

**BEFORE THE PUBLIC SERVICE COMMISSION
STATE OF NORTH DAKOTA**

**Dakota Access, LLC
Dakota Access Pipeline Pump Station – Emmons County
Siting Application**

CASE NO. PU-19-204

DIRECT TESTIMONY OF JEFF D. MAKHOLM, PH.D.

ON BEHALF OF

DAKOTA ACCESS, LLC

NOVEMBER 13, 2019

1 **I. INTRODUCTION AND SUMMARY OF CONCLUSIONS**

2 **Q. Please state your name, business address and current position.**

3 A. My name is Jeff D. Makhholm. I am a Managing Director at National Economic Research
4 Associates, Inc. (“NERA”). NERA is a firm of consulting economists with its principal
5 offices in a number of major cities in the United States and around the world. My
6 business address is 99 High Street, Boston, Massachusetts, 02110. I have been with the
7 firm since 1984.

8 **Q. Please describe NERA.**

9 A. NERA was founded in 1961 by consulting economists working in conjunction with
10 Professor Alfred E. Kahn of Cornell University (a founder and longtime Special
11 Consultant at NERA), making it the oldest (and still the largest) firm of independent
12 consulting economists, worldwide. Among other areas of economics applied to industrial
13 organization, regulation, and economic trade questions, NERA has been heavily involved
14 in the definition and creation of competitive energy markets in the United States and
15 around the world, including U.S. natural gas markets.

16 **Q. On whose behalf do you provide testimony in this matter?**

17 A. I appear on behalf of Dakota Access, LLC (“Dakota Access”).

18 **Q. What is the purpose of your direct testimony in this proceeding?**

19 A. I am testifying in support of the request of Dakota Access for an order amending the
20 current Certificate of Corridor Compatibility and Route Permit (“Corridor Certificate and
21 Route Permit”) in connection with the proposed construction and operation of a new
22 pumping station and related facilities on the Dakota Access Pipeline in Emmons County,
23 North Dakota. I will describe the increases in customer demand for crude petroleum

1 transportation service that have been experienced by the Dakota Access Pipeline since the
2 pipeline went into service in June of 2017 and that are expected to continue to increase in
3 the future, which necessitate that the daily transportation throughput capability of the
4 pipeline be increased in order for it to meet market demand. I will explain why
5 increasing the daily transportation throughput capabilities of the existing, in-place Dakota
6 Access Pipeline, through by way of additional pumping facilities and pumping capacity
7 on the pipeline, is a superior approach for meeting the increased customer demands for
8 crude petroleum transportation service compared to other alternatives including
9 construction of new pipelines, physical expansion of existing, in place pipelines, or
10 increased transportation of crude petroleum from the Bakken and Three Forks
11 Formations (the “Bakken Petroleum System”) in the Willison Basin of North Dakota by
12 railcar and trucks.

13 **Q. Please describe your academic background and experience.**

14 A. I have M.A. and Ph.D. degrees in economics from the University of Wisconsin, Madison,
15 with a major field of Industrial Organization and a minor field of Econometrics/Public
16 Economics. I also have B.A. and M.A. degrees in economics from the University of
17 Wisconsin, Milwaukee. I joined NERA in 1986. From 1987 to 1989, I was an Adjunct
18 Professor in the Graduate School of Business at Northeastern University in Boston,
19 Massachusetts, teaching courses in microeconomic theory and managerial economics.

20 **Q. Please describe your professional experience pertinent to this proceeding.**

21 A. My work as a consulting economist principally involves the area of regulated
22 industries—both those that operate networks (such as oil and gas pipelines, electricity
23 transmission and gas distribution systems, telecommunications networks, and water

1 utility systems) and those operating infrastructure businesses at specific sites, such as
2 airports, electricity generation plants, oil refineries, and sewage treatment plants. I have
3 researched and provided evidence regarding regulated pricing, the presence or absence of
4 market power, competition, the fair rate of return, regulatory rulemaking, incentive
5 ratemaking, load forecasting, least-cost planning, cost measurement, contract obligations,
6 and bankruptcy, among other issues, concerning these industries. I have prepared expert
7 testimony and affidavits, and I have appeared as an expert witness, in many state and
8 federal agency and United States District Court proceedings, as well as in regulatory and
9 court proceedings abroad.

10 I have also directed studies on behalf of utility companies, governments, and the
11 World Bank in many countries: drafting regulations, developing tariffs, recommending
12 financing options for major capital projects, and advising on industry restructurings. I
13 have assisted in the privatization of state-owned utilities. My current curriculum vitae,
14 which more fully details my educational and consulting experience and my publications,
15 is attached hereto and marked as Exhibit A.

16 **Q. In your work, do you have experience pertaining to the regulation of oil and gas by**
17 **pipelines in the United States and North America generally?**

18 A. Yes. I have extensive experience in dealing with market entry and regulatory issues for
19 oil and gas pipelines throughout the US and Canada.

20 For oil pipelines, on behalf of particular oil pipeline shippers or the Association of
21 Oil Pipelines, I have testified before the Federal Energy Regulatory Commission (the
22 "FERC") regarding market-based rates and the operation of the FERC's cap mechanism
23 for oil pipeline charges. In 2006 and again in 2011, on behalf of the State of Alaska, I

1 testified in the Trans-Alaska Pipeline System rate proceeding before the FERC on various
2 pipeline cost and ratemaking issues. In 2013, I provided evidence in the District Court of
3 Dallas County on behalf of Energy Transfer relating to a pipeline project to move crude
4 oil from the Cushing, OK area to refineries on the Texas Gulf Coast.

5 My involvement in FERC natural gas pipeline rate regulation has been extensive
6 before, during and after the restructurings that led to today's competitive markets in both
7 the use and expansion of natural gas pipeline transport capacity. I testified before the
8 FERC in many cases involving interstate pipelines for dozens of clients—principally gas
9 distributors, either individually or in groups—on questions of rate design, cost allocation,
10 pipeline competition, and the treatment of costs for pipeline expansions. In NERA's work
11 for natural gas distributors in the United States, I have analyzed supply options and tariff
12 conditions for the various pipelines that provide Canadian natural gas to US markets.
13 Regarding gas and other liquid fuel pipelines in Canada, I have presented testimony
14 before Canada's National Energy Board (now known as the Canadian Energy
15 Regulator—CER) and provincial regulators.

16 **Q. Have you published papers or books on issues related to the economic development
17 and regulation of oil and gas pipelines?**

18 A. Yes. Listed on my curriculum vitae are two books, twenty published papers, and three
19 working papers pertaining to economic and regulatory issues associated with oil and
20 natural gas pipelines around the world. My 2015 peer-reviewed paper, entitled
21 "Regulation of Natural Gas in the United States, Canada, and Europe: Prospects for a
22 Low Carbon Fuel" (*Review of Environmental Economics and Policy*) examines the
23 institutional and political endowments that are promoting gas use in the United States and

1 Canada, displacing U.S. coal use, and inhibiting a similar sort of gas use in Europe. My
2 2016 paper in the *Energy Law Journal* (written with Dr. Laura Olive), entitled “The
3 Politics of U.S. Oil Pipelines: The First Born Struggles to Learn from the Clever Young
4 Sibling,” deals with the history of regulatory treatment of oil and gas pipelines in the
5 United States. My book *The Political Economy of Pipelines* (The University of Chicago
6 Press, 2012) examines regulation and performance of pipelines in many countries around
7 the world.

8 **II. PROJECT PURPOSE AND NEED**

9 **Q. What transportation services are provided by the Dakota Access Pipeline?**

10 A. As described in detail in the original application for a Corridor Certificate and Route
11 Permit for the Dakota Access Pipeline, the pipeline in North Dakota is part of a larger
12 pipeline system and network running from areas in North Dakota that produce crude
13 petroleum from the Bakken Petroleum System in the Williston Basin of North Dakota to
14 the Gulf Coast refinery region.¹ The pipeline originates near Stanley, North Dakota, and
15 terminates at the Patoka Terminal near Patoka and Vernon, Illinois. In addition to
16 connecting to other pipelines which serve Midwest refineries, the pipeline connects to the
17 Energy Transfer Crude Oil (ETCO) pipeline which delivers crude petroleum to refineries
18 in Louisiana and Texas. The Gulf Coast refineries accessed by the pipeline produce
19 refined petroleum products that serve markets and customer demands throughout the U.S.

20 **Q. What was the original anticipated daily throughput volume for the Dakota Access**
21 **Pipeline?**

¹ North Dakota Public Service Commission Case No. PU-14-842

1 A. I understand that initially, the average daily throughput for the Dakota Access Pipeline
2 was approximately 450,000 bpd, and at the time was expected to reach an average daily
3 throughput of 570,000 bpd.

4 **Q. What is the current daily throughput volume on the Dakota Access Pipeline?**

5 A. My understanding is that the average daily throughput volume on the Dakota Access
6 Pipeline is now 570,000 bpd.

7 **Q. Is the current daily throughput sufficient to meet shipper demands for the pipeline's**
8 **transportation services?**

9 A. I understand at the time the original application for the pipeline was filed, shippers had
10 entered into long-term transportation contracts with Dakota Access for 405,000 bpd of
11 transportation service. In accordance with FERC common carrier regulations, Dakota
12 Access is required to reserve approximately 10 percent of the capacity of the pipeline for
13 walk-up shippers. I understand that Dakota Access has experienced a substantial increase
14 in demand for crude petroleum transportation service on its pipeline from the levels of
15 demand originally anticipated and currently demand for crude petroleum transportation
16 services on the Dakota Access Pipeline exceeds its maximum throughput. In response,
17 Dakota Access is implementing a Capacity Optimization plan to increase the pipeline's
18 daily throughput capabilities.

19 I understand from discussions with company representatives that seven new
20 shippers participated in a December 2018 Open Season, and existing and potential new
21 shippers have expressed significant interest in contracting for additional capacity to meet
22 their expected future transportation needs at volumes that exceed the pipeline's current

1 capacity (without the Capacity Optimization).² Adding pumping capacity will allow
2 Dakota Access to meet the growing demand from shippers by optimizing and fully
3 utilizing the existing pipeline infrastructure, without the need to install new pipelines. It
4 is my understanding that the pipeline has also received nominations exceeding capacity
5 for at least the past nine months including demands for transportation service on the
6 pipeline from walk-up shippers that have exceeded the 10 percent capacity available to
7 those shippers. The Dakota Access Pipeline cannot accommodate the increased shipper
8 demands for crude petroleum transportation service without adding pumping resources at
9 various points along the pipeline, including in North Dakota.

10 **Q. Why has demand for crude petroleum transportation services on the Dakota Access**
11 **Pipeline increased?**

12 A. The increased demand is driven by increased crude oil production from the Bakken
13 Petroleum System in the Williston Basin of North Dakota. When the Dakota Access
14 Pipeline began operating in June 2017, the Williston Basin produced approximately
15 1,033,000 bpd and by December 2018, production increased 36 percent to 1,403,000
16 bpd.³ The North Dakota Pipeline Authority forecasts production to increase by
17 approximately 400,000 bpd over the next five years.⁴

18 **Q. Why has production increased?**

19 A. The presence of in-place drilling and production facilities (enabling producers to respond
20 rapidly to changes in customer demand and price) and ongoing advances in drilling

² An open season is a process in which pipelines solicit interest from potential shippers for commitments to new pipeline capacity.

³ North Dakota State Industrial Commission, Oil and Gas Production Report, July 2017 and January 2019.

⁴ Kringstad, J.J., North Dakota Pipeline Authority, "Energy Development and Transmission Interim Committee," Slide 29, Williston Basin Oil Production & Export Capacity, 14 August 2019. See Exhibit B, attached.

1 technology (i.e., multilateral, extended reach and complex path drilling techniques) have
2 driven this increased production. Recent industry analyses indicate substantially
3 increased projections of recoverable reserves from the Bakken Petroleum System in the
4 Williston Basin of North Dakota resulting from the advances in drilling and recovery
5 technology.⁵

6 **Q. How is existing crude petroleum transportation infrastructure accommodating**
7 **increased production from the Bakken Petroleum System in the Williston Basin of**
8 **North Dakota?**

9 A. As explained above, the Dakota Access Pipeline cannot currently accommodate the
10 increased demand for pipeline transportation service that is resulting from increased
11 production in the region. Without the ability to move additional volumes by pipeline, rail
12 and truck transportation are the only options.⁶

13 **Q. Are there benefits to transporting crude petroleum over long distances by pipeline**
14 **rather than by railroad or truck?**

15 A. Yes. Pipeline transportation for crude petroleum is safer, more efficient, and less
16 expensive than railroad or truck transportation. Transportation of crude petroleum by
17 railcars and trucks presents safety issues not presented by pipeline transportation, and
18 also diverts railroad and trucking capacity away from other uses such as transportation of
19 grain and other farm products to market and processing centers and transportation of
20 consumer and industrial products. As I understand from Mr. Frey's testimony, higher

⁵ See, e.g.,: <https://www.spglobal.com/platts/en/market-insights/latest-news/oil/103018-continental-resources-doubles-estimate-for-bakken-oil-recovery>

⁶ Kringstad, J.J., North Dakota Pipeline Authority, "Energy Development and Transmission Interim Committee," Slide 9, Estimated ND Rail Export Volumes, 14 August 2019. See Exhibit C, attached.

1 throughput volumes can be achieved on the Dakota Access Pipeline through the addition
2 of pumping capacity, among other actions, without the need to expand the pipeline's
3 existing size or footprint. Optimizing the daily crude petroleum transportation
4 capabilities of this existing transportation infrastructure is an efficient and safe option for
5 accommodating expanded petroleum production. Installation of the Emmons County
6 Pump Station and related facilities will make efficient use of the existing, constructed, in-
7 place pipeline to transport additional volumes of product as demanded by shippers and
8 will enable Dakota Access to optimize and fully utilize its existing, permitted pipeline
9 infrastructure. This capacity optimization can be achieved more quickly and much less
10 expensively than construction of entirely new pipeline capacity.

11 **Q. Does this conclude your prepared direct testimony?**

12 A. Yes, it does.

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Dr. Makhholm concentrates on the issues surrounding the regulation of energy, mining and transportation industries—those that operate networks (such as oil and gas pipelines, electricity transmission and gas distribution systems, telecommunications and water utility systems) and those operating infrastructure business at specific sites, such as mines, hydrocarbon rigs, oil refineries, electricity generation plants, oil and gas storage facilities, gas treatment plants, sewage treatment plants and airports. These issues include the broad categories of project valuation, efficient pricing, market definition and the components of reasonable regulatory practices. Specific valuation issues in the extractive industries include the value of permits for include the right to explore and develop natural resources. Specific pricing issues include tariff design, incentive ratemaking, and the unbundling of prices and services, and analysis of energy commodities markets (including derivative markets comprising forwards, futures and swaps for commodities and liquefied natural gas--LNG). Issues of market definition include assessments of mergers, including the identification and measurement of market power. Issues of reasonable regulatory practices include the creation of credible and sustainable accounting rules for ratemaking as well as the establishment of administrative procedures for regulatory rulemaking and adjudication. On such issues among others, Dr. Makhholm has prepared expert testimony, reports and statements, and has appeared as an expert witness in many states, federal and U.S. district court proceedings as well as before courts, international arbitrations and regulatory bodies and Parliamentary panels abroad.

Dr. Makhholm's clients in the United States include privately held oil, gas and utility corporations, public corporations and government agencies. He has represented dozens of gas and electric distribution utilities, as well as both intrastate and interstate oil and gas pipeline companies and oil, gas and electricity producers. Dr. Makhholm has also worked with many leading law firms engaged in issues pertaining to the local and interstate regulation of energy utilities.

Internationally, Dr. Makhholm has directed an extensive number of projects in the mining, utility and energy transportation businesses in 20 countries on six continents. These projects have involved work for investor-owned and regulated business as well as for governments and the World Bank. These projects have included advance pricing and regulatory work prior to major gas, railroad and toll highway privatizations (Poland, Argentina, Bolivia, Mexico, Chile and Australia), gas industry restructuring and/or pricing studies (Canada, China, Spain, Morocco, Mexico and the United Kingdom), utility mergers and market power analyses (New Zealand), gas development and and/or contract and financing studies (Tanzania, Egypt, Israel and Peru), regulatory studies (Chile, Argentina), and oil pipeline transport financing and regulation (Russia). As part of this work, Dr. Makhholm has prepared reports, drafted regulations and conducted training sessions for many government, industry and regulatory personnel.

Dr. Makhholm has published many papers in various peer-reviewed and editor-reviewed publications (*Review of Environmental Economics and Policy, Economics of Energy & Environmental Policy, Public Utilities Fortnightly, Natural Gas and Electricity, The Electricity Journal, The Energy Law Journal, and Competition and Regulation in Network Industries*)—involving a wide range of subjects pertaining to his research work. He is a frequent speaker in the U.S., Europe and elsewhere at conferences and seminars addressing market, pricing and regulatory issues for the energy, commodity and transportation sectors. His latest book, *The Political Economy of Pipelines: A Century of Comparative Institutional Development*, was published by the University of Chicago Press in 2012 and re-issued in Chinese in 2016 by Beijing's Petroleum Institute Press.

EDUCATION

UNIVERSITY OF WISCONSIN-MADISON,
MADISON, WISCONSIN
Ph.D., Economics, 1986
Dissertation: Sources of Total Factor Productivity in the Electric Utility Industry
M.A., Economics, 1985

BROWN UNIVERSITY
PROVIDENCE, RHODE ISLAND
Graduate Study, 1980-1981

UNIVERSITY OF WISCONSIN-MILWAUKEE
MILWAUKEE, WISCONSIN
M.A., Economics, 1980
B.A., Economics, 1978

EMPLOYMENT

1996-present	<u>Senior Vice President/Managing Director.</u> National Economic Research Associates, Inc., (NERA) Boston, Massachusetts.
1986-1996	<u>Vice President/Senior Consultant.</u> National Economic Research Associates, Inc., (NERA) Boston, Massachusetts.
1987-1989	<u>Adjunct Professor.</u> College of Business Administration, Northeastern University, Boston, Massachusetts
1984-1986	<u>Consulting Economist.</u> National Economic Research Associates, Inc., (NERA) Madison, Wisconsin.
1983-1984	<u>Consulting Economist.</u> Madison Consulting Group, Madison, Wisconsin.
1981-1983	<u>Staff Economist.</u> Associated Utility Services, Inc., Moorestown, New Jersey.

RECENT TESTIMONY (SINCE 2000)

In the United States District Court for the Eastern District of New York, Case No.: 17 CIV. 5787 (WFK) (SJB), Expert Declaration on behalf of Just Energy Group, Inc., April 30, 2019. Subject: Pricing for retail energy supply.

Before the Massachusetts Department of Public Utilities, Case No. D.P.U. 18-150 (Massachusetts Electric Company and Nantucket Electric Company), Sur-Rebuttal Testimony on behalf of Cumberland Farms, Global Partners, etc., April 30, 2019. Subject: Electric vehicle charging incentive program.

Before the Illinois Commerce Commission, Rebuttal Testimony on behalf of NextEra Energy Transmission MidAtlantic, Inc., Docket No. 18-0843, March 28, 2019. Subject: Certificate of Public Convenience and Necessity for electricity transmission asset purchase.

Before the Massachusetts Department of Public Utilities, Case No. D.P.U. 18-150 (Massachusetts Electric Company and Nantucket Electric Company), Direct Testimony on behalf of Cumberland Farms, Global Partners, etc., March 22, 2019. Subject: Electric vehicle charging incentive program.

In the United States District Court for the District of Puerto Rico, PROMESA Title III, Case No. 17 BK 3283-LTS and Case No 17 BK 4780-LTS, Expert Declaration on behalf of Movants, February 25, 2019. Subject: Value of receiver in the bankruptcy of the Puerto Rico Electric Power Authority (PREPA).

In the Matter of the Arbitration and Conciliation Act, Cap. A18 Laws of the Federation of Nigeria, 2004, Addax Petroleum Development (Nigeria) Limited, Claimant, vs. Chevron Nigeria Limited, Respondent, Expert Report on behalf of Chevron Nigeria Limited, February 22, 2019. Subject: Value of crude oil.

Before the Federal Energy Regulatory Commission, Comments in the Matter of the FERC Notice of Inquiry Regarding Certification of New Interstate Gas Facilities, Docket No. PL18-1-000, July 25, 2018.

Before the Ontario Energy Board, Expert Report and Direct Testimony in case EB-2017-0307 on behalf of Enbridge Gas Distribution and Union Gas Limited regarding support of the productivity offset (the *X-factor*) to be used in the price cap formula that will apply to the two distribution businesses for the upcoming deferred rebasing periods, November 23, 2017.

Before the International Court of Arbitration, Case No. 19576/CA/ASM, Drummond Coal Mining LLC (DCM), et al, Respondents/Counterclaimants, vs. Ferrocarriles del Norte de Colombia S.A., Claimant/Counter-Respondent, Third Expert Report, 1 November 2017. Subject: Market values of mining export losses due to imposed constraints on capacity.

Before the New York State Public Service Commission, Rebuttal Testimony on behalf of the Retail Energy Supply Association (RESA). October 27, 2017. Subject: Provide perspective regarding the operation of retail energy markets in New York state.

Before the New York State Public Service Commission, Direct Testimony on behalf of the Retail Energy Supply Association (RESA). September 15, 2017. Subject: Provide perspective regarding the operation of retail energy markets in New York state.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the International Court of Arbitration, Case No. 19576/CA/ASM, Drummond Coal Mining LLC (DCM), et al, Respondents/Counterclaimants, vs. Ferrocarriles del Norte de Colombia S.A., Claimant/Counter-Respondent, Second Expert Report, 29 August 2017. Subject: Response to alleged damages claimed as a result of failure to meet contractual rail shipment obligations.

Before the Michigan Public Service Commission, Direct Testimony on behalf of Constellation NewEnergy Inc., Case No U-18248. DTE Electric Company. July 21, 2017. Subject: Economic analysis of proposed charges for electricity capacity in Michigan.

Before the Michigan Public Service Commission, Direct Testimony on behalf of Constellation NewEnergy Inc., Case No U-18239. Consumer's Energy Company. July 17, 2017. Subject: Economic analysis of proposed charges for electricity capacity in Michigan.

Before the International Court of Arbitration, Case No. 19576/CA/ASM, Drummond Coal Mining LLC (DCM), et al, Respondents/Counterclaimants, vs. Ferrocarriles del Norte de Colombia S.A., Claimant/Counter-Respondent, Expert Report, 20 June 2017. Subject: Market values of mining export losses due to imposed constraints on capacity.

Before the National Energy Board, Expert Report and Reply Testimony on behalf of Plains Midstream Canada ULC. Hearing Order RH-002-2016, May 15, 2017. Subject: Proper cost allocation for liquid fuel pipeline tariffs.

Before the National Energy Board, Expert Report and Direct Testimony on behalf of Plains Midstream Canada ULC. Hearing Order RH-002-2016, November 2016. Subject: Proper cost allocation for liquid fuel pipeline tariffs.

Before the Supreme Court of the State of New York, County of New York, Expert Testimony on behalf of plaintiffs in: S.A. de Obras y Servicios, Copasa and Cointer Chile, S.S. and Azvi Chile, S.A. Agencia en Chile, Plaintiffs v. The Bank of Nova Scotia and Scotiabank Capital, IAS Part 49, Index No. 651649/2013 and 651555/2012. August 10, 2016, Subject: Value of P3 toll road enterprise in Chile.

Before the National Energy Board, Expert Testimony on behalf of FortisBC Energy Inc., Hearing Order Number GH-003-2015, March, 2016. Subject: Tolling for pipeline extensions

Before the Superior Court of the State of Delaware in and for New Castle County, Expert Report on behalf of Deere & Company, in C.A. No. N13C-07-330 MMJ CCLD. December 2, 2015. Subject: Value of Power Purchase Agreements in the wind power industry.

Before the Superior Court of the State of California for the County of Los Angeles in the Matter of GAF Materials Corporation v. Paramount Petroleum Corporation, Opinion given September 3, 2015. Case No: BC 481673. Subject: Oil price indexing to set asphalt prices.

Before the United States District Court for the Northern District of Oklahoma, Expert Report on behalf of SFF-TIR, LLC, the Stuart Family Foundation (et al), Case No. 14-CV-369-TCK-FHM, June 30, 2015. Subject: Fair value of shares in a pipeline industry services firm.

Before the International Chamber of Commerce Expert Report on behalf of STP Energy Pte Ltd. Subject: Valuation of offshore oil and gas exploration permit, April 29, 2015.

Before the Régie de l'énergie, Written Evidence on behalf of Gaz Métro. Subject: Pricing of gas distribution system expansion, January 20, 2015

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the Supreme Court of Western Australia, Filed Statement on behalf of North West Shelf Pty Ltd, Subject: Value and interpretation of gas swaps agreement, December 24, 2014.

Before the District Court of Tarrant County, Texas, 17th Judicial District, Expert Report of Jeff D. Makhholm on behalf of OAO Gazprom, et al, Subject: Valuation of failed LNG import project, November 14, 2014.

Before the National Energy Board, Expert Report and Direct Testimony on behalf of MAS (Market Area Shippers Group), Hearing Order RH-001-2014, July 2014. Subject: Effectiveness of toll design//regime in settlement.

Before the National Energy Board, Expert Testimony on behalf of FortisBC Energy Inc., Hearing Order Number GH-001-2014, July 10, 2014. Subject: Tolling for pipeline extensions.

Before the National Energy Board, Expert Testimony on behalf of Alliance Pipeline, May 22, 2014. Subject: Restructuring services/tolls.

Before the Economic Regulation Authority of Western Australia on behalf of ATCO Gas Australia, March 2014. Subject: Cost accounting for gas pipeline regulation.

Before the 298th Judicial District Court of Dallas County, Texas, Expert Testimony on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, February 2014. Subject: Assessment of causation and valuation of damages from lost crude oil pipeline opportunity.

Before the National Energy Board, Expert Testimony on behalf of Enbridge Gas Distribution Inc. and Union Gas limited, Hearing Order MH-001-2013, November 1, 2013. Subject: Tolling issues involving pipeline abandonment.

Before the National Energy Board, Expert Report and Direct Evidence on behalf of MAS (Market Area Shippers Group), Hearing Order RH-001-2013, July 26, 2013. Subject: Contract renewal provisions.

Before the 298th Judicial District Court of Dallas County, Texas, Supplemental Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, July 24, 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the 298th Judicial District Court of Dallas County, Texas, Rebuttal Expert Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, March 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the 298th Judicial District Court of Dallas County, Texas, Direct Expert Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, January 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the Alberta Public Utility Commission, Direct Testimony on behalf of ATCO Electric and ATCO Gas, Proceeding ID #2131, December 2012. Subject: Analysis of ATCO Electric's and ATCO Gas' capital tracker proposals

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the American Arbitration Association, Expert Report with Dr. Victor P. Goldberg, Case No. AAA No. 16 132 Y 00502 11. December 17, 2012. Subject: Confidential Arbitration.

Before the National Energy Board, Written Evidence on behalf of FortisBC Energy Inc., Hearing Order GH-001-2012, May 29, 2012. Subject: Tariff treatment for pipeline extensions to new Canadian gas production regions.

Before the National Energy Board, Expert Report and Direct Testimony on behalf of Market Area Shippers Group, Hearing Order RH-003-2011, March 2012. Subject: Assessment of TransCanada's omnibus restructuring proposal and commentary on Market Area Shippers Group's alternative solution.

Before the Alberta Public Utility Commission (with Agustin J. Ros). Reply Expert Report. Application No. 1606029, AUC Proceeding 566. February 22, 2012. Subject: Update to TFP analysis and review of PBR plans for the Commission's performance-based regulation initiative.

Before the State Corporation Commission of the State of Kansas, Testimony on Behalf of Coffeyville Resources Refining & Marketing, LLC, Docket No. 12-MDAP-068-RTS. October 25, 2011. Subject: Reasonable ratemaking methodology.

Before the United States Federal Energy Regulatory Commission, Prepared Direct Testimony in Public Utilities Commission of Nevada and Sierra Pacific Power Company v Tuscarora Gas Transmission Company, Docket No. RP11-1823-000. October 17, 2011. Subject: Reasonable interstate gas pipeline tariff levels.

Before the Public Utilities Commission of Nevada, Pre-filed Rebuttal Testimony on behalf of Nevada Power Company and Sierra Pacific Power Company d/b/a NV Energy. Docket Nos. 11-03003, 11-03004 & 11-03005. August 3, 2011. Subject: Prudence of hedging practices.

Before the United States Federal Energy Regulatory Commission, Affidavit in Public Utilities Commission of Nevada and Sierra Pacific Power Company v Tuscarora Gas Transmission Company, Docket No. RP11-1823-000. February 28, 2011. Subject: Reasonable interstate gas pipeline tariff levels.

Before the Public Utilities Commission of Nevada, Prepared Direct on behalf of Nevada Power Company d/b/a NV Energy, 2011 Gas and Electric Deferred Energy Proceeding, Docket No. 11-03___. February 24, 2011. Subject: Prudence of hedging practices.

Before the Public Utilities Commission of Nevada, Prepared Direct on behalf of Sierra Pacific Power Company d/b/a NV Energy, 2011 Gas Deferred Energy Proceeding, Docket No. 11-03___. February 24, 2011. Subject: Prudence of gas hedging practices.

Before the Federal Energy Regulatory Commission and the State of Alaska Regulatory Commission, Prepared Direct Testimony on behalf of Trans Alaska Pipeline System. Docket No. IS09-348-004, *et al.* January 21, 2011. Subject: Prudence of capital rehabilitation costs.

Expert report filed before the Alberta Public Utility Commission (with Agustin J. Ros). Application No. 1606029, AUC Proceeding 566. December 30, 2010. Subject: Total factor productivity study for use in the Commission's performance-based regulation initiative.

Before the Commonwealth of Kentucky, Edmonson Circuit Court. Opinion on behalf of plaintiff in Honeycutt vs. Atmos Energy Corporation. Docket No. 09-CI-00198 and 10-CI-00040. September 10, 2010. Subject: Valuation of natural gas for royalty computations.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the Régie de l'Énergie, Direct Testimony on behalf of Hydro-Québec TransÉnergie. Demande R-3738-2010. August 2, 2010. Subject: Economic analysis of issues related to the regulatory policies for network upgrades.

Before the Public Utilities Commission of Nevada, Pre-Filed Supplemental Direct Testimony on behalf of Nevada Power Company, Sierra Pacific Power Company d/b/a NV Energy (electric and gas departments), Docket No: 10-03003, 10-03004, 10-03005. May 5, 2010. Subject: Gas hedging.

Before the Arkansas Public Service Commission, Rebuttal Testimony on behalf of Entergy Arkansas, Inc., Docket No. 09-084-U. March 24, 2010. Subject: Justification of the operation of a multi-year formula rate plan.

Before the Public Utilities Commission of Nevada, Pre-Filed Direct on behalf of Nevada Power Company, Docket No. 10-03003. February 26, 2010. Subject: Prudence of gas purchase costs.

Before the New York State Public Service Commission, Rebuttal Testimony on behalf of Rochester Gas and Electric Corporation, Case 09-E--07717 Case 09-G-0718 and New York State Electric & Gas Corporation, Case 09-E-0715, Case 09-E-0716. February 12, 2010. Subject: Cost of equity capital.

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Panel Moderator, 33rd Annual IPPNY Fall Conference, A New Energy Standard: Adapting to An Evolving Market & Grid, Panel Discussion - REV: An Outlook, September 14, 2018, Saratoga Springs, NY.

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“How to Make LNG Accessible to All of Europe?” CEER Workshop. Athens, Greece, September 12, 2016.

“Gas Markets, Gas Use and Europe’s Gas Supply from the East,” Eurasian Natural Gas Infrastructure Conference, Istanbul, Turkey, June 9, 2015

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“Ensuring Natural Gas Availability,” MIT Energy Initiative, 2013 MITEI Symposium, Cambridge, Massachusetts, April 16, 2013.

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“Governance and the Electricity Sector,” Governance and Regulation in the Electricity Sector Conference. Toronto, Ontario, June 4, 2010.

“Public Utility Companies and Regulatory Risk,” Saul Ewing’s 4th Annual Public Utility Symposium. Philadelphia, PA, May 24, 2010.

“It’s All About Inland Transportation,” US Gas Pipelines Reflect What’s Happening in Europe,” Florence School of Regulation Specialized Training on Regulation of Gas Markets. Florence, Italy, March 24, 2010.

“Windmills and Wires: FERC Rate Cases, Transmission Cost Allocation, and Renewable Power Development,” Law Seminars International Sixth Annual National Conference on Today’s Utility, Las Vegas, Nevada, February 11, 2010.

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“Institutional, Transactional and Political Barriers to Competitive Gas Market in Europe: Europe’s Pipelines and Economics,” Florence School of Regulation Workshop: Tariffs for European Gas Transmission Networks. Florence, Italy, March 6, 2009.

“Cost recovery mechanisms: Options and where each works best; what approach is most likely to get necessary projects built,” Law Seminars International, Utility Rate Case: Issues and Strategies 2009. Las Vegas, Nevada, February 5, 2009.

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“Maintaining Adequate Infrastructure in the Natural Gas and Electric Industries,” Increasing Longer-Term Stability in Energy Markets conference sponsored by the Institute for Regulatory Policy Studies. Springfield, Illinois, May 1, 2008.

“Rate Decoupling and Associated Rate and Cost Issues,” New Hampshire Public Utilities Commission, Concord, New Hampshire, November 6, 2007.

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“A Gas Network to Meet the Needs of New Electricity Generators,” Ontario Energy Association, Ontario, Canada, June 23, 2005.

“Forks in the Road for Electricity Transmission,” Electricity Industry Regulation and Restructuring conference by The Salt River Project and The Arizona Republic, October 11, 2002.

“Role of Yardsticks in Cost & Service Quality Regulation,” London Regulated Industries Group, November 30, 2000.

“Natural Gas Issues: Retail Competition, LDC Gas Rate Unbundling, and Performance Based Rates,” Wisconsin Public Utility Institute, November 17, 2000.

“Performance Based Ratemaking (PBR) in Restructured Markets,” Edison Electric Institute Seminar in San Antonio Texas, April 27, 2000.

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“Gas and Electricity Sector Convergence: Economic Policy Implications,” Energy Week ’99, “The Global Shakeout,” The World Bank, Washington D.C., April 6-8, 1999.

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“Open Access in Gas Transmission,” New England Chapter of the International Association for Energy Economics, Boston, Massachusetts, December 13, 1995.

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“Incremental Pricing: Not a Quantum Leap,” Natural Gas Ratemaking Strategies Conference, Houston, Texas, February 3, 1995.

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“A Mirror on the Evolution of the Gas Industry: The Views from Within the Business and from Abroad,” 1994 LDC Meeting-ANR Pipeline Company, October 4, 1994.

“Creating New Markets Out of Old Utility Services,” Fifteenth Annual NERA Santa Fe Antitrust and Trade Regulation Seminar, Santa Fe, New Mexico, July 9, 1994.

“Sources of and Prospects for Privatization in Developed and Underdeveloped Economies,” Spring Conference of the International Political Economy Concentration and the National Center for International Studies at Columbia University, New York, March 30, 1994.

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“Experiencias en el Desarrollo del Mercado de Gas Natural (Experiences in gas market development),”
“Perspectivas y Desarrollo de Mercado de Gas Natural,” Centro de Extensión de la Pontificia
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“The Role of Rate of Return Analysis in a More Progressive Regulatory Environment,” Twenty-Fifth
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“Privatization of Energy and Natural Resources,” International Privatization Conference “Practical Issues
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“Serious Problems with CREG Document 070 Facing Colombia’s Energy Market.”, report generated for the Asociación Nacional de Empresas Generadoras (ANDEG). White paper (with Graham Shuttleworth) assessing the economic and policy implications of a proposal by the Colombian Energy and Gas Regulatory Commission (CREG) to reform the country’s Reliability Charge mechanism for the wholesale power market. September 2015.

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“Regulatory Assessment of the Turkish Electricity Sector.” Report prepared for Prisma Energy on the examination of the economic and regulatory risks facing investors in the privatization of the energy infrastructure of Turkey. December 6, 2006.

“Calculation of the X-Factor in the 2nd Reference Report of the Bundesnetzagentur.” Report prepared for E. ON Ruhrgas, Germany: Design of a regulatory method based on comparison of average tariffs, consistent with new German legislation on the regulation of gas transmission networks. April 21, 2006. (with Graham Shuttleworth and Michael Kraus).

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“Natural Gas Pipeline Access Regulation”. Report prepared for BHP Petroleum Pty Ltd., May 31, 2001.

“Manual de Procedimientos para el Sistema Uniforme de Cuentas Regulatorias Eléctricas (SUCRE) de México” (April 2000). The report includes an explanation of each of the accounts needed for regulation, recording procedures and the structure the information should take when reporting to the regulator.

“Investigation into Petronets’ Liquid Fuels Pipeline Tariffs: Final Report” (March 9th, 2000). This report presents NERA opinions in the quasi-arbitration of the tariffs disputes in the oil industry in South Africa for their liquids pipelines.

“Seeking Genuine Gas Competition in NSW”, prepared for BHP Petroleum Pty. Ltd., February 18, 2000.

“Análisis y Revisión del Recurso de Revocatoria Interpuesto por la Compañía Boliviana de Energía S.A. (COBEE) a la Resolución SSDE N° 92/99 de la Superintendencia de Electricidad” (September 6, 1999). This report represents NERA’s opinion on COBEE’s appeal in the electricity tariff review process in Bolivia (report in Spanish).

“Gas Sector Regulation Consultancy Services” report prepared for the Vietnam Oil and Gas Corporation, August 10, 1999.

“Natural Gas Demand Estimation for Guatemala, Honduras and El Salvador” (July 19th, 1999). This report done for an international consortium of companies presents calculations of prices and volumes of natural gas demand for three Central American countries if a pipeline is built from Mexico.

“Comments on East Australian Pipeline Limited Access Arrangements: (July 15, 1999). Report prepared on behalf of Incitec Ltd.

“Supplementary Submission to IPART on AGLGN’s Proposed Access Arrangements” on behalf of Incitec Limited (April 27th, 1999). This submission discusses reload practices, customer contributions, operating expenses and recalculates charges for a user of the distribution network in New South Wales, Australia.

“Supplementary Submission to IPART on AGLGN’s Proposed Costs and Tariffs” on behalf of BHP (April 15th, 1999). This submission explains how NERA recalculated charges for AGLGN in New South Wales, Australia.

“Initial Comments on AGLGN’s Revised Access Arrangement Information” on behalf of BHP (March 20th, 1999). This submission presents NERA’s comment to AGLGN submission to IPART in New South Wales, Australia.

“International Restructuring Experience” (February 12th, 1999). This paper surveys a number of countries whose experience of restructuring and competition in the electricity sector is directly relevant to the proposed changes in Mexico – Argentina, Australia, Chile, Guatemala, New Zealand, Norway, Spain, the US and the UK

“Report I: Review of the Regulatory Framework” (January 18th, 1999). This report presents the options for a natural gas framework in Peru.

“Conceptual Framework for the Reform of the Electricity Sector in Mexico: White Paper” (November 24th, 1998). This report represents the White Paper for restructuring of the electricity sector in Mexico which is being used in Congress for debate.

“Precios del Gas Natural para la Generación de Electricidad en el Perú” (November 16th, 1998). This report analyzes different alternatives for the treatment of natural gas prices in the electricity tariff model (report in Spanish).

“Tariffs and Subsidies: Report for the Tariffs Group” (November 10th, 1998). This report presents recommendation on the path for tariffs and subsidies for 1999 to the Electricity Tariffs Group of the Government of Mexico.

“Gasoducto México-Guatemala: Informe Final” (October 22nd, 1998). This report analyzes the legal and regulatory framework in both Mexico and Guatemala and costs and volumes for the building of a natural gas pipeline connecting both countries. A copy of the report was given by President Zedillo (Mexico) to President Arzú (Guatemala) (report in Spanish).

“Checks and Balances in Regulating Power Pools: Seven case Studies. A Report for the Electricity Pool of England and Wales” (September 10th, 1998). This report surveys the regulation of power pools in electricity industries around the world.

“Fuels Policy Group: Recommendations” (September 11th, 1998). This report presents recommendations to the Government of Mexico on their fuels policies for the electricity sector.

“Análisis de Costos e Inversiones. Revisión Tarifaria de Transener” (August 25, 1998). Report given to ENRE (the Argentinean electricity regulator) on behalf of a Consortium of Generators on the analysis of costs and investments to be considered for the revenue requirement of the electricity transmission company (report in Spanish).

“Central America Pipeline: Regulatory Analysis and Proposal” (July 28, 1998). This report presents the regulatory analysis and development of a fiscal, legal and commercial framework proposal for gas import, transportation, distribution and marketing in El Salvador, Honduras and Guatemala regarding the proposed Central American Pipeline.

“Energy Regulation in El Salvador” (July 28, 1998). This report presents a deep analysis of the electricity and natural gas regulatory, legal and tax frameworks in El Salvador.

“Energy Regulation in Guatemala” (July 28, 1998). This report presents a deep analysis of the electricity and natural gas regulatory, legal and tax frameworks in Guatemala.

“The Cost of Capital for Gas Transmission and Distribution Companies in Victoria” (June 22, 1998). Report prepared for BHP Petroleum Pty Ltd.

“Principios Económicos Básicos de Tarificación de Transmisión Eléctrica. Revisión Tarifaria de Transener” (May 26, 1998). The main purpose for this report was to provide an economic and regulatory analysis of laws, decrees, license and documents of the tender to provide advise in the tariff review of Transener (the electricity transmission company in Argentina), to present an economic analysis of transmission tariffs and to provide an opinion on specific topics to be discussed in the public hearing. This report was written for a consortium of generators in Argentina (reports in English and Spanish)

“Asesoría en la Fijación de Tarifas de Transener y Normativa del Transporte, Benchmarking Study” (May 26, 1998). This report compares the costs of Transener (the electricity transmission company in Argentina) with those of other companies elsewhere for a consortium of generators (the electricity transmission company in Argentina).

“International Regulation Tool Kit: Argentina” (March 20, 1998). This document describes the natural gas regulatory framework in Argentina for BG.

“Tarificación de los Servicios Que Prestan las Terminales de Gas LP” (January 9, 1998). The final report given to PEMEX Gas y Petroquímica Básica (México) for the determination of rates for LPG terminals.

“NERA-Pérez Compañía Distribution Tariff Model” (January 5, 1998). This report explains the methodology behind NERA’s calculations of distribution tariffs for Pérez Compañía in Monterrey.

“Monterrey Natural Gas Market Assessment,” (January 5, 1998). A series of reports were written to present the results of the market study of the demand for natural gas in the geographic zone of Monterrey to a company interested in bidding for the natural gas distributorship.

“Resolving the Question of Escalation of Phases (bb) and (cc) Under the Maui Gas Sale and Purchase Contract”, prepared for the New Zealand Treasury, December 16, 1997.

“Timetable and Regulatory Review for the Monterrey International Public Tender,” (December 5, 1997). A description of the necessary steps to bid for a distribution company as well as an explanation and analysis of natural regulations in Mexico for Pérez Compañ.

“Economic Issues in the PFR for 18.3.1(I)(bb) & (cc)”, prepared for the New Zealand Treasury, November 17, 1997.

“NERA’s Distribution Tariff Model” (October 29, 1997). This report explains the methodology behind NERA’s calculations of distribution tariffs for MetroGas.

“Evaluation Design Standards for MetroGas,” (October 24, 1997). This report dealt with the analytical support resulting from work with MetroGas to create a meticulously-documented security criterion analysis that supported its efforts to obtain due recognition—and appropriate tariff treatment—for its costs.

“Ghana Natural Gas Market Assessment,” prepared for the Ministry of Mines and Energy, Ghana (March-July, 1997). A series of four reports assessing prospective gas demand usage and netback prices for a number of proposed pipeline project alternatives.

“Final Report for Russian Oil Transportation & Export Study: Commercial, Contractual & Regulatory Component,” prepared for The World Bank, June 25, 1997.

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“Market Models for Victoria’s Gas Industry: A Review of Options,” April 1997, prepared for Broken Hill Proprietary (BHP) Petroleum, to propose an alternative model for gas industry restructuring in Victoria, Australia.

“New Market Arrangements for the Victorian Gas Industry,” prepared for Broken Hill Proprietary Petroleum; March 13, 1997.

“CEG Privatization: Comments to the Regulatory Framework,” prepared for Capitaltec Consultoria Economica SA describing our comments with respect to the regulatory framework and the license proposed in the privatization of Riogas and CEG in Rio de Janeiro, Brazil; March 7, 1997.

“Determination of the Efficiency Factor (X),” prepared for ENARGAS, Argentina, January 24, 1997.

“Determination of Costs and Prices for Natural Gas Transmission,” prepared for Pemex Gas y Petroquímica Básica, México, December 19, 1996.

“Regulating Argentina’s Gas Industry,” a report prepared for The Ministry of Economy and The World Bank, November 26, 1996.

“Open Access and Regulation,” prepared for Gascor, in the State of Victoria, Australia; (October 2, 1996).

“A Review and Critique of Russian Oil Transportation Tariffs (Russian Oil Transportation & Export Study; Commercial, Contractual & Regulatory Component),” prepared for The World Bank, June 13, 1996.

“Tariff Options for Transneft (Russian Oil Transportation & Export Study; Commercial, Contractual & Regulatory Component),” prepared for The World Bank, June 6, 1996.

“Comments on the Proposed Amendments to the Regulation of Airports in New Zealand,” prepared for the New Zealand Parliament Select Committee hearings on the regulation of monopolies, March 13, 1996.

“Evaluating the Shell Camisea Project,” prepared for Perupetro S.A., Government of Peru, December 8, 1995.

“Towards a Permanent Pricing and Services Regime,” prepared for British Gas, London, England, November, 1995.

“Final Report: Gas Competition in Victoria,” prepared for Gas Industry Reform Unit, Office of State Owned Enterprises, June 1995.

“Natural Gas Tariff Study,” prepared for the World Bank, May 1995, consisting of:

Principles and Tariffs of Open-Access Gas Transportation and Distribution Tariffs
Handbook for Calculating Open-Access Gas Transportation and Distribution Tariffs

“Economic Implications of the Proposed Enerco/Capital Merger,” prepared for Natural Gas Corporation of New Zealand, December 1994.

“Contract Terms and Prices for Transportation and Distribution of Gas in the United States,” prepared for British Gas TransCo, November 1994.

“Economic Issues in Transport Facing British Gas,” prepared for British Gas plc, December 1993.

“Overview of Natural Gas Corporation's Open-Access Gas Tariffs and Contract Proposals,” prepared for Natural Gas Corporation of New Zealand, October 1993.

Energy Development and Transmission Interim Committee

Justin J Kringstad

Geological Engineer

Director

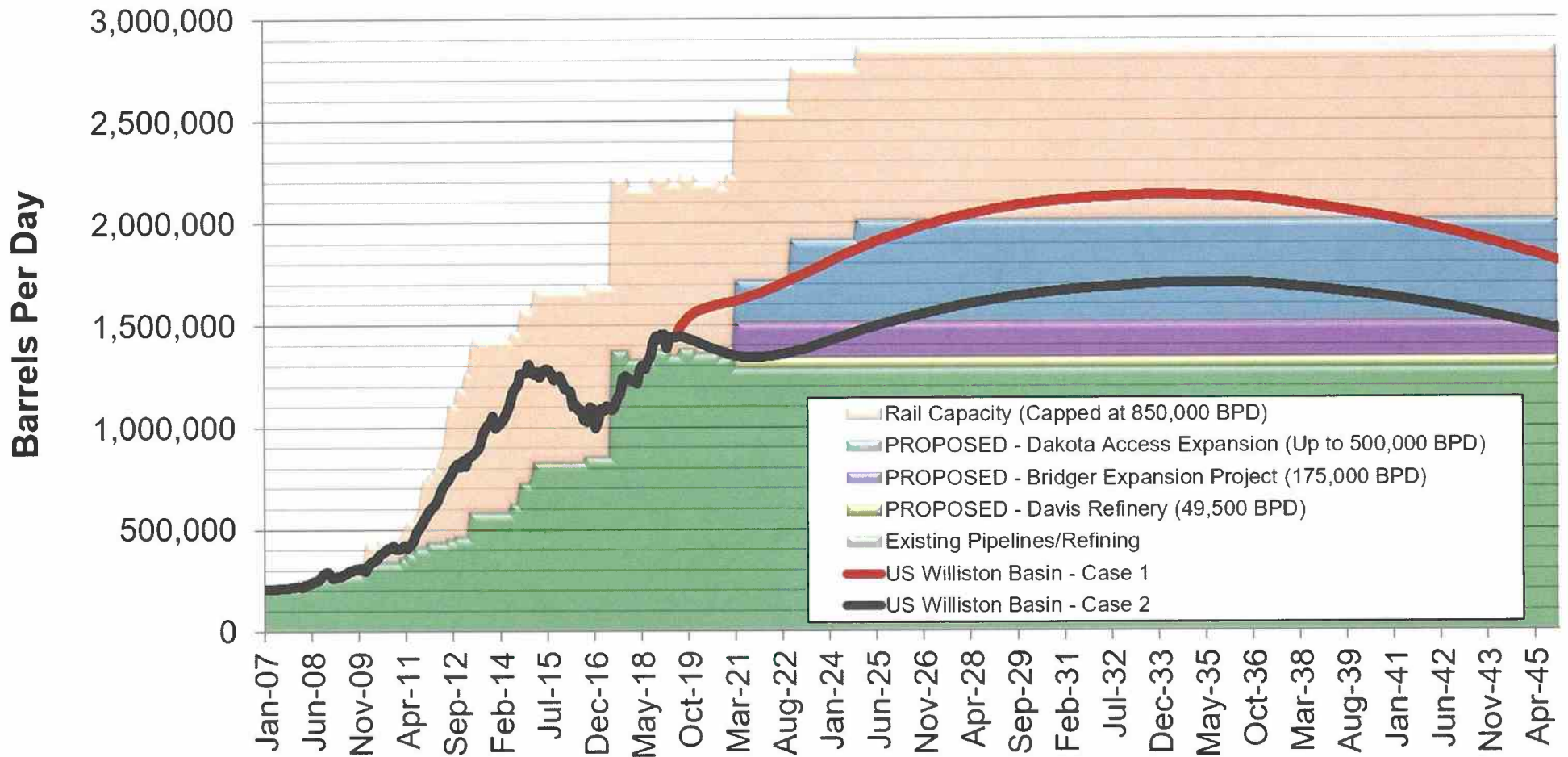
North Dakota Pipeline Authority

August 14, 2019



Exhibit B

Williston Basin Oil Production & Export Capacity, BOPD



Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.



Energy Development and Transmission Interim Committee

Justin J Kringstad

Geological Engineer

Director

North Dakota Pipeline Authority

August 14, 2019



Exhibit C

Estimated ND Rail Export Volumes

