

# 531-1



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FEB 12 2008

COGCC

Land Testimony  
Jackson County, Colorado  
Cause No. 531, Docket No. 0802-SP-03  
EOG Resources, Inc.  
Spacing Application  
Niobrara Formation

My name is Steve Smith. I am a Land Specialist for EOG Resources, Inc. ("EOG" or "Applicant"). I am familiar with the lands subject to the application area. A copy of my curriculum vitae is enclosed in the exhibit booklet submitted by the Applicant.

**Exhibit L-1 Land Map**

Exhibit L-1 is a map which depicts the Application area outlined in orange. The proposed drilling and spacing units are reflected per the legend on the Exhibit. Also depicted is the Leasehold ownership within the Application Lands for the Niobrara Formation.

**Exhibit L-2 Mineral Ownership**

Exhibit L-2 reflects that the minerals underlying the Application Lands are owned in federal, state and fee.

**Exhibit L-3 Surface Ownership**

Exhibit L-3 is an outline of the spacing area of the Application Lands with the surface owners listed.

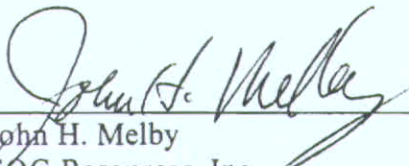
As of this date, we have not received any notice of objection or protest to our Application. All interested parties received notice of this Application under my direction and control. Exhibits L-1 through L-3 were prepared under my direction and control.

Steve Smith  
EOG Resources, Inc.  
Land Specialist

**Exhibit G-6 Topographic Map**

Exhibit G-6 is a United States Geological Survey Topographic Map covering the affected lands. The topography is gently rolling to flat with the average elevation approximately 8200'-8300'.

Exhibits G-1 through G-6 were prepared under my direction and control.

  
John H. Melby  
EOG Resources, Inc.  
Division Geological Specialist

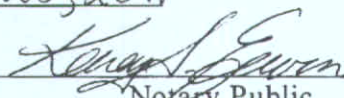
**ACKNOWLEDGMENT**

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

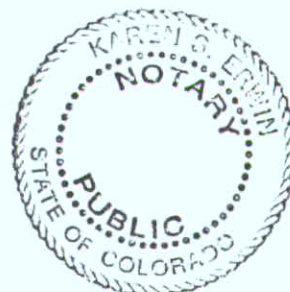
The foregoing instrument was acknowledged before me this 12th day of February, 2008, by John Melby.

Witness my hand and official seal.

My commission expires: June 25, 2011

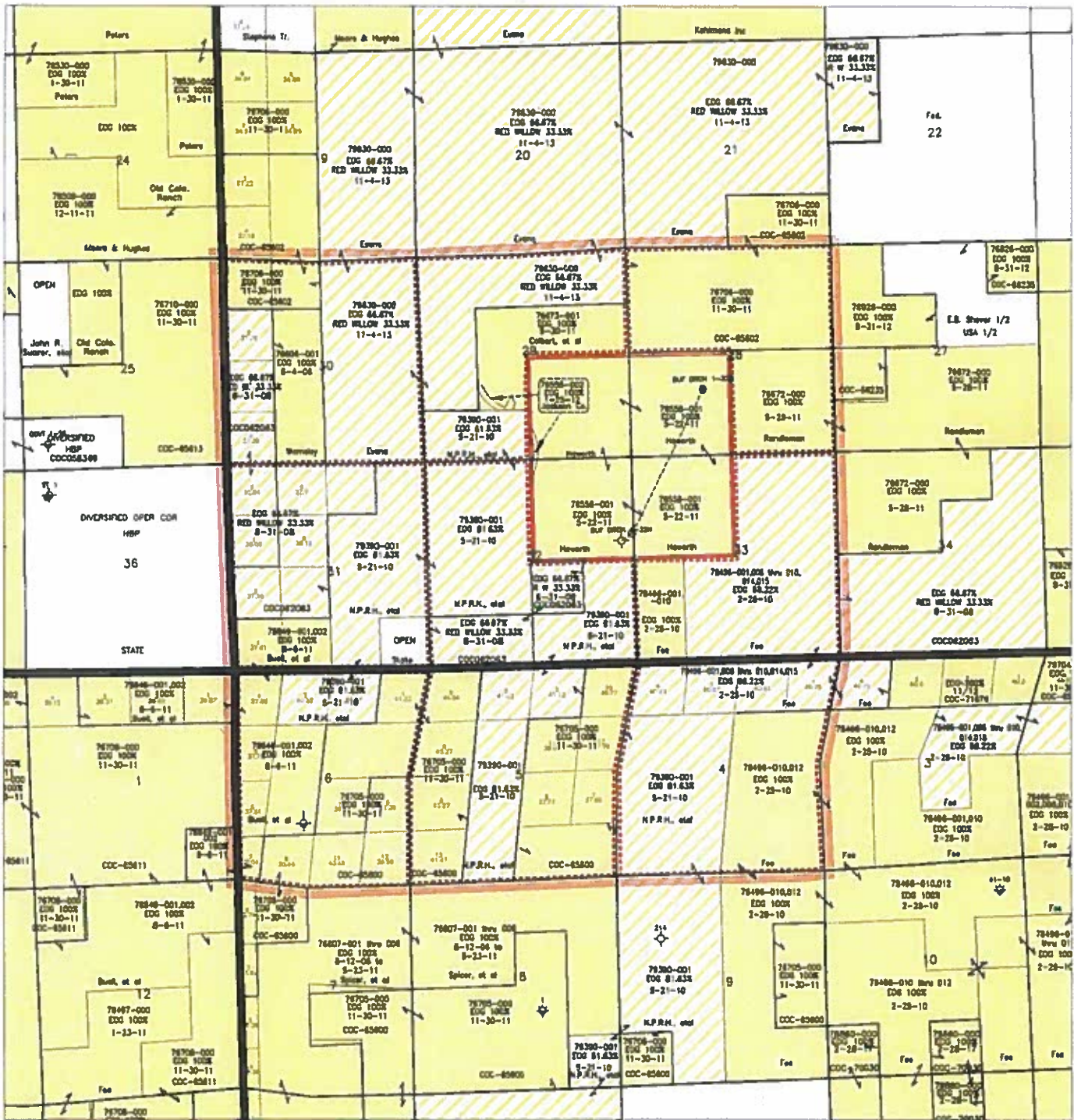
  
\_\_\_\_\_  
Notary Public  
Address: 600 17<sup>th</sup> St., Suite 1000N  
Denver, CO 80202

(SEAL)





# R 80 W



T 7 N

T 6 N

Proposed Spacing four 480 Ac. & five ±640 Ac. Units  
 One 640 Ac. Spacing by Lease  
 Affected Lands

EOG 100% W.I.  
 EOG PARTIAL W.I.

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Scale: 1"=3000'

0 1 2 Miles

Cause No. 531 Docket No. 0802-SP-03  
 Exhibit L-1

eog resources

Denver Division

Proposed Niobrara Spacing  
 LAND MAP

JACKSON COUNTY, COLORADO

Scale: 1"=3000' Author: S. SMITH Date: Feb 12, 2008 - 2:17pm



# COGCC

R 80 W



Scale: 1:1000000 Date: 2008-08-08 Author: SMITH 10:34am



COGCC



Scale: 2" = 1 MILE	U:\erdc\spac_2008_gesdnc	Author: S. SMITH	Feb 08, 2008 - 10:34am
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STEVEN K. SMITH

13875 Dogleg Lane  
Broomfield, Colorado 80020

303-466-2108 Home // 303-824-5428 Office  
Email Address: [steve\\_smith@eogresources.com](mailto:steve_smith@eogresources.com)

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**EMPLOYER**

EOG Resources, Inc.  
600 17<sup>th</sup> Street, Suite 1000N  
Denver, Colorado 80202

**OCCUPATION**

Petroleum Landman (25 Years)

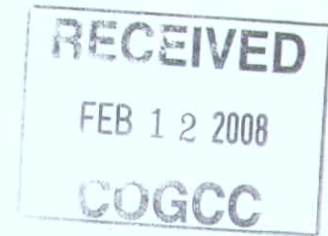
**EDUCATION**

The University of Louisiana at Lafayette  
Bachelor of Business Administration (BBA)  
Petroleum Land Management (PLM), May, 1983

Certified Professional Landman (CPL), October, 1989  
Environmental Site Assessor (ESA), April, 1993  
Member of the American Association of Professional Landmen (AAPL)



**Geologic Testimony  
Jackson County, Colorado  
Cause No. 531, Docket No. 0802-SP-03  
EOG Resources, Inc.  
Spacing Application  
Niobrara Formation**



My name is John H. Melby. I am currently a professional petroleum geologist with EOG Resources, Inc. and have been a geologist for over 40 years. I am currently a Registered Professional Geologist in the States of Wyoming and Utah. I am familiar with the Niobrara Formation underlying the Application Lands. A copy of my curriculum vitae is included in the exhibit booklet submitted by EOG.

**Exhibit G-1 Stratigraphic Cross Section (A-A')**

Exhibit G-1 is a west to east stratigraphic cross section (A-A') across the application lands. It is hung on top of the Niobrara Formation and shows this formation extends under all of the proposed spaced lands. It also has a Location Index and Topographic Index showing elevations of the affected lands.

**Exhibit G-2 Type Log**

Exhibit G-2 is a type log for the Niobrara Formation from the Cosaka Coalmont #1 (Section 6, T6N-R80W). It shows the Niobrara to be approximately 455' thick at this well, and composed of marine shale with higher resistivity than the above and below formations.

**Exhibit G-3 Proposed Niobrara Spacing Locator Map**

Exhibit G-3 is a proposed Niobrara Spacing Locator Map showing the proposed drilling windows and the affected lands. It also shows where Geologic Cross Section A-A' (Exhibit G-1) is located with respect to these lands.

**Exhibit G-4 Niobrara Structure Map**

Exhibit G-4 is a structure map drawn on the top of the Niobrara Formation. The contour interval is 250'. This area is structurally complex and this map shows many faults in green. The general dip is about 350'-400' per mile to the northeast.

**Exhibit G-5 Niobrara Isopach Map**

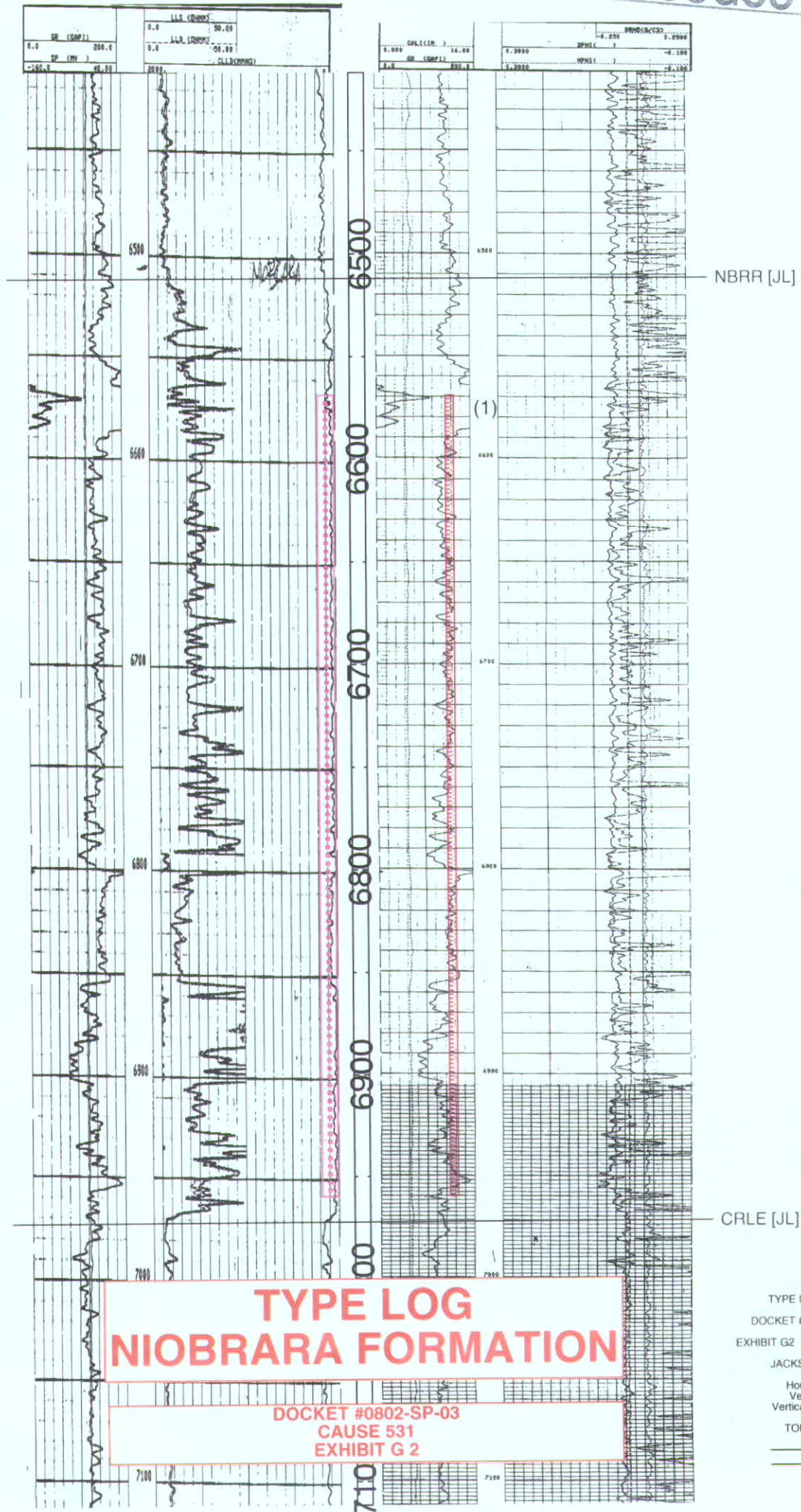
Exhibit G-4 is a Niobrara Isopach Map. It shows the Niobrara to range from approximately 450' thick on the west to 420' thick on the east side of the affected lands. The contour interval is 20'.

COSEKA RESOURCES  
SOUTH COALMONT 1  
SW NE SW  
T6N R80W S6  
8,253  
9/3/1982  
05057062440000  
SHANNONSANDSTONE

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(1) IPF: TestType: IPF  
Test Volumes  
29 BPD OIL  
4 BB WATER

COG RESOURCES  
TYPE LOG - NIOBRARA FM.  
DOCKET #0802-SP-03, CAUSE 531  
EXHIBIT G2 SCALE AS SHOWN  
JACKSON CO, COLORADO  
Horizontal Scale = 0.1  
Vertical Scale = 40.0  
Vertical Exaggeration = 0.0x  
TOPS AND MARKERS  
— CRLE JL  
— NBRR JL

Operator:  
Well Label:  
Well Control:  
Turntable:  
WELL: BUREAU  
WELL: CAMP DATE:  
User:  
Printer:

By: JHM

January 25, 2008 6:25 AM



## Proposed Drilling Windows

T  
7  
NT  
6  
N

## Type Log

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Cause No. 531 Docket No. 0802-SP-03

Exhibit G-3





Denver Division

## Proposed Niobrara Spacing

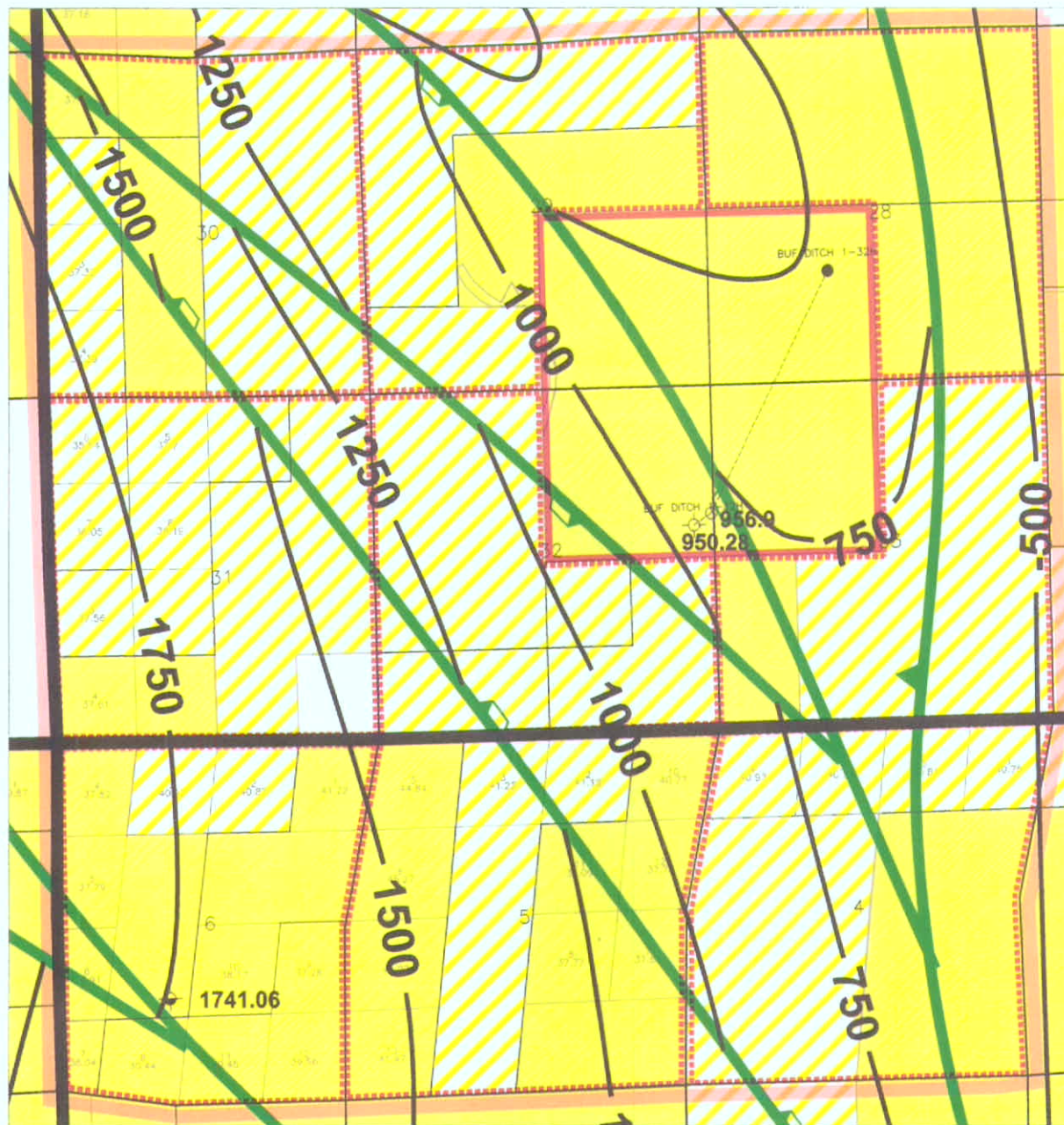
### Locator Map

## Jackson County, Colorado

Scale: 1"=4000'

 One 640 Ac. Spacing by Lease  
 Proposed Spacing four 480 Ac. & five + 640 Ac. Units  
 Cross Section  
 Affected Lands

R 80 W

T  
7  
NT  
6  
N

———— 640 Ac. Spacing by Lease  
..... Proposed Spacing  
     Affected Lands

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Cause No. 531 Docket No. 0802-SP-03

Exhibit G-4



Denver Division

Proposed Niobrara Spacing  
**NIOBRARA STRUCTURE MAP**

C.I. = 250'

JACKSON COUNTY, COLORADO

Scale:  
2" = 1 Mile

D:\color\NP_spac_2008_geoGina.dwg	Author
SPAC_HEARING	J. Ligon

Feb 11, 2008 -  
1:06pm

EOG 100% W.I.

EOG PARTIAL W.I.

Scale: 2"=1 Mile

0 1/2 1 Mile

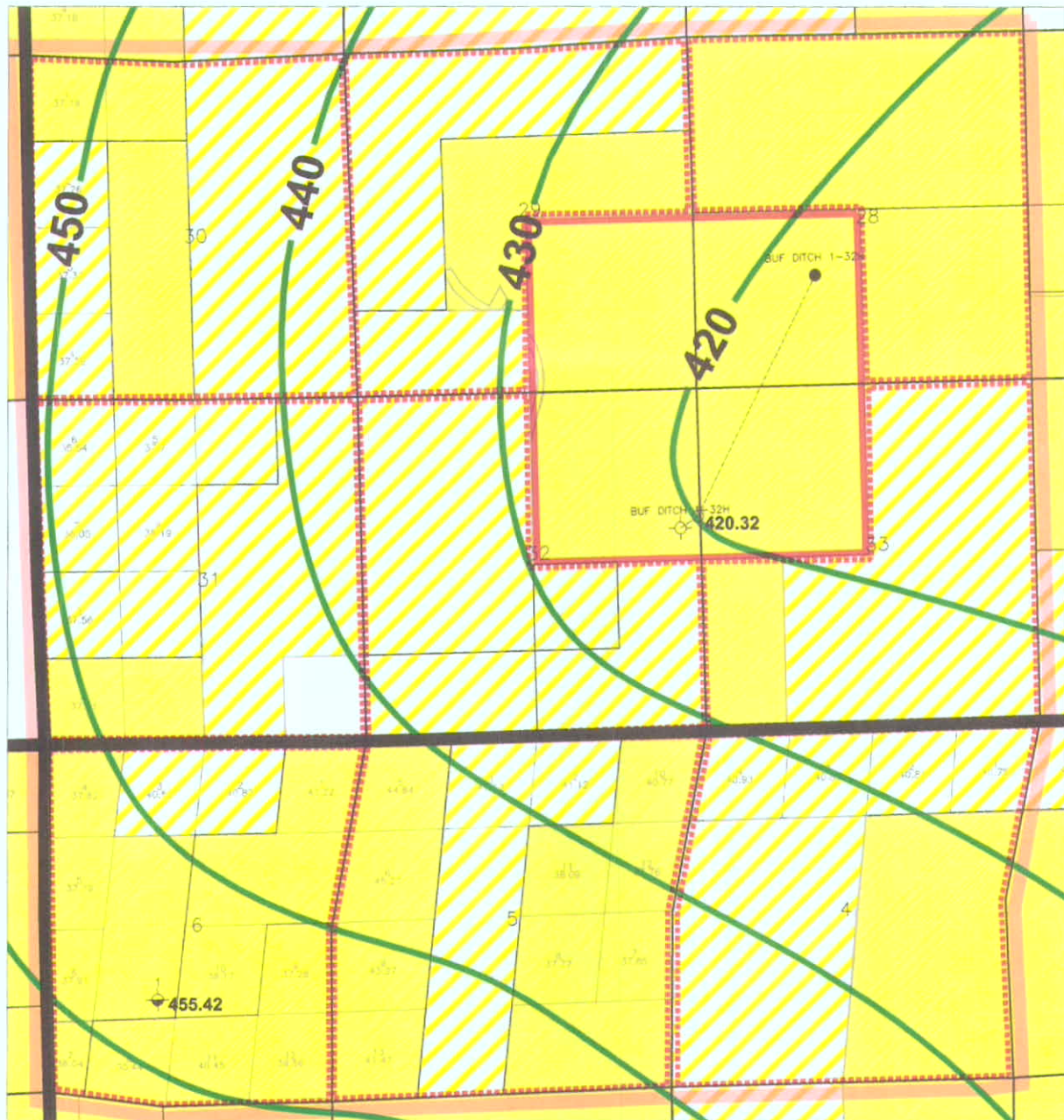




R 80 W

T 7 N

T 6 N



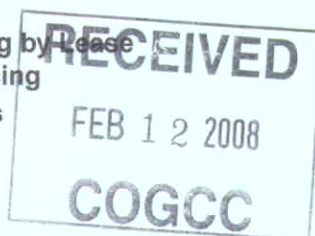
- 640 Ac. Spacing by Lease
- - - Proposed Spacing
- Affected Lands



EOG 100% W.I.

EOG PARTIAL W.I.

Scale: 2" = 1 Mile  
0 1/2 1 Mile



Cause No. 531 Docket No. 0802-SP-03  
Exhibit G-5



Denver Division

Proposed Niobrara Spacing  
Niobrara Isopach Map

C.I. = 20'

JACKSON COUNTY, COLORADO

Scale: 2" = 1 Mile  
D:\color\NP\_spec\_2008\_geo\Gina\531\SPAC HEARING  
Author: J. Ligon  
Feb 11, 2008 - 1:08pm

R 80 W

T 7 N

T 6 N



- ..... Proposed Spacing four 480 Ac. & five + 640 Ac. Units
- One 640 Ac. Spacing by Lease
- Affected Lands

Cause No. 531 Docket No. 0802-SP-03  
Exhibit G-6

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**eog resources**

Denver Division

Proposed Niobrara Spacing  
TOPOGRAPHIC MAP

JACKSON COUNTY, COLORADO

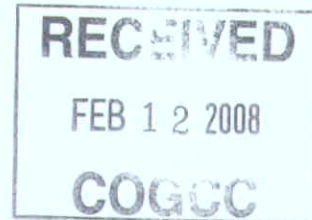
Scale: 2" = 1 Mile  
D:\color\NP\_spac\_2008\_geo\GIS\Map\SPAC\_HEARING J. Ligon Feb 11, 2008 - 1:06pm

Scale: 2" = 1 Mile

0 1/2 1 Mile



JOHN H. MELBY  
8169 Pierson Court  
Arvada, CO. 80005  
(303)423-5876 (Home)



### PROFESSIONAL SUMMARY

*Petroleum geologist with extensive oil & gas experience in the Green River Basin, Moxa Arch, Powder River and Williston Basins for Davis Oil, Amoco, Apache and EOG Resources. Mapped and evaluated properties in the Uinta Basin, Morrow Play of SE Colorado, DJ Basin, North Park Basin, Casper Arch, Sacramento Basin, Sand Wash Basin and Nevada. Skilled in integrating geologic data to produce economic prospects. Currently registered Professional Geologist in both Wyoming and Utah.*

### EMPLOYMENT HISTORY

#### EOG RESOURCES - Denver, Colorado Division Geological Specialist

1989-Present

Responsible for geological studies and prospect generation in the Greater Green River Basin, Wind River Basin & Powder River Basin of Wyoming. Also responsible for the DJ, Sand Wash and North Park Basins of Colorado.

- Found significant Lewis and Mesa Verde gas production at Dripping Rock, Cepo and Strike Fields, Wyoming.
- Aided in the recent discovery in North Park, Colorado.
- Conducted extensive geologic studies in all the above Basins that resulted in many drillable prospects.
- Continue to follow, plan and direct daily geological operations in active EOG oil and gas fields.

#### APACHE CORPORATION - Denver, Colorado Staff and District Geologist

1985-1989

Responsible for generating prospects in the Powder River, Green River and Wind River Basins.

- Found Muddy & Dakota production in southern Powder River Basin Sand Dunes area based upon original geologic interpretation.

- Conducted extensive studies on the Moxa Arch Frontier and Dakota Formations in the Green River Basin that resulted in drillable prospects.
- Generated Lewis production in the Washakie Basin after preparing studies that resulted in the acquisition of 25,000 acres.
- Supervised 4 geologists in generating prospects in the Permian, Powder River and Williston Basins.

**DAVIS OIL COMPANY - Denver, Colorado**  
**Geologist**

**1974-1985**

Conducted geologic studies, integrated data and helped obtain financing for an organization drilling up to 300 wells per year. Developed the ability to generate, finance, sell and drill economically viable prospects.

- Analyzed and interpreted stratigraphic data for Moxa Arch property acquisition; discovered profitable Storm Shelter Field and drillable prospects in Frontier and Dakota formations. Early work and drilling established control and framework for subsequent Blue Forest – Swan, Dakota discoveries. Wells in this field now produce between 75 and 100 MMCFGD and 5000 BCPD.
- Worked in all related areas of the Green River Basin (Rock Springs Uplift, Red Desert and Washakie Basins), developing effective geologic models for subsequent generation of producing and drillable prospects.
- Found significant gas/condensate production in the Lewis Play (Hay Reservoir – Great Divide Field) and Almond Play (Echo Springs area).
- Developed exploration analysis and interpretation studies for producing gas fields in the Sacramento Basin in California.

**AMOCO PRODUCTION COMPANY**

**1967-1974**

**Area Geologist, New Orleans Division** **(1972-1974)**

Supervised 4 geologists to prepare in-depth stratigraphic study of the Smackover Play in Mississippi, Alabama and Florida.

**Operations Geologist, Denver Division** **(1969-1972)**

Responsible for drilling, evaluating and day-to-day operation of exploration project on 7.5 million U.P.R.R. acreage.



**Geologist, Denver Division**

**(1967-1969)**

Completed exploration studies for Cook Inlet Basin, Alaska project and initiated prospects in the Powder River and Williston Basins.

**EDUCATION**

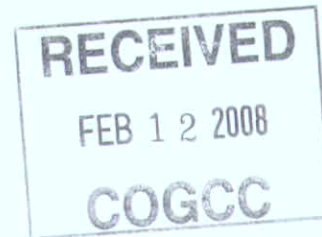
**M.S., Geology, University of Wisconsin (Madison):** Stratigraphy Thesis on the Cambrian in Western Wisconsin.

**B.S., Geology, University of Wisconsin (Madison)**

**PROFESSIONAL ORGANIZATIONS**

**American Association of Petroleum Geologists  
Rocky Mountain Association of Geologists**

**Engineering Testimony  
Jackson County, Colorado  
Cause No. 531, Docket No. 0802-SP-03  
EOG Resources, Inc.  
Spacing Application  
Niobrara Formation**



My name is Osman Apaydin. I am a reservoir engineer with EOG Resources, Inc. I have over 10 years experience in reservoir engineering, production operations, facility engineering and related matters and am familiar with the engineering conditions with respect the Application Lands. A copy of my curriculum vitae is included in the exhibit booklet submitted by EOG.

**Exhibit E-1 Drainage Calculations**

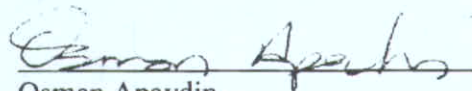
Exhibit E-1 reflects the original oil in place, estimated ultimate recovery, porosity and calculated drainage area for a number of wells within the Application Lands. Our studies reflect that the average vertical well EUR is approximately 87,165 per well; the original oil in place is 1,743,293 BBL. The average drainage area for a vertical well is 117 acres. EUR estimate for the only horizontal well, with limited production history, is around 250,000; the original oil in place is 5,000,000 BBL. The drainage area for the horizontal well is 336 acres.

**Exhibit E-2 Economic Calculations**

Exhibit E-2 reflects the various economics likely created by the proposed drilling and spacing units and the field development.

Based upon my engineering analysis, the current drilling and spacing units will promote efficient drainage, protect correlative rights and avoid waste. This Application is similar to other applications to create drilling and spacing units previously granted by this Commission and we do not believe that granting this Application will adversely affect correlative rights.

Engineering Exhibits E-1 and E-2 were prepared under my direction and control.

  
Osman Apaydin  
EOG Resources, Inc.  
Reservoir Engineer



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

Witness my hand and official seal.

My commission expires: June 25, 2011

June 25, 2011  
*Thomas J. Egan*  
 \_\_\_\_\_  
 Notary Public  
 Address: 600 17<sup>th</sup> St., Suite 1000W  
 Denver, CO 80202

(S E A L)



Niobrara Formation Drilling & Spacing Unit Application  
North Park Basin  
Drainage Calculations

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WELLNAME	API NO	Well Orientation	FIELD	SEC.	TSHP.	RGE.	EUR OIL (BBL)	OOIP(BBL)	h(ft)	Porosity	Calculated Drainage Area (Acres)
TITANIUM #1-26	5057060940000	Vertical	COALMONT	26.0	7.0	81.0	132,249	2,644,980	90	0.06	177
STATE #1-36	5057060650000	Vertical	COALMONT	36.0	7.0	81.0	115,522	2,310,440	90	0.06	154
FED 1-35	5057060610000	Vertical	COALMONT	35.0	7.0	81.0	13,723	274,460	90	0.06	18
<b>Average</b>							<b>87,165</b>	<b>1,743,293</b>			<b>117</b>
BUFFALO DITCH 1-32H	5057064630000	Horizontal	NORTH PARK	32.0	7.0	80.0	251,000	5,020,000	90	0.06	336

$B_o = 1.4$  rvb/STB (from Observed API Gravity and GOR data)

$S_w = 0.50$  fraction (calculated from Archie  $S_w$  calculation)

$RF = 0.05$  fraction (assumed)

Equations used:

$$OOIP = EUR / RF$$

$$Area = OOIP * B_o / 7758 / h / por / (1 - S_w)$$

where:

OOIP = original oil in place (BBL)

EUR = estimated ultimate recovery (BBL)

RF = recovery factor (fraction)

Area = drainage area (acres)

$B_o$  = formation volume factor (rvb/STB)

h = thickness, (ft)

por = porosity (fraction)

$S_w$  = water saturation (fraction)

Exhibit E-1  
Docket No 0802-SP-03  
Cause No 531



# Niobrara Formation Drilling & Spacing Unit Application North Park Basin Economic Calculations

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CAPEX, \$M	Oil Price, \$/BBL	Gas Price, \$/MCF	NPV <sub>10</sub> , \$M	ROR, %	EUR, Oil, MBO	EUR, Gas, MMCF
8000.0	65.0	6.0	1621.0	19.7	251.0	215.0
<b>Production @ 85%</b>			130.0	10.8		
<b>Production @ 115%</b>			3113.0	29.9		
6000.0	65.0	6.0	3702.0	44.4		
<b>Production @ 85%</b>			2211.0	28.8		
<b>Production @ 115%</b>			5994.0	61.8		

## Key Assumptions

OPEX \$3500/Month

WI 100%, Royalty 12.5%, NRI 87.5%

Before corporate taxes

The economics for this project are sound. Over the life of the field development we expect the CAPEX to improve to \$6000M levels, which would enhance the economics of the project.

Exhibit E-2

Docket No 0802-SP-03

Cause No 531

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**COGCC****Osman G. Apaydin**600 17<sup>th</sup> Street, Suite 1000N, Denver, CO, 80202

+1 303 8245406 (Office) +1 303 5188397 (Cell) osman\_apaydin@eogresources.com

**EXPERIENCE****EOG Resources, Inc.***Senior Reservoir Engineer***Denver, Colorado, USA***January 2006 – Present*

- Various reservoir engineering tasks for oil, gas and gas condensate fields in the basins of Rock Mountain region. The range of reservoir types included conventional sands, stacked tight sands, and naturally fractured carbonate and shale reservoirs.

**SCHLUMBERGER***Senior Reservoir Engineer, Consulting Services***Denver, Colorado, USA***July 1998 – December 2005*

- Reservoir engineering and simulation of stacked tight gas reservoirs in Rocky Mountain Basins including:
  - Jonah Field, Green River Basin. Tasks included investigating liquid drop out in the reservoir, numerical simulation of hydraulic fractures, history matching of two separate 2<sup>1/2</sup> sector areas and prediction of well spacing scenarios for the upcoming drilling campaign. Calculated incremental reserves to identify locations with 20, 10 and 5 Acre drilling potentials
  - Pinedale Field, Green River Basin. Conducted reservoir engineering tasks, PLT analysis and single well modeling for different operators
  - Mamm Creek Field, Piceance Basin. Conducted reservoir engineering tasks and supported simulation work
  - Identified and proposed the best well spacing and orientation practices for a Barnett Shale tight gas reservoir and various tight coal gas reservoirs
- Reservoir and production engineering and simulation of a diatomite field, Lost Hills, California
  - Designed reservoir simulation models to justify improved well fracturing and microbial treatment techniques. Conducted a parametric simulation study to back allocate well flow rates. Interpreted extensive production data and identified potential drilling and re-completion candidates.
- Reservoir engineering and fracture modeling of fractured carbonates in the Tetuan Member of the Villeta Formation, Colombia
  - Participated in developing methodologies to generate 3D fracture distribution from 2D areal geological data and image logs (1D vertical Data). Distributed fracture intensity and porosity and used numerical well test simulation to tune the fracture permeability and other parameters.
- As a senior reservoir engineer and part of an integrated team collected, analyzed and interpreted 30 years of exhaustive field data for the biggest onshore oil field of Mexico. This is a triple porosity (matrix, vugs and fractures) carbonate reservoir with more than 250 wells. Main challenges were disparate data sets that had to be utilized to build consistent geological and simulation models.
  - Conducted basic engineering tasks of the project like data gathering and organization, pressure data verification and compartmentalization study, PVT, production analysis, material balance.
  - Built a dual porosity simulation model and performed history matching and predictions with both black oil and compositional simulators.
  - Developed methodologies to build fracture network model where main challenge was disparate data sets, and came up with field-development plan.
- As a reservoir engineer and part of an integrated team collected, analyzed and interpreted 10 years of exhaustive field data of an offshore oil reservoir for Mexican state oil company by using industry leading reservoir engineering software suite. Main challenges were vug characterization and asphaltene precipitation problems.
  - Helped design experimental procedures to characterize triple porosity behavior of carbonate reservoirs, where main challenge was vug characterization.
  - Conducted basic engineering tasks of the project like data gathering and organization, pressure data verification and compartmentalization study, numerical well test, PVT, production analysis, material balance
  - Constructed the full field simulation model, history matched the production history. Analyzed different production scenarios and suggested the best development strategies for the next 30 years

**STANFORD UNIVERSITY***Stanford University Petroleum Research Institute, Research Assistant***Stanford, CA, USA***July 1996–June 1998*

- Conducted core scale experiments to develop methodologies to increase oil recovery. Analyzed foam flow in homogenous and heterogeneous systems by using CT scanning technology (saturation profiles) and pressure response.



## **SCHLUMBERGER**

*Petroleum Engineer Trainee, Consulting Services*

**Denver, Colorado, USA**

*June 1997 – September 1997*

- Generated representative equation of state for various reservoir fluids in North and South America and China.
- Built dual porosity numerical well test models and tuned the reservoir properties to match the test results.

## **EDUCATION**

---

### **STANFORD UNIVERSITY**

*Master of Science in Petroleum Engineering*

**Stanford, CA, USA**

*June 1998*

- **Research Topic:** Foam Flow in Porous Media
- GPA 3.5/4.0, Awarded full financial aid during course of study. Teaching assistant for graduate level class.
- Represented Stanford University at Society of Petroleum Engineers Western Regional Student Paper Contest.
- Elected Social Chair, Society of Petroleum Engineers - Stanford Chapter.

### **ISTANBUL TECHNICAL UNIVERSITY**

*Master of Science in Industrial Engineering (Only Completed Course Requirements for the degree)*

**Istanbul, Turkey**

*June 1998*

- One third of the graduate course work was completed at Stanford University

### **ISTANBUL TECHNICAL UNIVERSITY**

*Bachelor of Science in Petroleum and Natural Gas Engineering*

**Istanbul, Turkey**

*June 1995*

- Ranked 3rd/300 among *School of Mines* students.

## **PUBLICATIONS**

---

"Numerical Simulation of Thick, Tight Fluvial Sands," SPE 90630-PA, published in SPE Reservoir Evaluation & Engineering Journal (August 2006) and presented at SPE International Petroleum Conference in Mexico held in Puebla, Mexico, 8-9 November 2004.

"Critical Parameters in Static and Dynamic Modeling of Tight Fluvial Sandstones" SPE95910, SPE Annual Technical Conference and Exhibition held in Dallas, Texas, U.S.A., 9 – 12 October 2005

"Integrating Rigorous Completions Optimization Into Full-Field Geocellular and Simulation Modeling" SPE 94012, SPE Western Regional Meeting, Irvine, California, Mar 30 - Apr 01, 2005

"The Challenges of Numerical Simulation of a Complex Fractured Carbonate Reservoir with Available Disparate Data Sets," SPE 91691, SPE International Petroleum Conference in Mexico held in Puebla, Mexico, 8-9 November 2004

"Vug Characterization and Pore Volume Compressibility for Numerical Simulation of Vuggy and Fractured Carbonate Reservoirs," SPE74341, International Petroleum Conference and Exhibition in Mexico, Villahermosa, February 2002.

"Simulation of Asphaltene Precipitation in Fractured Reservoirs: A Case Study," SPE74373 International Petroleum Conference and Exhibition in Mexico, Villahermosa, February 2002

"Surfactant Concentration and Effects on Foam Flow in Homogenous Porous Media" published in Transport in Porous Media Journal and presented at SPE/DOE 12th Symposium (SPE59286) on Improved Oil Recovery at Tulsa, Oklahoma, April 2000.

"Foam Flow in Heterogeneous Porous Media: Effect of Crossflow." published in June 1999 SPE Journal (SPE56009) and presented at SPE/DOE 11th Symposium (SPE39678) on Improved Oil Recovery which was held at Tulsa, Oklahoma, April 1998.

"Charts and an Equation Developed for Easy Conversion of APIT/60 Gravities to API60/60 Gravities of Hydrocarbon Liquids" published in the Petroleum proceedings of the 11th Petroleum Congress of Turkey held at Ankara, Turkey, April 1996

**References are available on request.**