COMPLETION REPORT

GL01038

GEOTHERMAL EXPLORATORY WELL S-89-4

Sulphurdale, Utah

For

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

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

GLO 1638

COMPLETION REPORT

GEFOTHERMAL EXPLORATORY WELL S-89-4

Sulphurdale, Utah

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

July 1989

TABLE OF CONTENTS

Ι.	ABSTRACT	Page 3
II.	LOCATION	Д.
III.	WELL DRILLING AND CONSTRUCTION HISTORY	5
IV.,	GEOLOGY	6
٧.	PERMITS	8
VI.	COSTS	8

FIGURES

Figure	1	 Location MapFoll	owing	Page	4
Figure	2	 Well Profile	11	11	5
Figure	3	 Drilling Curve	11	<i>i</i> i	5
Figure	4	 7" Blowout Preventer Stack	11		5

APPENDICES

APPENDIX	A	S-89-4 Drilling History
APPENDIX	в	Slim Hole Drilling Flan
APPENDIX	С	A Lithologic Evaluation of Drill Cuttings
APPENDIX	D	Permits and related correspondance
APPENDIX	Ε	Summary Cost Estimate
APPENDIX	F	Geolograph Charts

PLATE (in pocket)

PLATE I - Survey Plat of MEI Production Area

COMPLETION REPORT FOR

S-89-4 Sulphurdale, Utah

I. ABSTRACT

A geothermal exploratory "slim hole" designated S-89-4 was drilled on Fee land controlled by Mother Earth Industries, Inc. between the dates of May 31 and June 5, 1989. The well is 3460 ft. south and 643 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 615 feet within a white metasandstone or quartzite (Coconino Formation) and the well was drilled, in this formation, to a total depth of 628 feet KB.

The prime contractor for the well was Grimshaw Drilling Inc.; 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-89-4 located near Sulphurdale, in Beaver County, Utah within the Cove Fort-Sulphurdale KGRA.

Specifically, the well is on MEI controlled fee land approximately 3460 feet south and 643 feet east of the northwest corner of Section 7, T26S, R6W, SLB&M. It is about 1480 feet from well 34-7A (Linda), about 595 feet from the nearest previously drilled production well P-88-2 (Loretta), and about 230 feet southeast of exploration well S-89-1.

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



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-89-4 was drilled in a "slim hole" configuration as follows:

On May 31, 1989, Grimshaw Drilling, Inc. equipment was moved from the site of S-89-1 to the S-89-4 location and rig-up was begun. By 1800 hrs on June 1 a 17.5" hole had been drilled to 50'KB and by 2300 hrs, 40' of 13.375", 61 15./ft., K-55, BT&C surface casing was set and cemented by Dowell/Schlumberger. On June 3 and 4, following miscellaneous repairs and further rig-up, an 8.625" hole was drilled to 360'KB. Three hundred fifty (350) feet of 7", 26 1b./ft., K-55, BT&C casing was run and cemented by Dowell using high temperature cement plus 40% silica flour. On June 5, after nippling up a double ram BDP stack, the well was drilled to a total depth of 628'KB in only 5 hours. The first steam entry was logged at 615'KB. Note that KB is equal to Ground Level plus 10 feet.

A drilling history, describing daily events between May 31 and June 5, 1989, drilling activity sheets, and tour reports 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 document the drilling rate from 379'KB to 628'KB.

18" Ansi 300 Blind Flange Not to 8" ANSI SEFIES 300 Scale MASTER GATE VALVE "×8" ANSI 300 50W Wellhead L GROUND LEVEL DEPTH 0 \\?/_\\/_\} 1/2/2/2/2/2/ 0' of 13 % " 68 #/ft, K-SS BT&C. IN 1714" hole. 100 . -91/8" hole. CEMENT 350' of 7", 20#/ft, K-55, BT «C 200 300 400 64 open hole 500 1st Steam Entry 615'KB 600 T.D. 628'KB 628 By: GWH Ckd: GWH **REVISIONS** Date: 6-23-89 Scale: 1"=200' Vert No. Date By Dwng. No: NE/894-2 GEOTHERMAL MANAGEMENT Co. 1 P.O. Box 2980 Evergreen, CO. 80439-2980 (303) 670-3454 2 Figure 5-89-4 PROFILE WELL 2 3 4 SULPHURDALE, UTAH 5





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-89-4 comprise breccias and ashflow 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 correllated with the Wales Canyon Formation) is found in S-89-4 at a depth of about 370 feet.

S-89-4 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-89-4 transected variably fractured, brecciated, pyritic and altered (argillic and silicic) light grey to medium grey to green-grey Tbt. The mineralogically similiar, but argillically altered, smectitic Wales Canyon Fm. was found at 370'KB. Commonly, the textures of the Tbt and of the Wales Canyon rocks were 80-100% obliterated by alteration to calcite, sericite, clay, quartz, and pyrite. At 610'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 615'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-89-4 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-89-4 was pressure tested in accordance with State regulations, the test was witnessed and approved by UDWR

VI. SUMMARY COST ESTIMATE

Attached to this report as Appendix E is a "Field Cost Estimate" for the drilling of S-89-4. The costs are lower than those for some of the other slim holes previously drilled by MEI because: 1) The hole was rapidly and efficiently drilled, and 2) the depth to steam was significantly less than in any other well drilled in the field to date. These changes resulted in decreased rig time and consultant/service company utilization, so that the approximate cost per foot of S-89-4 was \$62.37.

APPENDIX A

S-89-4 DRILLING HISTORY

5-71-80			
0.200		1830	RDMD from S-89-1. MIRL op S-89-4 site.
6-1-29			
010700		1800	Continued MIRU
1900		2000	Deill SO(KD of 17 50 bole for surface since
1000		2000	Due and compet (Devel) (Schlumborger) 40 ft
2000		2200	of 13.375", 61#/ft, K-55, BT&C casing.
2200		2400	WOC .
6-2-89			
0000		0730	WOC. RU mud and light systems.
0730		0900	Cut off 13.375" casing, further rig up.
0900		1200	Renair mud tanks.
1200		2400	Miscellapeous rig-up and repairs.
			(fan 1992) en en en en fan en
6-3-89			
0000		0200	MU flow line and weld in place.
0200		0600	Break subs off 17.5" bit.
0500	~~-	0800	DA to 76'KB using mud. Hole sloughing.
0800	_	1000	Build up mud vierosity and weight
1000		1110	DA 74-100'KR
1110		1200	Wolding and conside
1200		1405	NA 100-1401/0
1200		1055	Persia sume rafill and task
1420		1000	Nepar pamp, retire mad cank.
1835		2400	DH 187-300 NB.
6-4-89			
0000		0340	DA 300-360'KB setting depth for 7"
			casing.
0340		0445	Circulate and condition hole.
0445		0530	Short trip, RIH, tag bottom, no fill.
0530		0730	Circulate and condition hole. Survey at
			360'KB. Deviation = .75 degree.
0730		1000	POOH, LD collars.
1000		1300	RU to run 8 joints of 7", 26#/ft, K-55,
			BT&C casing.
1300		1330	Cementing by Dowell. CIP at 1330 hrs.
1330		2130	WOC.
2130		2400	Cut off casings, MU 6" SOW flange and begin
			to NU BOP stack.

6-5-89
0000 - 1200 NU BOP stack, MU blooie line, Test BOP. Test witnessed and approved by J. Solum. (750 psi to 740 psi in 15 minutes.)
1200 - 1745 Drill cement from 341'KB to 360'KB.
1745 - 1925 DA 360-628'KB with air/foam. First steam entry at 615'KB.
1925 - 2300 Condition hole.
2300 - 2400 POOH, LD DP. Crew released except for one watchman while well was flowed.

MEI DRILLING ACTIVITY LOG WELL* [5 89-?] DATE: [5-31] 39 TIME DEPTH NAME COMMENTS M Horris Start Riging down of Hole #589-1 08:00 R Aquiar get all Lipes disconcerted off of Rig D'Talbut tip = over, Build new drill pad Move equinent out of in Front of deily Kichins get mud system un hooked . get Electrail L Hawking Syster disconceted Start preting up all the Little missine guerent get the Rig-B Larsen knowed off substructor pulled sub over to J'GrinshapNew bacation and act is hereed and should end pice of sab over with forfift and set 12 holted on f Levoled 20. Move Rig on Substructor + get it hereid up get dericht in aire get the B a.P. Nipped Dano. and stacked out on comment pad. get plate & Bleeder value Nippled on well. Blow well + then put it on Bleed. move Stairs over to New site to Start to Rig 200 6:30 the state of the second

E DRILLING ACTIVITY LOG WELL* [S-89-2] DATE: [G-1- 189 TIME DEPTH NAME COMMENTS 07:00 M Harris Get pad Flaters out for dog house R Augine get doghous moved in get all Rental O Talbot tools Rounded up and stacked out on consult Rad get Air Compresser noved on location more mister parip by Anir copressor chang out Balts on value well # 5.89-1 got moved off ald Loachion start + get dog house Riged up move water fank and dill pad get Big Light plant & Little Light plant moveain get air compresser plumbelin + mist pump plumidin drag dow Fule tank and get it plumped in to the air comprese and mist pump get Light plant wurd in and all the hight we could find that Nould Work get 40 ft of 133/8 Conductor 215 2:00 . Q00 Casing moved on to pipe Rocks

NEI DRILLING ACTIVITY LOG WELL # 15-89-21 DATE: (1-1-59) TIME DEPTH NAME COMMENTS 1970 0700 KH Get location heady move air Compension + Mist tank to bocation and 'Bet Same unhook light plants and move to bocation and Set up take Blewe line agent and made to bacation Clean 17" bit up to drill with take Rotaiting head all Take Suppl of B.P.S. nove Cat walk and Beaver Side To kig and kig up move 6/4 Callor and Subs move 133/2 Cassing to Cat walk his up fuel line and water fank fick up 17in bit Bit Suby Crossover Subs make up on Kelly and Drill Kelly Down Clean Hole 1800 sick up Callar and Drill to 50" KB Stand Callar Bit and Subs Back ma un Cassing 50" FB and Lement -2200 21900 to to fix Lights wait on Cenent Randy Harvey hours Larry Wall Hours Date Hunt 17

DATE: 6-2-89] DATE: 6-2-89 TIME DEPTH NAME COMMENTS 02:30 M Harris quito zork Casing zons Centerted R augilate set i a maiting on it was gring myd sy sta D talbot moved the mud pump and got it out of the way while we was doing that Rick worked on Lights after we moved mud pump out tryed to move mud pit couldn't get enough traction on that end to get it up out of the hole it is in (tank is still got a hot of Solids init.) had to go Dut the other endo dtill pip- + pip= Racks in the may had Rick move them while he is moving had Dave get forchour to Rig + I cut of 13% Casing 6° Below table. Belt came off on fort Lift had to put it Back on it came off agin and weput it back on about the 5th bibt time it usuidn't slay on hengenous to mess with Finish moving drill pipe & pipe Rack with back hoe, pall out mud tank + pulled it over to the Rig pushed it into place pushed in mud pump. Started to rueld Pot + Boy a way lot he could find.

Ang and tank make cut and weld clear aff loor 47,11 mud hink with Hao male and weld Flow I'ne from hig fight charge punp from hig se true el DATE: (6-2-8) andy Make Cut + Weld Suchen Live D COMMENTS لمو *: [S - 87-21] Geslogiash. ALLING ACTIVITY LOG WE AG TIME TUEPTH NAME 82

Milling ACTIVITY LOG WELL*:[597-] DATE:[6-3:89] TIME DEPTH NAME COMMENTS 24/06 0000 invested invested in Casing for Glaw Line wert + gotta pice of 8 casing 2244 kong made following and got it redded on halled mus over to Rig Starked taking aport 17 m Bit & Saves Chard Bit to device is the ground of Bigbit subs hotal over couldn't device is any pale with the saves chard bit for device is any pale with the saves in the form pate a Bit save the Street is botted over couldn't Mind others any pale with the saves, mix mud pate an Bit save the Street is botted over couldn't Bit of the save the save botted over couldn't Coord 40 Kally down when went to Red up hole had slugatin pate an Bit save the save the last of a loss of the save save cord 40 kally down when went to Red up hole had slugatin pate a Bit save the save the save the save of thole of toose formation control to get mud Real heavy hole a lot of those cord 40 Kally down over the save the save up to the save of those pate a Bit save the save the save the save the save of those pate a Bit save the save the save the save the save of those cord 40 Kally down over the save the save the save </th <th>- Ride</th> <th>te en la serie de la companya de la La companya de la comp</th> <th></th> <th></th>	- Ride	te en la serie de la companya de la La companya de la comp		
TIME DEPTH NAME COMMENTS 2400 0000 "Wedd" migple on Casing for 6dow / inc event + got pice of 8 casing 22ft Long made follow hin and got it wedded on halled must over to Rig Started taking apart 17 m Rit & saves Chard Bit to derekted & Brok it Losse Could find only one tong ports takegeningh for Bigbit subs tootall over couldn't Gind others any palse went & got one off floor from MET. Rig got Big Bit sub bist toose, mix mud put on Bit sub t 840 St. Storted drilling Quote, drilled OCOD 40 Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole mix mud 2001/2 Net Kelley Backon & Cleaned out hole Mix Back 2000 Hoose Formation Comining in an us circulati with herop mud Clean out hole Mid wide too Wede goe through Flourthe Net Kelley Backon the Start Start of the start when mud 1200 How Start hole the Start and the Start with herop Mid Clean out hole Mid wide too Wede goe through Flourthe	MEI DRILLING A	ACTIVITY LOG	WELL #: [5 89-]	DATE: 6-3. 891
1400 1000 invested interple an Casing for flow Line wat + got a pice of 6 casing 22tt kong made folowhin and got it would a on halled must over to Rig Started taking apart 17 m Bit & Sais Chard Bit to derickled & Brok it Lasse Could fird only one tong patter largerningh fol Bigbit subs hosted over couldn't find others any pales wont & got and off lime from M.E. T. Rig got Big Bit sub bists house, mix mud paton Bit sab + 840 site stored drilling Guott, drilled DECO 40 Kellsy down when went to Rod up hole had sluked in put Kelley Backon & Cleaned out hole mix mud while Circulating hole try to Rod up agin Still wouldn't go had to get mud Real heavy had a tok of Loose Formation Comming in on us circulated with heavy mud clean out hole pind wouldn't go through Flowth and the get hole in would had a work for the set of the set Formation comming in on us circulated with heavy mud clean out hole pind wouldn't go through Flowth and the get hole in the set of the set of the set Decoded to get mud Real heaving cat house the set of the set Not the get hole in the set of the set of the set had to get mud the set of the set of the set had the get hole in the set of the set of the set had the get hole in the set of the set of the set had the get hole in the set of the set of the set had the get hole in the set of the set of the set had the get hole in the set of the set of the set of the set had the get hole in the set of the set of the set of the set of the set had the get hole in the set of the set o	TIME DEPTH N	IAME	COMMEN	TS
t got a pice of S casing 22tthong made folowing and got it woulded on halled musi over to Rig Started taking apart 17 n Rit & suis Chard Rit to derickled & Brok it Lasse Codd fird only one tong posts batgaringh for Bigbit subs tootal over couldn't dind others any pales want & got and other from me T. Rig got Big Rit sub bists hoose, mix mud put on Bit Sabt 294 Site. Started drilling Quoti. drilled put to Bit Sabt 294 Site and to be to be hold slutching put to Bit Sabt 294 Site Subscience drilling Quoti. drilled put on Bit Sabt 294 Site Started and to be to be bit a boose. And to get mud Rial heavy had a tot of toose Formation comming in on we take to get through Flowth And to get hole the count of the subscience of the boose Formation comming in on we take to get through Flowth And to get hole the count of the subscience of the boose And to get hole the count of the boose Formation comming in on we take to be down on the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the boose And to get hole the count of the count of the boose And the get hole the count of the count of the boose And the get hole the count of the count of the count of the boose And the get hole the count of the count of the boose And the get hole the count of	2400 0000	wedd	an Casin	a for flow Line went
and got it redded on halled mus over to Rig Started taking apart 17 in Rit & Saves Chard Rit to derickhod & Brok it Losse Could fird only one tong partie taigungh for Bighit subs hostall over couldn't Gind others any pales went & got one off flow from ME. T. Rig got Big Rit sub bists hostall over couldn't put on Bit sub + 840 Site. Storted drilling Ouott, drilled OCOO 40 Kelley Backon & Cleaned out hole mix mud while Circulating hole try to Rod zip agin Still wooldit go hed to get mud Real heavy had a tot of flows Formation Commany in on us circulatil with heirs mud clean out hole while the widet goo through Flowth		+ got o	pice of & casing 2	2ft Long made folow Line
Starfed taking apart 17 m Bit & Sues Chand Bit to derick Led & Brok it Losse Could find only one tong porthe targenough for Bighit subs tootal our couldn't drind others any pales wint & got and all floor from M.E.T. Rig got Big Bit sub birts Losse. Mix Muid put an Bit sub + 244 Site. Started drilling @4014. drilled DE00 40 Kelley dawa when went to Rad up hole had slutted in put Kelley Backon & Cleaned out hole mix Muid while Circulating hole try to Rod up agin Still wouldn't go hed to get muid Real heavy had a tot of toose Formation Comming in an us circulati with herry mud clean out hole With an didn't gop through Flouth Wid to get hole the started with gop through Flouth Net to get hole the started with gop through Flouth Net to get hole the start heavy had a tot of toose Formation Comming in an us circulati with herry mud clean out hole with a dod the started with a started with a started to get the started with gop through Flouth Net to get hole the started with a did to get through a tot the started to be started to be started to be the		andgo	+ it melded on hall	led mud over to Rig
derick big & Brok it Losse Could fird only one tong parts liggerough for Bigbit subs Lookall over couldn't dind others any palse wint & got and off flow from ME. T. Rig got BigBit sub bists hoose, mix mud put on Bit sub + 840 Sit. Stated drilling Ottoti. drilled OCOD 40 Kelley down when went to Rod up hole had sluked in put Kelley Backon & Cleaned out hole mix mud while Circulating hole try to Rod up agin Still wouldn't go had to get mud Real heavy had a Lot of Loose Formation Comming is on us circulatit with heroy mud Clean out hole Dud no when the states of the sub- tud le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh ind le get hole the sessing cast Long & Still Routh & States ind le get hole the sessing cast Long & Still Routh & States ind le get hole the sessing cast Long & Still Routh & States ind le get hole the sessing cast Long & States with the sessing is the sessing cast Long with the sessing cast Long & States with the sessing is the sessing cast Long with the sessing cast Long & States with the sessing cast Long with the sessing with the sessing cast Long with the sessing with the sess		Started	taking apart 17 in 1	Lit & Subs Chard Bit to
Content of the set of		derickha	g + Brok it Lasse Coul	d find only one tong
find others any palse wint + got and off flow from M.E.T. R.g. got B.g. Bit sub bist: Loose: mix mud put on Bit sub + 8% sit. Storted drilling @4044. drilled 0000 40 Kelly down when went to Rod up hole had Slutadin put Kelley Backon & Cleaned out hole mix mud while Circulating hole try to Rod up hole had Slutadin had to get mud Real heavy had a tot of toose Formation Comming in an us circulatit with heavy mud Clean out hole while wouldn't goe through Flowth had le got hole its training cat hang up with mid had le got hole its training cat hang up with heavy had le got hole its training cat hang up with heavy had le got hole its training cat hang up with heavy had le got hole its training cat hang up with mid the south its training to the training with heavy had le got hole its training cat hang up with mid the south its training to the training with heavy had he got hole its training cat hang up with mid the south its training to the training with heavy had he got hole its training to the training to the training with heavy the south its training to the trainin		Port L	tgenough for Bigbits	ubs Lookall over couldn't
M.E.T. R.g. gat B.g. Bit sub bist: Loose: mix mud put on Bit sub + 840 Git. Started drilling @4011. drilled OGOO 40 Kelley down when went to Rod 2p hole had slugatin put Kelley Backon & cleaned out hole mix mud while Circulating hole try to Rod 2p agin Still wouldn't go had to get mud Real heavy had a Lot of Loose Formation Comming in on 22 circulaht with herey mud Clean out tale mid wouldn't goe through Flouthe did to get hole in casing cat Long x when mud had be get hole in casing cat Long x when mud		dind of	hers any pales wint	+ got one off floor from
Put on Bit Sabt 844 Site. Storted drilling @40 th. drilled O \$00 40 Kelley down when went to ked up hole had Slukedin Put Kelley Backon & Cleaned out hole mix mud zehile Circulating hole try to Rod zip agin Still wouldn't go hed to get mud Real heavy had a Lot of Loose Formation Comming is on as circulatil with heavy mud Clean out hole Mide wouldn't goe through Flout head hud fa get hole the state wouldn't goe through Flout head Kelley Back and the state of the	/	MET.	Rig got Big Bit sub	brok: Loose: mix mud
0600 40 Kelley dawn when went to Rod up hole had slufind in put Kelley Backon & cleaned out hole mix mud while Circulating hole try to Rod up agin Still wouldn't go hod to get mud Real heaving had a tot of Loose Formation Comming in on us circulahl with herey mud clean out hale mud no was directed Flowthe had to get hole mud no was circulahl with herey mud clean out hale mud no was to go through Flowthe had to get hole mud no was being with mid had to get hole in casting cat barger when mid		put on B.	17 Sab + 8 4 8 14. Started	drilling Quoti, drilled
put Kelley Backon & Cleaned out hole mix mud zehile Circulating hole try to Rod zip agin Still wouldn't go hod to get mud Real heavy had a tot of toose Formation Comming in on us circulatil with herey mud clean out hole Mud wouldn't goo through Flautike hud to get hole the seine cost targer when mud The seine histories in when here the seine cost targer when mud The seine histories in when here the seine where here the seine mud Control to get hole the seine cost targer when mud the seine histories in the seine where the seine here	0600 40	Kelley d	oun when went to Rad	1 up hole had slupeding
Circulating hate try to Rod zip agin Still wouldn't go had to get much Real heavy had a Lot of Loose Formation Comming in on us circulatit with heavy much clean out hole wind wouldn't goe through Flowt the had to get hale its constraine cat harger when mid had to get hale its constraine cat harger when mid had to get hale its constraine at harger when mid had to get hale its constraine at harger when mid		put Kelle	y Backon & cleaned out	hole mix mud while
Loc to get mud Real heavy had a bot of boose Formation Comming in on us circulatil with herry mud clean out hole Mud Wo Wowldn't goe through Flouth dind to get hole in tersting cat targer when mud is the the the tersting cat targer when mud		Circulati	ing have dry to Rod zip	agin Still wouldn't go
Parties Comparing is on us circulant with hery mud clean out hole Mud no ubrit goe through Flant the third to get boke its castra cat harg is when mud third to get boke its castra cat harg is when mud third to get boke its castra cat harg is when mud		hod to	get much Real hearry	had a Lot of Loose
) <u>mud Clean out hole Mus wouldn't goo through Flout ho</u> <u>hud ha art hole in costing cat Lang v when mud</u> Fisherhicker in the second de water with the second secon		Formatio	1 Comming in on 2	s circulant with herry
		- mud Clea	n out hole. Mut thou	out goo through Flouting
		thud ha	rt hale in Colona G	of Larger when mud

terr : and territer

-

, .

263

1703

Jan 06:39

2

5

Antennes for seasons and the seasons

INEL DRILLING ACTIVITY LOG WELL # 15-81-1 DATE: (6-3-81] TIME DEPTH NAME I COMMENTS 12:00 100" RH Drill 7th take goose neck off and turn 12:55 107" RH make Conection Collar 6/4 2005138" RA make Convection Collar 6/4 2:50 16911 RH make Concetion Drill pipe 3/2 jose pump presure check and take apart pump Replaced 2-6" Swabs fix werch 3:30; RA 7:00:169 KM 7.45 198 Konection DP 8:20 230 Conection + Shut down to ADJ Clutch RH Convection + Condition Hole fix Light plant 1000 261 RH 11:25 291 RH Conection y Harve in Hung Moon 6 Ifunt

MEI DRILLING ACTIVITY LOG WELL * [S 89] DATE: [G-4-89] TIMF DEPTH NAME I COMMENTS 2400 300 mile Willing going Fair drilling in Solis former on Flow Line Land 107° 344 Ft from G.D. drilling Las Slowdown Hitting Some Envell Franke, Flow Line temp 110 350 Ft. from Grandbard 340 360 KB 360 KB. T. U for 7' Circulating hole + condistong it. Get Caseing Ready 340 4:45 EStrasec 445 5:30 Short Trip Irip Back To Bottom no £.)/ -5:30 7:00 circ & Cond Hole STrap (9) Joints of 7" @ 396,30 7:00 7:30 Survey a 350 3/4 % Trip out Hole to Run Caseing & Lay Down 2:30 D.C. Hopthem. 10:00 Rig up to Run Caseing Run & Joint's 10:00 12:00

ty y to Cener 64 Unag laurulater over to location. Dag B.O.P.S. over 64 Volve. well Head Un location. Dates to Every thing the land we want of and weld loss to florgeon A'S up water wash Dawn line to Rig. wite up water NX VA Iment on located DATE (6-4-89) ing to pick 19 8 011 1 TB at 7' Cassing and COMMENTS 1 Service all Equip Derrick hights, Pixed S Jug 1 modirate, TIEL DRILLING ACTIVITY LOG WELL * 15-82-4 % とく 010 whit are Cement - m SERVICED אצאנ Tag ed 4 11ed XXXX C × 子 hou H CW TIME DEPTH NAME <u>9</u> 9 Q.T. J.S. 1.30

03 <u>36</u>, 39 11:34test Bop it had a head at the door on pipe Rams lighten it waigh for State man test 30ps agin have a very test Bob agin this time we get a good DATE: (65-89 Sadt Leak an Door Shill tighter it agi'n COMPENTS hole had cements 00 WELL* [S 89.4] Nipple - 2p - B.O.D.S hang Bloic Line Dave telo - 10 1 1 ALLING ACTIVITY I With Days TIME 'DEPTH' NAME 12 00 2400

NEI DRILLING ACTIVITY LOG WELL* 15-89-4] DATE [6-5-87 TIME DEPTH NAME COMMENTS 3411 tag Coment @ 341 Drill out Cement + shoe 12:00 this out with 6 Bit Pick up hanner trip in hole tag formation 0348 Stilling @ 5.30 348 KA 5:45.379 RA Convection Drilling Sand and Shake Convection 6.25,410 KA Convection 655 442 R 120 473 Lanaction. " d/ Connection 150506 Convection 8.75535 Convection Prill Break 565 to 1565 Conection Hit Stean @ 615 Ft 105677 628 Constan formation falling in work and Condition Haly 1:001628 RH The out of bloke with Drill pipe ale I C.L. tamer 12 Drillod 320 1 in 5/2

								23800 Anda	×30							01 237 237 237 237 237 237 237 237						инс - нас сектонец инс - нас сектонец инс инс инс инс инс инс инс инс инс инс				HEGC NDC CODE 202E NDC CODE 201 202 203 204 205 205 205 205 205 205 205 205 205 205	
						20 53344 53345 53344 53345 53345 53345 53345 53355 53345 53355 53355 5335555 533555 5335555 533555555			x30							01 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 01 3304 10 10 10 10 10 10 10 10 10 10						AHC - 25C SEVENEL SECOLOR 2 ALLON A ALLON A				нцег турс соре 2015 2015 2016 2016 2017 2016 2016 2017	
						200		20000	×30							04 377 20 20 20 20 20 20 20 20 20 20 20 20 20						AIRC - 18C SEVOIENL AIRC - 18C AIRC - 1				НЕСТ 1000 CODE 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 20000 2000 2000 2000	
					NLL 3 JUE 4 STUE 4 STUE 4 STUE 4 STUE 1 JUE 1				x20							04 04 04 04 04 04 04 04 04 04						инс - есс сототен с сототен с сототен с инс - есс инс - ессс инс - есс инс - есс				MEC WINC CODE 225E 225E BIL NO DELIN HOR BIL NO DELIN HOR BIL NO BIL NO BIL NO BIL NO	
						30 533 Mail 977 30 30 30		23800 	×30				NG		71900 6199 71900 71900 71900 71900 71900 71900 71900	04 377 377 3 3 4 4 4 3 3 4 4 3 3 7 4 3 3 3 4 4 3 3 7 4 3 3 3 7 4 3 3 3 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 4 3 3 7 4 4 3 3 7 4 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 3 7 4 3 7 4 3 7 4 3 7 4 3 7 4 3 7 4 3 7 4 1 4 3 7 4 1 4 3 7 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4										NUCC CODE 2025 2026 2027 2028 2029 2011 2029 2020 2021 2022 2021 2021	
					NLL S JOHN M STHE NO STHE NO STHE NO STHE NLL			33860	×20				NO 31 C1 V120 OH													MEC WINC CODE 225E 225E 225E 225E 225E 225E 225E 235 2400 255 255 255 255 255 255 225E 225E 225E 225E 225E 225E	
		9380 975 975 975 975 975 975 975 975 975 975				30 53344 8774		ла ла даухор 23800	×30				NO NO NO NO NO NO NO NO NO NO NO NO NO N	2000 2000 2000 2000 2000		01 01 377 02 377 (7) (7) (7) (7) (7) (7) (7) (· · · · · · · · · · · · · · · · · · ·				سال سال <td></td> <td></td> <td></td> <td>нес турс соре 2025 2025 2026 2027 2</td> <td></td>				нес турс соре 2025 2025 2026 2027 2	
		W 14 1			NL4	30 53344 57344 72		23800	×30				NG 1			۵۱ 377 377 377 377 377 377 377 37	ректонка весока вес					AND CEEC					
		944EC			N12	30 53344 3744			200 200 200 200 200 200 200 200 200 200		232 M BOOT									Ga Raili Gaor IT		AND				HEGE MODE CODE 225E 225E 225E 225E 225E 225E 225E 235E 2410 25 25 2600 2700 281 290 290 290 200 <td></td>	
MOLL		00000000000000000000000000000000000000			NL 2 325 1 1394 1 1394	30 5334 573			×20				NO SI C VILSO CH			معنا عادی مرابع م م مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابه مرابع مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرام م مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مرابه مراب مرابه مراما مرابه مراب مرابه مرام مرابه مرام مرابه مراب مرابه مراب مرابه مراب مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مرابع مراب مراب مراب مرابع مراب مراب مراب مراب مراب مراب مراب مراب	1006 1006 1006 1006 1006 1006 1006 1006									HEGC MYDC CODE 2252 2252 225 225 225 225 225 2411 HO 100 HO	
		орона 1 горона 1 гор				30 5334 72			×20			HOLL388			373800 373800 3740 3740 3740 3740	معید معد (۲۰۰۵) (۲۰۰۵) (۲۰۰۵) (۲۰۰۵) (۲۰۰۵) (۲۰۰۵)	2002 200 2002 2					A STOLES CONTRACT					
MOLL MOLL		23800 W '2 3 T	3 225 3 225 3 226 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			30 53344 6714			200 200 200 200 200 200 200 200 200 200		1430 1430	ACH23		λ30	73500 3760 3760	04 2397 - 04 - 2397 - 2397	200-7 1 ついし 1005 1005 1005 1005 1005 1005 1005 100			Ga 						ньс түрс соре 2155 2156 2157 2	
		231800 W '4 T Too	3 225 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			30 53253 			799			NOL1324			2-79000	04 377 377 377	1			Gau						MLC 2005 2005 2005 2005 2005 2005 2005 200	
		23860 73860 867 867	5 2275 3 2775 3 2775 2775 2775 2775 2775 2775 2775 2775		NL4	30 553344 #Vid			230		×> -7 ×039 3400 1730	ACH3		2300 2550	2-3300 3-768 6-760	01 39%	COST			CG0						MEC MDC CODE 225E BUL NO BUL NO BUL NO DMN-MN-62 I I O O I I I O O I I O O I 2017 FLIZ LOLYT LIC	
MOLL		0446C	3 228 3 228 3 228 3 28 4 3 28 4 5 4 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5	30 · 1	HLa s 225 s contractions s contractions contractions s contractions s contractions s contraction	30		Meta Meta Alivitos	7.20	(U22)		A043)		×30	273000 8700 8700	01 07 07	1009 100 100					Cardina Cardin				MLC IVDC CODE 225E BIL NO BIL NO BIC OI BIC OI BIC OI COL 2140C	
HOUL 1		01460	3 225 3 225 3 226 3 226	0.00		30	HO LL CAL		730		COME RECOV	NOLL393		220 220 200 200 200 200 200 200 200 200	273200 273200 273200	01 02 33%	1007/10/					AISC-25C				MLC MDC CODE 2255 2255 245 245 245 245 245 2	
		0165C		- 060 	NLL 3715 1 3715 1 400 5	30 30	HOIL HOIL	73300 	7.30			ACHC3		× 30	273900 8749 6790	0L 354	EECORD DEALATION EECORD									MEC IMDC CODE RILE NO BILL NO Shinkoweka	
		0465C	3 2275 3 2275 23 42947	30 .	NL4	30 553344 diffid	HOUL HOUL	Direct Mote	7.300			MOLIJON AGNO	Car Car Car Car Car Car Car Car Car Car	04.×		01 33%						ALL CHARTER		GNC		NLC IVDC CODE 212E 211 NO	
		0446C	3 8285	30 · 00	HL4	30	HOLL	29440	7,390				CH CH	×300	H	01	RECORD DE AIVLION					VISC 28C				NLC IVDC CODE 21SE 81L NO	
		33440		30 ·]	NL	30	HOL.	29340	7.30		1430	HOLISE		- A340								VISC-SEC				MLC TVDC CODE 225E	
		3340	, ,	 • مد 		30	HOLL	299400 	DEA	M	1439	MOIT288	••••	· A30	 	u.æ.,	DEVLATION DEVLATION		Ľ			MICC-SEC				MPC CODE	
		33110		- ac	HL	30	HOLE:	23300	7.30		Li30	NOILJON		·~30		u.æo	DEVLATION		Ľ	+∕		28-28M		+		NGCC.	
									Ι	Τ									11-1-1-		• /			F			1
		<u> </u>															UT JONE	-11 2 1		Į7	IZ.	0512	<u> </u>			SER NO.	
										NT 204300	35 HI SHOLL	111-10-10-17	AT30 .0H	3000	300			5		·		5.20° 76				.20/1 £13/	ŀ
									· · · ·	·						007	002	2	∭	+		. 10			-	2 ⁴¹ V31/	1
									· - · ·			<u> </u>		<u>.</u>		- ·	<u> </u>		 			5 501105				TUO HITIBO	₼
]		03007 ST	A Demic	0798		+ • •	_		F
		<u> </u>											· [-					∦∣								JOIN TATOL	ŀ
												.							 		┼──	<u> </u>				U O O C	
				. (ja									<u> </u>	_					 						+ +	15d-dW0d/Wd	1
				•			AL. OH			M	OLTANGO				0.90	VCE	1003			<u>مە</u>	coss ari	F		080	DEA TI	T	
ų,	<u>8</u>	Wd3	1 25		778	553344	-					010		794		04	104.4	1	 	L		3994			<u> </u>		7
	╋		+	╋	+		1															AEICHL			-+-	3715	Ē
	╀	<u> </u>	+	+			╂───	┝╌╴┨												<u> </u>		CRADIENT		$+\pi$	T	IVIC CODE	╞
HOL			<u> </u>	x		30	HOL	23440	'A20	N	Latio	HOUDSH	-	'A30		1490	HOITAIV3G			-4-		44/44 285-254			_	TYPE	-F
						~												Ĩ	IZ,	IZ.	Ţ	5130				SER NO	Ē
	—									W 2019/10	35 IN 1940LLV	12.0 0.57	130 104	2000	2011		NOIL	Š				1.30- W			·	-26/1 5131	ľ
														I		1	1	111 2 1	ISL		-					2	-

J.

-5/1

											-+		 	-	+	li ê li		T			r	T	سب شر ا	1.00
·							610000111						- Brita	- 10-	WOLL	8		<u> </u>		1.30- 10			-257 5137	7
a										T			035477	<u> </u>	1 3411	12	7	7	7	CUT			ON YES	1.
<u> </u>	+	-											- 		NOTAIVAQ OSCORD		1.7	7	17	44/44			3441	-
DISECTION		<u>•</u>	I NLA		1004					ROLLIN	<u> </u>	~~~								ASC-26C	<u> </u>		MPG.	
·		-			<u> </u>								+					1.		CRADIENT		$+\pi\pi$	IVDC CODE	
			╞──	<u> </u>		<u> </u>				· · · ·		+								MEICHL	┠╌┶┶┙	╉┺┻┺	3215	┤╼╸
2900	176		1225				+		<u> </u>			· †								BILL		-	BIT NO	1.0
NUS 443				22304 22304	TIR BIT	TANK TOP	•	Lus <u>s</u>	ACORE SHOO	Carden C	: : ·	2000	5.20						no esco	T		010031		
1 COLL37						L	<u> </u>					1				H	<u> </u>							-
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	- (<u>7</u>	1 1000							·····				_					· .	<u> </u>			8098	
														<u> </u>			₿ 				\square			
														<u> </u>			₿{			+	┠┵┵┙	╉┺┺┙	2201 JATOT	
	~	~ 1	·	<u>,</u>		~9 			;;- -	<u> </u>	-+	• .	-7	1	\ 			JANK		1144		1	TOTAL PTC.	H
		• /		} .+-	$\frac{1}{1}$.	- 71		· ····	$har{h}$	\			4	<u>+</u>			0000 574					NI HULGO	1=
<u> </u>				;	<u>i.</u>	-47	· · · · · ·		<u>'</u>				I		 					5 197105		2	TUO HTTE	1-
						,	!	•		da b i	ਸ +			+	90:41	2	<u> </u>		t				2 ⁴ V41/	1
							COMPANY	00 2343		เพละดี เครา	V In		30914		T ROBA				<u> </u>	1.30-74	1	1.		
·	— —	<u> </u>		•			1			1			1 035471	<u> </u>		Ĭ		17-	7	100			CON '2535' NO'	14
	+									-1		1480	+		DEVIATION		ĹŹ	TZ.	ΙŻ	di/Ad			BILL	1
				<u> </u>		T	1					T	T T							29-284			MEC.	1
				<u> </u>	<u> </u>	<u> </u>						· 			<u> </u>					340.023944 TH310430	\square		INDC CODE	1
			1		<u> </u>	†	-		· · · · · · · · ·			+								AEICHL			3715	
7102	228	1143	25	<u> </u>		╂───	<u> </u>			·		+ .		- 01	TED IN			<u> </u>		3MMLL		1.		14
HINE TON		736	404	153344	118	8.69	J	· (A)#2	140030 300	(BHDA CI	•	101					Į.	-			Į	<i></i>	The second	
					110 '18	h94706	1		HOLLYNG	юн –		3900	0.00	. 304	LOOT						i .	00003		
00HL2WI			Tana I		NO 'LA		<u>' </u>		NOITANS	Eoi		3960	0.00	VCE	1003	\parallel		04	T		<u> </u>	TTT	ISd dWid/Md	
		W			AL' OH		<u>'</u>		HOITAMS	64		33400	6 -36	VCE	1007								15-3-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-	
		W.			AL' ON	<u></u>	<u></u>			64		CO46E	0-100	VCE	1007									
			2 SEATTE		AL OH		<u></u>					3900		30V									Still TV10L	
			17144C		- C / 7			~~	HOI1 1949	ter con		3200	<u>ă 30</u>										III III III III IIII IIII IIIII IIIII IIIII IIIIII	
	e de		ت العالية المراجع المراجع المراجع		0170			·~~	1017A43	es F pn		3200		0% C1				2000 70000						
					110 1A			20)	1017AB	4 pm				905 									III IS-3M0-4/M-5 III IIII IIIII IIIIII IIIIIIIIII	
	e de					C 54	Trp:		HOLLYNG EFE	4 pn		3000 	<u><u></u></u>			Neon			MI PECEN	2401 0/m 9 90105			Star Market U 0 0 0 0 0 1 0 0 0 0 1	
	e de							5 V)	בין או			29900 		2000 () () () () () () () () () () () () ()		MORNING		3411 36007 511		3401 3401 55 907105 14 ⁴ 3.207 18				
	e de		275000 275000 2750 2750 2750 2750 2750 2					2 CO 2	1031 MI BHON 			29900 2017		2000 C)		MORNING TOUR		3411 3407 511		201102 2 201102 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 20110 2 2 20110 2 2 20110 2 2 20110 2 2 2 2				
			577 Marce 577 Marce 577 C 577 C 577 C 577 C 577 C 577 C 577 C 577 C 577 C 577 C 577 C 577 C									2000 2000 27 0H 2000 7420				MORNING TOUR	· · · · · · · · · · · · · · · · · · ·			20108 2 20108 2 201			Замилика	
	e de							20) 20)				2000 2000 2010 2010 2010 2010				MORNING TOUR				235-2414 2414 2414 2414 2414 2414 2414 2414				
								044 3343L				2000 2000 27 27 001 2000 2012 2012				MORNING TOUR				201192 2 201192 2 20119 20119 20119 20119 20119 20119 20119 20119 20119 201				
								00m 35H2				2000 2010 2010 2010 2010 2010 2010 2010	5	2000		MORNING TOUR				1000 1000 1000 1000 1000 1000 1000 100			Экичиникова	
								5 V)					5-35 	2000 C		MORNING TOUR				2401 079 079 2401 079 2401 079 2401 2401 2401 2401 2401 2401 2401 2401			вичиливые вичиливые вичиливые вичиливые политивые политивые <t< td=""><td></td></t<>	
	12 0 12 12 12 12 12 12 12 12 12 12 12 12 12					23360							0-3400 	Vec () (MORNING TOUR				2401 Com S 50000 S 500000 S 500000 S 500000 S 500000 S 500000 S 500000 S 50000000 S 50000000 S 500000000000 S 5000000000000000000000000000000000000			віте віте <t< td=""><td></td></t<>	
	1000	6 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2				23800		5 V)				2960 2000 2000 2000 2000 2000 2000 2000	0-300 	Vec () (HORNING TOUR				3m1 3m1 3m1 3m1 3m1 3m1 3m1 3m1 3m1 3m1			Віся Віся <t< td=""><td></td></t<>	
		6 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2									2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	23400 2400		Vee (7) % (7)		MORNING TOUR				2411 Crim S 50005 S 50			ВІС 4000000000000000000000000000000000000	
												2860 27 20 20 20 20 20 20 20 20 20 20 20 20 20		Vec 1) 5 3 0 2 40 40 40 40 40 40 40 40 40 40		MORNING TOUR				231 231 231 231 231 231 231 231 231 231				
												23000 2000 2000 2000 2000 2000 2000 200		ννεε 		HORNING TOUR				232 2401 25 50005 26 700 26 700 20 700 20 20 700 20 700 20 20 20 20 20 20 20 20 20 20 20 20 2				
														ννεε 		MORNING TOUR				2010 2020				
														۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰		MORNING TOUR				3 507105 5 507105 M ⁴ 3 207 W 3 20				
														۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰						2401 5 90705 4 10 7 20 7 10 7 20 7 10 7 10 7 10 7 10 7 10 7 10 7 10 7 1				
CD-1271					ай би 	Radio 2								2000 200 2000 2		MORNING TOUR				3 107105 3 107105 3 107105 3 107105 3 107105 3 10705 3 10705				

. *

-1/2

•

3/5

NU	ATT REL		PCR				1	, mic		1 · ·																
	Ì	Ċ,	2 0				6	(-3-	-81	•	•• •	•••• •	• •	-	•• ••	• • • •	• • • •	• • •	•	• •						• •• • •••
	CONTRA	CTOR		· · · · · · · · · · · · · · · · · · ·				RIG	NO.	1																
-	\sim				~					FIELD ON DIST.	· · · · ·	000	(TÝ			STATE			T							
	j	<u> </u>	<u> </u>	. 1	<u>}</u> (1		<u> </u>		Dear	<u> </u>	<u></u>		205		4	<u> </u>		THRE		ECURU	12.61				
-	SIGNATU	RE OF	CONTRA	ACTOR'S	TOOL PUSH	(ER ~	<u>د</u>	•			NZE	INKE		4 GR.	100	PEET	REA TO	SET AT	1 3428		144 1			PT. 3	#TED	
			•				• •	-	-	LAST			1.	1	-	1.		1.	P1. 0	UT OFF	- -		PRESE	TLOIG	TH	
		r	• •					- STRO		CASHIG	3				<u> </u>	100	Lis_		_							
-6 4	PUMP HQ.		PULP.	BARUFACT	URER		TTPE		TM								1 .		TOH &	LAST CU	PS T					
				•		- <u></u>					· ·	1.				1	1	1	OMU	LATIVE	· · ·					
									÷	<u> </u>		1			l <u>.</u>	1	<u></u>		TONE	al. OR TRS	*					
	1				T					L LO	OTAGE		-	3		FORMATIO	101		OTARY	-	Frank	-	 • #0.	60	P 140.	HETHOD
HL V		Шт	RECORD		I	WUD RE	CORD						10.	- Ť.	ି କାର	ow continect	weim :	• •	6Pu	BIT 1000 .	PRESS	UNER	sea	LHER	1.0	194-
_	BIT NO.				TIME						1			4.					+	<u> </u>	┨────	wite	+	SIL	+	100-02
	STZE			· ·		1.	· · ·			40	100								!	_	1		<u>ا</u>		1	<u> </u>
-			TIL		PRESSURE	1			11 -	II					_											
	i wac a	OUE	111.	╏┓┓┓	GRADIENT	<u> </u>				1					•							· ·	1		1	
-	MFG.			 	VISC -SEC	<u> </u>	 		lli			6PTN	DEV.		DIRECTION	00	PTN	DEV.	OWNE	CTION		HT-TH		DEV.	CHREC	CTION
	TYPE			1	PV/10	$\downarrow \downarrow$	+-4-	<u>↓</u>		DEVIATI				+		1					1		+			
	SER. NO	<u> </u>			CELS		1.7-	<u> /</u>	Πğ	Time	100	ELAPSED	<u> </u>	┽╌			L				.					
				1	N			L	Ŷ	PROM	10	TWE	0000 +	0. 001	TAILS OF OPI	ERATIONS IN S	EQUENCE AN	ID REMARKS								
	/TFA	2				1			II ž	<u> </u>		1 2	<u> </u>	E	110			÷					<u>t.u</u>	<u></u>		<u></u> .
				<u> </u>	100.053	1	· .		1		Arres	1	20	Ir		4	. 4 0			r.1)	1.40.5		- 	·	•	
	- HLABO	our		ļ	1	<u> </u>	t					1	-,						7			;				
	DEPTH	IN I		L		D & CHEMIC	CALS ADDED						\vdash	-+-		<u></u>			· ·	<u> </u>	<u> </u>	<u> </u>				<u> </u>
-	TOTAL	FTG.			TOPE .	ANT.	TYPE	- MIT		J		<u> </u>		- 14-	<u> </u>		Mig- 24	<u> </u>		<u> </u>		3	<u>k</u>			
_	TOTAL	HRS.				<u> </u>					· · · · · · · · · · · · · · · · · · ·	L		_++		- Ciga	1	1.	_ ÷.	·		· /		•	<u> 7 1</u>	<u></u>
	9 curt 51	TRUC.	III							· ·	19.20	L			<u> </u>							••				
	1 10	011						-		$(\eta) > 0$	1: 10	1-7	·		·											
	1 19161	DIR	11						11	· ·	, s.			17	·	/ .	•						LER			
	Griverum		-	1	╞══				()⊨							_			1	T	1			<u></u>		THETHOD
81		±∎t t	RECORD		: .	NO REC	ORD	•`		E0	OTAGE	00_0	COME	•	GH	PORMATIC DV CORE REC	AN CONTRACT	. •	ROTAR	1	PRESS	94		PU	WP HQ.	CLDI .
		T	~	1		1	1			PR04	. 10	. COME.C											S.P.M.	SZE	5.0.0	<u>& F</u>
	- BIT NO.		0.1/1		1	 	<u> </u>			in	200								170	Lap	400	11			1	
<u>_</u>	STZE		74	Γ_{TTT}	WEIGHT	 	┼───				1200							•	110	1	1	P	1	1	1	1
2		DDE	111	<u> </u>	GRADIENT	ļ	l								•					1			· ·	1	1	1
\leq	MFG.			· ·	VISC SEC						- <u>-</u>			-		1 00	-	DEV.		I CTION		I	<u> </u>	DEV.	OIRE	
	TYPE		•		Printe					DEVIATIO	• "			+												
	STR NO	, T			2,00		· /	/-	ll g	RECORD				- 		1										
			15						11 P	PROM	10	THE	C00E	0.00	TAILS OF OPI	ERATIONS IN S	EQUENCE A	© REMARKS				•				
47		2	15				1		١X	12.00	1:40	140	2	11	2.11.00	~ <	Same	1 + 9	Shal	le_						
ź	1		ιζ_						11	1.10	2120	1	6		/ -	2	mid		1 /		1+	11.	1.			
47	DEPTH	out				+	!	<u> </u>		1 3. 3.	1- V/	1	12	15	بتصمو		- un	1	<u>_</u>	Hen .	are_		- K			
≩د	DEPTH	IN			┢──┓						a.y	1	1.0	-++	ᢣᠰ᠋ᡰ᠇ᠷ	y 5	- crone	<u> </u>	مملح	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-					· · · · ·
	TOTAL	FTG.		<u> </u>	THE	ANT.	TYPE	MT.		€#بة	Ci.s	12-	<u> </u>	44	دوسط	6-out		- work	ه	×~-,	رمميهر	>—£	ᡔᠬᢇ	-Q	pud.	-vit-f
=	TOTAL	HRS.					l	· · ·		6.55	12:00	5	12	-16	}~<i>;∦;</i>≁	4 <u>~</u>		L	Sho	rte				-,		/
1.0	0 CUT ST	RUC.		TTT	1			1	HI '			Ľ				/			_		-					
	1 10				_				11.					·	•							•				
	- 18 6 C		└┧╍┖┥	┞┵Ӻ┸					91				1											~~~~	4 h	town
=					╞══							<u> </u>				_			1	1		1		1	/	Luczupo.
-	1	_∎it (RECORD			MID REC	ORD .	:		P1	OTAGE	08_0	CORE	· · ·	, ' 09	FORMATI	CON COMBETTO -	•	ROTAR	VT. 04	-	-	# HO.	~	HP HQ.	RA
	977. 10			<u> </u>						PROM	. 10	CORE	~							1000-	PRESS	SZE	SPA	92E	S.P.M.	ALL :
					1=-	 	 	 											1							1
-8	1 <u>34</u>		TTT		WEIGHT	<u> </u>	<u> </u>				1									1	1				1	
-	LADC O	ODE	HLL.	\mathbf{L}	CRUDIENT	I	· · ·				+	_							+	+	h		<u> </u>	+	1	+
	MPG.				VISC SEC	·				⊩ —`	<u> </u>					-	T		<u></u>	1		1	<u> </u>	1		
	TYPE				PW/11	L				DEVIATE	»⊢_"		OEV.	4				U-E V.			<u> </u>		'	we v.	GHIE	
	SER NO	.			4.00		1./	-7-	III §	RECOR	<u></u>		·	╇												
					-	1	1		15			TIME	CODE	0. 04	TALL OF OF	ERATIONS IN										
	/IFA	2		1.		t		<u> </u>	ii E		1	1	1													

ł

										_					112								
								· · ·						1007.4	13	<u> </u>		<u> </u>	1.20- 74			.201	ST3
		<u> </u>	<u> </u>	·		SUBANABU C		35 HI 9HOU.V	1940 40 S TV			03500		51 2MU	Į į	-7-	17	7	7130			40'	<u> </u>
+							+			_+		+		DEVLATION	,	-7-	17	17	-				311
┍╧┈	┵┯	NLAN		HOLL	23380	1 280	N		HOLDSA	<u> </u>	7.00	<u>+ -</u>				(1					PPD
┢┣-		-+		<u> </u>							· · ·	┠──┼				· · · ·			THERE			3000	ם ל
	-+	-+			┼──					_	· · ·	┞─┼				-			.ur913m	┠╍╍╍	┢┸┖┸	<u> </u>	32
275		32.6	-															1	3001		<u></u> +		U NC
			;;;;;	AL ON	VIAN TOR	· ·	· (1996)		(CHG)	:	10 10						Ğ	DO BECO	.	•	KECOKD.	ANT.	-
					1	<u> </u>					I									<u> </u>			
<u>P 6</u>																		_		\mathbf{H}	+	18101	9 6
						<u>.</u>	•							ļ				 	 		Π	10	0
			- <u>A</u>					~~;	2 ding	<u>⊢</u>		6/.	0 -0.e	<i>ŧ</i> −−−+					 	┟╌┵╌┵	╋┸┻╹	2001.	עעד
برويق	136-	tert.	to-		1/27		<u></u>	nava	2.0	<u>ا</u> ر خ		-// (<u></u>	' or: ≆	UI I		344	- TMA.	2044		<u> </u>	- 214 -	TVI
	1/20	اريدن	4	μ <i>i</i> ;	-1		مدر	$\dot{\rightarrow}$	300	<u>بل</u>	<u> </u>			1057			4300V 5T	0110101	<u>ann</u>		┼──	NUT	HL
+	-Le	• 3 +	10					<u></u>	Turna		<u>د ۱</u>	1-0%	1-2-	1001		┣───	<u> </u>	<u> </u>	1 101700		<u>├</u> ───	1001	HUZ
<u><) </u>	ج		7		, <u> </u>	ترك	4	$ \not \rightarrow $	C		7)	24	00	1001		┣───		┢───	<u> </u>	├ ───			v
			0		•					<u>v</u> _	<u> </u>	211	1	+	Ð	┣───		<u> </u>	120-2	ł	1	1.25	S
	- <u>-</u>					STRAMBIC	DIVERSE WE	35 HI SHOLL!	/1240 40 STA	0 061	1 3000	0550	<u> </u>	27 200	Ĩ		7	1-7-			<u> </u>	0	N 1
+				<u> </u>								- 		DEVIATION	1		+5-	+5-	-	}		<u>├</u> `	
1 100	·	HLIDO	-	HOLL	DIREC	1 200	M	1430	HOLTOR	.	-v90	╧╧	000						23-256				Ū.
┢━━╋					L									ļ		∦ ───		<u>├</u> ──	LUGIOV NO		+	3000	5.0
					 	ļ			·		ļ	┢──┼		<u> </u>		 	<u> </u>	<u> </u>	AEICHL	┠╼┸┹┷	┨┛┛╹ ╸	┢───	Э
┝═┼			· · ·											L				<u> </u>	3001	 	<u> </u>	$+\tau$	ON
	was a		553944	-0004	mate		. wa		ACHON .	· .	-04	27200	01	HOM			· •	<u></u>	<u></u>		.1	1	-
		<u>~ </u>	2	AL OH	TIANT CO			HOITANDO	<u>ه</u>	1		ă-100	337.	1003							680033	1718	
		2	Z	_	10	~	<u>ر</u>	7	SIL	1	Σ					· I				┠┯┼┯	+ + + + + + + + + + + + + + + + + + +	ISd dil	MAA
			1		22	2			. []	r_{V}						$[\cdot]$				┠┼┼┼	╏┫╎	10	0
	•	<									4										μ		110
	\sim			1	· C	41	~ ~ ~				21			<u>() () ()</u>								5011	
912 1	, <u> </u>	0			17	7. 1	17 10	6 <u>1</u>		<u> </u>	1	·	101	6		-1.00	03004 21	A DEHCA	anie				
		2.0		27	• • • •	12.11		+ 71	spisze	21-	5.		- CCC	10.00		L					<u>}</u>	100 1	1112
$\overline{\tau}$	h C			E.	- 5 2	2092	000	17-J	c'	2					B	 	<u> </u>		1 501105		 	4~.	
122	8407		-2		<u>ן כ</u> ק				• • • • •		τ.		0750	109.72	Ĩ.	ļ	<u> </u>	ļ				1	.v S
						SIRVING	SHY SOHON	THOMS IN SHOLL	NI340 IN 578	130 0	- 3000 H	Cast AV	3 01	71.2014	a -			<u> </u>	1.30-14				
		•					•							RECORD	Š	-4-	4	4	195	· · ·		<u> </u>	- 32
7430		NL490		HOL	23210	DEN.	H	1430	HOLLOBH	•	'ABG		1.430				<u> </u>	+	338-784		<u> </u>	<u> </u>	
																	┣──-		CRADIENT		h_{TT}	3000	<u>, 2</u>
\vdash		[<u> </u>								L							<u> </u>	AEICHL	┠┷┷┷	μ		æ
\vdash							_				L		OZ	1002		ļ .			341	 			ON .
375 3341	145 g	175 3H)	11204	+ 0004	14.50		: tuma	COSE DECOM		'			01 · ·	HOMA		l			• • • • • • •			 	
<u> </u>	701 27	<u>~ </u>	-	ND, TW	N84108			HOITAMSO	•			a . 80	1VCE	1001		II			·	<u> </u>			
			54		10x W				1 · ·					[<u> </u>		, I					
	·			10 15V	1 30005	<u> </u>	· · ·	<u> </u>	<u>†</u>	╬╼╊		`	<u> </u>	1									
				wart 90 .	TOH IN	00	01	0 -	+	12-			12.00	2001 100 200001		NOUIS	3411		83	NUT2A NUHA	7 dm/1d	Ľ	1014
usian hia	1294			1.066	m :u	27	~/	↓	-	لاستع			1 - 2	1.11								•	
mul		5200			3215	14 738	01 100			100	<u>'aa</u>	3344	- 3215	I,			<u> </u>	8	IHSTIA . TO	21 2 20 20	CONTRA	TURE OF	TAP
	100 113	1310	G2003	ia ani'i	- 3318							2		1510 00 01314	[7	·····	-	· · ·	·	••	• .	. (
								the set of the set of the set	the second se						_				_				
	••••											•			<u>t o</u>	RIGH						ROTOR	<u> </u>

•

:

-5/4

									•			ł	1	1	1117	18	_	 -	·····	I	_	1	
																			644			2 4 V-11	
<u> </u>		_					-	STORE IN SHOLLY	112.01.01	7 0614	CODE H0	24	- 81	1 HORE	ă.				7.30- 7a	•	1	2071 \$12	
	1	1				1	1					1	<u></u>	000038	12	IEF		$\overline{17}$	30			ER NO	5 4
	1430	-		-	12200	1 1000	- <u> </u>	1.000	804.53		****			DEVIATION	17	17	77	TT	* dk/Ad			34.	-
	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>					T	 						1	NIC BEC	 		100.	a i i i i i
				<u> </u>		<u> </u>					+	- +						1	CRADIENT		rtmr	3000 200	
			+	 							<u> </u>	┠──┟						<u></u>	LICIA	┝┸┸┙	\mathbf{L}	37	<u>_</u>
		_	-	—		I					+	┢──╁				 		<u> </u>	2011	 	<u> </u>		
	328		L 53394	177	-	ŀ		CONE RECO		1		2.2800	QL .	* 1016				I	L.,				
- 19718 - 10H -		-04 4904		NO.17			·	HOLL VIGIO				0.00	. 304	E003				ID SECO]_	GROOM	1 THE	רי
WY NY	4040	-	T									1		1			1	T		. 1	1-1	ISd dWGd/M	149 787
	~~~~~~		I					1								II		+			Π	8098	Titute
				77		2100	4	to t	may of	72	-9-	<u> </u>	100.0	1	11	⊪		· 		1		נסע צעאתכין	
			•		104	<u> </u>		, work	60-11	201	4					II		+	<u> </u>			STAL HRS	문 P
		2/ 1 ~	5000	- 10			2-10	o sm		<u>74</u> //	20	77-				11		- 100	-			DIAL FIG.	<u>.</u>
	$+ \tilde{\alpha}$	10			<u>π</u>	Ting		a. /	Para	-1	16	2	12-	1			C300V 51	CIENICA	018	 		NI HLAR	
	<u>1 10</u>	<u>~ ~ ``</u>	Mar	- 20		H	17		- /	T	1			Vz.E	III	II	<u> </u>	L	L	<u> </u>	-+	100 114	
		×.	1	<u>т</u>		14	L I	100	0.7	52	7	<u> </u>	06.0	1.30					\$ 500105	 	<u> </u>		- 12 _
872 FTT	72 (7~	15	- 12	-L'M	207	14	6 X	. [] •	70	2	19	105-	100:21	1						1 .	2 ⁰¹ Vd	J ar
				1.	-	STREAM	OW YONGH	D35 HI SHOLL	110.0	N 190 X	CD06 H0	2001	- 04	HORA .	1				1.20- 74		`		107
<u>.</u>	1			1		T	-		1			1 43547 6	<u> </u>	(1)(0)(3)	 S	1-7-	/	F.Z	6677			ON 35	× • • • /
	+	+				+			101173		'A20	+		DEVIATION			17	17	dh/hd			BU	- -
	×30	<u> </u>	490			1 200	'				1	+							235-2514		-	100	R 7
					I	Ļ								- 240					CRADIENT			3000 207	vi - C
			_	<u> </u>		L		5-17229	ar + - +	. \.		- +	366	DAL	1	<u> </u>	·	1	AEICHL	╏──┴└─	-+	32	3 6
							131		<u> </u>	$ \chi $			SHE	142			-	<u> </u>	2011	i		TRO	
2000 · · · ·	3215 1	ar 177		-							1	Date	ØL	90964					<u> </u>				- H
19738 700		-		BLE OH	110100	l i		HOITAME		1. A.	2000	0.20	304	1003			` 01	no secon	۳.	ſ	02003	a Ti <u>n</u>	רג [
10000	1	ALC COL	1		<u>.</u>	.		7 r	T	TT	9	1 7	1007	I OCH				<u> </u>	T		T	ISdramild/W	
<u>ر ن</u>	- - - 12	/	<u>نځ</u> وسنهل)	÷ S	-05	<u>tó</u>	يلحر	7-51	-7			1000			II	+	+	<u> </u>			8 6 0 8	<u> </u>
	ہے ج	****	\mathcal{A}	L.	Sher-	-01-	101	do -				 				 			 			1000	
							·		UT			 					+			┢┷┙	╘╋┹┻┸┛	2014 11/10	
			·		1		í		110	2						III		·	-	I			
			7	7.9-	<u> </u>	حر .		0		2							0300V 51		<u>ann</u>	·		NUL	_ <u></u>
	772		ナー・	Nº 17		2	20	ਣ		7.	-37	h h	105.5	202.20	l ·					ļ	_ <u></u>		
								1010	1.00	24	10		C2. 24	1050	K				1 501105				
			アセ	7		art	$\rightarrow C$	m	111	11	11	61.17	15 10	0017	Ĩ						1	LA PT	ν Γ
	······					53899838		625 HI SHOLL	V1040 40 51	T 06179	CDD6 HD	3441		HORA	ð	-		Γ.	1.30- Te			201 312	. <u>.</u>
	ï	T					-		1			1 0.5.671	<u> </u>	13mu	lig			111	1180			ON 3E	s 19
	+	-	~	<u> </u>								· 		DEVLATION	117		1)	TT	dl/Ad			BALA	- 1
012550	DEA 1	<u> </u>		Į		Dir.x.			1			╷──╷╹					- P	11-	225-25M			- Del	# 1
	├ 		_	\vdash	 	 					+	┨↓		<u> </u>		1	-1	†*	CENDIENT		пπ		1 10 -
				L	L	L						$ \downarrow \downarrow $		l		·····		1	AEICHL	┢┷┷┷┙	Ч	32	<u>.</u>
										<i>.</i>									3101			U. NO.	a i se -
21 1 1 1 1 1 1	77%	·/T (32)	·	• 000								23800	of.				<u></u>		<u> </u>		_ <u>t</u>		╶┼┫┼
	1347		1 2200	HO 1A	TRATOR	1	ues	HOITAMSO	i inderstationen serie de la constationen de la constationen de la constationen de la constationen de la consta Estationen de la constationen de la c		3300		3071	. 160						· ·	620231	8 1 FT	
· HETH 100.	4704 V	TOH JHITH	1			_		1	T	TI	- I			<u>.</u>	1		r	· · ·					
M13 100	83941) T 4904	101 - 201			-			-	1	1. I			<u> </u>	1	⊢		<u> </u>				<u> </u>	<u></u>	
HITH CONT	4300 V ARIA	101 4854		SALL NO													-						
	4904 T	104 .007.0		ALL COLL	TOH HUT		T	095	5	3	<u>^</u>		4	100 1145		TOWAL.	341		22				Wid 10 10 10
				OR TRUE			T OT	095 04	5	4 50	с Я		451	OK FINEK LORINC CV7NHC	P	NONIS	344	4	83	901 J J 908	rvæ amfia	-010 di	WN a B 9 5
		101 Jan		ON TRUE			01	09C	5	4 55	с Я		451	DR LINER TUBING CASHIG LAST	F	10815	J <i>d</i> A	•	83	90124 904	rvn 44014	IS NO	m a 1 2
00011399 00011399 00011399 00011399 00011399		294 Januari 2944		OR LERA		TA 732	01 01 01 929	095 07 100	5 Sumor	ج 22 هو	С У 1	3374	1. 125	OK FINER LIBING CVRHC CVRHC	F	STROKE		4	1111 1111	106'S TO		IN TURE OF	
		204 2334	530407 1 204 Gibi00	OR LENG VILLE VILLE VILLE OR LENG OR LENG OR LENG		74 732	1 01 30 30	09C 09C 104 100	5 Sumor S	9 55 100	х Х Ал	33999 2 단	2, 175] 11215	06 LINER 71/16/16 2011/16 1.051			 	8		1 - 1	CONTRACT	14 HOT	10 m m m m m m m m m m m m m m m m m m m
NTIL 024		104 JADAJ 2044 104 72220		OF TRUE	104 W 2040 W 104 W 104 W 104 W	TA TE	ा ೧। ४४.३२२	092 04 170 170	5 SLUMOV S	59	Г Х Ч	33999 2010	2.5 1751 1775	OR LINER TUBIE CASHE CASHE			344	*	HSN-TOI	1		жителов (54	
		600 100	53H47 12H G2802	00 1004	1 304 1 1100 1 30445 1 30445 1 30445 1 3045 1 3045 1 3045	74732	1 01 30, 300 01, 438	092 (1) 1) 1) 1) 1) 1) 1) 1) 1)	5 Submor SN S	55 55 20 2	Г Я Рас А	33998 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3	1.1 14 E 1225	DE FIERE CYTHIC CYTHIC LIBINC CYTHIC				4 	aan MSUT-JOI			HATEACTOR	nn4 n 1 2)IS

"Slim Hole" Drilling Program

Objective: Drill/Complete exploratory hole to $\pm 1500^{\circ}$ TD and evaluate formation. Conductor casing 13 3/8" set at $\pm 40-120^{\circ}$, surface casing set at $\pm 250^{\circ}-400^{\circ}$, 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 26/4" hole for 20" Conductor Casing.

4. Spud well with 17 1/2" bit and drill to \pm 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 \pm 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 it 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 $\pm 250^{\circ}$ -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.

<u>6 1/4" Hole, ±250'/400' - TD</u>

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 just before use (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: $\pm 40-120'$ 13 3/8" 61 ppf J-55 BT&C in 17 1/2" hole Optional: $\pm 40-120'$ 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 1D: 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" \times 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 its

- 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 onlocation 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



Not to Scale



JCH 10/5/88

4 -28 -28 -212

Appendix C

LITHOLOGIC LOG OF MEI WELL S-89-4

Prepared for

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

By

Joseph N. Moore Salt Lake City, Utah

July, 1989

EXECUTIVE SUMMARY

MEI well S-89-4 was drilled into a structurally complex fault block. The rocks encountered in this well are similar to those in other MEI wells and include alluvial deposits and soils, Three Creeks Tuff, Wales Canyon Tuff, a pyroxene-bearing dike, and the Coconino Sandstone. However, repetition of the Wales Canyon Tuff and the underlying soils developed on the Coconino Sandstone demonstrate that the upper 460 feet of S-49-4 are part of a gravitational glide block that moved from east to west.

The Coconino Sandstone which hosts the steam reservoir was encountered at a depth of 600 feet in S-89-4 and at 850 feet in S-89-1. These relationships indicate that S-89-4 is located in a different fault block than S-89-1. The most likely orientation of the fault that separates these blocks is easterly, with movement down to the north.

The volcanic and sedimentary rocks of S-89-4 have been intensely altered to mixtures of quartz, pyrite, calcite, and sericite. These minerals indicate that temperatures during hydrothermal alteration did not exceed 200° to 225°C.

MEI well S-89-4 was sampled to a depth of 620 feet. This report describes the lithologies and alteration assemblages encountered in the well.

LITHOLOGIC RELATIONSHIPS

The lithologies encountered in S-89-4 are illustrated in the attached log. The rocks encountered in this well include alluvial deposits and altered soils(?), the Three Creeks Tuff, the Wales Canyon Tuff, a pyroxene-bearing dike, and the Coconino Sandstone. However, as discussed below, gravitational gliding has resulted in a repetition of the Wales Canyon Tuff and the sedimentary deposits overlying the Coconino Sandstone.

The alluvial deposits in S-89-4 extend from the surface to a depth of 120 feet. These deposits consist of poorly consolidated sands and gravels composed of the volcanic and sedimentary rocks exposed in the adjacent hills. Layers of gravel, consisting of coarse rounded clasts of these lithologies occur at 60-70, 90-100, and 110-120 feet.

The cuttings between 120 and 160 feet consist dominantly of light-gray Three Creeks Tuff, although a variety of sedimentary and volcanic rock fragments, and aggregates of sulphides are also present. These fragments appear to represent material derived from the shallow alluvial deposits.

Between 160 and 350 feet, the cuttings consist of uniformly gray Three Creeks Tuff. This ash-flow tuff is characterized by approximately 50% phenocrysts of quartz, plagioclase, biotite, potassium feldspar, and hornblende in a matrix of densely welded shards and ash. The Three Creeks Tuff is distinguished from other ash-flow tuffs by the common occurrence of dipyramidal quartz and its coarse grain size. Thin sections of the Three Creeks Tuff from S-89-4 show that the phenocrysts and matrix of the rock have been strongly altered to clays, sericite, quartz, and carbonate.

The Three Creeks Tuff in S-89-4 appears to rest on densely welded Wales Canyon Tuff. Although also crystal-rich and mineralogically similar to the Three Creeks Tuff, the Wales Canyon Tuff is finer grained and lacks the conspicuous quartz phenocrysts that characterizes the overlying ash-flow tuffs. Thin sections show that the Wales Canyon Tuff, like the Three Creeks Tuff has been intensely altered. Nevertheless, the general features of the Wales Canyon Tuff can still be distinguished.

Two intervals of Wales Canyon Tuff, separated by altered soil(?) containing fragments of Coconino Sandstone, were encountered in the well. The Wales Canyon Tuff is present between 350 and 450 feet and again between 460 and 590 feet. The lower section of Wales Canyon Tuff ranges from medium-gray(460-560 feet) to light-gray(560-600 feet) in color.

Fragments of a porphyritic pyroxene-bearing dike are present near the base of the Three Creeks Tuff at 360 feet and in the underlying Wales Canyon Tuff. Thin sections from 350-360 show that the dike contains phenocrysts of enstatite accompanied by minor altered olivine(?) and clinopyroxene. The matrix of the dike consists of fine-grained plagioclase, clinopyroxene, potassium feldspar, and magnetite. In contrast to the associated ash-flow tuffs which are strongly altered, fragments of the dike are relatively fresh.

The mineralogy of the dike fragments is similar to that of the "latite" dikes and domes mapped by Moore and Samberg (1978) in the Sulphurdale area. Based on the mapped relationships, it can be shown that the "latite" was emplaced after the Three Creeks Tuff at 27 my but before the Osiris Tuff at 22 my. Moore and Samberg (1978) concluded that the "latites" were related to intrusion of a quartz monzonite stock that underlies Sulphurdale.

Fragments of Coconino Sandstone occur in a 20 foot zone between 440 and 460 feet and below 590 feet. Chips from a depth of 450-460 feet contain clasts of both Coconino Sandstone and highly altered Wales Canyon Tuff. These clasts occur in a matrix

of fine-grained quartz and sericite. The presence of both lithologies suggests that this clastic rock represents a fault breccia.

In contrast, chips from a depth of 590-610 feet consist of fragments of sandstone in a matrix of sericite and quartz. These chips are interpreted as representing soil developed on the underlying Coconino Sandstone prior to the deposition of the Wales Canyon Tuff.

The top of the Coconino Sandstone was encountered at a depth of 600 feet. Thin sections show that the sandstone consists dominantly of quartz cemented by quartz overgrowths.

HYDROTHERMAL ALTERATION

With few exceptions, the rocks encountered in S-89-4 display intense argillic alteration. In order to better characterize the alteration assemblages and textures, thin sections of selected intervals were examined. The location of the thin sections is shown on the accompanying log. Brief descriptions of the thin sections are presented in Appendix 1.

The alluvial deposits have been hydrothermally altered to clays and aggregates of sulphides. X-ray diffraction analyses of similar aggregates from S-89-5 indicate that the sulphide minerals include both pyrite and marcasite.

Petrographic examination of a thin section from 134-140 feet which contains abundant sluffed material indicates that some of the fragments of Three Creeks Tuff contain fine-grained clay (probably kaolin), calcite, and sericite (mixed layer illite/smectite or illite). Textural relationships suggest that calcite was partially dissolved prior to deposition of the clay.

Both the matrix and the phenocrysts of the ash-flow tuffs have been intensely altered. Plagioclase phenocrysts have been altered to mixtures of clays or sericite, and calcite. Biotite phenocrysts throughout the well have been replaced by fine-grained mixtures of

quartz, sheet silicates (clays, sericite, and light green chlorite/smectite?), pyrite, magnetite, and leucoxene. All of the hornblende originally present in the rocks has been completely altered to calcite, clays or sericite, and opaque minerals.

The matrix of the ash-flow tuffs has been variably altered to mixtures of quartz and sericite (or clays). Much of this quartz probably represents recrystallization of cristobalite formed during devitrification of the originally glassy shards and ash matrix. Similarly, the sheet silicates present in the matrix appear to represent an alteration product of the potassium feldspar formed during devitrification. Silicification of the ash-flow tuffs was observed in the thin section from 450-460 feet.

Pyrite is the only sulphide identified in the volcanic and sedimentary rocks beneath the alluvium. It occurs as disseminated crystals within the matrix of the ash-flow tuffs, as a replacement of biotite, and in veins where it is commonly associated with calcite.

In contrast to the intense alteration that characterizes the Three Creeks and Wales Canyon Tuffs, alteration of the pyroxenebearing dike is very weak. Phenocrysts of a ferromagnesian mineral that appears to have been olivine(?) have been completely altered to serpentine, chlorite, and a pleochroic sheet silicate (celadonite?). Although the pyroxenes are generally fresh, the margins of some of the phenocrysts have been replaced by finegrained amphibole.

Veins are common throughout the wells and are found in all rock types. Vein assemblages in chips of the ash-flow tuffs include: calcite + pyrite <u>+</u> quartz, calcite + quartz, calcite, quartz <u>+</u> sericite, calcite + barite + quartz + sericite + pyrite, and pyrite. Veins of chalcedony + calcite + sericite cut fragments of the pyroxene-bearing dike whereas veins and open space fillings of quartz, pyrite, and quartz + pyrite + sericite are present in the Coconino Sandstone.

In summary, the secondary mineral assemblages observed in S-89-4 are similar to those encountered in other MEI wells. These assemblages are typical of low to moderate temperature regimes. The presence of both interlayered illite/smectite and chalcedony, for example, suggest that temperatures were probably no higher than 200 - 250°C during alteration (Henley and Ellis, 1983; Fournier, 1985). Significantly, minerals typical of higher temperature regimes (225 to 250°C) such as epidote have not been observed in this well.

The differences in the degree of hydrothermal alteration between the pyroxene-bearing dike and the ash-flow tuffs suggests that either the dike postdates the bulk of the alteration or that it has been relatively impermeable to the geothermal fluids. It is not possible to provide a definitive answer to this question since volcanic rocks younger than the dike have not been encountered in the wells.

STRUCTURAL RELATIONSHIPS

The distribution of volcanic and sedimentary rocks in S-89-4 demonstrate that this well was drilled within a gravitational glide block adjacent to steeply dipping faults. The accompanying lithologic log shows that this gravitational glide block extends to a depth of 460 feet and includes both the Three Creeks and Wales Canyon Tuffs. The similarity between the fault breccia and soil encountered at 440-460 and 590-610 feet respectively suggests that the glide plane was localized within incompetent horizons developed on top of the Coconino Sandstone. As noted above, this fault zone is marked by a breccia containing clasts of both the Coconino Sandstone and the Wales Canyon Tuff.

Fault breccia is also present near the base of the well at 600-610 feet. A thin section from this interval shows that the breccia is cemented by fine-grained quartz. Minor silicification is also present in cuttings from the base of the Wales Canyon Tuff.

The depth to the Coconino Sandstone in S-89-4 (600 feet) is approximately 250 feet shallower than it is in well S-89-1. These relationships indicate that S-89-4 is in an upthrown block relative to S-89-1. The most likely orientation of the fault between these wells is easterly, parallel to the major east-west trending structure located adjacent to wells 24-7 and S-87-3. However, the presence of silicification in chips from the base of the Wales Canyon Tuff indicates that faulting postdates deposition of these volcanic rocks.

REFERENCES

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

Henley, R.W., and Ellis, A.J., 1983, Geothermal systems, ancient and modern: a geochemical review: Earth Science Reviews, v. 64, p. 599-612.

Moore, J.N. and Samberg, S.M., 1979, Geology of the Cove Fort-Sulphurdale KGRA: University of Utah Research Institute Report 18, 44p.

APPENDIX 1

THIN SECTION DESCRIPTIONS

130-140 feet: Chips in this sample consist of approximately equal amounts of Three Creeks Tuff and fragments of alluvium. These fragments consist of Coconino Sandstone, Bullion Canyon lava flows, limestone, and dacite. Alteration of the Three Creeks Tuff is intense. Plagioclase, biotite and hornblende have been altered to sericite, chlorite/smectite, kaolin(?), pyrite, leucoxene, and iron oxides. Veins of pyrite and calcite + pyrite <u>+</u> quartz are present. Textural relationships suggest that dissolution of calcite occurred prior to deposition of koalin. Unaltered potassium feldspar is present in many chips.

180-190 feet: Intensely altered Three Creeks Tuff. Phenocrysts have been altered to sericite, quartz, calcite, leucoxene, and pyrite. Fresh potassium feldspar is common. 30-50% of the matrix of the ash-flow tuff has been altered to quartz and sericite. Veins of calcite + pyrite are present. Disseminated calcite and pyrite are also present in the matrix.

260-270 feet: Intensely altered Three Creeks Tuff as above. Approximately 60-75% of the matrix of the ash-flow tuff has been altered. Veins of calcite + pyrite \pm quartz \pm sericite and calcite + quartz are present.

360-370 feet: Intensely altered Three Creeks Tuff as above and approximately 30% chips of a pyroxene-bearing dike. Phenocrysts in the dike consist primarily of enstatite accompanied by minor altered olivine (?) and clinopyroxene. The matrix of the dike is completely crystalline and consists of plagioclase, clinopyroxene, potassium feldspar, and magnetite. Alteration of the dike is limited to replacement of the olivine by serpentine, chlorite, and a pleochroic sheet silicate (celadonite?) and to minor alteration

of the pyroxene rims to fine-grained amphibole. Veins of chalcedony + calcite + sericite cut the dike.

450-460 feet: Intensely altered Wales Canyon Tuff and breccia. Feldspar phenocrysts of the Wales Canyon Tuff have been altered to sericite and calcite whereas the ferromagnesian minerals have been replaced by sericite, calcite, leucoxene, and pyrite. The ash-flow tuff is cut by veins of calcite + pyrite, quartz + sericite, calcite + barite + quartz + sericite + pyrite. The edges of the barite crystals show evidence of being resorbed. Minor silicification of the Wales Canyon Tuff, and open space fillings of quartz are present.

The breccia contains clasts of Coconino Sandstone and Wales Canyon Tuff in a matrix of quartz and sericite. The breccia is cut by veins of calcite.

480-490 feet: Intensely altered Wales Canyon Tuff as above. Veins of calcite + pyrite and pyrite are common.

590-600 feet: Intensely altered Wales Canyon Tuff as above and altered soil(?). Fragments of silicified tuff containing open space fillings of quartz and pyrite are present. In contrast to chips from 480-490 feet, carbonate is a minor alteration product. The altered soil(?) consists of fragments of Coconino Sandstone in a matrix of sericite, quartz and pyrite.

600-610 feet: Coconino Sandstone. Approximately 30% of the chips consist of breccia containing fragments of Coconino Sandstone in a matrix of fine-grained quartz. Veins of pyrite, quartz + sericite + pyrite and open space fillings of quartz are present.





Appenaix D



DEPARTMENT OF NATURAL RESOURCES DIVISION OF WATER RIGHTS

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

Norman II. Bangerter

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:

 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.

- 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</u> further.
 - 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,

san Kent Jones, P.E.

Directing Appropriations Engineer

KLJ:JS:rc

cc: Gerald W. Stoker Jerry Bronicel Delano Development Company

Son

S89-4 Field Cast Est		1		
Based on Grimshaw Drin, Inc. proposed costs	· · · · · · · · · · · · · · · · · · ·			
1000' TD. Not incl MEI administrative costs				
or D7. Backhoe, etc.				
Item	GDI Est	5/31/89	6/1/89	6/2/89
Mob/rigup	2000	2000		
Construct Pad	. 250	250		
Drill 17 1/2" hole 40' @\$31/ft	1240		1240	
Run 13 3/8" Conductor	150		150	
Cement conductor, WOC 6 hrs	600			600
Drill 9 7/8" hole 310' @ \$18/ft				
Run 7" casing x 300' (4 hrs)	400	ļ		
Cement 7" casing, WOC (16 hrs tot)	1600			
NU/Test BOPE (16 hrs)	1600			ļ
Drill 6 1/4" hole 360'-500' @\$12.50/ft	2500	ļ	·	ļ
Drill 6 1/4" hole 500'-626' @\$15/ft	7500	· · ·	·······	
Trip out/2 hr flowtest/"trip in" (5 hrs)		ĮĮ		
			·	ļ
GDI Subtotal:	17840	· · · · · · · · · · · · · · · · · · ·		
Land & Marine Dantala	2500		· · · ·	· · ·
Land & Flar the Rentals	2500		·····	
Unitex Rentals	1350	2400		
		2400	760	
Casing 40 13 578 @ \$19.00/11	0	<u> </u>	700	
Single shot (malagnash (Eastman)				<u> </u>
Single Shorygeologi apir (Eastinan)	2500			
Fuel (Jubricente	2500	ļ		1599 77
Compant Conductor (Carling)	2300		450	1300.73
Cement 7" (Dowell)	3500		700	<u> </u>
H2S Safety	1500	<u> </u>	·	<u> </u>
Genlonist	1000	┟	<u> </u>	
Wellhead enuin	1630	<u> </u>		
9 7/8" hit	1000	<u> </u>	·····	
Welder	500	<u>├</u> /		
Mechanic, renairs	0	<u> </u>		<u> </u>
Generator rental (1 wk)	0	700		<u>}1</u>
	ž			<u> </u>
	\$37.632			· · · · · · · · · · · · · · · · · · ·
Daily Total:		\$5,350	\$2,600	\$2,189
A 7.4.3		45 350	\$7.050	¢10 130

Appendix E

S89-4 Field Cost Est		1		•
Based on Grimshaw Drlg, Inc. proposed costs				
1000' TD, Not incl MEI administrative costs				
or D7, Backhoe, etc.				
			(Final)	
Item	6/3/89	6/4/89	6/5/89	Totals
Mob/rigup		·		2000
Construct Pad				250
Drill 17 1/2" hole 40' @\$31/ft				1240
Run 13 3/8" Conductor .				<u> 150 </u>
Cement conductor, WOC 6 hrs				600
Drill 9 7/8" hole 310' @ \$18/ft	<u> </u>			<u> </u>
Run 7" casing x 300' (4 hrs)	· · · · · · · · · · · · · · · · · · ·	400		400
Cement 7" casing, WOC (16 hrs tot)		1600		1600
NU/Test BOPE (16 hrs)		·	1600	1600
Drill 6 1/4" hole 360'-500' @\$12.50/ft			1750	1750_
Drill 6 1/4" hole 500'-626' @\$15/ft			1890	1890
Trip out/2 hr flowtest/"trip in" (5 hrs)			500	500
GDI Subtotal:				
Land & Marine Rentals	·····	· · · ·	889	889
Drilex Rentals			1325	1325
Compressor rental (1/2 mo)		<u> </u>		2400
Casing 40' 13 3/8 @ \$19.00/ft				760
Casing 320 ft 7" @ \$7.00/ft		2240		2240
Single shot/geolograph (Eastman)	28	28	28	84
Mud/chemicals			1125	1125
Fuel/lubricants		ļ		1589
Cement Conductor (Carling)				<u> </u>
Cement 7" (Dowell)	·	3793.66		3794
H2S Safety		385	1050.56	1436
Geologist			950	950
Wellhead equip		1630		1630
9 7/8" bit	200			
Welder				320
Mechanic, repairs	54.10			54
Generator rental (1 wk)				700
			E Contingens	1945
Daih Tatal	* E 960	5% Contingency:		1000
	40,002 416 001	\$10,09/ \$26 707	\$11,100 \$77 EAE	\$ 70 170
Piles Tadal.	S 1 23 1 0 1 1	1 3/0 34/	1 307.000 1	- 722.110

۰

٠

.

·

•

Appendix F

	IZ HOUR CHART	TIME ON
	COMPANY MEL	DATE 6/5/87
	WELL	WELL NUMBER 5-81-4
	TOTAL DEPTH ON 374 TOTAL DEPTH OFF 54	
	REMARKS	
	TIME RECORD OPERAT	ION RECORD
	8:00	•
	05 ==++++	┝╫╫╫╋╧╋╋╋
	io <u>=</u> =+++++	╺╉┼╀┽┽╊┦┾┼┽┽┿╸╎
	15 ===+++++	╾╋╉╋╋╋╋╋╋╋╋
	20 ==+++++	
о Солония (Солония). С солония с	25 ==+++++	╺ ┥┥┥╡┝╡╎┥┝╪╎┥┥
	30 ==++++	╶╉┼╉╉╋╁╋╂┼╡┟┽╋╸╎
	35 ==++++	╶╂╬╂╋╇╂╄╋╉╄┿╋╸╎╶╴
		╺╄┼╃┽╄╉┽┾╉╄╅┝╉╴╿
		╻┥┥┥┥┥╹╹╹╹╹╹╹╹╹╹╹╹╹╹╹╹╹╹╹
	50 ==+++++	╾╈╃┹╋╋╋╋╋╋
	ss ===+++++	<u>_</u> <u></u> <u></u> <u></u>
	9:00 ==+++++	_┨╡╞╡╞┨╞╿╿┥┥┥┥╸ ╏╶╴
	os ==	╶┼┼┼┼┼┟┼┟┥┥┥┥
		┈╁┽┼┼┼┼┼┽┽┽┽┽╸╏
		╶┼┾┼┽╄╉┼┽┦┽┝╅╃╴╏╴┆
	20 ==	╶┶┶┶┽┽┶┶┶┽┥┥┥╸╸
	23 ==+++++	<u>-∔-┼-┼-┼-┼-┼</u> -┦ │
	30 / ■ → → ↓ ↓ ↓	<u> </u>
	38 = +++++	┶┽┾┼┿┽┿┽┿┽┿╴╣
		╶┼┽┾┼┽┾┽┝┽┝┽╧╢╴║
		<u> </u>
		_ <u>_</u>
	10:00	_↓_↓↓↓↓↓↓↓↓♪
		╶┼┽┼┼┾╎┾┼┼┼┼┼┼╴┦╵║
		<u>_+++</u> +++++
		<u></u>
		<u>_+_+_</u> ≥
	35 3	
		ίν τη
		S S S S S S S S S S S S S S S S S S S
		2

╹╎╎╎┥╿┤╿

বদ্ব -110 siv 50







Eastman Christensen A STAR CCORDING



Plate I 1"=307'

.