GL01640

COMPLETION REPORT

GEOTHERMAL EXPLORATORY WELL S-89-1

Sulphurdale, Utah

For

Mother Earth Industries, Inc.
7350 E. Evans, Suite B
Scottsdale, Arizona 85258

GEOTHERMAL MANAGEMENT Co., Inc. P.O. Box 2980 Evergreen, CO. 80439-2980

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For

Mother Earth Industries, Inc.
7350 E. Evans, Suite B
Scottsdale, Arizona 85260

Prepared by
Geothermal Management Company, Inc.
P.O. Box 2980
Evergreen, Colorado 80439

June 1989

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PLATE (in pocket)

COMPLETION REPORT FOR

S-89-1
Sulphurdale, Utah

I. ABSTRACT

A geothermal exploratory "slim hole" designated S-89-1 was drilled on Fee land controlled by Mother Earth Industries, Inc. between the dates of May 8 and May 26, 1989. The well is 3261 ft. south and 509 ft. east of the northwest corner of Section 7, T26S, R6W, SLB&M.

After penetrating approximately 120 feet of acid leached alluvial materials and bedrocks typical of the local Sulphur Pit the well encountered a landslide block containing highly altered and fractured rocks of the upper portion of the Three Creeks Tuff member of the Bullion Canyon Volcanic series (Moore and Samberg, 1979) and rocks thought to be the Wales Canyon Formation. A significant flow of steam was encountered at a depth of 886 feet within a white metasandstone or quartzite (Coconino Formation) and the well was drilled, in this formation, to a total depth of 1041 feet KB.

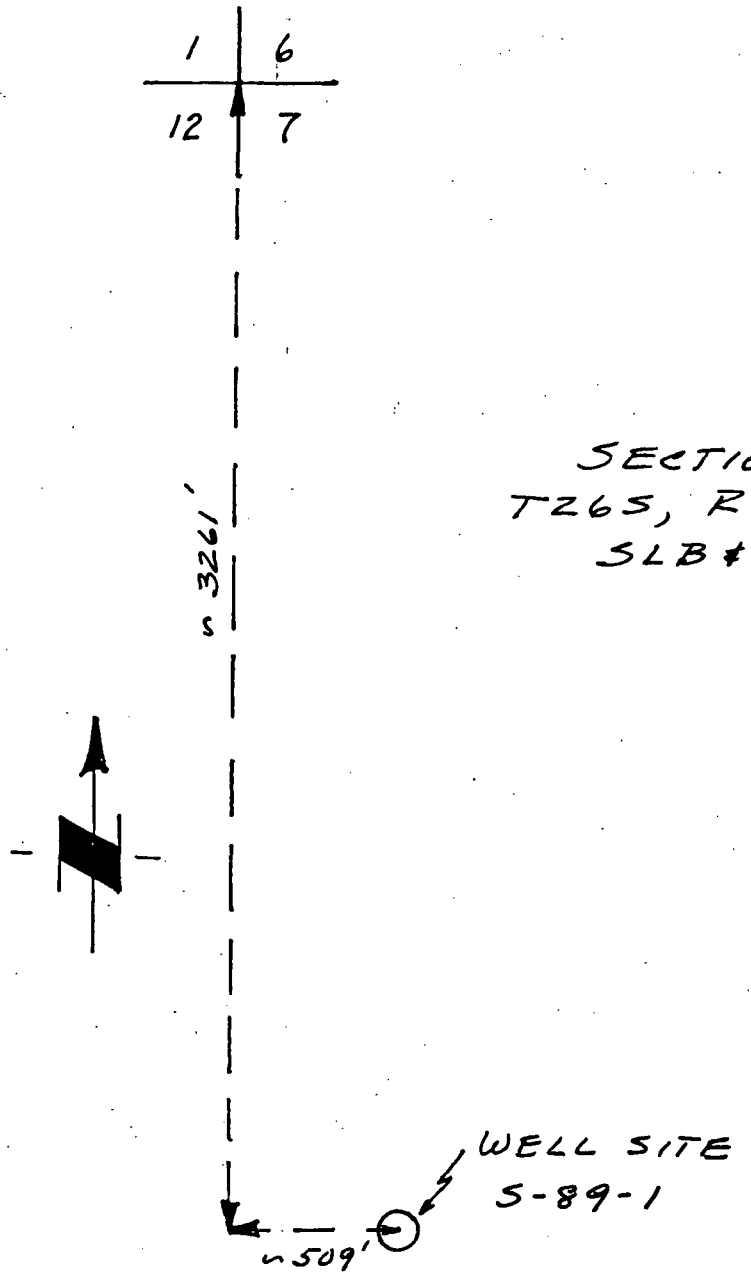
The prime contractor for the well was Sierra Drilling Company; surveys were done by Sunrise Engineering, Inc. of Fillmore, Utah; Safety Services were provided by Bell Safety of Evanston, Wyoming; wellsite geological supervision was by Geothermal Management Company, Inc. of Evergreen, Colorado; and petrographic examination of drill cuttings was done by Joseph Moore of Salt Lake City, Utah. All other activities were conducted by Mother Earth Industries, Inc.

II. LOCATION

This report pertains to MEI exploratory slim hole S-89-1 located near Sulphurdale, in Beaver County, Utah within the Cove Fort-Sulphurdale KGRA.

Specifically, the well is on MEI controlled fee land approximetely 3261 feet south and 509 feet east of the northwest corner of Section 7, T26S, R6W, SLB&M. It is about 1430 feet from well 34-7A (Linda) and about 565 feet from the nearest previously drilled production well P-88-2 (Loretta).

Figure 1 depicts the location of the well relative to the section corner; Plate I (in the pocket) is a survey plat of the entire MEI production area.



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GEOTHERMAL MANAGEMENT Co.
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LOCATION MAP S-89-1
SULPHURDALE, UTAH

By: GWH | Ckd: GWH
Date: 5/31/89
Scale: 1" = 600'
Dwng. No: ME1891-1

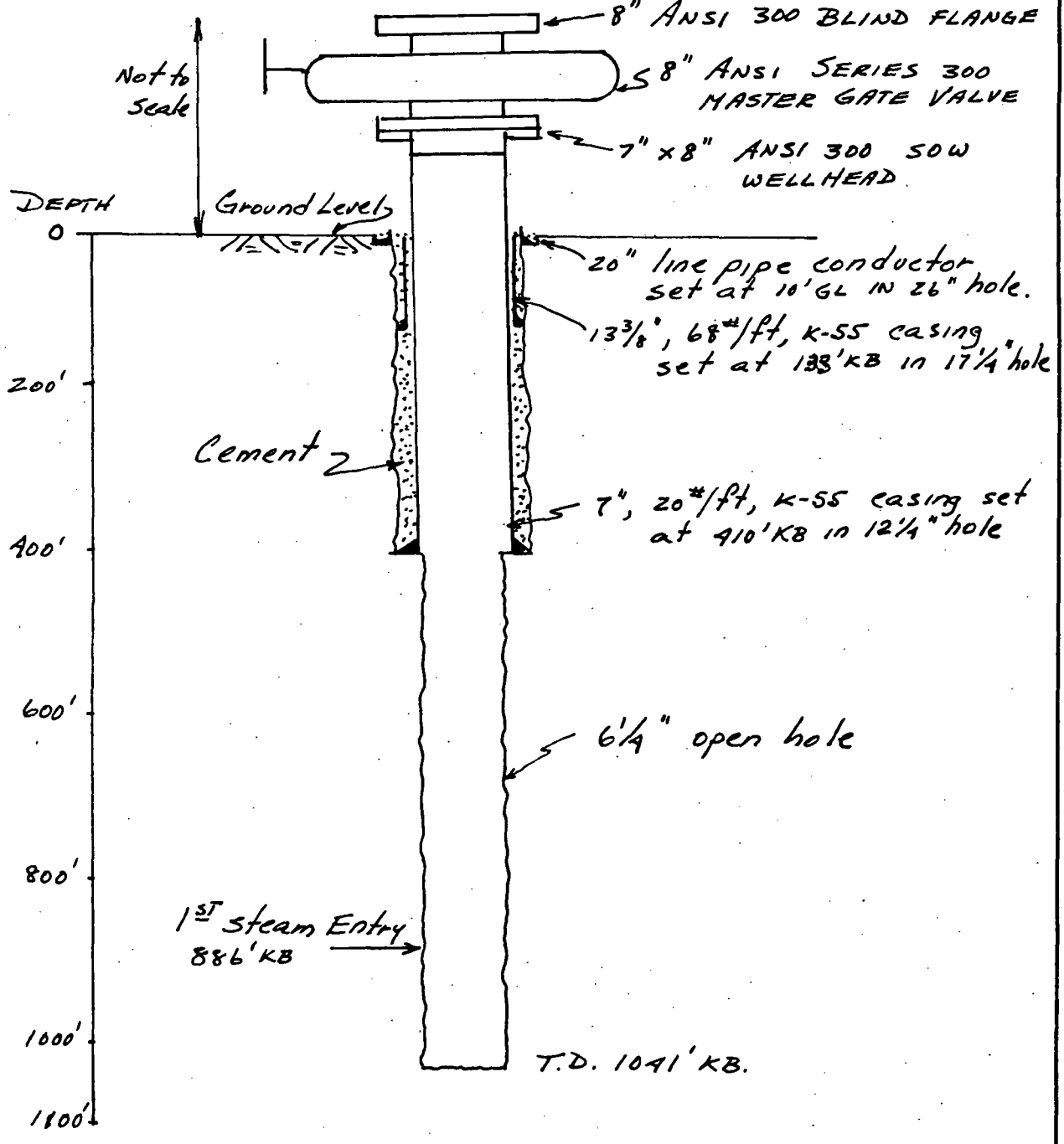
Figure 1

III. WELL DRILLING AND CONSTRUCTION HISTORY

In order to cost-effectively search for extensions of the dry steam geothermal resource discovered to date, exploratory well S-89-1 was drilled in a "slim hole" configuration as follows:

On May 12, 1989, 20" conductor casing was set to 10 feet below ground level and Redi-Mix cemented. On May 13, 1989 during attempts to drill out of the conductor, circulation was lost and the casing bond to the ground was broken. Following repairs to several key rig parts, conductor casing was reset and cemented on May 17, 1989. On May 20 and 21, 1989, the well was drilled to 136'KB after which 13.375" surface casing was set and cemented by Dowell/Schlumberger using a high temperature geothermal mix. On May 22 and 23, the well was drilled to 410'KB at which depth 7" production casing was run and cemented. On May 25, the well was drilled to a total depth of 1041'KB with the first steam entry logged at 886'KB. Note: KB = Ground Level plus 10 feet.

A drilling history, describing daily events between May 8 and May 26, 1989, drilling activity sheets, tour reports, and a pipe tally accompany this document as Appendix A. Figure 2 is a profile of the well as completed; Figure 3 is a drilling curve showing the rate of drilling progress, and Figure 4 shows the Blowout Preventer stack used on the 7" casing. Appendix B, attached, is MEI's basic drilling procedure developed for slim exploratory wells. Appendix F comprises the geolograph charts that depict the drilling rate from 20'KB to 1020'KB (20 short of the total depth).



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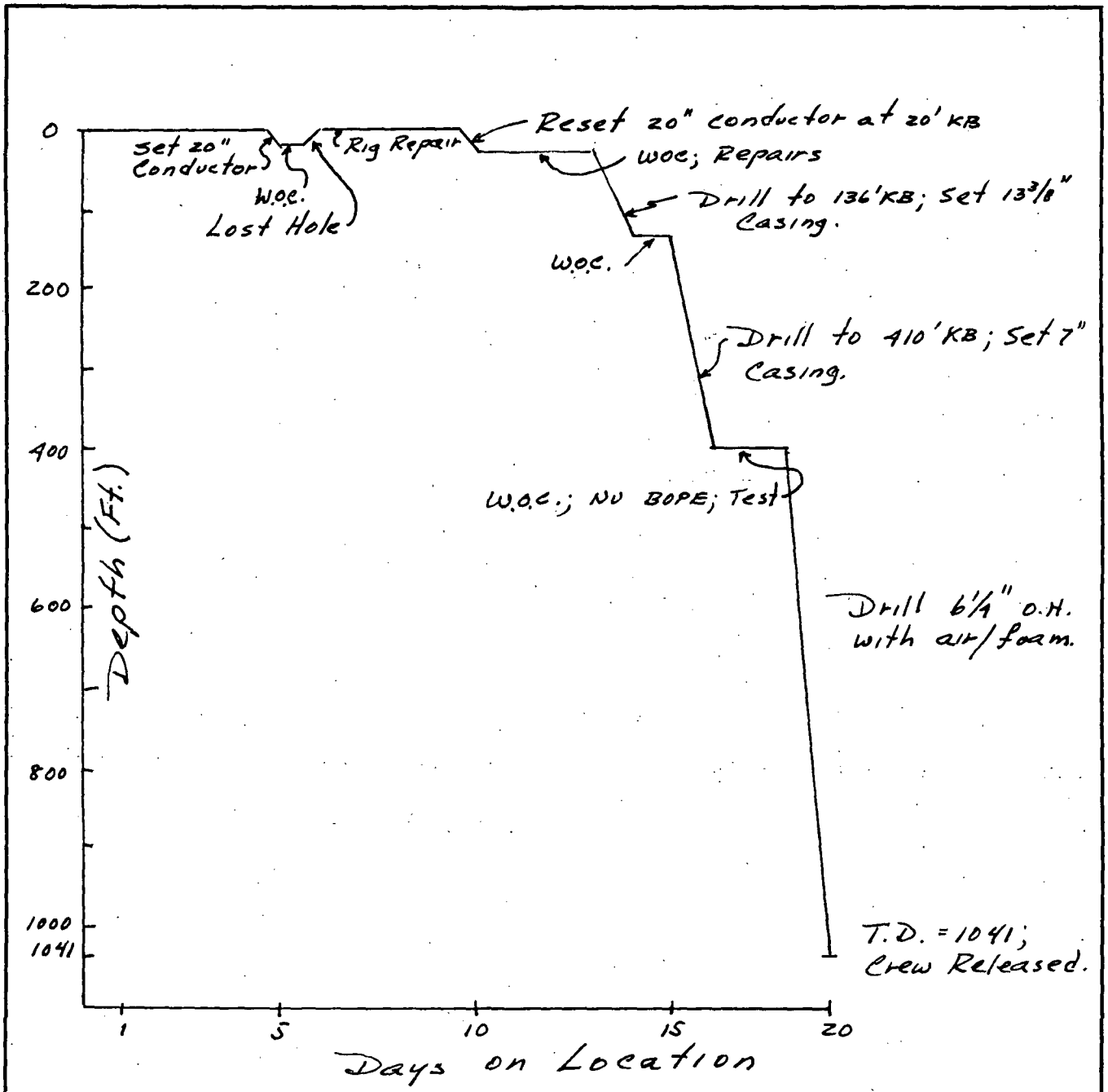
WELL PROFILE S-89-1

SOLPHURDALE, UTAH

By: GWH | Ckd: GWH
Date: May 31 1989
Scale: 1"=200' Vert.
Dwng. No: ME1891-2

Figure 2



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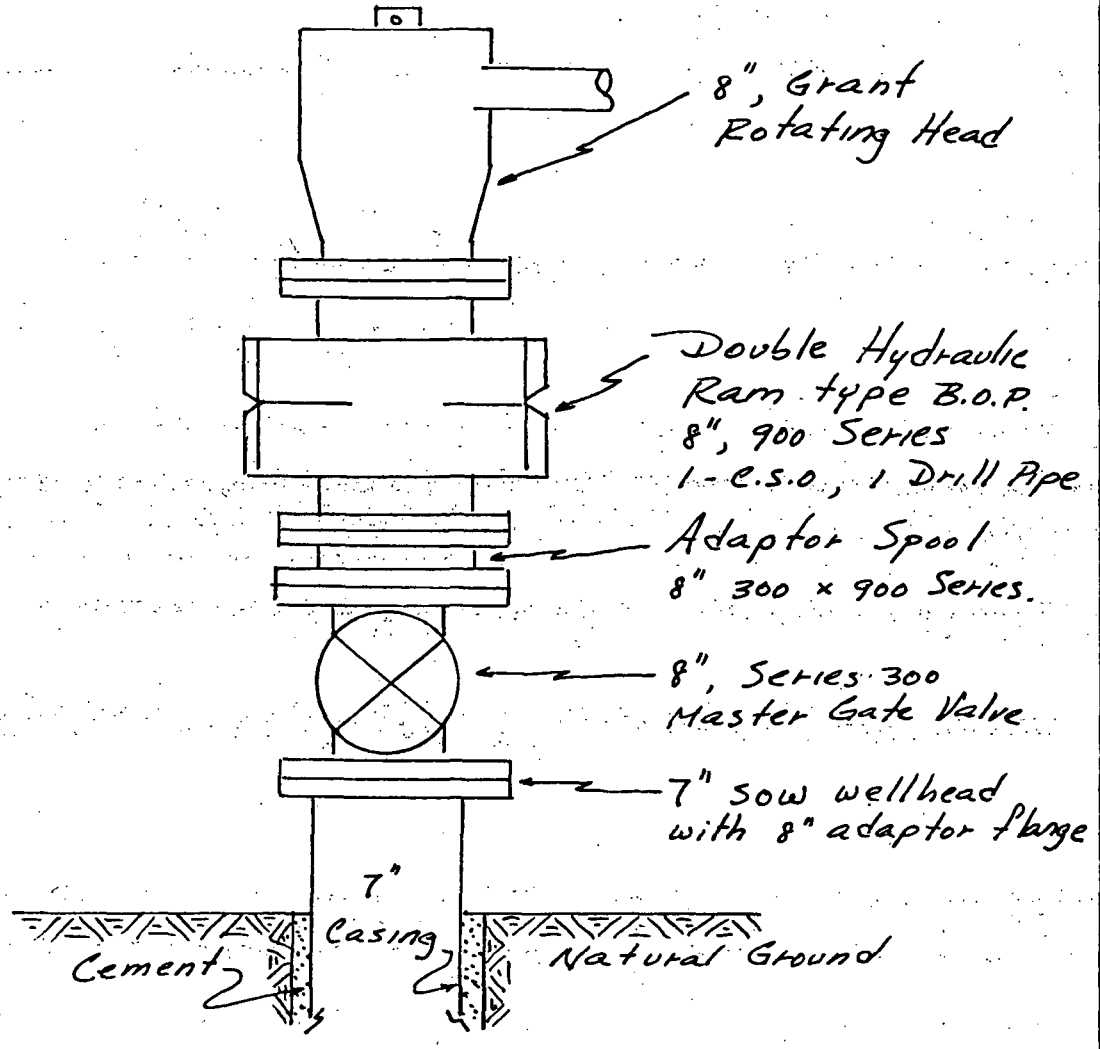
DRILLING CURVE S-89-1

SULPHURDALE, UTAH

By: GWH | Ckd: GWH
Date: May 31, 1989
Scale: 1" = 200' Vert.
Dwng. No: ME1891-3

Figure 3



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7" B.O.P.E. STACK 5-89-1

SULPHURDALE, UTAH

By: GWH | Ckd: GWH
Date: May 31, 1989
Scale: None
Dwng. No: ME1891-4

Figure 4

IV. GEOLOGY

The Cove Fort-Sulphurdale region, in southwestern Utah, comprises folded and faulted sedimentary and metasedimentary rocks of Paleozoic to Mesozoic age that are overlain, sequentially, by Oligocene to Miocene age ash-flow tuffs and Quaternary basalts. All of the rocks except the basalts have been intruded locally by Miocene quartz monzonite and/or latite porphyry stocks, sills, and dikes.

The rocks penetrated in S-89-1 comprise breccias and ash-flow tuffs, reworked and hydrothermally altered to varying extents, that have been designated as the Three Creeks Tuff Member of the Bullion Canyon Volcanics (one of the oldest of the local volcanic units). The Three Creeks Tuff has three distinct zones: an upper and a lower zone of red to grey densely welded tuff and a middle zone of poorly welded white tuff. Only the lower zone of the Three Creeks Tuff has been mapped in the Cove Fort area of interest.

This lowermost zone of the Three Creeks Tuff has been further subdivided into two cooling units. The upper unit is characterized by euhedral plates of biotite up to several millimeters wide and euhedral (beta morphology) quartz crystals while the rocks of the lower cooling unit are mineralogically the same but much finer grained. The lower unit (tentatively renamed the Wales Canyon Formation) is found in S-89-1 at a depth of about 640 feet.

S-89-1 initially penetrated approximately 120'KB of alluvium, colluvium, leached, silicified, and variably pyritized Three Creeks Tuff (Tbt) that is typical of the materials found in the main Sulphur Pit. From 120 to 220'KB, a zone of reworked Tbt, possibly created along a landslide movement plane, was penetrated. This zone was characterized by accumulations of Tbt phenocrysts without the normal rock matrix.

Below 220'KB, S-89-1 transected variably fractured, brecciated, pyritic and altered (argillic and silicic) light grey to medium grey to green-grey Tbt. The mineralogically similiar Wales Canyon Fm was found at 640'KB. Commonly, the textures of the Tbt and of the Wales Canyon rocks were 80-100% obliterated by alteration.

At 848'KB, the well encountered a white, vitreous, fractured, pyritic pre-Tertiary age metasandstone or quartzite thought to be the Coconino Fm. Steam was first noticed near the contact, but the first significant entry was at 886'KB. The steam volume increased as major fractures were penetrated at 924 and 984'KB.

Attached, as Appendix C, is a petrographic description of drill cuttings from this well together with some interpretive comments.

V. PERMITS

Because well S-89-1 was drilled on privately owned land and not on Federal property, the permitting required was minimal. Attached as Appendix D is a copy of the relevant permit from the Utah Division of Water Resources (UDWR). Archeological clearance for the well was given as a result of studies encompassing the whole prospect area that were previously accomplished and documented. When the BOP stack on S-89-1 was pressure tested in accordance with State regulations, the test was witnessed and approved by UDWR representitive John Solum.

VI. SUMMARY COST ESTIMATE

Attached to this report as Appendix E is a "Field Cost Estimate" for the drilling of S-89-1. The costs are higher than average for a slim hole because: 1) problems were encountered while drilling and cementing the 20" conductor casing and, 2) 400'of 7" production casing, rather than a lesser amount, was set for the sake of safety in the relatively altered rocks in the upper part of the hole. These changes resulted in increased rig time, cement utilization, and casing charges so that the approximate cost per foot of S-89-1 was $71.72.

Appendix A

DRILLING HISTORY

S-89-1

5-8-89

0700 - 1700 Begin mobilization, miscellaneous repairs and clean-up.

5-9-89

0800 - 2000 Begin subbase construction, more repairs and clean-up.

5-10-89

0800 - 2000 Fix hydraulic lines, raise derrick, continue rig-up.

5-11-89

0900 - 2400 Unload drill pipe and miscellaneous equipment pressure check lines and hoses, gather subs, valves, and bits, install geolograph.

5-12-89

0800 - 1000 Bell Safety hand P. Murphy on site and gave H_2S course to 6 drill hands.
1000 - 1330 Continue rig-up.
1330 - 1500 Weld sub to 26.25" bit and MU BHA.
1500 - 1630 Spud hole and drill to 20' KB.
1630 - 1815 POOH. PU 20" line pipe conductor casing and set at 10' GL.
1815 - 1835 Carling Redimix on site with 1.5 Cu. Yds. Class A cement. CIP at 1835.
1835 - 2400 WOC. Continue rig-up, MU mud drain, set up lights, hang geolograph wire, rig tong cable. Release crew.

5-13-89

0800 - 1205 Rig up, cut off conductor, prepare to DO cement.
1205 - 1230 Drill out cement.
1230 - 1355 Lost circulation around casing. Try bentonite and LCM patch. No luck.
1355 - 1430 Drill with air/foam, Hughes 17.5" mill tooth bit.
1430 - 1500 Fix friction clutch.
1530 Sample at 40' KB.
1615 Kelly down at 53' KB.
1630 POOH. 20" casing loose and rotating.
1630 - 1830 Try to break subs. Wrong tools on site.
1830 - 2000 RIH with collar #1, tag 7' of fill, POOH. MU Kelly. RIH. Rig clutch failed. Remove clutch, shut down pending repairs.

5-14-89
0800 - 1600 Repairs, rig-up and clean-up.

5-15-89
0000 - 2400 Day off for crews.

5-16-89
1000 - 1800 Repairs on pumps and clutch.

5-17-89
0800 - 1100 Install and adjust clutch.
1100 - 1300 Remove 20" conductor.
1300 - 1430 Build 2" skirts on 26" bit and drill to 25' KB.
1430 - 1600 PU 27' of 20" casing and RIH.
1600 - 1645 Cement 20" with Redimix. CIP at 1645.
1645 - 1800 WOC. Continue rig-up.

5-18-89
0900 - 1100 Cut off 20" conductor.
1100 - 1330 Weld on flow nipple, set Dresser sleeve.
1330 - 1430 MU 17.5" Reed milltooth bit and BHA.
1430 - 1830 Miscellaneous rig repairs and rig-up.

5-19-89
0800 - 1630 Made and welded on hand rails.
1630 - 1800 Wait for new light plant from SLC. Wrong type arrived; return it and wait for replacement.

5-20-89
0700 - 1200 Install new light plant, make mud, circulate.
1200 - 1400 Drill ahead 22' KB to 39'KB.
1400 - 1600 Repair pump.
1600 - 1700 DA 39'-46'KB.
1700 - 2000 DA 46'-76'KB.
2000 - 2230 Repair pump.
2330 - 2400 DA 76'-106'KB.

5-21-89
0000 - 0100 DA 106'-128'KB.
0100 - 0130 Prime pumps when mud aeriated spontaneously.
0130 - 0200 DA 128'-136'KB. TD for 13.375" casing.
0200 - 0300 Short trip.
0300 - 0700 Circulate, condition hole for 13.375" casing.
0700 - 0800 POOH at 136'KB. Locate casing equipment.
0800 - 1330 Run and set 133' of 68#/Ft., K-55, BT&C 13.375" casing.
1330 - 1430 Dowell/Schlumberger in to cement with Class A geothermal cement.
1430 - 2000 WOC. Clean equipment. MU flow line.
2000 - 2400 Finish flowline, RIH 12.25" milltooth bit.

5-22-89

0000 - 0130 Drill 13' of cement and into formation at 136'KB.
0130 - 0800 DA 136'-270'KB.
0800 - 1800 DA 270'-410"KB. TD for 7" casing.
1800 - 2000 POOH.
2000 - 2130 RIH. No fill, circulate and condition, POOH.
2130 - 2400 Rig up to run 7" casing.

5-23-89

0000 - 0230 Run and set 7" 28#/Ft.,K-55, BT&C casing at 410'KB.
0230 - 0425 D/S in to cement casing. CIP at 0425.
0425 - 0800 WOC. Clean-up and maintainance duties.
0800 - 2400 Cut off casings, NU BOP stack. Water swivel assembly broke so no pressure test possible.

5-24-89

0000 - 0700 Rig repairs and maintainance.
0700 - 1115 Water swivel repaired. Prepare to pressure test BOPE.
1115 - 1300 Continue small pre-test preparations.
1300 - 1845 Five 600 PSI pressure tests tried and failed due to small leaks at flanges and at swivel.
1845 J.Solum, Utah State Division of Water accepts results of test with 760 PSI leaking to 740 PSI in 15 minutes.
1845 - 1915 RIH with 6.25" milltooth bit.
1950 - 2400 Drill cement.

5-25-89

0000 - 0345 Drill out cement. Drill formation 410-416'KB. Survey No. 1 - 0.5 degree deviation.
0345 - 0630 DA 416'-511'KB. (30'/hr. average).
0630 - 0810 DA 511'-560'KB.
0810 - 0920 DA 560'-608'KB.
0920 - 1030 DA 608'-665'KB. (>60'/hr.).
1030 - 1230 DA 665'-701'. Survey No. 2 - 2 degree deviation. 5 ppm H_2S detected.
1230 - 1310 DA 701'-710'KB. Air/foam temperature 110F.
1310 - 1330 DA 710'-730'KB.
1330 - 1500 DA 730'-790'KB. Air/foam temperature 120F.
1500 - 1615 DA 790'-886'KB. **First steam entry**. Air/foam temperature 180F.
1615 - 1750 DA 886'-924'KB. Major fracture at 924'KB.
1750 - 1800 DA 925'-947'KB.
1800 - 2020 DA 947'-1041'KB. Rotating head rubber wearing out.POOH. Release most of crew.
2020 - 2400 Flow well full bore.

5-26-89

0000 - 0700 Flow well full bore (with supervision).

0700 Shut in well using flow line valve leaving small steam bleed. Release rest of crew for Memorial Day holiday.

DRILLING ACTIVITY LOG WELL # [ ] DATE [5-8-89]

TIME	DEPTH	NAME	COMMENTS
0900		K Richins	Install Air Regulator on Air Comp start Lightplant Run 1" hose to Rig & Air comp Spot sub structure, grease Rig. Attempt to fix Hyd pump Undo guy wires, Clean part House
			REMOVE SMALL GENERATOR OFF RIG
			CLEAN AROUND CHARGER PUMP DIET
	1700		
			Hands 8 hrs
			Drill 8 hrs

MEI DRILLING ACTIVITY LOG WELL # [ ] DATE [5-9-89]

TIME	DEPTH	NAME	COMMENTS
		K Richins	
0800			Fill day tank on Light plant, dis Assemble Hyd pump, Repair Hyd Hose Finish cleaning Parts house skin Loc. with cat set pit and pump Repaird oiLer pump, Rebuild Hyd pump Install same test Rupture Hyp Hose cut 1" Hard line For hand Rails weld same Help welder on sub
			Hands 12 hrs
			Drill 11 hrs 5/9/89

DRILLING ACTIVITY LOG	WELL # [ ]	DATE [5/08/99]

TIME	DEPTH	NAME	COMMENTS
		K. Richins	
0800			Rig up 1" fuel line from Diesel tank & fuel rig
0900			Stretch out Electric lines
09:30			set water tank & Lite plant
10:00			start pump to transfer water from top pit to bottom
10:30			lay out hoses to fill water tank
11:00			set stabilizer's on platform
11:30			fix blown Hydraulic line on pump
12:00			Lunch
12:30			fix another blown Hydraulic Line
13:00			fix 3rd blown Hydraulic Line
13:50			Raise Derrick
14:00			pin Derrick legs, adjust board, Hang cat Line
15:50			set catwalk & Beaver slide & mount to Rig
16:00			fill Hydraulic tank (25 Gallons)
16:50			work on Hand Rails
17:50			Yellow Dog went down had to Restart
18:00			unload welder

DRILLING ACTIVITY LOG WELL# [ ] DATE [5/10/89]

TIME	DEPTH	NAME	COMMENTS
18:25			picked up tools
18:50			set air drilling compresser & tank
19:00			clean oil bath filter on compresser
19:50			clean tools & put away
			2½ Gallon Rotary Table
			25 Gallon Hydraulic fluid
			1 hr cat
			2 hr fork lift
			Hanos 12 hrs
			Dell 12 hrs

DRILLING ACTIVITY LOG WELL # [S-89-1] DATE [5-11-89]

TIME	DEPTH	NAME	COMMENTS
		K Richins	
0900			unload 3½" DP & Lift subs, slips tongs
1000			Load 2 Kelley's & 2 socks HP Reed bit
			search for X over subs Load Honda
			pump truck to Rig For watertank fill
			Change oil in Rig Hang tongs (not complete)
1200			Presser check mud line & Kelly Hose
			find Tool's To Drill with - like subs
1500			Valve's,

DRILLING ACTIVITY LOG WELL # C-89-1 DATE 5-12-97

TIME	DEPTH	NAME	COMMENTS
2200		K Richins	tighten bolts on Rotary Install Geolograph and sheave under crown Run cable tie to gooseneck on swivel, gather tools
2400			

DRILLING ACTIVITY LOG WELL # [589-1] DATE [5-12-89]

TIME	DEPTH	NAME	COMMENTS
0800		K Richard	RUN Diesel Line To Light plant & Air comp. and Mist pump
			Change oil in mist pump and Air comp
			Haul water pump to pond Run suction and discharge to water tank fill mist pump tank
			unload collars and 2 xover subs.
			weld old sub to 26" bit pick up xover's
			Install counter weight For tongs in Derrik
1500			SPUD 26" hole To 10' Ground Level
1630			pull up Break subs, Lay Down bit
1700			pull Rotary Table
1800			pick up 20" casing set on bttm, Cement same
1900			plumb Air line F/ Air comp to stir mist tank
			Replace Kelley on tracks, Build suction From pump to pit cut 20" @ base of Rotary table
			Replace Rotary Table hook up lighting in
2200			Derrick and set 2 spot Light on ground.
			34 Joints 3½" Drillpipe 10 4¾" Collars on Loc.

DRILLING ACTIVITY LOG W[illegible] [5-89-1] DATE [5-13-89]

TIME	DEPTH	NAME	COMMENTS
9:00			Nipple up flow line and weld flow nipple move Collars on Cat Walk and Dig Ditch make up Bit + Subs on Kelly and get Ready to Drill
	20 FT		Drilling with mud pump lost Circulation thru Conductor
	30 FT		Switch to Air Drilling Drilled 30 FT and Haste Clutch went out pulled Bit in Casing + Shut Rig Down
8:00			Removed Clutch for Replacement

Randy Harvey 12
Larry Wall 12
Mike Nielson 12

DRILLING ACTIVITY LOG WELL # [5 89-1] DATE [5-2 -91]

TIME	DEPTH	NAME	COMMENTS
9:15		K Rushing	Nipple up flow line + weld flow nipple
			mud [illegible] 215
2:00			[illegible] pick up BHA DP
			Released Crew to Break Tour
			@ midnight

Burt Lowe

MEI DRILLING ACTIVITY LOG WELL* [589-1] DATE [5-14-89]

TIME	DEPTH	NAME	COMMENTS
8:00			Weld mud mix hoppes
			Re hang tong to finger board
			Re tip weight indicator
			Fuel Cain Rotary Cain
			Dig Ditches for mud Run off
4:00			Clean up rig
			Randy Harvey 8
			Larry Wall 8
			mike Nielson 8

DRILLING ACTIVITY LOG WELL # [5-89-1] DATE [5-16-89]

TIME	DEPTH	NAME	COMMENTS
10:00			make key way for Hydaulic pump on winch and installed Same
			make key way for clutch Drive shaft and Clutch together and installed Same
			adjusted Clutch clutch would not Engage So we ADJ + Repaired Clutch
			Clean tool trailer
6:00			grease + Service Rig light plant
			Paudy Harvey 8
			Larry wall 8
			willie young 8

MEI DRILLING ACTIVITY LOG WELL # [589-1] DATE [5-17-89]

TIME	DEPTH	NAME	COMMENTS
8:00			ADJust Clutch take Clutch apart fix Springs
			put Back together and test clutch Shut Down
			ADJust Clutch test Clutch shut Down
11:00			ADJust Clutch test ok
			pick up kelly Break out Bottom hole Assembly
			Break off 17½ Bit pull Rotary table Cut
			flow nipple off pull Conductor pipe Replace
			Rotary table pick up 26" Bit make up
1:00			kelly weld 2" Etentions on Bit
			Ream hole 26" Drill 15ft in plus 10ft kelly
2:30			Cushing = 25ft Cut 26" Bit + Rotary table
4:00			o/s floor pick up 27ft of 20" Cassing + Run
4:00			in hole wait for Cement. Cemeted Cassing
4:50			at 1145 pulled 20" Cassing off Cat Walk
6:00			Strung up Hydralic wench line
			Randy Harvey 10
			Larry Wall 10
			Willie Young 10

DRILLING ACTIVITY LOG WELL # [S 84-1] DATE [5-18-89]

TIME	DEPTH	NAME	COMMENTS
8:00			
9:00			went to Hospital and take urine test
9:00			Cut Conductor Cassing OFF and lay down
11:00			set weld flow nipple put on dresser sleve
			weld 4 Stablizing Ear's on Conductor
1:30			Break off 26" Bit put Rotary table in and
2:30			make up 17½ in Reed Bit with 3.15. Jets
4:30			Chain off Conductor Cassing work on Cat line
5:30			Rig up air to Start light Plant
5:30			
6:30			worked on Hydraulic pump on winch

Randy Harvey	10½
Larry Wall	10½
willie young	10½

DRILLING ACTIVITY LOG WELL # [SG-1] DATE [5-19-99]

TIME	DEPTH	NAME	COMMENTS
8:00			while waiting for light plant we mesured Cut made and welded Hand Rails for Rig
4:30			Light Plant arrived at 2:00 Light plant was 480 volts Could not use Sent Back to Salt lake City and wait an anether light plant
4:30			help mechanic work on Hydraulic
6:00			System on wrench + Rig

Randy Harvey 10
Larry Wall 10
Willie young 10
Dave Manitzky

DRILLING ACTIVITY LOG WELL # [S89-1] DATE [5-20-89]

TIME	DEPTH	NAME	COMMENTS
7:00	22		work on Rod oilers and wait for Electrition
9:00	22		to hook up light plant
9:00	22		Circulate hole and mud up
10:00	22		Pull liner in pump and Replace gaskets
11:30	22		Circulate hole and mud up. 12:00 Started Drilling
2:00	39		Drilled from 22' to 39 feet
2:00			Changed packing on Charger pump + and took
4:00			out all Vales for inspection on pump
4:00	39'		Drilling 39' To 46' feet
5:00	46		made Connection at 46' feet Depth and Weld 2"
			Valve on flow line
6:00	46		Drilling 46'-76' Kelly Down when crew Changed
8:00	76		" " "
			Randy Harvey 13
			Larry Wall 13
			willie young 13

MEI DRILLING ACTIVITY LOG WELL # [S-89-1] DATE [Mar 20-21] 89

TIME	DEPTH	NAME	COMMENTS
1000		KRichins	Move Rental Equip From ground put on cement Dock
			Put Contractors Equip on cement, Hydrill BOP
1400			Lift subs Koomey control Casing tongs & Elevators
1400			Left Loc to Release @ 2000 hrs
2000			conn @ 76'
2100			Pull Liner on middle of pump Replace gasket
			prime mud pump
2230	30		Drlg F 76' to 106', Hole tppers clean
2400	22		Conn @ 106' To 128
0100	*		pump system Aired up prime pump
0130	8		Drlg F 128' to 136' T.D for Casing
0200			Total Depth 136' mud to thick to pump, pump water
			From pond to water down mud
0300			short trip Drill collars
0400			circ and cond Hole For 13 3/8 Casing wait on
			dowell
0700			Trip out @ 136'
0800			Haul 13 3/8 casing Elevators, Shoe, Centralizers

MEI DRILLING ACTIVITY LOG WELL # [S-87-1] DATE: [5-21-89]

TIME	DEPTH	NAME	COMMENTS
8:00	136	RH	Shut Down Servie Rig + Equipment
			Break 17½ n Bit Stand back Collar + Subs. in
			Derrik Rig up to Run Casing pick up shoe
1:30			+ Cassie Run in Hole with same welded JTS
1:30			Rig up + Cement
2:30			pump Cement
2:30			wait on Cement
			Clean Shale Shaker pit Remove flow line
7:0			and wash out. Fixed mud pump
7:00			Cut Casing and weld flow nipple on hook
8:00	136	RH	up flow line

Randy Harvey 12
Larry Wall 12
Willie young 12
Dave Martzky 6

DRILLING ACTIVITY LOG WELL # [S-89-1] DATE [5-21-22-89]

TIME	DEPTH	NAME	COMMENTS
2000		KRichins	weld up flow line Repack swivel
2230			Pick up 1 stand From Derrick Breakoff subs
			pick up Bit sub & Xover trip IN Hole
0030			Drlg Cement 13' thru shoe
0130			Drlg Formation @ 136'
0200			Conn @ 169'
0200			Drlg F 169'
0300			Conn @ 200'
0330			Cond mud Formation Cause High Visc
0600			Drlg F 200' to 231
0700			Conn @ 231'
0715			Drlg F/ 231 To 262'
0730			Conn @ 262'
0745			Drlg F 262' To 270 @ 0800
0800			

MEI DRILLING ACTIVITY LOG WELL # [5-89-1] DATE [5-22-89]

TIME	DEPTH	NAME	COMMENTS
8:00	270	RH	Drilling formation
9:05	295	RH	Service Rig on kelly Down made Conection
9:30	295	RH	Drilling formation
10:30	313	RH	Drilling formation
11:00	317	RH	pick up to fix mud (Condition Mud)
1230	325	RH	Drilling formation make Conection
1:00	356	RH	Drilling formation make Conection
2:30	388		Drilling formation make Conection
515	388		Drilling formation
6:00	410		Drilled to T.D.
6:00	410		Circulate + Condition Hole
7:30	410		Set kelly Back, trip out with 7 stds
8:00			
			Randy Harvey 12
			Larry Wall 12
			willie young 12

MEI DRILLING ACTIVITY LOG WELL [ ] DATE 6-23 19

TIME	DEPTH	NAME	COMMENTS
2000			trip in hole tag bttm no fill
2030			Circ and cond hole haul casing
2130			Trip out to run DC's steap CASING
2230			CSG UP YELLOW DOG fill water tank
2330			WELD CASING SHOE ON CASING
2:30			RUN CASING AND FILL HOLE
4:00			CEMENT CASING Plug Down @ 4:25 Moderate Return
5:00			cut hole DRAIN CASING Rig Down Casers
6:00			wash pits DRAIN flow LINE
0630			Fill day tank on Lightplant fuel Backhoe
			fuse blew on light plant
0800			

Company MOTHER EARTH / SIERRA DRILLING.

Lease and Well No. Kelly 36' - WELL # 5-89-1

PIPE TALLY

No. Joints	Length of Joint Feet	Length of Joint Inches	TOTAL Feet	TOTAL Inches	No. of Stands								
	BHA	61				282	31	45	1041	35	32	314	
251	30	71	76	32	1	283	5/8		1040	78	33	315	
252	30	10	106	42	2	284			TD		34	316	
253	31	35	137	77	3	285						317	
254	31	34	169	11	4	286						318	
255	P/U		200	37	5	287						319	
256	31	41	231	78		288						320	
257	30	84	262	45	1	289						321	
258	31	33	293	78	8	290						322	
259	31	44	325	22	9	291						323	
260	31	38	356	60	10	292						324	
261	31	44	388	04	11	293						325	
262	30	65	418	69	12	294						326	
263	31	58	450	92	13	295						327	
264	31	57	482	49	14	296						328	
265	31	55	514	04	15	297						329	
266	31	54	545	58	16	298						330	
267	31	68	577	26	17	299						331	
268	31	20	608	46	18	300						332	
269	30	31	638	77	19	301						333	
270	31	54	670	31	20	302						334	
271	30	83	701	14	21	303						335	
272	31	22	732	36	22	304						336	
273	30	76	763	06	23	305						337	
274	31	45	794	51	24	306						338	
275	31	27	825	78	25	307						339	
276	30	14	855	92	26	308						340	
277	30	68	886	60	27	309						341	
278	30	71	917	31	28	310						342	
279	30	67	947	98	29	311						343	
280	30	68	978	66	30	312						344	
281	31	24	1009	90	31	313						345	

LEASE	WELL NO.	API WELL NUMBER	DATE
	589-1		5-21-99

OPERATOR	CONTRACTOR	RIG NO.
[illegible] HDT [illegible], INC	Grimshaw [illegible] Drilling INC	2

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

D.P. SIZE	WT./FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DIST.	COUNTY	STATE
		[illegible]

LAST CASING, TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

WIRE LINE RECORD — REEL NO. — SIZE — NO. LINES — FT. SLIPPED — FT. CUT OFF — PRESENT LENGTH — TON MI. OR TRIPS SINCE LAST CUT — CUMULATIVE TON MI. OR TRIPS

TIME DISTRIBUTION — HOURS

CODE NO.	OPERATION	MORN.	DAY	EVE.
1	RIG UP AND TEAR DOWN			
2	DRILL ACTUAL			
3	REAMING			
4	CORING			
5	CONDITION MUD & CIRCULATE			
6	TRIPS			
7	LUBRICATE RIG			
8	REPAIR RIG			
9	CUT OFF DRILLING LINE			
10	DEVIATION SURVEY			
11	WIRE LINE LOGS			
12	RUN CASING & CEMENT			
13	WAIT ON CEMENT			
14	NIPPLE UP B.O.P.			
15	TEST B.O.P.			
16	DRILL STEM TEST			
17	PLUG BACK			
18	SQUEEZE CEMENT			
19	FISHING			
20	DIR. WORK			
21				
22				
23				
COMPLETION	A. PERF'R'TN			
	B. TBG TRIPS			
	C. TREATING			
	D. SWABBING			
	E. TESTING			
	F. ADDIT'N'L			
	G.			
	TOTALS			

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

HRS. W/CONTR. D.P.			
HRS. W/OPR. D.P.			
HRS. W/O D.P.			
HRS. STANDBY			
TOTAL DAY WORK			
NO. OF DAYS FROM SPUD			
CUMULATIVE ROTATING HRS.			

MORNING TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
TOTAL			FT.
WT. OF STRING			LBS.

BIT RECORD

BIT NO.		
SIZE	9 7/8	
IADC CODE		
MFG.	Reed	
TYPE	HP11J	
SER. NO.	477	
JETS 1/32" /TFA in²	15 15 15	
DEPTH OUT		
DEPTH IN	136	
TOTAL FTG.		
TOTAL HRS.	0	
DULL: CUT. STRUC. I O D L B G O R		
GPM/PUMP-PSI		

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN
136				Sand & Shale								

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
6:00	11:30	5 1/2	12	Rig up to Rund Casing.
1130	2:30	1	12	[illegible] Casing
2:30	7:00	4 1/2	13	[illegible]
7:00	8:00	1	21	[illegible] weld [illegible] nipple [illegible]
				F. 1 @ 5:00 [illegible]

DRILLER [illegible]

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
TOTAL			FT.
WT. OF STRING			LBS.

BIT RECORD

BIT NO.		
SIZE		
IADC CODE		
MFG.		
TYPE		
SER. NO.		
JETS 1/32" /TFA in²		
DEPTH OUT		
DEPTH IN		
TOTAL FTG.		
TOTAL HRS.		
DULL: CUT. STRUC. I O D L B G O R		
GPM/PUMP-PSI		

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2000	2230	2 1/2	14	Weld Flowline nipple [illegible] Repack Swivel
2230			6	Pick up [illegible] Pickup Bit sub
	2400	1 1/2		& [illegible] Trip in hole

DRILLER [illegible]

EVENING TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
D.C. ID		OD	FT.
STB RMR		OD	FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
TOTAL			FT.

BIT RECORD

BIT NO.		
SIZE		
IADC CODE		
MFG.		
TYPE		
SER. NO.		
JETS 1/32" /TFA in²		
DEPTH OUT		
DEPTH IN		
TOTAL FTG.		
TOTAL HRS.		
DULL: CUT. STRUC. I O D L		

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN
				[illegible]								

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS

LEASE	WELL NO.	API WELL NUMBER	DATE
			5-27-89

OPERATOR	CONTRACTOR	RIG NO.
M F T	Sierra	

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

D.P. SIZE	WT./FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DIST.	COUNTY	STATE

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

WIRE LINE RECORD — REEL NO. / SIZE / NO. LINES / FT. SLIPPED / FT. CUT OFF / PRESENT LENGTH / TON MI. OR TRIPS SINCE LAST CUT / CUMULATIVE TON MI. OR TRIPS

TIME DISTRIBUTION – HOURS

CODE NO.	OPERATION	MORN.	DAY	EVE.
1	RIG UP AND TEAR DOWN			
2	DRILL ACTUAL			
3	REAMING			
4	CORING			
5	CONDITION MUD & CIRCULATE			
6	TRIPS			
7	LUBRICATE RIG			
8	REPAIR RIG			
9	CUT OFF DRILLING LINE			
10	DEVIATION SURVEY			
11	WIRE LINE LOGS			
12	RUN CASING & CEMENT			
13	WAIT ON CEMENT			
14	NIPPLE UP B.O.P.			
15	TEST B.O.P.			
16	DRILL STEM TEST			
17	PLUG BACK			
18	SQUEEZE CEMENT			
19	FISHING			
20	DIR. WORK			
21				
22				
23				
COMPLETION	A. PERF'R'T'N			
	B. TBG TRIPS			
	C. TREATING			
	D. SWABBING			
	E. TESTING			
	F. ADDIT'N'L			
	TOTALS		12	

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

HRS. W/CONTR. D.P.	
HRS. W/OPR. D.P.	
HRS. W/O/D.P.	
HRS. STANDBY	
TOTAL DAY WORK	
NO. OF DAYS FROM SPUD	
CUMULATIVE ROTATING HRS.	

MORNING TOUR

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	FT.
1	BIT 9 7/8	1.00
1	Bit sub	2.64
1	STB RMR X O OD	2.55
4	D.C. ID 6 1/2 OD	123.50
	STB RMR OD (crossed out)	
1	D.C. ID X O OD	
1	STB RMR X O OD	
4	2 1/2 OD	12467
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	
	WT. OF STRING	9,000 LBS.

BIT RECORD

BIT NO.	3
SIZE	9 7/8
IADC CODE	
MFG.	Reed
TYPE	HP11J
SER. NO.	Pild 473
JETS 1/32" / TFA in²	3/15's
DEPTH OUT	
DEPTH IN	167
TOTAL FTG.	
TOTAL HRS.	5 1/2
DULL CUT. STRUC. I O D L B G O R	
GPM/PUMP-PSI	

MUD RECORD: TIME / WEIGHT / PRESSURE GRADIENT / VISC.-SEC. / PV/YP / GELS / WL-CC'S / pH / SOLIDS % — MUD & CHEMICALS ADDED: TYPE / AMT. / TYPE / AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD: DEPTH / DEV. / DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2400	0030	1/2	6	Trip IN
0030	0130	1	2	Drlg Cement 13' to Shoe
0130	0400	2 1/2	2	Drlg Formation F/ 136' To 200
0400	0600	2	5	Inhibition MUD (Formation Cause High Visc
0600	0800	2	2	Drlg F/ 200' 270'

DRILLER [signature]

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	FT.
1	BIT 9 7/8	1.00
1	Bit sub	2.60
1	STB RMR XO OD	.95
4	D.C. ID 6 1/2 OD	123.50
1	STB RMR XO OD	2.55
1	D.C. ID X O OD	
1	STB RMR XO OD	
	BHA	133.11
8	STANDS DP	24958
	SINGLES DP	
	KELLY DOWN	28
	TOTAL	410
	WT. OF STRING	8,000 LBS.

BIT RECORD

BIT NO.	3
SIZE	9 7/8
IADC CODE	
MFG.	Reed
TYPE	HP11J
SER. NO.	Pild 473
JETS 1/32" / TFA in²	3-15
DEPTH OUT	410
DEPTH IN	167
TOTAL FTG.	242
TOTAL HRS.	13 1/4
DULL CUT. STRUC. I O D L B G O R	
GPM/PUMP-PSI	

MUD RECORD — MUD & CHEMICALS ADDED: TYPE: Gel, AMT.: 10 sx

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. 1 LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN
270			2	Sand & Shale	70							5

DEVIATION RECORD: DEPTH / DEV. / DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
8:00	9:00	1	2	Drlg.
9:00	9:30	1/2	7	Service Rig
9:30	11:00	1 1/2	2	Drlg
11:00	12:30	1 1/2	5	Condition Mud
12:30	6:00	5 1/2	2	Drlg
6:00	7:30	2	5	Circ. & Cond. Hole
7:30	8:00	1/2	6	Set kelly Back trip out with 7 jts

DRILLER [signature]

EVENING TOUR

DRILLING ASSEMBLY (At end of tour)

BIT / STB RMR OD / D.C. ID OD / STB RMR OD / D.C. ID OD / STB RMR OD / STANDS DP / SINGLES DP / KELLY DOWN / TOTAL

BIT RECORD

BIT NO. / SIZE / IADC CODE / MFG. / TYPE / SER. NO. / JETS 1/32" / TFA in² / DEPTH OUT / DEPTH IN / TOTAL FTG. / TOTAL HRS. / DULL CUT. STRUC. I O D L B G O R

MUD RECORD: TIME / WEIGHT / PRESSURE GRADIENT / VISC.-SEC. / PV/YP / GELS / WL-CC'S / pH / SOLIDS % — MUD & CHEMICALS ADDED: TYPE / AMT. / TYPE / AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD: DEPTH / DEV. / DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2000	2030	1/2	6	Trip IN Hole
2030	2130	1	5	Circ and Cond Hole
2130	2330	2	6	Trip out Lay Down 6 1/2" Drill collars
2330	2400	1/2	12	Weld shoe RUN 7" casing

DRILLER [signature]

LEASE | WELL NO. 5491 | API WELL NUMBER | DATE 5-21-91

OPERATOR MEI | CONTRACTOR Sitrug | RIG NO. 2

SIGNATURE OF OPERATOR'S REPRESENTATIVE | SIGNATURE OF CONTRACTOR'S TOOL PUSHER

FIELD OR DIST. Sinbad | COUNTY Grand | STATE Utah

D.P. SIZE	WT./FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

LAST CASING TUBING OR LINER

SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

WIRE LINE RECORD REEL NO.

SIZE	NO. LINES	FT. SLIPPED

FT. CUT OFF | PRESENT LENGTH

TON MI. OR TRIPS SINCE LAST CUT

CUMULATIVE TON MI. OR TRIPS

TIME DISTRIBUTION – HOURS

CODE NO.	OPERATION	MORN.	DAY	EVE.
1	RIG UP AND TEAR DOWN			
2	DRILL ACTUAL			
3	REAMING			
4	CORING			
5	CONDITION MUD & CIRCULATE			
6	TRIPS			
7	LUBRICATE RIG			
8	REPAIR RIG			
9	CUT OFF DRILLING LINE			
10	DEVIATION SURVEY			
11	WIRE LINE LOGS			
12	RUN CASING & CEMENT			
13	WAIT ON CEMENT			
14	NIPPLE UP B.O.P.			
15	TEST B.O.P.			
16	DRILL STEM TEST			
17	PLUG BACK			
18	SQUEEZE CEMENT			
19	FISHING			
20	DIR. WORK			
21				
22				
23				
COMPLETION	A. PERF'R'T'N			
	B. TBG TRIPS			
	C. TREATING			
	D. SWABBING			
	E. TESTING			
	F. ADDIT'NL			
	G.			
TOTALS				

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

HRS. W/CONTR. D.P.			
HRS. W/DPR. D.P.			
HRS. WO/D.P.			
HRS. STANDBY			
TOTAL DAY WORK			

NO. OF DAYS FROM SPUD

CUMULATIVE

MORNING TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
TOTAL			FT.
WT. OF STRING			LBS.

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG.	
TYPE	
SER. NO.	
JETS 1/32" /TFA in²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG.	
TOTAL HRS.	
DULL CUT. STRUC. I O D L B G O R	
GPM/PUMP-PSI	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
TOTAL			FT.
WT. OF STRING			LBS.

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG.	
TYPE	
SER. NO.	
JETS 1/32" /TFA in²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG.	
TOTAL HRS.	
DULL CUT. STRUC. I O D L B G O R	
GPM/PUMP-PSI	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

EVENING TOUR

DRILLING ASSEMBLY (At end of tour)

NO.			
BIT			FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
D.C. ID	OD		FT.
STB RMR	OD		FT.
STANDS DP			FT.
SINGLES DP			FT.
KELLY DOWN			FT.
			FT.

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG.	
TYPE	
SER. NO.	
JETS 1/32" /TFA in²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG.	
TOTAL HRS.	
DULL CUT. STRUC. 1 0 0 1	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

MORNING TOUR

FOOTAGE

FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000 #	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	METHOD DRLG.

DEVIATION RECORD

DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2400	330	3½	12	Run 7" casing, Hit up Powell
330	0430	1	12	Cement 7" Rig Down to 425 AM
				Moderate Return Flow
0430	0530	1	21	Cut hole in 13 3/4, Drain Lay Down Flow line
0530	0700	2½	13	Wait on Cement

DRILLER Randy Hall

DAY TOUR

FOOTAGE

FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000 #	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	METHOD DRLG.

DEVIATION RECORD

DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
8:00	1:00		13	Wait on Cement
1:00	8:00		14	Weld Flange and nipple up BOPS

DRILLER Randy Hall

EVENING TOUR

FOOTAGE

FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000 #	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	METHOD DRLG.

DEVIATION RECORD

DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2000	2400	4	14	Nipple up BOP Stabline, Pick up Tools

LEASE	WELL NO.	API WELL NUMBER	DATE
	5921?		5-24-89?

OPERATOR	CONTRACTOR	RIG NO.
M F I	SIERRA	2

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

FIELD OR DIST.	COUNTY	STATE
	Beaver?	Utah

D.P. SIZE	WT./FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

LAST CASING, TUBING OR LINER

SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

WIRE LINE RECORD — REEL NO. — SIZE — NO. LINES — FT. SLIPPED — FT. CUT OFF — PRESENT LENGTH — TON MI. OR TRIPS SINCE LAST CUT — CUMULATIVE TON MI. OR TRIPS

TIME DISTRIBUTION – HOURS

CODE NO.	OPERATION	MORN.	DAY	EVE.
1	RIG UP AND TEAR DOWN			
2	DRILL ACTUAL			
3	REAMING			
4	CORING			
5	CONDITION MUD & CIRCULATE			
6	TRIPS		1	
7	LUBRICATE RIG			
8	REPAIR RIG		1	
9	CUT OFF DRILLING LINE			
10	DEVIATION SURVEY			
11	WIRE LINE LOGS			
12	RUN CASING & CEMENT			
13	WAIT ON CEMENT			
14	NIPPLE UP B.O.P.			
15	TEST B.O.P.		6	
16	DRILL STEM TEST			
17	PLUG BACK			
18	SQUEEZE CEMENT			
19	FISHING			
20	DIR. WORK			
21		3	4	
22				
23				
COMPLETION	A. PERF'R'T'N			
	B. TBG TRIPS			
	C. TREATING			
	D. SWABBING			
	E. TESTING			
	F. ADDIT'N'L			
	G.			
	TOTALS		12	

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

HRS. W/CONTR. D.P.	
HRS. W/OPR. D.P.	
HRS. WO/D.P.	
HRS. STANDBY	
TOTAL DAY WORK	
NO. OF DAYS FROM SPUD	
CUMULATIVE ROTATING HRS.	

MORNING TOUR

DRILLING ASSEMBLY (At end of tour): BIT — STB RMR — D.C. ID — STB RMR — D.C. ID — STB RMR — STANDS DP — SINGLES DP — KELLY DOWN — TOTAL — WT. OF STRING

BIT RECORD: BIT NO. — SIZE — IADC CODE — MFG. — TYPE — SER. NO. — JETS 1/32" /TFA in² — DEPTH OUT — DEPTH IN — TOTAL FTG. — TOTAL HRS. — DULL: CUT. STRUC. I O D L B G O R — GPM/PUMP-PSI

MUD RECORD: TIME — WEIGHT — PRESSURE GRADIENT — VISC.-SEC. — PV/YP — GELS — WL-CC'S — pH — SOLIDS % — MUD & CHEMICALS ADDED: TYPE, AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	LINER SIZE	S.P.M.	LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD: DEPTH — DEV. — DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2400	0230	2 1/2	14	Repack swivel Rig up Kearney
0230				Attempt pressure test Jam nut Appears to
	0400	1 1/2	8	be different threads on swivel packing.
0400				Restring Catline nipple up Extention on Flow
	0630	2 1/2	14	Line Cid Rig and light start
0630	0730	1	8	Break swivel off Lay Down & Load
0730	0800	1/2	8	Lay Kelley Block on Bridge Catwalk to get
				[illegible] out of Drill line

DRILLER [illegible]

DAY TOUR

DRILLING ASSEMBLY (At end of tour):

NO.			
1	BIT 6 1/4	1.50	FT.
1	B.S.	2.42	
4	D.C. 4 1/2 ID	123.28	FT.
		14.74	
8	STANDS DP	275.4	FT.
	SINGLES DP		FT.
	KELLY DOWN	28'	FT.
	TOTAL	410	FT.
	WT. OF STRING		LBS.

BIT RECORD: BIT NO. — SIZE — IADC CODE — MFG. — TYPE — SER. NO. — JETS 1/32" /TFA in² — DEPTH OUT — DEPTH IN — TOTAL FTG. — TOTAL HRS. — DULL: CUT. STRUC. I O D L B G O R — GPM/PUMP-PSI

MUD RECORD: TIME — WEIGHT — PRESSURE GRADIENT — VISC.-SEC. — PV/YP — GELS — WL-CC'S — pH — SOLIDS % — MUD & CHEMICALS ADDED: TYPE, AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	LINER SIZE	S.P.M.	LINER SIZE	S.P.M.	METHOD RUN
410				Sand & Shale								

DEVIATION RECORD: DEPTH — DEV. — DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
8:00	9:00	1	8	Fix Drive Chain
9:00				Weld Etention on Flow line Pack swivel &
	1:00	4	21	Rig up Jeronomo Line
1:00	7:00	6	15	Test BOP
7:00	8:00	1	6	Pickup Bit Sub & Run 4 1/2 DC's in Hole
				& Trip in Hole

DRILLER Randy Harvey?

EVENING TOUR

DRILLING ASSEMBLY (At end of tour): BIT — STB RMR — D.C. ID — STB RMR — D.C. ID — STB RMR — STANDS DP — SINGLES DP — KELLY DOWN — TOTAL

BIT RECORD: BIT NO. — SIZE — IADC CODE — MFG. — TYPE — SER. NO. — JETS 1/32" /TFA in² — DEPTH OUT — DEPTH IN — TOTAL FTG. — TOTAL HRS. — DULL: CUT. STRUC. I O D L

MUD RECORD: TIME — WEIGHT — PRESSURE GRADIENT — VISC.-SEC. — PV/YP — GELS — WL-CC'S — pH — SOLIDS % — MUD & CHEMICALS ADDED: TYPE, AMT.

FOOTAGE FROM	TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	LINER SIZE	S.P.M.	LINER SIZE	S.P.M.	METHOD RUN
				OK								

DEVIATION RECORD: DEPTH — DEV. — DIRECTION

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2000	2100	1	21	Lube Rig start Air and mist
2100	2200	1	8	Install Hyd Wench
2200	2300	1	21	Install Rotary Rubber and Drive bushing
2300	2330	1/2	2	Drill cement [illegible] 6' of Cement
2330	2400	1/2	6	trip out Lay Down Bit pickup Hammer Drill

LEASE	WELL NO.	API WELL NUMBER	DATE
		S-89-1	5/25

OPERATOR	CONTRACTOR	RIG NO.

SIGNATURE OF OPERATOR'S REPRESENTATIVE	SIGNATURE OF CONTRACTOR'S TOOL PUSHER

D.P. SIZE	WT./FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DIST.	COUNTY	STATE

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

WIRE LINE RECORD — REEL NO.

SIZE	NO. LINES	FT. SLIPPED

FT. CUT OFF	PRESENT LENGTH

TON MI. OR TRIPS SINCE LAST CUT

CUMULATIVE TON MI. OR TRIPS

TIME DISTRIBUTION — HOURS

CODE NO.	OPERATION	MORN.	DAY	EVE.
1	RIG UP AND TEAR DOWN			
2	DRILL ACTUAL		3½	
3	REAMING			
4	CORING			
5	CONDITION MUD & CIRCULATE			
6	TRIPS			
7	LUBRICATE RIG			
8	REPAIR RIG			
9	CUT OFF DRILLING LINE			
10	DEVIATION SURVEY		1½	
11	WIRE LINE LOGS			
12	RUN CASING & CEMENT			
13	WAIT ON CEMENT			
14	NIPPLE UP B.O.P.			
15	TEST B.O.P.			
16	DRILL STEM TEST			
17	PLUG BACK			
18	SQUEEZE CEMENT			
19	FISHING			
20	DIR. WORK			
21				
22				
23				
COMPLETION	A. PERF'R'T'N			
	B. TBG TRIPS			
	C. TREATING			
	D. SWABBING			
	E. TESTING			
	F. ADDIT'N'L			
	G.			
	TOTALS		13	

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

HRS. W/CONTR. D.P.	
HRS. W/OPR. D.P.	
HRS. WO/D.P.	
HRS. STANDBY	
TOTAL DAY WORK	
NO. OF DAYS FROM SPUD	
CUMULATIVE ROTATING HRS.	

MORNING TOUR

NO.	DRILLING ASSEMBLY (At end of tour)	FT.
	BIT	
	STB RMR OD	
	D.C. ID OD	
	STB RMR OD	
	D.C. ID OD	
	STB RMR OD	
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	
	WT. OF STRING	LBS.

BIT RECORD		
BIT NO.		
SIZE		
IADC CODE		
MFG.		
TYPE		
SER. NO.		
JETS 1/32" /TFA in²		
DEPTH OUT		
DEPTH IN		
TOTAL FTG.		
TOTAL HRS.		
DULL: CUT. STRUC. T B G / I O D L O R		
GPM/PUMP-PSI		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.—SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL.—CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	FOOTAGE TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2400	0330	3½	6	Trip / Lay Down Bit Pick up Hammer / Trip in
0330			7	Drlg F 416' To 545
				↓ ↓
	0730			" " " " "
0730	0800	½	8	Repair tong Cable

DRILLER [illegible signature]

DAY TOUR

NO.	DRILLING ASSEMBLY (At end of tour)	FT.
1	BIT 6¼	.50
1	Bit Sub	2.46
4	[illegible] 4½	123.28
	STB RMR OD	
	D.C. ID OD	
	STB RMR OD	
35	STANDS DP	9/700
	SINGLES DP	
	KELLY DOWN	25
	TOTAL	
	WT. OF STRING	LBS.

BIT RECORD		
BIT NO.		
SIZE		
IADC CODE		
MFG.		
TYPE		
SER. NO.		
JETS 1/32" /TFA in²		
DEPTH OUT		
DEPTH IN		
TOTAL FTG.		
TOTAL HRS.		
DULL: CUT. STRUC. T B G / I O D L O R		
GPM/PUMP-PSI		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.—SEC.	Air Mist		
PV/YP	/	/	/
GELS	/	/	/
WL.—CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	FOOTAGE TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN
540	830	D						4"	145			

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION
	701	2°							

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS Fuel = 25"
8:00	11:30	3½	2	Air Drilling
11:30	1:00	1½	10	Condition Hole and [illegible] Survey 2°
1:00	8:00	7	2	Air Drilling fractured Hole

DRILLER [illegible signature]

EVENING TOUR

NO.	DRILLING ASSEMBLY (At end of tour)	FT.
	BIT	
	STB RMR OD	
	D.C. ID OD	
	STB RMR OD	
	D.C. ID OD	
	STB RMR OD	
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	

BIT RECORD		
BIT NO.		
SIZE		
IADC CODE		
MFG.		
TYPE		
SER. NO.		
JETS 1/32" /TFA in²		
DEPTH OUT		
DEPTH IN		
TOTAL FTG.		
TOTAL HRS.		
DULL: CUT. STRUC. T B G / I O D L O R		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.—SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL.—CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE FROM	FOOTAGE TO	DR.-D RM.-R CORE-C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	METHOD RUN

DEVIATION RECORD	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION	DEPTH	DEV.	DIRECTION

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
2000	2030	½	2	Drlg f/ 1030 To 1041
2030	2200	1½	6	Trip out Lay String Down. Chain Kelly
				w/ BOP's / Flow line [illegible]
2200				pick up Equip around Rig
	2400	2	21	[illegible]

Appendix B

"Slim Hole" Drilling Program

Objective: Drill/Complete exploratory hole to ±1500' TD and evaluate formation. Conductor casing 13 3/8" set at ±40-120', surface casing set at ±250'-400', 6 1/4" open hole to 1500' or producing formation.

Prepared by: Jay C. Hauth, July 1988
Version 2: October, 1988
Version 3: April, 1989

Sequence of Operations

1. Construct location and sump per rig requirements.

2. MIRU rotary drilling rig.

3. Mix spud mud per attached drilling fluids program
3a Drill 26¼" hole for 20" Conductor Casing.
4. Spud well with 17 1/2" bit and drill to ±40-120'. Run and cement 13 3/8" conductor per attached cementing program. Optionally, run 12" OD X .375" wall ASTM A53 gr B, seamless or ERW pipe, w/butt weld ends. Optionally, install master valve and rotating head w/ 6" flowline per attached drawing, per supervision/geology direction. Note requirement for ±50' handwheel extension with optional master valve.

5. Visually inspect and note on Tour Sheet whether all drill pipe is white banded, specifying that it meets AAODC API Class II inspection as to the following:

1. Electromagnetic inspection of tubes (Sconoscope or Scanalog)
2. Wall thickness and cross-sectional area (Ultrasonic or gamma ray)
3. Tool jt inspection (electronic or mag particle)

Also check to see that all drill collar connections have been mag particle inspected and that all bottom hole assemblies have been magnafluxed prior to delivery. Note condition on Tour Sheet. Ensure that 7" casing is on location and in position to run. Ensure all casing accessories, wellhead equipment, and circulating head are on hand.

6. RIH with 9 7/8" bit and drill with mud to ±250'-400, depending on geology. Remove thread protectors, clean threads, drift and measure casing while drilling surface hole. Measure KB height and log on Tour Sheet. After casing point has been selected, drill any additional hole that might be required so that casing can be landed within 1' of bottom, and still space out correctly on surface. Maintain hole as straight as possible while drilling. Take drift shots every 100-200'. Run maximum reading thermometer on each survey. Maximum angle at TD 4 degrees or less. Maximum rate of change 1 degree per 100'. Monitor and record flow line temperatures every hour. Catch 2 sets of formation samples every 10'.

7. Upon reaching desired depth, circulate and condition mud until shaker screen is clean and viscosity is less than 45 sec/qt. Make wiper trip. Check for fill. If hole is in good condition, circulate bottoms up, POOH, and laydown 9 7/8" drilling assembly. If tight hole was encountered on wiper

trip, then make another wiper trip. It may also be necessary to further condition mud.

8. Rig up and run 7" casing to TD, per attached casing program. Run in hole slowly to avoid breaking down formation and losing circulation. Circulate past any bridges encountered. Use proper makeup torque on casing, and geothermal casing dope on threads.

9. Once casing has been run to TD, circulate hole clean, while reciprocating casing, with at least two full circulations. Circulate until hole is clean, mud is in good shape, and viscosity is less than 45 sec/qt. Check bottoms up time to be sure mud is not channeling.

10. When mud is in good shape, cement casing as per attached cement program. Monitor and record cement data to assure adherence to cmt. program. Catch cement samples. If possible, reciprocate casing while pumping cement. Land casing approximately 1' off bottom. Center casing in rotary table.

11. WOC 8 hrs. (check samples to determine if additional time is req'd) Monitor cement in annulus. If it falls back, bring it back to surface with 1" pipe.

12. Land and cut off 7" casing. Weld on 7" x 300 SR Starter flange. Test between welds. Check with level to be sure flange is on correctly. Callout surveyors to survey casing head location.

13. Make sure that BOP equipment has been inspected by the manufacturer or an authorized agent prior to arrival and that all equipment is proper and in good shape on delivery. Nipple up BOP equipment per attachment. Test 7" casing and BOP equipment to 500 psi with BLM representative present to witness. Log test data and request BLM witness to sign name and successful test completion on Tour Sheet.

14. Trip in hole with 6 1/4" mill tooth bit and tag cement. Log top of cement on Tour Sheet. Drill out baffle plate, cement and float shoe from 7" csg with spud mud. Drill 10' of formation and then trip to pick up button bit or hammer/hammer bit. If the decision is made to air drill, run float in bit sub and unload mud out of hole with air on the trip back in. If the decision is made to drill with mud, then displace the spud mud out of the hole with the gel/water/polymer system when you reach bottom with bit. See attached mud system details.

15. Drill 6 1/4" hole with air, foam, or mud to 1500', or until producing formation is encountered. Test formations per engineer's direction, log per permit and engineer/geologist requirements. Operate BOP on each trip out of hole and log on Tour Sheet. Ensure accumulator is holding pressure.

16. Upon reaching TD, circulate hole clean, laydown drill string, ND BOPs, clean location and release rig.

17. Submit all reports as required by regulatory agencies.

Drilling Fluids Program

17 1/2" and 9 7/8 " surface hole, 0- ±250'-400'

Mud System: Gel, lime, water, LCM (Spud Mud)
Mix 15-20 Lb/Bbl bentonite in fresh water. Flocculate with lime.

Weight: As low as possible with mechanical solids control equipment

Viscosity: 45-55 sec/qt or as needed to clean hole

Water loss: No control

Total hardness: No control

pH: Mix lime through chemical barrel to maintain 9.5-10.5 pH

Comments: Lost circulation through this interval is possible. No formation pressures are anticipated. Keep plastic viscosity down and yield point up. Run solids control equipment continuously. Break circulation slowly and trip slowly. Use Desco to thin mud if necessary.

6 1/4" Hole, ±250'/400' - TD

Mud system: Polymer, gel, soda ash, Desco, high temp thinner. Drill out cement with Spud Mud and then dump Spud Mud. Build new system. Mud up in clean steel pits by mixing, with fresh water, 1/2 lb/bbl caustic soda and a ratio of 8 bentonite to 1 Drispac regular. Mix bentonite first and then slowly add (30 min/sk) Drispac. (Substitute a high molecular weight anionic liquid polymer such as Magcobar Rapid Mud for Drispac if so desired)

Weight: As low as practical with water and mechanical solids control equipment.

Viscosity: 38-45 sec/qt with bentonite and Drispac (8:1 ratio of bentonite:Drispac) Stay on this ratio to maintain viscosity after Mud-up.

Water Loss: No control

Total Hardness: Below 300 ppm with soda ash.

pH: 9.5-10.5

Rheology: Control flow properties at reasonable levels with Desco thinner. If downhole temperatures increase to where Desco is not effective, then use high temp thinner

Torque, Drag, Hole Stability, and high temp lubricant: Add 2 ppb Soltex additive as necesary.

Lost Circulation (surface to TD): Methods to be used as follows:
1. Lost circulation materials such as nut plug, cotton seed hulls, saw dust, medium Kwik-Seal, etc.
2. Gunk Squeezes
3. Cement
4. Lighter-than-water drilling fluids

Abnormal Presure: Weight material (barite) should be on location at all times.

Corrosion: Add corrosion inhibitors such as oxygen scavengers or scaling amines to control corrosion.

Stable Foam Make-up:
Mix 1/2 - 2 ppb Drispac in water
1-2 ppb soda ash
5-10% foamer <u>just before use</u> (use alpha olefin sulfonate for high temp foamer)
Air-Mud ratio required = 100:1 to 300:1

Special considerations:
1. Drilling recorder to monitor rate of penetration
2. Catch drill cutting samples (2 sets) every 10', cleaned, sacked, and labeled in accordance with geologist direction. Collect samples every 5' on conductor.
3. All lost circulation zones encountered shall be recorded in Tour book, recording both the depth at which the loss occurred, as well as amount and rate of fluid lost.
4. In and Out temperatures, both mud and air, shall be recorded in Tour book every hour.
5. Temperatures should be taken with every directional survey by running a maximum registering thermometer in the survey instrument.

Casing Program

Conductor casing: ±40-120' 13 3/8" 61 ppf J-55 BT&C in 17 1/2" hole
Optional: ±40-120' 12" OD X .375" wall ASTM A53 gr B, seamless or ERW pipe, w/butt weld ends, in 17 1/2" hole.

Surface Casing: ±250'-400' x 7" J-55 20 ppf ST&C Range 2 Casing

Torque: 3200 ft-lbs

Drift ID: 6.331"

Strength ratings:
- Yield - 2992 psi
- Collapse - 1816 psi
- Tension - 187,200 lb

Accessories:

Float equipment: flapper type conventional float shoe on bottom of string and baffle plate installed one jt up from bottom

Centralizers: 2 centralizers installed in the middle of the bottom 2 jts (7" x 9 7/8" bow type)

Wellhead equipment: 7" x 300 SR SOW starter flange for wellhead. 300 SR gate valve for master valve.

Notes:

- Tack weld shoe, also top and bottom of couplings on bottom three jts
- Lower casing in hole slowly to avoid formation breakdown and lost circ.
- Use geothermal grade thread dope on casing threads

Cementing program

±250'-400 x 9 7/8" hole x 7" casing surface job

Slurry description: API Class "G" or "H" cement mixed with 5.0 gal/sk water

Requires: .2301 sk/linear ft in 9 7/8" annulus

Slurry wt: 15.8 lbs/gal or 118 lbs/cu. ft.

Yield: 1.15 cu.ft./sk

Water requirement: 5.0 gal/sk or 0.67 cu.ft./sk

Pump time: 1-2 hrs

24 compressive strength: 2915 psi

7" J-55 20 ppf ST&C casing displacement= .0404 bbl/linear ft or .2273 cu.ft./linear ft.

Note: calculate cement job with 100% excess in open hole; 50% in cased hole is OK.

H2S Safety

The H2S safety company will be called out to perform certification training, install and maintain properly operating H2S monitors, and provide on-location advice and expertise regarding safety related items. The monitors will be rigged up prior to spudding the hole, and the safety man will be available on location no later than drilling out the production casing.

In all matters of safety, the H2S safety man has the FINAL WORD on procedures. NO DRILLING OPERATIONS SHALL BE CONDUCTED CONTRARY TO THE H2S SAFETY MAN'S DIRECTION. NO EXCEPTIONS.

H2S monitors will be installed at the following locations:

1. Mud return line
2. Vicinity of floor
3. Vicinity of wellhead/BOP's
4. Additional locations per Safety Man direction, MEI/contractor recommendations.

Windsocks will be installed as to be visible from various areas of location. An H2S warning sign (with green/yellow/red warning flags) is to be installed on the access road, and the appropriate flag will be displayed, depending on current operations. Two different briefing areas will be established, to allow safe briefing in any wind condition. Emergency breathing equipment (5 min. and working-size Scott Air Packs; workline hose; high-pressure air bottles in safety trailer, etc.) will be available.

Prior to spud, all rig personnel shall successfully complete an H2S training/certification course presented by the safety man. This will include Air Pack use, operation and location of H2S monitors around the rig, location and use of briefing areas, and general information regarding safety. Throughout drilling operations, rig personnel will have procedural update briefings, safety meetings, etc., as needed.

H2S ALARM PROCEDURE
POST PROMINENTLY IN DOGHOUSE

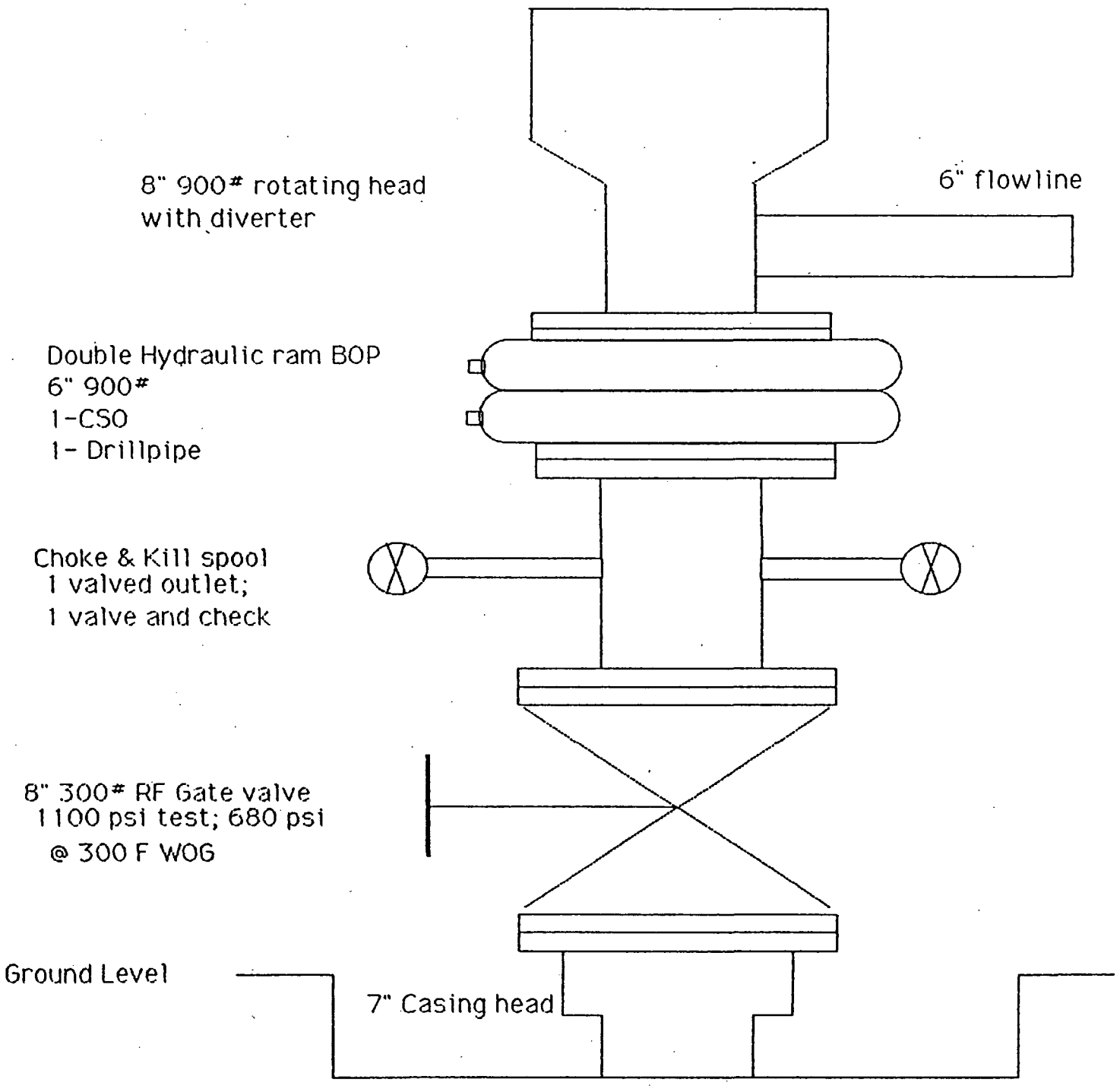
IN CASE OF H2S ALARM:

1. MASK UP WITH ESCAPE UNIT

2. GO IMMEDIATELY TO THE UPWIND BRIEFING AREA

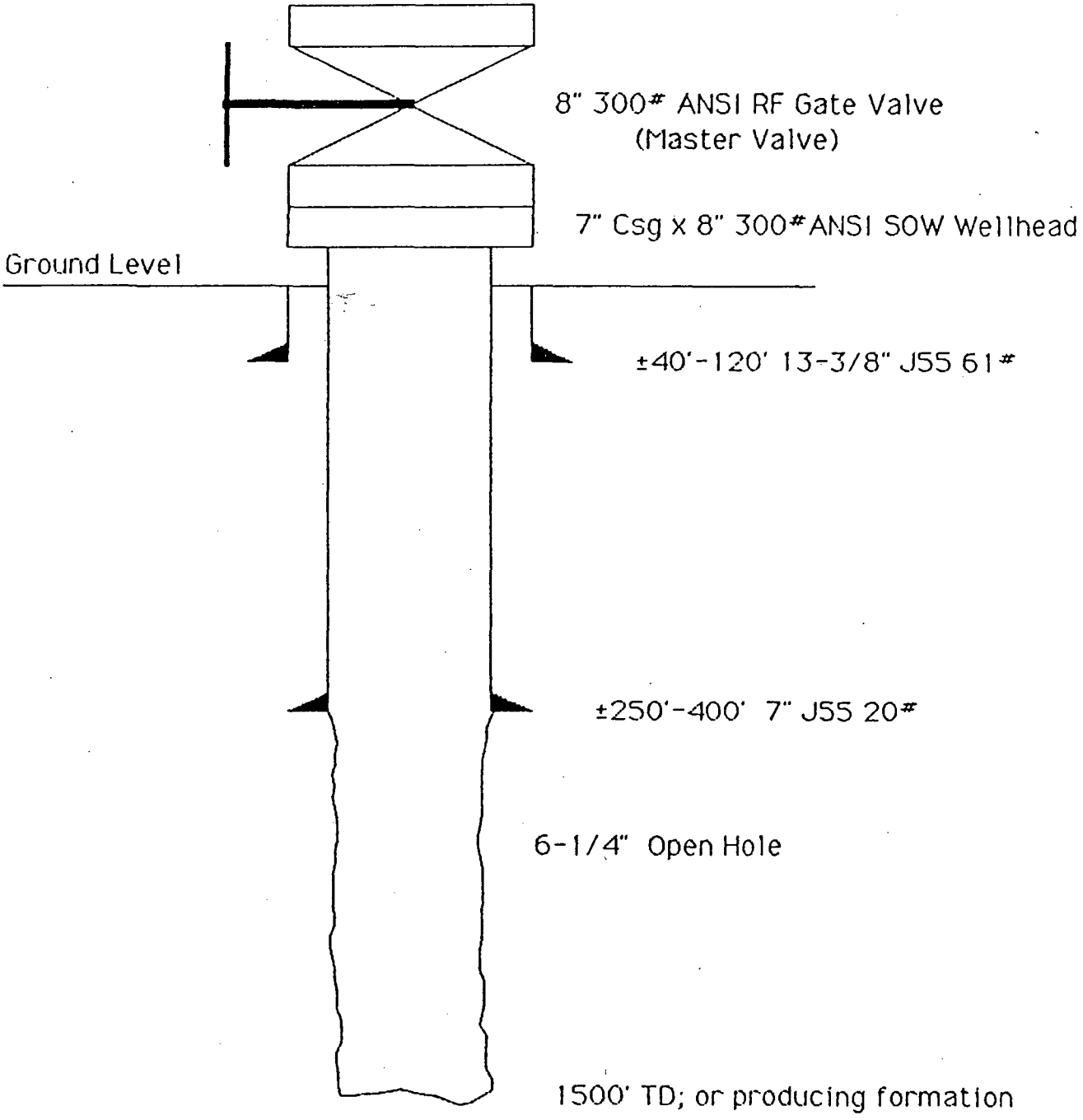
NO EXCEPTIONS UNLESS DIRECTED BY H2S SAFETY MAN ON LOCATION

Blowout Preventer Details; 7" casing



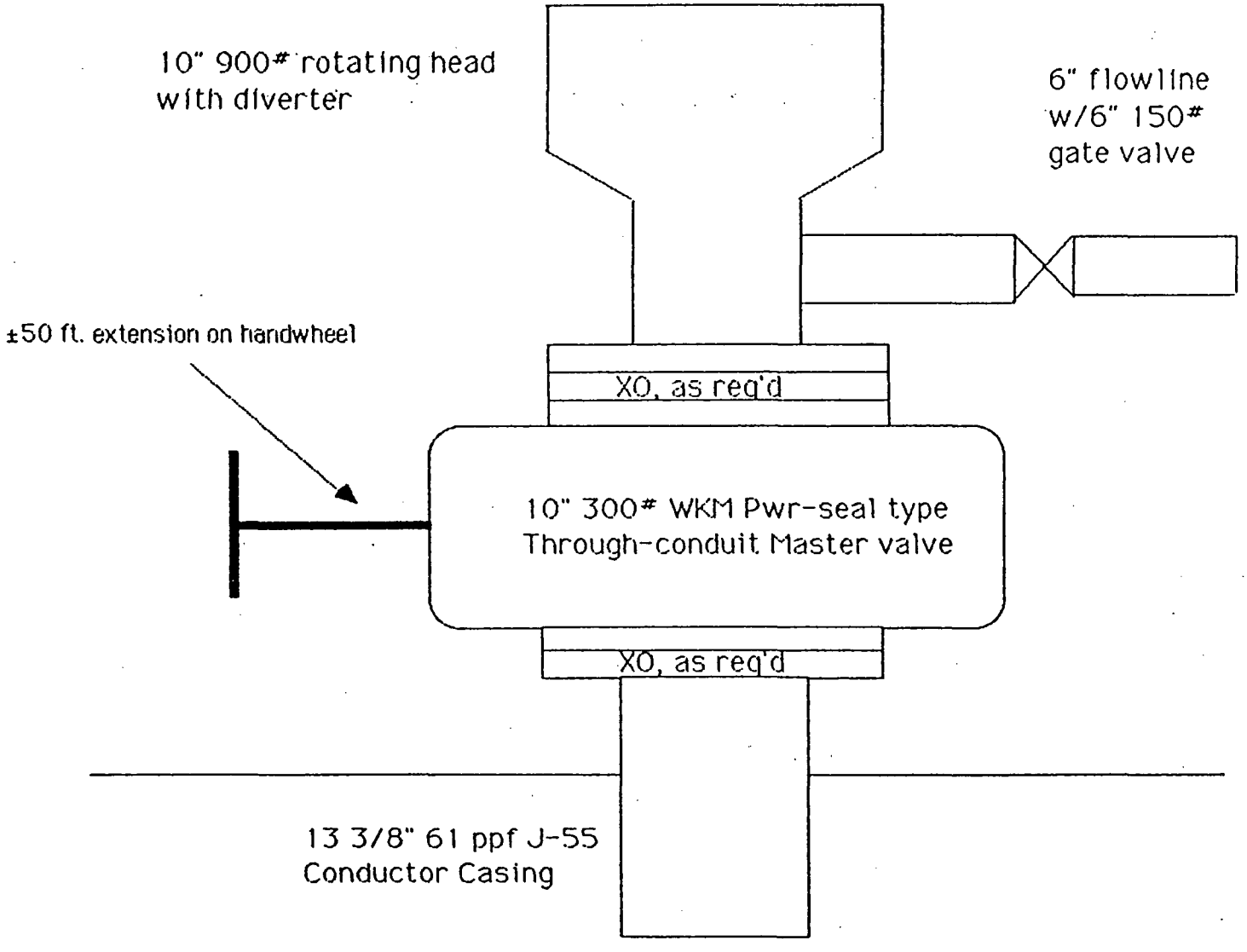
JCH 9/88

Slim Hole Completion Details



Not to Scale

Blowout Preventer Details; 13 3/8" casing (optional, as req'd on slim hole program)



JCH 10/5/88

Appendix C

LITHOLOGIC LOG OF MEI WELL S-89-1

Prepared for
Mother Earth Industries, Inc.
7350 E. Evans Road, Suite B
Scottsdale, Arizona 85260

By
Joseph N. Moore
Salt Lake City, Utah

June, 1989

This report describes the hydrothermal alteration and lithologies encountered in MEI well S-89-1. The well was sampled to a depth of 1030 feet.

Lithologic Relationships

The lithologies encountered in S-89-1 are illustrated in the attached log. The rocks sampled in the upper 120 feet of the well consist of variably altered alluvium. Samples collected between 30 and 50 feet, consist of unsorted and unaltered alluvium. In contrast, the alluvium penetrated between 50 and 120 feet is characterized by intense acid alteration. Fragments of Three Creeks Tuff, flow banded rhyolite, andesite lava flows, and an altered rhyolitic ash-flow tuff are present in the alluvium.

The alluvium is underlain by highly altered ash-flows of the Three Creeks Tuff. This ash-flow tuff is characterized by approximately 50% phenocrysts of quartz, biotite, potassium feldspar, plagioclase, and hornblende. The presence of quartz phenocrysts, which commonly are dipyramidal in form and biotite crystals up to several millimeters across are diagnostic of the Three Creeks Tuff and serve to distinguish it from the underlying ash-flow tuffs even where it is highly altered. In thin section, the quartz phenocrysts are characteristically embayed.

The matrix of the Three Creeks Tuff in S-89-1 varies from light to medium gray depending on the degree of alteration of the matrix and phenocrysts. Thin section observations described below show that the ash-flow tuffs range from moderately to intensely altered.

The Three Creeks Tuff in S-89-1 appears to rest unconformably on the Wales Canyon Tuff. This contact was encountered at a depth of 640 feet. The Wales Canyon Tuff is distinguished from the overlying ash-flows by its finer grain size, lack of abundant quartz phenocrysts, and the common occurrence of lithic fragments. The Wales Canyon Tuff consists of approximately 40% phenocrysts,

mainly of plagioclase, biotite and hornblende(?) in a matrix of altered ash and shards. The matrix of the Wales Canyon Tuff ranges from light to medium gray as a result of intense hydrothermal alteration.

The rocks encountered below 860 feet consist of white, vitreous quartzite that has tentatively been assigned to the Coconino Sandstone. Thin sections show that the Coconino is composed dominantly of quartz with well developed quartz overgrowths. Minor sericite and carbonate cement are present in some chips. Samples from 900-910 feet appear to have been brecciated and rehealed with quartz.

Hydrothermal Alteration

The alteration of the rocks encountered in S-89-1 ranges from moderate to strong. In order to better characterize the type and distribution of the alteration minerals, thirteen thin sections were studied. The locations of the thin sections is shown on the lithologic log, and a brief description of each is included as Appendix 1.

The upper 120 feet of S-89-1 is characterized by intense acid leaching of the alluvium. Some of these intensely altered rocks, which appear to have sluffed from shallower depths, are contained in the thin section from 150-160 feet. These chips contain alunite, kaolin, and anhydrite. Minor disseminated pyrite is present below 90 feet.

Below 120 feet, the rocks are argillically altered. The secondary minerals occurring within the altered ash-flow tuffs include quartz, clays (fine-grained weakly birefringent minerals; probably smectite), sericite (mixed-layer clays and illite), calcite, and pyrite.

Quartz, clays, sericite, and calcite occur as alteration products of both the matrix of the ash-flow tuffs and of the phenocrysts. The alteration of the matrix is often less intense

than the phenocrysts it contains. Thin section observations suggest that clays are more abundant in the Three Creeks Tuff whereas sericite is more common in the underlying Wales Canyon Tuff. The presence of primary devitrification textures throughout the well indicates that these minerals are an alteration product of potassium feldspar and cristobalite formed during devitrification of the ash and shards rather than representing an alteration of a glassy matrix. In general, calcite replacement of the matrix appears to be closely associated with calcite veins.

Plagioclase phenocrysts throughout the well are altered to mixtures of clays, sericite, and calcite. In most samples, more than 75% of the feldspar phenocrysts have been altered. Fine-grained smectite is well developed in plagioclase phenocrysts in the Three Creeks Tuff, particularly in thin sections from 340 and 540 feet. Sericite is abundant in the plagioclase phenocrysts in the Wales Canyon Tuff. Biotite phenocrysts have been moderately to strongly altered to sericite, quartz, clays, opaques (pyrite and magnetite), and sphene.

Although hornblende is a common mineral in both the Three Creeks and Wales Canyon Tuffs, unaltered hornblende was not observed in any of the thin sections studied. The morphology of the altered phenocrysts suggests that the hornblende has been completely replaced by calcite and sericite.

Pyrite is widespread throughout the well, occurring in at least trace amounts in nearly every sample. The pyrite occurs as disseminated crystals, fine-grained aggregates, and in veins where it is commonly associated with calcite. In places, it appears to occur as an alteration product of biotite. No other sulphide minerals were observed.

Calcite is the dominant vein mineral occurring in the well. Less commonly, quartz veins containing pyrite, sericite, and minor calcite are present. Where crosscutting relationships can be observed, carbonate veins are always younger than the quartz veins.

Fragments of quartz veins from 640 feet display concentric growth zones that suggest the mineral originally precipitated in the vein was chalcedony. According to Fournier (1985), the deposition of chalcedony instead of quartz would limit the maximum temperature of vein deposition to about 180°C. Such moderate temperatures are consistent with the hydrothermal mineral assemblages found in the rocks penetrated by S-89-1. In contrast, minerals such as potassium feldspar and epidote, which characterize geothermal systems where temperatures exceed 200°C, have not been found in these rocks.

Structural Relationships

Although there is little direct evidence in the form of breccias and gouge zones indicating that S-89-1 crossed any major fault zones, the widespread and intense alteration demonstrate that the well was drilled into a significant fracture zone. Comparison with the downhole geology of the adjacent wells indicates that S-89-1 is located in the same fault block as S-88-3. In S-88-3, the sedimentary basement was encountered at a depth of 800 feet. In contrast, S-89-4 penetrated the basement rocks at approximately 600 feet. Thus, S-89-1 is located in a downthrown block relative to S-89-4. The locations of these wells suggests that the fault that bounds these blocks trends in an easterly direction. This orientation would be subparallel to the fault located adjacent to wells 24-7 and 87-3.

Summary

Well S-89-1 was drilled adjacent to a major fault zone that separates structural blocks containing S-89-1, S-88-3, and P-88-2 from S-89-4. The most likely orientation along this structure is easterly, with movement down to the north.

Hydrothermal alteration of the volcanic and sedimentary basement rocks in S-89-1 is characterized by quartz, pyrite, calcite, and sericite. The presence of these minerals is

consistent with both the present temperatures and the secondary minerals occurring in the overlying, recent alluvial deposits. Significantly, no alteration assemblages typical of higher temperature regimes (greater than about 200°) have been found in this well. These relationships suggest that the alteration assemblages encountered in S-89-1 could have been produced by the present thermal system when the water table was at shallower depths. In addition, petrographic examination of the rocks in S-89-1 provide further support for the observation made by Huttrer (personal communication, 1989) that pyrite, in particular, is closely associated with strong fracturing and steam-bearing zones within the reservoir sandstones. Thus, the presence of pyrite in the sandstones could be useful for assessing the potential of sandstones in less well known portions of the geothermal system.

References

Fournier, R. O., 1985, The behavior of silica in hydrothermal systems: Reviews in Economic Geology, v. 2, pa. 45-61.

APPENDIX 1

Thin Section Descriptions

150-160 feet: Sluffed alluvium

This sample contains abundant chips of Three Creeks Tuff, granodiorite, andesite lava flows, dacite lava flows, flow-banded rhyolite, rhyolitic ash-flow tuffs, and cement. Alteration of the fragments is generally weak, although chips composed entirely of alunite and ash-flow tuff fragments containing abundant kaolin, disseminated pyrite, hematite, and fine-grained quartz are present. A small percentage of the fragments are cut by calcite veins.

180-190 feet: Three Creeks Tuff

Chips of moderately to intensely altered Three Creeks Tuff, quartz grains cemented by mud, cement, andesite lava flows. Biotite and feldspar in the Three Creeks Tuff are partially to completely altered to sericite, and calcite. Hornblende(?) is altered to calcite. The matrix of the ash-flow tuff shows minor alteration to quartz and clays. Minor disseminated pyrite is present. Veins consist of calcite and calcite + pyrite. One fragment of anhydrite cut by a calcite + pyrite vein was observed.

240-250 feet: Three Creeks Tuff

The sample consists of moderately to strongly altered Three Creeks Tuff. The ash-flow tuff contains spherulitic devitrification textures indicating that it was densely welded. Approximately 50% of the ash and shard matrix of the ash-flow tuffs is altered to quartz, clays, sericite, and calcite. Biotite is strongly altered to sericite and opaques, feldspar is altered to sericite and calcite. All hornblende has been altered to calcite. Disseminated pyrite is common. Veins of calcite + pyrite and quartz + sericite are present. Crosscutting relationships indicate

that the quartz veins predate the carbonate veins.

340-350: Three Creeks Tuff

Intensely altered Three Creeks Tuff as above. Alteration products are similar to those found in chips from 240-250 feet, although calcite is less abundant in the matrix. Biotite phenocrysts are variably altered to sericite, quartz, and pyrite. Pyrite is common as disseminated crystals, veins, and as an alteration product of biotite. Veins of calcite + pyrite and quartz + sericite + pyrite are present with the calcite veins being the most recent.

440-450 feet: Three Creeks Tuff

Strongly altered Three Creeks Tuff as above. Pyrite is common as disseminated grains and in veins. Veins of calcite + pyrite are present.

540-550: Three Creeks Tuff

Intensely altered Three Creeks Tuff as above. Approximately half of the biotite has been altered to coarse sphene, calcite, and sericite. The sphene appears to be partially replaced by calcite. Pyrite is minor constituent of the chips, occurring as disseminated grains. Veins of calcite are present.

580-590: Three Creeks Tuff

Intensely altered Three Creeks Tuff as above. Plagioclase phenocrysts are replaced by smectite and in places minor sphene is present. Minor disseminated pyrite and calcite occur in the matrix of the ash-flow tuff.

640-650: Wales Canyon Tuff

The chips in this sample consist of intensely altered Wales Canyon Tuff. Most of the biotite phenocrysts are altered to sericite and opaque minerals whereas the feldspars are altered to

calcite and sericite. Pyrite occurs as disseminated grains in the matrix, as veins, and as a replacement of biotite. The matrix is strongly altered to quartz and sericite. Quartz veins containing concentric growth zones and open-space fillings of calcite are present.

740-750: Wales Canyon Tuff

Intensely altered Wales Canyon Tuff as above. The sericite, in places is coarse-grained. More than 75% of the feldspars are altered to calcite and sericite. The biotite appears relatively fresh. Veins of pyrite + calcite, calcite, and calcite + quartz are present.

800-810: Wales Canyon Tuff

Intensely altered Wales Canyon Tuff as above. The veins present in this sample consist of calcite and sericite + pyrite. Crosscutting relationships indicate that the calcite veins postdate the sericite veins.

850-860: Wales Canyon Tuff/Coconino Sandstone

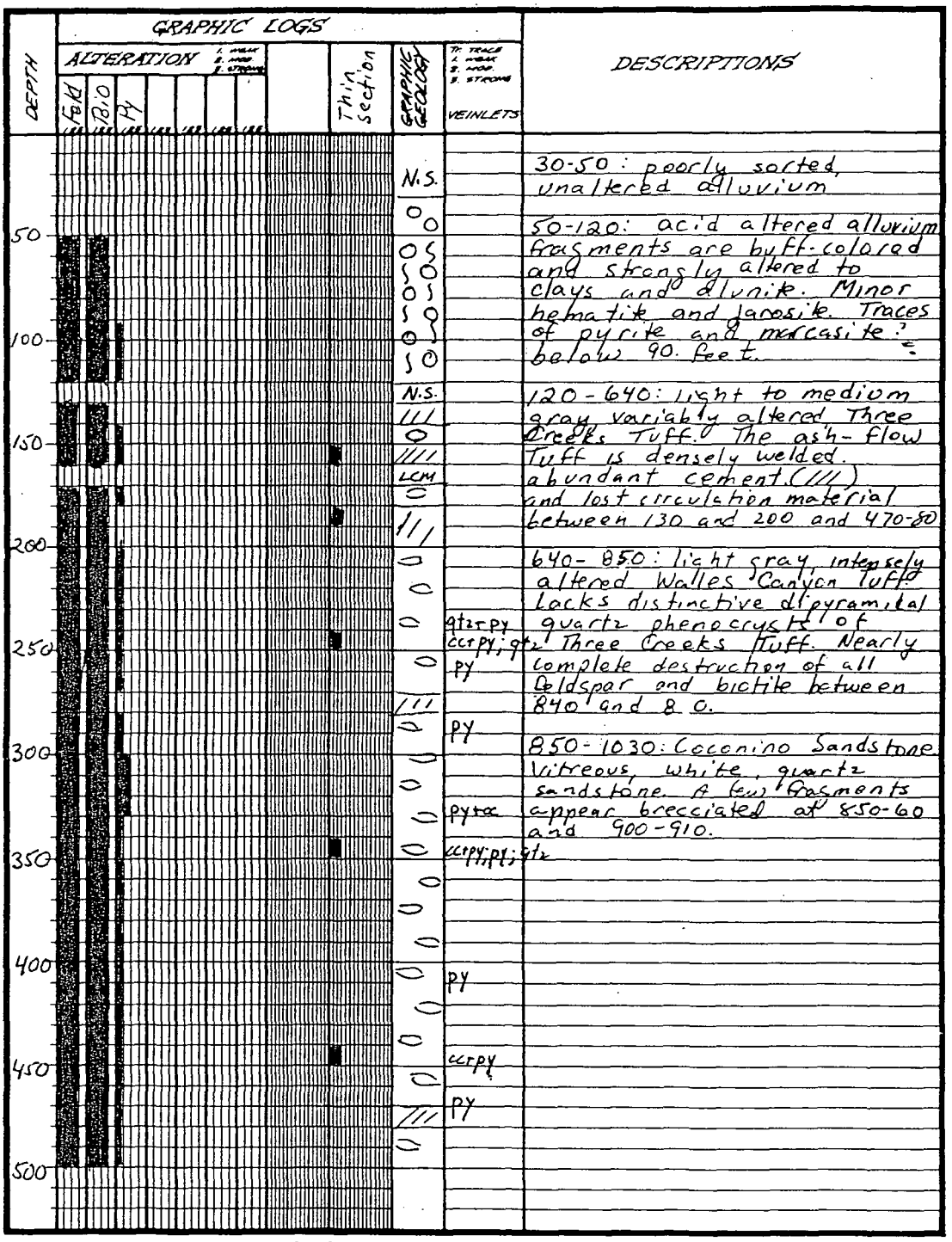
This sample consists of intensely altered Wales Canyon Tuff similar to that described above, chips of Coconino Sandstone and of rare limestone. Some of the chips consist of sandstone breccia cemented with quartz, calcite, and sericite. These chips may represent an altered soil developed on the sedimentary basement. Veins of quartz + pyrite, calcite + quartz, and calcite + pyrite are present.

900-910: Coconino Sandstone

The chips consist of brecciated, silicified and pyritized sandstone.

1000-1010: Coconino Sandstone

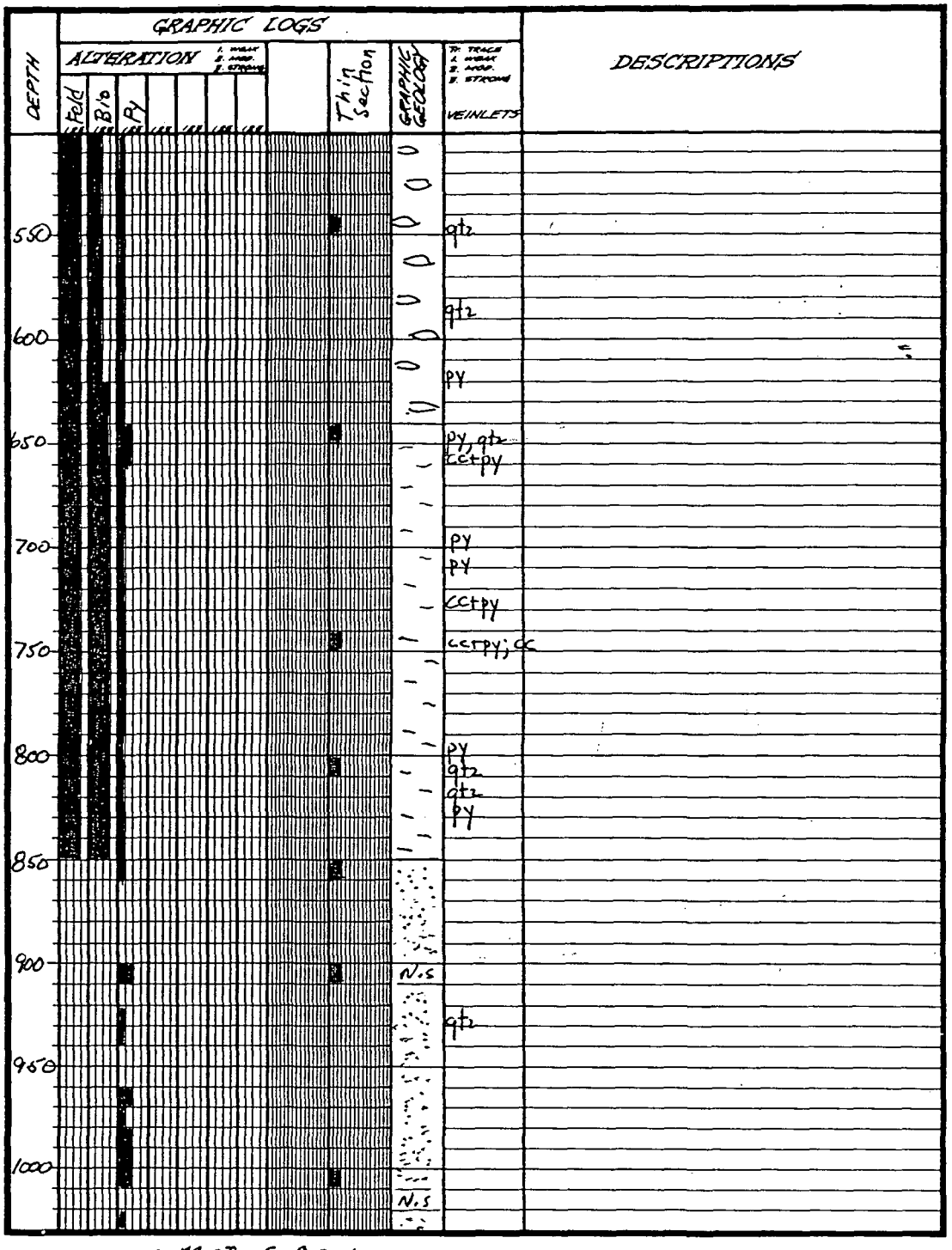
The chips are composed of fine-grained quartz sandstone, cemented primarily by quartz overgrowths. Minor sericite and carbonate cement are present. Veins of quartz + pyrite and calcite occur in the chips.



DRILL HOLE MEI S-89-1

LOCATION Sulphurdale

LOGGED BY JNM



DRILL HOLE MEI-S-89-1

LOCATION Sulphurdale

LOGGED BY JNM

Appendix D

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Robert L. Morgan
State Engineer

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

1636 West North Temple, Suite 220
Salt Lake City, Utah 84116-3156
801-538-7240

April 14, 1989

Mr. Jay C. Hauth, Operations Manager
Mother Earth Industries, Inc.
3761 South 700 East, Suite 200
Salt Lake City, UT 84106

RE: Request to Drill Slim Holes S89-1 through S89-7
Expiration Date: October 14, 1989

Dear Mr. Hauth:

Reference is made to your request of April 5, 1989, to drill seven "slim hole" geothermal wells as part of MEI's continued field development program at the Cove Fort/Sulfurdale KGRA. The location of the wells is to be:

S89-1 South 3211 feet and East 609 feet from the NW Corner of Section 7, T26S, R6W, SLB&M;

S89-2 South 2853 feet and East 578 feet from the NW Corner of Section 7, T26S, R6W, SLB&M;

S89-3 South 3597 feet and East 1108 feet from the NW Corner of Section 7, T26S, R6W, SLB&M;

S89-4 South 3456 feet and East 354 feet from the NW Corner of Section 7, T26S, R6W, SLB&M;

S89-5 South 3684 feet and West 225 feet from the NE Corner of Section 12, T26S, R7W, SLB&M;

S89-6 South 3369 feet and West 465 feet from the NE Corner of Section 12, T26S, R7W, SLB&M;

S89-7 South 3129 feet and West 915 feet from the NE Corner of Section 12, T26S, R7W, SLB&M.

By this letter you are hereby granted permission to drill, subject to the following conditions:

1. Your request is approved as a test well application only. If, at a later date, it is desired to bring the well to production, it will be necessary to obtain the State Engineer's approval on the appropriate water right application(s) at or previous to that time.

2. The driller must be bonded and have a current well driller's permit from the Division of Water Rights. A federal bond covering the well will satisfy the bonding requirement.

3. These wells may be drilled to a maximum of 1500 feet. The applicant must obtain written permission from the State Engineer prior to drilling to a depth significantly beyond 1500 feet, i.e., to a depth requiring changes or additions to the Plan of Operations submitted to the State Engineer, or posing a threat to the safety of personnel rig equipment and/or the structural integrity of the well.

4. The applicant must notify the Division of Water Rights at least 24 hours prior to 1) the commencement of drilling, and 2) testing the BOP equipment and the surface casing, so that a representative may be on site for the inspections. The applicant must also notify the Division prior to testing the well for flow or resource characteristics so that a representative of the Division may observe the test.

5. The casing shall be installed according to the schedule in the plan of operations in the request to drill, summarized as follows:

   A. The conductor casing (13-3/8 inch) shall be installed to a depth of 40-120 feet and the annular space shall be cemented back solid to the surface.

   B. The surface casing (7 inch) shall be set to a depth of 250-400 feet and cemented back to the surface. Blow-out prevention equipment shall be installed and tested <u>before drilling further</u>.

   C. The well may be drilled open-hole below the surface casing.

   Any variances from the Plan of Operations must be approved by the State Engineer prior to their implementation.

6. The BOP Equipment and the surface casing shall be pressure tested in accordance with federal regulations as contained in Federal GRO Order No. 2. The applicant shall notify the Division prior to the test so that a representative of the Division may witness the test.

7. Mud return temperatures shall be monitored and recorded at least with the addition of each new drill pipe, or 30 feet, whichever is less. If the return temperatures reach 125 degrees Fahrenheit before the surface casing has been set, drilling shall cease immediately until casing has been set and/or BOP equipment has been installed and successfully tested.

8. The driller shall take all necessary precautions to prevent fires, blow-outs, or others hazards and to conduct all activities in a safe and workmanlike manner. The driller shall be prepared with proper equipment and drilling techniques to handle either artesian or thermal pressure, or both, particularly in the bedrock layers which apparently form the reservoir matrix. The driller shall utilize such equipment as is necessary to contain the well at any stage, whether above or within the bedrock layer. Appropriate H2S warning devices shall be utilized during all drilling and testing operations, and personnel shall be instructed in proper emergency procedures and the use of emergency equipment.

9. The applicant shall provide for proper and safe disposal of any geothermal fluids produced during the drilling or testing of the well. Plans for disposal pits or other facilities must be approved by the State Engineer prior to the commencement of testing. No more water may be diverted from any of the wells than is necessary to conduct the tests associated with drilling. Any extended flow test to determine the production capabilities of the well must be approved in writing by the State Engineer prior to the commencement of testing.

10. In case of any emergency, the applicant shall immediately notify the Division at one of the numbers listed below:

	Work	Home
Gerald Stoker	(801) 586-4231	
John Solum	(801) 538-7406	(801) 546-1979
Kent Jones	(801) 538-7405	(801) 561-9901

It is the responsibility of the applicant to notify the Division.

11. The applicant shall submit to the Division all drilling reports and logs at the completion of drilling, and geologic data, chemical analyses, and test results at the completion of testing or earlier if the State Engineer determines that the information is necessary for immediate decisions regarding the management of the resource. This information will, at the request of the applicant, be held confidential until it is released by the applicant.

12. This approval is conditioned upon the proper easements and trespass agreements being obtained from Provo City, the fee hold of the land where the proposed well S89-3 will reside. A copy of such agreements shall be provided *the Division of Water Rights before the approval of* S89-3 is considered final.

This is permission for the licensed driller to begin drilling the geothermal test well. Note that the expiration date of this letter is October 14, 1989.

Please notify Gerald Stoker, the Area Engineer, at 586-4231 or John Solum, at 538-7406 prior to the commencement of drilling operations.

This is not permission for you to develop a final test well to be used for production purposes, but is only intended to develop sufficient information to determine if a likely geothermal resource is available in the area. It is the responsibility of the applicant to obtain proper water rights and other necessary permits.

Yours very truly,

Robert O. Morgan

For Kent Jones, P.E.
Directing Appropriations Engineer

KLJ:JS:rc

cc: Gerald W. Stoker
Jerry Bronicel
Delano Development Company

Appendix E

S89-1 Field Cost Est 5/25/89	
Based on 1000' hole,	
does not incl use of MEI D7, backhoe, etc.	
or MEI administrative costs	
Item	**$**
Rig Op. Cost (Grimshaw Drlg Inc)	
Mob/Rigup	3500
Construct pad	250
Drill 28" hole 15' @$56/ft	840
Set/cmt 20" conductor	500
Rigup mud system	500
Generator freight SLC	400
Drill 17-1/2" hole 120' @ $35//ft	4200
Run 13-3/8 conductor 120'	450
Cmt 13-3/8, WOC	1400
Drill 9-7/8 hole 120-400' @$20/ft	5600
Run 7" csg 400'	475
Cmt 7" csg, WOC	1600
NU BOP	1000
Test BOP	600
Drill 6-1/4" hole 400-500'@$12.50/ft	1250
Drill 6-1/4" hole 500-1000'@$15/ft	7500
Grimshaw Drilling Inc. Total:	30065
L&M Rentals	3901
Drilex rentals	1350
Compressor Rental (1/2 mo)	2400
Generator rental	700
Casing 20" 25'@$40	1000
Casing 13-3/8 120'@$25	3000
Casing 7" 400' @ $7	2800
Single shot, geolograph	112
Mud/chemicals	2906
Fuel, lubricants	2536
Cement (Carling)	568
Cement 13-3/8 (Dowell)	4603
Cement 7" (Dowell)	5537
H2S safety	3500
Geologist (GMC) 10 days+exp	4000
Wellhead equip	1630
Casing crew 7" string	811
MEI matls	1000
17-1/2 bit	1500
9-7/8 bit	200
Misc op supplies	46
Welding	500
Total:	**$74,665**

APPENDIX F

12

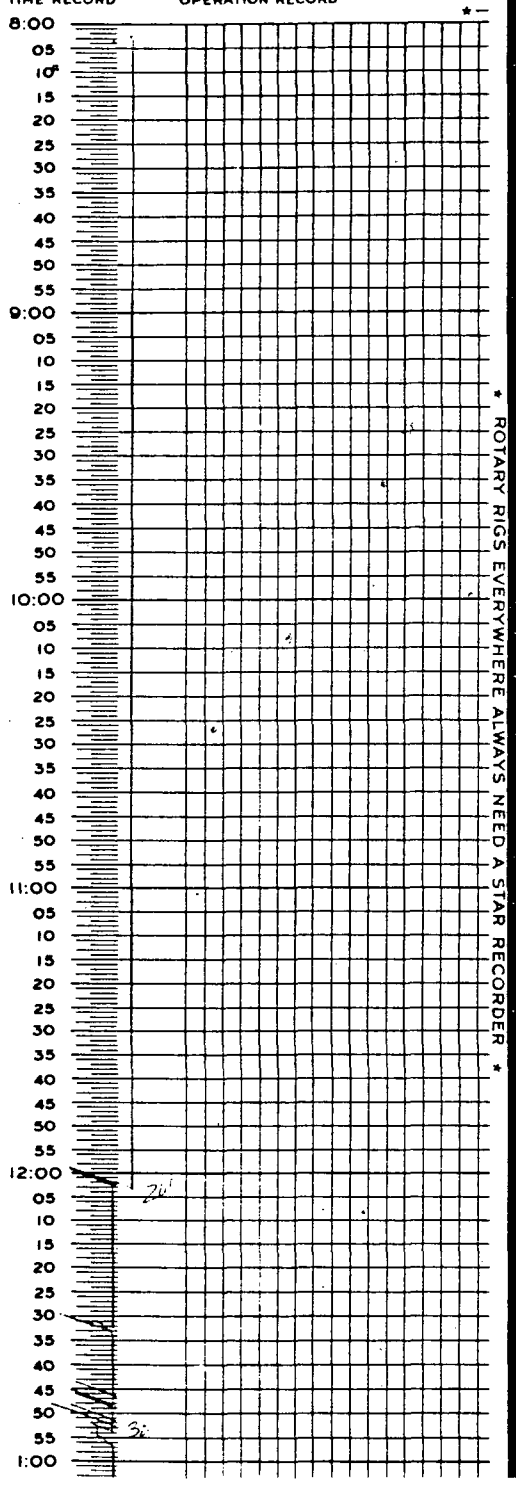
12 HOUR CHART — TIME ON

COMPANY MC1 — DATE

WELL S79-1 — WELL NUMBER S-79-1

TOTAL DEPTH ON 26' — TOTAL DEPTH OFF 76

REMARKS



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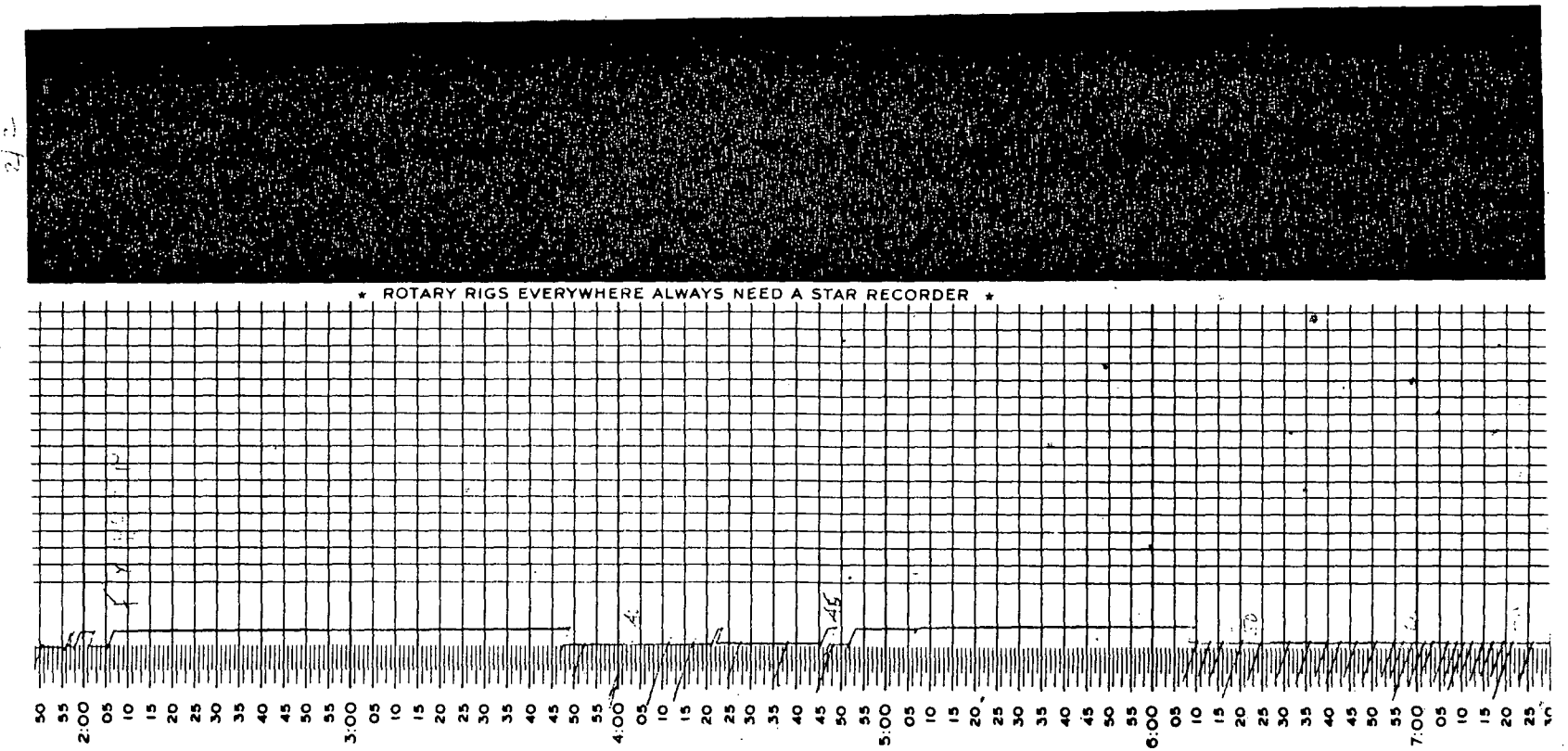
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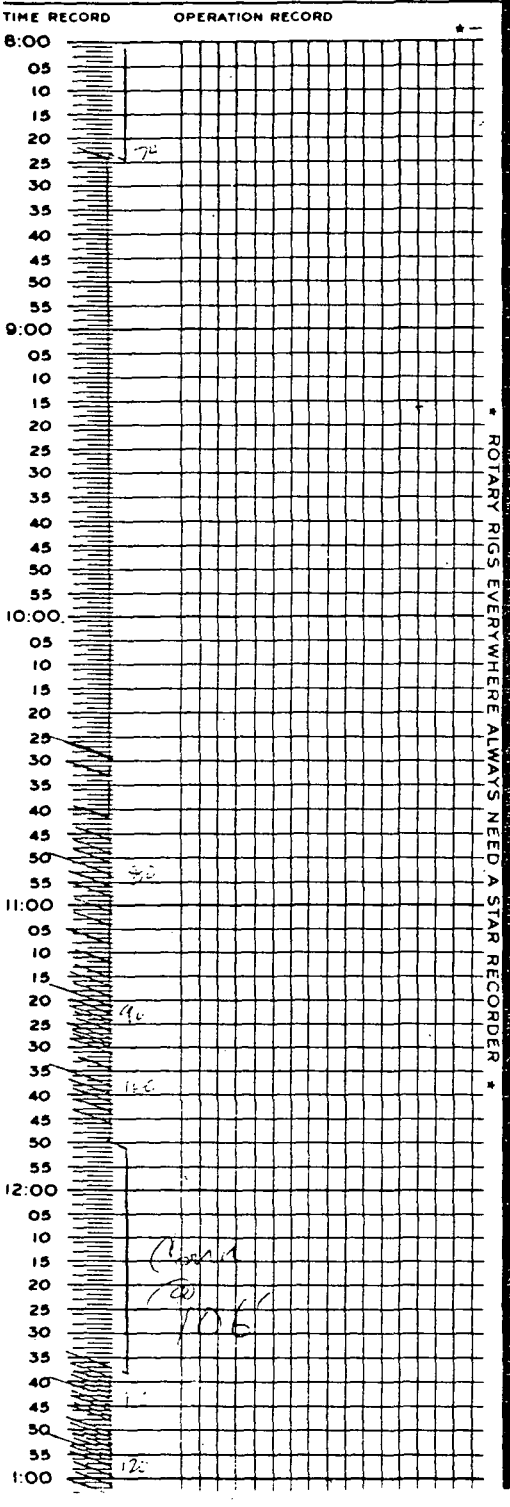
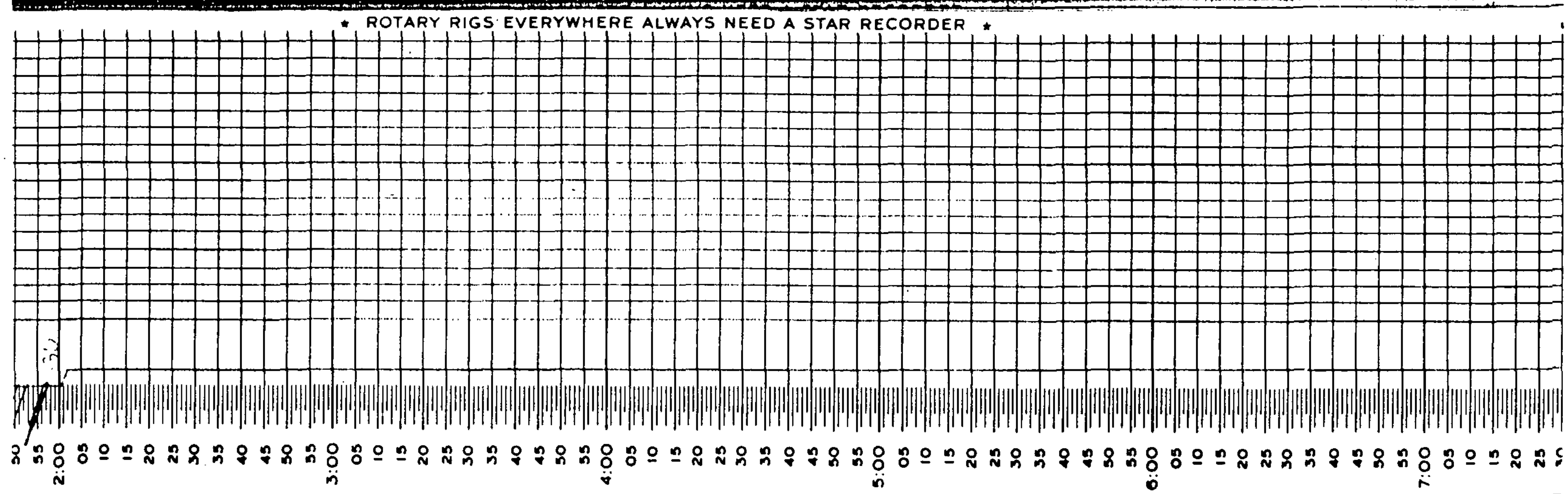
1/2

12 HOUR CHART
COMPANY UMC
WELL
TOTAL DEPTH ON 74
REMARKS

TIME ON 0800
DATE May 21-59
WELL NUMBER S89-1
TOTAL DEPTH OFF 136

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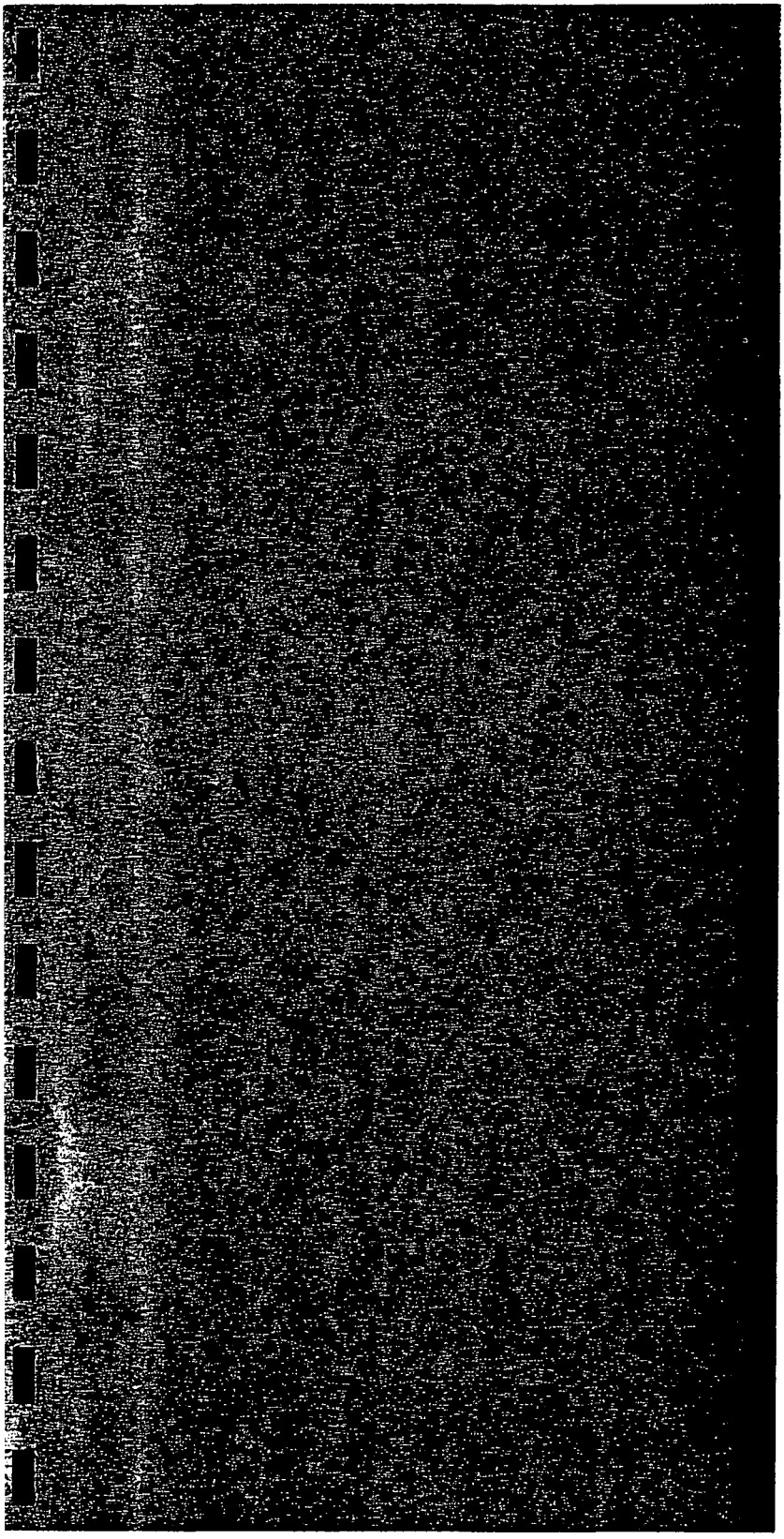

12 HOUR CHART — TIME ON 2400

COMPANY [illegible] — DATE 5 23 89

WELL [illegible] — WELL NUMBER

TOTAL DEPTH ON 12 6 — TOTAL DEPTH OFF

REMARKS

TIME RECORD	OPERATION RECORD
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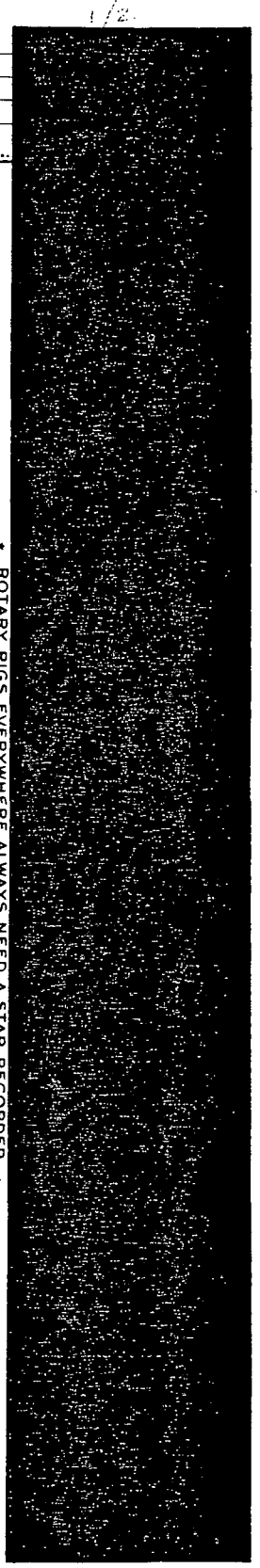
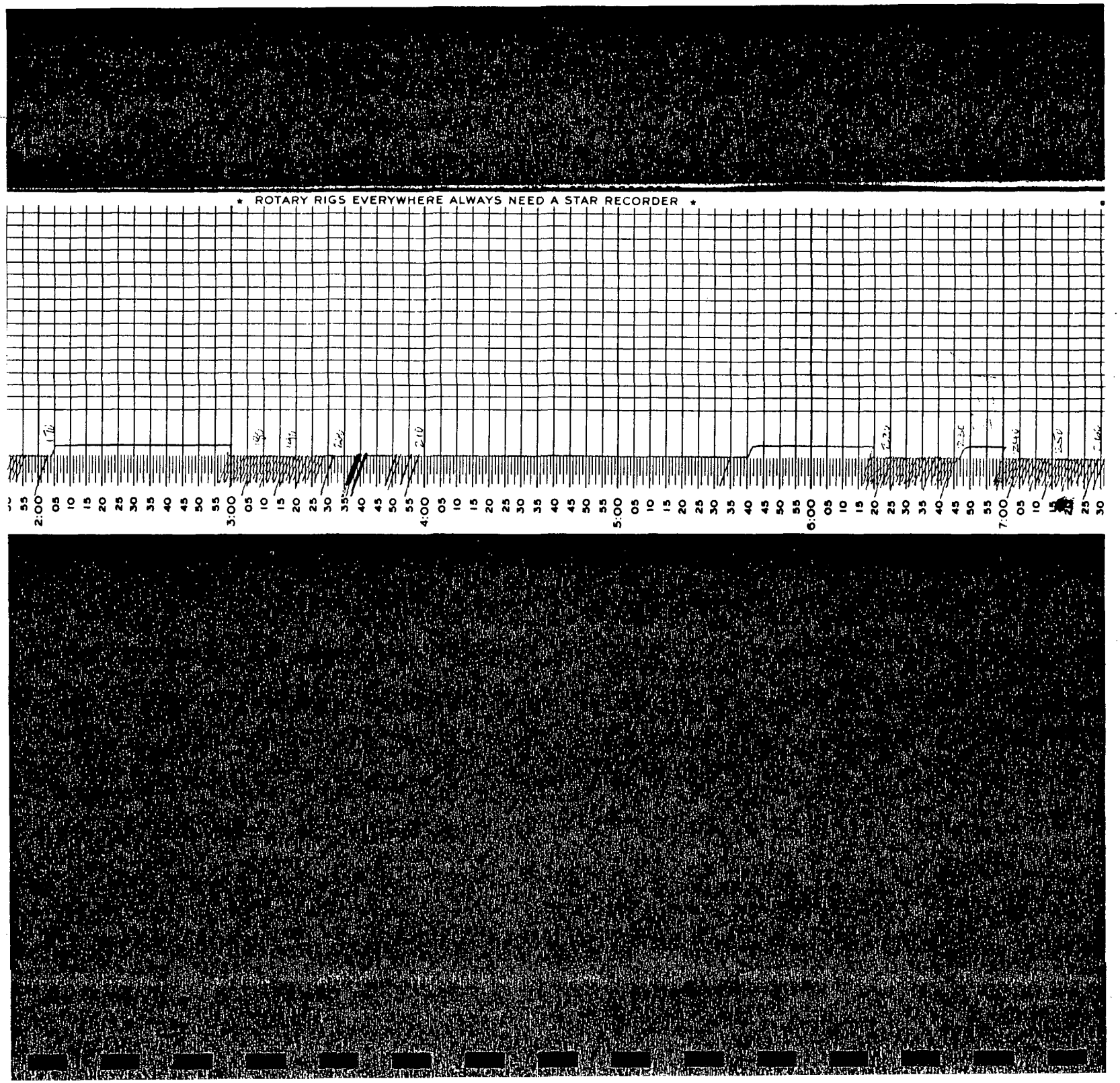
* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *

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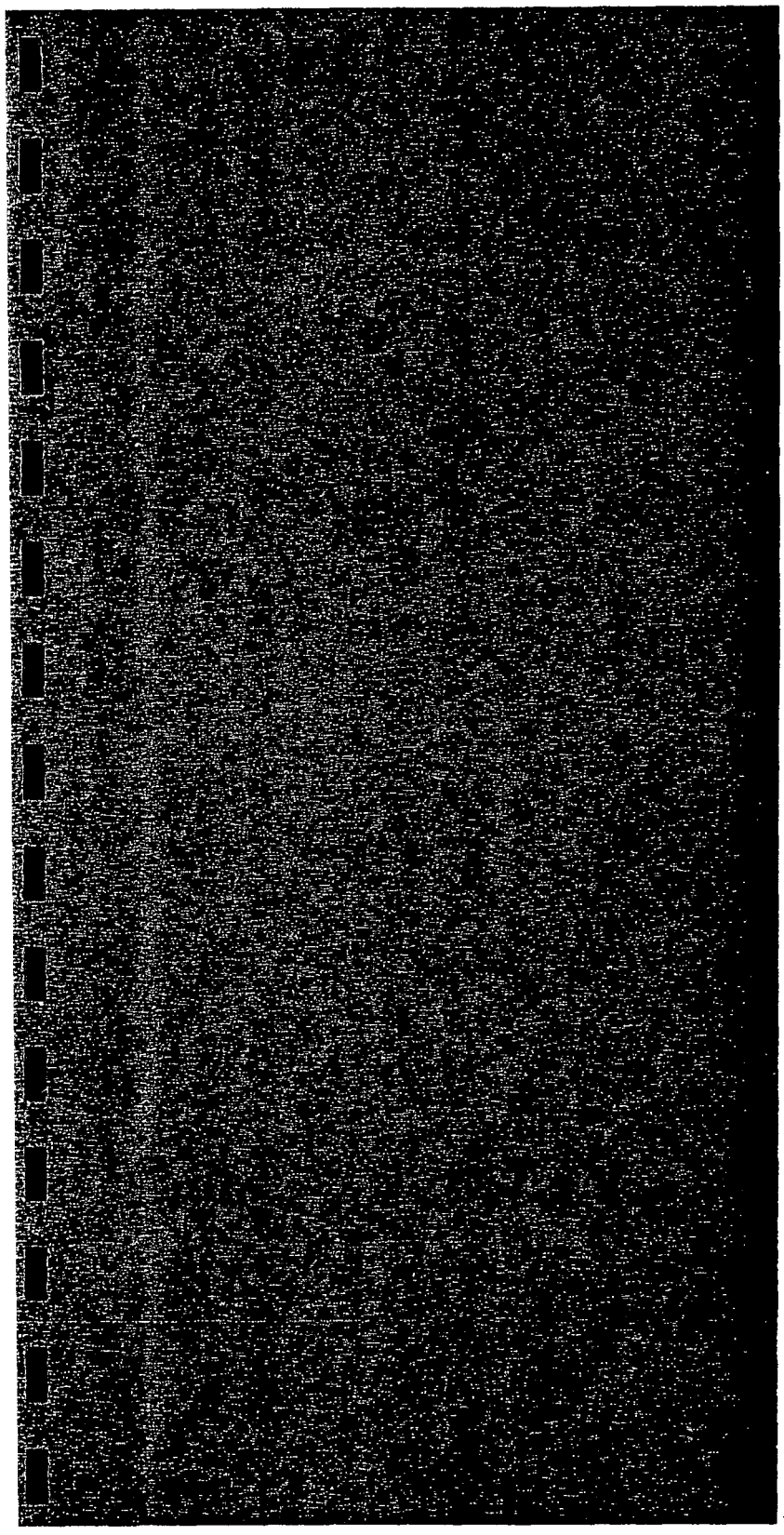


12 HOUR CHART TIME ON

COMPANY DATE

WELL WELL NUMBER

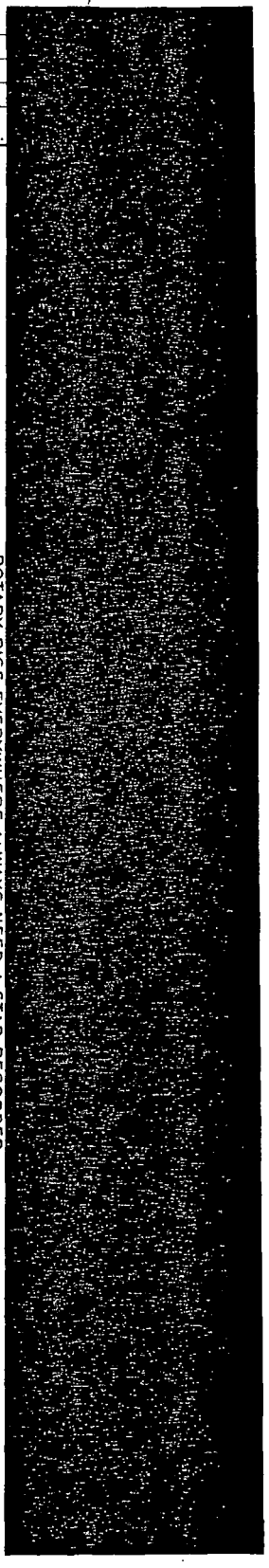
TOTAL DEPTH ON TOTAL DEPTH OFF

REMARKS

TIME RECORD OPERATION RECORD

8:00 05 10 15 20 25 30 35 40 45 50 55
9:00 05 10 15 20 25 30 35 40 45 50 55
10:00 05 10 15 20 25 30 35 40 45 50 55
11:00 05 10 15 20 25 30 35 40 45 50 55
12:00 05 10 15 20 25 30 35 40 45 50 55
1:00

* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *



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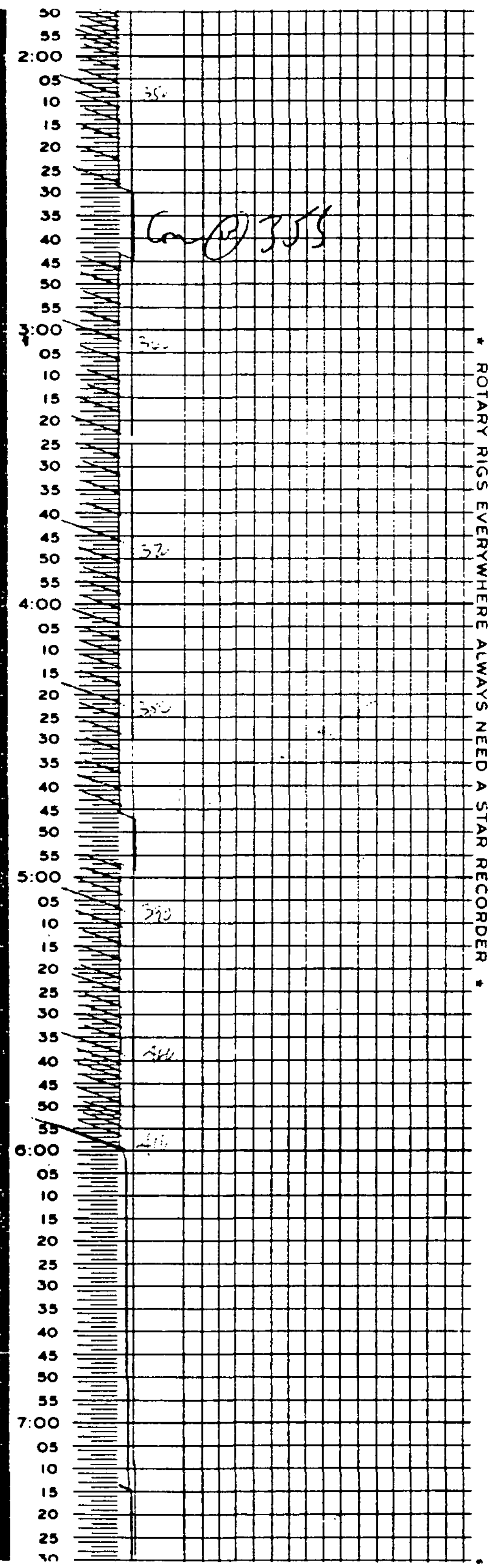
* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *
2:00
3:00
4:00
5:00
6:00
7:00

1/2

12 HOUR CHART

TIME ON 0300

COMPANY MOI

DATE 5/

WELL

WELL NUMBER

TOTAL DEPTH ON 410

TOTAL DEPTH OFF

REMARKS

TIME RECORD	OPERATION RECORD
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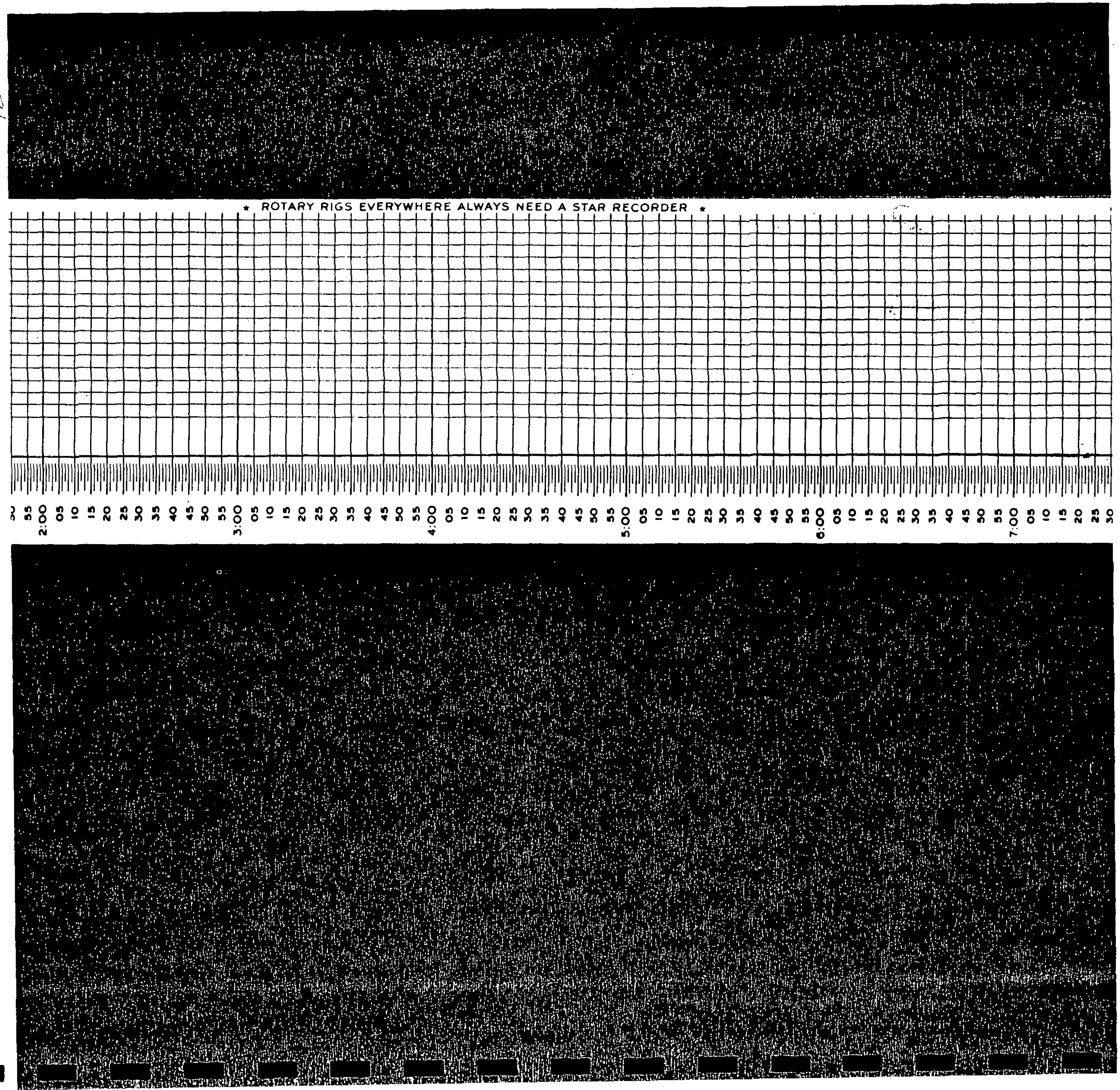
1:00	

* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *


★ ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER ★
50 55 2:00 05 10 15 20 25 30 35 40 45 50 55 3:00 05 10 15 20 25 30 35 40 45 50 55 4:00 05 10 15 20 25 30 35 40 45 50 55 5:00 05 10 15 20 25 30 35 40 45 50 55 6:00 05 10 15 20 25 30 35 40 45 50 55 7:00 05 10 15 20 25 30

12 HOUR CHART
COMPANY MJ, E
WELL
TOTAL DEPTH ON 410
TIME ON 0800
DATE 5-24-89
WELL NUMBER 5-89-1
TOTAL DEPTH OFF 4

REMARKS

TIME RECORD	OPERATION RECORD
8:00	
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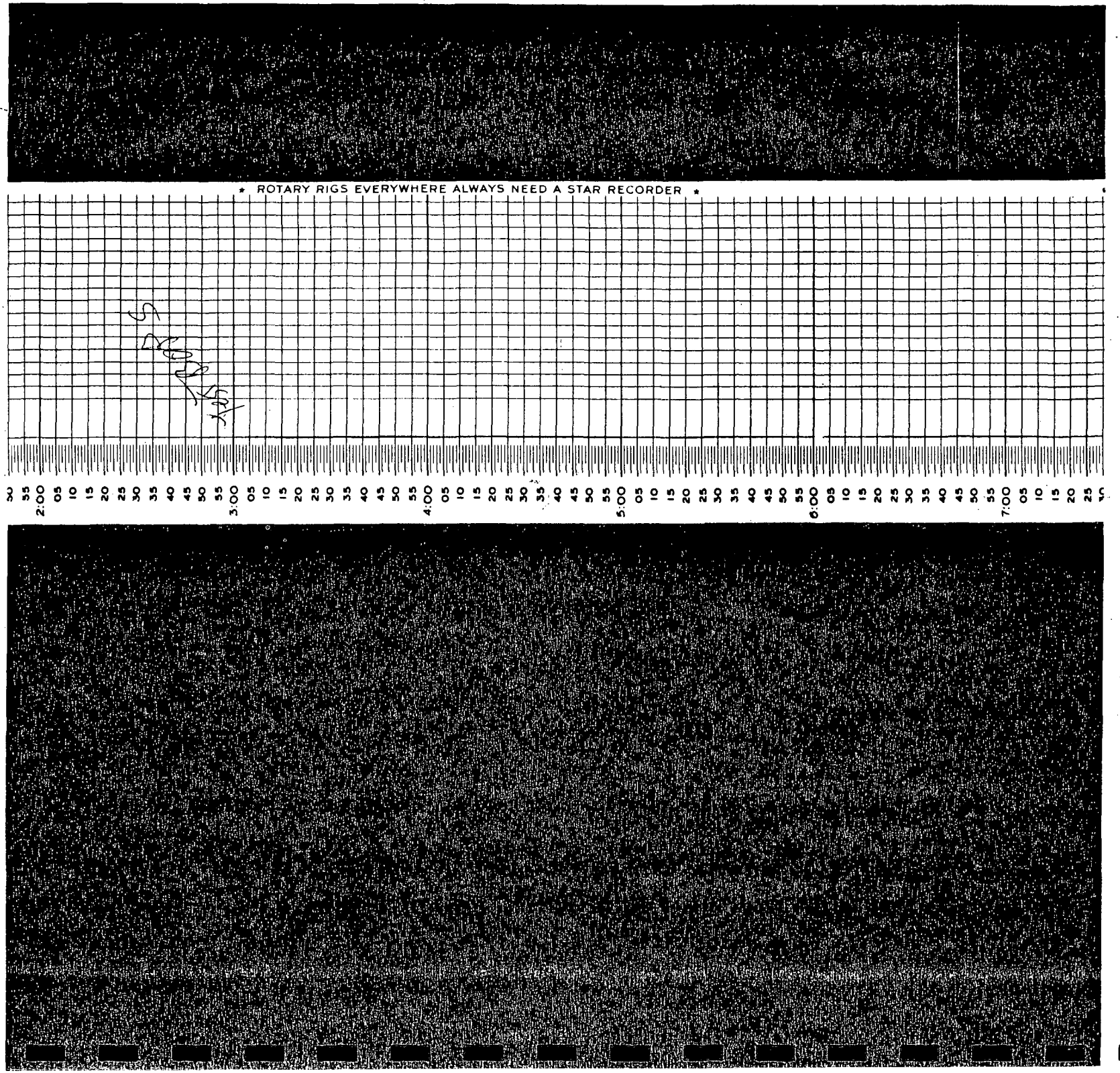
* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *


* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *
2:00
3:00
4:00
5:00
6:00
7:00

12 HOUR CHART

TIME ON 2000

COMPANY MEI

DATE 5-24-89

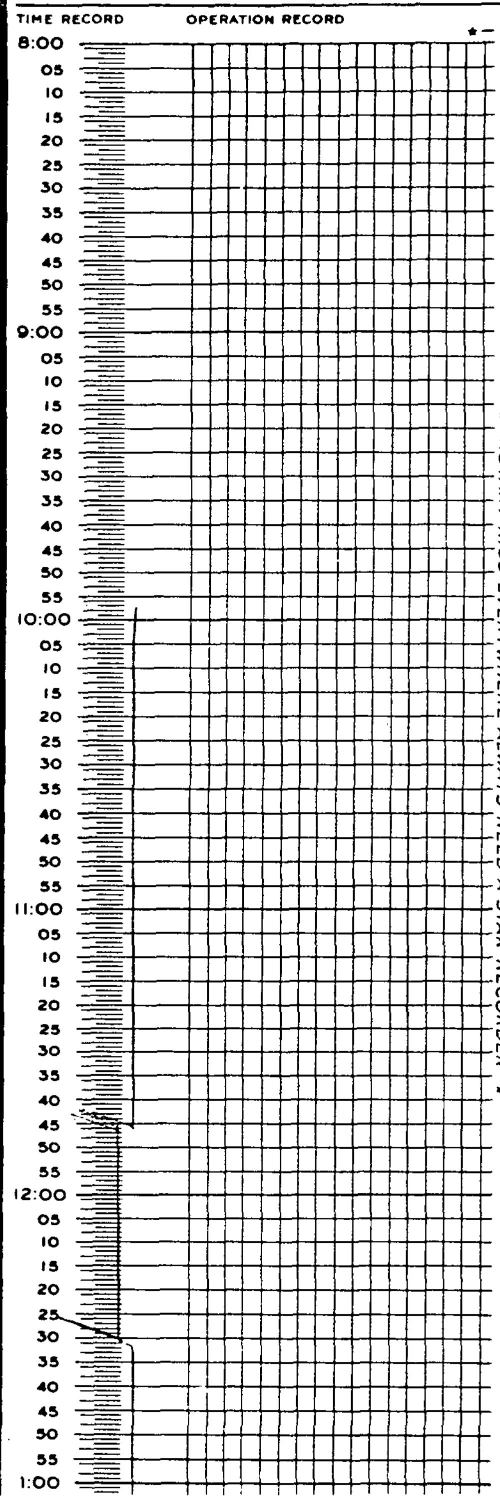
WELL 5-89-1

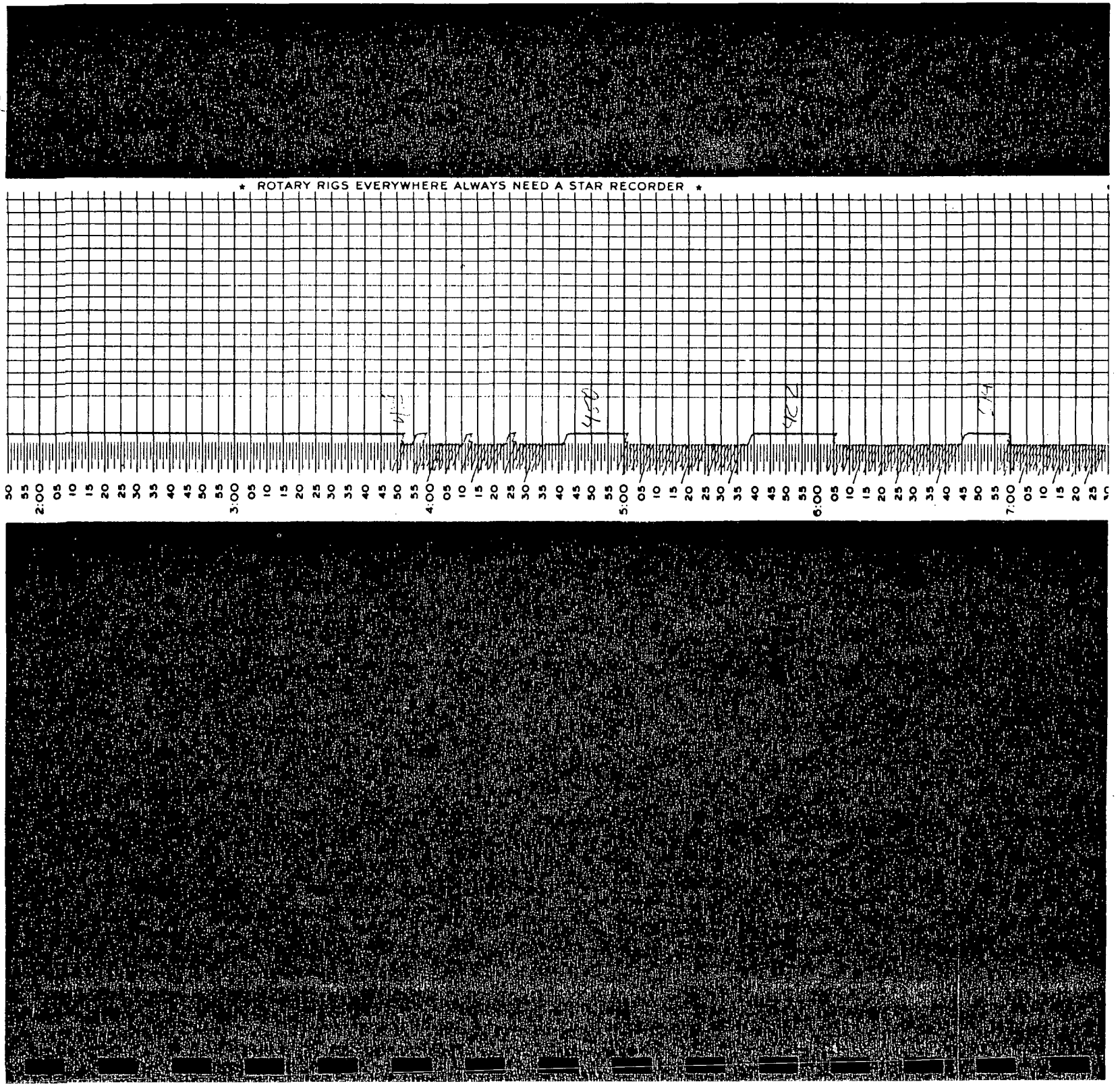
WELL NUMBER

TOTAL DEPTH ON 410

TOTAL DEPTH OFF

REMARKS




★ ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER ★
450
422
50 55 2:00 05 10 15 20 25 30 35 40 45 50 55 3:00 05 10 15 20 25 30 35 40 45 50 55 4:00 05 10 15 20 25 30 35 40 45 50 55 5:00 05 10 15 20 25 30 35 40 45 50 55 6:00 05 10 15 20 25 30 35 40 45 50 55 7:00 05 10 15 20 25

12 HOUR CHART
COMPANY MTI
WELL S-89-1
TOTAL DEPTH ON 545
TIME ON 0800
DATE 5-25-89
WELL NUMBER S-89-1
TOTAL DEPTH OFF 1025
REMARKS

TIME RECORD OPERATION RECORD

8:00 05 10 15 20 25 30 35 40 45 50 55
9:00 05 10 15 20 25 30 35 40 45 50 55
10:00 05 10 15 20 25 30 35 40 45 50 55
11:00 05 10 15 20 25 30 35 40 45 50 55
12:00 05 10 15 20 25 30 35 40 45 50 55
1:00

545 550 560 570 580 590 600 610 623 640 650 660 670 680 690 700

* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *

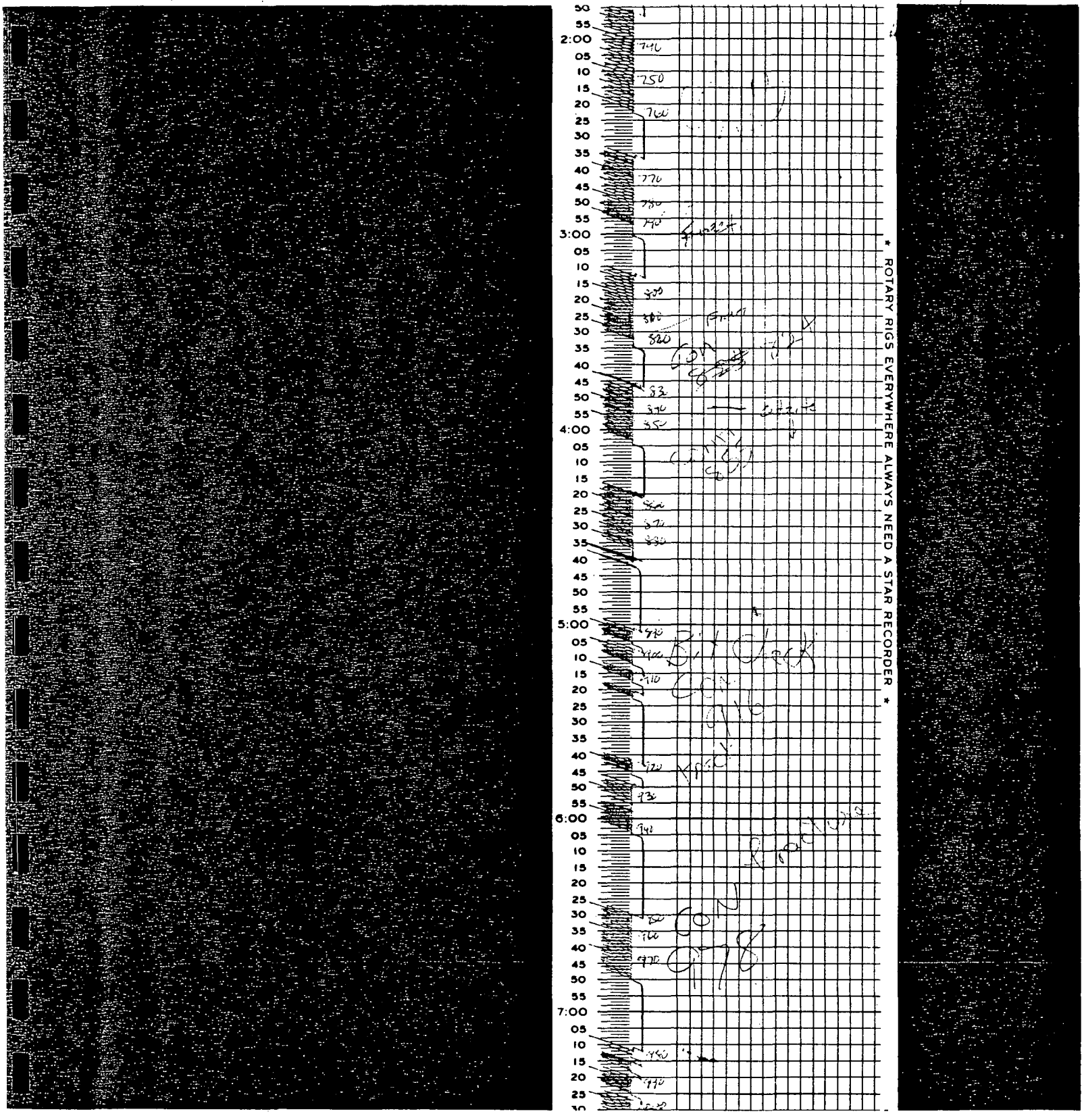
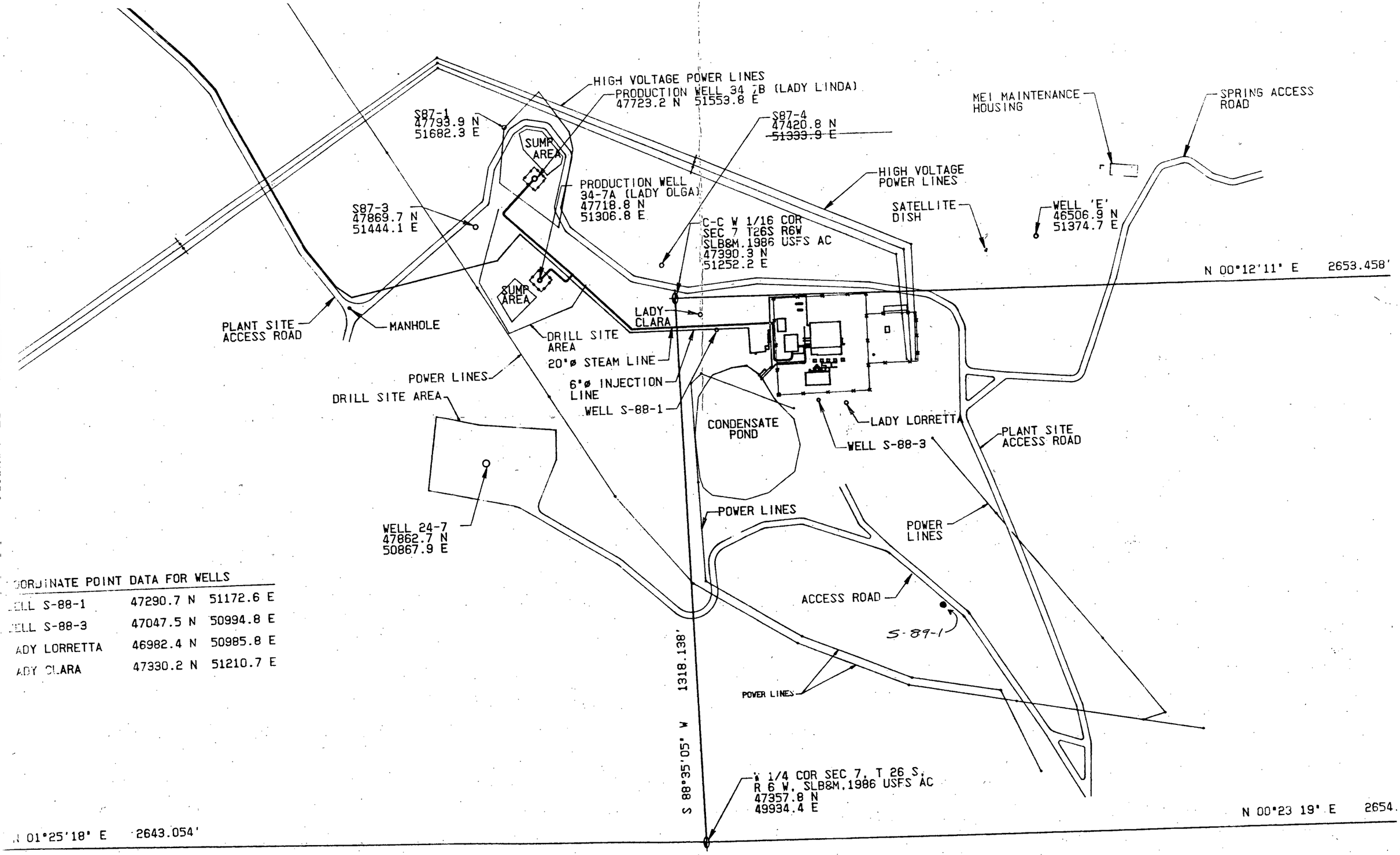

* ROTARY RIGS EVERYWHERE ALWAYS NEED A STAR RECORDER *

PLATE I



COORDINATE POINT DATA FOR WELLS		
WELL S-88-1	47290.7 N	51172.6 E
WELL S-88-3	47047.5 N	50994.8 E
LADY LORRETTA	46982.4 N	50985.8 E
LADY CLARA	47330.2 N	51210.7 E