

1 NEW MEXICO OIL CONSERVATION DIVISION

2 STATE LAND OFFICE BUILDING

3 STATE OF NEW MEXICO

4 CASE NO. 10925

5
6 IN THE MATTER OF:7
8 The Application of Armstrong Energy
9 Corporation for an Unorthodox Oil Well
10 Location, Lea County, New Mexico.11
12
13
14 BEFORE:

15 DAVID R. CATANACH

16 Hearing Examiner

17 State Land Office Building

18 March 3, 1994

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21 REPORTED BY:22 CARLA DIANE RODRIGUEZ
23 Certified Shorthand Reporter
24 for the State of New Mexico

APR 12 1994

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A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

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BY: **WILLIAM F. CARR, ESQ.**

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1 EXAMINER CATANACH: At this time, we'll
2 call Case 10925.

3 MR. STOVALL: Application of Armstrong
4 Energy Corporation for an unorthodox oil well
5 location, Lea County, New Mexico.

6 EXAMINER CATANACH: Appearances in this
7 case?

8 MR. CARR: May it please the Examiner,
9 my name is William F. Carr with the Santa Fe law
10 firm, Campbell, Carr, Berge and Sheridan. I
11 represent Armstrong Energy Corporation, and I
12 have one witness.

13 **MIKE BOLING**

14 Having been first duly sworn upon his oath, was
15 examined and testified as follows:

16 EXAMINATION

17 BY MR. CARR:

18 Q. Would you state your name for the
19 record, please.

20 A. My name is Mike Boling.

21 Q. Where do you reside?

22 A. Roswell, New Mexico.

23 Q. By whom are you employed?

24 A. Armstrong Energy Corporation.

25 Q. In what capacity are you employed by

1 Armstrong?

2 A. As a consulting petroleum geologist.

3 Q. Have you previously testified before
4 the New Mexico Oil Conservation Division?

5 A. Yes, I have.

6 Q. At the time of that testimony, were
7 your credentials as an expert witness in
8 petroleum geology accepted and made a matter of
9 record?

10 A. Yes, they were.

11 Q. Are you familiar with the application
12 filed in this case on behalf of Armstrong Energy
13 Corporation?

14 A. Yes, I am.

15 Q. Have you made a geological study of
16 that portion of the Delaware formation involved
17 in this case?

18 A. Yes, I have.

19 MR. CARR: Are Mr. Boling's
20 qualifications acceptable?

21 EXAMINER CATANACH: Yes, they are.

22 Q. Would you briefly state what Armstrong
23 Energy Corporation seeks with this case?

24 A. Armstrong seeks approval of an
25 unorthodox well location in the Delaware

1 formation, in the Northeast Lea-Delaware pool for
2 our Mobil Lea State No. 5 well, to be drilled
3 2440 feet from the north line and 870 feet from
4 the west line of Section 2, Township 20 South,
5 Range 34 East.

6 Q. What are the well location requirements
7 that are applicable in the Northeast Lea-Delaware
8 pool?

9 A. 40-acre tracts; you should be 660 from
10 the outer boundary of the proration unit.

11 Q. Have you prepared certain exhibits for
12 presentation here today?

13 A. Yes, I have.

14 Q. Let's refer to what has been marked
15 Armstrong Exhibit No. 1. Could you identify this
16 and review it for Mr. Catanach?

17 A. Yes. Exhibit No. 1 is a type log from
18 one of the wells in the west half of Section 2,
19 20/34. This happens to be from the Mobil Lea
20 State No. 2 well, which is in the northwest of
21 the southwest quarter of that section.

22 The purpose of the type log is to
23 familiarize you with the nomenclature that we use
24 in the area, and also to identify the four major
25 sand intervals that have been mapped, and point

1 out the productive intervals.

2 The first sand interval, the
3 nomenclature we use is first, second, third and
4 fourth sand. As marked on the type section, the
5 base of the first sand in this well is
6 approximately 5660 feet deep. This sand is
7 widespread across not only the Northeast
8 Lea-Delaware pool, which encompasses Section 2,
9 but also the Quail Ridge field, which encompasses
10 the south half of Section 3 and north half of
11 Section 10 to the west of us.

12 It is a prolific reservoir in the Quail
13 Ridge field. Read & Stevens has approximately 13
14 wells producing out of this reservoir. There is
15 one well in Section 2, which is in the
16 northwest/southeast, that is productive out of
17 this interval, and we have shows in five of the
18 six wells that we have drilled in Section 2 in
19 this interval. It is one of the main pay
20 intervals in the area.

21 The second sand, at 5840, is a
22 uniformly thick sand across the area of both the
23 Quail Ridge and Northeast Lea fields. It's
24 uniformly wet. It ranges from 80 to 135 feet
25 thick. Completions have been attempted in three

1 wells. All have failed. All have made,
2 essentially, 100 percent water.

3 At 5995, and this well is the base of
4 the third sand, the productive interval in the
5 west half of Section 2, and the interval that
6 we're most concerned with today. This is a sand
7 that occurs in the west half of Section 2 and
8 also in portions of the south half of Section 3,
9 and the east half of Section 10 to the west.

10 It is a prolific reservoir in the west
11 half of Section 2. It is uniformly thick and
12 very porous and permeable. We have four wells
13 producing in this interval, all with productive
14 capacities in excess of three or four hundred
15 barrels a day.

16 The fourth sand is at 6040 feet. It is
17 a sand that is thin, very isolated, basically, in
18 the south half of Section 2. It has not been
19 found to be productive in any of the wells today.

20 Q. All right, Mr. Boling. Let's go to
21 your location plat, Armstrong Exhibit No. 2, and
22 review that for the Examiner.

23 A. Exhibit No. 2 is simply a location plat
24 that shows the location of wells that I'm going
25 to refer to on the cross-section, that are

1 critical in interpreting where we want to put the
2 proposed location; also, the other Delaware wells
3 in the area.

4 All of the well symbols in north half
5 10 and south half 3, are productive Delaware
6 wells in that first interval. As you can see,
7 the cross-section will go from west to east, from
8 the Read & Stevens Mark Federal No. 8, which is
9 in the northeast of the southeast of 3, through
10 the Armstrong Energy--that should be well No. 2,
11 actually, not Well No. 1, which is the type log
12 well, and the next well is the Mobil Lea No. 1,
13 and the final well is the West Pearl State No.
14 2.

15 Proposed location is north and slightly
16 west of the Armstrong Energy Mobil Lea State No.
17 2, in the southwest of the northwest of 2.

18 Q. Let's go now to the cross-section,
19 A-A', and I would ask you to review the
20 information on that exhibit for Mr. Catanach.

21 A. The purpose of the cross-section is
22 primarily to show the rapid thinning and rapid
23 lithologic characteristic changes that occur in
24 this sand.

25 If you start on the west end, the

1 left-hand side, the Read & Stevens Mark Federal
2 No. 8, the dry hole, you can see that this is a
3 stratigraphic cross-section hung on the base of
4 the third sand of the producing interval in the
5 west half of 2. As you can see, my cutoff point
6 for net porosity was 15 percent.

7 If you'll look at the Read & Stevens
8 well, you'll see there's six feet of sand at the
9 very base of that interval that is at or above 15
10 percent. That happens to also fall right below
11 the oil/water contact.

12 The critical thing to note in the Read
13 & Stevens well is the interval from about 5880,
14 which is actually the correlative point of the
15 top of the third sand, down to the base of the
16 third sand. You can see it's very tight. The
17 bottom portion, the bottom 20 or 30 feet of that
18 interval has already been--the lithologic change
19 has already taken place from sand to dolomite.

20 The sand that occurs above that is very
21 tight, nonproductive. This indicates to me that
22 the Read & Stevens No. 8 well is out, the main
23 depositional channel that we've been producing
24 out of with our wells, and therefore it was a dry
25 hole. There was actually no hydrocarbons

1 encountered in any zone in these wells.

2 It's also important to note that all
3 the sand up and down the hole was getting very
4 marginal; it's getting tighter, thinner, more
5 carbonate is being introduced into the section;
6 again, telling you that you're getting out of the
7 depositional channel, you're getting into a
8 lithologic change. We're making a facies change
9 from the sandier environment into the dolomite.

10 The next well, the Mobil Lea State No.
11 2, as you can see, is dramatically different from
12 the Read & Stevens Federal No. 8. We went from
13 six feet of porosity to 97 feet in one location.

14 No. 2 well, as you can see it's a very
15 productive well. It IP'd for 211 barrels a day.
16 It's an extremely productive well. The No. 1
17 well, the next well to the right, as you can see,
18 also very thick, 87 feet of porosity, and very
19 prolific well.

20 Then you move to the northeast, to the
21 West Pearl State No. 2, and you see we have
22 approximately 15 feet of sand in there above 15
23 percent porosity that's preserved. And the whole
24 interval above that, from the base of the second
25 sand at 5830, down to the top of the producing

1 interval, which is at 5918, the facies change is
2 complete and it's now dolomite.

3 So, the well on the far west and far
4 east are defining the outside edge of the
5 boundaries of the depositional channel. So, what
6 we want to try and do is stay in the center of
7 the depositional channel, because we have
8 evidence, not only in Section 2 and 3, but also
9 in Sections 3 and 10, of the rapid thinning of
10 this sand, where you can go from thick, prolific
11 sand, to nothing, in one location.

12 Q. Let's go now to your structure maps,
13 and start with your structure map on the base of
14 the third sand, Armstrong Exhibit No. 4.

15 A. Yeah. The structure map on the base of
16 the third sand is a map that is made on the base
17 of this most productive interval. What this map
18 shows is that there are a series of lows,
19 separated by noses, that generally trend
20 northeast/southwest, across both the northeast
21 Lea and the Quail Ridge field.

22 There is a major depositional pathway
23 that begins in the southwest quarter of Section 3
24 and goes to the southeast, and terminates down in
25 the southeast quarter of 10 and the southwest

1 quarter of 11. It trends northwest/southeast.

2 There are four wells in that
3 depositional channel that produce out of the
4 third sand, but they are a lot lower than our
5 wells and typically produce a lot more water, and
6 also show signs of inhibited permeability.

7 It is my contention that the nose that
8 you see running down across the southeast portion
9 of 3 and the northeast quarter of 10, separates
10 two depositional pathways.

11 The one in the west half of 2, as you
12 can see, the four wells in the southwest quarter
13 are in a north/south trending depositional
14 pathway. Every one of those wells have sands in
15 excess of 80-feet thick of net porosity greater
16 than 15 percent. Most of it's greater than 20
17 percent.

18 As you can see, our proposed location,
19 I think we're going to be at about a minus 2292
20 on the base of the sand up there, and what I'm
21 concerned about, and the reason that we're asking
22 for the unorthodox location, is this rapid
23 thinning of the sand, as you leave the
24 depositional channel, frightens me. I'm afraid
25 that if we don't have the unorthodox location,

1 we're going to be in a position where we're going
2 to miss the sand altogether, and leave oil
3 trapped from the No. 2 and No. 1 wells that we'll
4 never be able to recover.

5 Now, we know that, over in Section 3,
6 there's a well there that's annotated minus 2317
7 and a well in the northwest of the northeast of
8 10 that's annotated minus 2327. The well that's
9 annotated minus 2327 has 76 feet of sand in it,
10 and the one that's minus 2317, has none.

11 So we know, as you get up into the
12 updip terminus of the depositional channel, you
13 can run out of sand real quick, too. It's not
14 just laterally, but going updip you're going to
15 run out of it. And that is a concern that we
16 have with the drilling of this well.

17 I think the base of the sand in this
18 proposed location will be approximately 30 feet
19 high to the base of the sand in the Mobil Lea
20 State No. 2 well, the well that's annotated minus
21 2321.

22 Q. All right, let's now take a look at the
23 top of the third sand, and I would refer you to
24 Armstrong Exhibit No. 5, your structure map.

25 A. The map on the top of the third sand

1 reinforces the interpretation of the
2 northeast/southwest trend; the noses and the low
3 spots are still present.

4 The thing to note on the top of the
5 productive interval in the proposed location is,
6 that's actually a low spot up there where the
7 proposed location is, which is indicating
8 thinning sand. If the top is getting lower, that
9 means the interval between the base and the top
10 of the interval is thinning. Therefore, there's
11 an indication that we're going to be losing sand
12 as we go north, and that's, again, a concern.

13 Q. Let's move to the net porosity isopach
14 on this interval, Armstrong Exhibit No. 6.

15 A. The net porosity isopach on the third
16 sand productive interval, I think most clearly
17 shows the two sands pods and the fact that
18 they're separated. Again, in the west half of 2,
19 we have quite fixed sands, but I'm optimistic
20 that we'll have at least 50 feet of sand in the
21 proposed location.

22 But, as you can see, the sand, based on
23 what's happening between the well in the
24 northeast of the southeast of Section 3, that's
25 annotated six feet, and the well immediately east

1 of it that's annotated 98 feet, you can see how
2 rapidly you start to thin as you get towards the
3 outer boundary of this depositional channel.

4 And you have to honor that thinning.
5 So, I had to make my map thin at that same rate,
6 going north. Again, if you move up into a legal
7 location, you're going to have thinner sand. The
8 thinner sands you have, the closer you're going
9 to be to the oil/water contact, and less
10 likelihood you'll have to have a commercially
11 productive well.

12 Q. Mr. Boling, we've been discussing the
13 third interval, the primary producing zone?

14 A. Yes.

15 Q. You also have a secondary objective,
16 being the first interval, is that right?

17 A. That's correct. As I stated earlier,
18 the first sand interval is a prolific reservoir.
19 This is a net isopach map of the first sand
20 interval. You can see it's quite widespread
21 across the area.

22 Q. And you're talking now about Armstrong
23 Exhibit No. 7?

24 A. Yes, sir, I am. This interval, the
25 first sand interval, will be the only bail-out

1 zone that we have in this well. As you can see,
2 the map indicates that in the proposed location,
3 we only have approximately 30 feet of sand
4 present.

5 Again, If you move further north into a
6 legal location, your sand's going to thin and you
7 again run the risk of drilling a completely
8 noncommercial well.

9 While the well in the northeast of the
10 southeast of Section 3 is annotated 20 feet, if
11 you'll recall and take a look at the
12 cross-section, you can see that that's ratty
13 sand, it's getting tight. The real thin
14 stringers, obviously the reservoir is degrading
15 as you go west, and I'm afraid it's going to
16 degrade as you go north, also.

17 Q. So, both of the objective zones, the
18 unorthodox well location is necessary?

19 A. Yes, sir.

20 Q. Let's go to Armstrong Exhibit No. 8,
21 the table. Explain what this is and what it's
22 designed for.

23 A. Yeah. This table is a table I made
24 comparing likely results of drilling a hole in
25 our proposed location, unorthodox location,

1 versus the nearest orthodox location.

2 In each of those two well locations,
3 there are four cases. This is based on the
4 structure, or the topographic elevation of the
5 base of the third sand and the isopach. If my
6 map is correct, in the unorthodox location and
7 the base of the sand is at minus 2292, we should
8 have a net porosity isopach of 50 feet. We would
9 have 27 feet above the oil/water contact, which
10 is as small an interval above the oil/water
11 contact that's productive in the area. It's
12 similar to our Mobil Lea State No. 3, which is in
13 the southwest of the southwest of 2.

14 If my structure, on the base of the
15 third sand is correct at minus 2292, but my
16 isopach is incorrect by as little as 10 feet, and
17 I only have 40 feet of net porosity, I'm only
18 going to have 17 feet above the oil/water
19 contact.

20 Conversely, if my structure map is off
21 as little as 10 feet, and my isopach map is
22 correct at 50, I'll have 17 feet. But, if I'm in
23 error on both my maps by as little as 10 feet on
24 the structure and 10 feet on the isopach, I'm
25 going to have seven feet above the oil/water

1 contact, and I'm not going to have a well.

2 And you can go through this same
3 exercise for an orthodox location. We're going
4 to stay flat on the base, but we will thin. And,
5 as you can see, the best case, I would have 18
6 feet above the oil/water contact. If I made any
7 errors at all on the isopach or the structure, I
8 would only have eight feet above the oil/water
9 contact, and if I was in error on both the
10 structure and the isopach, I would have two feet
11 above the oil/water contact in an orthodox
12 location, which would not be a productive well.

13 Q. Assuming you're not in error--

14 A. Okay.

15 Q. --the orthodox location is definitely
16 preferable to the standard location?

17 A. Yes, that's correct.

18 Q. And even if you are off on one of these
19 factors, again, the unorthodox location is the
20 preferable location?

21 A. Yes, it is.

22 Q. If you're going to effectively produce
23 the reserves under this tract, the unorthodox
24 location is necessary?

25 A. Yes, sir.

1 Q. If you haven't already done it, could
2 you summarize for the Examiner, based on your
3 geological study, the reasons for drilling at the
4 well location?

5 A. The reason for drilling the location is
6 the fact that we have abundant evidence that
7 suggests rapid thinning of the sand, both in an
8 updip sense, that is up the depositional channel,
9 and also in a lateral sense, on the edges.

10 I'm quite concerned that we're going to
11 run out of sand as we move further north into an
12 orthodox location. Since there's no control for
13 another two miles north, there's not another deep
14 hole for two miles, we're definitely shooting in
15 the dark. It's almost like drilling a wildcat.

16 We have information to the south but we
17 have nothing to hang our hat on going north, and
18 I'm trying to be as cautious as I can with
19 drilling this well, and keeping in mind that if
20 we were to get up to a location--if we move too
21 far north and miss the sand completely, we're
22 going to leave a lot of oil trapped between that
23 well that's in the northwest of the southwest of
24 Section 2 and that dry hole. We'll never get
25 it.

1 We're a long way away, would be over a
2 quarter of a mile away in an orthodox location.
3 And, so, even if we drill the orthodox location,
4 the reason it's preferable, even if we go up
5 there and we only have 30 to 40 feet of sand,
6 we're still going to be able to capture those
7 reserves that are going to be between the two
8 wellbores that we otherwise wouldn't be able to
9 get.

10 Q. Is an advantage being gained on any
11 offset operator by virtue of the proposed
12 unorthodox location?

13 A. Offset? No.

14 Q. Were there any operators to whom notice
15 of this application needs to be given pursuant to
16 OCD rules?

17 A. No.

18 Q. Will approval of this application, in
19 your opinion, result in the recovery of
20 hydrocarbons that would otherwise be wasted?

21 A. Absolutely.

22 Q. Would the approval of the application
23 otherwise be in the best interest of conservation
24 and the protection of correlative rights?

25 A. Yes.

1 Q. Were Exhibits 1 through 8 prepared by
2 you?

3 A. They were.

4 MR. CARR: At this time, Mr. Catanach,
5 we move the admission into evidence of Armstrong
6 Energy Corporation Exhibits 1 through 8.

7 EXAMINER CATANACH: Exhibits 1 through
8 8 will be admitted into evidence.

9 MR. CARR: That concludes the direct
10 examination of Mr. Boling.

11 EXAMINATION

12 BY EXAMINER CATANACH:

13 Q. Mr. Boling, who are the offset
14 operators?

15 A. Well, in Sections 3 and 10, they're
16 Read & Stevens. In the northwest of the
17 southeast of Section 2, MidContinent Production
18 Company owns that well that's in the
19 northwest/southeast. And those are all the other
20 Delaware wells in the area, with the exception of
21 the southeast/southeast of Section 35, which
22 Pennzoil operates a Delaware well that is
23 producing out of a carbonate interval that is
24 stratigraphically equivalent to the second sand.

25 Q. Does Armstrong operate the entire west

1 half of Section 2, or lease it?

2 A. We have earned, by drilling the
3 southwest quarter, but we have rights, through
4 the farmout, to explore the west half, yes. And
5 he also owns the northeast quarter of 2.

6 Q. Isn't this the second time you've been
7 in for an unorthodox location?

8 A. Yes, sir.

9 Q. Let me ask you how your interpretation
10 panned out on the first one.

11 A. It was bang on, but I was surrounded by
12 three wells down there, so I knew that--that was
13 the well that was in the southeast of the
14 southwest that was annotated as a dry hole. We
15 were able to move updip and get thicker, but I
16 had three control points, four, to play with.

17 Q. Any potential in the second and fourth
18 sands?

19 A. The second sand is not going to be
20 productive. Apparently, the reason for that is,
21 it is extremely fine-grained, even for the
22 Delaware, extraordinarily fine-grained. In fact,
23 it almost looks like dust when you look at it
24 under a microscope.

25 And the conclusion we've drawn

1 ourselves, and Read & Stevens, because Read &
2 Stevens tried to complete two of their wells and
3 we tried to complete one of ours and got water,
4 we don't feel like the rock is permeable to oil.
5 There's oil in it, it's full of oil, but we just
6 can't get any of it out.

7 The fourth sand, actually, the only
8 place that we've seen any shows in the fourth
9 sand is in the northeast/northeast of Section 2,
10 which also has a thin, like, 20-foot third sand
11 interval. And when we completed that well, we're
12 certain that we frac'd into the fourth interval.
13 So, both those sands are probably producing up
14 there, but that's the only place.

15 EXAMINER CATANACH: I don't have
16 anything else.

17 MR. CARR: We have nothing further in
18 this case.

19 EXAMINER CATANACH: There being nothing
20 further, Case 10925 will be taken under
21 advisement.

22 (And the proceedings concluded.)

23 I do hereby certify that the foregoing is
24 a complete record of the proceedings in
25 the Examiner hearing of Case No. 10925,
heard by me on March 1991.
David R. Catanach, Examiner
Oil Conservation Division

1 CERTIFICATE OF REPORTER

2
3 STATE OF NEW MEXICO)
4) ss.
COUNTY OF SANTA FE)

5
6 I, Carla Diane Rodriguez, Certified
7 Shorthand Reporter and Notary Public, HEREBY
8 CERTIFY that the foregoing transcript of
9 proceedings before the Oil Conservation Division
10 was reported by me; that I caused my notes to be
11 transcribed under my personal supervision; and
12 that the foregoing is a true and accurate record
13 of the proceedings.

14 I FURTHER CERTIFY that I am not a
15 relative or employee of any of the parties or
16 attorneys involved in this matter and that I have
17 no personal interest in the final disposition of
18 this matter.

19 WITNESS MY HAND AND SEAL April 12,
20 1994.

21
22
23
24 CARLA DIANE RODRIGUEZ, RPR
25 CSR No. 4