# STATE OF NEW MEXICO

## STATE ENGINEER OFFICE

### SANTA FE

S. E. REYNOLDS
STATE ENGINEER

October 27, 1966

ADDRESS CORRESPONDENCE TO:
STATE CAPITOL
SANTA FE, NEW MEXICO 87501

Mr. A. L. Porter, Jr.
Secretary-Director
Oil Conservation Commission
Santa Fe, New Mexico

'66 Oct 28 AM 8 0?

Dear Mr. Porter:

Reference is made to the application of Atlantic Richfield Company dated October 21, 1966 which seeks administrative approval to convert the following wells to water injection:

Well #73 in the SE¼ of the NE¼ Sec. 14, T. 31 N., R. 17 W.; Well #10 in the SE¼ of the NE¼ of Sec. 30, T. 31 N., R. 16 W., and well #12 in the SE¼SW¼ Sec. 29, T. 31 N., R. 16 W.

This office offers no objection to the granting of the application, provided the commission is convinced that the casing, cementing, tubing and injection program proposed will adequately control the injected fluid and prevent the commingling of fluids and gases from stratum to stratum. It is noted that Atlantic proposes to perforate above and below the packer on wells 10 and 12, which in turn indicates that the wells will be operated as dual injectors. I would call to your attention the fact that the 5½" casing will be the only protection used to contain the injected fluids and to prevent commingling of the fluids and gases, which may be encountered outside the casing from depths of about 100' to depths of about 800' below land surface.

FEI/ma
cc-Atlantic Richfield Co.

Yours truly,

S. E. Reynolds
State Engineer

By: Frank E. Irby
Frank E. Irby
Chief
Water Rights Div.

AtlanticRichfieldCompany
North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer

'66 Oct 24 AM 8 1?

October 21, 1966

State of New Mexico
State Engineer's Office
State Capitol
Santa Fe, New Mexico

Attention: Mr. Frank E. Irby,
Chief Water Rights Division

Gentlemen:

Atlantic Richfield Company is requesting permission to convert Wells Nos. 10, 12, and 73 in the Horseshoe-Gallup Unit, San Juan County, New Mexico from producing to injection status. A copy of our application to the New Mexico Oil Conservation Commission is attached.

Below is information that might be useful to you in reviewing the application and making your determination to the New Mexico Oil Conservation Commission.

As shown on the application it is planned to inject water down tubing below a packer into the lower zone and down the tubing casing annulus into the upper zone in Wells Nos. 10 and 12. This is the practice in all the dual zone wells in the Unit. In Well No. 73, it is planned to inject in the lower zone only down the tubing with a packer set less than 100' above the perforations.

1. New casing was installed in No. 10 on November 9, 1958.
   New casing was installed in No. 12 on November 25, 1958.
   New casing was installed in No. 73 on July 22, 1959.

2. The interval above the upper zone in Wells Nos. 10 and 12 is primarily shale and is impermeable. If a casing leak should occur, it would be detected by a leak at the braden head. Once a leak is detected, it would be repaired by means of cementing or in an extreme case, running a liner inside the production casing. We conclude that a casing leak is improbable as all injected water is inhibited for corrosion.

3. The project is expected to be in operation until approximately 1978.

We hope this information will be helpful in substantiating your waiver of objection to this proposal. Please send us a copy of your determination to the New Mexico Oil Conservation Commission. If you need any additional information please let us know.

Yours very truly,

W. P. Tomlinson by [illegible]
W. P. Tomlinson

WPT:jcb

cc: New Mexico Oil Conservation Commission ✓
P. O. Box 2088
Santa Fe, New Mexico

AtlanticRichfieldCompany
North American Producing Division
New Mexico-Arizona District
Post Office Box 1978
Roswell, New Mexico 88201
Telephone 505 622 4041

W. P. Tomlinson
District Engineer

PMX - 22
Hearing Nov 13

October 21, 1966

New Mexico Oil Conservation Commission (4)
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.

Re: Horseshoe-Gallup Unit
San Juan County, New Mexico

Gentlemen:

In accordance with Rule 11 of Order No. R-2210 concerning the Horseshoe-Gallup Unit in San Juan County, New Mexico, Atlantic Richfield Company requests approval to convert the following three producing wells to injection. These wells were not listed as future injection wells in the exhibits presented by Atlantic at the hearing.

| Unit Well No. | Former Operator | Lease | Former Well No. | Location |
|---|---|---|---|---|
| 10 | Atlantic | Navajo | 10 | SE/4 NE/4 Section 30 T-31-N, R-16-W |
| 12 | Atlantic | Navajo | 12 | SE/4 SW/4 Section 29 T-31-N, R-16-W |
| 73 | Mobil | Navajo | A-17 | SE/4 NE/4 Section 14 T-31-N, R-17-W |

Wells Nos. 10 and 12 are both located in the fairway portion of the field where there exists good development of both the upper and lower zones. Both of these wells are in areas with nine-spot injection patterns. The nine-spot patterns in this area are not providing sufficient injection points to efficiently sweep the reservoir and recover all the remaining secondary reserves. The low rate of production in Well No. 10 (14 BOPD and 10 BWPD) and similar offset wells give evidence to the need for additional injection. Also, center wells in existing nine-spots have tended to water out prematurely as a result of preferential NE-SW permeability which exists primarily in the

upper zone. This holds true in Well No. 12 which is making 6 BOPD and 120 BWPD and represents a prematurely high water cut for the area. The conversion of the two wells will provide five-spot patterns which will result in a more efficient and economical recovery of remaining reserves.

Schematic sketches of Wells Nos. 10 and 12 are attached as Exhibits Nos. 1 and 2. As shown, injection is proposed to be into the upper zone through the tubing casing annulus and into the lower zone through tubing with the two zones separated by a packer. This is the identical physical hook-up of all the dual injectors in the project. Exhibits Nos. 4 and 5 are Induction-Electric Logs of these wells. Exhibit No. 7 is a plat showing the location of the three proposed wells, all wells within the Unit and offset Operators and wells. It is anticipated that approximately 500 BWPD per zone will be injected into Wells Nos. 10 and 12 at surface pressures in the range of 600 to 800 psig.

Well No. 73 is in the northern part of the Unit where only the lower zone is present. Like the other area discussed, lack of adequate injection points in this area is curtailing the recovery of the remaining secondary reserves. This is pointed out by the low productivity of the wells in this area. Well No. 73 is making only 3 BOPD and 0 BWPD and thus can better be used as an injector to obtain a more timely and efficient recovery of reserves.

A schematic sketch of Well No. 73 is attached as Exhibit No. 3. As shown, injection is proposed to be below a packer, down the tubing into the lower zone only. It is anticipated that 400 BWPD will be injected into the lower zone at a surface pressure in the range of 600 to 800 psig. Also, Attached as Exhibit No. 6 is a Gamma-Ray-Induction Log of the well.

Wells Nos. 10 and 12 are interior wells in the project and thus there are no offset Operators to these two wells. Consequently, no letter was furnished any other Operators concerning the conversion of these wells as provided for in Section 3 of Rule 11. However, well No. 73 is approximately 1/2 mile from Humble's Horseshoe-Gallup Pressure Maintenance Project No. 2. Therefore, Humble was furnished copies of

this letter of our intent to convert Well No. 73 to injection, dated October 21, 1966. The proposed conversions were submitted to the Working Interest Owners of the Unit for their approval. An affirmative vote of more than 65% of the Working Interest Owners has been received as required by the Unit Operating Agreement.

We would appreciate approval of this request at your earliest convenience. Please forward a copy of your approval letter to the United States Geological Survey and the New Mexico Commissioner of Public Lands. If you need additional information please let us know.

Yours very truly,

W. P. Tomlinson

W. P. Tomlinson

WPT:jcb

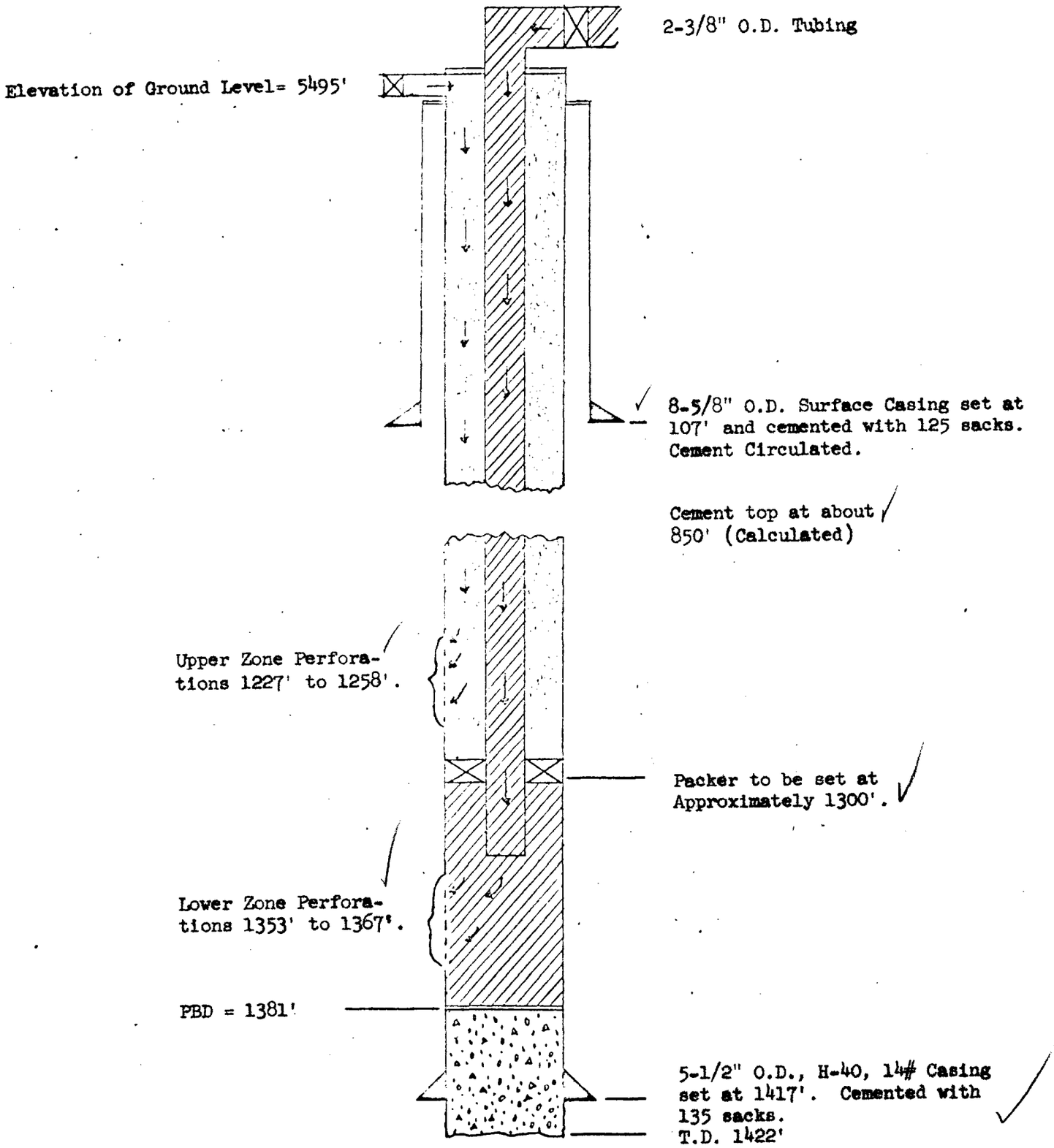
Attachments

cc: United States Geological Survey
P. O. Box 959
Farmington, New Mexico
Attn.: Mr. Phil McGrath

Commissioner of Public Lands
State Land Office
Santa Fe, New Mexico

State of New Mexico, State Engineer
State Capitol
Santa Fe, New Mexico
Attention: Mr. Frank E. Irby,
Chief Water Rights Division

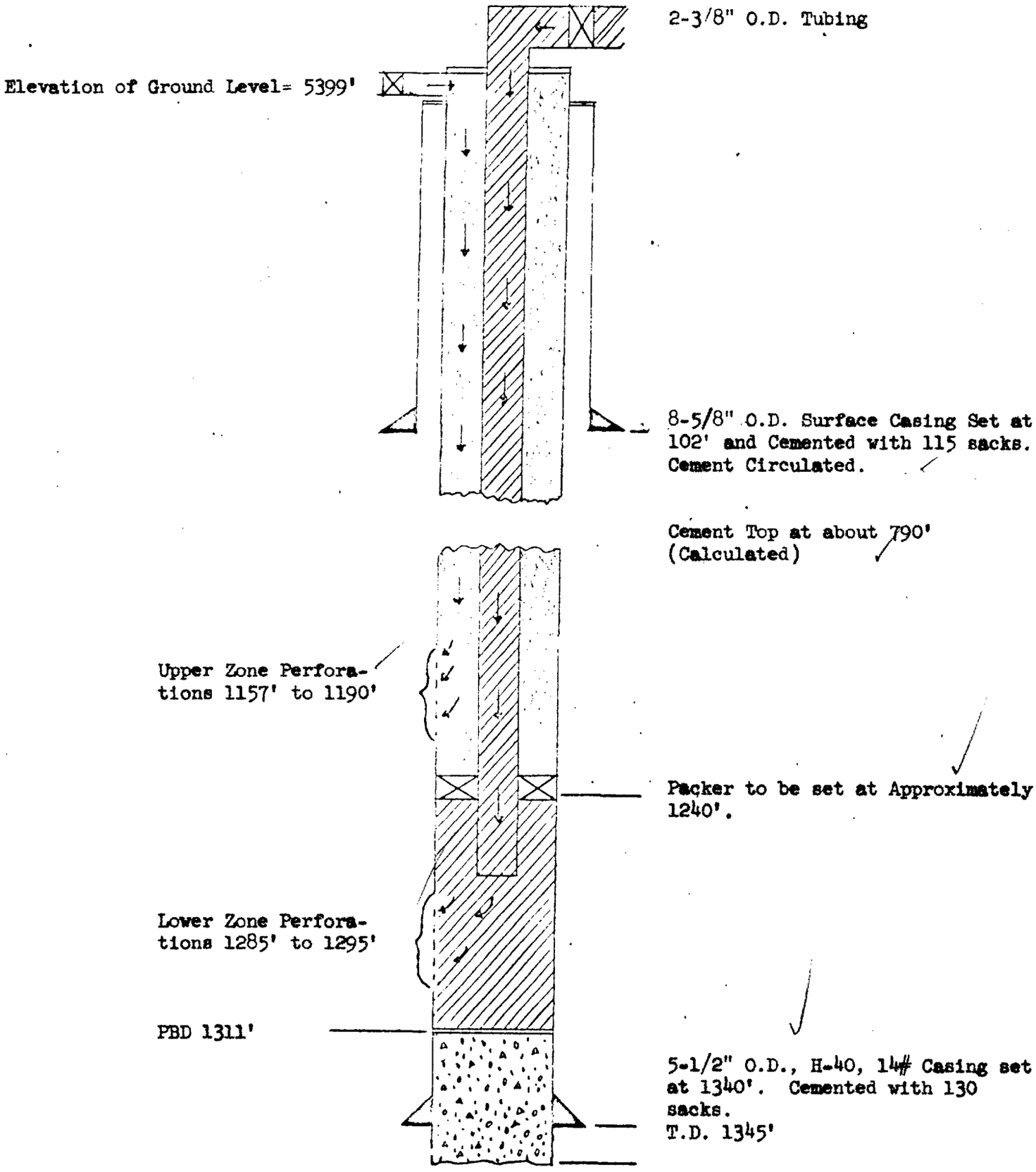
Humble Oil and Refining Company
2000 Classen Center - North Building
Oklahoma City, Oklahoma 73106




ATLANTIC RICHFIELD COMPANY
Schematic Drawing

Horseshoe-Gallup Unit Well No. 10
San Juan County, New Mexico

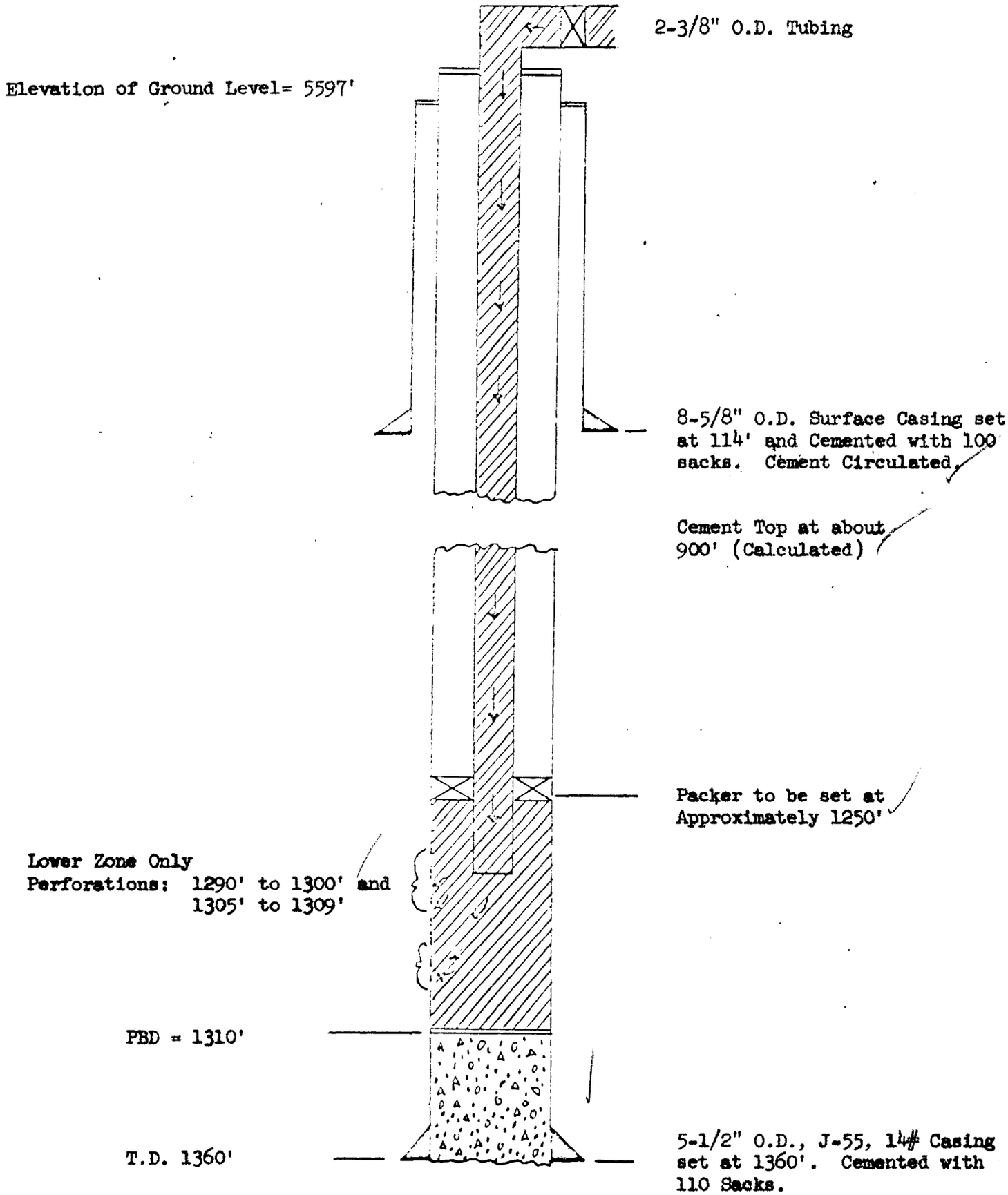
EXHIBIT NO. 1




ATLANTIC RICHFIELD COMPANY
Schematic Drawing

Horseshoe-Gallup Unit Well No. 12
San Juan County, New Mexico

EXHIBIT NO. 2




ATLANTIC RICHFIELD COMPANY
Schematic Drawing

Horseshoe-Gallup Unit Well No. 73
San Juan County, New Mexico

EXHIBIT NO. 3

# SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

SCHLUMBERGER

## Induction-Electrical Log

COUNTY SAN JUAN, N.M.
FIELD or LOCATION HORSESHOE - GALLUP
WELL NAVAJO # 10
COMPANY ATLANTIC REFG. CO.

COMPANY ATLANTIC REFINING COMPANY
WELL NAVAJO # 10
FIELD HORSESHOE - GALLUP
LOCATION SEC. 30-31N-16W
COUNTY SAN JUAN
STATE NEW MEXICO

Other Surveys
SL

Location of Well
1980' FR N/L
660' FR E/L
SEC. 30-31N-16W

Elevation: D.F.: 5501
K.B.: 5502
or G.L.: 5495

FILING No.

FOLD HERE

| RUN No. | ONE | | | | | |
|---|---|---|---|---|---|---|
| Date | 11-9-58 | | | | | |
| First Reading | 1389 | | | | | |
| Last Reading | 104 | | | | | |
| Feet Measured | 1285 | | | | | |
| Csg. Schlum. | 104 | | | | | |
| Csg. Driller | 104 | | | | | |
| Depth Reached | 1395 | | | | | |
| Bottom Driller | 1395 | | | | | |
| Depth Datum | KB | | | | | |
| Mud Nat. | GEL-OIL-CHEM. | | | | | |
| Dens. \| Visc. | 9.1 \| 47 | | | | | |
| Mud Resist. | 1.44@ 82 °F | @ °F | @ °F | @ °F | @ °F | |
| " Res. BHT | 1.4 @ 85 °F | @ °F | @ °F | @ °F | @ °F | |
| Rmf C | 1.15@ 85 °F | @ °F | @ °F | @ °F | @ °F | |
| Rmc C | 1.6 @ 85 °F | @ °F | @ °F | @ °F | @ °F | |
| " pH | 8.0@ °F | @ °F | @ °F | @ °F | @ °F | |
| " Wtr. Loss | 16 CC 30 min. | CC 30 min. | CC 30 min. | CC 30 min. | CC 30 min. | |
| Bit Size | 7 7/8" | | | | | |
| Spcgs.—AM | 16" | | | | | |
| IND. | 40" | | | | | |
| MN | 27'2" | | | | | |
| Opr. Rig Time | ½ HR. | | | | | |
| Truck No. | 2517 FARM. | | | | | |
| Recorded By | MATTHEWS | | | | | |
| Witness | CUMELLA | | | | | |

# SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

SCHLUMBERGER

## Induction-Electrical Log

COUNTY SAN JUAN, N.M.
FIELD or LOCATION HORSESHOE GALLUP
WELL NAVAJO # 12
COMPANY ATLANTIC REF. CO.

COMPANY ATLANTIC REFINING COMPANY
WELL NAVAJO # 12
FIELD HORSESHOE - GALLUP
LOCATION SEC. 29-31N-16W
COUNTY SAN JUAN
STATE NEW MEXICO

Other Surveys
SL

Location of Well
6[illegible]' FR S/L
19[illegible]' FR W/L
SE [illegible] 29-31N-16W

Elevation: D.F.:
K.B.: 5406
or G.L.: 5399

FILING No.

FOLD HERE

| RUN No. | ONE | | | | |
|---|---|---|---|---|---|
| Date | 11-24-[illegible] | | | | |
| First Reading | 133 | | | | |
| Last Reading | 93 | | | | |
| Feet Measured | 232 | | | | |
| Csg. Schlum. | 93 | | | | |
| Csg. Driller | 93 | | | | |
| Depth Reached | 1336 | | | | |
| Bottom Driller | 1335 | | | | |
| Depth Datum | KB | | | | |
| Mud Nat. | GEL [illegible] CM. | | | | |
| Dens. Visc. | 9.4 [illegible] | | | | |
| Mud Resist. | 1.58 @ 68° F | @ °F | @ °F | @ °F | @ °F |
| Res. BHT | 1.30 @ 82° F | @ °F | @ °F | @ °F | @ °F |
| Rmf (@) | 1.05 @ 82° F | @ °F | @ °F | @ °F | @ °F |
| Rmc (@) | 1.60 @ 82° F | @ °F | @ °F | @ °F | @ °F |
| pH | 8.0 @ °F | @ °F | @ °F | @ °F | @ °F |
| Wtr. Loss | 4.0 CC 30 min | CC 30 min | CC 30 min. | CC 30 min. | CC 30 min. |
| Bit Size | 7 7/8" | | | | |
| Spcgs.—AM | 16" | | | | |
| MN | 27' 2" | | | | |
| IND. | 40" | | | | |
| Opr. Rig Time | 1/2 HR. | | | | |
| Truck No. | 2512 [illegible] | | | | |
| Recorded By | MATTHEW | | | | |
| Witness | [illegible] | | | | |

ATLANTIC REFINING COMPANY
Log of Well No. 12

Horseshoe-Gallup Unit
San Juan County, New Mexico

# SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

SCHLUMBERGER

COMPANY

WELL #73

FIELD

LOCATION

COUNTY

STATE

COUNTY
FIELD or
LOCATION
WELL
COMPANY

Other Surveys

Location of Well

Elevation: D.F.
K.B.
or G.L.

FILING No. 3104

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RUN No. | | | | | | | | | | |
| Date | | | | | | | | | | |
| First Reading | | | | | | | | | | |
| Last Reading | | | | | | | | | | |
| Feet Measured | | | | | | | | | | |
| Csg. Schlum. | | | | | | | | | | |
| Csg. Driller | | | | | | | | | | |
| Depth Reached | | | | | | | | | | |
| Bottom Driller | | | | | | | | | | |
| Depth Datum | | | | | | | | | | |
| Mud Nat. | | | | | | | | | | |
| Dens., Visc. | | | | | | | | | | |
| Mud Resist. | @ | F | @ | F | @ | F | @ | F | @ | F |
| " Res. BHT | @ | F | @ | F | @ | F | @ | F | @ | F |
| Rmf | @ | F | @ | F | @ | F | @ | F | @ | F |
| Rmc | @ | F | @ | F | @ | F | @ | F | @ | F |
| " pH | @ | F | @ | F | @ | F | @ | F | @ | F |
| " Wtr. Loss | CC 30 min. | | CC 30 min. | | CC 30 min. | | CC 30 min. | | CC 30 min. | |
| Bit Size | 7 7/8" | | | | | | | | | |
| Spcgs. IND. | 40" | | | | | | | | | |
| Opr. Rig Time | | | | | | | | | | |
| Truck No. | 2517-ARH | | | | | | | | | |
| Recorded By | MATTHEWS | | | | | | | | | |
| Witnessed | | | | | | | | | | |

ILLEGIBLE

ATLANTIC RICHFIELD COMPANY
Log of Well No. 73

## *INTENTIONAL OMISSIONS*

The following document(s) have been intentionally omitted from this file due to the indicated reasons.

FILE # PMX 22

## *DESCRIPTION OF OMITTED DOCUMENTS*

| | OMITTED DOCUMENT | REASON OMITTED |
|---|---|---|
| (1) | Induction Electrical Log Exhibit 4 | Too Large |
| (2) | " " Exhibit 5 | " |
| (3) | Induction Log Exhibit 6 | " |
| (4) | Proposed Injection Wells / Proposed for Conversion | " |


# Begin New File

***SEAPORT IMAGING***

Ensign™

**Scanner Type:** ALL

**Function:** Begin New File

This is used only with multi-image file formats.

LARGE FORMAT EXHIBIT HAS BEEN REMOVED AND IS LOCATED IN THE NEXT FILE

'66 Oct 28 AM 8 07

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.

Re: Horseshoe-Gallup Unit
San Juan County, New Mexico

Gentlemen:

This is to advise that the undersigned has reviewed the application of Atlantic Richfield Company to convert Wells Nos. 10, 12, and 73 in the subject Project from producing status to injection. As an offset Operator to Well No. 73, we have no objection to this proposal.

Yours very truly,

O. K. as to transaction
O. K. as to Form

Signed J. H. Adams

Company HUMBLE OIL & REFINING COMPANY

Date October 26, 1966

cc: Atlantic Richfield Company
P. O. Box 1978
Roswell, New Mexico
Attention: Mr. W. P. Tomlinson