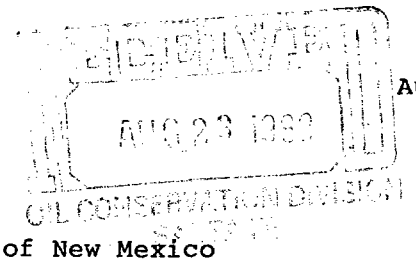
BLACKWOOD & NICHOLS CO., LTD.
P.O. BOX 1237
DURANGO, COLORADO 81302-1237

(303) 247-0728



August 17, 1988

Case 9489

State of New Mexico
Energy & Minerals Department
Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

Re: Salt Water Disposal Well Application
Northeast Blanco Unit Well No. 206
SW 1/4, Sec. 10, T31N, R7W
San Juan County, New Mexico

Gentlemen:

Enclosed is a New Mexico Oil Conservation Division Form 108 for the referenced well. In April 1988, for this same well, an application to inject into the Ojo Alamo Formation was processed by your office. This request was set for hearing as Case #9385, and was dismissed per our request by Order R-8709.

Blackwood & Nichols Co., Ltd. critically needs water disposal facilities in this area of the Northeast Blanco Unit. We believe this new application for the Nacimiento Formation is a reasonable prospect. Please review this application for completeness and advise us if a hearing is necessary.

Thank you for your cooperation in this matter.

Sincerely,

BLACKWOOD & NICHOLS CO., LTD.

William F. Clark

William F. Clark
Operations Manager

WFC:ew

Enclosure

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

FORM C-108
Revised 7-1-81

Case 9489

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☒ yes ☐ no

II. Operator: Blackwood & Nichols Co., Ltd.

Address: P. O. Box 1237, Durango, Colorado 81302

Contact party: William Clark Phone: 303-247-0728

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. See Attachment I.

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. See Attachment III.

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. See Attachment IV.

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.). See Attachment V.

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. See Attachment V.

X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.) (On File)

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. See Attachment V.

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. See Attachment V.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form. See Attachment VI.

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: William F. Clark Title Operations Manager

Signature: William F. Clark Date: August 17, 1988

* 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.

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.

(2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(3) A description of the tubing to be used including its size, lining material, and setting depth.

(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

(1) The name of the injection formation and, if applicable, the field or pool name.

(2) The injection interval and whether it is perforated or open-hole.

(3) State if the well was drilled for injection or, if not, the original purpose of the well.

(4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

(1) The name, address, phone number, and contact party for the applicant;

(2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells;

(3) the formation name and depth with expected maximum injection rates and pressures; and

(4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

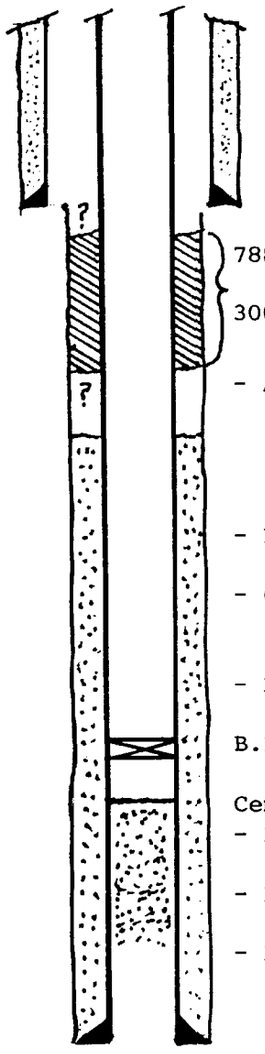
NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

ATTACHMENT I

INJECTION WELL DATA SHEET

Blackwood & Nichols Co., Ltd.	Northeast Blanco Unit			
OPERATOR	LEASE			
206	790' FSL - 1190' FWL	10	31N	7W
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE

Schematic



Tubular Data

Surface Casing

Size 9 5/8" Cemented with 200 sx.

TOC Surface feet determined by circulated

Hole size 12 1/4"

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 4 1/2 " Cemented with 440 sx.

TOC 1500 feet determined by CBL

Hole size 7 7/8"

Total depth 3704

Injection interval

_____ feet to _____ feet

(perforated or open-hole, indicate which)

Nacimiento Perforations

Current: 1798' to 1830' (32') 2 SPF

Proposed: 1920' to 1956' (36')
1990' to 2004' (14')
2120' to 2130' (10')
2156' to 2166' (10')
2190' to 2206' (16')
2236' to 2250' (14')

Proposed
Tubing size 2 3/8" lined with plastic* set in a

Baker Model R-3 or equivalent packer at 1650 feet
(brand and model)
(or describe any other casing-tubing seal). *If injection test is successful.

Other Data

1. Name of the injection formation Nacimiento

2. Name of Field or Pool (if applicable) NA

3. Is this a new well drilled for injection (_) Yes (X) No

   If no, for what purpose was the well originally drilled? Gas Development

4. 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). See Attachment II.

5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. There are no overlying oil & gas zones. The nearest pool below the proposed injection interval is the Fruitland at 3250'.

Well No. 206
August 17, 1988

ATTACHMENT II

4. Well History

In 1981, the Pictured Cliffs Formation was perforated at 3518', 3524', 3529', 3537' and 3549' with 4 SPZ and was sand-water fraced. These perforations, 3518' to 3549', were squeezed with 150 sacks of cement in 1982.

Also in 1982, a lower Pictured Cliffs zone was perforated at 3572', 3580', 3584', 3608' with 4 SPZ and was sand-water fraced through a Model D packer set at 3556'. This lower Pictured Cliffs zone was nonproductive so a bridge plug was set at 3505'. Then two squeeze holes were shot at 3462' to test the cement quality - pressure tested to 1800 psig, ok. Then a bridge plug was set at 3450'.

Finally in 1982, an Upper Pictured Cliffs zone (or Fruitland Sand) was perforated at 3414', 3422' and 3432' with 4 SPZ and was sand-water fraced. This zone produced from 1982 to 1984, making only 27,948 MCF of gas.

In May, 1982, the bridge plug at 3450' was drilled out and then the wellbore was cleaned out to 3500'. Then the perforations from 3414' to 3462' were squeezed off with 60 sacks (71 cf) of cement being spotted at 3491'. Hard cement was found at 3132'. Then a 4 1/2" bridge plug was set at 2700', and casing leaks were found from 788' to 1200'. The casing leaks were squeezed with 300 sacks (354 cf) of cement. Finally the casing pressure tested to 2500 PSIG with a 25 PSI per minute bleed down; however, we could not establish a measureable rate with the pump truck.

Next the Ojo Alamo Formation was perforated with 1 SPF at 2427' - 2447' (20'), 2462' - 2482' (20'), 2496' - 2536' (40'). These perforations were broken down with balls and 500 gallons of 7 1/2% HCl acid/total load - 84 bbls.). Subsequent swabbing for water samples were: 5-14-88, 100 bbls. swabbed, TDS - 5560 ppm; 5-16-88, 112 bbls. swabbed, TDS - 6040 ppm.

On May 17, 1988 a Step Rate Test was performed on the Ojo Alamo Formation perforations. This test indicated poor reservoir quality. On June 20, 1988, a 4 1/2" bridge plug was set at 2370' and the casing did not pressure test. A casing leak between 76' and surface was found. Then the Nacimiento Formation was perforated with 2 SPF from 1798' to 1830' (32'). Subsequently the Nacimiento was swabbed for water samples.

Proposed Work if Nacimiento is approved for water disposal:

1) Isolate Nacimento perforation with bridge plug at 1500'.

2) Cement squeeze casing leak from 0 to 76' with 100 sacks of cement.

3) Drill out cement and remove bridge plug at 1500'.

4) Set cement retainer at 2375' and cement squeeze off Ojo Alamo perforation from 2427' to 2536'.

5) Pressure test casing to 1000 PSIG. Repair if necessary.

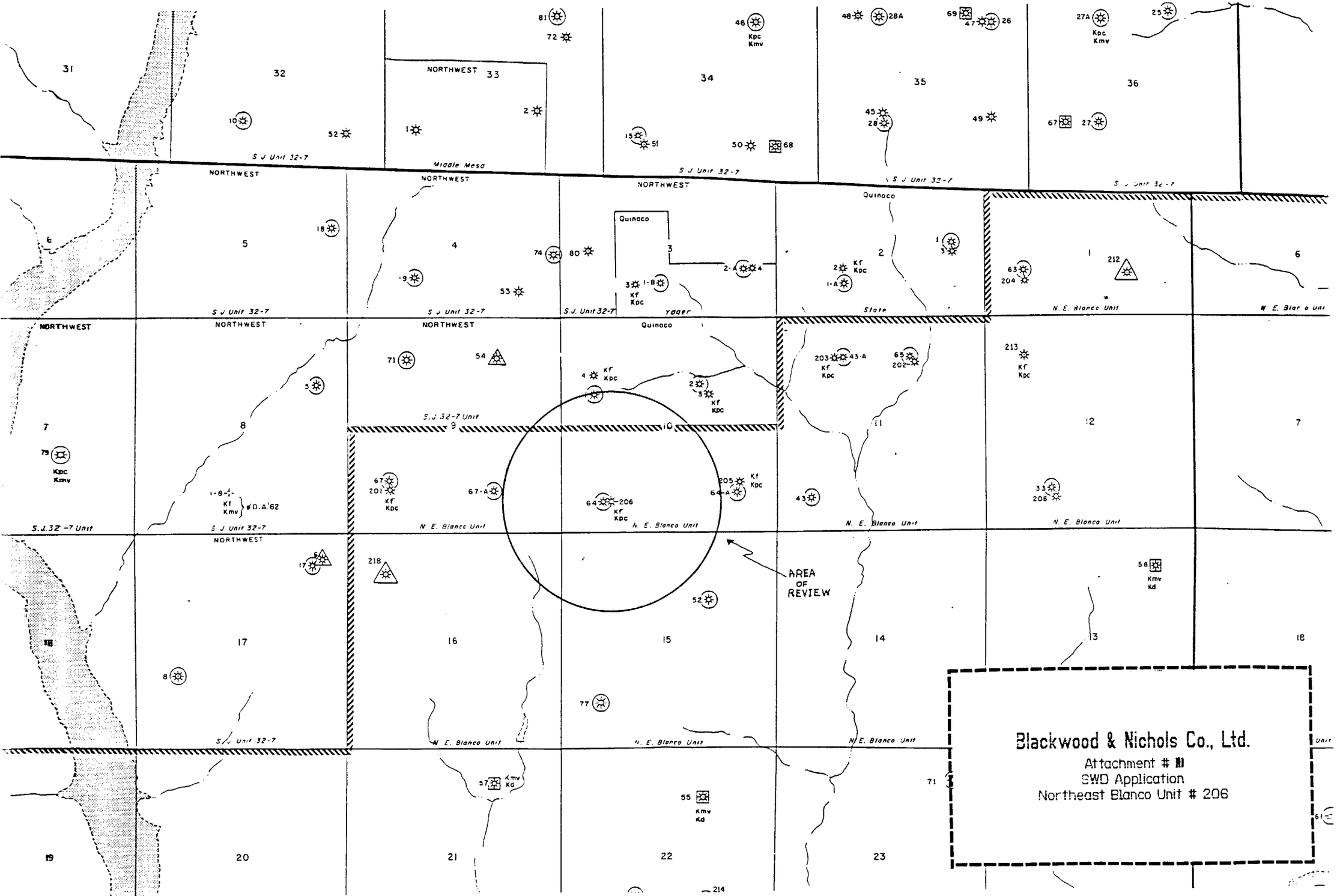
6) Perforate remaining Nacimiento zones as indicated on Attachments I and V.

7) Obtain a water sample for analysis.

8) Break down Nacimiento perforation with ball sealers and acid; recover load.

9) Perform a step rate test to determine maximum injection pressure.

10) Run nonplastic lined tubing for a 3 to 6 month injectivity test. If well has reasonable capacity then plastic lined tubing will be installed.


AREA OF REVIEW
Blackwood & Nichols Co., Ltd.
Attachment # III
SWD Application
Northeast Blanco Unit # 206
NORTHWEST
Quinoco
Middle Mesa
Yager
State
S J Unit 32-7
N. E. Blanco Unit
S.J. 32-7 Unit
Kpc
Kmv
Kf
Kd

ATTACHMENT IV
AREA OF REVIEW WELLS

WELL NAME	LOCATION	STATUS	SPUD DATE	COMP. DATE	TOTAL DEPTH	CASING/CEMENTING RECORD				PERFORATIONS	STIMULATION
						OH	CSG.	DEPTH	CEMENT		
NORTHEAST BLANCO UNIT #64	790' FSL - 990' FWL SEC. 10, T31N, R7W	PGW	10-6-78	11-10-78	6250'	12 1/4"	9 5/8"	223'	150 SXS.	5528'-5724'	SWF W/73,500 GALS. WATER & 60,000# 20/40 SAND
						8 3/4"	7"	3794'	350 SXS.*	5816 - 6152'	SWF W/ 91,895 GALS. WATER & 80,000# 20/40 SAND
						6 1/4"	4 1/2"	3681-6246'	300 SXS.		
NORTHEAST BLANCO UNIT #64A	990' FSL - 990' FEL SEC. 10, T31N, R7W	PGW	7-14-79	8-03-79	6190'	12 1/4"	9 5/8", 36#	221'	200 SXS.	5458' - 5642' (40 HOLES)	SWF W/67,075 GALS. WATER & 88,000# 10/20 SAND
						8 3/4"	7", 23#	3739'	300 SXS.*	5748' - 6032' (60 HOLES)	SWF W/79,560 GALS. WTR. & 124,000# 10/20 SAND
						6 1/4"	4 1/2"	3556-6190'	300 SXS.		
NORTHEAST BLANCO UNIT #67A	990' FSL - 1650' FEL SEC. 9, T31N, R7W	PGW	7-05-79	7-30-79	6528'	12 1/4"	9 5/8", 36#	214'	175 SXS.	5495' - 5638' (44 HOLES)	SWF W/66,276 GALS. WATER & 88,000# 10/20 SAND
						8 3/4"	7", 23#	3749'	300 SXS.*	5772' - 5884' (36 HOLES)	SWF W/79,543 GALS. WATER & 124,000# 20/20 SAND
						6 1/4"	4 1/2"	3520-6528'	375 SXS.		
NORTHEAST BLANCO UNIT #205	1180' FSL - 925' FEL SEC. 10, T31N, R7W	PGW	7-22-79	8-07-79	3660'	12 1/4"	9 5/8", 36#	216'	150 SXS.	3350' - 62' (11 HOLES)	SWF W/28,640 GALS. WATER &30,000# 10/20 SAND
						7 7/8"	4 1/2", 10.5#	3660'	487 SXS.*		
YAGER #1	1800' FNL - 850' FWL SEC. 10, T31N, R7W	PGW	5-08-77	7-05-77	6014'	13 3/4"	9 5/8", 36#	253'	250 SXS.	5620' - 80' (8 HOLES)	SWF W/62,328 GALS. WATER & 22,500# 100 MESH +69,000 #10/20 SAND
						8 3/4"	7", 20#	3650'	600 SXS.		
						6 1/4"	4 1/2"	3556-6010'	300 SXS.	5766' - 5830' (8 HOLES)	SWF W/84,000 GALS. WATER & 22,500# 100 MESH +110,000# 10/20 SAND

*CALCULATED CEMENT TOPS
ASSUMING 50% EXCESS TO
COVER HOLE SIZE VARIATIONS
IS 1300 - 1700 FOR THESE WELLS.

Well No. 206
August 17, 1988

ATTACHMENT V

PROPOSED OPERATION

1. The proposed injection well will be used to dispose of produced water from the Northeast Blanco Unit wells. The maximum daily rate of disposal will be determined by the step rate injection test. The average daily rate cannot be determined at this time. Primary use of the facility will be disposal of produced water from development of Fruitland Coal gas wells. Amount of water to be disposed of will depend on this development. Blackwood & Nichols' current estimate of produced water to be disposed of is less than 500 BPD; however, this should not be the implied limit because they plan to develop more coal gas wells in the near future.

2. The proposed system will be designed and installed as a closed system.

3. The maximum injection pressure will be determined by the step rate injection test. The average pressure will be maintained at less than the maximum pressure.

4. The latest produced water analysis are: (all values in mg/l)

Well Name	Na	Ca	Mg	K	Cl	HCO_3	SO_4	CO_4	TDS
NEBU #212	3639	29	20	20	520	7970	<10	696	9,410
NEBU #213	3110	8	15	22	920	6680	11	612	8,223
NEBU #214	3950	24	23	29	2330	7860	<10	0	10,190
NEBU #215	2570	22	5	21	3310	1790	<10	0	7,260
NEBU #218	3196	27	20	24	440	8930	<10	0	8,600
								Average -	8,736

5. Water Sample Analysis (attached):

   Sampled Date: 6-27-88
   Formation: Nacimiento
   Total Dissolved Solids: 6370 ppm

6. Geologic information -

   The Nacimiento Formation was encountered at 1798' to 2290'. The proposed injection intervals are the better quality sands and have a gross interval from 1798' to 2250' (452' feet) and a net thickness (proposed perforations) of 132 feet. The Ojo Alamo (below) and Animas and San Jose (above) are the only other possible aquifers in this wellbore. There are no known aquifers below the Ojo Alamo. There are no known oil or gas reservoirs above this interval. The South Los Pinos Fruitland-Pictured Cliffs Pool is the first productive zone below the Nacimiento, starting at approximately 3140'.

7. Proposed stimulation program -

   Propose to perforate the Nacimiento with 1 shot per foot from 1920' - 1956', 1990' - 2004', 2120' - 2130', 2156' to 2166', 2190' to 2206', 2236' - 2250'. Samples of formation fluids will be collected and analyzed. A step rate test will be run to determine the capacity of the formation to accept fluid. The perforations will be broken down with balls and acid to enhance the injection capacity. However, the Nacimiento will not be stimulated (fraced) without the approval of the New Mexico Oil Conservation Division. The proposed disposal interval is shown on the attached log section.

   Blackwood & Nichols Company proposes that for an initial 3 to 6 month test period that unlined tubing be employed. Then, if the injectivity performance is positive, that plastic lined tubing will be installed. In both cases a packer will be set at 1500'.

8. There are no fresh water supply wells within a three mile radius of the proposed injection well.

9. I hereby certify that I have examined available geologic and engineering data and can find no evidence of connection between the disposal zone and underground drinking water sources.

BLACKWOOD & NICHOLS CO., LTD.

August 17, 1988
Date

William F. Clark
William F. Clark
Operations Manager

TECH, Inc.
333 East Main
Farmington
New Mexico

TECH

API WATER ANALYSIS REPORT FORM

Company	Sample No.	Date Sampled
Blackwood Nichols		6/27/88

Field	Legal Description	County or Parish	State

Lease or Unit	Well	Depth	Formation	Water, B/D
NE BU	# 206		Nacimiento	

Type of Water (Produced, Supply, etc.)	Sampling Point	Sampled By

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	1688	73.7
Calcium, Ca	505	25.2
Magnesium, Mg	10	0.8
Barium, Ba		

ANIONS		
Chloride, Cl	1917	54.0
Sulfate, SO_4	1973	41.2
Carbonate, CO_3	0	0
Bicarbonate, HCO_3	275	4.5

Total Dissolved Solids (calc.) 6370

Iron, Fe (total)
Sulfide, as H_2S Neg

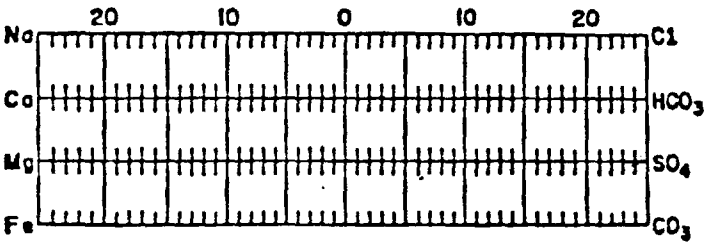
REMARKS & RECOMMENDATIONS:

OTHER PROPERTIES

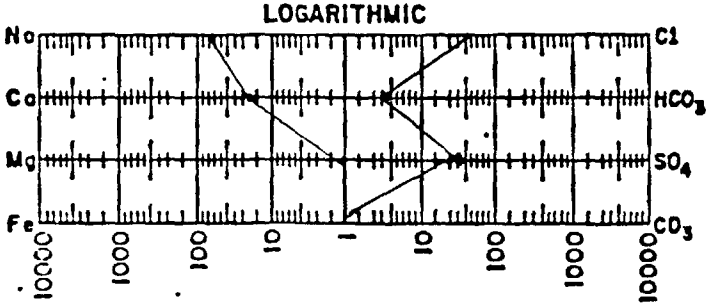
pH	6.83
Specific Gravity, 60/60 F.	1.002
Resistivity (ohm-meters) 75° F.	6.0

WATER PATTERNS — me/l

STANDARD



LOGARITHMIC



ATTACHMENT VI

NORTHEAST BLANCO UNIT NO. 206

WATER DISPOSAL WELL NOTIFICATION

"INTENT TO DISPOSE OF
WATER IN THE SUBSURFACE"

Blackwood & Nichols Co., Ltd. proposes to dispose of produced water in the Nacimiento formation. The injection well will be the Northeast Blanco Unit #206 located 790' FSL & 1190' FWL of Section 10, T31N, R7W, San Juan Co., New Mexico. Water will be injected in the interval 1798' - 2250'. Maximum rate and pressure are to be determined by step rate testing.

Questions should be addressed to Mr. Bill Clark, c/o Blackwood Nichols Co., Ltd., P. O. Box 1237, Durango, Colorado, 81302-1237, or call 303-247-0728. Objections or requests for hearing by interested parties, must be filed with the New Mexico Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501, within 15 days.

WIRELINE SERVICES
GEARHART-OWEN

COMPENSATED DENSITY SIDE WALL NEUTRON LOG

FILING NO.

Formation Top + Print

Note #206 Not logged #64 - Twin

COMPANY BLACKWOOD & NICHOLS CO LTD.

WELL N. E. B. U No ~~64~~ 206

FIELD BLANCO PICTURED CLIFFS

COUNTY SAN JUAN STATE NEW MEXICO

LOCATION:

790 FSL & 990 FWL
790 ✓ 1190 ✓

SEC 10 TWP 31 N RGE 7W

Other Services

CDL/SNP/GR
AIO

Permanent Datum GROUND LEVEL Elev. 6624

Log Measured from KB 13 Ft. Above Permanent Datum

Drilling Measured from KB

Elevations:
KB 6637
DF 6636
GL 6624

Date	11 OCT. 1978			
Run No.	ONE			
Depth—Driller	3790			
Depth—Logger	3777			
Bottom logged interval	3776			
Top logged interval	1728			
Type fluid in hole	F. G. M.			
Density / Visc.	10.5 / 38			
Ph / Fluid Loss	8.5 / 10.8			
Max rec. temp., deg F.	°F	°F	°F	
Source of Samples	FLOWLINE			
Rm @ Meas. Temp.	6.8 @ 72 °F	@ °F	@ °F	
Rmf @ Meas. Temp.	6.0 @ 70 °F	@ °F	@ °F	
Rmc @ Meas. Temp.	7.0 @ 70 °F	@ °F	@ °F	
Source Rmf / Source Rmc	M / M			
Time End Circulation	1400			
Time Logger on Bottom	1741			
Recorded By	HAMILTON			
Witnessed By	MR. LOOS, MR. JORDON			

FIELD PRINT

Run No.	Bore-Hole Record: Bit	Level or Contact	From	To	Casing Record: Size	Wgt.	From	To
ONE	12¼		SURF	220	9⅝	30	SURF	220
	8¾		220	3790				

BULK DENSITY—NEUTRON—POROSITY
GRAMS/cm³ SNP

BULK DENSITY 3. 2.5 2.0

DENSITY POROSITY (%) 0% 10% 20% 30% 40%

NEUTRON POROSITY (%) LITHOLOGY = SANDSTONE 30%

CORRECTION 0 -.25 +

DEPTHS

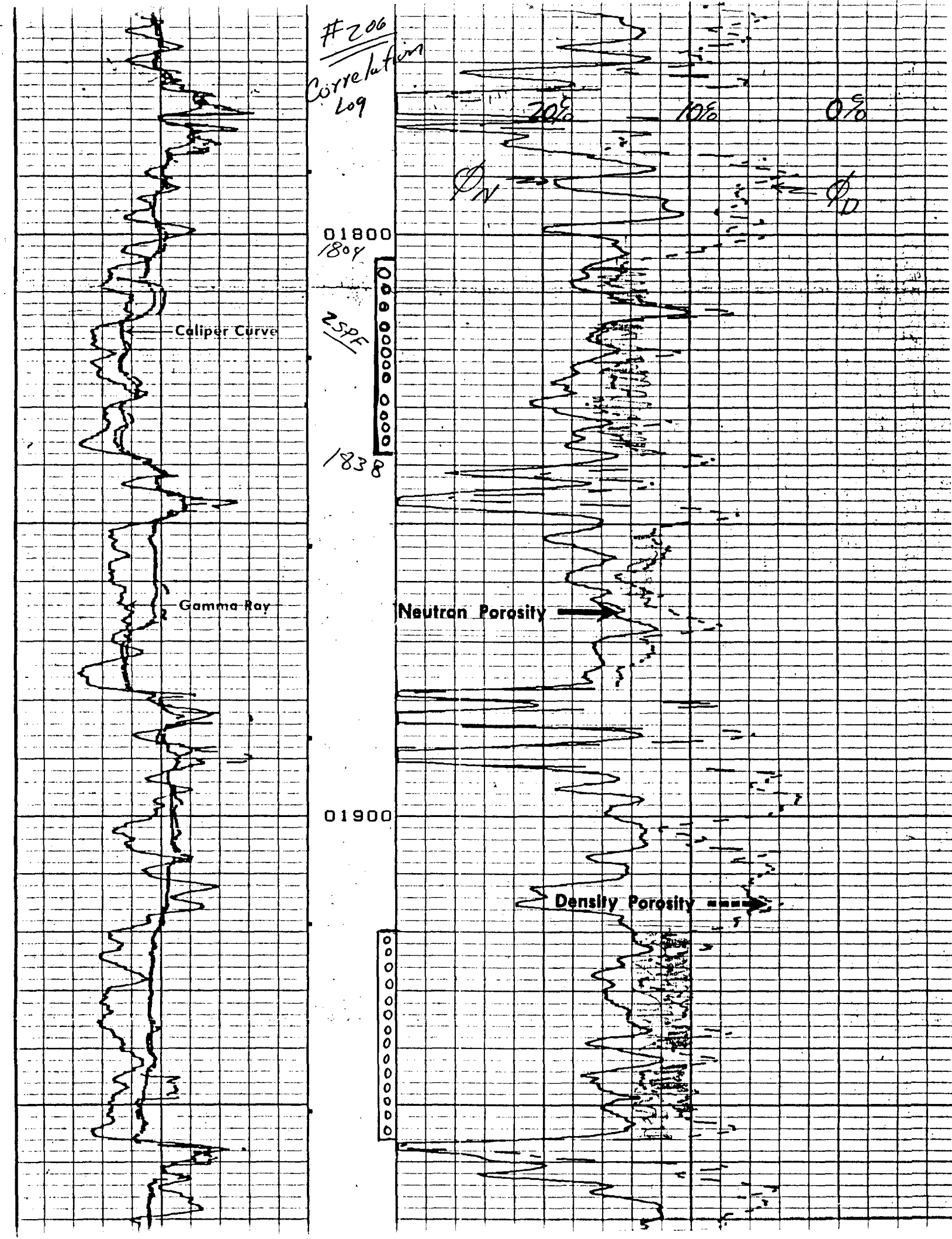
GAMMA RAY API → 200 ← UNITS

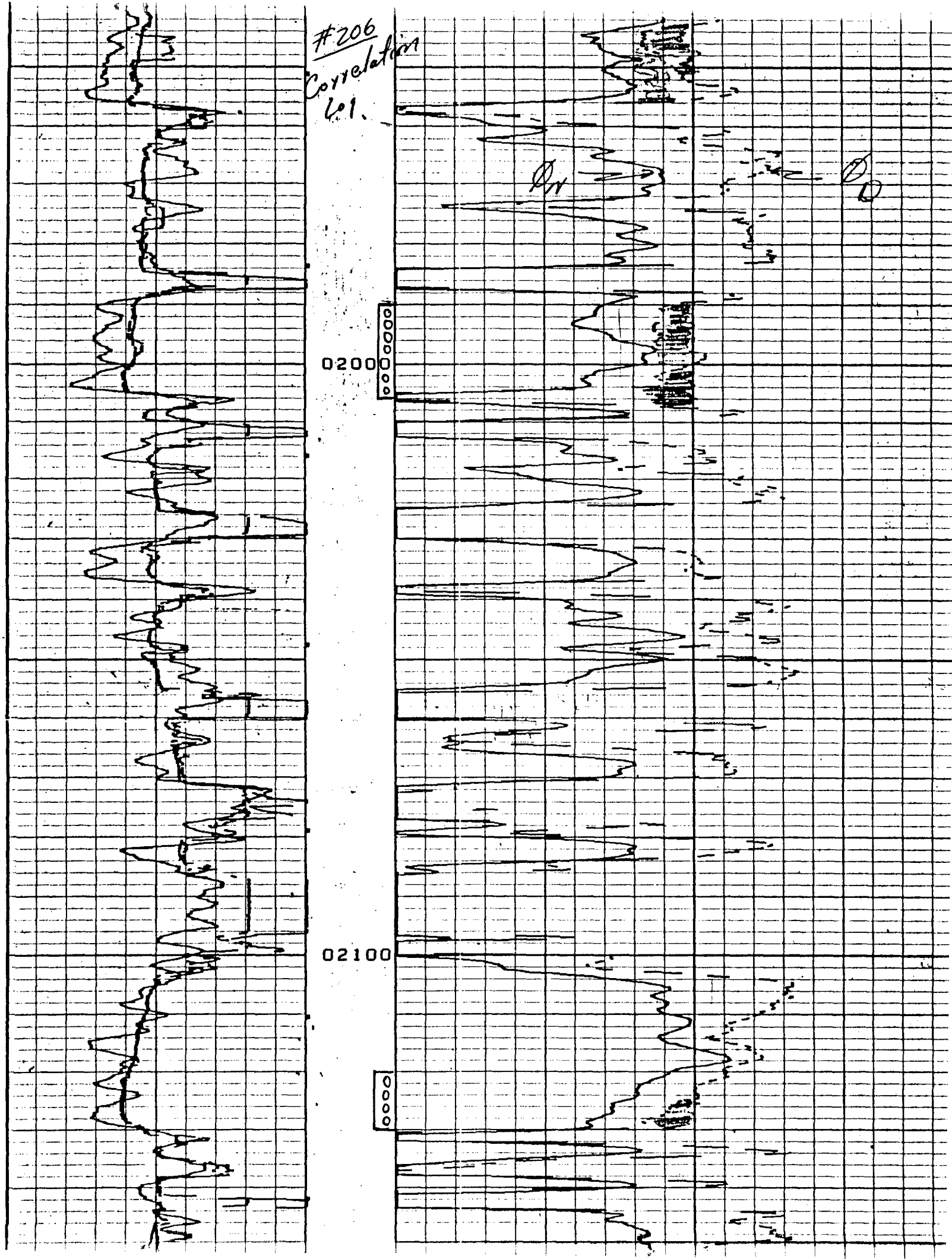
0 200 400

CALIPER

HOLE SIZE - INCHES 5 15

200 15 30 % 2 0 0061-06


#206
Correlation
Log
20%
10%
0%
ϕ_N
ϕ_D
01800
180'
25'E
1838
Caliper Curve
Gamma Ray
Neutron Porosity
01900
Density Porosity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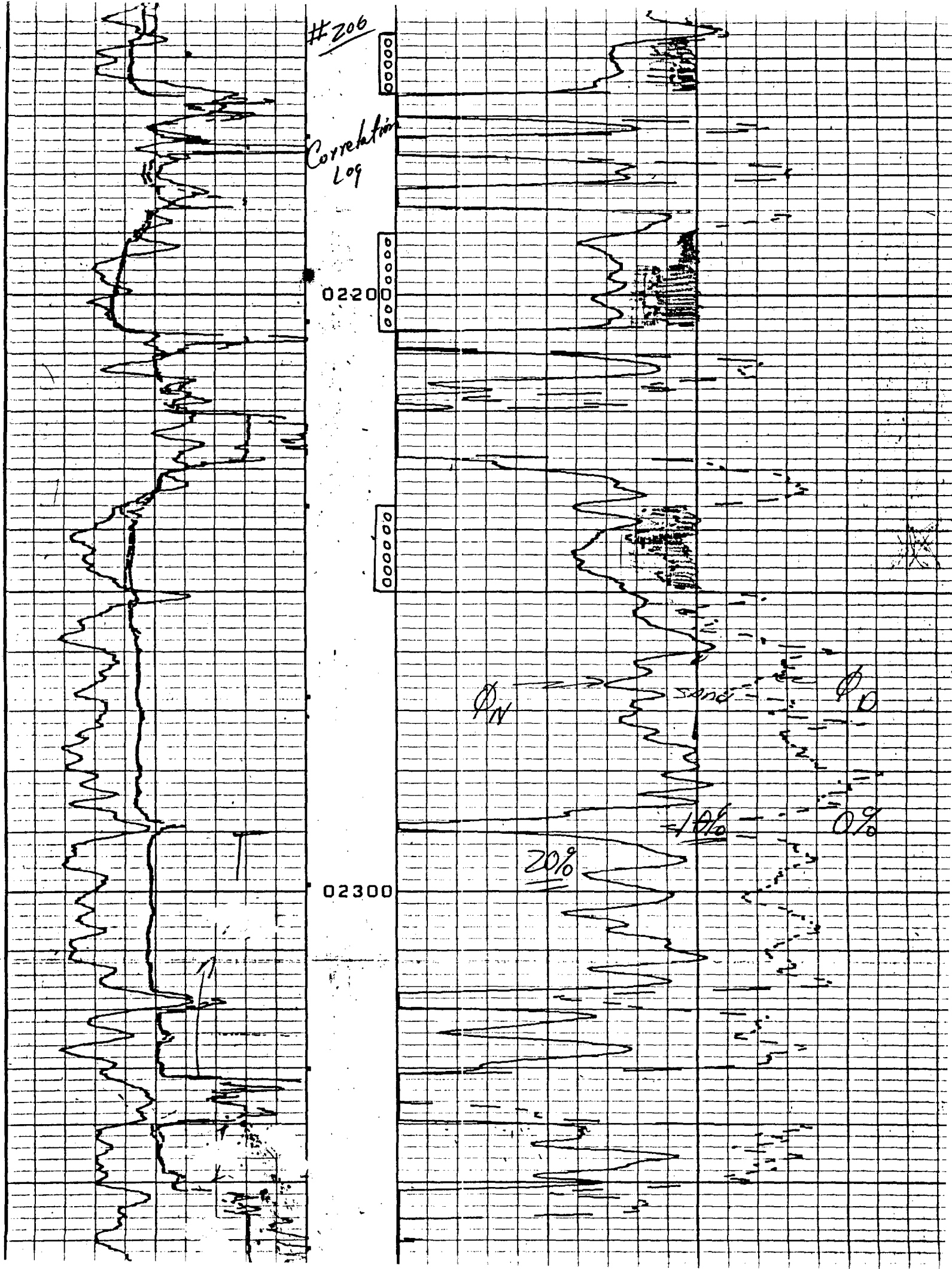
Correlation
Log.
ϕ_N
ϕ_D
02000
02100


#206
Correlation Log
02200
02300
ϕ_N
sand
ϕ_D
10%
0%
20%