BLACKWOOD & NICHOLS CO.
A LIMITED PARTNERSHIP
P.O. BOX 1237
DURANGO, COLORADO 81302-1237

(303) 247-0728

August 15, 1991

New Mexico Oil Conservation Division
P. O. Box 2088
Sante Fe, New Mexico 87401

Gentlemen:

Due to an oversite, enclosed please find the signed Form C-108 which was sent yesterday with attachments.

Thank you,

Al Rector

Al Rector

AR:avd
Enclosure
cc: BLM - Farmington, NM
Hallwod Petroleum

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

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, CO 81302-1237

Contact party: Al Rector 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.

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: Al Rector Title Operations Engineer

Signature: Al Rector Date: August 15, 1991

* 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. _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division

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.

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ENERGY AND MINERALS DEPARTMENT

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

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Address: P.O. Box 1237, Durango, CO 81302-1237

Contact party: Al Rector Phone: (303) 247-0728

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Signature: _____ Date: _____

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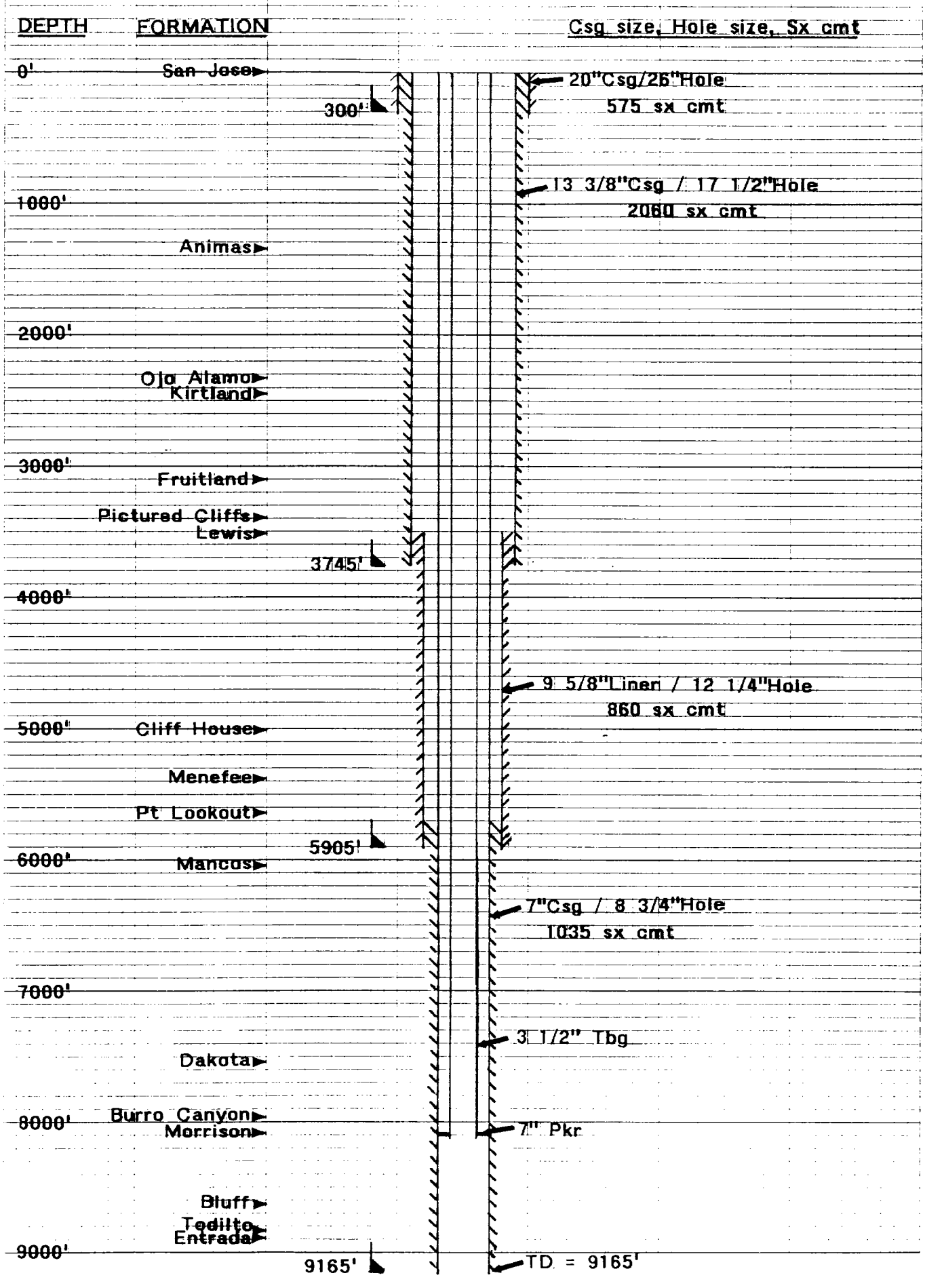
III. Well Data: Attachment #1
Schematic Diagram

Blackwood & Nichols Co.,LTD
Middle Mesa Salt Water Disposal Well #2
555'FSL & 720'FWL, Sec 11, T-31-N, R-7-W
NMPM

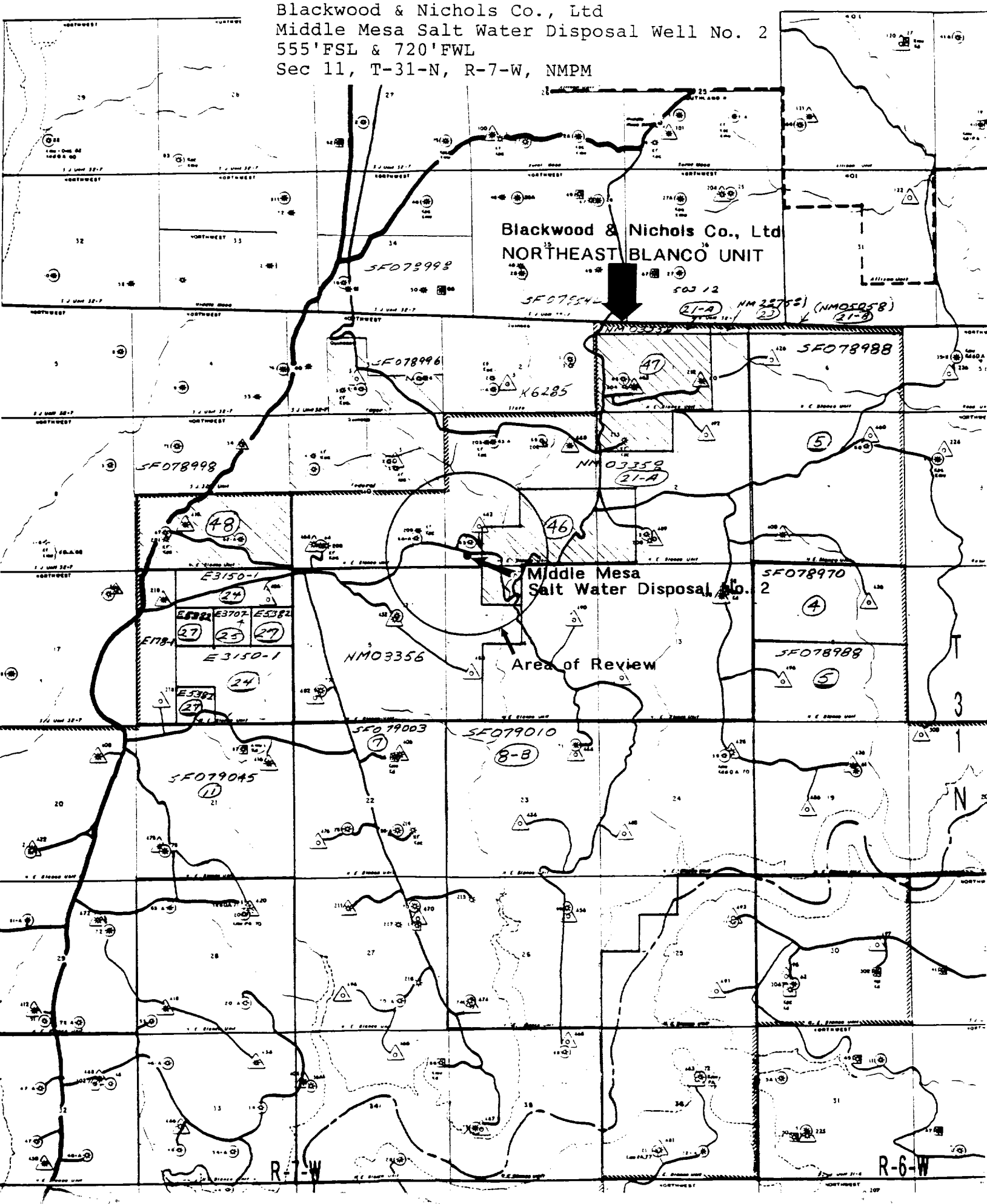


46 0700

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

Well & Lease Map: Attachment #2

Blackwood & Nichols Co., Ltd
Middle Mesa Salt Water Disposal Well No. 2
555'FSL & 720'FWL
Sec 11, T-31-N, R-7-W, NMPM



Attachment #3: All Wells of Public Record Within Area of Review

WELL NAME	LOCATION	STATUS	FORMATION	TD	COMPLETION DATE	HOLE SIZE	CASING SIZE	DEPTH SET	CEMENT VOLUME	TOC	PERFORATIONS	STIMULATION	
Northeast Blanco Unit No. 442	1310' FSL-1080' FWL Sec. 11, T31N-R7W	PGW	Fruitland Coal	3367'	10/13/90	12 1/4"	9 5/8"	304'	295cf	Surface			
						8 3/4"	7"	3046'	896cf	Surface			
						6 1/4"	-	3367'	-		Open hole, 3046'-3367'		
Northeast Blanco Unit No. 43	790' FSL-825' FWL Sec. 11, T31N-R7W	PGW	Blanco Mesa Verde	5934'	01/07/58		10 3/4"	166'	236cf	Surface			
						9 7/8"	7 5/8"	3593'	659cf	1000' (calc)			
						6 3/4"	5 1/2"	5932'	233cf	4050' (TS)	5692'-5804'	65,700 gals water + 50,000 # 20-40 sand	ATP-1250 psig Air-47 bpm Isip-0
											5458'-5674'	63,000 gals water + 40,000 # 40-60 sand	ATP-1650 psig Air-44 bpm Isip-800 psig
Northeast Blanco Unit No. 64A	990' FSL-990' FEL Sec. 10, T31N-R7W	PGW	Blanco Mesa Verde	6190'	08/03/79	12 1/4"	9 5/8"	221'	236cf	Surface			
						8 3/4"	7"	3739'	486cf	2375' (calc)			
						6 3/4"	4 1/2"	3556'-6190'	408cf	3556' (circ)	5748'-6032' 60 shots	79,560 gals gel + 124,000 # 10-20 sand	ATP-1300 psig Air-63 bpm Isip-0
											5458'-5642'	67,075 gals gel + 88,000 # 10-20 sand	ATP-1750 psig Air-55 bpm Isip-450 psig
Northeast Blanco Unit No. 205	1180' FSL-925' FEL Sec. 10, T31N-R7W	PGW	So. Los Pinos Fruitland/PC	3660'	08/03/79	12 1/4"	9 5/8"	216'	177cf	Surface			
						7 7/8"	4 1/2"	3620'	443cf	2375' (calc)	3464'-3586' 90 shots	62,394 gals foam + 100,000 # 10-20 sand	ATP-2650 psig Air-30 bpm Isip-2000
											3350'-62' 11 shots	28,640 gals gel + 30,000 # 10-20 sand	ATP-2200 psig Air-15 bpm

III. Well Data: Tabular (Schematic: See Attachment #1)

A. 1. Lease Name: Northeast Blanco Unit, Lease NM03358
Well Name: Middle Mesa Salt Water Disposal Well #2
Location: 555' FSL & 720' FWL, Section 11, T31N, R7W

2. Casing Program:

Hole Size	Casing Size	Setting Depth	Sacks of Cement	Cement Top	Cement Top Determined By
26"	20"	300'	575	Surface	Circulating or temp survey
17 1/2"	13 3/8"	3745'	2060	Surface	Circulating or temp survey
12 1/4"	9 5/8"	3512-5905'	860	Liner Top	Reverse out/temp survey/CBL
8 3/4"	7"	9165'	1035	Liner Top	CBL log

3. Tubing Program:
3 1/2", 9.3 #/ft, J-55, EUE 8rd internally coated tubing set @ +8120 ft.
Internal coat: ICO type SC-650 (corrision resistant straight epoxy coating)

4. Packer: Otis 7" PL Packer or equivalent set at + 8100'

B. 1. Name of injection formations; a. Entrada b. Bluff c. Morrison (no field or pool name for these formations)

2. Injection intervals (approximate footages):
Entrada = 8899' - 9165', perforated.
Bluff = 8627' - 8857', perforated.
Morrison = 8084' - 8627', perforated.

3. This well will be drilled for the purpose of injection for water disposal.

4. None anticipated.

5. The Dakota formation, top 7560', is the next higher formation to produce gas in this area; there is no known lower oil or gas producing formation.

V. See well and lease map: Attachment #2

VI. No wells within the area of review penetrate the proposed injection zone. Attachments #3 is a tabulation of data on all wells of public record within the area of reviews.

VII. 1. Rate of disposal will be determined by a step rate injection test to be run on the Middle Mesa SWD #2.

2. The proposed injection system will be designed as a closed system.

3. The maximum injection pressure will be determined by a step rate injection test. Average injection pressure will be kept below this maximum pressure.

4. The source of injection fluid will be produced water from Northeast Blanco Unit gas wells. Water from gas wells with similar composition has not demonstrated incompatibility when injected into the Entrada, Bluff and Morrison formations of the following Northeast Blanco Unit Salt Water Disposal Wells: Middle Mesa Salt Water Disposal Well #1, Pump Mesa Salt Water Disposal Well #1 and Sims Mesa Salt Water Disposal Well #1.

Produced water analysis (injection fluid) from wells in the Northeast Blanco Unit are: (values in ppm, unless noted)

Well Name	Producing Formation	NA	CA	MG	K	CL	HCO 3	SO 4	CO 3	TDS
NEBU #202	P.C.	2670	5.7	6.1	18.5	2440	3030	2100	336	7,300
NEBU #205	P.C.	3900	46.7	18	37	3780	5160	2100	252	10,800
NEBU #203	P.C.	3730	33.3	16.2	27.7	3090	4370	2100	852	10,200
NEBU #442	Fruitland	9120	48	--	--	750	7200	143	840	9,120
NEBU #400	Fruitland	3545	24	24	--	639	8540	--	--	12,800
NEBU #406	Fruitland	3829	88	54	--	568	9760	--	--	14,300
NEBU #211	Fruitland	4859	32	39	--	2024	9760	--	--	16,700
NEBU #218	Fruitland	3625	24	39	--	391	9252	--	--	13,300

5. Disposal zone formation water analysis:

Well Name	Location	Formation	NA	CA	MG	CL	HCO 3	SO 4	CO 3	TDS
Middle Mesa SWD #1	Sec 32,T31N,R7W	Morrison	3852	281	29	3905	610	3099	0	11,800
Middle Mesa SWD #1	Sec 32,T31N,R7W	Bluff	3669	192	39	6035	183	--	0	10,100
Sims Mesa SWD #1	Sec 10,T30N,R7W	Entrada	4760	1310	29	8280	152	2100	0	19,000
Sims Mesa SWD #1	Sec 10,T30N,R7W	Morrison	10600	685	65.9	18200	537	1750	0	35,100
Pump Mesa SWD #1	Sec 36,T31N,R8W	Entrada	5650	160	0	4470	866	5450	0	15,300

VIII. The closest overlying aquifers are the Ojo Alamo, Animas, San Jose, and Nacimiento. The Ojo Alamo should be encountered in this well from 2337' to 2442'. There are no known aquifers below the Entrada.

The proposed injection zones are the sandy and porous portions of the Morrison, Bluff, and Entrada formations. At the proposed Middle Mesa SWD #2 location the zones could be described as follows:

Morrison - light gray to gray, fine grained to medium grained, well rounded and slightly calcareous sandstones. Individual sandstone bodies are expected to be 10-50' thick separated by shales and siltstones. Some sandstones may be slightly arkosic, but generally are quartzitic with some friable sands. Overall depth would be estimated at 8084'-8627' with overlying unit being Burro Canyon and the underlying unit being the Bluff member. A possible thickness of 200' sand is anticipated.

Bluff - light red to pink to gray, fine grained to medium grained sandstones. Clean, slightly friable, sorted. Individual sandstones are expected to be 10-20' thick and separated by shales and siltstones. Overall depth of zone would be estimated at 8627'-8857' with approximately 80' of porous sandstone. Rests on top of Todilto.

Entrada - gray to white, hard, fine to medium grained sandstone. Well sorted and well-rounded. Depth of zone is estimated at 8899'-9165' with the upper 100' being estimated as porous sandstone. Rests on Chinle.

IX. Stimulation will consist of perforating selected porous intervals in the Morrison, Bluff and Entrada and stimulating using a sand water frac treatment. Details will be provided to the District NMOCD office prior to stimulation.

X. Test information and logs will be provided to the District NMOCD office as available.

XI. There are no known wells producing fresh water within one mile of the proposed injection well.

XII. 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.

XIII. Proof of Notice

Copy of ad from Farmington Daily Times attached.

Copies of application have been furnished by certified mail to the following parties:

Bureau of Land Management
1235 La Plata Highway
Farmington, NM 87401

Hallwood Petroleum
434 Turner Drive
Durango, CO 81301

AFFIDAVIT OF PUBLICATION

No. 28161

STATE OF NEW MEXICO,
County of San Juan:

CHRISTINE HILL being duly sworn, says: "That she is the NATIONAL AD MANAGER of The Farmington Daily Times, a daily newspaper of general circulation published in English in Farmington , said county and state, and that the hereto attached LEGAL NOTICE

was published in a regular and entire issue of the said Farmington Daily Times, a daily newspaper duly qualified for the purpose within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico for TWO consecutive (days) (/////) on the same day as follows:

First Publication FRIDAY, AUGUST 9, 1991

Second Publication SUNDAY, AUGUST 11, 1991

Third Publication

Fourth Publication

and that payment therefore in the amount of $ 21.25 has been made.

Christine Hill

Subscribed and sworn to before me this 12th day of AUGUST, 1991.

Connie Andrae

Notary Public, San Juan County, New Mexico

My Comm expires: JULY 3, 1993

COPY OF PUBLICATI

NOTICE

Intent to Dispose of water in subsurface Blackwood Nichols Co., Ltd. proposes to dispose of produced water in the Entrada/Bluff and Wingate formations. The injection well will be the Southeast Blanco Unit Middle Mesa SWD #2 located 985' FSL & 728' FWL of Section 11, T31N, R7W San Arriba, Co., New Mexico. Water will be injected in intervals from 8080' to 9140'. Maximum rate and pressure are to be determined by step rate testing.

Questions should be addressed to Mr. Alexander, 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.

Legal No 28161 published in the Farmington Daily Times, Farmington, New Mexico on Friday and Sunday, August 9 and 11, 1991.

AFFIDAVIT OF PUBLICATION

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County of San Juan:

CHRISTINE HILL being duly sworn, says: "That she is the NATIONAL AD MANAGER of The Farmington Daily Times, a daily newspaper of general circulation published in English in Farmington , said county and state, and that the hereto attached LEGAL NOTICE

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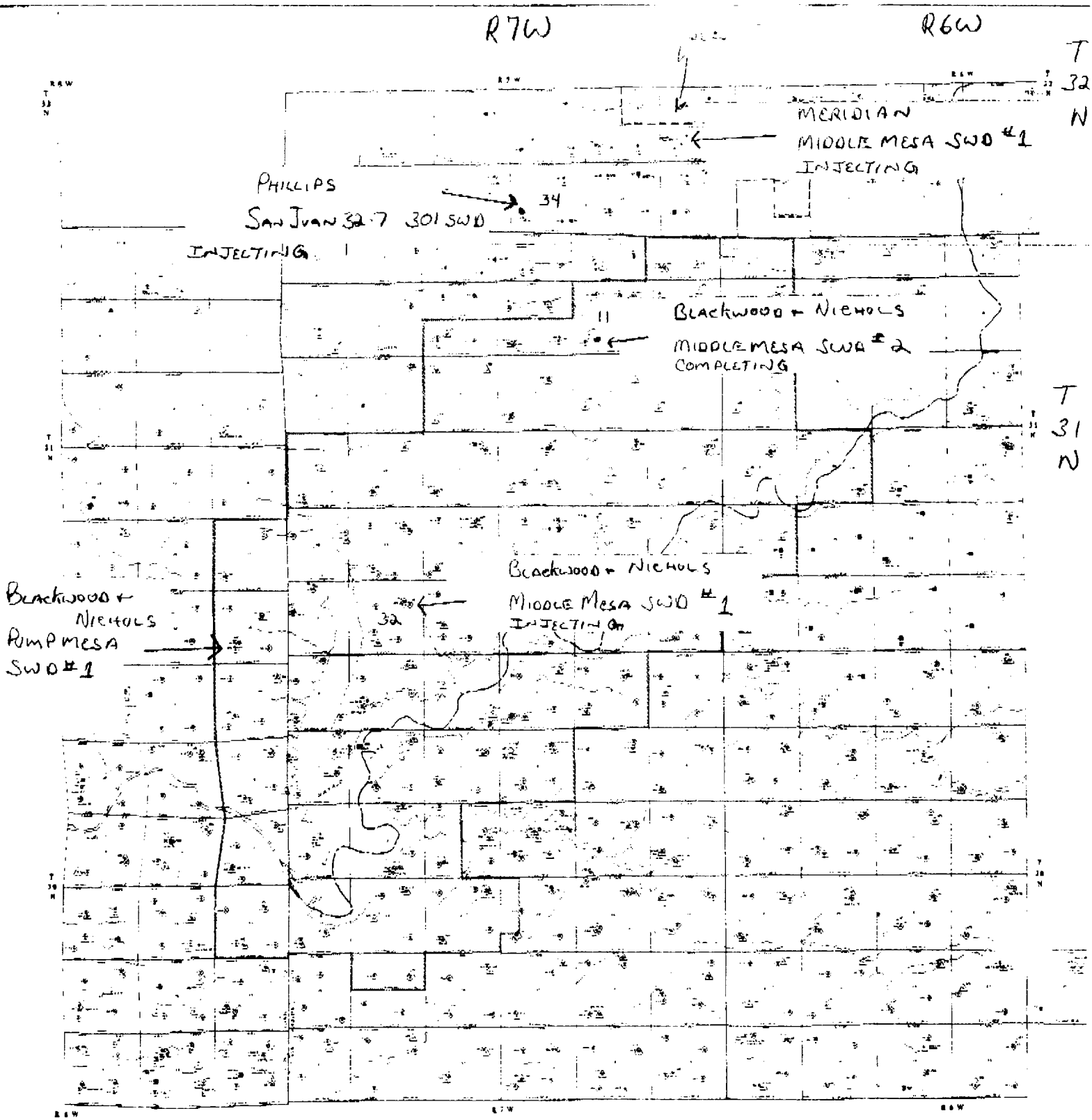
MORRISON ENTRADA WATER INJECTION WELLS



2-20-92

API WATER ANALYSIS REPORT FORM

Lab No. 2623

Company	Sample No.	Date Sampled
Blackwood & Nichols	#8	1/18/90

Field	Legal Description	County or Parish	State
N. Ute Mesa		SJ	NM

Lease or Unit	Well	Depth	Formation	Water, B/D
UEBU	#502		Upper Morrison	

Type of Water (Produced, Supply, etc.)	Sampling Point	Sampled By
133 BBL's Swabbed	Swabbing Unit	Baxter

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	3552	168.2
Calcium, Ca	281	14.0
Magnesium, Mg	29	2.4
Barium, Ba		

ANIONS		
Chloride, Cl	3905	110.0
Sulfate, So_4	3099	64.6
Carbonate, CO_3	0	0
Bicarbonate, HCO_3	610	10.0

Total Dissolved Solids (calc.) 11,800

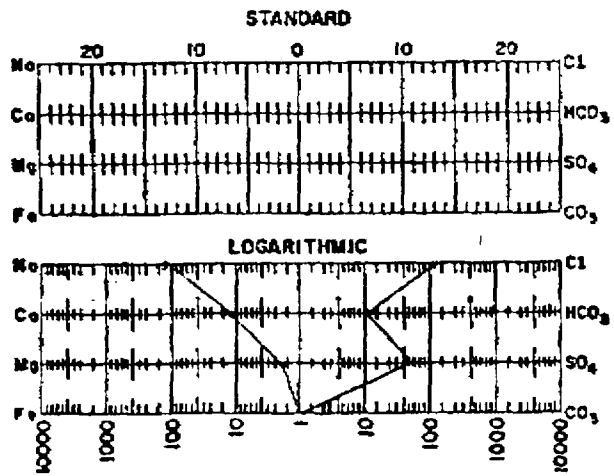
Iron, Fe (total)

Sulfide, as H_2S

OTHER PROPERTIES

pH	7.08
Specific Gravity, 60/60 F	1.008
Resistivity (ohm-meters) 68 F.	.40

WATER PATTERNS — *me/l*



REMARKS & RECOMMENDATIONS:

Date Received	Preserved	Date Analyzed	Analyzed By
1/22/90		1/22/90	Jacque Ballard

TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

CDS LABORATORIES
75 SUTTLE STREET
P.O. BOX 2605
DURANGO CO 81302

(303) 247-4220

BLACKWOOD/NICHOLS
P O BOX 1237
DURANGO, CO 80302

ATTN:

DATE 01/18/91
CDS ID# 3077
WELL: PUMP MESA
SWD #1 MORRISON
N36 31N8W
DATE TAKEN: 11/29/90
DATE REC'D: 11/30/90

CONSTITUENT		mg/L	meq/L
SODIUM	Na+ **	5650	245.761
POTASSIUM	K+	NA	0.000
CALCIUM	Ca++ *	160	7.984
MAGNESIUM	Mg++	NA	0.000
IRON TOTAL	Fe++ & Fe+++	1.9	0.102
POSITIVE SUB-TOTAL		5811.900	253.847
CHLORIDE	CL-	4470	126.082
CARBONATE	CO3=	0	0.000
BICARBONATE	HCO3-	866	14.193
HYDROXIDE	OH-	0	0.000
SULFATE	SO4=	5450	113.483
NEGATIVE SUB-TOTAL		10786.00	253.758

TOTAL DISSOLVED SOLIDS	15300	mg/L
pH	7.07	units
SPECIFIC GRAVITY	1.014	@ 73 Deg. F
CONDUCTIVITY		umho/cm
RESISTIVITY	56.2	ohm-cm
HARDNESS as CaCO3	397	mg/L
TOTAL ALKALINITY AS CaCO3	710	mg/L
SAR		
LANGLIER		

MORRISON PERFORATIONS
TOP - 8152'
Bottom - 8514'

COMMENT

*Ca + Mg Calculated as Ca
**Calculated
NA - Not Analyzed

APPROVED BY: _____
DR. JOE BOWDEN, DIRECTOR

CHECKED BY: SKS