

U130  
22-103-24E  
UINTAH COUNTY, U

X-13 CORE LOG

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TAN	REC GRD	LITH.	DESCRIPTION
13		23.21				↑	13-23	SANDSTONE PALE BROWN TO
14			73.26.96			↑	14	GRAY, FINE TO MEDIUM GRAINED
15		23.28	40			↑	15	WITH SOME INTERBEDDED SHALES
16		110				CUT	16	SUB TO BOUNDED GRAINS - WHITE
17			100.50			10.0	17	STREAKS SEEN THROUGHOUT RUN
18			163			RGD	18	(NAHCOLITE) ALSO THOUGHT TO BE
19			19.29.65.92			10.0	19	THE BONDING AGENT ALL SANDS
20			81.95			↑	20	ARE HIGHLY POROUS
21			165			↑	21	
22			41.90		730	↓	22	
23						↑	23	23-25.85 SANDSTONE BROWN TO
24			70			↑	24	DARK BROWN WITH BLACK STREAKS
25			30			↑	25	OF DEAD OIL (MUD) COARSE GRAIN
26						CUT	26	SUB TO BOUNDED GRAINS
27						10.0	27	25.85-30.82 SANDSTONE GRAY
28			32			RGD	28	FINE TO MEDIUM GRAINED
29						9.98	29	(NOT HIGHLY CALCAREOUS) SOME
30			82			↑	30	BLEBS AND STREAKS OF NAHCOLITE
31			71			↑	31	30.82-32.98 SANDSTONE BROWN TO
32			60.98		32.98	↓	32	DARK BROWN WITH INTERBEDDED GRAYS
33			41.59			↑	33	32.98-35.2 SANDSTONE BROWN TO DARK
34			40.50			↑	34	BROWN, COARSE GRAINED SUB TO BOUNDED
35						↑	35	WITH BLACK STREAKS (DEAD OIL) NAHCOLITE
36						↑	36	OR CALCARE BONDING OR PORE FILLING AGENT
37						CUT	37	35.2-36.15 SANDSTONE - GRAY - FINE
38						10.0	38	GRAINED WITH WHITE BLEBS OF NAHCOLITE
39			50			RGD	39	36.15-42.94 SANDSTONE - BROWN
40						9.94	40	TO DARK BROWN WITH WHITE (BONDING)
41			70			↑	41	NAHCOLITE AS A PORE FILLING AGENT
42			13.54		42.94	↓	42	ROCK IS COARSE GRAINED SOFT + CRUMBLY
43						↑	43	42.94-50.61 SANDSTONE BROWN TO
44			10.70			↑	44	DARK BROWN WITH WHITE (NAHCOLITE
45			21			CUT	45	BONDING OR PORE FILLING AGENT
46			100.64			7.83	46	COARSE GRAINED, SOFT
47			33.84			RGD	47	CRUMBLY DARK
48			45			7.61	48	
49			60			↑	49	
50			61		50.61	↓	50	
51						↓	51	50.61-54.00 LOST CORE ZONE
52						↓	52	GROUND UP CORE WHILE DRILLING
53						↓	53	AT CEMENTATION PLUG
54			16.59	10	54.00	↑	54	54.00-61.84
55		160	29			↑	55	SANDSTONE BROWN TO DARK
56		189				CUT	56	BROWN COARSE GRAINED SUB
57		77				80	57	ANALOG TO BOUNDED GRAINS, CALCAREOUS
58		12				RGD	58	CEMENT BONDING (LOW ANGLE)
59		17.16.59				7.84	59	MAG. MINERALS PRESENT
60		79	5			↑	60	
61		59.84	84		61.84	↓	61	LOST CORE 61.84-63.64

PROJECT: VIKSP  
HOLE NO: X-13 SHEET 2 OF 23 DATE: 5/4/76 LOGGED BY: W. MOUTON COLLAR: 5484 TO 11246

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC ERG	LITH.	DESCRIPTION
62								LOST CORE 61.84-63.64
63					63.64			63.64-64.71 RUBBLE ZONE SANDSTONE CR
64						CUT		FINE TO MED GRAINED CALCAREOUS LENTINE
65						5.19		64.71-67.03 SANDSTONE GRAY FINE GRAINE
66					1005	2.64		SUB-ROUNDED TO ROUNDED GRAINS
67			24					67.03-74.74 SANDSTONE LIGHT BROWN TO BROWN
68			45.84					MEDIUM TO COARSE GRAINED SUBANGULAR
69			.59			CUT		TO SUB-ROUNDED, BLACK STREAKS OF DEAD
70			.67			10.1		oil, CALCAREOUS BANDING AGENT
71			.79			RCD		POROUS MATERIAL
72			.56			10.06		
73			.74					
74			24.44 .54					74.74-86.19 SANDSTONE GRAY, FINE
75		1.79	.64					GRAINED, ROUNDED GRAINS SOME
76	VER							EMPTY VUGS PRESENT BLACK
77		.09	.09		10.09			AND BROWN STREAKS OF DEAD
78								GIVE CORE A MOTTLED LOOK
79						CUT		INTERBEDDED COARSE GRAINED
80						9.9		SANDSTONE ALL MATERIAL
81						RCD		IS HIGHLY CALCAREOUS
82			.11			9.9		
83			24.30					
84			30.12.76					
85			.65					
86			27.54 .09 594 .91		26.94			86.19-97.12 SANDSTONE GRAY TO
87			30.57					DARK GRAY FINE TO COARSE
88			.09.58					GRAINED MATERIAL (INTERBEDDED)
89			.64					SOME TONES HAVE BLACK
90						CUT		AND BROWN STREAKS OF
91			10.45			10.0		DEAD OIL MOST GRAINS ARE
92			.04.75			RCD		SUB-ROUNDED TO ROUNDED
93			.21.50.70			10.01		COARSE GRAINED MATERIAL IS
94			24.51 .84 .88					IS SOMEWHAT MORE POROUS
95			.40.71					THAN THE FINE GRAINED MATERIAL
96			.10.40 .61		97.00			96.60-97.00 LOST CORE
97			.10.32					97.00-106.10 SANDSTONE GRAY FINE
98			.61					GRAINED ROUNDED GRAINS CALCAREOUS
99								BROWN AND BLACK STREAKS OF DEAD
100			42.59.92			CUT		oil - NOT MUCH POROSITY INTERBEDDED
101			.41.56			11.1		LIGHT BROWN TO GRAY SANDSTONE
102			.44			RCD		COARSE GRAINED CALCAREOUS STREAK
103			.07.37			10.1		OF DEAD OIL SOME POROSITY
104			.06.62 .99					
105			.29					
106			.10					107.12-108.10 LOST CORE ZONE
107			.10		107.12			
108					108.10			108.10-117.95 SANDSTONE GRAY TO
109			.66			CUT		DARK GRAY FINE WELL ROUNDED
110						10.0		GRAINS, METALLIC MINERALS
111						RCD		PRESENT

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC REQD	LITH.	DESCRIPTION
112								SOME INTERBEDDED COARSE
113			35					GRAINED ZONES - BROWN AND
114			03.82			CUT		BLACK STREAKS OF DEAD OIL
115			19.36			10.0		
116			03.28	87		9.85		
117			13.75		17.8			117.95-130.27 SANDSTONE GREEN WITH
118			95					STREAKS OF BROWN (DEAD OIL)
119								INTERBEDDED FINE AND COARSE
120			14			CUT		GRAINED ZONES PREDOMINANTLY
121			49			10.0		FINE GRAINED - ALL ZONES
122						RED		CALCAREOUS COARSE GRAINED
123			42			10.1		ZONES CONTAIN METALLIC
124			19		5/5/76			MINERALS AND HAVE HIGH
125			99					PEROSITY - PERMEABILITY - GRAINS
126			75					ARE ROUNDED TO SUB ROUNDED
127			02.44	15	12.05			
128			08					
129			15					
130			21.45					130.27-131.14 OLITE BED
131			15			CUT		131.14-137.59 SANDSTONE GRAY
132			26			10.2		INTERBEDDED FINE AND COARSE GRAIN
133						RED		ZONES PREDOMINANTLY FINE GRAINED
134			34.46		5/5/76	10.25		ALL ZONES CALCAREOUS - THE
135			41					COARSER ZONES CONTAIN METALLIC
136			110.53					MINERALS AND GRAINS ARE SUB TO
137			35		13.30			137.59-144.39 SHALE - LIGHT BROWN
138			27					WITH INTERBEDDED GRAY GREEN
139			12.93					SANDSTONE LAMERS - ALL ZONES
140			62					ARE CALCAREOUS WITH THE
141			0		11.55 AM	CUT		SAND LAMERS HAVING COARSE SUBANGULAR
142			04.84		5/5/76	11.0		GRAINS AND HIGH PERMEABILITY - POROSITY
143			134.89			RED		THE SHALES HAVE SOME WHITE STREAK
144			91		5/5/76	10.18		144.31-146.94 SANDSTONE (NAHCOLITE)
145			60					GRAY COARSE SUBANGULAR GRAINS
146			67.72					146.94-148.48 SHALE LIGHT GREEN
147			38					CALCAREOUS HARD
148			48		13.48			148.48-149.30 LOST - 82' OF CORE - UP
149					13.30			149.30-156.01 SANDSTONE LIGHT TO
150			35					DARK GRAY COARSE ROUNDED GRAINS
151			20.70			CUT		METALLIC MINERALS CALCAREOUS
152			54			10.0		CEMENT BLACK STREAKS OF DEAD
153			81			RED		OIL HIGH PEROSITY PERMEABILITY
154			57		5/5/76	8.94		
155			32					
156			33					156.01-158.24 SANDSTONE - REDISH
157								BROWN, MEDIUM GRAINED CALCAREOUS CEMENT
158			21		15.14			158.24-162.27 SANDSTONE REDISH
159			19.70		5/5/76	CUT		BROWN, MEDIUM GRAINED W/
160			51			10.0		CALCAREOUS CEMENT - SOME
161			51		15.00 PM	RED		BLEBS OF COARSE GRAINED SS

HOLE NO: 13 SHEET 4 OF 23 DATE: 5/5/76 PROJECT: WKSX LOGGED BY: V. MOULTON COLLAR: 5484 TD: 124.1

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC REQD	LITH.	DESCRIPTION
162			.09			1		WITH INTER BEDDED SHALE, DALE
163			.01.94			LIT		BROWN CALLAREOUS - THE SANDS
164			.43.87			10.0		IN THIS RUN HAVE A HIGH
165			.16			RCD		PERMEABILITY - POROSITY COEF
166			.165			10.02		ROCK IS COMPETENT
167			.16.94					
168			.24		168.27			168.27-178.51 SANDSTONE LIGHT
169								TO DARK BROWN TO GRAY MED
170								TO COARSE GRAINED, ROUNDED
171			.36			LIT		GRAINS, HIGHLY CALCAREOUS,
172			.91			10.25		WITH STREAKS OF DEAD OIL
173			.51.25.91			RCD		BLACK AND BROWN
174						10.24		PERMEABILITY - POROSITY IS
175			.12					GOOD (HIGH). ROCK IS MOSTLY
176			.165					VERY COMPETENT
177	VER	.42	A2.71	.96				
178		.51	.51		178.51			178.51-188.55 SANDSTONE DARK
179			.168					GRAY TO REDDISH BROWN WITH
180			.183					BLACK AND BROWN STREAKS OF
181			.41.88			LIT		DEAD OIL SEEN IN THIS RUN
182			.74.94			10.0		INTERBEDDED ZONES OF COARSE
183			.37.65.91			RCD		TO FINE GRAINED MATERIAL
184			.136			10.04		ALL ROCK IS CALCAREOUS AND
185			.11					HAS SOME PERMEABILITY - POROSITY
186			.01.61.72					METALLIC MINERALS ARE
187			.15.73.91					PRESENT IN SOME AREAS
188			.55.65		188.56			
189			.79					188.55-198.74 SANDSTONE LIGHT
190								TO DARK GRAY - MEDIUM ROUNDED
191			.27.51			LIT		GRAINS HIGHLY CALCAREOUS
192			.17			10.20		WITH SOME PERMEABILITY - POROSITY
193						RCD		MAGNETIC MINERALS AS WELL
194						10.19		AS METALLIC MINERALS ARE
195								SEEN THROUGHOUT RUN
196			.38					
197								
198			.33.74		198.74			
199			.34					198.74-208.70 SANDSTONE FINE AND
200			.75					COARSE GRAINED INTERBEDDED,
201			.38					GRAY TO DARK GRAY SUBBEDDED
202			.78			LIT		TO ROUNDED GRAINS, HIGHLY
203			.06			11.0		CALCAREOUS - COARSE GRAINED
204			.31			RCD		ZONES HAVE HIGH PERMEABILITY POROSITY
205			.26.77			9.96		FINE GRAINED ZONES HAVE HIGH POROSITY
206			.76					SOME STREAKS OF DEAD OIL, METALLIC
207			.23.62	.96				AND MAGNETIC MINERALS PRESENT
208					208.70			208.70-209.74 LOST LOG CORE
209			.74		209.74			
210								
211			.13.2	.43				

HOLE NO: X-13 SHEET 5 OF 23 DATE: 5/6/76

LOGGED BY: W. MORTON COLLAR 5494 TD 1124.6

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TAN	REC ARGD	LITH.	DESCRIPTION
212						↑	1	209.74-219.56 SANDSTONE MEDIUM
213			53.63	93		↑	1	TO COARSE, SUBROUNDED TO
214			14.09	80		CUT	1	ROUNDED GRAINS, GRAY TO DARK
215						10.0	1	GRAY, CALCAREOUS CEMENT
216			75.95			R00	1	SOME ZONES HAVE LARGE
217			93			9.82	1	AMOUNTS OF METALLIC AND
218							1	MAFIC MINERALS (PART) BLACK
219			56		29.56	X	1	AND BROWN STREAKS OF DEAD OIL
220			11				1	219.56-229.63 SANDSTONE GRAY
221			20			CUT	1	TO DARK GRAY, MEDIUM TO
222			29.4	13 10		10.0	1	COARSE GRAINED, SUBROUNDED
223			62.77			R00	1	TO ROUNDED GRAINS CALCAREOUS
224			15.30	80 85	5/16/75	10.07	1	CEMENT SOME ZONES CONTAIN
225			00.10	45 73			1	LARGE AMOUNTS OF MAFIC AND
226			15.90				1	METALLIC MINERALS, SOME
227			15.83				1	BLACK AND BROWN STREAKS OF
228			25.62				1	DEAD OIL IN RUN
229			05.29	14	229.63	X	1	229.63-239.79 SANDSTONE GRAY
230			153				1	TO DARK GRAY FINE TO COARSE
231			11				1	GRAINED, SUBROUNDED TO
232			20.95			CUT	1	ROUNDED GRAINS, CALCAREOUS
233			52.74			11.01	1	CEMENT COARSE ZONES HAVE
234			00.52			R00	1	LARGE QUANTITIES OF METALLIC
235						10.16	1	AND MAFIC MINERALS COARSE
236							1	ZONES HAVE PERMEABILITY-PODSH
237							1	ROCK IS VERY COMPACT
238			61				1	
239			102		239.79	X	1	239.79-240.64 LOST 85' OF CORE
240			14		240.64	X	1	
241						↑	1	240.64-250.64 SANDSTONE GRAY
242							1	TO REDISH BROWN, MEDIUM TO
243						CUT	1	COARSE GRAINED, SUBROUNDED
244						10.0	1	TO ROUNDED GRAINS, CALCAREOUS
245						R00	1	CEMENT, SOME MAFIC AND
246						10.0	1	METALLIC MINERALS PRESENT
247			30				1	COARSE GRAINED AREAS ARE
248							1	MORE PERMEABLE THAN OTHER
249			10				1	AREAS VERY COMPACT
250			164		250.64	X	1	ROCK
251			10				1	250.64-260.76 SANDSTONE GRAY TO
252			09				1	DARK GRAY, SOME REDISH BROWN
253			00			CUT	1	MEDIUM TO COARSE GRAINED
254						10.1	1	SUBROUNDED TO ROUNDED GRAIN
255						R00	1	CALCAREOUS CEMENT MAFIC AND
256			44			10.12	1	METALLIC MINERALS PRESENT
257							1	COARSE GRAINED ZONES HAVE
258							1	MORE PERMEABILITY-PODSH
259							1	THAN OTHER ROCK, VERY COMP
260			14.76		260.76	↑	1	ACTENT ROCK
261			63				1	



DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC LRQD	LITH.	DESCRIPTION
262					20.16	1		26.76-270.80 SANDSTONE GRAY
263								TO GREENISH BROWN - MOSTLY
264						CUT		MEDIUM GRAINED WITH INTERBEDDED
265			A7			10.0		ZONES OF COARSE AND FINE GRAIN
266						20.0		MATERIAL, SUBROUNDED TO ROUNDED
267						10.0		GRAINS, MAFC AND METALLIC
268								MINERALS PRESENT, CALCAREOUS
269								CEMENT VERY COMPACT ROCK
270		VER	.80		20.88			
271		T.3						270.80-281.00 SANDSTONE WITH
272		.6	.60					INTERBEDDED SHALES SANDSTONE
273			.97					IS GRAY TO PALE GREEN FINE TO
274			.79			CUT		MEDIUM GRAINED - ROUNDED
275			A7			10.2		GRAINS, CALCAREOUS CEMENT
276			.51			20.0		SOME MAFC AND METALLIC
277						10.2		MINERALS PRESENT. SHALE
278			.93					PALE GREEN MASSIVE, VERY
279			.46					COMPACT
280			.14		21.00			
281			.00					281.00-291.19 SANDSTONE PALE
282			.00					GREEN TO GREEN FINE TO MEDIUM
283								GRAINED, ROUNDED GRAINS
284						CUT		CALCAREOUS, METALLIC AND
285			.35			11.01		MAFC MINERALS PRESENT VERY
286			.20 .50			20.0		COMPACT ROCK SOME
287			.40			10.9		PERMEABILITY - POROSITY
288			.15 .23 .72		30.0			INTERBEDDED SHALE GREEN
289			.38					TO PALE GREEN CALCAREOUS
290			.07 .9					FISSILE HARD COMPACT ROCK
291					21.14			LOST CORE 291.19-282.00 - 281'
292			.00 .4 .21 .51					292.00 - 302.10 SHALE - MUDSTONE
293			.09 .51 .82					OR CLAYSTONE GREEN TO PALE
294			.08 .14					GREEN CALCAREOUS, HARD FISSILE
295			.13			CUT		NUMEROUS PARTING PLANES
296			.16 .39			10.1		NOT A VERY COMPACT ROCK
297			.15 .31			20.0		
298			.05 .43			10.1		
299			.77 .94					
300			.11 .19 .31 .43 .51		56.0			
301								
302			.00 .10		32.10			32.10-32.10 SANDSTONE GREEN
303			.01 .50					TO DARK GRAY WITH INTERBEDDED
304			.02 .67					PALE GREEN SHALE LAYERS
305			.00 .40			CUT		5-15 MEDIUM TO COARSE GRAINE
306			.53 .41			10.0		WITH SUBROUNDED TO ROUNDED
307						20.0		GRAINS, CALCAREOUS CEMENT
308			.04 .31			10.0		WITH BLACK STREAKS OF DEAD
309			.55					OIL COMPACT ROCK
310			.50		41.5			SANDSTONE HAS GOOD PERMEABILITY
311					21.10			AND POROSITY

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GR/TON	REC REQD	LITH.	DESCRIPTION
312			39		31.20	1		312.10-321.21 SANDSTONE GREEN TO
313								DARK GRAY WITH INTERBEDDED
314			34		5/12/76	CUT		PALE GREEN SHALES - SANDSTONE
315			19 31		10.0			IS MEDIUM TO COARSE GRAINED
316			15 71		20.0			WITH SUBROUNDED TO ROUNDED
317			11 81		9.1			GRAINS, CALCAREOUS CEMENT
318								BLACK STREAKS OF DEAD OIL
319								COMPACT ROCK SANDSTONE
320			14					HAS GOOD PERMEABILITY - POROSITY
321			05 21		32.2	1		321.21-331.41 SANDSTONE GREEN TO
322			04					DARK GRAY WITH PALE GREEN
323			14 71		5/12/76			AND REDISH BROWN SHALE LAMINAE
324			22 97		CUT			INTERBEDDED SANDSTONE IS
325			21 66 87		9.0			MEDIUM TO COARSE GRAINED
326			56		20.0			WITH SUBROUNDED TO ROUNDED
327			07 76 50		0.2			GRAINS, CALCAREOUS CEMENT
328			26					BLACK STREAKS OF DEAD OIL
329			51					SANDSTONE HAS GOOD
330								PERMEABILITY - POROSITY
331			29 41		33.41	1		
332			35 56 74					331.41-341.71 SANDSTONE WITH A FEW
333			09 07 60 72 84					INTERBEDDED SHALES - SANDSTONE
334			22 52		CUT			IS GREEN TO REDISH BROWN, MEDIUM
335			25 47		10.3			TO COARSE GRAINED, SUBROUNDED
336			00 66		20.0			TO ROUNDED GRAINS, CALCAREOUS
337			03 41 63 96		10.3			CEMENT, SHALE IS REDISH
338			26 61 86					BROWN FINE CALCAREOUS HARD
339			13					SANDSTONE HAS GOOD PERM-
340			11 35					EABILITY - POROSITY
341			11 46 71		34.71	1		341.71-351.89 SANDSTONE GREEN
342			84					TO DARK GRAY PREDOMINANTLY
343								MEDIUM GRAINED BUT SOME
344								COARSE GRAINED ZONES, GRAINS
345			16 70		CUT			SUBROUNDED TO ROUNDED
346			33		10.2			CALCAREOUS CEMENT - COARSE
347			46		20.0			GRAINED ZONES HAVE SOME
348			34 51		10.18			PERMEABILITY - POROSITY
349			20					COMPACT ROCK
350								
351			51 89		351.89	1		
352								351.89-352.71 SANDSTONE GREEN TO DAR-
353			21 46					GRAY - PREDOMINANTLY MEDIUM GRAIN
354								WITH SOME COARSE GRAINED ZONES SEE
355			46		CUT			FOUNDED TO ROUNDED GRAINS CALCAREOUS
356					10.2			CEMENT COMPACT ROCK
357			13 37		20.0			352.71-362.09 SHALE, CLAYSTONE LT
358			50		10.2			MUDSTONE - GREEN TO REDISH
359			87 70					BROWN, HARD, CALCAREOUS CEMENT
360								WITH INTERBEDDED SANDSTONE
361			79		362.09	1		LAYERS (AS ABOVE)



HOLE NO: 1-13 SHEET 8 OF 23 DATE: 5/7/76

LOGGED BY: W. MAXTON COLLAR 5184 TD 1174.6

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TBN	REC. GRD	LITH.	DESCRIPTION
362			.03					362.09-372.31 SHALE - CLAYSTONE
363			.06 162					OR MUDSTONE WITH INTED BEDDED
364			.41					SANDSTONE LAYERS, GREEN TO
365			.21 .59 .96					REDISH BROWN, HARD, SOME
366			.25 .95					FLAKES OR FLEBS OF METALLIC
367			.54					(PURITE) CAN BE SEEN WITH
368			.62					A HAND LENS
369			.14 .71					
370			.52					
371			.46					
372			.31					372.31 - 382.49 SANDSTONE GREEN
373								TO REDISH BROWN, VERY FINE GRAIN
374			.06					WELL SORTED, ROUNDED GRAINE
375								ALMOST A MUDSTONE OR
376								CLAYSTONE VERY DENCE
377			.18 .74					COMPONENT ROCK
378								CALCAREOUS CEMENT NOT
379			.54					MUCH PERMEABILITY BUT
380			.81					SOME POROSITY METALLIC
381			.31					MINERALS SEEN (PURITE)
382			.14 .41					382.49 - 394.64 SANDSTONE
383			.52					REDISH BROWN TO GREEN VERY
384			.26					FINE GRAINED WELL SORTED
385			.60					ROUNDED GRAINS COULD BE
386			.50					A CLAYSTONE OR MUDSTONE
387								VERY DENCE COMPONENT
388			.09 .52					ROCK, CALCAREOUS CEMENT
389			.81					NOT MUCH PERMEABILITY BUT
390								SOME POROSITY METALLIC
391			.03					MINERALS (PURITE) SEEN
392			.06 .14					394.64 - 402.75 SANDSTONE REDISH
393								BROWN TO GREEN VERY FINE
394								WELL SORTED, ROUNDED
395								GRAINS COULD BE A CLAY-
396			.40					STONE OR MUDSTONE
397			.00 .51					VERY DENCE COMPONENT
398			.11					ROCK, CALCAREOUS CEMENT
399			.16					NOT MUCH PERMEABILITY BUT
400								SOME POROSITY, METALLIC
401			.57 .24					MINERALS SEEN
402								402.75 - 412.83 SANDSTONE REDISH
403								BROWN TO GREEN, VERY FINE
404			.51 .74					GRAINED WELL SORTED +
405								ROUNDED GRAINS COULD BE
406			.33					CLAYSTONE OR MUDSTONE
407			.45					VERY DENCE COMPONENT
408			.65					ROCK NOT MUCH PERMEABILITY
409			.27 .71					BUT SOME POROSITY
410			.20 .85					METALLIC (PURITE) MINERAL
411								SEEN



DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC EQD	LITH.	DESCRIPTION
462			.61 .80					
463			.06 .51 .71		463.70	✓		
464			.24					463.70 - 473.81 OIL SHALE LOW
465			.11 .74					GRADE WITH INTERBEDDED LAYERS
466	SS		.21 .16			CUT		OF SANDSTONE - SHALE IS LIGHT
467			.26 .31			10.1		TO REDISH BROWN - HARD, CALCAREOUS
468		VER	.34			RQD		MATERIAL - EXTENSIVE AMOUNT
469		I.31				10.1		OF METALLIC MINERALS SEEN
470			.04					IN CERTAIN AREAS SOME GILSONITE
471			.46					ALONG PARTING PLANES AND FRX'S
472			.91					
473			.49 .81		473.81	✓		473.81 - 484.01 SANDSTONE WITH
474								INTER BEDDED OIL SHALE - SS
475								COULD BE A CLAYSTONE OR
476						CUT		MUDSTONE - REDISH BROWN
477			.61			10.2		VERY FINE GRAINED, DENSE,
478			.31			RQD		COMPONENT ROCK, LARGE
479			.11			10.2		AMOUNTS OF METALLIC MINERALS
480								ASSOCIATED WITH CALCITE. IN
481			.70					WUGS ZONES OR BLENDS MOSTLY
482								PURITE
483					484.01	✓		
484			.01			✓		484.01 - 486.71 SANDSTONE AS
485			.81					ABOVE
486			.56					486.71 - 494.16 OIL SHALE LOW
487			.13 .36 .51 .56 .71			CUT		TO MEDIUM GRADE PREDOMINANTLY
488						10.15		MEDIUM GRADE BROWN TO
489			.01 .21 .61			RQD		REDISH BROWN, FISSILE, HARD,
490						10.15		CONJUGIAL FRACTURE, VERY
491								COMPONENT ROCK
492								
493			.11 .83					
494			.16		494.16	✓		494.16 - 504.39 OIL SHALE
495			.56 .61 .86					PREDOMINANTLY LOW GRADE WITH
496			.06 .18 .25 .32 .41					SOME INTERBEDDED MEDIUM
497			.56			CUT		GRADE - LIGHT TO REDISH BROWN
498			.23			10.23		498.23 - 501.67 LOST CORE ZONE
499						RQD		CORE FELLOUT OF BARREL
500						6.66		ON RETRIEVE
501			.67					
502			.84					HARD CALCAREOUS COMPACTED
503			.45					ROCK
504			.61 .05 .89		504.31	✓		504.31 - 510.71 OIL SHALE LOW TO
505	HL		.71					MEDIUM GRADE JOINTED
506	SS		.22			CUT		SECTION LIGHT TO REDISH
507			.05 .21 .46			6.32		BROWN, HARD, CALCAREOUS
508			.12 .59 .92			RQD		ROCK NOT VERY COMPACTED
509			.31 .76			6.32		
510			.71 .4		507.11	✓		
511								

DEPTH	±MM	FRX	PP	ASSAY	GAU	REC	LITH.	DESCRIPTION
				10 20 30 40	TON	GRD		
512								510.71-520.89 OIL SHALE LOW TO
513			16					MEDIUM, LIGHT TO REDISH BROWN
514			109.91			CUT		HARD CALCAREOUS ROCK THIS RUN
515			16			10.3		HAD NO JOINTS AND IS COMPACT
516			91			ROD		ROCK - SMELL OF HYDROCARBON
517			41.14			0.18		AND HYDROGEN SULFIDE FROM
518								BLOOM LINE
519			01.41.89					
520			89					
521	VER. 1.24							520.89-531.08 OIL SHALE
522			34					LOW TO MEDIUM GRADE
523			11					LIGHT TO REDISH BROWN HARD
524			13.98			CUT		CALCAREOUS ROCK SOME
525			21.79			10.2		JOINTING FOUND IN THIS
526			103			ROD		RUN THIS RUN EXHIBITED
527	75°	1.69	22.65	65.00		10.21		SOME FISSILING, SOME
528	1.71		40					NAHCOLITE <sup>ND</sup> & CALCITE SEEN
529			00.71					IN SMALL ELONGATED NUGS OR
530			131					BLEBS
531			08					531.08-541.21 OIL SHALE LOW TO
532			02.57.10					MEDIUM GRADE LIGHT TO
533			37					REDISH BROWN, HARD, CALCAREOUS
534			31.71			CUT		ROCK - SMALL AMOUNTS OF
535			26			10.1		NAHCOLITE OR CALCITE WERE
536						ROD		SEEN IN SMALL ELONGATED
537			02			10.13		NUGS OR BLEBS - NOT READILY
538			02.75					OBSERVANT
539			31.74					COMPACT ROCK
540			46					
541			21					541.21-551.29 OIL SHALE LOW
542			21					TO MEDIUM GRADE LIGHT
543			24.90					TO REDISH BROWN, HARD,
544			09.62			CUT		CALCAREOUS ROCK. IN SOME
545			21.67.87			10.1		AREAS SMALL ELONGATED
546			41			ROD		NUGS OR BLEBS FILLED WITH
547			15.30			10.08		NAHCOLITE ARE FOUND,
548			61					COMPACT ROCK SAND
549			76.92					LAYERS ARE FOUND AT
550			71					533 (10') AND 537 (10.5')
551			29					551.29-561.33
552			39.72					OIL SHALE LOW TO
553			33.51					MEDIUM GRADE LIGHT
554			4			CUT		TO REDISH BROWN HARD
555	70°	1.16	11.80			10.0		CALCAREOUS ROCK IN SOME
556			51			ROD		AREAS SMALL ELONGATED
557			34			10.02		NUGS OR BLEBS FILLED
558			15.27	34.57				WITH NAHCOLITE AND/OR
559			14					CALCITE ARE FOUND
560			38.57					
561			31.33					

THE CLEVELAND BASIN CO. PROJECT: W. MOULTON  
HOLE NO: X-13 SHEET 2 OF 23 DATE: 5/13/76 LOGGED BY: W. MOULTON COLLAR 5484 TO 1124 E

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GR/TON	REC EQD	LITH.	DESCRIPTION
562						↑		561.33-571.36 OIL SHALE LOW
563			.36			↑		TO MEDIUM GRADE LIGHT TO
564						↑		REDISH BROWN HARD
565						CUT		CALCAREOUS ROCK IN SOME
566			.40			10.0		AREAS SMALL ELONGATED
567			.40			RQD		UGS OR BLENDS FILLED WITH
568			.32			10.03		NAKOLITE VERY COMPACT
569			.04					ROCK.
570								
571			.36			571.36		571.36-574.71 OIL SHALE HIGH
572								GRADE, DARK REDISH BROWN,
573			.18					LOW SPECIFIC GRAVITY SOFT DENSE
574			.84			CUT		ROCK COMPACT ROCK
575			.81			10.2		SLIGHTLY CALCAREOUS
576			.75			RQD		574.71-581.54 OIL SHALE
577			.44			10.18		LOW TO MEDIUM GRADE LIGHT
578								TO REDISH BROWN, HARD
579								CALCAREOUS ROCK
580								
581			.54			581.54		581.54-591.93 OIL SHALE LOW TO
582			.66 .36 .51					MEDIUM GRADE LIGHT TO REDISH
583			.95					BROWN HARD CALCAREOUS ROCK
584								SOME SANDSTONE LAYERS FOUND
585			.84			CUT		IN THIS RUN
586			.31			10.40		586.51 - .76 SANDSTONE LAYERS
587			.34			RQD		587.61 - .71 BROWN OIL SATURATED
588						10.39		
589			.26 .31 .65					
590			.21 .89					
591			.93			591.93		
592			.85					591.93-596.71 OIL SHALE HIGH
593			.76					GRADE DARK REDISH BROWN TO
594								BLACK CALCAREOUS COMPACT
595						CUT		ROCK WITH INTERBEDDED SANDSTONE
596						10.1		LAYERS VERY THIN (.01)
597			.44 .39			RQD		596.71-602.01 OIL SHALE LOW
598			.52			10.08		TO MEDIUM GRADE LIGHT
599			.23 .83					BROWN HARD CALCAREOUS
600			.34					COMPACT ROCK
601			.04					602.01-606.97 (602-605) TOP OF
602			.01					BRENNES-AQUER OIL SHALE
603			* MECHANICAL			CUT		LOW TO MEDIUM GRADE LIGHT
604			NO FRX OR PP			5.0		TO REDISH BROWN CALCAREOUS
605			NOTED			RQD		ROCK SOME KURDIE AND BROKEN IN
606						1.96		AREAS - SEE COMMENTS
607								606.97-617.01 OIL SHALE MEDIUM
608						CUT		TO HIGH GRADE BROWN TO BLACK
609						10.10		WITH INTERBEDDED LAYERS OF
610			.33			RQD		MUDSTONE - UGS THROUGHOUT
611						10.07		ZONE CONTAIN NAKOLITE / CALKITE

INDICATED BY UGS OIL SHALE ZONE  
LOW TO MEDIUM GRADE UGS FILLED WITH NAKOLITE / CALKITE



HOLE NO: 1-13 SHEET 13 OF 23 DATE: 5/15/76LOGGED BY: W. MOUTON COLLAR 5484 TD: 1724.6

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GRV TON	REC GRD	LITH.	DESCRIPTION
612.			.79			CUT		AND METALLIC MINERALS MOSTLY
613			.6			10.0		PURITE - H <sub>2</sub> S SMALL COMPONENT
614						EQD		CALCAREOUS ROCK. NOT MUCH
615						10.07		PERMEABILITY
616								
617			.04			*		617.04 - 627.17 CALCAREOUS MUD
618			.6					STONE BEDISH BROWN DENSE
619						CUT		HARD ROCK WITH VUGS OF
620						10.0		METALLIC MINERALS (PURITE
621						EQD		+ NATIVE COPPER) COMPONENT
622						10.13		ROCK, NO PERMEABILITY SOME
623			.47					PORESPITS SOME NAHCOLITE
624								AND CALCITE SEEN BOTTOM OF
625			.16 .76					THIS IS OIL SHALE MEDIUM GRADE
626			.08 .16					BROWN, CALCAREOUS COMPONENT ROCK
627			.17 .51 91.97			*		627.17 - 632.13 OIL SHALE MEDIUM GRADE
628			.81			CUT		BROWN TO DARK BROWN WITH ONE
629			.80			50		SANDSTONE LAYER AND ONE SMALL
630						REL		UNCL. ZONE 2' @ 628.71 HARD
631						416		COMPONENT ROCK
632			.13 .27			CUT		632.13 - 634.41 - OIL SHALE MEDIUM GRADE
633						EQD		BROWN TO DARK BROWN WITH JOINTING
634			.21			EQD		LEACHED OUT NAHCOLITE AT 635.5. VOID?
635						CUT		635.21 - .41 VOID (635.41 - 636) RUBBLE
636						EQD		636.39 - .92 VOID
637						EQD		634.41 - 637.21 OIL SHALE
638						*		637.21 LEACHED OUT
639						CUT		LOW TO MEDIUM GRADE
640						10.0		637.71 (NAHCOLITE)
641						EQD		637.71 - 637.96 VUG
642						9.88		HARD ROCK WITH VUGS
643								(BOTH FILLED AND
644								ABSENT FILLED)
645								640.31 - .41 LEACHED OUT
646								NAHCOLITE LIT. FILLED WITH NAHCOLITE
647								641.81
648								
649								
650								
651								
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660								
661								

1. HOLE NO. 1-13  
 2. SHEET 13 OF 23  
 3. DATE 5/15/76  
 4. LOGGED BY W. MOUTON  
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 318. TD 1724.6  
 319. HOLE NO. 1-13  
 320. SHEET 13 OF 23  
 321. DATE 5/15/76  
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DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TUN	REC AQD	LITH.	DESCRIPTION
662								661.71-671.95 OIL SHALE LOW TO
663		VER	EXTENSIVE PPS					MEDIUM GRADE, BROWN TO
664		I 4 1/4	INTHS RUN SOME					DARK BROWN EXTENSIVE PPS
665			OLD PPS FILLED			CUT		JOINTING AND BRECCIA ZONES FILL
666			WITH NAHCOLITE			10.25		WITH NAHCOLITE AND CALCITE
667			CALCITE			ROD		BUGS THROUGHOUT ENTIRE RUN
668						10.2		MOSTLY FILLED WITH NAHCOLITE
669			FILLED W/ NAHCOLITE					THIS POTENTIAL AQUIFER IS AN
670	85	H 3 1/2	CALCITE					AREA THAT HAS UNDERGONE PREVIOUS
671			95			671.95	*	STRUCTURAL CHANGE
672	80	N	96					671.95-681.89 OIL SHALE LOW TO
673		VER	FRS					MEDIUM GRADE BROWN TO
674								DARK BROWN HARD FISSILE
675						CUT		ROCK SMALL SMALL BLESS OR
676			.11 .23 78			10.0		NODULES OF NAHCOLITE AND/OR
677			.71 .91			ROD		CALCITE-PPS SOME FILLED
678	60	N	.21 .26			9.94		WITH CALCITE AND/OR NAHCOLITE
679	152		.05 .52					
680			.48					
681			.31 .89			10.18	*	
682			.00					681.89-689.71 OIL SHALE LOW TO
683	80	A	.51					MEDIUM GRADE BROWN TO DARK
684	60		.26 94			CUT		BROWN, HARD, CALCAREOUS,
685			.54			9.0		COMPONENT ROCK
686	60	N	.46 .86			ROD		
687	70		.71			7.82		687.21 LEACHED OUT UNG
688	45	N	.01					
689	VER	I 3 1/2	.31			689.71	*	689.71-690.89 LOST CORE ZONE
690						690.89	*	
691			.72 .76					690.89-701.03 OIL SHALE LOW TO
692			.00 .38 47					MEDIUM GRADE BROWN TO DARK
693			.61			CUT		BROWN, HARD, CALCAREOUS,
694			.70			10.2		COMPONENT ROCK IMPERMEABLE
695						ROD		ZONE WITHIN AQUIFER ZONE
696	45	N	.71 .04 .63			10.2		COMPRISING THE BIRDSNEST
697			.51					AQUIFER - STRONG H <sub>2</sub> S SMELL
698			.35					ON CORE
699								699.35-700.38 VOID
700			.35 .41 .80				*	
701			.34 .37 .68			701.01	*	701.01-701.91 OIL SHALE LOW TO
702			.31 .76					MEDIUM GRADE BROWN TO
703			.99					DARK BROWN SOME BLESS
704			.47 (LEAF IMPRINT)			CUT		OF NAHCOLITE AND CALCITE
705			.00			10.0		CALCAREOUS HARD AND FAIRLY
706			.34 .64 .91			ROD		COMPONENT ROCK
707			.14 .51 .73			9.82		
708			.00					706.0-709 MOSTLY EMPTY BUT
709	VER		.33 .63				*	SOME NAHCOLITE AND CALCITE
710	I 6 1/2		.67 .96			710.01	*	PRESENT
711	I 4 1/2		.67 .71				*	

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. BQD	LITH.	DESCRIPTION
712	50°	H 41	16.46			10.41	↑	710.91-720.91 OIL SHALE - LOW GRADE
713			15.61	76				LIGHT BROWN HARD, CALCAREOUS
714			07.71			CUT		WITH NUMEROUS VUGS AND
715			78			10.0		INNER BEDDED CALCITE AND
716			01.71			RQD		NAHCOLITE LAYERS - MOST VUGS
717			21.31	50.76		10.0		ARE EMPTY WITH ONE VUG
718			84					IS AN EMPTY VUG LAST 1.5'
719			21					(717.76-718.36 VOID) IS SOLID
720			91			720.51	*	COMPONENT SHALE
721								
722			31					722.31 VUG WITH CALCITE AND/OR NAHCOLITE
723	38°		50			CUT		720.91-729.08 OIL SHALE - LOW TO MEDIUM
724	39°		43			8.0		GRADE SHALE BROWN TO DARK BROWN
725			98			RQD		HARD, CALCAREOUS, COMPONENT ROCK
726			95			8.17		VUGS FILLED WITH CALCITE AND NAHCOLITE
727			75					IMPERMEABLE WITH LOW POROSITY
728								726.95 VUG WITH CALCITE AND/OR NAHCOLITE
729			88			729.36	*	729.08-739.36 OIL SHALE LOW TO
730								MEDIUM GRADE LIGHT TO DARK
731			53					BROWN, HARD, CALCAREOUS
732						CUT		COMPONENT ROCK IMPERMEABLE
733			34			10.2		WITH LITTLE POROSITY
734						RQD		734.15 VUGS STRUCTURE WITH
735						10.85		CALCITE AND GILSONITE STRONG H <sub>2</sub> S
736								SMELL IN THIS ZONE. FROM WATER
737								COMING IN AT BOTTOM OF
738	45°							AQUIFER
739	45°		36			739.36	*	739.36-749.43 OIL SHALE LOW
740	VER		91					TO MEDIUM GRADE, HARD,
741			60.44					CALCAREOUS, LIGHT TO DARK
742			06.25 37.95			CUT		BROWN ROCK VERY COMPACT
743						10.0		ROCK - CONTINUOUS CORE SMELL
744						RQD		OF H <sub>2</sub> S COMING FROM CORE
745						10.07		AND CORE BARREL ROCK IS
746			96					IMPERMEABLE WITH LITTLE
747								POROSITY
748								
749			40.43			749.43	*	749.43-759.53 OIL SHALE LOW TO
750			81					MEDIUM GRADE, LIGHT TO DARK
751								BROWN, HARD, CALCAREOUS, VERY
752						CUT		COMPONENT ROCK, SMELL
753						10.1		OF H <sub>2</sub> S COMING FROM CORE
754						RQD		BARREL - IMPERMEABLE WITH
755						10.1		LOW POROSITY
756								
757								
758			40					758.40 PARTING PLANE HAS GILSONITE IN VUG
759			53			759.53	*	759.53-769.59 OIL SHALE LOW
760			35					TO MEDIUM GRADE LIGHT TO
761								DARK BROWN HARD CALCAREOUS

BOTTOM OF BIRDNEST AQUIFER IS APPROX. 721 FEET

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC. EQD	LITH.	DESCRIPTION
762			89			↑		759.53-769.59 OIL SHALE LOW TO
763						CUT		MEDIUM GRADE, LIGHT TO
764						10.0		DARK BROWN, HARD, CALCAREOUS
765						ROD		COMPONENT ROCK - FEW PARTIAL
766						10.04		PLANES AND NO SANDSTONE
767								LAYERS OR CALCITE NAHCOLITE
768								ZONES SMOELL OF H <sub>2</sub> S FROM
769			35.59		769.59	×		CORE BARREL ROCK IS IMPERM-
770			.35					EABLE WITH LITTLE POROSITY
771								769.59-779.53 OIL SHALE LOW TO
772						CUT		MEDIUM GRADE LIGHT TO DARK
773						10.0		BROWN HARD CALCAREOUS
774						ROD		COMPONENT ROCK - NO PERM
775						9.94		PERMIBILITY WITH VERY LITTLE
776								POROSITY SMALL BLENDS
777								OF SANDY MATERIAL SEEN IN
778			81			×		SOME PARTS OF THIS RUN
779			.53 86		779.53	×		779.53-789.77 OIL SHALE LOW TO
780								MEDIUM GRADE LIGHT TO DARK
781								BROWN HARD CALCAREOUS
782								COMPONENT ROCK NO
783						CUT		PERMEABILITY WITH LITTLE
784						10.2		POROSITY
785						ROD		
786			17			10.24		786.17 GILSENITE ON PARTING PLANE
787								787.51-801.61 SAND FIELED VUG
788								
789			77.93		789.77	×		789.77-800.22 OIL SHALE LOW TO
790								MEDIUM GRADE, LIGHT TO DARK
791								BROWN, HARD, CALCAREOUS
792								COMPONENT, ROCK NO PERMEABLE
793						CUT		LOW POROSITY THIN LAYERS
794						10.4		OF SANDSTONE WERE FOUND
795						ROD		794.1-806 SANDSTONE LAYER
796			15			10.45		IN THIS RUN
797			08			↑		800.22-810.36 OIL SHALE LOW TO
798			21.71					MEDIUM GRADE LIGHT TO
799						×		DARK BROWN, HARD, CALCAREOUS
800			22		800.22	×		COMPONENT ROCK NO
801								PERMEABILITY WITH LITTLE
802								POROSITY
803						CUT		
804			74			10.1		804.74 GILSENITE ON PARTING PLANE
805						ROD		
806			29			10.4		
807			40					
808			16					808.16 GILSENITE ON PARTING PLANE
809						×		
810			36		810.36	×		810.36-810.41 OIL SHALE LOW TO
811			53					MEDIUM GRADE

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TWT	REC GRQD	LITH.	DESCRIPTION
812								810.36-820.41 OIL SHALE LOW TO
813								MEDIUM GRADE LIGHT TO DARK
814	VER	I <sup>41</sup> <sub>1.02</sub>	49			CUT		BROWN HARD CALCAREOUS COMP-
815						10.0		COMPETENT ROCK NO PERMEABILITY
816			16			ROD		WITH LITTLE POROSITY SOME THIN
817						10.15		LAYERS AND BLED'S BLED'S OF
818	VER	I <sup>04</sup> <sub>1.01</sub>						SANDSTONE
819								819.31-820.41 SANDSTONE LAYER OIL
820			41					SATURATED COOKING OIL AND GAS
821								820.41-820.53 OIL SHALE LOW TO
822								MEDIUM GRADE LIGHT TO DARK
823						CUT		BROWN, HARD, CALCAREOUS COMP
824						10.0		COMPETENT ROCK NO PERMEABILITY AND
825			31			ROD		LITTLE POROSITY A FEW VERY
826						10.12		THIN AND SMALL LAYERS AND
827								BLED'S OF SANDSTONE
828								
829								
830			53					820.53-840.74 OIL SHALE LOW TO
831								MEDIUM GRADE, LIGHT TO DARK
832			19					BROWN, HARD, BRITTLE CALCAREOUS
833						CUT		833.91-834.01 SANDSTONE LAYER OIL
834						10.2		SATURATED
835			57			ROD		
836						10.21		834.03-850.97 SANDSTONE LAYER OIL
837			08					SATURATED
838								COMPETENT ROCK, NO
839			41					PERMEABILITY WITH LITTLE
840			74					POROSITY
841								840.74-850.97 OIL SHALE LOW TO
842								MEDIUM GRADE, LIGHT TO DARK
843								BROWN, HARD, CALCAREOUS
844						CUT		COMPETENT ROCK WITH
845						10.25		NUMEROUS THIN SANDSTONE
846			161			ROD		LAYERS AND BLED'S A FEW
847						10.23		ARE OIL SATURATED ROCK HAS
848								NO PERMEABILITY WITH LITTLE
849			74					POROSITY
850			97.41					850.97-861.20 OIL SHALE LOW TO
851								MEDIUM GRADE LIGHT TO DARK
852								BROWN, HARD, CALCAREOUS
853								COMPETENT ROCK (SOLID PIECE
854						CUT		OF CORE 9.32') RUN HAS NUMEROUS
855						10.2		THIN SANDSTONE LAYERS AND
856						ROD		BLED'S I WAS OIL SATURATED
857						10.23		(102') NO PERMEABILITY WITH
858								LITTLE POROSITY
859								
860								
861			20					



DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TDR	REC RQD	LITH.	DESCRIPTION
862					8/20/76	↑		861.20-865.97 OIL SHALE LOW TO
863					8/20/76	↑		MEDIUM GRADE LIGHT TO DARK
864					8/20/76	↑		BROWN, HARD, CALCAREOUS
865			.97		8/20/76	↑		COMPONENT ROCK - SOME
866					8/20/76	↑		SMALL THIN SANDSTONE LAYERS
867					8/20/76	↑		865.97-874.78 OIL SHALE LOW TO
868			.51		8/20/76	↑		MEDIUM GRADE, LIGHT TO DARK
869					8/20/76	↑		BROWN HARD, CALCAREOUS,
870			.16		8/20/76	↑		COMPONENT ROCK - NO
871			.71		8/20/76	↑		PERMEABILITY WITH LITTLE
872			.76		8/20/76	↑		POROSITY - VERY SLOW DRILLING
873					8/20/76	↑		(CHATTER)
874			.78		8/20/76	↑		
875			.63		8/20/76	↑		874.78-885.06 OIL SHALE LOW TO
876					8/20/76	↑		MEDIUM GRADE, LIGHT TO MEDIUM
877					8/20/76	↑		BROWN, HARD, CALCAREOUS,
878					8/20/76	↑		COMPONENT ROCK - HAS NO
879			.07		8/20/76	↑		PERMEABILITY AND LITTLE
880					8/20/76	↑		POROSITY
881					8/20/76	↑		VERY SLOW DRILLING
882					8/20/76	↑		
883					8/20/76	↑		
884					8/20/76	↑		885.06-894.66 OIL SHALE
885			.26		8/20/76	↑		PREDOMINATELY LOW GRADE, LIGHT
886					8/20/76	↑		TO MEDIUM BROWN, HARD,
887					8/20/76	↑		CALCAREOUS COMPONENT ROCK
888					8/20/76	↑		NO PERMEABILITY WITH LITTLE POROSITY
889					8/20/76	↑		894.66-895.56 SANDSTONE LAYER SATURATED
890					8/20/76	↑		895.56-896.99 SANDSTONE LAYER SATURATED
891					8/20/76	↑		EXCEPT IN SANDSTONE LAYERS
892					8/20/76	↑		
893					8/20/76	↑		
894			.16		8/20/76	↑		894.66-904.71 OIL SHALE PREDOMINATE
895					8/20/76	↑		LOW GRADE LIGHT TO MEDIUM BROWN
896					8/20/76	↑		HARD CALCAREOUS COMPONENT ROCK
897					8/20/76	↑		NO PERMEABILITY WITH LITTLE POROSITY
898					8/20/76	↑		896.36-.51 SANDSTONE LAYER SATURATED
899					8/20/76	↑		896.51-.56 SANDSTONE LAYER SATURATED
900					8/20/76	↑		896.91-900.01 SANDSTONE LAYER SATURATED
901					8/20/76	↑		EXCEPT IN SANDSTONE
902					8/20/76	↑		LAYERS
903					8/20/76	↑		900.01-903.46 SANDSTONE LAYER SATURATED
904			.71		8/20/76	↑		903.46-904.71 OIL SHALE LOW TO
905					8/20/76	↑		MEDIUM GRADE (PREDOMINATELY
906					8/20/76	↑		LOW GRADE) LIGHT TO MEDIUM
907					8/20/76	↑		BROWN HARD CALCAREOUS ROCK
908					8/20/76	↑		WITH NUMEROUS THIN (<.02)
909					8/20/76	↑		SANDSTONE LAYERS MOST ARE
910					8/20/76	↑		NOT OIL SATURATED RUN IS
911					8/20/76	↑		VERY COMPONENT WITH

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC CARD	LITH.	DESCRIPTION
912								NO PERMEABILITY AND
913								LITTLE POROSITY
914			.88		914.85	✓		914.85 - 914.88 SANDSTONE LOWER OIL
915			.52			✗		SATURATED BUBBLING GAS
916								914.88 - 924.93 OIL SHALE LOW TO
917						CUT		MEDIUM GRADE LIGHT TO DARK
918						10.1		BROWN HARD CALCAREOUS ROCK
919						ROD		WITH NUMEROUS THIN (.02') SAND-
920			.84			10.1		STONE LAYERS MOST NOT OIL SATURATED
921	+100							924.93 - 924.96 OIL SATURATED, COMPACT
922								922.51 - 923.01 SANDSTONE LOWER, OIL
923			.26					SATURATED BUBBLING GAS
924			.93		924.93	✓		ROCK WITH NO PERMEABILITY AND
925			.81			✗		LITTLE POROSITY.
926								924.93 - 934.96 OIL SHALE PREDOMINATELY
927						CUT		LOW GRADE, LIGHT BROWN, HARD,
928						10.0		CALCAREOUS ROCK WITH NUMEROUS
929						ROD		SANDSTONE LAYERS THIN (.02') MOST
930			.32			9.93		NOT OIL SATURATED COMPACT ROCK
931	+90							NO PERMEABILITY AND LITTLE POROSITY
932								932.11 - .36 SANDSTONE LAYER OIL SATURATED
933								AND BUBBLING GAS
934			.86		934.86	✓		
935								934.86 - 944.91 OIL SHALE PREDOMINATELY
936			.71					LOW GRADE, LIGHT BROWN, HARD, CALCAREOUS
937						CUT		ROCK WITH NUMEROUS SANDSTONE LAYERS
938						10.0		940.41 - .53 SANDSTONE LAYER SATURATED
939						ROD		STONE LAYERS (THIN (.02')) MOST
940						10.05		NOT OIL SATURATED ROCK HAS
941	+80		.71					NO PERMEABILITY AND LITTLE
942								POROSITY.
943								944.91 - 954.98 OIL SHALE PREDOMINATELY
944			.91		944.91	✓		LOW GRADE LIGHT TO
945								MEDIUM BROWN, HARD, CALCAREOUS
946								COMPACT ROCK NO PERMEABILITY
947						CUT		AND LITTLE POROSITY
948						10.0		950.21 - 952.51 UPPER WAVY BED
949						ROD		INTERBEDDED SANDSTONE LIGHT
950						9.97		BROWN OIL SATURATED, BUBBLING
951	+70							GAS
952								954.98 - 964.90 OIL SHALE LOW GRADE
953			.88		954.98	✓		(PREDOMINATELY) LIGHT TO MEDIUM
954								BROWN, HARD, CALCAREOUS,
955						CUT		COMPACT ROCK, NO
956						10.0		PERMEABILITY WITH LITTLE
957			.46			ROD		POROSITY - NUMEROUS SAND
958						10.02		STONE LAYERS (.02') 2 ARE OIL
959								SATURATED AND ARE BUBBLING GAS
960								
961	+60							

HOLE NO: Y-13 SHEET 20 OF 23 DATE: 6/2/76LOGGED BY: W. MOUTON COLLAR 5894 TD: 1124.6

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC AGD	LITH.	DESCRIPTION
962								954.98-964.90 OIL SHALE LOW GRADE
963								LIC. BROWN HARD CALCAREOUS
964			90			964.90		COMPONENT ROCK
965								964.90-974.93 OIL SHALE VERY LOW
966						964.93		GRADE WITH INTERBEDDED MARL
967						964.96		STONE, LIGHT BROWN, HARD,
968						964.99		CALCAREOUS COMPONENT ROCK
969						965.02		ENTIRE RIN NO PP'S OR FRX
970						965.05		ROCK HAS NO PERMEABILITY
971	+50					965.08		AND LITTLE POROSITY
972						965.11		
973						965.14		
974						965.17		964.93-976.71 OIL SHALE MEDIUM
975						965.20		TO HIGH GRADE DARK BROWN TO
976						965.23		BLACK SOFT COMPONENT ROCK.
977						965.26		976.71-985.05 OIL SHALE LOW TO
978						965.29		MEDIUM GRADE, HARD CALCAREOUS
979			92			965.32		COMPONENT ROCK - NO PERM-
980						965.35		EABILITY AND LITTLE POROSITY
981	+40					965.38		SOME AREAS IN THIS RIN COOL
982					36.5	965.41		RECLASSIFIED MARLSTONE
983					17.4	965.44		FEW PARTING PLANES
984			68		14.6	965.47		985.05-994.98 OIL SHALE LOW GRADE
985					17.5	965.50		WITH MARLSTONE INTERBEDDED PALE
986					23.6	965.53		BROWN TO LIGHT BROWN, HARD,
987					12.6	965.56		987.71-988.71 TO USPM FOR TESTING
988					6.5	965.59		CALCAREOUS, COMPONENT
989					5.7	965.62		ROCK NO PERMEABILITY AND SOME POROSITY
990			12.456		4.1	965.65		990.71-993.71 LAYERS AND SMALL LUGS
991	+30		11.39		3.3	965.68		FILLED WITH NAUCLITE INTERBEDDED
992			9.9		9.2	965.71		WITH LOW GRADE LIGHT BROWN OIL
993			21.78		5.3	965.74		SHALE
994			3.5470		4.9	965.77		994.98-1005.03 OIL SHALE LOW
995			21.47		2.9	965.80		GRADE PREDOMINANTLY PALE
996			33.87		1.3	965.83		TO LIGHT BROWN SOME MEDIUM
997			46		2.0	965.86		ROCK TOWARDS BOTTOM OF RIN
998			106.55		3.7	965.89		ALL ROCK IS HARD CALCAREOUS
999					11.2	965.92		AND COMPONENT NO PERMEABILITY
1000					13.4	965.95		AND LITTLE POROSITY
1001	+20		86		21.0	965.98		
1002					32.0	966.01		1005.03-1006.71 OIL SHALE LOW TO
1003					16.4	966.04		MEDIUM GRADE HARD BROWN
1004					14.4	966.07		CALCAREOUS COMPONENT ROCK
1005			91.23		10.2	966.10		1005.76-1006.85 SANDSTONE, LAYER SATURATED (OIL)
1006			100		16.6	966.13		1006.71-1008.21 TO USPM FOR TESTING
1007					25.6	966.16		1007.21-91 (2) SANDSTONE, LAYER SATURATED (OIL)
1008					33.2	966.19		+ FINE LUGS
1009					23.2	966.22		1007.85-912 SANDSTONE LAYER OIL SATURATED
1010			22		29.6	966.25		+ FINE LUGS
1011	+10				40.0	966.28		1006.71-1015.01 OIL SHALE MEDIUM TO
								HIGH GRADE BROWN TO DARK BROWN
								HARD CALCAREOUS COMPONENT

THIS ROCK WAS TAKEN OUT FOR USPM FOR TESTING

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC. GRD	LITH.	DESCRIPTION
1012			11		41.0			ROCK - NUMEROUS TWIN (.02')
1013					24.0			SANDSTONE LAMERS (11. SATUR)
1014					18.9	1015.00		BUBBLING GAS
1015					17.6			1015.09 - 1021.41 OIL SHALE LOW TO
1016					11.9			MEDIUM, MOSTLY LOW GRADE
1017					20.3	0.05		HARD, CALCAREOUS, COMPETENT
1018					17.6	0.05		ROCK NO PERMEABILITY AND
1019					11.4	0.05		LITTLE POROSITY (LOW GRADE
1020		INAM			12.4	0.05		WITHIN 3' OF MARKER)
1021	0	I 34	.04 A1		10.9	0.05		1021.41 - 1021.84 NAHOLANY MARKER
1022					9.4	0.05		(SEE NOTES) SANDSTONE LAYER OIL
1023			.54		8.8	0.05		SATURATED BUBBLING GAS
1024			.33		11.7	0.05		1021.84 - 1025.12 OIL SHALE LOW GRADE
1025			.12.71		16.8	1026.12		LIGHT BROWN HARD CALCAREOUS COMP.
1026					48.7	2		ENTIRE ROCK
1027					23.7	0		1025.12 - 1035.32 OIL SHALE MEDIUM
1028					21.5	0		TO HIGH GRADE DARK BROWN &
1029					20.7	0		BLACK SOFT CALCAREOUS
1030					18.1	0		COMPETENT ROCK PERMINATI
1031	-10				32.2	0		HIGH GRADE NO PERMEABILITY
1032					21.3	0		AND LITTLE POROSITY
1033					14.5	0		START OF THE NAHOLANY ZONE
1034			.06 53		52.6	0		
1035		USE	.13		66.9	0		1035.32 - 1041.50 OIL SHALE HIGH
1036		111.02			78.5	0		GRADE W/NAHOLITE PLATE SOFT
1037		111.14			38.2	0		1037.06 - 64 CRYSTALLINE NAHOLITE
1038		FILLED WITH			47.2	0		1037.11 - 1038.75 TO USM FOR GASTESTING
1039			.28		54.6	0		1039.46 - 1041.50 LOST CORE ZONE
1040					35.7	0		
1041	-20		.30		46.9	0		1041.66 - 1043.09 TO USM FOR GASTESTING
1042					25.0	0		
1043			.08		40.6	0		1043.09 - 1044.35 LOST CORE ZONE
1044			.05		18.8	0		1041.50 - 1044.35 OIL SHALE HIGH GRADE
1045					21.0	0		DARK BROWN TO BLACK, SOFT, PAPERY
1046					33.3	0		1044.35 - 1054.59 OIL SHALE MEDIUM
1047					22.9	0		TO HIGH GRADE BROWN TO BLACK
1048					17.7	0		HIGH GRADE IS SOFT - MEDIUM GRADE
1049					16.7	0		IS HARDER. ALL IS CALCAREOUS
1050			.11		19.2	0		(HIGH GRADE SLIGHT) COMPETENT
1051	-30				20.4	0		ROCK NO PERMEABILITY WITH
1052					20.4	0		LITTLE POROSITY
1053					21.1	0		
1054			.09		30.3	0		
1055			.41		43.6	0		1055.11 - 31 SANDSTONE LAYER OIL SATURATED
1056					35.8	0		BUBBLING GAS
1057					21.4	0		1054.51 - 1064.01 OIL SHALE MEDIUM TO
1058					34.3	0		HIGH GRADE, BROWN TO BLACK
1059					31.8	0		SOFT TO MEDIUM HARD CALCAREOUS
1060			.29		19.4	0		COMPETENT NO PERMEABILITY
1061	-40				14.2	0		AND LITTLE POROSITY
								1061.11 - 71 SANDSTONE LAYER OIL SATURATED
								BUBBLING GAS

14.6 OF ALK. 2X 15.5  
 1/2 IN THESE AREAS - DANGER KEPT LIFTING  
 1/2 IN THESE AREAS - DANGER KEPT LIFTING

INCLUDES NAHOLANY MARKER

COMPETENT

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC ARGD	LITH.	DESCRIPTION
1062						16.8		
1063						28.2	1064.01	1064.01-1074.25 OIL SHALE MEDIUM
1064						32.7		TO HIGH GRADE DARK BROWN TO
1065			10			15.0	1064.25	BLACK SOFT CALCAREOUS
1066						8.9	1064.25	COMPONENT ROCK - SOME
1067			22.34			13.4	1064.25	PARTS ARE SOFT AND FLAKY
1068						9.9	1064.25	PARTLY TEXTURE SOME VERY
1069						17.2	1064.25	THIN SANDSTONE LAYERS IN THE
1070						32.6	1064.25	ROCK (L. 02')
1071	-50					35.2	1064.25	1071.51-1074.25 SANDSTONE LAYER OIL SATURATED
1072						24.4	1064.25	NO PERMEABILITY AND LITTLE
1073						22.9	1064.25	POROSITY
1074						37.4	1064.25	1074.25-1084.36 OIL SHALE MEDIUM
1075						32.3	1064.25	(PREDOMINATELY) TO HIGH GRADE
1076			.64			21.4	1064.25	BROWN TO DARK BROWN, SOME
1077			.34			19.4	1064.25	BLACK, HARD CALCAREOUS
1078			.1938			13.6	1064.25	COMPONENT ROCK NO
1079			.36			11.0	1064.25	PERMEABILITY AND LITTLE
1080						12.0	1064.25	POROSITY
1081	-60					18.2	1064.25	
1082								
1083								1084.36-1094.51 OIL SHALE PREDOMINATELY
1084			.36					LOW GRADE, SOME MEDIUM GRADE
1085								WITH A LITTLE HIGH GRADE LIGHT
1086								TO DARK BROWN CALCAREOUS
1087								SOMEWHAT WEAK ROCK
1088								HAS PERMEABILITY WITH LITTLE POROSITY
1089								1089.18-1090.17 FALSE MARKER
1090								SANDSTONE LAYER OIL SATURATED
1091	-70							BUBBLING GAS
1092								
1093								
1094								1094.51-1104.61 OIL SHALE PREDOMINATELY
1095								LOW GRADE BUT SOME MEDIUM
1096								TO HIGH GRADE ZONES ARE PRESENT
1097								LIGHT TO DARK BROWN, CALCAREOUS
1098								WEAK ROCK - NO PERMEABILITY
1099								AND LITTLE POROSITY
1100								
1101	-80							
1102								
1103								
1104								1104.16-.26 AND 1104.36-.44 SANDSTONE
1105								LAYERS, OIL SATURATED, BUBBLING GAS
1106								1104.61-1114.58 OIL SHALE LOW
1107								GRADE CREAM TO LIGHT BROWN
1108								HARD, CALCAREOUS ROCK, COMPACT
1109								ROCK - SOME AREAS ARE WEAK
1110								HAS A FEW VERY THIN (<0.2')
1111	-90							OIL SATURATED SANDSTONE LAYER

NUMEROUS PARTINGS  
NOT THOUGHT TO BE MECHANICAL



LOGGED BY: W. MASON COLLAR 5484 TD: 1746

[illegible]