

LITHOLOGIC WELL LOG

Area  
Nv  
Chev, R  
SAK 1-9

3102078

UNIVERSITY OF  
RESEARCH INSTITUTE  
EARTH SCIENCE LAB.

CHEVRON RESOURCES COMPANY

PROSPECT San Emidio  
 COUNTY Washoe STATE Nevada  
 DATE 1-30-78 SECTION 9  
 TOWNSHIP 29N  
 RANGE 23E  
 WELL No. Kosmos #1-9

(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
1/30/78	0-70'	gummy clay alluvial sand secondary silica & calcite cement (* Note: % silica >>> % calcite), secondary quartz crystals are also present	40 30 30	54°F		73°F
	70-100	gummy clay <u>extremely</u> fine grained sand	97 3	55°		64°
* Somewhere in ) this interval ) ran out of ) clay ) (MAL) )	100-130	gummy clay very fine sand which consists of siliceous cement (with little calcite) with dissementi- ated pyrite. The pyrite fraction of the sand is ~ 4%	90 10	54°		89°
	130-162	clay *pyrite is disseminated in clay gravel size fragments consist- of alluvial material and siliceous cement (% alluvial material >> % siliceous cement).	90 10	99°	*Mud out temperature is not reliable, see drilling notes.	77°
*	162-194	most of clay fraction was lost during the sample washing procedure gravel & coarse sand consisting of very fine-grained siliceous cement (jasperoid) and slightly coarse-grained silica & little calcite cement with dissemin- ated pyrite	80 20	86°	As a result of the siliceous cement drilling is slow.	104°
10:30 AM 2/1/78	194-224	siltstone, very well cemented with minor pyrite Massive, non crystalline secondary quartz, sometimes fragmental, re-cemented	80 20	MI 90) MO 95)	Most of sample from	
3:15 PM	224-257	fine-grained siltstone-no noticeable cement strong trace pyrite clay - blue green	50 50	98°		105°

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3:45 PM	257-288	very fine-grained siltstone- light grey to white- clay estimate - 50% pyrite cubes - green zeolite? trace	50%	98°		105°
4:15 PM	288-318	white to light grey silty clay- (most of sample washes away)	100	94°		105°
4:45 PM	318-348	very fine-grained siltstone & silty clay- common pyrite (2-3%) weak cement-Mainly compaction	~50% 50	103°		118°
5:15 PM	348-378	white, poorly cemented silt silty clay & unconsolidated clay pyrite common-cubes in clay	30 70	104°		115°
5:30 PM	378-408	silty clay white to lt. grey mainly quartz & feldspar? very minor dk minerals- some bitite? common pyrite	100	102°		115° (estimated)
?	408-437	Lt. grey silty clay as above very sticky-silt fraction <10% - trace pyrite	100	102°		110° (estimated)
8:55 PM	437-467	silty clay well cemented (silica) - siltstone secondary silica trace pyrite clay sometimes has green tinge - zeolite?  (Look at this in office - section 4/or X ray?)	50 40 10	122°		126°
9:20 PM	467-497	silica cemented fine to very fine siltstone lt. grey clay massive secondary silica - some red like jasper? trace pyrite common green zeolite (?) in clays & silts	70 25 5	126°		131°

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TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
9:50 PM	497-505	white, grey, green & rarely-reddish - well cemented siltstone	80	120°	Bottoms up sample	131°
		massive quartz, pyrite, occ. brown banded (opal or jasper) & zeolites?	20		(Look at this sample)	
2/3/78	505-583	sand, fine, medium and coarse contains qtz detritus, pyrite, volcanics and siltstone	50	103°		103°
		siltstone - dark grey, well cemented	25			
		siltstone - white, grey, blue-green, medium cemented. No reaction with HCL.	25			
	583-610	No sample		105°		105°
2/4/78	610-643	Basalt, dark, hard, pyrite	40	110°		not measured
		Siltstone, bluish, very well cemented	30			
		Sand a/a HCL -	30			
		White quartz	TC			
	647-674	Sand a/a	40	120°		"
		Basalt a/a	30			
		Siltstone, bluish a/a	25			
		Quartz, white	5			
	674-704	Siltstone, bluish, medium to very well cemented	35	120°		"
		Sand - fine to coarse, some granule gravel contains quartz detritus				
		siltstone fragments and some volcanics. Subangular, poorly sorted.	35			
		Basalt, dark, dense, hard	25			
		Silica, white,	5			
	705-737	Basalt a/a	60	113°		123°
		Sand and granule gravel a/a	30			
		Siltstone, white, poorly cemented	5			
		Silica, white	5			

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2/4/78	737-768	Clay, soft, gummy, sandy	100	117°		not measured	
	768-802	Clayey sand and gravel, grey	100	112°		112°	
	802-832	Sand, fine to coarse, granule gravel	60	114°		112°?	
		Clay, bluish	30				
		Basalt and quartz	5% 5				
		832-863	Clay, sandy, bluish	100	114°		120°
		863-834	Clay, sandy, grey	100	114°		118°
		834-924	a/a	100	118°		118°
		924-954	Clay, sandy, reddish	100	118.5°		118.5°
		954-987	a/a	100	117°		119°
2/5/78	987-995	Sand, very fine to very coarse, some granule gravel. Detrital quartz. Sand dark grey . . subangular to subrounded - HCL	30	102°		Temp. out not certain	
		Basalt - dark, dense	10				
	995-1026	Gravel, granule † very coarse sand	85	102°		"	
		Basalt a/a	10				
		Clay, reddish, soft, gummy	5				
		Quartz	TC				
	1026-1052	Sand very fine to very coarse	70	102°	Mud out - not certain	116°	
		Granule gravel	20				
		Clay, brownish, soft, gummy	10				
		Basalt, quartz	T				
1053-1089	a/a	a/a	108°		118°		
1083-1120	a/a	a/a	112		120		
1120-1152	Gravel, granule, volcanics and siltstone fragments	20	118°		125°		
	Sand, dark very fine to very coarse, quartz and sec. silica	80					
1152-1184	a/a	a/a	120°		125°		
1184-1213	Sand and granule gravel a/a	100	120°		128°		
1213-1244	Sand and granule gravel, volcanic, quartz grains and sec. silica, reddish silt.	100	120°		130°		

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2/5/78	1244-1276	Gravel, granule-volc. red & blue sit. quartz pyrite Sand very fine to very coarse- volc., quartz det.	50	118°		128°
	1276-1304	a/a	a/a	124°		136°
	1306-1369	Clay, reddish, sandy	100	124°		136°
	1369-1400	No sample			(Crew did not take one)	
	1400-1432	Gravel, volcanic, granule to very fine pebble, subangular to subrounded. Sand, very fine to very coarse. Quartz detritus, pyrite. Red clay.	100	128°	Very poor recovery. Therm. damaged	134°
	1432-1492	No sample			(Driller did not take one)	
	1492-1522	Gravel, granule and sand, coarse to very coarse, sec. silica, quartz grains, pyrite.	80	121°		130°
		Clay, bluish	20			
	1522-1553	Sand and gravel a/a Clay a/a	35 5	129°		130°
	1553-1585	Sand and gravel a/a, pyrite Sandy clay, slight reaction to HCL	30 10	129°		133°
	1585-1615	Sand, coarse to very coarse Quartz detritus. Grains subrounded to subangular. Pyrite. Clay/silt, reaction to HCL positive; biotite Gravel, granule, subangular to subrounded	50 25 25	130°		132°

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2/5/78	1615-1646	Sand, coarse to very coarse. Abundance of quartz detritus Gravel, granule, subrounded, silica fragments Clay/silt, grey, positive reaction to HCL	60 20 20	128°		135°
	1646-1678	Sand a/a Gravel, granule a/a Clay/silt a/a	65 20 15	127°		134°
	1678-1707	Gravel, granule and fine pebble, subrounded Sand, coarse and very coarse Clay/silt a/a, positive HCL	50 20 30	120°		123°
	1708-1741	Gravel, a/a Sand a/a, pyrite, biotite Clay/silt a/a, positive HCL, color changed from grey to reddish	50 30 20	120°		130°
2/6/78	1741-1906	Sand - fine to coarse, quartz predom., sec. silica Gravel, granule or fine pebble, subangular reddish and bluish siltstone, quartz Clay/silt, positive HCL, color- grey	50 30 20	120°	Sample not taken by mooring tower.	130°
2/7/78	1906-1948	Gravel-up to 5 mm fragments- generally dk green to grey quartz, volcanic (basalt) and siltstone fragments Fine grained clay 20% estimated pyrite - trace	80 20	116°		132°
	1948-1978	SS - dk greenish grey, coarse grained-up to 2 mm rounded grains, mainly quartz, some quartzite, some rhyolite & basalt? lt. green zeolite? common. trace pyrite	100	124°		136°

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2/7/78		(1978-1989 - No sample - having circulation problems - Almost complete loss of returns @ 1989)				
	1989-2020	Fine to coarse ss & gravel Quartz fragments & an intermediate volcanic - Andesite? Grains well rounded - trace pyrite Red silty clay	60    40	135°	Clay was playa deposit? coarse, poorly sorted but well rounded grains alluvial or fan deposits?	138°
	2020-2052	Dk. red-brown silty clay	100	122°		138°
	2052-2081	AA	100	119°		140°
	2081-2114	Dk. grey green fine gr. ss Quartz, volcanics, some granite? Red Brown silty clay as above	30  70	118°		130°
	2114-2143	Fine-med. gr. quartz ss - with some volcanic (rhyolite)? Dk. red Brown silty clay	60  40	118°		134°
	2143-2171	SS - med-coarse gr., dk. green, mostly quartz & quartzite & quartz-mica schist. Lt. grey silty clay	70  30	114°		134°
2/8/78	2175-2205 (torco adjusted)	Sand, lithic - medium grained, greenish grey, composed of quartzite, massive quartz, quartz. micro- breccia, and volcanic frag- ments, mainly basalt - vesicular. Grains well rounded. Clay, green to grey & occasionally pink-silty. pyrite - trace.	70  30	120°		126°

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TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/8/78	2205-2236	Sand, med-coarse grained, well rounded, quartz grains and quartzite fragments, some veins from metamorphic Rx - foliated Clay, silty, green & lt. grey pyrite - trace - crystalline on clays -	20  80	109°		124°
	2236-2267	Sand - lithic - mainly quartz, quartzite & quartz micro-breccia. greenish grey Green & grey silty clay Red-brown-sedimentary hemitite? - soft with occasionally striated surfaces - lustrous - like slickensides only too soft - Also gypsum as coating on clay grains - trace pyrite - possible galena some calcareous material - trace calcite?	60  30 10	111°	Joe - check mineralogy	127°
	2267-2300	Siltstone - fine grained, grey to greenish & brownish gray - moderately well compacted but not apparently cemented Clay - soft, brownish red trace massive quartz & pyrite trace green vein filling	50  50	118°		132°
	2300-2330	Red & green silty clay Massive vein quartz & granite gneiss fragments trace pyrite	95 5	117°		132°
	2330-2357	Siltstone, fine grained, moderately well cemented (siliceous)-medium to light greenish grey Clay - lt. grey strong trace of sulfurs - crystalline coating on siltstone chunks, some blade-like crystals. Also trace	90 10	120	Sample-spot check-  Check mineralogy	137



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TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/8/78	2330-2357 (cont'd)	of white prismatic lustrous - crystalline coating on siltstone - zeolite? trace pyrite			(No bagged sample - only vial)	
	2330-2363	Siltstone, AA, medium green Well cemented clay, silty, light grey trace vein quartz	20 80	120°	Most of this sample is from 2357-2363.	137°
2/9/78	2372	Reddish-brown claystone - some shows vein quartz Green-whitish altered basalt siltstone occasionally containing pyrite cubes & a blade mineral (?) Secondary (2°) microcrystalline quartz, 2° coarse quartz (some containing black mineral (?), some showing FE-staining) Gypsum	80 15 5 5%		<u>Spot check</u>	
	2363-2394	Reddish-br. claystone (some shows vein quartz) gray & medium-to-dark green Well cemented siltstone (may be altered volcanics) secondary quartz/both microcrystalline-vein quartz	45 53 2	119°	Note: the siltstone is really altered basalt & the claystone is vein-filling material (see core)	138°
	2394-2422	Reddish-br. claystone gray & green (medium to dark) Well-cemented siltstone - 20% of green & grey siltstone is veined w/a black amorphous appearing mineral (?) - 5% of grey siltstone gives the appearance of being foliated due to the black mineral - 15% of green siltstone contains rounded quartz grains and 2 types of green minerals	25 70	120°	*have this sample X-rayed and sent for thin sections	139°

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TIME	DEPTH (ft)	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/9/78	2394-2422 (cont'd)	- small % of siltstone shows fractures filled w/vein quartz 2° microcrystalline & vein quartz some of which has chlorite inclusions	5			
	2422-2455	Reddish-br. claystone grey-green siltstone exhibiting some characteristics as above foliation is very prevalent in some of the grey siltstone it almost appears to be gneissic in character 2° quartz as above	2 96 2	120°		139°
	2455-2486	Same as above only difference is started to pick up traces of basalt (?) or black siltstone		112°	*make a thin section of this sample	137°
	2486-2519	- Reddish-brown claystone - Gray & green siltstone (same as above) - Black siltstone or basalt some fractured & filled w/vein quartz - 2° quartz/microcrystalline & vein)  <u>Note:</u> green siltstone is much darker than before  - traces of pyrite present	2 10 86 2		*make a thin section of this sample	
	2514-2549	Missing				
	2549-2579	- Gray & green siltstone, as above - Black siltstone or basalt - 2° microcrystalline & vein quartz  *same general characteristics as above	5 95 2	125°		140°

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TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/9/78	2579-2609	-Reddish-br. claystone some showing microcrystalline quartz (or vein quartz) veining	22	124°		138°
		-Black siltstone (or basalt) exhibits small degree of alteration (green mineral possibly chlorite and some microcrystalline quartz)	30			
		-Dark brownish grey siltstone occasionally shows inclusion of chlorite (?) occasionally fractures filled w/Fe-oxides or vein quartz	45			
2/10/78		-Light green siltstone (tuff?)	3			
		-Light grey siltstone (tuff)	3			
		-Light grey-br.-white siltstone exhibiting foliation may be metamorphic	15			
		-2° microcrystalline & vein quartz occasionally containing pyrite and/or chlorite (?)	4			
		-Fine grained green quartz sandstone cemented by microcrystalline quartz & chlorite (?). Quartz grains are rounded	1			
		-Trace amounts of pyrite present	20			
	2623	Reddish-br. claystone - trace black siltstone (or basalt) shows chlorite and/or epidote (?) alteration assemblage, and occasionally chips exhibit veins of microcrystalline or vein quartz	70	132°	Spot check *make a thin section	144°
		Light grey-white-br. siltstone shows foliation texture probably metamorphic in origin	15			
		Dark grey siltstone shows fractures w/Fe-oxides and fractures w/vein or microcrystalline quartz	10			

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2/10/78	2623 (cont'd)	2° vein quartz, microcrystalline quartz and a green colored quartz grains. Some of the vein quartz contains a pale green mineral (?)	5			
	2609-2640	Light grey siltstone (very fine grained ss) same character as above Light br.-white metamorphics as above Black siltstone (basalt) 2° silica vein & microcrystalline quartz (quartz crystals & green colored quartz also present) some of microcrystalline quartz is associated w/ Fe-oxides, green mineral, pyrite Greenish-white fine grained ss(?) Light green siltstone as above *Traces of orpiment (1)  light green clay & reddish-br. clay	55 20 5 15 2 3	134°	---	146°
		Interval shows same character as samples above			---thin section	
	2640-2670	Same as above, no basalt however traces of gypsum, pyrite A lot of 2° microcrystalline silica ~15%		128°	---	142°
					---make a thin section	
	2696	Light br.-white-grey siltstone (metamorphic) Light grey-dark grey fine-grained ss shows chlorite alteration in places, fractures filled w/vein quartz & chlorite, Fe-oxides Light grey-medium grey siltstone 10 parts altered to chlorite, fractures filled w/vein quartz & chlorite	15 70 10	117°	Spot check	129°

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2/10/78	2696 (cont'd)	2° silica, microcrystalline and vein quartz associated w/chlorite (?), some FE-oxide, pyrite Trace of reddish-br. clay	5			
2/11/78	2670-2700	Same as above		116°		128°
	2701-2733	Same as above (see core description below)		114°		124°
CORE	2717-2727	Green, fine-grained sandstone (possibly tuff but doubt it). See the attached core description sheet.				
	2733-2766	Same as above  *Believe the material we have been calling meta- morphics (?) is vein fill - see core description		122°		127°
	2766-2795	Same as above		116°		130°
	2795-2827	Light grey siltstone shows some pyrite Reddish-clay associated w/silica Light-grey siltstone fracture filled w/green mineral (?), silica & clay parts show alteration to a green mineral (?) Metamorphic (same as above) shows alteration to same green mineral as above 2° silica-microcrystalline and vein traces of pyrite  *this sample is exactly like core	10 55 30 2	117°		130°
2/12/78	2827-2860	Same as above		116°		124°

2/11/78

GENERAL DESCRIPTION OF SAN EMIDIO CORE (Interval 2717' - 2727')

Green, fine-grained ss (possibly tuff)

JLI

- large grains (2x matrix size) of a dark green translucent mineral (not chlorite) = 15% of rock
- quartz grains of ~ same dimensions
- has streaks (zones), not fractures, of Fe-oxides, most likely hematite

The core shows generally moderate fracturing; in places the fracturing is intense creating small breccia zones. The main large fractures are irregular and occur predominantly vertically and horizontally with respect to the core and the small-scale fractures occur in all directions. Fracture dimensions range from < 0.5 mm to > 15 mm (1.5 cm). The larger fractures are filled with hematite, silica (microcrystalline and vein) green and red clays, a white brittle mineral (zeolite?), chlorite and another green mineral; minor amounts of limonite are also present. Small-scale fractures consist of hematite and/or silica. Zones (or streaks) and fractures of a green mineral (?) also occur but are subordinate to those described above. Chlorite, clays and the other green mineral in the fractures show slidenslide.

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2/12/78	2860-2890	Light-grey gummy clay Light medium grey siltstone Light green siltstone os in core 2° silica (microcrystalline and vein) also green colored quartz- 2° silica fracture	35 15 20  15	115°		124°
	2887	Red clay (hematite) like fracture material in core	5			
		Quartz ss breccia Traces of pyrite, meta- morphic (as above)	10			
	2840-2922	Light-grey clay Light-medium-grey siltstone Light green siltstone (as above) Quartz ss breccia 2° silica Light-brown tan siltstone Traces of red-clay, meta- morphic  *similar to above	5 30 15 20 20 10	116°		126°
	2922-2953	Quartz ss breccia contains angular fragments of light green siltstone as in core Light grey siltstone (as above) Light green siltstone Light-medium br. siltstone 2° silica (as above) Slate (?) Traces of pyrite	40  10 15 10 10 15			
	2953-2980	Siltstone - grey & green- grey, well cemented Slate - black, well cem. rock? Quartz ss breccia	80 15 5	120°		136°
	2980-3048	No sample?				

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2/12/78	3048-3077	Siltstone, quartz grey-green hydroth. min. - epidote? Altered silica?	100	122°		136°
	3077-3108	a/a	100	?		
	3108-3139	Siltstone-quartz grey green and brownish (or v. fine s-stone?)	100	124°		137°
	3139-3171	Siltstone a/a Sand medium & fine grained, quartz detritus Clay?	50 40 10	122°		138°
	3171-3199	Siltstone a/a? Clay - brownish, gummy sandy	50 50	117°		136°
	3200-3229	Siltstone, grey & greenish green min? Hydrotherm. epidote?	100	121°		137°
	3229-3261	Siltstone, grey, greenish Green alterations, altered clay	100	122°		138°
	3261-3293	a/a	100	124°		140°
	3232-3321	Siltstone, grey & reddish, altered clay		120°		132°
	3321-3351	Grey & red siltstone/claystone hemotite, secondary silica	100	122°		132°
	3350-3381	Siltstone, grey, very well cemented, biotite - quartz cem. volcanic fragments, altered clay slicken-slides on surface? CaCO <sub>3</sub> TC	100	122°		134°
	3381-3411	Siltstone - grey some altered clay	100	122°		133°
	3411-3450	Siltstone a/a sec. silica, volc. fragments some altered clay	100	125°		145°



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Review lithology to 2980

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
	3450-3476	Silt. a/a Dark, dense rock, foliation slate?	30 70	133°		148°
	3476-3506	Siltstone a/a Slate? Clay, red, altered Rhyolite, altered (ash flow)	40 40 10 10	132°		147°
	3506-3537	Rhyolite, altered (ash flow)	100	132°		142°
	3539-3570	Rhyolite, altered (ash flow)	100	122°		142°
	3570-3598	Rhyolite a/a Siltstone, grey	80 20	125°		140°
	3598-3629	Clay, brown, soft, gummy	100	128°		140°
	3629-3660	Rhyolite, altered Black, dense rock - slate	90 10	127°		141°
	3660-3692	Rhyolite, altered Siltstone, dark-grey & black	70 30	122°		138°
	3692-3722	Rhyolitic ash flow Siltstone-claystone grey & reddish	80 40	126°		146°
	3722-2752	Siltstone, grey and dark grey some reddish	100	125°		144°
	3752-3783	Slate Siltstone/mudstone grey & reddish	80 20	125°		144°
	3783-3813	Slate Siltstone/mudstone a/a	90 10	118°		136°
	3813-3825	Slate with Ca CO <sub>3</sub> Quartz, white-yellowish Siltstone/mudstone	40 40 20	120°		140°

LITHOLOGIC WELL LOG

CHEVRON RESOURCES COMPANY

PROSPECT San Emidio  
 COUNTY Washoe STATE Nevada  
 DATE \_\_\_\_\_ SECTION 9  
 TOWNSHIP 29N  
 RANGE 23E  
 WELL No. Kosmos #1-9

(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
	3826-3858	Slate Siltstone/mudstone	70 30	124°		140°
	3858-3888	Dk. grey slate, numerous veins with well formed gypsum crystals	100	125°		140°
	3888-3920	Dk. grey slate Lt. grey clay	90 10	122°		142°
	3920-3952 - Depth adjusted	Dk. grey slate	100	126°		145°
	3946-3981	Dk. grey slate trace vein quartz trace red clay	100	126°		145°
2/18/78	3981-4012	Dk. grey slate		124°		142°
	4012-4043	Dk. grey slate		125° (est) (pump 2 on)		147°
	4043-4072	Dk. grey slate		135°		149°
	4092-4103	Grey slate, mainly muscovite- chlorite, trace pyrite and vein quartz.		136°		149°
	4103-4135	Med. grey slate Lt. brownish grey impure quartzite Vein quartz common, terminated quartz crystals. Observed, also, well formed gypsum crystals. Trace pyrite	30 60	133°(est)		148°
	4135-4166	Medium grey slate - foliation moderately well developed, mainly muscovite. Very minor biotite. Minor silica rich zones which show more fracturing than cleav- age. Very minor pyrite.		133°(est)		148°

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(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/18/78	4166-4196	Slate A/A minor gypsum very minor calcite		133°(est)		143°
	4196-4225	Slate A/A trace quartz (vein) and gypsum		133°(est)		148°
	4225-4255	Slate A/A well formed calcite crystals in veins common.		133°(est)		148°
	4255-4288	Gray slate - well consolidated, probably quartz rich. Main mica is muscovite.				
	4288-4319	Gray slate, minor impure quartzite. Minor vein quartz, massive		131°		150°
	4319-4352	Gray slate A/A, except quartzite up to 1/2 of sample.		124°		152°
2/21/78	4352-4382	Medium gray slate & impure quartzite (50/50%). Some quartz/feldspar?? rich zones are softer, contain biotite and <u>may</u> show kaolinitization.		127°		155°
	4382-4402	Slate A/A Gypsum & secondary quartz common.		128° ...at 4400.....		161°
				98° ...at 4403.....	Fell to after cooling tower started.	122°
2/22/78	4402-4413	Gray slate A/A Gypsum?, silica & quartz	TC	113°		146°
	4413-4425	Gray slate A/A		124°		152°
	4425-4443	Dk. gray slate & quartzite occasional lt. gray muscovite phyllite		126°		154°
	4459-4478	CORE SLATE & QUARTZITE See separate description		100° ...at 4476.....		154°

4453-4482 - interval cored

CORE DESCRIPTION

0' - 1'	Slate with quartzite veins -	40% quartz 60% slate
1' - 2'	Slate with quartzite veins -	40% quartz 60% slate
	Veins with calcium crystals and quartz crystals. Pyrite and mica mineralization.	
	No. 6 & 8 - taken to the office.	
2' - 2.5'	Quartzite with open veins - No. 1 thin section Contact with slate - 45°.	
2.5' - 3.5'	Slate with 45° sealed fracture, some open veins. - this same direction as fractures. Fractures with calcium No. 2 - two thin sections	
3.5' - 4.5'	Quartzite - No. 3 thin section. Pyrite.	
4'6" - 6'10"	Fractured zone with blocky quartz, some clay minerals - sample for X-ray deff.	
6'10" - 9'4"	Slate with sealed fractures, filled with calcium? Phlozopite? 60° are direction of fractures. No. 4 thin section.	
9'4" - 9'7"	Brecciated zone. (Taken to Office - No. 7)	
9'7" - 12'	Slate a/a, intersecting white (calcium and ?) filled fractures.	
12' - 12.5'	Fractured zone with sec. mineralization, red brownish clay, gypsum? calcite? X-ray deff.	
12.5' - 21'	Slate with minor sealed fractures, mica foliation App. horizontal. No. 5 thin sec. No. 16 taken to office 17' - 18'	

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(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/25/78	4478-4495	Gray slate Quartzite & vein quartz	80 20	132°		160° (162° at 4493)
2/26/78	4495-4524	NO SAMPLE		138°		162°
	4524-4556	Slate, dk. gray, common quartz, some gypsum, some pyrite clay and rhyolite-from up hole? numerous metal (bit?) fragments		140°		170°
	4571	Slate - dk. gray, some gneissic also impure quartzite Lt. gray to greenish gray very fine grained soft clay Angular, probably not from up hole Some small part of sample is calccreous - H <sub>2</sub> S odor emitted when HCL added	50 50	150°	Water being added " " Faster drilling-- fault zone? "	168°
	4576	Clay, brownish red, gray & greenish gray. Minor quartz & slate fragments		150°	" "	167°
	4582	Clay, red & gray Black, aphanitic glassy rocks- basalt? or skarn Some blue green zeolite?	80 20	147°	" Check mineralogy	164°
	4584	Clay Impure quartzite Slate	5 75 20		A/A	
	4556-4587	Slate (more of a phyllite) some slate contains pyrite and/or microcrystalline qtz. 2° silica broken quartz crystals, microcrystalline qtz. with or without pyrite. subangular green colored quartz, Fe-stained qtz. <i>Gypsum &amp; pyrite, Quartzite 10%</i> <i>Trace amts of chlorite? transparent yellow mineral. green mineral (?) like one present in Soda Lake 44-5 sulfides (?) &amp; metal frags (from bit?)</i>	75 12 3	146°		162°
					<i>have x-ray analysis sulfide may be (black jact) sphalerite</i>	

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TIME	DEPTH (ft)	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
2/27/78	4587-4607	Missing				
	4607(?) - 4648	Slate -fractured and filled with either gypsum and quartz (micro-crystalline) Quartzite -fractured & filled w/a green mineral (vial contains a sample for x-ray diffraction analysis) ② Fe-oxides -shows some pyrite Clay 2° silica -qtz. xtals, microcrystalline qtz (shows some sphalerite, pyrite) -quartz microbreccia Gypsum -fills fractures & free grains Trace amounts of -green mineral/fillings paces in slate (see vial) -green mineral #2 -sphalerite -pyrite -blue-green mineral (?) -phlogapite (mic) -white zeolite (?)	70 5 10 12 2	MI: 150°F MO: 170°F	*Good deal of rubber in sample from dyna-drill assembly	
	4648'-4660'	Same as Above slate quartzite clay 2° silica gypsum	80 5 ~10 12 20	146(?)		166°

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(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
3/1/78	4660-4691	Slate -fractures filled w/gypsum and qtz. 2° silica -microcrystalline qtz w/or w/out pyrite -qtz. xtals traces of gypsum & quartzite	98  2	142° = MI 162° = MO		
	4691-4719	Same as above Slate 2° Silica Gypsum Traces of mica & pyrite	85 12 3	MI = 138° MO = 160°	This interval is more fractured than the one above if fractur- ing in this samples can be recognized by an increase in th silica gypsum content.	
	4721-4752	Same as above		MI = 152°		MO = 164°
	4752-4788	Basically same as above % vary somewhat but not appreciably.		MI = 148° MO = 168°		
	4785-4816	Same as above only less fractured slate quartzite 2° silica Trace of gypsum	90 8 2	MI = 140° MO = 167°		fractures in slate & quartzite are filled w/ gypsum w/o qtz.
	* Note: 50 gals. of cold water has been added to mud so that MO temperatures will show a decrease for awhile.					
	4816-4847	Same as above slate quartzite 2° silica Trace of gypsum	91 8 1	MI = 138° MO = 161°		
	4846-4877	Basically same as above slate & quartzite 2° silica	99 1	MI = 131° MO = 160°		

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TIME	(ft)		LITHOLOGY	%	Mud In	COMMENTS	Mud Out
	DEPTH						
3/1/78	4877-4906		Clay Slate and Qtzite	90 10	MI = 130°	MO = 161° I cannot determine accurately the amount of silica in sample.	
	4936		Spot check slate -fractures w/ gypsum & silica quartzite 2° silica traces of mica, gypsum & clay	85 9 6	MI = 138° MO = 163°		
	4906-4936		Same as above		MI, Mo same		
3/3/78	4936-4955		Slate -fractures filled w/2° silica Quartzite 2° Silica -microcrystalline & vein& fine grain fine-grained contains Pyrite & 2 other minerals-see vial of unknowns. -large pieces of broken qtz. xtals are present up to 3mm Pyrite Traces of 1, green mineral (see vial) 2, Mica 3, clay & 4, ? (vial)	88 3 8 1	MI = 111° MO = 161°	@ 4944' there was a change in bits after completion of the temperature survey.  Have X-ray diffraction analysis done on the unknowns.  *Green mineral is not like any seen before in hole	
			* Sample exhibits more hydrothermal minerals than previously encountered.				
	4955-4986		Slate Quartzite 2° Silica Traces of mica, gypsum, clay	90 3 3	MI = 128°,	MO = 161°	



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(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
3/1/78	4986-5016	Slate Quartzite 2° Silica -vein w/pyrite also contains 2 other minerals (See vial of unknowns) qtz. microbreccia fine-grained w/pyrite micro- crystalline	86 5 8	MI = 133° MO = 161°	Have x-ray analysis done	
	5016-5052	Slate -as above 2° Silica -microcrystalline -fine-grained micro(fine-grained) vein fine-grained qtz contains py- smokey qtz?	85 10	MI = 158° MO = 165°	x-ray analysis drill rate has decreased from 6-1/2 hr. to 2-1/2 hr.	
	5052-5080	Quartzite traces of -fine-grained green rx (see vial) -red & dark green clay -white mineral (see vial)	3			
	5052-5080	Slate Quartzite 2° Silica Vein & fine-grained both w/py trace of white zeolites (?) (see vial), mico, and gyp.	90 4 6	MI = 135° MO = 165°	Drilling very, very slow Will PoH to change bit.	
	5047-5078	Slate Quartzite 2° Silica Trace of clay and py.	80 5 15	MI = 122° MO = 164°	Same characteristics as up hole	

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(ft)

TIME	DEPTH	LITHOLOGY	%	Mud In	COMMENTS	Mud Out
3/1/78	5078-5109	Slate & Quartzite 2° Silica vein qtz. fine-grained qtz. microcrystalline qtz. vein (fine) micro silica contains py & other sulfides (?) check by X-ray diffraction analysis	25 75	MI = 138°	MO = 168° TS, X-ray dyfraction  Vein minerology should be checked	
	5100-5142	Trace of 2 types of green grains, py, sulfides ? , clay (pyrite) Same as above.		MI = 124°	MO = 166° Cold Water was added	
	5150	Same only 2° Silica Slate and quartzite	40 60	MI = 126°	MO = 165°	
	5165	Same as above.		MI = 132°	MO = 158° * Cold Water was added.	
	5170-5202	Same as above		MI = 140°	MO = 162°	
	5200-5231	Slate and quartzite 2° Silica -Vein -Microcrystalline -fine-grained Trace of clay, py, gypsum	70 30	MI = 140°	MI = 161° Upon addition of H <sub>2</sub> gas is given off.	
	5234-5265	Same as above slate & quartzite 2° Silica	65 35	MI = 158°	MO = 165°	
	5265-5298	Slate & quartzite 2° Silica -Same as above.	60 40	MI = 136°	MO = 160°	

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TIME	DEPTH	LITHOLOGY	COMMENTS	
3/1/78	5298-5329	Slate & quartzite 75 2° Silica 25 Same characteristics as above.	MI = 136°	MO = 160°
	5329-5356	Slate & quartzite 75 2° Silica 25 Same characteristics	MI = 138°	MO = 160°
	5367	TD Lithology same as above.		