

Case No. 7873

5/25/83 Examiner Hearing

Exhibit No. 1

APPLICATION FOR AUTHORIZATION TO IN

- I. Purpose: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☐ yes ☒ no
- II. Operator: Yates Petroleum Corporation
Address: 207 S. 4th Street; Artesia, N.M. 88210
Contact party: Nelson Muncy Phone: (505) 746-3558
- III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? ☐ yes ☒ no
If yes, give the Division order number authorizing the project _____
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- * VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
 2. Whether the system is open or closed;
 3. Proposed average and maximum injection pressure;
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
 5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- *VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- * X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
- * XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification
- I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- Name: Nelson Muncy Title Engineer
Signature: Nelson Muncy Date: 4/22/83
- * If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. Subject well logs were submitted to NMOC in Hobbs

FORM C-108 Supplement

Midwest State #1

I. Purpose:

To reenter and deepen the D/A Midwest State #1 from old TD of 10,510' to 10,650' for a salt water disposal well.

II. The Operator is: Yates Petroleum Corporation
207 South Fourth Street
Artesia, New Mexico 88210

III. Well Data:

See attached NMOCD well data sheet.

IV. See form C-108.

V. Ownership map attached (Midland Map Co.) with a scale of:
1" = 2,000'.
Well and lease information posted through 4-15-83. Map has a two-mile radius circle and a one-half mile radius circle.

VI. There are no wells except for the proposed disposal well within the area of review, as indicated by the attached map. The subject well was P/A on 12/28/72 (Schematic attached) see attached C-105 (dated: 12/28/72).

VII. Data on proposed operations:

- (1). The proposed average daily rate of injection is 2,000 bbls per day and the estimated ultimate maximum daily rate is 4,000 bbls per day. The estimated total volume of fluids to be injected is 2.19×10^7 bbls.
- (2). The system will be closed with an oil seal.
- (3). The average injection pressure is 0 to 2,076 PSIG.
- (4). The source of the injection fluid will be produced water from the following Yates Petroleum Corporation wells that are producing from the Permo-Upper Penn zone in the general area of the subject well, identified as follows:
 - a. Woodpecker "SY" St. #1
660' FNL & 660' FEL
Sec. 21-T14S-R33E
See attached analysis
 - b. Woodpecker "SY" St. #2
1980' FNL & 660' FEL
Sec. 21-T14S-R33E
See attached analysis.
 - c. Woodpecker "SY" St. #3
660' FNL & 1800' FEL
Sec. 21-T14S-R33E
See attached analysis.
 - d. Woodpecker "SY" St. #4
660' FNL & 1980' FWL
Sec. 21-T14S-R33E
See attached analysis.
 - e. Woodpecker "SY" St. #5
1980' FNL & 1980' FEL
Sec. 21-T14S-R33E
No analysis available at this time. Any analysis should be consistent with those of other wells in this area.

- f. Swan "VB" St. #1
1980' FSL & 660' FEL
Sec. 21-T14S-R33E
See attached analysis.
- g. Dove "VK" St. #1
2980' FSL & 660' FEL
Sec. 3-T14S-R33E
See attached analysis
- h. Hanladdie "WR" St. #1
1980' FSL & 1980' FWL
Sec. 9-T14S-R33E
See attached analysis.

The water produced from subsequently drilled wells in this area will utilize the disposal well covered by this application.

(4). & (5).

The produced chlorides range from 10,897-92,00 MG/L in the wells that are proposed to be the source of injected fluids. A water analysis is available from the LDM Amoco "GX" State #1 (0.8 of a mile south in Sec. 19-T14S-R33E). The chlorides were reported at 18,000 MG/L from the attached DST #5 (10,410-450'). The subject well was D/A and a water analysis is not available from the proposed injection zone. Therefore, injection compatibility appears acceptable.

The proposed injection zone is included with the vertical limits of the Saunders Permo-Upper Penn pool, as correlative with the Adobe Gray 35-1 in Unit N of Sec. 36-T14S-R33E, the type well for the field rule. However, the proposed injection zone is stratigraphically lower than the oil productive zone in this field.

VIII. Geological Data:

Injection zone: Canyon (Permo-Upper Penn) 10,378-578', Dolomite wht, creamy, xln, vuggy good porosity, decreasing porosity with depth.

The underground source of drinking water in this area is the Ogallala formation of Tertiary age. The base of which is estimated at 250' at the location of the proposed disposal well. The Chinlee formation is also a fresh water aquifer which immediately underlies the Ogallala formation. Both of these aquifers are behind two strings of casing with both strings circulated with cement.

IX. The proposed stimulation program is to break down the perforations from 10,378-478' with 5,000 gallons of 15% acid.

If necessary, an acid fracture will be performed.

X. GR, SMP, ML, PML, DIL logs have been submitted to the NMOCD in Hobbs. DST data found on attached C-103.

- XI. The State Water Engineer's (Roswell office), advises there is only one fresh water well of record within one-mile and it lies in the SE/4 SW/4 of Sec. 18-T14S-R33E within the area of review. However, such office does not have a water analysis but advises that the Ogollala water in this area would show 40-80 MG/L total chlorides, if an analysis was available. A Visual area check indicates that the well was T/A.
- XII. Available geological and engineering data have been examined and no evidence of open faults or any other hydrologic connections between the disposal zone and any underground fresh water aquifers have been found.
- XIII. The off-set operators listed below have been furnished a copy of this application by certified mail.

Yates Petroleum Corporation
207 S. 4th Street
Artesia, NM 88210

Pogo Production Company
P.O. Box 2504
Houston, Tx 77001

Texaco, Inc.
P.O. Box 88107
Dallas, Tx 75388

Gulf Oil Corporation
P.O. Box 1150
Midland, Tx 79701

The surface owners listed below have been furnished a copy of this application by certified mail.

Gerald Tulk
Box 666
Lovington, NM 88260

N.M. State Land Office
P.O. Box 1148
Santa Fe, NM 87501

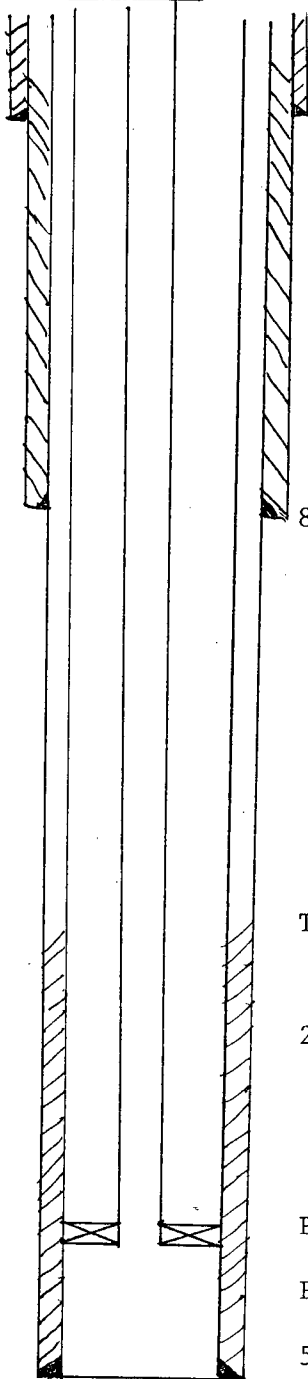
Additional data submitted:

Petroleum Information (P.I.) cards on all wells within the two-mile radius circle.

INJECTION WELL DATA SHEET

Yates Petroleum Corporation		Midwest State #1	(Lease #K-2865)	
OPERATOR		LEASE		
#1	660 FNL & 1980 FEL	19	14S	33E
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE

Schematic



Tabular Data

Surface Casing

Size 13 3/8 " Cemented with 400 sx.
 TOC surface feet determined by calculation
 Hole size 17 1/2"

Intermediate Casing

Size 8 5/8 " Cemented with 300 sx.
 TOC 2978' feet determined by calculation
 Hole size 11"

Long string

8-5/8" @ 4155' Size 5 1/2 " Cemented with approx. 1000 sx.
 w/300 sx TOC approx. 7000' feet determined by Bond log
 Hole size 7 7/8"
 Total depth 10,510'

Injection interval

10,378 feet to 10,578' feet
 (perforated or open-hole, indicate which)

TOC approximately 7000'

2-7/8" plastic lined tubing

Packer @ approximately 10,300'

Proposed injection interval - Canyon Dolomite 10,378'-10,578'.

5-1/2" @ 10,650' w/approximately 1000' sx

New TD 10,650' (DEEPEN WELL FROM OLD TD OF 10,510')

Tubing size 2 7/8" lined with plastic set in a
 (material)

Baker Model-R (Plasted coated) packer at 10,300' feet
 (brand and model)

(or describe any other casing-tubing seal).

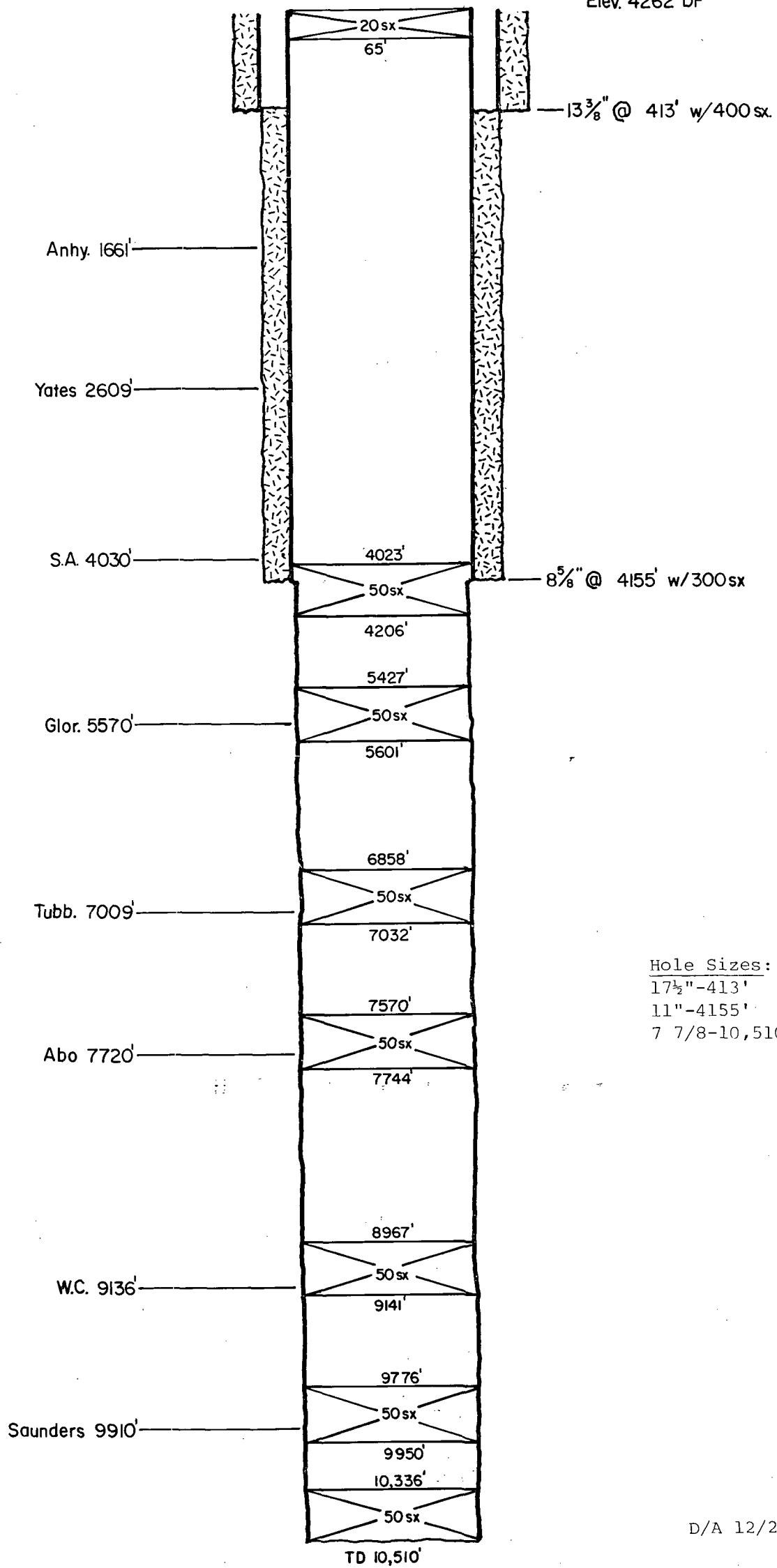
Other Data

- Name of the injection formation Canyon (Permo-Upper Penn)
- Name of Field or Pool (if applicable) Undesignated
- Is this a new well drilled for injection? ☐ Yes ☒ No
 If no, for what purpose was the well originally drilled? Oil and/or gas test
- Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No, production casing was not run. The well was plugged as shown in the attached schematic.
- Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None in this section. Approximately one-mile East is the Saunders Permo-Upper Penn oil pool. Corresponding depth of pay in this well is from 9,910' to 10,378'.

Midwest State No.1
 660' FNL-1980' FEL
 Sec.19, T-14-S, R-33-E

CURRENT WELL DIAGRAM

Elev. 4262 DF



D/A 12/28/72

COUNTY LEA FIELD Wildcat STATE NM API 30-025-24294
OPR BELL PETROLEUM CO SERIAL
NO 1 LEASE Midwest State MAP
Sec 19, T.14-S. R-33-E CO-ORD
660' FNL. 1980' FEL of Sec ELEV. DF L & S

		CLASS		GL	
SPD		FORMATION	DATUM	FORMATION	DATUM
11-19-72	CMP 12-28-72				
13 3/8" at 413' w/400 sx 8 5/8" at 4155' w/300 sx					
LOGS	EL GR RA IND HC A	TD 10,510'		PBD	

PLUGGED & ABANDONED

CONTR Robinson Bros. OPRS ELEV 4262 DF 10,500' TYPE RT

FR 11-20-72
(Pennsylvanian)
11-27-72 Drlg. 3280' anhy
12-5-72 TD 4823' dolo; Prep DST 4686-4823'
Cored 4731-72', rec 41' dolo w/fracs & sli odor
Cored 4773-4823', rec 50' dolo, w/fracs, bldg
oil in fracs
12-12-72 Drlg. 8020' lm
DST 4686-4823', open 2 hrs, rec 970' DF, 1 hr
ISIP 1889#, FP 144-468#, 2 hr FSIP 1739#, HP
2125-2125#, BHT 110 deg
12-19-72 Drlg 9815' lm & sh
1-2-73 TD 10,510'; PLUGGED & ABANDONED.
DST 10,441-510', open 1 hr 50 mins, rec 2980' DM,
1 hr ISIP failed, FP 1013-1842#, 1 hr 35 min FSIP
3321#, HP 4966-4966#

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LAND OFFICE	
OPERATOR	

Form C-105
Revised 1-1-65

NEW MEXICO OIL CONSERVATION COMMISSION WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease	
State <input checked="" type="checkbox"/>	Fee <input type="checkbox"/>
5. State Oil & Gas Lease No.	
K-2865	

1a. TYPE OF WELL		OIL WELL <input checked="" type="checkbox"/> GAS WELL <input type="checkbox"/> DRY <input type="checkbox"/> OTHER <input type="checkbox"/>	
b. TYPE OF COMPLETION		NEW WELL <input checked="" type="checkbox"/> WORK OVER <input type="checkbox"/> DEEPEN <input type="checkbox"/> PLUG BACK <input type="checkbox"/> DIFF. RESVR. <input type="checkbox"/> OTHER <input type="checkbox"/>	

2. Name of Operator		Bell Petroleum Company	
3. Address of Operator		P.O. Box 1538 Midland, Texas 79701	

4. Location of Well		UNIT LETTER "B" LOCATED 660' FEET FROM THE North LINE AND 1980' FEET FROM East LINE OF SEC. 19 TWP. 14S RGE. 33E NMPM	
12. County		Lea	

15. Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Casinghead
11-20-72	12-23-72	Plug & Abandon	4249.8 GL 4262 DF	3.5 below GL
20. Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools Cable Tools
10510'	--	none	O-TD	-

24. Producing Interval(s), of this completion - Top, Bottom, Name		25. Was Directional Survey Made	
None		Yes	

26. Type Electric and Other Logs Run		27. Was Well Cored	
GR-SMP-ML-PML-DIL (Schlumberger)		yes	

28. CASING RECORD (Report all strings set in well)					
CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8"	61#	413'	17 1/2"	400 sax	None
8 5/8"	24# & 32#	4155'	11"	300 Sax	None

29. LINER RECORD				30. TUBING RECORD			
SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN	SIZE	DEPTH SET	PACKER SET
	None					None	

31. Perforation Record (Interval, size and number)		32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.	
none		DEPTH INTERVAL AMOUNT AND KIND MATERIAL USED	
		none	

33. PRODUCTION							
Date First Production		Production Method (Flowing, gas lift, pumping - Size and type pump)				Well Status (Prod. or Shut-in)	
						Plug & Abandon	
Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period	Oil - Bbl.	Gas - MCF	Water - Bbl.	Gas - Oil Ratio
Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate	Oil - Bbl.	Gas - MCF	Water - Bbl.	Oil Gravity - API (Corr.)	
34. Disposition of Gas (Sold, used for fuel, vented, etc.)						Test Witnessed By	
35. List of Attachments							

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED Jan Hering TITLE Production Supervisor DATE January 5, 1973

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LAND OFFICE	
OPERATOR	

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old
C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease
State <input checked="" type="checkbox"/> Fee <input type="checkbox"/>
5. State Oil & Gas Lease No. K-2865

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR.
USE "APPLICATION FOR PERMIT -" (FORM C-101) FOR SUCH PROPOSALS.)

1. <input checked="" type="checkbox"/> OIL WELL <input type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER	7. Unit Agreement Name
2. Name of Operator Bell Petroleum Company	8. Farm or Lease Name Midwest State
3. Address of Operator P.O. Box 1538 Midland, Texas 79701	9. Well No. #1
4. Location of Well UNIT LETTER "B" 660' FEET FROM THE North LINE AND 1980' FEET FROM THE East LINE, SECTION 19 TOWNSHIP 14S RANGE 33E NMPM.	10. Field and Pool, or Wildcat Wildcat
15. Elevation (Show whether DF, RT, GR, etc.) 4249.8 GL DF 4262	12. County Lea

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data
NOTICE OF INTENTION TO: SUBSEQUENT REPORT OF:

PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG AND ABANDONMENT <input checked="" type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	OTHER <input type="checkbox"/>	CASING TEST AND CEMENT JOBS <input type="checkbox"/>	OTHER <input type="checkbox"/>

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

12/5/72 DST #1 4686' - 4823' San Andres Recovered 970' Drlg. Fluid.
12/22/72 Ran Logs to TD 10510
12/23/72 DST #2 10441-10510' Penn. Recovered 2980' Mud (Bottom 30' Sulphur wtr. Cut).
12/26/72 DST #3 (retest DST #2) 10443-10510' Penn. Recovered: 1590' mud, 2947' sulphur wtr.
12/27/72 Plug and Abandon- Cement plugs spotted as follows:
Plug #1 10510 50 sax 10336' Plug #2 9950- 50 sax 9776'
Plug #3 9141 50 sax 8967' Plug #4 7744 50 sax 7570'
Plug #5 7032 50 sax 6858' Plug #6 5601 50 sax 5427'
Plug #7 4206 50 sax 4023'
Shoe at 4155' Across, below and above.
Plug in top of Pipe O- 65' 20 sax.
Used Halliburton Class H. Cement , 2% Cal. Chloride.
Will not recover any pipe.

Verbal approval given by J.D. Ramey 12-27-72

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED <u>John Ramey</u>	TITLE <u>Production Supervisor</u>	DATE <u>12/28/72</u>
APPROVED BY <u>John Ramey</u>	TITLE	DATE
CONDITIONS OF APPROVAL, IF ANY:		

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LAND OFFICE	
OPERATOR	

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old
C-102 and C-103
Effective 1-1-65

Sq. Indicate Type of Lease	
State <input type="checkbox"/>	Fee <input type="checkbox"/>
5. State Oil & Gas Lease No.	
K-2865	

SUNDRY NOTICES AND REPORTS ON WELLS
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Bell Petroleum Company

3. Address of Operator
P.O. Box 1538 Midland, Texas 79701

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UNIT LETTER "B" . 660' FEET FROM THE North LINE AND 1980' FEET FROM
THE East LINE, SECTION 19 TOWNSHIP 14S RANGE 33E NMPM.

15. Elevation (Show whether DF, RT, GR, etc.)
4249.8 GL DF 4262

7. Unit Agreement Name
8. Farm or Lease Name Midwest State
9. Well No. #1
10. Field and Pool, or Wildcat Wildcat
12. County Lea

Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK <input type="checkbox"/>	PLUG AND ABANDON <input type="checkbox"/>	REMEDIAL WORK <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
TEMPORARILY ABANDON <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	COMMENCE DRILLING OPNS. <input type="checkbox"/>	PLUG AND ABANDONMENT <input checked="" type="checkbox"/>
PULL OR ALTER CASING <input type="checkbox"/>	OTHER <input type="checkbox"/>	CASING TEST AND CEMENT JOBS <input type="checkbox"/>	OTHER <input type="checkbox"/>

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

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Plug #7 4206 50 sax 4023'
Shoe at 4155' Across, below and above.
Plug in top of Pipe 0- 65' 20 sax.
Used Halliburton Class H. Cement , 2% Cal. Chloride.
Will not recover any pipe.

Verbal approval given by J.D. Ramey 12-27-72

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED <u>John Ramey</u>	TITLE <u>Production Supervisor</u>	DATE <u>12/28/72</u>
APPROVED BY <u>John Ramey</u>	TITLE <u></u>	DATE <u>NOV 5 1972</u>

CONDITIONS OF APPROVAL, IF ANY:

DUAL INDUCTION - LATEROLOG

COUNTY	LEA	WELL LOCATION	WILCOAT #1 MIDWEST STATE	COMPANY	BELL PETROLEUM COMPANY
FIELD OR WELL	WILCOAT #1 MIDWEST STATE	STATE	NEW MEXICO	Other Services	PML, SNP
Sec.	19	Twp.	14-S	Rge.	33-E
Permanent Datum:	G.L.	Elev.	4249	Elev.: K.B.	4263
Log Measured From	D.F.	Ft. Above Perm. Datum	0	D.F.	4762
Drilling Measured From	D.F.			G.L.	4749
Date	12-23-72				
Run No.	ONE				
Depth - Driller	105' 10"				
Depth - Logger	105' 10"				
Btm. Log Interval	105' 03"				
Top Log Interval	4' 155'				
Casing - Driller	8' 5' 76' 4' 155'				
Casing - Logger	4' 155'				
Bit Size	7' 7/8"				
Type Fluid in Hole	FRESH MUD				
Dens.	Visc.	D. 1	39		
pH	Fluid Loss	10.0	10.2ml	ml	ml
Source of Sample	CIRC				
R. 60 Min. Temp.	.94	- 65 °F			
R. 60 Min. Temp.	.36	- 65 °F			
R. 60 Min. Temp.		- °F			
Source: R. 60 Min.		- °F			
R. 60 Min. Temp.	.46	- 138°F			
Time Since Circ.	10 HOURS				
Max. Rec. Temp.	139	- °F			
Equip. Location	7645	HOBBS			
Recorded By	J.R. WILSON				
Measured by	J.R. WILSON				

The well name, location and borehole reference data were furnished by the customer.

Apparent Porosity Computations:

This Logarithmic Overlay method of presentation simplifies detection of hydrocarbons. It is based upon a comparison of values derived from resistivity and porosity measuring devices.

Every formation is characterized by a Formation Resistivity Factor (F) which relates the resistivity of the formation, when 100% water saturated, to the resistivity of the surrounding water. This F is also related to the formation porosity. These relationships are given under Computations Equations. With each of the Formation Density Compensated Log, the Siderwall Neutron Porosity Log, and the Bonehole Compensated Sonic Log, automatic computations plot the film recording of an F curve. To facilitate display comparisons, films of both the F curve and the resistivity curves are recorded on logarithmic scales.

This presentation is made by overlaying the films, shifted to account for water and hydrocarbon-bearing zones. The curves from one film onto the other. With the $\Delta\sigma_{\text{eff}}$ curves properly positioned, the presence of hydrocarbons is easily discerned. In hydrocarbon-bearing zones, the f curve, indicating $\Delta\sigma_{\text{eff}}$ is appropriate for 100% water saturation, reads a lower value than the radiosity curves.

When curves of both deep and shallow investigation resistivity devices are traced, and are properly positioned to account for the resistivities of waters in their respective planes of investigation, the logarithmic overlay presentation also indicates the amount of oil displaced by invasion.

On the Logistical Delivery presentation, appropriate scales permit direct reading for volume, density and water saturation.

Density: $\phi_0 = \frac{\rho_{\text{air}} - \rho_b}{\rho_{\text{air}} - \rho_1}$

$$\text{Sonic: } \phi_s = \frac{\Delta t - \Delta t_{mo}}{\Delta t_f - \Delta t_{mo}} \cdot \frac{1}{C_p}$$

Neutron: $\phi_N =$ As recorded on Sidewall Neutron Porosity Log.

Formation Factor Computations

$$F = \frac{Q}{r^2} \qquad F = \frac{R_+}{R_-}$$

Water Saturation Computations:

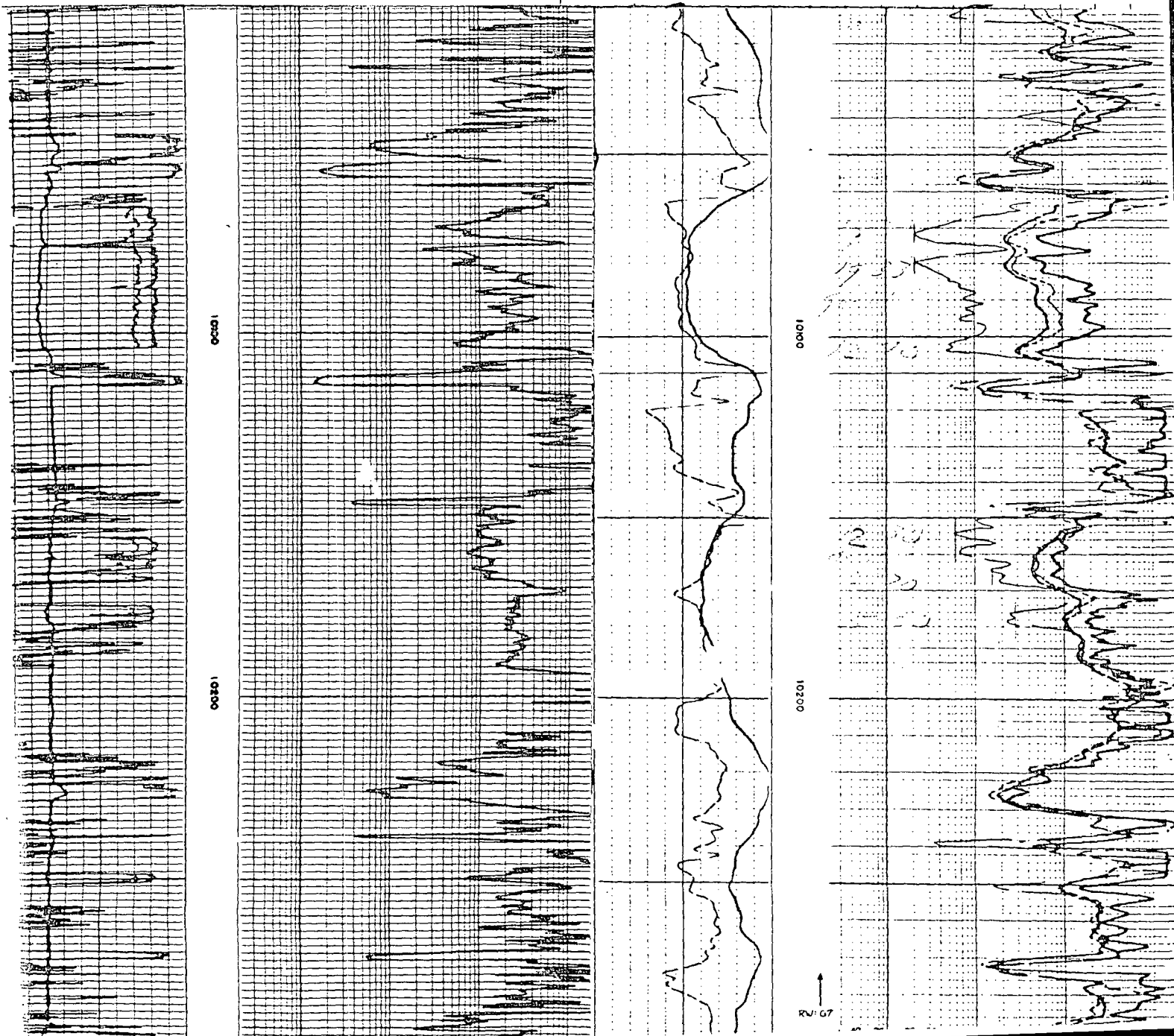
FR

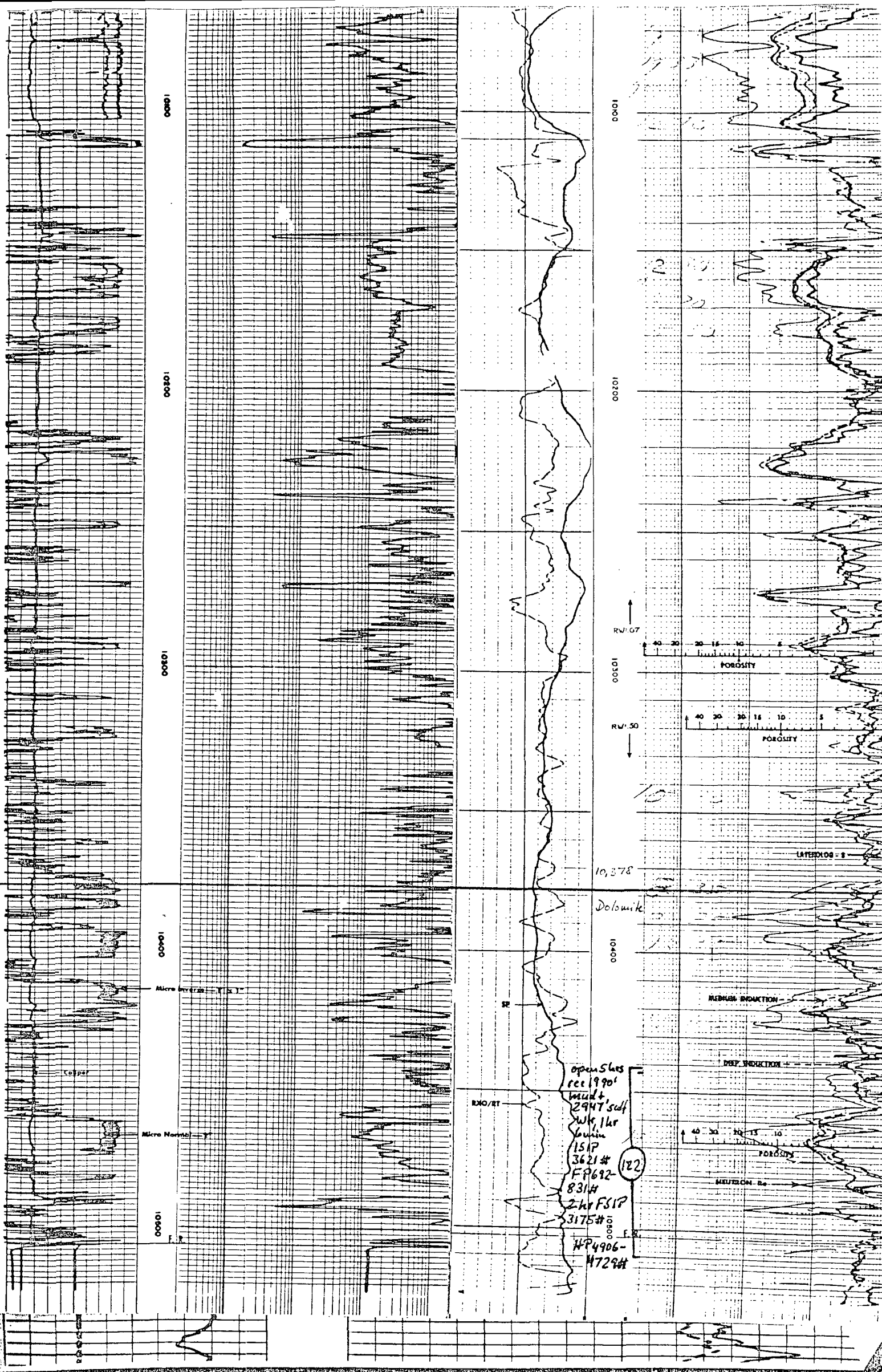
$$S_w \equiv \sqrt{\frac{1}{R_1}} \equiv \sqrt{\frac{1}{R_2}}$$

RKS									
Logs in Mud Type or Additional Samples				Scale Changes					
Sample No.				Type Log	Depth	Scale Up Hole	Scale Down Hole		
Driller									
Fluid in Hole									
Visc.									
Fluid Loss		ml							
Size of Sample									
1st Meas. Temp.	62	°F	61	°F	Run No.	Tool Type	Pad Type	Tool Pos.	Other
2nd Meas. Temp.	62	°F	61	°F					
3rd Meas. Temp.	62	°F	61	°F					
1st: R ₁₀₀ R ₁₀₀									
1st: BHT	61	°F	61	°F					
2nd: BHT	61	°F	61	°F					
3rd: BHT	61	°F	61	°F					

Used: CART. No.: MPC-0-282
PANEL No.: MPP-131
SONDE No.: MPS-C-53

REPRODUCTION FOR RESALE PROHIBITED





10000
10100
10200
10300
10400
10500

10000
10100
10200
10300
10400
10500

RV: 0.7

RV: 5.0

POROSITY

POROSITY

10,378

Dolomite

Micro Invert

Cooper

Micro Normal

RM/RT

open Shale
rec 1990
mudt,
2947 surf
w/ 1hr
soil
151P
3621 #
FP692
831 #
2 hr FSIP
3175 #
HP4906-
M7294

122

MIDHUS INDUCTION

DEEP INDUCTION

POROSITY

NEUTRON LOG