

# THE CLEVELAND-CLIFFS IRON COMPANY

WESTERN DIVISION OFFICE

## Interoffice Memo

TO: P. W. McKie

FROM: E. R. Carnahan

COPIES TO: T. A. Kauppila  
E. R. Carnahan  
~~File~~

DATE: September 4, 1975

---

SUBJECT: WHITE RIVER SHALE PROJECT - REVISION OF LITHOLOGIC LOGS

Subsequent to the completion of the Geologic Exploration Program Report a request was received from White River Shale representatives for a copy of the original lithologic logs. Those contained in the report itself were somewhat abbreviated to allow a systematized format to be adhered to and to be compatible with past oil shale descriptive efforts that were used as a guide. Thus, the initial field logs actually contained more detailed information than those incorporated in the report. However, the field logs were not well standardized, were difficult to interpret in some instances and (in general) do not lend themselves to duplication so as to yield legible copies.

To satisfy the White River request a complete set of revised lithologic logs have been drawn up for the four "P" holes and the nine "X" holes. The objective has been to retain all information contained in the field logs. In several instances the wording has been altered or rearranged for the sake of clarity and ease in examination. Two minor changes were made in the revised version, as follow:

- (a) errors in observation, identification or measurement in the field logs (where noted) were corrected
- (b) some detailed information, resulting from subsequent core examination, was added in a few instances in which the field log was lacking

Thus, the revised lithologic descriptions are an improved and slightly augmented version of the original field notes, and contain all the essential information found in those notes. The main difference between the lithologic description in

the geologic report and this revised version is that the latter includes many more references to the many, thin, tuffaceous sandstone layers that are found distributed throughout the zone of interest.

It should be pointed out that additional descriptive information is available relating to the four "P" holes. FUGRO Corporation personnel compiled detailed lithologic logs covering the total lengths of these holes as they were drilled. However, structural features, such as parting planes, are generally absent.

ERC

ERC:cm

# FIELD LOG OF BORING

PROJECT NO. 74-263  
 DATE 9/20/71 TITLE PORT JAMES  
 START 9/20/71 COMPLETE             
 EQUIPMENT USED FAIRBANKS D-200 RIG

BORING NO. 201 CODE ASLE  
 ELEVATION            DATUM             
 WATER LEVEL            AFTER             
 LOGGED BY           

PAGE 1

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Kind of Tool	Recovery, Condition		
0-5	1	AIR STORY		CHIPS	SAND SANDSTONE, VERY FINE GRAINED, LIGHT BROWN, MASSIVE, NON CALCAREOUS	
5-10	2	AIR STORY		"	SAME SANDSTONE AS ABOVE WITH AN ADDITIONAL VERY FINE GRAIN SANDSTONE, LIGHT GRAY, MASSIVE SLIGHTLY CALCAREOUS	
10-15	3	AIR STORY		"	SAME AS ABOVE, WITH A HIGHER % GRAY SANDSTONE THAN OF THE LIGHT BROWN SANDSTONE	
15-20	4	AIR STORY		"	SAME AS ABOVE	

NOTES:

FAIRBANKS

# FIELD LOG OF BORING

PROJECT NO. 24-068

BORING NO. P-1 CORE HOLE

DATE 9/21 TITLE SUN PHILIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START 9/21 COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED WINDING DRILL RIG

LOGGED BY MARY MCKEN

PAGE 2

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
20-25		AIR ROTARY		CLIPS	ENTIRE SAMPLE CONSISTS OF VERY FINE GRAIN SILTY LIGHT GRAY SANDSTONE	
25-30		AIR ROTARY		"	SANDSTONE; SAME AS ABOVE	
30-35		AIR ROTARY		"	SANDSTONE; SAME AS ABOVE	
35-40		AIR ROTARY		"	SANDSTONE; SAME AS ABOVE	

NOTES:

1000

1000

# FIELD LOG OF BORING

PROJECT NO. 74-068

BORING NO. P-1 CORE HX1

DATE 9/21 TITLE SUN-PHILLIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START 9/21 COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING DRILL RIG

LOGGED BY MARK MILLIKEN

PAGE 3

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
40-45		AIR ROTARY			SANDSTONE, AS ABOVE	15 ft
45-50		AIR ROTARY			SANDSTONE, AS ABOVE	15 ft
50-55		AIR ROTARY			SANDSTONE, AS ABOVE	15 ft
55-60		AIR ROTARY			SANDSTONE, AS ABOVE	15 ft
60-64		AIR ROTARY			SANDSTONE, AS ABOVE	15 ft

NOTES: 64' FT - AIR ROTARY  
64' PLUS - CORE RIG

FORM

# FIELD LOG OF BORING

PROJECT NO. 74-112

BORING NO. P-1 Core

DATE 7/27/74 TITLE SOIL - Phillips - 110410

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START 14:50 COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W Air Rotary

LOGGED BY J. S. Srembrak

*each space will represent 1 foot.*

*Page 1 of 1*

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
60						
						3 1/2
65						
					Start of core 68'	V. porous
		core	100	100%	Sandstone, Grey <sup>24</sup> (wet), medium to fine grained	possibly
69'4"					sorted, siliceous cemented, very hard, very slight	
70					calcareous, organic stringers, minor calcite grains	
					almost pure quartz, differentiated compacted, non	
				100%	Marlstone Yellowish grey (5Y 7/2) and light grey	
					V. poorly sorted, calcareous, hard, cross bedded	
					differentiated compacted, non fossiliferous	
75'					fine bedded, some sandstone bedded	
					non fossiliferous [offset of 1/8" at 78' due to	compacted
		core		100%	possibly small thin layers, possible	
					bitite or other scattered dark organic matter	
79'						

NOTES: 68 - 78 100% RQD

79 - 112 100% RQD

### 3 OF BORING

cannot have high angle  
bedding here unless something  
strange is happening. Must  
be joints -- cross bedding may  
be possible, but I doubt it.  
R/L

BORING NO. 1-1 (156)

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER

LOGGED BY ANN E.

					DESCRIPTION	REMARKS
			Force	Condition	color, consistency, moisture condition, grain-size distribution, bedding, geologic details:	
22-26	5	ROCK		100%	M. to med. yellowish grey to light grey, finely bedded, calcareous, some sandstone organic deposits. <u>some high angle folding</u>	
22-35	6				Darkstone with interbedded sandstone + 8' in thickness. med. grey with dark grey, med. to coarse grained calcareous nodules with some organic matter. <u>high angle folding</u>	
23-28	7				Dark grey med. grey, other interbeds are darker grey, fine grained - finely bedded, massive, calcareous, nodules of calcine with associated organic matter (calcareous).	

**NOTES:**

# FIELD LOG OF BORING

PROJECT NO. 74-100  
 DATE 7/1/81 TITLE 5011-Phillips-50110  
 START 0600 COMPLETE 1200  
 EQUIPMENT USED 1" x 1/2" x 1/2" x 1/2"

BORING NO. 1-1 CURE  
 ELEVATION            DATUM             
 WATER LEVEL            AFTER             
 LOGGED BY ALP D

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
80-82	5	CURE		100%	Mud trace, yellowish gray to light gray, thin, bedded, calcareous, some sandstone organic deposits, some high angle bedding	
83-85	6				Marlstone with interbedded sandstone at 83-84' in marlstone, light gray with dark grey, each 1/2" to 1" thick, calcareous nodules 1/2" to 1" in diameter, moderately calcareous, some materials (gypsum?) present, some med-coarse grained 83-84' med. grey, micaceous flakes and organic material, high angle bedding	
85-88	7				Marlstone, med. grey, other interbeds are darker grey, fine grained thinly bedded, moderately calcareous, pockets of caliche with associated organic matter, gypsum?	

NOTES:

7/1/81



## FIELD NO. 22-11-11

PROJECT NO. 74-01

THE UNIVERSITY OF CHICAGO LIBRARY

\_\_\_\_\_

$\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

7-1-61 COMPLETE

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

10-10-1964

$\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}$

2000

DEPTH	SAMPLES			Recovery, Condition	Soil type, color, consistency, moisture content distribution, bedding, etc.
	No.	Date	Core Feet		
7-91	9	102E		100%	Dark gray, silty clay, fine sand, some siltstone fragments, well sorted, medium grain size, high angle bedded, fairly uniform, some coarse & small with some siltstone fragments weathered greenish material
7-92	10				SAME AS ABOVE WITH SOME SILTSTONE FRAGMENTS
7-93	11				Shiny deposit, 100%, soft
7-94	12				SAME AS ABOVE WITH PACKETS OF SILTSTONE MATERIAL AND SMALL CRYSTALS OF QUARTZ IN IT
7-95	13				SAME AS ABOVE
7-96	14				SAME AS ABOVE

NOTES: 92-10-1615-220170

# FIELD LOG OF BORING

PROJECT NO. 74-25  
 DATE 9-1-74 TITLE SOIL BORING - 74-25  
 START 7:30 AM COMPLETE 11:30 AM  
 EQUIPMENT USED 1" DIAMETER

BORING NO. 1  
 ELEVATION 100.0  
 WATER LEVEL 98.5  
 LOCATED BY 1

DEPTH	SAMPLES			RECOVERY, %	SOIL TYPE, COLOR, CONSISTENCY, MOISTURE, GRAIN-SIZE DISTRIBUTION, BEDDING, etc.
	No.	Type	Depth (ft)		
102-105	12	Core		100%	Marlstone, med. gr., (fine) ... with occasional thin layers of ... calcareous, (fine) ...
105-108	13				SAME AS ABOVE, at 107.5' lenses of ... stone, med. gr., med. grained with ... organic material - lenticular ... deposits
108-111	14				SAME AS ABOVE with calcareous ... grained lenses of material and ... material interspersed in lenses
111-114	15				MARLSTONE med. gr., (fine) ... hard, sandy, ... calcareous except for a minor ... alternating ... grained sand

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 44-1268  
 DATE 8/21/54 TITLE WATER RESOURCES - DRAINAGE  
 START 8:00 AM COMPLETE 1:00 PM  
 EQUIPMENT USED 2" Dia. 10' Boring  
1" Dia. 10' Boring

BORING NO. 10  
 LOCATION ON HIGHWAY  
 WATER LEVEL 10.5  
 LOCATED BY W. J. H. H.

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Size or Form	Recovery, Condition	
14-17	17	100%		100%	Light brown, silty, fine grained, sandy, non calcareous, hard, compact, no holes, no organic fragments, no pebbles, no coarse sand
17-19	18				SAME AS ABOVE WITH SOME SILT, CONTAINING organic fragments, depending on the use
19-23	19				SAME AS ABOVE
23-26	20				SAME AS ABOVE ORGANIC FRAGMENTS
26-29	21				SAME AS ABOVE WITH SOME SILT, pebbles, coarse sand, and sand
29-31	22				Coarsest material, G.C. (gravel), bedded, no organic fragments, no coarse sand, no organic fragments

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 15-11  
 DATE 10-10-55 TITLE 15-11  
 START 10-10-55 COMPLETE 10-10-55  
 EQUIPMENT USED 15-11

BORING NO. 15-11  
 ELEVATION 100 DATE 10-10-55  
 WATER LEVEL 100  
 LOGGED BY 15-11

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Recovery, %	Condition	
0-1			100%		SILTSTONE med. gr. silty, fine grained, brown, well sorted, in some areas with red ground
					concretionary and silt concretionary
15-32	15				SILTSTONE somewhat silty, brownish in some pockets, minor
					concretionary
32-41	16				SAME AS ABOVE
41-44	17				SAME AS ABOVE med. calcareous
					15-11
44-47	18				SILTSTONE med. gr. silty, fine grained, brown, well sorted, in some areas with red ground
					concretionary and silt concretionary
47-51	19				SAME AS ABOVE

NOTES: 100% recovery of 15-11

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE \_\_\_\_\_

ELEVATION \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY \_\_\_\_\_

NO. OF PAGES \_\_\_\_\_

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Depth Feet	Recovery, Condition	
154-155				100%	SILTSTONE med grey (US) fine, hard with calcareous material in places organic matter in surface zone of 154 well consolidated, hard
155-156					
156-157					SAME AS ABOVE organic matter, etc.
157-158					
158-159					SAME AS ABOVE coloration & texture lighter grey, silty areas due to grey with more organic matter
159-160					
160-161					
161-162					SILTSTONE, dark grey, grading to silty grey in calcareous areas, etc. water and leaf imprints pocket of calcareous material pyrite crystals present
162-172	33		100	100%	siltstone med light grey (US) & pale brown (syr 5/2), very fine bed slightly calcareous (some higher calc zones) hard, poorly consolidated
	34				
	75				

NOTES:



# FIELD LOG OF CORING

PROJECT NO. 72-060  
 DATE 9/23/77 TITLE SUN-24483-CORING  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_  
 EQUIPMENT USED L-V No. 100

SORING NO. P-1  
 ELEVATION \_\_\_\_\_  
 WATER LEVEL \_\_\_\_\_  
 LOGGED BY \_\_\_\_\_

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Clows or Fossils	Recovery, Condition	
188-197	42	core	100	100	Sandstone with some marlstone.
	43				beds, hard, more massive bedding
	44				ranges from 1" to 5" poorly sorted
	45				fine-grained, shows more cross bedding
					and differentiated compaction. <del>non</del>
					non fossiliferous, some organic stuff
					at 196' a 5" zone of medium grain sandstone
					with biote
197-214					Marlstone Lt brown (5YR 6/7) to
					lt grey (N7) hard, very fine bedded
					highly calcareous, poorly sorted
					non fossiliferous, differentiated
					compact around 214' only with
					minor offset and folding occurring
					there, dark zone (N3) at 206-
					207, a 2" med bed sandstone
					bed (turbidite?) occurs at 212'
214-217	51	CORE		100%	SILTSTONE dark grey fine grained
					clayey, hard, well consolidated

NOTES:

## FIELD LOG OF BORING

PROJECT NO. 174-012

FORM NO. 5-25

DATE 11/25/65 TITLE 100-112625-2040

CLASSIFICATION \_\_\_\_\_ STATUS \_\_\_\_\_

START 12/1/68 COMPLETE 12/1/68

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED None

1963 BY \_\_\_\_\_

DEPTH	SAMPLES			Description
	No.	Type	Recovery, %	
24-27	51	24	100%	red silty clay except for sample 51
27-280	52			SAME AS ABOVE some organic fragments present
280-283	53			SAME AS ABOVE, grey black (N2)
283-284	54			SAME AS ABOVE
284-289	55			
289-295	56			
295-335	57			
335-438	58			
438-442	59	CORE	100%	<p>SILTSTONE with silty clay matrix</p> <p>grey to light grey, fine to medium grained</p> <p>dark grey some organic material</p> <p>partly sandy, some silty</p> <p>quartzite with some silty clay</p> <p>claystone with silty clay matrix</p> <p>gray to light gray silty clay</p>

**NOTES:**



# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE \_\_\_\_\_

ELEVATION \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY \_\_\_\_\_

DEPTH	DESCRIPTION			
	Grain Size	Texture, Condition	Color, Consistency, Moisture, etc.	Grain-size distribution, bedding, geologic notes
238-240				
240-242				same as above
242-245				
245-248				
248-251				
251-254				
254-257				
257-260				
260-263				
263-267				
267-271				
271-285		100% 100%		<p>silty shale medium light grey (275)</p> <p>hard, calcareous, poorly sorted</p> <p>thin bedded, non fossiliferous</p> <p>possible "oil shale" at 271'</p> <p>NOTE: This section appears dark</p> <p>due to drilling grease on</p> <p>the core</p> <p>contact with next unit gradation</p>

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 91  
 DATE 7/29/71 TIME 10:00 - 12:00  
 START                      COMPLETE                       
 TO DEPTH 170 5' 11" In Potomac

BORING NO.                      Core                       
 ELEVATION                      TYP                       
 WATER LEVEL                      FEET                       
 LOGGED BY                     

DEPTH	NO.	TEST	RECOVERY, %	CONDITION	Soil type, color, consistency, moisture, and grain-size distribution, bedding, geologic
285-293			100%	100%	Tuff Sandstone, light bl- grey (58 7/1) hard, non-calcareous, fine-grained, poorly sorted, generally massive, some 5" beds, leaf imprints, inclusion of pyrite organic matter
293-303			100	100	Same as above at 298.5 brown/green bed 1" possible siltstone (?)
303-312			100	100	Tuff Sandstone medium light grey (N6), hard fine grained, non-calcareous, massive, inclusions of pyrite, biotite, possible hornblende with calcareous material. Stringers of brown siltstone appearing material. 4" bed of calcareous siltstone at 308' medium grain N5
312-316			100	100	silty shale, <del>hard</del> medium light (N6) hard, poorly sorted, calcareous thin bedded, non fossiliferous

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 1008  
 DATE 1962 TITLE SOIL BORING - SONO  
 START 1:00 PM COMPLETE 2:00 PM  
 EQUIPMENT USED 2" W. 10' 2" 10' 2"

BORING NO. 1-0-10  
 ELEVATION 2070'  
 WATER LEVEL AT 1:00  
 LOCATED BY ...

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows of Force	Recovery, Condition	
217-246	86	CORE	98 3/4	100%	SILTSTONE, gray to black (k2) - a ... thinly bedded, well crystallized ... veins and pockets of nodule ... calcite, cleavage plain along joint ... 45° other cleavage occurs along bedding planes
320-323	87				at 321 nodule pocket with calcite crystals light gray highly crystalline
323-376	88				at 325 and 326 well crystallized light gray nodule crystals
326-329	89				at 327 joint plane, cleavage ... nodule at 328
329-332	90				SAME
332-335	91				at 334 nodule crystals ...
335-338	92				at 337 nodule crystals ...
	1				bedded layers of siltstone

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-131

BORING NO. 1

DATE 1-27 TITLE

ELEVATION  DATUM

START 2:00 AM COMPLETE

WATER LEVEL

EQUIPMENT USED 1 1/2" 2" 3" 4" 5" 6" 8" 10" 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100"

LOGGED BY

DEPTH	SAMPLE DATA				DESCRIPTION
	No.	Type	Blows Per Foot	Recovery, Condition	
238-241	73	CORE	100	100%	SAME AS ABOVE
241-244	74				Same as above
244-246	75				crystals
346-351		96	75	91%	shale grayish brown SYR <sup>3/2</sup> hard, calcareous, thin bedded iron pyrite weathered, conchoidal (possible oil shale)
351-378					shales, light grey (N7), hard calcareous, thin bedded, poorly sorted with beds (.5" to 1") of miccolite and calcite also intergrowths of miccolite + calcite in the sh pyrite inclusions, heavy miccolite + calcite between 363-367. decreasing miccolite and calcite below 367. cavity at 370, calcite increased Fractures at 354 and 357 70° incline

NOTES: 346-351 (27' recovery 90%)

## FIELD NO. 3311

1. *Journal of the American Medical Association*, 1997; 277: 1033-1038.

Copyright © 2005 John Wiley & Sons, Ltd.

2007-2008 COMPLETE

\_\_\_\_\_

Core

1. The first step is to identify the problem. This involves understanding the current situation and what needs to be changed.

1. The first group of authors (e.g., [1, 2]) has shown that the use of a single, common, and simple model for the entire system is not only possible but also convenient. The second group of authors (e.g., [3, 4]) has shown that the use of a single, common, and simple model for the entire system is not only possible but also convenient. The third group of authors (e.g., [5, 6]) has shown that the use of a single, common, and simple model for the entire system is not only possible but also convenient.

— 10 —

Core No.	Interval	Core Length	Recovery, %	Condition	Notes
37	36'-40'	37'	100		3" sandstone bed, poorly sorted, fossiliferous, Naclonite & calcite bed at 254'. 3" sandstone bed, with quite medium grain at 402', fractured.
38	40'-44'	44' CORE	32% 95%		CLAYSTONE: 1" to 5" thick, to clay gray, silty, slightly indurated, some calcareous (L. 404-406), slightly to mod. fract. at high angle, 20° to 40° to 80°+; 10' to 12' of sandstone, 5' to 6' of claystone, and 2' of sandstone, 1' of claystone.
39	40'-410	410' CORE	36% 100%		407-408 claystone, 409-410 sandstone, 411-412 claystone, 413-414 sandstone, 415-416 claystone, 417-418 sandstone, 419-420 claystone, 421-422 sandstone, 423-424 claystone, 425-426 sandstone, 427-428 claystone, 429-430 sandstone, 431-432 claystone, 433-434 sandstone, 435-436 claystone, 437-438 sandstone, 439-440 claystone, 441-442 sandstone, 443-444 claystone, 445-446 sandstone, 447-448 claystone, 449-450 sandstone, 451-452 claystone, 453-454 sandstone, 455-456 claystone, 457-458 sandstone, 459-460 claystone, 461-462 sandstone, 463-464 claystone, 465-466 sandstone, 467-468 claystone, 469-470 sandstone, 471-472 claystone, 473-474 sandstone, 475-476 claystone, 477-478 sandstone, 479-480 claystone, 481-482 sandstone, 483-484 claystone, 485-486 sandstone, 487-488 claystone, 489-490 sandstone, 491-492 claystone, 493-494 sandstone, 495-496 claystone, 497-498 sandstone, 499-500 claystone, 501-502 sandstone, 503-504 claystone, 505-506 sandstone, 507-508 claystone, 509-510 sandstone, 511-512 claystone, 513-514 sandstone, 515-516 claystone, 517-518 sandstone, 519-520 claystone, 521-522 sandstone, 523-524 claystone, 525-526 sandstone, 527-528 claystone, 529-530 sandstone, 531-532 claystone, 533-534 sandstone, 535-536 claystone, 537-538 sandstone, 539-540 claystone, 541-542 sandstone, 543-544 claystone, 545-546 sandstone, 547-548 claystone, 549-550 sandstone, 551-552 claystone, 553-554 sandstone, 555-556 claystone, 557-558 sandstone, 559-560 claystone, 561-562 sandstone, 563-564 claystone, 565-566 sandstone, 567-568 claystone, 569-570 sandstone, 571-572 claystone, 573-574 sandstone, 575-576 claystone, 577-578 sandstone, 579-580 claystone, 581-582 sandstone, 583-584 claystone, 585-586 sandstone, 587-588 claystone, 589-590 sandstone, 591-592 claystone, 593-594 sandstone, 595-596 claystone, 597-598 sandstone, 599-600 claystone, 601-602 sandstone, 603-604 claystone, 605-606 sandstone, 607-608 claystone, 609-610 sandstone, 611-612 claystone, 613-614 sandstone, 615-616 claystone, 617-618 sandstone, 619-620 claystone, 621-622 sandstone, 623-624 claystone, 625-626 sandstone, 627-628 claystone, 629-630 sandstone, 631-632 claystone, 633-634 sandstone, 635-636 claystone, 637-638 sandstone, 639-640 claystone, 641-642 sandstone, 643-644 claystone, 645-646 sandstone, 647-648 claystone, 649-650 sandstone, 651-652 claystone, 653-654 sandstone, 655-656 claystone, 657-658 sandstone, 659-660 claystone, 661-662 sandstone, 663-664 claystone, 665-666 sandstone, 667-668 claystone, 669-670 sandstone, 671-672 claystone, 673-674 sandstone, 675-676 claystone, 677-678 sandstone, 679-680 claystone, 681-682 sandstone, 683-684 claystone, 685-686 sandstone, 687-688 claystone, 689-690 sandstone, 691-692 claystone, 693-694 sandstone, 695-696 claystone, 697-698 sandstone, 699-700 claystone, 701-702 sandstone, 703-704 claystone, 705-706 sandstone, 707-708 claystone, 709-710 sandstone, 711-712 claystone, 713-714 sandstone, 715-716 claystone, 717-718 sandstone, 719-720 claystone, 721-722 sandstone, 723-724 claystone, 725-726 sandstone, 727-728 claystone, 729-730 sandstone, 731-732 claystone, 733-734 sandstone, 735-736 claystone, 737-738 sandstone, 739-740 claystone, 741-742 sandstone, 743-744 claystone, 745-746 sandstone, 747-748 claystone, 749-750 sandstone, 751-752 claystone, 753-754 sandstone, 755-756 claystone, 757-758 sandstone, 759-760 claystone, 761-762 sandstone, 763-764 claystone, 765-766 sandstone, 767-768 claystone, 769-770 sandstone, 771-772 claystone, 773-774 sandstone, 775-776 claystone, 777-778 sandstone, 779-780 claystone, 781-782 sandstone, 783-784 claystone, 785-786 sandstone, 787-788 claystone, 789-790 sandstone, 791-792 claystone, 793-794 sandstone, 795-796 claystone, 797-798 sandstone, 799-800 claystone, 801-802 sandstone, 803-804 claystone, 805-806 sandstone, 807-808 claystone, 809-810 sandstone, 811-812 claystone, 813-814 sandstone, 815-816 claystone, 817-818 sandstone, 819-820 claystone, 821-822 sandstone, 823-824 claystone, 825-826 sandstone, 827-828 claystone, 829-830 sandstone, 831-832 claystone, 833-834 sandstone, 835-836 claystone, 837-838 sandstone, 839-840 claystone, 841-842 sandstone, 843-844 claystone, 845-846 sandstone, 847-848 claystone, 849-850 sandstone, 851-852 claystone, 853-854 sandstone, 855-856 claystone, 857-858 sandstone, 859-860 claystone, 861-862 sandstone, 863-864 claystone, 865-866 sandstone, 867-868 claystone, 869-870 sandstone, 871-872 claystone, 873-874 sandstone, 875-876 claystone, 877-878 sandstone, 879-880 claystone, 881-882 sandstone, 883-884 claystone, 885-886 sandstone, 887-888 claystone, 889-890 sandstone, 891-892 claystone, 893-894 sandstone, 895-896 claystone, 897-898 sandstone, 899-900 claystone, 901-902 sandstone, 903-904 claystone, 905-906 sandstone, 907-908 claystone, 909-910 sandstone, 911-912 claystone, 913-914 sandstone, 915-916 claystone, 917-918 sandstone, 919-920 claystone, 921-922 sandstone, 923-924 claystone, 925-926 sandstone, 927-928 claystone, 929-930 sandstone, 931-932 claystone, 933-934 sandstone, 935-936 claystone, 937-938 sandstone, 939-940 claystone, 941-942 sandstone, 943-944 claystone, 945-946 sandstone, 947-948 claystone, 949-950 sandstone, 951-952 claystone, 953-954 sandstone, 955-956 claystone, 957-958 sandstone, 959-960 claystone, 961-962 sandstone, 963-964 claystone, 965-966 sandstone, 967-968 claystone, 969-970 sandstone, 971-972 claystone, 973-974 sandstone, 975-976 claystone, 977-978 sandstone, 979-980 claystone, 981-982 sandstone, 983-984 claystone, 985-986 sandstone, 987-988 claystone, 989-990 sandstone, 991-992 claystone, 993-994 sandstone, 995-996 claystone, 997-998 sandstone, 999-1000 claystone.

2530

# FIELD LOG OF BORING

PROJECT NO. 4-0-2-5

BORING NO. P-1 (1920)

DATE AT 5:13

ELEVATION          DATUM         

START          COMPLETE         

WATER LEVEL          AFTER         

TELEPHONE USED         

LOGGED BY         

DEPTH	TESTS				DESCRIPTION
	No.	Area	Recovery, %	Condition	
407-412	100%	100%	97%		CLAYSTONE w/ THIN SILT SA. 5Y 4/2 INTERBEDS; lt olive gray 5Y 4/2 to yell. gray 5Y 4/2 (siltstone); lt. to bedded, nonsalc. to silt. calc. non fractured
410-413	100%	100%	95%	97%	CLAYSTONE; lt. olive gray 5Y 4/2 to dusty brn. 5YR 2/2, hard, thinly bedded to v. thinly bedded, silt. calc. (10% HCL), silt. frag. (one joint 80"±), joint surface clean and smooth, nonfossiliferous, fractures on some bedding planes give impression of colloidal dec.
413-416	100%	100%	73%	90%	CLAYSTONE. Dusty brn 5YR 4/2 hard, thinly bedded to v. thinly bedded, silt. calc. to locally mod. calc., non fractured. (high angle joints at 15

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (COEF)

DATE 10/11/74 TITLE SOME DILLIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FALLING 2500, 6 3/4" DIAMOND BIT, 412

LOGGED BY W.E. HIND

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
CONT. 413-416					joints are lightly coated w/ a combination of secondary calcite and clay, nonfossiliferous; 2, thin horizons (1" thick) of a dark colored brittle material - fizzes violently locally - nautilite?? (after Profitt), last 1' of core broken
416-424	30x DIA 118 CORE		22%	38%	CLAYSTONE; dusky brn. silt 2 1/2 to v. dusky red 10R 2 1/2, hard to mod. hard, thinly bedded to v. thinly bedded, silt. calc. (10% HCl), highly fractured, high angle joints to 90°, brittle-crushed zones, extensive secondary calcite and clay, nonfossiliferous - when core was removed from barrel driller commented on presence of clay - possible washed out clay lenses.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-060-15

BORING NO. P-1000

DATE 2/11/74 TITLE SUN - PHILLIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED SPILLING 2500, 6 3/4" DIAMOND  
CORE, A, 2

LOGGED BY W. E. H. H. H.

P. 1000

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows of Force	Recovery, Condition	
411-420	Box 119	DIA CORE	20%	50%	CLAYSTONE; dusky brn. 5YR 2/2 to v. dusky red 10R 2/2, med. to hard, thinly bedded to v. thin- bedded, silt. calc., highly struc- tured, high angle joints not evident. Frac. faces are rough and rugose- silt. secondary calcite, vugs, pores vugs and some fractures coated w/ a soft, dk. colored mineral that fizzes violently w/ 10% HCl silt petroliferous odor
420-433	Box 120	DIA CORE	90%	100%	CLAYSTONE; dusky red 5YR 2/2 to olive gray 5Y 3/2, hard, thinly be- to v. thinly bedded, silt. calc., one rugged frac. at top of core - probably tail end of disturbed zone above, minor sec. calcite on frac. surface, remainder of core v. competent, mechanical fracture

NOTES:



# FIELD LOG OF BORING

PROJECT NO. 74-068-EG

BORING NO. F-1 (CORE)

DATE 10/1/74 TITLE SUN - PHILLIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FALLING 2500, 6 3/4 DIAMOND  
CORE, AIR

LOGGED BY W. R. LUNG  
F-15

RQD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
CONT. 430-433					break w/ a v. smooth surface, increasing petroliferous odor.	
433-436	201	DIA. CORE	100%	100%	CLAYSTONE; dusky yellowish brn 10R 2/2 to dark gray 5N 5/2, hard, v. thinly bedded to thinly bedded, abundant streaks and blebs of soft blk material w. brn. streak - gilsonite, some mechanical breaks coated w/ v. fine grained purple mineral - nonfizzing occ. spots of calcite, silt odor, veins. (horizontal) of calcite mixed w/ some other mineral, no joints.	
436-439	202	DIA. CORE	100%	100%	CLAYSTONE; v. dusky red 10R 2/2, hard, v. thin bedded, silt to mod. calc., one joint + 60°, joint faces smooth and clean, gilsonite streaks abundant, silt odor.	

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. 0-1 (CORE)

DATE 10/1/74 TITLE SUN - PHILLIPS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 4 3/4" DIAMOND BIT, A12

LOGGED BY W. F. LIND

P-17

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
439-442	Box 123	DIA CORE	100%	100%	CLAYSTONE - SILTY CLAYSTONE, dusky brn. silt 2 1/2, hard, v. thin bedded silt content increasing, appearance of small red grains, two joints > 70°, surface partially coated w/secondary calcite, some fracture faces give impression of collidal dep., silt. to mod. calc, gilsonite still present.
442-445	Box 124	DIA CORE	100%	100%	CLAYSTONE - SILTY CLAYSTONE, grayish red silt 4 1/2 to dusky brown silt 2 1/2, hard, bedding indistinct mod. to v. calc, non frag, occ. gilsonite. less silt w/ depth.
445-448	Box 125	DIA CORE	100%	100%	CLAYSTONE, dusky yellowish brown silt hard, bedding indistinct, v. calcareous, non fractured, gilsonite still present.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORES)

DATE 10/1/74 TITLE SUN- Phillips

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FALING 2500, 6 3/4" DIAMOND BIT, LOGGED BY W. R. Lund  
AIR P. 20.

DEPTH	SAMPLES				DESCRIPTION	
	No.	Type	Blows or Force	Recovery, Condition		
443-451	BOX 126	DIA CORE	100%	100%	CLAYSTONE; med. gray NS to med. brn. 5YR 7/2, hard, bedding indistinct mod. to calc, nonfractured, rare gilsonite, sil. ool.	
451-454	BOX 127	DIA CORE	100%	100%	CLAYSTONE, dusky brn. 5YR 4/2 to dk. gray NS, bedding indistinct, hard, v. calc., nonfrac, rare gilsonite	loc. sil. ool.
454-457	BOX 128	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE, dusky brown 5YR 4/2, hard, bedding indistinct, v. calc., nonfrac, occ. gilsonite	7/10-1/2 = 1/2
457-460	BOX 129	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE??, dusky brn. 5YR 4/2, hard, bedding indistinct, calc. but 4' from above, nonfractured, occ. gilsonite	

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/1/74 TITLE San-Phillips

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED SPILLING 2500, 6 3/4" DIAMOND BIT LOGGED BY M.D. DAVIS  
AIR \_\_\_\_\_ . P-31

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Diagn. St. Force	Recovery, Condition	
460-463	Box 130	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE, dusty brn SYR <sup>1/2</sup> hard, thinly bedded, v. calc. non fractured, occ. gilsonite
463-465	Box 131	DIA CORE	100%	100%	CLAYSTONE-LIMESTONE, dusty brn SYR <sup>1/2</sup> hard, thinly bedded, v. calc. non fractured, occ. gilsonite
465-495	132 141	CORE	100%	100%	marlstone, dusty brown (5 YR 2/2) hard, thinly bedded, poorly sorted, non fossiliferous possible fine pyrite crystals very homogeneous throughout core run. At 478' and 479' 1" bed of light grey marlstone some differential compaction seen, also core broken at each bed.
495-498	142 143	cor	99	100	silty shale, Grayish brown 5 YR 1/2, hard thinly bedded poorly sorted, varies from
	157				

NOTES:	1853 conductivity	4500
	2000 "	3000

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 Core

DATE 10/1/77 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED 2-W Air Rotary

LOGGED BY M. S. [unclear]

ROD

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows Force	Recovery, Condition	
495-525	125	core	7		slightly calcareous to moderately calcareous, non fossiliferous, minor amounts of pyrite and bitite, very homogeneous. core has extremely long length between breaks up to 4' average length of core 3', rock is brittle will fracture if drop
525-528	Box 152	DIA. CORE	100%	100%	CLAYSTONE; dk. gray N-3, hard, thinly bedded, mod. calc. non-fossiliferous, nonfractured, v. good core recovery, ave. length 2'.
528-531	153	core	100	100	CLAYSTONE: med dk gray N-3, thin, thickly bedded, non fossiliferous, nonfractured, 2" dark zone, good recovery, ave length 1 1/2'

NOTES: 800 Conductivity 4900

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 core

DATE 10/2/79 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W Air Rotary

LOGGED BY W. L. ...

RAD

23

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows of Force	Recovery, Condition	
531-534	154	core	100	100	CLAYSTONE: N-4 med d'n gr., hard thinly bedded with silty interbeds (common) non-fossiliferous - non-structured, good recovery core length 1 1/2'; slightly calcareous
534-537	155	core	100	100	CLAYSTONE: 5 YR 2/2 - Dusky brown, hard thinly bedded, non-fossiliferous - non-structured, slightly calcareous, good recovery, core length 1 3/4'
537-540	156	core	100	100	CLAYSTONE: 5 YR 2/2 Dusky brown, hard, thinly bedded, non-fossiliferous, non-structured, slightly calcareous, exc. recover. core size 3'
540-543	157	core	100	100	CLAYSTONE: 5 YR 2/2 Dusky brown, as above, exc. core size 2'

NOTES:

## FIELD LOG OF BORING

P24

PROJECT NO. 74-058-15BORING NO. P-1 coreDATE 5/1/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY Lee L. Ward

QSD

P-1

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows Per Foot	Recovery, Condition	
543-546	158	core	100	100	CLAYSTONE: 5 YR 2/2 Dk. brown Brownish hard massive claystone - moderately finely bedded - slightly calcareous
546-549	159	core	100	100	Claystone 5 YR 2/2 Dusky Brown as above
549-552	160	core	100	100	Claystone 5 YR 2/2 Dusky Brown as above 550' 6" 3/4" horiz dk brown layer possible fossil high - red brown
552-555	161	core	100	100	Claystone as above possible fossil high - red brown
555-	162	core	100	100	silty shale Dusky brown to 5 YR 2/2 to Med dark grey (N3) hard, poorly sorted thin bedded moderately calcareous, possible
	171				

NOTES:



925

Page No. 21

10-10-68

WATER LEVEL \_\_\_\_\_

1965 BY A.S.

7

NOTES:



# FIELD LOG OF BORING

PROJECT NO. 11-043-15

BORING NO. 15

DATE 12/7/71 TITLE 11-043-15

ELEVATION            NATURAL           

START            COMPLETE           

WATER LEVEL            AFTER           

EQUIPMENT USED EMULSION 1000, 3 1/2" DIAM. BIT  
212.

LOGGED BY           

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Recovery, %	Condition	
615'-618'	100 101	DIA CORE	100%	100%	Shale; N4 gray to N6 dk. gray silt. calc., hard, v. thinly bedded - well dev. and exposed in core - fractured, occ. thin <1" horizontal beds of black material, hard on calc, v. fine grained to silt
619'-621'	102 103	DIA CORE	100%	100%	Shale; N4 dk. gray to black, N5 grain size < silt, noncalc. to silt calc. hard, v. thinly bedded - well dev. nonfractured, rx becomes basic between 619'3" & 620'8", or so odor - oil shale?
621'-624'	104 105	DIA CORE	100%	100%	Shale — Argillaceous Limestone dk. gray N-4 to lt gray N-7 with silt grain < silt, silt. calc — v. calc. with silt hard, v. thinly bedded - well dev. non- fractured, upper portion same as in 618'-621', color change from green to brown

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. 7-1

DATE 10/3/72 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED WILSON 1000, 420' diameter  
bit, AIR

LOGGED BY W. J. R.

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Grain Size	Recovery, Condition	
					in 10' to 10' depth
624-627	101	DIA 10" SE	100%	100%	Argillaceous limestone → Silt N-4 to N-2, dk. gray to black, silty grain size < silt, v. calc. → silt calc. hard, v. thinly bedded, non frac., non fossiliferous, thin horizon: 21" of black shale occ. from 624'-627'
627-630	102	DIA 10" SE	100%	100%	Shale; dk. gray N-4 to black N-2, v. grain size < silt, silt calc., hard, v. thinly bedded, non frac., non-fossiliferous occ. horizon: black shale, 628.5" to 629.4" silty sandstone (buff color, N-4 gray, fine - med. grained, hard, locally med. calc.
630-632	103	DIA 10" SE	100%	100%	Shale; dk. gray N-4 to dk. silty dk. gray N-2, silty, dk. gray grain < silt (minor increase in grain size) pyritic, silt calc., hard, v.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 12-21-57

DATE 12-21-57

DATE 12-21-57

LOCATION 1000 ft. below surface

START 10:00 AM

STOP 1:00 PM

EQUIPMENT 1000 ft. borehole

LOGGERS 1000 ft. borehole

DEPTH	TIME	REMARKS	REMARKS
600-620			1000 ft. borehole
620-640			1000 ft. borehole
640-660			1000 ft. borehole
660-680			1000 ft. borehole
680-700			1000 ft. borehole
700-720			1000 ft. borehole
720-740			1000 ft. borehole
740-760			1000 ft. borehole
760-780			1000 ft. borehole
780-800			1000 ft. borehole
800-820			1000 ft. borehole
820-840			1000 ft. borehole
840-860			1000 ft. borehole
860-880			1000 ft. borehole
880-900			1000 ft. borehole
900-920			1000 ft. borehole
920-940			1000 ft. borehole
940-960			1000 ft. borehole
960-980			1000 ft. borehole
980-1000			1000 ft. borehole

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 14-040-5

BORING NO. 5-1

DATE 2-27-74 TITLE 14-040-5

ELEVATION \_\_\_\_\_ LATITUDE \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ FEET \_\_\_\_\_

EQUIPMENT USED 2" DIA. 10' LONG, 1/2" DIA. 10' LONG

LOGGED BY \_\_\_\_\_

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Grain Size	Fracture, Condition	
639-642	2	1A	20%	100%	Silty, clayey, dk gray 14-5, grain size increasing 15-20% above silt cut off, noncalc., hard, v. thinly bedded, nonfract., non fossiliferous, occ. coarse sand lenses (1-2") permeated w/ black for
642-645	3	2A	100%	100%	Silty, shaly, dk gray 14-4, grain size increasing 15-20% above silt cut off, noncalc., hard, v. thinly bedded, nonfract., non fossiliferous, occ. coarse sand lenses (1-2") permeated w/ black for
645-648	4	3A	100%	100%	Shaly, dk gray 14-4, grain size increasing 15-20% above silt cut off, noncalc., hard, v. thinly bedded, nonfract., non fossiliferous, occ. coarse sand lenses (1-2") permeated w/ black for

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. 7

DATE 8/12/71 TITLE SOIL - 74-068-15-10

ELEV. FROM SEA LEVEL

START                      COMPLETE                     

WATER LEVEL                     

EQUIPMENT USED 5" DIA. 8' BORE, 10" DIA. 2' BORE LOGGED BY  
                    JLT, JLR

DEPTH	SOIL TESTS				TEST DATA
	No.	Type	1/2" Frac.	Recovery, Condition	
1-651	1	SOIL CORE	100%	100%	Soil is dark gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-652	2	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-653	3	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-654	4	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-655	5	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-656	6	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-657	7	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-658	8	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-659	9	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.
1.51-660	10	SOIL CORE	100%	100%	Soil is light gray, silty, clayey, medium to coarse grained, non-fractured, non-bedded, non-laminated, non-schistose material.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 77-06A - 1

BORING NO. 121

DATE 4/3/71 TITLE Winn - 211/05 - 50110

ELEVATION                      CITY                     

START                      COMPLETE                     

WATER LEVEL                      METER                     

EQUIPMENT USED FAIRBANKS 720, 1 1/2" diamond bit, AIR

LOGGED BY                     

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Size	Frequency, %	
657-660	201	DIA	100%	100%	Shale; dk. gray N-A to dk. gray; silt, mod. calc. grains silt or below, hard, v. thin bedded, nonfossiliferous, black material abundant.
660-663	202	DIA	100%	100%	Shale; dk. gray N-A to dk. gray; silt, mod. calc. grains silt or below, hard, v. thin bedded, nonfossiliferous; abundant within coarse horizons - some w/ black material some calc.
663-666	203	DIA	100%	100%	Shale; dk. gray N-A to dk. gray; silt, mod. calc. grains silt or below, hard, v. thin bedded, nonfossiliferous; abundant within coarse horizons - some w/ black material some calc.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 94-032-15

BORING NO. 6-1

DATE 10/3/76 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ CATION \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ CAPTED \_\_\_\_\_

EQUIPMENT USED FAIRBANKS 2500, 3-1/4" diameter LOGGED BY \_\_\_\_\_  
BIT, AIR

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	% Recovery	Condition	
666-667	109	1A CORE	100%	100%	Shale; dk gray N-4 to black, silty silt to mod. calc. silt thin bedded, nonfractured fossiliferous, bitumen staining buffing sandstone at 667'
668-672	109 DIA CORE		100%	100%	Shale; dk gray N-4 to black, silty or dk reddish gray, silt silt size or below, hard, thin bedded nonfrag, nonfossiliferous At 671'2" Tuff, white 10YR 8/1 to 10YR 8/2 gray, 10YR 8/2 to 10YR 8/1 generally massive but locally prismatic, hard - cementing, v. fine grained silty mica, f. (Hapite?) nonfractured, general of hard, silty bitumen

NOTES:



CORING NO. 5-1

SECRET

WATER LEVEL \_\_\_\_\_ 175

10000 27

100

1



# FIELD LOG OF BORING

PROJECT NO. 74-233-15

BORING NO. 6

DATE 10/3/74 TITLE

ELEVATION

START  COMPLETE

WATER LEVEL

EQUIPMENT USED 4" in Rotary (Sigsbee)

LOGGED BY

DEPTH	SAMPLES				DESCRIPTION
	Core	Grain	Recovery, %	Condition	
575-725	100	100	100	100	Oil shale, pale brown (5YR 8/2) to dusky brown (5YR 8/2) thin bedded, non-fossiliferous, moderately calcareous, non-fossiliferous very homogeneous throughout core interval. Sandstone, toff intervals, 681' (1 1/2") 687' (1 1/2") 689' (1 1/2") 693' (1 1/2") 701' (1 1/2") 702' (1 1/2") medium grain, very pale orange (10YR 8/2) to medium light green (10YR 8/2) medium sorting. Zones of high oil content 702.5' to 705' and possible 697-698' length of <del>average</del> <sup>average</sup> carbon core average of 3'
705-708		100	100	100	Oil shale pale brown (5YR 8/2) to dusky brown, hard, thin bedded poorly sorted, moderate calcareous non fossiliferous, grading in to a harder shale

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-003-15  
 DATE 10/3/74 TITLE \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_  
 EQUIPMENT USED L-W Air Rotary Pump 2500

BORING NO. P-1 Core \_\_\_\_\_  
 ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 LOGGED BY M. S. [unclear]

RDD

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Diags & F.R.S.	Recovery, Condition	
709-723.5 717			100	100	S. 14 stone and shale gravel, orange (30YR 7/4) to moderate brown (5YR 4/4), hard moderate sorted, moderate to slightly calcareous, non fossiliferous. Fractured, near vertical joint entire length of section. Some dark bed possible oil shale at 715' and 716'. Core is broken into almost perfect halves by joint.
717-725.5			100	100%	silty shale. Pale yellowish brown (10YR 8/6)
			80%		Grayish brown (5YR 3/2), medium gray (2.5Y 4/1) band, rather bedded, poorly sorted, non calcareous, non fossiliferous. Vertical joint extends from 717
					to 719.5, possible joint + at 720 at rough 60°. Some differentiation common.
725.5 to 732					Shale and Oil shale with interbeds of sand stone. Shale: grayish orange pink 5YR 7/2 to Grayish brown

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74 068-15

BORING NO. P-1 Cone

DATE 10/3/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED Low Air Rotary

LOGGED BY M. J. Smith

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
725.5 to 732 cont			62		hard, varies from non-calcareous to moderately calcareous, non fossiliferous, differentiated into compacted with minor offsets. Sandstone: generally tuffaceous, moderate varies in thickness from 1/2" to 2" Very Pale orange (10YR 8/2), moderately sorted, hard, porous. At 731 a 3" bed of "gypsiferous" sandstone black, soft, porous non calcareous, poorly sorted, core broken at this point. Unknown feature at 726, 2" "cavity" filling of some sort, secondary minerals present (Iron-oxide) 732-735' 100 100 Oil Shale dusky brown 5YR 2/1 hard, thin bedded, calcareous non fossiliferous, some compaction of bedding

NOTES: \_\_\_\_\_

# FIELD LOG OF DRILLING

PROJECT NO. 77-068-15

SURVEY NO. 1-1

DATE 12/4/71 TITLE SUN-77ILLPS-30410

ELEVATION            CITY           

START            COMPLETE           

WATER LEVEL            AFTER           

INSTRUMENT USED MAILING 2000, 6 3/4" diameter LOGGED BY           

bit, 412

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Recovery, %	Condition	
735-735'	BFA 222	DIA CORE	100%	100%	SHALE; dk. gray 5YR 4/1 to 5/1, grading downward to dark red 5R 3/4 and med. gray 4/5, calc. to st. calc., hard, v. thinly bedded - locally differentially compacted, non-fossiliferous, no fractures - irregular parting plane at 735' 6" which coincides w/ a 1" buffaceous zone containing bitumen
738-741	BOX 223	DIA CORE	100%	100%	SHALE, lt. brownish gray 5YR 4/1 to grayish brown 5YR 3/2, calc. to st. calc., v. thinly bedded, hard, no fractures, non-fossiliferous - homogeneous
741-744	BOX 224	DIA CORE	100%	100%	SHALE; lt. brownish gray 5YR 4/1 to grayish brown 5YR 3/2, st. calc., hard, v. thinly bedded, non-fossiliferous, no fractures

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE \_\_\_\_\_ TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY \_\_\_\_\_

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Grain Size	Recovery, Condition	
CONT. 741-744					fossiliferous, homogeneous
744-747	225	DIAM. CORE	100%	100%	SHALE; grayish brn. 5YR 3/2 to 1/2 ft. olive gray 5Y 5/2, noneak. to silt. calc., hard, v. thinly bedded, non-fractured
					Bituminous Tuff; Blk N-1 is 10' of tuff coating mod. brn 5YR 4/4 to 1/2 ft. mod. to v. calc. - most the alteration product, hard, crudly stratified, hard, apparently represents a weak zone before broken above it.
					SHALE, similar to that above marker.
747-750	226	DIAM. CORE	100%	100%	SHALE, med. gray N-5 to dk. gray silt calc., hard, v. thinly bedded, nonfractured (entire 3' section one piece), nonfossiliferous; some thin sand horizons; pale brn. 5Y 3/5 fine grained, mod. to moderately calc.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE \_\_\_\_\_ TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ / AFTER \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY \_\_\_\_\_

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Recovery, %	Condition	
Cont 747-750					noncalc, white cement, at base end of core geolite? or calc?
750-753	Box 227	DIA CORE	100%	100%	SHALE; blk N-1 to dusky red SR 3/4 or grayish red SR 4/2, noncalc. to v. slt. calc, hard, v. thinly bedded, one natural parting plane at 750'3" which coincides w/ a 1" thin bituminous buff horizon, remainder of core is homogeneous.
753-756	Box 228	DIA CORE	100%	100%	SHALE; dusky red SR 3/4 to bluish red SR 2 1/2, non to slt. calc, hard, v. thin bedded, one apparent parting plane at 754'9" coinciding w/ a 1/2" thick horizon of marlstone; granular orange pink SR 7/2, med hard, calc non fossiliferous.

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. 7- Core

DATE 12/4/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED 5V Air Rotary

LOGGED BY Mr. [illegible]

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Disc./ Turns	Recovery, Condition	
756-759	23	Core	100%	100%	Shale: bluish red 5YR 4/2 to dusky red 5YR 4/1, silt calc., hard, vertically bedded, natural parting plane at 758.9" where corer does not go 2 1/2 inch <del>horizon</del> horizon of white N9 to brash grey 5YR 4/1, soft, nonfizzing material - nahcolite, nonfossiliferous
759- <del>760</del> <sup>760</sup>	23		100	100	Shale: dusky brown (5YR 2/2) hard, calcareous, non-fossiliferous, nonfractured, thin bedded
760-761			100%	50%	Oil shale, (Mahogany <sup>Red</sup> <del>1/2</del> 1/2?) Grayish black (N2) Moderately hard, Generally massive, calcareous, very distinctive, 1'
761-762	23		60%	100	Oil shale, Grayish black (N2) some lighter zones, hard, thin bedded, non fossiliferous possible fractures, differentiated, compacted

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. D-1

DATE 10/4/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W - Air Rotary Faling 2500

LOGGED BY M. S. [unclear]

P. 4

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Feet	Recovery, Condition	
763-764			0	100	Nachcolite, translucent, honey color, hackly, vitreous, cavities
764-765	232		100	100	Siltstone, pale brown (5YR 5/2) hand, thin bedded, highly calcareous, non fossiliferous inclined bedding ←
765-766.5			75	100	Oil shale Grayish brown 5YR 3/2 moderately hard, thin bedded slightly calcareous, some thin calcite lenses, high oil content, non fossiliferous
766.5					Sandstone: dusky brown (5YR 2/2) hard, fine-grain, porous (saturated with oil), H <sub>2</sub> S gas present, 2" thick I
766.5 →	233		100	100	Shale grayish orange (10YR 7/4)
773	234				to Grayish brown (5YR 5/2) hard thin bedded, varies from highly calcareous to moderately calcareous, non-fossiliferous

NOTES:



# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. Am/ Core

DATE 10/4/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W Air Rotary Filing 2500

LOGGED BY M. S. S. S. S.

P. 42

DEPTH	SAMPLES					DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition		
765.5 →						non-fossiliferous, some tuffaceous
773 cont)						sandstone at 768 (1") and
						some very thin (2.1") throughout
						section
773-774			80	100		Oil Shale: dark brown (5YR 2/2)
						moderately hard, some faint
						bedding observable, moderately
						calcareous, non fossiliferous,
						non fractured, high oil content
774-786		235				Siltstone: Pale brown (5YR 5/2) to
		236				Grayish brown (5YR 3/2) hard thin
		237				bedded, very fine-grained to clay
		238				highly calcareous to slightly
						calcareous, poorly sorted. High
						oil content zones 775'-777'
						and 784-786. Tuffaceous Sandstone
						porous, hard, medium grained, with
						some Naeholite at 773 (2")
						and 785 (2") other than very
						thin beds also present

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 Core

DATE 10/4/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W - Air Rotary Logging 2500

LOGGED BY M. Sembrat

93

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows of Force	Recovery, Condition	
786-789	239		100	100	Siltstone: Very Pale Orange (10YR 8/2) to Pale brown (5YR 5/2) thin beds to medium bedded (2") highly calcareous, fine-grained, non-fossiliferous, non-fractured, a very few, very thin beds (1") of tuffaceous Sandstone
789-819	239 ↓ 249		100	100	Siltstone (with some Shales) pale yellowish brown (10YR 6/2), pale brown (5YR 5/2) and Grayish brown (5YR 3/2), hard to very hard very thin bedded to thin bedded (up to 1") with some color banding zones (806.5 - 809, 789-791) non fossiliferous, non-fractured, some differential compaction of bedding. Some oil zones (moderate grade) 792-795 and 814 to 818. Tuffaceous Sandstone medium grain, moderate sorting

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 Core

DATE 10/5/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START 10:30 AM COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED LW-Air Rotary

LOGGED BY M. Stenbiedt

P 44'

ROD 1

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blow 8" Force	Recovery, Condition	
789-819 <u>cont.</u>					hard, porous, oil impregnated giving of H <sub>2</sub> S gas, [805' (2"), 811' (1") 812' (4") 814' (1")] and some <del>thin</del> very thin beds scatter throughout run.
819-820' 9"					
819-822	8X 50	3" DIA CORE	100%	100%	Shale; blk N-2 to blkish red SR 1/2 or very dusky red 10R 1/2, silty calc, v. thinly bedded, hard, nonfractured, nonfossiliferous, bituminous odor 820' 9" - 822'
					Siltstone; grayish orange pink SR 1 1/2 to lt. gray N-7, 90% grains silt size or below, thinly bedded, parallel to silt calc, hard, possible vert. parting plane at end of core - beginning of sandstone horizon, nonfossiliferous
822-825	3X 25	3" DIA CORE	80%	100%	822-822' 1" SILTY SANDSTONE (TUFFACE) lt. gray N-7, med. calc, thinly bedded, fossiliferous

NOTES:



152

• • •

311 DIN  
CORE

Ex. 1-1 pc

NOTES

1 2 3 4

—

..

— 2 —

—

*Journal of Management Education* 30(6)p. 789-804

\_\_\_\_\_

[illegible]

common in the local rivers in the

Year	Value
2000	1.0
2001	1.0
2002	1.0
2003	1.0
2004	1.0
2005	1.0
2006	1.0
2007	1.0
2008	1.0
2009	1.0
2010	1.0
2011	1.0
2012	1.0
2013	1.0
2014	1.0
2015	1.0
2016	1.0
2017	1.0
2018	1.0
2019	1.0
2020	1.0

1. *Chrysomelids*

SUP E : 1002, 6894, 6898, D/L

1.  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

[illegible]

Hand added in 1871

10/16 - 11/18 - 12/18 - 1/18 - 2/18 - 3/18 - 4/18 - 5/18 - 6/18 - 7/18 - 8/18 - 9/18 - 10/18 - 11/18 - 12/18 - 1/19 - 2/19 - 3/19 - 4/19 - 5/19 - 6/19 - 7/19 - 8/19 - 9/19 - 10/19 - 11/19 - 12/19 - 1/20 - 2/20 - 3/20 - 4/20 - 5/20 - 6/20 - 7/20 - 8/20 - 9/20 - 10/20 - 11/20 - 12/20 - 1/21 - 2/21 - 3/21 - 4/21 - 5/21 - 6/21 - 7/21 - 8/21 - 9/21 - 10/21 - 11/21 - 12/21 - 1/22 - 2/22 - 3/22 - 4/22 - 5/22 - 6/22 - 7/22 - 8/22 - 9/22 - 10/22 - 11/22 - 12/22 - 1/23 - 2/23 - 3/23 - 4/23 - 5/23 - 6/23 - 7/23 - 8/23 - 9/23 - 10/23 - 11/23 - 12/23 - 1/24 - 2/24 - 3/24 - 4/24 - 5/24 - 6/24 - 7/24 - 8/24 - 9/24 - 10/24 - 11/24 - 12/24 - 1/25 - 2/25 - 3/25 - 4/25 - 5/25 - 6/25 - 7/25 - 8/25 - 9/25 - 10/25 - 11/25 - 12/25 - 1/26 - 2/26 - 3/26 - 4/26 - 5/26 - 6/26 - 7/26 - 8/26 - 9/26 - 10/26 - 11/26 - 12/26 - 1/27 - 2/27 - 3/27 - 4/27 - 5/27 - 6/27 - 7/27 - 8/27 - 9/27 - 10/27 - 11/27 - 12/27 - 1/28 - 2/28 - 3/28 - 4/28 - 5/28 - 6/28 - 7/28 - 8/28 - 9/28 - 10/28 - 11/28 - 12/28 - 1/29 - 2/29 - 3/29 - 4/29 - 5/29 - 6/29 - 7/29 - 8/29 - 9/29 - 10/29 - 11/29 - 12/29 - 1/30 - 2/30 - 3/30 - 4/30 - 5/30 - 6/30 - 7/30 - 8/30 - 9/30 - 10/30 - 11/30 - 12/30 - 1/31 - 2/31 - 3/31 - 4/31 - 5/31 - 6/31 - 7/31 - 8/31 - 9/31 - 10/31 - 11/31 - 12/31 - 1/32 - 2/32 - 3/32 - 4/32 - 5/32 - 6/32 - 7/32 - 8/32 - 9/32 - 10/32 - 11/32 - 12/32 - 1/33 - 2/33 - 3/33 - 4/33 - 5/33 - 6/33 - 7/33 - 8/33 - 9/33 - 10/33 - 11/33 - 12/33 - 1/34 - 2/34 - 3/34 - 4/34 - 5/34 - 6/34 - 7/34 - 8/34 - 9/34 - 10/34 - 11/34 - 12/34 - 1/35 - 2/35 - 3/35 - 4/35 - 5/35 - 6/35 - 7/35 - 8/35 - 9/35 - 10/35 - 11/35 - 12/35 - 1/36 - 2/36 - 3/36 - 4/36 - 5/36 - 6/36 - 7/36 - 8/36 - 9/36 - 10/36 - 11/36 - 12/36 - 1/37 - 2/37 - 3/37 - 4/37 - 5/37 - 6/37 - 7/37 - 8/37 - 9/37 - 10/37 - 11/37 - 12/37 - 1/38 - 2/38 - 3/38 - 4/38 - 5/38 - 6/38 - 7/38 - 8/38 - 9/38 - 10/38 - 11/38 - 12/38 - 1/39 - 2/39 - 3/39 - 4/39 - 5/39 - 6/39 - 7/39 - 8/39 - 9/39 - 10/39 - 11/39 - 12/39 - 1/40 - 2/40 - 3/40 - 4/40 - 5/40 - 6/40 - 7/40 - 8/40 - 9/40 - 10/40 - 11/40 - 12/40 - 1/41 - 2/41 - 3/41 - 4/41 - 5/41 - 6/41 - 7/41 - 8/41 - 9/41 - 10/41 - 11/41 - 12/41 - 1/42 - 2/42 - 3/42 - 4/42 - 5/42 - 6/42 - 7/42 - 8/42 - 9/42 - 10/42 - 11/42 - 12/42 - 1/43 - 2/43 - 3/43 - 4/43 - 5/43 - 6/43 - 7/43 - 8/43 - 9/43 - 10/43 - 11/43 - 12/43 - 1/44 - 2/44 - 3/44 - 4/44 - 5/44 - 6/44 - 7/44 - 8/44 - 9/44 - 10/44 - 11/44 - 12/44 - 1/45 - 2/45 - 3/45 - 4/45 - 5/45 - 6/45 - 7/45 - 8/45 - 9/45 - 10/45 - 11/45 - 12/45 - 1/46 - 2/46 - 3/46 - 4/46 - 5/46 - 6/46 - 7/46 - 8/46 - 9/46 - 10/46 - 11/46 - 12/46 - 1/47 - 2/47 - 3/47 - 4/47 - 5/47 - 6/47 - 7/47 - 8/47 - 9/47 - 10/47 - 11/47 - 12/47 - 1/48 - 2/48 - 3/48 - 4/48 - 5/48 - 6/48 - 7/48 - 8/48 - 9/48 - 10/48 - 11/48 - 12/48 - 1/49 - 2/49 - 3/49 - 4/49 - 5/49 - 6/49 - 7/49 - 8/49 - 9/49 - 10/49 - 11/49 - 12/49 - 1/50 - 2/50 - 3/50 - 4/50 - 5/50 - 6/50 - 7/50 - 8/50 - 9/50 - 10/50 - 11/50 - 12/50 - 1/51 - 2/51 - 3/51 - 4/51 - 5/51 - 6/51 - 7/51 - 8/51 - 9/51 - 10/51 - 11/51 - 12/51 - 1/52 - 2/52 - 3/52 - 4/52 - 5/52 - 6/52 - 7/52 - 8/52 - 9/52 - 10/52 - 11/52 - 12/52 - 1/53 - 2/53 - 3/53 - 4/53 - 5/53 - 6/53 - 7/53 - 8/53 - 9/53 - 10/53 - 11/53 - 12/53 - 1/54 - 2/54 - 3/54 - 4/54 - 5/54 - 6/54 - 7/54 - 8/54 - 9/54 - 10/54 - 11/54 - 12/54 - 1/55 - 2/55 - 3/55 - 4/55 - 5/55 - 6/55 - 7/55 - 8/55 - 9/55 - 10/55 - 11/55 - 12/55 - 1/56 - 2/56 - 3/56 - 4/56 - 5/56 - 6/56 - 7/56 - 8/56 - 9/56 - 10/56 - 11/56 - 12/56 - 1/57 - 2/57 - 3/57 - 4/57 - 5/57 - 6/57 - 7/57 - 8/57 - 9/57 - 10/57 - 11/57 - 12/57 - 1/58 - 2/58 - 3/58 - 4/58 - 5/58 - 6/58 - 7/58 - 8/58 - 9/58 - 10/58 - 11/58 - 12/58 - 1/59 - 2/59 - 3/59 - 4/59 - 5/59 - 6/59 - 7/59 - 8/59 - 9/59 - 10/59 - 11/59 - 12/59 - 1/60 - 2/60 - 3/60 - 4/60 - 5/60 - 6/60 - 7/60 - 8/60 - 9/60 - 10/60 - 11/60 - 12/60 - 1/61 - 2/61 - 3/61 - 4/61 - 5/61 - 6/61 - 7/61 - 8/61 - 9/61 - 10/61 - 11/61 - 12/61 - 1/62 - 2/62 - 3/62 - 4/62 - 5/62 - 6/62 - 7/62 - 8/62 - 9/62 - 10/62 - 11/62 - 12/62 - 1/63 - 2/63 - 3/63 - 4/63 - 5/63 - 6/63 - 7/63 - 8/63 - 9/63 - 10/63 - 11/63 - 12/63 - 1/64 - 2/64 - 3/64 - 4/64 - 5/64 - 6/64 - 7/64 - 8/64 - 9/64 - 10/64 - 11/64 - 12/64 - 1/65 - 2/65 - 3/65 - 4/65 - 5/65 - 6/65 - 7/65 - 8/65 - 9/65 - 10/65 - 11/65 - 12/65 - 1/66 - 2/66 - 3/66 - 4/66 - 5/66 - 6/66 - 7/66 - 8/66 - 9/66 - 10/66 - 11/66 - 12/66 - 1/67 - 2/67 - 3/67 - 4/67 - 5/67 - 6/67 - 7/67 - 8/67 - 9/67 - 10/67 - 11/67 - 12/67 - 1/68 - 2/68 - 3/68 - 4/68 - 5/68 - 6/68 - 7/68 - 8/68 - 9/68 - 10/68 - 11/68 - 12/68 - 1/69 - 2/69 - 3/69 - 4/69 - 5/69 - 6/69 - 7/69 - 8/69 - 9/69 - 10/69 - 11/69 - 12/69 - 1/70 - 2/70 - 3/70 - 4/70 - 5/70 - 6/70 - 7/70 - 8/70 - 9/70 - 10/70 - 11/70 - 12/70 - 1/71 - 2/71 - 3/71 - 4/71 - 5/71 - 6/71 - 7/71 - 8/71 - 9/71 - 10/71 - 11/71 - 12/71 - 1/72 - 2/72 - 3/72 - 4/72 -

for:

257.13.15A

253 CRE

162

126

HALE 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319

TE-001 . . . . .

6/12/19 . . . . .

February 1944

51772 - 111516

$\frac{1}{2} \left( \frac{1}{2} \right) = \frac{1}{4}$

— — — — —

92

1997

1. The first step is to identify the problem.

[illegible]

padding, g2c'cc' - 25.

..... hard .....

... ... .. ... ..

2011-01-01

240-243

50

11

$$\frac{1}{2} \frac{d}{dt} \left( \frac{1}{2} \frac{d}{dt} \right)$$

SHALE - SILTSTONE; bluish gray 572 1/2, 90'

1911: 5' or 6" low carbonate, & thin, beds.

1. The first part of the paper is devoted to a discussion of the

Some small directly criss-bedding seen.

Spicer

1043-244

1. *Chlorophyll a* (Chl *a*)

人

100%

645' - 345' S'

SHALE - SILTSTONE, fine, dk gray N-6, calc.

given: 1.1.1. below, rest calc. to get 2.1.1.

Albino: a. - heri. contractura. -

Exposition Universelle de 1889

*Dever*

1314 - 260' SHALE; grayish brown - YR 7.

1. Amount of iron 54.41, 90% grains sold

[illegible]

... .. Lower half of ...

*Chelodactylus*

NOTES:

dissected, 200's

846'3"-846'6" BRY. FLEM. BITUMEN.

HORIZON (ENTIRE LENSE??) V. ELK.

massive, med. hard to hard, conchoidal  
upper surface rounded by sand  
plane, porositiferous, slightly etched  
lower, white color.

846'4"-847' SHALE; gray to red  
to dusky red, SR 74 or med. gray  
v. thinly bedded, one parting  
847'3" zone with a thin layer  
of bit. nonfossiliferous

3' x 3" D.M.

1' x 1' x 1'

SHALE - GR. SIVE; med. gray to  
gray N-1 & locally black N-1. 90% fine  
fine, porous, thinly bedded & more  
brittle, fractured nonfossiliferous



# FIELD LOG OF BORING

PROJECT NO. 71-068-15

BORING NO. 1-1

DATE 12/6/74 TITLE SUN-PHILLIPS-SONO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRBANKS 2500, 6 3/4" DIAMOND BIT,  
A.P.

LOGGED BY W.R. Lund

• psc.

R90

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
852-857	BOX 261	3" DIA CORE	100%	100%	852'-852'3" SHALE-SILTSTONE AS ABOVE	
					852'3"-852'6" BITUMENOUS SHALE, blk	
					N-1, noncalc v. thinly bedded, hard, horizontal	
					natural parting plane near upper contact,	
					nonfossiliferous, parting plane fact has	
					small blebs of tar like substance on it	
					852'6"-855" SHALE-SILTSTONE, grayish red	
					med 1/2 to 1 1/2" gray N-6, noncalc, v. thinly	
					bedded, hard, nonfractured, nonfossiliferous	
855-858	BOX 262	3" DIA CORE	100%	100%	SHALE-SILTSTONE, med lt. gray N-6 to	
					med gray N-5, noncalc, v. thinly bedded,	
					hard & brittle (difficult to break), one	
					horizontal parting plane at 855'4",	
					nonfossiliferous, bedding v. well dev. alter-	
					nating ill. & H. horizons give a "sandy	
					strips" appearance, bitumen content	
					increases in test foot	

NOTES:

Turns

100

BORING NO. P-1

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL 2 AFTER 2

LOGGED BY W. R. Lund  
P51

ROD

NOTES:	

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/6/74 TITLE SOM-Phillips - SOM10

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 7/8" diamond bit,  
AIR

LOGGED BY W. R. Lund

P. 52

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
<u>CENT</u> <u>864-867</u>					<u>bedded, hard, three horizontal parting</u> <u>planes between 864'10" and 865'10"</u>	
<u>867-870</u>	<u>Box</u> <u>266</u>	<u>3" DIA</u> <u>CORE</u>	<u>100%</u>	<u>100%</u>	<u>SHALE-SILTSTONE, lt. brn. gray, SYR 9/10, n. fossilif.</u> <u>noncalc., v. thinly bedded, hard, three</u> <u>parting, 267' and 269'5" v. fine</u> <u>horizontal, one at 45°, nonfossiliferous</u> <u>color becomes lighter w/depth.</u>	
<u>870-873</u>	<u>Box</u> <u>268</u>	<u>3" DIA</u> <u>CORE</u>	<u>74%</u>	<u>94%</u>	<u>SHALE-SILTSTONE, med. lt. gray, n. 6 to</u> <u>darkish gray SYR 9/10, color noticeably lighter</u> <u>than any rock previously encountered (noted),</u> <u>noncalc., v. thinly bedded, hard, 3 horizontal</u> <u>parting planes, 4" of core lost between</u> <u>870'5" and 870'10", brittle, nonfossiliferous</u>	<u>Ry brittle</u> <u>core broke</u> <u>2 R 1/2 hole-</u> <u>recovered on</u> <u>next run</u>
<u>873-876</u>	<u>Box</u> <u>269</u>	<u>3" DIA</u> <u>CORE</u>	<u>100%</u>	<u>100%</u>	<u>SHALE-SILTSTONE, med. gray, n. 6 to</u> <u>gray SYR 9/10, noncalc., v. thinly bedded,</u> <u>Corrected for</u> <u>hard, one horizontal parting plane at</u> <u>315'</u> <u>314'8", nonfossiliferous</u>	

recovered

## NOTES



# FIELD LOG OF BORING

PROJECT NO. 74-063-15

BORING NO. P-1

DATE 12/6/76 TITLE SUN-PHILLIPS-SONIO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED 7 1/2" W.C. 2500; 6 3/4" diamond bit  
AIR

LOGGED BY W. R. Lund

P-53

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows of Force	Recovery, Condition		
876-879	Box 769	3" DIA CORE	100%	100%	SHALE - SILTSTONE, brown gray, 5YR 4/1, moderate, thin bedded, hard, somewhat friable, parting plane at 877.4' with all thin bedded, 877.6' abundant, reddish brown, 10YR 8/1, fine grained, massive, to be more of an orange bituminous material than sand lenses, and have blades of fine material, resembles sand structure, medium, appears to have been pushed over or pushed a part of the material.	
879-909	270		95	100	Siltstone Very Pale orange 10YR 8/1 to grayish brown 5YR 3/1 hard very fine grained, very thin bedded (approx. 1/16" vis) with some color banding moderately calcareous to slightly calcareous, non fossiliferous some minor differential compaction. Fractures (joints)	

NOTES	REMARKS

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 Core

DATE 10/6/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED L-W Air Rotary Drilling 2500

LOGGED BY M. Stembiedy

54

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
879-909	270				at 883 → 884 (multiple fractures)	
cont.	279				at 893, 3 horizontal fractures	
					possible vertical, at 900	
					horizontal parting plane	
					886' 5" multiple fractures	
					Tuffaceous sandstone	
					884' 6" (2" bed) 885' 11" bed	
					891' 6" (2" bed) 895' 0" bed	
					901' (3" bed) 904' 11" bed (1" bed)	
					highly porous, slightly calcareous	
					gas present, only at 895'	
					medium to fine grained, calcareous	
					softening	
					887' 6" (2" bed) tuffaceous	
					fine grained (medium sand size)	
					non-calcareous, pebbly sandstone	
					moderately hard, pale yellowish	
					brown (to YR 5/4) color	
					quartz pyrite crystals	

NOTES: \_\_\_\_\_



# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. P-1 Core

DATE 10/6/74 TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED EW Air Rotary Failing 2500

LOGGED BY M. Siembieda

RQD

P 55

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows Per Foot	Recovery, Condition		
929'	280		100	100	Siltstone: Very Pale orange (10YR 8/2) and pale brown (5YR 5/2) to grayish brown (5YR 3/2), hard, very fine grained, poorly sorted, very thin bedded, with some color banding (bands 1" or thicker) darker <sup>color</sup> zone 936-937, varies from slightly calcareous to moderately calcareous, tends to become less calcareous at depth, non-fossiliferous and non-siliceous non-fractured	
	281				Tuffaceous Sandstone (912' to 912' 6") Med. dark grey N4. Massive, fine grained, hard possible pyrite + biotite <del>or</del> slightly calcareous [similar zone at 922' 6" (1" thick)] other tuffaceous Sandstone, tighten in color at 918' (3") 932' 8" (1/4")	

## FIELD LOG OF BORING

PROJECT NO: \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE 10/6/74 TITLE

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL AFTER:

EQUIPMENT USED L-W Air Rotary Fastener

LOGGED BY H. S. Embreda

ROD

P-56

[illegible]

**2000**



## FIELD LOG OF BORING

PROJECT NO. 72-068-15

BORING NO. P-1

DATE 10/2/74 TITLE Sun-Phillips - Source

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED SAILING 2500, 6 3/4 diamond  
bit, rotary/air

LOGGED BY BR

ROD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery; Condition		
CONT 942-945					944.2" - 945" SHALE - SLT. color - grayish red - 5.242, normal vertically bedded horizontal parting plane at 944.2" - 945" smaller than 100% recovery	
945-948	100%	100%	100%	100%	945 - 946 SHALE - 5.242 - 5.243 946 - 948 Echinurus shale; 5.243 - 5.244 dk gray - 5.244, vertical to horizontal bedding hard, thin - 5.244 - 5.245, 5.245 - 5.246 5.246 - 5.247, 5.247 - 5.248, 5.248 - 5.249 5.249 - 5.250, 5.250 - 5.251, 5.251 - 5.252 5.252 - 5.253, 5.253 - 5.254, 5.254 - 5.255 5.255 - 5.256, 5.256 - 5.257, 5.257 - 5.258 5.258 - 5.259, 5.259 - 5.260, 5.260 - 5.261 5.261 - 5.262, 5.262 - 5.263, 5.263 - 5.264 5.264 - 5.265, 5.265 - 5.266, 5.266 - 5.267 5.267 - 5.268, 5.268 - 5.269, 5.269 - 5.270 5.270 - 5.271, 5.271 - 5.272, 5.272 - 5.273 5.273 - 5.274, 5.274 - 5.275, 5.275 - 5.276 5.276 - 5.277, 5.277 - 5.278, 5.278 - 5.279 5.279 - 5.280, 5.280 - 5.281, 5.281 - 5.282 5.282 - 5.283, 5.283 - 5.284, 5.284 - 5.285 5.285 - 5.286, 5.286 - 5.287, 5.287 - 5.288 5.288 - 5.289, 5.289 - 5.290, 5.290 - 5.291 5.291 - 5.292, 5.292 - 5.293, 5.293 - 5.294 5.294 - 5.295, 5.295 - 5.296, 5.296 - 5.297 5.297 - 5.298, 5.298 - 5.299, 5.299 - 5.300 5.300 - 5.301, 5.301 - 5.302, 5.302 - 5.303 5.303 - 5.304, 5.304 - 5.305, 5.305 - 5.306 5.306 - 5.307, 5.307 - 5.308, 5.308 - 5.309 5.309 - 5.310, 5.310 - 5.311, 5.311 - 5.312 5.312 - 5.313, 5.313 - 5.314, 5.314 - 5.315 5.315 - 5.316, 5.316 - 5.317, 5.317 - 5.318 5.318 - 5.319, 5.319 - 5.320, 5.320 - 5.321 5.321 - 5.322, 5.322 - 5.323, 5.323 - 5.324 5.324 - 5.325, 5.325 - 5.326, 5.326 - 5.327 5.327 - 5.328, 5.328 - 5.329, 5.329 - 5.330 5.330 - 5.331, 5.331 - 5.332, 5.332 - 5.333 5.333 - 5.334, 5.334 - 5.335, 5.335 - 5.336 5.336 - 5.337, 5.337 - 5.338, 5.338 - 5.339 5.339 - 5.340, 5.340 - 5.341, 5.341 - 5.342 5.342 - 5.343, 5.343 - 5.344, 5.344 - 5.345 5.345 - 5.346, 5.346 - 5.347, 5.347 - 5.348 5.348 - 5.349, 5.349 - 5.350, 5.350 - 5.351 5.351 - 5.352, 5.352 - 5.353, 5.353 - 5.354 5.354 - 5.355, 5.355 - 5.356, 5.356 - 5.357 5.357 - 5.358, 5.358 - 5.359, 5.359 - 5.360 5.360 - 5.361, 5.361 - 5.362, 5.362 - 5.363 5.363 - 5.364, 5.364 - 5.365, 5.365 - 5.366 5.366 - 5.367, 5.367 - 5.368, 5.368 - 5.369 5.369 - 5.370, 5.370 - 5.371, 5.371 - 5.372 5.372 - 5.373, 5.373 - 5.374, 5.374 - 5.375 5.375 - 5.376, 5.376 - 5.377, 5.377 - 5.378 5.378 - 5.379, 5.379 - 5.380, 5.380 - 5.381 5.381 - 5.382, 5.382 - 5.383, 5.383 - 5.384 5.384 - 5.385, 5.385 - 5.386, 5.386 - 5.387 5.387 - 5.388, 5.388 - 5.389, 5.389 - 5.390 5.390 - 5.391, 5.391 - 5.392, 5.392 - 5.393 5.393 - 5.394, 5.394 - 5.395, 5.395 - 5.396 5.396 - 5.397, 5.397 - 5.398, 5.398 - 5.399 5.399 - 5.400, 5.400 - 5.401, 5.401 - 5.402 5.402 - 5.403, 5.403 - 5.404, 5.404 - 5.405 5.405 - 5.406, 5.406 - 5.407, 5.407 - 5.408 5.408 - 5.409, 5.409 - 5.410, 5.410 - 5.411 5.411 - 5.412, 5.412 - 5.413, 5.413 - 5.414 5.414 - 5.415, 5.415 - 5.416, 5.416 - 5.417 5.417 - 5.418, 5.418 - 5.419, 5.419 - 5.420 5.420 - 5.421, 5.421 - 5.422, 5.422 - 5.423 5.423 - 5.424, 5.424 - 5.425, 5.425 - 5.426 5.426 - 5.427, 5.427 - 5.428, 5.428 - 5.429 5.429 - 5.430, 5.430 - 5.431, 5.431 - 5.432 5.432 - 5.433, 5.433 - 5.434, 5.434 - 5.435 5.435 - 5.436, 5.436 - 5.437, 5.437 - 5.438 5.438 - 5.439, 5.439 - 5.440, 5.440 - 5.441 5.441 - 5.442, 5.442 - 5.443, 5.443 - 5.444 5.444 - 5.445, 5.445 - 5.446, 5.446 - 5.447 5.447 - 5.448, 5.448 - 5.449, 5.449 - 5.450 5.450 - 5.451, 5.451 - 5.452, 5.452 - 5.453 5.453 - 5.454, 5.454 - 5.455, 5.455 - 5.456 5.456 - 5.457, 5.457 - 5.458, 5.458 - 5.459 5.459 - 5.460, 5.460 - 5.461, 5.461 - 5.462 5.462 - 5.463, 5.463 - 5.464, 5.464 - 5.465 5.465 - 5.466, 5.466 - 5.467, 5.467 - 5.468 5.468 - 5.469, 5.469 - 5.470, 5.470 - 5.471 5.471 - 5.472, 5.472 - 5.473, 5.473 - 5.474 5.474 - 5.475, 5.475 - 5.476, 5.476 - 5.477 5.477 - 5.478, 5.478 - 5.479, 5.479 - 5.480 5.480 - 5.481, 5.481 - 5.482, 5.482 - 5.483 5.483 - 5.484, 5.484 - 5.485, 5.485 - 5.486 5.486 - 5.487, 5.487 - 5.488, 5.488 - 5.489 5.489 - 5.490, 5.490 - 5.491, 5.491 - 5.492 5.492 - 5.493, 5.493 - 5.494, 5.494 - 5.495 5.495 - 5.496, 5.496 - 5.497, 5.497 - 5.498 5.498 - 5.499, 5.499 - 5.500, 5.500 - 5.501 5.501 - 5.502, 5.502 - 5.503, 5.503 - 5.504 5.504 - 5.505, 5.505 - 5.506, 5.506 - 5.507 5.507 - 5.508, 5.508 - 5.509, 5.509 - 5.510 5.510 - 5.511, 5.511 - 5.512, 5.512 - 5.513 5.513 - 5.514, 5.514 - 5.515, 5.515 - 5.516 5.516 - 5.517, 5.517 - 5.518, 5.518 - 5.519 5.519 - 5.520, 5.520 - 5.521, 5.521 - 5.522 5.522 - 5.523, 5.523 - 5.524, 5.524 - 5.525 5.525 - 5.526, 5.526 - 5.527, 5.527 - 5.528 5.528 - 5.529, 5.529 - 5.530, 5.530 - 5.531 5.531 - 5.532, 5.532 - 5.533, 5.533 - 5.534 5.534 - 5.535, 5.535 - 5.536, 5.536 - 5.537 5.537 - 5.538, 5.538 - 5.539, 5.539 - 5.540 5.540 - 5.541, 5.541 - 5.542, 5.542 - 5.543 5.543 - 5.544, 5.544 - 5.545, 5.545 - 5.546 5.546 - 5.547, 5.547 - 5.548, 5.548 - 5.549 5.549 - 5.550, 5.550 - 5.551, 5.551 - 5.552 5.552 - 5.553, 5.553 - 5.554, 5.554 - 5.555 5.555 - 5.556, 5.556 - 5.557, 5.557 - 5.558 5.558 - 5.559, 5.559 - 5.560, 5.560 - 5.561 5.561 - 5.562, 5.562 - 5.563, 5.563 - 5.564 5.564 - 5.565, 5.565 - 5.566, 5.566 - 5.567 5.567 - 5.568, 5.568 - 5.569, 5.569 - 5.570 5.570 - 5.571, 5.571 - 5.572, 5.572 - 5.573 5.573 - 5.574, 5.574 - 5.575, 5.575 - 5.576 5.576 - 5.577, 5.577 - 5.578, 5.578 - 5.579 5.579 - 5.580, 5.580 - 5.581, 5.581 - 5.582 5.582 - 5.583, 5.583 - 5.584, 5.584 - 5.585 5.585 - 5.586, 5.586 - 5.587, 5.587 - 5.588 5.588 - 5.589, 5.589 - 5.590, 5.590 - 5.591 5.591 - 5.592, 5.592 - 5.593, 5.593 - 5.594 5.594 - 5.595, 5.595 - 5.596, 5.596 - 5.597 5.597 - 5.598, 5.598 - 5.599, 5.599 - 5.600 5.600 - 5.601, 5.601 - 5.602, 5.602 - 5.603 5.603 - 5.604, 5.604 - 5.605, 5.605 - 5.606 5.606 - 5.607, 5.607 - 5.608, 5.608 - 5.609 5.609 - 5.610, 5.610 - 5.611, 5.611 - 5.612 5.612 - 5.613, 5.613 - 5.614, 5.614 - 5.615 5.615 - 5.616, 5.616 - 5.617, 5.617 - 5.618 5.618 - 5.619, 5.619 - 5.620, 5.620 - 5.621 5.621 - 5.622, 5.622 - 5.623, 5.623 - 5.624 5.624 - 5.625, 5.625 - 5.626, 5.626 - 5.627 5.627 - 5.628, 5.628 - 5.629, 5.629 - 5.630 5.630 - 5.631, 5.631 - 5.632, 5.632 - 5.633 5.633 - 5.634, 5.634 - 5.635, 5.635 - 5.636 5.636 - 5.637, 5.637 - 5.638, 5.638 - 5.639 5.639 - 5.640, 5.640 - 5.641, 5.641 - 5.642 5.642 - 5.643, 5.643 - 5.644, 5.644 - 5.645 5.645 - 5.646, 5.646 - 5.647, 5.647 - 5.648 5.648 - 5.649, 5.649 - 5.650, 5.650 - 5.651 5.651 - 5.652, 5.652 - 5.653, 5.653 - 5.654 5.654 - 5.655, 5.655 - 5.656, 5.656 - 5.657 5.657 - 5.658, 5.658 - 5.659, 5.659 - 5.660 5.660 - 5.661, 5.661 - 5.662, 5.662 - 5.663 5.663 - 5.664, 5.664 - 5.665, 5.665 - 5.666 5.666 - 5.667, 5.667 - 5.668, 5.668 - 5.669 5.669 - 5.670, 5.670 - 5.671, 5.671 - 5.672 5.672 - 5.673, 5.673 - 5.674, 5.674 - 5.675 5.675 - 5.676, 5.676 - 5.677, 5.677 - 5.678 5.678 - 5.679, 5.679 - 5.680, 5.680 - 5.681 5.681 - 5.682, 5.682 - 5.683, 5.683 - 5.684 5.684 - 5.685, 5.685 - 5.686, 5.686 - 5.687 5.687 - 5.688, 5.688 - 5.689, 5.689 - 5.690 5.690 - 5.691, 5.691 - 5.692, 5.692 - 5.693 5.693 - 5.694, 5.694 - 5.695, 5.695 - 5.696 5.696 - 5.697, 5.697 - 5.698, 5.698 - 5.699 5.699 - 5.700, 5.700 - 5.701, 5.701 - 5.702 5.702 - 5.703, 5.703 - 5.704, 5.704 - 5.705 5.705 - 5.706, 5.706 - 5.707, 5.707 - 5.708 5.708 - 5.709, 5.709 - 5.710, 5.710 - 5.711 5.711 - 5.712, 5.712 - 5.713, 5.713 - 5.714 5.714 - 5.715, 5.715 - 5.716, 5.716 - 5.717 5.717 - 5.718, 5.718 - 5.719, 5.719 - 5.720 5.720 - 5.721, 5.721 - 5.722, 5.722 - 5.723 5.723 - 5.724, 5.724 - 5.725, 5.725 - 5.726 5.726 - 5.727, 5.727 - 5.728, 5.728 - 5.729 5.729 - 5.730, 5.730 - 5.731, 5.731 - 5.732 5.732 - 5.733, 5.733 - 5.734, 5.734 - 5.735 5.735 - 5.736, 5.736 - 5.737, 5.737 - 5.738 5.738 - 5.739, 5.739 - 5.740, 5.740 - 5.741 5.741 - 5.742, 5.742 - 5.743, 5.743 - 5.744 5.744 - 5.745, 5.745 - 5.746, 5.746 - 5.747 5.747 - 5.748, 5.748 - 5.749, 5.749 - 5.750 5.750 - 5.751, 5.751 - 5.752, 5.752 - 5.753 5.753 - 5.754, 5.754 - 5.755, 5.755 - 5.756 5.756 - 5.757, 5.757 - 5.758, 5.758 - 5.759 5.759 - 5.760, 5.760 - 5.761, 5.761 - 5.762 5.762 - 5.763, 5.763 - 5.764, 5.764 - 5.765 5.765 - 5.766, 5.766 - 5.767, 5.767 - 5.768 5.768 - 5.769, 5.769 - 5.770, 5.770 - 5.771 5.771 - 5.772, 5.772 - 5.773, 5.773 - 5.774 5.774 - 5.775, 5.775 - 5.776, 5.776 - 5.777 5.777 - 5.778, 5.778 - 5.779, 5.779 - 5.780 5.780 - 5.781, 5.781 - 5.782, 5.782 - 5.783 5.783 - 5.784, 5.784 - 5.785, 5.785 - 5.786 5.786 - 5.787, 5.787 - 5.788, 5.788 - 5.789 5.789 - 5.790, 5.790 - 5.791, 5.791 - 5.792 5.792 - 5.793, 5.793 - 5.794, 5.794 - 5.795 5.795 - 5.796, 5.796 - 5.797, 5.797 - 5.798 5.798 - 5.799, 5.799 - 5.800, 5.800 - 5.801 5.801 - 5.802, 5.802 - 5.803, 5.803 - 5.804 5.804 - 5.805, 5.805 - 5.806, 5.806 - 5.807 5.807 - 5.808, 5.808 - 5.809, 5.809 - 5.810 5.810 - 5.811, 5.811 - 5.812, 5.812 - 5.813 5.813 - 5.814, 5.814 - 5.815, 5.815 - 5.816 5.816 - 5.817, 5.817 - 5.818, 5.818 - 5.819 5.819 - 5.820, 5.820 - 5.821, 5.821 - 5.822 5.822 - 5.823, 5.823 - 5.824, 5.824 - 5.825 5.825 - 5.826, 5.826 - 5.827, 5.827 - 5.828 5.828 - 5.829, 5.829 - 5.830, 5.830 - 5.831 5.831 - 5.832, 5.832 - 5.833, 5.833 - 5.834 5.834 - 5.835, 5.835 - 5.836, 5.836 - 5.837 5.837 - 5.838, 5.838 - 5.839, 5.839 - 5.840 5.840 - 5.841, 5.841 - 5.842, 5.842 - 5.843 5.843 - 5.844, 5.844 - 5.845, 5.845 - 5.846 5.846 - 5.847, 5.847 - 5.848, 5.848 - 5.849 5.849 - 5.850, 5.850 - 5.851, 5.851 - 5.852 5.852 - 5.853, 5.853 - 5.854, 5.854 - 5.855 5.855 - 5.856, 5.856 - 5.857, 5.857 - 5.858 5.858 - 5.859, 5.859 - 5.860, 5.860 - 5.861 5.861 - 5.862, 5.862 - 5.863, 5.863 - 5.864 5.864 - 5.865, 5.865 - 5.866, 5.866 - 5.867 5.867 - 5.868, 5.868 - 5.869, 5.869 - 5.870 5.870 - 5.871, 5.871 - 5.872, 5.872 - 5.873 5.873 - 5.874, 5.874 - 5.875, 5.875 - 5.876 5.876 - 5.877, 5.877 - 5.878, 5.878 - 5.879 5.879 - 5.880, 5.880 - 5.881, 5.881 - 5.882 5.882 - 5.883, 5.883 - 5.884, 5.884 - 5.885 5.885 - 5.886, 5.886 - 5.887, 5.887 - 5.888 5.888 - 5.889, 5.889 - 5.890, 5.890 - 5.891 5.891 - 5.892, 5.892 - 5.893, 5.893 - 5.894 5.894 - 5.895, 5.895 - 5.896, 5.896 - 5.897 5.897 - 5.898, 5.898 - 5.899, 5.899 - 5.900 5.900 - 5.901, 5.901 - 5.902, 5.902 - 5.903 5.903 - 5.904, 5.904 - 5.905, 5.905 - 5.906 5.906 - 5.907, 5.907 - 5.908, 5.908 - 5.909 5.909 - 5.910, 5.910 - 5.911, 5.911 - 5.912 5.912 - 5.913, 5.913 - 5.914, 5.914 - 5.915 5.915 - 5.916, 5.916 - 5.917, 5.917 - 5.918 5.918 - 5.919, 5.919 - 5.920, 5.920 - 5.921 5.921 - 5.922, 5.922 - 5.923, 5.923 - 5.924 5.924 - 5.925, 5.925 - 5.926, 5.926 - 5.927 5.927 - 5.928, 5.928 - 5.929, 5.929 - 5.930 5.930 - 5.931, 5.931 - 5.932, 5.932 - 5.933 5.933 - 5.934, 5.934 - 5.935, 5.935 - 5.936 5.936 - 5.937, 5.937 - 5.938, 5.938 - 5.939 5.939 - 5.940, 5.940 - 5.941, 5.941 - 5.942 5.942 - 5.943, 5.943 - 5.944, 5.944 - 5.945 5.945 - 5.946, 5.946 - 5.947, 5.947 - 5.948 5.948 - 5.949, 5.949 - 5.950, 5.950 - 5.951 5.951 - 5.952, 5.952 - 5.953, 5.953 - 5.954 5.954 - 5.955, 5.955 - 5.956, 5.956 - 5.957 5.957 - 5.958, 5.958 - 5.959, 5.959 - 5.960 5.960 - 5.961, 5.961 - 5.962, 5.962 - 5.963 5.963 - 5.964, 5.964 - 5.965, 5.965 - 5.966 5.966 - 5.967, 5.967 - 5.968, 5.968 - 5.969 5.969 - 5.970, 5.970 - 5.971, 5.971 - 5.972 5.972 - 5.973, 5.973 - 5.974, 5.974 - 5.975 5.975 - 5.976, 5.976 - 5.977, 5.977 - 5.978 5.978 - 5.979, 5.979 - 5.980, 5.980 - 5.981 5.981 - 5.982, 5.982 - 5.983, 5.983 - 5.984 5.984 - 5.985, 5.985 - 5.986, 5.986 - 5.987 5.987 - 5.988, 5.988 - 5.989, 5.989 - 5.990 5.990 - 5.991, 5.991 - 5.992, 5.992 - 5.993 5.993 - 5.994, 5.994 - 5.995, 5.995 - 5.996 5.996 - 5.997, 5.997 - 5.998, 5.998 - 5.999 5.999 - 6.000, 6.000 - 6.001, 6.001 - 6.002 6.002 - 6.003, 6.003 - 6.004, 6.004 - 6.005 6.005 - 6.006, 6.006 - 6.007, 6.007 - 6.008 6.008 - 6.009, 6.009 - 6.010, 6.010 - 6.011 6.011 - 6.012, 6.012 - 6.013, 6.013 - 6.014 6.014 - 6.015, 6.015 - 6.016, 6.016 - 6.017 6.017 - 6.018, 6.018 - 6.019, 6.019 - 6.020 6.020 - 6.021, 6.021 - 6.022, 6.022 - 6.023 6.023 - 6.024, 6.024 - 6.025, 6.025 - 6.026 6.026 - 6.027, 6.027 - 6.028, 6.028 - 6.029 6.029 - 6.030, 6.030 - 6.031, 6.031 - 6.032 6.032 - 6.033, 6.033 - 6.034, 6.034 - 6.035 6.035 - 6.036, 6.036 - 6.037, 6.037 - 6.038 6.038 - 6.039, 6.039 - 6.040, 6.040 - 6.041 6.041 - 6.042, 6.042 - 6.043, 6.043 - 6.044 6.044 - 6.045, 6.045 - 6.046, 6.046 - 6.047 6.047 - 6.048, 6.048 - 6.049, 6.049 - 6.050 6.050 - 6.051, 6.051 - 6.052, 6.052 - 6.053 6.053 - 6.054, 6.054 - 6.055, 6.055 - 6.056 6.056 - 6.057, 6.057 - 6.058, 6.058 - 6.059 6.059 - 6.060, 6.060 - 6.061, 6.061 - 6.062 6.062 - 6.063, 6.063 - 6.064, 6.064 - 6.065 6.065 - 6.066, 6.066 - 6.067, 6.067 - 6.068 6.068 - 6.069, 6.069 - 6.070, 6.070 - 6.071 6.071 - 6.072, 6.072 - 6.073, 6.073 - 6.074 6.074 - 6.075, 6.075 - 6.076, 6.076 - 6.077 6.077 - 6.078, 6.078 - 6.079, 6.079 - 6.080 6.080 - 6.081, 6.081 - 6.082, 6.082 - 6.083 6.083 - 6.084, 6.084 - 6.085, 6.085 - 6.086 6.086 - 6.087, 6.087 - 6.088, 6.088 - 6.089 6.089 - 6.090, 6.090 - 6.091, 6.091 - 6.092 6.092 - 6.093, 6.093 - 6.094, 6.094 - 6.095 6.095 - 6.096, 6.096 - 6.097, 6.097 - 6.098 6.098 - 6.099, 6.099 - 6.100, 6.100 - 6.101 6.101 - 6.102, 6.102 - 6.103, 6.103 - 6.104 6.104 - 6.105, 6.105 - 6.106	

## NOTES



## FIELD LOG OF BORING

PROJECT NO. 72-068-15

DATE 10/2/74 TITLE Carl Phillips - Santa

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

EQUIPMENT USED FALLING 2500, 6 3/4 diamond  
bit, rotary air

BORING NO. P-1

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL AFTER

LOGGED BY W.R. C. n

173

ROD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blow or Force	Recovery Condition		
957-954	294	3" DIA CORE	2976	100%	SHALE-SANDSTONE 12-14% H.T. 10-12% S.S. N.S. Mottled, 2-4" thick, bedded, some thin horizontal partings of 1/2" to 1" S.S. and 1/2" to 1" thin shales.	
951-957	295	3" DIA CORE	100%	100%	SHALE-SANDSTONE 12-14% H.T. 10-12% S.S. N.S. Mottled, 2-4" thick, bedded, some thin horizontal partings of 1/2" to 1" S.S. and 1/2" to 1" thin shales.	
951-960	296	3" DIA CORE	9676	100%	SHALE-SANDSTONE 12-14% H.T. 10-12% S.S. N.S. Mottled, 2-4" thick, bedded, some thin horizontal partings of 1/2" to 1" S.S. and 1/2" to 1" thin shales.	

**NOTES:**

## FIELD LOG OF BORING

PROJECT NO. 72-068-15

DATE 10/17/74 TITLE Geo-Phillos-Soma

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4 diamond  
b.t., rotary fair

BORING NO. P-1

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

LOGGED BY W. R. C. J.

RQD						
DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery Condition	Soil type, color, consistency, moisture, condition, grain-size distribution, bedding, geologic details	
960'-963'	BOX 247	3" DIA CORE	100%	100%	960'-962' 10" SHALE-SILT SHALE, Lt. gray, w/ 2 to grayish brown siltstone to locally siltstone, thin bedded - 6" to 12" thick, differentially eroded, some bedding of calc. fossils, in a sandy appearance, hard, rather, non-laminar at base.	
					962' 10" - 963' : Silty shale, dark, blue, N. 100 dusky brn. SILT 3/4, some, thin, wavy bedding, bedding, thin, thin, thin, bedding, in a sandy, sandy, sandy, thin, thin, thin.	
963'-966'	BOX 248	3" DIA CORE	100%	100%	963'-966' : Silty shale, dark, blue, N. 100 brn. SILT 3/4, some, thin, wavy bedding, thin, thin, thin, thin, a wavy appearance, in a sandy, sandy, bedding plane, a thin, thin, thin, thin, covered w/ black material, local, some in oil content, some, some, some.	

NOTES:



# FIELD LOG OF BORING

PROJECT NO. 72-068-15

BORING NO. P-1

DATE 10/7/70 TITLE SUN-Phillips-SOILS

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4 Diamond bit,  
rotary air

LOGGED BY W. R. Lund

P-60

ROD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
966-969	Box 219	3" DIA CORE	100%	100%	966'-967'7" SHALE-SILTSTONE, grayish red to R4/2 to brnish gray SVR 4/1, noncalc, thinly bedded (locally wavy), hard, non- fractured, nonfossiliferous.	
					967'7"-968' CALCAREOUS SHALE - MARLSTONE lt. gray N-7, pinkish gray SVR 4/1 or med. lt. gray N-6, calcareous, v. thinly bedded, hard - appearance v. similar to RR. above and below but calc.	
					968'-969' SHALE-SILTSTONE, similar to that described above the calcareous zone.	
969'-972'	Box 300	3" DIA CORE	100%	100%	969'-971'2' SHALE-SILTSTONE; lt. gray N-7 to med. lt. gray N-6, noncalc., v. thinly bedded, hard, nonfractured. 971'2"-972' Bituminous SHALE; brnish blk SVR 2/1, noncalc, v. thinly bedded, hard, horizontal parting planes at 971'6" and 971'10", nonfossiliferous	

NOTES:

finco

## FIELD LOG OF BORING

PROJECT NO. 72-068-15

BORING NO. P-1

DATE 10/7/74 TITLE Sun-Phillips-SOHIO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAILING 2500, 1 3/4 diamond

LOGGED BY: W. R. Lund

Rotary / air

94

RGD.

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
972-975	BOX 301	3" DIA CORE	100%	100%	972-972.4 SHALE-SILTSTONE, olive gray silt, rare, v. thick bedded, hard, massive	
					972.4-972.7 B. Luminous shale BKN, blk to bluish blk, siltstone v. thin bedded, hard, massive, v. thin, iridescent, to bluish nearly pale brown silt	
					972.7-972.9 TUFF, bluish, bluish gray, v. fine grained, irregular alter- ation-mineralogical, fragment, rare, irregular bedding, hard, massive, siliceous, horizon of tuffaceous through this horizon, nonfossiliferous	
					972.9-973.5 B. Luminous shale and TUFF, BLK-N (shale), blk to bluish brn. OYR 4/2 (tuff), alternating thin beds of tuff and shale, all of tuff horizon, forming the base of this sequence - bottom of this tuff	

## NOTES

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P1

DATE 10/7/74 TITLE SUN - Phillips - S0410


ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 3500, 6 3/4" diamond bit  
rotary air.

LOGGED BY W.R. Lund  
P-62

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
CONT 972-975					is very wavy 	
					973' 5" - 973' 10" SHALE-SILTSTONE, 1/4" gray	
					N-7 to grayish orange pink SYRTH	
					noncalc. to sil. calc. in thinly bedded	
					hard, nonfractured	
					973' 10" - 975' SILTY SANDSTONE - SANDY	
					SILTSTONE, WHITE N-9 to pink	
					gray SYRTH, v. fine sand and silt	
					subrounded to rounded, poorly sorted	
					med. calc. (Ca carbonate), hard, g. to	
					fine micaceous are predominant fossils,	
					fracture surfaces have a sandstone	
					texture.	
975-978	BOX 302		100%	100%	975-978 10' SILTY SANDSTONE - SANDY	
					SILTSTONE, AS ABOVE	
					975' 10" - 978' SHALE-SILTSTONE 1/4" olive	
					gray 5 1/4" noncalc. v. thinly bedded, hard,	
					nonfractured, nonfossiliferous	

NOTES



# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/2/74 TITLE SUN-Phillips-SAMMO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/8" diamond bit,  
rotary air

LOGGED BY W. R. Lund  
P. 63

R00

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
978-981	BOX 303	3" DIA CORE	100%	100%	978'-978'6" SHALE SILTSTONE AS ABOVE 978'6"-981' Bituminous Shale, blk N-1 to brnsh blk SVR 4, noncalc, thinly bedded, hard, nonfractured, abundant thin irregularly shaped buff stringers w/ a buff brown dense at 978'8"	
981-984	BOX 304	3" DIA CORE	100%	100%	981'-983'1" Bituminous SHALE blk N-1 to brnsh blk SVR 4, noncalc, v. thin calc. v. thinly bedded, hard, horizontal parting plane at 982'9" is calcareous w/ a tan like substance, abundant irregular buff stringers 983'1"-984' Marlstone, pinkish gray SVR 01 to brnsh gray SVR 4, v. calc. v. thinly bedded, nonfractured, non fossiliferous - locally sand content increases.	

NOTES:	
--------	--

## FIELD LOG OF BORING

PROJECT NO. 74-068-15

DATE 7/10/74 TITLE SUN-Phillips-50410

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4" diamond  
rotary air

BORING NO. P-1

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

LOGGED BY W. E. Lund

P. 64

ROD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
984-987	Box 306	2" DIA CORE	100%	100%	984-986 MARLESTONE, v. bl. to dk. gray pinkish gray S.Y.E. 11, 2' thick, thin, bedded, hard, nonfossiliferous, planar to 1/2" sand, 1/2" to 1/4" silt, 1/4" to 1/8" clay. 987-988 SANDSTONE, v. bl. to dk. gray gray, 1/2" to 1/4" sand, 1/4" to 1/8" silt, 1/8" to 1/4" clay. 989-990 MARLESTONE, v. bl. to dk. gray nonfossiliferous.	
981-990	Box 306	2" DIA CORE	100%	100%	981-983 SANDSTONE, v. bl. to dk. gray 984-986 MARLESTONE, v. bl. to dk. gray 987-988 SANDSTONE, v. bl. to dk. gray 989-990 MARLESTONE, v. bl. to dk. gray pinkish gray S.Y.E. 11, 2' thick, thin, bedded, hard, nonfossiliferous, planar to 1/2" sand, 1/2" to 1/4" silt, 1/4" to 1/8" clay. 991-992 SANDSTONE, v. bl. to dk. gray to brownish blk due to iron staining, v. u. silt, cat. v. thin, to 1/2" thick, hard, nonfossiliferous, planar, 1/2" to 1/4" sand, 1/4" to 1/8" silt, 1/8" to 1/4" clay.	

## NOTES



# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/2/74 TITLE SUN-Philips - SOHIO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FALLING 2500, 6 3/4" DIAMOND BIT, Rotary air.

LOGGED BY W. P. Lund  
P 65.

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
990-993	BOX 307	3" DIA CORE	100%	100%	Bituminous Shale, brownish gray, 5YR 4/2 to brownish black, 5YR 4/1, noncalcareous, thin bedded, hard, two horizontal parting planes at 990.75 and 992.75, nonfossiliferous.	
993-996	BOX 308	3" DIA CORE	100%	100%	993-996 Bituminous Shale, similar to 990-993, 5YR 4/2 to 5YR 4/1, noncalcareous, thin bedded, hard, two horizontal parting planes at 993.75 and 995.75, nonfossiliferous.	
996-999	BOX 309	3" DIA CORE	62%	100%	996-999 Shale - SILTSTONE, olive gray, 5YR 4/2 to 5YR 4/1, noncalcareous, thin bedded, hard, two horizontal parting planes at 996.75 and 998.75, nonfossiliferous.	
999 - 1017	310 311 312 314		98	100%	Shale: Very light gray (N&Y) to dusky brown, 5YR 4/5 to 5YR 4/2, very thinly bedded, slightly calcareous to moderately calcareous, poorly sorted.	

NOTES:



ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

LOGGED BY H. E. S. H. S.

66


		DESCRIPTION		REMARKS
Interval	Depth	Recovery Correlation	Notes on core consistency, moisture, color, grain size distribution, bedding, geologic details	
99'-101'			homogeneous throughout zone possible pyrite and <del>pyrite</del> mica (Phlogopite?), some silt beds, some H <sub>2</sub> S gas present, non-fossiliferous	
101'-102'	100	100	Siltstone: Pale yellowish brown (10YR 6/2) hard, thinly bedded color banding, very fine-grained moderately calcareous to highly calcareous, slight <del>is</del> porous with H <sub>2</sub> S gas present Zones of high mica content <del>compact</del> , differentiated compacted, <del>non</del> non-fossiliferous some inter bedded sandstones, cross-bedded	
102'-103'	100	100	shale: light grey (N 7) to dusky yellowish brown (10YR 2/2), hard thinly bedded <del>to</del> <del>is</del> <del>is</del> (fairly developed, not too obvious)	

NOTES	

# LOG OF BORING

DATE: \_\_\_\_\_ ELEVATION: \_\_\_\_\_ DATUM: \_\_\_\_\_  
 START: \_\_\_\_\_ WATER LEVEL: \_\_\_\_\_ AFTER: \_\_\_\_\_  
 EQUIPMENT USED: \_\_\_\_\_ LOGGED BY: K. Stemhede

67

DEPTH	CORRECTION	DESCRIPTION	REMARKS
		(hardness, color, consistency, moisture, condition, grain size distribution, bedding, geologic details)	
1021-1029 cont		moderately to slightly calcareous some pyrite possible mica, non fossiliferous Darker Zone between 1024' 9" to 1025' 6" contains sandstone lenses and is differentiated compacted sandstone bed at 1026' 11" (1/4") and at 1027' 6" (1/4")	
1029-1056		Shale; Medium dark grey (N4) to dusky yellowish brown (10YR 3/2) hard, thinly bedded, moderately calcareous, non-foss, li ferrous poorly sorted. Three vertical joints between 1040 to 1045 the zone is broken up in small pieces, joints are smooth and flat, closed. At 1045' 6" sandstone (Tuff) pale yellowish orange (10YR 8/6) and dark grey (N3) medium and fine grain beds, differentiated compacted ground beds, slightly	

NOTES:

THRU

DATE \_\_\_\_\_ CORE \_\_\_\_\_  
 LOCATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 LATITUDE \_\_\_\_\_ AFTER \_\_\_\_\_  
 LONGITUDE \_\_\_\_\_ Symb. \_\_\_\_\_

Core		Condition		Description	
Core	Condition	Core	Condition	Description	
1029-1057				calcareous, at 1034 Tuff sandstone (2")	
1057				greenish black (5 5 2/1) soft	
				slightly calcareous, possible	
				pyrite that has been weathered	
				out	
1056 -		100	100	Siltstone; medium light grey (N6)	
1059				hard, thinly bedded to	
				thick bedded (4"), more massive	
				in characteristic than previous zone	
				Non-fossiliferous non-fractured	
				moderately calcareous to highly	
				calcareous, some cross-bedding	
				and differentiated compacted	
1059-1062	30% 530	3" DIA CORE	98% 100%	SHALE-SILTSTONE, med. lt. gray N-6	
				to olive gray 5 4 3/2, noncalc., v.	
				thinly bedded, hard, 3 horizontal	
				parting planes at 1059'6", 1059'7"	
				1060'1", nonfossiliferous.	

NOTES:

FACIES

# FIELD LOG OF BORING

BORE NO. 24-068-1 BORE NO. P-1 (CORE)  
 DATE 2-1-73 TITLE SUN-THINGS - 24-068 ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_ WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 EQUIPMENT USED FAIRING 2500, 6 3/4 diamond bit, air factory LOGGED BY W.R. Lund  
 P. 69.

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows of Force	Recovery Condition		
1062'-1065'	BOX 391	3" DIA CORE	95%	100%	SHALE-SILTSTONE; pale yellowish brown SYR <sup>6/12</sup> , olive gray SYR <sup>3/12</sup> , to med. lt. gray N-6; noncalc. v. thinly bedded, hard, horizontal parting planes at 1063'2" and 1063'10', parting plane fractures have backly fracture	
1065'-1068'	BOX 332	3" DIA CORE	79% <del>100%</del>	100%	SHALE-SILTSTONE; pinkish gray SYR <sup>8/12</sup> to brnish gray SYR <sup>4/12</sup> , silt. to mod. calc. locally, thinly bedded, hard, numerous horizontal parting planes, beds thicken locally, occ. thin horizons of sandy siltstone (sacroidal text) and calc. shale-marlsstone, locally bedding appears truncated.	
1068'-1071'	BOX 333	3" DIA CORE	100%	100%	Inte-bedded shale and sandy shale; mod. brn. SYR <sup>4/12</sup> , grayish brown SYR <sup>3/12</sup> to grayish red SYR <sup>4/12</sup> , noncalc. to mod. calc, thinly bedded (< 1/8" > 1/2"), hard, horizontal	

NOTES:

FOOTER

70-06

1068' 10" (core)

DATE: 7/11/52 LOCATION: DATUM:

WATER LEVEL: AFTER:

REMARKS: 1350 FEET LUGGED BY J. R. Lund

					DESCRIPTION
					Core type, color, luster, moisture condition, grain-size distribution, bedding, geologic details
					Parting planes at 1068'3", 1068'6", 1069'3"
					1068'8", nonfossiliferous, alternating colors
					give rock a banded appearance, sand is 1/3
1071-1074	BOX 334	3" DIA CORE	100%	100%	SHALE-SILTSTONE; olive gray, SY 3/2, non-calcareous, v. thinly bedded, hard, horizontal parting planes at 1071'8", 1072'4", 1073'1", faces are smooth & speckled w/ pyrite, nonfossiliferous
1074-1077	BOX 335	3" DIA CORE	100%	100%	1074'1"-1074'5" SILTSTONE-SHALE; olive gray SY 3/2 to dusky brown SYR 3/2, noncalc., v. thinly bedded, hard, nonfractured, no parting planes
					1074'5"-1074'7" SILTSTONE (TUFFACEOUS) dk. gray N-S, noncalc, single bed, hard, core broke in this interval, nonfossiliferous, strong odor - doesn't appear to be oil impregnated
					1074'5"-1077 SILTSTONE-SHALE similar to

NOTES:

RING

7-261

C. E. R. NO. P-1 (Core)

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

LOGGED BY W. R. Lund

P-17

DEPTH	TESTS				DESCRIPTION	REMARKS
	Mo.	Mo.	Mo.	Mo.		
					above	
1077-1080	Box 536	3" DIA CORE	100% 100%	100%	SHALE-SILTSTONE; lt. brownish gray siltstone to brownish gray siltstone to med. dk. gray N-4, noncalc, v. thinly bedded, hard, horizontal parting planes at 1078' 3" 1078' 9", 1079' 3", nonfossiliferous	
1080-1083	Box 337	3" DIA CORE	100% 100%	100%	1080'-1080' 10" SHALE-SILTSTONE, AS ABOVE 1080' 10" - 1080' 10" Bituminous shale; blk N-1, noncalc, thinly bedded, hard. 1080' 10" - 1082' 1"; CLAYSTONE; med. dk. gray N-4, noncalc, med. to thickly bedded, hard, nonfrag., lower 6" of this horizon streaked w/ pyrite x-ls. 1082' 1" - 1083 SHALE-SILTSTONE; similar to above at beginning of box.	
1083-1086	Box 338	3" DIA CORE	100% 100%	100%	CALCAREOUS SHALE - Locally Marlstone lt. gray N-6, med. to v. calc., thinly bedded	

NOTES:

Furnace

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (CORE)

DATE 10/8/74 TITLE SUN-Phillips - 50410

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4" diamond bit, LOGGED BY W.R. Lund  
AIR/ROTARY

P-72

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
					hard brittle, horizontal parting planes at 1083'6" and 1088'6", nonfossiliferous, parting plane surfaces have a sacroidal texture.	
1086-1089	BOX 339	3" DIA CORE	100%	100%	SILTSTONE-CLAYSTONE, med. gray N-S to brownish gray, silty, noncalc, thin to medium bedded, hard, nonfractured, horizontal parting plane at 1086'3", parting plane face speckled w/ pyrite and shorite?, nonfossiliferous.	
1089-1092	BOX 340	3" DIA CORE	85 1/2%	95-100%	Shale-Siltstone, grayish olive to yellow, silty calc., v. thinly bedded, hard, broken up, most fractures represent horizontal parting planes - blocky fracture on faces, nonfossiliferous.	

NOTES:	

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (Core)

DATE 10/8/74 TITLE SUN-PH. 11/23 - 50 H10

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FALLING 2500, 6 3/4" diamond  
bit, Rotary/air

LOGGED BY \_\_\_\_\_

P. 73

RQD

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows Force	Recovery, Condition		
1092-1095	BOX 341	3" DIA CORE	86%	100%	Siltstone-shale; lt. gray N-7 to med. lt. gray N-6 silt. calc. v. thinly bedded, hard, broken up - horizontal parting planes, nonfossiliferous	
1095-1098	BOX 342	3" DIA CORE	83%	100%	Siltstone-shale; lt. gray N-7 to med. lt. gray N-6 silt. calc. to locally med. calc., v. thinly bedded, hard, fractured - horizontal parting planes, e. rubble, nonfossiliferous, and marlstone	
1098-1101	BOX 343	3" DIA CORE	100%	100%	Marlstone; white N-9 to med. lt. gray N-6, v. calc., thinly bedded - bedding locally contorted w/ many roll and loop structures, unfractured, horizontal parting planes at 1098' 4", 1099' 5" and 1100' 2", nonfossiliferous, faces have a sacroidal texture - v. small grains of a dk. mineral give a "salt and pepper" appearance	

NOTES:

fuoro



# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1 (25)

DATE 10/2/74 TITLE SUN-PA-11/25-SOHIO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4" diamond  
bit, air rotary

LOGGED BY S. J. W. L. S. L.  
P-74

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Dial Force	Recovery, Condition		
1101-1104	BOX 344	3" DIA CORE	100%	100%	Marlstone; lt. gray N-6 to med. lt. gray N-5, v. calcareous, v. thinly bedded, hard one horizontal parting plane 1102'5", occ. shale interbeds in last 6"	
1104-1107	BOX 345	3" DIA CORE	100	100	SILTSTONE-SHALE; med. lt. brn to grayish brn SYR 3/4, silt. to mod. calc, v. thinly bedded, hard, horizontal parting planes at 1104'7" & 1106'2", nonfossiliferous	
1107-1110	BOX 346	3" DIA CORE	100	100	Shale-Siltstone; med. gray N-5, med. lt. gray N-6, mod. calc, thinly bedded, hard horizontal parting planes at 1107'10", 1108'5", 1108'10", 1109'8", nonfossiliferous	
1110-1113	BOX 347	3" DIA CORE	100	100	Shale-Siltstone; v. lt. gray N-7, silt. calc, horizontal parting planes at 1111'3", 1111'6", 1112'2" other wise similar to above	

NOTES:

TURKEY

# FIELD LOG OF CORE

DATE 11/27/77 TIME 10:00 AM  
 START 1113' 0"  
 EQUIPMENT USED 3" x 3" 6 3/4" diamond

LOCATION 1113' 0"  
 WATER LEVEL 1113' 0"  
 LOGGED BY 1113' 0"

DEPTH	TIME	REMARKS	DESCRIPTION
1113-1114	10:00	100%	SILTSTONE, brownish grey, fine grained, thin bedded, horizontal parting planes at 1113' 5", 1113' 7", 1114' 1", 114' 4", non-fossiliferous
1116-1119	10:05	100%	Siltstone, pale yellowish brown (10YR 6/2), medium light grey, medium hard, to hard, thin bedded, some appear massive, some color banding, poorly sorted, highly calcareous, non-fossiliferous, pyrite (arsenopyrite) homogeneous. Sandstone 1119' 5" to 1119' 9", black (N9), soft, fine to medium grain, moderately porous, oil impregnated, sharp contact, breaks at contact. <del>1119' 9"</del> shale 1226', dark grey (N3) hard, parting planes above this zone differentiated compacted, minor offset

NOTES: \_\_\_\_\_

# FIELD LOG OF MINING

DATE 6/27/78 TIME 10:00 LOCATION 100 ELEVATION 100 LATUM 100  
 START 100 END 100 WATER LEVEL 100 AFTER 100  
 EQUIPMENT 100 FIELD LOG 100 BY 100

DEPTH	TIME	TEMP	MOISTURE	CONDITION	DESCRIPTION
1140'	100	100	100	100	Interbedded, shale, siltstones and sandstone. Blue grey (5Y 6/2) pale yellowish brown (10YR 6/2), light grey (N7), moderately hard to hard brittle, thinly bedded slightly calcareous, non fossiliferous. <del>100</del> differential compacted. Total 1140' 6" (1/4") soft.
1145'	100	100	100	100	Forable Moderate brown 5YR 7/4
1148'	100	100	100	100	To FF Very light grey (N8) to light grey (N7), soft to moderately hard very fine grained, moderately sorted, non calcareous, non fossiliferous. Non-fractured. Parting planes 1148' 11" (from top of soft)
1148.5'	100	100	100	100	Shale (moderate) greenish grey 15Y 6/1. Medium light grey hard thinly bedded, non fossiliferous. Non calcareous some interbedded. Tuff (very fine orange 10YR 5/5)

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 100-100, 101 LOCATION 100-100, 101  
 DATE OF FIELD WORK 100-100, 101 ELEVATION 100-100, 101  
 START 100-100, 101 WATER LEVEL 100-100, 101  
 EQUIPMENT USED 100-100, 101 LOGGED BY 100-100, 101

DEPTH	DIAMETER	RECOVERY	CONDITION	DESCRIPTION
1148'5"				At 1150'3" sandstone with 1/4"
1153'6"				thin slightly calcareous sandstone
cont				gains. Between 1150'3" & 1153'6"
				a set of (3) vertical joints
				smooth, concave irregular (core is
				split)
1153'6"				Siltstone Medium light grey (Wt)
				dark yellowish brown 10YR 5/6
				hardly thinly bedded, very poorly
				sorted, moderately calcareous
				parting planes at 1154'6"
				Non-fossiliferous
1158'		90	100	Shale (Hudstone) Medium grey (N5)
1158'				to dusky brown 5YR 2 1/2, hard
				thinly bedded color becoming
				Non-fossiliferous, varies from
				slightly to Moderately calcareous
				some cross bedding and
				differential compaction
				Joints (3) from 1157' to 1158'6"

## NOTES:

--	--	--	--	--

PROJECT Y

DATE 8/8/61

START            COMPLETE           

EQUIPMENT USED           

WELL NO.           

LOCATION           

WATER LEVEL            AFTER           

LOG NO.           

DEPTH	SAMPLES		Recovery, Condition	Remarks or observations, lithology, color, texture, grain size, distribution, bedding, geologic details
	Core	Flow or Force		
1156				Dark grey shale (see)
1161 1/2'				Dark grey shale (see)
1161 10"				Dark grey shale, some sandstone
1163 4"				rock, soft, black, sticky
1163 10"		100	100	Silty shale olive grey (5Y 4/1)
1163 4"				very slightly calcareous, massive
				(some faint bedding) hard, non fossiliferous
				non-fractured
1163 4"		100	100	Silty shale dark greenish grey
1163 10"				5Y 4/1, hard, non calcareous
				thin bedded and some massive beds
				very well sorted, non fossiliferous
				non-fractured
1164 7"		100	100	Silty shale olive grey (5Y 4/1)
1164 5"				to <del>light</del> light grey (N1) moderate
				hard, moderate calcareous
				medium to fine grained, generally
				massive, some fine bedding
				parting surface at 1164 6"
				at approx 30° angle from horizontal

NOTES:

# WELL LOG OF SPRING

PROJECT NO. -068 DIST. 100  
 DATE 10-3-76 TITLE Surf - 100 ELEVATION 100 DATUM 100  
 START 100 COMPLETE 100 WATER LEVEL 100 ARCE 100  
 EQUIPMENT USED Well log 250 LOGGED BY M. J. Smith

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Sand (%)	
1169' 8"			10	10	Light shale, dusky brown, 5YR 3/2
1173' 6"					hard, thinly bedded, calcareous
					bedding, slightly calcareous
					Increasing at depth, non-
					fossiliferous, non fractured,
					some thin tuffaceous sandstone
					<del>less than</del> less than 1/8"
1173' 6"			100	100	T. FF (sandstone?) very pale orange
1176'					10YR 3/2 to pale yellowish brown
					10YR 3/2, soft to moderately
					hard, fine to coarse-grain
					well sorted (localize homogeneity)
					zones) moderately to highly
					calcareous, inclusion of
					pyrite (arsenopyrite?)
					massive to thinly bedded
					non-fractured. At 1175' 3"
					becomes coarser and more massive

NOTES:

# FIELD LOG OF CORE

PROJECT NO. 74-065 LOCATION AT  
 DATE 10/9/74 TITLE FOAM DATUM   
 START  COMPLETE  WATER LEVEL  AFTER   
 EQUIPMENT USED FALLING 2000, 4 1/2" diameter LOGGED BY W. J. H. H.  
bit, rotary log

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blow or Force	Recovery Condition	
1176'-1179'	Box 369	3" DIA CORE	81%	100%	1176'-1179' TUFF-TUFFaceous SILTSTONE, pinkish gray, 5-12% grains silt or clay, poor to moderate sorting, mod. hard, calcareous, bedding indistinct - may be massive, occasional fine grains of muscovite, irregularly shaped blebs, a parting face may indicate highly weathered porous lumps, parting plane at 1176'-1'
					1177'-1178' Interbedded siltstones and tuff; pinkish gray 5YR6/1 to dk. greenish gray 5G4/1, silt calc to calc, mod hard to hard, nonfractured base of this unit is a buff brownish shale matrix, beds are contorted
					1178'-1179' SHALE-MUDSTONE; lt. brownish gray 5YR6/1 to grayish orange pink 5YR7/6, locally mod. hard, 5YR7/4, range to silt calc, thinly bedded, hard, hard matrix, parting plane at 1178' assoc.

NOTES:



# FIELD LOG OF BORING

PROJECT NO. 74-068 BORING NO. R-1  
 DATE 10/9/74 TITLE SUN-PHILLIPS SCH 10 ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_ WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 EQUIPMENT USED FAIRING 2500, 6 3/4" diamond bit, rotary/air LOGGED BY W.R. Lund  
 P. 76

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
<u>cont</u> <u>1176'-1179'</u>					<u>w/ a thin tuff stringer, bedding plane faces are irregular.</u>
					<u>1178'3"-1178'6" Bituminous shale &amp; TUFF;</u>
					<u>blk N-1 to lt. brn. silt 5/6, noncalc. to silt. calc., v. thinly bedded w/ compact or structures, hard, parting plane at</u>
					<u>1178'6"</u>
					<u>1178'6"-1179' TUFF-TUFFACEOUS SILTSTONE</u>
					<u>pale brn. silt 5/6 to grayish orange pink</u>
					<u>silt 7/2, +95% grains silt size or below,</u>
					<u>mod. to good sorting, calcareous, v. thinly bedded, mod. hard to hard, nonfractured,</u>
					<u>horizontal parting plane at 1178'9",</u>
					<u>nonfossiliferous</u>
<u>1179'-1182'</u>	<u>Box 370</u>	<u>3" DIA CORE</u>	<u>100%</u>	<u>100%</u>	<u>1179'-1180' TUFF-TUFFACEOUS SILTSTONE</u>
					<u>similar to above, lower 4" begin to pick up thin shale interbeds</u>
					<u>1180'-1182' SHALE-CLAYSTONE, mod dk. gray</u>
					<u>N-4, 90% grains silt or below (probably clay)</u>

NOTES:

51800

# FIELD LOG OF BORING

PROJECT NO. 74-068  
 DATE 10/19/74 TITLE SUN-Phillips - 50410  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_  
 EQUIPMENT USED FAILING 2500, 6 3/4" diamond  
bit, rotary/air

BORING NO. 100  
 ELEVATION \_\_\_\_\_ LATUM \_\_\_\_\_  
 WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 LOGGED BY W. R. Lord

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
<u>cont</u> <u>1179-1184</u>					<u>noncalc to silt. calc., thinly bedded, relict fossiliferous, one core 3' long, face in</u> <u>lower part shows v. fine grained disseminated</u> <u>pyrite, v. smooth surfaces on mechanical break</u>
<u>1182-1185</u>	<u>Box</u> <u>371</u>	<u>3" DIA</u> <u>CORE</u>	<u>100%</u>	<u>100%</u>	<u>SHALE-CLAYSTONE, med. dk. gray N-4,</u> <u>v. similar to 1180-1182 above, parting</u> <u>plane at 1184 - horizontal w/ hackly</u> <u>fracture some white coatings (unknown</u> <u>type - zeolite?), fine pyrite common</u>
<u>1185-1188</u>	<u>Box</u> <u>372</u>	<u>3" DIA</u> <u>CORE</u>	<u>100%</u>	<u>100%</u>	<u>SHALE-CLAYSTONE, med. dk. gray N-4,</u> <u>v. similar to rock directly above, 3/4"</u> <u>buff horizon - grayish orange 104R 7/10, silt.</u> <u>calc., med. hard at 1186'6", bottom</u> <u>of core bounded by a horizontal</u> <u>natural parting plane. Core in one piece</u>
<u>1188-1191</u>	<u>Box</u> <u>373</u>	<u>3" DIA</u> <u>CORE</u>	<u>92%</u>	<u>100%</u>	<u>1188-1188'3' FELDSPATHIC QUARTZ WACKE;</u> <u>dk. gray N-3 to grayish blk. N-2, fine to</u>

## NOTES:

TURNS

# FIELD LOG OF BORING

PROJECT NO 74-068-15

BORING NO. 5

DATE 12/3/73 TITLE SUN - PHILLIPS - SONID

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED SPILLING 2500, 6 3/4 diamond  
bit, rotary/air

LOGGED BY W. F. LUND

P. 17

DEPTH	SAMPLES				DESCRIPTION
	No.	Type	Blows or Force	Recovery, Condition	
CONT. 1188-1191					med, subrounded to rounded, gtz grains with 5-10% fine grained subangular feldspar, v. fine grained dk mineral indeterminant, CaCO <sub>3</sub> cement (v. calc) thick bedded, porous, 70% silt size, soft to med. hard - can rub sand grains base w/ fingers, nonfossiliferous, irregular horizontal parting at lower contact 1188'3"-1191' SHALE - CLAYSTONE, med. dk. gray N-4, +95% silt or below (probably clay), noncalc., v. thinly bedded, hard, nonfractured, horizontal parting plane at 1190', disseminated pyrite common.
1191'-1194'	Box 37A	3" DIA CORE	100%	100%	1191'-1193'1" SHALE - CLAYSTONE, med dk. gray N-4 to grayish blk N-2, v. similar to rock directly above, horizontal parting plane at 1192'4" 1193'1"-1193'9" INTERBEDDED SHALE AND TUFF

## NOTES:

Turned

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/3/74 TITLE JUN-Phillips-SONIO

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4" diamond  
bit, rotary/air

LOGGED BY W.R. Lurid  
P. TS

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
CONT. 1191'-1194'					med. dk. gray N-4 to grayish orange 10YR 7/4, noncalc. (shale) to silt. calc. (luff), mod. hard to hard, nonfract, nonfossiliferous, horizontal parting plane 1193' 9"	
					1193' 9" - 1194' SHALE-CLAYSTONE; v. dusky red 10R 2 1/2, v. similar to rock at beginning of interval, nonfractured	
1194'-1197'	Box 315	3" DIA CORE	92%	100%	1194'-1194' 6" SHALE-CLAYSTONE; med. dk. gray N-4 to v. dusky red 10R 2 1/2, v. similar to above	
					1194' 6" - 1197' TUFF; pinkish gray 5YR 8/1 to grayish orange 10YR 7/4, ash to lapilli size, subang. to subrounded, poorly sorted, calcareous, thin to med. bedded, bedding locally contorted, soft to mod. hard, horizontal parting plane at 1194' 11", fracture at 20° at 1195' 7"; frag. faces show abundant devitrified pumice lumps, occ. mica.	

NOTES:

7-23-73 L-013

# FIELD LOG - CORE

PROJECT NO. 74-068 DATE 10/9/74 TITLE SUN Phillips SONIO ELEVATION \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_ WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 EQUIPMENT USED FAIRING 2500, 6 3/4" diamond bit, rotary/air LOGGED BY W.P. [unclear]

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Flow of Force	Recovery, Condition		
<u>cont.</u> <u>1194-1197</u>					<u>lower 2" v. hard-silica cemented.</u>	
<u>1197-1200</u>	<u>BOX 374</u>	<u>3" DIA CORE</u>	<u>100%</u>	<u>100%</u>	<u>1197' - 1197' 10" SHALE - CLAYSTONE, med dk, gray N-4, normal to stt calc, v. thinly bedded, hard, nonfractured, irregular bedding at lower contact</u>	
					<u>1197' 10" - 1199' TUFF - TURFACIOUS SILT-STONE, grayish orange pink 5YR 7/1, silt sized grains, med. sorted silt. to med. calc, stt. to med. bedding, hard, horizontal parting plane at 1198'</u>	
					<u>1199-1200 Interfingered Bituminous shale and TUFFS, brnsh blk 5YR 2/1 (shale) to grayish orange 10YR 7/4, calc. to silt calc, v. thinly bedded, hard, nonfrac, shale appears quite rich</u>	
<u>1200-1203</u>	<u>BOX 377</u>	<u>3" DIA CORE</u>	<u>81%</u>	<u>100%</u>	<u>1200' - 1201' Interfingered Bituminous Shale &amp; Tuff: brnsh blk 5YR 2/1 (shale) to grayish orange 10YR 7/4 (tuff) similar to above</u>	

NOTES: \_\_\_\_\_

7-23-73 1-013

# FIELD LOG OF BORING

PROJECT NO. 74-068-15

BORING NO. P-1

DATE 10/9/79 TITLE Sun-Phillips-50410

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED FAIRING 2500, 6 3/4" diamond  
b. t. rotary/air

LOGGED BY W. R. Lund  
P. 80

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blow or Force	Recovery, Condition		
Cont. 1200-1203					1201'1" - 1202'2" Interbedded Tuff & Marls tone, 1/2 pale orange (tuff) to pale brn. siltstone (marls tone) v. calc. thin to mod. bedding, bedding often canted, mod. hard, horizontal parting planes at 1201'8" and 1202'4"	
					1202'2" - 1203' shale - siltstone, mod. yellowish brn. siltstone mod. brn. siltstone, noncalc. v. thinly bedded, hard, parting plane at 1202'9", top thin horizon marked by a 1" blk. zone	
1203' - 1206'	Box 378	5" DIA. CORE	26%	100%	1203' - 1205'4" Shale-siltstone, grayish red siltstone, noncalc, v. thinly bedded, hard, nonfractured, nonconformity at 1205'4" - 1206' Tuff, grayish orange pink 10R 8/2, ash to lapilly size, subang. to subrounded, poorly sorted, v. calc. thin to thickly bedded, soft to mod. hard, horizontal parting planes at 1205'5" and 1205'9", 1205'10"	

NOTES:

# FIELD LOG OF BORING

PROJECT NO. 74-062-15 BORING NO. 2-1  
 DATE 10/9/74 TITLE SUN-Phillips-SONID ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_ WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 EQUIPMENT USED FAIRBANKS 7500, 6 3/4 diamond bit, LOGGED BY WRC

colony/arr

81

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
					parting surfaces show many devitrified pumice lumps, nonfossiliferous.	
1206-1209	Box 319	3" DIA CORE	100%		1206-1208' 9" Tuff-Tuffaceous Siltstone, v. pale orange to yellowish gray silt, v. similar to the tuff directly above, horizontal parting planes at 1206' 8.5", 1206' 11 1/2", 1208' 4". 1208' 9" - 1209' shale - see below.	
1209-1212	Box 320	3" DIA CORE	80 1/2%	100%	1209'-1210' 8" shale; lt. olive gray silt to blk N-1, silt cat., v. thin bedded, hard, horizontal parting planes at 1209' 5 1/2" & 1210' 5 1/2". 1210' 8" - 1212' Tuffaceous Siltstone; grayish yellow silt to yellowish gray silt, grains predom. silt size - occ. horizons have dev. t. pumice lumps, poor to med. sorting, silt cat., thinly bedded, soft to med. hard - some rubble zones, locally friable, nonfossiliferous.	
1212-1215	Box 321	3" DIA CORE	80 1/2%	100%	Tuffaceous Siltstone; similar to above	

## NOTES:

10/10/74



# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_

BORING NO. \_\_\_\_\_

DATE \_\_\_\_\_ TITLE \_\_\_\_\_

ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_

START \_\_\_\_\_ COMPLETE \_\_\_\_\_

WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_

EQUIPMENT USED \_\_\_\_\_

LOGGED BY \_\_\_\_\_

82

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows of Force	Recovery, Condition		
					horizontal parting planes at 1210' 2", 1212' 4", 1213' 5", 1214' 6", 1214' 10"	
1215 - 1220	382	3" DIA CORE	75%	100%	1215 - 1216 Tuffaceous Siltstone, similar to above, parting planes listed at 1216'	
1216' - 1218' 8"					SHALE Siltstone, grayish brown siltstone, soft calc., v. thinly bedded, hard, parting planes at 1216' 2", 1216' 8" - 1218' Tuffaceous Siltstone, grayish yellow siltstone, predominantly with up to horizontal conchoidal fracture. Lumps, poor to med. sorted, v. calc., thin to med. bedding, soft to hard, parting planes at 1218' 3", 1218' 4", 1217' 7", 1217' 11"	
1220' - 1223' 6"	384		100	100	nonfossiliferous. Shale, Gray, sh. brown siltstone, hard, thinly bedded, highly calcareous, non-fossiliferous, some interbedded tuff.	

NOTES:

# FIELD LOG OF BORING

PROJECT NO. \_\_\_\_\_ BORING NO. P-1 Core  
 DATE 10/9/74 TITLE \_\_\_\_\_ ELEVATION \_\_\_\_\_ DATUM \_\_\_\_\_  
 START \_\_\_\_\_ COMPLETE \_\_\_\_\_ WATER LEVEL \_\_\_\_\_ AFTER \_\_\_\_\_  
 EQUIPMENT USED L-W Air Rotary Drilling 2500 LOGGED BY M. Symbieda

83

DEPTH	SAMPLES				DESCRIPTION	REMARKS
	No.	Type	Blows or Force	Recovery, Condition		
0.00 - 1223' 6" cont.		385			parting plane at 1221' 2"	
1223' 6"	385	385	97	100	Tuff, very pale orange (10YR 8/2)	
1226					Soft to moderately hard	
					fine to <del>coarse</del> medium grain (some	
					pumice?) moderate sorting	
					generally massive, highly	
					calcareous, non-fossiliferous	
					non-fractured	
1226 -			80	100	shale (mudstone) Pale yellowish	
1238					brown (10YR 6/2) to dark	
					yellowish brown (10YR 2/2)	
					olive black (5Y 2/1), moderately	
					calcareous hard, thinly bedded	
					non-fossiliferous, some	
					interbedded tuffs at top	
					of <del>zone</del> Zone fractures	
					1131' 3" to 1231' 2", <del>non-R</del> Rubble	
					and 1238' 6" to 1239' Rubble	

NOTES:

7-23-73 A L 013