

CASE 3251: Appli. of CONTINENTAL
for a waterflood project in the
RATTLESNAKE DAKOTA POOL.

CASE NO.

325

Application,
TRANSCRIPTS,
SMALL Exhibits
ETC.

State of New Mexico
Oil Conservation Commission



STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

OTHER

OIL CONSERVATION COMMISSION

P. O. BOX 2088

SANTA FE, NEW MEXICO

June 16, 1965

C
O
P
Y
Mr. Jason Kellahin
Kellahin & Fox
Attorneys at Law
Post Office Box 1769
Santa Fe, New Mexico

Dear Mr. Kellahin:

Reference is made to Commission Order No. R-2928, recently entered in Case No. 3251, approving the Continental Oil Company Rattlesnake-Dakota Waterflood Project.

Injection is to be through the three authorized water injection wells which shall be equipped with tubing and packers. Injection into the upper zone is to be through the casing-tubing annulus and injection into the Middle Dakota through the tubing.

According to our calculations, when all of the authorized injection wells have been placed on active injection, the maximum allowable which this project will be eligible to receive under the provisions of Rule 301-E-3 is 490 barrels per day.

Please report any error in this calculated maximum allowable immediately, both to the Santa Fe office of the commission and the appropriate district proration office.

In order that the allowable assigned to the project may be kept current, and in order that the operator may fully benefit from the allowable provisions of Rule 701, it behooves him to promptly notify both of the aforementioned commission offices by letter of any change

OIL CONSERVATION COMMISSION

P. O. BOX 2088

SANTA FE, NEW MEXICO

-2-

Mr. Jason Kellahin
Kellahin & Fox
P. O. Box 1769
Santa Fe, New Mexico
June 16, 1965

C in the status of wells in the project area, i.e., when active injection commences, when additional injection or producing wells are drilled, when additional wells are acquired through purchase or unitization, when wells have received a response to water injection, etc.

O Your cooperation in keeping the commission so informed as to the status of the project and the wells therein will be appreciated.

P Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

Y ALP/DSN/ir

cc: Mr. Frank Irby
State Engineer Office
Santa Fe, New Mexico

Oil Conservation Commission
1000 Rio Brazos Road
Aztec, New Mexico

Case 3257

Heard. 6-8-65

Rec. 4-8-65

1. Grant Continental's request for
a waterflood in Rattlesnake - Dakota
oil pool. S.J. Co.

2. Approve 3 injection wells as follows:

a. Cont - Rattlesnake #149, 1980/S, 2310/E sec 12

b. — — — — #151, 1700/S, 900/W —

c. — — — — #155, 330/N, 2310/E sec 13

all in 29N-12W.

3. operators under Rule 701.

Thos. H. J.

DEARNLEY-MEIER REPORTING SERVICE, Inc.

FARMINGTON, N. M.
PHONE 325-1182

SANTA FE, N. M.
PHONE 983-3971

ALBUQUERQUE, N. M.
PHONE 243-6651

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 26, 1965

EXAMINER HEARING

IN THE MATTER OF:

APPLICATION OF CONTINENTAL OIL COMPANY
FOR A WATERFLOOD PROJECT, EDDY COUNTY,
NEW MEXICO

Case No. 3251

BEFORE:

DANIEL S. NUTTER

TRANSCRIPT OF HEARING



dearnley-meier

SPECIALIZING IN: DEPOSITIONS, HEARINGS, STATEMENTS, EXPERT TESTIMONY, DAILY COPY, CONVENTIONS
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MR. NUTTER: The hearing will come to order. The first case this morning will be Number 3251.

MR. DURRETT: Application of Continental Oil Company for a waterflood project, San Juan County, New Mexico. If the Examiner please, I'd like to state for the record that the Commission has received a letter from Mr. Charles R. Roberts, Continental Oil Company, requesting that this case be continued to June 9th examiner's meeting.

MR. NUTTER: Case Number 3251 will be continued to June 9th, to be heard at this same place at nine A. M. Call the next case.

* * *

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ELIZABETH K. HALE, Notary Public and Court Reporter, do hereby certify that the proceedings in the foregoing case were taken and transcribed by me, and that the foregoing is a true and correct transcript of proceedings to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF, my hand and seal of office this 4th day of June, 1965.

Elizabeth K. Hale
Notary Public

My commission expires

May 23, 1968.

I hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3251 heard by me on 5/26, 1965.
[Signature] Examiner
New Mexico Oil Conservation Commission

proposes to drill and complete a well in Unit L of Section 14, Township 20 South, Range 33 East, Teas Pool, Lea County, New Mexico, with surface casing set at approximately 950 feet, cement circulated, and production casing set at approximately 3400 feet and cemented to approximately 2500 feet above the casing point. The well would be plugged and abandoned in accordance with the provisions of Order R-111-A.

CASE 3265: Application of Coastal States Gas Producing Company for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the San Andres formation through perforations from 4545 feet to 4590 feet in its Southern Minerals State Well No. 1-15 located in Unit L of Section 15, Township 9 South, Range 33 East, Flying "M" San Andres Pool, Lea County, New Mexico.

CASE 3112: (Reopened)

In the matter of Case 3112 being reopened pursuant to the provisions of Order No. R-2824, which order authorized Gallup-Dakota commingling in the wellbore by means of a dual-flow downhole choke assembly in its Jicarilla 28 Well No. 1 located in Unit J of Section 28, Township 25 North, Range 4 West, Rio Arriba County, New Mexico. All interested parties may appear and show cause why the authority granted under this order should not be terminated.

CASE 3266: Application of Pan American Petroleum Corporation for a dual completion and commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (conventional) of its Federal "A" Well No. 4 located in Unit L of Section 13, Township 9 South, Range 35 East, Lea County, New Mexico, to produce oil from the Bough Permo-Penn and an undesignated Devonian pool through parallel strings of tubing. Applicant further seeks authority to commingle the production from said pools on said lease after separately metering the production from each pool.

CASE 3258: (Continued from the May 26th examiner hearing)

Application of Midwest Oil Corporation for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of the dual completion (conventional) of its State "C" Well No. 1 located in Unit K of Section 32, Township 13 South, Range 34 East, Lea County, New Mexico, to produce oil from the Upper and Lower Pennsylvanian formations through parallel strings of tubing.

DOCKET: EXAMINER HEARING- WEDNESDAY - JUNE 9, 1965

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 3251: (Continued from the May 26, 1965 Examiner Hearing)

Application of Continental Oil Company for a waterflood project, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project in the Rattlesnake Dakota Pool, San Juan County, New Mexico, by the injection of water into the upper and middle zones of the Dakota formation, through three injection wells in Sections 12 and 13, Township 29 North, Range 19 West.

CASE 3260: Application of Delaware-Apache Corporation for a unit agreement, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of the West Lusk Deep Unit Area comprising 1920 acres, more or less, of State and Federal lands in Township 19 South, Range 31 East, Eddy County, New Mexico.

CASE 3261: Application of Delaware Apache Corporation for a pool extension and special rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the extension of the Jenkins-Cisco Pool to include the S/2 of Section 19 and the NW/4 of Section 30, Township 9 South, Range 35 East, Lea County, New Mexico, and the SE/4 of Section 24, and the NE/4 of Section 25, Township 9 South, Range 34 East. Applicant further seeks the promulgation of special rules for said pool including a provision for 80-acre proration units.

CASE 3262: Application of Monsanto Company for a unit agreement, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval of the Cueva Unit Area comprising 12,489 acres, more or less, of State, Federal and fee lands in Townships 22 and 23 South, Range 25 East, Eddy County, New Mexico.

CASE 3263: Application of Jake L. Hamon for the creation of a new gas pool and for special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new Morrow Gas Pool for his Hamon State E-8913 Well No. 1 located in Unit A of Section 20, Township 20 South, Range 36 East, Lea County, New Mexico, and the promulgation of special pool rules including a provision for 640-acre spacing.

CASE 3264: Application of Carl Engwall for an exception to Commission Order R-111-A, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an exception to the potash-oil area casing and cementing rules as set forth in Commission Order R-111-A. Applicant



CONTINENTAL OIL COMPANY

LEGAL DEPARTMENT

A. T. SMITH
GENERAL ATTORNEY
C. R. HAMPTON
F. E. RADLOFF
G. H. MAYBERRY
C. R. ROBERTS
J. D. TRESNER
ATTORNEYS

1755 GLENARM PLACE
DENVER, COLORADO 80202
May 14, 1965

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Attention of Mr. A. L. Porter, Secretary-Director

RE: Application for Order Approving
Waterflood of Rattlesnake Dakota
Formation, Rattlesnake Field,
San Juan County, New Mexico,
Case No. 3251

Gentlemen:

I have been advised that the above-mentioned application of Continental Oil Company has been set for hearing on May 26, 1965. Due to circumstances beyond my control, it will not be possible for me to be in Santa Fe on that date and to conduct the hearing on behalf of Continental Oil Company as I had planned to do. I would appreciate your putting this matter over to June 9, 1965, the next regular hearing date.

I appreciate your cooperation in this matter.

Very truly yours,

Charles R. Roberts
Charles R. Roberts (CR)

CRR-kn

DOCKET MAILED

Date 5-27-65

PIONEERING IN PETROLEUM PROGRESS SINCE 1875



HUMBLE OIL & REFINING COMPANY

DENVER, COLORADO 80201

CENTRAL REGION

P. O. BOX 129

DENVER AREA

May 17, 1965

W. P. RYMAN
AREA EXPLORATION MANAGER
J. ROY DORROUGH
AREA PRODUCTION MANAGER

Mr. A. L. Porter
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Re: Continental Oil Company
Waterflood Application
Rattlesnake Field
San Juan County, New Mexico

Dear Sir:


This letter refers to Continental Oil Company's application of February 25, 1965 for a hearing to obtain authority for a waterflood of the Rattlesnake-Dakota Reservoir, Rattlesnake Field, San Juan County, New Mexico. Humble Oil & Refining Company, as a lease holder within one mile of the proposed injection wells, has no objection to the proposed waterflood.

Very truly yours,

HUMBLE OIL & REFINING COMPANY

JRD:mg

cc: Continental Oil Company
P. O. Box 3312
Durango, Colorado

By 
Denver Area Production Manager
Central Region

A M E R I C A ' S L E A D I N G E N E R G Y C O M P A N Y





CONTINENTAL OIL COMPANY

LEGAL DEPARTMENT

1755 GLENARM PLACE
DENVER, COLORADO 80202

May 5, 1965

A. T. SMITH
GENERAL ATTORNEY
C. R. HAMPTON
F. E. RADLOFF
G. H. MAYBERRY
C. R. ROBERTS
J. D. TRESNER
ATTORNEYS

New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Attention of Mr. A. L. Porter, Secretary-Director

RE: Application for Order Approving
Waterflood of Rattlesnake Dakota
Formation, Rattlesnake Field,
San Juan County, New Mexico

Gentlemen:

Enclosed are three copies, including exhibits,
of Continental Oil Company's application for authority to
waterflood the Rattlesnake Dakota reservoir, Rattlesnake
Field, San Juan County, New Mexico. I have transmitted
complete copies of this application, including exhibits,
to the State Engineer's Office, P. O. Box 1079, Santa Fe,
New Mexico, and to all other interested parties.

I would appreciate your setting this matter down
for hearing and advising me at your convenience of the hear-
ing date.

Very truly yours,

Charles R. Roberts

CRR:kn
Enc.

DOCKET MAILED

Date 5-12-65

PIONEERING IN PETROLEUM PROGRESS SINCE 1875

LABORATORY REPORT

WATER ANALYSIS

No. 100

Company Union Pacific
Well 100
Field 100
County 100
State 100

Formation 100
Depth 100
Date Collected 100
Source of Sample 100
Laboratory No. 100

Specific Gravity at 60°F 1.000
Resistivity at 25°C 100 Ohm-inches
pH 7.0
Total Solids 3.0
Free Carbon Dioxide nil
Hydrogen Sulfide nil
Organic Acids as Propionic nil
Chlorides 100
Sulfates 100
Carbonates 100
Bicarbonates 100
Free Hydroxyl nil
Langelier Index 100 Indicates

Sodium 100
Potassium 100
Magnesium 100
Calcium 100
Strontium 100
Barium 100
Iron—Total 100
Iron—Dissolved 100
Silicon 100
Suspended Solids—Total 100
Suspended Solids—
Acid Soluble 100
Suspended Solids—
Pentane Soluble 100

Remarks: Routine water analysis for compatibility of well water with Bakota.
Non-acid water.

Winning tests show the waters to be compatible. Water analyses indicate no trouble would be expected in flooding the Bakota with water from later well No. 100.

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 5
CASE NO. 325

[Signature]
W. D. Greenhouse

OIL CONSERVATION COMMISSION
LABORATORY

Company _____	Oil _____
Well _____	Depth _____
Field _____	Date Collected _____
County _____	Source of Sample _____
State _____	_____
Specific Gravity at 60°F _____	_____
Resistivity at _____°F _____ Ohm-Meters	_____
pH _____	_____
Total Solids _____	Lithium _____
Free Carbon Dioxide _____	Sodium _____
Hydrogen Sulfide _____	Potassium _____
Organic Acids as Propionic _____	Magnesium _____
Chlorides _____	Calcium _____
Sulfates _____	Strontium _____
Carbonates _____	Barium _____
Bicarbonates _____	Iron — Total _____
Free Hydroxy _____	Iron — Dissolved _____
Langelier Index _____ Indicates	Silicon _____
_____	Suspended Solids — Total _____
_____	Suspended Solids —
_____	Acid Soluble _____
_____	Suspended Solids —
_____	Dewatered Soluble _____

Remarks _____

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 4
CASE NO. 3257

Original Signed by
W. D. GRIFFHOUSE



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 959
Farmington, New Mexico

IN REPLY REFER TO:

DURANGO PROC.

MAY 19 1965

OFFICE HRS.

May 18, 1965

KRO

Continental Oil Company
P. O. Box 3312
Durango, Colorado

Attention: Mr. H. D. Maley

Gentlemen:

This office has received a copy of your application for waterflooding the Rattlesnake Dakota field, located on Navajo tribal lease I-89-Ind-56, which was submitted to the New Mexico Oil Conservation Commission.

This office offers no objection to the initiation of water injection into the Dakota reservoir. Prior approval should be obtained from this office for the conversion of each well to an injection well.

Sincerely yours,

P. T. McGrath
District Engineer

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 6
CASE NO. 3251

HUMBLE OIL & REFINING COMPANY

DENVER, COLORADO 80201

CENTRAL REGION

DENVER AREA

W. P. NYMAN
AREA DELEGATION MANAGER
J. ROY DORROUGH
AREA PRODUCTION MANAGER

May 17, 1965

MAY 19 1965	
P. O. BOX 120	
CONFIDENTIAL	1
RECEIVED	1
FILED	1
INDEXED	1
SEARCHED	1
SERIALIZED	1
FILED	1

Mr. A. L. Porter
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Re: Continental Oil Company
Waterflood Application
Rattlesnake Field
San Juan County, New Mexico

Dear Sir:

This letter refers to Continental Oil Company's application of February 25, 1965 for a hearing to obtain authority for a waterflood of the Rattlesnake-Dakota Reservoir, Rattlesnake Field, San Juan County, New Mexico. Humble Oil & Refining Company, as a lease holder within one mile of the proposed injection wells, has no objection to the proposed waterflood.

Very truly yours,

HUMBLE OIL & REFINING COMPANY

COPY ORIGINAL
SIGNED J. ROY DORROUGH
By
Denver Area Production Manager
Central Region

JRD:mg
cc: Continental Oil Company
P. O. Box 3312
Durango, Colorado

THIS COPY FOR

BEFORE EXAMINER UTZ	
OIL CONSERVATION COMMISSION	
EXHIBIT NO.	7
CASE NO.	3251

A M E R I C A ' S L E A D I N G E N E R G Y C O M P A N Y



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PAGE 1

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 9, 1965

EXAMINER HEARING

IN THE MATTER OF:

Application of Continental Oil Company for
a waterflood project, San Juan County,
New Mexico.

Case No. 3251

BEFORE: ELVIS A. UTZ

TRANSCRIPT OF HEARING

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 1213 FIRST NATIONAL BANK EAST • PHONE 256-1294 • ALBUQUERQUE, NEW MEXICO

MR. UTZ: Case 3251, in the matter of the application of Continental Oil Company for a waterflood project in San Juan County, New Mexico, in the Rattlesnake Daktoa Pool.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox, Santa Fe, representing the applicant. I have associated with me, in this case, Mr. Gordon Mayberry, a member of the Colorado Bar. We have one witness and I would like to have him sworn, please.

(Witness sworn.)

RICHARD K. O'NEIL

called as a witness, having been first duly sworn on oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A My name is Richard K. O'Neil.

Q By whom are you employed and in what position?

A I am employed by Continental Oil Company as Senior Production Engineer in the Durango, Colorado Office.

Q Have you ever testified before the Oil Conservation Commission?

A No, sir.

Q For the benefit of the Examiner, would you briefly outline your education and experience as an engineer?

A I'm a graduate of the Colorado School of Mines in 1937 with a Petroleum Degree. I have been employed since that time with Continental in positions in Colorado. I am currently in charge of the waterflood operations in northern New Mexico and Utah.

Q How long have you held that position?

A I have been a Senior Production Engineer for the last two years.

Q In charge of the waterflood operation?

A I have been in charge of the waterflood for two years.

Q Does the area involved in Case 3251 come within your jurisdiction?

A Yes, sir.

Q Are you familiar with that application?

A Yes.

MR. KELLAHIN: Are the witness' qualifications accepted?

MR. UTZ: He's qualified to testify in this case.

Q (By Mr. Kellahin) Are you familiar with the application of Continental Oil Company in Case 3251?

A Yes, I am.

Q What is proposed by Continental in this case?

A Continental proposes to waterflood the Rattlesnake

Dakota Pool utilizing three injection wells and four producing wells in the upper and middle benches of the Dakota Reservoir.

(Whereupon, Applicant's Exhibits Nos. 1 to 7 inclusive were marked for identification.)

Q Referring to what has been marked as Exhibit No. 1, would you identify that Exhibit and discuss it, please?

A Exhibit No. 1 is a lease plat of the Dakota Pool and the surrounding area. The gray colored area in that plat is the Continental acreage involved, there are red arrows pointing to the three proposed injection wells and the green arrow pointing to the water supply well.

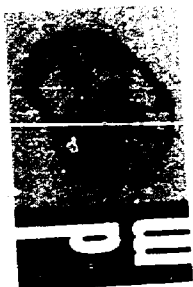
Q Are all of those wells presently drilled?

A All those wells are presently drilled and now on producing status.

Q Could you, for the benefit of the Examiner, give a brief summary of the history of this pool?

A The immediate area of interest here was developed during the period of 1926 to 1939 with six producing wells. These six wells were all plugged and abandoned in the mid 1940's. While they were producing, they produced 345,000 barrels of oil. Well No. 22, in the middle of the proposed waterflood area, produced 340,000. The I.P. was 340 to 350 pounds. In 1955, the bottom hole pressure was 155 pounds. At the commencement of the redrilling program, the pressure in

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the area was 291 pounds.

Q When did this redrilling program occur?

A Well No. 148 was drilled as a test well, twinning well No. 22 in June of 1962. The area was developed with six additional wells on forty-acre spacing and the drilling program was completed in March, 1964.

Q When these new wells were drilled, did you find the pressure had substantially recovered in this area?

A That is correct. In 1964, the pressure was 291 pounds and at the time of depletion or of the plugging with the original wells, the estimated pressure was under 100 pounds. It appears there was a water drive that repressured the area.

Q Is it an effective water drive for continued production?

A It's partial water drive. It is insufficient to deplete the area by the mechanism now involved.

Q Based on the history of this pool, in your opinion, is the reservoir substantially depleted on primary production?

A Yes, sir, the reservoir is currently producing twenty-five barrels of oil a day and 866 barrels of water a day. It is essentially depleted at this time by primary means.

Q Referring to what has been marked as Exhibit No. 2, would you identify that exhibit and discuss it, please?

A Exhibit No. 2 is a structure map on the top of the upper bench of the Dakota formation. This map shows that the area of interest is on a structural high in the Rattlesnake field. I would like to give a brief geological summary of the area, which can be referred to with the structure map. The Dakota formation in the area of the Rattlesnake field is composed of numerous lenticular sandstones, light gray shales, coals, abundant carbonaceous materials, and basal conglomerate. These sediments were deposited in a marsh and swamp environment near the edge of a transgressing cretaceous sea. The upper twenty to thirty feet was reworked and redeposited as near-shore marine sandstones. The sands in all the upper Dakota was deposited in a northeast southwest trending stream channel. This can be recognized on the structure map. The field is located on a small structure with low relief, approximately 150 feet of closure on the Dakota top, only the top fifty feet is now possibly productive. The sands are generally quartzitic, fine-grained, well sorted with porosities ranging from twenty-four to twenty-five per cent and permeabilities ranging from 400 to 500 hundred millidarcies. The upper marine sands, which we identify as the upper bench, are poor sorting and more clay size particles resulting in lower porosity and lower permeability.

Q You referred to the area of interest being on a



high, is that of any significance to this waterflood project: if so, what is the significance?

A This area was depleted, as I mentioned, about 1939. The wells that were producing at that time were essentially producing no fluid. It is believed that in the last twenty years, there has been a resaturation on the crest of the structure which was identified in the drilling of Well 148 and this is the oil that we are now producing by this limited water drive.

Q Now, referring to what has been marked as Exhibit No. 3, would you identify that exhibit and discuss it, please?

A Exhibit No. 3 is a cross section showing the lenticularity of the sand and the correlation of the upper and middle benches of the Dakota Reservoir.

Q Now, the exhibit shows, as you stated, the upper and the middle benches of the Dakota. Are these two separate sources of supply, or what is the situation as to those?

A Initially, the upper and middle benches were separate reservoirs. However, during the depletion during the early development, the wells were drilled and completed out of a common source of supply and at the present time, we consider them as a common source of supply.

Q Will this situation affect your injection program for the waterflood project?

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A While we will produce the wells as if they were a common source of supply, we feel that there is a need to segregate injection into the two benches to maintain proper control of our water injection.

Q Is this due to variations in the permeability?

A This is due to variations in the permeability in the area and additionally due to the water distribution or redistribution upon the resaturation. Some zones are well in the upper bench.

Q Now, what will be your source of water for injection purposes?

A We plan to reinject all of the produced Dakota water and, additionally, we plan to use De Chelly water from Well No. 145 to supplement the produced water.

Q Do you have an analysis of the water?

A Yes. We have an analysis of these waters and we would like to enter them as Exhibits 4 and 5.

Q Does this reflect that the water is fresh?

A Both of these waters are fresh. They are compatible and we anticipate no problems using De Chelly water mixed with the water as a waterflood water.

Q What volumes will you inject?

A Three thousand barrels of water a day total.

Q Is the oil a sweet or sour crude?

A The oil is sweet crude, it's sixty-five gravity and it's a very volatile light crude.

Q Is there anything present in this reservoir or in the water to be used that would cause you to anticipate corrosion problems?

A There is nothing, at this time, that would cause us to anticipate corrosion problems. The only apparent problem that has been encountered was corrosion from the Gallup sands occurring between 300 and 450 feet. This was anticipated on the drilling of the wells, the Dakota wells, and they were cemented to surface to protect against external casing corrosion from the Gallup.

Q Will the injection be through a closed system?

A Injection will be through a closed system. We will treat the water if necessary to remove oxygen and to inhibit bacterial action.

Q You stated that the wells were cemented to the surface. Is this true of all of the wells?

A This is true, an attempt was made to cement all of the wells to surface that were completed in the Dakota and the intermediate string which will be the production string on 145 was cemented to surface.

Q When you say all of the wells, we are talking about the wells involved in this project, not necessarily



all the wells in the pool?

A That's right. I am referring strictly to the wells in the waterflood area.

Q What life do you anticipate from this project?

A We anticipate a 2.8 years' life for the waterflood project.

Q Do you anticipate that it would call for an expansion at any other time?

A No, we don't consider any expansion. We consider this a terminal project in the completion of the water.

Q As I understand, you are presently making large volumes of water in this pool now, is that correct?

A Yes, our current production is twenty-five barrels of oil and 866 barrels of water a day.

Q Do you expect there will be a reduction in the volumes of water produced as you inject water in the reservoir?

A No, sir. We anticipate a significant increase in the volume of water, however, our calculations show that the oil cut should remain relatively constant over the next two years and by increasing the total fluid withdrawal, we can increase the oil production to a commercial level.

Q You say to a commercial level, is it noncommercial at this point, in your opinion?

A That is correct. At the present time, considering

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the total fluid withdrawal and the oil producing rate, the reservoir is now noncommercial in this area.

Q In your opinion then, would approval of this project result in the recovery of oil that would not otherwise be recovered?

A Very definitely. This project will result in recovery of oil which cannot be produced under the present mode of operation.

Q In the event it was not approved, what would be the alternative?

A In the event that we can't waterflood, we would probably plug and abandon five of the seven wells in the area.

Q Are you familiar with the provisions of Rule 701 of this Commission?

A Yes, sir.

Q This project would be operated under the provisions of those rules, is this correct?

A That's right.

Q Were Exhibits 1 through 5 prepared by you or under your supervision?

A Exhibits 1 through 5 were prepared by Continental Oil Company personnel in the Durango office and I have personally checked and verified the data contained on them.

Q You adopt them as your exhibits? A Yes.

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Q Have you contacted the United States Geological Service in connection with this project?

A Yes, sir. We have contacted Mr. McGrath of the United States Geological Survey in Durango and he has indicated his approval of the project.

Q Is that in the form of a letter which has been marked as Exhibit No. 6?

A That is correct.

Q Are there any other operators in this area?

A Humble Oil and Refining Company owns acreage within one mile of the proposed waterflood and we have a letter from Humble indicating their approval of the project.

Q That has been marked as Exhibit No. 7?

A That is correct.

MR. KELLAHIN: At this time I would like to offer in evidence Exhibits 1 through 7.

MR. UTZ: Without objection, Exhibits 1 through 7 will be entered into the record of this case.

Q (By Mr. Kellahin) Have you anything further to add to this, Mr. O'Neil?

A No, sir.

MR. KELLAHIN: That's all I have on direct examination.



CROSS EXAMINATION

BY MR. UTZ:

Q Where is the 147 Well located, your water producing well?

A The water producing well is 145. This well is 660 from the south line and 1980 from the west line in Section 12, Township 29 North, Range 19 West. It is shown on that map as a dry hole. It would be in the southeast of the southwest of 12, a diagonal location from No. 148.

Q What was the foot location on that again?

A 660 from the south line and 1980 from the west line of Section 12.

Q Have you given the foot locations from the section line of your three injections wells anywhere in your exhibits?

A No, sir. I haven't.

Q Would you give me those now?

A All right. Well No. 149 is 1980 from the south line, 2310 from the east line, Section 12, Township 29 North, Range 19 West; Well 151 is 1700 feet from the south line, 900 feet from the west line in Section 12, Township 29 North, Range 19 West; Well 155 is 330 feet from the north line, 2310 from the east line, Section 13, Township 29 North, Range 19 West.



MR. UTZ: Are there any other questions of the witness?

MR. IRBY: Yes, sir.

MR. UTZ: Mr. Irby.

MR. IRBY: Frank Irby, State Engineer's Office.

Q (By Mr. Irby). I didn't get your answer on the life expectancy of the project.

A The project has a life expectancy of 2.8 years from the commencement of waterflooding.

Q Your two analyses on the water sources are numbered 4 and 5, which is which?

A No. 4, I believe is the Dakota water and No. 5 is the De Chelly water which was taken from Well No. 100.

Q I believe you stated that these wells where you intended to make them dual injectors, are cemented all the way?

A That's right. The cement jobs on these wells were designed to cement to surface.

Q Did you state the quality of the cement used in these?

A No, sir. I did not.

Q Will you do that, please?

A These jobs were cemented with neat cement with 4% jell.

Q And that 4% is by --

A By weight.

Q -- by weight in the dry state?

A In the dry state.

MR. IRBY: That's all I have.

MR. UTZ: Are there any other questions?

The witness may be excused. The case will be taken under advisement.

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this 21st day of June, 1965.

Ada Dearnley
ADA DEARNLEY

My Commission Expires:

June 19, 1967.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 3-2-2-1 heard by me on June 9, 1965.
Charles J. [Signature] Examiner
New Mexico Oil Conservation Commission

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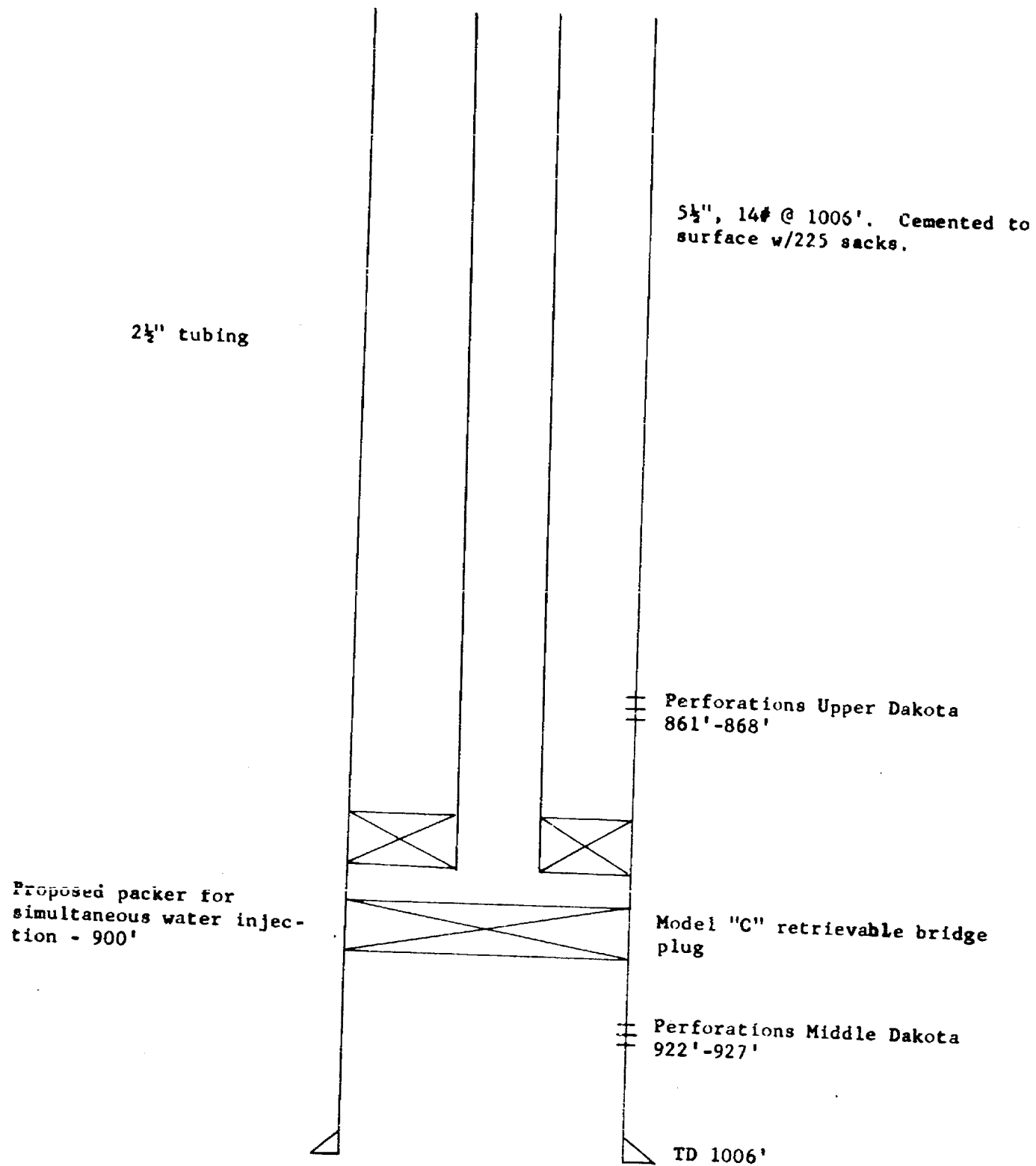
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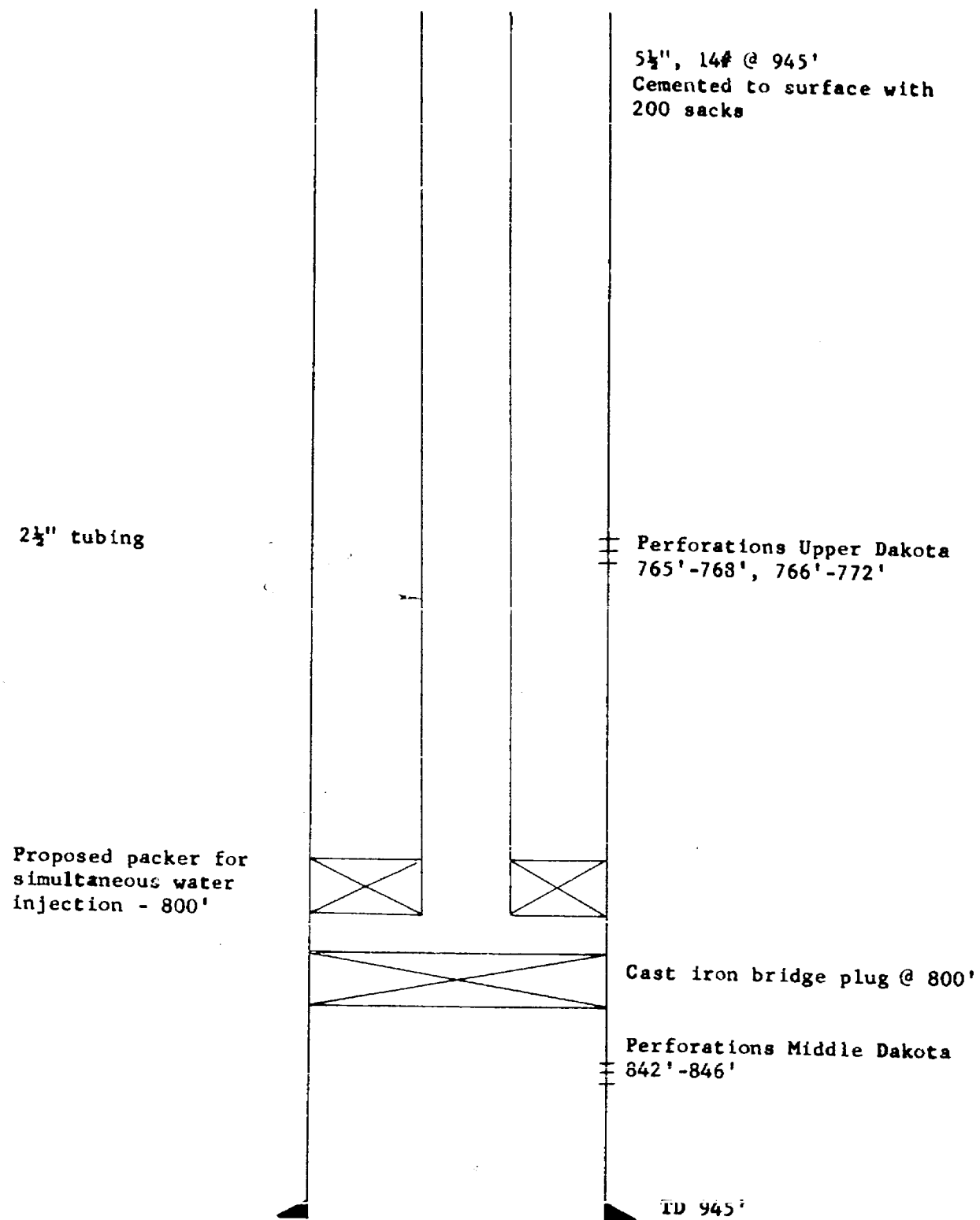
<u>WITNESS</u>	<u>PAGE</u>
RICHARD K. O'NEIL	
Direct Examination by Mr. Kellahin	2
Cross Examination by Mr. Utz	13

RATTLESNAKE DAKOTA
WELL NO. 149

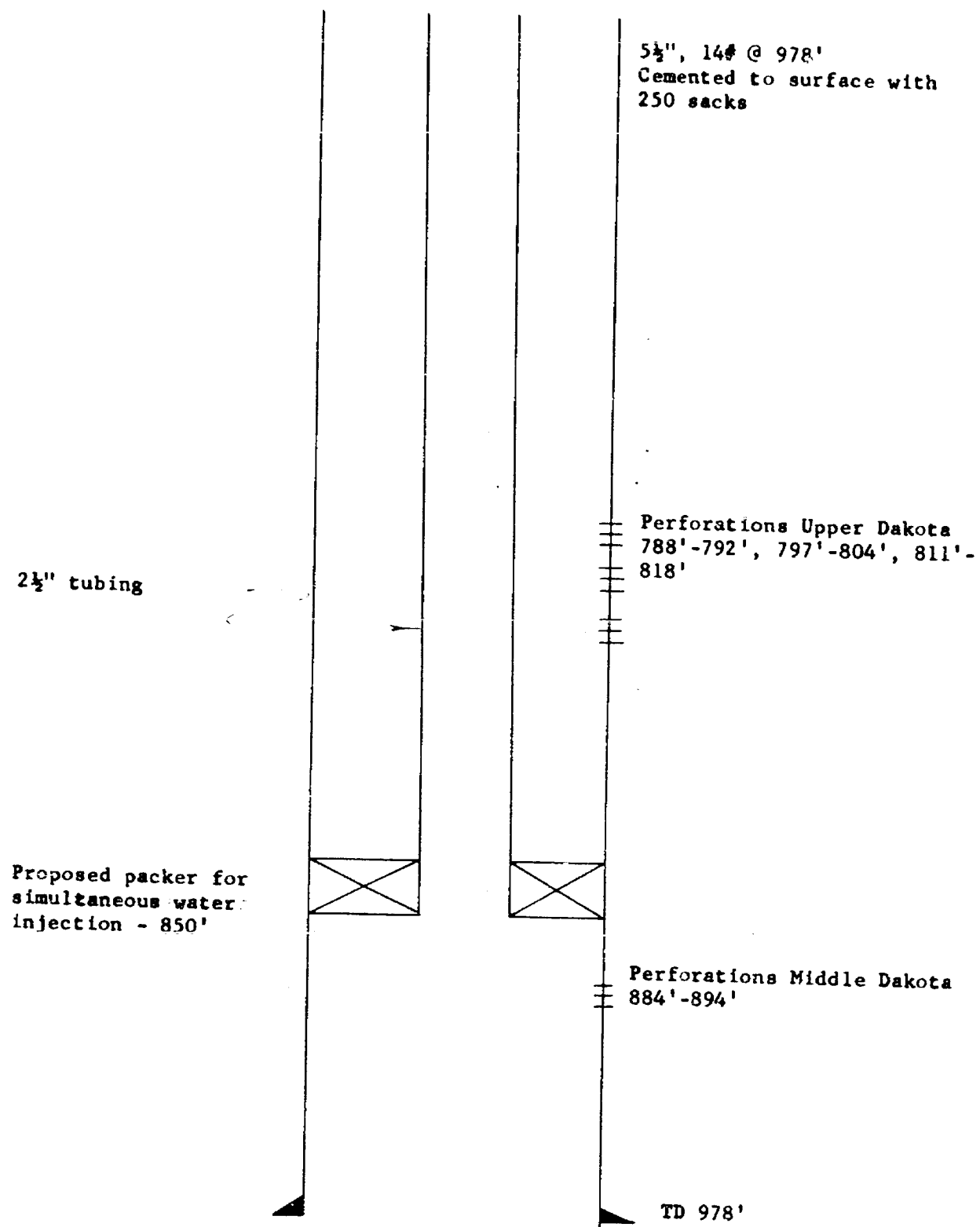
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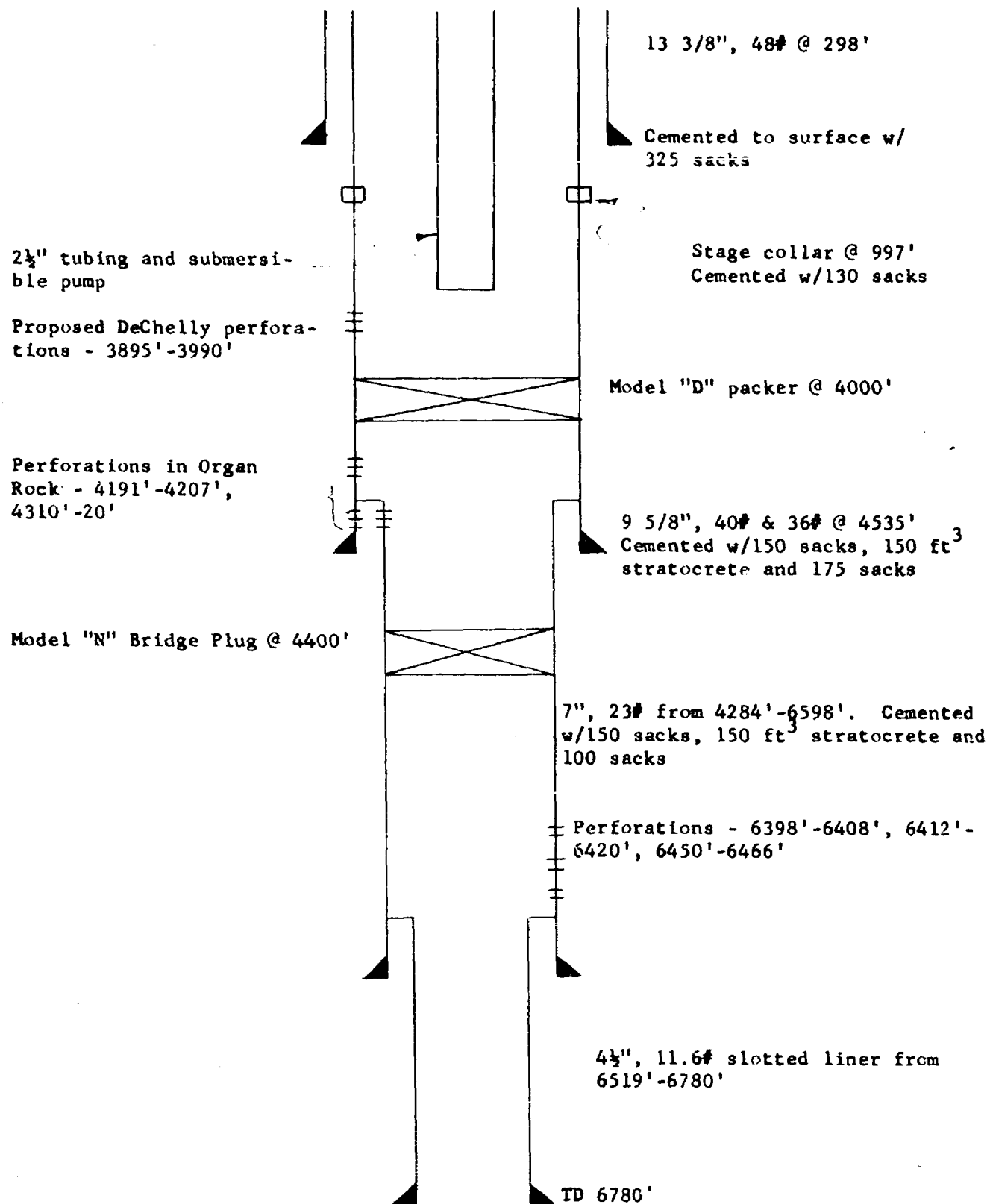
RATTLESNAKE DAKOTA
WELL NO. 151

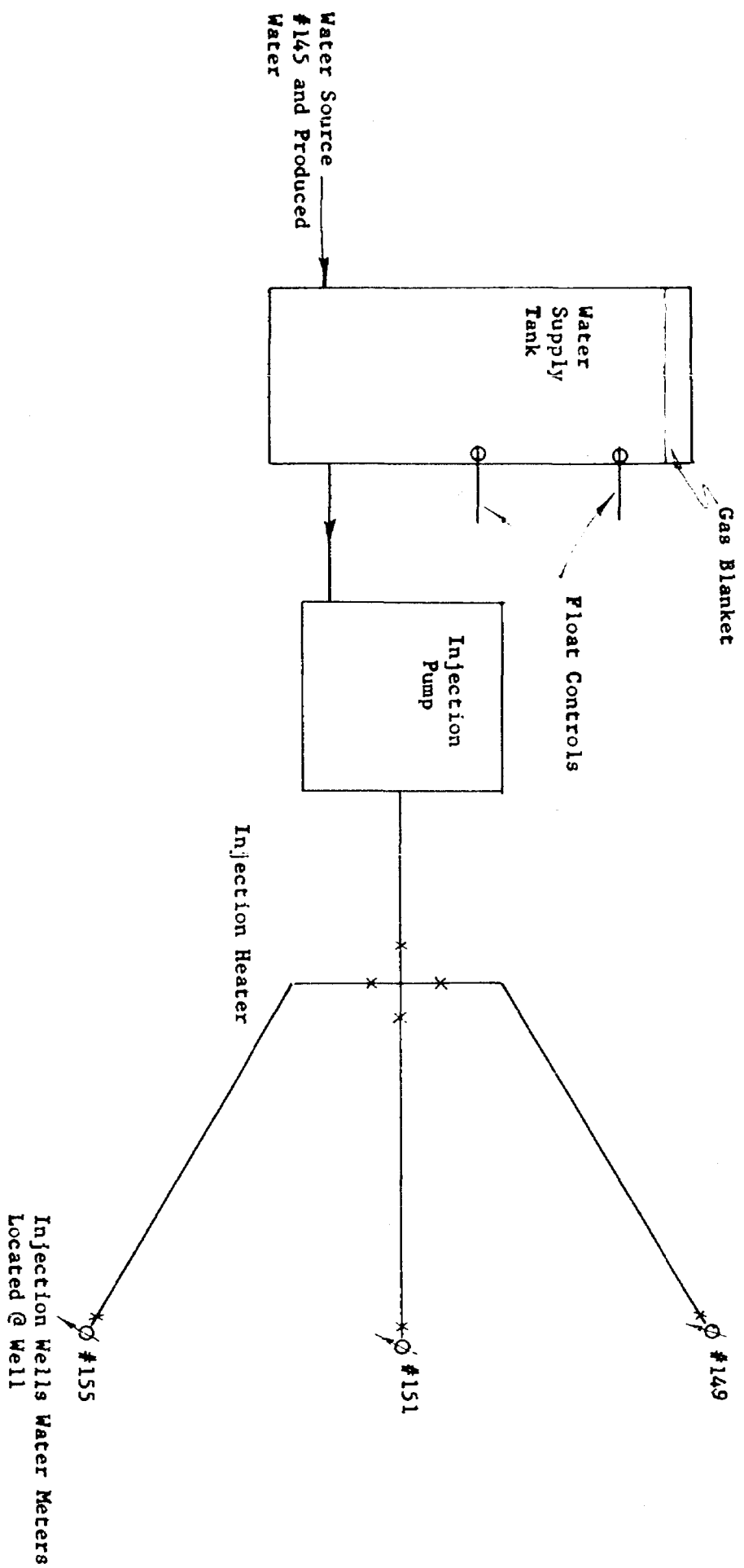


RATTLESNAKE DAKOTA
WELL NO. 155



RATTLESNAKE FIELD NO. 145
WATER SUPPLY WELL





Diagrammatic Sketch of Injection
Facilities
Rattlesnake Dakota
San Juan County, New Mexico

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE No. 3251
Order No. R-2928

APPLICATION OF CONTINENTAL OIL COMPANY
FOR A WATERFLOOD PROJECT, SAN JUAN
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on June 9, 1965, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 15th day of June, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Continental Oil Company, seeks permission to institute a waterflood project in the Rattlesnake-Dakota Pool by the injection of water into the upper and middle zones of the Dakota formation through three injection wells in Sections 12 and 13, Township 29 North, Range 19 West, NMPM, San Juan County, New Mexico.

(3) That the wells in the project area are in an advanced state of depletion and should properly be classified as "stripper" wells.

(4) That the proposed waterflood project should result in the recovery of otherwise unrecoverable oil, thereby preventing waste.

(5) That the subject application should be approved and the project should be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

-2-

CASE No. 3251

Order No. R-2928

IT IS THEREFORE ORDERED:

(1) That the applicant, Continental Oil Company, is hereby authorized to institute a waterflood project in the Rattlesnake-Dakota Pool by the injection of water into the upper and middle zones of the Dakota formation through the following-described wells in Township 29 North, Range 19 West, NMPM, San Juan County, New Mexico:

Continental-Rattlesnake Well No. 149, located
1980 feet from the South line and 2310 feet
from the East line of Section 12;

Continental-Rattlesnake Well No. 151, located
1700 feet from the South line and 900 feet
from the West line of Section 12;

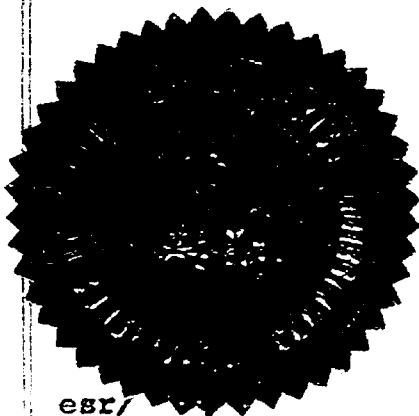
Continental-Rattlesnake Well No. 155, located
330 feet from the North line and 2310 feet
from the East line of Section 13.

(2) That the subject waterflood project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

(3) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Commission in accordance with Rules 704 and 1120 of the Commission Rules and Regulations.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.



STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Jack M. Campbell
JACK M. CAMPBELL, Chairman

Guston B. Hays
GUSTON B. HAYS, Member

A. L. Porter, Jr.
A. L. PORTER, Jr., Member & Secretary

esr/



CONTINENTAL OIL COMPANY

P. O. Box 3312
Durango, Colorado
February 25, 1965

32.51

New Mexico Oil Conservation Commission (3)
P. O. Box 871
Santa Fe, New Mexico

Attn: Mr. A. L. Porter, Secretary-Director

Gentlemen:

Continental Oil Company herewith makes application for a hearing to obtain authority for a waterflood of the Rattlesnake Dakota reservoir, Rattlesnake Field, San Juan County, New Mexico.

The feasibility of waterflooding the reservoir has been studied, and an engineering report recommending the waterflood has been approved by Continental Oil Company. The Rattlesnake Dakota reservoir producing mechanism is natural water drive. The natural water drive resulted in high initial oil and water production rates. However, total fluid production and reservoir pressure have declined as withdrawal rates exceeded the natural water influx rate. The proposed waterflood will provide for increased oil and water withdrawal rates and increase the ultimate oil recovery. The waterflood will be in the best interest of conservation.

It is proposed to inject water into the upper and middle Dakota zones into Wells No. 149, 151 and 155. The injection rate will be 3,000 barrels of water per day. The water source would be developed by perforating the casing opposite the DeChelly Formation in Well No. 145 and using present Dakota produced water. Well No. 145 is a shut-in Organ Rock Formation salt water disposal well. Salt water disposal was discontinued when the Pennsylvanian "CD" pressure maintenance program was initiated in October, 1964. Attached are the logs and diagrammatic sketches of the proposed injection wells, water source well and injection facilities. Also, attached is a cross-section showing the upper and middle Dakota zones, a Dakota structure contour map, a lease plat and the performance curves of the proposed waterflood area.

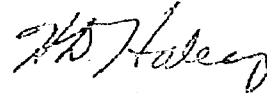
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Page Two

Water compatibility will not be a problem as Dakota and DeChelly water compatibility tests have been conducted. The injection water may be chemically treated and filtered, provided a high quality water is required.

We respectfully request a hearing to present testimony and secure approval for the Rattlesnake Dakota reservoir waterflood.

Very truly yours,



H. D. Haley
District Manager
Durango District
Production Department

FTH/ca

cc: Continental Oil Company, Legal Department, Denver, Colorado
Mr. E. A. Austin, Continental Oil Company, Denver, Colorado
State Engineer's Office, P. O. Box 1079, Santa Fe, New Mexico
U. S. Bureau of Mines, P. O. Box 10035, Amarillo, Texas
U. S. Geological Survey, P. O. Box 959, Farmington, New Mexico
Navajo Tribal Council
U. S. Geological Survey, P. O. Box 1857, Roswell, New Mexico