

HOLE NO: X-13 SHEET 1 OF 23 DATE: 1/27/71 LOGGED BY: W. M. MASON COLLAR: 512A TD: 1120

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC EQD	LITH.	DESCRIPTION
13		20.31 185.91				↑	1	13-23 SANDSTONE PALE BROWN
14			73.96.95				1	GRAY, FINE TO MEDIUM GRAINED
15		23.28	40				1	WITH SOME INTERBEDDED SHALE
16		110				CUT	1	SUB TO BOUNDED GRAINS - WH
17		100.50 1.1				10.0	1	STREAKS SEEN THROUGHOUT RI
18		163				RQD	1	(NAHCOLITE) ALSO THOUGHT TO BE
19		11.29.65.92				10.0	1	THE BONDING AGENT ALL SAND
20		81.95					1	ARE HIGHLY POROUS
21		165					1	
22		41.90			73.0	↓	1	
23						↓	1	23-25.85 SANDSTONE BROWN TO
24		.70					1	DARK BROWN WITH BLACK STREAK
25		.30					1	OF DEAD OIL (NAHCOLITE) AND
26							1	SUB TO ROUNDED GRAINS
27							1	25.85-30.82 SANDSTONE GRAY
28		.32				RQD	1	FINE TO MEDIUM GRAINED
29						9.98	1	(NOT HIGHLY CALCAREOUS) SOME
30		.82					1	BLEBS AND STREAKS OF NAHCOL
31		.71					1	30.82-32.98 SANDSTONE BROWN TO
32		.60.98			32.98	↓	1	DARK BROWN WITH INTERBEDDED GRAY
33		41.59					1	32.98-35.2 SANDSTONE BROWN TO DARK
34		40.50					1	BROWN, COARSE GRAINED SUB TO ROUN
35							1	WITH BLACK STREAKS (DEAD OIL) NAH
36							1	OR CALCITE BONDING OR PORE FILLING
37						CUT	1	35.2 TO 36.15 SANDSTONE - GRAY, FINE
38						10.0	1	GRAINED WITH WHITE BLEBS OF NAH
39		.50				RQD	1	36.15-42.94 SANDSTONE - BROWN
40						9.94	1	TO DARK BROWN WITH WHITE (PROMIN
41		.20					1	NAHCOLITE AS A PORE FILLING AG
42		13.54			42.94	↓	1	ROCK IS COARSE GRAINED, SOFT + CRUMB
43							1	42.94-50.61 SANDSTONE BROWN TO
44		.10.70					1	DARK BROWN WITH WHITE (NAHCOL
45		.21				CUT	1	BONDING OR PORE FILLING AGENT
46		100.14				7.83	1	COARSE GRAINED, SOFT
47		.33.84				RQD	1	(CRUMBLY) ROCK.
48		.85				7.61	1	
49		.60					1	
50		.61			50.61	↓	1	
51							1	50.61-54.00 LOST CORE ZONE
52							1	GROUND UP CORE WHILE DRILLIN
53					54.00		1	CUT CEMENTATION PLUG.
54		.16.49	10				1	54.00-61.84
55		.66	.29				1	SANDSTONE BROWN TO DARK
56		.68					1	BROWN, COARSE GRAINED SUB
57		.77				CUT	1	ANGULAR TO ROUNDED GRAINS, CALC
58		.12				8.0	1	CEMENT, JOINTING (LOW ANGLE)
59		.27.10.81				7.84	1	MAFIC MINERALS PRESENT
60		.77	.15				1	
61		.59.84	.84		61.84	↓	1	

COMMENTS:

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. BRGD	LITH.	DESCRIPTION
62								LOST CORE 61.84-63.64
63					63.64			63.64-64.71 RUBBLE ZONE SANDSTONE
64						CUT		FINE TO MED GRAINED CALCAREOUS LENTICULAR
65						RD		64.71-67.03 SANDSTONE GRAY FINE GRAINED
66					67.03	2.64		SUB-ROUNDED TO ROUNDED GRAINS
67			94					67.03-74.74 SANDSTONE LIGHT BROWN TO BR
68			45.8A					MEDIUM TO COARSE GRAINED SUBANGULAR
69			59			CUT		TO SUB-ROUNDED, BLACK STREAKS OF DE
70			67			10.1		OIL, CALCAREOUS BONDING AGENT
71			79			RD		POROUS MATERIAL
72			56			10.1		
73			74					
74			24.44.54					74.74-86.19 SANDSTONE GRAY
75		1.79	84					GRAINED, ROUNDED GRAINS SOME
76	Ver	1.04						EMPTY VUGS PRESENT BLACK
77			09					AND BROWN STREAKS OF DE
78								GIVE CORE A MOTTLED LOOK
79						CUT		INTERBEDDED COARSE GRAINED
80						9.9		SANDSTONE ALL MATERIAL
81						RD		IS HIGHLY CALCAREOUS
82			11			9.9		
83			14.30					
84			30.12.76					
85			65					
86			27.54.09.54.511		86.99			86.19-97.12 SANDSTONE GRAY TO
87			30.57					DARK GRAY FINE TO COARSE
88			09.58					GRAINED MATERIAL (INTERBEDDED
89			64					SOME ZONES HAVE BLACK
90						CUT		AND BROWN STREAKS OF
91			24.45			10.0		DEAD OIL IN ST GRAINS ARE
92			04.75			RD		SUB-ROUNDED TO ROUNDED
93			27.50.77			10.01		COARSE GRAINED MATERIAL IS
94			24.51.84.89					IS SOMEWHAT MORE POROUS
95			40.41					THAN THE FINE GRAINED WHITE
96			10.40.61		97.00			96.60-97.00 LOST CORE
97			00.32					97.00-106.10 SANDSTONE GRAY FINE
98			69					GRAINED-ROUNDED GRAINS CALCAREOUS
99								BROWN AND BLACK STREAKS OF DEAD
100			42.59.72			CUT		OIL - NOT MUCH POROSITY INTERBEDDED
101			41.56			11.1		LIGHT BROWN TO GRAY SANDSTONE
102			41			RD		COARSE GRAINED CALCAREOUS STREAK
103			07.37			10.1		OF DEAD OIL SOME POROSITY
104			06.62.79					
105			29					
106			10					107.10-108.10 LOST CORE ZONE
107			10		107.10			
108					108.10			108.10-117.95 SANDSTONE GRAY TO
109			66			CUT		DARK GRAY FINE WELL-ROUNDED
110						RD		GRAINS, MINERAL MATERIAL
111						RD		

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC LARD	LITH.	DESCRIPTION
112								SOME INTERBEDDED COARSE
113			35					GRAINED ZONES - BROWN AND
114			103.92			CUT		BLACK STREAKS OF DEAD OIL
115			119.36			10.0		
116			103.28	87		9.95		
117			163.95					117.95-130.27 SANDSTONE WITH
118			145					STREAKS OF BROWN (DEAD OIL)
119								INTERBEDDED FINE AND COARSE
120			114			CUT		GRAINED ZONES PREDOMINANTLY
121			141			10.0		FINE GRAINED - ALL ZONES
						RCD		CALCAREOUS COARSE GRAINE
			42					ZONES CONTAIN METALLIC
121			119					MINERALS AND HAVE
125			99					POROSITY - PERMEABILITY
126			75					ARE ROUNDED TO SUB ROUNDED
127			102.45	6				
128			105					
129			115					
130			21.45					130.27-131.14 OLITE BED
131			115			CUT		131.14 - 137.59 SANDSTONE GRAY
132			26			10.2		INTERBEDDED FINE AND COARSE GR
133						RCD		ZONES PREDOMINANTLY FINE GRAINED
134			34.96			10.25		ALL ZONES CALCAREOUS - THE
135			41					COARSER ZONES CONTAIN METALLIC
136			110.53					MINERALS AND GRAINS ARE SUB TO
137			35					137.59-144.39 SHALE - LIGHT GREEN
138			21					WITH INTERBEDDED GRAY GREEN
139			12.93					SANDSTONE LAYERS - ALL ZONES
140			162					ARE CALCAREOUS WITH THE
141			0			CUT		SAND LAYERS HAVING COARSE SUBANGUL
142			104.94			11.0		GRAINS AND HIGH PERMEABILITY. POROS
143			134.97			RCD		THE SHALES HAVE SOME WHITE STRE
144			91			10.18		144.39-146.91 SANDSTONE (NAHCOLITE)
145			160					CRDY COARSE SUBANGULAR GRAIN
146			107.72					146.94-148.42 SHALE LIGHT GREEN
147			38					CALCAREOUS HARD
148			48					148.48-49.20 LOST 182' OF CORE UP
149								149.30-156.01 SANDSTONE LIGHT TO
150			35					DARK GRAY COARSE ROUNDED GRAIN
151			20.10			CUT		METALLIC MINERALS CALCAREOUS
152			156			10.0		CEMENT. BLACK STREAKS OF DEAD
153			81			RCD		OIL HK-H POROSITY PERMEABILITY.
154			57			8.94		
155			33					
156			33					156.01-158.21 SANDSTONE - REDDISH
157								BROWN, MEDIUM GRAINED CALCAREOUS CEMENT
158			121					158.24-162.7 SANDSTONE REDDISH
159			17.70			CUT		BROWN, MEDIUM GRAINED, W/...
160			51			9.0		ONLY APTER... (Faint text)

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. BPPD	LITH.	DESCRIPTION
162			.59					WITH INTERBEDDED SHALE, MINE
163			.01 .94					BROWN CALCAREOUS - THE SAND
164			.43 .87					IN THIS RUN HAVE A HIGH
165			.16					PERMEABILITY - POROSITY DIFF.
166			.165					ROCK IS COMPETENT
167			.165 .90					
168			.24					168.27-178.51 SANDSTONE LIGHT
169								TO DARK BROWN TO GRAY AND
170								TO COARSE GRAINED, ROUNDED
171			.36					GRAINS, HIGHLY CALCAREOUS
			.91					WITH STREAKS OF DEAD OIL
			.51 .75 .91					BLACK AND BROWN
174								PERMEABILITY - POROSITY IS
175			.12					GOOD (HIGH) ROCK IS MOSTLY
176			.165					VERY COMPETENT
177	VER	.A2	.A2 .71	.96				
178		.S1	.51					178.51-188.55 SANDSTONE DARK
179			.18					GRAY TO REDDISH BROWN WITH
180			.183					BLACK AND BROWN STREAKS OF
181			.41 .88					DEAD OIL SEEN IN THIS RUN
182			.74 .94					INTERBEDDED ZONES OF COARSE
183			.37 .65 .91					TO FINE GRAINED MATERIAL
184			.136					ALL ROCK IS CALCAREOUS AND
185			.11					HAS SOME PERMEABILITY - POROS
186			.01 .61 .74					METALLIC MINERALS ARE
187			.15 .72 .71					PRESENT IN SOME AREAS
188			.55 .65					
189			.179					188.55-198.74 SANDSTONE LIGHT
190								TO DARK GRAY - MEDIUM ROUN
191			.27 .51					GRAINS HIGHLY CALCAREOUS
192			.17					WITH SOME PERMEABILITY - POROS
193								MAFIC MINERALS AS WELL
194								AS METALLIC MINERALS ARE
195								SEEN THROUGHOUT RUN
196			.34					
197								
198			.34 .74					
199			.34					198.74-208.70 SANDSTONE FINE AND
200			.75					COARSE GRAINED INTERBEDDED,
201			.138					GRAY TO DARK GRAY SUBROUNDED
202			.78					TO ROUNDED GRAINS, HIGHLY
203			.06					CALCAREOUS - COARSE GRAINED
204			.31					ZONES HAVE HIGH PERMEABILITY POROS
205			.26 .77					FINE GRAINED ZONES HAVE HIGH POROS
206			.26					SOME STREAKS OF DEAD OIL, METALL
207			.28 .62 .96					AND MAFIC MINERALS PRESENT
208								202.70-209.74 LOST LOG CORE
209			.74					
210								

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. ERQD	LITH.	DESCRIPTION
212						↑	1	209.74 - 219.56 SANDSTONE MEDIUM
213			53.62	93		↑	1	TO COARSE, SUBROUNDED TO
214			14.49	80		CUT	1	ROUNDED GRAINS, GRAY TO DARK
215						10.0	1	GRAY, CALCAREOUS CEMENT
216			75.95			RQD	1	SOME ZONES HAVE LARGE
217			93			9.82	1	AMOUNTS OF METALLIC AND
218							1	MAFIC MINERALS (PARTLY) BLACK
219			56		219.56		1	AND BROWN STREAKS OF DEAD OIL
220			11				1	219.56 - 221.13 SANDSTONE GRAY
221			180			CUT	1	TO DARK GRAY, MEDIUM TO
222			29.41	18.90		10.0	1	COARSE GRAINED SUBROUNDED
223			62.77			RQD	1	TO ROUNDED GRAINS, CALCAREOUS
224			15.30	80.55		10.0	1	CEMENT SOME ZONES CONTAIN
225			00.10	45.703			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	229.82		1	
230			153				1	229.83 - 239.71 SANDSTONE GRAY
231			11				1	TO DARK GRAY FINE TO COARSE
232			20.95				1	GRAINED, SUBROUNDED TO
233			52.74			CUT	1	ROUNDED GRAINS, CALCAREOUS
234			00.52			11.0	1	CEMENT COARSE ZONES HAVE
235						RQD	1	LARGE QUANTITIES OF METALLIC
236						10.6	1	AND MAFIC MINERALS COARSE
237							1	ZONES HAVE PERMEABILITY-POROSITY
238			61				1	ROCK IS VERY COMPACT
239			02		239.79		1	
240			64		240.14		1	239.79 - 240.64 LOST .85' OF CORE
241							1	240.64 - 250.14 SANDSTONE GRAY
242							1	TO REDISH BROWN, MEDIUM TO
243							1	COARSE GRAINED, SUBROUNDED
244						CUT	1	TO ROUNDED GRAINS, CALCAREOUS
245						10.0	1	CEMENT, SOME MAFIC AND
246						RQD	1	METALLIC MINERALS PRESENT
247			30			10.0	1	COARSE GRAINED AREAS ARE
248							1	MORE PERMEABLE THAN OTHER
249			10				1	AREAS VERY COMPACT
250			64		250.14		1	ROCK
251			10				1	250.64 - 260.76 SANDSTONE GRAY
252			49				1	DARK GRAY, SOME REDISH BROWN
253			00				1	MEDIUM TO COARSE GRAINED
254						CUT	1	SUBROUNDED TO ROUNDED GRAIN
255						10.1	1	CALCAREOUS CEMENT MAFIC AND
256			44			RQD	1	METALLIC MINERALS PRESENT
257						10.12	1	COARSE GRAINED ZONES HAVE
258							1	MORE PERMEABILITY-POROSITY
259							1	THAN OTHER ROCK, VERY COMPACT
260			14.76		260.76		1	ROCK
261							1	

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC EQD	LITH	DESCRIPTION
262					260.16	✓	262	26176-270.80 SANDSTONE GRAV
263							263	TO GREENISH BROWN - MOSTLY
264					5/6/76	CUT	264	MEDIUM GRAINED WITH INTERBEDDED
265			A7		100		265	ZONES OF COARSE AND FINE GRAIN
266					5/6/76	RQD	266	MATERIAL, SUBROUNDED TO ROUNDED
267					10.04		267	GRAINS, MAELIC AND METALLIC
268							268	MINERALS PRESENT, CALCAREOUS
269							269	CEMENT VERY COMPACT ROCK
270		VER	.80		208	✓	270	
271		1.3					271	270.80-281.00 SANDSTONE WITH
272		1.6	.60				272	INTERBEDDED SHALES SANDSTONE
273			.97				273	IS GRAY TO PALE GREEN FINE
274			.79				274	MEDIUM GRAINED, ROUNDED
275			A7				275	GRAINS, CALCAREOUS, SOME
276			.51				276	SOME MAELIC AND METALLIC
277							277	MINERALS PRESENT SHALE
278			.93				278	PALE GREEN MASSIVE, VERY
279			.46				279	COMPACT
280			.14				280	
281			.00				281	281.00-291.19 SANDSTONE PALE
282			.00				282	GREEN TO GREEN FINE TO MED
283							283	GRAINED, ROUNDED GRAINS
284							284	CALCAREOUS, METALLIC AND
285			.35				285	MAELIC MINERALS PRESENT VERY
286			.20 .50				286	COMPACT ROCK SOME
287			.40				287	PERMEABILITY - POROSITY
288			.15 .23 .72				288	INTERBEDDED SHALE GREEN
289			.38				289	TO PALE GREEN CALCAREOUS
290			.07 .11				290	FISSILE HARD COMPACT ROCK
291							291	1ST FLOOR 291.19-282.00 - .291
292			.00 .61 .81 .91				292	292.00-302.10 SHALE - MUDSTONE
293			.09 .51 .82				293	OR CLAYSTONE GREEN TO PALE
294			.08 .14				294	GREEN CALCAREOUS, HARD FISSILE
295			.13				295	NUMEROUS PARTING PLANES
296			.16 .31				296	NOT A VERY COMPACT ROCK
297			.15 .31				297	
298			.05 .48				298	
299			.77 .94				299	
300			.11 .17 .31 .43 .51				300	
301							301	
302			.00 .10				302	302.10-312.10 SANDSTONE GREEN
303			.01 .82				303	TO DARK GRAY WITH INTERBEDDED
304			.02 .67				304	PALE GREEN SHALE LAMERS
305			.00 .46				305	SS IS MEDIUM TO COARSE GRAIN
306			.03 .11				306	WITH SUBROUNDED TO ROUNDED
307							307	GRAINS, CALCAREOUS CEMENT
308			.04 .31				308	WITH BLACK STREAKS OF DEEP
309			.55				309	OIL COMPACT ROCK
310			.50				310	SANDSTONE LAMERS, COMPACT

COMMENTS:

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL/ TON	REC. ERQD	LITH.	DESCRIPTION
312			31		312.10			312.10-312.21 SANDSTONE GREEN TO
313								DARK GRAY WITH INTERBEDDED
314			34		5/27	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		9.11			GRAINS, CALCAREOUS CEMENT
318								BLACK STREAKS OF DEAD OIL
319								CONTINUED ROCK SANDSTONE
320			14					HAS GOOD PERMEABILITY - POROSITY
321			15 71		321.21			321.21-331.41 SANDSTONE GREEN
322			14					DARK GRAY WITH PALE GREEN
323			14 71					AND REDISH BROWN SHALE HAVE
324			22 91					INTERBEDDED SANDSTONE IS
325			21 16 87					MEDIUM TO COARSE GRAINED
326			16					WITH SUBROUNDED TO ROUNDED
327			107 76 57					GRAINS, CALCAREOUS CEMENT
328			26					BLACK STREAKS OF DEAD OIL
329			151					SANDSTONE HAS GOOD
330								PERMEABILITY - POROSITY
331			29 41		331.41			
332			35 56 74					331.41-34.71 SANDSTONE WITH A FEW
333			09 21 10 72 84					INTERBEDDED SHALES - SANDSTONE
334			22 52		5/28	CUT		IS GREEN TO REDISH BROWN, MEDIUM
335			25 47		10.3			TO COARSE GRAINED, SUBROUNDED
336			100 14		20.0			TO ROUNDED GRAINS, CALCAREOUS
337			103 14 83 16		10.3			CEMENT, SHALE IS REDISH
338			26 14 80					BROWN FINE CALCAREOUS - HARD
339			13					SANDSTONE HAS GOOD PERM-
340			11 35					ENABILITY - POROSITY
341			11 46 71		341.71			341.71-351.89 SANDSTONE GREEN
342			84					TO DARK GRAY PREDOMINANTLY
343								MEDIUM GRAINED BUT SOME
344								COARSE GRAINED ZONES, GRAIN
345			16 70		5/31	CUT		SUBROUNDED TO ROUNDED
346			33		10.2			CALCAREOUS CEMENT - COARSE
347			46					GRAINED ZONES HAVE SOME
348			34 51		10.18			PERMEABILITY - POROSITY
349			20					COMPACT ROCK
350								
351			151 81		351.81			
352								351.81-357.71 SANDSTONE GREEN TO
353			21 46					GRAY - PREDOMINANTLY MEDIUM GRAY
354								WITH SOME COARSE GRAINED ZONES
355			46		5/36	CUT		ROUNDED TO ROUNDED GRAINS CALCAREOUS
356					10.2			CEMENT COMPACT ROCK
357			13 37					357.71-362.09 SHALE, LAMINATED
358			50		10.2			MUDSTONE - GREEN TO REDISH
359			18 70					BROWN, HARD, CALCAREOUS CEMENT
360								WITH INTERBEDDED SANDSTONE
361								

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. CRQD	LITH.	DESCRIPTION
362			.03			362.31		362.09-372.31 SHALE - CLAYSTONE
363			.06 .162					OR MUDDSTONE WITH INTERBEDDED
364			.41			CUT		SANDSTONE LAMERS, GREEN TO
365			.21 .59	.516		10.20		REDISH BROWN, HARD, SOME
366			.25 .16			RQD		FLAKES OR BLEDGS OF METALLIC
367			.54			10.22		(PURITE) CAN BE SEEN WITH
368			.62					A HAND LENS
369			.14 .71					
370			.52					
371			.46					
372			.31			372.31		372.31-372.49 SANDSTONE, GRE
373								TO REDISH BROWN, VERY FINE GRA
374			.06					WELL SORTED, ROUNDED GRAINS
375								ALMOST A MUDDSTONE OR
376								CLAYSTONE VERY DENSE
377			.68 .14			RQD		COMPACTED ROCK
378						10.8		CALCAREOUS CEMENT NOT
379			.54					MUCH PERMEABILITY BUT
380			.81					SOME POROSITY METALLIC
381			.31					MINERALS SEEN (PURITE)
382			.14 .41			382.49		382.49-394.64 SANDSTONE
383			.68					REDISH BROWN TO GREEN VERY
384			.76					FINE GRAINED WELL SORTED
385			.60					ROUNDED GRAINS COULD BE
386			.50			CUT		A CLAYSTONE OR MUDDSTONE
387						10.15		VERY DENSE COMPACTED
388			.09 .12			RQD		ROCK, CALCAREOUS CEMENT
389			.81			10.15		NOT MUCH PERMEABILITY BUT
390								SOME POROSITY METALLIC
391			.03					MINERALS (PURITE) SEEN
392			.06 .14			392.14		392.14-402.75 SANDSTONE REDD
393								BROWN TO GREEN, VERY FINE
394								WELL SORTED, ROUNDED
395								GRAINS COULD BE A CLAY
396			.40			CUT		STONE OR MUDDSTONE
397			.00 .59			10.1		VERY DENSE COMPACTED
398			.11			RQD		ROCK, CALCAREOUS CEMENT
399			.16			10.11		NOT MUCH PERMEABILITY BUT
400								SOME POROSITY, METALLIC
401			.07 .24					MINERALS SEEN
402						402.75		402.75-412.83 SANDSTONE REDD
403								BROWN TO GREEN, VERY FINE
404			.51 .24					GRAINED WELL SORTED +
405								ROUNDED GRAINS COULD BE
406			.38			CUT		CLAYSTONE OR MUDDSTONE
407			.45			10.1		VERY DENSE COMPACTED
408			.65			RQD		ROCK NOT MUCH PERMEABIL
409			.27 .71			10.08		BUT SOME POROSITY
410			.20 .16					METALLIC (PURITE) MINERA

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC EAGD	LITH.	DESCRIPTION
412			.83			412.83	+	412.83-423.04 SANDSTONE - REDISH
413							+	BROWN TO GREEN, VERY FINE
414			.98				+	GRAINED WELL SORTED ROUND
415			.54			CUT	+	GRAINS COULD BE A CLAYSTONE
416			.83			10.10	+	OR MUDSTONE. VERY DENSE
417						RQD	+	COMPACT ROCK NOT
418			.73			10.21	+	MUCH PERMEABILITY WITH
419			.11 .26 .73				+	LITTLE POROSITY METALLIC
420			.14				+	MINERALS SEEN
421			.41 .81				+	
422			.05				+	
423			.04 .80			423.04	+	423.04-433.31 SANDSTONE
424			.74				+	VERY FINE GRAINED
425			.54				+	SORTED ROUNDED GRAINS
426			.58				+	NO VISIBLE FOLDING COULD BE
427						10.2	+	A CLAYSTONE OR MUDSTONE
428						RQD	+	VERY DENSE MASSIVE COM
429						10.22	+	PACT ROCK NOT MUCH
430							+	PERMEABILITY WITH LITTLE
431							+	POROSITY METALLIC MINER
432							+	SEEN (PYRITE)
433			.33			433.31	+	433.31-444.77 SANDSTONE RED
434							+	BROWN TO GRAY VERY FINE
435							+	GRAINED WELL SORTED ROUN
436			.54				+	GRAINS DEAD OIL PRESENT
437			.22			CUT	+	IN STREAKS AND VUGS. SOME
438			.18 .96			10.15	+	VUGS EMPTY (OIL IN DISCHARGE
439			.74 .65			RQD	+	WATER) MOSTLY A DENSE
440			.51			10.15	+	COMPACT ROCK WITH
441			.06				+	SOME METALLIC MINERALS
442			.01 .80				+	PRESENT (PYRITE)
443			.47			443.46	+	
444			.48 .77				+	444.77-453.66 OIL SHALE LOW
445			.49				+	GRADE WITH INTERBEDDED
446			.29				+	SANDSTONE (AS ABOVE) SHALE
447			.09 .73			CUT	+	IS BROWN TO REDISH BROWN
448			.59			10.2	+	LOW GRAINED CALCAREOUS, META
449			.57			RQD	+	MINERALS PRESENT - SMELL
450			.28 .84			10.2	+	OF HYDROCARBONS AND
451			.16 .57 .68				+	HYDROGEN SULFIDE
452			.27 .96				+	
453			.57 .66			453.66	+	
454			.36				+	453.66-463.70 OIL SHALE LOW GRADE
455			.36 .51				+	LIGHT TO REDISH BROWN EXTREMELY
456			.33 .91			CUT	+	FINE GRAINED - HARD EX-SILE
457			.96			10.0	+	COMPACT ROCK NOT MUCH
458			.56			RQD	+	PERMEABILITY BUT THERE IS
459						10.04	+	POROSITY WITH INTERBEDDED
460							+	SANDSTONE LAYERS. METALL
461							+	

COMMENTS: 486-487 CONTAIN UNINTAH - GREEN RIVER FORMATIONS

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. GRQD	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 ⁴		.21 .16			CUT		OF SANDSTONE - SHALE IS LIGHT
467			.26 .31			10.1		TO REDISH BROWN - HARD, CALCA
468		VER	.34			RD		MATERIAL - EXTENSIVE AMOUNT
469		I .61				10.1		OF METALLIC MINERALS SEEN
470		I .31	.04					IN CERTAIN AREAS SOME GILSON
471			.46					ALONG PARTING PLANES AND FRX
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								MUDSTONE - REDISH BROWN
477			.61			10.2		VERY FINE GRAINED, DENSE,
478			.31			RD		COMPONENT ROCK, LARGE
479			.11			10.2		AMOUNTS OF METALLIC MINER
480								ASSOCIATED WITH CALCITE IN
481			.70					LUCKS ZONES OR BLENDS MOST
482								PURITE
483						484.01		
484			.01					484.01-486.71 SANDSTONE AS
485			.01					ABOVE
486			.56					486.71-494.16 OIL SHALE LOW
487			.13 .38	51 56 71		CUT		TO MEDIUM GRADE PREDOMIN
488						10.5		MEDIUM GRADE BROWN TO
489			.01 .21 .61			RD		REDISH BROWN, FISSILE, HARD
490						10.5		CONVOLUTED FRACTURE, VERY
491								COMPONENT ROCK
492								
493			.11 .83			494.16		494.16-504.39 OIL SHALE
494			.16					PREDOMINANTLY LOW GRADE WITH
495			.56 .61	96				SOME INTERBEDDED MEDIUM
496			.06 .18	25 34 61				GRADE - LIGHT TO REDISH BRO
497			.56			CUT		497.23-501.67 LOST CORE ZONE
498			.23			10.23		CORE FELLOUT OF BARREL
499						RD		ON RETRIEVAL
500						6.16		
501			.67					
502			.84					HARD CALCAREOUS COMPACT
503			.45					ROCK
504			.05 .39			504.39		504.39-510.71 OIL SHALE LOW TO
505			.71					MEDIUM GRADE JOINTED
506			.62			CUT		SECTION LIGHT TO REDISH
507			.05 .21	46		6.32		BROWN, HARD, CALCAREOUS
508			.02 .59	92		RD		ROCK NOT VERY COMPACT
509			.31 .76			6.32		
510			.14			510.71		

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL/ TON	REC. ERGD	LITH.	DESCRIPTION
512								510.11-520.09 OIL SHALE LOW TO
513			.16					MEDIUM, LIGHT TO REDISH BROWN
514			.69 .91			CUT		HARD CALCAREOUS ROCK THIS RUN
515			.16			10.2		HAD NO JOINTS AND IS COMPACT
516			.81			ROD		ROCK - SOME OF HYDROCARB
517			.41 .64			10.18		AND HYDROGEN SULFIDE. FRO
518								BLOOM LINE
519			.01 .41 .69					
520			.89			52.09	X	
521		VER. 1.01 .34						520.29-531.08 OIL SHALE
522			.34					LOW TO MEDIUM GRADE
523			.11					LIGHT TO REDISH BROWN AND
524			.13 .58					CALCAREOUS ROCK SOME
525			.79					JOINTING FOUND IN THIS
526			.14					RUN THIS RUN EXHIBITED
527	75'		.10 .22 .65	65 .80		10.21		SOME FISSILITY, SOME
528		1.71	.10					NAHCOLITE OR CALCITE SEEN
529			.00 .71					IN SMALL ELONGATED NUGGS
530			.13					BLEBS
531			.08			53.08	X	531.08-541.21 OIL SHALE LOW
532			.02 .61	.11				MEDIUM GRADE LIGHT TO
533			.31					REDISH BROWN, HARD, CALCIT
534			.31 .71			CUT		ROCK - SMALL AMOUNTS OF
535			.26			10.11		NAHCOLITE OR CALCITE WERE
536						ROD		SEEN IN SMALL ELONGATE
537			.02			10.13		NUGS OR BLEBS - NOT READILY
538			.02 .75					OBSERVANT
539			.31 .74					COMPACT ROCK
540			.46					
541			.21			54.21	X	541.21-551.29 OIL SHALE LOW
542			.21					TO MEDIUM GRADE LIGHT
543			.24 .90					TO REDISH BROWN, HARD,
544			.01 .62			CUT		CALCAREOUS ROCK. IN SOME
545			.21 .67 .81			10.1		ARE 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			.21			55.21	X	551.29-561.33
552			.31 .72					OIL SHALE LOW TO
553			.33 .51					MEDIUM GRADE LIGHT
554			.61			CUT		TO REDISH BROWN HARD
555	70'	11 16.2	.11 .80			10.0		CALCAREOUS ROCK IN SOME
556			.51			ROD		AREAS SMALL ELONGATED
557			.36			10.04		NUGS OR BLEBS FILLED
558			.15 .27 .34 .57					WITH NAHCOLITE AND/OR
559			.14					CALCITE ARE FOUND
560			.38 .57					

HOLE NO: X-13 SHEET 12 OF 23 DATE: 5/13/76 LOGGED BY: W. M. MORTON COLLAR: 5494 TD: 1124

DEPTH	±MM	FRX	PP	ASSAY				GAL/TON	REC. REQD	LITH.	DESCRIPTION
				10	20	30	40				
562									↑	I	561.33-571.36 OIL SHALE LOW
563			.36						↑	I	TO MEDIUM GRADE LIGHT
564									↑	I	REDISH BROWN HARD
565									CUT	I	CALCAREOUS ROCK IN SOME
566			.40						10.0	I	AREAS SMALLER LONGATED
567			.40						RDD	I	GLASS OR FLIES FILLED WITH
568			.32						10.03	I	NAHCOLITE VERY COMPACT
569			.04							I	ROCK.
570										I	
571			.36					571.36		I	571.36-574.71 OIL SHALE HIGH
572										I	GRADE, DARK REDISH BROWN,
573			.18							I	LOW SPECIFIC GRAVITY SOFT DEN
574			.84							I	ROCK COMPACT ROCK
575			.81							I	SLIGHTLY CALCAREOUS
576			.75							I	574.71-581.54 OIL SHALE
577			.44							I	LOW TO MEDIUM GRADE LIGHT
578										I	TO REDISH BROWN, HARD
579										I	CALCAREOUS ROCK
580										I	
581			.54							I	581.54-591.93 OIL SHALE LOW TO
582			.66 .86 .91							I	MEDIUM GRADE LIGHT TO REDISH
583			.95							I	BROWN HARD CALCAREOUS ROCK
584										I	SOME SANDSTONE LAYERS
585			.84						CUT	I	IN THE RUN
586			.31						10.40	I	586.51 - 591.93 SANDSTONE LAYERS
587			.34						RDD	I	587.61 - 71 BROWN OIL SATURATED
588									10.31	I	
589			.26 .31 .65							I	
590			.21 .87							I	
591			.93					591.93		I	
592			.85							I	591.93-596.71 OIL SHALE, HIGH
593			.76							I	GRADE, DARK REDISH BROWN, TO
594										I	BLACK CALCAREOUS COMPACT
595									CUT	I	ROCK WITH INTERBEDDED SANDSTONE
596									10.1	I	LAYERS VERY THIN (<0.1)
597			.44 .39						RDD	I	596.71-602.01 OIL SHALE, LOW
598			.52						10.08	I	TO MEDIUM GRADE LIGHT
599			.23 .83							I	BROWN HARD CALCAREOUS
600			.34							I	COMPACT ROCK
601			.04					602.01		I	602.01-606.97 (602-605) TO 100'
602			.01							I	BRINNEST AQUIFER OIL SHALE
603			X MECHANICAL						CUT	I	LOW TO MEDIUM GRADE LIGHT
604			NO FRX OR DIPS						5.0	I	TO REDISH BROWN CALCAREOUS
605			NOTED						RDD	I	ROCK SOME RUPPLE AND BROKEN
606								606.97	4.96	I	AREAS - SEE COMMENTS
607										I	606.97-617.01 OIL SHALE MEDIUM
608									CUT	I	TO HIGH GRADE BROWN TO BLACK
609									10.10	I	WITH INTERBEDDED LAYERS
610			.33						RDD	I	IN THE RUN - SEE COMMENTS

COMMENTS: TOP OF BRIDGES RIVER 602.01 INDICATED BY LOG OIL SHALE ZONE LOW TO MED. GRADE W/ GLASS FILLED WITH NAHCOLITE

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC ERGQ	LITH.	DESCRIPTION
612			.29			CUT	MC	AND METALLIC MINERALS MOSTLY
613			.61			10.0	MC	TURBID - H ₂ S SMALL COMPACT
614						POD	MC	CALCAREOUS ROCK NOT MIX
615						10.0	MC	PERMEABILITY
616							MC	
617			.04			*	MC	617.01 - 622.17 CALCAREOUS MUD
618			.61				MC	STONE REDISH BROWN DENSE
619						CUT	MC	HARD ROCK WITH VUGS OF
620						10.0	MC	METALLIC MINERALS (PARTLY
621						POD	MC	NATIVE COPPER) COMPACT
622						10.15	MC	ROCK, NO PERMEABILITY SO
623			.47				MC	POROSPITY SOME NATURAL
624							MC	AND (CALCITE SEEN BO
625			.16 .76				MC	KNOW IS OIL SHALE MEDIUM
626			.08 .16				MC	BROWN, CALCAREOUS COMPACT
627			.17 .51	91 .97			MC	627.17 - 632.13 OIL SHALE MEDIUM
628			.81			CUT	MC	BROWN TO DARK BROWN WITH ONE
629			.80			50	MC	SANDSTONE LAYER AND ONE SM
630						POD	MC	ALL ZONE 2' @ 528.71 HARD
631						APP	MC	COMPACT ROCK
632			.13 .27			CUT	MC	632.13 - 634.11 OIL SHALE MEDIUM
633						POD	MC	GRAD. BROWN TO DARK BROWN WITH JOINT
634			.21			POD	MC	LEACHED OIL NAHCOLITE AT 635.10
635						POD	MC	
636						POD	MC	635.21 - 641.10 (635.41 - 636) RUBBLE
637						POD	MC	636.51 - 642.10 634.11 - 637.21 OIL SHALE
638							MC	637.21 LEACHED OIL NAHCOLITE
639							MC	637.71 (NAHCOLITE) HARD ROCK WITH VUGS
640						CUT	MC	(BOTH FILLED AND PARTIALLY FILLED)
641						10.0	MC	640.31 - 641.10 LEACHED OIL NAHCOLITE
642						POD	MC	641.81
643						9.82	MC	
644							MC	644.51 - 645.36 MUDSTONE LAYER WITH
645							MC	METALLIC MINERALS CALCAREOUS
646							MC	
647			.09			*	MC	637.01 - 655.75 OIL SHALE LOW TO
648							MC	MEDIUM GRADE EXTENSIVE
649							MC	VUGS SOME FILLED WITH NAHCOLITE
650						CUT	MC	AND CALCITE SOME EMPTY - VUGS
651						8.50	MC	ARE INTERCONNECTED BOTH
652						POD	MC	HORIZONTALLY AND VERTICALLY
653						8.66	MC	SOME FRACTURED ROCK AND
654							MC	JOINTING SEEN CALCAREOUS
655						*	MC	65.75 - 661.71 CONTINUED IS AREA
656							MC	EXCEPT FOR UNCONSOLIDATED
657						CUT	MC	SANDS STRONG H ₂ S SMALL
658						6.0	MC	659.27 - .55 UNCONSOLIDATED SAND IN
659						POD	MC	660.13 - 660.97 SHALE VERY MUSHY ROCK
660						5.96	MC	
661							MC	

COMMENTS: (2) 652.13 - 652.13 PULLED STRINGS CHANGED BIT - CUT 2' LEFT IN HOLE NOID @ 632.13 BECAUSE THERE'S 3/4 OF A DOWT LEFT IN HOLE

SAMPLE ANALYSIS
VUGS & PPS IN
THIS ROCK

EXTENSIVE PPS
IN THE BROWN
VERY BROKEN
UP

55°
45°
45°

65°
45°

80°
70°
ALL 70°

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. BRGD	LITH.	DESCRIPTION
662								66.71-67.95 OIL SHALE LOW TO
663		VER	EXTENSIVE PP'S					MEDIUM GRADE, BROWN TO
664		I 41	INTX RUNS SOME					DARK BROWN EXTENSIVE PP'S
665			OLD PP'S FILLED			CUT		JOINTS AND BRECCIA ZONES FULL
666			WITH NAHCOLITE			10.25		WITH NAHCOLITE AND CALCITE
667			CALCITE			ROD		WUGS THROUGHOUT ENTIRE RUN
668						10.28		MOSTLY FILLED WITH NAHCOLITE
669			FILLED W/ NAHCOLITE					THIS POTENTIAL AQUIFER IS AN
670	85°	F 21	CALCITE					ALIEA THAT HAS UNDERGONE PRIME
671			.35			67.95		STRUCTURAL CHANGE
672			.96					67.95-68.89 OIL SHALE LOW TO
673		VER	.75					MEDIUM GRADE, BROWN TO
674								DARK BROWN HARD FISSILE
675								ROCK SMALL SMALL BLEDORS
676			.11 .23	78		10.0		NODULES OF NAHCOLITE AND/OR
677			.71 .91			22.0		CALCITE-PP'S SOME FILLED
678	60°	I 21	.26			9.94		WITH CALCITE AND/OR NAHCOLITE
679	VER	I 21	.05 .52					
680			.48					
681			.31			68.89		
682			.00					68.89-69.71 OIL SHALE LOW TO
683	85°	I 21	.94			CUT		MEDIUM GRADE BROWN TO DARK
684	60°	I 21	.94			9.0		BROWN, HARD, CALCAREOUS,
685			.16			ROD		COMPONENT ROCK
686	65°	I 21	.71			7.52		68.71 LEACHED OUT WUG
687	45°	I 21	.01					
688		VER	.31			69.71		68.71-69.71 LOST CORE ZONE
689			.27 .20			69.85		
690			.00 .38	47				69.85-70.03 OIL SHALE LOW TO
691			.61			CUT		MEDIUM GRADE BROWN TO DARK
692			.70			10.2		BROWN, HARD, CALCAREOUS,
693						ROD		COMPONENT ROCK IMPERMEABLE
694						10.2		ZONE WITHIN AQUIFER ZONE
695	45°	I 71	.04 .63					COMPRISING THE BIRDSNEST
696		I 63	.51					AQUIFER - STRONG H ₂ S SMELL
697			.35					ON CORE
698								69.35-70.38 VOID
699								
700			.31 .41	28		70.01		70.01-70.91 OIL SHALE LOW TO
701			.34 .37	68				MEDIUM GRADE BROWN TO
702			.31 .78			CUT		DARK BROWN SOME BLEBS
703			.99			10.0		OF NAHCOLITE AND CALCITE
704			.47			ROD		CALCAREOUS HARD AND FAIRLY
705			.100			9.82		COMPONENT ROCK
706			.34 .64	91				
707			.14 .51	73				
708			.00					WUG @ 709 MOSTLY EMPTY BUT
709	VER		.33 .63					SOME NAHCOLITE AND CALCITE
710	T 67		.67 .91			710.01		PP'S ONLY

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. LRGD	LITH.	DESCRIPTION
712	50°	H41	.16 .26		100%	↑		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 BEDDIED 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 15
719			.21					(717.76-718.38 VUG) IS SOLID
720			.51					COMPONENT SHALE
721								
722			.31					122.31 VUG WITH CALCITE AND/OR NAHCOLITE
723			.50					720.91-721.05 OIL SHALE - LOW TO MEDIUM
724		N 38°	.63					GRADE SHALE BROWN TO DARK BROWN
725			.98					HARD, CALCAREOUS, COMPACT ROCK
726			.75			8.17		VUGS FILLED WITH CALCITE AND NAHCOLITE
727			.15					IMPERMEABLE WITH LOW POROSITY
728								726.15 VUG WITH CALCITE AND/OR NAHCOLITE
729			.08					721.08-739.36 OIL SHALE LOW TO
730								MEDIUM GRADE LIGHT TO DARK
731			.53					BROWN, HARD, CALCAREOUS
732						CUT		COMPACT ROCK IMPERMEABLE
733			.34			10.2		WITH LITTLE POROSITY
734						RQD		734.15 VUG STRUCTURE WITH
735						10.23		CALCITE AND GILSONITE STRONG H ₂ S
736								SMELL IN THIS ZONE. FROM WATER
737								COMING IN AT BOTTOM OF
738	45°		.15					AQUIFER
739	45°		.36					731.36-749.43 OIL SHALE LOW
740	VC		.51					TO MEDIUM GRADE, HARD
741			.60 .61					CALCAREOUS, LIGHT TO DARK
742			.06 .15 .31 .45			CUT		BROWN ROCK VERY COMPACT
743						10.0		ROCK - CONTINUOUS CORE SMELL
744						RQD		OF H ₂ S COMING FROM CORE
745						10.07		AND CORE FRAGILE ROCK IS
746			.96					IMPERMEABLE WITH LITTLE
747								POROSITY
748								
749			.40 .43					749.43-759.53 OIL SHALE LOW TO
750			.81					MEDIUM GRADE, LIGHT TO DARK
751								BROWN, HARD, CALCAREOUS, VERY
752						CUT		COMPACT ROCK, SMELL
753						10.1		OF H ₂ S COMING FROM CORE
754						RQD		FRAGILE - IMPERMEABLE WITH
755						10.1		LOW POROSITY
756								
757								
758			.40					758.00 PARTING PLANE HAS GILSONITE IN VUG
759			.53					759.53-769.59 OIL SHALE LOW
760			.35					TO MEDIUM, PART LIGHT TO

COMMENTS: BOTTOM OF BIRD'S NEST AQUIFER IS APPROX. 72 FEET

HOLE NO: X-13 SHEET 16 OF 23 DATE: 5/23/76 LOGGED BY: N. MOULTON COLLAR: 5184 TD: 1124

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. RGD	LITH.	DESCRIPTION
762			.49			↑		759.53-769.59 OIL SHALE LOW TO
763						CUT		MEDIUM GRADE, LIGHT TO
764						10.0		DARK BROWN, HARD, CALCAREOUS
765						RQD		COMPETENT ROCK - FEW PART
766						10.04		PLANES AND NO SANDSTONE
767								LAYERS OR CALCITE NARROW
768								ZONES SMELL OF H ₂ S FROM
769			.35 .59		769.51	X		CORE BARREL ROCK IS IMPER-
770			.35					MEABLE WITH LITTLE POROSITY
771								709.59-715.53 OIL SHALE LOW TO
772								MEDIUM GRADE, LIGHT TO
773								BROWN HARD CALCAREOUS
774								COMPETENT ROCK - NO PER-
775								MEABILITY WITH VERY LITTLE
776								POROSITY SMALL BUEBS
777								OF SANDS MATERIAL SEEN IN
778			.81			Y		SOME PARTS OF THIS RUN
779			.53 .86		779.53	X		779.53-787.77 OIL SHALE LOW TO
780								MEDIUM GRADE, LIGHT TO
781								DARK BROWN HARD CALCAREOUS
782								COMPETENT ROCK NO
783						CUT		PERMEABILITY WITH LITTLE
784						10.2		POROSITY
785						RQD		
786			.17			10.24		786.17 GILSONITE ON PARTING PLANE
787								787.51-810.36 SAND FIELDED VUG
788								
789			.17 .93		789.77	X		789.77-810.22 OIL SHALE LOW TO
790								MEDIUM GRADE, LIGHT TO
791								DARK BROWN, HARD, CALCAREOUS
792								COMPETENT, ROCK NO PERME-
793						CUT		LOW POROSITY THIN LAYERS
794						10.4		OF SANDSTONE WERE FOUND
795						RQD		794.1-96 SANDSTONE LAYER
796			.15			10.45		IN THIS RUN
797			.28			↑		800.22-810.36 OIL SHALE LOW TO
798			.21 .71					MEDIUM GRADE, LIGHT TO
799								DARK BROWN, HARD, CALCAREOUS
800			.22		800.22	X		COMPETENT ROCK NO
801								PERMEABILITY WITH LITTLE
802								POROSITY
803						CUT		
804			.74			10.1		804.74 GILSONITE ON PARTING PLANE
805						RQD		
806			.29			10.14		
807			.40					
808			.16					808.16 GILSONITE ON PARTING PLANE
809						Y		
810			.36		810.36			810.36-810.41 OIL SHALE LOW TO

COMMENTS:

HOLE NO: X-13 SHEET 17 OF 23 DATE: 5/25/71 LOGGED BY: W. M. MORTON COLLAR: 544 TD: 1174

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC. BRGD	LITH.	DESCRIPTION
812								810.56-820.41 OIL SHALE LOW TO
813								MEDIUM GRADE LIGHT TO DARK
814	VER	I .49 .06	.49			CUT		BROWN HARD CALCAREOUS COMP-
815						10.0		ETENT ROCK NO PERMEABILITY
816			.16			RCD		WITH LITTLE POROSITY SOME TH
817						10.05		LAYERS AND BLED BLED. OF
818	VER	I .02 .01						SANDSTONE
819								819.31-820.41 SANDSTONE LAYER OIL
820			.41		820.41	X		SATURATED OILING CH AND GAS
821								820.41-820.53 OIL SHALE LOW TO
822								MEDIUM GRADE LIGHT TO DARK
823								BROWN, HARD, CALCAREOUS COMP
824								ROCK NO PERMEABILITY AND
825			.31					LITTLE POROSITY A FEW VERY
826								THIN AND SMALL LAYERS AND
827								BLED OF SANDSTONE
828								
829								
830			.53		830.53	X		830.53-840.74 OIL SHALE LOW TO
831								MEDIUM GRADE, LIGHT TO DARK
832			.19					BROWN, HARD, BRITTLE CALCAREO
833						CUT		833.91-840.61 SANDSTONE LAYER OIL
834						10.2		SATURATED
835			.57			RCD		
836						10.2		840.61-850.97 SANDSTONE LAYER OIL
837			.08					SATURATED
838								COMPETENT ROCK, NO
839			.41					PERMEABILITY WITH LITTLE
840			.74		840.74	X		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						10.2		NUMEROUS THIN SANDSTONE
846			.16			RCD		LAYERS AND BLED, A FE
847						10.25		ARE OIL SATURATED ROCK HA
848								NO PERMEABILITY WITH LITL
849			.74					POROSITY
850			.97.21		850.97	X		850.97-861.20 OIL SHALE LOW TO
851								MEDIUM GRADE LIGHT TO DARK
852								BROWN, HARD, CALCAREOUS
853								COMPETENT ROCK (SOLID PIEC
854						CUT		OF CORE 9.37') RUN HAS NUMER
855						10.2		THIN SANDSTONE LAYERS, AND
856						RCD		BLED, 1 WAS OIL SATURATED
857						10.23		(22') NO PERMEABILITY WITH
858								LITTLE POROSITY
859								
860								

COMMENTS:

HOLE NO: 1-13 SHEET 18 OF 23 DATE: 5/27/76 LOGGED BY: W. WOODSON COLLAR: 5/27/76 TD: 121

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC ERQD	LITH.	DESCRIPTION
862					8/12/25	CUT	I	861.20-865.97 OIL SHALE LOW TO
863					8/12/25	CUT	I	MEDIUM GRADE LIGHT TO DARK
864					8/12/25	RQD	I	BROWN, HARD, CALCAREOUS
865			.97		8/12/25	RQD	I	COMPONENT ROCK - SOME
866					8/12/25	RQD	I	SMALL THIN SANDSTONE LAMERS
867					8/12/25	RQD	I	865.97-874.78 OIL SHALE LOW TO
868			.51		8/12/25	CUT	I	MEDIUM GRADE, LIGHT TO DARK
869					8/12/25	9.0	I	BROWN HARD, CALCAREOUS
870			.16		8/12/25	RQD	I	COMPONENT ROCK - NO
871			.71		8/12/25	8.81	I	PERMEABILITY WITH LITTLE
872			.76		8/12/25		I	POROSITY - DEEP SLOW DRILLING
873					8/12/25		I	(CHATTERY)
874			.78		8/12/25		I	
875			.63		8/12/25		I	874.78-885.06 OIL SHALE LOW TO
876					8/12/25		I	MEDIUM GRADE, LIGHT TO MEDIUM
877					8/12/25	CUT	I	BROWN, HARD, CALCAREOUS,
878					8/12/25	10.2	I	COMPONENT ROCK - HAS NO
879			.07		8/12/25	RQD	I	PERMEABILITY AND LITTLE
880					8/12/25	10.28	I	POROSITY
881					8/12/25		I	DEEP SLOW DRILLING
882					8/12/25		I	
883					8/12/25		I	
884					8/12/25		I	885.06-894.66 OIL SHALE
885			.06		8/12/25		I	PREDOMINATELY LOW GRADE, LIGHT
886					8/12/25		I	TO MEDIUM BROWN, HARD,
887					8/12/25	CUT	I	CALCAREOUS COMPONENT ROCK
888					8/12/25	10.0	I	NO PERMEABILITY WITH LITTLE POROSITY
889					8/12/25	RQD	I	889.56-894.66 SANDSTONE LAYER SATURATED
890					8/12/25	9.16	I	890.00-894.66 SANDSTONE LAYER SATURATED
891					8/12/25		I	EXCEPT IN SANDSTONE LAYERS
892					8/12/25		I	
893					8/12/25		I	
894			.66		8/12/25		I	894.66-904.71 OIL SHALE PREDOMINATELY
895					8/12/25		I	LOW GRADE LIGHT TO MEDIUM BROWN
896					8/12/25		I	HARD CALCAREOUS COMPONENT ROCK
897					8/12/25	CUT	I	NO PERMEABILITY WITH LITTLE POROSITY
898					8/12/25	10.0	I	898.36-904.71 SANDSTONE LAYER SATURATED
899					8/12/25	RQD	I	899.51-904.71 SANDSTONE LAYER SATURATED
900					8/12/25	10.05	I	899.91-904.71 SANDSTONE LAYER SATURATED
901					8/12/25		I	EXCEPT IN SANDSTONE
902					8/12/25		I	LAYERS
903					8/12/25		I	903.46-904.71 SANDSTONE LAYER SATURATED
904			.71		8/12/25		I	904.71-904.83 OIL SHALE LOW TO
905					8/12/25		I	MEDIUM GRADE (PREDOMINATELY
906					8/12/25	CUT	I	LOW GRADE) LIGHT TO MEDIUM
907					8/12/25	10.1	I	BROWN HARD CALCAREOUS ROCK
908					8/12/25	RQD	I	WITH NUMEROUS THIN (<.02)
909					8/12/25	10.12	I	SANDSTONE LAYERS MOST ARE
910					8/12/25		I	NOT OIL SATURATED RUN TO

COMMENTS:

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	CAL TON	REC. ERQD	LITH.	DESCRIPTION
912								NO PERMEABILITY AND
913								LITTLE POROSITY
914			.88		914.83	X		914.83-914.83 SANDSTONE LAYER ON
915			.52					SATURATED BUBBLING GAS
916								914.83-924.93 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 DISTINCT OIL SATUR
921	+100							921.81-921.81 OIL SATURATED, COMPETE
922								922.51-923.01 SANDSTONE LAYER OIL
923			.26					SATURATED, BUBBLING GAS
924			.93					ROCK WITH NO PERMEABILITY AND
925			.91					LITTLE POROSITY
926								924.93-934.86 OIL SHALE PREDOMINANT
927						CUT		LOW GRADE, LIGHT BROWN, HARD
928						10.6		CALCAREOUS ROCK WITH NUMEROUS
929						ROD		SANDSTONE LAYERS THIN (<.02') MOST
930			.32			9.93		NOT OIL SATURATED, COMPETENT ROCK
931	+90							NO PERMEABILITY AND LITTLE POROS
932								932.11-936 SANDSTONE LAYER OIL SATUR
933								AND BUBBLING GAS
934			.86		934.86	X		
935								934.86-944.91 OIL SHALE PREDOMINANT
936			.71					LOW GRADE, LIGHT BROWN, HARD, CAL
937						CUT		AREOUS ROCK WITH NUMEROUS SA
938						10.0		NOT OIL SATURATED, COMPETENT ROCK
939						ROD		940.41-953 SANDSTONE LAYER SATURAT
940								STONE LAYERS (THIN <.02') MOST
941	+80		.71			10.05		NOT OIL SATURATED, ROCK HAS
942								NO PERMEABILITY AND LITTLE
943								POROSITY
944			.91		944.91	X		944.91-954.88 OIL SHALE PRED
945								INATLY LOW GRADE LIGHT TO
946								MEDIUM BROWN, HARD, CALCARE
947						CUT		COMPETENT ROCK NO PERMEABILITY
948						10.0		AND LITTLE POROSITY
949						ROD		950.21-952.51 UPPER WAVY BED
950						9.97		CONVERTED SANDSTONE LIGHT
951	+70							REDSUBBROWN OIL SATURATED, BUBBL
952								GAS
953								954.88-964.90 OIL SHALE LOW GRA
954			.88		954.88	X		(PREDOMINANTLY) LIGHT TO MEDIUM
955								BROWN, HARD, CALCAREOUS,
956						CUT		COMPETENT ROCK, NO
957						10.0		PERMEABILITY WITH LITTLE
958			.46			ROD		POROSITY - NUMEROUS SAND
959						10.02		STONE LAYERS (<.02') 2 ARE OIL
960								

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL TON	REC REQD	LITH.	DESCRIPTION
962								964.88-964.90 OIL SHALE LOW GRADE
963								LIGHT BROWN HARD CALCAREOUS
964			910			964.90		COMPONENT ROCK
965								964.90-964.93 OIL SHALE VERY LOW
966						964.93		GRADE WITH INTERBEDDED MAR
967						964.93		STONE, LIGHT BROWN, HARD,
968						964.93		CALCAREOUS COMPONENT ROCK
969						964.93		ENTIRE RUN NO PP'S OR FRX
970						964.93		ROCK HAS NO PERMEABILITY,
971	+50					964.93		AND LITTLE POROSITY
972								
973								
974								964.93-964.97 OIL SHALE MEDIAN
975								TO HIGH GRADE DARK BROWN TO
976								BLACK SOFT COMPONENT ROCK
977								964.97-965.05 OIL SHALE LOW TO
978								MEDIUM GRADE, HARD CALCAREOUS
979			92					COMPONENT ROCK - NO PERM-
980								EABILITY AND LITTLE POROSITY
981	+40							SOME AREAS IN THIS RUN COOL
982					36.5			RECLASSIFIED MARLSTONE
983					17.4			FEW PARTING PLANES
984			.68		14.6			965.05-965.08 OIL SHALE LOW GRADE
985					17.5			WITH MARLSTONE INTERBEDDED PALE
986					23.6			BROWN TO LIGHT BROWN, HARD,
987					12.6			965.08-965.11 USPM (AS TESTING)
988					6.5			CALCAREOUS COMPONENT
989					5.7			ROCK NO PERMEABILITY AND SOME PORE
990			12.466		4.1			965.11-965.14 LAMERS AND SMALL UG
991	+30		.11 .39		3.3			FILLED WITH NAUCLITE INTERBEDD
992			.59		9.2			WITH LOW GRADE LIGHT BROWN OIL
993			21.73		5.3			SHALE
994			31.5670		4.9			965.14-965.17 OIL SHALE LOW
995			21.47		2.9			GRADE PREDOMINANTLY PALE
996			23.37		1.3			TO LIGHT BROWN SOME MEDIAN
997			.46		2.0			ROCK TOWARDS BOTTOM OF K
998			.06.55		3.9			ALL ROCK IS HARD CALCAREOUS
999					11.2			AND COMPONENT NO PERMEABILITY
1000					13.1			AND LITTLE POROSITY
1001	+20		.86		21.0			
1002					32.0			1005.03-1006.71 OIL SHALE LOW TO
1003					16.4			MEDIUM GRADE HARD BROWN
1004					14.4			CALCAREOUS COMPONENT ROCK
1005			.03.23		10.2			1005.76-1006.82 SANDSTONE LAYER SATURATED
1006			.00		16.6			1006.71-1006.82 USPM (AS TESTING)
1007					25.6			1006.82-1006.85 SANDSTONE LAYER OIL SATURATED
1008					33.2			1006.85-1006.88 SANDSTONE LAYER OIL SATURATED
1009			22		23.2			1006.88-1006.91 SANDSTONE LAYER OIL SATURATED
1010					29.6			1006.91-1006.94 OIL SHALE MEDIAN

COMMENTS: 987.71-988.71 WAS RETURNED ON 6/3/76
THIS ROCK WAS TAKEN OUT FOR USPM GAS TESTING

COMMENTS: 1021.41 - 1022.71 TO USBM FOR GAS TESTING
INCLUDES MAHOGANY MARKER

HOLE NO: 4-13 SHEET 21 OF 23 DATE: 6/23/76 LOGGED BY: W. N. MOULTON COLLAR: 54.1 TD: 1120

DEPTH	±MM	FRX	PP	ASSAY IP 20 30 40	GAL TON	REC REQD	LITH.	DESCRIPTION
1012			11		41.0			ROCK - NUMEROUS THIN (<0.2')
1013					24.0			SANDSTONE LAYERS OIL SATUR
1014					18.9	1015.09		BUBBLING GAS
1015					17.6			1015.09 - 1021.41 OIL SHALE LOW TO
1016					11.9			MEDIUM, MOSTLY LOW GRADE.
1017					20.3	0.3		HARD, CALCAREOUS, COMPACT
1018					17.8	0.3		ROCK NO PERMEABILITY AND
1019					11.4	0.3		LITTLE POROSITY (LOW GRADE
1020					12.4	0.3		WITHIN 3' OF MARKER)
1021	0	INAM	.04 41		10.9	0.3		1021.41 - 1021.84 MAHOGANY MARKER
1022					9.4	0.3		(SEE NOTES) SANDSTONE LAYER ALL
1023			54		8	0.3		SATURATED BUBBLING GAS
1024			.33		11	0.3		1021.84 - 1025.12 OIL SHALE LOW GR
1025			12.71		16.3	0.3		LIGHT BROWN HARD CALCAREOUS COND
1026					48.7	0.3		ENTENT ROCK
1027					23.7	0.3		1025.12 - 1035.32 OIL SHALE MEDIUM
1028					21.5	0.3		TO HIGH GRADE DARK BROWN
1029					20.7	0.3		BLACK SOFT CALCAREOUS
1030					18.1	0.3		COMPACT ROCK PERMEABLE
1031	-10				32.2	0.3		HIGH GRADE NO PERMEABILITY
1032					21.3	0.3		AND LITTLE POROSITY
1033					44.5	0.3		START OF THE MAHOGANY CONG
1034			.06 53		52.6	0.3		
1035		VER.	.13		66.9	0.3		1035.32 - 1041.50 OIL SHALE HIGH
1036		111.02			78.5	0.3		GRADE W/NAHCELITE BLUE SOFT
1037		111.04			38.2	0.3		1037.06 - 1041.50 OIL SHALE HIGH
1038		FILL WITH			47.2	0.3		1037.11 - 1038.75 TO USBM FOR GAS TESTING
1039		NAHCELITE	.18		54.6	0.3		1039.46 - 1041.50 LOST CORE ZONE
1040					35.7	0.3		
1041	-20		.50		46.9	0.3		1041.66 - 1043.09 TO USBM FOR GAS TESTING
1042					25.0	0.3		
1043			.09		40.6	0.3		1043.09 - 1044.35 LOST CORE ZONE
1044			.135		18.8	0.3		1041.50 - 1044.35 OIL SHALE HIGH GRADE
1045					21.0	0.3		DARK BROWN TO BLACK SOFT, PAPER
1046					38.3	0.3		1044.35 - 1054.59 OIL SHALE MEDIUM
1047					32.9	0.3		TO HIGH GRADE BROWN TO BLACK
1048					17.7	0.3		HIGH GRADE IS SOFT - MEDIUM GRADE
1049					16.7	0.3		IS HARDER. ALL IS CALCAREOUS
1050			.11		19.2	0.3		(HIGH GRADE SLIGHT) COMPACT
1051	-30				20.4	0.3		ROCK NO PERMEABILITY WITH
1052					20.4	0.3		LITTLE POROSITY
1053					29.1	0.3		
1054			.59		30.3	0.3		
1055			.41		43.6	0.3		1055.11 - 31 SANDSTONE LAYER OIL SATURATED
1056					35.8	0.3		BUBBLING GAS
1057					21.4	0.3		1054.59 - 1064.01 OIL SHALE MEDIUM
1058					34.3	0.3		HIGH GRADE, BROWN TO BLACK
1059			.29		31.8	0.3		SOFT TO MEDIUM HARD CALCAREOUS
1060					19.4	0.3		COMPACT NO PERMEABILITY

DEPTH	±MM	FRX	PP	ASSAY 10 20 30 40	GAL/TON	REC. GRD	LITH.	DESCRIPTION
1062					16.8			
1063					28.2	10M 01		1064.01 - 1074.25 OIL SHALE MEDIAN
1064					32.7			TO HIGH GRADE. DARK BROWN TO
1065			.10		15.0	10M 02		BLACK SOFT CALCAREOUS
1066					8.9	10M 03		COMPONENT ROCK - SOME
1067			.22 .94		13.4	10M 04		PAPER SIZE SOFT AND FLAKY
1068					9.9	10M 05		PAPER TEXTURE SOME VERY
1069					17.2	10M 06		THIN SANDSTONE LAYERS IN THE
1070					32.6	10M 07		ROCK (2.02')
1071	-50				35.2	10M 08		1071.51 - 1084.36 SANDSTONE LAYER
1072					28.2	10M 09		NO PERMEABILITY AND LITTLE
1073					28.2	10M 10		POROSITY
1074					3.3	10M 11		1074.25 - 1084.36 OIL SHALE MEDIAN
1075					3.3	10M 12		(PREDOMINANTLY) TO HIGH GRADE
1076		.64			2.4	10M 13		BROWN TO DARK BROWN, SOME
1077		.34			19.4	10M 14		BLACK, HARD CALCAREOUS
1078		.19 .38			13.6	10M 15		COMPONENT ROCK NO
1079		.36			11.0	10M 16		PERMEABILITY AND LITTLE
1080					12.0	10M 17		POROSITY
1081	-60				18.2	10M 18		
1082						10M 19		
1083						10M 20		1084.36 - 1094.51 OIL SHALE PREDOMINANTLY
1084		.36				10M 21		LOW GRADE, SOME MEDIUM GR
1085						10M 22		WITH A LITTLE HIGH GRADE. LIGHT
1086						10M 23		TO DARK BROWN CALCAREOUS
1087						10M 24		SOMEWHAT WEAK ROCK
1088						10M 25		HAS NO PERMEABILITY WITH LITTLE PORE
1089						10M 26		1089.51 - 1090.17 FALSE MARBLE
1090						10M 27		SANDSTONE LAYER OIL SATURATED
1091	-70					10M 28		BUBBLING GAS
1092						10M 29		
1093						10M 30		
1094						10M 31		1094.51 - 1104.61 OIL SHALE PREDOMINANTLY
1095						10M 32		LOW GRADE BUT SOME MEDIUM
1096						10M 33		TO HIGH GRADE ZONES ARE PRES
1097						10M 34		LIGHT TO DARK BROWN, CALCAREOUS
1098						10M 35		WEAK ROCK. NO PERMEABILITY
1099						10M 36		AND LITTLE POROSITY
1100						10M 37		
1101	-80					10M 38		
1102						10M 39		
1103						10M 40		
1104						10M 41		1104.16 - .26 AND 1104.36 - .44 SANDSTONE
1105						10M 42		LAYERS, OIL SATURATED, BUBBLING GA
1106						10M 43		1104.61 - 1114.58 OIL SHALE LOW
1107						10M 44		GRADE CREAM TO LIGHT BROWN
1108						10M 45		HARD, CALCAREOUS ROCK, COMPEN
1109						10M 46		ROCK - SOME AREAS ARE WEAK
1110						10M 47		HAS A FEW VERY THIN (2.02')

NUMEROUS PARTINGS
MOST THOUGHT TO BE MECHANICAL

