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## **511 DOCUMENTS**

**RECEIVED**

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**COGCC**

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

IN THE MATTER OF THE APPLICATION OF  
EOG RESOURCES, INC. FOR AN ORDER TO  
ESTABLISH FOUR (4) APPROXIMATE 1280-  
ACRE DRILLING AND SPACING UNITS WITH  
WELL LOCATION RULES FOR THE CODELL  
FORMATION OF CERTAIN DESCRIBED  
LANDS LOCATED IN TOWNSHIP 11 NORTH,  
RANGE 63 WEST, HEREFORD FIELD, WELD  
COUNTY, COLORADO

Cause No. 421

Docket No. 150100039

**REQUEST FOR RECOMMENDATION OF  
APPROVAL OF APPLICATION WITHOUT A HEARING**

EOG Resources, Inc. ("Applicant"), by and through its undersigned attorneys, hereby requests pursuant to Rule 511.a. of the Rules of Regulations of the Colorado Oil and Gas Conservation Commission for the Director to recommend approval of its November 17, 2014, 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 in the Application. To Applicant's information and belief, no protests were timely filed in this matter.

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

DATED this 5th day of January, 2015.

Respectfully submitted,

**EOG Resources, Inc.**

By: 

Jamie L. Jost

Joseph M. Evers

Jost & Shelton Energy Group, P.C.

Attorneys for Applicant

1675 Larimer Street, Suite 420

Denver, CO 80202

(720) 379-1812

# **EOG RESOURCES, INC.**

Cause No. 421  
Docket No. 150100039

**EOG Resources, Inc.**  
**Jason McLaren - Land Testimony**  
Cause 421; Docket No. 150100039  
Drilling and Spacing Unit Application – Codell Formation  
Hereford Field, Weld County, Colorado

January 2015 Colorado Oil and Gas Conservation Commission Hearing

My name is Jason McLaren, and I am currently employed as a Landman for EOG Resources, Inc. ("Applicant"). I graduated from Emory University in 1995 and the University of Wyoming College of Law in 2000 with a J.D. I have over 12 years of experience in oil and gas land work. I am familiar with the lands subject to, and matters set forth in, the verified application dated November 17, 2014 ("Application").

In support of Applicant's Application and my sworn testimony herein, I am submitting six (6) exhibits. This testimony and exhibits provide the supporting basis for approval of the Applicant's request for an order to establish four (4) approximate 1280-acre drilling and spacing units and authorize one (1) horizontal well within each unit in order to efficiently and economically recover the oil, gas and associated hydrocarbons within said 1280-acre drilling and spacing units from the Codell Formation underlying the below-described lands ("Application Lands"):

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #1</b>
Section 9: All	
Section 16: All	
 <u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #2</b>
Section 19: All	
Section 30: All	
 <u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #3</b>
Section 20: All	
Section 29: All	
 <u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #4</b>
Section 21: All	
Section 28: All	

Weld County, Colorado

**Exhibit 1: Leasehold Ownership Map:**

Exhibit 1 is a map showing the location of the Application Lands and Applicant's leasehold interest. The following parties own leasehold or unleased mineral interests in the Application Lands:



<u>INTEREST OWNER(S)</u>	<u>UNIT WI</u>
EOG Resources, Inc.	92.4722%
Other Working Interest Owners	7.5278%
TOTAL:	100.0000%

**Exhibit 2: Mineral Ownership Map:**

Exhibit 2 is a map showing the mineral ownership of the Application Lands, which is owned entirely in fee.

**Exhibit 3: Surface Ownership Map:**

Exhibit 3 is a map showing the surface ownership of the Application Lands, which is owned in fee and by the State of Colorado.

**Exhibit 4: Topographic Map:**

Exhibit 4 is a map showing the topography of the Application Lands. Approval of the Application for a drilling and spacing units would allow for a less impactful surface development plan.

**Exhibit 5: Aerial Map:**


Exhibit 5 is an aerial map showing of the Application Lands.

**Exhibit 6: Interested Parties:**

Exhibit 6 is a list of the interested parties within the Application Lands. Based upon our examination of relevant documents, all of the interested parties received proper notice. As of the date of this testimony, the Applicant is not aware of any unresolved protests or objections to the Application.

**Affirmation**

The matters described herein were all conducted under my direction and control. I hereby swear that to the best of my knowledge and belief, all of the matters set forth herein and in the exhibits are true, correct, and accurate.

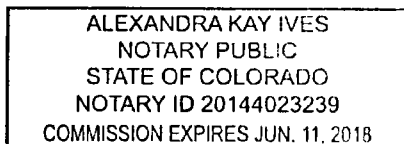
  
\_\_\_\_\_  
Jason McLaren, Landman  
EOG Resources, Inc.

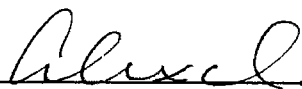
STATE OF COLORADO                     )  
   ) ss.  
CITY AND COUNTY OF DENVER        )

The foregoing instrument was subscribed and sworn to before me this 30<sup>th</sup> day of December 2014, by Jason McLaren, Landman for EOG Resources, Inc.

Witness my hand and official seal.

My commission expires: June 11, 2018

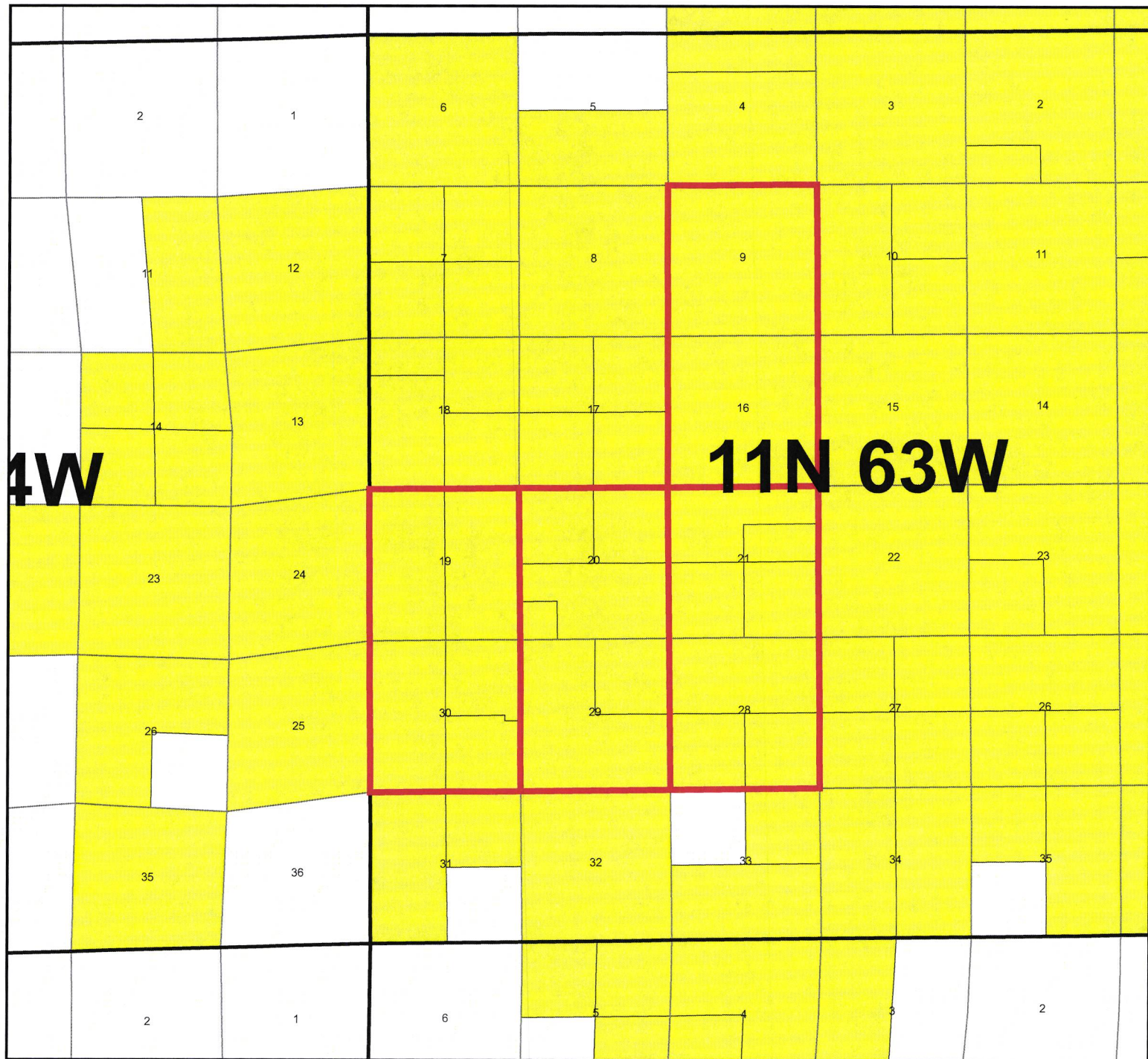


  
\_\_\_\_\_  
Notary Public



# Aerial Map

## Proposed Approx. 1280 ac Spacing Units

Township 11 North, Range 63 West, 6th PM  
Weld County, CO



### Legend

-  Proposed Codell 1280 Spacing
-  EOG Leasehold

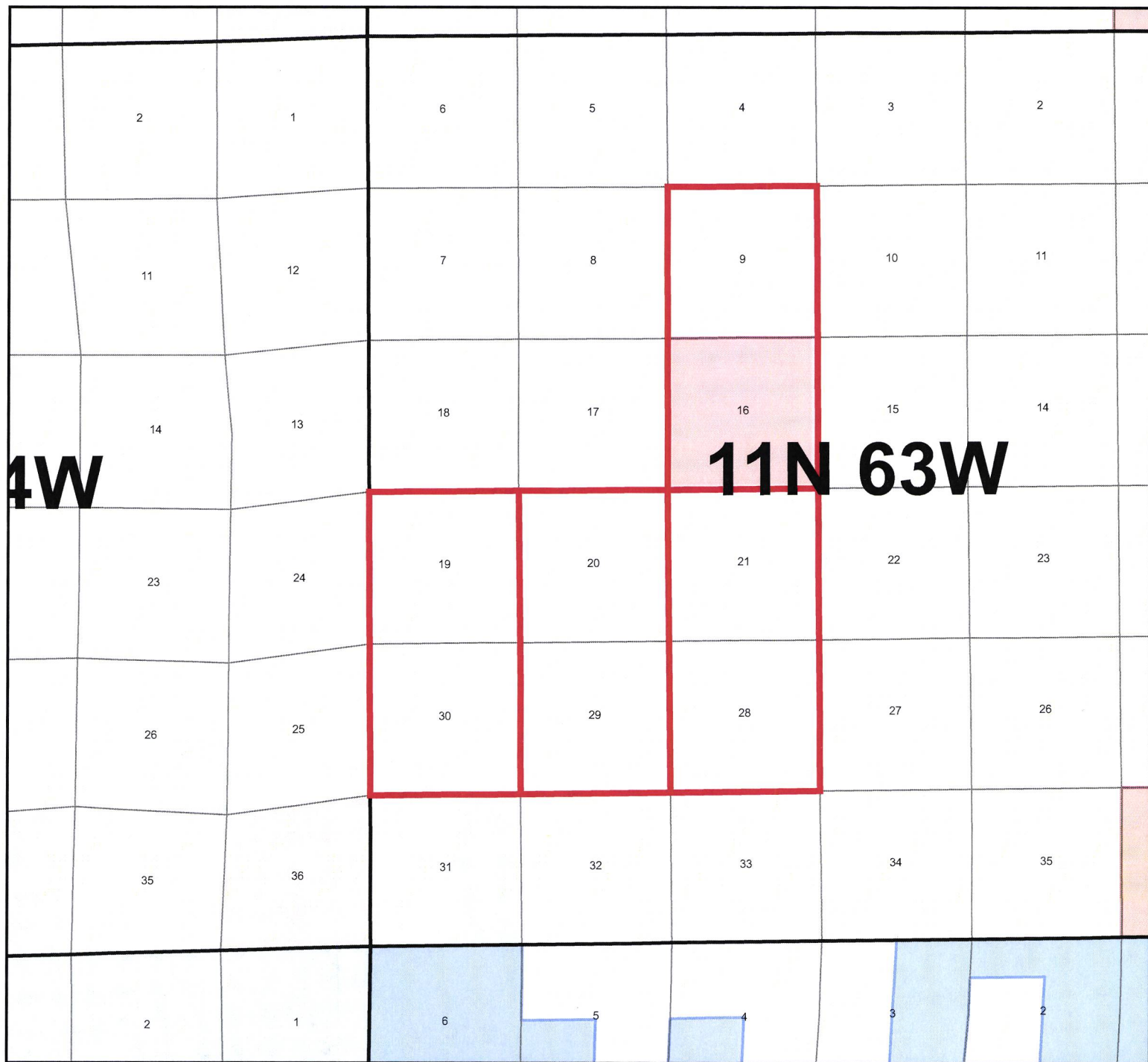
Codell Formation  
Exhibit L1  
January 2015



# Mineral Ownership Map

## Proposed Approx. 1280 ac Spacing Units

Township 11 North, Range 63 West, 6th PM  
Weld County, CO



### Legend

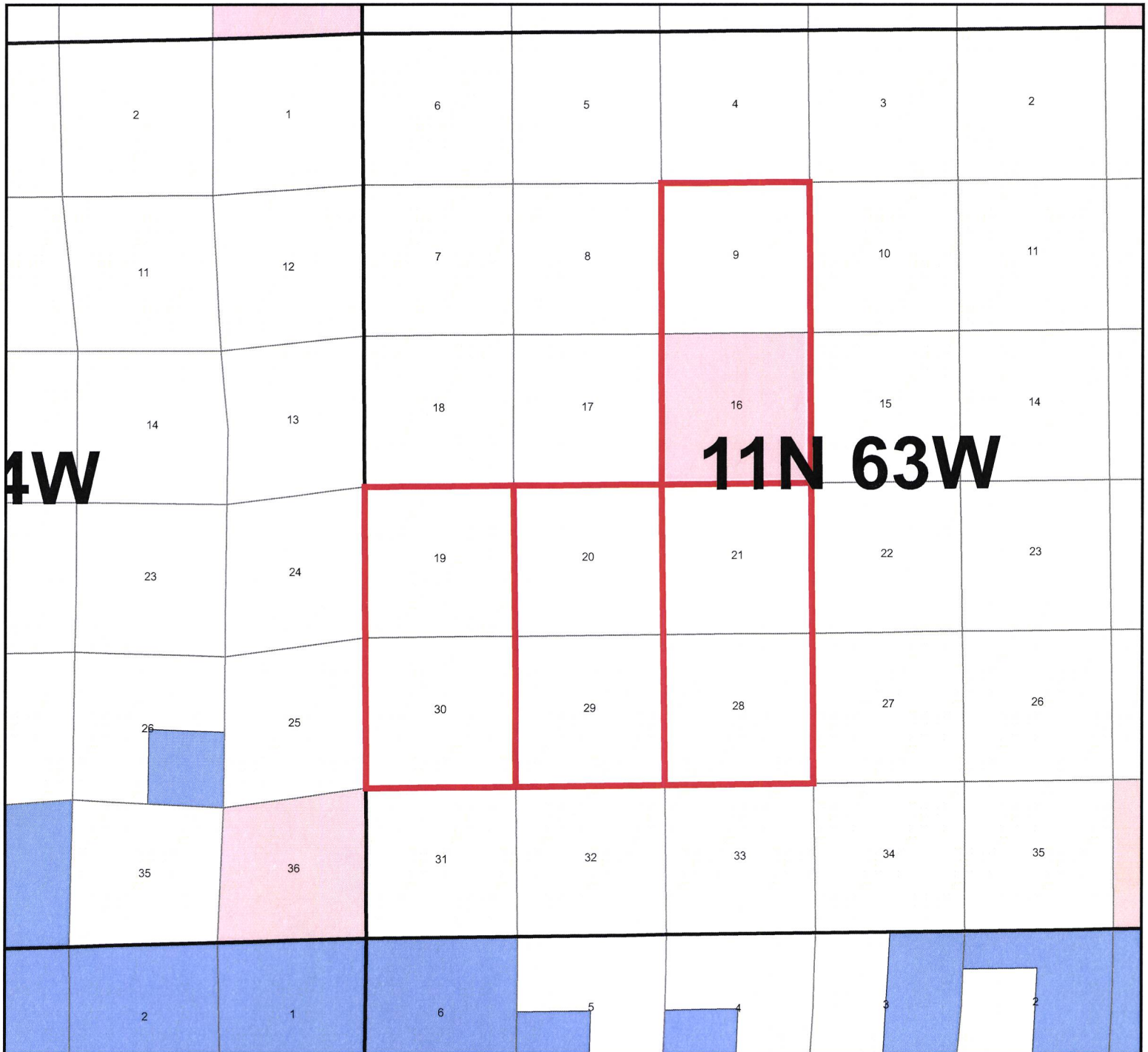
- Proposed Codell 1280 Spacing
- Federal Leased Minerals
- State Leased Minerals
- Federal Unleased Minerals
- State Unleased Minerals
- Fee Minerals

**Codell Formation**  
**Exhibit L2**  
**January 2015**





# Surface Ownership Map

## Proposed Approx. 1280 ac Spacing Units

Township 11 North, Range 63 West, 6th PM  
Weld County, CO



### Legend

-  Proposed Codell 1280 Spacing
-  Federal Surface Ownership
-  State Surface Ownership
-  Private Surface Ownership

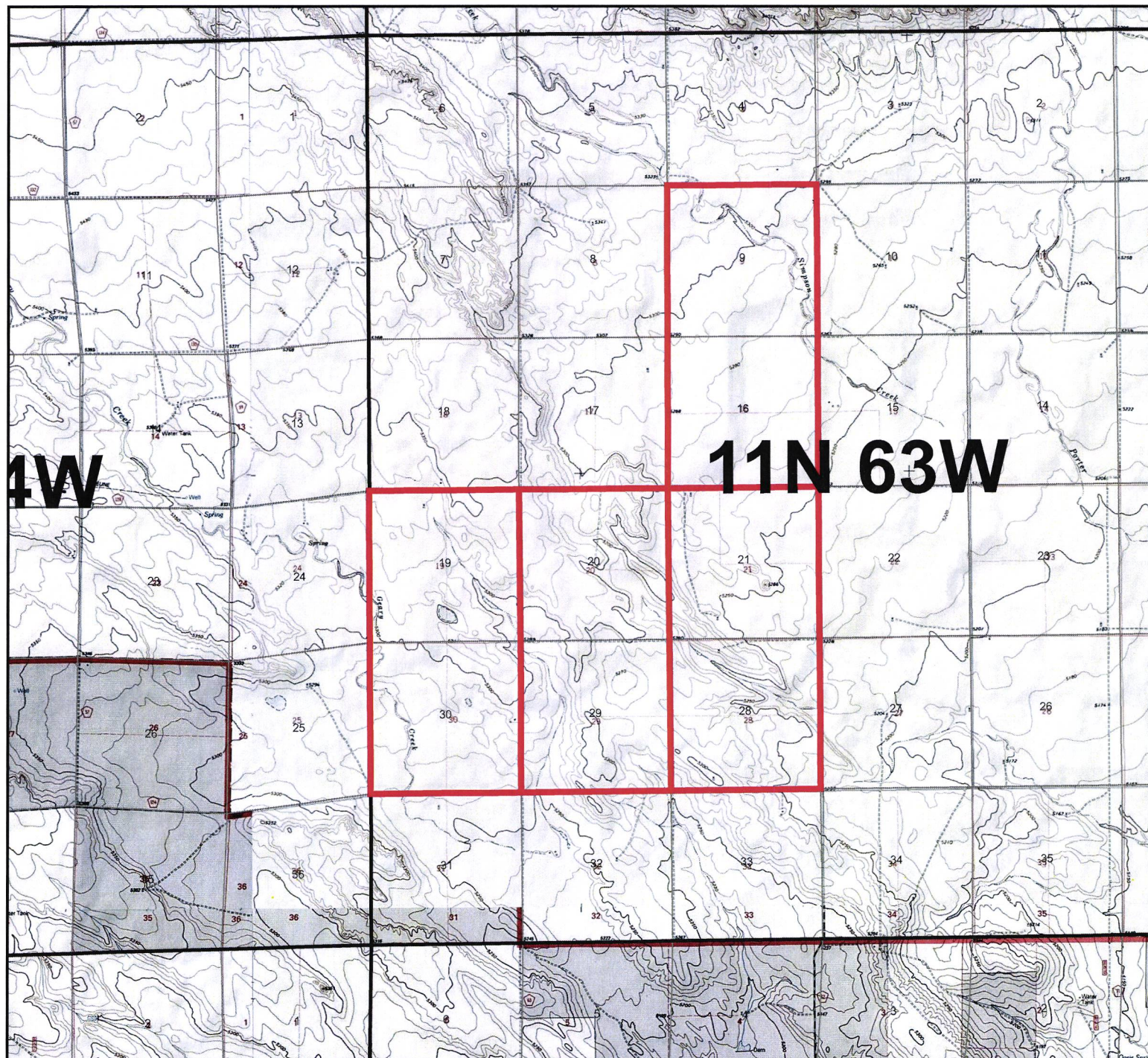
**Codell Formation**  
**Exhibit L3**  
**January 2015**



# Topographical Map

## Proposed Approx. 1280 ac Spacing Units

Township 11 North, Range 63 West, 6th PM  
Weld County, CO



### Legend

 Proposed Codell 1280 Spacing

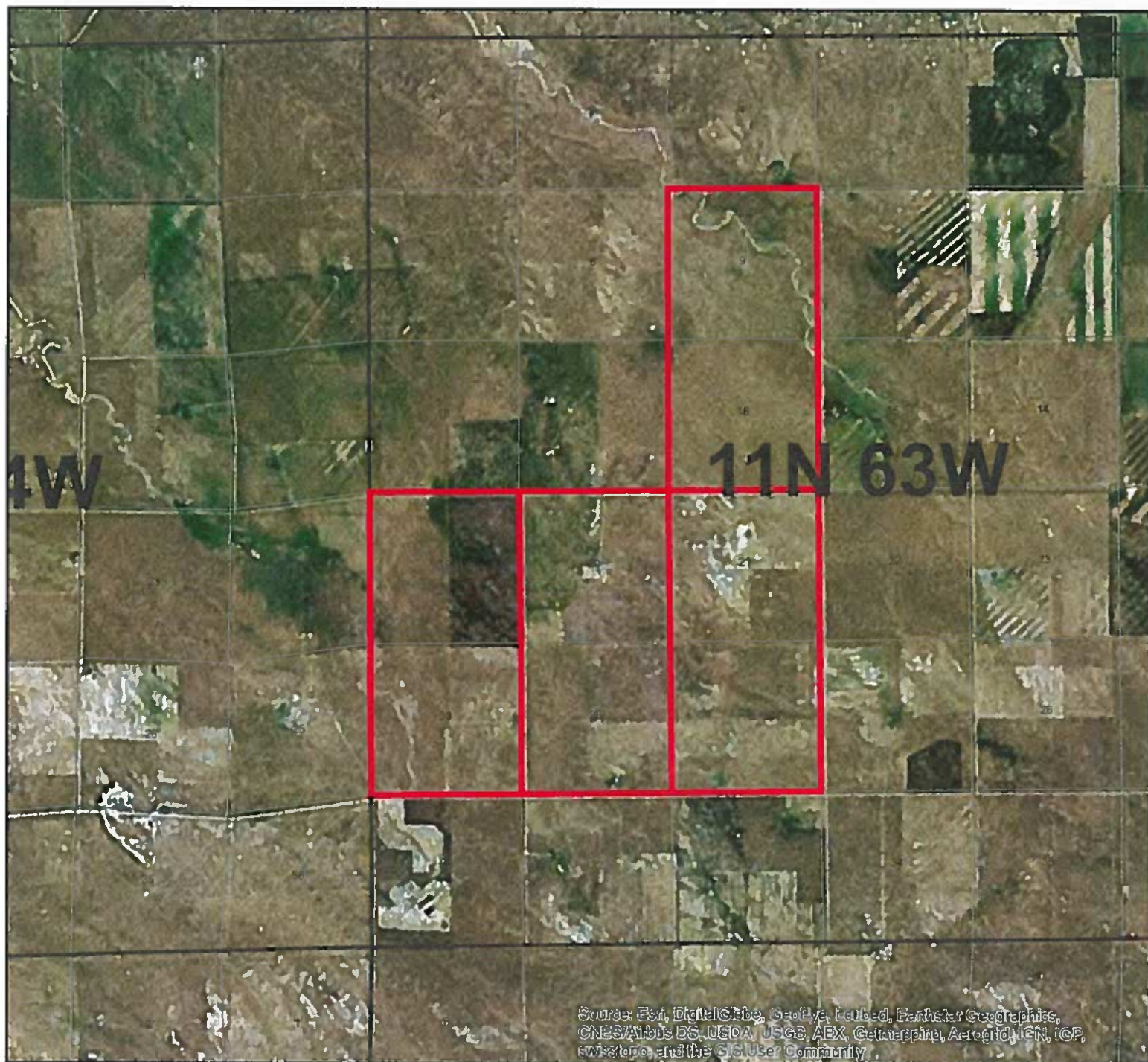
**Codell Formation**  
**Exhibit L4**  
**January 2015**



# Aerial Map

## Proposed Approx. 1280 ac Spacing Units

Township 11 North, Range 63 West, 6th PM  
Weld County, CO



### Legend

 Proposed Codell 1280 Spacing

**Codell Formation**  
**Exhibit L5**  
**January 2015**

# **EOG RESOURCES, INC.**

## **Matthew L. Nobles Petroleum Geologist – Geological Testimony**

### **January 2015 Colorado Oil and Gas Conservation Commission Hearing**

My name is Matthew L. Nobles, and I am currently employed as a Petroleum Geologist for EOG Resources, Inc. (“EOG”). I graduated from Colorado School of Mines with a Bachelor’s in Geological Engineering in 2011.

I have over 3.5 years of experience in the oil and gas industry. I am familiar with the lands subject to, and the matters set forth in the January 2015, verified application (“Application”).

In support of EOG’s Application in the above-referenced docket, I am submitting four (4) exhibits. The exhibits are attached to my sworn testimony and form the basis for EOG’s Application to gain approval to drill and complete one (1) horizontal well for the Niobrara Formation in the requested 1280-acre drilling and spacing unit covering the following lands (the “Application Lands”):

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #1</b>
Section 9: All	
Section 16: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #2</b>
Section 19: All	
Section 30: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #3</b>
Section 20: All	
Section 29: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #4</b>
Section 21: All	
Section 28: All	

Weld County, Colorado



The Codell Formation is a laminated to highly burrowed sandstone deposited in the Western Interior Seaway during Cretaceous time. The Codell thins from North to South over the proposed spaced area.

Four geology exhibits were prepared and presented as follows:

***I. Exhibit G-1 – (Structure Map-C.I.=100')***

Exhibit G-1 is a subsea structure map constructed on the top of the Codell Formation. The regional dip is approximately 50'/mile to the west across the proposed spaced area.

***II. Exhibit G-2 – (Isopach Map-C.I.=2***

Exhibit G-2 is an isopach map of the total Codell Formation. Total thickness ranges from approximately 17'-23', with the thickest area in the northern portion of the proposed spaced area.

***III. Exhibit G-3 – (Codell-Type Log)***

Exhibit G-3 is an AIT type log for the Codell Formation. The Codell is overlain by the Ft. Hayes member of the Niobrara Formation and underlain by the Carlile Shale.


***IV. Exhibit G-4 (Cross Section A-A')***

Exhibit G-4 is a stratigraphic cross section constructed through nearby wells showing the mapped interval of the Codell Formation. This exhibit shows that the Codell Formation exists under the proposed spacing area. The location of cross section A-A' is shown on Exhibit G-1 & G-2.

My conclusion is that the Codell Formation exists under all of the Application lands.

The matters described herein were all conducted under my direction and control. 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 30th day of December, 2014.


  
Matthew L. Nobles,  
Geologist  
EOG Resources, Inc.

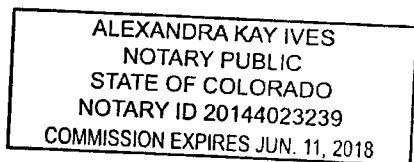
STATE OF COLORADO                    )  
  ) ss.  
CITY AND COUNTY OF DENVER )

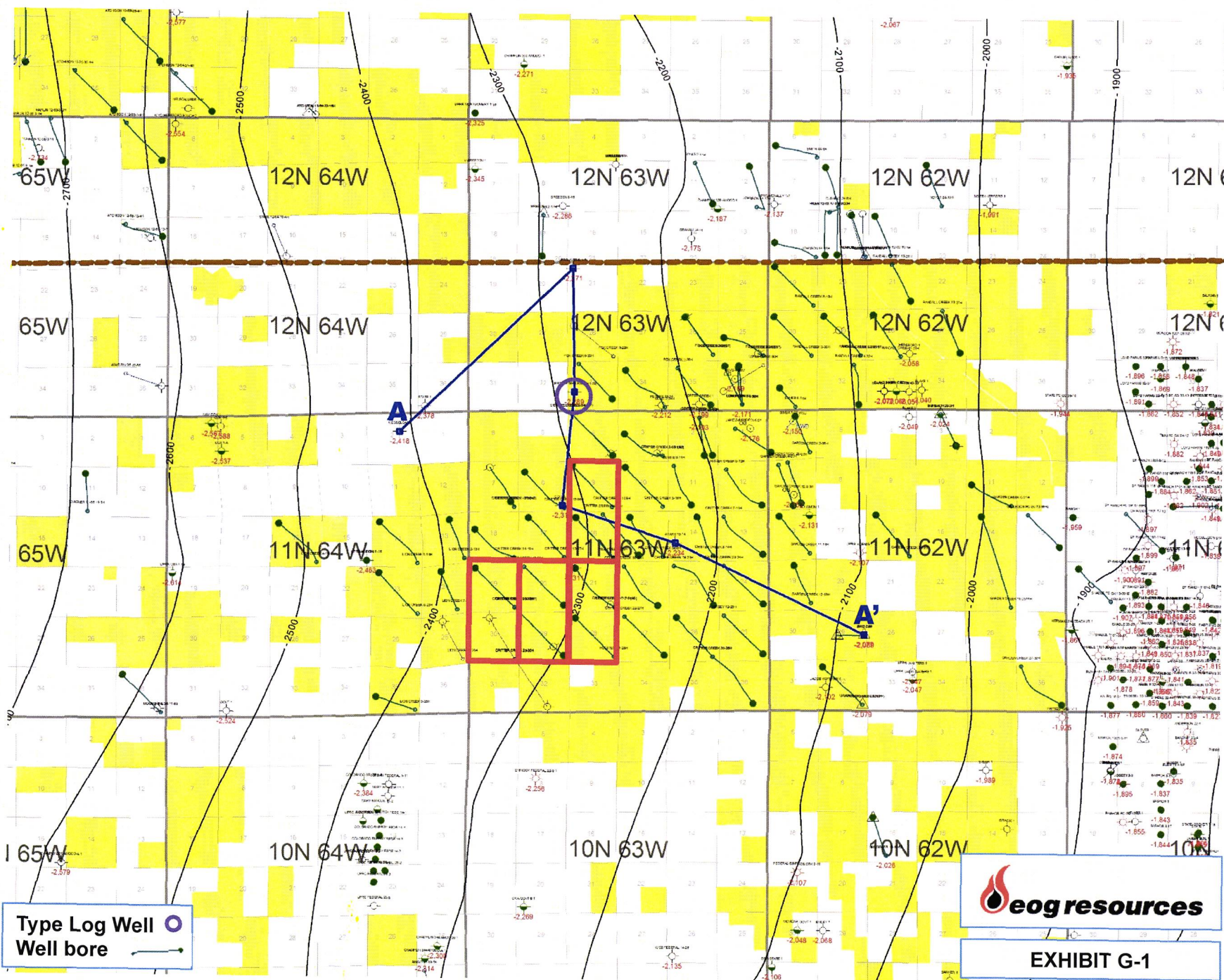
The foregoing instrument was subscribed and sworn to before me this 30<sup>th</sup> day of December, 2014, by Matthew L. Nobles, Geologist, for EOG Resources, Inc.

Witness my hand and official seal.

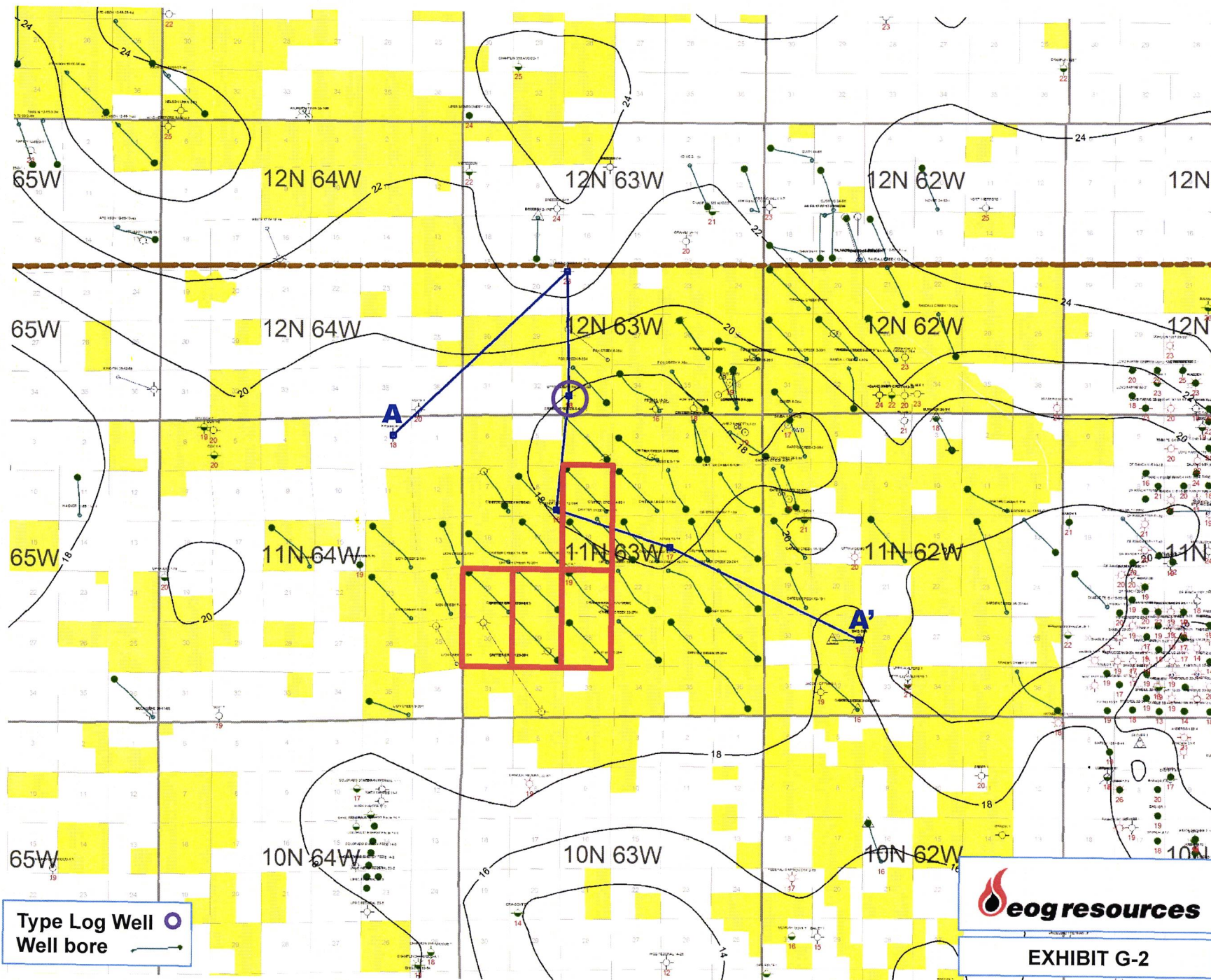
My commission expires: June 11, 2018

  
Notary Public









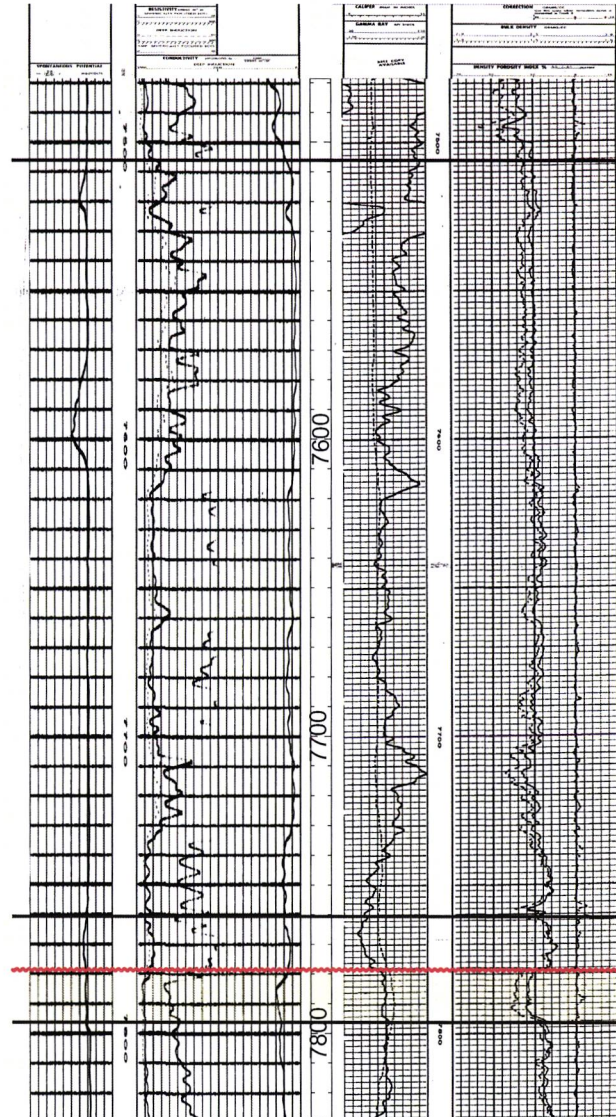


DHSO  
TRANS-TEXAS ENERGY  
UPRR-PETERS RANCH 1-33  
T12N R63W S33  
C NW SW  
5,490  
05123103950000  
9/20/1981

UPPER CRETACEOUS

NIOBRARA

SMOKY HILL CHALK



Pierre Sh.

Niobrara.

Ft. Hayes L.S.

Codell

Carlile Sh.

CODELL  
TYPE LOG



EXHIBIT G-3



DRY  
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 KESSELBACH  
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 C SW NE  
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SRV  
 CONQUEST OIL CO  
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 4/30/2011

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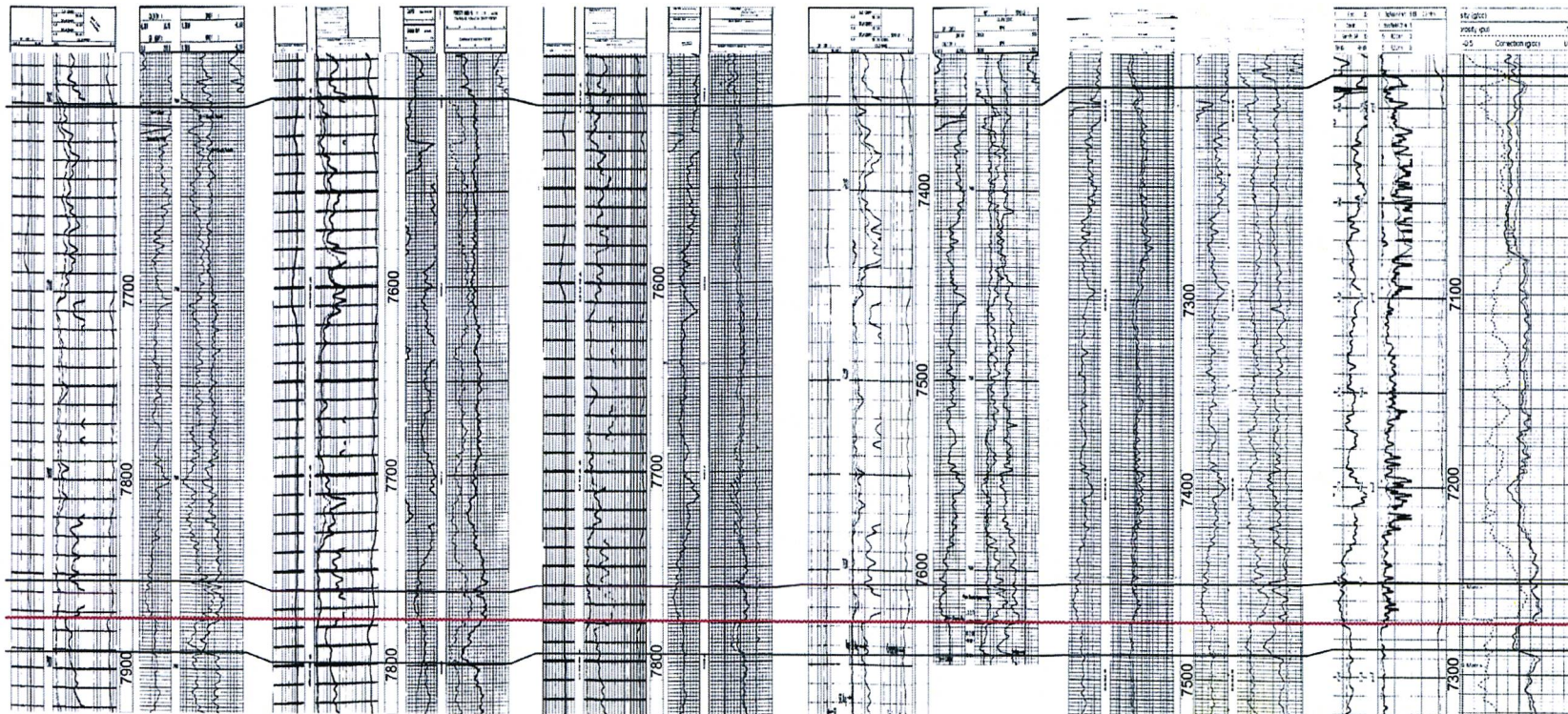


EXHIBIT G-4

# EOG RESOURCES, INC.

## Danny Frederick, Reservoir Engineer – Engineering Testimony

### Codell Formation

January 2015 Colorado Oil and Gas Conservation Commission Hearing

My name is Danny Frederick. I am currently employed as a reservoir engineer with EOG Resources, Inc. (“EOG”) I have over 20 years experience in reservoir engineering, production operations and related matters and am familiar with the matters set forth in the January 2015 verified application (“Application”) and with the engineering conditions with respect to the following lands (“Application Lands”):

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #1</b>
Section 9: All	
Section 16: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #2</b>
Section 19: All	
Section 30: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #3</b>
Section 20: All	
Section 29: All	

<u>Township 11 North, Range 63 West, 6<sup>th</sup> P.M.</u>	<b>DSU #4</b>
Section 21: All	
Section 28: All	

Weld County, Colorado

In support of EOG’s Application in the above-referenced docket, I am submitting five (5) exhibits. The exhibits are attached to my sworn testimony and form the basis for EOG’s Application to gain approval to establish four (4) approximate 1280-acre drilling and spacing units in the Application Lands.

### Drainage and Economic Calculations

EOG believes that horizontal drilling and completing of the Codell Formation with long laterals in 1280 spacing units is the most efficient way to develop the resource potential. The following is a summary of the attached exhibits.

#### E1 Summary of Drainage Area Calculations for 7 Codell horizontal wells

- For each well, show cumulative and forecast ultimate oil and gas production from decline curve analysis
- Porosity feet from geologic maps and log analysis
- Drainage area is calculated for each well using the first equation. Use EUR, porosity feet, Recovery Factor, Water saturation, Oil formation volume factor and calculate area.
- Drainage radius is calculated for each well using the 2<sup>nd</sup> equation –Joshi equation. Using drainage area from previous step and lateral length, solve for drainage radius.
- The average drainage radius for these 7 Codell horizontal wells is 358’

E2 Drainage calculation for 9000' lateral

- Next step is to estimate the drainage area for the wells with a 9000' lateral length.
- Using a 9000' lateral length, and the average drainage radius value of 358', derived from the 7 horizontal wells in the previous exhibit, I calculate a drainage area of 157 acres

E3 Codell Spacing Summary

- This exhibit summarizes the information in the previous exhibits and calculates total drainage area for the requested number of wells:
- Seven horizontal Codell wells with sufficient production data exist in the study area and have an average estimated drainage radius of 358 feet
- The estimated area that can be drained with 1 extended lateral HZ Codell well is 157 acres
- The estimated area that can be drained with 1 extended lateral HZ Codell wells is 157 acres, which is smaller than requested approx. 1280 acre spacing unit
- One horizontal Codell well in the proposed spacing unit is necessary to prevent waste and will not adversely impact correlative rights

E4-5 Production plots for wells used in drainage calculations

- Show daily oil rate in BOPD for the month in green, gas rate in MCFD in red, water rate in BWPD in blue
- Fit line and EUR

Notes on Joshi Method

- I am utilizing the Joshi method for estimating horizontal well drainage
- Method uses the drainage radius expected from a vertical well along with the lateral length of the horizontal well
- The drainage area is a cigar shaped area with a width of 2 times the radius and a length equal to the completed lateral length, PLUS a semicircle on each end with the same radius

Economics were run using completed well costs of \$10,015,000 for the Jubilee 103-0433H well, the type curve of which is presented in the attached exhibits, and EOG's operating cost assumptions. The single well economics meet the Company's requirements for these wells.

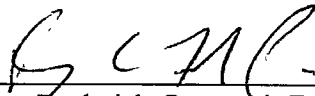
Based upon my engineering analysis, 1280-acre drilling and spacing units will help promote efficient drainage, protect correlative rights and avoid waste. EOG does not believe that granting this Application will adversely affect correlative rights.

The matters described herein were all conducted under my direction and control. 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.

I respectfully request that, in addition to the testimony provided here, the Commission take administrative notice of the testimony and exhibits presented by EOG Resources, Inc. in.



Dated this 30th day of December, 2014.

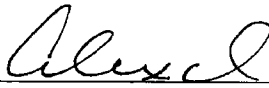
  
\_\_\_\_\_  
Danny Frederick, Reservoir Engineer  
EOG Resources, Inc.

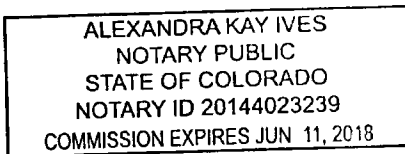
STATE OF COLORADO                    )  
  ) ss.  
CITY AND COUNTY OF DENVER )

The foregoing instrument was subscribed and sworn to before me this 30th day of December, 2014 by  
Danny Frederick, Reservoir Engineer, for EOG Resources, Inc.

Witness my hand and official seal.

My commission expires: June 11, 2018

  
\_\_\_\_\_  
Notary Public



# Summary of Existing Codell Horizontal Wells Within Study Area Calculated Drainage Area

Well	API #	Location	Oil	Gas	Oil EUR (bbls)	Porosity-FT (feet)	Estimated Drained Area (acres)	Completed	Drainage Radius (feet)
			Cumulative Production (bbls)	Cumulative Production (mcf)				Lateral Length (feet)	
DEWEY 7-9-1CH	49021210020000	15N-65W-7	30,895	41,044	95,903	4.0	35	3,666	189
ROAD RUNNER 1-6H	49021209660000	15N-64W-5	42,247	23,287	68,873	3.7	27	4,077	134
WARREN 17-1CH	49021209830000	15N-65W-17	68,836	37,019	277,190	3.8	103	3,624	506
JUBILEE 80-09H	49021209760000	13N-65W-9	81,989	67,449	274,514	3.0	131	3,764	602
JUBILEE 103-0433H	49021210120000	13N-65W-4	117,941	73,633	487,362	3.0	233	9,315	498
REDSTONE 2-1-1CH	49021209670000	13N-65W-1	57,355	55,206	170,319	3.0	81	9,452	181
TOMAHAWK 1-30H	49021208770000	14N-64W-30	69,981	114,992	193,539	3.4	82	3,894	395
Average									358

## Equations Used:

$$OOIP = EUR / RF$$

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

$$B_o = 1.3$$

$$S_w = 0.35$$

$$RF = 0.18$$

OOIP = original oil in place (BBL)

RF = recovery factor (fraction)

EUR = estimated ultimate recovery (BBL)

Area = drainage area (acres)

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

h = thickness, (ft)

por = porosity (fraction)

$S_w$  = water saturation (fraction)

## Joshi Equation for Horizontal Drainage Area

$$D = (PI * r^2 + 2r * L) / 43560$$

r = Effective Drainage Radius from Wellbore, ft

L = Completed Lateral Length, ft

D = Drainage Area for Horizontal Well

## Estimated Drainage for Proposed 9000' Codell Horizontal Well

### Horizontal Well Drainage Area

Joshi Method

$r$  = effective drainage area from vertical well, ft

$L$  = lateral length, ft

$D$  = drainage area for horizontal well

$$D = (\pi * r^2 + 2r * L) / 43560$$

$r$  = 358 ft

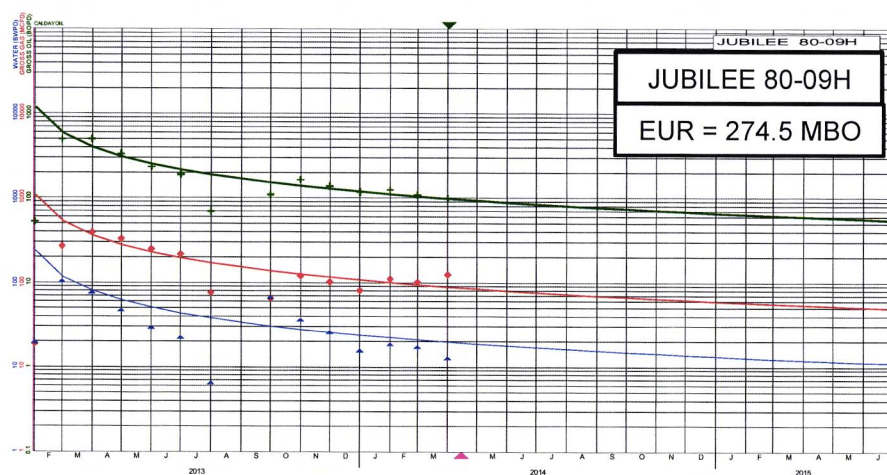
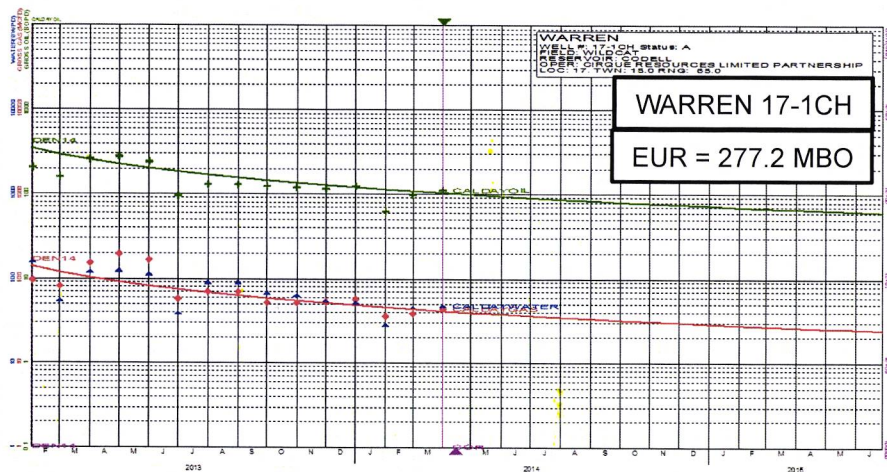
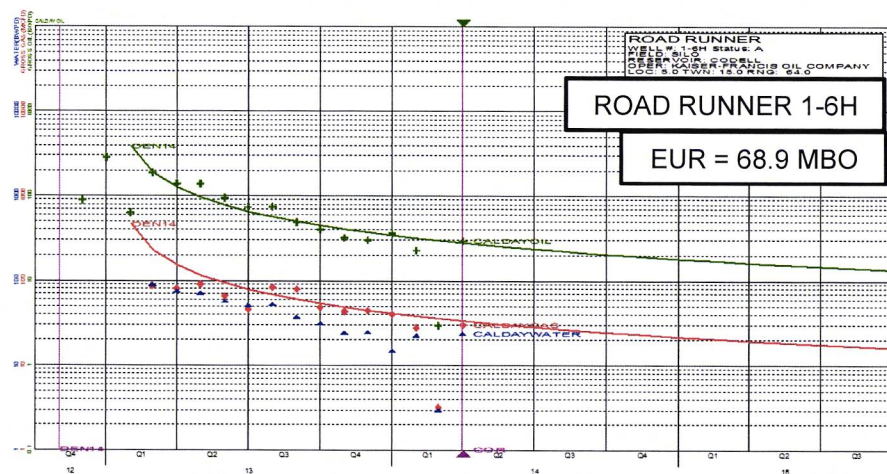
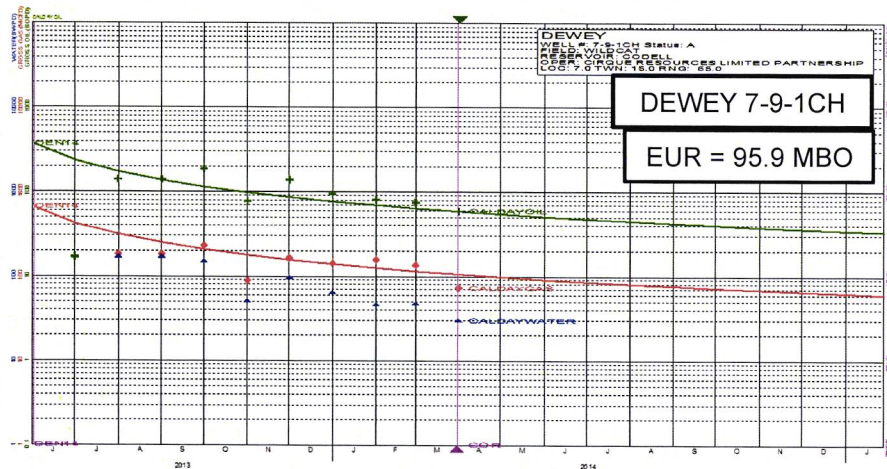
$L$  = 9000 ft

$D$  = 157 acres

# Codell Spacing Summary

- Seven (7) horizontal Codell wells in study area have an average drainage radius of 358 feet
- The estimated area that can be efficiently drained with one extended lateral horizontal Codell well is 157 acres
- The estimated area that can be efficiently drained with one (1) extended lateral horizontal Codell wells is 157 acres, which is smaller than the approximate 1280 acre spacing unit
- One (1) horizontal Codell wells in the proposed 1280 acre drilling and spacing unit are necessary to prevent waste and will not adversely impact correlative rights

# Codell Production Plot





# Codell Production Plot

