

west virginia department of environmental protection

Oil and Gas Conservation Commission
601 57th Street, SE Charleston, WV 25304
(304)926-0499, Ext 1656

Earl Ray Tomblin, Governor
Barry K. Lay, Chairman
dep.wv.gov

**BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA**

IN THE MATTER OF THE REQUEST BY NOBLE
ENERGY INC. FOR AN EXCEPTION TO RULE
39CSR1-4.2 REGARDING THE DRILLING OF THE
PROPOSED WELLS IDENTIFIED AS THE MND
20AU, BU, CU, AND DU TO BE LOCATED IN
CLAY DISTRICT, MARSHALL COUNTY, WEST
VIRGINIA.

DOCKET NO. 236
CAUSE NO. 226
ORDER NO. 1

REPORT OF THE COMMISSION

This cause came before the Commission on October 28, 2015, at the Department of Environmental Protection, Charleston, West Virginia, after giving notice as required by law, at the request of Noble Energy, Inc. ("Noble"), on the previously filed applications seeking approval for an exception to the deep well spacing requirements set forth W. Va. C.S.R. § 39-1-4.2 for the drilling of four proposed deep wells, identified as MND20 AU (API# 47-051-01867), MND20 BU (API# 047-051-01868), MND20 CU (API# 047-051-01869) and MND20 DU (API# 047-051-01870), from a common well pad. Noble proposes to drill each of those wells within 3,000 feet of each other and within 3,000 feet of Noble's MND6 HUHS (API# 047-051-01732) deep well, and has requested approval from the Commission for a variance pursuant to W. Va. C.S.R. § 39-1-4.3. There being a quorum of the Commission present, a hearing was commenced. Present for Noble were Brian Leonhard, Theodore Romig, Dolores Swiger and Robert Benyo,

Promoting a healthy environment.

and Noble's counsel, Kenneth E. Tawney of Jackson Kelly PLLC. No opposing or noticed parties entered an appearance at the hearing.

The Commission heard testimony from three witnesses, Brian Leonhard, Theodore Romig and Robert Benyo. Their testimony and response to questions by members of the Commission included the reasoning for spacing the four wells within 3,000 feet of each other and three of the four wells within 3,000 feet of another deep well — Noble's MND6 HUHS well; characteristics of the Point Pleasant formation in which the four wells will be drilled; discussion of existing coring data from other Point Pleasant wells in the area; expected pressures; comparison of horizontal drilling of multiple wells from a single well compared to vertical wells; and discussion of unit size, leasing information and compliance with setback distances and unit boundaries; and the necessity of drilling horizontal wells in the target formation closer together than 3,000 feet. Documents submitted as exhibits, including specifically Noble's permit applications for the four wells, established that Noble has submitted all the necessary statutory information for a deep well permit, including proof that all requisite notices were provided. Noble also submitted a plat showing the proposed MND20 well pad, the horizontal well bore paths for and lengths of the subject four wells, the unit boundaries, distances between wells, distances to unit boundaries, and distances from the MND6 HUHS well.

Following the witness testimony, there being no other witnesses or interested parties present, the Commission adjourned for an executive session. Following the executive session, a member of the Commission made a motion to grant Noble's variance request to allow drilling of the four wells within 3,000 feet of one another and within 3,000 feet of the MND6 HUHS well. The motion was properly seconded and a vote was taken without objection. The motion passed by unanimous vote and Noble's request was granted. Thereupon, the Commission made the following Findings of Fact and Conclusions of Law:

FINDINGS OF FACT

1. Members of the Commission present at the hearing were Barry Lay, Chair, Robert Radabaugh, and Anthony Gum. Greg Foster, Counsel to the Commission, and Cindy Raines were also present.

2. Noble is an operator with the meaning of paragraph (4) subsection (a) of West Virginia Code § 22C-9-2.

3. Noble proposes to drill the MND20 AU, MND20 BU, MND20 CU and MND20 DU wells into the Point Pleasant formation, making these wells deep wells as defined by West Virginia Code § 22C-9-2.

4. The proposed location of the MND20 AU, MND20 BU, MND20 CU and MND20 DU wells are within 3,000 feet of each other. The MND20 AU, MND20 BU and MND20 CU wells are within 3,000 feet of the MND6 HUHS well. Thus, a variance to W. Va. C.S.R. § 39-1-4.2 is required.

5. There were no objections by any noticed parties.

6. A motion to grant Noble's spacing variance request was made and seconded.

7. The motion passed by unanimous vote of the Commission.

CONCLUSIONS OF LAW

1. W. Va. C.S.R. § 39-1-4.2 requires that all deep wells drilled shall be not less than 3,000 feet from a permitted deep well location and that W. Va. C.S.R. § 39-1-4.3 allows for an exception to that requirement upon notice and a hearing.

2. Due notice of time, place and purpose of the hearing has been given in all respects as required by law.

3. Pursuant to Chapter 22C, Article 9, of the West Virginia Code, as amended, the Commission has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order. A quorum of the Commission was present at the hearing.

4. In order to grant the well work permits for the proposed MND20 AU, MND20 BU, MND20 CU and MND20 DU wells, a spacing variance is required pursuant to W. Va. C.S.R. § 39-1-4.2.

5. The requested spacing variance and location of (a) the MND20 AU, MND20 BU, MND20 CU and MND20 DU wells within 3,000 feet of each other and (b) the MND20 AU, MND20 BU and MND20 CU wells within 3,000 feet of the MND6 HUHS well, is necessary to promote the efficient development of oil and gas resources, prohibit waste, and encourage the maximum recovery of oil and gas resources. See W. Va. Code § 22C-9-1.

ORDER

Upon presentation of evidence at a hearing before the West Virginia Oil and Gas Conservation Commission on October 28, 2015, and based upon the Findings of Fact and Conclusions of Law contained herein, the Commission hereby grants a variance from the requirement in W. Va. C.S.R. § 39-1-4.2 that states in relevant part, "each deep well drilled shall be not less than 3,000 feet from a permitted deep well location" The spacing variance granted hereby applies only to the MND20 AU (API# 047-051-01867), MND20 BU (API# 047-051-01868), MND20 CU (API# 047-051-01869) and MND20 DU (API# 047-051-01870) wells and permits Noble to drill those wells no less than 1,000 feet of each other and to drill the MND20 AU, MND20 BU and MND20 CU wells no less than 1,000 feet of an existing deep well — Noble's MND6 HUHS well (API# 047-051-01732). Within 90 days of the respective completion of each of the four wells, Noble is hereby directed to provide well records and

drilling logs to the West Virginia Department of Environmental Protection, Oil and Gas Conservation Commission.

IT IS SO ORDERED.

IN THE NAME OF THE STATE OF WEST VIRGINIA

OIL AND GAS CONSERVATION
COMMISSION OF THE STATE OF WEST
VIRGINIA

By: Barry K. Lay
Barry K. Lay, Chairman

Dated this 2nd day of November, 2015, at Charleston, West Virginia

Raines, Cindy J

From: Greg S. Foster <Greg.S.Foster@wvago.gov>
Sent: Thursday, October 29, 2015 9:29 AM
To: Raines, Cindy J
Subject: FW: Report of the Commission - Noble Energy Docket No. 236, Cause 226
Attachments: Report of the Commission 4821-9528-3242 v.1-c1.docx

Cindy, the only language I question is that he says "within 1000 feet". I thought the commission meant to allow a spacing of 1000 feet, not less.

Greg S. Foster
Assistant Attorney General
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Charleston, West Virginia 25301
PH: (681) 313-4534
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Greg.S.Foster@wvago.gov

From: Tawney, Kenneth [<mailto:ktawney@jacksonkelly.com>]
Sent: Wednesday, October 28, 2015 1:58 PM
To: Cindy.J.Raines@wv.gov; Greg S. Foster
Cc: Dee Swiger - Noble Energy, Inc. (dswiger@nblenergy.com)
Subject: Report of the Commission - Noble Energy Docket No. 236, Cause 226

Pursuant to our conversation at the conclusion of this morning's hearing, I am attaching the draft report of the commission meeting and order granting the requested relief. Compared to the draft I handed you earlier, I corrected the attendees and revised the ordering paragraph to say that the wells could be drilled within 1,000 feet of each other to be consistent with Mr. Radabaugh's motion (instead of saying that the wells could be drilled closer than 3,000 feet apart).

If there are any other revisions that you would like me to make, please let me know. Thank you for your assistance.

Kenneth E. Tawney
Member | **Jackson Kelly PLLC**
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Office: (304) 340-1189 | Mobile: (304) 553-5203 | Fax: (304) 340-1080 | ktawney@JacksonKelly.com | [V-card](#) | **BIO**

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BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA

DOCKET NO. 236
CAUSE NO. 226

IN THE MATTER OF THE REQUEST BY NOBLE ENERGY, INC.
FOR AN EXCEPTION TO RULE 39 CSR-1-4.2 REGARDING THE
DRILLING OF THE PROPOSED WELLS IDENTIFIED AS THE
MND 20 AU, BU, CU, AND DU TO BE LOCATED IN CLAY
DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.

Transcript of hearing had on the
28th day of October , 2015, at 10:05 a.m., at the
West Virginia Department of Environmental
Protection, located at 601 57th Street, SE,
Charleston, West Virginia, pursuant to the notice.

 ORIGINAL

Wendy M. Thomas
Certified Court Reporter

399 Blue Lick Road
Winfield, West Virginia 25213
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BEFORE :

BARRY K. LAY, CHAIRMAN
BOB RADABAUGH, COMMISSIONER
ANTHONY GUM, COMMISSIONER

CINDY RAINES, STAFF

GREG S. FOSTER
Assistant Attorney General
Division of Arts & Education

APPEARANCES :ON BEHALF OF NOBLE ENERGY, INC.:

KENNETH E. TAWNEY, ESQUIRE
Jackson Kelly, PLLC
500 Lees Street, East, Suite 1600
Charleston, West Virginia 25301-3202

Also Present:

Dee Swiger, Regulatory Analyst with Noble
Brian Leonhard, Operations Landman
Rob Benyo, Well Engineering & Well Execution Manager
for Noble
Ted Romig, Geologist for Noble Energy

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WITNESS

Brian Leonhard

Ted Romig

Rob Benyo

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1 CHAIRMAN LAY: Before the Oil and Gas
2 Conservation Commission of the State of West Virginia, in
3 the matter of the request by Noble Energy, Incorporated,
4 for an exception to Rule 39 CSR 1-4.2 regarding the
5 drilling of the proposed wells identified as the MND 20 AU,
6 BU, CU, and DU to be located in Clay District, Marshall
7 County, West Virginia. This is Docket Number 236. Cause
8 Number 226. Let the record show that present are members
9 of the Commission, Anthony Gum, Robert Radabaugh, and Barry
10 Lay. Also present are Greg Foster, Counsel, and Cindy
11 Raines of staff. I would like to place of record as
12 exhibits to the Commission, Exhibit 1, a copy of the Notice
13 of Hearing, along with the Certified Mail Receipts.

14 (WHEREUPON, Exhibit No. 1 was
15 marked for identification.)

16 CHAIRMAN LAY: Exhibit 2 is a copy of the Notice
17 of Hearing on the Secretary of State's website.

18 (WHEREUPON, Exhibit No. 2 was
19 marked for identification.)

20 CHAIRMAN LAY: Exhibit 3 is a copy of the Class
21 II legal advertisement in the Moundsville Newspaper, the
22 Daily Echo.

23 (WHEREUPON, Exhibit No. 3 was
24 marked for identification.)

1 CHAIRMAN LAY: Exhibit 4, copies of the pertinent
2 information from the applications in their entirety to the
3 proposed four wells.

4 (WHEREUPON, Exhibit No. 4 was
5 marked for identification.)

6 CHAIRMAN LAY: And Exhibit 5 is an exhibit
7 showing the outline of the proposed unit and the wells, and
8 their relationship to themselves and an existing well.

9 (WHEREUPON, Exhibit No. 5 was
10 marked for identification.)

11 CHAIRMAN LAY: At this time the Commission will
12 take appearances.

13 MR. TAWNEY: Kenneth Tawney, counsel for Noble,
14 with the law firm of Jackson Kelly, PLLC.

15 MS. SWIGER: Dee Swiger, Regulatory Analyst with
16 Noble.

17 MR. LEONHARD: Brian Leonhard, Operations
18 Landman.

19 MR. BENYO: Rob Benyo, Well Engineering & Well
20 Execution Manager for Noble.

21 MR. ROMIG: Ted Romig, Geologist for Noble
22 Energy.

23 CHAIRMAN LAY: Any housekeeping issues, Mr.
24 Tawney?

1 MR. TAWNEY: None. If I may, though, if I could
2 just see what you identified as Exhibit 5, because I think
3 it's the same exhibit that we're going to talk about.

4 (Examines document.) And it is, so that's good.

5 CHAIRMAN LAY: Okay. If that's all the
6 housekeeping issues, you can call your first witness.

7 MR. TAWNEY: We would like to call Brian
8 Leonhard.

9 CHAIRMAN LAY: Please take the stand. Court
10 reporter, please swear him in.

11 (Witness sworn.)

12 WHEREUPON,

13 **BRIAN LEONHARD,**

14 was called as a witness and, after being duly sworn,
15 testified as follows:

16 DIRECT EXAMINATION

17 BY MR. TAWNEY:

18 Q. Would you state your full name, please?

19 A. Brian Leonhard.

20 Q. And where do you live?

21 A. Canonsburg, Pennsylvania.

22 Q. By whom are you employed?

23 A. Noble Energy.

24 Q. What is your job title?

1 A. I'm an Operations Landman.

2 Q. What are your duties as an operations landman?

3 A. Land acquisition and title work for individual
4 drilling units for Noble Energy.

5 Q. What is your educational background?

6 A. I have my Bachelor's Degree in Business
7 Administration from Westminster College in Pennsylvania.
8 I'm currently working on my Master's in Energy Business
9 through the University of Tulsa.

10 Q. And how long have you worked for Noble?

11 A. Three years.

12 Q. And by way of background, where does Noble
13 operate in West Virginia?

14 A. My particular area is Marshall County, but we
15 also have operations in Tyler, Doddridge, Pleasant and
16 Gilmore counties.

17 Q. And Ritchie?

18 A. And Ritchie, yes. I'm sorry.

19 Q. And how many horizontal Marcellus wells has Noble
20 drilled?

21 A. Two hundred and twenty two.

22 Q. How many are producing?

23 A. One hundred and sixty seven.

24 Q. Has Noble drilled any wells to the Point Pleasant

1 formation?

2 A. Yes.

3 Q. How many?

4 A. One.

5 Q. Okay. Can you identify that well?

6 A. That's the MND 6 HU.

7 Q. And is -- well, we'll get to that in a minute.

8 Are you familiar with Noble's MND 20 well pad and the MND
9 20 AU, BU, CU, and DU wells that Noble plans to drill from
10 that pad?

11 A. Yes, sir.

12 Q. The plat has already been marked as Exhibit 5.

13 Does everyone have a copy?

14 (WHEREUPON, a discussion was

15 had off record.)

16 BY MR. TAWNEY:

17 Q. Referring to Exhibit 5, what is it?

18 A. This is our plat of the proposed MND 20 unit
19 boundary, showing all four wells off of the same pad, and
20 its relation to our MND 6 HU well.

21 Q. Has Noble obtained 100 percent of the leases or
22 oil and gas ownership interests for the MND 20 unit?

23 A. Yes.

24 Q. And you have pooling rights for all the tracts in

1 this unit?

2 A. Correct. This is a voluntary unit.

3 Q. So we're not here to request any mandatory
4 pooling orders from the Commission?

5 A. No, sir.

6 Q. Now, can you point out the well pad location on
7 Exhibit 5?

8 A. The red dot on the northeast corner of the unit
9 plat.

10 Q. It's shown as MND 20?

11 A. Correct.

12 Q. And are the horizontal well bore pads shown on
13 the map?

14 A. Yes.

15 Q. What are they?

16 A. We have the MND 20 AU, BU, CU, and DU horizontal
17 well bores.

18 Q. And are the outside wells at least 400 feet from
19 the unit boundary?

20 A. Yes.

21 Q. And the toe of the wells are at least 400 feet
22 from the boundary of the unit?

23 A. Yes.

24 Q. And even at the, we'll call it the northwestern

1 boundary line, those are also 400 feet from the unit
2 boundary?

3 A. Yes.

4 Q. Now, you talked about the MND 6 HU well. Is that
5 commonly referred to as the Moundsville 6 well?

6 A. It is.

7 Q. And is it shown on this plat?

8 A. Yes.

9 Q. Where is it?

10 A. To the southwest of the proposed MND 20 unit.

11 Q. So what is marked in red is the MND 6, is the
12 well pad and location of that well?

13 A. Yes.

14 Q. Is there only one well drilled to the Point
15 Pleasant formation from that pad?

16 A. Yes.

17 Q. Are there other wells on that pad?

18 A. There are Marcellus wells on that pad.

19 Q. So is the well bore of the Moundsville 6 well
20 shown, the path of the well bore?

21 A. Yes.

22 Q. And that is the green line running from the MND 6
23 well pad?

24 A. Yes.

1 Q. I also see distances on the plat after the well
2 designations. What does that represent?

3 A. That represents the spacing between the proposed
4 well paths, so 1,000 feet in between each.

5 Q. And is Noble proposing to drill these wells 1,000
6 feet apart?

7 A. Yes.

8 Q. And there's also a distance shown between MND 20
9 AU and the Moundsville 6. Is Noble proposing to drill the
10 MND 20 AU well 1,000 feet from the Moundsville 6 lateral?

11 A. Yes.

12 Q. Would the BU well be within 3,000 feet of the
13 Moundsville 6?

14 A. Yes.

15 Q. It would be 2,000 feet?

16 A. Two thousand feet.

17 Q. And the CU well would be right at 3,000 feet from
18 the Moundsville 6?

19 A. Correct.

20 Q. And then the lateral distances are also reflected
21 on the map after the well name?

22 A. They are.

23 Q. And I can't recall if I asked you this or not,
24 but is the Moundsville 6 well completed to the Point

1 Pleasant formation?

2 A. Yes.

3 Q. Are there any other Point Pleasant wells within
4 two miles of any of the proposed wells or the existing
5 Moundsville 6 well?

6 A. Not that I'm aware of, or any that are of record.

7 Q. And Noble is requesting an exception to the 3,000
8 foot spacing requirements set forth in the regulations to
9 allow the AU, BU, CU, and DU wells to be drilled within
10 3,000 feet of one another, in fact, 1,000 feet apart?

11 A. Yes.

12 Q. And it's also asking for an exception to allow
13 the drilling of the AU, BU, and CU wells within 3,000 feet
14 of the Moundsville 6 well?

15 A. Yes.

16 Q. How much surface acreage will be covered by the
17 well pad?

18 A. As it's laid out here, the well pad itself will
19 occupy 9.7 acres, and the access road will cover 7.7 acres.

20 Q. Does Noble have a surface use and consent
21 easement?

22 A. Yes.

23 Q. And, for the record, the surface use easement is
24 included in the well permit application. Has Noble

1 determined the acreage that could be drained from each of
2 the MND 20 wells?

3 A. We estimate it's approximately 186 acres per
4 well.

5 Q. And is that based on an average lateral length of
6 approximately 8,100 feet?

7 A. Yes, I believe so.

8 Q. Has Noble modeled the drainage acreage that a
9 hydraulically fractured vertical well in to the Point
10 Pleasant would drain?

11 A. Yes, we think it's roughly in the range of seven
12 to twelve acres per vertical well.

13 Q. So how many vertical wells would be required to
14 drain the acreage in the MND 20 unit?

15 A. Somewhere around 112 vertical wells.

16 Q. Can you estimate how much surface acreage would
17 be required to drill 112 vertical wells?

18 A. Yes, it would be anywhere between five and ten
19 acres per well pad. And it could be in the range of five
20 to ten acres for each access road, as well, for each of
21 those 112.

22 Q. In your opinion, would it be feasible to drill
23 112 vertical wells to develop the Point Pleasant formation
24 from the unit area?

1 A. No, sir.

2 Q. Would drilling four horizontal wells from four
3 different well pads have the same surface use impact and
4 requiring about four times as much acreage?

5 A. Yes, yeah, it would include additional surface
6 acreage.

7 Q. So given the economies of scale, the best thing
8 to do is drill four horizontal wells from the MND 20 well
9 pad?

10 A. Yes.

11 Q. Does that ultimately translate into cost savings
12 for customers?

13 A. I believe so, yes. It may be uneconomic for
14 Noble to drill these four individual wells off of four
15 individual pads, so we would not be providing any
16 additional gas supplied to the market, keeping prices lower
17 for consumers.

18 Q. And have natural gas prices come down
19 considerably since 2008, when the horizontal drilling
20 began?

21 A. Yes.

22 Q. Can you compare the environmental impacts of
23 drilling four horizontal wells from four different pads, as
24 compared to drilling the four wells from the same pad?

1 these proposed wells. Did you perform those calculations
2 and determine what the going radius was?

3 A. Not myself, no. I think Mr. Benyo would be
4 better suited to answer that.

5 Q. Okay. So he provided you the information to do
6 your land calculations?

7 A. Yes, sir.

8 Q. Okay. That was my question.

9 A. Okay.

10 CHAIRMAN LAY: Any other questions?

11 COMMISSION RADABAUGH: Not at this time.

12 CHAIRMAN LAY: Okay. Thank you. That's all I
13 have. The witness can be excused.

14 THE WITNESS: Thank you.

15 (Witness stands aside.)

16 MR. TAWNEY: Theodor Romig.

17 CHAIRMAN LAY: Is it Romey?

18 MR. TAWNEY: Romig. R-o-m-i-g.

19 (Witness sworn.)

20 WHEREUPON,

21 **THEODORE ROMIG,**

22 was called as a witness and, after being duly sworn,
23 testified as follows:

24 DIRECT EXAMINATION

1 BY MR. TAWNEY:

2 Q. Would you state your full name, please?

3 A. Yes. Theodore Romig.

4 Q. Where do you live?

5 A. Hempstead, Texas.

6 Q. By whom are you employed?

7 A. Noble Energy.

8 Q. What is your job title?

9 A. Geologist.

10 Q. And what do you do as a geologist for Noble?

11 A. Exploration and development in the Appalachian
12 Basin, particularly the Marcellus and the Utica.

13 Q. How many years have you worked as a geologist for
14 Noble?

15 A. Nineteen years.

16 Q. What was your job experience prior to that?

17 A. I graduated from the University of Akron in 1977,
18 started off with a mud logging company, worked with the
19 logging company for two years. After that process, Seismic
20 Data for Western Geophysical for about a year, then took my
21 first job with an independent oil and gas company in
22 Houston. I worked for three different oil and gas
23 companies in Houston before hiring on with Noble Energy 19
24 years ago.

1 Q. Let's talk a little bit about the Moundsville 6
2 well, to begin. Now, that well has already been drilled?

3 A. That's correct. That well was drilled in
4 December 2014, and TD'd -- we drilled a pilot, okay, and it
5 drilled to 10,770 feet. We ran a full suite of logs with
6 an image log and cut 173 foot of core in that well. We
7 then plugged back and drilled the lateral, which is shown
8 on your plat there, over 9,000 foot lateral. And that well
9 TD'd at 20,309 feet, and it TD'd in February of 2015.

10 Q. And in what formation was it completed?

11 A. It was completed in the Point Pleasant.

12 Q. Is it in production yet?

13 A. It is not. It has been completed and we are
14 expecting it to be turned into line the first of next week.

15 Q. What's the target formation for the four wells
16 that you propose to drill on the MND 20 unit?

17 A. They are the Point Pleasant.

18 Q. So the same formation as the Moundsville 6 well?

19 A. (Nods affirmatively.) That is correct.

20 Q. So let's talk about the geological
21 characteristics of the Point Pleasant formation. What is
22 the thickness?

23 A. The thickness that we found at our Moundsville 6
24 well was 120 feet. We expect that thickness to be about

1 the same at the proposed Moundsville 20 pad.

2 Q. Can you describe the nature of the shale in Point
3 Pleasant?

4 A. Uh-huh. We call the Point Pleasant a calcareous
5 organic shale. It sits right on top of the Trenton line,
6 okay, and it's right underneath the Utica shale. It's an
7 interesting formation in that it has characteristics of
8 both the Trenton, the carbonate from the Trenton, and it
9 has the shale characteristic from the overlying Utica. And
10 so what it is is, it's an interbedded calcareous shale
11 throughout the entire section. You're going from a shallow
12 water formation to a deeper water formation at the Utica.

13 Q. Tell me what TOC means.

14 A. TOC is the total organic carbon found in the
15 rock.

16 Q. What is the TOC content of the Point Pleasant?

17 A. Okay. The TOC that we found in the Point
18 Pleasant core that we took in the Moundsville 6 well, it
19 averaged about three percent. Now, we found streaks of a
20 higher TOC scattered throughout that 120 feet. Some as
21 high as four percent. But when you took everything and put
22 it together, it averaged about three percent.

23 Q. What is the porosity that you experienced in
24 Point Pleasant?

1 A. Okay. We cored the entire Point Pleasant
2 interval, and the range of porosities that we found in the
3 120 feet ranged from six to eleven percent, with an average
4 of about nine percent porosity.

5 CHAIRMAN LAY: You said six to eleven?

6 THE WITNESS: Six to eleven. That's correct.

7 BY MR. TAWNEY:

8 Q. What is the permeability that you have found?

9 A. The permeability that we found ranged from 250
10 nano-darcies to about 500 nano-darcies. Quite low.

11 Q. Now, put that in perspective. Is that -- well,
12 first of all, just tell me what permeability means.

13 A. Permeability are the pathways that you find in
14 the rock, okay, that the oil or the gas can travel through
15 to the well bore. Okay. Since it's so low, those pathways
16 are very small and some of them aren't connected. Okay.
17 And that's what permeability is. So it's those pathways
18 that allow the hydrocarbon to flow through the rock.

19 Q. So how would you measure the permeability in a
20 limestone, would that be measured in nano-darcies?

21 A. A limestone other than the Point Pleasant?

22 Q. Yes.

23 A. You would probably measure it in micro-darcies or
24 darcies.

1 Q. And so nano-darcies is much tighter?

2 A. That's correct.

3 Q. The less permeability?

4 A. Correct. And that's what makes it -- that's why
5 we call it an unconventional resource.

6 Q. Has Noble compared these preliminary formation
7 evaluation results with other preliminary results?

8 A. We have. What we've done is, you know, the well
9 that we've drilled at Moundsville 6, we've taken that data
10 and we've traded it with other companies in order to, you
11 know, enlarge our database, so we have a better idea of
12 what the Point Pleasant is going to look like in this area.
13 So what we've done is, we've traded with several companies.
14 That's all covered under a confidentiality agreement, and
15 so we were able to compare our results with theirs, and
16 they're very comparable.

17 Q. So were those results taken in the general area
18 of the MND 20 unit?

19 A. That's correct. In Marshall County and Wetzel
20 County.

21 Q. Do you have any information on the core pressure
22 or the reservoir pressure of the Point Pleasant, in that
23 area?

24 A. Yes. The pressure gradient that we have in our

1 Moundsville 6 well is a .9, and we're expecting a pressure
2 gradient very similar to that in the Moundsville 20 pad.

3 Q. In your estimation, could the Point Pleasant
4 formation be economically produced without stimulation?

5 A. No, sir.

6 Q. And why is that?

7 A. Just what we were talking about, the permeability
8 just does not allow the hydrocarbon to flow through the
9 rock if it is not stimulated.

10 Q. So your --

11 A. Those pathways just aren't there.

12 Q. In your opinion, is hydraulically fracturing the
13 wells necessary in order to get them to produce in paying
14 quantities?

15 A. That is correct.

16 Q. What, in your opinion, is the optimal spacing for
17 a well in the Point Pleasant shale or Point Pleasant
18 formation in Marshall County?

19 A. Based on our analysis of the data that we've
20 collected at the Moundsville 6 well and the data that we
21 have traded for, we believe that to be a thousand feet.

22 Q. And is that data going to be further discussed by
23 Mr. Benyo?

24 A. It is.

1 Q. And you have proposed to drill the AU, BU, CU,
2 and DU wells a thousand feet apart and also the MND 20 AU
3 would be drilled a thousand feet from the Moundsville 6
4 well?

5 A. That's correct.

6 MR. TAWNEY: That's all the questions I have of
7 this witness. If the Commission has any questions?

8 CHAIRMAN LAY: Any questions?

9 **EXAMINATION**

10 BY CHAIRMAN LAY:

11 Q. I just have one. You said that in your analysis
12 for the well spacing, you said you believe the well spacing
13 should be a thousand feet?

14 A. Correct.

15 Q. Would you clarify that? Do you mean a thousand
16 foot radii or a thousand foot diameter between wells?

17 A. A thousand feet between two parallel wells
18 drilled laterally.

19 Q. So, therefore, your drainage radius actually is
20 500 foot off center?

21 A. That's correct. We believe our fracture half
22 length to be between 250 and 500 feet.

23 Q. That was my next question.

24 A. Okay.

1 Q. So your answer is half length is 200 to 500 feet
2 -- 250?

3 A. 250 to 500. That's correct.

4 Q. Okay.

5 A. And I think this is going to be an interesting
6 pad because, you know, we call it a spacing pad test
7 because there haven't been any of these proposed in West
8 Virginia to this point. And so once these four wells are
9 drilled and are allowed to produce, then we'll be able to
10 find out if that thousand feet is, you know, is right. You
11 know, because we're very early in this play in the dry gas
12 area. And so we're taking all the data we can, and the
13 thousand feet is the best number that we've been able to
14 come up with to this point.

15 Q. Okay. You mentioned that your core pressure was
16 .9 gradient?

17 A. Correct.

18 Q. So over pressured reservoir?

19 A. That's correct, sir.

20 Q. And remind me to ask him a question about that
21 later.

22 CHAIRMAN LAY: You're the drilling engineer.
23 Correct?

24 MR. BENYO: (Nods affirmatively.)

1 CHAIRMAN LAY: Okay.

2 BY CHAIRMAN LAY:

3 Q. Based on your answers and your half length, I
4 assume that you have done some reservoir modeling for
5 stimulation?

6 A. That's correct. And Rob will talk about that.
7 What we did was, we did some rate transient analysis along
8 with some reservoir modeling, and that's how we came up
9 with that number.

10 Q. Were you able to determine your -- you said the
11 250 to 550 foot range?

12 A. Right.

13 Q. Were you given any data on frac height growth?

14 A. We do not have any data for that. We have not
15 run -- we did not run microseismic in our Moundsville 6
16 pad.

17 Q. No, I understand, but your model, did it have --
18 what was your projected height growth?

19 A. You know, I can't answer that. I'm not sure what
20 that was.

21 Q. Okay. And just to clarify, I assume that your
22 TOC, your porosity and permeability was extracted from your
23 core on the Moundsville 6 well?

24 A. (Nods affirmatively.) That's correct. We cored

1 173 feet. We cored Utica, all of the Point Pleasant, and
2 some of the Trenton.

3 Q. Now, you said you've traded data and that it was
4 similar to the other operator's data?

5 A. (Nods affirmatively.)

6 Q. How wide of an area would you say that the data
7 that you looked at covered?

8 A. Okay. We traded for two wells. One well was
9 about four miles to the north and east of the proposed
10 Moundsville 20 pad. Okay. And then the other well that we
11 traded for was in Wetzel County, and I'm going to guess
12 that was probably about 12 miles.

13 Q. And they both exhibited the same -- or similar
14 characteristics?

15 A. Yes, sir.

16 Q. Let me go back to reservoir composition. You
17 said it was an organic shale interbedded with carbonates?

18 A. Uh-huh.

19 Q. The composition of those carbonates?

20 A. It's an interesting formation in that, you know,
21 you had carbonate platform surrounding this sub basin that
22 Point Pleasant was deposited in. And so when you go and
23 look at that core, it's really interesting because you can
24 see the shale fragments that came off of that platform that

1 surrounded that mini basin. And those are the carbonate
2 layers that you see interbedded within that Point Pleasant,
3 interbedded within the shales. And so it's the carbonate
4 fragments that came in off of the platforms that surrounded
5 that mini basin.

6 Q. Okay. So you're telling me that it's basically a
7 conglomerate of carbonates?

8 A. Those thin carbonate layers, they are, exactly.
9 It's a beautiful thing to see.

10 Q. Okay. So they are -- if they've been worked, are
11 they limestone or dolomite or what's their --

12 A. No, they are just, you know, pretty much shale
13 fragments.

14 Q. Okay.

15 A. Yeah.

16 Q. So it is a conglomerate type of carbonate?

17 A. Uh-huh, correct.

18 Q. I've never heard it described that way.

19 A. I wouldn't have described that way until, you
20 know, we cut that core and we were able to actually go and
21 look at it.

22 Q. Okay. And the matrix of that is limestone then?

23 A. Correct, uh-huh, a lime mud, uh-huh.

24 Q. Okay.

1 CHAIRMAN LAY: I think that's all the questions I
2 had.

3 MR. TAWNEY: I have no further questions.

4 THE WITNESS: Thank you.

5 (Witness stands aside.)

6 CHAIRMAN LAY: You can call your next witness.

7 MR. TAWNEY: Robert Benyo.

8 (Witness sworn.)

9 WHEREUPON,

10 **ROBERT BENYO,**

11 was called as a witness and, after being duly sworn,
12 testified as follows:

13 DIRECT EXAMINATION

14 BY MR. TAWNEY:

15 Q. Would you state your full name, please.

16 A. Robert Benyo.

17 Q. And where do you live?

18 A. I live in Canonsburg, Pennsylvania.

19 Q. Who is your employer?

20 A. I work for Noble Energy.

21 Q. What is your job title?

22 A. My job title is the New Well Engineering and
23 Execution Manager.

24 Q. And what are your duties?

1 A. My duties are to oversee a team of geologists,
2 engineers and superintendents responsible for the
3 completion engineering design and execution of the
4 completions for the Marcellus Business Unit.

5 Q. Can you tell us a little bit about your education
6 and job experience?

7 A. Yes. I have a degree in petroleum and natural
8 gas engineering from West Virginia University. I graduated
9 in 2003. After that I spent some time with Schlumberger
10 (phonetic) on the pressure pumping service side in Texas
11 and Wyoming. I then went to Evergreen Resources and
12 Pioneer Natural Resources working in unconventional
13 reservoirs in the Rocky Mountains, specifically CBM and
14 shale. Then worked for AJ Lucas, a drilling company in
15 Australia, working in their acquisition and divestiture
16 business group, focused on coal bed methane in Australia
17 and Southeast Asia. I've been with Noble Energy since
18 then, for about five years now, in the Frontier Business
19 Unit, DJ Business Unit our in the Rocky Mountains, and have
20 been out here in the Marcellus Business Unit for a little
21 bit over a year.

22 Q. Now, you're familiar with Noble's planned
23 drilling of the four wells on the MND 20 Unit?

24 A. Yes.

1 Q. And Noble is proposing to drill those wells 1,000
2 feet apart and 1,000 feet from the Moundsville 6 well that
3 is outside the unit?

4 A. Yes.

5 Q. What is the expected fracture half length around
6 the well bore in the proposed wells?

7 A. Based on the data that we have, it's between 250
8 and 500 feet fracture half length.

9 Q. And so did you choose --

10 CHAIRMAN LAY: Give me that number again, please.
11 Excuse me.

12 THE WITNESS: 250 to 500 feet.

13 CHAIRMAN LAY: Okay. Same response. Sorry, I
14 just missed it.

15 MR. TAWNEY: No, that's okay.

16 BY MR. TAWNEY:

17 Q. And so did you choose the upper end of that range
18 as the distance, or half the distance, between the two
19 wells?

20 A. Yes, we did.

21 Q. Why was that?

22 A. That is the distance that we're comfortable that
23 we can drill and complete these wells in the most efficient
24 manner.

1 Q. And how did you reach the determination that it
2 was 250 to 500 feet?

3 A. That was using reservoir models based on the data
4 from the core and based on the log data from the
5 Moundsville 6, along with some published data. And those
6 models were backed up by rate transient analysis from
7 offset production data.

8 Q. So do you agree with Mr. Romig that the optimal
9 spacing for a horizontal well in the Point Pleasant
10 formation in Marshall County is 1,000 feet?

11 A. Based on the data that we have, yes.

12 Q. And that's what you're proposing for the MND 20
13 pad wells?

14 A. That's correct.

15 Q. Do you believe there will be communication
16 between the wells if they're drilled at the distance apart
17 Noble proposes?

18 A. I do not.

19 Q. What happens if you space the well bores farther
20 apart than Noble has proposed?

21 A. Based on the data that we have, if you space the
22 wells further apart you will leave resource undeveloped and
23 that resource will be wasted.

24 Q. So if you drilled 3,000 feet apart, you would

1 basically be wasting the gas any further than 500 feet from
2 that well bore?

3 A. That's correct.

4 Q. In your opinion, could the Point Pleasant
5 formation be effectively and economically produced with
6 traditional vertical wells?

7 A. No, it could not.

8 MR. TAWNEY: That's all the questions I have of
9 this witness.

10 CHAIRMAN LAY: Any questions?

11 COMMISSION RADABAUGH: No.

12 COMMISSION GUM: Nothing.

13 **EXAMINATION**

14 BY CHAIRMAN LAY:

15 Q. Again, the same question I asked Mr. Romig. Did
16 your model give you any indication of potential frac
17 height?

18 A. The model, not that I'm aware of.

19 Q. Okay. Given Mr. Romig's testimony that core
20 pressures are .9 gradient, your anticipated bottom level
21 pressure is very near to 10,000 pounds?

22 A. That's correct.

23 Q. And only from a perspective of the safety issue
24 for the state and those residents, are you comfortable that

1 your design perimeters are met and capable of handling of
2 those high pressures?

3 A. I am. We have successfully completed the
4 Moundsville 6, using 15,000 psi rated equipment. That's
5 our intention, as far as we know it today, to use that
6 going forward providing us ample factor.

7 Q. I know that's something not normally in our
8 venue, but in this situation we're also protecting the --
9 as well as the Office of Oil & Gas, so I wanted to make
10 sure that you have POP's and casing designed capable of
11 handling those excess pressures. That's not the norm for
12 our basin.

13 A. That's correct.

14 Q. Okay.

15 CHAIRMAN LAY: I think that's all the questions I
16 have. Do you guys have anything else?

17 COMMISSION RADABAUGH: Not at this time.

18 CHAIRMAN LAY: With that, you may be excused.

19 THE WITNESS: Thank you.

20 (Witness stands aside.)

21 MR. TAWNEY: And that concludes testimony that we
22 have to present. So for reasons stated by the witness and
23 given the fracture half lengths and the fact that you have
24 to stimulate these wells to get the production out, their

1 belief that a thousand feet between wells is the
2 appropriate spacing, we would ask the Commission to grant
3 them the waiver of the 3,000 foot spacing requirement so
4 that they can drill these four wells a thousand feet apart
5 and 1,000 feet from the existing Moundsville 6 well.

6 CHAIRMAN LAY: Okay. Very good. We'll go off
7 the record then.

8 (WHEREUPON, a recess was taken
9 from 10:48 a.m. until 11:00 a.m.)

10 CHAIRMAN LAY: Do we have a motion?

11 COMMISSION RADABAUGH: I have a motion. Mr.
12 Chairman, I would like to make a motion to grant Noble
13 Energy their request for exception to Rule CSR 39-1-4.2, to
14 allow 1,000 foot spacing between wells, starting at the MND
15 6 HUHS, moving to the MND 20 AU, then to the MND 20 BU,
16 then to the MND 20 CU, and the MND 20 DU. Upon completion,
17 Noble shall submit a copy of the well logs to the
18 Commission.

19 COMMISSION GUM: Mr. Chairman, I would like to
20 second that motion.

21 CHAIRMAN LAY: We have a motion and a properly
22 made second. Any further discussion?

23 COMMISSION GUM: Nothing.

24 CHAIRMAN LAY: All those in favor of the motion,

1 aye. (Commission votes affirmatively.) Opposed, nay. (No
2 response from the Commission.) Motion carried. Mr.
3 Tawney, we will grant your relief. We, however, ask that
4 you prepare a draft order for the Commission and counsel to
5 review.

6 MR. TAWNEY: (Tenders document to the
7 Commission.)

8 CHAIRMAN LAY: You already have it?

9 MS. RAINES: You already have it? Awesome. You
10 are good.

11 MR. TAWNEY: But you know what -- off the record.

12 (WHEREUPON, a discussion was
13 had off the record.)

14 CHAIRMAN LAY: Let's go back on just for a
15 moment. Anything further for the record?

16 COMMISSION GUM: Nothing.

17 CHAIRMAN LAY: Okay. That being the case, we
18 will close the record for this docket. Thank you. Now
19 we're off the record.

20 (Hearing Concluded at 11:03 a.m.)

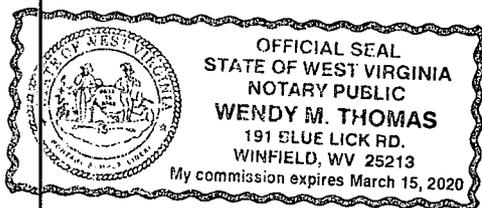
R E P O R T E R ' S C E R T I F I C A T E

STATE OF WEST VIRGINIA,
COUNTY OF KANAWHA, to wit;

I, **WENDY M. THOMAS**, Certified Court Reporter and Notary Public of West Virginia, do hereby certify that the foregoing is, to the best of my skill and ability, a true and accurate transcript of all the proceedings as set for in the caption hereof.

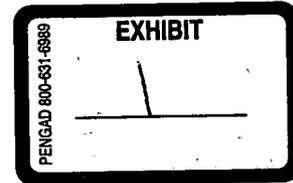
Given under my hand this 15th day of November,
2015.

My Commission expires March 15, 2020.



Wendy M. Thomas
Certified Court Reporter

EXHIBITS



west virginia department of environmental protection

Oil and Gas Conservation Commission
601 57th Street, SE Charleston, WV 25304
(304)926-0499, Ext 1656

Earl Ray Tomblin, Governor
Barry K. Lay, Chairman
www.wvdep.org

**BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA**

IN THE MATTER OF THE REQUEST BY NOBLE ENERGY
INC. FOR AN EXCEPTION TO RULE 39CSR1-4.2 REGARDING
THE DRILLING OF THE PROPOSED WELLS IDENTIFIED
AS THE MND 20AU, BU, CU, AND DU TO BE LOCATED IN
CLAY DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.

DOCKET NO. 236
CAUSE NO. 226

NOTICE OF HEARING

Noble Energy, Inc. ("Noble") has requested the WV Oil and Gas Conservation Commission review and approve a request for exceptions to the spacing requirements as set forth in CSR §39-1-4.2; for a wells identified as the MND 20AU, BU, CU and DU. The proposed location for the MND 20AU is approximately 1,000' from an existing well identified as the MND6HUHS API: 47-051-01732. And the MND 20BU, CU and DU are proposed to be drilled from same pad as the MND 20AU.

The matter is scheduled as stated below:

DATE: October 28, 2015

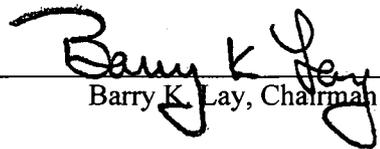
TIME: 10:00 am

PLACE: Department of Environmental Protection
Oil and Gas Conservation Commission
601 57th Street, SE
Charleston, WV 25304

IN THE NAME OF THE STATE OF WEST VIRGINIA

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA

By: _____


Barry K. Lay, Chairman

Dated this 9th day of October, 2015, at Charleston, West Virginia.

Promoting a healthy environment.

Docket # _____
Certified Mail

Noble Energy, Inc.
Attention: Dee Swiger
1000 Noble Energy Drive
Canonsburg, PA 15317

Murray Energy Corporation
Consolidation Coal Comany
46226 National Road
St. Clairsville, OH 43950

91 7199 9991 7035 6612 6435

91 7199 9991 7035 6612 6442

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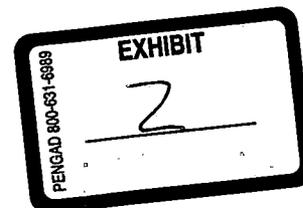
Administrative Law

Online Data Services Help

Administrative Law

Meeting Notice Detail

Back to Meeting Notices



Oil and Gas Conservation Commission
Date/Time: 10/28/2015 -- 10:00 AM
<p>Location:</p> <p>Department of Environmental Protection Oil and Gas Conservation Commission 601 57th Street, SE Charleston, WV 25304 304-926-0499 Ext 1656</p>
<p>Purpose: HEARING - IN THE MATTER OF THE REQUEST BY NOBLE ENERGY INC. FOR AN EXCEPTION TO RULE 39CSR1-4.2 REGARDING THE DRILLING OF THE PROPOSED WELLS IDENTIFIED</p> <p>AS THE MND 20AU, BU, CU, AND DU TO BE LOCATED IN CLAY DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.</p>
<p>Notes:</p> <p>This is a compliant meeting.</p>
Meeting was approved : 10/9/2015 9:52:31 AM

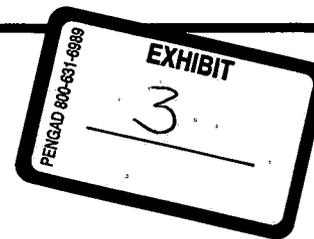
Back to Meeting Notices

Friday, October 9, 2015 — 9:54 AM

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Raines, Cindy J

From: Raines, Cindy J
Sent: Friday, October 09, 2015 10:20 AM
To: 'mdsvecho@gmail.com'
Subject: Class II legal ad - Docket 236-226
Attachments: OGCC 236-226.doc



Please print the attached as a Class II legal ad in the Moundsville Daily Echo Monday, October 12 and again on Monday, October 19. Please confirm receipt.

**BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA**

IN THE MATTER OF THE REQUEST BY NOBLE ENERGY
INC. FOR AN EXCEPTION TO RULE 39CSR1-4.2 REGARDING THE DRILLING OF THE PROPOSED WELLS IDENTIFIED AS THE MND 20AU, BU, CU, AND DU TO BE LOCATED IN CLAY DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.

DOCKET NO. 236
CAUSE NO. 226

NOTICE OF HEARING

Noble Energy, Inc. ("Noble") has requested the WV Oil and Gas Conservation Commission review and approve a request for exceptions to the spacing requirements as set forth in CSR §39-1-4.2; for a wells identified as the MND 20AU, BU, CU and DU. The proposed location for the MND 20AU is approximately 1,000' from an existing well identified as the MND6HUHS API: 47-051-01732. And the MND 20BU, CU and DU are proposed to be drilled from same pad as the MND 20AU.

The matter is scheduled as stated below:

DATE: October 28, 2015

TIME: 10:00 am

PLACE: Department of Environmental Protection
Oil and Gas Conservation Commission
601 57th Street, SE
Charleston, WV 25304

IN THE NAME OF THE STATE OF WEST VIRGINIA

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA

By: _____
Barry K. Lay, Chairman

Dated this 9th day of October, 2015, at Charleston, West Virginia.

Thank you!

Andy Raines

Oil and Gas Conservation Commission

601 57th Street, SE

Charleston, WV 25304

304-926-0499

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc. 494501907 051-Marshall Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: MND 20 AU Well Pad Name: MND 20

3) Farm Name/Surface Owner: Murray Energy (Consolidation Coal Company) Public Road Access: Taylor's Ridge Road

4) Elevation, current ground: 1079.23 Elevation, proposed post-construction: 1058.04

5) Well Type (a) Gas Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow _____ Deep

Horizontal

JW 8/17/15

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant 10662'-10782' / 120' Thick / 9668 psi

8) Proposed Total Vertical Depth: 10,742'

9) Formation at Total Vertical Depth: Point Pleasant

10) Proposed Total Measured Depth: 20,229'

11) Proposed Horizontal Leg Length: 8,023'

12) Approximate Fresh Water Strata Depths: 445', 708', 805'

13) Method to Determine Fresh Water Depths: Nearest offset well

14) Approximate Saltwater Depths: na

15) Approximate Coal Seam Depths: 526'-536'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar - maps attached

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No _____

(a) If Yes, provide Mine Info: Name: McElroy Mine

Depth: 526-536'

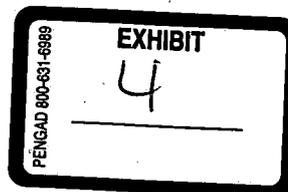
Seam: Pittsburgh #8

Owner: Consolidation Coal Company

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Environmental Protection
Page 1 of 3



18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	New	LS	94	40'	40'	Surface to TD
Fresh Water	20"	New	J-55	94	936'	936'	CTS
I Intermediate	13 3/8"	New	J-55	54.5	2154'	2154'	CTS
Intermediate	9 5/8"	New	P-110	47	9600'	9600'	CTS
Production	5 1/2"	New	P-110	23.0	20,229'	20,229'	10% excess TOC=1000' above 9.825 shoe
Tubing							
Liners							

JN 8/17/15

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	0.375			Type I	Surface to TD
Fresh Water	20"	24"	0.438	2110		Class A	30% excess Yield =1.18
Coal Intermediate	13 3/8"	17.5"	0.380	2730		Class A	30% excess Yield =1.18
Intermediate	9 5/8"	12.375" / 12.25"	0.472	9440		Class A	20% Excess to Surface
Production	5 1/2"	8.5"	0.415	16,510	13,000	Class H	10% excess Yield TOC =1000' above 9.625' shoe
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Point Pleasant at an estimated total vertical depth of approximately 10,742 feet. Drill Horizontal leg - stimulate and produce the Point Pleasant Formation. Should we encounter formation issues, set the 20" into next competent formation but not deeper than elevation. Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. our maximum pressure is not to exceed 10,000 lbs.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.39

22) Area to be disturbed for well pad only, less access road (acres): 9.69

23) Describe centralizer placement for each casing string:

Conductor - No centralizers used. Fresh Water/Surface - Bow Spring centralizers every 3 joints to 100' from surface. 1st Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Production - Rigid Bow Spring every third joint from KOP to TOC. Rigid Every joint to KOP.

24) Describe all cement additives associated with each cement type:

See attached sheet - Conductor - Type I to Surface. Surface/ Fresh Water - 15.6 ppg Class A + 2% CaCl, 0.25# Lost Circ 30% Excess Yield = 1.18. 1st Intermediate - 15.6 ppg Class A +2% CaCl, 0.25# Lost Circ. 30% Excess Yield = 1.18.
Intermediate - 2 Stage Cement Job with 14.5ppg Class A lead + additives (antisetting, antifoam, fluid loss, retarder, salt, viscosifer) & 15.6ppg Class A tail with additives (antisetting, antifoam, fluid loss, retarder, salt, dispersant or 12.0 Class A Lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield =2.47) 13.5 ppg Class A tail + additive (+/-5%fluid loss additive, .25% freewater additive, & .5% light weight additive, Yield =1.57), 0.125#/sk lost Circ 20% excess to Surface.
Production - 14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisetting, extender, dispersant) 10% Excess TOC >=1000' above 9.625" shoe.

25) Proposed borehole conditioning procedures:

Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water/Surface -The hole is drilled w/air or Freshwater based mud and casing is run on air. Once casing is at setting depth, fill with KCl water circulate a minimum of one hole volume prior to pumping cement. First Intermediate - Drilled on air. Once casing is at a setting depth, circulate a minimum of one hole volume prior to pumping cement. Second Intermediate - Drilled on air. fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement. Production - drilled on +/- 14.5ppg SOBMs. Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.



DRILLING WELL PLAN

MND-20A-UHS (Utica HZ)

Utica Shale Horizontal

Marshall County, WV

Ground Elevation			1059'			MND-20A SHL (Lat/Long)			(494946.59N, 1634115.61E) (NAD27)		
Azm			145°			MND-20A LP (Lat/Long)			(493178.46N, 1631647.32E) (NAD27)		
WELLBORE DIAGRAM			145°			MND-20A BHL (Lat/Long)			(486606.87N, 1636248.79E) (NAD27)		
WELLBORE DIAGRAM	HOLE	CASING	GEOLOGY	TOP	BOTTOM	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
	36"	30" 94# LS	Conductor		40'	Air	Type 1 to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.375" wall thickness	
	24"	20" 94# J-55 BTC	Pittsburgh Coal	526	526	Air or Fresh Water Based Mud	15.6 ppg Class A + 2% CaCl ₂ , 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Water protection & coal isolation string, casing set 400' below Pit coal, Surface casing = 0.438" wall thickness Burst=2110 psi	
	17.5"	13-3/8" 54.5# J-55 BTC	Big Lime	1625	1741	Air	15.6 ppg Class A + 2% CaCl ₂ , 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Isolate Big Injun, casing set 300' below Big Injun, Intermediate casing = 0.380" wall thickness Burst=2730 psi	
		12.375"-12.25"	9-5/8" 47# P-110 BTC	Big Injun	1741	1854	Air	2 Stage Cement Job with 14.5ppg Class A lead + additives (antsetting, antifoam, fluid loss, retarder, salt, viscosifier) & 15.6ppg Class A tail with additives (antsetting, antifoam, fluid loss, retarder, salt, dispersant) or 12.0 ppg Class A lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield = 2.47)/13.5 ppg Class A tail + additives (+/-5% fluid loss additive, .25% freshwater additive, & 5% light weight additive, Yield = 1.57), 0.125#/sk Lost Circ 20% Excess To Surface	Bow spring centralizers every 3 joints to 100' from surface	Fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing to be set 400' into the Queenston. Intermediate Casing = 0.472" wall thickness Burst= 8440 psi Collapse=5300psi
1st Intermediate Casing				2154							
5th Sand				2599	2628						
Speechley				3156	3202						
Warren				3770	3784						
Java				4707	4802						
Pipe Creek				4802	4889						
Angola				4889	5471						
Rheinstreet				5471	5792						
Cashaqua				5792	5864						
Middlesex				5864	5887						
West River				5887	5948						
Burkett				5948	5973						
Tully Limestone				5973	5997						
Hamilton				5997	6032						
Marcellus				6032	6087						
Onondaga				6087	6095						
Huntersville				6095	6309						
Oriskany				6309	6421						
Heiderburg				6421	6681						
Bass Island Dolomite	6681	6760									
Salina G - "Big Lime"	6760	6960									
Salina F	6960	7759									
Lockport	7759	8081									
Rochester Shale	8081	8386									
Dayton Fm/Packer Shell	8386	8492									
Clinton	8492	8575									
Medina	8575	8674									
Queenston	8674	9431									
Intermediate Casing	9074' TVD, +/-9600' MD										
	8.5" Curve	5-1/2" 23# HCP-110 Wedge 563	Reedsville	9431	10049	+/-14.5ppg SOB M	14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antsetting, extender, dispersant) 10% Excess TOC >= 1000' above 9.625" shoe	Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=16510 psi Note:Actual centralizer schedules may be changed due to hole conditions	
		8.5" Lateral	5-1/2" 23# HCP-110 TXP BTC	Utica	10049						10662
Point Pleasant				10662	10782	TARGET	10742				

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LP @ 10742' TVD / 12208' MD

8.5 Hole - Cemented Long String
5-1/2" 23# HCP-110 TXP BTC/ Wedge 563

+/-8023' ft Lateral

TD @ +/-10742' TVD
+/-20229' MD

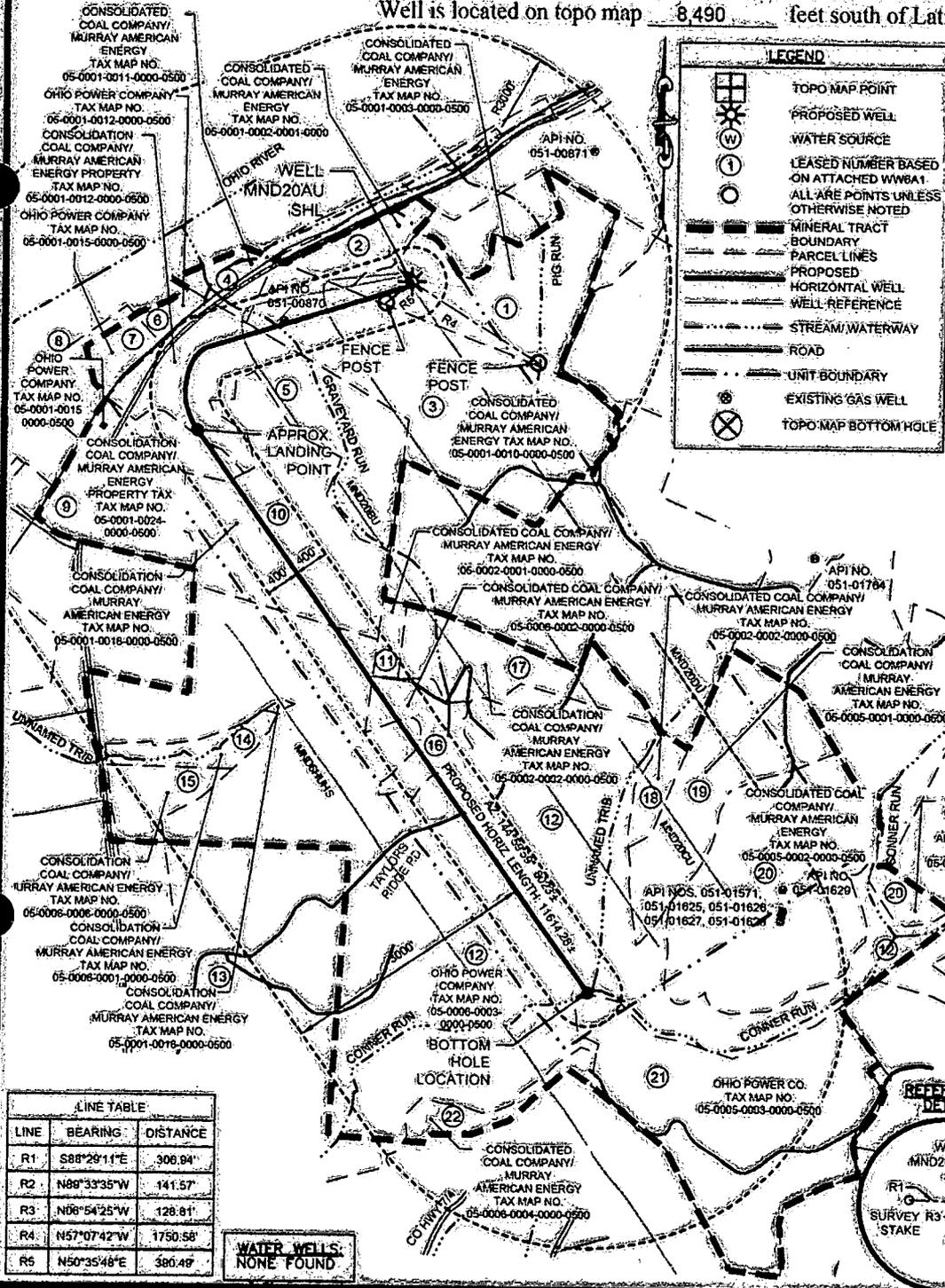
Well is located on topo map 8,490 feet south of Latitude: 39° 52' 30"

PVE Sheffler
 Engineering • Surveying • Design
 Waterfront Corporate Park III, Suite 101
 2000 Georgetown Drive
 Sewickley, PA 15143-8992
 Phone: 724-444-1100

- NOTES:
1. There are no water wells or developed springs within 250' of proposed well.
 2. There are no existing buildings within 625' of proposed well.
 3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
 4. There are no native trout streams within 300' of proposed well.
 5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
 6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted herein. The location of the boundary lines, as shown, and based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

LEGEND

- TOPO MAP POINT
- PROPOSED WELL
- WATER SOURCE
- LEASED NUMBER BASED ON ATTACHED WWBA1 ALL ARE POINTS UNLESS OTHERWISE NOTED
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- HORIZONTAL WELL
- WELL REFERENCE
- STREAM/WATERWAY
- ROAD
- UNIT BOUNDARY
- EXISTING GAS WELL
- TOPO-MAP BOTTOM HOLE



SURFACE HOLE LOCATION (S1)

UTM 17 - NAD83
 N: 4411315.167
 E: 516848.422
 NAD27 - WV NORTH
 N: 494946.590
 E: 1634115.610
 LAT/LON DATUM - NAD83
 LAT: 39.851691
 LON: -80.803044

APPROX. LANDING POINT

UTM 17 - NAD83
 N: 4410763.921
 E: 516105.426
 NAD27 - WV NORTH
 N: 493178.460
 E: 1631647.320
 LAT/LON DATUM - NAD83
 LAT: 39.846739
 LON: -80.811743

BOTTOM HOLE LOCATION

UTM 17 - NAD83
 N: 4408785.313
 E: 517540.732
 NAD27 - WV NORTH
 N: 486606.870
 E: 1636248.790
 LAT/LON DATUM - NAD83
 LAT: 39.828883
 LON: -80.795019

FILE #: MND 20 AU

DRAWING #: MND 20 AU

SCALE: 1"=2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT H 138: 638.58'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

SIGNED: *[Signature]*

R.P.E.: 21452 L.L.S.: P.S. NO. _____

REGISTERED PROFESSIONAL ENGINEER
 GARY A. SHEFFLER JR.
 21452
 STATE OF WEST VIRGINIA
 PLACE SEAL HERE

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP

OFFICE OF OIL & GAS
 601 57TH STREET
 CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1078.23'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA/OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY / MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) _____

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 20,229' ±

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP
 Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE
 City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

Well is located on topo map 8,490 feet west of Longitude: 80° 47' 30"

Bottom Hole is located on topo map 1621 feet south of Latitude: 39° 50' 00"

Bottom Hole is located on topo map 932 feet west of Longitude: 80° 47' 30"

PVE Sheffler
Engineering • Surveying • Design
Waterfront Corporate Park III, Suite 101
2000 Georgetowne Drive
Sewickley, PA 15143-8992
Phone: 724-444-1100

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WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV. OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 AU

API WELL # 47 051 01867
STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1079.23'

COUNTY/DISTRICT: MARSHALL/CLAY QUADRANGLE: POWHATAN POINT, W. VA/OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

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PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
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TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 20,220'

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

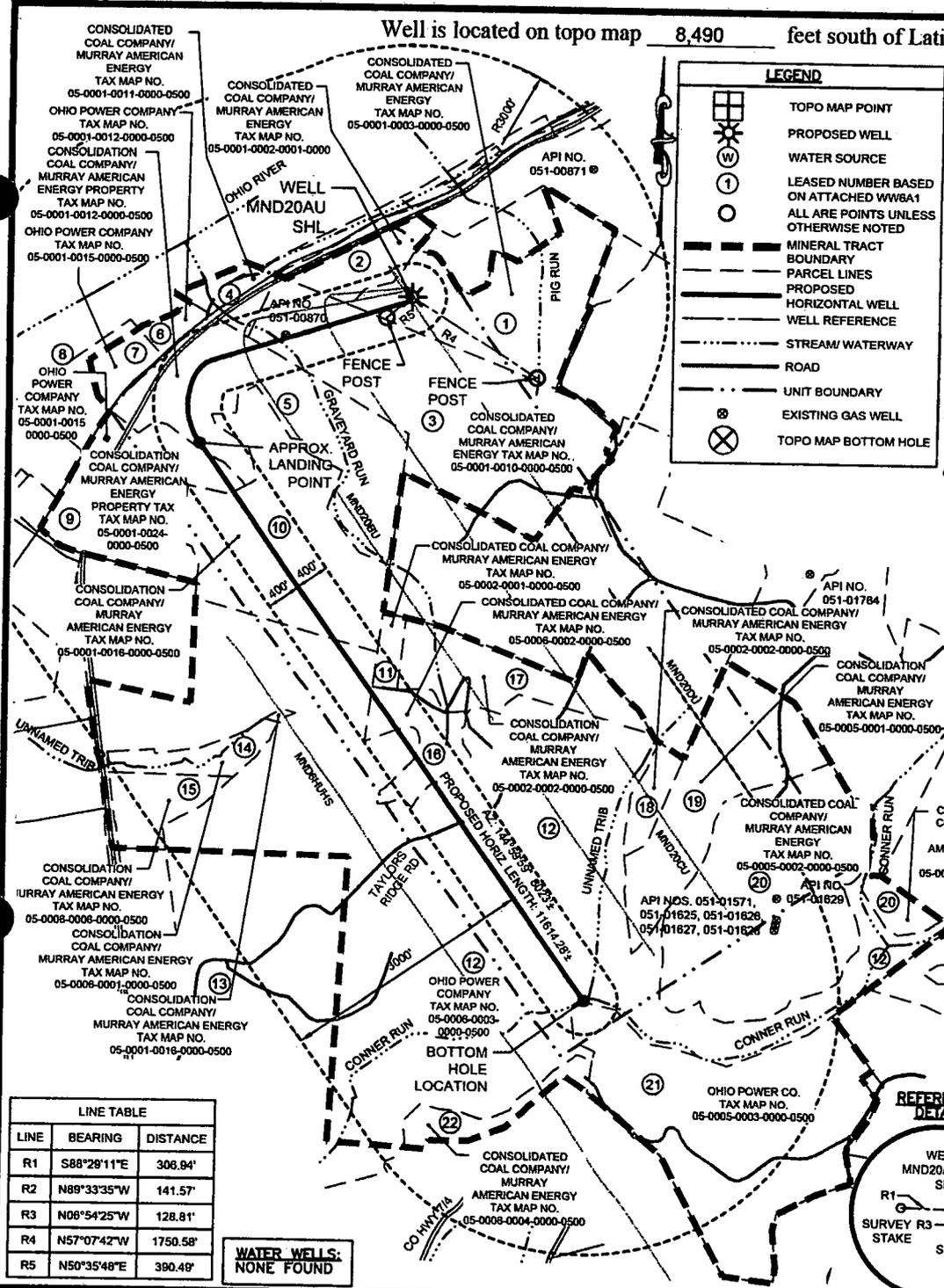
Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

Well is located on topo map 8,490 feet south of Latitude: 39° 52' 30"

PVE Sheffler
Engineering • Surveying • Design
Waterfront Corporate Park III, Suite 101
2000 Georgetowne Drive
Sewickley, PA 15143-8992
Phone: 724-444-1100

Well is located on topo map 3,194 feet west of Longitude: 80° 47' 30"



- NOTES:**
- There are no water wells or developed springs within 250' of proposed well.
 - There are no existing buildings within 625' of proposed well.
 - Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
 - There are no native trout streams within 300' of proposed well.
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<p>SURFACE HOLE LOCATION (SH.)</p> <p>UTM 17 - NAD83 N: 4411315.167 E: 516848.422 NAD27, WV NORTH N: 494946.590 E: 1634115.610 LAT/LON DATUM-NAD83 LAT: 39.851691 LON: -80.803044</p>	<p>APPROX. LANDING POINT</p> <p>UTM 17 - NAD83 N: 4410763.921 E: 516105.426 NAD27, WV NORTH N: 493178.460 E: 1631647.320 LAT/LON DATUM-NAD83 LAT: 39.846739 LON: -80.811743</p>
<p>BOTTOM HOLE LOCATION</p> <p>UTM 17 - NAD83 N: 4408785.313 E: 517540.732 NAD27, WV NORTH N: 486806.870 E: 1636248.790 LAT/LON DATUM-NAD83 LAT: 39.828883 LON: -80.795019</p>	

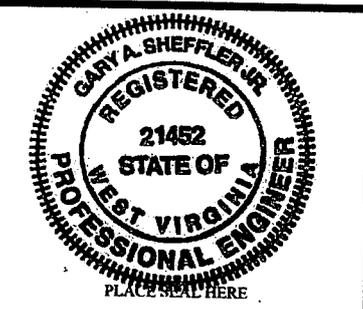
LINE	BEARING	DISTANCE
R1	S88°29'11"E	306.84'
R2	N89°33'35"W	141.57'
R3	N08°54'25"W	128.81'
R4	N57°07'42"W	1750.58'
R5	N50°35'48"E	390.48'

WATER WELLS:
NONE FOUND

FILE #: MND 20 AU
DRAWING #: MND 20 AU
SCALE: 1"=2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT H 138: 638.58'

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SIGNED: *[Signature]*
R.P.E.: 21452 L.L.S.: P.S. NO. _____



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1079.23'
COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO
SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55
OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

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PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) _____

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 20,229' ±
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Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE
City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

Bottom Hole is located on topo map 1,621 feet south of Latitude: 39° 50' 00"

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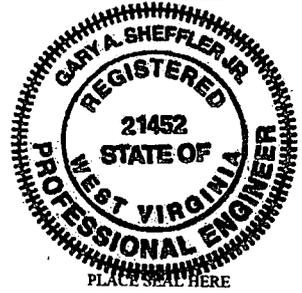


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FILE #: MND 20 AU
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PROVEN SOURCE U.S.G.S. MONUMENT
OF ELEVATION: H 138: 638.58'

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WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 AU

API WELL # 47 051
STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1079.23'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

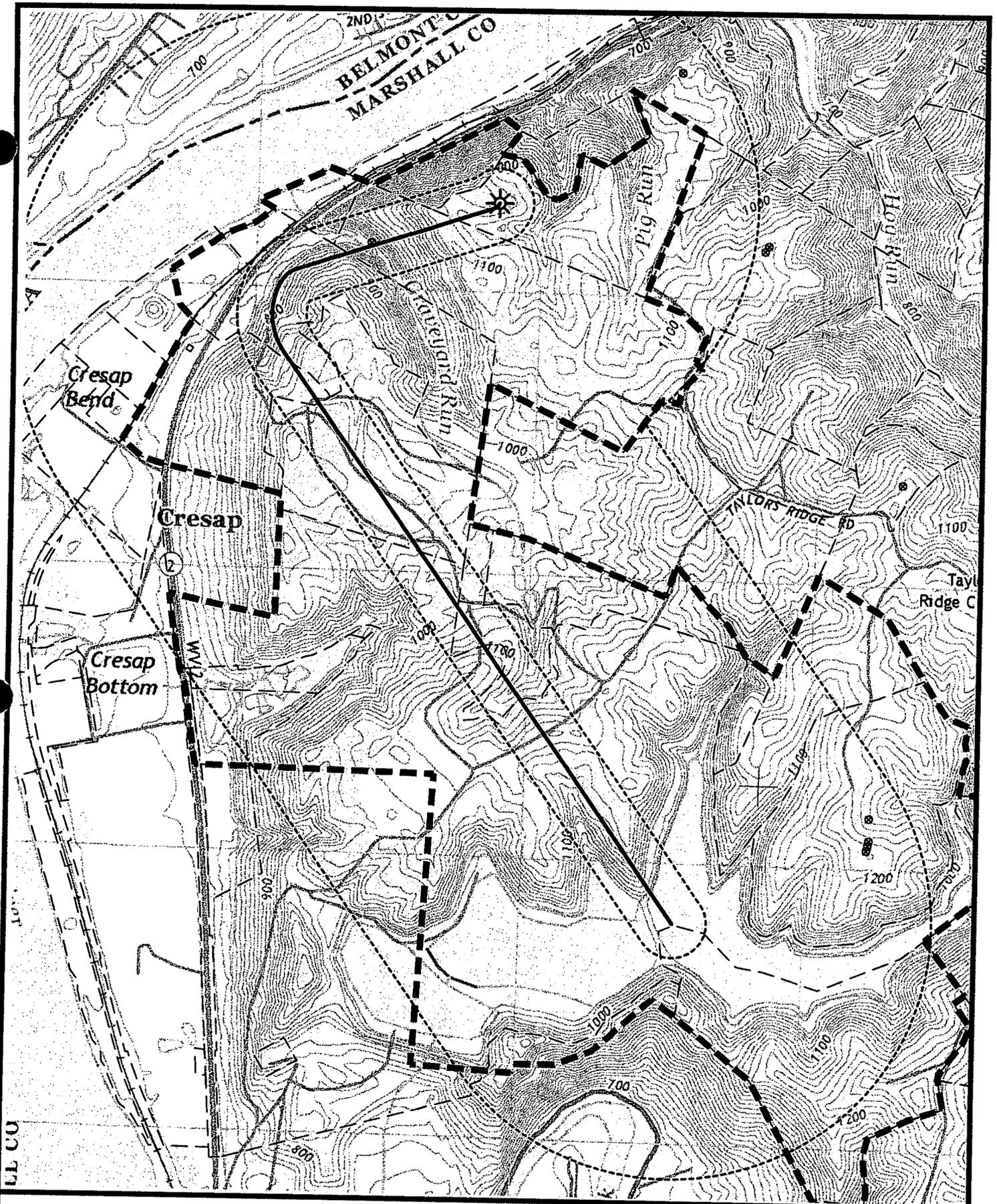
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TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 20,229±

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508



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DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 AU

API WELL # 47 051
 STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER

ELEVATION: 1079.23'

COUNTY/DISTRICT: MARSHALL / CLAY

QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/
MURRAY ENERGY

ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY

ACREAGE: 70.55

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TARGET FORMATION: POINT PLEASANT

ESTIMATED DEPTH: TVD: 10,742' ± TMD: 20,229±

WELL OPERATOR: NOBLE ENERGY, INC.

DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE

Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317

City MORGANTOWN State WV Zip Code 26508

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc. 494501907 051-Marshall Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: MND 20 BU Well Pad Name: MND 20

3) Farm Name/Surface Owner: Murray Energy (Consolidation Coal Company) Public Road Access: Taylor's Ridge Road

4) Elevation, current ground: 1080.18 Elevation, proposed post-construction: 1058.4

5) Well Type (a) Gas Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow _____ Deep

Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant 10662'-10782' / 120' Thick / 9668 psi

8) Proposed Total Vertical Depth: 10,742'

9) Formation at Total Vertical Depth: Point Pleasant

10) Proposed Total Measured Depth: 19,960'

11) Proposed Horizontal Leg Length: 8,295'

12) Approximate Fresh Water Strata Depths: 445', 708', 805'

13) Method to Determine Fresh Water Depths: Nearest offset well

14) Approximate Saltwater Depths: na

15) Approximate Coal Seam Depths: 526'-536'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar - maps attached

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No _____

(a) If Yes, provide Mine Info: Name: McElroy Mine
Depth: 526-536'
Seam: Pittsburgh #8
Owner: Consolidation Coal Company

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18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	New	LS	94	40'	40'	Surface to TD
Fresh Water	20"	New	J-55	94	936'	936'	CTS
I Intermediate	13 3/8"	New	J-55	54.5	2154'	2154'	CTS
Intermediate	9 5/8"	New	P-110	47	9400'	9400'	CTS
Production	5 1/2"	New	P-110	23.0	19,960'	19,960'	10% excess TOC=1000' above 9.625" shoe
Tubing							
Liners							

JW 8/17/15

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	0.375			Type I	Surface to TD
Fresh Water	20"	24"	0.438	2110		Class A	30% excess Yield =1.18
Coal Intermediate	13 3/8"	17.5"	0.380	2730		Class A	30% excess Yield =1.18
Intermediate	9 5/8"	12.375" / 12.25"	0.472	9440		Class A	20% Excess to Surface
Production	5 1/2"	8.5"	0.415	16,510	13,000	Class H	10% excess Yield TOC =1000' above 9.625" shoe
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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 Office of Oil and Gas
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 WV Department of
 Environmental Protection
 Page 2 of 3

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Point Pleasant at an estimated total vertical depth of approximately 10,742 feet. Drill Horizontal leg - stimulate and produce the Point Pleasant Formation. Should we encounter formation issues, set the 20" into next competent formation but not deeper than elevation. Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. our maximum pressure is not to exceed 10,000 lbs.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.39

22) Area to be disturbed for well pad only, less access road (acres): 9.69

23) Describe centralizer placement for each casing string:

Conductor - No centralizers used. Fresh Water/Surface - Bow Spring centralizers every 3 joints to 100' from surface. 1st Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Production - Rigid Bow Spring every third joint from KOP to TOC. Rigid Every joint to KOP.

24) Describe all cement additives associated with each cement type:

See attached sheet - Conductor - Type I to Surface. Surface/ Fresh Water - 15.6 ppg Class A + 2% CaCl, 0.25# Lost Circ 30% Excess Yield = 1.18. 1st Intermediate - 15.6 ppg Class A + 2% CaCl, 0.25# Lost Circ. 30% Excess Yield = 1.18.
Intermediate - 2 Stage Cement Job with 14.5ppg Class A lead + additives (antisetling, antifoam, fluid loss, retarder, salt, viscosifer) & 15.6ppg Class A tail with additives (antisetling, antifoam, fluid loss, retarder, salt, dispersant or 12.0 Class A Lead + additives (+/- 5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield = 2.47) 13.5 ppg Class A tail + additive (+/- .5% fluid loss additive, .25% freewater additive, & .5% light weight additive, Yield = 1.57), 0.125#/sk lost Circ 20% excess to Surface.
Production - 14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisetling, extender, dispersant) 10% Excess TOC >= 1000' above 9.625" shoe.

25) Proposed borehole conditioning procedures:

Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water/Surface - The hole is drilled w/air or Freshwater based mud and casing is run on air. Once casing is at setting depth, fill with KCl water circulate a minimum of one hole volume prior to pumping cement. First Intermediate - Drilled on air. Once casing is at a setting depth, circulate a minimum of one hole volume prior to pumping cement. Second Intermediate - Drilled on air. fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement. Production - drilled on +/- 18.5ppg SOB. Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.

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Fresh Water Protection String:		Cement Additives	
Allied Material Name	Additive (Material) Type	Additive (Material) Description	CAS #
2CAC (Class A Common)	Base Cement	Grey powder	65997-15-1
2A-100	Accelerator	White, flake	10043-52-4
			7447-40-7
			7732-18-5
2LC-CPF (Cellophane Flakes)	Lost Circulation Aid	White and colored flake	7647-14-5
			Non-Hazardous

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 Environmental Protection



DRILLING WELL PLAN
MND-20B-UHS (Utica HZ)
 Utica Shale Horizontal
 Marshall County, WV

Ground Elevation		MND-20B SHL (Lat/Long)				(494962.73N, 1634099.22E) (NAD27)				
Azimuth		MND-20B LP (Lat/Long)				(493965.85N, 1632316.76E) (NAD27)				
WELLBORE DIAGRAM		MND-20B BHL (Lat/Long)				(487172.65N, 1637073.41E) (NAD27)				
HOLE	CASING	GEOLOGY	TOP	BOTTOM	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
36"	30" 94# LS	Conductor		40	Air	Type 1 to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.375" wall thickness	
24"	20" 94# J-55 BTC	Pittsburgh Coal	526	526	Air or Fresh Water Based Mud	15.6 ppg Class A + 2% CaCl ₂ , 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Water protection & coal isolation string, casing set 400' below Pit coal, Surface casing = 0.438" wall thickness Burst=2110 psi	
		Surface Casing		936						
17.5'	13-3/8" 54.5# J-55 BTC	Big Lime	1625	1741	Air	15.6 ppg Class A + 2% CaCl ₂ , 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Isolate Big Injun, casing set 300' below Big Injun, Intermediate casing = 0.380" wall thickness Burst=2730 psi	
		Big Injun	1741	1854						
		1st Intermediate Casing		2154						
		5th Sand	2599	2628	Air	2 Stage Cement Job with 14.5ppg Class A lead + additives (antisettling, antifoam, fluid loss, retarder, salt, viscosifier) & 15.6ppg Class A tail with additives (antisettling, antifoam, fluid loss, retarder, salt, dispersant) or 12.0 ppg Class A lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield = 2.47/13.5 ppg Class A tail + additives (+/-5% fluid loss additive, .25% freshwater additive, & 5% light weight additive, Yield = 1.57), 0.125#/sk Lost Circ 20% Excess To Surface	Bow spring centralizers every 3 joints to 100' from surface	Fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing to be set 400' into the Queenston. Intermediate Casing = 0.472" wall thickness Burst= 9440 psi Collapse=5300psi	
		Speechley	3156	3202						
		Warren	3770	3784						
		Java	4707	4802						
		Pipe Creek	4802	4889						
		Angola	4889	5471						
		Rheinstreet	5471	5792						
		Cashaqua	5792	5864						
		Middlesex	5864	5887						
		West River	5887	5948						
		Burkett	5948	5973						
		Tully Limestone	5973	5997						
		Hamilton	5997	6032						
		Marcellus	6032	6087						
		Onondaga	6087	6095						
		Huntersville	6095	6309						
		Oriskany	6309	6421						
		Helderburg	6421	6681						
		Bass Island Dolomite	6681	6760						
		Safina G - "Big Lime"	6760	6960						
		Safina F	6960	7759						
		Lockport	7759	8081						
		Rochester Shale	8081	8386						
		Dayton Fm/Packer Shell	8386	8482						
		Clinton	8482	8575						
		Medina	8575	8674						
		Queenston	8674	9431						
		Intermediate Casing	9074' TVD, +/-9400' MD							
8.5" Curve	5-1/2" 23# HCP-110 Wedge 563	Reedsville	9431	10049	+/-14.5ppg SOBMM	14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisettling, extender, dispersant) 10% Excess TOC >= 1000' above 9.625" shoe	Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=16510 psi Note:Actual centralizer schedules may be changed due to hole conditions	
		Utica	10049	10662			Rigid Bow Spring every joint to KOP			
8.5" Lateral	5-1/2" 23# HCP-110 TXP BTC	Point Pleasant	10662	10782						
		TARGET		10742						

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WV Department of Environmental Protection

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LP @ 10742' TVD / 11710' MD

8.5 Hole - Cemented Long String
 5-1/2" 23# HCP-110 TXP BTC/Wedge 563

+/-8295' ft Lateral

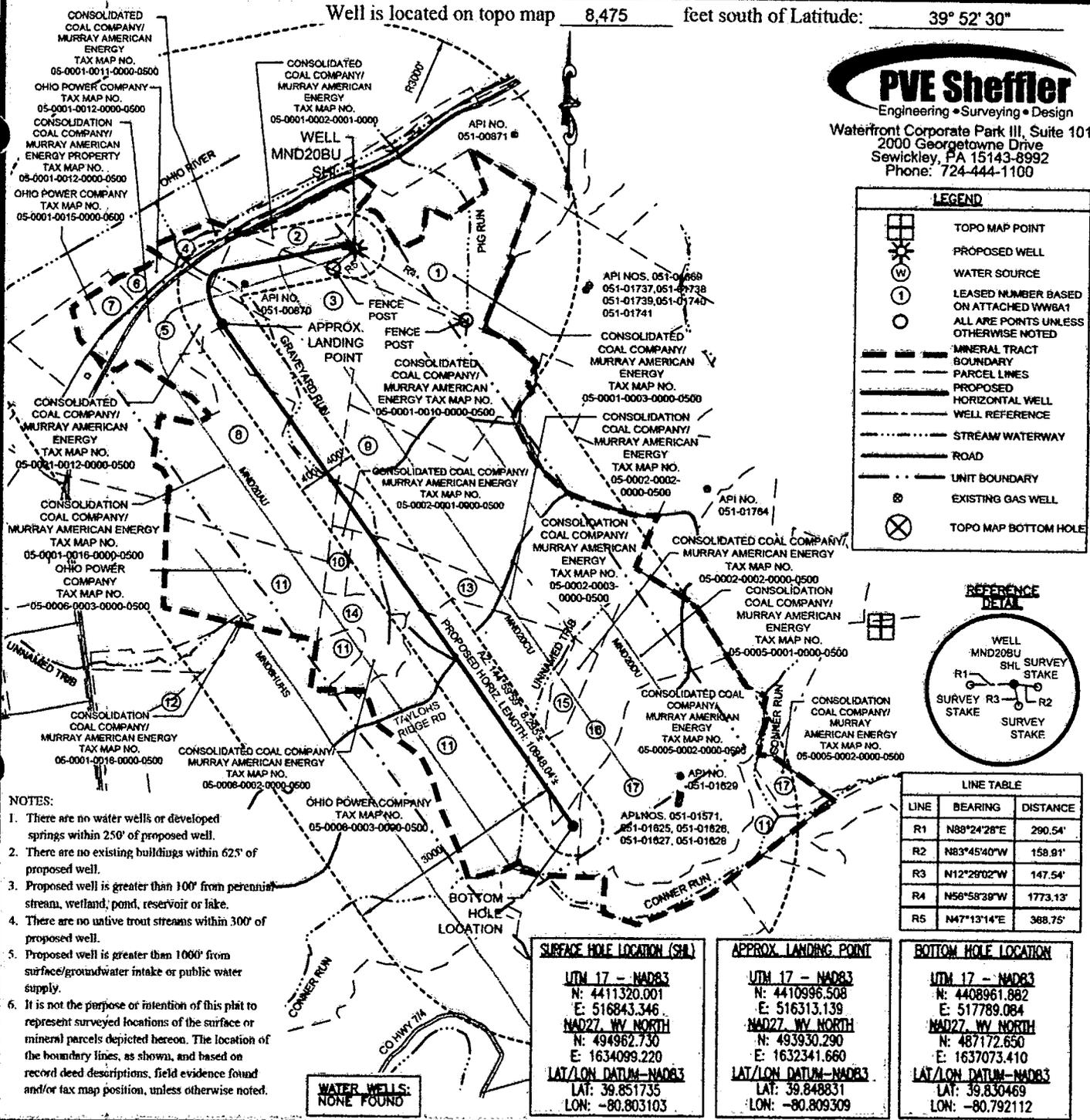
TD @ +/-10742' TVD +/-19960' MD

Centralizer

Well is located on topo map 8,475 feet south of Latitude: 39° 52' 30"

PVE Sheffler
 Engineering • Surveying • Design
 Waterfront Corporate Park III, Suite 101
 2000 Georgetown Drive
 Sewickley, PA 15143-8992
 Phone: 724-444-1100

Well is located on topo map 3,211 feet west of Longitude: 80° 47' 30"



FILE #: MND 20 BU
 DRAWING #: MND 20 BU
 SCALE: 1"=2000'
 MINIMUM DEGREE OF ACCURACY: 1/2500
 PROVEN SOURCE: U.S.G.S. MONUMENT
 OF ELEVATION: H 138: 638.58'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

SIGNED: [Signature]
 R.P.E.: 21452 L.L.S.: P.S. NO.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1080.18'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,960' ±

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

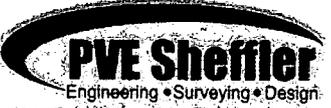
DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 BU

API WELL # 47 051 01868
 STATE COUNTY PERMIT

Bottom Hole is located on topo map 1,043 feet south of Latitude: 39° 50' 00"

Bottom Hole is located on topo map 125 feet west of Longitude: 80° 47' 30"

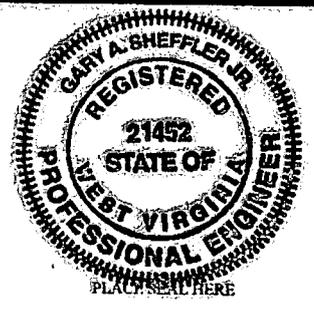


Engineering • Surveying • Design
Waterfront Corporate Park III, Suite 101
2000 Georgetowne Drive
Sewickley, PA 15143-8992
Phone: 724-444-1100

FILE #: MND 20 BU
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WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 BU

API WELL # 47 051 01868
STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1080.18'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWATAN POINT, W. VA / OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY / MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
PLUG-OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,960'

WELL OPERATOR: NOBLE ENERGY, INC DESIGNATED AGENT: JESSICA ALSOP

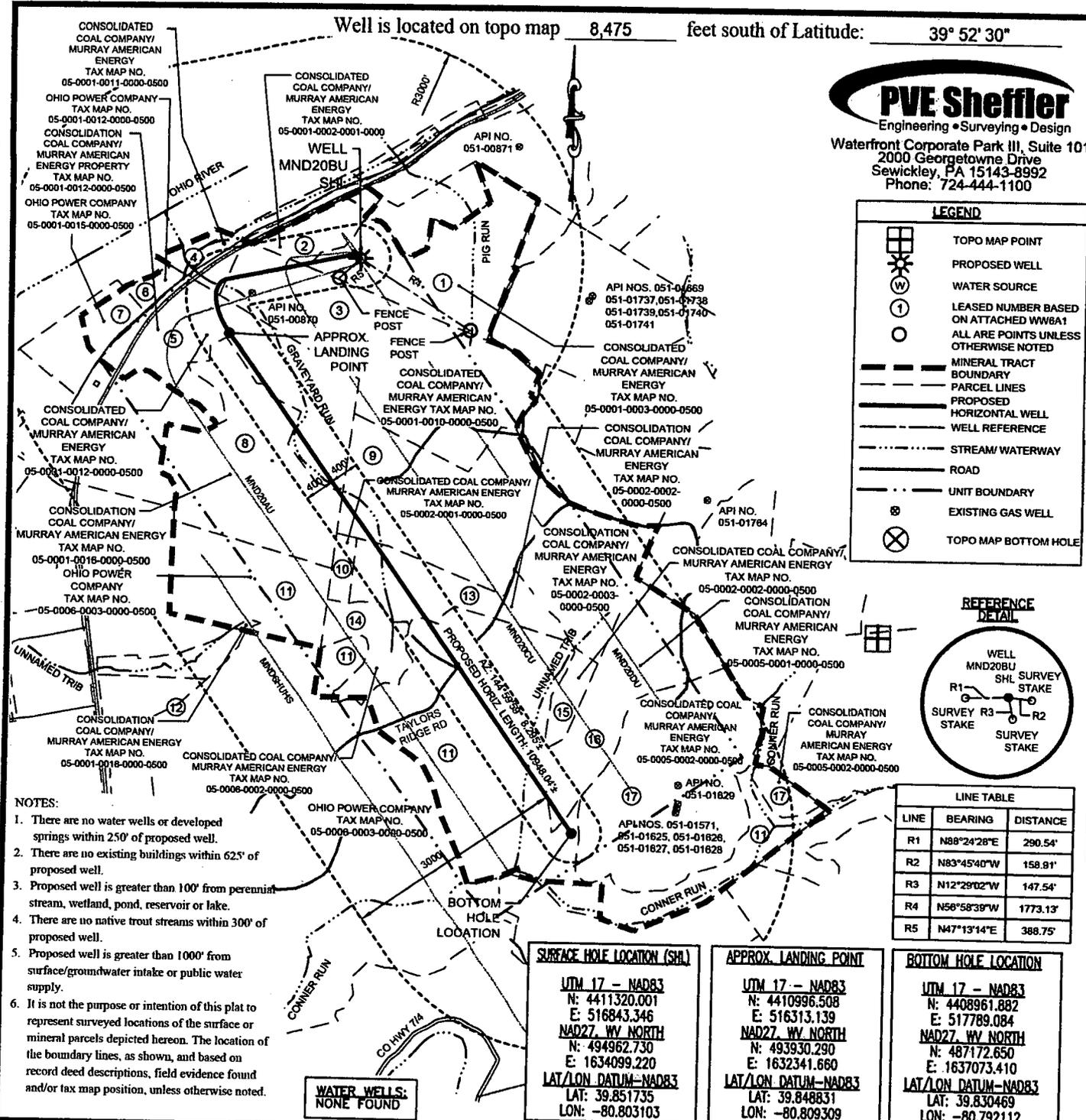
Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City: CANONSBURG State: PA Zip Code: 15317 City: MORGANTOWN State: WV Zip Code: 26508

Well is located on topo map 8,475 feet south of Latitude: 39° 52' 30"

PVE Sheffler
 Engineering • Surveying • Design
 Waterfront Corporate Park III, Suite 101
 2000 Georgetowne Drive
 Sewickley, PA 15143-8992
 Phone: 724-444-1100

Well is located on topo map 3,211 feet west of Longitude: 80° 47' 30"



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SIGNED: [Signature]
 R.P.E.: 21452 L.L.S.: P.S. NO.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER
 COUNTY/DISTRICT: MARSHALL / CLAY
 SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY
 OIL & GAS ROYALTY OWNER: CNX GAS COMPANY

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT
 WELL OPERATOR: NOBLE ENERGY, INC.
 Address: 1000 NOBLE ENERGY DRIVE
 City CANONSBURG State PA Zip Code 15317

DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015
 OPERATOR'S WELL #: MND 20 BU
 API WELL # 47 051
 STATE COUNTY PERMIT

ACREAGE: 70.55
 ELEVATION: 1080.18'
 QUADRANGLE: POWHATAN POINT, W. VA./OHIO
 ACREAGE: 70.55

ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,960' ±
 DESIGNATED AGENT: JESSICA ALSOP
 Address: 1031 BRETTWALD DRIVE
 City MORGANTOWN State WV Zip Code 26508



Bottom Hole is located on topo map 1,043 feet south of Latitude: 39° 50' 00"

Bottom Hole is located on topo map 125 feet west of Longitude: 80° 47' 30"

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SIGNED: *Gary A. Sheffler Jr.*
 R.P.E.: 21452 L.L.S.: P.S. NO. _____



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 BU

API WELL # 47 051
 STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1080.18'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

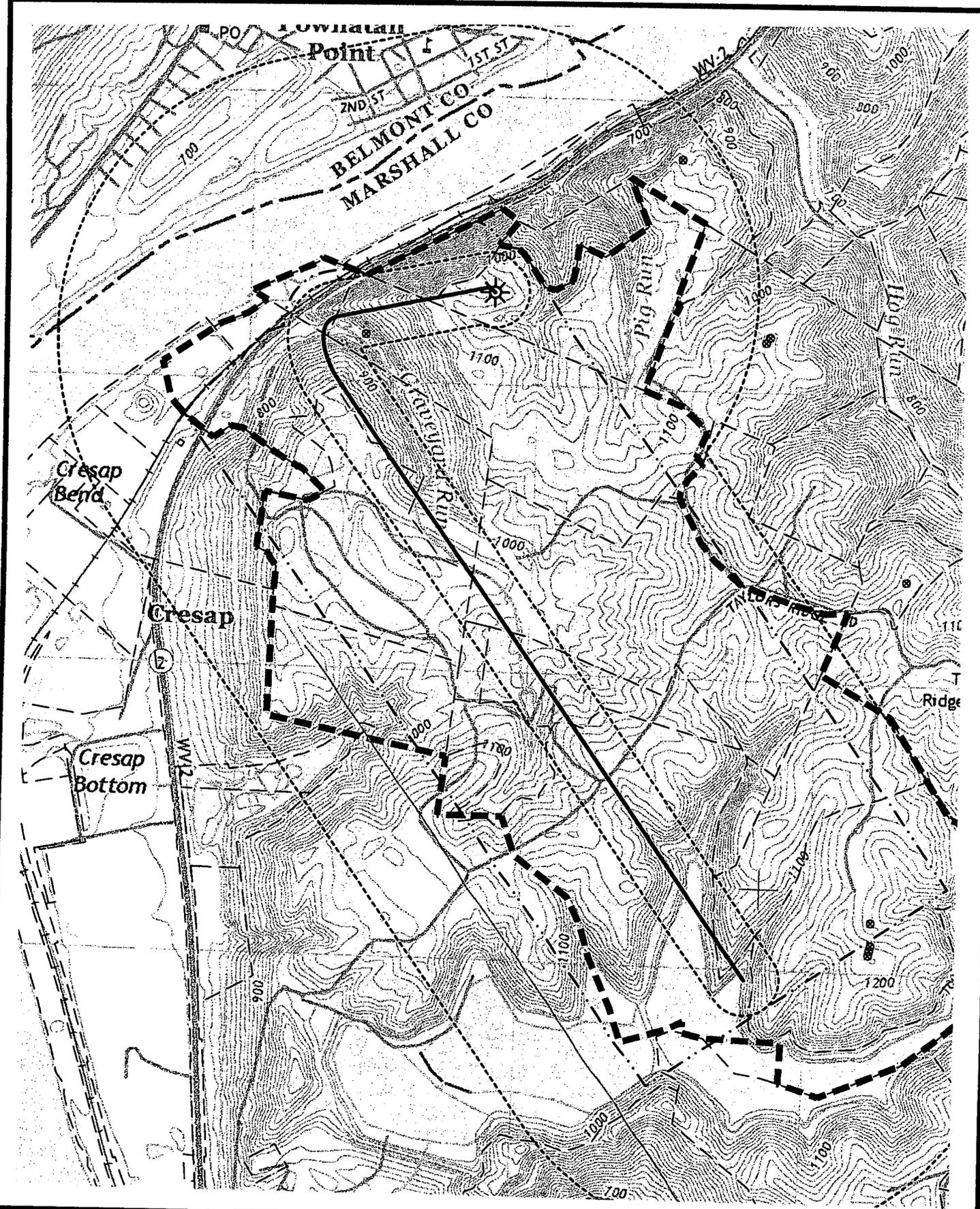
DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,960±

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
 WVDEP
 OFFICE OF OIL & GAS
 601 57TH STREET
 CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV: SEPTEMBER 10, 2015

OPERATOR'S WELL #: MND 20 BU

API WELL #	<u>47</u>	<u>051</u>	
	STATE	COUNTY	PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1080.18'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT

WELL OPERATOR: NOBLE ENERGY, INC.

Address: 1000 NOBLE ENERGY DRIVE

City CANONSBURG State PA Zip Code 15317

ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,960'±

DESIGNATED AGENT: JESSICA ALSOP

Address: 1031 BRETTWALD DRIVE

City MORGANTOWN State WV Zip Code 26508

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc. 494501907 051-Marshall Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: MND 20 CU Well Pad Name: MND 20

3) Farm Name/Surface Owner: Murray Energy (Consolidation Coal Company) Public Road Access: Taylor's Ridge Road

4) Elevation, current ground: 1079.21 Elevation, proposed post-construction: 1058.4

5) Well Type (a) Gas Oil Underground Storage

Other

(b) If Gas Shallow Deep

Horizontal

6) Existing Pad: Yes or No No

JN 8/17/15

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant 10662'-10782' / 120' Thick / 9668 psi

8) Proposed Total Vertical Depth: 10,742'

9) Formation at Total Vertical Depth: Point Pleasant

10) Proposed Total Measured Depth: 19,356'

11) Proposed Horizontal Leg Length: 8,144'

12) Approximate Fresh Water Strata Depths: 445', 708', 805'

13) Method to Determine Fresh Water Depths: Nearest offset well

14) Approximate Saltwater Depths: na

15) Approximate Coal Seam Depths: 526'-536'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar - maps attached

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

(a) If Yes, provide Mine Info: Name: McElroy Mine

Depth: 526-536'

Seam: Pittsburgh #8

Owner: Consolidation Coal Company

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18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	New	LS	94	40'	40'	Surface to TD
Fresh Water	20"	New	J-55	94	936'	936'	CTS
I Intermediate	13 3/8"	New	J-55	54.5	2154'	2154'	CTS
Intermediate	9 5/8"	New	P-110	47	9200'	9200"	CTS
Production	5 1/2"	New	P-110	23.0	19,356'	19,356'	10% excess TOC=1000' above 9.625 shoe
Tubing							
Liners							

JN 8/17/15

<u>TYPE</u>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	30"	36"	0.375			Type I	Surface to TD
Fresh Water	20"	24"	0.438	2110		Class A	30% excess Yield =1.18
Coal Intermediate	13 3/8"	17.5"	0.380	2730		Class A	30% excess Yield =1.18
Intermediate	9 5/8"	12.375" / 12.25"	0.472	9440		Class A	20% Excess to Surface
Production	5 1/2"	8.5"	0.415	16,510	13,000	Class H	10% excess Yield TOC =1000' above 9.625" shoe
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Point Pleasant at an estimated total vertical depth of approximately 10,742 feet. Drill Horizontal leg - stimulate and produce the Point Pleasant Formation. Should we encounter formation issues, set the 20" into next competent formation but not deeper than elevation. Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. our maximum pressure is not to exceed 10,000 lbs.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.39

22) Area to be disturbed for well pad only, less access road (acres): 9.69

23) Describe centralizer placement for each casing string:

Conductor - No centralizers used. Fresh Water/Surface - Bow Spring centralizers every 3 joints to 100' from surface. 1st Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Production - Rigid Bow Spring every third joint from KOP to TOC. Rigid Every joint to KOP.

24) Describe all cement additives associated with each cement type:

See attached sheet - Conductor - Type I to Surface. Surface/ Fresh Water - 15.6 ppg Class A + 2% CaCl, 0.25# Lost Circ 30% Excess Yield = 1.18. 1st Intermediate - 15.6 ppg Class A +2% CaCl, 0.25# Lost Circ. 30% Excess Yield = 1.18.
Intermediate - 2 Stage Cement Job with 14.5ppg Class A lead + additives (antisetling, antifoam, fluid loss, retarder, salt, viscosifer) & 15.6ppg Class A tail with additives (antisetling, antifoam, fluid loss, retarder, salt, dispersant or 12.0 Class A Lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield =2.47) 13.5 ppg Class A tail + additive (+/- .5% fluid loss additive, .25% freewater additive, & .5% light weight additive, Yield =1.57), 0.125#/sk lost Circ 20% excess to Surface.
Production - 14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisetling, extender, dispersant) 10% Excess TOC >=1000' above 9.625" shoe.

25) Proposed borehole conditioning procedures:

Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water/Surface -The hole is drilled w/air or Freshwater based mud and casing is run on air. Once casing is at setting depth, fill with KCl water circulate a minimum of one hole volume prior to pumping cement. First Intermediate - Drilled on air. Once casing is at a setting depth, circulate a minimum of once hole volume prior to pumping cement. Second Intermediate - Drilled on air. fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement. Production - drilled on +/- 14.5ppg SOB.M. Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.

Received
Office of Oil & Gas

Fresh Water Protection String:**Cement Additives**

Allied Material Name	Additive (Material) Type	Additive (Material) Description	CAS #
CCAC (Class A Common)	Base Cement	Grey powder	65997-15-1
CA-100	Accelerator	White, flake	10043-52-4 7447-40-7 7732-18-5 7647-14-5
CLC-CPF (Cellophane Flakes)	Lost Circulation Aid	White and colored flake	Non-Hazardous

Received
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SEP 02 2015



DRILLING WELL PLAN
MND-20C-UHS (Utica HZ)
 Utica Shale Horizontal
 Marshall County, WV

Ground Elevation		1059'		MND-20C SHL (Lat/Long)		(494976.91N, 1634113.24E) (NAD27)				
Azim		145°		MND-20C LP (Lat/Long)		(494409.04N, 1633227.21E) (NAD27)				
WELLBORE DIAGRAM		145°		MND-20C BHL (Lat/Long)		(487738.42N, 1637898.03E) (NAD27)				
HOLE	CASING	GEOLOGY	TOP	BOTTOM	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
36"	30" 94# LS	Conductor		40	Air	Type 1 to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.375" wall thickness	
		Pittsburgh Coal	526	526	Air or Fresh Water Based Mud	15.8 ppg Class A + 2% CaCl ₂ 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Water protection & coal isolation string, casing set 400' below Pit coal, Surface casing = 0.438" wall thickness Burst=2110 psi	
24"	20" 94# J-55 BTC	Surface Casing		936						
		Big Lime	1625	1741	Air	15.8 ppg Class A + 2% CaCl ₂ 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Isolate Big Injun, casing set 300' below Big Injun, Intermediate casing = 0.380" wall thickness Burst=2730 psi	
17.5"	13-3/8" 54.5# J-55 BTC	Big Injun	1741	1854						
		1st Intermediate Casing		2154						
12.375"-12.25"	9-5/8" 47# P-110 BTC	5th Sand	2599	2628						
		Speechley	3156	3202						
		Warren	3770	3784						
		Java	4707	4802						
		Pipe Creek	4802	4889						
		Angola	4889	5471						
		Rheinstreet	5471	5792						
		Cashaqua	5792	5864						
		Middlesex	5864	5887						
		West River	5887	5948						
		Burkett	5948	5973						
		Tully Limestone	5973	5997						
		Hamilton	5997	6032						
		Marcellus	6032	6087						
		Onondaga	6087	6095						
		Huntersville	6095	6309						
		Oriskany	6309	6421						
		Helderberg	6421	6681						
		Bass Island Dolomite	6681	6760						
		Salina G - "Big Lime"	6760	6960						
Salina F	6960	7759								
Lockport	7759	8081								
Rochester Shale	8081	8386								
Dayton Fm/Packer Shell	8386	8492								
Cinton	8492	8575								
Medina	8575	8674								
Queenston	8674	9431								
		Intermediate Casing	9074' TVD, +/-9200' MD							
8.5" Curve	5-1/2" 23# HCP-110 Wedge 563	Reedsville	9431	10049						
		Utica	10049	10662						
		Point Pleasant	10662	10782						
8.5" Lateral	5-1/2" 23# HCP-110 TXP BTC	TARGET	10742							

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LP @ 10742' TVD / 11356' MD

8.5 Hole - Cemented Long String
 5-1/2" 23# HCP-110 TXP BTC/ Wedge 563

+/-8144' ft Lateral

TD @ +/-10742' TVD +/-19356' MD

Centralizers

Well is located on topo map 8,460 feet south of Latitude: 39° 52' 30"

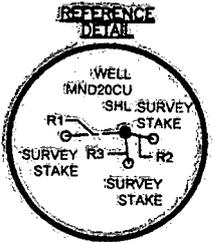
PVE Sheffler
 Engineering • Surveying • Design
 Waterfront Corporate Park III, Suite 101
 2000 Georgetowne Drive
 Sewickley, PA 15143-8992
 Phone: 724-444-1100

NOTES:

1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream; wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, and based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

LEGEND

- TOPO MAP POINT
- PROPOSED WELL
- WATER SOURCE
- LEASED NUMBER BASED ON ATTACHED WM8A1
- ALL ARE POINTS UNLESS OTHERWISE NOTED
- MINERAL TRACT BOUNDARY
- PARCEL LINES
- PROPOSED HORIZONTAL WELL
- WELL REFERENCE
- STREAM/WATERWAY
- ROAD
- UNIT BOUNDARY
- EXISTING GAS WELL
- TOPO MAP BOTTOM HOLE



LINE TABLE

LINE	BEARING	DISTANCE
R1	N85°49'10"E	305.25'
R2	N77°40'32"W	147.34'
R3	N06°26'41"W	159.24'
R4	N56°20'42"W	1769.21'
R5	N47°05'47"E	408.68'

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION
UTM 17 - NAD83 N: 4411324.392 E: 516847.545 NAD27 - WV NORTH N: 494976.910 E: 1634113.240 LAT/LON DATUM - NAD83 LAT: 39.851774 LON: -80.803054	UTM 17 - NAD83 N: 4411111.418 E: 516606.214 NAD27 - WV NORTH N: 494291.280 E: 1633309.660 LAT/LON DATUM - NAD83 LAT: 39.849860 LON: -80.805881	UTM 17 - NAD83 N: 4409138.449 E: 518037.435 NAD27 - WV NORTH N: 487738.420 E: 1637898.030 LAT/LON DATUM - NAD83 LAT: 39.832055 LON: -80.789205

WATER WELLS:
NONE FOUND



Well is located on topo map 3,197 feet west of Longitude: 80° 47' 30"

FILE #: MND 20 CU

DRAWING #: MND 20 CU

SCALE: 1"=2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT H 138: 638.58'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

SIGNED: *[Signature]*

R.P.E.: 21452 L.L.S.: P.S. NO. _____



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP

OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1079.21'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO

SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55

OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) _____

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742 ± TMD: 19,356 ±

WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508



Bottom Hole is located on topo map 466 feet south of Latitude: 39° 50' 00"

Bottom Hole is located on topo map 11.010 feet west of Longitude: 80° 45' 00"

PVE Sheffler
 Engineering • Surveying • Design
 Waterfront Corporate Park III, Suite 101
 2000 Georgetown Drive
 Sewickley, PA 15143-8992
 Phone: 724-444-1100

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 OFFICE OF OIL & GAS
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 CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV. OCTOBER 15, 2015
 OPERATOR'S WELL #: MND 20 CU
 API WELL # 47 051 01869
 STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

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 WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP
 Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE
 City: CANONSBURG State: PA Zip Code: 15317 City: MORGANTOWN State: WV Zip Code: 26508

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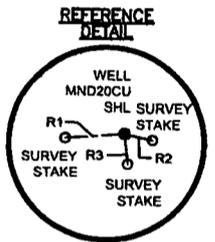
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 OFFICE OF OIL & GAS
 601 57TH STREET
 CHARLESTON, WV 25304

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER
 COUNTY/DISTRICT: MARSHALL / CLAY
 SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY
 OIL & GAS ROYALTY OWNER: CNX GAS COMPANY

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

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 WELL OPERATOR: NOBLE ENERGY, INC.
 Address: 1000 NOBLE ENERGY DRIVE
 City CANONSBURG State PA Zip Code 15317

DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015
 OPERATOR'S WELL #: MND 20 CU
 API WELL # 47 051
 STATE COUNTY PERMIT

ELEVATION: 1079.21'
 QUADRANGLE: POWHATAN POINT, W. VA./OHIO
 ACREAGE: 70.55
 ACREAGE: 70.55

ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,358±
 DESIGNATED AGENT: JESSICA ALSOP
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(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25304



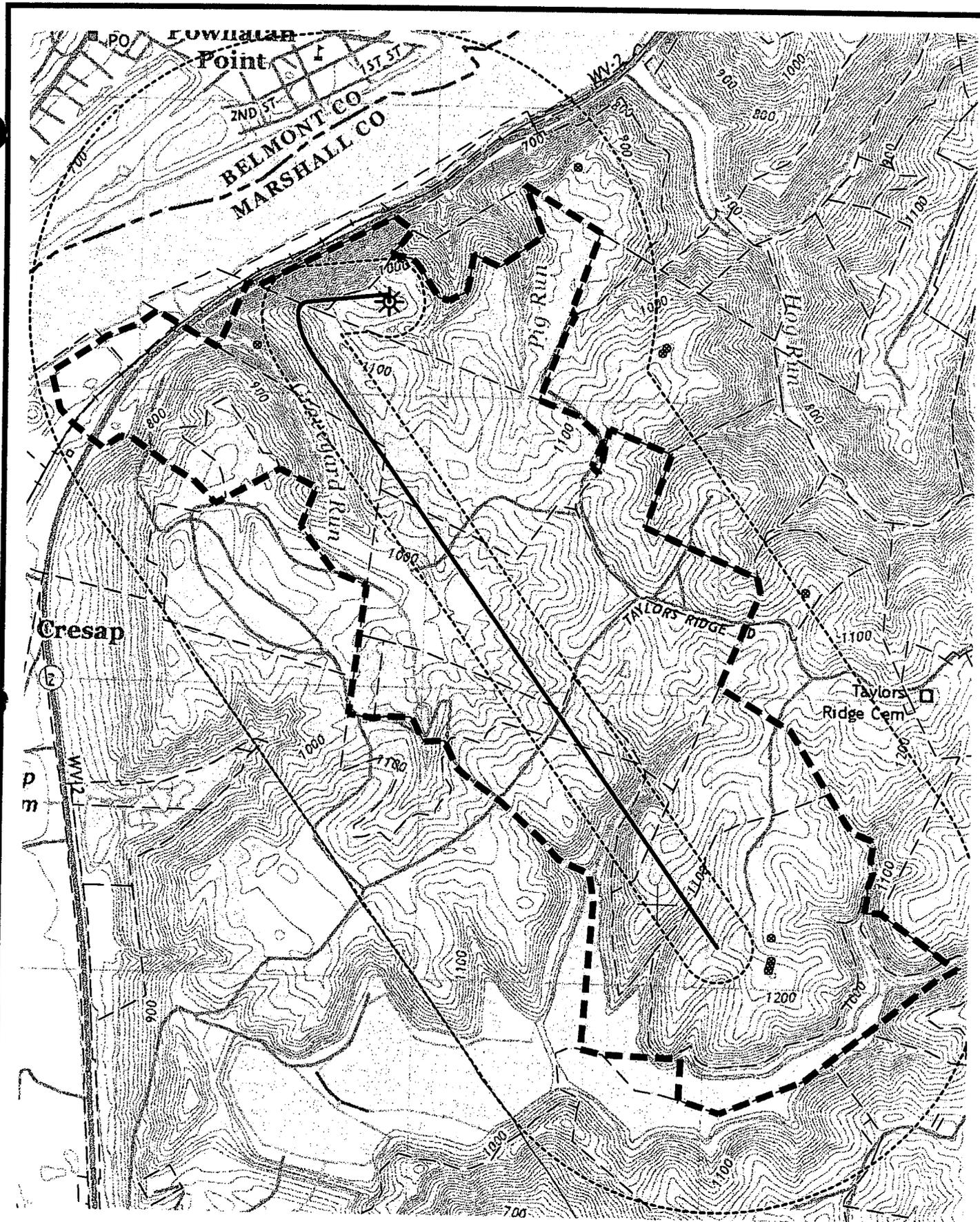
DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015
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City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508



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 WVDEP
 OFFICE OF OIL & GAS
 601 57TH STREET
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DATE: AUGUST 19, 2015 - REV: OCTOBER 15, 2015

OPERATOR'S WELL #: MND 20 CU

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WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP

Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE

City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc. 494501907 051-Marshall Franklin Powhatan Point
Operator ID County District Quadrangle

2) Operator's Well Number: MND 20 DU Well Pad Name: MND 20

3) Farm Name/Surface Owner: Murray Energy (Consolidation Coal Company) Public Road Access: Taylor's Ridge Road

4) Elevation, current ground: 1078.89 Elevation, proposed post-construction: 1058.4

5) Well Type (a) Gas Oil Underground Storage

Other

(b) If Gas Shallow Deep

Horizontal

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6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Point Pleasant 10662'-10782' / 120' Thick / 9668 psi

8) Proposed Total Vertical Depth: 10,742'

9) Formation at Total Vertical Depth: Point Pleasant

10) Proposed Total Measured Depth: 19,027'

11) Proposed Horizontal Leg Length: 7,922'

12) Approximate Fresh Water Strata Depths: 445', 708', 805'

13) Method to Determine Fresh Water Depths: Nearest offset well

14) Approximate Saltwater Depths: na

15) Approximate Coal Seam Depths: 526'-536'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar - maps attached

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

(a) If Yes, provide Mine Info: Name: McElroy Mine

Depth: 526-536'

Seam: Pittsburgh #8

Owner: Consolidation Coal Company

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18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	New	LS	94	40'	40'	Surface to TD
Fresh Water	20"	New	J-55	94	936'	936'	CTS
I Intermediate	13 3/8"	New	J-55	54.5	2154'	2154'	CTS
Intermediate	9 5/8"	New	P-110	47	9100'	9100"	CTS
Production	5 1/2"	New	P-110	23.0	19,027'	19,027'	10% excess TOC=1000' above 9.625 shoe
Tubing							
Liners							

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TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"	0.375			Type I	Surface to TD
Fresh Water	20"	24"	0.438	2110		Class A	30% excess Yield =1.18
Coal Intermediate	13 3/8"	17.5"	0.380	2730		Class A	30% excess Yield =1.18
Intermediate	9 5/8"	12.375" / 12.25"	0.472	9440		Class A	20% Excess to Surface
Production	5 1/2"	8.5"	0.415	16,510	13,000	Class H	10% excess Yield TOC =1000' above 9.625" shoe
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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 SEP 02 2015

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Point Pleasant at an estimated total vertical depth of approximately 10,742 feet. Drill Horizontal leg - stimulate and produce the Point Pleasant Formation. Should we encounter formation issues, set the 20" into next competent formation but not deeper than elevation. Should we encounter a unanticipated void we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. our maximum pressure is not to exceed 10,000 lbs.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.39

22) Area to be disturbed for well pad only, less access road (acres): 9.69

23) Describe centralizer placement for each casing string:

Conductor - No centralizers used. Fresh Water/Surface - Bow Spring centralizers every 3 joints to 100' from surface. 1st Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Intermediate - Bow Spring centralizers every 3 joints to 100' from surface. Production - Rigid Bow Spring every third joint from KOP to TOC. Rigid Every joint to KOP.

24) Describe all cement additives associated with each cement type:

See attached sheet - Conductor - Type I to Surface. Surface/ Fresh Water - 15.6 ppg Class A + 2% CaCl, 0.25# Lost Circ 30% Excess Yield = 1.18. 1st Intermediate - 15.6 ppg Class A +2% CaCl, 0.25# Lost Circ. 30% Excess Yield = 1.18.
Intermediate - 2 Stage Cement Job with 14.5ppg Class A lead + additives (antisettling, antifoam, fluid loss, retarder, salt, viscosifer) & 15.6ppg Class A tail with additives (antisettling, antifoam, fluid loss, retarder, salt, dispersant or 12.0 Class A Lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield =2.47) 13.5 ppg Class A tail + additive (+/-5%fluid loss additive, .25% freewater additive, & .5% light weight additive, Yield =1.57), 0.125#/sk lost Circ 20% excess to Surface.
Production - 14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisettling, extender, dispersant) 10% Excess TOC >=1000' above 9.625" shoe.

25) Proposed borehole conditioning procedures:

Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water/Surface -The hole is drilled w/air or Freshwater based mud and casing is run on air. Once casing is at setting depth, fill with KCl water circulate a minimum of one hole volume prior to pumping cement. First Intermediate - Drilled on air. Once casing is at a setting depth, circulate a minimum of once hole volume prior to pumping cement. Second Intermediate - Drilled on air. fill with salt saturated water once drilled to TD, once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement. Production - drilled on +/- 14.5ppg SBM. Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.

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Office of Public Safety
SEP 02 2015

Fresh Water Protection String:		Cement Additives	
Allied Material Name	Additive (Material) Type	Additive (Material) Description	CAS #
CCAC (Class A Common)	Base Cement	Grey powder	65997-15-1
CA-100	Accelerator	White, flake	10043-52-4 7447-40-7 7732-18-5 7647-14-5
CLC-CPF (Cellophane Flakes)	Lost Circulation Aid	White and colored flake	Non-Hazardous

Received
Office of Oil & Gas
SEP 02 2015



DRILLING WELL LOG
 MND-20D-UHS (Utica HZ)
 Utica Shale Horizontal
 Marshall County, WV

Ground Elevation		1059'		MND-20D SHL (Lat/Long)				(494960.84N, 1634129.63E) (NAD27)		
Azm		145°		MND-20D LP (Lat/Long)				(494793.06N, 1634179.09E) (NAD27)		
WELLBORE DIAGRAM		145°		MND-20D BHL (Lat/Long)				(488304.19N, 1638722.64E) (NAD27)		
HOLE	CASING	GEOLOGY	TOP	BOTTOM	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
36"	30" 94# LS	Conductor		40	Air	Type 1 to surface	N/A	Ensure the hole is clean at TD.	Stabilize surface fill/soil. Conductor casing = 0.375" wall thickness	
24"	20" 94# J-55 BTC	Pittsburgh Coal	526	526	Air or Fresh Water Based Mud	15.6 ppg Class A + 2% CaCl ₂ 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Water protection & coal isolation string, casing set 400' below Pit coal, Surface casing = 0.438" wall thickness Burst=2110 psi	
		Surface Casing	936							
17.5"	13-3/8" 54.5# J-55 BTC	Big Lime	1625	1741	Air	15.6 ppg Class A + 2% CaCl ₂ 0.25# Lost Circ 30% Excess Yield = 1.18	Bow spring centralizers every 3 joints to 100' from surface	Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Isolate Big Injun, casing set 300' below Big Injun, Intermediate casing = 0.380" wall thickness Burst=2730 psi	
		Big Injun	1741	1854						
		1st Intermediate Casing	2154							
12.375"-12.25"	9-5/8" 47# P-110 BTC	5th Sand	2599	2628	Air	2 Stage Cement Job with 14.5ppg Class A lead + additives (antisetting, antifoam, fluid loss, retarder, salt, viscosifier) & 15.6ppg Class A tail with additives (antisetting, antifoam, fluid loss, retarder, salt, dispersant) or 12.0 ppg Class A lead + additives (+/-5% dispersant, 10% light weight additive, .75% fluid loss additive and 1.15% fluid loss additive, Yield = 2.47)/13.5 ppg Class A tail + additives (+/-5% fluid loss additive, .25% freshwater additive, & 5% light weight additive, Yield = 1.57), 0.125#/sk Lost Circ 20% Excess To Surface	Bow spring centralizers every 3 joints to 100' from surface	Fill with salt saturated water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing to be set 400' into the Queenston. Intermediate Casing = 0.472" wall thickness Burst= 9440 psi Collapse=5300psi	
		Speechley	3156	3202						
		Warren	3770	3784						
		Java	4707	4802						
		Pipe Creek	4802	4889						
		Angola	4889	5471						
		Rheinstreet	5471	5792						
		Cashaqua	5792	5864						
		Middlesex	5864	5887						
		West River	5887	5948						
		Burkett	5948	5973						
		Tully Limestone	5973	5997						
		Hamilton	5997	6032						
		Marcellus	6032	6087						
		Onondaga	6087	6095						
		Huntersville	6095	6309						
		Oriskany	6309	6421						
		Helderburg	6421	6681						
		Bass Island Dolomite	6681	6760						
		Salina G - "Big Lime"	6760	6960						
		Salina F	6960	7759						
Lockport	7759	8081								
Rochester Shale	8081	8386								
Dayton Fm/Packer Shell	8386	8492								
Clinton	8492	8575								
Medina	8575	8674								
Queenston	8674	9431								
Intermediate Casing	9074' TVD, +/- 9100' MD									
8.5" Curve	5-1/2" 23# HCP-110 Wedge 563	Reedsville	9431	10049	+/-14.5ppg SOBM	14.8ppg Class H Lead + additives and 15.8ppg Class H Tail + additives (antifoam, antisetting, extender, dispersant) 10% Excess TOC >= 1000' above 9.625" shoe	Rigid Bow Spring every third joint from KOP to TOC	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=16510 psi Note:Actual centralizer schedules may be changed due to hole conditions	
		Utica	10049	10662						
8.5" Lateral	5-1/2" 23# HCP-110 TXP BTC	Point Pleasant	10662	10782			TARGET	10742	Rigid Bow Spring every joint to KOP	

JN 8/17/15

Office of Oil & Gas
 Received
 SEP 02 2015

LP @ 10742' TVD / 11206' MD

8.5 Hole - Cemented Long String
 5-1/2" 23# HCP-110 TXP BTC/Wedge 563

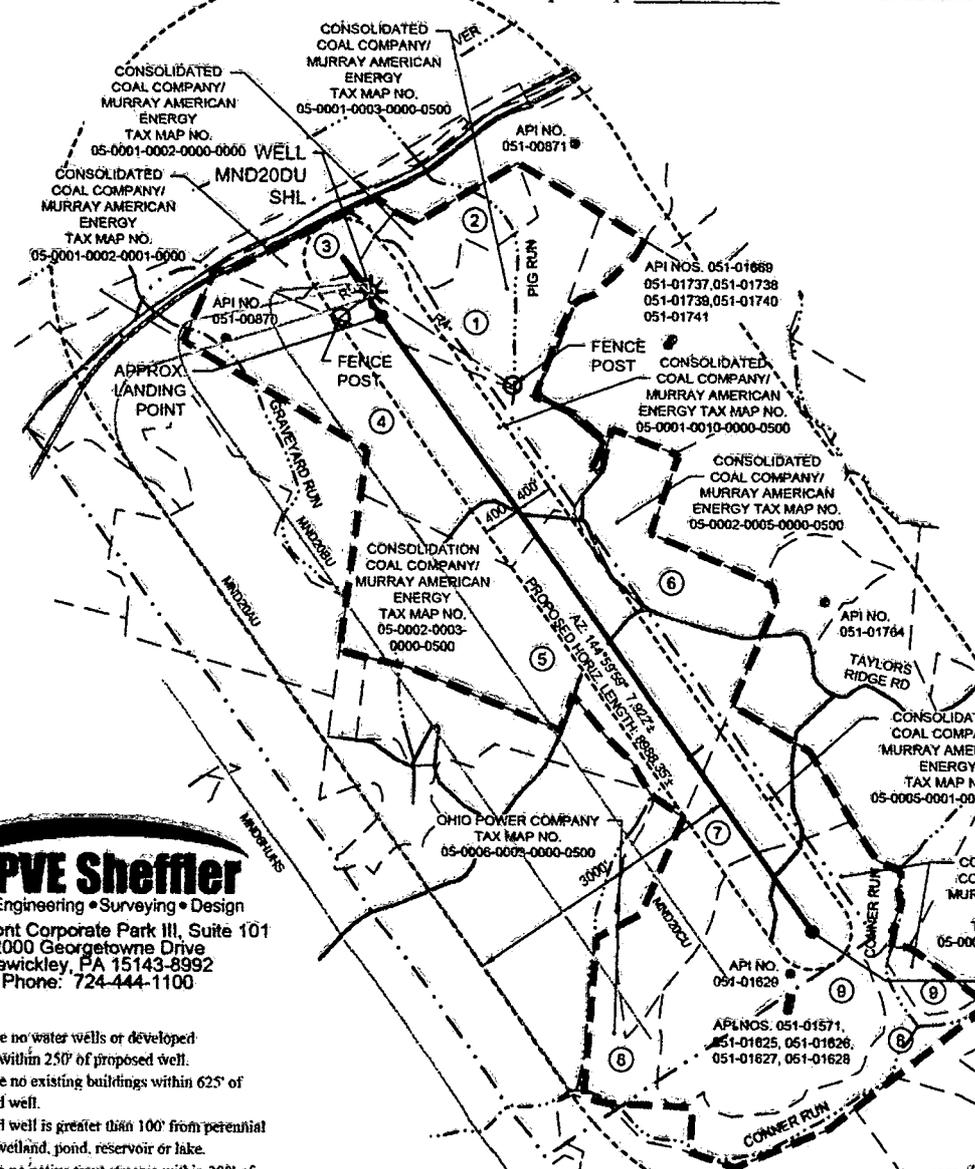
+/-7922' R Lateral

TD @ +/-10742' TVD
 +/-19027' MD

Centralizers

Well is located on topo map 8,476 feet south of Latitude: 39° 52' 30"

Well is located on topo map 3,180 feet west of Longitude: 80° 47' 30"

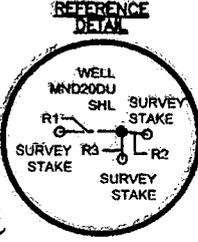


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- WELL REFERENCE
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- ROAD
- UNIT BOUNDARY
- EXISTING GAS WELL
- TOPO MAP BOTTOM HOLE

LINE TABLE

LINE	BEARING	DISTANCE
R1	N88°03'48"E	317.67'
R2	N83°43'12"W	131.55'
R3	N01°54'08"W	141.25'
R4	N58°34'15"W	1748.70'
R5	N50°07'06"E	407.28'



PVE Sheffler
Engineering • Surveying • Design
Waterfront Corporate Park III, Suite 101
2000 Georgetown Drive
Sewickley, PA 15143-8992
Phone: 724-444-1100

- NOTES:**
- There are no water wells or developed springs within 250' of proposed well.
 - There are no existing buildings within 625' of proposed well.
 - Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
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WATER WELLS:
NONE FOUND

SURFACE HOLE LOCATION (SHL)
UTM 17 - NAD83
N: 4411319.580
E: 516852.621
NAD27, WV NORTH
N: 494960.840
E: 1634129.630
LAT/LON DATUM - NAD83
LAT: 39.851731
LON: -80.802995

APPROX. LANDING POINT
UTM 17 - NAD83
N: 4411243.842
E: 516886.587
NAD27, WV NORTH
N: 494710.440
E: 1634236.940
LAT/LON DATUM - NAD83
LAT: 39.851048
LON: -80.802600

BOTTOM HOLE LOCATION
UTM 17 - NAD83
N: 4409315.016
E: 518285.783
NAD27, WV NORTH
N: 488304.190
E: 1638722.640
LAT/LON DATUM - NAD83
LAT: 39.833640
LON: -80.786297

FILE #: MND 20 DU
DRAWING #: MND 20 DU
SCALE: 1"=2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE U.S.G.S. MONUMENT
OF ELEVATION: H 138: 638.58'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

SIGNED: *[Signature]*
R.P.E.: 21452 L.L.S.: P.S. NO.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304



DATE: AUGUST 19, 2015 - REV. OCTOBER 15, 2015
OPERATOR'S WELL #: MND 20 DU
API WELL # 47 051 01870
STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

WATERSHED: SHORT CREEK-OHIO RIVER ELEVATION: 1078.89'
COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: POWHATAN POINT, W. VA./OHIO
SURFACE OWNER: CONSOLIDATION COAL COMPANY/ MURRAY ENERGY ACREAGE: 70.55
OIL & GAS ROYALTY OWNER: CNX GAS COMPANY ACREAGE: 70.55

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CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY)

TARGET FORMATION: POINT PLEASANT ESTIMATED DEPTH: TVD: 10,742' ± TMD: 19,027' ±
WELL OPERATOR: NOBLE ENERGY, INC. DESIGNATED AGENT: JESSICA ALSOP
Address: 1000 NOBLE ENERGY DRIVE Address: 1031 BRETTWALD DRIVE
City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508

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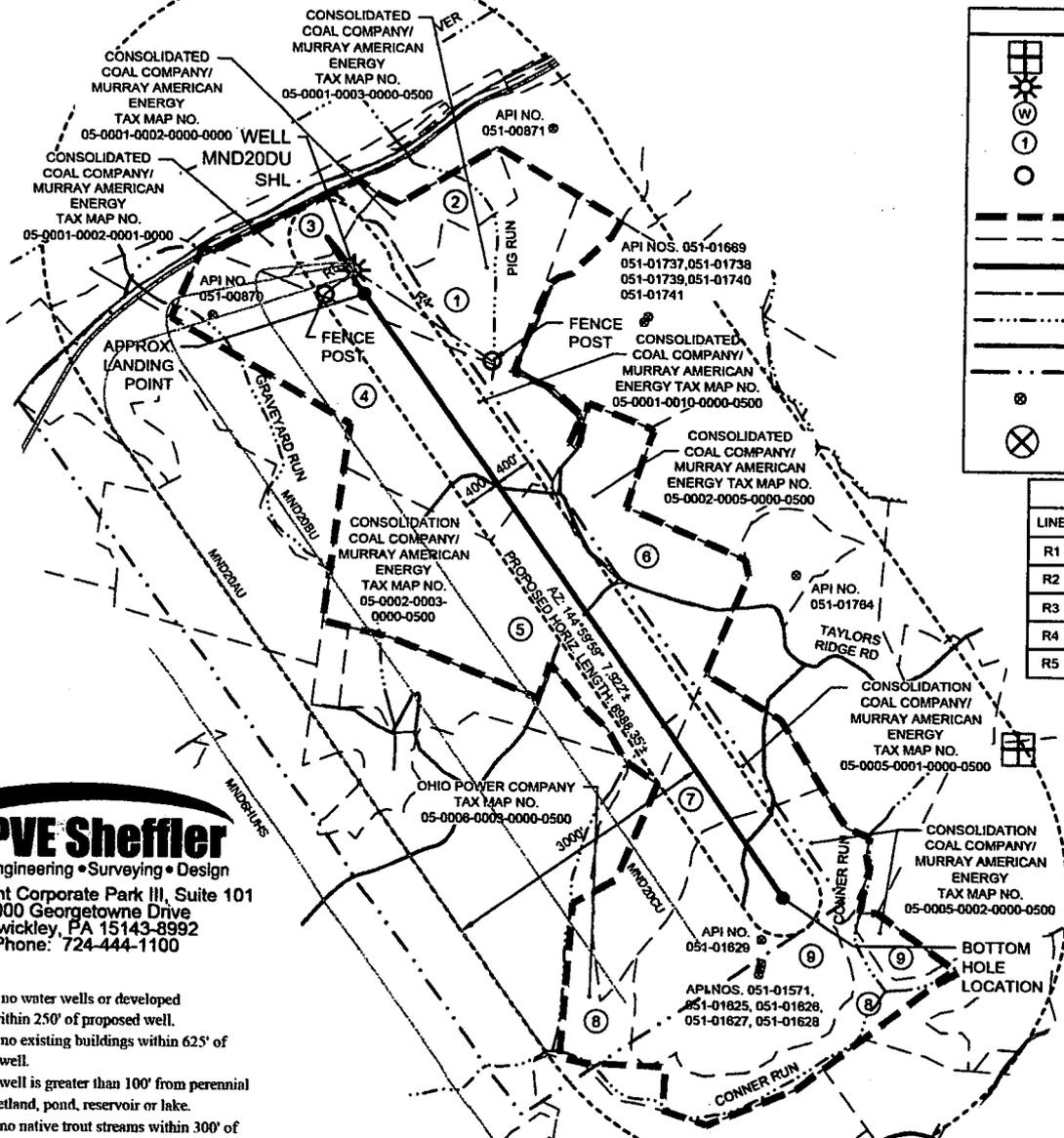
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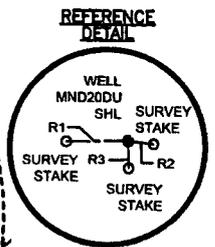


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R.P.E.: 21452 L.L.S.: P.S. NO.



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DATE: AUGUST 19, 2015 - REV. OCTOBER 15, 2015
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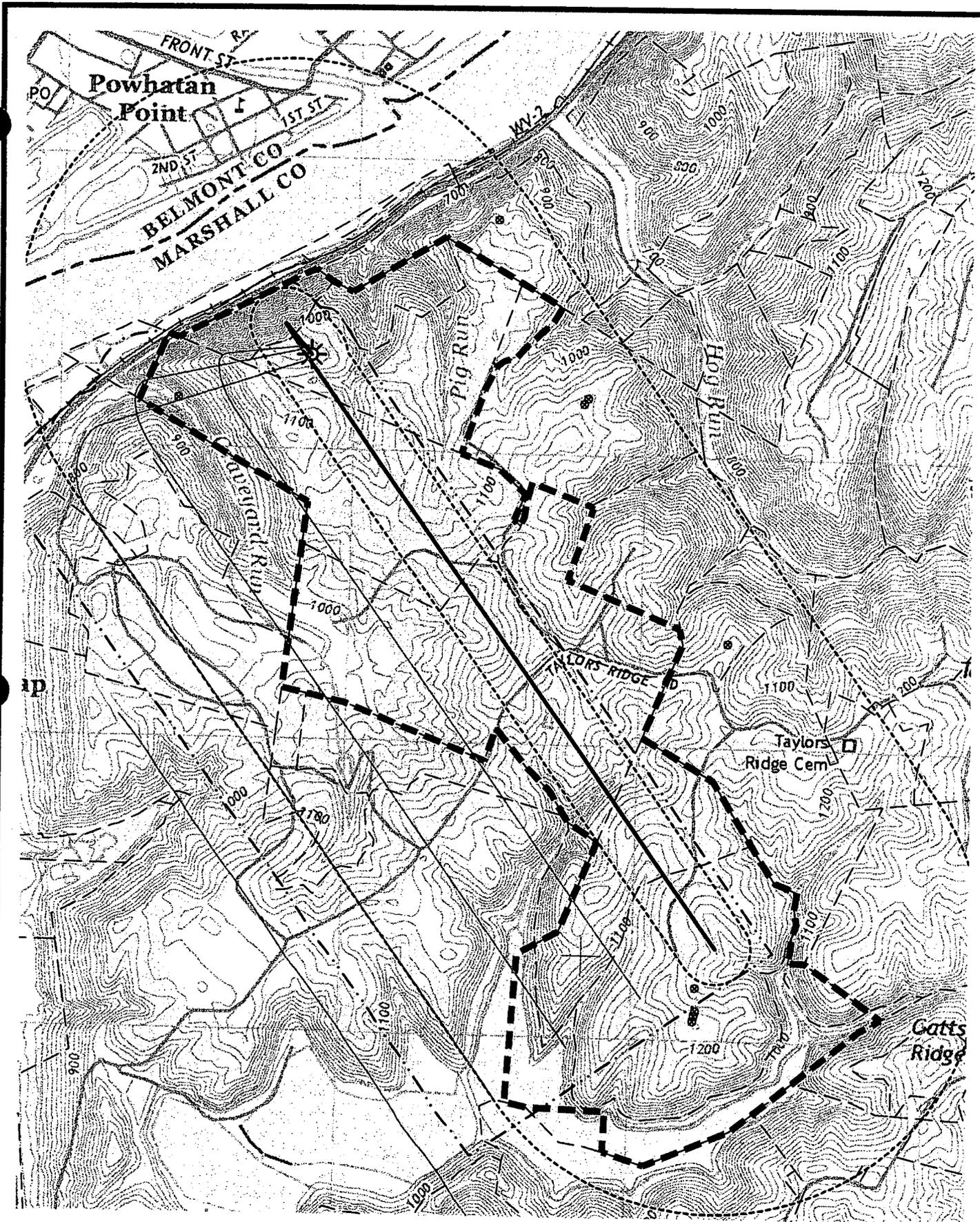
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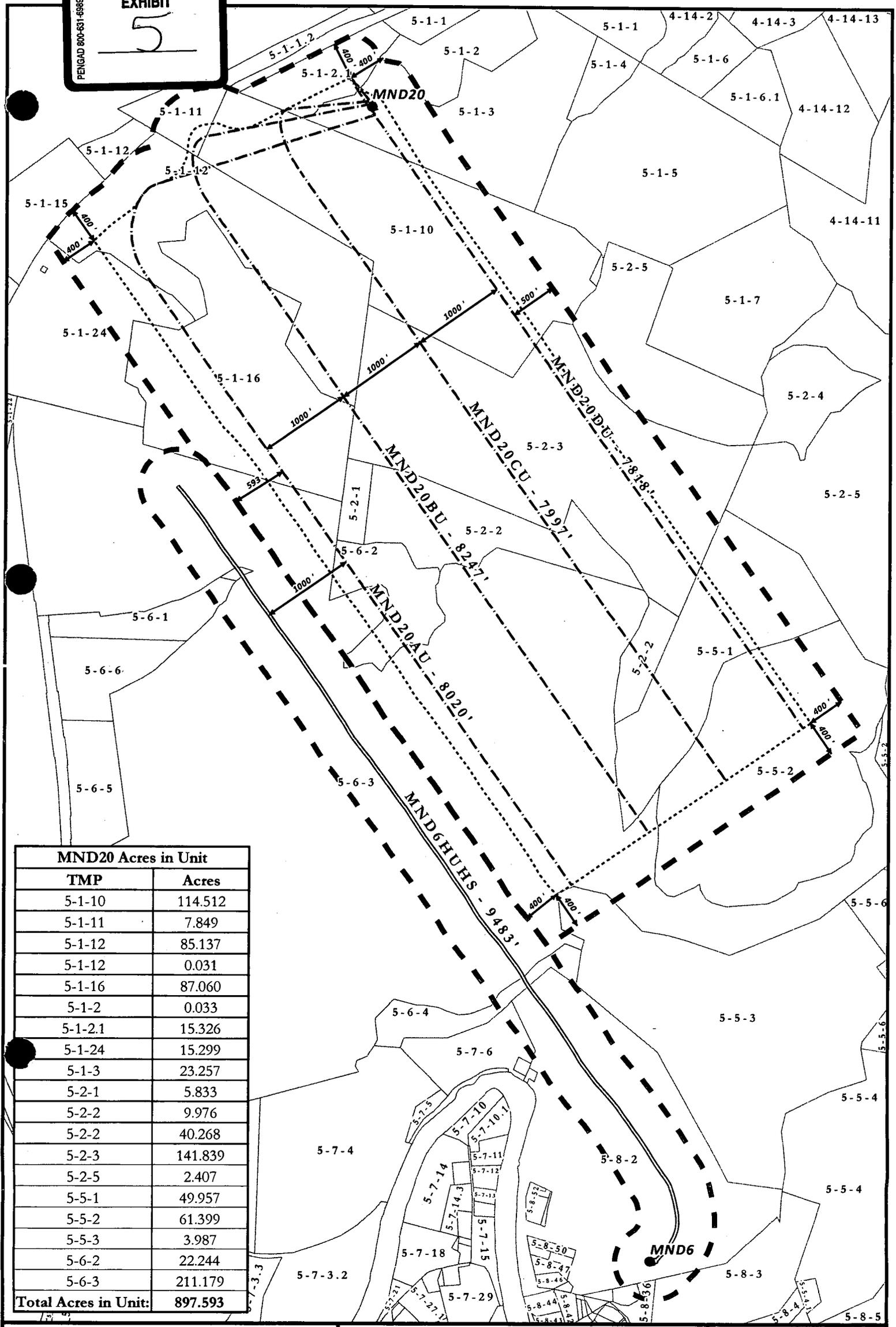
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City CANONSBURG State PA Zip Code 15317 City MORGANTOWN State WV Zip Code 26508



MND20 Acres in Unit	
TMP	Acres
5-1-10	114.512
5-1-11	7.849
5-1-12	85.137
5-1-12	0.031
5-1-16	87.060
5-1-2	0.033
5-1-2.1	15.326
5-1-24	15.299
5-1-3	23.257
5-2-1	5.833
5-2-2	9.976
5-2-2	40.268
5-2-3	141.839
5-2-5	2.407
5-5-1	49.957
5-5-2	61.399
5-5-3	3.987
5-6-2	22.244
5-6-3	211.179
Total Acres in Unit:	897.593

- Well Pad
- ↔ Measured Distance
- - - Planned Utica Well
- Completed Utica Well
- ⋯ 400 ft Buffer
- ▭ Unit Boundary
- ▭ Parcel Boundary

MND 20 Utica Unit - 897.593 ac.
Clay District - Marshall County, WV

0 600 1,200 2,400 Feet

1 Inch = 1,200 Feet

Author: TimHusson
 Date: September 10, 2015

noble energy

1
1

DEP - REQUEST FOR EXCEPTION HEARING
RE: Noble Engineering - Docket No. 236
October 28, 2015

Sheet 1 Page 1

BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF WEST VIRGINIA

DOCKET NO. 236
CAUSE NO. 226

IN THE MATTER OF THE REQUEST BY NOBLE ENERGY, INC.
FOR AN EXCEPTION TO RULE 39 CSR-1-4.2 REGARDING THE
DRILLING OF THE PROPOSED WELLS IDENTIFIED AS THE
MND 20 AU, BU, CU, AND DU TO BE LOCATED IN CLAY
DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.

Transcript of hearing had on the
28th day of October , 2015, at 10:05 a.m., at the
West Virginia Department of Environmental
Protection, located at 601 57th Street, SE,
Charleston, West Virginia, pursuant to the notice.

 COPY

Wendy M. Thomas
Certified Court Reporter

399 Blue Lick Road
Winfield, West Virginia 25213
304-541-0636
wvnoah@yahoo.com

DEP - REQUEST FOR EXCEPTION HEARING
RE: Noble Engineering - Docket No. 236
October 28, 2015

BEFORE:

BARRY K. LAY, CHAIRMAN
 BOB RADABAUGH, COMMISSIONER
 ANTHONY GUM, COMMISSIONER

CINDY RAINES, STAFF

GREG S. FOSTER
 Assistant Attorney General
 Division of Arts & Education

APPEARANCES:

ON BEHALF OF NOBLE ENERGY, INC.:

KENNETH E. TAWNEY, ESQUIRE
 Jackson Kelly, PLLC
 500 Lees Street, East, Suite 1600
 Charleston, West Virginia 25301-3202

Also Present:

Dee Swiger, Regulatory Analyst with Noble
 Brian Leonhard, Operations Landman
 Rob Benyo, Well Engineering & Well Execution Manager
 for Noble
 Ted Romig, Geologist for Noble Energy

1 CHAIRMAN LAY: Before the Oil and Gas
 2 Conservation Commission of the State of West Virginia, in
 3 the matter of the request by Noble Energy, Incorporated,
 4 for an exception to Rule 39 CSR 1-4.2 regarding the
 5 drilling of the proposed wells identified as the MND 20 AU,
 6 BU, CU, and DU to be located in Clay District, Marshall
 7 County, West Virginia. This is Docket Number 236. Cause
 8 Number 226. Let the record show that present are members
 9 of the Commission, Anthony Gum, Robert Radabaugh, and Barry
 10 Lay. Also present are Greg Foster, Counsel, and Cindy
 11 Raines of staff. I would like to place of record as
 12 exhibits to the Commission, Exhibit 1, a copy of the Notice
 13 of Hearing, along with the Certified Mail Receipts.
 14 (WHEREUPON, Exhibit No. 1 was
 15 marked for identification.)
 16 CHAIRMAN LAY: Exhibit 2 is a copy of the Notice
 17 of Hearing on the Secretary of State's website.
 18 (WHEREUPON, Exhibit No. 2 was
 19 marked for identification.)
 20 CHAIRMAN LAY: Exhibit 3 is a copy of the Class
 21 II legal advertisement in the Moundsville Newspaper, the
 22 Daily Echo.
 23 (WHEREUPON, Exhibit No. 3 was
 24 marked for identification.)

CONTENTS

WITNESS	EXAMINATION
Brian Leonhard	Mr. Tawney - Pg 6 Chairman Lay - Pg 15
Ted Romig	Mr. Tawney - Pg 16 Chairman Lay - Pg 23
Rob Benyo	Mr. Tawney - Pg 28 Chairman Lay - Pg 32
EXHIBIT	MARKED
Exhibit No. 1	Pg 4
Exhibit No. 2	Pg 4
Exhibit No. 3	Pg 4
Exhibit No. 4	Pg 5
Exhibit No. 5	Pg 5

Reporter's Certificate - Pg 36

1 CHAIRMAN LAY: Exhibit 4, copies of the pertinent
 2 information from the applications in their entirety to the
 3 proposed four wells.
 4 (WHEREUPON, Exhibit No. 4 was
 5 marked for identification.)
 6 CHAIRMAN LAY: And Exhibit 5 is an exhibit
 7 showing the outline of the proposed unit and the wells, and
 8 their relationship to themselves and an existing well.
 9 (WHEREUPON, Exhibit No. 5 was
 10 marked for identification.)
 11 CHAIRMAN LAY: At this time the Commission will
 12 take appearances.
 13 MR. TAWNEY: Kenneth Tawney, counsel for Noble,
 14 with the law firm of Jackson Kelly, PLLC.
 15 MS. SWIGER: Dee Swiger, Regulatory Analyst with
 16 Noble.
 17 MR. LEONHARD: Brian Leonhard, Operations
 18 Landman.
 19 MR. BENYO: Rob Benyo, Well Engineering & Well
 20 Execution Manager for Noble.
 21 MR. ROMIG: Ted Romig, Geologist for Noble
 22 Energy.
 23 CHAIRMAN LAY: Any housekeeping issues, Mr.
 24 Tawney?

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1 MR. TAWNEY: None. If I may, though, if I could
2 just see what you identified as Exhibit 5, because I think
3 it's the same exhibit that we're going to talk about.
4 (Examines document.) And it is, so that's good.
5 CHAIRMAN LAY: Okay. If that's all the
6 housekeeping issues, you can call your first witness.
7 MR. TAWNEY: We would like to call Brian
8 Leonhard.
9 CHAIRMAN LAY: Please take the stand. Court
10 reporter, please swear him in.
11 (Witness sworn.)
12 WHEREUPON,
13 BRIAN LEONHARD,
14 was called as a witness and, after being duly sworn,
15 testified as follows:
16 DIRECT EXAMINATION
17 BY MR. TAWNEY:
18 Q. Would you state your full name, please?
19 A. Brian Leonhard.
20 Q. And where do you live?
21 A. Canonsburg, Pennsylvania.
22 Q. By whom are you employed?
23 A. Noble Energy.
24 Q. What is your job title?

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1 A. I'm an Operations Landman.
2 Q. What are your duties as an operations landman?
3 A. Land acquisition and title work for individual
4 drilling units for Noble Energy.
5 Q. What is your educational background?
6 A. I have my Bachelor's Degree in Business
7 Administration from Westminster College in Pennsylvania.
8 I'm currently working on my Master's in Energy Business
9 through the University of Tulsa.
10 Q. And how long have you worked for Noble?
11 A. Three years.
12 Q. And by way of background, where does Noble
13 operate in West Virginia?
14 A. My particular area is Marshall County, but we
15 also have operations in Tyler, Doddridge, Pleasant and
16 Gilmore counties.
17 Q. And Ritchie?
18 A. And Ritchie, yes. I'm sorry.
19 Q. And how many horizontal Marcellus wells has Noble
20 drilled?
21 A. Two hundred and twenty two.
22 Q. How many are producing?
23 A. One hundred and sixty seven.
24 Q. Has Noble drilled any wells to the Point Pleasant

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1 formation?
2 A. Yes.
3 Q. How many?
4 A. One.
5 Q. Okay. Can you identify that well?
6 A. That's the MND 6 HU.
7 Q. And is -- well, we'll get to that in a minute.
8 Are you familiar with Noble's MND 20 well pad and the MND
9 20 AU, BU, CU, and DU wells that Noble plans to drill from
10 that pad?
11 A. Yes, sir.
12 Q. The plat has already been marked as Exhibit 5.
13 Does everyone have a copy?
14 (WHEREUPON, a discussion was
15 had off record.)
16 BY MR. TAWNEY:
17 Q. Referring to Exhibit 5, what is it?
18 A. This is our plat of the proposed MND 20 unit
19 boundary, showing all four wells off of the same pad, and
20 its relation to our MND 6 HU well.
21 Q. Has Noble obtained 100 percent of the leases or
22 oil and gas ownership interests for the MND 20 unit?
23 A. Yes.
24 Q. And you have pooling rights for all the tracts in

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1 this unit?
2 A. Correct. This is a voluntary unit.
3 Q. So we're not here to request any mandatory
4 pooling orders from the Commission?
5 A. No, sir.
6 Q. Now, can you point out the well pad location on
7 Exhibit 5?
8 A. The red dot on the northeast corner of the unit
9 plat.
10 Q. It's shown as MND 20?
11 A. Correct.
12 Q. And are the horizontal well bore pads shown on
13 the map?
14 A. Yes.
15 Q. What are they?
16 A. We have the MND 20 AU, BU, CU, and DU horizontal
17 well bores.
18 Q. And are the outside wells at least 400 feet from
19 the unit boundary?
20 A. Yes.
21 Q. And the toe of the wells are at least 400 feet
22 from the boundary of the unit?
23 A. Yes.
24 Q. And even at the, we'll call it the northwestern

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1 boundary line, those are also 400 feet from the unit
2 boundary?
3 **A. Yes.**
4 Q. Now, you talked about the MND 6 HU well. Is that
5 commonly referred to as the Moundsville 6 well?
6 **A. It is.**
7 Q. And is it shown on this plat?
8 **A. Yes.**
9 Q. Where is it?
10 **A. To the southwest of the proposed MND 20 unit.**
11 Q. So what is marked in red is the MND 6, is the
12 well pad and location of that well?
13 **A. Yes.**
14 Q. Is there only one well drilled to the Point
15 Pleasant formation from that pad?
16 **A. Yes.**
17 Q. Are there other wells on that pad?
18 **A. There are Marcellus wells on that pad.**
19 Q. So is the well bore of the Moundsville 6 well
20 shown, the path of the well bore?
21 **A. Yes.**
22 Q. And that is the green line running from the MND 6
23 well pad?
24 **A. Yes.**

Page 11

1 Q. I also see distances on the plat after the well
2 designations. What does that represent?
3 **A. That represents the spacing between the proposed**
4 **well paths, so 1,000 feet in between each.**
5 Q. And is Noble proposing to drill these wells 1,000
6 feet apart?
7 **A. Yes.**
8 Q. And there's also a distance shown between MND 20
9 AU and the Moundsville 6. Is Noble proposing to drill the
10 MND 20 AU well 1,000 feet from the Moundsville 6 lateral?
11 **A. Yes.**
12 Q. Would the BU well be within 3,000 feet of the
13 Moundsville 6?
14 **A. Yes.**
15 Q. It would be 2,000 feet?
16 **A. Two thousand feet.**
17 Q. And the CU well would be right at 3,000 feet from
18 the Moundsville 6?
19 **A. Correct.**
20 Q. And then the lateral distances are also reflected
21 on the map after the well name?
22 **A. They are.**
23 Q. And I can't recall if I asked you this or not,
24 but is the Moundsville 6 well completed to the Point

Page 12

1 Pleasant formation?
2 **A. Yes.**
3 Q. Are there any other Point Pleasant wells within
4 two miles of any of the proposed wells or the existing
5 Moundsville 6 well?
6 **A. Not that I'm aware of, or any that are of record.**
7 Q. And Noble is requesting an exception to the 3,000
8 foot spacing requirements set forth in the regulations to
9 allow the AU, BU, CU, and DU wells to be drilled within
10 3,000 feet of one another, in fact, 1,000 feet apart?
11 **A. Yes.**
12 Q. And it's also asking for an exception to allow
13 the drilling of the AU, BU, and CU wells within 3,000 feet
14 of the Moundsville 6 well?
15 **A. Yes.**
16 Q. How much surface acreage will be covered by the
17 well pad?
18 **A. As it's laid out here, the well pad itself will**
19 **occupy 9.7 acres, and the access road will cover 7.7 acres.**
20 Q. Does Noble have a surface use and consent
21 easement?
22 **A. Yes.**
23 Q. And, for the record, the surface use easement is
24 included in the well permit application. Has Noble

Page 13

1 determined the acreage that could be drained from each of
2 the MND 20 wells?
3 **A. We estimate it's approximately 186 acres per**
4 **well.**
5 Q. And is that based on an average lateral length of
6 approximately 8,100 feet?
7 **A. Yes, I believe so.**
8 Q. Has Noble modeled the drainage acreage that a
9 hydraulically fractured vertical well in to the Point
10 Pleasant would drain?
11 **A. Yes, we think it's roughly in the range of seven**
12 **to twelve acres per vertical well.**
13 Q. So how many vertical wells would be required to
14 drain the acreage in the MND 20 unit?
15 **A. Somewhere around 112 vertical wells.**
16 Q. Can you estimate how much surface acreage would
17 be required to drill 112 vertical wells?
18 **A. Yes, it would be anywhere between five and ten**
19 **acres per well pad. And it could be in the range of five**
20 **to ten acres for each access road, as well, for each of**
21 **those 112.**
22 Q. In your opinion, would it be feasible to drill
23 112 vertical wells to develop the Point Pleasant formation
24 from the unit area?

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1 A. No, sir.
2 Q. Would drilling four horizontal wells from four
3 different well pads have the same surface use impact and
4 requiring about four times as much acreage?
5 A. Yes, yeah, it would include additional surface
6 acreage.
7 Q. So given the economies of scale, the best thing
8 to do is drill four horizontal wells from the MND 20 well
9 pad?
10 A. Yes.
11 Q. Does that ultimately translate into cost savings
12 for customers?
13 A. I believe so, yes. It may be uneconomic for
14 Noble to drill these four individual wells off of four
15 individual pads, so we would not be providing any
16 additional gas supplied to the market, keeping prices lower
17 for consumers.
18 Q. And have natural gas prices come down
19 considerably since 2008, when the horizontal drilling
20 began?
21 A. Yes.
22 Q. Can you compare the environmental impacts of
23 drilling four horizontal wells from four different pads, as
24 compared to drilling the four wells from the same pad?

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1 A. Sure. I think from the land perspective, if we
2 were to separate these into four individual well pads for
3 each individual well, we would -- that would involved
4 additional tree clearing, additional access roads,
5 additional truck traffic, and just overall a larger
6 environmental footprint.
7 Q. So in your opinion does drilling multiple
8 horizontal wells from a single well pad have a much lower
9 environmental impact result in less disruption to the
10 community and have a beneficial impact on consumer prices?
11 A. Yes.
12 MR. TAWNEY: That's all the questions I have of
13 this witness. If the Commission has any questions?
14 CHAIRMAN LAY: Questions from the Commission?
15 COMMISSION RADABAUGH: This unit is a voluntary
16 unit?
17 THE WITNESS: Yes, sir.
18 CHAIRMAN LAY: Anything else?
19 COMMISSION GUM: Nothing from me.
20 CHAIRMAN LAY: I have a couple questions.
21 EXAMINATION
22 BY CHAIRMAN LAY:
23 Q. You gave us some information with regard to the
24 well drainage area of a vertical well and the drainage of

Page 16

1 these proposed wells. Did you perform those calculations
2 and determine what the going radius was?
3 A. Not myself, no. I think Mr. Benyo would be
4 better suited to answer that.
5 Q. Okay. So he provided you the information to do
6 your land calculations?
7 A. Yes, sir.
8 Q. Okay. That was my question.
9 A. Okay.
10 CHAIRMAN LAY: Any other questions?
11 COMMISSION RADABAUGH: Not at this time.
12 CHAIRMAN LAY: Okay. Thank you. That's all I
13 have. The witness can be excused.
14 THE WITNESS: Thank you.
15 (Witness stands aside.)
16 MR. TAWNEY: Theodor Romig.
17 CHAIRMAN LAY: Is it Romey?
18 MR. TAWNEY: Romig. R-o-m-i-g.
19 (Witness sworn.)
20 WHEREUPON,
21 THEODORE ROMIG,
22 was called as a witness and, after being duly sworn,
23 testified as follows:
24 DIRECT EXAMINATION

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1 BY MR. TAWNEY:
2 Q. Would you state your full name, please?
3 A. Yes. Theodore Romig.
4 Q. Where do you live?
5 A. Hempstead, Texas.
6 Q. By whom are you employed?
7 A. Noble Energy.
8 Q. What is your job title?
9 A. Geologist.
10 Q. And what do you do as a geologist for Noble?
11 A. Exploration and development in the Appalachian
12 Basin, particularly the Marcellus and the Utica.
13 Q. How many years have you worked as a geologist for
14 Noble?
15 A. Nineteen years.
16 Q. What was your job experience prior to that?
17 A. I graduated from the University of Akron in 1977,
18 started off with a mud logging company, worked with the
19 logging company for two years. After that process, Seismic
20 Data for Western Geophysical for about a year, then took my
21 first job with an independent oil and gas company in
22 Houston. I worked for three different oil and gas
23 companies in Houston before hiring on with Noble Energy 19
24 years ago.

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1 Q. Let's talk a little bit about the Moundsville 6
2 well, to begin. Now, that well has already been drilled?
3 A. That's correct. That well was drilled in
4 December 2014, and TD'd -- we drilled a pilot, okay, and it
5 drilled to 10,770 feet. We ran a full suite of logs with
6 an image log and cut 173 foot of core in that well. We
7 then plugged back and drilled the lateral, which is shown
8 on your plat there, over 9,000 foot lateral. And that well
9 TD'd at 20,309 feet, and it TD'd in February of 2015.
10 Q. And in what formation was it completed?
11 A. It was completed in the Point Pleasant.
12 Q. Is it in production yet?
13 A. It is not. It has been completed and we are
14 expecting it to be turned into line the first of next week.
15 Q. What's the target formation for the four wells
16 that you propose to drill on the MND 20 unit?
17 A. They are the Point Pleasant.
18 Q. So the same formation as the Moundsville 6 well?
19 A. (Nods affirmatively.) That is correct.
20 Q. So let's talk about the geological
21 characteristics of the Point Pleasant formation. What is
22 the thickness?
23 A. The thickness that we found at our Moundsville 6
24 well was 120 feet. We expect that thickness to be about

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1 the same at the proposed Moundsville 20 pad.
2 Q. Can you describe the nature of the shale in Point
3 Pleasant?
4 A. Uh-huh. We call the Point Pleasant a calcareous
5 organic shale. It sits right on top of the Trenton line,
6 okay, and it's right underneath the Utica shale. It's an
7 interesting formation in that it has characteristics of
8 both the Trenton, the carbonate from the Trenton, and it
9 has the shale characteristic from the overlying Utica. And
10 so what it is is, it's an interbedded calcareous shale
11 throughout the entire section. You're going from a shallow
12 water formation to a deeper water formation at the Utica.
13 Q. Tell me what TOC means.
14 A. TOC is the total organic carbon found in the
15 rock.
16 Q. What is the TOC content of the Point Pleasant?
17 A. Okay. The TOC that we found in the Point
18 Pleasant core that we took in the Moundsville 6 well, it
19 averaged about three percent. Now, we found streaks of a
20 higher TOC scattered throughout that 120 feet. Some as
21 high as four percent. But when you took everything and put
22 it together, it averaged about three percent.
23 Q. What is the porosity that you experienced in
24 Point Pleasant?

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1 A. Okay. We cored the entire Point Pleasant
2 interval, and the range of porosities that we found in the
3 120 feet ranged from six to eleven percent, with an average
4 of about nine percent porosity.
5 CHAIRMAN LAY: You said six to eleven?
6 THE WITNESS: Six to eleven. That's correct.
7 BY MR. TAWNEY:
8 Q. What is the permeability that you have found?
9 A. The permeability that we found ranged from 250
10 nano-darcies to about 500 nano-darcies. Quite low.
11 Q. Now, put that in perspective. Is that -- well,
12 first of all, just tell me what permeability means.
13 A. Permeability are the pathways that you find in
14 the rock, okay, that the oil or the gas can travel through
15 to the well bore. Okay. Since it's so low, those pathways
16 are very small and some of them aren't connected. Okay.
17 And that's what permeability is. So it's those pathways
18 that allow the hydrocarbon to flow through the rock.
19 Q. So how would you measure the permeability in a
20 limestone, would that be measured in nano-darcies?
21 A. A limestone other than the Point Pleasant?
22 Q. Yes.
23 A. You would probably measure it in micro-darcies or
24 darcies.

Page 21

1 Q. And so nano-darcies is much tighter?
2 A. That's correct.
3 Q. The less permeability?
4 A. Correct. And that's what makes it -- that's why
5 we call it an unconventional resource.
6 Q. Has Noble compared these preliminary formation
7 evaluation results with other preliminary results?
8 A. We have. What we've done is, you know, the well
9 that we've drilled at Moundsville 6, we've taken that data
10 and we've traded it with other companies in order to, you
11 know, enlarge our database, so we have a better idea of
12 what the Point Pleasant is going to look like in this area.
13 So what we've done is, we've traded with several companies.
14 That's all covered under a confidentiality agreement, and
15 so we were able to compare our results with theirs, and
16 they're very comparable.
17 Q. So were those results taken in the general area
18 of the MND 20 unit?
19 A. That's correct. In Marshall County and Wetzel
20 County.
21 Q. Do you have any information on the core pressure
22 or the reservoir pressure of the Point Pleasant, in that
23 area?
24 A. Yes. The pressure gradient that we have in our

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1 Moundsville 6 well is a .9, and we're expecting a pressure
2 gradient very similar to that in the Moundsville 20 pad.
3 Q. In your estimation, could the Point Pleasant
4 formation be economically produced without stimulation?
5 A. No, sir.
6 Q. And why is that?
7 A. Just what we were talking about, the permeability
8 just does not allow the hydrocarbon to flow through the
9 rock if it is not stimulated.
10 Q. So your --
11 A. Those pathways just aren't there.
12 Q. In your opinion, is hydraulically fracturing the
13 wells necessary in order to get them to produce in paying
14 quantities?
15 A. That is correct.
16 Q. What, in your opinion, is the optimal spacing for
17 a well in the Point Pleasant shale or Point Pleasant
18 formation in Marshall County?
19 A. Based on our analysis of the data that we've
20 collected at the Moundsville 6 well and the data that we
21 have traded for, we believe that to be a thousand feet.
22 Q. And is that data going to be further discussed by
23 Mr. Benyo?
24 A. It is.

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1 Q. And you have proposed to drill the AU, BU, CU,
2 and DU wells a thousand feet apart and also the MND 20 AU
3 would be drilled a thousand feet from the Moundsville 6
4 well?
5 A. That's correct.
6 MR. TAWNEY: That's all the questions I have of
7 this witness. If the Commission has any questions?
8 CHAIRMAN LAY: Any questions?
9 EXAMINATION
10 BY CHAIRMAN LAY:
11 Q. I just have one. You said that in your analysis
12 for the well spacing, you said you believe the well spacing
13 should be a thousand feet?
14 A. Correct.
15 Q. Would you clarify that? Do you mean a thousand
16 foot radii or a thousand foot diameter between wells?
17 A. A thousand feet between two parallel wells
18 drilled laterally.
19 Q. So, therefore, your drainage radius actually is
20 500 foot off center?
21 A. That's correct. We believe our fracture half
22 length to be between 250 and 500 feet.
23 Q. That was my next question.
24 A. Okay.

Page 24

1 Q. So your answer is half length is 200 to 500 feet
2 -- 250?
3 A. 250 to 500. That's correct.
4 Q. Okay.
5 A. And I think this is going to be an interesting
6 pad because, you know, we call it a spacing pad test
7 because there haven't been any of these proposed in West
8 Virginia to this point. And so once these four wells are
9 drilled and are allowed to produce, then we'll be able to
10 find out if that thousand feet is, you know, is right. You
11 know, because we're very early in this play in the dry gas
12 area. And so we're taking all the data we can, and the
13 thousand feet is the best number that we've been able to
14 come up with to this point.
15 Q. Okay. You mentioned that your core pressure was
16 .9 gradient?
17 A. Correct.
18 Q. So over pressured reservoir?
19 A. That's correct, sir.
20 Q. And remind me to ask him a question about that
21 later.
22 CHAIRMAN LAY: You're the drilling engineer.
23 Correct?
24 MR. BENYO: (Nods affirmatively.)

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1 CHAIRMAN LAY: Okay.
2 BY CHAIRMAN LAY:
3 Q. Based on your answers and your half length, I
4 assume that you have done some reservoir modeling for
5 stimulation?
6 A. That's correct. And Rob will talk about that.
7 What we did was, we did some rate transient analysis along
8 with some reservoir modeling, and that's how we came up
9 with that number.
10 Q. Were you able to determine your -- you said the
11 250 to 550 foot range?
12 A. Right.
13 Q. Were you given any data on frac height growth?
14 A. We do not have any data for that. We have not
15 run -- we did not run microseismic in our Moundsville 6
16 pad.
17 Q. No, I understand, but your model, did it have --
18 what was your projected height growth?
19 A. You know, I can't answer that. I'm not sure what
20 that was.
21 Q. Okay. And just to clarify, I assume that your
22 TOC, your porosity and permeability was extracted from your
23 core on the Moundsville 6 well?
24 A. (Nods affirmatively.) That's correct. We cored

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1 173 feet. We cored Utica, all of the Point Pleasant, and
2 some of the Trenton.
3 Q. Now, you said you've traded data and that it was
4 similar to the other operator's data?
5 A. (Nods affirmatively.)
6 Q. How wide of an area would you say that the data
7 that you looked at covered?
8 A. Okay. We traded for two wells. One well was
9 about four miles to the north and east of the proposed
10 Moundsville 20 pad. Okay. And then the other well that we
11 traded for was in Wetzel County, and I'm going to guess
12 that was probably about 12 miles.
13 Q. And they both exhibited the same -- or similar
14 characteristics?
15 A. Yes, sir.
16 Q. Let me go back to reservoir composition. You
17 said it was an organic shale interbedded with carbonates?
18 A. Uh-huh.
19 Q. The composition of those carbonates?
20 A. It's an interesting formation in that, you know,
21 you had carbonate platform surrounding this sub basin that
22 Point Pleasant was deposited in. And so when you go and
23 look at that core, it's really interesting because you can
24 see the shale fragments that came off of that platform that

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1 surrounded that mini basin. And those are the carbonate
2 layers that you see interbedded within that Point Pleasant,
3 interbedded within the shales. And so it's the carbonate
4 fragments that came in off of the platforms that surrounded
5 that mini basin.
6 Q. Okay. So you're telling me that it's basically a
7 conglomerate of carbonates?
8 A. Those thin carbonate layers, they are, exactly.
9 It's a beautiful thing to see.
10 Q. Okay. So they are -- if they've been worked, are
11 they limestone or dolomite or what's their --
12 A. No, they are just, you know, pretty much shale
13 fragments.
14 Q. Okay.
15 A. Yeah.
16 Q. So it is a conglomerate type of carbonate?
17 A. Uh-huh, correct.
18 Q. I've never heard it described that way.
19 A. I wouldn't have described that way until, you
20 know, we cut that core and we were able to actually go and
21 look at it.
22 Q. Okay. And the matrix of that is limestone then?
23 A. Correct, uh-huh, a lime mud, uh-huh.
24 Q. Okay.

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1 CHAIRMAN LAY: I think that's all the questions I
2 had.
3 MR. TAWNEY: I have no further questions.
4 THE WITNESS: Thank you.
5 (Witness stands aside.)
6 CHAIRMAN LAY: You can call your next witness.
7 MR. TAWNEY: Robert Benyo.
8 (Witness sworn.)
9 WHEREUPON,
10 ROBERT BENYO,
11 was called as a witness and, after being duly sworn,
12 testified as follows:
13 DIRECT EXAMINATION
14 BY MR. TAWNEY:
15 Q. Would you state your full name, please.
16 A. Robert Benyo.
17 Q. And where do you live?
18 A. I live in Canonsburg, Pennsylvania.
19 Q. Who is your employer?
20 A. I work for Noble Energy.
21 Q. What is your job title?
22 A. My job title is the New Well Engineering and
23 Execution Manager.
24 Q. And what are your duties?

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1 A. My duties are to oversee a team of geologists,
2 engineers and superintendents responsible for the
3 completion engineering design and execution of the
4 completions for the Marcellus Business Unit.
5 Q. Can you tell us a little bit about your education
6 and job experience?
7 A. Yes. I have a degree in petroleum and natural
8 gas engineering from West Virginia University. I graduated
9 in 2003. After that I spent some time with Schlumberger
10 (phonetic) on the pressure pumping service side in Texas
11 and Wyoming. I then went to Evergreen Resources and
12 Pioneer Natural Resources working in unconventional
13 reservoirs in the Rocky Mountains, specifically CBM and
14 shale. Then worked for AJ Lucas, a drilling company in
15 Australia, working in their acquisition and divestiture
16 business group, focused on coal bed methane in Australia
17 and Southeast Asia. I've been with Noble Energy since
18 then, for about five years now, in the Frontier Business
19 Unit, DJ Business Unit our in the Rocky Mountains, and have
20 been out here in the Marcellus Business Unit for a little
21 bit over a year.
22 Q. Now, you're familiar with Noble's planned
23 drilling of the four wells on the MND 20 Unit?
24 A. Yes.

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1 Q. And Noble is proposing to drill those wells 1,000
2 feet apart and 1,000 feet from the Moundsville 6 well that
3 is outside the unit?
4 **A. Yes.**
5 Q. What is the expected fracture half length around
6 the well bore in the proposed wells?
7 **A. Based on the data that we have, it's between 250**
8 **and 500 feet fracture half length.**
9 Q. And so did you choose --
10 CHAIRMAN LAY: Give me that number again, please.
11 Excuse me.
12 THE WITNESS: 250 to 500 feet.
13 CHAIRMAN LAY: Okay. Same response. Sorry, I
14 just missed it.
15 MR. TAWNEY: No, that's okay.
16 BY MR. TAWNEY:
17 Q. And so did you choose the upper end of that range
18 as the distance, or half the distance, between the two
19 wells?
20 **A. Yes, we did.**
21 Q. Why was that?
22 **A. That is the distance that we're comfortable that**
23 **we can drill and complete these wells in the most efficient**
24 **manner.**

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1 Q. And how did you reach the determination that it
2 was 250 to 500 feet?
3 **A. That was using reservoir models based on the data**
4 **from the core and based on the log data from the**
5 **Moundsville 6, along with some published data. And those**
6 **models were backed up by rate transient analysis from**
7 **offset production data.**
8 Q. So do you agree with Mr. Romig that the optimal
9 spacing for a horizontal well in the Point Pleasant
10 formation in Marshall County is 1,000 feet?
11 **A. Based on the data that we have, yes.**
12 Q. And that's what you're proposing for the MND 20
13 pad wells?
14 **A. That's correct.**
15 Q. Do you believe there will be communication
16 between the wells if they're drilled at the distance apart
17 Noble proposes?
18 **A. I do not.**
19 Q. What happens if you space the well bores farther
20 apart than Noble has proposed?
21 **A. Based on the data that we have, if you space the**
22 **wells further apart you will leave resource undeveloped and**
23 **that resource will be wasted.**
24 Q. So if you drilled 3,000 feet apart, you would

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1 basically be wasting the gas any further than 500 feet from
2 that well bore?
3 **A. That's correct.**
4 Q. In your opinion, could the Point Pleasant
5 formation be effectively and economically produced with
6 traditional vertical wells?
7 **A. No, it could not.**
8 MR. TAWNEY: That's all the questions I have of
9 this witness.
10 CHAIRMAN LAY: Any questions?
11 COMMISSION RADABAUGH: No.
12 COMMISSION GUM: Nothing.
13 **EXAMINATION**
14 **BY CHAIRMAN LAY:**
15 Q. Again, the same question I asked Mr. Romig. Did
16 your model give you any indication of potential frac
17 height?
18 **A. The model, not that I'm aware of.**
19 Q. Okay. Given Mr. Romig's testimony that core
20 pressures are .9 gradient, your anticipated bottom level
21 pressure is very near to 10,000 pounds?
22 **A. That's correct.**
23 Q. And only from a perspective of the safety issue
24 for the state and those residents, are you comfortable that

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1 your design perimeters are met and capable of handling of
2 those high pressures?
3 **A. I am. We have successfully completed the**
4 **Moundsville 6, using 15,000 psi rated equipment. That's**
5 **our intention, as far as we know it today, to use that**
6 **going forward providing us ample factor.**
7 Q. I know that's something not normally in our
8 venue, but in this situation we're also protecting the --
9 as well as the Office of Oil & Gas, so I wanted to make
10 sure that you have POP's and casing designed capable of
11 handling those excess pressures. That's not the norm for
12 our basin.
13 **A. That's correct.**
14 Q. Okay.
15 CHAIRMAN LAY: I think that's all the questions I
16 have. Do you guys have anything else?
17 COMMISSION RADABAUGH: Not at this time.
18 CHAIRMAN LAY: With that, you may be excused.
19 THE WITNESS: Thank you.
20 (Witness stands aside.)
21 MR. TAWNEY: And that concludes testimony that we
22 have to present. So for reasons stated by the witness and
23 given the fracture half lengths and the fact that you have
24 to stimulate these wells to get the production out, their

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1 belief that a thousand feet between wells is the
2 appropriate spacing, we would ask the Commission to grant
3 them the waiver of the 3,000 foot spacing requirement so
4 that they can drill these four wells a thousand feet apart
5 and 1,000 feet from the existing Moundsville 6 well.
6 CHAIRMAN LAY: Okay. Very good. We'll go off
7 the record then.
8 (WHEREUPON, a recess was taken
9 from 10:48 a.m. until 11:00 a.m.)
10 CHAIRMAN LAY: Do we have a motion?
11 COMMISSION RADABAUGH: I have a motion. Mr.
12 Chairman, I would like to make a motion to grant Noble
13 Energy their request for exception to Rule CSR 39-1-4.2, to
14 allow 1,000 foot spacing between wells, starting at the MND
15 6 HUHS, moving to the MND 20 AU, then to the MND 20 BU,
16 then to the MND 20 CU, and the MND 20 DU. Upon completion,
17 Noble shall submit a copy of the well logs to the
18 Commission.
19 COMMISSION GUM: Mr. Chairman, I would like to
20 second that motion.
21 CHAIRMAN LAY: We have a motion and a properly
22 made second. Any further discussion?
23 COMMISSION GUM: Nothing.
24 CHAIRMAN LAY: All those in favor of the motion,

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REPORTER'S CERTIFICATE

STATE OF WEST VIRGINIA,
COUNTY OF KANAWHA, to wit;

I, WENDY M. THOMAS, Certified Court Reporter and
Notary Public of West Virginia, do hereby certify that the
foregoing is, to the best of my skill and ability, a true
and accurate transcript of all the proceedings as set for
in the caption hereof.

Given under my hand this 15th day of November,
2015.

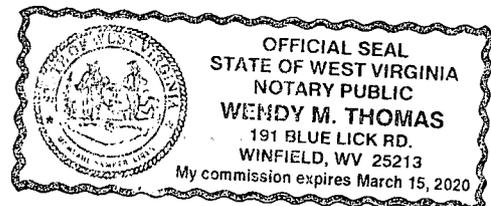
My Commission expires March 15, 2020.



Wendy M. Thomas
Certified Court Reporter

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1 aye. (Commission votes affirmatively.) Opposed, nay. (No
2 response from the Commission.) Motion carried. Mr.
3 Tawney, we will grant your relief. We, however, ask that
4 you prepare a draft order for the Commission and counsel to
5 review.
6 MR. TAWNEY: (Tenders document to the
7 Commission.)
8 CHAIRMAN LAY: You already have it?
9 MS. RAINES: You already have it? Awesome. You
10 are good.
11 MR. TAWNEY: But you know what -- off the record.
12 (WHEREUPON, a discussion was
13 had off the record.)
14 CHAIRMAN LAY: Let's go back on just for a
15 moment. Anything further for the record?
16 COMMISSION GUM: Nothing.
17 CHAIRMAN LAY: Okay. That being the case, we
18 will close the record for this docket. Thank you. Now
19 we're off the record.
20 (Hearing Concluded at 11:03 a.m.)





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