CHEVRON SHALE OIL COMPANY
DRILL HOLE RECORD

DRILL HOLE No. CC 23
DRILL AREA

COORDINATES		COLLAR ELEV	TD		
N	E				

DRILL CO	DRILLER	CORE SIZE	DIA. HOLE	CASING	DATE START	DATE COMPL

RADIOMETRIC LOG	LOGGER	TD LOGGED		

GEOLOGIC LOG BY C. Creighton / C. Scott

DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
			Rotary Samples
0		Soil	Silty soil w/ some organic matter (o.m.) yellow-brn
10		Soil/S.S.	oxidized - leached zone little or no o.m. weathered S.S. into soil (S.S. ~50%) yellow-brn.
20			$CaCO_3$ horizon
30		Siltst/S.S.	? bedrock begins
40			Sandy siltstone, yellow-brn, weathered
50		mrlst/Siltst	gray-lt. brn silty mrlstn, weathered, minor muscovite(?)

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
60		mlst/slts	65-70 less weathered, very hi $CaCO_3$
			$CaCO_3$ content increases ↓
70			
80		- - -	reddish brn, soil looking in appearance, mod-hi HCl reaction
			unconsolidated, fragments less angular than uphole
		S.S.	qtz, K-spar, opaque mineral (magnetite?) ← sand
			$CaCO_3$ cement
90			
100			finer grained, darker colored than above
			less lithified (100-110), well sorted
110			yellow-brn, more lithified, subang-subrnd chips
			dker brown fine grained S.S.
120			

REMARKS:

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
130		S.S.	S.S. with clay 130 - 150
		S.S./clay	dull - brn SS. 80 %
140			
150		S.S.	hard S.S. fragments dull brn - dull gray
			possible reducing zone
			dull gray; decrease in fine material* ↓ or better cementation
160			
170			
180			
			increase in fine unconsolidated material in sample*
190			color change to darker
			black needle-like material present

REMARKS: *Much of the fine material is fine gr. sand to silt. large amounts of this is washed out

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
200		S.S.	changes back to tan color
210			
220			
			trace of possible tuff fragments
230			
		mrlst	decrease in fine material - mrlst fragments more angular / well cemented
R-8 240			
		mrlst	
250		O.sh	micrite appearance, common to o.sh.
260			

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
270			Calcite xtals present
280			
		o.sh.	
290			calcareous sltst.
		sltst.	
		sltst/o.sh.	
300			
310			
320			
		o.sh.	
330			

REMARKS:

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
		0.Sh.	
340			
350			End of Rotary Samples

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
	O.sh.		Begin core examination
350			med grade o.sh. lean-med o.sh.
			analcitized tuff bed & tuff partially alterated to clay bed, tar present
360			core loss 359.4 - 360.0
			1" band of "spotted" o.sh., laminations are in lenses rather than continuous
			1" analcitized tuff, coarse - fine grained, buff colored
			360 - 370 clay lenses or spots occur throuout o.sh.
			1 cm ss/siltst bed : 364.3
370			1 cm tuff, some pyrite, tar : 366.0
			slightly distorted tuff bed (analcitized?)
			mrlst 380-381
380			
		mrlst	
			grey - buff tuff minor tar, fine grained - 398.4 - 1"
390		o.sh.	lean - rich o.sh.
			lean o.sh. 394-395
			mrlst 403-404, 406-407
		mrlst	
400			401.7 - 406 clay lens - spots buff colored
		o.sh.	lt gray, fine grained (analcitized?) tuff 1½ cm
410			410 - 412.5 fractured, parallel to 18° from core axis pyrite common along fractures, minor xtallization (gypsum?) (analcite?) non-effervescing
		mrlst	
		o.sh.	?tuff, analcitized, 50% voids of which 85% is tar filled 419.9, 1"
			mrlst 416-418

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
		o.sh.	
420			
		mrlst	
430			- 2" layer of fine-grained s.s., tar, fractured.
		o.sh	442-443 dip changes from horizontal to 15° from horizontal
			- 3" layer tuff with o.sh. streamers, lt gray-buff
440			- sltst - mrlst. w̄ fractures - 1 ft
			fracture has sulfide along bedding plane (highly colored) & also tar in minor amts, somewhat varved, brn - buff, (oxidized?)
		interbed	within zone @ 438.6 - 3" layer of tuff highly altered tarred bottom - more tar above than below
			439.7 - 3" zone of tar filled brecciated o.sh.
450			443.3 - 446.9 interbed zone of tuffs few mm - 1" gray - buff (some clay alt.) & o.sh. (tuffs ~ 10%)
		Osh	449.2 - 2" layer pyritized (in pockets) claystn, swirly banded buff colored
460			454.5 - 456.3 interbed 5"-10cm tuffs gray to buff as above 25% of total
			459.1 ss, fine gr. clean contacts, well sorted
			- sltsn or fine gr. ss 2"
			2-3" tuffs 465.6 & 467.7, 470.6, 474.5 (1" pyr ≈ 10%)
470			477.7
			mrlst 449-450 463-464 471-473 478-479
480			- vug in rich o.sh. limonite - hematite stains? minor pyrite xtals
			485.0 - 490.9 stromatolite appearance (sand influx?)

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
		o.sh	mrlst 485-486 507-508
490			
500			501-502.3 slightly brecciated, Alkali powder on core (beginnings of nahcolite zone?)
510			
		mrlst	
520			
530		o.sh	
			mrlst. - lean o.sh. A groove 536.8 - 538.2 core loss or vuggy, minor pyrite white crystalline material fills vug @ 536.9, precipitate? non effervesing
		mrlst	
540			mod o.sh. 537-537.3
		o.sh/tuffs	o.sh - tuffaceous s.s. interbeds R-7 tuffs-many are tar filled, color varies from gray - brn. few mm - 8" thickness (~ 15% core)
550			
		o.sh	

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
		o.sh.	
560			gray - lt. brn tuff, some altered to clay, mod tar 4" thick. Mahogany Marker — mrlst 564-565
			1 cm tuffaceous s.s., gray, cavities unfilled
570			1½" sltst bed - lt. brn, some tar
			contorted bedding in rich o.sh. 2" thick
580			clastic: clay at top, ss at bottom, tar present
			1" brn-gray tuff - very fine grain
590			588.0 - 589.2 nahcolite zone
		o.sh	
600			595.8 - 596.1 4 tuff layers (~40%) clay altered to secondary calcite.
			599.0 - 601.4 laminations reduced to lens shaped black areas in rich o.sh.
			603.7 1 cm carbon layer (dk black)
610			ss/tuffs 1-2 cm thick 608.8, 610.7, 610.8, 613.1, 614.4, 615.1, 616.8, 619.2
		o.sh/interbeds	3" tuff dk & coarser downward, fracture (near parallel) w sulfides @ 615.5
620			619.2
		o.sh.	varies from rich, nicely laminated o.sh to brecciated lean marlst, usually in 1 ft. thicknesses core loss @ 626.2 - 627.1
			629.2 — mrlst 622-623, 612-614, 625-626.2, 615-616

REMARKS:

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
		o.sh./mrlst	lean o.sh 633-635
630		mrlst	B groove mostly mrlst - lean o.sh ; faulted, broken, and brecciated
			@ 636.1 & 638.1 sulfur enriched, pyrite present, gray - yellow 1½" 2" clear streaks diagonally, fine grained, hard s.s /tuff
640			Cavity containing pyrite & crystals of hard, clear, poorly faced mineral
	12-30 GPT	o.sh.	7" layer rich o.sh
650			R-C
		o.sh.	lean o.sh. 656-657 654-655 660-661
			1) ½ cm dk gray, fine grained, rust colored stains on either side, finely pyritized
			2) 2 cm lt " " " " " " " "
			3 marbleize pyrite in pockets.
660			1 & 2 are either fine grained, clean s.s. or tuffs
		mrlst	658.0 black tuff, fine - med grained, hematite & sulfur coats, 1" thick
			658.5 - 659.1 poor returns, broken
			663.1 2½" thick black - dk gray tuff, some sulfur
			664.9 & 665.9 1cm s.s./sltst beige
670			668.3 - 668.8 tuff gray - brn, some dendritic analcite(?) xtals fine - coarse grn.
		o.sh.	672.6 - 3" fine - med grn s.s. beigle - peach
			gray fine - coarse grn tuff
680			rich o.sh.
			mrlst 670-671 675-676 685-686.
690			lean o.sh
		mrlst	
		o.sh.	
			rich o.sh - tuffs

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DEPTH	ALT'N	ROCK UNIT	DESCRIPTION
		o.sh.	previous page
700		o.sh.	rich
		mrlst.	mrlst buff-gray, some fractured, laminated coreloss 705.3 - 706.8
710		o.sh.	rich o.sh. spotted - laminated
			L5 gray - buff, lam - nonlam mrlst.
720		mrlst.	lean o.sh. 723-724
730			R5
		mrlst / o.sh.	2 mm organic layer 5" brecciated mrlst w tar (slightly)
740			
750		o.sh	med. grade o.sh.
			774.0 - 775.8 buff, laminated mrlst which appears oxidized increase in silt content
760		mrlst	
		o.sh.	disturbed bedding in some places oil shale interfingers w marlstone/o.sh. breccia

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DEPTH	ELEV.	ROCK UNIT	DESCRIPTION
		mrlst	mrlst.: buff-gray, 50% laminated, some pyrite in cavities, also tar in minor amts
770			broken or fractured - 10%
			@ 768.5 brown tuff w darker gray shaded areas, sugary texture
780			@ 781.0 (1½") & 781.8 (2") sltst, lt. brn - beige
790			core loss/poor returns 776.0 - 779.4, 792.0 - 801.0
			increase in silt content ↓
800			
			leam o.sh.
			2" spotted s.s. brn - gray 810 - 811, 813 - 814, 819 - 820
810			
820			T.D.

REMARKS: