BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
CONFERENCE ROOM, STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO
October 3, 1973

EXAMINER HEARING

IN THE MATTER OF:

Application of Northern Minerals, Inc. for a waterflood project, McKinley County, New Mexico.

Case No. 5072

BEFORE: RICHARD L. STAMETS,
Examiner.

TRANSCRIPT OF HEARING

MR. STAMETS: Call next case 5072.

MR. DERRYBERRY: Case 5072, Application of Northern Minerals, Inc. for a waterflood project, McKinley County, New Mexico.

MR. DAVIDSON: Mr. Examiner, Lloyd Davidson of Northern Minerals.

MR. STAMETS: L-l-o-y-d?

MR. DAVIDSON: Yes. This is Mark Weidler, W-e-i-d-l-e-r.

MR. STAMETS: Hold it a minute while I shuffle through the remaining papers here. Are there any other appearances here? The witness will stand and be sworn, please.

(Whereupon, the witness was sworn.)

MR. STAMETS: You may proceed, Mr. Davidson.

****

MARK WEIDLER,

a witness, having been first duly sworn according to law, upon his oath testified as follows:

DIRECT EXAMINATION

BY MR. DAVIDSON:

Q This is an application for a pilot waterflood in Section 29, of 16 North, 6 West. Northern Minerals drilled a shallow well we call the #6-Y Santa Fe Pacific, and we recovered very little oil. We elected to attempt a pilot waterflood program by

drilling two potential producers south of the injection well or south of the 6-Y and using the 6-Y as our injection well and drill a water well north of there to use as the water supply.

We would like permission to inject water through the original 6-Y well which we will now use as an injection well and attempt to produce oil out of the two wells that we drilled south of the 6-Y.

MR. DAVIDSON: Now, that is the general statement. Mr. Weidler is prepared to answer the questions concerning this.

MR. STAMETS: Let's go off the record.

(Whereupon, a discussion was held off the record.)

MR. STAMETS: If you will introduce or have your witness introduce himself and qualify him.

THE WITNESS: My name is Mark Weidler. I am a consultant petroleum geologist with Colorado Plateau Geological Services, Farmington, New Mexico.

MR. STAMETS: Mr. Weidler, have you ever appeared before this Commission or had your qualifications --

THE WITNESS: No, I have not.

MR. STAMETS: If you would briefly state your educational background and your experience.

THE WITNESS: I have a Bachelor of Science and Master of Science degrees of Geology from the University of Nebraska. Baccalaureate was in 1953, Master's in 1954.

I was employed by Shell Oil Company as an exploration geologist from 1954 through April of 1971, and have been a consultant petroleum geologist in Farmington from May of 1971 through the present time.

MR. STAMETS: You are familiar with the application?

THE WITNESS: I am, yes.

MR. STAMETS: All right. The witness is qualified.

Q (By Mr. Davidson) Mr. Weidler, I suppose it would be best for you just to commence with the procedure that you propose to use in the wells that have been drilled and where they are located and tell it in a narrative form.

A Mr. Examiner, we provided several brochures there, background which contained the essential documents to support this application. We have provided in synopsis form a background of proposed plan. I can either read it or excerpt it as would best suit the case. In essence --

Q Excerpting it.

MR. STAMETS: Excerpting it would be fine.

A As Mr. Davidson said, they drilled a test well near the center of Section, southwest, northeast Section 29 of 16 North, 6 West. The well is located on a structural feature known as Miguel Creek Dome. We encountered oil sands in the course of the pay zone approximately 80 feet above the massive Gallup sandstone.

We made a completion of the #6-Y which is shown on the schematic of the well and is shown as Figure No. 4 and produced a small amount of oil with pumping from open-hole intervals from 734 to 748 over-all. Oil sand occurs from 734 to 744.

The nature of the crude produced at this location indicated gravity is in the range of 31 to 33 degrees and there is no, the crude oil is essentially devoid of essentiated petroleum gasses, methane through pentane; and as a result, there is very little primary reservoir energy available to move the oil into the well bore to be produced.

In light of this, we consider the possibility of injecting water into the formation and using injected water as a primary source of reservoir energy for moving the oil into the well bore for production.

For this purpose, Northern Minerals drilled their Santa Fe Pacific Number 7 and Number 8; and if you will refer to figure Number 2, a blow-up plat to the scale of one inch equals 200 feet is shown illustrating the aerial relationships of the wells involved, SFP #6-Y being the original completion well.

We have drilled Number 7 and Number 8 and effected open-hole completions with casings set on top of the oil pay and the completion schematic for Number 7 and Number 8 are shown as Figures Number 5 and Number 6. What we propose is to take water produced from the massive Gallup formation at a depth of approximately 810 feet and using a Gaso Model 3364 injection pump inject into the Santa Fe Pacific #6-Y and withdraw in Santa Fe Pacific Number 7 and Number 8 in the pilot.

The water supplies well, as you can see in the plat, is located approximately 137 feet north, northwest of the Santa Fe Pacific 6-Y; and that is the essential aspect. Our feeling is that by injection of water into the formation we may establish sufficient reservoir energy to produce oil in Number 7 and Number 8 at commercial rates and certainly improve the recovery of in-place oil that has been evident in cores cut in these wells.

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MR. STAMETS: Does that conclude your direct evidence?

MR. DAVIDSON: Except that we have a letter from Tenneco Oil Company that Tenneco consents, Tenneco being the only offsetting lease owner as shown on the plat that you have there. We have a letter from Tenneco here that I'll be glad to introduce in which Tenneco consents to this program.

CROSS-EXAMINATION

BY MR. STAMETS:

Q Mr. Weidler, Figure Number One seems to show a fault running from the northeast to the southwest in this area immediately to the south of the proposed pilot project.

A Yes. That fault is a very tentative fault. It was interpreted pre-drilling and the plat I used here was primarily for illustrating locations of nearby wells and the lease situation rather than to illustrate the configuration of the formation at the Hospah level.

Q How long do you anticipate it will be before you see some sort of a response from the producing wells?

A I would anticipate seeing a response, some response within thirty days and perhaps sooner.

Q What is the nature of the Gallup water?

A The Gallup water, I'm not prepared to submit a water

analysis. We wanted to produce the formation for awhile before collecting a sample for analysis. It is quite fresh in the area. From other analyses I've seen, we are looking at probably total solids on the order of 1500 to 2000 parts per million or less.

It is potable, drinkable. We have no reason to believe that the Gallup water will not be compatible with the formation to which it will be injected.

Q Do you anticipate any corrosion problems?

A No, we do not.

Q How is the injection to be accomplished, through tubing under a packer?

A No. The water will be injected down in the four and a half inch casing, if you will refer to Figure Number 4. In this hole, the casing was set at a depth of 733.4 feet and the interval drilled out; and we will be injecting down in the casing into the open-hole interval from 734 to 744.

Q In that case, you are only injecting into the 6-Y well and that cement has been circulated to the surface?

A It was. Yes, sir.

Q Is there any shallow fresh ground water in this area above the Gallup?

A Not to our knowledge. The surface is under terrain by the Hospah sandstone to a depth of approximately the

surface down to about 220 feet. It is possible there may be potable water in that formation, but I can't testify to that. We had no waterflow, no evidence of water during the drilling phase.

Q Have you made any calculations as to the frac pressure in the area and pressures that you should not exceed in this project?

A No, we have not. Based on the Cornell's of the sounds of the porosities and permeabilities, the porosities are in the range of 20 to 27 percent; and the permeabilities range from 100 up to 300 or 400 millidarcies.

We plan not to exceed approximately 750 pounds of injection pressure. We feel that we can initiate injection with those pressures and that would be approximately equivalent to the geostatic radiant, and we would not expect any breakdown at those pressures.

Q Would it be fairly simple for you to submit that calculation after the Hearing?

A We could, yes. I'd have to make some arrangements for that.

Q This wouldn't cause any unnecessary delay?

A I don't believe so.

Q The way that the injection well is currently set up, if there was a hole in the casing or a hole and a void in the same end, then it is possible that water

could escape and you would not be aware of it while you were injecting it?

A It is possible. The injection of water will be metered and the pressure monitored at the surface; but we would have no immediate means of detecting such a leak.

Q If this developed into a long-term project, would it seem to be reasonable to institute either injection under tubing and packers or some other means of determining leakage?

A It would be feasible, and this could be done. We felt for our purposes here that the mechanical arrangement would be adequate for the pilot.

Q What are we looking at, a year for the pilot project?

A I would say anywhere from a month to probably six months at the outside. Mr. Davidson may want to amplify on that.

MR. DAVIDSON: No. That's all we know.

Q And you do not seek any additional injection wells at this time?

A Not at this hearing, sir.

MR. STAMETS: Are there any other questions? Mr. Arnold?

CROSS-EXAMINATION

BY MR. ARNOLD:

Q Mr. Weidler, what were your oil-water saturations taken of the Cornell Core Analysis?

A If you will allow me, I'll just give you an idea here from the Core Analysis. On Santa Fe Pacific Number 7, the Core Analysis Data covers the interval from 765 feet to 771 feet. The indicated oil saturations range from a minimum of 19.0 percent up to a maximum of 32.4 percent.

The water indicated, water saturations range from a minimum of 3.7 percent to a maximum of 31.9 percent on Santa Fe Pacific Number 8 which will be the other.

Q Excuse me just a minute. How could you account for the wide variation within the one core, 3.7 to 31.9? Do you have a shell break-in?

A Yes. There are some shell laminations in the intervals, and the water I personally believe is unduly low because we were unable to package the cores in a sealed container prior to analysis. I'm sure we have lost some water by evaporation prior to analysis.

Q You haven't testified at all as to whether or not you think there is an oil-water contact in the area or exactly what the situation is.

A No. We have no, from the data presently at hand, we have not established the limits of this accumulation.

I can testify that all of the wells that we have drilled in connection with establishing this pilot waterflood have encountered, we have cored the Hospah zone and have encountered oil.

What we envision is if the pilot flood is effective, then we would simply go on a patterned spacing yet to be determined, probably 20-acre alternating producers and injectors as a development phase of this project.

Q Do you think that the 6-Y well, that's the one you are going to inject, you did encounter both oil and water in it, also, or your water saturation is higher in the 6-Y?

A No. They are essentially the same in all of the cores. Within the standards you can establish for cores or porosities or permeabilities of the water, saturations were in the range that I have on the Number 7. Oil saturations were in the range from 20 to 30 percent.

Water saturations were from low up to maximum of about 40 percent and porosities in the 20 to 27 percent range. As I see it, we are in the accumulation with this project and not establishing a flood from edgewater into the accumulation.

Q You would just be primarily a stratigraphic or a structural accumulation or both or how do you --

A Well, it's difficult to make a definitive statement. Miguel Creek Dome is a fairly large closed structure and fairly well documented in the literature, and there is no question about the size of the closure. The location of this project is on the north plunge of that anticline considerably downdip from the mapable culmination.

The sand that we are dealing with is a Marine sandstone that has the primarily anticlinar characteristics. It is possible that ultimately we will find that stratigraphic factors are important in the accumulation. I can't testify that that is the fact at this state. I'd have to consider it basically a structural accumulation from the data at hand so far.

Q How long do you anticipate that it will take to get some sort of a response from these other two wells?

A As I mentioned, I would expect some response within thirty days.

Q Within thirty days?

A Yes.

MR. ARNOLD: I believe that's all.

MR. STAMETS: Mr. Davidson, this bunch of papers here in the black folder is your Exhibit 1?

MR. DAVIDSON: Yes.

MR. STAMETS: Would you like to offer that

into evidence?

MR. DAVIDSON: We would.

MR. STAMETS: Without objection, Exhibit 1 will be admitted. Is there anything further in this case? Mr. Weidler, the Examiner would like to have the calculations of the fractured pressure in there; and at a later date, we would like to have a water analysis on the Dakota water.

MR. DAVIDSON: We will submit it.

MR. STAMETS: The witness may be excused. Anything further in this case? We will take the case under advisement.

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REPORTER'S CERTIFICATE

I, JANET RUSSELL, a Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Janet Russell
COURT REPORTER

INDEX

WITNESS,

MARK WEIDLER

EXHIBITS

Applicant's		Offered	Admitted
Exhibit 1	Map	15	15

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 5172 heard by me on October 3, 1973.

Richard L. Stamets, Examiner
New Mexico Oil Conservation Commission

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