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BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO

IN THE MATTER OF THE APPLICATION OF)	Cause No. 407
KERR-MCGEE OIL & GAS ONSHORE LP FOR)	
AN ORDER ESTABLISHING AN APPROXIMATE)	Docket No. 181000706
947.16-ACRE DRILLING AND SPACING UNIT)	
AND APPROVING UP TO SEVENTEEN)	Type: SPACING
HORIZONTAL WELLS WITHIN THE UNIT FOR)	
THE PRODUCTION OF OIL, GAS, AND)	
ASSOCIATED HYDROCARBONS FROM THE)	
NIOBRARA AND CODELL FORMATIONS FOR)	
ALL OF SECTION 2 AND THE N½ OF SECTION)	
11, TOWNSHIP 1 NORTH, RANGE 65 WEST,)	
6TH P.M., WATTENBERG FIELD, WELD)	
COUNTY, COLORADO.)	

REQUEST FOR RECOMMENDATION OF
APPROVAL OF APPLICATION WITHOUT A HEARING

Kerr-McGee Oil & Gas Onshore LP ("Applicant"), Operator No. 47120, by its attorneys, Welborn Sullivan Meck & Tooley, P.C., requests pursuant to Rule 511.a. of the Rules and Regulations of the Colorado Oil and Gas Conservation Commission for the Director to recommend approval of its July 25, 2018, verified application ("Application") and the supporting exhibits without a hearing.

Applicant requests that the above-captioned matter be approved based upon: (i) the merits of the Application, and (ii) Applicant's sworn written testimony verifying sufficient facts along with exhibits that adequately support the relief requested by the Application. To Applicant's information and belief, no protests are yet filed in this matter.

WHEREFORE, Applicant requests that its request for a recommendation for approval of its Application without a hearing be granted.

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DATED this 5 day of October, 2018

Respectfully submitted,

By:

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Joseph C. Pierzchala

Geoffrey W. Storm

Welborn Sullivan Meck & Tooley, P.C.

Attorneys for Applicant

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gstorm@wsmtlaw.com

BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO

IN THE MATTER OF THE APPLICATION OF)	Cause No. 407
KERR-MCGEE OIL & GAS ONSHORE LP)	
FOR AN ORDER ESTABLISHING AN)	Docket No. 181000706
APPROXIMATE 947.16-ACRE DRILLING)	
AND SPACING UNIT AND APPROVING UP)	Type: SPACING
TO SEVENTEEN HORIZONTAL WELLS)	
WITHIN THE UNIT FOR THE PRODUCTION)	
OF OIL, GAS, AND ASSOCIATED)	
HYDROCARBONS FROM THE NIOBRARA)	
AND CODELL FORMATIONS FOR ALL OF)	
SECTION 2 AND THE N½ OF SECTION 11,)	
TOWNSHIP 1 NORTH, RANGE 65 WEST,)	
6TH P.M., WATTENBERG FIELD, WELD)	
COUNTY, COLORADO.)	

SUMMARY OF RULE 511 WRITTEN TESTIMONY

Kerr-McGee Oil & Gas Onshore, LP ("Applicant"), Operator No. 47120, by and through its attorneys, Welborn Sullivan Meck & Tooley, P.C., respectfully submits this written testimony and the accompanying Exhibits A, B and C to the Oil and Gas Conservation Commission of the State of Colorado ("Commission") in support of its Application for an order establishing an approximate 947.16-acre drilling and spacing unit for all of Section 2 and the N½ of Section 11, Township 1 North, Range 65 West, 6th P.M., and approving up to seventeen horizontal wells within the unit for the production of oil, gas and associated hydrocarbons from the Niobrara and Codell Formations. Applicant owns leasehold interests in the following lands ("Application Lands"):

Township 1 North, Range 65 West, 6th P.M.

Section 2: All

Section 11: N½

Based upon work supervised by Joseph Kmetz, Applicant listed in Exhibit A to the Application in this matter the names and addresses of the interested parties and each of those parties was notified as indicated in the Certificate of Mailing filed in this matter. Joseph Kmetz prepared the written land testimony, Exhibit A hereto. Dr. Steven Goolsby prepared the written geologic testimony, Exhibit B hereto. Dr. David Faulder prepared the written engineering testimony, Exhibit C hereto. Copies of the affiants' respective resumes are included with their testimony.

Attached to Exhibit A is Leasehold Ownership Map, showing Kerr-McGee's ownership within the Application Lands, an Aerial Map of the Application Lands, and a Topographic Map of the Application Lands.

Attached to Exhibit B are geologic exhibits that include: a base map and cross section index showing the locations of cross sections N-S, showing the Application Lands and lands in the vicinity; a type log showing the Niobrara, Fort Hays, Codell, and Carlile Formations, and demonstrating that the Niobrara and Codell Formations are reservoirs that could be developed more efficiently using horizontal drilling techniques; a stratigraphic cross section of the interval containing the Niobrara and Codell Formations; a Niobrara structure map, showing the presence of the Niobrara in the Application Lands and the regional monoclonal dip across the Application Lands; an isopach map of the Niobrara Formation showing an average thickness of 325 feet across the Application Lands; a Codell structure map showing the presence of the Codell Formation in the Application Lands, and the regional monoclonal dip across the Application Lands; and an isopach map of the Codell Formation showing an average thickness of 17 feet across the Application Lands. The Geologic Testimony shows that the Niobrara and Codell Formations are present throughout the Application lands, that the Niobrara Formation averages 325 feet thick across the Application Lands, that the Codell Formation averages 17 feet thick across the Application Lands.

Attached to Exhibit C are engineering exhibits based on data from offset wells located in the vicinity of the Application Lands that are producing from the Niobrara and Codell Formations. These exhibits show: that the estimated drilling and completion economics for the Applicant's proposed spacing unit and well density would produce favorable economics for the proposed operations; that the calculated drainage area based upon analogous horizontal Niobrara and Codell wells is not greater than 24.2 acres for Niobrara wells within the unit and 189 acres for Codell wells within the unit, and that the proposed 947.16-acre drilling and spacing unit is not smaller than the maximum area that can be drained by seventeen horizontal wells producing from the Niobrara and Codell Formations.

Based upon the geologic and engineering information, Applicant believes that an order establishing an approximate 947.16-acre drilling and spacing unit for all of Section 2 and the N½ of Section 11, Township 1 North, Range 65 West, 6th P.M., and approving up to seventeen horizontal wells within the unit, will result in economic wells with a favorable return on investment that will allow for efficient drainage and recovery of hydrocarbons from the Niobrara and Codell Formations without causing waste or injuring correlative rights.

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Dated: October 2, 2018

Respectfully submitted,

KERR-MCGEE OIL & GAS ONSHORE, LP

A handwritten signature in black ink, appearing to read 'J. Pierzchala', is written over a horizontal line.

Joseph C. Pierzchala

Geoffrey W. Storm

Welborn Sullivan Meck & Tooley, P.C.

Attorneys for Applicant

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<p align="center">Exhibit A</p> <p align="center">KERR-MCGEE OIL & GAS ONSHORE LP</p> <p align="center">Joseph Kmetz</p>	<p align="center">Docket No. 181000706</p> <p align="center">Land Testimony – Cause 407</p> <p align="center">Weld County, Colorado</p>
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Application Lands

Township 1 North, Range 65 West, 6th P.M.

Section 2: All

Section 11: N½

My name is Joseph Kmetz, and I am currently employed as Landman with Kerr-McGee Oil & Gas Onshore LP (“Kerr-McGee”). I have 3 years of experience in land and am familiar with the land characteristics on the Applications Lands.

In support of our Application today, I have prepared three (3) exhibits. The exhibits are attached to my sworn testimony and form the basis for Kerr-McGee’s Application to gain approval to drill and complete up to seventeen (17) horizontal wells in the approximate 947.16-acre drilling and spacing unit for the Niobrara and Codell Formations.

Exhibit L-1 is a plat depicting the Application Lands and lands in the vicinity, and covers an area generally centered on Section 2 and the N½ of Section 11, Township 1 North, Range 65 West, 6th P.M. The proposed drilling and spacing unit is shown with the red boundary. Kerr-McGee’s leasehold is shown in yellow.

Exhibit L-2 is a surface plat depicting the Application Lands and lands in the vicinity. The proposed drilling and spacing unit is shown with the red boundary. Kerr-McGee’s leasehold is shown in yellow.

Exhibit L-3 is a topographic plat depicting the Application Lands and lands in the vicinity. The proposed drilling and spacing unit is shown with the red boundary. Kerr-McGee’s leasehold is shown in yellow.


Kerr-McGee believes that the proposed drilling and spacing unit will allow for efficient and economic development of the Niobrara and Codell Formations, will assist in preventing waste, will protect correlative rights without harm to adjacent owners, and will result in a greater ultimate recovery of oil, gas and associated hydrocarbon substances from respective benches of the target formations.

Kerr-McGee is an Owner with the right to drill, as defined by the Commission Rules, within the proposed drilling and spacing unit.

Docket 181000706

To the best of my knowledge and belief, all of the matters set forth herein, my testimony and in the exhibits are true, correct and accurate.

Dated this 4th day of October, 2018


Joseph Kmetz
Landman

STATE OF COLORADO)
) ss
CITY AND COUNTY OF DENVER)

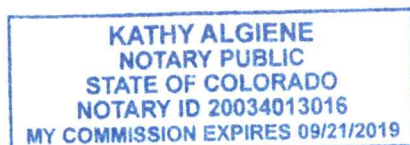
I, the undersigned Notary Public in and for said County in said State, hereby certify that Joseph Kmetz, whose name as Landman for Kerr-McGee Oil & Gas Onshore LP, is signed to the foregoing instrument and who is known to me, acknowledged before me on this day that, being informed of the contents of the instrument, executed the same voluntarily for and as the act of said corporation.

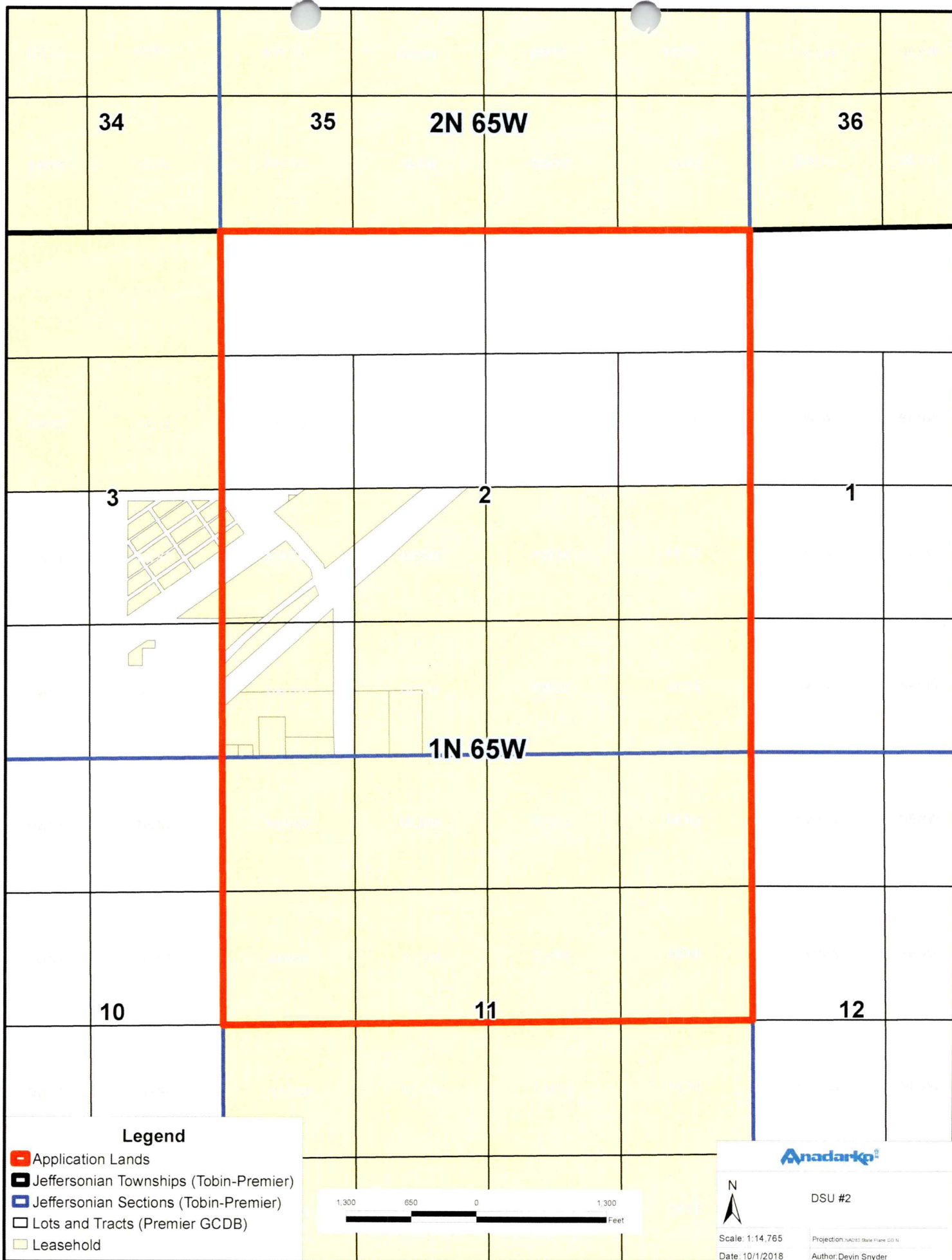
Subscribed and sworn to before me this 4th day of October, 2018.

Witness my hand and official seal

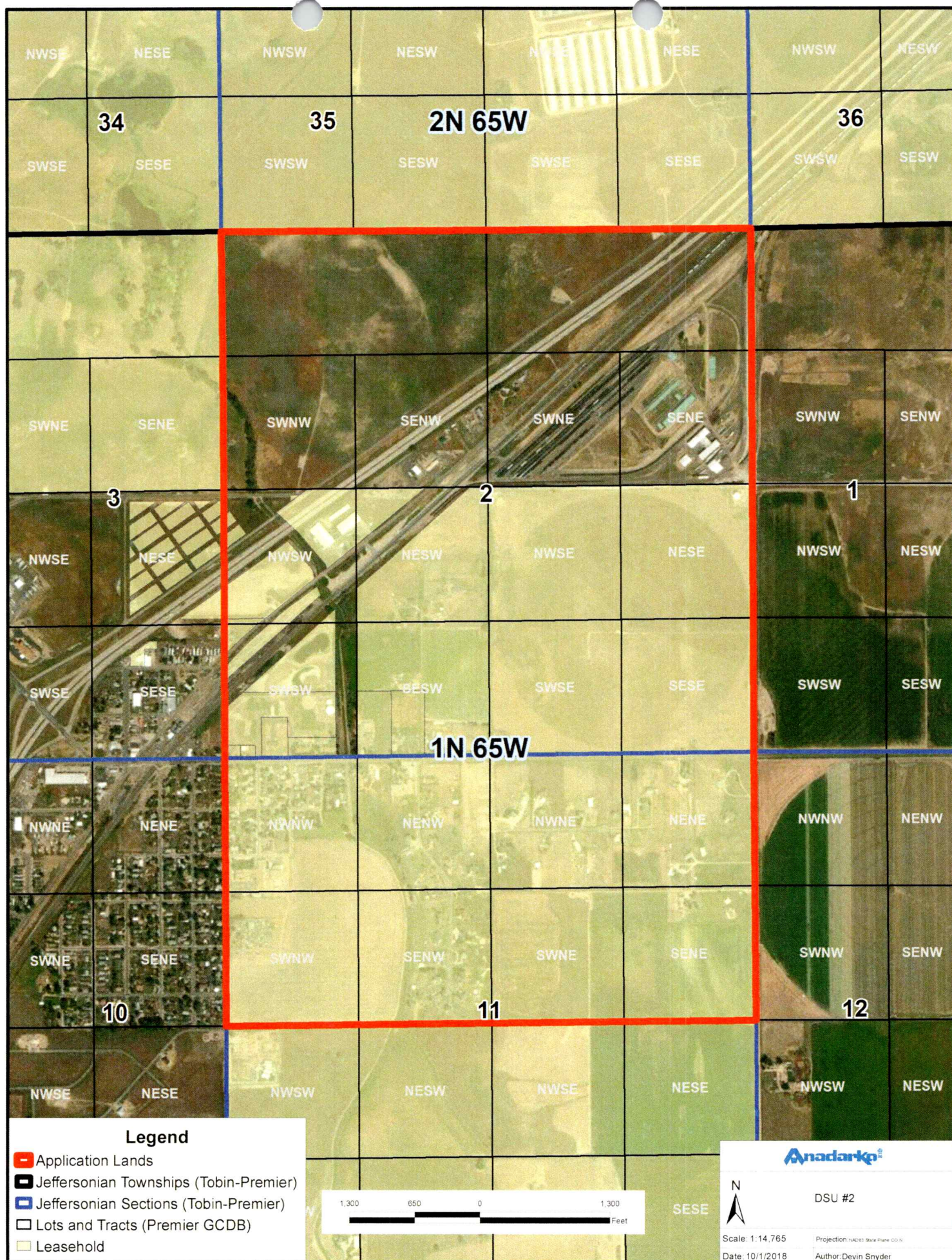
My commission expires 9/21/2019

Harly Aguero
Notary Public



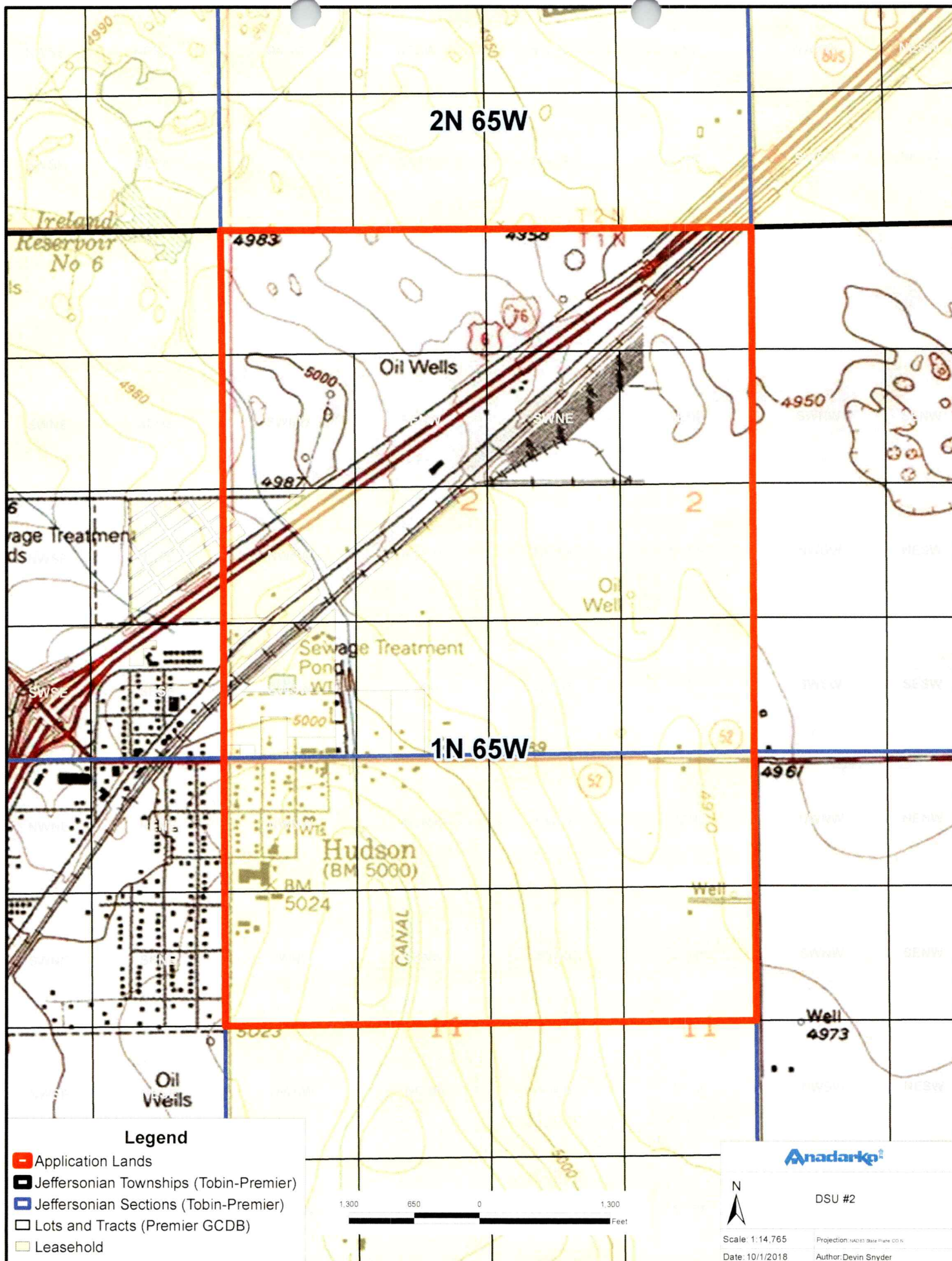


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 Depictions and information are intended to be confidential, and may be subject to legal restrictions or protections. For questions regarding appropriate use, contact the GSC (x62900).

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Depictions and information are intended to be confidential, and may be subject to legal restrictions or protections. For questions regarding appropriate use, contact the GSC (x62900).

KERR-MCGEE OIL & GAS ONSHORE LP

David D. Faulder – Engineering Testimony

Cause No. 407, Docket No. 181000706

Request to establish an approximate 947.16-acre drilling and spacing unit and approve up to seventeen horizontal wells within the unit for the production of oil, gas, and associated hydrocarbons from the Niobrara and Codell formations for all of section 2 and the N½ of section 11, Township 1 North, Range 65 West, 6th P.M., Wattenberg field, Weld county, Colorado..

My name is David D. Faulder, a reservoir engineer and the principal for Homestead Resources LLC., providing engineering testimony in support of this Application by Kerr-McGee Oil & Gas Onshore LP. I have over 37 years experience in the industry, a licensed petroleum engineer in Colorado and California, and a member of the Society of Petroleum Evaluation Engineers. I received a BS from the University of Wyoming and MS and Doctorate degrees from Colorado School of Mines, all in Petroleum Engineering, a resume is attached.

Supporting this application, engineering exhibits are submitted showing the analog wells used for analysis, original oil in place calculation, Niobrara and Codell type curves, and average drainage areas and radii. The exhibits are attached to the sworn testimony, forming the engineering basis supporting the Application request for a 947.16 acre unit for the drilling of no more than seventeen (17) horizontal wells producing from the Niobrara and Codell formations from Application lands.

Township 1 North, Range 65 West, 6th P.M.

Section 2: All

Section 11: N½

I conducted the analysis supporting this sworn testimony and am familiar with the lands and matters set forth in this Application.

The engineering analysis and Exhibits supporting this testimony are presented below.

1. The location of Niobrara analog wells and the location of the proposed spacing unit are presented in **Exhibit E.1A**. A total of 24 analog Niobrara wells approximately three to four miles to the west were used for this analysis and are shown as blue dots. The average stimulated horizontal length is 5657 ft.
2. The location of Codell analog wells and the location of the proposed spacing unit are presented in **Exhibit E.1B**. Twelve analog Codell wells approximately two to four miles to the west of the proposed DSU were used for this analysis and are shown as orange dots. The average stimulated horizontal length is 4902 ft.
3. A calculation of the Niobrara Original Oil in Place for the 947.16-acre drilling and spacing unit is presented in **Exhibit E-2A**. This calculation estimates an OOIP of 61.5 million stb underlie the proposed DSU in the Niobrara formation.
4. A calculation of the Codell Original Oil in Place for the 947.16-acre drilling and spacing unit is presented in **Exhibit E-2B**. An estimated OOIP of 5.4 million stb underlie the proposed DSU in the Codell formation.

5. The Niobrara normalized type curve from the analog wells is presented in **Exhibit E-3A**. This analysis used the 24 analog wells shown in Exhibit E-1A. Decline curve analysis was performed for both the oil and gas phases, providing a representative GOR vs. cumulative oil produced response. Economics criteria used a September 28, 2018 WTI and Henry Hub strip pricing, with representative pricing and operating parameters. Thus, the estimated EURs have an economic basis. The representative Niobrara type curve has an estimated EUR of 128.9 MBO.
6. The Codell normalized type curve from the analog wells is presented in **Exhibit E-3B**. This analysis used the 12 analog wells shown in Exhibit E-1B. Decline curve analysis was performed for both the oil and gas phases, providing a representative GOR vs. cumulative oil produced response. Economics criteria used a September 28, 2018 WTI and Henry Hub strip pricing, with representative pricing and operating parameters. Thus, the estimated EURs have an economic basis. The representative Niobrara type curve has an estimated EUR of 154.5 Mstb.
7. The Niobrara average drainage area and equivalent stimulated lateral length radius is presented in **Exhibit E-4A**. The average drainage area is 19.8 acres.
8. The Codell average drainage area and equivalent stimulated lateral length radius is presented in **Exhibit E-4B**. The average drainage area is 134 acres.

The Application proposed the drilling of up to seventeen horizontal wells to drain the Niobrara and Codell formations underlying the proposed DSU. This will consist of twelve Niobrara and five Codell wells with an average stimulated lateral length of 6,900 ft, allowing for a minimum 460 ft offset at the toe and heel for the unit boundaries.

The drilling and completion of twelve horizontal Niobrara wells, adjusted for the stimulated lateral length, has an average drainage area of 24.2 acres each or a total of 290 acres. Likewise, the five Codell horizontal wells, adjusted for the stimulated lateral length, have an average drainage area of 189 acres, of a total of 946 acres. Both of these estimated drainage areas, adjusted for the stimulated lateral length, are less than the Application acreage of 947.16 acres.

It is concluded the drilling of up to twelve Niobrara and five Codell horizontal wells with an average stimulated lateral length of 6,900 ft will efficiently and economically develop the Niobrara and Codell formations and avoid the waste of hydrocarbon resources.

I recommend the Commission approve the drilling of up to seventeen horizontal wells within the proposed 947.16 acre drilling spacing unit for the Application lands for the production of oil, gas, and associated hydrocarbons from the Niobrara and Codell formations. This will promote development of the Application lands, promote efficient drainage, protect correlative rights and avoid waste.

The engineering analysis presented herein was conducted by myself, and to the best of my knowledge, the analysis supporting my testimony and conclusions presented are true, correct, and accurate.

Dated October __, 2018

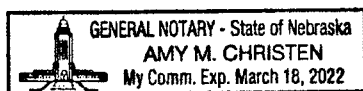
The engineering analysis presented herein was conducted by myself, and to the best of my knowledge, the analysis supporting my testimony and conclusions presented are true, correct, and accurate.

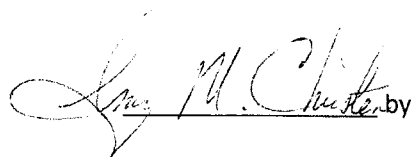
Dated October 4, 2018

 by

David D. Faulder

The foregoing instrument was sworn to before me on October 4, 2018, by David D. Faulder



 by

Notary Public

RESUME

David D. Faulder
3974 West Belvedere Road
Beatrice, Nebraska 68310
720-560-7634
ddfaulder@earthlink.net

LICENSES

State of California Professional Engineers License, since 1987.
Petroleum Engineering, No. P01590.

State of Colorado Professional Engineers License, since 2002.
Petroleum Engineering, No. 36871.

PROFESSIONAL HISTORY

1992 - present Homestead Resources LLC, Beatrice, Nebraska
Consulting Geothermal & Petroleum Engineer and Economist
Reservoir and energy economic studies. Clients include AltaRock Energy, Apex Petroleum Engineering, Calpine Corporation, Caithness Energy, Chena Hot Springs Resort, Florida Power and Light, Harding and Shelton, Intrepid Resources, Mosbacher Power, Nighthawk Production, Occidental Oil Company, OESI, PacifiCorp, Philippine National Oil Company, Russian River Energy, SAIC, Sacramento Municipal Utility District, Terra-Gen Power LLC, WPX Energy.

2014 - 2016 Nighthawk Production, LLC, Highlands Ranch, Colorado
Reservoir Engineering Manager for company's producing properties and exploration activities in Lincoln Co, Colorado.

2006 - present Colorado School of Mines, Golden, Colorado
Adjunct Professor, Petroleum Engineering Dept. PEGN 422, Oil Property Evaluation and Reserves, Fall 2006, graduate classes in geothermal engineering, 2008 to present annual Petroleum Super School for topics pressure transient analysis, reservoir simulation, and economic analysis

2010 - 2012 Terra-Gen Power, LLC, Denver, Colorado
Reservoir Engineering Manager for company's geothermal assets producing 220 MW at Coso Hot Springs, Beowawe, and Dixie Valley. Reservoir studies, injection optimization, pressure and rate-transient analysis,

tracer tests, PTS survey analysis, wellbore modeling, and reservoir simulation. Developed and calibrated a new field model for operational and reservoir management.

2007 - 2008 Bill Barrett Corporation, Denver, Colorado
Exploration Engineering Advisor for company-wide exploration projects providing engineering and economic analysis and support for senior management.

2004 - 2007 SAIC, Lakewood, Colorado
Senior Advisory Engineer, Geothermal/Petroleum Engineer and Economist. Reservoir studies of geothermal and petroleum systems, economic evaluations of Alaska oil and gas resources.

2001 - 2002 Wind River Consultants, Lakewood, Colorado.
Principal - Reservoir engineering of oil, gas, and geothermal reservoirs, including well test analysis, numerical simulation, analysis of horizontal wells, project economics, producing asset portfolio analysis.

2000 - 2000 Malkewicz-Hueni Associates, Golden, Colorado
Associate Petroleum Engineer - Gas well analysis and reserves and reservoir simulation using Eclipse.

1998 - 2000 The Brashear Group LLC, Tulsa, Oklahoma.
Project Manager - Economic evaluation of National Petroleum Technology Organization research project metrics and private clients.

1989 - 1998 Idaho National Engineering Laboratory, Idaho Falls, Idaho.
Advisory Scientist, Reservoir Engineer, Principal Investigator for Geothermal Reservoir Technology Program, U.S. Department of Energy. Responsibilities: program management and direction, reservoir simulation and research, field case studies, and industry interface for the DOE. Principal member of team evaluating the hydrocarbon endowment of the North Slope Alaska, performed detailed economic analysis and modeling.

1985 - 1989 Chevron Geothermal Co. of California, San Francisco, California
Reservoir Engineer for geothermal operations at Heber, California; Beowawe and Desert Peak, Nevada; Roosevelt Hot Springs, Utah; and Darajat, Indonesia. Responsibilities: well test design, execution and analysis; interference studies, reservoir simulation studies, resource evaluations, well workovers, and production engineering.

1982 - 1985	Chevron USA, Denver, Colorado Reservoir Engineer for Rangely Weber Sand Unit, Rangely, Colorado. Responsibilities: waterflood studies, modeling, and optimization; field development, project economics including windfall profits tax effects, reserve estimates, production forecasts, software development and computer applications.
1981 - 1982	Chevron USA, Denver, Colorado Drilling Representative in Wyoming Overthrust. Responsibilities: on site rig supervision of deep sour gas wells in Whitney Canyon - Carter Creek Field, cost control, routine drilling decisions, fishing, running casing, cementing, etc.
1980 (summer)	Chevron USA, Bakersfield, California Drilling Representative as a summer professional hire, rig supervision in the Bakersfield area.
1980 - 1980	True Drilling Company, Wyoming Floorhand
1979 - 1979	University of Wyoming, Laramie, Wyoming Lab Assistant , Petroleum Engineering Department. Drilling fluids lab assistant.
1979 - 1980	MGF Drilling Company, Wyoming Floorhand
1978 - 1979	IMCO Services, Casper, Wyoming Drilling Fluids Engineer , Sales and Service Representative. Responsibilities: operate weighted mud systems for deep high pressure gas wells and low solids non-dispersed systems for drilling optimization.

EDUCATION

Colorado School of Mines	Ph.D., Petroleum Engineering, minor in Mineral Economics, Dec. 2008. Dissertation topic - <i>A Stochastic Methodology for Portfolio Analysis of Proved Petroleum Assets</i> .
	M.S. Petroleum Engineering, 1996. Thesis topic - <i>Production Decline Curve Analysis at The Geysers, California Geothermal Field</i>
University of Wyoming	B.S. in Petroleum Engineering, 1981.

Golden Gate
University

54 hours towards an M.B.A. in Finance-Investment
option.

PATENTS

Electrolytic System and Method for the Enhanced Release and Deposition of Sub-surface and Surface Components, inventors Michael Peters and David Faulder, US Patent Office 8157981, granted April 17, 2012 and 8394253 granted December 18, 2012 companion patent 8333883 B2.

Electrolytic system and method for generating biocides having an electron deficient carrier fluid and chlorine dioxide, Michael Peters, John D. Breedlove, David D. Faulder, and Seth R. Mayer, US Patent Office 8,394,253, granted May 17, 2012.

Compositions and Methods for Electrolytic Cleaning of a Material, inventors Steve Pettee, Michael Peters, David Faulder, US Patent Office application filed December 2007.

Electrolytic System and Method For Enhanced Industrial, Radiological And Nuclear Decontamination, Continuation in Part to US 2008/0115930 A1, inventors Michael Peters, David Faulder, US Patent Office application filed September 2008.

PROFESSIONAL SCHOOLS

Chevron Well Test School

40 OSHA Training for Hazardous Materials

A Course on Petroleum Reservoir Simulation, *Stanford University*

Naturally Fractured Reservoirs, *Servipetrol, Ltd.*

Using Real Options to Value and Manage Natural Resource Projects, *Colorado School of Mines*

Risk Analysis, Prospect Evaluation and Exploration Economics, *Rose & Associates*

PROFESSIONAL ORGANIZATIONS

Society of Petroleum Evaluation Engineers, member #892, since 2016.

Society of Petroleum Engineers (not currently active)

Member of the Peripheral/Emerging Technology Committee, 1994-1997.

Finance Chairman for the Mid-continent section IOR/DOE Conference in Tulsa, Oklahoma, 1999-2000.

Geothermal Resources Council
Member of the 1994 Annual Meeting Committee.

Pi Epsilon Tau, the Petroleum Engineering Honor Society

REFERENCES

Dr. DeAnn Craig – Commissioner – Colorado Oil and Gas Conservation Commission,
past President, Society of Petroleum Engineers, 1998.

Dr. Ramona Graves – Dean College of Engineering, Colorado School of Mines

Dr. Jennifer Miskimins - Professor, Colorado School of Mines

Dr. William Harrison – Director, Kansas Geologic Survey, retired

Mr. Dennis Kaspereit, Geothermal Resource Group, Consultant

Dr. Donald Stinson – Petroleum Consultant

PAPERS PUBLISHED

Brashear, J.B, Becker, A.B, and Faulder, D.D., 2001. "Where Have All the Profits Gone?", *Journal of Petroleum Technology*, June, SPE 73141, 8 p.

Faulder, D. D., 1991. "Conceptual Geologic Model and Native State Model of the Roosevelt Hot Springs Hydrothermal System," *Proceedings of the 16th Workshop on Geothermal Reservoir Engineering*, Stanford University, Stanford, CA, 1991, pp. 131-142.

Faulder, D. D., 1991, "Hydrothermal Opportunities and Challenges in the Basin and Range," *DOE Geothermal Program Review IX, CONF-913105, San Francisco, CA*, pp. 51-56.

Faulder, D. D., 1992, "Model Study of Historical Injection in the Southeast Geysers," *Proceedings of the 17th Workshop on Geothermal Reservoir Engineering*, Stanford University, Stanford, CA, 1992, pp. 111-119.

Faulder, D. D., 1994, "Long-Term Flow Test #1, Roosevelt Hot Springs, Utah," *Geothermal Resource Council Transactions*, v. 18, pp. 583-590.

Faulder, D. D., 1996a, *Production Decline Curve Analysis at The Geysers, California Geothermal Field*, Colorado School of Mines, M.Sc. Thesis, 97 p.

Faulder, D. D., 1996b, "Permeability-Thickness Determination from Transient Production Response at the Southeast Geysers," *Geothermal Resources Council Transactions*, v. 20.

Faulder, D. D., 1997a, "Decline Curve Analysis of Vapor-dominated Reservoirs," *DOE Program Review XV, March 24-25*.

- Faulder, D. D., 1997b, "Advanced Decline Curve Analysis in Vapor-Dominated Geothermal Reservoirs," *SPE 38763, Annual Fall Technical Conference and Exhibition, San Antonio, Texas October 5-8*.
- Faulder, D. D., 2008, A Stochastic Methodology for Portfolio Analysis of Proved Petroleum Assets, Colorado School of Mines, Ph.D. Dissertation, 257 p.
- Faulder, D. D. and Johnson, S. D., 1987, "Desert Peak Geothermal Field Performance," *Geothermal Resources Council Transactions*, v. 11, p. 527-533.
- Faulder, D. D., Johnson, S. D., and Benoit, W. R., 1997, "Integrated Geologic Model of the Beowawe, Nevada Hydrothermal System," *Proceedings of the 21st Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA, 1997*.
- Faulder, D.D., Moseley, F.L., 2003. A "Top Down" Approach for Applying Modern Portfolio Theory to Oil and Gas Property Investments, *SPE 82028, SPE Hydrocarbon Economics and Evaluation Symposium held in Dallas, Texas, U.S.A., April 5-8*.
- Faulder, D.D. and M. Shook, 1991, "Geothermal Reservoir Simulation on Microcomputers," *SPE Microcomputer Applications*, July-August, pp. 26-31.
- House, N.J., Faulder, D.D., Olson, G.L., and Fanchi, J.R., 2003. Sleipner Gas Field, CO2 Sequestration, "IFLO" Simulation Study, *SPE 81202, SPE/EPA/DOE Exploration and Production Environmental Conference held in San Antonio, Texas, U.S.A., March 10-12*.
- Plum, M. M., Negus-deWys, J., Faulder, D. D., and Lunis, B. C., 1989, *Economic Review of the Geopressure Resource with Recommendations*, EGG-2581, 1989, 20 p.
- Rose, P. E., Apperson, K. D., and Faulder, D. D., 1997, "Fluid Volume and Flow Constraints for a Hydrothermal System at Beowawe, Nevada," *SPE 38762, Annual Fall Technical Conference and Exhibition, San Antonio, Texas October 5-8*.
- Shook, G. M. and D. D. Faulder, 1991, "Analysis of Reinjection Strategies for The Geysers," *Proceedings of the 16th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, CA, January 1991*, pp. 97-106.
- Shook, G. M. and D. D. Faulder, 1991, *Validation of a Geothermal Simulator*, EP-9851, October.
- Thomas, C.P., D.D. Faulder, T.C. Doughty, D.M. Hite, G.J. White, 2007. *Alaska North Slope Oil and Gas A Promising Future or an Area in Decline?*, U.S. Department of Energy, National Energy Technology Laboratory, Arctic Energy Office, DOE/NETL-2007/1280, August,

479 p.

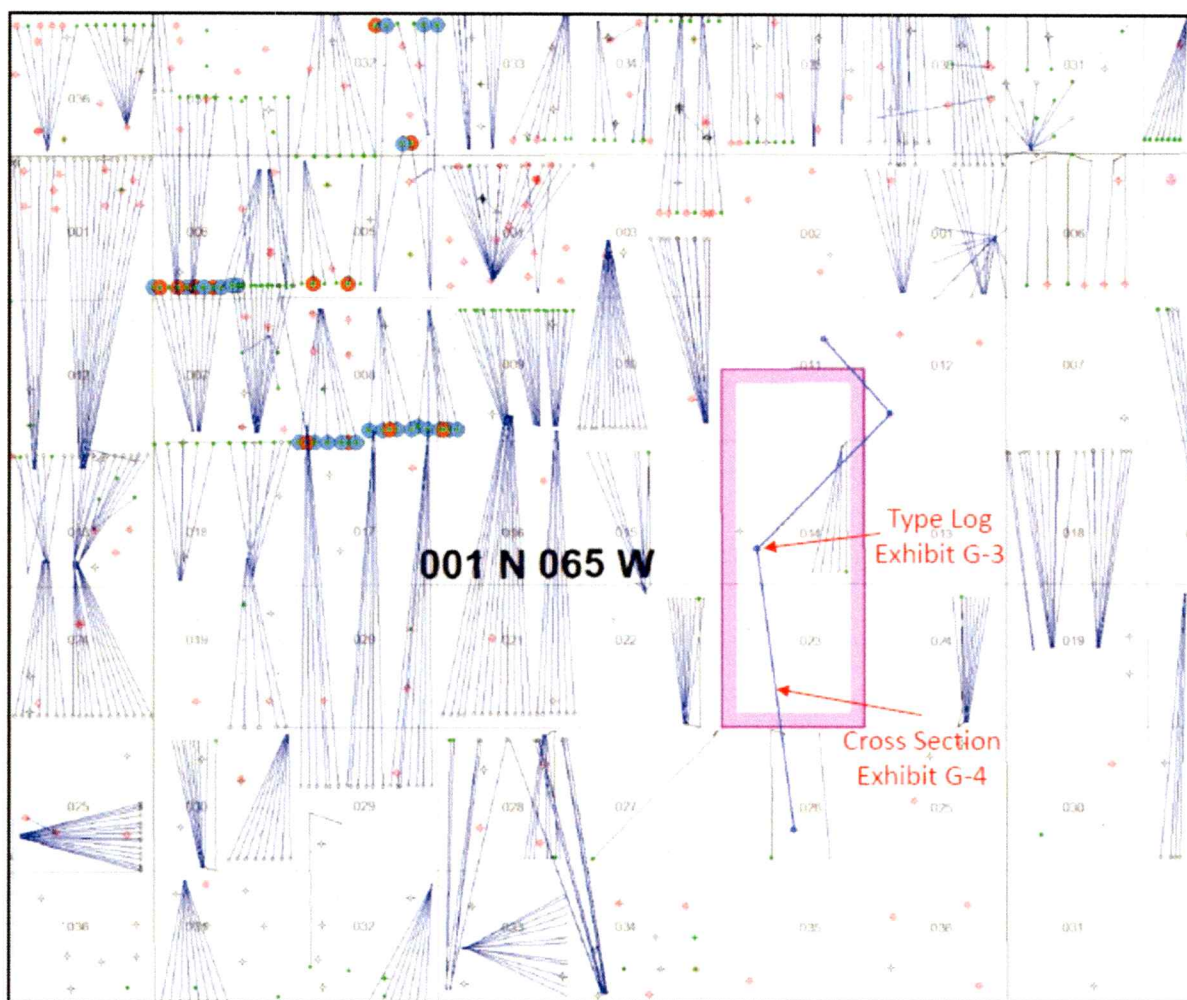
Thomas, C.P., T.C. Doughty, D.D. Faulder, D.M. Hite, et. al, 2006. *Alaska Natural Gas Needs and Market Assessment*, U.S. Department of Energy, National Energy Technology Laboratory, Arctic Energy Office, June.

Thomas, C.P., T.C. Doughty, D.D. Faulder, D.M. Hite, 2004, *South-Central Alaska Natural Gas Study*, U.S. Department of Energy, National Energy Technology Laboratory, Arctic Energy Office, June.

Thomas, C.P., R. B. Allaire, T. C. Doughty, D. D. Faulder, J. S. Irving, H. C. Jamison, and G. J. White, 1993, *Alaska North Slope National Energy Strategy Initiative: Analysis of Five Undeveloped Fields*, DOE/ID/01570-T164, U.S. Department of Energy, May.

Thomas, C. P., T. C. Doughty, D. D. Faulder, W. E. Harrison, J. S. Irving, H. C. Jamison, and G. J. White, 1991, *Alaska Oil and Gas: Energy Wealth or Vanishing Opportunity?*, DOE/ID/01570-H1, U.S. Department of Energy, January, 278 p.

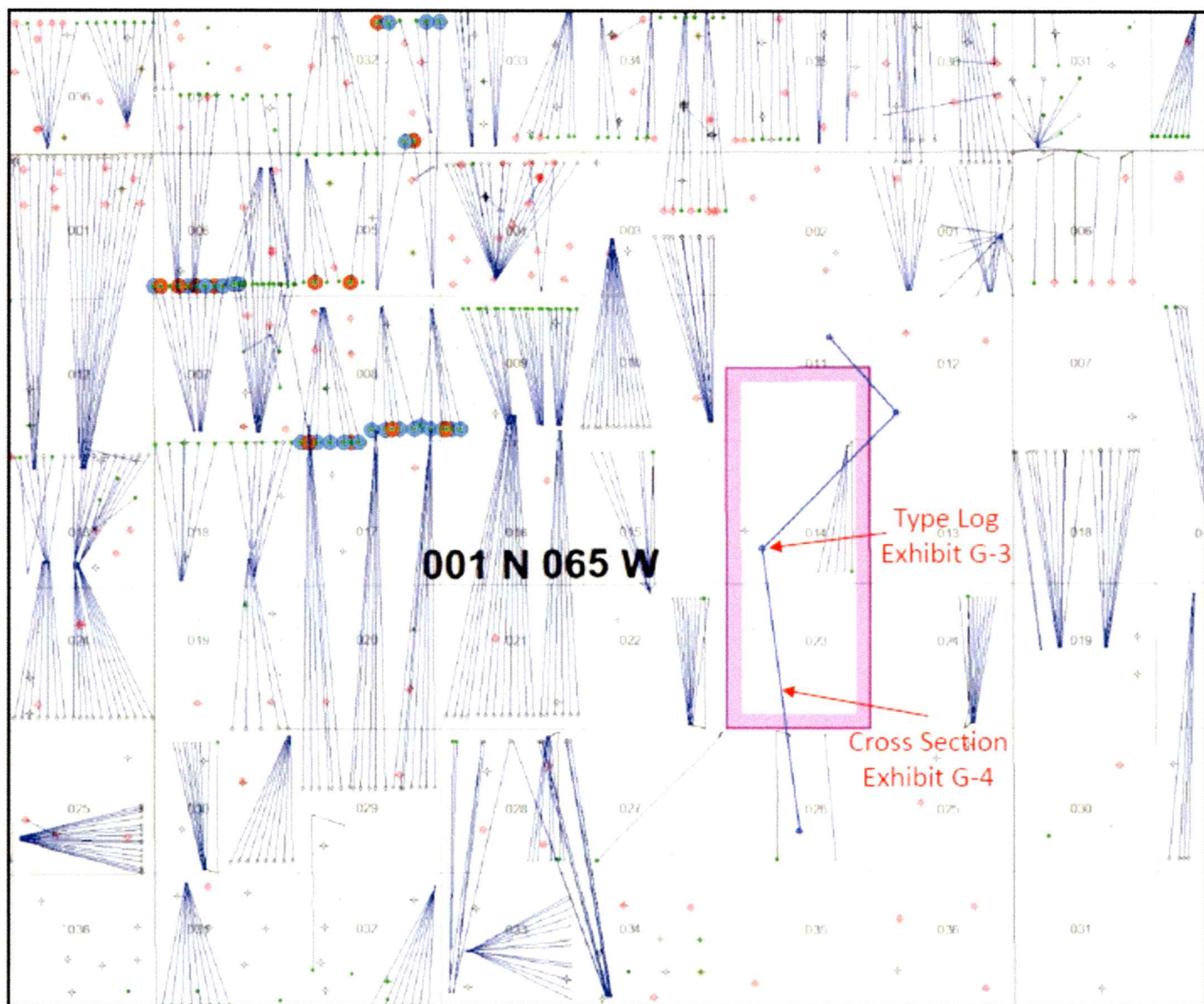
Exhibit E-1A: Application Lands and Offset Niobrara Wells Used in Analysis



Counter	OPERATOR	API	LEASE	TOWNSHIP	RANGE	SECTION	Interval	VINTAGE	STIMULATED LATERAL LENGTH, FT
1	ANADARKO	5123377230000	BOYD 1N-32HZ	01N	65W	5	NIOBRARA B	2014	8041
2	ANADARKO	5123377090000	BOYD 26N-32HZ	01N	65W	5	NIOBRARA C	2014	9140
3	ANADARKO	5123377910000	BOYD 27N-5HZ	01N	65W	5	NIOBRARA C	2014	5013
4	ANADARKO	5123377740000	BOYD 2N-32HZ	01N	65W	5	NIOBRARA C	2014	9164
5	ANADARKO	5123414950000	ENGLISH FARMS 13N-9HZ	01N	65W	8	NIOBRARA B	2016	4270
6	ANADARKO	5123415010000	ENGLISH FARMS 15N-8HZ	01N	65W	8	NIOBRARA B	2016	5575
7	ANADARKO	5123415020000	ENGLISH FARMS 16N-8HZ	01N	65W	8	NIOBRARA B	2016	5339
8	ANADARKO	5123414930000	ENGLISH FARMS 34N-9HZ	01N	65W	8	NIOBRARA C	2016	4361
9	ANADARKO	5123414940000	ENGLISH FARMS 35N1-9HZ	01N	65W	8	NIOBRARA C	2016	4266
10	ANADARKO	5123415030000	ENGLISH FARMS 36N-8HZ	01N	65W	8	NIOBRARA C	2016	5177
11	ANADARKO	5123415040000	ENGLISH FARMS 37N-8HZ	01N	65W	8	NIOBRARA C	2016	5299
12	ANADARKO	5123414920000	ENGLISH FARMS 38N-8HZ	01N	65W	8	NIOBRARA C	2016	5466
13	ANADARKO	5123362760000	ENGLISH FARMS XX08-72HN	01N	65W	8	NIOBRARA C	2013	3931
14	ANADARKO	5123407520000	GOODIN 36N-A6HZ	01N	65W	7	NIOBRARA C	2016	5628
15	ANADARKO	5123407490000	GOODIN 36N-B6HZ	01N	65W	7	NIOBRARA B	2016	5573
16	ANADARKO	5123408370000	GREEN 1N-8HZ	01N	65W	8	NIOBRARA B	2016	5692
17	ANADARKO	5123408350000	GREEN 2N-8HZ	01N	65W	8	NIOBRARA C	2016	5528
18	ANADARKO	5123408380000	GREEN 3N-8HZ	01N	65W	8	NIOBRARA B	2016	5678
19	ANADARKO	5123408360000	GREEN 4N-8HZ	01N	65W	8	NIOBRARA C	2016	5611
20	ANADARKO	5123408400000	GREEN 5N-8HZ	01N	65W	8	NIOBRARA B	2016	5544
21	ANADARKO	5123395920000	STEWARD 14N-6HZ	01N	65W	7	NIOBRARA B	2016	5529
22	ANADARKO	5123395930000	STEWARD 34N-6HZ	01N	65W	7	NIOBRARA B	2016	4914
23	ANADARKO	5123395890000	STEWARD 35N-6HZ	01N	65W	7	NIOBRARA B	2016	5297
24	ANADARKO	5123395970000	STEWARD 36N-6HZ	01N	65W	7	NIOBRARA B	2016	5728

¹ Niobrara wells shown as Blue dots
{00665497.1}

Exhibit E-1B: Application Lands and Offset Codell Wells Used in Analysis



2

Counter	OPERATOR	API	LEASE	TOWNSHIP	RANGE	SECTION	Interval	VINTAGE	STIMULATED LATERAL LENGTH, FT
1	ANADARKO	5123377040000	BOYD 27C-5HZ	01N	65W	5	CODELL	2014	5092
2	ANADARKO	5123377730000	BOYD 28C-32HZ	01N	65W	5	CODELL	2014	4011
3	ANADARKO	5123415050000	ENGLISH FARMS 15C-8HZ	01N	65W	8	CODELL	2016	5355
4	ANADARKO	5123414960000	ENGLISH FARMS 34C-9HZ	01N	65W	8	CODELL	2016	4294
5	ANADARKO	5123408390000	GREEN 1C-8HZ	01N	65W	8	CODELL	2016	5591
6	ANADARKO	5123408340000	GREEN 2C-8HZ	01N	65W	8	CODELL	2016	5570
7	ANADARKO	5123395960000	STEWARD 13C-6HZ	01N	65W	7	CODELL	2016	4868
8	ANADARKO	5123395910000	STEWARD 14C-6HZ	01N	65W	7	CODELL	2016	5245
9	ANADARKO	5123395940000	STEWARD 35C-6HZ	01N	65W	7	CODELL	2016	5530
10	ANADARKO	5123395900000	STEWARD 36C-6HZ	01N	65W	7	CODELL	2016	5438
11	ANADARKO	5123378300000	ZIEMER 13C-5HZ	01N	65W	5	CODELL	2014	4098
12	ANADARKO	5123378280000	ZIEMER 35C-5HZ	01N	65W	5	CODELL	2014	3732

² Codell wells shown as Orange dots

Exhibit E-2A Niobrara Original Oil in Place Calculations

$$\text{OOIP} = (7758 * \text{Porosity} * (1 - \text{Sw}) * \text{Area} * \text{Thickness}) / \text{Oil FVF}$$

DSU

Township 1 North, Range 65 West, 6th P.M.

Section 2: All

Section 11: N½

947.16 acres, more or less, Weld County, CO

Niobrara Formation

Porosity (%)	6%
Sw (%)	27%
Area (acres)	947.16
Thickness (ft)	325
Oil FVF (RB/STB)	1.7
OOIP per DSU (MMBO)	61.5

Exhibit E-2B Codell Original Oil in Place Calculations

$$\text{OOIP} = (7758 * \text{Porosity} * (1 - \text{Sw}) * \text{Area} * \text{Thickness}) / \text{Oil FVF}$$

DSU

Township 1 North, Range 65 West, 6th P.M.

Section 2: All

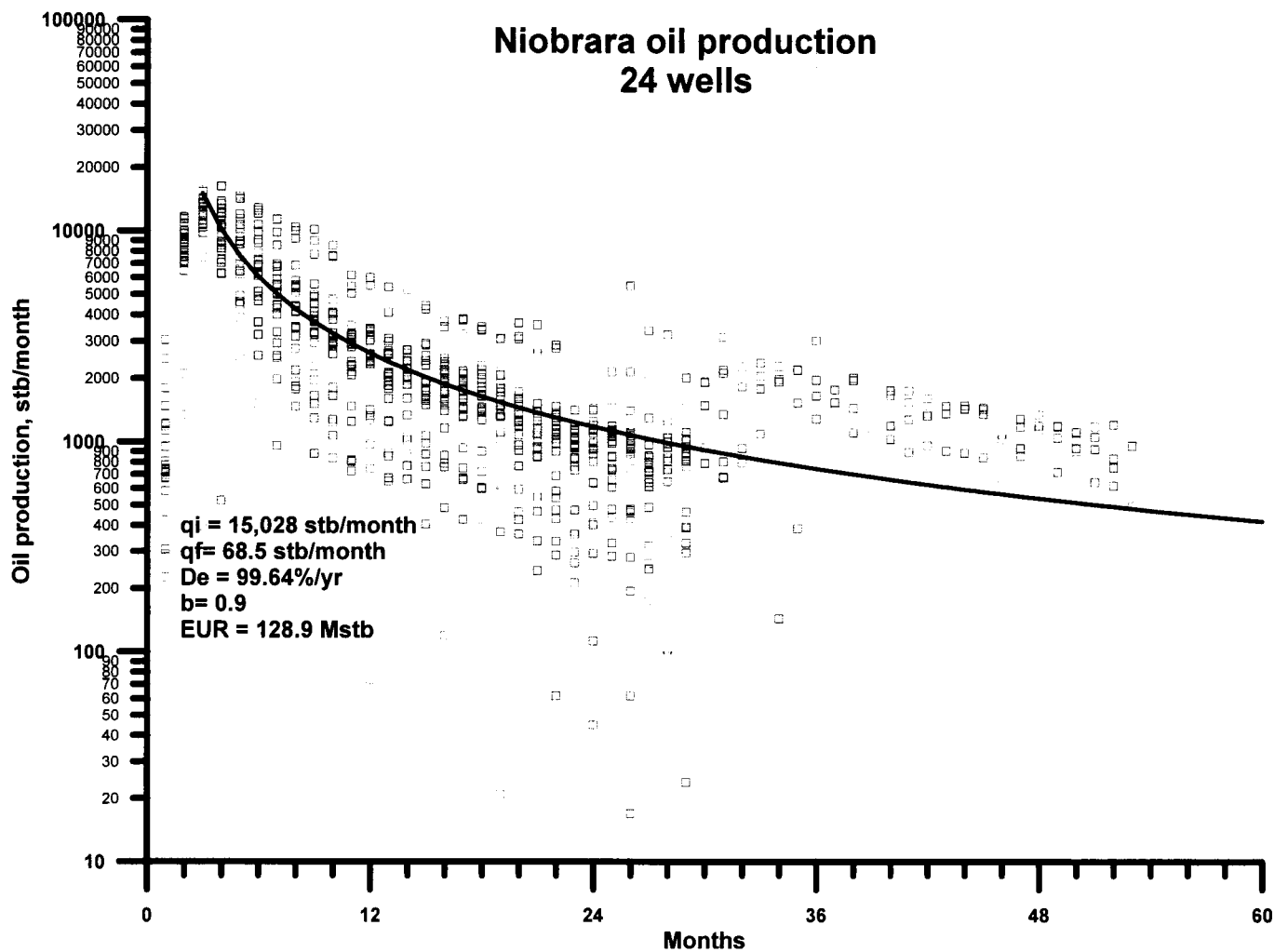
Section 11: N½

947.16 acres, more or less, Weld County, CO

Codell and Ft Hays formations

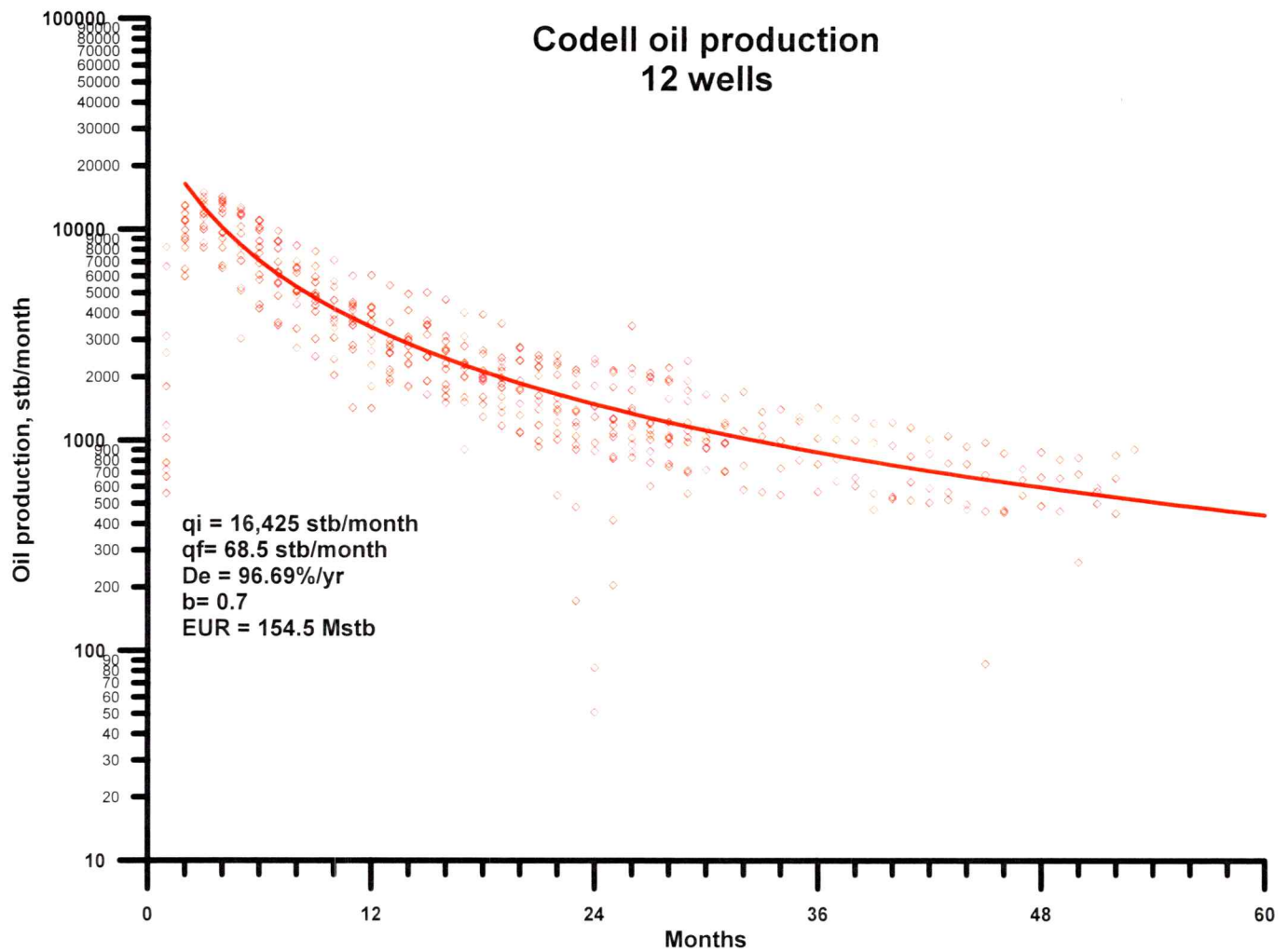
Porosity (%)	6.6%
Sw (%)	55%
Area (acres)	947.16
Thickness (ft)	42
Oil FVF (RB/STB)	1.7
OOIP per DSU (MMBO)	5.4

Exhibit E-3A Niobrara Normalized Type Curve



24 Analog Well from Exhibit E1-A
Drilled 2014-2016
Oil EUR 128.9 MBO
(Dmin 10, "b" 0.9, Yrs 19.7)

Exhibit E-3B Codell Normalized Type Curve



12 Analog Well from Exhibit E1-B
Drilled 2014-2016
Oil EUR 154.5 MBO
(D_{min} 10, "b" 0.7, Yrs 18.0)



**BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO**

IN THE MATTER OF THE APPLICATION OF KERR-MCGEE OIL & GAS ONSHORE LP FOR AN ORDER ESTABLISHING AN APPROXIMATE 947.16-ACRE DRILLING AND SPACING UNIT AND APPROVING UP TO SEVENTEEN HORIZONTAL WELLS WITHIN THE UNIT FOR THE PRODUCTION OF OIL, GAS, AND ASSOCIATED HYDROCARBONS FROM THE NIOBRARA AND CODELL FORMATIONS FOR ALL OF SECTION 2 AND THE N½ OF SECTION 11, TOWNSHIP 1 NORTH, RANGE 65 WEST, 6TH P.M., WATTENBERG FIELD, WELD COUNTY, COLORADO.

Cause No. 407

Docket No. 181000706

Type: Spacing

Dr. Steven Goolsby – Geology Direct Testimony

In support of the request for approval of the above-captioned Application of Kerr-McGee Oil & Gas Onshore LP, Operator No. 47120 ("Applicant" or "Kerr-McGee") pursuant to COGCC Rule 511, I, Dr. Steven Goolsby, being duly sworn, depose and state as follows:


1. Exhibit G-1 is a copy of my Curriculum Vitae which is true and correct in all material respects as of the date of this Testimony.
2. I have supervised preparation of the attached Exhibits G-1 through G-8 and have reviewed the Verified Application in this matter. To the best of my knowledge and belief each of these Exhibits is correct and accurate over the Application Lands as of the date of this Testimony.
3. Exhibit G-2 is a base map and cross section index showing the locations of cross section N-S. Highlighted on this base map are the current Application Lands (light purple). Other nearby horizontal wells in the Niobrara and Codell are also shown on the map, with those used in the engineering testimony in support of the above-captioned Application highlighted in orange (Codell) and blue (Niobrara). Vertical wells used for the regional structural and isopach maps are also shown on the map, although wells with major faults in the Niobrara or Codell have not been used to construct those maps.
4. Exhibit G-3 is a type log that illustrates the stratigraphic nomenclature used in this Application. The Niobrara Formation is comprised of interbedded chinks, limestones, and marls and encompasses the interval between the base of the Sharron Springs Shale and the top of the Codell Sandstone. The Codell

Sandstone is comprised of sandstones, siltstones, and shales and encompasses the interval from the base of the Ft Hays Limestone to the top of the Carlile Shale.

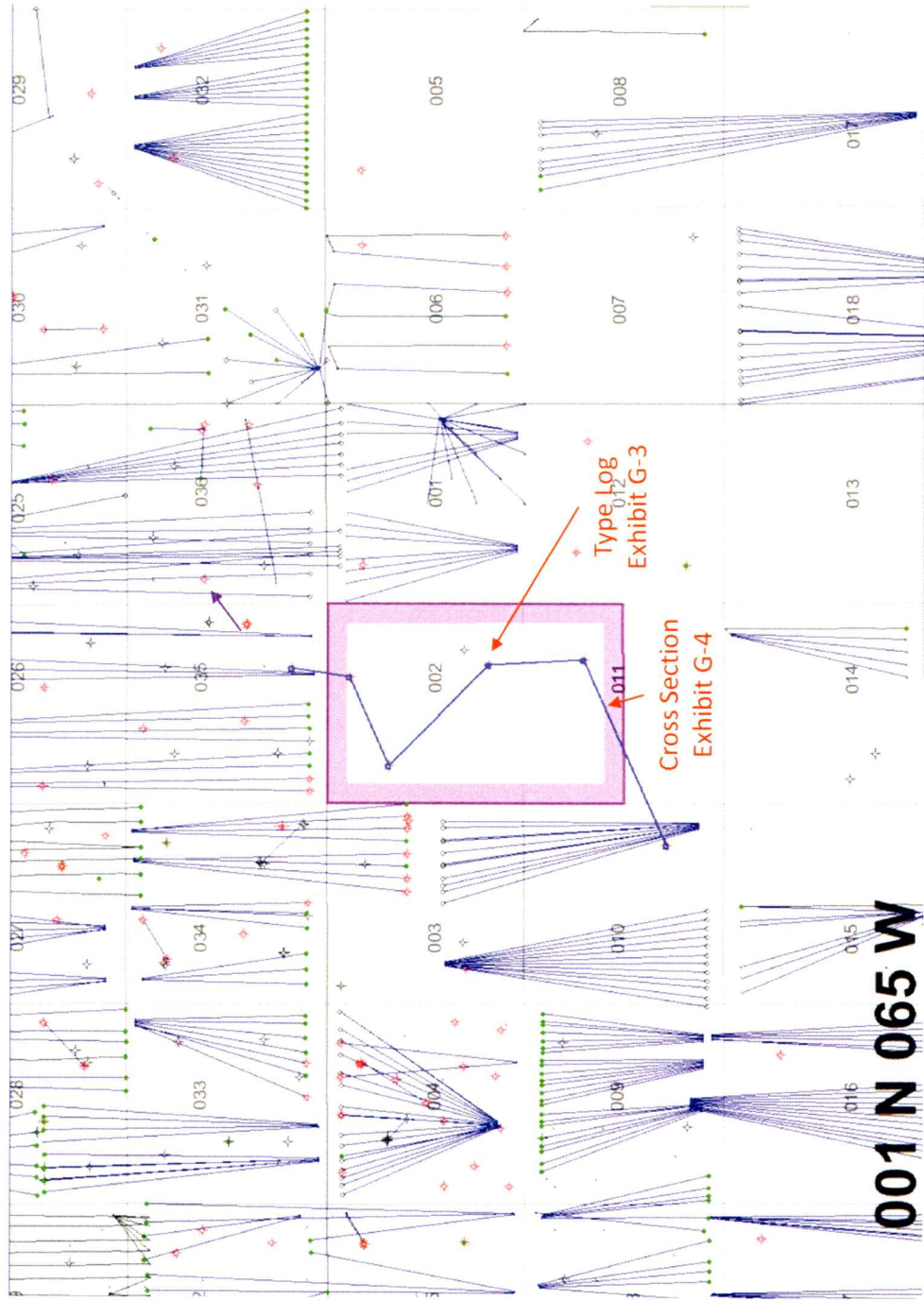
5. Exhibit G-4 is Stratigraphic Cross Section N-S that depicts the Niobrara section underlying and immediately adjacent to the Application Lands. All four Niobrara benches (A, B, C, and D) are present along with the underlying Fort Hays Limestone and Codell Sandstone.
6. Exhibit G-5 is a regional structural interpretation on the top of the Niobrara Formation. Both basement and polygonal normal faults are expected to disrupt the Niobrara section in the area surrounding these Application Lands. This structural map is designed to be regional in scope. While faults were recognized, wells with localized faulting were not used for this map.
7. Exhibit G-6 is a regional isopach of the Niobrara section from the top of the Niobrara to the base of the Fort Hays Limestone. The average thickness in this portion of the DJ Basin is around 325 feet. Localized depositional variations in thickness are minimal and rarely exceed 300' to 360'. Thins noted on this isopach serve to identify minor faults cutting the Niobrara section.
8. Exhibit G-7 is a regional structural interpretation on the top of the Codell Sandstone. Both basement and polygonal normal faults are expected to disrupt the Codell section in the area surrounding these Application Lands. This structural map is designed to be regional in scope. While faults were recognized, wells with localized faulting were not used for this map.
9. Exhibit G-8 is an isopach map of the total Codell Sandstone. Total thickness ranges from 14 to 20' thick, and averages 17 feet in thickness. Faulting can completely remove the Codell in very limited and localized areas along the basement and polygonal fault planes, but this thinning is not sufficient to prevent horizontal drilling for the Codell in the area of the Application lands.
10. I believe the Codell and Niobrara formations in the areas surrounding the reference wells used in the engineering portion of the above-captioned Application are similar to those in the Application Lands and such wells are therefore reasonable to use as analogues.
11. The Niobrara Formation is a marine formation of Upper Cretaceous age that was deposited as relatively deep-water sediments in the Western Interior Seaway during Cretaceous time. The Codell Sandstone is a relatively shallow-water marine sandstone of Upper Cretaceous Age that was also deposited in the Western Interior Seaway during Cretaceous time. This seaway was vast and covered much of present day North America from the Gulf of Mexico to the Arctic. In my opinion, the Niobrara and Codell formations therefore exist under all of the Application Lands, and are common sources of supply within the Application Lands.

Steven M. Goolsby

Dr. Steven M. Goolsby received a B.S. in Geology from Stephen F. Austin State University in 1975 and a Ph.D. in Geology from the Colorado School of Mines in 2008. In the past, Steven has been employed by the Colorado Geological Survey, Canadian Hunter Exploration, and several smaller companies. In 1975, he cofounded Goolsby Brothers and Associates, Inc., which still furnishes a diverse array of geological and petrophysical consulting services to the oil and gas industry. In 2005, he joined Ed Coalson in founding Coyote Oil and Gas, LLC, an oil and gas exploration firm. On April 1st of 2009, he joined Vecta Oil and Gas, LLC, as senior oil and gas exploration geologist. In 2013 Vecta formed Foreland Resources, Ltd., a resource play company pursuing horizontal drilling projects in West Texas and the Rocky Mountain areas. He currently works full time consulting through Goolsby Brothers and Associates, Inc. Steven is a Certified Petroleum Geologist through the Division of Professional Affairs of the American Association of Petroleum Geologists and is a Registered Professional Geologist with the State of Wyoming. His current interests include play and prospect evaluation and studies that integrate rock properties, geophysical log responses, subsurface fluid attributes, and geology into the evaluation of oil and gas reservoirs.

 KerrMcGee
Cause #407 Docket No. # 180900XXX Exhibit G-1
Vitae of Dr. Steven M. Goolsby

181000706



Application Lands



Cause #407
Docket No. #1809000000
Exhibit G-2 18/000706

Location Map of the
Proposed Spacing Unit

2-3

ELEV_KB: 4,973
T1N_R65W S2

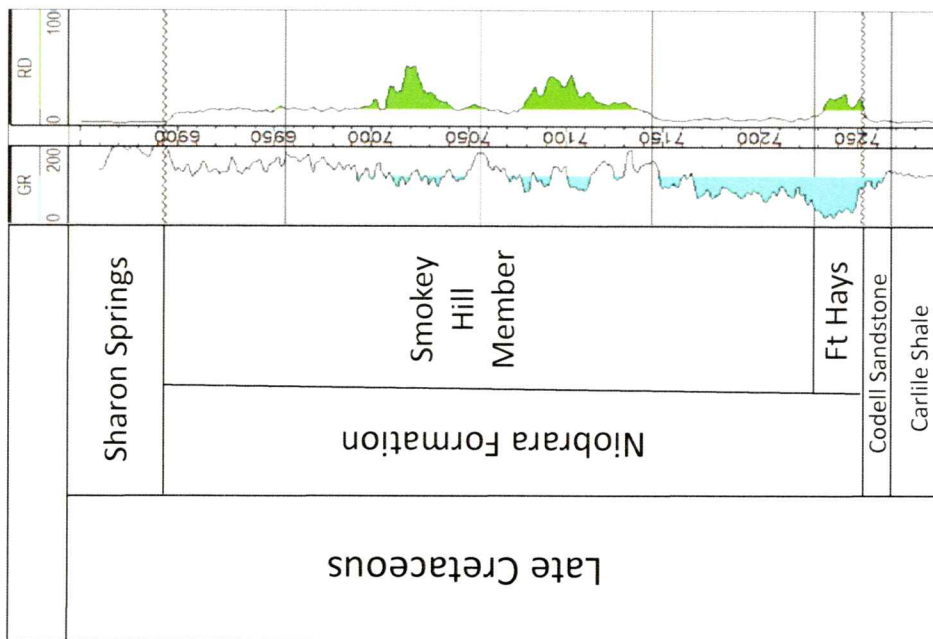


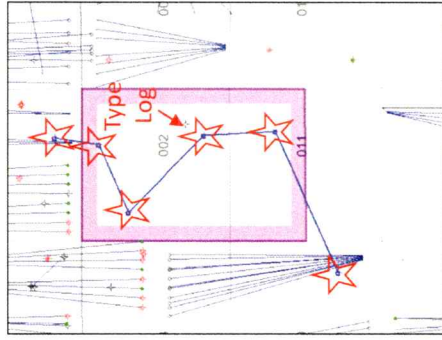
Cause #407

Docket No. #1809000XXX-

Exhibit G-3

Type Log
For the Niobrara
Formation and Codell
Sandstone





Cause #407

Docket No. #180900xxx

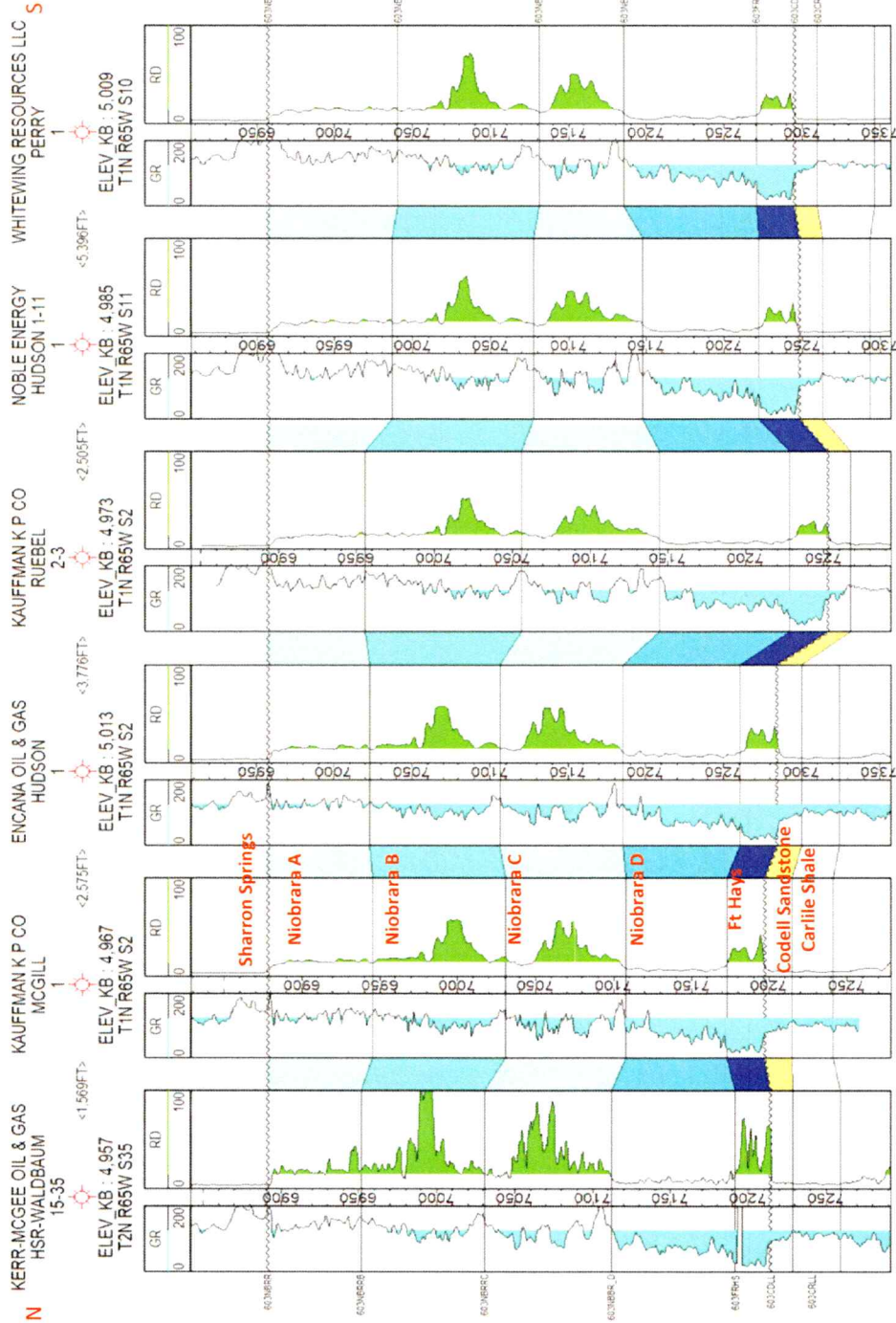
Exhibit G-4 18 1000706

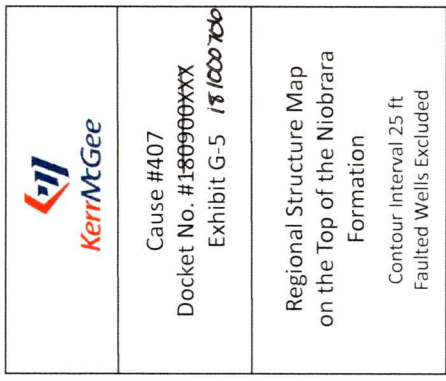
North-South

Stratigraphic Cross Section

Niobrara and Codell

Datum=Top of Niobrara





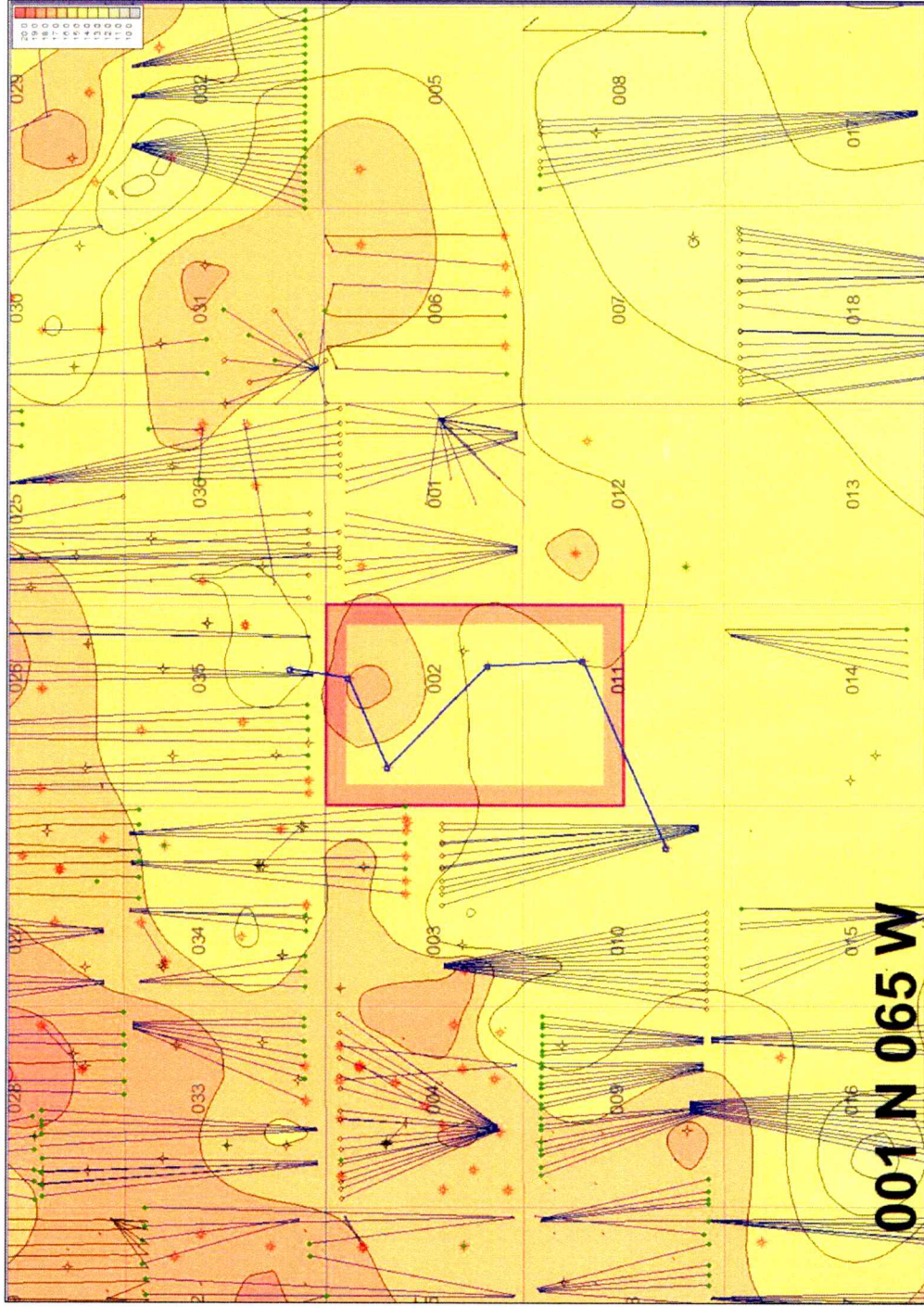
Cause #407

Docket No. #180900XXX

Exhibit G-5 1810007000

Regional Structure Map on the Top of the Niobrara Formation

Contour Interval 25 ft
Faulted Wells Excluded



Cause #407
Docket No. #189900XXX
Exhibit G-8 18/000006

Regional Isopach Map of
the Codell Sandstone
Contour Interval 1 ft
Faulted Wells Excluded