



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

January 6, 2017

RULE 37 CASE NO. 0298285
STATUS NO. 810308
DISTRICT 02

**APPLICATION OF EOG RESOURCES, INC. FOR AN EXCEPTION TO
STATEWIDE RULE 37 FOR THE GINOBILI UNIT, WELL NO. 6H, EAGLEVILLE
(EAGLE FORD-2) FIELD, KARNES COUNTY, TEXAS**

AMENDED PROPOSAL FOR DECISION

HEARD BY: Ryan Lammert – Administrative Law Judge
Brian Fancher, P.G. – Technical Examiner

PROPOSAL FOR DECISION: Jennifer Cook – Administrative Law Judge
Brian Fancher, P.G. – Technical Examiner

PROCEDURAL HISTORY:

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EOG Resources, Inc.

Protestant-
BHP Billiton Pet (TXLA OP) Co.

Table of Contents

I.	Statement of the Case	3
II.	Background.....	3
III.	Jurisdiction and Notice	4
IV.	Applicable Legal Authority	5
V.	Discussion of Evidence	6
A.	Summary of Applicant’s Evidence and Argument.....	6
1.	EOG presented volumetric calculations to show the amount of total recoverable reserves in the Unit within the Field’s correlative interval.	7
2.	EOG presented calculations of what EOG anticipates producing from the Unit based on EOG’s development plan for the Unit and productivity data of wells in the area.....	9
B.	Summary of Protestant’s Evidence and Argument.....	11
1.	BHP claims EOG’s Rule 37 exception request is premature.	11
2.	BHP claims EOG’s Rule 37 exception request contains faulty assumptions.	12
3.	BHP claims EOG’s Rule 37 exception request is not necessary for EOG to recover its fair share of recoverable hydrocarbons from the Unit.	14
4.	BHP discusses the potential for the Well to drain BHP’s adjacent tract.	15
VI.	Examiners’ Analysis and Recommendation.....	16
A.	There is sufficient evidence that the Well is necessary to prevent confiscation.....	16
B.	The Examiners recommend granting EOG’s application for an exception to the 330-foot minimum lease line spacing distance as proposed.....	21
VII.	Conclusion, proposed findings of fact and proposed conclusions of law	21

This Amended Proposal for Decision is amended to conform the description of location of the well to a revised plat that was submitted after the plat offered into the record as evidence in this case was submitted. The plats are substantially similar and contain only minor differences.

In a letter dated December 7, 2016, the Administrative Law Judge and the Technical Examiner (“Examiners”) notified the parties of their proposal to take official notice of a revised plat that was the most current plat on file at the Commission, as well as a revised Form W-1 and W-1H both of which conform to the revised plat. In the letter, the Examiners also notified the parties that the Examiners planned to issue this Amended Proposal for Decision and the proposed order to conform to the revised plat. In the letter, the Examiners gave the parties until December 19, 2016 to object or otherwise respond to these proposals. No response or objection was received. The Examiners hereby take official notice of the revised plat (referred to as Examiners Ex. 1), the revised Form W-1 (referred to as Examiners Ex. 2), and the revised Form W-1H (referred to as Examiners Ex. 3). The primary change is to conform the information contained in the last paragraph in section “I. Background” below to the revised plat wherever that information is located in the Amended Proposal for Decision.

I. Statement of the Case¹

EOG Resources, Inc. (“EOG” or “Applicant”) filed an application (“Application”) with the Railroad Commission (“Commission” or “RRC”) seeking a lease line spacing exception permit under the provisions of 16 TEX. ADMIN. CODE § 3.37 (“Statewide Rule 37” or “Rule 37”). Applicant seeks an exception to lengthen the horizontal drainhole of a well that has already been drilled; Applicant requests to move the first take point 840 feet towards the heel of the wellbore. This additional 840 feet of horizontal drainhole (“Additional Drainhole”) will be closer than the 330 feet minimum lease line distance limit in the field rules (“Field Rules”) for the Ginobili Unit (“Unit”), Well No. 6H (“Well”), in the Eagleville (Eagle Ford-2) Field (“Field”), Karnes County, Texas because the Additional Drainhole is closer than allowed by rule to a tract external and immediately adjacent to the Unit. The Application is protested by BHP Billiton Pet (TXLA OP) Co. (“Protestant” or “BHP”), who is the operator of the tract adjacent to the Unit and closest to the proposed Additional Drainhole.

The Examiners respectfully submit this Amended Proposal for Decision (“PFD”) and recommend the Commission approve the Application and grant the Rule 37 exception. There is sufficient evidence that allowing the Additional Drainhole is necessary to prevent confiscation and protect correlative rights.

II. Background

Applicant filed the Application seeking a spacing exception permit under the provisions of Statewide Rule 37. Applicant seeks an exception to the minimum lease line distance requirement in the Field Rules because the Additional Drainhole as proposed will be closer than allowed to a tract external to the Unit; the proposed Additional Drainhole would be less than 330

¹ The hearing transcript in this case will be referred to as “Tr. at [pages:lines]”. Applicant’s exhibits will be referred to in the PFD as “Applicant Ex. [exhibit no.]”. Protestant’s exhibits will be referred to as “Protestant Ex. [exhibit no.]”.

feet from Protestant's adjacent external tract. The applicable minimum lease line spacing distance is 330 feet pursuant to the Field Rules.

This case involves an amended permit application for a horizontally drilled well that Applicant has already drilled in the Field located in the Hernandez, HRS A Survey, Abstract No. 4 in Karnes County, approximately 2.3 miles in a north direction from the town of Panna Maria, Texas. The well was originally permitted with a horizontal drainhole length of approximately 5,800 feet and no Rule 37 exception was needed. In the amended permit application, Applicant seeks to add 840 feet to the horizontal drainhole by moving the first take point 840 additional feet toward the heel of the Well. The lease line of the Unit next to the area of this Additional Drainhole is closer than the 330 minimum lease line distance in the Field Rules. The lease line closest to the 840 feet of Additional Drainhole at issue in this case is northwest of the Additional Drainhole and is defined by a creek. Hence, it is not a straight line. Protestant operates the tract on the other side of this lease line. A copy of a drilling plat showing the Well affected by this Rule 37 and a copy of a plat depicting just the area around the Additional Drainhole at issue is attached as Appendix A.²

The Well is drilled to an approximate depth of 11,000. The surface location of the Well is 626 feet from the northeast line of the Unit boundary and 210 feet from the southeast line of the Unit boundary; it is 2,213 feet from the northwest line of the Hernandez, HRS A Survey, Abstract No. 4 line and 584 feet from the northeast line of the Hernandez, HRS A Survey, Abstract No. 4 line. The terminus location is 30 feet from the northwest line of the Unit boundary and 385 feet from the southwest line of the Unit boundary; it is 8,877 feet from the northeast M. Lopez Survey, Abstract No. 181 line and 951 feet from the southeast M. Lopez Survey, Abstract No. 181 line. The penetration point is 129 feet from the northeast line of the Unit boundary and 503 feet from the southeast line of the Unit boundary.³

III. Jurisdiction and Notice

Rule 37 is authorized pursuant to sections 81.051 and 81.052 of the Texas Natural Resources Code, which provide the Commission jurisdiction over all persons owning or engaged in drilling or operating oil or gas wells in Texas and the authority to adopt all necessary rules for governing and regulating persons and their operations under the jurisdiction of the Commission.⁴

Rule 37 contains provisions regarding notice of the application for a spacing exception and notice of any hearing on an application.⁵ Regarding notice of the application, Rule 37 requires:

When an exception to only the minimum lease line spacing requirement is

² Appendix A is Examiners Ex. 1 and Applicant Ex. 3.

³ See Examiners Ex. 1.

⁴ TEX. NAT. RES. CODE §§ 81.051 and 81.052; see, e.g., 29 Tex. Reg. 8271 (August 27, 2004).

⁵ Even though Rule 37 spacing limits do not apply because there are special Field Rules containing spacing limits, Rule 37 exception provisions apply whether the spacing limits are in Rule 37 or special field rules. Tex. R.R. Comm'n, *Final Order Amending the Field Rules for the Eagleville (Eagle Ford-2) Field, Dewitt, Karnes, Lavaca, and Live Oak Counties, Texas*, Oil and Gas Docket No. 02-0297221, 2 (March 8, 2016); see also Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* § 9.4 (LexisNexis Matthew Bender 2015).

desired, Applicant shall file a list of the mailing addresses of all affected persons, who, for tracts closer to the well than the greater of one-half of the prescribed minimum between-well spacing distance or the minimum lease line spacing distance, include:

- (i) the designated operator;
- (ii) all lessees of record for tracts that have no designated operator; and
- (iii) all owners of record of unleased mineral interests.⁶

Notice of the Application was provided as required.⁷

After notice of the Application was provided, the Commission received the protest by Protestant, thereby necessitating a hearing on the Application. Rule 37 requires that notice of hearing be given to the same persons who were provided notice of the Application.⁸ The Commission's Hearings Division sent notice of the hearing to all persons required to be provided notice.⁹

IV. Applicable Legal Authority

Statewide Rule 37 provides statewide well spacing limits for all fields that do not have special field rules. In this case, the Field Rules set a minimum lease line distance of 330 feet.¹⁰ Rule 37 applies to applications for an exception to spacing limits whether the Rule 37 spacing limits apply or there are spacing limits in the Field Rules.¹¹

Rule 37 provides that the Commission may grant an exception to the Rule 37 as follows:

[T]he commission, in order to prevent waste or to prevent the confiscation of property, may grant exceptions to permit drilling within shorter distances than prescribed in this paragraph when the commission shall determine that such exceptions are necessary either to prevent waste or to prevent the confiscation of property.¹²

Rule 37 further provides:

⁶ 16 TEX. ADMIN. CODE § 3.37(a)(2)(A).

⁷ See Notice of Application issued by the Commission's Oil and Gas Division on September 29, 2015.

⁸ 16 TEX. ADMIN. CODE § 3.37(a)(3).

⁹ See Amended Notice of Hearing issued on January 29, 2016.

¹⁰ Tex. R.R. Comm'n, *Final Order Amending the Field Rules for the Eagleville (Eagle Ford-2) Field, Dewitt, Karnes, Lavaca, and Live Oak Counties, Texas*, Oil and Gas Docket No. 02-0297221 (March 8, 2016).

¹¹ Tex. R.R. Comm'n, *Final Order Amending the Field Rules for the Eagleville (Eagle Ford-2) Field, Dewitt, Karnes, Lavaca, and Live Oak Counties, Texas*, Oil and Gas Docket No. 02-0297221. 2 (March 8, 2016), see also Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* § 9.4 (LexisNexis Matthew Bender 2015).

¹² 16 TEX. ADMIN. CODE § 3.37(a)(1).

At any such hearing, the burden shall be on the applicant to establish that an exception to this section is necessary either to prevent waste or to prevent the confiscation of property.¹³

In sum, in order for Applicant to obtain an exception to the 330-foot minimum lease line distance limit, Applicant has the burden to prove the exception is necessary to either prevent waste or prevent the confiscation of property.

V. Discussion of Evidence

Applicant provided the testimony of three witnesses and twenty-five exhibits. Protestant provided the testimony of one witness and eighteen exhibits.

A. Summary of Applicant's Evidence and Argument

Applicant maintains that the proposed Additional Drainhole is necessary to prevent legal confiscation and to protect correlative rights. EOG provided evidence of substantial recoverable hydrocarbons under the Unit and that approximately 42,000 barrels of hydrocarbons will be unrecoverable if the proposed Additional Drainhole is not allowed.

Mr. Rick Johnston was the primary witness to testify for EOG. Mr. Johnston is a consulting petroleum engineer and a registered engineer in the State of Texas. He obtained a degree in chemical engineering from the University of Texas in 1978 and has been a practicing engineer since then. He performed a study of the Unit in preparation of his testimony.¹⁴

He described the Well and Unit. The Well is a horizontal well that has already been drilled at a regular location (i.e. a location not requiring a spacing exception). In this case, Applicant seeks to extend the lateral drainhole by moving the first take point closer to the heel. The Well is the sixth well and most recently drilled well on the Unit. The surface location is toward the south end of the Unit and is drilled from the south to the north in a northwest direction and parallel to the other five wells that have already been drilled.¹⁵ The well spacing between the 6 wells on the Unit is roughly 225 feet between each well. Mr. Johnston testified that 225 feet is some of the closer well spacing that he has seen in this Field.¹⁶ Of the six wells that have been drilled on the Unit, two of the wells have been completed and are producing; those are Well Nos. 1H and 2H. No portion of Well Nos. 3H, 4H, 5H, or 6H has yet been completed.¹⁷

After obtaining the initial permit, EOG submitted an amended permit application which is pending and at issue in this case. In the amended application, EOG seeks to change the location of the first take point to extend the drainhole length. If the amended permit application

¹³ 16 TEX. ADMIN. CODE § 3.37(a)(3).

¹⁴ Tr. at 10:21 to 12:10.

¹⁵ Tr. at 12:13 to 13:7.

¹⁶ Tr. at 13:8 to 13:20.

¹⁷ Tr. at 14:4 to 15:16.

were granted, it would allow EOG to add 840 feet of completable drainhole length down towards the southern end of the well near the heel.¹⁸

The minimum lease line spacing distance for the Well is 330 feet as defined by the Field Rules.¹⁹ Near the proposed 840 feet of drainhole length at issue in this case, the boundary of the Unit is defined by a meandering creek; as it meanders, it gets closer to the proposed Additional Drainhole than 330 feet. The closest point is 103 feet from Protestant's adjacent tract and most of the Additional Drainhole length is less than 330 feet from Protestant's tract.²⁰ Protestant's adjacent tract is the Zaiontz A Unit; Well No. 5H on that unit is the closest well and is 667 feet from the proposed Additional Drainhole.²¹

The Field Rules have a minimum lease line spacing distance of 330 feet with 80 acre density per well with optional 40 acre density. The correlative interval spans from 10,294 to 10,580, which is the same interval utilized for this Well and Mr. Johnston's study is limited to this interval.²² The Field Rules were approved most recently via amendment on March 8, 2016.²³ It is EOG's plan to drill 19 wells on the Unit approximately 225 to 250 feet apart. EOG maintains that because the Field Rules have a stacked lateral rule, EOG will be able to drill the planned wells without need of a Statewide Rule 38 density exception.²⁴ Since this case is to address an application for a Rule 37 exception only, the Examiners do not opine one way or another about whether density exceptions are necessary for EOG's planned development of the Unit.

He also testified that the Field is one of the fields proposed for unconventional fracture treatment designation and it requires fracture stimulation of the rock to economically produce.²⁵

1. EOG presented volumetric calculations to show the amount of total recoverable reserves in the Unit within the Field's correlative interval.

Mr. Johnston first presented volumetric calculations he performed to estimate the recoverable hydrocarbons under the Unit. Mr. Johnston provided a cross section comprised of three wells in the area around the Unit. One is the Milton No. 1, which is the well that defines the correlative field interval. The second is a BHP well, the Banduch A1H well (the "BHP Well"), and the information regarding the well log was obtained from BHP. The third well is an EOG well, the Leonard AC No. 101 well (the "EOG Well"). These wells are some of the closest wellbores that penetrate the entire Eagle Ford so they contain both the lower and upper Eagle Ford formation and the entire correlative interval.²⁶

In order to determine appropriate input variables for his volumetric calculation, Mr. Johnston performed an open-hole log analysis. He took a petrophysical analysis of the BHP

¹⁸ *Id.*; Applicant Ex. 2.

¹⁹ See Applicant Exs. 5 and 6; Tex. R.R. Comm'n, *Final Order Amending the Field Rules for the Eagleville (Eagle Ford-2) Field, Dewitt, Karnes, Lavaca, and Live Oak Counties, Texas*, Oil and Gas Docket No. 02-0297221 (March 8, 2016)

²⁰ Tr. at 15:18 to 16:12; Applicant Ex. 3.

²¹ Tr. at 16:13 to 17:1; Applicant Ex. 3.

²² Tr. at 19:8 to 20:5; Applicant Ex. 5.

²³ Tr. at 20:6 to 20:21; Applicant Ex. 6.

²⁴ Tr. at 20:22 to 21:23; Applicant Ex. 6.

²⁵ Tr. at 40:6 to 41:19; Applicant Ex. 18.

²⁶ Tr. at 21:24 to 23:16; Applicant Ex. 7.

Well,²⁷ showing the net feet of pay, the effective porosity and the water saturation. BHP evaluated the upper and lower Eagle Ford separately. He also used a similar analysis provided by EOG.²⁸ He calculated weighted averages for the entire correlative interval of the Field based on feet of pay in order to arrive at values for porosity and water saturation. The average total height of pay is 185.8 feet according to EOG's data and 182.3 feet according to BHP's data. The average porosity is 9.4 percent utilizing EOG's data and 9.4 percent utilizing BHP's data. The average water saturation using EOG's analysis is 24.3 percent and 29.4 percent utilizing BHP's data.²⁹

Mr. Johnston used an isopach map to determine his estimated reservoir volume; he used the acres within each one of the contours of the map to calculate the number of acre feet within the Field correlative interval of the Unit.³⁰ He used three different methods to calculate the number of acre feet, all of which provided similar results. The three methods he used are the trapezoid, vertical slice, and the frustum/pyramid method. The result from the trapezoid method and the vertical slice are identical, and the frustum/pyramid method result is slightly less total acre feet. The range of total acre feet of the upper and lower Eagle Ford for the Unit is between 116,928³¹ to 117,251³² acre feet. He took the total acre feet of pay and divided it by the total number of acres in the Unit—631.15 acres—to calculate an average thickness of pay to be between 185.26 to 185.77 feet per acre.³³ Mr. Johnston discussed a calculation he did utilizing an isopach map provided by BHP and the trapezoid method resulting in a total of 116,660 acre feet of pay and an average thickness of 184.84 feet per acre. Mr. Johnston testified that his multiple calculations demonstrate that all the calculations lend comparable results.³⁴ To show that these methods are generally accepted in the industry, he provided excerpts from accepted industry literature showing equations that are utilized to calculate reservoir volumetrics. The excerpts reflect similar equations and concepts that he used in his calculations.³⁵

Mr. Johnston testified about how he used the information gathered to perform volumetric calculations and estimate volume of recoverable oil from the Unit. He used a weighted average porosity of 9.4 percent and a water saturation of 24.3 percent.³⁶ He used an oil formation volume factor of 1.51.³⁷ He used 631.15 acres as the number of acres in the Unit and an average thickness from the trapezoid method of 185.77 feet and a recovery factor of 20 percent. He concludes that there is 8.5 million barrels of recoverable oil in the Unit; this calculation includes the estimated recoverable oil from both the upper and lower Eagle Ford formation. He calculated

²⁷ RRC API No. 42-255-33261.

²⁸ RRC API No. 42-255-34702.

²⁹ Tr. at 25:17 to 27:6; Applicant Ex. 9.

³⁰ Tr. at 23:18 to 24:11; Applicant Ex. 8.

³¹ Mr. Johnston's result from using the frustum/pyramid method.

³² Mr. Johnston's result from using the trapezoid method and vertical slice method.

³³ Tr. at 27:7 to 29:19; Applicant Ex. 10.

³⁴ Tr. at 29:20 to 31:8; Applicant Ex. 11.

³⁵ Tr. at 31:9 to 31:25; Applicant Ex. 12.

³⁶ See Applicant Ex. 9.

³⁷ Mr. Johnston use an oil formation volume factor that he obtained from a pressure-volume-temperature analysis for the Alton Unit No. 1-H located in Karnes County. The oil formation volume factor with a bottom hole pressure up in the range of about 8,500 to 8,800 pounds was 1.51, and this is where he came up with the oil formation volume factor that he used in his calculations. Tr. at 34:25 to 35:16, Applicant Ex. 15.

the amount utilizing both EOG's isopach map and BHP's isopach map, and the result is the same—8.5 million barrels.³⁸

Mr. Johnston also performed a volumetric calculation to estimate the recoverable oil in the Unit for just the lower Eagle Ford formation of the Field. The lower Eagle Ford has more favorable porosity and less water saturation. EOG's planned production is to only drill in the lower Eagle Ford. He used a porosity of 10.3 percent and a water saturation of 19.0 percent. He used a thickness of 111 feet.³⁹ These parameters result in 6 million barrels of recoverable oil for the Unit from the lower Eagle Ford formation. He used the same recovery factor of 0.2 or 20 percent.⁴⁰

Mr. Johnston looked at Statewide Rule 38 exception data on the Commission website for the Field in Karnes County. The recovery factors utilized range from 20 to 30 percent, mostly 20 and 25 percent. Mr. Johnston chose a 20 percent recovery factor for his calculations to be conservative because it is on the low end of what other operators are using based on the data he reviewed.⁴¹

2. EOG presented calculations of what EOG anticipates producing from the Unit based on EOG's development plan for the Unit and productivity data of wells in the area.

In addition to performing volumetric calculations, Mr. Johnston calculated an estimated ultimate recovery ("EUR") of what EOG will produce from the Unit based on EOG's planned development of the Unit and well production data from wells in the area. First, Mr. Johnston gathered production and completion data on all the wells in the Field within a five-mile radius of the Well. Then, he performed a decline curve analysis for each of the oil leases.⁴² With that information, he created a scatter graph (plotting ultimate recovery on the Y axis versus drainhole length on the X axis) to evaluate the relationship between drainhole length and ultimate recovery for those wells. Using his scatter graph, he did a linear least squares regression of this data to estimate that the average well within this five-mile area is going to recover 48.9 barrels of oil per foot of completed drainhole length.

In addition to estimating the amount of recovery of oil per foot of drainhole by doing a least square regression, he calculated an estimated recovery based on simple average calculations. He also calculated the sum of all the EURs divided by the sum of all of the drainhole lengths which results in an average of 50.2 barrels of oil per foot of drainhole.⁴³ He also did the same average calculation based on only those wells that offset or are adjacent to the Unit. Adding the EURs for all those wells divided by the sum of all the drainhole lengths, the result is an average recovery of 40.1 barrels of oil per foot.⁴⁴

³⁸ Tr. at 32:2 to 33:15; Applicant Ex. 13.

³⁹ *Id.*

⁴⁰ Tr. at 33:16 to 34:24; Applicant Ex. 14.

⁴¹ Tr. at 35:17 to 37:12; Applicant Ex. 16.

⁴² Tr. at 38:18 to 40:5; Applicant Ex. 17.

⁴³ Tr. at 41:20 to 43:13; Applicant Ex. 19.

⁴⁴ Tr. at 43:17 to 44:17; Applicant Ex. 20R; see also Tr. at 66:8 to 69:14.

Mr. Johnston performed a calculation of the expected performance of the 19 planned wells for the Unit based on his EUR calculations; all of the 19 planned wells for the Unit are going to be drilled in the lower Eagle Ford formation only. First, he used a drainhole recovery of 48.9 barrels per foot based on his least square regression analysis. The resulting total EUR for the Unit is 4,750,900 barrels. To provide alternative calculations, he also calculated the expected recovery amount using 40.1 barrels per foot; the resulting total EUR is 4,023,300 barrels. He also calculated the EUR for the Unit using 50.2 barrels per foot; this results in a EUR of 4,858,400 barrels. He then compared the estimate of the recoverable oil utilizing his volumetric calculation—which included both the upper and lower Eagle Ford—of 8.5 million to the estimated EUR (from his least square regression analysis) of 4.8 million and concluded that because his estimate of the oil that will be recovered by the 19 planned wells on the Unit is approximately 3.5 million barrels less than the volumetric calculation estimate, this equates to a shortfall in the mineral interest owners fair share of oil on the Unit. Mr. Johnston then opined that the exception to Rule 37 is necessary to give EOG a larger portion of this fair share. Mr. Johnston opined that the volumetric estimate represents the lessee's and mineral interest owner's fair share of the hydrocarbons in the Unit.⁴⁵

Using an estimated 50 barrels of recoverable oil per drainhole foot, Mr. Johnston calculated that, if the proposed 840 foot Additional Drainhole is allowed, the estimated incremental oil expected to be recovered will be approximately 42,000 barrels of oil.⁴⁶

Mr. Johnston provided a production decline curve for the two producing wells on the Unit. He did this in anticipation of testimony by BHP's witness, Keith Masters, about the estimated recovery of the producing wells on the Unit. Mr. Johnston opines that a lower hyperbolic exponent is appropriate while Mr. Master opines that a higher hyperbolic exponent is appropriate. Mr. Johnston states that his estimate of barrels per foot is based on two studies—the five-mile radius study involving 410 wells and his analysis of adjacent wells involving about 20 wells—while Mr. Masters' estimates are based on only the two wells on the Unit that are early in their production.⁴⁷

Mr. Johnston concludes that currently recoverable oil in place in the Field of the Unit is roughly the 8.5 million barrels of oil (using his volumetric calculation) minus the 400,000 that has been produced already from the first two wells on the Unit, for a total of 8.1 million barrels. He estimates ultimate recovery from the total 19 wells that EOG plans to drill on this Unit is 4.8 million barrels (based on his EUR calculations). Mr. Johnston claims that the 8.5 million from the volumetric calculation represents the fair share of recoverable hydrocarbons for the Unit. He further asserts because his EUR calculations show a recovery of only 4.8 million barrels from the Unit, EOG faces a shortfall of approximately 3.5 million barrels of its fair share that EOG will not recover. Mr. Johnston opines that this Rule 37 should be approved to allow EOG to recover more of its fair share.⁴⁸

⁴⁵ Tr. at 44:18 to 47:6; Applicant Exs. 21 and 22R; see also Tr. at 66:8 to 69:14.

⁴⁶ Tr. at 47:8 to 47:21; Applicant Ex. 23.

⁴⁷ Tr. at 50:16 to 53:21.

⁴⁸ Tr. at 53:22 to 54:25.

Mr. Ryan Rogers also testified. He is a petroleum engineer at EOG Resources. He has a bachelor's in science and petroleum engineering from Louisiana State University.⁴⁹ All of EOG's wells on the Unit are drilled into the lower Eagle Ford portion of the Field. EOG has drilled upper Eagle Ford wells within the five-mile radius. In general, EOG has seen a 50-percent degradation in performance between the upper and lower Eagle Ford wells. Therefore, EOG is not currently drilling any more upper Eagle Ford wells because they are uneconomic at this time. Even when oil prices were at \$80 per barrel they were not economical for EOG to drill. EOG has no plans to drill in the upper Eagle Ford.⁵⁰ He also testified that EOG uses a 20% recovery factor in Rule 38 exception requests and has done so for internal economic discussions of the wells on the Unit.⁵¹

B. Summary of Protestant's Evidence and Argument

BHP requests that the Rule 37 exception not be granted because the proposed Additional Drainhole encroaches BHP's offsetting leasehold. BHP raises three primary reasons that it believes the exception should be denied: (1) the application is premature because the Unit is underdeveloped and any estimates of recovery are too speculative now; (2) EOG's calculations are based on faulty assumptions; and (3) EOG can recover its fair share without needing a Rule 37 exception.

Protestant's witness was Mr. Keith Brian Masters. He received a bachelor of science in petroleum engineering from the University of Texas in 1980 and a masters in petroleum engineering from Tulane. He also has an MBA in finance from St. Edward's University. Since approximately 1980, he has been employed as a petroleum engineer.⁵²

Mr. Masters testified that BHP has three major concerns. Mr. Masters testified that his primary concern is that the Application is premature. He testified that Mr. Johnston's projections have inherent assumptions and that if the Unit were fully developed first before the Rule 37 exception was requested, there would be more reliable data about the productivity of the Unit. Secondly, he believes the methodology used by Mr. Johnston is inappropriate for a Rule 37 case and Mr. Johnston uses faulty assumptions. Third, he believes that if more reasonable assumptions are used, the revised calculations will show that EOG will get its fair share from the Unit without the need of a Rule 37 exception.⁵³ He testified about each concern in detail.

1. BHP claims EOG's Rule 37 exception request is premature.

Regarding Mr. Master's claim that the Rule 37 application is premature, he testified that the Unit is too underdeveloped to evaluate what the fair share will be using Mr. Johnston's methodology. He testified that only two of the planned 19 wells on the Unit have been completed and questioned if and when any others will be drilled or completed. He said that this underdevelopment creates a problem in evaluating what is going to be produced from the Unit

⁴⁹ Tr. at 178:1 to 178:20.

⁵⁰ Tr. at 178:21 to 180:11.

⁵¹ Tr. at 183:12 to 183:22.

⁵² Tr. at 82:7 to 84:21.

⁵³ Tr. at 85:2 to 86:8.

and whether EOG will ultimately produce its fair share. He testified that the type of analysis that was presented by Mr. Johnston contains key assumptions and reasonable changes in the assumptions can cause the results of the analysis to vary drastically. The two primary assumptions he points to are the recovery factor in the volumetric calculations and the decline curve interpretation of various wells in the area. He opines that the fact that only two out of 19 wells have been completed has a significant impact on the margin of error of the projections made by Mr. Johnson.⁵⁴ He states:

If, on the other hand, we have 19 wells drilled and had enough production history to reliably interpret and project the ultimate recovery from the wells in the unit, that would be one thing but we are completely on the other end of the spectrum in that regard.⁵⁵

He concludes that the margin of error is so substantial rendering Mr. Johnston's calculations unreliably speculative.

2. BHP claims EOG's Rule 37 exception request contains faulty assumptions.

Mr. Masters claims that Mr. Johnston made three primary faulty assumptions, which are: (1) Mr. Johnston relies on a volumetric calculation of the combined upper and lower Eagle Ford instead of treating them separately, (2) he is using a recovery factor of 20 percent in his volumetric calculations which is too high, and (3) his EUR estimates of future production of the Unit are too conservative.⁵⁶

He testified that there are two distinct subdivisions of the Eagle Ford in the area that are well recognized and each has distinctly different petrophysical properties. All of the wells that have been drilled in the immediate area including all the wells on the Unit have been drilled into the lower Eagle Ford. He testified that it is difficult to effectively stimulate the entire Eagle Ford interval across the upper and the lower Eagle Ford, so if you have a well in the lower Eagle Ford, it is going to produce from the lower Eagle Ford and vice versa. He testified that it is inappropriate to compare the volumetric recoverable oil in place in the Unit, based on recovery from the entire Eagle Ford reservoir, to projected recovery from wells drilled into only the lower Eagle Ford. He said a comparison of these two calculations is analogous to comparing "apples and oranges." He provides this as a reason for EOG's alleged 3.5-million-barrel shortfall that Mr. Johnston discussed.⁵⁷

He provided a type log that he testified shows the delineation between the upper Eagle Ford and the lower Eagle Ford. He also testified that there are limits on the height of the fractures that are used and it is unlikely that a well is going to stimulate, effectively, both the upper and lower Eagle Ford. There is a difference in formation between the lower and upper Eagle Ford and they tend to act independently.⁵⁸ He provided photographs of cores that were

⁵⁴ Tr. at 88:1 to 89:8.

⁵⁵ Tr. at 89:4 to 89:8.

⁵⁶ Tr. at 94:22 to 95:11.

⁵⁷ Tr. at 92:9 to 93:11.

⁵⁸ Tr. at 95:12 to 98:4.

taken of a well in the area that shows some of the basic differences between upper and lower Eagle Ford. The deepest core photographs are in the lower Eagle Ford and they are very dark in color reflecting substantial organic matter. The photographs of core become lighter as the photographs move up the core, becoming a much lighter grayish color in the upper Eagle Ford, demonstrating that there are distinct different characteristics between the upper and the lower Eagle Ford.⁵⁹ He also provided excerpts of a transcript with testimony by an EOG expert in which the EOG expert also agrees that there is a subdivision of the lower Eagle Ford versus the upper Eagle Ford and that the lower Eagle Ford is more rich with organic matter than the upper.⁶⁰

He provided a technical paper on Eagle Ford well spacing from Pioneer Natural Resources presented at the Unconventional Resources Technology Conferences held in July 2015 in San Antonio, Texas. The Unconventional Resources Technology Conference was sponsored by the Society of Petroleum Engineers, American Association of Petroleum Geologists, and the Society of Exploration Geophysicists. It is a case study of wells in Karnes County to assess drainage of wells in order to determine spacing. The opinion expressed is that a typical fracture half-length is 350 feet in the direction perpendicular to the wellbore, and that the fracture height is 120 feet, typically. He provided this to demonstrate that when a well is drilled into the lower Eagle Ford, it is going to produce from the lower Eagle Ford and when a well is drilled into the upper Eagle Ford, it is going to produce from the upper.⁶¹

He also disagrees with the recovery factor of 20 percent that Mr. Johnston used in his volumetric calculations; in his opinion 20 percent is too high. He states that 20 percent is a reasonable number for a solution gas drive conventional reservoir, which this is not. He believes consideration needs to be made for the fact that the reservoir is unconventional in that every cubic inch of this reservoir is not effectively fracture stimulated and therefore does not contribute to production, so he thinks it is very unreasonable to expect a 20 percent recovery of the entire bulk reservoir volume as opposed to that part of the reservoir that is stimulated.⁶² He said he did not know why operators have used recovery factors of 20 percent or higher in Statewide Rule 38 exception requests, but stressed the importance of perspective. He believes that because the Rule 38 cases were not protested, there was insufficient scrutiny to heavily rely on those as representative.⁶³ However, the Examiners note it is also plausible that there were no protests because no one believed a recovery factor of 20 percent to be inappropriate.

He provided revised volumetric calculations of recoverable oil for the Unit. He provided one including just the lower Eagle Ford. To accomplish this, he took the log properties from the EOG analysis of the lower Eagle Ford⁶⁴ and used those parameters for the calculation of porosity, water saturation and thickness. He also changed the recovery factor from 20 to 15 percent. He thinks only the lower Eagle Ford should be included at 101 feet of thickness. Using these parameters, he arrives at a recoverable oil calculation of 4,377,540 million barrels. In a second calculation, he considers the entire Eagle Ford with the lower recovery factor of 15

⁵⁹ Tr. at 98:5 to 99:19.

⁶⁰ Tr. at 99:20 to 103:2; Protestant Ex. 4.

⁶¹ Tr. at 103:3 to 107:7.

⁶² Tr. at 93:12 to 94:2.

⁶³ Tr. at 123:1 to 123:23.

⁶⁴ Applicant Ex. 9.

percent to analyze the impact of a lower recovery factor alone. Under that scenario, he estimates 6.4 million barrels of recoverable oil from the Unit.⁶⁵

He testified that the study of five hundred wells to arrive at a correlation between drainhole length and recoverable oil does not take into consideration relevant factors. He notes the broad range on Mr. Johnston's scatter plot indicates a weak correlation between drainhole length and recoverable oil. He states that Mr. Johnston has not considered the way the wells were stimulated, the way they were staged, the way they were spaced or other factors that could affect the EUR from these wells. Mr. Masters also states that there is not sufficient data supporting the calculations and the projections are not reliable.⁶⁶

3. BHP claims EOG's Rule 37 exception request is not necessary for EOG to recover its fair share of recoverable hydrocarbons from the Unit.

Mr. Masters discussed his opinion that EOG's projections of ultimate recovery are too conservative. He estimated the recovery of the two producing wells on the Unit that he believes are the most relevant wells to evaluate since they are on the Unit and in close proximity to the Well. He provided decline curves constructed from daily production data. According to his projections, Well Nos. 1 and 2 on the Unit will have a combined EUR of approximately 1.1 million barrels. He applied a hyperbolic exponent of 1.0 in his analysis. That is a number that he believes to be within the acceptable range that industry practitioners typically use for the Eagle Ford. He surmises that Mr. Johnston used a hyperbolic exponent of approximately .4 to .5, which Mr. Masters believes is too low for an Eagle Ford well. Mr. Masters has evaluated thousands of Eagle Ford wells and believes the industry is utilizing a range of hyperbolic exponents of .9 to 1.2. He claims Mr. Johnston is out of that range, leading to questionable conservative reserve estimates.⁶⁷ He believes Mr. Johnston applied hyperbolic exponents in his EUR calculations that are unrealistically low and the application of a more appropriate hyperbolic exponent leads to a projection of a higher ultimate recovery.⁶⁸

He provided an alternative case for projecting an EUR for the Unit. He utilized Mr. Johnston's projected EUR of 708,000 barrels for the Unit's Well Nos. 1H and 2H and divided that amount by the drainhole length of the two wells to arrive at an estimate of 71.1 barrels per foot of drainhole length. Applying that metric to the planned 19 wells for the Unit results in a EUR for the Unit of 6.6 million barrels of oil.⁶⁹ He then opines that since EOG would be getting 6.6 million barrels of oil from the Unit under this theory, EOG is getting its fair share and no Rule 37 exception is warranted. He did acknowledge that this is one, of other, possible scenarios of the EUR for the Unit.⁷⁰

⁶⁵ Tr. at 116:6 to 122:25; Protestant Exs. 10 and 11.

⁶⁶ Tr. at 124:21 to 127:6.

⁶⁷ Tr. at 127:7 to 137:20; Protestant Exs. 12-14.

⁶⁸ Tr. at 94:3 to 94:21.

⁶⁹ Tr. at 137:21 to 139:4.

⁷⁰ Tr. at 139:5 to 139:17.

He noted that the Field Rules allow stacked laterals and opined that if EOG were to drill additional stacked lateral wells to recover reserves in the upper Eagle Ford, that could be a method for EOG to obtain more of its fair share of reserves.⁷¹

He summarized that the Unit does have the potential for substantial production and there is a range of reasonableness of some of the assumptions in estimating future production. He opined in this case that within that range of reasonableness, one can just as likely conclude that EOG will recover its fair share as that it will not. For that reason, he believes the application is premature and should be denied.⁷² In contrast to the larger amounts of estimated production of the Unit, he claims that the 42,000 potentially unrecoverable amount if the proposed Additional Drainhole is not allowed is “a drop in the bucket.”⁷³

4. BHP discusses the potential for the Well to drain BHP’s adjacent tract.

Mr. Masters discussed the possibility of the Well’s drainage of BHP’s adjacent tract. He used the lease line spacing limit of 330 feet in the Field Rules as the estimated drainage range for the Well. He reasoned that if the drainage range were less, operators in the Field—such as EOG—would request a shorter limit to prevent waste; in his opinion, the fact that 330 feet was established as the minimum limit suggests that 330 feet is the drainage range for the Well. In his opinion, the proper lease line spacing for field rules should be a distance that is shorter than the actual drainage capability of a well; he thinks it is appropriate that there be partial interference between wells that are drilled on opposite lease lines to ensure no waste along the lease line.⁷⁴ Using a 330 foot hypothetical drainage vector, he estimates 3.13 acres of drainage would occur from BHP’s adjacent tract closest to the proposed Well drainhole extension.⁷⁵ He also claims that because the well on the Unit closest to the Well—Well No. 5H—is approximately 225 feet from and parallel to the Well, Well No. 5H will drain some of the area that would be drained by the proposed Additional Drainhole if you assume that the 330 feet spacing limit in the Field Rules represents the drainage area of Well No. 5H.⁷⁶ When pressed on whether Mr. Masters or BHP has an opinion as to whether BHP would be adversely affected by the proposed exception, Mr. Masters answered questions as follows:

- Q. Do you have an opinion, Mr. Masters, that BHP will be adversely affected by this approval?
- A. They believe they will. They've told me that.
- Q. Is it your opinion that they are going to be adversely affected?

⁷¹ Tr. at 109:20 to 112:9.

⁷² Tr. at 145:15 to 145:25.

⁷³ Tr. at 167:6 to 167:7.

⁷⁴ Tr. at 140:20 to 141:25; Protestant Ex. 16 at 1.

⁷⁵ Tr. at 139:18 to 140:19.

⁷⁶ Tr. at 142:1 to 142:15.

- A. I think it's likely there will be some drainage from the BHP acreage. I will say that. As far as quantifying it specifically, we've been hard pressed to say there would be no impact.⁷⁷

VI. Examiners' Analysis and Recommendation

The Examiners recommend granting EOG's application for an exception to the lease line minimum spacing limit such that the Additional Drainhole is allowed as proposed.

Rule 37 authorizes exceptions to prevent waste or prevent confiscation.⁷⁸ In evaluating a Rule 37 case, it is worthwhile to consider that both the rule and much of the case law interpreting the rule contemplate only vertical wells; the rules were not written with horizontal wells in mind.⁷⁹ Given that the entire length of the horizontal drainhole must comply with Rule 37 spacing limitations,⁸⁰ new and challenging spacing issues have developed with the rise in horizontal drilling.⁸¹ This case provides an example of some of the challenges in applying spacing limitations to horizontal wells. While there is extensive case law regarding vertical wells, there is limited case law discussing Rule 37 exceptions for horizontal wells, as the majority of the developed case law in this area predates 1965.⁸² The Examiners' analysis is provided in this context.

A. There is sufficient evidence that the Well is necessary to prevent confiscation.

Applicant claims the Well is necessary to prevent confiscation. The Examiners conclude that the evidence demonstrates that Applicant has met the burden of proof necessary to prove that the Well is necessary to prevent confiscation.

In a confiscation analysis, Applicant must show (1) absent an exception, Applicant will not have an opportunity to recover its fair share of minerals under its tracts from a regular location and (2) the proposed location is reasonable.⁸³ While confiscation principally refers to drainage, that is not the exclusive method of confiscation.⁸⁴ There are several prior proposals for decision considering a situation in which there is a horizontal well proposed requiring a Rule 37 exception, and concluding—assuming the other elements of confiscation are met—a Rule 37 exception is necessary to prevent confiscation.⁸⁵ As stated by the Texas Supreme Court:

⁷⁷ Tr. at 174:18 to 175:1.

⁷⁸ 16 Tex. Admin. Code § 3.37(a)(1).

⁷⁹ See Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* § 9.9 (LexisNexis Matthew Bender 2015).

⁸⁰ 16 Tex. Admin. Code § 3.86(a)(3) and (b); see also Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* § 9.9 (LexisNexis Matthew Bender 2015).

⁸¹ See Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* § 9.9 (LexisNexis Matthew Bender 2015).

⁸² See generally Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* §§ 9.4-9.6 and 9.9 (LexisNexis Matthew Bender 2015).

⁸³ *Gulf Land Co. v. Atlantic Refining Co.*, 131 S.W.2d 73, 80 and 85 (Tex. 1939); see also Tex. R.R. Comm'n, *Discussions of Law, Practice and Procedure* 32-34 (April 1991); see also Vol. 2 Ernest E. Smith and Jacqueline Lang Weaver, *Texas Law of Oil and Gas* §§9.6 (LexisNexis Matthew Bender 2015).

⁸⁴ See *Gulf Land Co. v. Atlantic Refining Co.*, 131 S.W.2d 73, 80 (Tex. 1939).

⁸⁵ See, e.g., *Amended Proposal for Decision*, Rule 37 Case Nos. 0291317, 0292253 and 0292241, Applications of Chesapeake Operating, Inc. for an Exception to Statewide Rule 37 for its TCCD South Unit, Well Nos. 4H, 5H and 6H, Newark, East (Barnett Shale) Field, Tarrant County, Texas (April 7, 2016); *Proposal for Decision*, Rule 37 Case No. 0291096, Application of Chesapeake Operating, Inc. for Rule 37 Exception, Pegasus Lease, Well No. 5H, Newark, East (Barnett Shale) Field.

The term 'confiscation' is a word capable of being used in many senses. . . . It is impossible to give a general definition which can be applied in all instances. . . . As used in Rule 37 and the Rule of May 29th, the term 'confiscation' evidently has reference to depriving the owner or lessee of a fair chance to recover the oil and gas in or under his land, or their equivalents in kin[d]. It is evident that the word refers principally to drainage. . . . It is the law that every owner or lessee of land is entitled to a fair chance to recover the oil and gas in or under his land, or their equivalents in kind. Any denial of such fair chance would be 'confiscation' within the meaning of Rule 37.⁸⁶

Applicant provided evidence of estimated total recoverable reserves for the Unit. While EOG and BHP dispute how much recoverable reserves exist, neither disputes the existence of millions of barrels of recoverable reserves for the Unit. There is also no dispute that recoverable reserves do exist where the Additional Drainhole is to be placed. EOG and BHP provided evidence that there is an expected recovery of approximately between 40.1-70.1 barrels of oil per foot of drainhole. Using 50 barrels per foot, EOG estimates 42,000 barrels of oil recoverable if the 840 foot Additional Drainhole is allowed.

The parties do dispute how much oil will go unrecovered if the Additional Drainhole is not allowed. BHP claims that because the Field Rules spacing limit is 330 feet, 330 feet should be used in this case as the drainage length of the wells in this Unit. BHP's logic is that if the drainage range is less than 330 feet, then a shorter spacing limit would have been adopted. Using a drainage range of 330 feet, BHP claims that EOG's well closest to the Well, Well No. 5H, will drain some of the same area since Well No. 5H is only about 225 feet from the Well. BHP's witness acknowledged he had no evidence of the drainage range and has not studied it.⁸⁷ EOG maintains that it has been drilling wells 225 feet apart in the Unit and if the drainage range were 330 feet, it would have placed the wells 660 feet apart. Using the same estimated 330 feet drainage range from the Field Rules, BHP argues that the Additional Drainhole will drain the reserves under 3.13 acres of BHP's adjacent tract. BHP did not provide any evidence of any BHP planned development of BHP's tract nor did BHP provide any evidence that its existing wells can recover the hydrocarbons that would be recovered by the Additional Drainhole.

While the exact drainage range is unknown, the Examiners find the fact that EOG has actually drilled six wells 225 feet apart compelling evidence of drainage activity in the area other than strict reliance on the Field Rules' spacing limit. Additionally, BHP could not establish significant drainage or harm by the proposed Additional Drainhole. At best, BHP claimed that it was "hard pressed" to say there would be no negative impact to BHP. BHP's witness also testified that in his opinion, it is preferable to have partial interference between wells drilled on opposite lease lines to ensure no waste. There was no evidence of any planned drilling near the Well on BHP's tract and the nearest well is 667 feet away. In sum, there was minimal evidence

Johnson County, Texas (May 22, 2015); *Proposal for Decision*, Rule 37 Case No. 0290915, Application of Chesapeake Operating, Inc. for Rule 37 Exception for its Englermann Lease, Well No. 3H, Newark, East (Barnett Shale) Field, Tarrant County, Texas (April 14, 2015).

⁸⁶ *Gulf Land Co. v. Atlantic Refining Co.*, 131 S.W.2d 73, 80 (Tex. 1939); see also *R.R. Comm'n of Tex. v. Williams*, 356 S.W.2d 131, 136 (Tex. 1961); *R.R. Comm'n of Tex. v. Gulf Production Co.*, 132 S.W.2d 254, 255 (Tex. 1939).

⁸⁷ See, e.g., Tr. at 172:9 to 173:1.

potential of drainage to Protestant’s tract, and even considering that the drainage range could be 330 feet, that does not change the Examiners’ ultimate recommendation in this case.

The parties dispute the amount of the difference in EOG’s volumetric calculation of recoverable oil in the Unit and the Unit EUR based on EOG’s study of well productivity in the area. EOG bases its claim of what its fair share is on the volumetric matrix estimation, and claims that it will only recover the amount estimated based on the well study and EOG’s planned development. EOG claims that because the volumetric estimation is more than EOG’s estimate based on EOG’s planned development, EOG is deprived of its fair share by the difference between the two estimates, which is approximately 3.5 million barrels of oil.

BHP claims that EOG’s assumptions and extrapolations are unreliable. BHP disputes both the volumetric matrix estimate and the estimate based on the planned development and well productivity in the area; BHP claims EOG’s volumetric matrix estimation is too high and the amount based on planned activity and well productivity in the area is too low, thus narrowing the difference between the two numbers resulting in a lower amount. BHP argues that the recovery rate of 20% in EOG’s volumetric matrix estimation is too optimistic and that 15% is reasonable. Also regarding the volumetric matrix estimate, BHP claims that EOG should not include the upper Eagle Ford pay in the analysis because EOG does not actually plan to produce from there; BHP asserts that failure to produce in the upper Eagle Ford is the real cause of EOG’s purported 3.5 million barrel shortfall.

Regarding EOG’s study of nearby wells, BHP performs a similar study of the two producing wells on the Unit. BHP argues that the hyperbolic curve EOG uses in estimating well productivity is not optimistic enough. Thus, BHP’s estimate of total productivity based on EOG’s planned development is higher. BHP also asserts that the actual expected recovery is 6.6 million barrels of oil which means that EOG will obtain its fair share without needing the Additional Drainhole.

It is unclear to the Examiners that a comparison of a volumetric estimate of Unit recoverable hydrocarbons to an EUR estimate based on well production in the area in conjunction with EOG’s planned well development is pertinent in this case. All estimates establish substantial recoverable reserves under the Unit. EOG and the mineral interest owners of the Unit have a right to recover the fair share of reserves under the Unit, including the area under around the proposed Additional Drainhole. The pertinent calculations provided by the parties are provided in the tables below:

Volumetric calculations (expressed in million barrels of oil)

	Volumetric – upper and lower Eagle Ford within the Unit	Volumetric – lower Eagle Ford only within the Unit
EOG-using EOG Isopach Map	8.58	
EOG-using BHP Isopach Map	8.53	
EOG	(see rows above)	6.01
BHP	6.44	4.38

EURs (expressed in million barrels of oil)

	EUR of planned 19 wells on Unit	EUR for two producing wells in unit
EOG-scatter graph analysis/5-mile study (48.9 bbls/ft)	4.75	
EOG- using simple average from adjacent well data (40.1 bbls/ft)	4.02	
EOG- using simple average/5-mile study (5.2 bbls/ft)	4.85	
EOG	(see rows above)	0.71
BHP	6.6	1.1

Lateral recovery per foot of drainhole and total amount recoverable from Additional Drainhole

	Estimate lateral recovery (bbls/ft of drainhole)	Recoverable hydrocarbons from Additional Drainhole (total barrels of oil)
EOG-scatter graph analysis/5-mile study	48.9	
EOG- using simple average from adjacent well data	40.1	
EOG- using simple average/5-mile study	5.2	
BHP	71	
EOG-using 50 bbls/ft		42,000

There is sufficient evidence in the record of substantial recoverable hydrocarbons under the entire Unit, and approximately 42,000 barrels of hydrocarbon would be unrecoverable without the proposed Additional Drainhole. EOG provided a prior Proposal for Decision that was ultimately adopted to show that the Commission has relied on volumetric calculations in the past for Rule 37 cases.⁸⁸ In that case, the examiners did rely on volumetric calculations to establish the recoverable reserves in place and an EUR study to estimate recovery of barrels of oil per drainhole foot; the examiners appear to rely in large part on this information to determine the amount of hydrocarbons that would be unrecoverable and that the applicant would be deprived of its fair share if the exception in that case were not granted. However, the Proposal for Decision does not seem to contain a comparison between volumetric calculations of the entire lease to EUR calculations of the entire lease to demonstrate the existence of a shortfall. The Examiners decline to make that comparison in this case and find there is sufficient evidence of confiscation without need of such a comparison.

One of BHP's primary assertions is that the request for the Rule 37 exception is premature because the Unit has only two producing wells and that EOG's projections of what it

⁸⁸ Applicant Ex. 4; Tex. R.R. Comm'n. *Application of XTO Energy, Inc. for a Rule 37 Exception for the Carter SE Unit, well No. b 2H, Neward, East (Barnett Shale) Field, Tarrant County, Texas*, Rule 37 Case No. 0265718 (Proposal for Decision Oct. 6, 2010).

would recover is based on minimal data and too many subjective assumptions. BHP asserts there is a large margin of error in the calculations due to the wide range of possible interpretations. BHP opines that the entire Unit should be developed and productive before any possible fair share analysis is done. Yet, BHP did not provide one example where the Commission has in the past denied an application as premature. Because the Examiners determine that the variation in estimates is not determinative in this case, the Examiners do not agree that the exception request should be denied as premature. EOG sufficiently proved, and all estimates show, there are significant reserves under the Unit and that if the proposed Additional Drainhole is not allowed, an estimated 42,000 barrels of oil will not be recovered. It is unclear that BHP disputes these basic facts. Whichever party's estimates are utilized, these facts remain true. Moreover, BHP's witness admitted that he performs these types of estimates on undeveloped tracts; these type calculations are not uncommon.⁸⁹ Moreover, the Examiners are reluctant to interfere with and impose in an operator's business determinations as to how, when, and in what order to develop its lease without evidence of a compelling need to do so; such was not given in this case.

Both EOG and BHP provided evidence that horizontal wells that utilize hydraulic fracturing are common in the Field and necessary to produce the Field economically. The Examiners agree that hydraulic fracturing via a horizontal well is necessary to economically produce hydrocarbons in the Unit. The only evidence of a regular well recovering any of the reserves to be recovered by the proposed Additional Drainhole is EOG's claim that EOG's Well No. 5H, which is approximately 225 feet and parallel to the Well will recover some of the area that would be drained by the Additional Drainhole. The Examiners did not find this compelling and conclude that no regular well can recover the reserves expected to be recovered by the proposed Additional Drainhole.

The Examiners find that the proposed well is reasonable. EOG has developed the Unit in a consistent pattern. It has drilled six parallel horizontal wells approximately 220 feet apart, starting parallel and next to the southwest boundary line and moving towards the northeast. It is necessary to drill horizontal wells to produce the Unit economically. Due to the long drainholes of horizontal wells, lease line spacing can become an issue with irregular shaped tracts. In this case, part of the Unit—approximately 1000 feet in the southern part of the Unit—has a meandering creek as the Unit boundary. This portion of the boundary meanders closer to the proposed Additional Drainhole than the 330 feet allowed, such that the Well as currently permitted does not extend to that southern portion of the Unit like the other five wells do. There is no evidence of an estimated amount of hydrocarbons that would be drained from BHP's tract if the exception were allowed. The closest well to the Well is on BHP's tract and is 667 feet from the Well; BHP did not provide any evidence of plan to develop closer to the Well. BHP expressed concern about drainage and BHP's witness stated BHP was "hard pressed to say there would be no impact." However, the potential for drainage seems to be minimal and the Examiners conclude that it is insufficient to warrant the location of the proposed Additional Drainhole unreasonable.

For these reasons, the Examiners conclude allowing the proposed Additional Drainhole is necessary to recover the reserves recoverable by from the proposed Additional Drainhole and

⁸⁹ Tr. at 165:18 to 166:4.

that there is no regular well that would recover these reserves. If unable to produce from the Additional Drainhole, the Applicant and mineral interest owners of the Unit will be deprived of the opportunity to get their fair share of the recoverable reserves from the Unit. The proposed location of the Additional Drainhole is reasonable. The Examiners conclude the evidence demonstrates that the Well is necessary at the proposed location to prevent confiscation.

B. The Examiners recommend granting EOG's application for an exception to the 330-foot minimum lease line spacing distance as proposed.

The Examiners recommend that the Commission grant Applicant's request for a well spacing limit exception to allow the Well to be drilled with the proposed Additional Drainhole as shown on the attached plat,⁹⁰ in the Application and described as follows:

- An amended permit for a new horizontal drill in the Ginobili Unit, Well No. 6H, in the Eagleville (Eagle Ford-2) Field;
- To be drilled at an approximate depth of 11,000 feet;
- Located in the Hernandez, HRS A Survey, Abstract No. 4 in Karnes County, approximately 2.3 miles in a north direction from the town of Panna Maria, Texas;
- Having a surface location 626 feet from the northeast line of the Unit boundary, 210 feet from the southeast line of the Unit boundary, 2,213 feet from the northwest Hernandez, HRS A Survey, Abstract No. 4 line, and 584 feet from the northeast Hernandez, HRS A Survey, Abstract No. 4 line;
- Having a terminus location 30 feet from the northwest line of the Unit boundary, 385 feet from the southwest line of the Unit boundary, 8,877 feet from the northeast M. Lopez Survey, Abstract No. 181 line, and 951 feet from the southeast M. Lopez Survey, Abstract No. 181 line;
- Having a penetration point 129 feet from the northeast line of the Unit boundary and 503 feet from the southeast line of the Unit boundary; and
- Being less than 330 feet from nearest Unit boundary line but not less than 103 foot from Protestant's adjacent tract.⁹¹

VII. Conclusion, proposed findings of fact and proposed conclusions of law

Based on the record in this case and evidence presented, the Examiners recommend that the Application be approved, the requested exception to allow the Additional Drainhole be granted, and that the Commission adopt the following findings of fact and conclusions of law.

FINDINGS OF FACT

1. EOG Resources, Inc. ("EOG" or "Applicant") submitted an application ("Application") for an exception to the 330 foot minimum lease line distance limit for the Ginobili Unit

⁹⁰ Examiners Ex. 1 and Applicant Ex. 3.

⁹¹ See Examiners Exs. 1-3.

("Unit"), Well No. 6H ("Well"), in the Eagleville (Eagle Ford-2) Field ("Field"), Karnes County, Texas.

2. Notice of the Application was sent by mail to the known addresses of the designated operator, all offset operators, all lessees of record for tracts that have no designated operator and all owners of record of unleased mineral interests.
3. The Commission received a protest to the Application by BHP Billiton Pet (TXLA OP) Co. ("Protestant" or "BHP") necessitating a hearing. Protestant is the operator of the tract adjacent to the Unit and closest to the Well.
4. The Notice of Hearing was sent by mail to the known addresses of the designated operator, all offset operators, all lessees of record for tracts that have no designated operator and all owners of record of unleased mineral interests.
5. BHP and EOG appeared at the hearing on this matter.
6. The Application is an amended permit application for a horizontally drilled well that Applicant has already drilled in the Field located in the Hernandez, HRS A Survey, Abstract No. 4 ("Survey") in Karnes County, approximately 2.3 miles in a north direction from the town of Panna Maria, Texas. The well was originally permitted with a horizontal drainhole length of approximately 5800 and no Statewide Rule 37 exception was needed. In the amended permit application, Applicant seeks to add 840 feet to the horizontal drainhole (the "Additional Drainhole") by moving the first take point 840 additional feet toward the heel of the Well. The lease line of the Unit next to the area of this Additional Drainhole is closer than the 330 minimum lease line distance in the Field Rules. The lease line closest to the 840 feet of Additional Drainhole at issue is northwest of the Additional Drainhole and is defined by a meandering creek. Protestant operates the tract on the other side of this lease line.
7. The Well is drilled to an approximate depth of 11,000. The surface location of the Well is 626 feet from the northeast line of the Unit boundary and 210 feet from the southeast line of the Unit boundary; it is 2,213 feet from the northwest line of the Hernandez, HRS A Survey, Abstract No. 4 line and 584 feet from the northeast line of the Hernandez, HRS A Survey, Abstract No. 4 line. The terminus location is 30 feet from the northwest line of the Unit boundary and 385 feet from the southwest line of the Unit boundary; it is 8,877 feet from the northeast M. Lopez Survey, Abstract No. 181 line and 951 feet from the southeast M. Lopez Survey, Abstract No. 181 line. The penetration point is 129 feet from the northeast line of the Unit boundary and 503 feet from the southeast line of the Unit boundary.
8. The Field Rules for the Field include provisions for a 330-foot minimum lease line spacing distance.
9. The Well is the sixth well and most recently drilled well on the Unit. The well spacing between the 6 wells on the Unit is roughly 225 feet between each well. Of the six wells that have been drilled on the Unit, two of the wells have been completed and are

producing; those are Well Nos. 1H and 2H. No portion of Well Nos. 3H, 4H, 5H, or 6H have yet been completed.⁹²

10. Estimates of recoverable reserves from the Unit are between 4.0 and 8.5 million barrels of hydrocarbons. There are substantial recoverable hydrocarbons under the Unit.
11. The proposed Additional Drainhole of the Well is expected to recover approximately 42,000 barrels of hydrocarbons.
12. A horizontal well in this type of shale reservoir is necessary to produce the Unit economically. There is no regular well that would be capable of producing all of the hydrocarbons that the Well is expected to produce at the proposed location if the proposed Additional Drainhole is allowed.
13. The proposed well is reasonable. EOG has developed the Unit in a consistent pattern. It has drilled six parallel horizontal wells approximately 225-250 feet apart, starting parallel and next to the southwest boundary line and moving towards the northeast. It is necessary to drill horizontal wells to produce the Unit economically. Part of the Unit—approximately 1000 feet in the southern part of the Unit—has a meandering creek as the Unit boundary. This portion of the boundary meanders closer to the proposed Additional Drainhole than the 330 feet allowed, such that the Well as currently permitted does not extend to that southern portion of the Unit like the other five wells do. There is no evidence of an estimated amount of hydrocarbons that would be drained from BHP's tract if the exception were allowed. The closest well to the Well is on BHP's tract and is 667 feet from the Well; BHP did not provide any evidence of a plan to develop closer to the Well. The potential for significant drainage of BHP's adjacent tract is minimal and insufficient to warrant the location of the proposed Additional Drainhole unreasonable.
14. If the exception were not granted, hydrocarbons would not be produced and would be unrecoverable. The exception is necessary to prevent confiscation. Additionally, the mineral interest holders in the Unit would not have the opportunity to achieve their fair share of production if the exception is not granted; the exception is necessary to protect correlative rights.

CONCLUSIONS OF LAW

1. Proper notice was issued in accordance with all applicable statutes and regulatory codes. *See* 16 TEX. ADMIN. CODE §§ 3.37(a)(2) and (a)(3), and 1.46.
2. All things have occurred and been accomplished to give the Commission jurisdiction in this matter pursuant to TEX. NAT. RES. CODE ch. 81. *See, e.g.*, TEX. NAT. RES. CODE § 81.051.
3. An exception is needed because the proposed Additional Drainhole is closer than allowed by the Field Rules to an external tract pursuant to Statewide Rule 37, 16 TEX. ADMIN.

⁹² Tr. at 14:4 to 15:16.

CODE § 3.37, and Tex. R.R. Comm'n, *Final Order Amending the Field Rules for the Eagleville (Eagle Ford-2) Field, Dewitt, Karnes, Lavaca, and Live Oak Counties, Texas*, Oil and Gas Docket No. 02-0297221 (March 8, 2016).

4. Applicant has met its burden of proof and satisfied the requirements of Statewide Rule 37. 16 TEX. ADMIN. CODE § 3.37.
5. Granting the Application and approving the requested exception to Statewide Rule 37 is necessary to prevent confiscation and protect correlative rights.

EXAMINERS' RECOMMENDATION

The Examiners recommend that the Commission grant Applicant's application for an exception to Statewide Rule 37 for the proposed Additional Drainhole in the Ginobili Unit, in the Eagleville (Eagle Ford-2) Field in Karnes County, Texas.

The proposed Additional Drainhole location is shown on the attached drilling plat, in the Application and described as follows:

- An amended permit for a new horizontal drill in the Ginobili Unit, Well No. 6H, in the Eagleville (Eagle Ford-2) Field;
- To be drilled at an approximate depth of 11,000 feet;
- Located in the Hernandez, HRS A Survey, Abstract No. 4 in Karnes County, approximately 2.3 miles in a north direction from the town of Panna Maria, Texas;
- Having a surface location 626 feet from the northeast line of the Unit boundary, 210 feet from the southeast line of the Unit boundary, 2,213 feet from the northwest Hernandez, HRS A Survey, Abstract No. 4 line, and 584 feet from the northeast Hernandez, HRS A Survey, Abstract No. 4 line;
- Having a terminus location 30 feet from the northwest line of the Unit boundary, 385 feet from the southwest line of the Unit boundary, 8,877 feet from the northeast M. Lopez Survey, Abstract No. 181 line, and 951 feet from the southeast M. Lopez Survey, Abstract No. 181 line;
- Having a penetration point 129 feet from the northeast line of the Unit boundary and 503 feet from the southeast line of the Unit boundary; and
- Being less than 330 feet from nearest Unit boundary line but not less than 103 foot from Protestant's adjacent tract.

Respectfully,


Jennifer Cook
Administrative Law Judge


Brian Fancher, P.G.
Technical Examiner



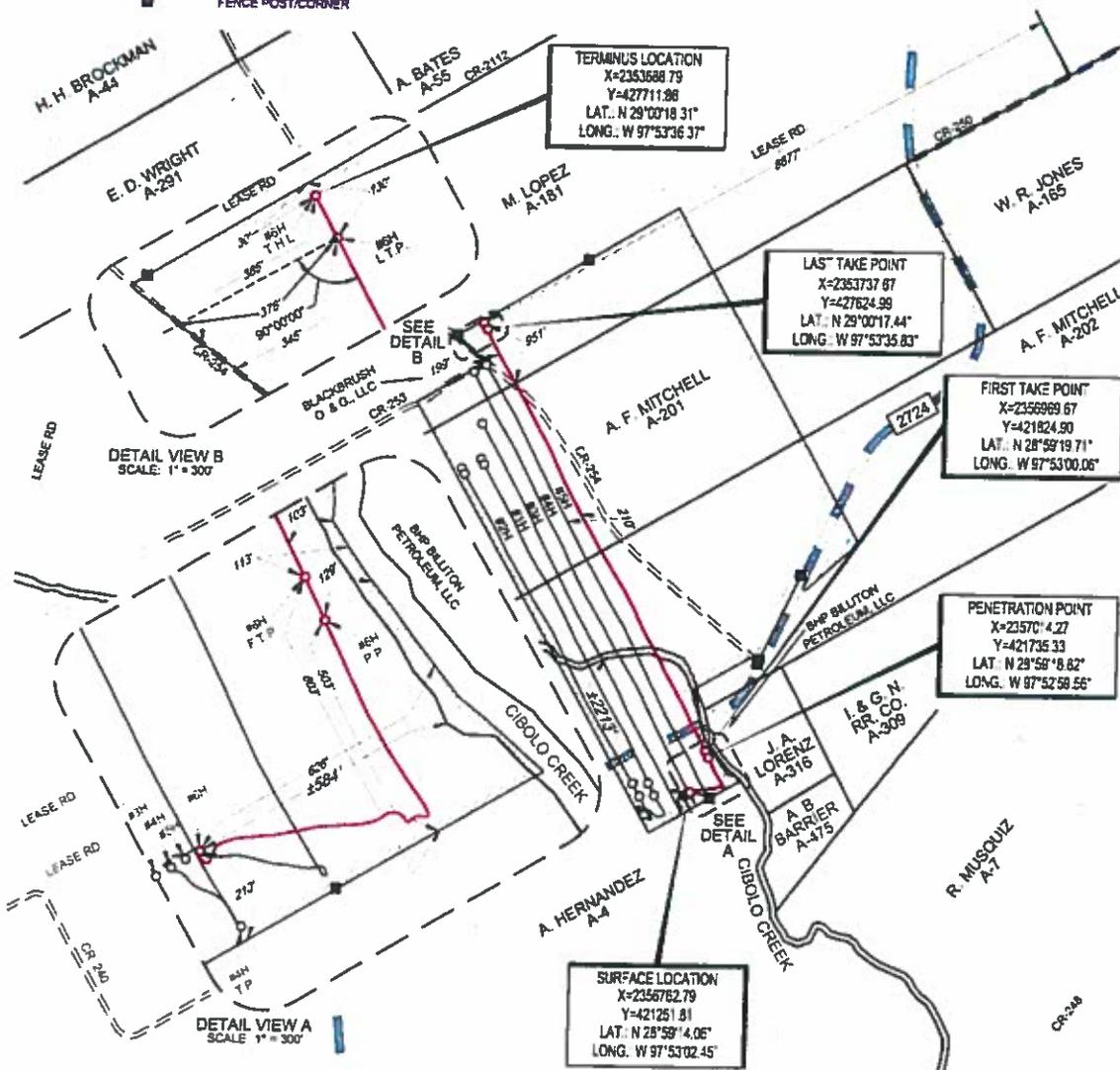
KARNES COUNTY, TEXAS
UNIT/LEASE SURVEY

S.H.L.	207 P&L	A. HERNANDEZ, A-4
	217 P&L	42717 P&L & 42847 P&L
P.P.	127 P&L	A. HERNANDEZ, A-4
	367 P&L	A. HERNANDEZ, A-4
F.T.P.	117 P&L	A. HERNANDEZ, A-4
	367 P&L	A. HERNANDEZ, A-4
L.T.P.	137 P&L	M. LOPEZ, A-181
	343 P&L	M. LOPEZ, A-181
T.H.L.	37 P&L	M. LOPEZ, A-181
	365 P&L	8677 P&L & 8671 P&L

LEGEND

- UNIT/LEASE BOUNDARY
- SURVEY/SECTION LINE
- HIGHWAY
- ROADWAY
- FENCE POST/CORNER

Appendix A



TERMINUS LOCATION
X=2353688.79
Y=427711.86
LAT.: N 29°00'18.31"
LONG.: W 97°53'36.37"

LAS^T TAKE POINT
X=2363737.67
Y=427624.99
LAT.: N 29°00'17.44"
LONG.: W 97°53'35.83"

FIRST TAKE POINT
X=2356969.67
Y=421824.90
LAT.: N 28°59'19.71"
LONG.: W 97°53'00.06"

PENETRATION POINT
X=235701.427
Y=421735.33
LAT.: N 29°58'18.82"
LONG.: W 97°52'58.56"

SURFACE LOCATION
X=2356762.79
Y=421251.81
LAT.: N 28°59'14.06"
LONG.: W 97°53'02.45"

ALL BEARINGS, DISTANCES AND COORDINATE VALUES CONTAINED HEREIN ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE OF THE NORTH AMERICAN DATUM 1983, IN SI UNITS FEET.
ORIGINAL DOCUMENT SIZE 8 5/8" X 14"

SCALE 1" = 200'
1200 2000

THE SURVEYOR HAS REVIEWED THE RECORDS OF THE PUBLIC RECORDS AND HAS FOUND NO RECORDS OF ANY INTEREST IN THE SURVEYED AREA. THE SURVEYOR HAS ALSO REVIEWED THE RECORDS OF THE PUBLIC RECORDS AND HAS FOUND NO RECORDS OF ANY INTEREST IN THE SURVEYED AREA. THE SURVEYOR HAS ALSO REVIEWED THE RECORDS OF THE PUBLIC RECORDS AND HAS FOUND NO RECORDS OF ANY INTEREST IN THE SURVEYED AREA.



LEASE NAME & WELL NO.: GINOBILL UNIT # 6H DATE OF SURVEY: OCTOBER 21, 2015
LOCATED: 42.3 MILES NORTH OF PANNA MARIA, TEXAS GROUND ELEVATION: 287'



CERTIFICATION:

I, PATRICK A. FOX, A REGISTERED PROFESSIONAL LAND SURVEYOR AND AN AUTHORIZED AGENT OF TOPOGRAPHIC LAND SURVEYORS, DO HEREBY CERTIFY THAT THE ABOVE DESCRIBED "PRE-CONSTRUCTION" PROPOSED WELL LOCATION WAS SURVEYED AND STAKED ON THE GROUND AS SHOWN HEREIN.

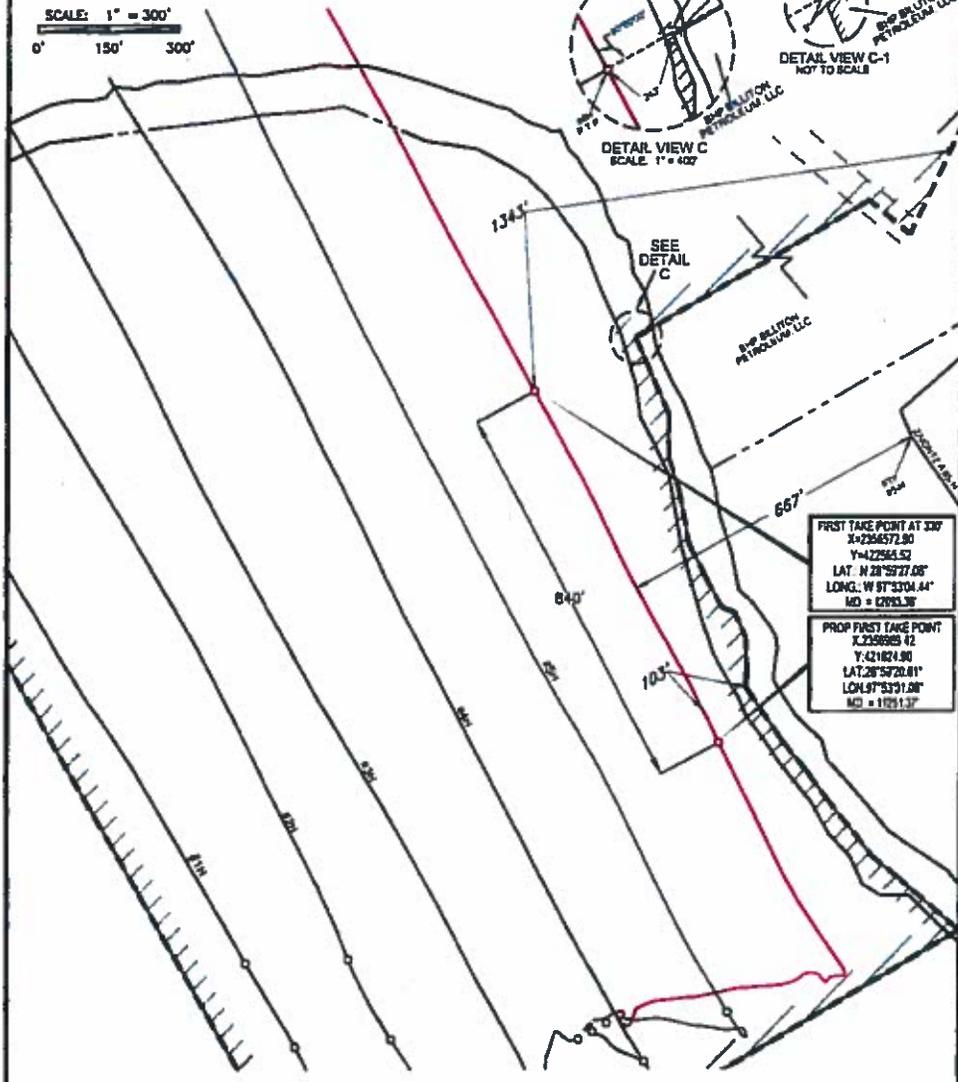
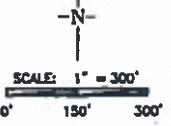
Patrick A. Fox

FILE NAME: GINOBILL UNIT # 6H REV 1
AVF

TEXAS REG NO

5069

PROPOSED SWR 37'
PORTION OF
GINOBILI UNIT #6H



FIRST TAKE POINT AT SWP
X=2266571.90
Y=4225661.52
LAT. N 28°52'27.08"
LONG. W 97°33'04.44"
MO = 02953.38

PROP FIRST TAKE POINT
X=2266571.90
Y=4225661.52
LAT. N 28°52'27.08"
LONG. W 97°33'04.44"
MO = 02953.38

LEGEND

- UNIT/LEASE BOUNDARY
- SURVEY/SECTION LINE
- HIGHWAY
- ROAD WY
- FENCE POST/CORNER

PRELIMINARY. THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE AND SHALL NOT BE USED OR VIEWED OR RELIED UPON AS A FINAL SURVEY DOCUMENT.

Patrick A. Fox, R.P.L.S. No. 5069
SURVEYED ON THE GROUND: OCTOBER 21, 2015
Field note description of even date accompanies this plat.

GINOBILI UNIT #6H	REVISION:	
	INT	DATE
DATE: 02/01/2016		
FILE: GINOBILI UNIT #6H		
DRAWN BY: EBD		
SHEET: 1 OF 1		

NOTES:
1. ORIGINAL DOCUMENT SEE BY 4 W/
2. ALL DISTANCES, DISTANCES AND COORDINATE VALUES CONTAINED HEREIN ARE AND SHALL BE UPON THE TEXAS STATE PLANS COORDINATE SYSTEM
3. ALL DISTANCES, DISTANCES AND COORDINATE VALUES CONTAINED HEREIN ARE AND SHALL BE UPON THE TEXAS STATE PLANS COORDINATE SYSTEM
4. THE SURVEY BOUNDARY HAS BEEN CAREFULLY SURVEYED BY THE SURVEYOR AND IS TRUE AND CORRECT TO THE BEST OF HIS KNOWLEDGE ACCORDING TO THE EVIDENCE OF THIS SURVEY. ORIGINAL SURVEY RECORDS, MAPS, AND OTHER DATA PROVIDED BY EOG RESOURCES, INC. THIS PLAN WAS CREATED FOR THE SOLE PURPOSE OF FILING A PERMIT WITH THE AGRICULTURE COMMISSION OF TEXAS AND SHOULD NOT BE CONSIDERED AS A "BOUNDARY SURVEY" IN COMPLIANCE WITH T.S.A. § 5.08. UNLESS OTHERWISE PROVIDED FOR BOUNDARY SURVEYS, THE OPERATIONS AND RIGHTS AND LIABILITIES TO THOSE PERSONS OR ENTITIES SHOWN ON THE FACE OF THIS PLAN ARE NOT TRANSFERABLE. THIS SURVEY IS CONVEYED FOR THE TRANSMISSION ONLY.

Exhibit No. 7
Docket No. 0298285
Date: April 8, 2016
EOG Resources, Inc.