Oahe area are susceptible to harm from an oil spill if oil were to coat their fur. Downstream Receptor Report at 77. Similarly, oiling of waterfowl and upland game birds plumage could cause thermoregulatory issues. *Id.* at 64; SRST HCA Report at 31. Other direct effects include toxicological impacts, which can cause sickness or mortality. Downstream Receptor Report at 95. Indirect effects such as habitat impacts, food source, and nutrient cycling disruptions, and alterations in ecosystem relationships are also possible in the event of a release. *Id.*

Lake Oahe is not the only source of fresh water for terrestrial vertebrates including deer. If the western shore of Lake Oahe were to become impacted by an inadvertent release of oil, it is likely that many terrestrial vertebrates would be able to utilize alternative sources of fresh water. Not including the Cannonball River, which lines the entire northern border of the SRST Reservation, there are more than 900 miles of mapped waterways and more than 3,000 ponds within the SRST Reservation based on an analysis of the National Hydrology Dataset and National Wetlands Inventory. Downstream Receptor Report at 96. Even if some deer or other wildlife species could ingest oil impacted water from Lake Oahe following a spill, oil contaminated water would likely not be above toxic thresholds. *Id.*

Behavioral responses of terrestrial game species would help to reduce potential adverse effects. Birds and mammals are mobile and generally will avoid oil-impacted areas and contaminated food. SRST HCA Report at 21; Downstream Receptor Report at 96. When unaffected alternative habitat is available nearby, the mortality of these species would be limited. Downstream Receptor Report at 96.

None of the models predicted a lake area with a surface oil thickness above the threshold that could potentially impact game species. Downstream Receptor Report at 96. In the event of a large rupture such as the ones modeled, the pipeline operator would work with others to respond promptly with response efforts that would reduce the volume and therefore the downstream impacts described in the Spill Model Report and the Downstream Receptor Report. ETP has outlined this response in the GRP. Further, as discussed in this document, the chance of an oil spill is low. ETP could also evaluate whether temporary water sources are necessary for wildlife. Downstream Receptor Report at 96.

Regarding fishing practices, the possibility that an oil spill could harm fishery resources is "well established." Downstream Receptor Report at 51 (citing Lee, K., et al., Expert Panel Report on the Behavior and Environmental Impacts of Crude Oil Released into Aqueous Environments. Royal Society of Canada (2015)). But very few studies have demonstrated increased mortality of fish as a result of oil spills. Id. (citing Langangen, O. et al., The effects of oil spills on marine fish: Implications of spatial variation in natural mortality, 119 Marine Pollution Bulletin 102-109 (2017)). An oil spill has the potential to affect fish directly through acute or chronic toxicity or indirectly by altering essential habitat (Lee et al., 2015). Spill response activities could also impact fish.

Fish are often better suited than other aquatic organisms to limit oil exposures and related impacts. Downstream Receptor Report at 51 (citing NMFS Website http://response.restoration.noaa.gov/oil-andchemical-spills/oil-spills/how-oil-spills-affect-fish-and-whales.html). An oil spill into Lake Oahe would likely cause a localized fish kill with very limited impacts to the immediate area surrounding the site of the spill. Downstream Receptor Report at 96.

Most fish species in Lake Oahe are moderately sensitive to dissolved hydrocarbons from an oil spill. Downstream Receptor Report at 55. Areas with the highest modeled dissolved hydrocarbons are generally along the east shore of Lake Oahe. Downstream Receptor Report at 55. Tribal members could have health issues if they consume fish, like walleye, pike, and catfish, that have eaten contaminated prey. SRST HCA Report at 32. But not much is known about the actual impact of eating fish that have ingested oil. Downstream Receptor Report at 85.

Most species of fish can metabolize and excrete hydrocarbons, so bioaccumulation is limited. *Id.* The biggest impact could be with the taste of the fish. *Id.* Given the short duration and limited effects, warnings about eating fish or a moratorium could mitigate this potential impact. *Id.* However, it is not likely that a warning or a moratorium would be necessary based on the Spill Report model levels of hydrocarbon concentrations. *Id.* If necessary, it would only be for a short time. *Id.*

Even under the unmitigated worst-case discharge scenarios, impacts to fish species would be of limited scale and of temporary duration and therefore impacts to fishing in the area would also be limited. Downstream Receptor Report at 96; *see also* SRST HCA Report at 18 ("The type of oil and the timing of the release influence the severity of oil's effects on fish. Light oils and petroleum products can cause acute toxicity in fish, but the toxic event is generally over fairly quickly. Heavier oils may not affect fish at all, or, in the cases of fish in larval or spawning stages, may be quite detrimental . . ."). In the event of a large rupture such as the ones modeled, the pipeline operator would work with others to respond promptly with response efforts (e.g., booming, burning, skimming, and collection, as appropriate) that would reduce the volume and therefore the downstream impacts described in the Spill Model Report and the Downstream Receptor Report. ETP has outlined this response in the GRP. Any impact to game fish species from the cleanup response would likely be offset by the benefits of the response.

The Final EA found that Tribal hunting and fishing practices would not be impaired by the Lake Oahe Crossing. Final EA at 86. Similar to the finding in the EA, here, the Corps did not identify potential effects as a disproportionately high and adverse impact because of the low probability of a spill, and the limited extent of the expected effects.

(c). Health Effects and Water Intake Considerations

Human health impacts are possible if a spill were to occur in or near Lake Oahe. These effects could come from inhalation of volatile chemicals, through the digestion of fish that could become contaminated, or through drinking contaminated water, either through water intakes from Lake Oahe or direct consumption from the lake. The likelihood of human impacts from a spill is considered very low for each of these potential human health pathways, based on the case studies outlined in Section 3.1.2 of the Downstream Receptor Report and the modeling results presented in the Spill Model Report. Downstream Receptor Report at 84.

The typical health effects associated with short-term (acute) inhalation of volatiles from crude oil are headaches, dizziness, nausea, vomiting, cough, respiratory distress, and chest pain. Short-term skin contact with oil could result in dermatitis. Downstream Receptor Report at 3.3.1. Tribal populations are known to be located close to the lakeshore, it is possible they could be affected by air quality for a short time following a spill. Archambault, ECF 272-3, at 2. Potential impacts from a spill through inhalation would likely be short term and very localized to the area immediately surrounding the spill. It is possible that the area closest to the location of a potential spill could be closed off to the public to limit the potential for inhalation and short term health impacts. Air monitoring would be initiated immediately and continued throughout the duration of clean-up activities. This would help mitigate health concerns. DAPL, in coordination with the Federal On-Scene Coordinator, the State On-Scene Coordinator, and local authorities, including a representative from potentially affected Tribes as determined by the Unified Command, would advise residents to avoid any areas of potentially unsafe conditions and potentially shut down certain portions of the river/river banks for a period of time, should conditions warrant. *See* Geographical Response Plan, Missouri River/Lake Oahe Emmons County, North Dakota (March 2018)(filed in *Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs*, No. 16-1534 (D. D.C. April 3, 2018)(ECF No. 350-1 and 350-2).

Impacts to fishery resources is also considered a low risk as a potential pathway of human exposure. If an oil spill were to occur in Lake Oahe, a fish advisory could be put into place limiting the amount of fish consumption. Based on expected concentrations shown to occur in the majority of the unmitigated scenarios modeled by ETP, it is not likely that a fish advisory would be put in place; if a fish advisory was issued it would be expected to be very short term and localized to the furthest upstream portions of Lake Oahe. Downstream Receptor Report at 85.

Based on the results of the ETP's modeling, the threat to drinking water intakes, especially the Tribal water intakes, is very low. Nonetheless, this analysis considered whether Tribal water intakes would be disproportionately affected by a hypothetical, unmitigated, worst-case release to Lake Oahe. The Corps has concluded there would be no disproportionate impact to minority and low-income populations. Table II-5 below provides location information relative to select Tribal and non-Tribal intakes downstream of the Lake Oahe crossing.

**Table II-5. Select Tribal and Non-Tribal Water Intakes Downstream of the Lake Oahe Crossing***

| Intake # / Owner<br>[Intake #s Correspond to Spill Model Report]* | Distance Downstream from Crossing Location (miles) |
|---|---|
| Intake #3 Agricultural Intake (non-Tribal) | 4.4 |
| Intake #4 Agricultural Intake (Tribal) | 8.1 |
| Intake #5 South Central Regional Water District Drinking Water Intake (non-Tribal) | 11.3 |
| Intake #7 Former Fort Yates Drinking Water Intake (Tribal). Offline/Not in use. | 26.8 |
| City of Mobridge Municipal Drinking Water Intake (non-Tribal) | 71.5 |
| Intake #14 SRST Replacement Drinking Water Intake** (Tribal) | 75.4 |
| WEB Water District Drinking Water Intake (non-Tribal) | 141.5 |
| CRST's Drinking Water Intake*** (Tribal) | 156.5 |
| Mni Wiconi Water Intake**** (Tribal/non-Tribal) | 205 |

* The intakes selected here include all of the known drinking water intakes encountered downstream within the 156 mile analysis area. The table also includes the first two agricultural intakes (one non-Tribal and the other Tribal) downstream from the Lake Oahe crossing. These represent the highest impact agricultural intake locations. Because of the Reservation boundaries and location of census block groups on the west side of Lake Oahe, this analysis assumed that all of the intakes on the west side represent Tribal populations. Likewise, it was assumed that the select intakes presented on the east side of Lake Oahe represent non-minority populations based on the location of the intakes, the registered water rights owners, and the presence of non-minority census block groups on the east side of Lake Oahe. Additional information can be found in the Spill Model Report (RPS, 2018). Only drinking water intakes within the analysis area are illustrated in Figures B-1 and B-2 (Appendix B). Although the Mni Wiconi intake is much farther downstream and outside of the formal analysis area, it has been included in the text and table for completeness.

** The depth of the SRST replacement intake is 60-80 feet, depending on water surface elevation (RPS, 2018).

*** CRST's drinking water intake is a minimum of 40 feet below the surface. Ordinary High Water - 1,617 feet above mean sea level (fmsl); Minimum Pool Elevation - 1,540 fmsl; Intake Elevation - Approx. 1,491 fmsl.

**** The Mni Wiconi water intake, although managed by the OST, serves both Tribal and non-Tribal communities in multiple regional water systems.

There are three water supply intakes within 15 miles downstream of the Lake Oahe crossing. The intake closest to the Lake Oahe crossing is approximately 4.4 miles downstream and is for agricultural, non-Tribal use. The second intake is approximately 8.1 miles downstream and is an SRST intake for agricultural use. The third intake, approximately 11.3 miles downstream, is the first potable water intake. It belongs to the non-Tribal South Central Regional Water District ("SCRWD"). It provides water to numerous populations that are non-minority and not low-income within several North Dakota counties to the east of Lake Oahe. The first reported Tribal intake currently used for public consumption is the SRST Replacement Intake located approximately 75.4 miles downstream of the Lake Oahe crossing (south of the Highway 1806 bridge from Wakpala to Mobridge, South Dakota). This intake replaced the Fort Yates intake, which according to the U.S. Bureau of Reclamation is now off-line and scheduled for demolition. The Fort Yates intake was located approximately 26.8 miles downstream of the Lake Oahe crossing. The nearest CRST intake is more than 150 miles downstream of the DAPL crossing.

As noted above, the spill model projects that even if a release were allowed to go unmitigated and travel more than 75 miles downstream to reach the SRST Replacement Intake, the concentrations in the water at the depth of the intake location are not anticipated to exceed regulatory thresholds because no appreciable Dissolved Hydrocarbon Concentrations (DHC) levels are predicted to be present there.[25] Even at the location of the off-line Fort Yates intake at 26.8 miles downstream, the maximum concentration of DHC is predicted to be only 145 µg/L in the top 5m (0 to 16.4 ft) of the water column, only 74 µg/L at 5 - 10m (or 16.4 to 32.8 ft) of depth below the surface, and 0 µg/L between a depth of 10m (32.8 ft) and the bottom of the river where the drinking water intake was located. Downstream Receptor Report at 91, Table 7-7.

The concentrations in the upper layers would be further reduced at the SRST Replacement Intake, which is located more than twice the distance downstream, due to dilution; volatilization from the dissolved phase to the atmosphere; adsorption to suspended particulate material and sedimentation; stranding on the shoreline or aquatic plants; or degradation. Because the depth of the SRST Replacement Intake is more than 40 ft below the surface, even at minimum water surface elevations, the concentration of dissolved hydrocarbons is predicted to be 0 µg/L at the point where water enters the Tribal drinking water intake.

The CRST intake is even less at risk because it is located more than twice as far downstream as the SRST Replacement Intake. Spill Model Report at 4. The in-stream concentrations would be much lower than those at the SRST Replacement Intake because of dilution; volatilization from the dissolved phase to the atmosphere; adsorption to suspended particulate material and sedimentation; stranding on the shoreline or aquatic plants; or degradation.

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[25] Benzene concentrations of 5 ppb were identified in the Final EA as the water quality threshold exceedance that would result in potential effects of closure of a water intake. Downstream Receptor Report at 85. Since benzene was not investigated as a single pseudo-component for the Spill Model Report we need to infer benzene concentrations from reported values of THC and DHC. *Id*. Relationships of the ratio of benzene to the fractional composition of fresh oil were made to conservatively calculate benzene concentration. *Id.* Benzene makes up approximately 0.0198% of fresh Bakken crude oil, by mass, while the total amount of soluble hydrocarbons contained within the modeled aromatic (AR) groups was 8.9% of the whole oil (DGTC, 2014). To reach a 5 µg/L threshold for benzene would require a THC concentration of 252.5 µg/L and a DHC concentration of 22.5 µg/L. *Id.* This is a conservative assumption, as benzene is more soluble and volatile than the AR1 group as a whole. *Id.* (citing the Spill Model Report).

Until it was taken off-line, the Fort Yates municipal drinking water intake was the first known Tribal, potable water intake downstream of the Lake Oahe crossing. Even then this put the first of such intakes more than 15 miles further downstream of the Lake Oahe crossing than the non-Tribal SCRWD intake. Spill Model Report at 4. The estimated minimum travel time to reach the SCRWD intake for an unmitigated spill at the Lake Oahe crossing is approximately 13-14 hours, compared with a minimum travel time of approximately 49-50 hours to reach the off-line Fort Yates intake. In each of these scenarios, the first oil predicted to reach the intake location would be entrained oil within the water column.

In the event that the spill continues unmitigated for an extended period of time, the SCRWD intake would be impacted first. As shown in Figure II-4-A and B, no community served by SCRWD is a low-income or minority population at the census block group level. The release would have to go unmitigated for approximately 49-50 hours to reach the former intake at Fort Yates which served a minority population. With this intake now off-line, it is estimated that a release would have to travel unmitigated for more than 10 days to reach the first Tribal potable water intake, the SRST Replacement Intake west of Mobridge. Spill Model Report at vi. Although well beyond the area affected under the detailed modeling, because the Missouri River intake for the CRST is located more than two times further downstream than SRST (about 156 miles downstream of the DAPL crossing), it is reasonable to assume that a release would have to travel unmitigated approximately twice as long (or more) to reach the CRST intake. If any dissolved hydrocarbons remained in the Missouri River and were to reach the CRST Tribal drinking water intake, the river water would have already passed the WEB Water District intake, at approximately 141.5 miles downstream of the DAPL crossing.

The OST Mni Wiconi intake is even less likely to be impacted than the CRST intake because it is another 50 miles downstream of the CRST intake (205 miles downstream of the DAPL crossing) and is also downstream of the Lake Oahe dam (which lies approximately 200 miles downstream of the DAPL crossing). The minimum water depth recorded for Lake Oahe for the entire period of record was 1570.2 fmsl. The discharge pipes for the dam are at an elevation of 1,425 fmsl, meaning 46m (142.5 ft) below that lowest recorded water depth. Any released hydrocarbons that reach the dam would need to mix within the water column to at least 142 feet below the lake surface. This is unlikely as near zero values of hydrocarbons are predicted at depths greater than 10m within a few miles of the crossing. *See* Table II-6.

**Table II-6. Predicted worst-case hydrocarbon contamination at representative locations at the downstream end of the model domain at the end of the 10-day modeling period.**

| Maximum Dissolved Hydrocarbon Concentration (µg/L) in region of intake locations | | | | |
|---|---|---|---|---|
| **Depth Bin** | **26.8 Miles Downstream** (b) (7)(F) [redacted] | **38.7 Miles Downstream** (b) (7)(F) [redacted] | **43.0 Miles Downstream** (b) (7)(F) [redacted] | **47.1 Miles Downstream** (b) (7)(F) [redacted] |
| 0-5 m (0 to 16.4 ft) | 145 | 58 | 62 | 38 |
| 5-10 m (16.4 to 32.8 ft) | 74 | 2 | 61 | 18 |
| 10-20 m (32.8 to 65.6 ft) | 0 | 0 | 1 | 2 |
| 20-25 m (65.6 to 82.0 ft) | 0 | 0 | 0 | 0 |
| Maximum in water column | 145 | 58 | 62 | 38 |

Agricultural intakes along Lake Oahe typically need to be installed only 20 feet below the lake surface in lake environments. Therefore, agricultural intakes are not anticipated to be deep permanent intake structures. Rather, the agricultural intake tubes/pipes are usually moveable and extended into the reservoir based on anticipated reservoir water elevations. As a result, it was not possible to rule out the presence of agricultural intakes within the top 10m (31.4 ft), where the modeling shows that some level of hydrocarbons could be present if a spill were to occur. Each of the modeled water intakes has the potential for elevated total and dissolved hydrocarbons. It is likely that advisories will be issued to not use Lake Oahe water for irrigation or stock water purposes, if elevated hydrocarbons are detected at any of the irrigation intakes along Lake Oahe. Since the results of the ETP modeling show that elevated hydrocarbons are expected to only occur for a few days at any given location, the potential impacts to crop yield would be insignificant if there are any impacts at all. Downstream Receptor Report at 92.

In the event of a spill, the intake owners of potentially impacted downstream agricultural irrigation intakes would be contacted and advised of the date and time that the plume is expected to reach the relevant intake location. The owners would also be informed of the number of days the plume is expected to travel over the specific intake and be advised to suspend withdrawals for anticipated plume travel time over that intake (nominally four days) plus a conservative buffer time. Alternatively, the agricultural intakes could be extended to the middle of the channel through the use of additional pipes to draw from deeper parts of the lake where the modeling has predicted that impacts would be insignificant or non-existent. Downstream Receptor Report, Section 3.2.

Based on the preceding analysis, no significant potential health effects to humans are anticipated. Despite the evidence of minimal risk of effects to downstream water intakes, the Corps further refined its analysis to ensure there was not a disparate impact to low-income or minority populations based on impacts to water resources. The same methodology discussed above for Geographic Extent (Section II.C.1) was utilized for the evaluation of the drinking water intake distribution impacts. This includes the analysis of census block groups within all drinking water districts that have an intake located on the Missouri River or Lake Oahe from: 1) the North

Bismarck Alternative crossing to the DAPL crossing (approximately 56 miles);[26] and 2) the DAPL crossing to the CRST intake (approximately 156 miles south of the DAPL crossing). The drinking water intake distribution as it relates to the presence of minority and low-income populations is presented in Table II-4 and Figure II-4-A and B.

Telephone interviews were conducted with public water districts in the analysis area to confirm the location of water intakes/Missouri River well fields as well as the water distribution in the respective districts. Water supply distributors were chosen for interview based on known intakes/wells utilizing the Missouri River or geographic proximity to the Missouri River (i.e., water district bordering the Missouri River).

For the drinking water supply analysis, all census block groups that are served by the various water supply districts/areas were analyzed to determine whether they contained minority populations. The analysis area includes 56 miles downstream from the North Bismarck crossing to the DAPL crossing, as well as 156 miles downstream from the DAPL crossing to the CRST intake. As shown in Table II-3 above, the populations impacted by an oil release to the Missouri River at either the North Bismarck Alternative or DAPL crossing would include both minority and non-minority populations. It was assumed that Tribal intakes along the Missouri River served all the populations within the Reservation boundaries. This may be overly conservative, though, because some areas within the Reservation boundaries may be served by wells away from the river.

As indicated in Table II-7 and Figure II-1 the first drinking water intakes on the Missouri River (approximately two miles downstream of the North Bismarck Alternative crossing and seven miles north of the City of Bismarck) are the SCRWD Missouri River well field intakes. According to Larry Kassian, Executive Director of SCRWD, this well field consists of nine wells directionally drilled under the Missouri River. These wells are drilled and completed to depths of 15 to 35 feet in the gravel deposits directly below the bottom of the river. The wells extend laterally beneath the river with distances of approximately 30 to 90 feet within permeable gravel and sandy deposits. They were installed in order to utilize Missouri River water/groundwater at the river/groundwater interface. During pumping, a blending of groundwater and Missouri River water is utilized by the wells. At higher pumping rates, a greater percentage of water is pulled from the Missouri River and the travel time through the river sediments below the Missouri River to the wells is decreased.

[26] The North Bismarck analysis stops at 56 miles because beyond the Lake Oahe crossing the impacts would begin to be repeated for the overlapping areas. For example, the impact areas for the next five miles of the North Bismarck crossing (miles 57-62), would be the same as those for the first five miles of the DAPL crossing (miles 0-5).

**Table II-7. List of Tribal and Non-Tribal Drinking Water Intakes Downstream of the North Bismarck Alternative and Lake Oahe Crossings**

| **Intake/ Owner**<br>[Intake #s When Present Correspond to RPS Spill Model Report+] | **Distance Downstream from North Bismarck Crossing (miles)** | **Distance Downstream from Lake Oahe Crossing (miles)** |
|---|---|---|
| South Central Regional Water District<br>Missouri River Horizontal Drinking Water Intake Well Field* (non-Tribal) | 1.9 – 2.0 | N/A |
| City of Mandan<br>Surface Water Intake (non-Tribal) | 7.1 | N/A |
| City of Bismarck<br>Surface Water Intake (non-Tribal) | 11.6 | N/A |
| City of Bismarck<br>Missouri River Horizontal Drinking Water Intake Wells* (Installed Within Gravel Unit Interface Below Missouri River) | 12.3 | N/A |
| Intake #5 South Central Regional Water District Drinking Water Intake (non-Tribal) | 67.3 | 11.3 |
| Intake #7 Former Fort Yates Drinking Water Intake (Tribal). Not in use. | 82.8 | 26.8 |
| City of Mobridge Drinking Water Intake (non-Tribal) | 127.5 | 71.5 |
| Intake #14 SRST Replacement Drinking Water Intake (Tribal) | 131.4 | 75.4 |
| WEB Water District Drinking Water Intake (non-Tribal)** | 141.5 | 85.5 |
| Gettysburg Drinking Water Intake (associated with the - Mid-Dakota Rural Water District Intake)<br>(non-Tribal). Not in use. | 172.6 | 116.6 |
| CRST's Drinking Water Intake (Tribal) | 212.5 | 156.5 |
| Mid-Dakota Rural Water District Intake (non-Tribal) | 252 | 196 |
| Mni Wiconi Water Intake*** (Tribal/non-Tribal) | 261.0 | 205.0 |

+ Only certain representative drinking water intakes downstream of the DAPL crossing were utilized in the Spill Model Report (RPS, 2018). T referenced by intake #.
* Both the SCRWD Drinking Water Intake Wells and the City of Bismarck Drinking Water Intake Well were installed horizontally beneath the Missouri River at the river/groundwater interface. The SCRWD Missouri River Horizontal Drinking Water Intake Well Field consists of nine intake wells.
** WEB Water District also provides drinking water for State Line Water Cooperative.
***This intake is managed by the OST but serves both Tribal and non-Tribal communities. This water intake serves several regional water systems that were all combined into one large system. Because of the Reservation boundaries and census block groups on the west side of Lake Oahe with minority populations, this analysis assumed that all of the intakes on the west side are Tribal. Likewise, due to the location of the intakes and the registered water rights owners as well as the presence of non-minority census block groups on the east side of Lake Oahe, it is assumed that the selected intakes on the east side of Lake Oahe are non-Tribal.

The City of Mandan and the City of Bismarck have drinking water intakes 7.1 and 11.6 miles, respectively, downstream of the North Bismarck Alternative crossing. The City of Bismarck also has a horizontal collection well under the Missouri River, 12.3 miles downstream of the North Bismarck Alternative crossing.

This analysis assumed that a pipeline located at the North Bismarck location would be placed well below the river within less permeable geologic units (as described for the Lake Oahe crossing). However, similar to the assumptions made for the DAPL at the crossing, any leak from the pipeline under the river would somehow have to rise through the more impermeable geologic units and reach the Missouri River. It would have to pass through the shallow groundwater contained within the gravel deposits below the Missouri River before reaching the river. The potential impacts to drinking water intakes associated with the North Bismarck Alternative would be greater than with the DAPL crossing. At least one non-Tribal drinking water intake is located upstream of each Tribal drinking water intake and would be impacted together with any respective downstream Tribal intake. No disproportionate impacts are anticipated to minority or low-income populations.

Since no drinking water impacts are anticipated from a release at the Lake Oahe crossing, there is no need for a separate analysis of impacts beginning upstream at the North Bismarck Alternative. In any event, such an analysis would yield no differences in potential impacts to low-income or minority populations. An analysis of 156 miles downstream from the North Bismarck Alternative would include the first 56 miles to the DAPL crossing and then the first 109 miles downstream of the DAPL crossing. Therefore, both alternatives would include the SRST replacement intake located approximately 75 miles south of the DAPL crossing. As noted in the discussion related to the effects downstream of the Lake Oahe crossing, there are no expected impacts at the point of the SRST replacement intake.

This analysis reaffirms the finding in the Final EA regarding the north Bismarck Alternative. Final EA, at 8. Based on the modeled extent and transport of oil from a potential spill, and the location, siting and operation of the water intakes, this analysis finds that no significant potential health effects to humans are anticipated through water intake exposure. The demographic analysis supports the finding that in the unlikely event of a spill, there is no disproportionately high or adverse effects to minority or low-income populations from potential effects to water intakes.

D. The North Bismarck Alternative

As shown in Table II-4 above, the populations potentially impacted by an oil release into the Missouri River within 56 miles downstream of the North Bismarck Alternative crossing would include a variety of minority and non-minority populations. Five of the census block groups that intersect the one-mile analysis buffer qualify as minority populations. In total, there are approximately 4,594 minority individuals within the census block groups that intersect the one-mile analysis buffer. By way of comparison, there are approximately 4,162 minority individuals within the block groups that intersect the one-mile analysis buffer within the first 56 miles downstream of the DAPL Lake Oahe crossing (the same distance covered by the North Bismarck Alternative analysis). Thus, the Lake Oahe crossing produces fewer potentially affected minority individuals than does the North Bismarck Alternative crossing. The same is true at the county level. The minority population of the two counties immediately adjacent to the North Bismarck Alternative crossing (Morton and Burleigh Counties) is 10,372. In the four counties within 56 miles downstream of the DAPL Lake Oahe crossing (Sioux County, ND and Corson County, SD on the west side; and Emmons County, ND and Campbell County, SD on the east side),[27] the total number of minority individuals is approximately 6,825.

Similar to the minority population results, there are fewer low-income individuals within the census block groups intersecting the one-mile buffer that runs downstream from the DAPL crossing at Lake Oahe than there are in the one-mile buffer running the same distance downstream of the North Bismarck Alternative crossing. Approximately 4,067 low-income individuals live within the block groups that intersect the one-mile analysis buffer for the 56 miles from the North Bismarck Alternative crossing to the northern boundary of the DAPL Lake Oahe crossing analysis area, but only approximately 1,860 low-income individuals live within the block groups that intersect the one-mile analysis buffer within the first 56 miles downstream of the Lake Oahe crossing. The low-income population of the two counties immediately adjacent to the North Bismarck Alternative crossing (Morton and Burleigh Counties) is 9,522. The total for the four counties within 56 miles downstream of the DAPL crossing is approximately 3,988 low-income individuals

As explained in the previous section, a release to the river at the North Bismarck crossing location could also potentially impact three drinking water intakes within the 56-mile North Bismarck Alternative analysis area as indicated in Table II-8.

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[27] A release traveling 56 miles downstream of the Lake Oahe crossing would only reach approximately the midpoint of the two referenced South Dakota counties (Corson County on the west side and Campbell County on the east side) after passing the two referenced North Dakota counties (Sioux County on the west side and Emmons County on the east side).

**Table II-8. Drinking Water Intakes Downstream of the North Bismarck Alternative Crossing.**

| Drinking Water Intake/ Owner | Distance (miles) Downstream from North Bismarck Crossing Location |
|---|---|
| South Central Regional Water District<br>Missouri River Horizontal Drinking Water Intake Well Field (non-Tribal) | 1.9 – 2.0 |
| City of Mandan<br>Surface Water Intake (non-Tribal) | 7.1 |
| City of Bismarck<br>Surface Water Intake (non-Tribal) | 11.6 |
| City of Bismarck<br>Missouri River Horizontal Drinking Water Intake Wells (Well Installed Within Gravel Unit Interface Below Missouri River) | 12.3 |

The analysis reaffirms the conclusions in the EA regarding the environmental justice implications of the alternative route. This analysis finds that the Lake Oahe crossing area contains fewer potentially affected minority individuals than does the North Bismarck Alternative crossing, and that water intakes (and the minority and low-income populations that rely on them) would be at greater risk with the North Bismarck alternative.

E. Conclusion

The Corps' review of environmental justice on remand finds that there is not a significant potential environmental effect to low-income or minority populations requiring further analysis in an environmental impact statement or requiring any additional mitigation. The primary basis for this finding is that significant adverse human health or environmental effects are not expected to impact any population downriver of the Lake Oahe crossing due to the low risk of a large or catastrophic spill. Notwithstanding that conclusion, the Corps performed an analysis of the area downstream of the Lake Oahe crossing all the way to the Cheyenne River Sioux water intake to assess whether granting Section 408 permission and conveying a right-of-way to ETP to construct and operate a portion of DAPL under federally-owned Corps-managed federal land results in disproportionately high and adverse human health or environmental effects on minority populations, including Tribes, and low-income populations in the unlikely event of a large spill. This analysis validates the conclusions in the EA and the Corps' review on remand does not reveal "significant new circumstance[s] or information relevant to environmental concerns." 40 C.F.R. § 1502.9(c). Therefore, the Corps concludes that a formal reconsideration of the July 2016 Final Environmental Assessment and Finding of No Significant Impact or the preparation of supplemental National Environmental Policy Act documentation is not required.

# III. Review of Expert Reports and Comments and the Highly Controversial Intensity Factor

A. Introduction

The Council on Environmental Quality regulations suggest that one factor that an agency should consider in evaluating the intensity of a proposed action's impact is "[t]he degree to which the effects on the quality of the human environment are likely to be highly controversial." 40 C.F.R. § 1508.27(b)(4). The CEQ regulations do not define the phrase "highly controversial" or establish a standard for the determination. Courts have interpreted the term "controversial" to refer to "cases where a substantial dispute exists as to the size, nature, or effect of the major federal action rather than to the existence of opposition to a use." *Town of Cave Creek, Arizona v. FAA*, 325 F.3d 320, 331 (D.C. Cir. 2003) (quoting *Found. for N. Am. Wild Sheep v. Dep't of Agric.*, 681 F.2d 1172, 1182 (9th Cir. 1982)). Many courts have found that "scientific or other evidence that reveals flaws in the methods or data relied upon by the agency in reaching its conclusions" constitutes a "controversy." *Nat'l Parks Conservation Ass'n v. United States*, 177 F. Supp. 3d 1, 33 (D.D.C. 2016) (citing *Nat'l Parks & Conservation Assoc. v. Babbitt,* 241 F.3d 722, 736-37 (9th Cir. 2001).

On July 25, 2016, the Corps granted Dakota Access, LLC (ETP) a Section 408 permission to place a portion of the Dakota Access Pipeline Project (DAPL) on federal real property interests acquired and managed for the Oahe Dam/Lake Oahe Projects in North Dakota. USACE_DAPL0071225. On February 8, 2017, the Corps granted and conveyed "an easement for a fuel carrying pipeline right-of-way for the installation, construction, operation, maintenance, repair, replacement and termination of a thirty-inch (30) diameter, HDD buried oil pipeline for the purpose of transporting crude oil…" USACE_ESMT000001. Between the two federal actions, the Corps received comments and reports from the Standing Rock Sioux Tribe (SRST), Cheyenne River Sioux Tribe (CRST), Yankton Sioux Tribe (YST), and Oglala Sioux Tribe (OST). In addition to the documents received before February 8, 2017, the Corps also reviewed comments and reports from the Tribes received after February 8, 2017. The comments concerned Tribal practices, the potential impacts of a spill on specific issues of concern, and emergency response coordination issues.

For the purpose of this analysis, the major federal action is the granting of the right-of-way under the Mineral Leasing Act, 30 U.S.C. § 185. The dimensions of the easement are 50 feet to include the diameter of the pipeline and spans portions of Morton and Emmons Counties in North Dakota. USACE_ESMT000017. The purpose of the easement is to install a portion of the DAPL on Corps-managed lands to transport at least 570,000 barrels of crude oil per day from the Bakken and Three Forks production region in North Dakota to a crude oil hub located near Patoka, Illinois. The comments received between July 25, 2016 and July 23, 2018 do not dispute the size or nature of the easement. Rather, the Corps generally categorized the comments as alleged disputes as to the effect of granting a 50-foot wide easement, and in particular, the effects of an operational failure of the portion of the installed pipeline within the easement.

In order to consider the degree to which the effects of the federal action are likely to be highly controversial, the Corps requested that ETP perform a factual and technical analysis of issues presented in the Tribal documents. See Corps letter to ETP (August 24, 2017). These issues included the design; construction; proposed operation; pre-operational integrity threat/risk analysis; risk mitigation systems; the impact of a potential spill from the pipeline on downstream ecological receptors, human receptors such as hunting, fishing, recreation and cultural practices; and environmental justice. The Corps similarly initially requested information from the SRST, CRST, YST, and OST on September 25, 2017. Multiple Corps representatives, including specialists and technical experts in the fields of water resources, engineering, environmental resources, geographic information systems, and modeling, reviewed the information provided by ETP and the Tribes.

The Corps met with ETP numerous times, including on October 19, 2017, November 28, 2017, January 11, 2018, February 8, 2018 and March 7, 2018 about the information they provided and information that was still pending at the time. ETP invited the SRST and CRST to the January 11, 2018, February 8, 2018, and March 7, 2018 meetings, but the Tribes declined to either attend and/or participate. The Corps met with SRST representatives on March 26, 2018 and May 22, 2018 to discuss information submitted by SRST. The Corps met with the CRST on May 29, 2018 to discuss information submitted by CRST. The Corps met with the YST on May 31, 2018 to discuss information submitted by YST. The Corps met with the OST on June 1, 2018 to discuss information submitted by OST. In addition to the letters, written comments, expert reports, and transcripts the Corps received from tribal meetings, the Corps considered all information verbally communicated at the meetings with the Tribes. Table III-1 is an index of documents that the Corps received from the Tribes, which the Corps then reviewed. The documents present issues concerning the design, construction, proposed operation, pre-operational integrity threat/risk analysis, and risk mitigation systems.

**Table III-1. Index of Documents**

| ID | Common Name | Document Title | Dated |
|---|---|---|---|
| Documents Received Prior to February 8, 2017 | | | |
| A | EarthFax Letter | **Review of the Dakota Access Pipeline Project**<br>Letter to President John Yellow Bird Steele and Members of the Tribal Council Oglala Sioux Tribe<br>Richard White, PE; Earthfax Engineering Group | 12/2/2016 |
| B | Accufacts | **Accufacts Review of the U.S. Army Corps of Engineers (USACE) Environmental Assessment (EA) for the Dakota Access Pipeline ("DAPL")**<br>Memorandum to Jan Hasselman, Earthjustice<br>Richard Kuprewicz | 10/28/2016 |
| C | Envy Report | **Technical Engineering and Safety Assessment: Routing, Construction and Operation of the Dakota Access Pipeline in North Dakota**<br>ENVY Enerji ve Cevre Yatirimlari A.S.<br>*Attachment A-7 of Declaration of Rollie E. Wilson* | 1/5/2017 |
| D | Nezafati Report | **Examining the Potential Adverse Impacts of the Dakota Pipeline Crossings to the Water Quality at the Cheyenne River Sioux Tribe Water Intake in the Missouri River**<br>*Attachment A-10 of Declaration of Rollie E. Wilson* | 01/2017 |
| J | Wilson Decl., Attachment A | **Cheyenne River Sioux Tribe's Preliminary Informational Paper Concerning Dakota Access LLC's Request for an Easement to Cross Lake Oahe, North Dakota,** Pursuant to 30 U.S.C. § 185<br>Harold Frazier<br>*Attachment A of Declaration of Rollie E. Wilson in Support of Cheyenne River Sioux Tribe's Motion for Summary Judgement Wilson Decl. Filed February 22, 2017* | 1/18/2017 |
| 5 | Kelly Declaration | **Declaration of Jeff Kelly**<br>Director of Game, Fish, and Wildlife SRST<br>*Filed February 14, 2017* | 11/28/2016 |
| 6 | Bowser Report | **Assessment and Review, Dakota Access Pipeline Environmental Assessment Terrestrial and Aquatic Organisms**<br>Dr. Gillian Bowser, PhD<br>*Attachment A-9 of Declaration of Rollie E. Wilson* | 01/2017 |
| Documents Received After February 8, 2017, but Prior to 2018 | | | |
| E | Kuprewicz Declaration- 2 | **Second Declaration of Richard B. Kuprewicz** (ECF No. 195-1)<br>Earthjustice | 3/24/2017 |
| F | Kuprewicz Declaration | **Declaration of Richard B. Kuprewicz** (ECF No. 272-1)<br>**<u>CONFIDENTIAL</u>**<br>Earthjustice | 2/12/2017 |
| G | Holmstrom Declaration | **Declaration of Donald Holmstrom**<br>Earthjustice | 8/7/2017 |
| H | Goodman Declaration | **Declaration of Ian Goodman**<br>Earthjustice | 8/7/2017 |

| | | | |
|---|---|---|---|
| I | Goodman Exhibit | **Declaration of Ian Goodman, Section 4- Exhibit C**<br>The Goodman Group | 8/7/2017 |
| | | Documents Received in 2018 | |
| K | SRST EJ Analysis | **An Environmental Justice Analysis of Dakota Access Pipeline Routes**<br>Robin Saha, Ph.D. and Paul Mohai, Ph.D. | 2/23/2018 |
| L | SRST Oil Spill Impact Report | **Impacts of an Oil Spill from the Dakota Access Pipeline on the Standing Rock Sioux Tribe**<br>Mike Faith, Jr. Chairman<br>Standing Rock Sioux Tribe | 2/21/2018 |
| M | SRST Appendices (Extension of L) | **Impacts of an Oil Spill from the Dakota Access Pipeline on the Standing Rock Sioux Tribe - Appendices CONFIDENTIAL**<br>Mike Faith, Jr. Chairman<br>Standing Rock Sioux Tribe<br>**Appendix C: SRST's Notice of Intent Comments on the Dakota Access Pipeline to the Army Corps of Engineers**<br>**Appendix E: SRST Technical Team Fatal Flaw Analysis Lake Oahe HCA Pipeline Crossing: Safety Instrumented Systems Report**<br>**Appendix F: Preliminary Report: Landslides in the Vicinity of the Dakota Access Pipeline Crossing of the Missouri River Near the Standing Rock Indian Reservation** | 2/21/2018 |
| N | Oglala-White Letter | **Preliminary Evaluation of Dakota Access Pipeline Emergency Response Plans**<br>Richard B. White, P.E., PLLC | 4/18/2018 |
| O | CRST | **Cheyenne River Sioux Tribe Letter and Attachments** | 4/18/2018 |
| P | Yankton KSE Affidavit | **Affidavit of Kip Spotted Eagle**<br>Kip Spotted Eagle, Yankton Sioux Tribal Historic Preservation Officer | 4/19/2018 |

*The non-sequential listing of letter or number identifiers is due in part to the timing of the receipt of documents and the Corps' coordination with ETP related to supplemental information requests. Among the items requested in that letter was a factual and technical analysis that addresses the issues presented in nine documents (listed in Corps letter under Item 2, letters "A" through "I"). Corps letter to ETP, August 24, 2017.

For its internal review process here, the Corps categorized the comments from the tribes into six general categories: risk, regulatory compliance, other design considerations, installation inspections, operation and maintenance, and NEPA process. The Corps further categorized the risk comments into eight subcategories: incident occurrence, threatened and endangered species, pipeline damage, operator performance, spill volume, spill response, spill impacts, and mitigation. The Corps further categorized the regulatory compliance comments into two subcategories: design guidelines (leak detection), and easement conditions and compliance. The Corps further categorized the other design considerations comments into four subcategories: materials, valves, HDD crossing, and high consequence area. The Corps then categorized the installation inspections comments into two subcategories: hydrostatic testing, and radiographic testing. The Corps also categorized the NEPA process comments into two subcategories: EA

Content, and EA Content (climate change).  Table III-2 presents a general summary of the comments.

**Table III-2. Summary of Concerns**

| Category | Issue | Summary of Concerns | Document ID |
|---|---|---|---|
| Risk | Risk Evaluation<br>(Incident Occurrence) | A quantitative analysis of the risk associated with failure of system components should have been provided in the EA.<br>The evaluation and conclusion of spill risk and spill volume are not adequate.<br>The risk analysis is missing critical details. | A, B, C, E, F, G,H, J, K, L, M, 6 |
| Risk | Risk Evaluation<br>(Threatened & Endangered Species) | Survey approach for endangered species in the area was insufficient to detect those species.<br>The surveys were conducted at seasonally inappropriate times for the organisms in question. | 6 |
| Risk | Risk Evaluation<br>(Pipeline Damage) | Scour analysis should have been performed with dam breach scenario.<br>Provide basis for scour calculations.<br>Clarify risk of landslide.<br>Describe erosion control practices used, in particular where ground slope is less than 25%.<br>Third party damage is not the leading cause of liquid transmission pipeline ruptures.<br>Clarify causes of pipeline ruptures and risk of damage during construction. | A, B,C, E, F, I, J, L, M |
| Risk | Risk Evaluation<br>(Operator Performance) | Operator’s safety performance record should be considered in risk evaluation.<br>A safety culture survey of the company should be conducted. | E, G, J, L, M |

| Category | Issue | Summary of Concerns | Document ID |
|---|---|---|---|
| Risk | Spill Model (Spill Volume) | Worst-case scenario spill volume was understated.<br>Spill volume understated to due overstatement of closure time of valves.<br>Lowest mean daily discharge rates should be used.<br>Report fails to capture the significantly higher transient flow rates associated with rupture.<br>A broader pipeline elevation should be used for pipeline siting and valve placement.<br>The EA did not adequately address how contaminants would travel up and through naturally-occurring geological cracks. | A, B, C, D, E, F, G, J, K, L, M |
| Risk | Spill Response | Provide an updated winter spill scenario considering movement of oil beneath ice and slower response times.<br>Consider specific oil properties, including volatility and flammability, in spill response.<br>Engage and train tribe in spill response plan.<br>Confidential documents.<br>Bioaccumulation in benthic organisms. | B, C, G, J, 6, L, M |
| Risk | Spill Impacts | Perform quantitative assessments of individual crude-oil constituents, other than benzene.<br>Water quality limits used were inappropriate.<br>Evaluate contaminant movement and impact under winter spill scenario.<br>Consider that properties of spilled oil can change over time, and be a continuous source of toxic substances such as benzene and PAHs.<br>Consider impacts from oil spills to underlying aquifers and downstream drinking water intakes, vegetation, fish, and wildlife, as well as threatened and endangered species. | A, B, C, D, G, J, 5, 6, L |

| Category | Issue | Summary of Concerns | Document ID |
|---|---|---|---|
| Risk | Mitigation | Sufficient and specific mitigation for spill events is not included in EA. Mitigation measures should be in place prior to operation.<br>Specify mitigation measures for water intake locations and leaks under Lake Oahe in the SPCC Plan.<br>Provide evaluation of spill response if immediate remediation is not possible/ adequate to eliminate a continuous source of contamination to the river. | A, C, D, J, L, M |
| Regulatory Compliance | Design Guidelines<br>(Leak Detection) | Leak detection system is not adequately characterized within the EA and supporting documents, or is overstated.<br>Provide additional information on remote leak detection and response. Provide additional design detail and a quantitative analysis of the risk associated with failure of system components. | B, C, D, E, F, G, J, L, M |
| Regulatory Compliance | Easement Conditions and Compliance | The USACE must take into consideration the interplay between the proposed pipeline and the substantive statutory provisions in the Flood Control Act, which governs Lake Oahe.<br>Additional requirements imposed by USACE Conditions are existing requirements.<br>Dakota Access has failed to address and ensure that the right-of-way it seeks will not violate applicable air and water quality standards; damage the environment; result in hazards to public health or safety; or negatively impact the interests of individuals living the area who rely on the fish, wildlife and biotic resources of the area for subsistence purposes. | E, J, K, L, M |
| Other Design Considerations | Materials | Provide description of pipe bedding, if used, and the type of fusion bonded epoxy, or FBE, coating used. | A |
| Other Design Considerations | Valves | Potential for surge damage.<br>Length of time to shut the valves in the event of a leak.<br>Components should be designed for winter conditions. | A, B, F, G |

| Category | Issue | Summary of Concerns | Document ID |
|---|---|---|---|
| Other Design Considerations | HDD Crossing | Extremely long HDD has extreme risk, is not proven and presents inspection and maintenance issues. | C, L, M |
| Other Design Considerations | High Consequence Area | The analysis does not accurately or adequately assess and include engineering and construction risks, or the fact that Lake Oahe is the fourth largest freshwater reservoir in the United States supplying water to millions of people. | B, C, E, F, G, J, L |
| Installation Inspections | Hydrostatic Testing | Hydrostatically test the pipeline after it is installed. | A, E |
| Installation Inspections | Radiographic Testing | Weld/ radiographic testing protocols are poorly defined or inadequate. | B, C, F |
| Operation and Maintenance | Pipeline Integrity | Discuss pipeline inspections tools including calibration.<br>Provide additional detail on in-line inspection tools related to action thresholds, corrosion threats and detection of transportation cracking.<br>Quality assurance /quality control protocols are warranted. | B, C, E, M |
| NEPA Process | EA Content | Relevant pipeline system information important to the federal crossings has not been provided in the EA.<br>Worst-case impact to the federal easements and unusually sensitive areas has not been provided in the public documents associated with the EA.<br>An engineering design and safety risk assessment was not conducted by DAPL.<br>Projects like DAPL should logically consider a comprehensive comparison and evaluation of a broader range of alternatives.<br>Lack of any environmental justice analysis in the EA.<br>Dakota Access is not financially capable. | B, C, D, E, G, H, I, J, K, L, M |
| NEPA Process | EA Content (Climate Change) | The pipeline would contribute to man-made climate change by building up the country's oil infrastructure. | D, L, M |

In response to some of the comments received, the Corps required ETP to produce the spill model report, address data gaps, and explain the selected methodologies. ETP performed additional computation modeling of the Lake Oahe DAPL crossing. Spill Model Report at ii; *See also* Downstream Receptor Report at i. OILMAPLand and SIMAP models "have been validated against real world releases and have been used extensively in the United States and internationally to meet regulatory requirements and other recommendations and guidelines." Spill Model Report at 15, 23. The Downstream Receptor Report incorporated input from the tribes.

In the Review and Analysis of Tribes' Submissions (August 31, 2018) (Submission Review), the Corps synopsized the Tribes' comments. ETP responded to the Tribes' comments asserting insufficiencies and inadequacies in the methodologies selected by providing supplemental information detailing the validity of the methodology and clarifying misconceptions. The Corps presents its responses, along with ETP's responses, to the comments received from the Tribes and their experts in Submission Review. The responses to the excerpted comments are specific to the Lake Oahe Segment unless otherwise noted. Also, some of the descriptions apply to both of the Project crossings of the Missouri River or the pipeline as a whole. But the main focus here is the Lake Oahe segment.

The Corps considered all of the comments from the documents indexed in Table III-1 and ETP's responses. Many of the comments characterized in the Submission Review generally illustrated a misunderstanding of previous analysis or general disagreement with the scope of the analysis. The Corps characterizes 28 of 339 comments the Corps received between July 25, 2016 and July 23, 2018, as potentially disputing the conclusions reached by the Corps, and the data and scientific methodologies utilized to assess the effects of the major federal action. The Corps then evaluated these 28 comments to determine whether they implicated the NEPA highly controversial intensity factor. In summary, none of the comments show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

B. Analysis

1. In December 2016, the OST submitted comments from EarthFax Engineering Group, LLC. Review of the Dakota Access Pipeline Project, Environmental Assessment Related to Crossings of Flow Easements and Federal Lands (December 2, 2016) (EarthFax Letter). EarthFax critiqued the EA for considering spill volumes from pipelines generally, rather than from pipelines with 16-inch or larger diameter. EarthFax Letter, at 1-3.

RESPONSE: EarthFax estimates the total volume of oil available for release in the event of a pipeline rupture at the 24" pipeline crossing of the Missouri River, and the 30" crossing of Lake Oahe. EarthFax's desktop estimation methodology started by determining the volume of oil that would pass a given point per unit of time based on the pipelines proposed 570,000 barrels/day (bbls/day) capacity. EarthFax then used estimates for average releases in the United States to assume a 3-minute response time to a release on the DAPL line. EarthFax then added to that quantity the volume of oil contained in a 24" or 30" diameter cylinder, respectively, that spans the length of the water body from estimated valve to valve. The second column of Table III-3 shows the EarthFax results as compared to the results of the initial DAPL spill modeling as reported in the May 2016 North Dakota Lake Oahe Crossing Spill Model Discussion ("Lake Oahe Crossing Report").

**Table III-3 Worst-Case Release Estimates**

| | **Document A EarthFax Estimate** | **DAPL Spill Model Results** |
|---|---|---|
| 24" Missouri River Crossing | 2,950 bbls | [redacted] bbls |
| 30" Lake Oahe Crossing | 4,620 bbls | [redacted] bbls |

As can be seen from Table III-3, ETP's estimated worst-case release volume for the Lake Oahe crossing exceeded the estimate based on the desktop calculation provided by Earthfax.

The PHMSA regulation requires a pipeline company to determine the relative impact of a hypothetical worse-case release in each of its emergency response zones. 49 C.F.R. § 194.105. On behalf of ETP, the WoodGroup Mustang, with data provided by RPS, used the OILMAPLand software to analyze the Missouri River and Lake Oahe crossings. According to ETP, this approach has been accepted by PHMSA and the Canadian National Energy Board, and is compliant with the U.S. pipeline integrity management rule 49 C.F.R. § 195.452. The model predicts a larger volume of oil at these crossings, partly due to the fact that the models incorporate the exact valve locations, proposed pump shutdown times, and valve closure rates.

As part of the analysis of these crossings, ETP estimated potential release volumes at Lake Oahe that are [redacted]% larger than those estimated by EarthFax. Spill models are designed to determine the relative impact of a hypothetical worst-case release in each of the Project's emergency response zones in compliance with 49 C.F.R. § 194.105. Spill models outputs are typically used for contingency planning and preparation of the Facility Response Plan (FRP). Accordingly, ETP performed modeling in order to develop the theoretical worst-case release volumes so that the response equipment and response team can be sized accordingly in compliance with 49 C.F.R. § 194.105.

The predicted spills generated by the model take a very conservative approach. Lake Oahe Crossing Report at 13. Using this approach, the predicted spills are larger and therefore overestimate the majority of spills seen in actual releases. This is due to a number of factors such as:

- Most releases are not caused by full ruptures of the pipeline.
- Due to anti-siphoning effects, a full gravity drain-down rarely occurs.
- The spill model assumes the pipeline is lying directly on top of the ground. In reality, the compacted back-fill over a buried pipeline restricts the volume that could be released during a spill and restricts the affected area.

- At water crossings, the spill model assumes that the pipeline is lying directly on top of the water. Because of the HDD crossing of the waterway, the overburden over the installed pipeline at least 92 feet below the lake restricts the spill volume that could be released and restricts the affected area.

To summarize, the Corps considered spill volumes well in excess of 100 bbls in the EA, consistent with EarthFax's suggestion. See EarthFax Letter at 3. ETP calculated a worst-case scenario specific to Lake Oahe following guidance in 49 CFR § 194.105. Final EA at 91. ETP estimated potential release volumes that are [redacted]% larger for the Lake Oahe crossing than the 4,620 bbls for a 30" pipe with a 3-minute response time that Earthfax indicated was realistic. Spill Model Report at iii.

Furthermore, some commenters asserted that a lack of specific information in publicly available documents about the calculation of the worst-case release values means that the estimates of potential spill volumes used for spill planning were unrealistically low. The calculation of the worst-case release values have been available to the Tribes and their experts as part of the administrative record in the district court proceeding. *See* USACE_DAPL72253.

As detailed above, the Corps considered the appropriate diameter of the pipeline and possible spill volume in accordance with EarthFax's comment. Therefore, this comment does not show that substantial dispute exists as to the size, nature, or effect of the major federal action because the comment does not show flaws in the methods or data the Corps actually relied on here.

2. EarthFax suggested that the EA used the incorrect river-flow rates to assess spill impacts. EarthFax Letter, at 4. EarthFax commented that "[a]t 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. . . ." According to EarthFax, the lowest mean daily discharge rates for the period of record is the more conservative discharge rate and relying on it would have resulted in findings of substantially higher estimated benzene concentrations at the Missouri River and Lake Oahe crossings.

RESPONSE: EarthFax asserts that using more conservative river-flow rates would result in substantially higher estimated benzene concentrations at each crossing. But EarthFax did not provide any scientific evidence or studies specific to discharge rates and benzene concentrations that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance on ETP's low-flow discharge rates instead of the lowest mean daily discharge rate for the periods of record. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major Federal action.

For further explanation, the lowest mean daily discharge rates for the period of record is the discharge rate for the one where the average flow rate was the lowest among all days considered. Even if the Corps used the lowest mean daily discharge rates in the calculations, the individual cells with exceedances for the individual categories within Table 3-7 of the EA would not have changed. Therefore, the use of lowest mean daily discharge rates would have no material impact on the assessment based on Table 3-7. Low flow rates are the appropriate unit of measurement instead of the lowest mean daily discharge rates for the period of record because the lowest mean daily discharge rates for the period of record is an absolute lowest value and may be an extreme outlier and not genuinely representative of conditions.

ETP performed additional spill modeling that includes low flow rates for Lake Oahe. In the Spill Model Report, the low flow condition was defined as being the 5th percentile daily flow rate for the 50-year period of record. Spill Model Report at 69. This provided for a statistical low flow over a wide range of flow rates without potentially introducing extreme outliers. The results are presented in the Spill Model Report. Spill Model Report at 70-73.

3. EarthFax commented that the EA relied on flawed data by focusing the worst-case scenario on benzene and generally asserted that quantitative assessments of individual crude-oil constituents should have been performed to ensure that benzene was the appropriate compound on which to focus. EarthFax Letter, at 5.

RESPONSE: The EA evaluated benzene as the appropriate water quality constituent because "based on the combination of toxicity, solubility, and bioavailability, benzene is commonly considered to pose the greatest toxicity threat from crude oil spills." Final EA at 46. According to ETP, although hydrocarbon components of crude oil have relatively limited solubility in water, the more water-soluble hydrocarbon components of crude oil are the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes). Spill Model Report at 43. A study that compared the calculated dissolved-phase concentrations of 69 crude oils found that benzene was the only aromatic or PAH compound tested that is capable of exceeding groundwater protection values for drinking water (O'Reilly et al. 2001). It also has the lowest concentration criteria of the four BTEX class categories in the North Dakota Administrative Code. N.D. Admin. Code § 33-16-02.1.

The Corps recognizes that benzene is volatile and that other hydrocarbon components are present and responsible for impacts beyond benzene. To further address this comment, ETP performed additional spill modeling using a pseudo component approach. Spill Model Report at 25. Under the pseudo component approach, the bulk hydrocarbon was broken into several groups and effects were determined based upon the chemical composition of the Bakken crude in its entirety. Spill Model Report at 76-79. The companion Downstream Receptor Report discusses the results relative to the drinking water standards. Downstream Receptor Report at 80-91.

Earthfax generally commented that a quantitative assessment of individual crude-oil constituents was appropriate but did not identify a particular assessment or the particular factors, criteria, or technique to perform the quantitative assessment. Earthfax did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion to rely on benzene as the appropriate compound or recommended pseudo component approach. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

4. Earthfax commented that the two benzene concentration limits for drinking water maximum contaminant level and aquatic organism acute toxicity level in the spill impact assessment was not the appropriate point of comparison for benzene in this project. EarthFax Letter at 5. Earthfax commented that the $LC_{50}$ value is not usually the appropriate standard against which comparisons should be made when evaluating ecological impacts. *Id.* EarthFax commented that the standard approach for an ecological risk assessment is to use the No Observed Adverse Effect Level concentration. *Id.* Earthfax also commented that the comparative benzene concentration limits in the EA do no account for the effects of water temperature on ecological risk. *Id.* at 6.

RESPONSE: The North Dakota Administrative Code, defines the "chronic standard" to mean the "four-day average concentration does not exceed the listed concentration more than once every three years." N.D. Admin. Code § 33-16-02.1-04. ETP determined the 5.0 µg/L level is the appropriate unit of measurement for the worst-cases spill analysis. Chronic toxicity levels are inappropriate for comparison to concentrations based on an accidental one-time release of a worst-case discharge. Rather, the chronic toxicity levels are for longer term exposures. Under chronic concentration conditions, fish may suffer growth, reproductive, or other long-term consequences. Even if the 2.2 µg/L surface water criteria was utilized in the EA, the results of an analysis utilizing the 2.2 µg/L level versus the 5.0 µg/L level would not be different since a 100 barrel spill event would result in an exceedance of the either standard. The Spill Model Report shows that a one-time event might lead to concentrations exceeding chronic limits in the water column for a period of hours, or at most days, at one location along the river but these concentrations would not likely persistently exceed the four-day average concentration more than once every three years.

ETP performed computational modeling under various scenarios (including winter low flow conditions) to evaluate the potential fate and transport of a release of crude oil into Lake Oahe. The Spill Model Report does not predict exceedances of drinking water standards for the location and depth of the now off-line Fort Yates intake. Spill Model Report at 172-177; *see also* Tom Thompson, US Bureau of Reclamation email to Larry Janis, USACE Omaha District (December 12, 2017)(stating that the Fort Yates intake is now off-line and scheduled for demolition). By the time the oil reached the location of the off-line Fort Yates drinking water intake (26.8 miles downstream of the crossing and taken off-line), the maximum concentration of dissolved hydrocarbons is predicted to be 145 µg/L in the top 5 meters of the water column. The maximum concentration of dissolved hydrocarbons is predicted to be 74 µg/L at 5-10 meters of depth below the surface. The maximum concentration of dissolved hydrocarbons is predicted to be 0 µg/L below 10 meters to the bottom of the river. The former Fort Yates drinking water intake was at a depth below 10 meters.

The Spill Model Report predicts further reduced concentrations in the upper layers at the SRST Replacement Intake, located 75.41 miles downstream of the Lake Oahe crossing. Downstream Receptor Report at 87; Spill Model Report at 175. Reduced concentrations may result due to dilution, volatilization from the dissolved phase to the atmosphere, adsorption to suspended particulate material and sedimentation, stranding on the shoreline or aquatic plants, or degradation. Spill Model Report at 175. The depth of the SRST Replacement Intake is 60-80 feet below the surface (19.1 to 25.5 meters) depending on water surface elevation; therefore, the concentration of dissolved hydrocarbons is also predicted to be 0 µg/L at the Tribal drinking water intake. Spill Model Report at 175. The Spill Model Report does not predict affects from the modeled hypothetical releases to the replacement water intakes for the SRST, or the water intakes for the CRST (approximately 156 miles downstream of the DAPL crossing), or OST (approximately 206 miles downstream of the DAPL crossing).

The minimum water depth recorded for Lake Oahe for the entire period of record was 1570.2 feet M.S.L. The discharge pipes for the dam are at an elevation of 1425 feet M.S.L -- 46 meters (142.5 feet) below the lowest ever water depth. Thus, any released hydrocarbons that reach the dam would need to mix within the water column to at least that depth. The Spill Model Report predicts near zero values of hydrocarbons at depths greater than 10 meters.

The modeling shows that concentrations of total and dissolved hydrocarbons would typically be present for less than four days in any particular location with peak concentrations present for only one to two days. Benzene would likely volatize and not be present in elevated concentrations downstream. Spill Model Report at 76-79. To reach the 5 µg/L drinking water standard for benzene would require a dissolved hydrocarbon concentration of 22.5 µg/L. And that this is a conservative assumption, as benzene is more soluble and volatile than the aromatic group as a whole.

Because of this, benzene would dissolve and evaporate more quickly than other compounds in the oil. By using the more persistent dissolved hydrocarbon compounds that are less soluble and volatile than benzene, this estimation of benzene from dissolved hydrocarbon compounds would tend to conservatively over-estimate the potential presence of benzene. Spill Model Report at 76-79.

The Corps considered EarthFax's recommendation to rely on a different concentration limit for benzene and determined, based on the above, it is not a more reliable concentration limit than the concentration limit relied on by ETP. Therefore, this comment does not show that substantial dispute exists as to the size, nature, or effect of the major federal action because the comment does not show flaws in the methods or data the Corps actually relied on here.

5. EarthFax commented that the EA oversimplifies oil recovery operations beneath ice and that a winter spill likely represents the worst-case scenario. EarthFax at 7. EarthFax commented that 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. *Id*. at 8.

RESPONSE: The Corps agrees with Earthfax that the recovery of oil under ice is difficult. The Corps considered spill response during sub-freezing temperatures and icy conditions in the EA. Final EA at 39. The Corps also considered impacts to groundwater during sub-freezing temperatures and icy conditions. Final EA at 47-48. To further address this concern, the Corps mandated full-scale winter/ice exercises at Lake Sakakwea and Lake Oahe as a condition to the easement. See Easement Condition 34. ETP tentatively scheduled winter exercises at Lake Oahe for February of 2019. Further, the Spill Model Report includes an assessment of the winter spill scenario of oil movement under the ice at Lake Oahe. Spill Model Report at 102.

EarthFax did not specifically identify an alternative methodology that was more appropriate for the evaluation. EarthFax generally commented that a more serious quantitative evaluation was appropriate but fails to identify a particular evaluation or the particular factors, criteria, or technique to perform the quantitative evaluation. EarthFax did not provide the results from its preferred quantitative evaluation to the Corps to consider and compare against ETP's winter spill scenarios. As a result, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action because a general statement that the EA should have presented a more serious, quantitative evaluation of the winter spill scenario does not show flaws in the methods or data the Corps actually relied on here.

6. EarthFax commented that the EA should have included a quantitative analysis of risk of failure of system components. EarthFax at 9.

RESPONSE: ETP asserts that quantitative risk assessments are not required by regulation, nor industry standard for the design of crude oil pipelines within the United States. ETP explained that prescriptive measures are nonetheless required that serve the purpose of providing independent protection layers for the applicable threats.

Specifically, during the design process, ETP evaluated the potential for incorrect operation and/or equipment failure at the terminals, pump stations, mainline valves, and pig launcher/ receivers. The control design is established to safeguard against incorrect operation using alarms and shutdowns to operate the pipeline within the guidelines of 49 C.F.R. § 195. The Corps considered numerous measures ETP would implement to minimize the risk of a pipeline leak and protect the users of downstream intakes. Final EA at 91-94. The design reports and risk planning documents associated with construction and operation of DAPL are described below.

The risk evaluation process for Lake Oahe involved the following:

- Risk Analysis: Based on the Sunoco Logistics Risk Algorithm Document (January 27, 2015), ETP generated qualitative risk results for the pre-operational Lake Oahe segment to evaluate the relative risk. ETP presented the results in a risk matrix and provided recommendations for potential risk reduction measures. Final Report, R-ETP-20160510: Dakota Access Pipeline Project Lake Oahe HDD Crossing Risk Analysis ("HDD Crossing Risk Analysis") (May 10, 2016).

- Integrity Management Plan: ETP provided the SXL - Pipeline Integrity Management Plan, ENGR-PR-0015 ("Pipeline Integrity Management Plan") (June 2015), and the SXL Risk Algorithm Document (January 27, 2015) to the Corps on May 9, 2016. The latter describes the methods and results of the Risk Assessment. ETP used this same algorithm in the Pipeline Integrity Management Plan.

- Threat and Consequence Assessment: ETP hosted a threat and consequence assessment workshop with subject matter experts to gain an understanding of the applicable threats to the integrity of the pipeline and consequences of a release at the Lake Oahe and Missouri River Crossing sections. The threat assessment approach was based on the American Society of Mechanical Engineers (ASME) standard ASME B31.8S, *Managing System Integrity of Gas Pipelines*. ETP employed this standard due to the comprehensive list of threats prescribed in Appendix A of that standard that are applicable to both liquid and gas pipelines. ETP's analysis of the hypothetical worst-case spill data indicated that the risk for the Lake Oahe crossing is not considered to be high; the risk ranking is between 2 and 3 (out of a possible 10, with 10 being the worst). Upon evaluation of the threat and consequence potentials, ETP identified the primary risk-drivers and provided the Corps with a summary of recommended mitigation measures to minimize the risk associated with the pipeline operation at the two HDD locations. Dakota Access Pipeline Project Threat Assessment Report: Missouri River and Lake Oahe HDD River Crossings (June 2016) ("Threat Assessment Report").

EarthFax included the highlighted table below with its summary of "71 incidents" [28] associated with pipelines having diameters of 16 inches or larger. Eartfax at 8. The highlighted portion of that table shows the most common causes of spills or incidences in the ten year period from mainline pipelines that were 16 inches or larger in diameter.

Keystone Incident Summary, January 2002-July 2012 (Highlights in Original).

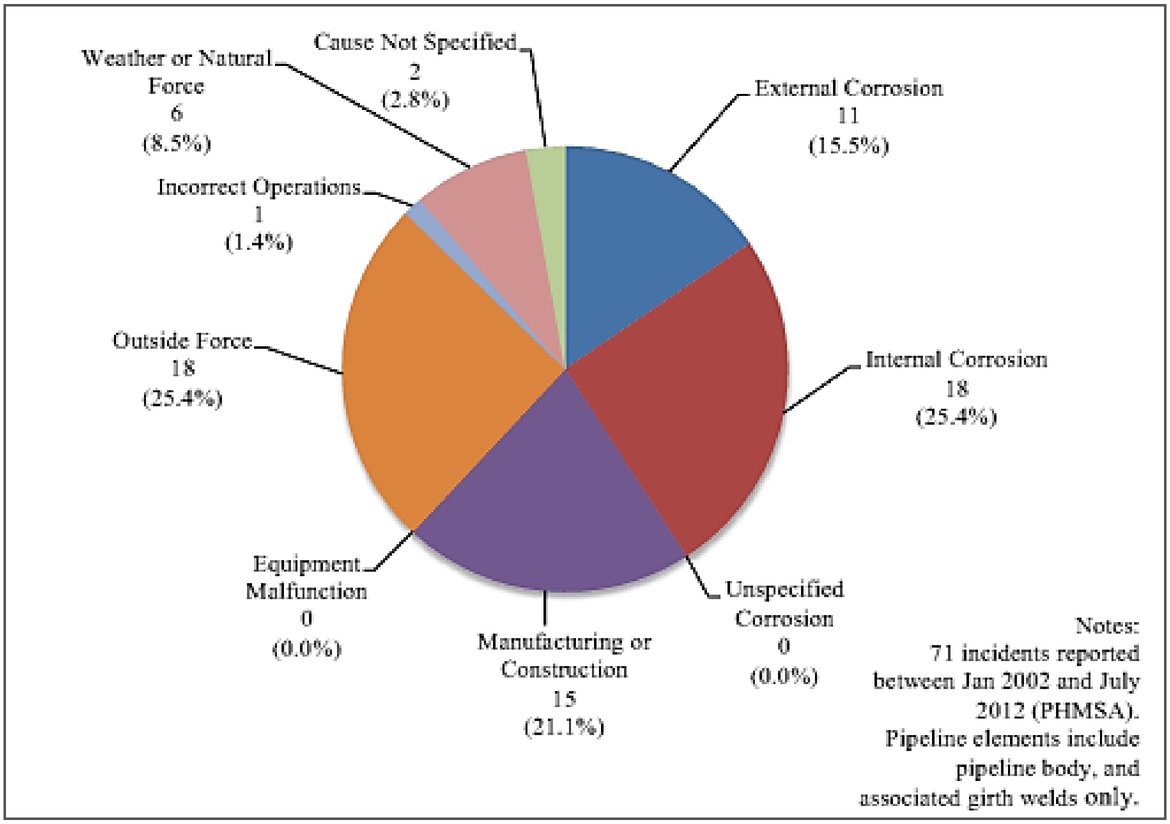
| Incident Category | EA Risk Rank | Keystone Incident Summary | |
|---|---|---|---|
| | | Number | Percent of Total |
| Third Party Damage | Low | 18 | 25.4 |
| External Corrosion | Low | 11 | 15.5 |
| Internal Corrosion | Low | 18 | 25.4 |
| Pipe Manufacturing Defects | Low | 15 | 21.1 |
| Construction-Related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

EarthFax created the table using data presented in the PHMSA Hazardous Liquid Pipeline Incident Data 2002-July 2012, and PHMSA Liquid Annual Pipeline Data 2011 (PHMSA, 2017). EarthFax excerpted this analysis of all pipeline incidents from analysis prepared for the Keystone pipeline. ETP claims that EarthFax does not present the full table of PHMSA data. ETP generated Figure III-1 and Table III-4 to illustrate the PHMSA data present in the two reports. Figure III-1 is identical to Figure 6 of the PHMSA reports and Table III-4 is identical to Table 7 of those reports.

[28] By the Corps count, there are 69 incidents listed in the Keystone Incident Summary provided by EarthFax.

**Figure III-1 Historic Incident Cause, Onshore Crude Oil Mainland Pipe, Diameters 16-Inch and Larger**

Keystone XL Pipeline Project




Representation of Figure 6 from PHMSA Hazardous Liquid Pipeline Incident Data 2002-July 2012, and PHMSA Liquid Annual Pipeline Data 2011.

**Table III-4 Historic Incident Summary, Onshore Crude Oil Pipeline System, Tanks**

| Item | Value | Unit |
|---|---|---|
| January 2002 – July 2012 | 10.58 | Years of data |
| Total Incidents | 93 | Reported incidents |
| Pipeline Mileage | 537,295 | Mile-years |
| Incident Rate per Mile-Year | 0.00017 | Reported incident per mile-year |
| Equipment exposure | 18,937 | Tank-years |
| Incident Rate per equipment-year | 0.0049 | Incident per tank-year |
| Maximum Incident Volume Reported | 49,000 | Barrels |
| Median Incident Volume Reported | 38 | Barrels |
| Average Incident Volume Reported | 1,720 | Barrels |
| 0-50 barrels | 51% | Percentage of incidents |
| 50-1000 barrels | 30% | Percentage of incidents |
| 1000 – 20,000 barrels | 17% | Percentage of incidents |

Sources: PHMSA Hazardous Liquid Pipeline Incident Data 2002 – July 2012, and PHMSA Liquid Annual Pipeline Data 2004 – 2011.

By omitting PHMSA's Table 7 ("Historic Incident Summary, Onshore Crude Oil Pipeline System, Tanks"), ETP claims that EarthFax left out important context relevant to the frequency of occurrence. EarthFax acknowledges the 71 incidents cover 10 years of record (or 7.1 incidents per year). But based on PHMSA's Table 7, the 71 incidents is a subset of the 93 total incidents reported for 537,295 miles of onshore pipeline. This calculates to an incident rate of 0.00017 per mile-year as referenced in the table. This equates to the equivalent of one incident every 5,882 years for any 1-mile segment. Therefore, while it is true that Third Party Damage, Internal Corrosion, External Corrosion, and Manufacturing defects represented substantial percentages of the universe of reported incidents, because that universe is itself so small ETP disagrees with EarthFax's conclusion that these percentages require rating the level of risk as something other than low.

In addition, the PHMSA annual report for hazardous liquids dataset (PHMSA, 2017) establishes that the majority of actual pipeline spills are relatively small in volume. Fifty percent of the spills consist of 4 bbls or less. In 84 percent of them, the spill volume was 100 bbls or less. In 95 percent of them, spill volumes were less than 1,000 bbls. Oil spills of 10,000 bbls or more occurred in only 0.5 percent of cases. These data demonstrate that most pipeline spills are small and that releases of 10,000 bbls or more are extremely uncommon.

Furthermore, ETP notes that the calculated incident frequency referenced above includes releases from older pipelines, regardless of the standards in place at the time of construction. As indicated by Mr. Nezafati, "aging pipeline, much of it built of wrought iron and bare steel, is especially vulnerable to the elements. About 45 percent of all crude oil pipeline in the United States—more than 30,000 miles—was installed before 1970. About 7,000 miles are made of pipe that was laid before World War II." Nezafati Report at 5.

ETP reports that PHMSA is actively working with pipeline operators to decrease the risk of releases. According to ETP, new pipelines benefit from improvements in design, construction, operation, and inspection. ETP anticipates that the actual number of incidents per mile for new pipelines constructed in accordance with current PHMSA standards would be substantially lower than predicted values based on an analysis that includes older pipelines.

Pipelines installed via HDD—the installation method used at the Lake Oahe crossing—appear to experience lower risk of release. Based upon a review of the PHMSA Reportable Incident Data for Hazardous Liquid and Gas Transmission Pipelines (2010-Present), the likelihood of a failure at an HDD crossing is extremely low. Of the 3,368 reportable incidents that occurred over the past 8.5 years, only three were reported as involving an HDD crossing (0.09%). One was due to internal corrosion of a natural gas pipeline installed in 1957. One was due to an exposed natural gas pipeline. One resulted in a 1.7 bbl release with subsequent 0.9 bbl recovery.

In conclusion, EarthFax generally commented that a quantitative analysis of the risk associated with failure of system components was appropriate. While the Corps agrees that operational failure prevention is an important component in the design of a modern pipeline, ETP demonstrated that it took steps during the planning and the design of the DAPL to define and reduce the risk of failure. EarthFax has not presented data or an alternative methodology that causes the Corps to doubt its reliance on ETP's risk analysis and preventive design measures. The Corps considered numerous measures ETP would implement to minimize the risk of a pipeline leak and protect the users of downstream intakes, including the HDD Crossing Risk

Analysis, SXL – Pipeline Integrity Management Plan, and Threat Assessment Report. Final EA at 91-94. The Corps reviewed PHMSA datasets to gauge the likelihood of a spill from the portion of the pipeline that crosses Lake Oahe via HDD. The Corps also imposed several conditions on the easement concerning the maintenance and operation of the valves, leak detection, and notification systems. See Easement Conditions 21, 22, and 23.

EarthFax does not identify a particular risk analysis or the particular factors, criteria, or technique to perform the risk analysis. Nor did EarthFax provide the results from its preferred quantitative risk analysis to the Corps to consider and compare against ETP's risk analysis. Therefore, this comment does not show that substantial dispute exists as to the size, nature, or effect of the major federal action because a general statement that the EA should have provided a quantitative analysis of the risk associated with system component failure does not show flaws in the methods or data the Corps relied on.

7. EarthFax asserts that the EA wrongly relied upon the premise that emergency block valves would close immediately upon leak detection. EarthFax at 9.

RESPONSE: ETP explained that the phrase "actuated to close" means that the process has been initiated, not that "these valves will close immediately" as asserted by EarthFax. The EA stated, "These valves have a closure time of no greater than three (3) minutes." Final EA at 90. This conservative estimate is six times what EarthFax estimated is a more realistic closure time for the valves on the DAPL segments valuated in the EA (24 - 30 seconds). ETP based the closure times on the Emergency Flow Restricting Device (EFRD) valves on the DAPL Pipeline Surge Analysis Report. Furthermore, the closure times are a function of the size of the valves and the electrical requirements, and electrical availability.

Valve Locations:

As previously noted, ETP performed a worst-case release scenario specific to Lake Oahe in accordance with PHMSA guidance in 49 CFR § 194.105 in order to determine the largest possible release volume specific to the segment of the pipeline that would cross under Lake Oahe. The spill model utilized in the Lake Oahe Crossing Report assumed the pipe was resting above ground and at grade, which allows for the model to predict the largest possible volume release. ETP then used OILMAPLand software to model a release every 200 feet along the pipeline centerline at DAPLs highest flow rate. The total volume modeled at each point (every 200 feet) is a combination of the volume of oil released under pressure before ETP shuts the pumps off and the volume of residual oil in the pipeline between the nearest main line valves (MLV) that could drain out. ETP then used OILMAPLand to see where the predicted quantities of oil would travel if released from the pipeline at ground level. ETP applied a risk score to each modeled spill scenario based on the total volume available to release, total predicted acreage impacted, and the number of HCAs that might interact with oil. ETP adjusted the location of the DAPL valves to minimize the risk scores.

According to ETP, the valve locations on the banks of Lake Oahe reduce the total volume of oil that could be released in the event of a spill. MLV-ND-380 sits approximately 0.5 miles from the west bank of the river at the nearest location outside of the floodplain that also has road access and power. Further to the west the terrain continues to slope upward away from the low-lying Lake Oahe. Without MLV-ND-380 there would be an additional 0.3 miles of pipe that could drain out into the Lake Oahe basin in the event of a release; therefore, MLV-ND-380 reduces the total available crude inventory by approximately 1,380 bbls. The scenario for the east bank of Lake Oahe is similar, with the terrain moving uphill from the bank of the river for approximately 4.8 miles. MLV-ND-390 protects the east bank of the river. MLV-ND-390 is approximately 0.5 miles from the edge of Lake Oahe. Therefore, the valve protects the lake from 4.3 miles of pipe that would otherwise have the potential to drain into the Oahe basin in the unlikely event of a release. MLV-ND-390 reduces the total available crude inventory by approximately 19,780 bbls.

Emergency Isolation Valve (EIV)/ Emergency Flow Restricting Device (EFRD) valves:

According to ETP, all pipeline MLVs are shutdown/isolation valves and qualify as EFRD valves which are remotely operated through a central control system. As such, an EFRD valve is located on each side of the Lake Oahe crossing.

All MLVs, and therefore all EFRD Valves, have been sized and specified to meet the industry standard API Specification 6D for the design, manufacturing, testing and documentation of such valves. These valves also meet ETP and Sunoco Logistics Valve Specifications. ETP selected the valve supplier based on consideration of the supplier’s experience and their performance in similar installations, their technical support, and part replacement availability.

ETP procured the 30-inch diameter valves, with Full Port internal passage, in accordance with the following specifications:

- ASME B16.47 Series A
- ANSI 600 Class Flanges (1,480 psi rating)
- Body are A350LF2 CS, (-20°F TO 300 °F)
- A350LF2 CS Ball and 17-4 PH SS STEM
- Trim and Seats are A350 LF2, 1mil, VITON GLT /A151 4140 1 mil ENP
- Block and Bleed
- Trunnion Mounted, Full Port Ball
- Manufactured by Valvitalia-Delta Valve Europe, Model Delta T55
- Valves were fitted with an Emerson Horizontal Electric motor driven actuator Model Series M2CP, 240 VAC /1/60 Hz, Signal Input 24 DC with explosion proof electrical protection, HP 1, 16.0A, along with manual override hand wheel

- Valve and Actuator were assembled in Ponca City, OK and Channelview, TX

ETP developed the EFRD Inspection and Test Plans (ITPs) to verify purchase, manufacture, assembly, and performance. These test plans are followed by the manufacturers and the assemblers and were verified by Third Party Inspectors. Third Party Inspectors were present at all assembly facilities and they witnessed all tests to ensure that the ITP was followed. All valves were hydrostatically tested in the fully-open, fully-closed and partially- stroked positions at the assembly facility. Through the above testing protocol, the MLVs were documented for compliance with the ITP. All valves are also hydrostatically tested for a second time in the field for a full 8-hr period in the partially-stroked position after the EFRD final installation.

The closure times on the EFRD valves were based on the DAPL Pipeline Surge Analysis Report and are a function of the size of the valves and the electrical requirements, and electrical availability.

ETP considers any unanticipated release of crude oil as a leak. ETP does not tolerate operational failures. Leaks are not acceptable, and no minimum amount of release is acceptable for operations. The isolation provided by the EFRDs on each side of the river reduces the worst-case crude amount that could be released.

All MLVs, and therefore all EFRD valves, on the DAPL system are equipped with electric-motor operated actuators. To reduce the potential for systematic faults within the controls, the actuators are supplied with heaters, surge arrestors on the power supply in the local enclosures, and power failure alarms. Each valve is monitored and controlled (via remote control) at the central pipeline control center. In the event of an electrical power failure at an EFRD valve site, the valve will remain in its last position (i.e. “fail-safe” position). If required, the valve actuator can be operated manually via the integrated hand wheel. The controls for the EFRDs are located in local enclosures with air conditioning and heating to protect them from the elements.

ETP provided design temperature specifications to the steel mills, pipe and fitting manufacturers, as well as all pump, valve, and instrumentation manufacturers to ensure that both high- and low-temperature concerns would be considered in the manufacturing of those materials and equipment. The valves and settings are designed to meet operating temperatures ranging from minus 20 degrees to 150 degrees Fahrenheit, even though the product in the pipeline and thus the pipe itself is not anticipated to drop below 60 degrees Fahrenheit, even in the coldest North Dakota winters.

(b) (7)(F) [redacted]

(b) (7)(F) [redacted]

(b) (7)(F) [redacted] A description of the functional testing procedure for all EFRDs is per Original Equipment Manufacturer (OEM) recommended procedure and test frequency defined as per 49 C.F.R. §195. Precautions to reduce the potential for systematic faults within the EFRD valve control is per OEM recommended Valve Preventive Maintenance Procedure and Valve Preventive Maintenance Schedule. ETP incorporated High Integrity Safety Interlocks into the DAPL system.

Surge Relief Valves (SRVs):

As required by regulation, DAPL pressure relief consists of pressure controls, thermal relief valves, and surge relief valves at select Pump Stations. The design of these systems is dependent on a complex range of factors. Systems where pressure is contained must have some type of pressure relief to reduce the risk of overpressure.

Pressure control for the DAPL pump stations systems is regulated by an integrated pressure control loop. Each pump station is equipped with redundant high pressure shutdown instrumentation, which includes the integrated pressure control loop which has an independent High pressure-Pressure Switch and Pressure Transmitter, which will override the control loop to shut down the pipeline before over-pressuring could occur.

To determine if there is a risk of surge during normal operations and to determine the design of the pressure relief system, transient flow simulation, steady-state, and normal operation flow models were developed. Given the importance of river crossing pipeline segments and the provision for EFRD closure, transient flow analysis was carried out for the purpose of sizing surge relief systems. The sizing recommendation for the SRVs was developed and issued through the DAPL Pipeline Surge Analysis Report. An SRV is located at the Redfield Pump Station in South Dakota. This SRV is a Danflo which was supplied by SPX Corporation and sizing details were validated through both SPX and third-party engineering services. The equipment manufacturer provided ETP with technical documentation for the installation and in-service testing of the SRV.

The DAPL Pump Stations are located near Johnsons Corner ND, Redfield, SD and Cambridge, IA. Each station was positioned based on the transient and steady-state surge analysis recommendations and is equipped with a series of process instrumentation to monitor and mitigate overpressure and surge conditions. The original equipment manufacturer provided ETP with technical documentation for the installation and in-service testing of the SRV's. Each SRV contains an actuated relief valve that allows for in-service field test verification.

As part of the pressure relief system, thermal relief valves are used for protection during static conditions in accordance with DAPL systems engineering standards and applicable code requirements.

Finally, the operation of the valves system including automatic valve shutdown is addressed in Easement Condition 21.

Therefore, the EA did not rely on the premise that emergency block valves would close immediately upon leak detection, but instead based its worst-case scenario release model time on a conservative estimate of no greater than three minutes. EarthFax's comment is therefore flawed and it does not actually create any substantial evidence of controversial effects.

8. EarthFax asserted that "[s]ince 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." EarthFax Letter at 11.

RESPONSE: ETP designed the HDD profile under Lake Oahe to provide 92 feet of cover over the pipeline below the bottom of the lake. The pipeline below Lake Oahe is at low risk of river scour at the proposed Lake Oahe crossing due to the ponded condition of the lake at this location. Additionally, based on the borings at the location of the crossing, the depth of the pipeline is over 70 feet below the estimated depth of the free-flowing Missouri River prior to the construction of the dam. Therefore, if the dam was removed/breached, the pipeline would be below the depth of the river even if it was allowed to scour down to its pre-dam levels. GeoEngineers performed a scour analysis in order to evaluate the scour risk to the proposed pipeline during 100- and 500-year discharge events for the Lake Oahe crossing. Final EA at 16. ETP coordinated with the North Dakota Office of the State Engineer who performed an independent review of the calculations as part of the Sovereign Lands Permitting Process to verify adequate depths for the pipe to be buried relative to geomorphological movements for the Lake Oahe crossing. The North Dakota Office of the State Engineer issued ETP a Sovereign Lands Permit. Final EA, Appendix M.

EarthFax asserts that the conclusions drawn in the EA are only true if the reservoir dam functions properly and generally recommends that the scour analysis should have incorporated the assumption that the dam is breached. EarthFax did not provide the results from any scour analysis containing their preferred assumption. Also, EarthFax did not provide any scientific evidence or studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance on ETP's scour analysis. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

9. EarthFax commented 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." EarthFax Letter at 12. EarthFax suggests that the pipeline was not properly designed for the span under Lake Oahe.

RESPONSE: As part of the Section 408 review, the Corps required an HDD plan. The Corps' geologist and geotechnical engineers reviewed ETP's HDD plan and deemed it sufficient. EarthFax did not provide any scientific evidence or studies specific to the Lake Oahe HDD plan that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance on ETP's HDD Plan. There is no evidence of deep-seated landslides in the vicinity of the Lake Oahe crossing. EarthFax did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion on the risk of landslides in the vicinity of the Lake Oahe crossing. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

10. EarthFax commented that Section 4.2 of the EA oversimplifies cleanup efforts and minimizes the impacts that a spill could occur and that 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. EarthFax Letter at 12.

RESPONSE: While the potential risk for a worst-case release is low, such a spill could result in high consequences. Final EA at 91. The EA describes the design and operation measures ETP will implement to protect downstream intake users. Final EA at 42; 88-94. ETP's Spill Prevention Control and Countermeasure Plan (SPCC Plan) describes cleanup procedures and remediation activities during construction. Final EA, Appendix A. ETP prepared a FRP that complies with the applicable requirements of the Oil Pollution Act of 1990 (OPA 90), the National Oil and Hazardous Substances Pollution Contingency Plan, and the Mid-Missouri Sub-Area Contingency Plan. Final EA, Appendix L.

Following PHMSA modeling guidance, ETP prepared a spill model specific to the Lake Oahe crossing. ETP used the hypothetical worst-case scenario volume to design a location-specific GRP for the crossing. ETP's GRP describes cleanup procedures and remediation activities during operations. ETP provided the GRP to the Corps, SRST, and CRST for review. ETP incorporated comments from the Corps, SRST, and CRST into revised versions of the GRP.

Furthermore, ETP coordinated its emergency response planning documents with the Corps in accordance with easement conditions 8, 9, and 10.

EarthFax did not specifically identify an alternative methodology that was more appropriate for the evaluation. EarthFax generally commented that a more comprehensive quantitative evaluation was appropriate but does not identify a particular evaluation or the particular factors, criteria, or technique to perform the quantitative evaluation. EarthFax did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion to rely on ETP's clean-up methods and spill impacts. Nor did EarthFax provide the results from its preferred quantitative evaluation to the Corps to consider. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

11. The SRST submitted comments from Accufacts, Inc. ("Accufacts") on October 28, 2016. Accufacts recommended that:

> [I]f remote detection via SCADA is incorporated, such detection and response should be primarily directed on rupture detection. Leak detection, the smaller rate releases, may be warranted on selective segments of the pipeline, but such efforts complicate the efforts (i.e., generate excessive false alarms) to reliable remotely indicate pipeline release to control room operators. Such a release approach should also clearly identify the measurement equipment, its precision and placement, and important transient analysis (i.e., changes in pipeline operating parameters such as crude oil variations and pump start up and shutdown impacts on parameters being monitored by the release detection system) that would indicate a rupture has most likely occurred

Accufacts at 5. Accufacts also commented that pressure loss is not the most likely timely indicator of pipeline rupture for the pipeline segment(s) that could impact the sensitive watersheds. *Id*.

RESPONSE: ETP is utilizing LeakWarn, which is a leading Computational Pipeline Monitoring (CPM) system software program for monitoring pipelines, to monitor the pipeline for leaks. ETP modeled, configured, and tuned the LeakWarn CPM system specific to the DAPL installation facilities, to include elevation profiles and pipeline maximum operating pressure in accordance with PHMSA requirements and API-RP-1130 guidance.

According to ETP, the LeakWarn CPM system is capable of detecting leaks down to 1 percent or better of the pipeline flow rate within a time span of approximately 1 hour or less and capable of providing rupture detection within 1 to 3 minutes. Once LeakWarn detects a leak, its interface to the SCADA system will trigger an audible alarm in the SCADA system, which will alert the ETP pipeline controller. The maintenance and operation of the valves, leak detection, and notification systems are required in Easement Conditions 21, 22, and 23.

Based on ETP's responses to Accufacts comments, the Accufacts comments do not show that a substantial dispute exists as to the size, nature, or effect of the major federal action as it relates to leak detection.

12. Accufacts commented that "Additional information and analysis is needed that would permit an independent verification that the rapid identification mentioned in the EA is even possible for the particular pipeline segments that could release into the unusually sensitive areas. Even if the claimed release detection parameters are true, which is highly unlikely given the lack of more detailed information in the EA, a large volume of oil would still be released before the

control room were to take appropriate action. Overstatement of remote response timing in an oil spill understates the risks associated with the pipeline." Accufacts at 6.

RESPONSE: According to ETP, the LeakWarn CPM system is capable of detecting leaks down to 1 percent or less than 1 percent of the pipeline flow rate within approximately 1 hour or less and is capable of providing rupture detection within 1 to 3 minutes. In the event of a slow leak, even if pressure measurements do not show a significant drop in pressure, a detectable meter imbalance will develop over a period of time resulting in an alarm to the Control Center. While the alarm threshold may be 1%, the SCADA and LeakWarn systems are sensitive to smaller changes in flow rate and pressure. DAPL Pipeline controllers are trained to shutdown pipelines and investigate when there is any doubt regarding the alarming of the possible presence of a release/leak.

Accufacts asserts that the additional information that is needed to perform its preferred independent analysis is described in Section IV of its comments. However, neither Section IV, nor anywhere else in the comments, specifically identifies the additional information and analysis that was more appropriate for the evaluation. Accufacts generally commented that more detailed information is required but did not provide any scientific evidence that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance of ETP's description of the LeakWarn CPM system. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action. Furthermore, the maintenance and operation of the valves, leak detection, and notification systems are required in Easement Conditions 21, 22, and 23.

13. Accufacts commented that "Corrosion threats should be based on actual measured in the field readings verifying ILI runs and not based on assumed 'conservative' corrosion rates." Accufacts at 7.

RESPONSE: The Corps agrees with the Accufacts comment that corrosion rates may vary considerably and industry averages may not accurately reflect a particular pipeline's operations. However, ETP cannot calculate a pipeline-specific corrosion rate until the pipeline has been in service; therefore, ETP provided the Corps with a conservative corrosion rate to support the EA analysis. Corrosion management is a dynamic process that ETP continuously evaluates to insure optimal protection of all the Dakota Access assets. Per the pipeline integrity management regulations for hazardous liquid pipelines (49 C.F.R. § 195.452) and according to the Sunoco Integrity management plan, the DAPL is subject to integrity testing.

Additionally, as per Easement Condition 32, ETP must run cleaning pigs twice in the first year. ETP collects and samples liquids from the cleaning pigs to determine if liquid water is present. If water is present then ETP samples and analyzes the water and develops internal corrosion mitigation plans based upon the lab test results. Thus far, ETP has run cleaning pigs every quarter, exceeding the frequency stated in Condition 32. According to ETP, to date, liquid build up has not been observed and there has not even been enough water collected to provide analysis.

ETP stated that the DAPL was designed with internal corrosion coupons that give approximated worst-case corrosion rates. ETP will examine the internal corrosion coupons at least twice each calendar year, but with intervals not exceeding 7.5 months per 49 CFR § 195.579. Per ETP internal procedure, corrosion coupons are pulled every six months in exceedance of this requirement. The DAPL has an internal corrosion control coupon located at the pig receiver to the east of Lake Oahe. According to ETP, a third party review of the corrosion coupon results indicates that they were below the acceptable rate (per procedure) of 1 mil per year (above 1 mil per year, treatment may be required).

Easement Condition 28 requires ETP to complete corrosion surveys for the pipeline segment within six months of placing the cathodic protection service into operation to ensure adequate external corrosion protection. ETP conducted a Close Interval Survey (CIS) in June 2017 to obtain cathodic protection potential readings at the rectifiers and CP test stations from MLV 380 to MLV 390. A third-party review of the cathodic protection records showed that the pipeline's cathodic protection system is performing in accordance with the pipeline safety regulations and the Operator's Operations and Maintenance Manual. ETP will perform another CIS for the entire pipeline within two years of the pipeline being placed in service in accordance with PHMSA regulations and Operator procedures. ETP will also run an in-line inspection device within two years of the pipeline being in service to discern any metal loss on the pipeline. ETP will test for wall thickness with each running of a metal loss in-line inspection device. The Operator performs a CIS every 5 to 7 years in conjunction with in-line inspection per procedures.

ETP explained that the Accufacts comment that corrosion threats should be based on actual measured in the field readings is flawed because ETP cannot calculate a pipeline-specific corrosion rate until the pipeline has been in service; therefore, the Corps determined it was reasonable to rely on ETP's conservative corrosion rate to support the EA analysis. Based on the foregoing, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

14. Accufacts commented that "ILI cannot identify all construction and transportation (i.e. cracking) defects that can survive a 1.25 MAOP hydrotest. Given the nature of the product anticipated to be moved on the system, the operator should provide evidence that transportation cracking threats are not introduced that might survive a hydrotest but grow with time because of pressure cycling that may be associated with the crude oil operation." Accufacts at 7.

RESPONSE: ETP utilized the highest quality fusion bond epoxy (FBE) as an external pipe coatings to reduce the risk of corrosion and stress corrosion cracking. Final EA at 42. According to ETP, external coating was used in accordance with DOT 195, Subpart H, Corrosion Control, ASME B31.4, and Dakota Access's construction specifications. ETP utilized modern, high-performance FBE and Abrasion-Resistant Overcoat (ARO) on both the Dakota Access Pipeline mainline pipe and on the joints. ETP coated the exterior of the line pipe with a 14-16 mil thick single layer of FBE, and applied an additional 40 mil layer of ARO over the FBE coating for bores and horizontal directional drills. These measures reduce the risk of potential threats.

To address the transportation fatigue cracking threat, ETP states that it took a "preventive" approach with the extensive use of the transportation specifications API RP 5L1 (Railroad), API RP 5LW (Marine), and API RP 5LT (Truck) to avoid inducing transportation fatigue cracks. According to ETP, NTSB investigations indicate transportation fatigue cracking is an issue for large diameter, thin wall pipe when it is shipped/transported while setting on its seam.

It is ETP's understanding that all known cases of transportation fatigue crack failures that have occurred on liquid pipelines have involved large diameter pipe with Diameter/Wall Thickness (D/t) ratios greater than 100 making it extremely susceptible if not transported appropriately. DAPL has thick wall (0.625-inch) for the 30-inch pipeline. This results in a D/t ratio of 48 (significantly less than the D/t ratio of 100).

Accufacts did not specifically provide any scientific evidence that would cause the Corps to doubt its reliance on ETP data regarding transportation fatigue crack failures. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action. Furthermore, coating requirements are addressed under Easement Conditions 17 - 20.

15. Accufacts commented that a complete risk analysis required, inter alia, consideration of pipeline elevation profile, maximum operating pressure, location of mainline valves, and location and type of critical leak detection monitoring devices by milepost. Accufacts at 9-10.

RESPONSE: Dynamic Systems, third party engineers, conducted the risk analysis for DAPL. According to ETP, Dynamic Systems considered the items recommended by Accufacts during their preparation of the risk analysis of the Lake Oahe crossing. Dynamic Systems, considered the following factors during their preparation of the risk analysis of the Lake Oahe and Missouri River crossings:

a) Elevations of the Lake Oahe and Missouri River crossings including elevations of the upstream and downstream isolating valves on either side of the HDD crossings of Lake Oahe and Missouri River, along with locations and type of operation, and the time to detect and isolate a leak.
b) The Design Basis Memorandum including the Project MOP values at the locations of the two HDD crossings.
c) A hydraulic profile for the design rate case and elevations which account for elevation changes.
d) The location of mainline valves and the type of operation (e.g., manual, remote, automatic) with all excess flow restriction design analysis (EFRD) as design safety measures.
e) Information on critical leak detection monitoring devices associated with the Leak Warn System consisting of pressure transmitters and ultra-sonic flow meters by milepost location.
f) Identification of High Consequence Areas by milepost location at the locations of the two HDD crossings.

Regarding Accufacts 7th item, ETP stated that the determination of protocol for the ILI tool run is based on more than just the results of the preliminary risk assessment. In particular, the protocol for the ILI tool run is determined post-construction in conjunction with the results of the as-built survey, the close interval survey, 3rd party construction risks, other identified threats, and the preliminary risk assessment. Thus, the information needed to justify "further requirements" for ETP to run in this area was not available when the Corps finalized the EA.

ETP provided the Corps with information on the risk analysis in the HDD Crossing Risk Analysis. These reports summarize risk analysis results and identify actions that would reduce the calculated likelihood of failure. The Reports concluded that the combined threat/combined consequence risk score of the Lake Oahe Crossing is 1.27 (with 100 being the highest). It therefore falls into the low risk portion of the risk matrix.

Furthermore, the Corps acknowledged the importance of the ILI process by incorporating the inspection as a requirement in Easement Conditions 29 and 31.

As outlined above, the DAPL risk analysis considered the factors identified by Accufacts. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action because the comment does not show flaws in the methods or data the Corps actually relied on here.

16. The CRST submitted comments from ENVY, Inc. ("ENVY Report") on January 5, 2017. ENVY suggested that the EA/FONSI was "devoid of a more robust and comparative assessment of the engineering design and safety risks that exist from HDD construction for either the 5,966-ft (1.13 mi) crossing north of Bismarck or the 7,800-ft. (1.47 mi) southern crossing that places the pipeline 92 f below the lakebed of Lake Oahe. The technical risk of crossing a freshwater lake that exceeds one mile is substantially bigger than a 100-200 ft crossing." ENVY Report at 11. ENVY also suggests that "an engineering design and safety risk assessment [was] not conducted as part of DAPL's fatal flaw analysis[.]" *Id*.

RESPONSE: According to ETP, both the Lake Oahe and the Alternative Route crossing north of Bismarck included HDDs of over one mile so the technical risk based on crossing lengths would have been similar. Even with the longer crossing at Lake Oahe, the risk of a spill was categorized as low due to the engineering design and proposed installation methodology.

ENVY did not specifically identify an alternative methodology that was more appropriate for the assessment. ENVY generally commented that the technical risk of crossing a freshwater lake that exceeds one mile is substantially bigger than a 100-200 foot crossing but does not identify a particular assessment or the particular factors, criteria, or technique to perform the comparative assessment. ENVY did not provide any scientific evidence or studies specific to the Lake Oahe crossing or the alternative crossing north of Bismarck that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance on ETP's risk analysis. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

17. ENVY commented that the Finite Element Analysis is the appropriate methodology for predicting how a product reacts to real-world forces, vibration, heat, fluid flow, and other physical effects. ENVY Report at 12.

RESPONSE: The Corps Design Branch Mechanical Section Chief, Michael T. Smith, reviewed the methods ETP proposed to use for welding various sections of the pipeline and concurred that the methods are compliant with applicable standards. USACE_DAPL0075565 and USACE_DAPL0073915. ETP reports that all welds have been, and will be, subjected to x-ray and have been, or will be, evaluated based on acceptance criteria (e.g., API 1104).

Representatives from the Corps, SRST, ETP, and various subject-matter experts for the parties discussed this issue at the December 2, 2016 technical meeting. ETP believes that an unauthorized third-party conducted the October 23, 2016 spot inspection of the DAPL above-ground welds. ETP asserts that a photograph of a weld from the unauthorized spot inspection attempts to show that welds were not performed in accordance with pipeline welding specification API 1104. On December 2, 2016, Mr. Eric Amundsen, Integrity Management and Engineering Specifications Lead for Dakota Access, demonstrated that the photograph of the weld in question was of a stick weld and not a robotically controlled weld for which the pipeline welding specification API 1104 applies. Stick welds are not subject to API 1104. The technical expert for ETP described how the weld shown in the photograph appeared to be within compliance with the pipeline standard for the type of weld and if the unauthorized third-party was looking at the correct standard they would have likely concluded that the weld was in compliance. ETP states that the robotic weld is a more controlled process than what can be accomplished with the human hand. The robotic weld provides more repeatability and less standard deviation than would be observed for a hand weld. Although both types of welds meet PHMSA requirements for safety, each has their own standard commensurate with their method of application.

Furthermore, the Corps required nondestructive tests of all girth welds under Easement Condition 14. Although ENVY prefers the Finite Element Analysis as the appropriate methodology for predicting how a product reacts to real-world forces, vibration, heat, fluid flow, and other physical effects, ENVY did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the conclusions of the Corps Design Branch Mechanical Section Chief, Michael T. Smith. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

18. ENVY commented that “Undetectable underground leaks pose as some of the most significant environmental pollution risks throughout the life of the pipeline and potential risks increase over time through corrosion, landslide movement or other disruptive forces.” ENVY Report at 13.

RESPONSE- The risk of an undetectable underground leak is low. ENVY did not specifically identify the significant environmental pollution risks or provide any scientific evidence or even studies specific to the Lake Oahe HDD that would cause the Corps to doubt its previous methodologies and data supporting the Corps' reliance on ETP's risk analysis or the Corps' conclusions on landslide and corrosion risks. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

19. ENVY commented that the comparison of the criteria listed in Tables 2.1 and 2.2 of the EA was not done appropriately and that ranking was done without the attention to weighting the value of certain selection criteria. ENVY Report at 29.

RESPONSE: The Corps evaluated reasonable alternatives to ETP's preferred crossing based on the Corps' limited jurisdiction over the portion of the pipeline that crossed federally-owned Corps managed land. Final EA, at 5-22. The alternative evaluation factors are presented in Table 2-1 of the EA. The construction cost comparison of the two alternatives is presented in Table 2-2. ENVY did not specifically identify an alternative methodology or particular data that was more appropriate for the evaluation than that described in Section 2.0 of the EA. ENVY generally commented that the comparison of the criteria listed in the EA was not done appropriately, that a more rigorous pipeline selection process should have been performed, and that the ranking was biased or arbitrary. However, ENVY did not provide any scientific evidence or studies specific to either the Lake Oahe or alternative Bismarck crossing that would cause the Corps to doubt its previous methodologies and data supporting the alternatives analysis and the Corps' reliance on ETP's risk analysis. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

20. The CRST submitted undated comments from Hooshang Nezafati, PhD. Mr. Nezafati commented that "in 2002 and 2003 (USGS, 2003), the U.S. Geological Survey (USGS), by agreement with the National Park Service (NPS), investigated the effects of oil and gas production operations on ground-water quality at Big South Fork National River and Recreation Area (BISO). . ." Nezafati Report at 11. Mr. Nezafati commented that "[a] laboratory study was conducted to examine the dissolution of petroleum hydrocarbons from a fresh crude oil sample collected from one of the study sites." *Id*. "The effective solubility of benzene, toluene, ethylbenzene, and total xylenes for the crude oil sample was determined to be 1,900, 1,800, 220, and 580 micrograms per liter (micro-g/L), respectively. These results indicate that benzene and toluene could be <u>present at concentrations greater than maximum contaminant levels</u> (5 micro-g/L for benzene and 1,000micro-g/L for toluene for drinking water) in ground water that comes into contact with fresh crude oil from the study area." *Id*. (emphasis in orginal).

RESPONSE: The results of the referenced report would generally be applicable at Lake Oahe. The report indicates that if released oil comes in contact with groundwater, then the impacted groundwater will likely exceed the maximum contaminant level (MCL) of the primary drinking water standard for benzene and toluene. This conclusion is likely true regardless of the region's hydrology and geology. However, as indicated in the Spill Model Report and the Downstream Receptor Report, there is no evidence that drinking water aquifers are at risk of coming into contact with oil even if there were to be a release from the pipeline segment associated with the Corps Lake Oahe Action Area.

The boring logs under the river crossing show that the proposed pipeline intersects clayey sand, silty sand, and clay. This indicates that the alluvium and glacial deposits may be directly overlying the Pierre Shale (an aquitard). Therefore, if a release occurs in the pipeline segment beneath the lake released oil likely would accumulate solely in these confining layers surrounding the pipeline, resulting in a local area of oil contamination. Migration of the oil from a release under Lake Oahe would be slowed by clay, clayey sand, and silty sand overlying the pipeline as well as the low permeability sediments that have accumulated at the bottom of the lake.

An underground leak from the pipeline under or adjacent to the river in the Corps Lake Oahe Action Area would not likely impact the Hell Creek and Fox Hills formations and their associated municipal or private wells. An underground release at the Corps Action Areas would generally travel very slowly (0.3 feet per year) and would not travel laterally west or southwest away from the Missouri River/Lake Oahe, as would be needed to enter the Fox Hills groundwater system or the Hell Creek formations.

Drinking water intakes located downstream from the Lake Oahe crossing could be at risk if there was a release that reached this body of water and traveled downstream in the vicinity of the intake structures. Final EA at 38. ETP's emergency response activities would include the cleanup procedures and remediation activities described in DAPL's FRP and GRP, which are also incorporated as Corps Easement Conditions 8 and 9a. *See also* Final EA, Appendices A and L.

ETP will continually evaluate the potential for a spill to compromise a potable water supply intake as part of the response action. ETP would consider alternative water supply sources as part of the contingency planning. ETP would evaluate shutting down certain intakes, utilizing other intakes, utilizing different drinking water sources, or bottled water as part of the contingency planning. Final EA, at 88-94. The Federal On-Scene Incident Commander would be responsible for assimilating and approving the response actions under the Unified Command.

ETP conducted additional spill modeling using a pseudo component approach, in which the bulk hydrocarbon was broken into several groups and effects were determined based upon the chemical composition of the Bakken crude in its entirety. Spill Model Report at 76-79. ETP preferred the pseudo-component approach as a practical means to answer specific fate and transport questions. Under this approach, chemicals in the oil mixture are grouped by physical-chemical properties, and the resulting component category behaves as if it were a single chemical with characteristics typical of the chemical group. Therefore, the fate of any particular chemical can be estimated without introducing an inordinate number of variables to the analysis. ETP preferred the pseudo-component approach over the individual component approach because individual component modeling would not have added sufficient value relative to the protection of drinking water intakes. The Spill Model Report predicts little to no dissolved hydrocarbons (DHC) to be present in the water column at the level of the drinking water intakes; therefore, no water quality thresholds are expected to be exceeded.

ETP prepared the companion Downstream Receptor Report to discuss the results relative to the drinking water standards. Downstream Receptor Report at 80-91.

The Nezafati Report did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion to rely on the benzene concentration limits and geologic analysis as outlined in the EA. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

21. The CRST submitted comments on January 18, 2017 (Wilson Decl., Attachment A). The CRST commented that the Rovenko Report notes that wellbore stability in the geologic conditions at this site is an increasing issue as the size of the drilling increases due to the soil conditions and geology of this area. Wilson Decl., Attachment A at 22. The CRST commented that the risk associated with these soil conditions and the construction technique was not adequately included in the risk assessment. *Id*. The CRST also commented that there was no weight given to this risk resulting from selection of HDD drilling techniques in the risk assessment. *Id*.

RESPONSE: ETP identified drill hole stability as a risk and the Corps considered it in the EA. Horizontal Directional Drill Design Services Report (HDD Report) (August 2015), at 3; Final EA, Appendix D. ETP retained experienced HDD consulting and drilling firms: GeoEngineers to design and Michels Directional Crossings (Michels) to perform the Lake Oahe HDD. These two companies performed a detailed analysis of the proposed drill across Lake Oahe. According to ETP, GeoEngineers has successfully designed hundreds of long bore HDDs and Michels has successfully installed a total of 24 HDDs over 7,000 feet long since 2004.

ETP in general encountered soil conditions in the exploration borings near the proposed HDD alignment consistent with the published geology for the area consisting predominantly of medium stiff to hard clay with varying amounts of sand, overlaid by medium dense to very dense sand with varying amounts of silt, clay and gravel. HDD Report at 3; Final EA, Appendix D. This is consistent with the information provided in the Rovenko Report as well. The GeoEngineers report expressed concern for hole instability in the overlying unconsolidated sediments at the higher elevation drill exit (west side of the crossing).

The Directional Drill Plan of Procedure Dakota Access Pipeline Project (Michels Directional Crossings, August 18, 2015) references numerous construction methods to address borehole stability. Final EA, Appendix B. Corps geotechnical and engineering experts reviewed the draft HDD planning documents relative to hole stability. In addition, GeoEngineers and Michels representatives presented the proposed drill plan to Corps specialists. ETP mitigated the risk of hole instabilities by the installation of a large-diameter casing through the loose to medium dense soils within exit tangent of the HDD profile to stabilize the soils. HDD Report at 7.

The CRST generally commented that the risk associated with the soil conditions and the construction technique was not adequately assessed but does not identify a particular assessment or the particular factors, criteria, or technique to perform the adequate assessment. The CRST did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps doubt its previous methodologies and data supporting the Corps' conclusions on soil conditions and construction technique. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

22. The CRST commented that the Army must consider Dakota Access' current financial weakness when it considers its "financial capability to construct, operate, [and] maintain" this pipeline. Specifically, the Army Corps must consider the likely loss of huge capital infusion, debt it will soon be unable to service and weak stock prices; and the fact that market conditions do not look favorable for a future where Dakota Access can achieve sufficient revenue to overcome these financial problems." Wilson Decl., Attachment A at 27.

RESPONSE: Corps policy required the Corps to consider financial capability and the Corps did:

> determine whether the applicant has the technical and financial capabilities to comply with the easement's consideration, mitigation and administrative expenses. ER 1130-2-550, at para. 17-9b.(7)&(8). The applicant's parent company, Energy Transfer, has completed more than 30 capital projects over $50 million. Energy Transfer Capital Projects in Excess of US $50 million, 2006-2014 (provided Dec, 2, 2016). Many of these projects were pipelines of 30 inches or more in diameter. *Id.* The Corps finds that the parent company's completion of those projects demonstrates that the applicant possess the technical and financial capabilities to comply with the easement.

USACE_ESMT000655 and 658.

Furthermore, under the OPA 90, the owner or operator is liable for the costs associated with the containment, cleanup, and damages resulting from a spill. ETP maintains financial responsibility for the duration of the response actions. If the responsible party cannot pay, funds from the Oil Spill Liability Trust Fund are used to cover the cost of removal or damages. The Fund is paid for through a five-cents per barrel fee on imported and domestic oil and also any fines or civil penalties collected from other operators.

The CRST generally commented that the Corps must consider speculative financial scenarios. As illustrated above, the Corps considered ETP's technical and financial capability. CRST did not provide any scientific evidence or even studies specific to ETP's financial capability to construct, operate, [and] maintain the DAPL that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion on ETP's technical and financial capability. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

23. The CRST submitted comments on terrestrial and aquatic organisms from Dr. Gillian Bowser, PhD. on January 18, 2017 (Bowser Report). Dr. Bowser commented "While the short term impacts on the pallid sturgeon are reduced through the use of HDD technology for pipeline

construction, impacts on prey species from delayed responses to any oil spills would have impacts on the sturgeons themselves and potential for bioaccumulation in long-lived mature pallid sturgeons is unknown. The only potential source for indirect impacts on pallid sturgeon associated with the HDDs that is noted in the EA is an '…inadvertent release of nontoxic bentonite mud (used for lubricating the drill path) into the water body' (USACE 2016 ps. 67)." Bowser Report at 4.

RESPONSE: Pallid sturgeon would not likely be present in the slow moving portion of Lake Oahe downstream of the Dakota Access crossing. Even if any sturgeon were to pass through the area, it is unlikely that they would be present long enough for bioaccumulation to have a significant impact. Dr. Bowser did not specifically identify data on bioaccumulation in long-lived mature pallid sturgeon that the Corps should have considered. Dr. Bowser generally commented that delayed responses to any oil spills would have impacts on sturgeons themselves, but that the potential for bioaccumulation in sturgeons is unknown. Dr. Bowser did not provide any scientific evidence or studies specific to sturgeon in Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' effects determination, which was concurred in by USFWS. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

Furthermore, according to ETP, nontoxic bentonite mud (used for lubricating the drill path) was not inadvertently released into the water body during the HDD.

24. The SRST submitted a declaration by Donald Holmstrom on August 7, 2017 (Holmstrom Declaration). Mr. Holmstrom commented that a proper risk analysis would focus on the operator of the pipeline and their actual performance including verification of the effectiveness of safeguards and the use of process safety key performance metrics to achieve effective targeted risk reduction. Holmstrom Declaration at 4. Mr. Holmstrom commented that such a focus is the more up-to-date industry standards and that they are not referenced or applied in the EA. *Id*. A valid risk analysis would recognize the history of the operator. *Id*.

RESPONSE: Mr. Holmstrom refers to Sunoco's incident history and safety performance based on PHMSA data for the period 2006-2016. ETP Vice President of Crude and Liquid Pipeline Operations, declared that

> approximately 70% of the 276 incidents referenced in the PHMSA data were confined to operators' property, which makes these incidents less likely to affect people, property, or environment because product often stays within engineered containment or its impact is limited to facility boundaries. Moreover, Sunoco's pipeline operations and maintenance are regularly inspected by regulators; these inspections have increased substantially in both frequency and intensity since 2013. Between 2013 and 2016, Sunoco had over 90 targeted, system-wide-program or site-specific PHMSA and state inspections for existing pipeline systems and new construction. In addition to these inspections, Sunoco frequently conducts internal reviews of its integrity management program, operations,

> maintenance, and emergency procedures. The integrity management program is the systematic application of processes, procedures, and best practices to identify threats, continually assess, prevent, and mitigate risks on pipeline systems. Although the PHMSA requirements at 49 CFR § 195.452 apply to HCA segments, Sunoco, through its IMP, evaluates and remediates risk in non-HCA segments as well, therefore implementing measures above and beyond the existing regulatory requirements.

Stamm Declaration, ECF 277-1 at 6-7 (August 17, 2017).

According to ETP, if an incident is confined to the operators' property, then it would not reach Lake Oahe or any other land or water used by the Tribe. This is because the released product often stays within a fenced-in facility boundary protecting the general public from the potential for incidental contact once the product is released. The DAPL valve facilities, MLV-ND-380 and MLD-ND-390, are located in upland locations that have been graded and leveled, and the sites are surrounded by security fencing and camera systems to provide additional security. No engineered containment system is needed because these above-ground valve sites are not subject to any routine maintenance activity that could result in a release. If work becomes necessary, special containment materials are first put in place. Finally, the manner in which the valves are constructed means there are no openings to the outside environment for oil to be released.

According to ETP, all MLV assemblies were designed in accordance with DOT 195, Subpart C, Paragraph 195.116 and Subpart D – Construction, Paragraphs 195.258 and 195.260. All MLV sites are integrated with the SCADA system to provide 24-hour monitoring and emergency shutdown of MLV's and pump stations along the pipeline.

Regardless of whether product stays within engineered containment or its impact is limited to facility boundaries, the Corps recognizes that there may still be affects to employees, first responders, bystanders, and others nearby. The Corps also recognizes that impacts limited to facility boundaries may still result in impacts that transcend facility boundaries and impact nearby or adjacent communities.

Mr. Holmstrom states his preferred general methodology, but does not identify a specific alternative methodology or particular criteria or performance metrics that the Corps should have considered. Mr. Holmstrom generally asserts that his preferred methodology is consistent with more-up-to-date industry standards but does not specifically identify those standards. Mr. Holmstrom did not provide any scientific evidence or even studies specific to Lake Oahe that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion to rely on ETP's risk analysis. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

25. The SRST submitted an Environmental Justice Analysis of Dakota Access Pipeline Routes by Robin Saha, Ph.D., and Paul Mohai, Ph.D. on February 23, 2018 ("SRST EJ Analysis"). The analysis infers that it was inappropriate to use the unit-hazard coincidence method, and that it was more appropriate to use GIS to combine small geographic areas, i.e.,

Census Blocks and Census Block Groups, in order to estimate the demographics within areas most likely to be impacted.  SRST EJ Analysis at 2-4.

RESPONSE:  In the supplemental Environmental Justice (EJ) analysis, the Corps used the boundary intersection method to determine the proportion of minorities and populations below the poverty level.  The boundary intersection method is one of the two distance-based methods recommended by the SRST EJ Analysis. The Corps applied the boundary intersection method to census block group data within a 1 mile buffer on each side of Lake Oahe from the DAPL crossing to CRST's drinking water intake.

The Corps determined that the areal apportionment method used by the SRST EJ Analysis is more appropriate to evaluate the siting of a project and determine potential EJ issues based on chronic long-term exposures to airborne particulates from a continuous emission source (e.g., evaluation of a compressor station).  The pipeline is not a continuous air emission source or a continuous discharge (or any known discharge) into Lake Oahe.

The Corps considered the alternative methodology offered by the SRST EJ Analysis, but their preferred methodology does not cause the Corps to doubt the methodology and data it relied on in performing the supplemental EJ analysis.  Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

26. The SRST submitted a report entitled "The Impacts of an Oil Spill from the Dakota Access Pipeline on the Standing Rock Sioux Tribe" on February 21, 2018 (SRST Comments). The SRST commented that the Reservoir Simulation Model or HecRas models were the appropriate models to apply to the Lake Oahe crossing to determine impacts on the Standing Rock Reservation.  SRST Comments at 1 and 42.  The SRST further commented that the Corps failed to properly determine impacts under different hydrological conditions and that such failure increases the risk to the Tribe and demonstrates that ETP is unprepared to address an oil spill under different hydrological conditions at Lake Oahe.  SRST Comments at 42.

RESPONSE:  The Reservoir Simulation Model is better suited for reservoir operations management and not spill modeling.  The River Analysis System model allows the user to perform one-dimensional steady flow, one and two-dimensional unsteady flow calculations, sediment transport/mobile bed computations, and water temperature/water quality monitoring. The Reservoir Simulation and River Analysis System model different conditions that would not assist in the spill impact analysis.  ETP used SIMAP to better understand the potential impacts of a worst-case scenario spill.  The SIMAP model inputs provide a variety of flow and other environmental conditions to characterize potential downstream fate and transport scenarios. SIMAP used these inputs to characterize the range of trajectory, fates, and potential biological effects in the event of several hypothetical large volume releases.

The Corps agrees that SIMAP was more appropriate than the Reservoir Simulation and River Analysis System models.  For the foregoing reasons, the SRST's recommendation to use the

Reservoir Simulation or HecRas models for the Lake Oahe crossing to determine impacts on the Standing Rock Reservation is flawed and unreliable and thus did not create any substantial evidence of controversial effects.

27. The SRST commented that "A robust geo-processing suitability model is necessary to determine the best route for a pipeline, or any linear transportation facility." SRST Comments at 65-70.

RESPONSE: The Corps evaluated reasonable alternatives to ETP's preferred crossing based on the Corps' limited jurisdiction over the portion of the pipeline that crossed federally-owned Corps managed land. Final EA at 5-22. SRST preferred a geo-processing suitability model but did not specifically identify any flaws in the data or methodology used in the Corps' alternatives analysis evaluation. SRST generally commented that it did not favor the process ETP followed in examining and ranking datasets but SRST did not provide any scientific evidence or the results of a geo-processing suitability model for the Corps to consider and that would cause the Corps to doubt its previous methodologies and data supporting the Corps' conclusion on the alternatives analysis. Therefore, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major federal action.

28. The SRST commented that "The Corps of Engineers' conclusion that, 'The pipeline route expressly and intentionally does not cross the Standing Rock Sioux Reservation and is not considered an Environmental Justice issue,' is inconsistent with the microeconomic theory outline above and, from a common-sense perspective nonsensical." SRST Comments at 84.

RESPONSE: The Corps considered SRST's microeconomics analysis. To further address this concern, ETP prepared the Downstream Receptor Report to address impacts to commercial fishing and tourism resources. Downstream Receptor Report at 49 and 97. Although SRST doesn't agree with the scope or conclusion of the analysis with regard to economic impacts, this comment does not show that a substantial dispute exists as to the size, nature, or effect of the major Federal action because SRST's microeconomic analysis does not show flaws in the methods or data the Corps relied on here.

C. Conclusion

As outlined above, the Corps considered the comments and concerns expressed by the Tribes and their experts regarding the data and methodologies used by the Corps and considered all the Tribes' other comments. *See also* Submission Review (August 31, 2018). The Corps also considered the data and methodologies utilized by ETP. ETP's Spill Model Report and companion Downstream Receptor Report provided enough accuracy to verify the Corps analysis in the EA that supported granting a 50-foot wide easement for the pipeline to cross Lake Oahe and evaluate the effects of an operational failure of the portion of the pipeline at the Lake Oahe crossing. While there may be other methods for predicting oil spill effects, it is not likely that employing further methods will result in substantively different views or information that is more comprehensive than what the Corps has considered here. The Corps finds that the effects of the federal action here are not "likely to be highly controversial." 40 C.F.R. § 1508.27(b)(4).

Further, the comments submitted by the Tribes and their experts do not present any "significant new circumstance or information relevant to environmental concerns." 40 C.F.R. § 1502.9(c); *see also* Submission Review. Therefore, the Corps has concluded that preparation of supplemental NEPA documentation is not required with respect to our review of the Tribes' comments.