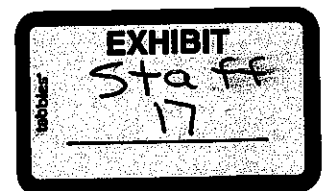


**BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION**

**DOCKET NO. HP14-002**

**IN THE MATTER OF THE REVISED APPLICATION OF DAKOTA ACCESS, LLC FOR  
AN ENERGY FACILITY PERMIT TO CONSTRUCT THE DAKOTA ACCESS  
PIPELINE**

**Rebuttal Testimony of Michael E. Timpson, Ph.D.  
On Behalf of the Staff of the South Dakota Public Utilities Commission  
August 14, 2015**



1 **Q: Please state your name and business address.**

2 A: Michael E. Timpson, Ph.D., Natural Resource Group, LLC (an ERM Group  
3 Company), 1500 SW 1<sup>st</sup> Ave, Suite 885, Portland, OR, 97201.

4 **Q: Describe your educational background.**

5 A: I received a Bachelor's degree in 1982 from the University of Rhode Island in  
6 Kingston, RI with a major in Natural Resources (soil science concentration). I  
7 received a Master's degree in 1985 from North Dakota State University in Fargo,  
8 ND, majoring in soil science, with a minor in geology. I received a Doctorate of  
9 Philosophy in 1992 from the University of Tennessee-Knoxville in Knoxville  
10 Tennessee, with a major in Plant and Soil Science and a minor in Environmental  
11 Engineering. I conducted post-doctoral research at Oak Ridge National  
12 Laboratory in 1993 and 1994, focusing on remediation of uranium-contaminated  
13 soils.

14 **Q: By whom are you now employed?**

15 A: I have been employed by Natural Resource Group, LLC (an ERM Company)  
16 since 2001. I currently hold the position of Principal Consultant in our Regulatory  
17 Group and serve as the office manager of the Portland, Oregon office.

18 **Q: What work experience have you had that is relevant to your involvement on  
19 this project?**

20 A: While pursuing my doctorate I was employed full time by the Department of Plant  
21 and Soil Science, part of the agricultural experiment station system of the  
22 University of Tennessee. As such, I conducted field work and operated a

1 laboratory that analyzed soils in support of the agricultural experiment station's  
2 research program and also supported the United States Department of  
3 Agriculture, Natural Resources Conservation Service soil survey program. Prior  
4 to joining Natural Resource Group, I worked for a smaller consulting firm  
5 conducting soils and wetlands evaluations in support of natural gas pipeline  
6 projects. Since joining Natural Resource Group I have conducted soils and  
7 agricultural impact and mitigation assessments for more than 3,000 miles of  
8 natural gas and petroleum pipelines across the United States, including three  
9 recent natural gas pipelines in North Dakota. As a third-party contractor to the  
10 Federal Energy Regulatory Commission, I've assisted in the preparation of soils  
11 and agricultural impact assessments related to natural gas pipelines for 13  
12 Environmental Impact Statements and Environmental Assessments under the  
13 National Environmental Policy Act and/or applicable state programs.

14 **Q: What Professional Credentials do you hold?**

15 A: I am a Licensed Professional Soil Scientist in the State of Wisconsin (License  
16 No. 174-112). My current license expires in July 2016.

17 **Q: What is the purpose of your rebuttal testimony?**

18 A: My rebuttal testimony is being provided to address specific concerns identified in  
19 direct testimony provided by intervening landowners. That testimony is  
20 specifically related to: the potential for trench excavation to bring dormant weed  
21 seeds to the surface from deeper soil layers; the potential for soil compaction  
22 related to construction to impact post-construction crop yields; and, the potential

1 for soil temperature changes that may occur over the pipeline due to pipeline  
2 operations to impact post-construction crop yields.

3 **Q: What methodology did you employ?**

4 A: I reviewed the information provided in Sections 14.5 and 16.1 of Dakota Access'  
5 Revised Application as well as the information provided in the Agricultural Impact  
6 Mitigation Plan (AIMP, Exhibit D of Dakota Access' Revised Application). I also  
7 reviewed existing publications and environmental review documents prepared for  
8 federal and state permits for similar projects in the upper Midwest. In addition, I  
9 applied my knowledge of soil characteristics and limitations as well as my  
10 knowledge of the Natural Resources Conservation Service (NRCS) Soil Survey  
11 Geographic Database (SSURGO) to determine if soils were properly classified by  
12 their limitations and if the appropriate mitigation measures were proposed for  
13 implementation to avoid or minimize potential construction impacts on agricultural  
14 soils (as defined in the project AIMP).

15 **Q: In pre-filed direct testimony, intervening landowners raised concerns about**  
16 **the possibility of impacts on crop yields due to heat generated during**  
17 **operation of the pipeline. Based on your experience and research, do you**  
18 **believe that heat-related impacts on crop yields could occur?**

19 A: Yes, heat-related effects on plant growth and crop yields have been identified as  
20 a result of pipeline operations for natural gas and oil pipelines. Published reports  
21 of impacts on plant growth and crop yields resulting from soil heating caused by  
22 pipeline operations are limited, however, a recent assessment of pipeline  
23 temperature effects on vegetation was conducted for the Alliance Pipeline, a

1 natural gas transmission pipeline that crosses portions of North Dakota,  
2 Minnesota, Iowa and Illinois (TERA Environmental Consultants, 2004).  
3 Measurements of soil temperature, plant available soil moisture, and spring  
4 wheat and barley yields were recorded upstream and downstream of a  
5 compressor station on the Alliance Pipeline in 2002, 2003, and 2004. Data were  
6 collected from four sites downstream of the compressor station (at distances  
7 ranging from 0.5 to 52 miles downstream) and compared with a site 0.5 mile  
8 upstream of the compressor station. Data collection took place at points directly  
9 over the trench, 6 feet way from the pipeline, and 43 feet away from the pipeline,  
10 and at different soil depths. Soil temperature was highest directly over the  
11 pipeline (as documented in previous studies, e.g., Naeth et al., 1993) and  
12 decreased with increasing distance from the pipeline. No significant differences  
13 were noted in plant available soil moisture or crop yield at any site with the  
14 exception that mean plant available soil moisture was significantly greater over  
15 the trench in 2002 than in adjacent areas. Data were collected under the drought  
16 conditions that existed in 2002, while precipitation and plant available soil water  
17 were normal to above normal in 2003 and 2004, respectively. The authors  
18 anticipated that soil temperatures above the pipeline might lead to increased soil  
19 drying, however, this effect was not documented. Increased soil temperature  
20 above the pipeline did not significantly affect plant available soil moisture or crop  
21 yield. Although the operational parameters of the Alliance natural gas pipeline  
22 may vary from the proposed Dakota Access oil pipeline, similar temperature

1 effects on plant growth, soil moisture parameters, and crop yield may be  
2 expected from operation of the Dakota Access pipeline project.

3 References:

4 Naeth, M.A., D.S. Chanasyk, W.B. McGill and A.W. Bailey. 1993. Soil  
5 temperature regime in mixed prairie rangeland after pipeline construction and  
6 operation. Can. Agriculture Engineering. 35(2): 89-95.

7 TERA Environmental Consultants. 2004. Effects of heat from a pipeline on crop  
8 growth – interim results. Proceedings of the 8th International Symposium on  
9 Environmental Concerns in Rights-of-Way Management, Saratoga Springs, NY.

10 **Q: If reduced crop yields are expected as a result of heat generated during**  
11 **operation of the pipeline, are there any mitigation measures that can be**  
12 **implemented? If so, please explain.**

13 A: Reduced crop yields may result from heat added to soils from pipeline  
14 operations; however, the majority of studies published to date have  
15 demonstrated a neutral to positive effect on crop yields as a result of the heat  
16 effects from pipeline operation. Further, there are no mitigation measures that  
17 can be implemented to change the heat effects on soils surrounding an operating  
18 pipeline.

19 **Q: If there are ways to mitigate the impacts, what measure(s) do you**  
20 **recommend the PUC should consider in order to mitigate the impacts of**  
21 **crop yield loss due to heat generated during operation of the pipeline?**

22 A: Data regarding crop yields near buried pipelines indicate that most effects of heat  
23 added to soils from pipeline operations have neutral to positive effects on crop

1 yields. As a result, no mitigation measures would be required to address heat  
2 effects from pipeline operations.

3 **Q: In pre-filed direct testimony, intervening landowners raised concerns about**  
4 **the possibility of impacts on crop yields due to the increased emergence of**  
5 **noxious weeds resulting from trenching and other soil disturbance during**  
6 **construction of the pipeline. Based on your experience and research, do**  
7 **you believe that impacts from an increased occurrence of noxious weeds**  
8 **could occur?**

9 A: Yes

10 **Q: If reduced crop yields or other impacts are expected as a result of the**  
11 **spread of noxious weeds resulting from construction of the pipeline, are**  
12 **there any mitigation measures that can be implemented? If so, please**  
13 **explain.**

14 A: There are a variety of mitigation measures that can be implemented to minimize  
15 the potential for spreading noxious and other weeds during pipeline construction.  
16 Section 16.1 of Dakota Access' Revised Application describes the  
17 preconstruction survey effort employed to document the presence of noxious  
18 weeds along the proposed pipeline route in South Dakota. Section 16.1.1  
19 describes the mitigation measures that may be employed to minimize the  
20 potential for spreading noxious weeds along the pipeline route during  
21 construction. The AIMP does not include a section describing the potential to  
22 spread noxious or other weed species as a result of construction, and includes

1 no mention of mitigation measures that would be employed to avoid or minimize  
2 the spread of weeds of any sort along the right-of-way.

3 **Q: If there are ways to mitigate the impacts, what measure(s) do you**  
4 **recommend the PUC should consider in order to mitigate the impacts**  
5 **resulting from the spread of noxious weeds resulting from pipeline**  
6 **construction?**

7 A: Section 16.1.1 of the Revised Application states that Dakota Access would  
8 consult with the South Dakota Department of Agriculture regarding appropriate  
9 Best Management Practices (BMPs) to implement to minimize the spread of  
10 noxious weeds during construction. The mitigation measures described in that  
11 Section, if used in combination, would be sufficient to minimize the potential  
12 spread of noxious weeds as a result of construction. However, the success of  
13 the mitigation measures should be documented through post-construction weed  
14 surveys for at least 2 years following the completion of construction.

15 Additional mitigation measures should be employed to minimize the potential for  
16 propagation of other common agricultural weeds as a result of construction. In  
17 areas of rotated cropland, typical weed control measures reduce the growth of  
18 weeds, minimizing competition between agricultural crops and weed species for  
19 nutrients and water. However, deeper portions of the topsoil in most agricultural  
20 lands also act as a seed bank for long-lived weed seeds located below the depth  
21 of most common pre-emergent herbicide treatments. Topsoil segregation,  
22 performed to preserve topsoil productivity and eliminate the potential for rutting  
23 due to construction traffic resulting in mixing of topsoil and subsoil, will result in a



1 mixing of the soil to the depth of the topsoil segregated from the construction  
2 workspace. For example, in areas with 12-inches or more of topsoil, Dakota  
3 Access proposes to segregate 12-inches of topsoil from the ditch and spoil  
4 storage areas of the construction right-of-way. Moving this volume of topsoil  
5 across the construction workspace will mix the soil. This mixing action brings  
6 dormant weed seeds to the surface of the stored topsoil piles and can result in  
7 significant growth of weeds. To minimize the potential for this new weed growth  
8 to result in new weed infestations following construction and restoration of the  
9 right-of-way, monitoring and controlling the growth of weeds on topsoil storage  
10 piles should be employed. To implement this additional weed control mitigation,  
11 the environmental inspector or agricultural inspector should be capable of  
12 identifying multiple species of weeds at a number of life stages, and be able to  
13 recommend and implement weed control measures early enough in the life cycle  
14 of the weed species in question to minimize or prevent the plants from setting  
15 seeds.

16 **In pre-filed direct testimony, intervening landowners raised concerns about**  
17 **the possibility of long-term impacts on crop yields due to the compaction**  
18 **of soil occurring during construction of the pipeline. Based on your**  
19 **experience and research, do you believe that soil compaction impacts on**  
20 **crop yields could occur?**

21 A: Yes.

1 **Q: If reduced crop yields are expected as a result of soil compaction during**  
2 **construction of the pipeline, are there any mitigation measures that can be**  
3 **implemented?**

4 **A:** There are mitigation measures that can be implemented to minimize the potential  
5 for compaction of soils to impact post-construction crop yields.

6 **Q: If there are ways to mitigate the impacts of soil compaction, what**  
7 **measure(s) do you recommend the PUC should consider in order to**  
8 **mitigate the impacts of crop yield loss due to soil compaction during**  
9 **construction of the pipeline?**

10 **A:** Section h of the AIMP describes the mitigation measures that would be  
11 implemented to alleviate compaction of soils resulting from construction traffic.  
12 Soil compaction is typically greatest on the "working side" or "travel lane" portion  
13 of the construction right-of-way, and largely results from the use of rubber-tired  
14 trucks used for hauling pipe segments and transporting other heavy items along  
15 the right-of-way. Little if any compaction typically occurs on the spoil storage  
16 side of the right-of-way, and virtually no compaction occurs over the trench line.  
17 The deep tillage methods described in Section h of the AIMP will likely be  
18 adequate to alleviate soil compaction that will result from construction. However,  
19 the approach for implementing the deep tillage methods and a means to  
20 determine if the proposed 3 passes of the tillage equipment have been sufficient  
21 to remediate the compacted soils is insufficient. The industry standard for  
22 judging whether decompaction measures are adequate is a comparison of soil  
23 density, as measured with a tool called a penetrometer, on the right-of-way with

1           undisturbed soils in adjacent off-right-of-way areas of the same field. Dakota  
2           Access' AIMP contains no provisions for making these comparisons, it simply  
3           assumes that 3 passes of the deep tillage equipment will be sufficient to alleviate  
4           the level of compaction induced by construction traffic. Natural Resource Group  
5           recommends that the PUC include requirements for compaction testing of areas  
6           on and off the construction right-of-way, using a penetrometer or other equivalent  
7           measuring device, to provide an appropriate means of determining whether deep  
8           tillage operations have reduced compaction to levels similar to adjacent sections  
9           of cropland undisturbed by construction activities.

10   **Q:    Does this conclude your testimony?**

11   **A:    Yes.**



**Michael E. Timpson, Ph.D., L.P.S.S.**  
**e-mail: mike.timpson@NRG-LLC.com**

Mike Timpson is a Senior Consultant at Natural Resource Group, LLC (NRG) and the Office Manager in NRG's Portland office. Mike has been working in the industry since 1997 and has expertise in soil, geological, and wetland resources for natural gas pipeline and liquefied natural gas (LNG) projects under the jurisdiction of the Federal Energy Regulatory Commission (FERC). He manages projects and coordinates the efforts of natural resource subconsultants. Mike has experience preparing Environmental Report Applications for several FERC 7(c) pipeline projects, as well as preparation of federal, state, and local permits necessary for the construction and operation of natural gas and petroleum pipelines. He also has extensive experience preparing sections for third-party Environmental Impact Statements (EISs) and Environmental Assessments (EAs) for a number of lead federal agencies.

### **Selected Project Experience**

- WBI Energy Transmission – Wind Ridge Pipeline Project, April 2014 –present, 96-miles of 16-inch-diameter pipeline, two meter stations, and associated facilities in North Dakota: Project Manager responsible for overseeing the preparation of the FERC 7(c) environmental report application, including authoring Resource Report 10 (Alternatives), preparation of an applicant-prepared draft Environmental Assessment, biological and cultural resource surveys, federal and state permitting, and public affairs support.
- Texas Gas Transmission, LLC – Texas Gas Abandonment Project, February 2013 to present, 568 miles of 26-inch-diameter pipeline and associated facilities in Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana: Project Manager responsible for overseeing the preparation of the FERC section 7(b) environmental report application, including authoring Resource Report 1 (Project Description), and providing quality assurance for the rest of the environmental application.
- Northwest Pipeline, GP – Kalama Lateral Pipeline Project, November, 2011 – 2012, 3.1 miles of 16-inch-diameter natural gas pipeline, a new meter station, and pig launcher/receiver facilities in Cowlitz County, Washington: Project Manager responsible for overseeing the preparation of the FERC section 7(c) Environmental Report Application, including authoring Resource Reports 1 (Project Description) and 10 (Alternatives), and assisting with Clean Water Act permitting.
- Williams Gas Pipeline, Project Manager – Pipeline Feasibility Study and Cost Estimate, October – December 2011, Environmental Permitting and Cost Estimate for 68- and 98-mile-long, 24-inch-diameter pipeline routes and associated aboveground facilities in southeastern Virginia: The cost estimates included use of the FERC pre-filing process, federal and state permitting, protected species consultations and biological surveys, cultural resource consultations and surveys, preparation of National Environmental Policy Act (NEPA) documents, construction inspection and compliance monitoring, and environmental and cultural resource mitigation.
- Portland General Electric Company, Cascade Crossing Transmission Project, October, 2010 – June 2013, 215 miles of new 500 kilovolt (kV) electric transmission line, upgrade of an existing 230 kV line, and related facilities in Oregon: Deputy Project Manager for the preparation of a third-party EIS for the U.S. Forest Service, preparing the project description and Alternatives section, the Traffic and Transportation section, and portions of the Vegetation and Water Resources sections of the EIS, and providing QA/QC oversight for the document.
- Alliance Pipeline, LP, Tioga Lateral Pipeline Project, 2011 – 2012, about 80 miles of natural gas pipeline and a new compressor station in North Dakota: Project team



member responsible for preparation of Resource Reports 2 (Water Use and Quality) and 6 (Geological Resources), section of the applicant-prepared EA for Water Resources and Geology; for the FERC section 7(c) Environmental Report Application. Managed the subconsultant conducting wetland and waterbody surveys, coordinated with the U.S. Army Corps of Engineers on jurisdictional determinations and prepared the pre-construction notification for Section 404, Nationwide Permit 12 application.

- Spectra Energy Corporation, New Jersey – New York Expansion Project, 2011 – 2012, 20 miles of multi-diameter natural gas pipeline and related aboveground facilities in New Jersey and New York: Project team member responsible for preparing the Wildlife and Aquatic Resources section; assisted with non-pipeline Alternatives section for a FERC third-party EIS.
- Liberty Natural Gas, Liberty Natural Gas Deepwater Port, September 2010 – February 2011, an offshore natural gas receiving terminal, 44 miles of offshore 36-inch-diameter pipeline in the Atlantic Ocean and Raritan Bay, and 9 miles of onshore 36-inch-diameter pipeline in New Jersey: Project team member responsible for preparing the offshore sediments section of a third-party EIS for the U.S. Coast Guard Deepwater Ports Standards Division; U.S. Maritime Administration; and cooperating agencies, including the FERC.
- Sierra Pacific Power Company, Electric Transmission Line Routing and Feasibility Study, 2009, 25 to 50 miles of 345 kV transmission lines (two) in Nevada: Project Manager responsible for preparing a report to identify and rank potential route alternatives.
- ConocoPhillips/BP, Denali – The Alaska Gas Pipeline Project, 2008, 1,700 miles of 48-inch-diameter natural gas pipeline originating on the North Slope of Alaska and terminating near Calgary, Alberta, Canada: Project team member responsible for study planning for soils and geological resources.
- Guardian Pipeline, LLC, Guardian Expansion and Extension Project, 2006 – Present, 119 miles of 30-, 20-, and 16-inch-diameter natural gas pipeline and two new compressor stations in Illinois and Wisconsin: Project Manager responsible for overseeing the preparation of the FERC section 7(c) Environmental Report Application, including authoring Resource Report 1 (Project Description), and federal, state, and local permitting. Also managing construction and monitoring of a compensatory wetland mitigation site in eastern Wisconsin, and post-construction monitoring of wetlands and agricultural impacts along the pipeline.
- Transcontinental Gas Pipe Line Corporation, Leidy to Long Island Expansion Project 2005, 51 miles of natural gas pipeline in Pennsylvania and New Jersey: Project Manager responsible for overseeing the preparation of the FERC section 7(c) Environmental Report Application and applicant-prepared EA, including preparing Resource Report 1 (Project Description) and assisting with Resource Report 10 (Alternatives).
- Transcontinental Gas Pipe Line Corporation, Central New Jersey Expansion Project, 2004, 3.9 miles of natural gas pipeline in New Jersey: Project team member responsible for preparing FERC Resource Reports 6 (Geology) and 7 (Soils), conducting wetland delineations, and assisting with preparing wetland permit applications.
- Questar Pipeline Company, Southern System Expansion Project, 2003 – 2004, about 20 miles of natural gas pipeline in Utah: Project team member responsible for supervising the preparation of Resource Reports 6 and 7 (Geology and Soils) for the FERC section 7(c) Environmental Report Application.
- EnCana Oil & Gas (USA) Inc., Entrega Gas Pipeline Project, 2003 – 2004, 327 miles of 42- and 36-inch-diameter natural gas pipeline in Colorado and Wyoming: Project team member responsible for preparing Resource Report 7 (Soils) for the FERC section 7(c) Environmental Report Application.



- Guardian Pipeline, LLC, Guardian Pipeline Project, 1999 – 2002, 149 miles of 36-inch-diameter natural gas pipeline in Illinois and Wisconsin: Project team member responsible for conducting and supervising wetland delineations and topsoil depth surveys, performing data quality control and electronic data transfer to project engineering firm, and managing surveys for endangered and threatened species.
- Pearl Crossing LNG Terminal LLC and Pearl Crossing Pipeline LLC (ExxonMobil), Pearl Crossing LNG Project, 2004 – 2005, 170 miles (two 53-mile-long offshore pipelines and one 64-mile-long onshore pipeline) of 42-inch-diameter natural gas pipeline and an offshore LNG import terminal in the Gulf of Mexico and Louisiana: Project team member responsible for preparing the Soils and Sediments sections of a FERC and U.S. Coast Guard third-party EIS.
- Creole Trail LNG Terminal and Pipeline Project, 2005 – 2006, an LNG terminal and 123.6 miles of send out pipeline in Louisiana: Prepared the sediments section for the LNG terminal and assisted with the Soils and Wetlands sections.
- ExxonMobil, Vista Del Sol LNG Terminal Project, 2004 – 2005, LNG import terminal and 27-mile pipeline near Corpus Christi, Texas: Project team member responsible for preparing the Sediments and Soils sections of a FERC third-party EIS.
- Gulf LNG Energy, LLC and Gulf LNG Pipeline, LLC, Gulf LNG Clean Energy Project, 2005 – 2006, 5 miles of 36-inch-diameter natural gas pipeline and an LNG import terminal in Mississippi: Project team member responsible for preparing the Dredging and Sediment Analysis section of the EIS; also provided oversight on the Soils section.
- Bradwood Landing, LLC and NorthernStar Energy, LLC, Bradwood Landing LNG Project, 2005 – 2006, 36 miles of 30- and 36-inch-diameter natural gas pipeline and an LNG import terminal in Oregon, Washington: Project team member responsible for preparing the Dredging and Sediment Analysis section of the draft EIS.
- KeySpan LNG, L.P., KeySpan LNG Facility Upgrade Project, 2004 – 2005, an LNG facility expansion in Rhode Island: Project team member responsible for preparing the Soils, Sediments, and Alternatives sections for a FERC third-party EIS.
- Crown Landing, LLC, Crown Landing LNG Terminal, 2005 – 2006, an LNG storage facility and 11 miles of natural gas pipeline in New Jersey, Delaware, and Pennsylvania: Project team member responsible for preparing the Soils and Sediments sections of a FERC third-party EIS.
- Weaver's Cove Energy, LLC, Weaver's Cove LNG Project, 2004 – 2005, an LNG terminal facility and 6 miles of natural gas pipeline in Massachusetts: Project team member responsible for preparing the Soils and Sediments sections of a FERC third-party EIS.
- Cheyenne Plains Gas Pipeline Company, LLC, Cheyenne Plains Pipeline Project, 2003 – 2004, 387 miles of 36-, 30-, 20-, and 8-inch-diameter natural gas pipeline, one new compressor station, and modifications to one existing compressor station in Colorado and Kansas: Project team member responsible for preparing the Groundwater, Soils, and Geology sections of a FERC third-party EIS.
- Hackberry LNG Terminal, LLC, Hackberry LNG Terminal Project, 2002 – 2003, an LNG plant in Louisiana: Project team member responsible for preparing the Soils section of a FERC third-party EIS.
- Williams, Chacahoula Gas Storage Project, 2001 – 2002, natural gas cavern storage and pipeline in Louisiana: Project team member responsible for preparing Resource Report 7 (Soils) for the FERC section 7(c) Environmental Report Application and the Soils section of the applicant-prepared EA.
- Kern River Gas Transmission Company, Kern River 2003 Expansion Project, 2002, 717 miles of natural gas pipeline and three new compressor stations and modifications to six existing compressor stations in Wyoming, Utah, Nevada, and California: Project



team member responsible for conducting third-party compliance monitoring for the FERC, and overseeing pre-construction plant salvage operations on Spreads 8 and 9 in Nevada and eastern California.

- Alaska Gas Pipeline Producers Team, Alaska Gas Pipeline Project, 2001 – 2002, 1,628 miles of natural gas pipeline in Alaska, North Dakota, Minnesota, Iowa, and Illinois: Project team member responsible for preparing Resource Report 7 (Soils) for the FERC section 7(c) Environmental Report Application.
- NRG Energy, Inc. Arthur Kill Pipeline Project, 2002 – 2004, 2.3 miles of natural gas pipeline in New York: Project team member responsible for preparing the Soils and Geology sections of New York State Public Service Commission Article VII application.
- Georgia Strait Crossing Pipeline LP, Georgia Strait Crossing Pipeline Project, 2001 – 2002, 47 miles of 20- and 16-inch-diameter natural gas pipeline and one compressor station in Washington State and the Strait of Georgia: Project team member responsible for preparing Geology, Soils and portions of the Water Resources sections for a FERC third-party EIS.
- Kinder Morgan Inc., Illinois Power Lateral Project, 2001, 49 mile-long natural gas pipeline in south-central Illinois, managed wetland delineations and threatened and endangered species surveys.

### **Education and Training**

- Ph.D., Plant and Soil Science, University of Tennessee, Knoxville, Tennessee, 1992
- M.S., Soil Science, North Dakota State University, Fargo, North Dakota, 1985
- B.S., Natural Resources, University of Rhode Island, Kingston, Rhode Island, 1982
- Licensed Professional Soil Scientist, Wisconsin #174-112
- FERC, Environmental Report Preparation Seminar, 2014
- FERC, Environmental Compliance Seminar, 2014