

BLACKWOOD & NICHOLS CO., LTD.

P.O. BOX 1237
DURANGO, COLORADO 81302-1237

(303) 247-0728

April 19, 1988

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

Case 9385

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 Form 108 for the referenced well. This is Blackwood & Nichols Co., Ltd.'s first water disposal well application and we are hopeful that you will be able to process it in a timely manner.

The No. 206 well is a noncommercial Pictured Cliffs completion we wish to abandon. Then the Ojo Alamo formation will be tested for disposal capacity. Blackwood & Nichols Co., Ltd. is planning a significant Fruitland development program during 1988 and this disposal test is important to our overall plans.

Please review this application and advise us of any problems. Thank you for your cooperation in this matter.

Sincerely,

BLACKWOOD & NICHOLS CO., LTD.

William F. Clark

William F. Clark
Operations Manager

WFC:ew

Enclosure

Case 9385

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 II.
- * 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 III
- 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 IV.
- *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 IV.
- * 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 IV.
- 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 IV.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form. See Attachment V.
- 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: April 18, 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.

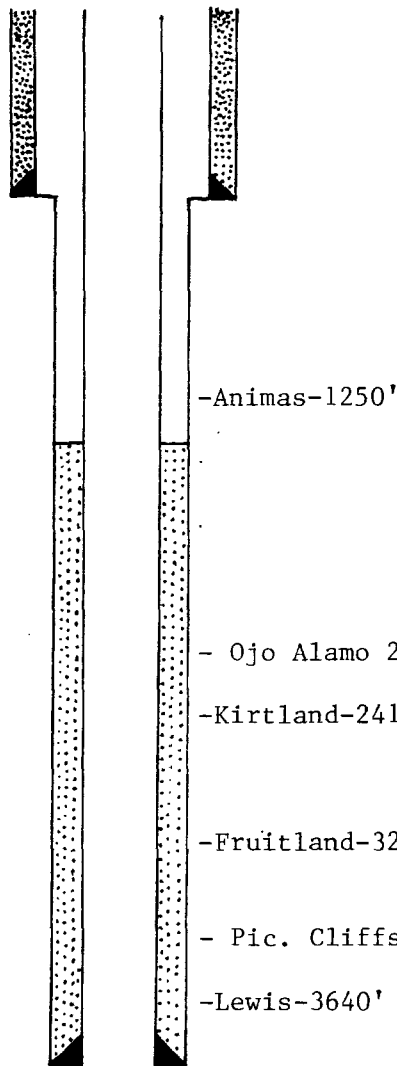
NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

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

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

Schematic



Tabular 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

2422 feet to 2531 feet
 (perforated or open-hole, indicate which)
 Propose to perforate with 1 SPF as follows:
 2422 - 42
 2451 - 61
 2466 - 76
 2491 - 2531

Proposed
 Tubing size 2 3/8" lined with plastic* set in a
 _____ (material)
 Baker Model R-3 or equivalent packer at 2400 feet.
 (brand and model)

(or describe any other casing-tubing seal). *If injection test is successful.

Other Data

- Name of the injection formation Ojo Alamo
- Name of field or Pool (if applicable) NA
- Is this a new well drilled for injection? Yes 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) 3518, 3524, 3529, 3537 & 3549 squeezed with 150 sxs. 3572, 80, 84 & 3608' - BP @ 3505', 3462' - PT to 1800 psi, BP @ 3450' 3414, 3422, 3432' - propose to squeeze with 50 sxs., leaving cement inside 4 1/2 casing from 3200' to 3432'.

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'.

ATTACHMENT III
AREA OF REVIEW WELLS

WELL NAME	LOCATION	STATUS	SPUD DATE	COMP. DATE	TOTAL DEPTH	CASING/CEMENTING RECORD		DEPTH	CEMENT	PERFORATIONS	STIMULATION
						OH	CSG.				
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' 5816 - 6152'	SWF W/73,500 GALS. WATER & 60,000# 20/40 SAND SWF W/ 91,895 GALS. WATER & 80,000# 20/40 SAND
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) 5748' - 6032' (60 HOLES)	SWF W/67,075 GALS. WATER & 88,000# 10/20 SAND SWF W/79,560 GALS. WTR. & 124,000# 10/20 SAND
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) 5772' - 5884' (36 HOLES)	SWF W/66,276 GALS. WATER & 88,000# 10/20 SAND SWF W/79,543 GALS. WATER & 124,000# 20/20 SAND
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
YAGER #1	1800' FNL - 850' FWL SEC. 10, T31N, R7W	PGW	5-08-77	7-05-77	6014'	7 7/8"	4 1/2", 10.5#	3660'	487 SXS.*	5620' - 80' (8 HOLES) 5766' - 5830' (8 HOLES)	SWF W/62,328 GALS. WATER & 22,500# 100 MESH +69,000 #10/20 SAND 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.

ATTACHMENT IV

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)

<u>Well Name</u>	<u>Na</u>	<u>Ca</u>	<u>Mg</u>	<u>K</u>	<u>Cl</u>	<u>HCO₃</u>	<u>SO₄</u>	<u>CO₃</u>	<u>TDS</u>
NEBU #211	3660	40	11	28	5060	2440	<10	0	11,000
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 #216	5070	43	32	37	4160	7170	<10	168	11,498
NEBU #218	3196	27	20	24	440	8930	<10	0	8,600
								Average -	9,454

5. A chemical analysis is not available at this time. A sample will be secured during testing. Water analysis for the Ojo Alamo at the nearest known sources are:

<u>Location</u>	<u>Source</u>	<u>Na</u>	<u>Ca</u>	<u>Mg</u>	<u>K</u>	<u>Cl</u>	<u>HCO₃</u>	<u>SO₄</u>	<u>CO₃</u>	<u>TDS</u>
SW-32-31-8	Pump Mesa Water Well	3279	452	37	NR*	1050	71	6606	0	12870
C-31-30-6	San Juan 30-6 Unit #58A-SWD	2170	1130	49	NR*	1460	2350	3240	0	10400
SE-14-32-7	Middle Mesa- Water Well	3194	2400	172	NR*	8800	120	1100	0	17160

NR* - not recorded

6. Geologic information -

The Ojo Alamo formation was encountered from 2230' to 2415'. The proposed injection interval is the basal sandstone unit just above the Kirtland. The gross thickness of this sandstone is 105', with approximately 80' being opened up for injection. The Ojo Alamo, Animas, San Jose and Nacimiento are the only possible aquifers above the proposed injection interval. There are no known aquifers below the proposed injection interval.

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 Ojo Alamo, starting at approximately 3140'.

7. Proposed stimulation program -

Propose to perforate the Ojo Alamo with 1 shot per foot from 2422' - 42', 2451' - 61', 2466' - 76' and 2491' - 2531'. 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. Additional perforating or stimulation may be done to enhance the injection capacity. 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 compression packer will be set at 2400'.

8. There are no fresh water supply wells within a one 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.

April 18, 1988
Date

William F. Clark
William F. Clark
Operations Manager

ATTACHMENT V

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 Ojo Alamo 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 2422-2531. 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., PO 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, PO Box 2088, Santa Fe, New Mexico, 87501, within 15 days.

Legal No. 21653 published in the Farmington Daily Times, Farmington, New Mexico on Sunday, Monday and Tuesday, April 17, 18 and 19, 1988.



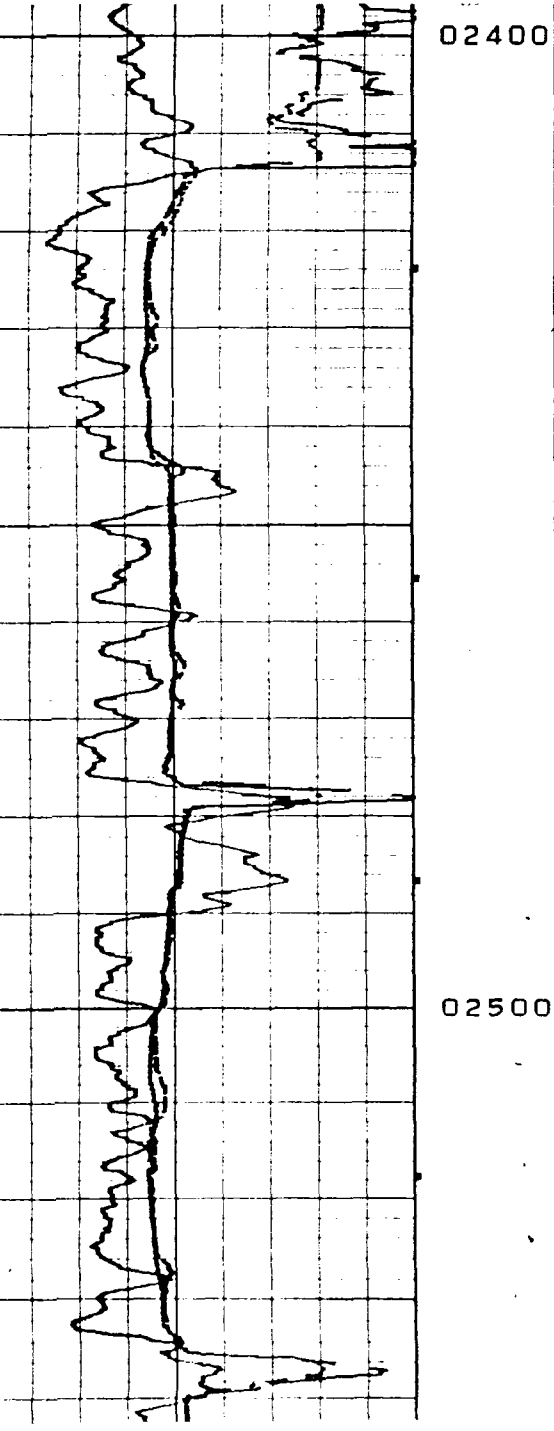
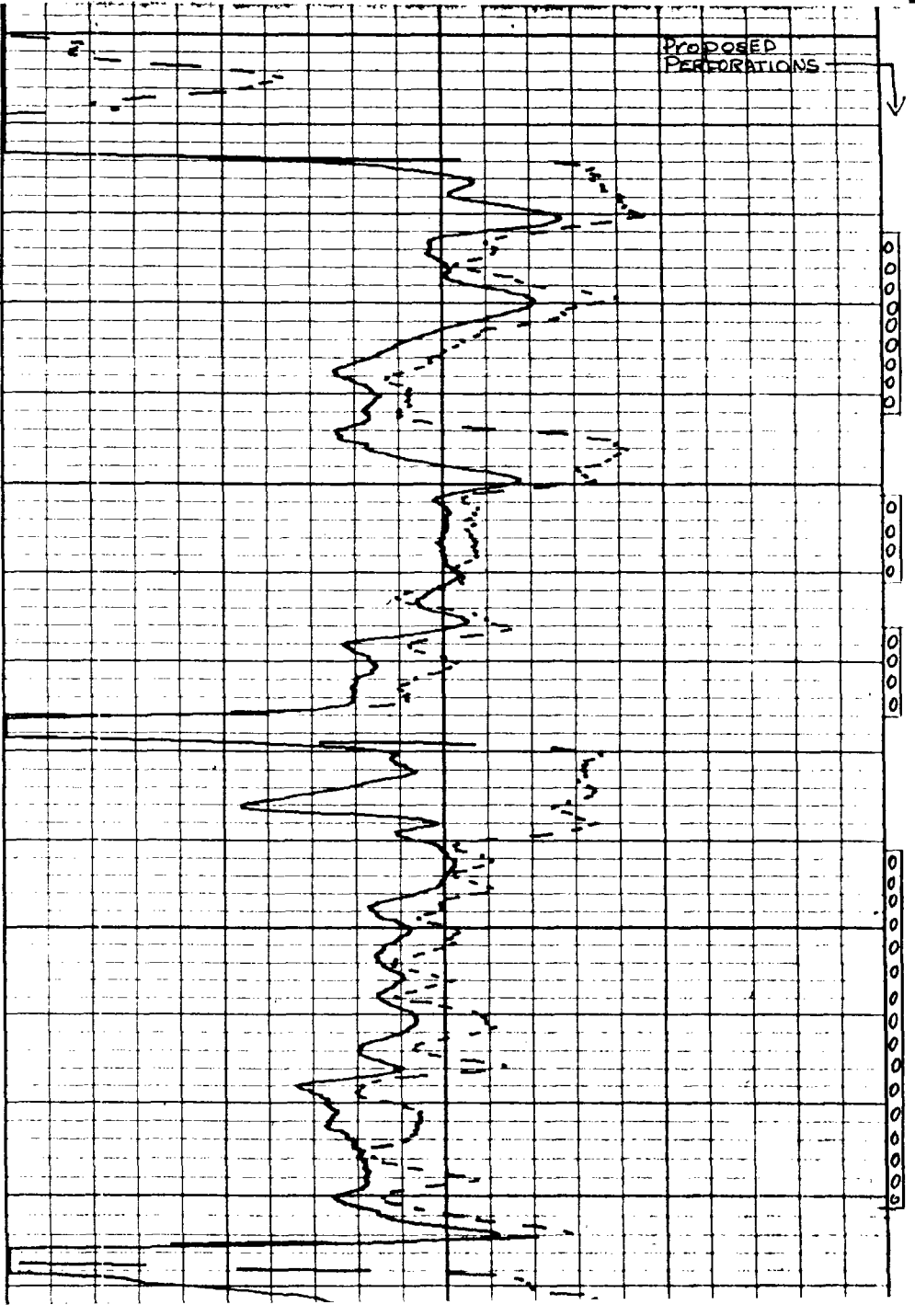
COMPENSATED DENSITY SIDE WALL NEUTRON LOG

FILING NO. 99000000

COMPANY BLACKWOOD & NICHOLS '80 LTD
 WELL N. E. B. U. No. 64 *This well is the offset to #4 #206*
 FIELD BEAVICO PICTURED CHIEFS (On logs #206)
 COUNTY SAN JUAN STATE NEW MEXICO
 LOCATION:
790 ESE of 990 FUL
 SEC 10 TWP 31N RGE 24E
 Other Services:
CDL/SNP/GAR
R10

Permanent Datum GROUND LEVEL Elev. 6624
 Log Measured from K13 Ft. Above Permanent Datum
 Drilling Measured from KB Elevations:
 KB 6637
 DF 6634
 GL 6624

Date	<u>11 OCT 1978</u>	
Run No.	<u>ONE</u>	
Depth - Driller	<u>3780</u>	FIELD
Depth - Logger	<u>3772</u>	FIELD
Bottom logged interval	<u>3776</u>	FIELD
Top logged interval	<u>1728</u>	FIELD
Type fluid in hole	<u>F. G. M.</u>	
Density	<u>10.5</u>	<u>38</u>
Ph	<u>8.5</u>	<u>10.8</u>
Max rec. temp., deg F.		
Source of Sample	<u>FLOWLINE</u>	
Meas. Meth. Temp.	<u>6.8</u>	@ <u>72</u>
Meas. Meth. Temp.	<u>6.0</u>	@ <u>70</u>
Meas. Meth. Temp.	<u>7.2</u>	@ <u>70</u>
Meas. Meth. Temp.	<u>M</u>	@ <u>M</u>
End Circulation	<u>1400</u>	
Logger on Bottom	<u>1741</u>	
Recorded By	<u>HAMILTON</u>	
Witnessed By	<u>MIC. GROSS, MIC. YORDAN</u>	
Run		



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE*

Form approved,
Bureau No. 42

(See other in-
structions on
reverse side)

5. LEASE DESIGNATION AND SERIAL

NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

UNIT AGREEMENT NAME

N.E.B.U. Agrmt. #1, Sec. 9
FARM OR LEASE NAME

Northeast Blanco Unit

9. WELL NO.

206

10. FIELD AND POOL, OR WILDCAT

South Los Pinos-Fruitland

11. SEC. T., R., M., OR BLOCK AND SURVEY
OR AREA

M-10-31N-7W

12. COUNTY OR
PARISH

San Juan

13. STATE

New Mexico

19. ELEV. CASINGHEAD

6622'

23. INTERVALS
DELETED BY

3704'

25. WAS DIRECTIONAL
SURVEY MADE

Yes

27. WAS WELL CORED

No

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

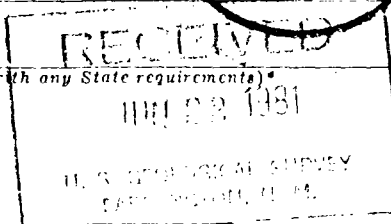
1a. TYPE OF WELL: OIL WELL GAS WELL DRY Other

b. TYPE OF COMPLETION: NEW WELL WORK OVER DEEP-EN PLUG BACK DIFF. RESVR. Other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P.O. Box 1237, Durango, Colorado

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface 790' F/SL - 1190' F/WL
At top prod. interval reported below Same
At total depth Same



14. PERMIT NO. DATE ISSUED

15. DATE SPUNDED 3-19-81 16. DATE T.D. REACHED 3-25-81 17. DATE COMPL. (Ready to prod.) 6-8-81 18. ELEVATIONS (DF, RKR, RT, CR, ETC.)* 6625' GL 19. ELEV. CASINGHEAD 6622'

20. TOTAL DEPTH, MD & TVD 3704' 21. PLUG BACK T.D., MD & TVD 3657' 22. IF MULTIPLE COMPLET. HOW MANY* 23. INTERVALS DELETED BY 3704'

24. PRODUCING INTERVAL(S), OF THIS COMPLETION--TOP, BOTTOM, NAME (MD AND TVD)* 3518' - 3549' - Pictured Cliffs 25. WAS DIRECTIONAL SURVEY MADE Yes

26. TYPE ELECTRIC AND OTHER LOGS RUN Gamma Ray-Neutron-Cement Bond 27. WAS WELL CORED No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
9 5/8"	36.00# H-40	208'	12 1/4"	200 sacks circulated	---
4 1/2"	10.50# K-55	3690'	7 5/8"	290 sks, top cmt. 1500'	---

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)	30. TUBING RECORD SIZE	DEPTH SET (MD)	PACKER SET (MD)
					2 3/8"	3564'	---

31. PERFORATION RECORD (Interval, size and number) 3518' - 3549' - 20 holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.	DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
	3518 - 3549	49,980 gals. gel water 84,968 lbs. 10-20 sand

33. DATE FIRST PRODUCTION Not connected PRODUCTION METHOD (Flowing, gas lift, pumping - size and type of pump) Shut-in WELL STATUS (Producing or shut-in)

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD	OIL--BBL.	GAS--MCF.	WATER--BBL.	GAS-OIL RATIO
6-15-81	3 hrs.	3/4"	→		Q = 890 mcf/d		
FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE	OIL--BBL.	GAS--MCF.	WATER--BBL.	OIL GRAVITY-API (CORR.)	
60	510	→		AOF = 1021 mcf/d			

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.) TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.
SIGNED DeLasso Loos TITLE District Manager DATE 6-19-81
DeLasso Loos

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 35, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

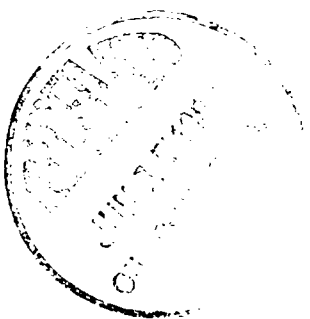
Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: "Sacks Cement": Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:

SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORREL INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURE, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
San Jose	0	1250	
Animas	1250	2230	
Ojo Alamo	2230	2415	
Kirtland	2415	3250	
Fruitland	3250	3505	
Pictured Cliffs	3505	3640	
Lewis	3640	---	

38.

GEOLOGIC MARKERS

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH