

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
DI-6

APPROVED DECEMBER 1941

Book

2.

Cuttings

0 - 970  
1040 - 1060  
1075 - 1200  
1975 - 1978  
2070 - 2130

from columns?

COLE

- #9 - p. 4a, 5
- 10 - p. 5a, 6
- 11 - p. 8, 8a
- 12 - p. 12a, 13
- 13. - p. 14a, 15
- 14 - p. 16a, 17
- 15: p. 20, 20a

Blk 2

F-1, Forewater, 2nd line

(Area 1, 202 ft. (Continued))

5.20 Well, ... - 3000  
... isolated handle, ...  
... - ... but ... of ...  
... soft

7.05 Well, ...  
... at 3555 (5' on 5 min)

7:08-7:12 47 3557-3560

6/1/52 - Sunday - 8 AM - 4 PM Field

3560-3562 - 1' @ 1 min each

Shut down to work on pumps, etc and  
refill pits; start to resume  
drilling at 11 AM - cuttings packed  
in - pulled up; bit plugged, dropped  
short length pipe inside drill pipe  
and out of hole, lower part string  
plugged, coll. box cuttings (drill  
colls packed)  
... packed, freed tool, pulled  
out the ... bit, put ... back in  
hole and pumped clear.

see next  
page

2:15 PM ... on bit ...

[Note on cuttings from plugged drill  
collars 3562 & higher - mostly 0-150' higher  
acc driller.

Many forams, mostly small but some  
larger, gast. & peloid, frag., molds, small  
brachiopods with brachia, frag. corals etc;  
preservation not good - forams with  
bits calcite cemented to shells, margins  
incomplete, etc.]

4:05 Pipe down to 3650' ready to  
BEGIN DRILLING → STOPPED TO  
REPAIR EQUIPMENT (Winch)

5:10 BEGIN DRILLING AT 3655'

6:09 Reached 3650', still very soft shilling.

6:40 Started pulling pipe.

8:35 Pipe out. Core barrel put on.

10:55 Core barrel at bottom of hole. Core  
taken in about 5 min. Core barrel stuck  
at bottom. Driller couldn't get to pipe.  
Presently cutting cables down on well  
when pumping was stopped to take  
core.

11:00 Freed drill collar and started to pull pipe.  
Pulling pipe at about 100 ft. Hole to 3655'.

June 2, 1952 - Midnight - 8 AM Russell

1:30 Pulling core out of hole.  
Joints very difficult to break  
- broke Tony cable once.

2:30 AM

and a Tony-jaw pin -  
and a winch rope  
and a second Tony cable

4:00 AM - Core barrel up -  
No core recovery -  
checked with Paul - Wants to  
go right back + try for  
another core - then take  
with circulation.

Bill Sprague, after the last  
rigging discussion as to whether  
it would be necessary to  
clean out to bottom of hole  
with mud and rock bit  
before making a core run,  
whether the core barrel could  
be run right back in with  
a pit of mud for cleaning hole  
and cutting. It was finally  
decided that the core barrel was  
to go back in and hope the  
mud would clean out ahead of  
barrel sufficiently to take core.  
(An alternative to core barrel was  
suggested by Gus Pike. He thought  
that more of the soft fraction  
could be recovered by using a  
special stand-circulation junk  
basket. The disadvantage to this  
was that no more than 2 feet  
recovery is possible and with  
any kind of luck more than that  
could be obtained with the core  
barrel).

4.15. mixing mud for core run.  
To end of shift.

June 2 - 1901. - 8 AM - 4 PM - Ladit

9.07 AM ± into hole with heavy mud + 12 ft  
11.00 start covering (with circulation) at 2455' 3650'  
after washing out 90' cuttings. (4)

Notes on Core #9 - 3655 - 3665'

Small oriented pieces at top of core appear to be mainly coral.

First oriented section is 2' section of white, friable ls. near up. Two pieces from bottom of this sent to Cole as sample Q. Second oriented piece is 6" long.

Assemblage of forams and corals much like that recovered from plugged drill collars (3562' & higher). Forams molts are present with orig. shell but rock is mainly a fine-grained ls.

Remainder of core consists of smaller pieces none of which are oriented. Part of molts and some of corals appear as molts. One large R. form has orig. shell. Some of coral molds are encrusted with banded ls. This may be algal.

40

20/4/44

Foraminifera from core at 3655' - 3665' -  
Determined by Dr. J. H. Van Couvering  
at the University of California, San Diego

11:44 AM

CONCRETE TANKING DONE AT 3560' CONTINUING OUT ON ROAD - NOTE - DIRT ROAD PASSED - SHOWS IN COLOR FROM 3560' - 3600'

ml. Q  
CORR #9  
3655-3665  
(3% horn)

2:20 PM out of hole with core barrel 3655-3665, recovering 3'3" (=33%) of hard but friable, white, coral and shell limestone (see 'notes' in several pieces wrapped in paper)

Time

- 6:30 FINAL RISE ON REMAINS DOWN TO 3665'
- 6:37 DOWN TO 3665' - RECORD WITH CHECK ON GUNN - MARK IN CORNER
- 6:41 GUNN DOWN TO 3665'
- 6:45 AT 3635' GUNN SET
- 7:22 AT 3720' GUNN AT PREVIOUS POSITION - SET AND SET DOWN TO 3720' - GUNN SET AND SET DOWN TO 3720'
- 7:58 AT 3700' - PREPARING FOR CLEANING AND PREPARING TO CORRE - ALL START OFF AT 11:00 AM TO 11:00 AM

June 3 - Turn No. 1 = 3 PM

TOTAL run down hole 44" at 3763



Notes on Core #10 ~ 3763-3858

A white — friable laminated  
ls. - numerous smaller forams and much fine  
detrital material. Some corals (no productoids)  
but no larger forams; also red-like bodies of  
algae (?) origin; will use whole mostly as molds  
(on Poros long shell); pebble-like lumps  
app. structure is ls? - thin section; note upper  
(sample from near top sent to CUP  
- Spl. R)

5a

Core #10 - 3763-3858

Sample from near top sent to CUP - Spl. R

5a

Leaves adjusted out of place  
small hole in center

7:10 AM  
Crew pulled - 3 ft recovered  
of 25' drilled - 12% recovery  
15 pieces oriented

Cole sampler  
Coxo #10  
3963-  
3988

6/3/52 8 AM - 1/2" <sup>7005</sup> lead + 5/16" pulley  
Bore into hole with 8/16" rock bit

ONR  
Rejt #6 →

10:23 AM BEGINNING TO DRILL AT 3905' WITH  
REMARKS - DRILLING BEGINS ON R  
CROSS SECTION ON BIT - TENDING TO  
SLOTTED HOLE

10:25  
CREW DRILLING AT 4025 —  
BETWEEN 4015 - 4020 DRILLER  
SAYS HE HAS SOME HARD THIN HARD  
SPOTS (LOW DRILLING RATE)  
REMARKS - ALL DRILLING IS  
A BIT OF A STRUGGLE  
REMARKS - CALCULATION OF  
CROSS SECTION  
4025 - 4040 - APPROXIMATELY 20' OF  
REMARKS - HARD DRILLING

1156

AT 4084 - Denton - one; & Simon at  
Perryville

12335

To 4085, drilling slowly, one medium -

- 12:25 AT 4051' DRILLING 200' - 200' AS PERVIOUS
- 12:35 To 4085', drilling slowly, one medium-hard interval 4075-80 - 11 min. (100' - 2)
- 1:00 PM To 4109'
- 1:30 4137' SAME BUT DRILLING VERY LITTLE PRESSURE ON BIT - NO RESISTANT STRIPS IN THIS 20'
- 2:07 4165'
- 2:36 4197' SAME DRILLING AS PERVIOUS - STOPPED FOR 10 MIN. TO REAM AND TIE RIGS

On last record show down to drill from 4051' - 4085' & 11 min. from 4075' - 4080'. These drilling times might represent "fine" cut. All drilling in this unit (3980' - 4090') show a slightly longer time per foot than in the previous unit of 3 to 6 min. generally. This is a contrast to the low speed time shown in the previous unit.

When another joint was added at 4195', bit plugged & while the bit was working it loose, it was decided to core at this depth instead of waiting until 4300' because as planned.

Total check at 4197' showed  $3\frac{1}{2}^\circ$  inclination.  
 Total check at 4182' showed  $4^\circ$  (100')  
 (2)

DEB-100000 (P-2)

But being used as a ...  
the ...  
11 ...

2. P.M. 12:30 P.M. (P.M.T.)

Bit being worked down at interval  
time (4197) at depth of 100 ft. Bit  
then pulled to surface and barrel & diamond  
bit after pumping a bit of water into  
hole.

- 7:45 Water out at 100
- 7:50 Pipe out
- 7:55 100 ft. hole full of water
- 8:00 Bit at bottom but Kelly down pressure for  
30' and water adding at joint to some  
extent.
- 8:55 100 ft. hole full of water
- 9:15 Core cut from 4197' - 4222'. Approx.  
12' part of core cut at rate of 1 in. / ft.  
22' left at about 1/2 in. / ft.
- 9:20 Lower 200' pipe pulled at end of  
shift.

June 4, Midnight - 8 A.M. Reservoir

12. P.M. Core No. 11 - 4197 - 4222 -

Recovered 11 ft 2 inches or  
74% of 25 ft core.

Core # 11  
4197  
4222  
(see over)  
e. (see over)

Core consists of 37 oriented  
pieces and a small proportion  
of smaller unoriented pieces  
and gravel. Material is a fairly  
well cemented, poorly sorted sand  
with larger grains and smaller grains  
with roll-like shape (?) (Hetero-  
phyllous?), all well preserved  
suitable for bulk. Rare mollusk

Notes on Core No 11 - 4197-4222'

White, - friable, porous, even-grained ls consisting mostly of rod-like bodies measuring 1-2 mm. in length (probably algal - like Plectambonites? and forams (both larger and smaller types; smaller forms more abundant) and fine detritus - all loosely cemented into a "firm" (medium hard) rock. No evidence of solution or extensive recrystallization. Differs strikingly from section above in that corals are almost, if not completely absent. E. lucidum fragments - spines, etc. present but not abundant. Rods and flattened forams are not oriented with long axis horizontal but, instead, lie at all angles - a mass of interlocked fragments



Samples to Cole - 6/4/54

- S - from top piece of core
- T - " 1/2" below top of core
- U - " " " " "
- V - " 1/4" from " " "

... and possibly ...  
...  
...  
... but others are more or less upright, parallel to the ...

Samples to Cole - 5/1/52

S - from top piece of core

T - " 1' below top of core

U - " 4" " " " "

V - " 8" " " " "

... and parallel to each other, ...  
 ... <sup>fragments</sup> ...  
 ... but others are more or less upright, parallel  
 to the main axis of the core. ...  
 ... color is white. Even sandy texture  
 and occurrence of large, — and  
 small forams, shell-like objects,  
 and paucity of corals and shells  
 represent ~~a~~ a unique soil type  
 in this location. Preliminary  
 interpretation is that it may  
 represent an old beach deposit  
 although presence of larger forams  
 does not encourage this hypothesis.  
 A more generalization is that it  
 is or is from (current deposited)  
 a shallow-water environment.

Note on drilling time interpretation

Because much of the section was  
 drilled with no return of cuttings  
 much emphasis has been placed  
 on the rate of drilling for an  
 interpretation of the type of  
 soil, particularly, principally its  
 hardness. Although it has  
 been generally admitted that there  
 are many variable factors which



made this method unsuitable for accurate determination of hardness it has nevertheless been possible to check the results from time to time with core and coring cuttings and has been found to reflect with reasonable consistency the true relative hardness. However, on the basis of drilling time records and rate of penetration of the core barrel at the greater depths (3000' and deeper) it was found, prior to actual recovery of core 11, that because the drill penetrated the rock so far easily (fast and smooth) there was ~~no~~ very soft rock at the interval (4192-4220) and core recovery should be negligible. The core recovered proved this assumption false. Recovery was 44% and the rock is "dirty hard". There has, in fact, been a tendency to underestimate the hardness of the last two cores (9 + 10) before actual recovery. In the case of core 11, at least, there are two possible explanations for this (as a combination of the two) 1) The greater length of the drill pipe and the greater weight would have a

is daily  
increasing  
width

Tendency to disperse the kind  
of weather which were usually  
detected in the upper part of the  
section; usually still shatter  
and breaking part of a restricted  
section of large amounts of  
material in the hole we  
must remember how much lower  
the temperature effect is.

2) Being a sand, even though  
fairly well cemented, this rock  
is probably much easier to  
drill (lower faster drilling rate)  
than rocks of equal hardness  
which had much denser portions  
of coal.

(Perhaps the word 'degree of  
cementation', rather than 'hardness'  
is a more accurate description  
of the characteristic for which  
an interpretation has been  
attempted)

1. 3044 (continued) The hole showed  
no approaching the postulated  
level and 2) Core II is a  
unique rock type (suggesting  
more and further changes in  
lithology) it has been decided  
to drill only a few more  
before resuming core  
level again.

2.15. In presence of young birds  
in hole with drill bits

2.16. In presence of young birds  
in hole with drill bits  
Make connection at 4277.

*[Handwritten signature]*

2.17. In presence of young birds  
in hole with drill bits.

Decide to run one more  
percent before leaving. Report  
of hole in that the hole  
is not too wide and  
very soft. Instead  
of getting hard, it was  
soft. This is because  
of dust coming to the hole  
by the other connection  
in drilling. Investigation  
is required. It is clear  
that large hole is  
not a problem. Report  
of one miss II because  
of this.

2.18. In presence of young birds  
in hole with drill bits. Under reported  
a very gradual landing which  
held up well to the end.

Notes on core #12 - 11316-11341

Top 5" consists of 2 oriented pieces of highly fossiliferous ls. (Sample 11316-11317) Upper 2" is (lots) that may be dolomitic. The rock is massive, fairly hard - but brittle. It seems to be made up almost entirely of seams (large and small) and fine detritus.

Third oriented piece is 5" long and shows a gradation from the porous rock above to hard dense limestone. The dolomite appears to be very finely crystalline and cavities (up to 2" across) are filled with calcite - not full.

Transition to <sup>hard</sup> limestone. There is a lot of 2" detritus. The most common of the brachiopod type fossils is *P. latispina* (see 11316-11317). Some of the *P. latispina* are very small, possibly by *P. latispina* or *P. latispina* or *P. latispina*.

As the limestone detritus two oriented pieces are white, porous and brittle. They may be *P. latispina* or *P. latispina*.

Below 11-2" soft sand with smaller brachiopods + minute calcite etc. - see the section with note. Formed by 3/2, dolomitic, porous fossil ls. that moderately hard but friable and may be dolomitic. Most is white soft + broken (one piece with *P. latispina*). Several cent to inch as sample 2) with hard fragments dolomitic ls with fossils in it. Matrix.

Two 3" pieces in matrix - dolomitic, f, above with *P. latispina* fossils. 124

White, porous and friable but without any fossils, seen only very short off with cut with HCL

Below it 1-2" unit sand with smaller Forams like a minute calcite xls - mostly virtually with acid.

Formed by 3 1/2 inch oriented piece fossil ls. that moderately hard but friable and may be dolomite. Most 3/4 inch soft + broken (one piece with *Pellatispira* - (Eocene) sent to Cole as sample X) with hard fragments dolomitic ls with forams in xl. matrix

east 6" broken but oriented - similar to hard pieces in interval above; with *Pellatispira* identical, xl, less. (12)

*[Faint, illegible handwritten notes]*

June 4 ~ Wed. ~ 8 AM - 4 PM Ridd

- 7:75 AM - have circulated on bottom (4316') since 6:45 AM; pull up to service rig and refill pits.

- 8:00 AM, coming out of hole to core

- 10:10 AM into hole with diamond bbl

- 12:25 PM shut casing - SE - finish

- 12:50 PM. Except 4320-22-22+3

- 2:20 PM on hole

Recover 2' of ls (6") grading into hard thin dolomite (25%) + white white dolomite. Recovery 32%

112  
1131  
(see above)

4406' - 4406'

Starting to run pipe into hole at 4 PM.

6:50 Pipe in hole + started running core bar.

7:05 Hole reamed + drilling started. Reached

8:05 4406' + 8:05. Drilling from 4341' to 4406' included Kelly down after adding.

two joints of pipe. Water then pumped  
into hole & circulated for 2 hours. When  
pipe got near bottom of hole, 120' of  
cuttings had settled.

10:30 (Approx.) Started to pull pipe.

Drilling at interval 4395 - 4406' (along  
stems no very hard zones, but did show  
some variation - from 7 min/ft. to lower  
500 ft.

June 2, 1954 - Midway to 8:30 AM  
11 - 2:30 AM, finished pulling pipe  
from core barrel. Last bit  
on core barrel.

3:05 AM - Due full back  
down 1/2 mile. Almost  
full because of frequent  
blows. 1/2 full at 3:15  
- about 1/2 full at 3:20  
Evening, it rains in all hole.  
3) It rains but good heat.

3:45 AM - Same story. 1/2 L  
- about 1/2 full. This day, it  
has to pull back out of the  
hole before coming to  
normal. Change of pressure core  
barrel? - back by cuttings  
while trying to free bit

3:50 AM - back full - get on bit

Foram - 19a (C) dol. ls.

Note no. (or #13) 4403-4431

White, dolomitic, foraminiferal ls. with many short rod-like bodies that are probably algal, with fine detritus. Larger forams include type with inflated central area and wide wavy border (note marked spec. in 2nd oriented piece from top).

Molds of gast + coral present in small unoriented, denser piece (2nd from bottom).

Bottom piece is 5" oriented section with numerous forams and molds of coral and strongly ribbed paterosponges, mold of gast, etc (note marked mold of ribbed sponges). This part of mass hard and cavernous.

Part of top piece sent to Cal. as sample Y  
(6/5/54)

on bottom, a mold of  
irregular, porous, irregular shape  
sponges. Still 5-6 mm high and  
nearly horizontal in this

(6/8/54)

on bottom, a hole to  
circulate with minute spray  
using 8" of 5/8" nozzle was  
made. "Worked" on hole  
subsequently by electric  
shock during the effort  
for 30 min.

4.25 AM. Core drilled. One 3-foot  
interval and two 1-foot intervals  
drilled at 1 ft per minute. Last  
drilled at 2 ft per minute.  
TOTAL 4406 = 3"

Core #13  
4406-4431  
1215

7.00 AM. Reconnected 1 foot core  
to existing pipe. All necessary  
connections made. Core  
run. The following 1 foot interval  
is now in place - definite

June 5 ~ Thurs - 8 AM - 4 PM ~ Hotel

Working on drilling line and brakes  
10:45 AM - start into hole with rock bit. Drill bit  
200' settings at bottom - due to the nature  
of the hole.

Drilling at 4:31 started.

8:15 AM - 12:30 PM

Drilling at beginning of shift. Drilled  
to 4555 at 4:57. Then mixed part of  
mud (105 bags Zepel 1423 bags Impermax).  
Started to pump mud down at about 7:30.  
3:15 started to pull pipe. Total inserted =



During course of this depth and tests  
a small fracture in the pipe was found  
and was found to be in line by 200 ft.  
Hole checked by driller & found to be  
4500'

Total reading - 3 1/4" inclination at  
4500'

10:00 Pipe out of hole  
11:10 Core bit put in barrel & began to  
run pipe back.

June 6 - Midnight - 3:00 AM

12:40 H.Y. Core barrel on bottom.  
Circulation of mud was  
in day was complete success.  
Core barrel went to bottom  
meeting no resistance from  
accumulated cuttings whatever.

1:15 - Core drilled in 13 1/2 minutes  
as follows

4500 - 4505	at 1/2 min per ft.
* 4505 - 4507	" 1 " "
4507 - 4508	" 1/2 " "
* 4508 - 4513	" 1 " "
4513 - 4516	" 3/4 " "
* 4516 - 4520	" 1 " "
4520 - 4521	" 1/2 " "
* 4521 - 4524	" 1 " "
4524 - 4525	" 1/2 " "

\* out bit for core.

Add. notes on Core #14 - 4525 - 4525'

Larger forams from bottom of top piece sent to Cole as sample AA-6/6/52. These forams are scattered through many parts of the core but more in abundance. Small cysts (in vial) from 16<sup>th</sup> oriented piece from top fragment of Rubin from 17<sup>th</sup> - bottom half.

Sent sample BB from 13 oriented piece from top to Cole 6/6/52 - has large forams and small globular type.

Both Eocene D - BB has few diatoms - Cole 6/19/52

16a

Core #14  
4525

4.25 AM  
Recovered 19 pieces oriented  
Eocene S.F. = 37% accuracy

Core #14  
4500-4525  
(300' depth)

4.25 AM

Recovered 19 pieces of material  
Core, 8 ft = 37% recovery.  
All but ~~the~~ bottom 6 inches  
a fine grained dolomitic  
sandstone. Last six inches  
a soft ~~white~~ green dolomite  
in a ~~crystalline~~ silty matrix.

Dense clumps or plates of  
creamy white dolomite included.  
Five pieces (all less than 1 inch  
diam) of green dolomite with  
many white, (effervescent  
in acid) smaller, fragmentary  
near to core immediately,  
next to ft.

Notes on core

Four distinct lithologic types  
are recognized in 8 ft of core.  
1. 7 1/2 feet is a fine  
grained dolomitic sandstone. Much  
of it is recrystallized. Minuscule  
Lenticular shaly (?) crystals, very  
clear crystalline grains with  
no crystal face apparent. Some  
smaller grains (~~of~~?) recrystallized. <sup>ostrea</sup> Material shell with  
surface ornament of Astarte  
(both small ones from top, approx 5  
inches). [removed to bottle]

Two larger fragments  
vertebrate bone fragment (P) →  
(1st piece lower middle) [longer than (2)]  
The 2nd oriented piece is from  
from bottom in the lowest  
example of the lithology in type.  
In bottom surface of this piece,  
are indications of what is  
described as the 3rd lithological  
type accompanied within one.

of fragments  
15

2) Except for one oriented piece  
of bone recovered from bottom  
of one barrel containing  
the 4th lithological type, the  
rest 5 inches of this core  
consists of several unoriented  
pieces, the largest of which  
is 3 inches round, and about  
1/2 pound of poorly sorted sand  
& gravel which may have  
been originally cemented or held  
in contact of with some "quartz"  
stones (possibly pebbles) of  
hard, dense dolomite or  
is embedded in some of  
the sandstone pieces.

Many small fragments, see large  
fragments. Street stained bright green  
on one piece

3) Mixed with the material described

~~Low level of water in hole~~  
~~down hole~~

under a stone some fine  
pieces of a soft layer of rock.  
The largest was pulled out in the  
sink down, its weight about  
1/2 lb. Many small pieces  
found, mostly fine grained  
a few larger fragments  
matrix of dense greenish to pink  
gray rock. Minute crystals, bluish  
& yellow. 2 minute granules  
of bright green (epidote??)

The fine grained piece recovered  
from bit. Well cemented  
with rubble, multicolored forams.  
Contains small shells.

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2:30 AM - down in hole with  
rod bit to down 45:00 45:35  
interval, to core 45:55 45:50  
immediately thereafter.

JUNE 6 - Fri - 8 AM - 4 PM - Rudek

8:00 AM - starting out of hole, having returned  
to bottom of last core run - 45:25  
10:00 - into hole with 3 core bit  
12:15 - partially plugged in bit - pull up 3  
stands and circulate  
12:45 - start out of hole to free bit.  
2:45 - out of hole

cut in diamond barrel sheared off and  
dropped into hole with spring - a fishing job  
to do - without proper junk bucket -

4/27/53 - 174 -

Diamond barrel in hole barrel. Then  
run in a 6 1/2" Hughes DSC bit & drilled  
2' of hole from 1555' to 1557'. Found  
no evidence of own barrel spring & cut  
at bottom of hole. Pipe pulled from hole  
(runway). All pipe out of hole. Decision  
made to run in core barrel again and  
try to take a core, inasmuch as the junk  
bucket to have left the hole, perhaps  
it is a core by or is embedded in it.  
No water in hole at the hole.

Time 1:00 PM - Runway barrel

Runway barrel - Runway barrel  
core barrel. - On bottom  
circulating at 2:05 AM.  
Core 175 17 - 175

~~175 17 - 175~~

Core 15  
4575  
175.53  
(see 175)

5.30 AM. core drilled 25 ft in  
25 min. Rate ranged from 2 1/2  
min per ft to 1 1/2 min to foot.  
Runway 2 1/2 feet = 10%  
I drilled piece = 3 1/2" and 4 1/2"  
Runway

Additional notes on core 515

4528-4553'

Only ~~one~~ <sup>two</sup> pieces oriented - total length  
in box = 2' 1"

Top piece a 2" rounded fragment of  
detrital ls with numerous forams - both  
large and small in a matrix of detritus  
some pieces of which appear well rounded.  
This piece is porous but not cavernous.  
Note one section (2 forams?) showing gray  
green. Smaller forams reworked but sections  
of larger type appear well preserved in  
this foram. dol. ls. also dark plate

Pieces below are small forams and detrital  
more cavernous, irregularly shaped, forams  
comparatively rare. Traces of dark stain,  
matrix of moll. ls. (with int. +  
ext. - sp. + poly - some can prob. be identified  
(and possibly - P. sp.) (small) (small) (small) (small)  
+ large (small) (small) (small) (small) (small) (small)  
small (small) (small) (small) (small) (small) (small)

Impure forams  
etc.

Many forams here with  
rock bit with indication  
to drill either 1) 300 feet of

During last run hole with 1 1/2 inch bit with tentative instruction to drill within 1) 300 feet if soft all the way, 2) as sorted rock becomes definitely hard.

Note on run

Driller noted, with one run, that it had drilled as though it was fairly hard as expected, but then becoming soft over the surface of getting only soft & Egyptian. The main part of that was the material of the run in fact. The whole is so coarse and sandy that it broke apart during drilling and was washed away.

Drill pipe shown - Top -> bottom

2-13"

Each run showed some material ranging from 1/2" to 1" in size. The run showed as good as I could find and the fragments of the run were in fact the same material as the run added to the run and was the same material as the run.

(See above)



JUNE 7 - Sat - 8 AM - 4 PM - Luck

- going into hole with 8 3/4 inch bit to 4523  
at 25:00 start drilling -

- see time record - with 5000 lbs  
on bit making average 5' or 3 min

12:20 AM to 4630' - hardening up a little  
(2' streak between 4625-30 feet 6 min -  
total 7 min for 5 intervals)

1:10 - distinctly harder (4635-45 min  
15 min. made 4645-4648 - 10 min  
will not up to 9,000 lbs) - decide to  
core - circulate until ~~2:45~~ 1:45 PM

correction  
- D.H. 10 1/2"  
averages 466  
- T.D. = 4619'  
= 66' below  
last core

[ - Had 120' cuttings when rock bit was  
put to 4553 but driller had no difficulty  
getting down + believes we can take  
core without putting mud in hole ]

- 3:15 - shut down to repair brakes.

4-11:30 AM

By shut down to repair.

5:15

Started to pull pipe out of hole.

5:45

Completed pulling pipe. Then we core

down + bit on + started running pipe into

hole. Running pipe at 1000 lbs.

from 2 - 11:30 AM

11:30 AM - bottom - started at 4619'

- at 4619'

6.35. Still working  
 Shut down the engine  
 because of fuel line leak  
 but continued with other engine  
 (engine room interaction).

June 5 - Sunday 8:00 AM - 4:00 PM Lady

- Drilling at rate of 1" or 30 min.
- 8:30 - in air - unable to rotate
- 9:10 blow safety valve on pump
- 9:25 - able to rotate - but only momentarily
- 11:00 ± loosened the shaft - tightened again

06.14 - 20	—	14
21	—	27
22	—	31
23	—	30
24	—	27
25	—	28
26	—	21
27	—	31
28	—	33
29	—	25
30	—	90

DNR  
 Rept. 7

- shot down at noon to refill pits
- 1:10 PM - blow safety valve on pump - 30 min
- pulling with 140,000 lbs. max. pressure
- 3 PM - can raise 5' - Sprague Clapnet
- thick oil pipe stretch (2-3" per 1000)
- blow out - sub (2-3) - (still stuck)

make 5') claimed bottom of pipe not moving. — [Pyke claims 1' per 1000 pipe stretch] — jam sub is not functioning.

May be extremely cavernous interval immediately above impervious basalt (if no zone of tuffaceous mat. is present). All of our water may be going into this zone and not lifting new (± old) cuttings to higher levels.

Ladd's guess =

Core #15 - 4528 - 4553

Top basalt 4610 - or slightly higher

Core #16 - 4619 - 4630 = 11'

4619

4553

66' - lost interval

57' dol ls?

9' basalt?

4 PM 10/20/70

A. G. Townsend

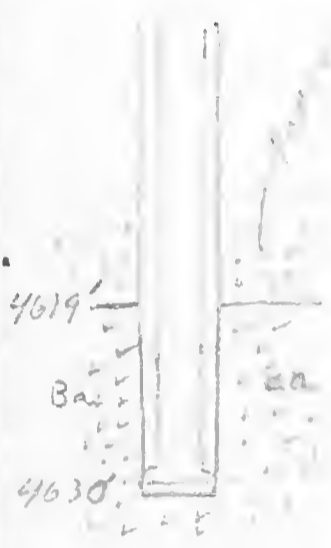
This shift should be called calamity shift. At beginning of shift, still trying to fix stuck bit, core barrels, and/or tool collar by

Starting the pipe coming out of the  
at what? case. Rotation at 1/2 rpm  
in particular; when tried, Kelly would wind up about  
2 turns, motors cough to a stop & Kelly would  
unwind. This was not tried often for fear of  
loosening pipe connections.

6:35 ± Started mixing mud with the somewhat  
separate hope that it might loosen & carry out  
the cuttings from bottom of hole. To this time  
sea water was being pumped successfully into  
the hole - no return of water, naturally, but  
at least it was going down & away from the  
bottom of the hole. At around 8 PM the mud  
was pumped into the hole with little hope or  
enthusiasm except that shown by the drillers  
who again tried to steady & joggling the  
pipe within the rather limited range. Opinions  
were divided on whether or not the jogs were  
helping. But soon after the mud was pumped  
into the hole, men disagreed that although  
the mud had failed to loosen the cuttings,  
it had managed to seal off the last exit  
for drilling fluid of any kind. Water  
could no longer be pumped into the hole!  
Drillers like to have circulation of course,  
and they considered the situation at this  
point unfortunate & definitely undesirable.

The first theory advanced (and perhaps  
the only one) for complete loss of circulation  
was suggested by Dr. Ladd, who proposed that  
the zone directly above the base-drilled  
rock (cement, presumably) was being eroded

110 gal 200 gal  
26 " 200 gal  
20 gal 200 gal



at a distance of 100 ft. The hole had  
 was done & was not till then. Since  
 the hole being sealed at the present time,  
 above which is a mass of gullies which  
 contains the same. This would indicate  
 a process gone above 4619'.

At about the same time as the mud  
 was starting to set, and while the derrick  
 alternately put up to 140,000 lbs. tension  
 on the rig & then dropped the pipe, and at  
 the very moment came back, blowing the  
 derrick to the side, & immediately over laid  
 a derrick which were watching proceedings  
 from a semi-circular position. The new  
 derrick the "sitting" about 10'. This  
 difficulty was caused by the clamps  
 on the derrick, which were working loose. This  
 supports the Russell theory that when 140,000  
 lbs. are being pulled on this rig, the  
 watchers should be at a distance beyond  
 the reach of a falling, 36' derrick.

The last reported incident brought  
 some comment about similar possibilities  
 on a drilling job over water.

All hands participated in repairs of the  
 cables, after which, and with virtually no  
 fanfare, the crew prepared to "shoot the  
 pipe & back away." By the end of the shift,  
 a cable was being wound on a drum at the  
 draw works & shot wire & other dynamic  
 equipment was being unpacked.

All during the day, whip-sticking was a

out but either points are wrong. The last  
 reliability of the sonar is the information  
 that only one core barrel came with the  
 rig and that, alas, lay 4605' (fig. - name)  
 directly down - seem to have its thin, steel  
 thread of contact severed. Unless the core  
 barrel could be recovered <sup>by</sup> washing down and  
 fishing, the saga of F-1 might be ended  
 with victory in our grasp, but without ability  
 to bring it to us.

No P 1 P 2 No  
 No

11829 P.S. With some inconsistency it was dis-  
 covered at the end of the night that the clutch  
 on the semi-dive system was 'frozen' to the motor.  
 Opinions differ on the cause of the malfunction,  
 but not on the effect. No matter - as far as  
 the chronicle is concerned, it's a coals-to-  
 Newcastle deal.

June 9, 1967 No. 2012 - 9 AM Bussell

Entire shift spent in repositioning  
 clutch.

June 9 ~ 8 AM - 4 PM Lead

Rigging shot line in twisting prior to  
 firing, broke at 2500' ±; strins shot placed  
 126' off bottom - failed to loosen,  
 prepare to set second 186' above bottom. (29)

4230  
4475  

---

131

4270  
258  

---

585

4135  
1835  

---

193

4130  
3764  

---

770

4130  
3755  

---

780

4120  
4270  

---

257

APR: 1924

Water 21 ft 2 in. depth  
Pipe 1000. 9 changes found:

- 1) 4479'
- 2) 4479' min. flow

4 P.M. - 7:30 P.M.

Patricia shot 4 spots. By 7:30 the shot  
pipe broke & changed holes:

- 1) 4495'
- 2) 4439' mis-fired
- 3) 4377'
- 4) 4069' mis-fired

None of above were successful.

11:30 P.M. - 5 A.M.

Russell sleeping - hole being  
shot - over & over again. See  
drilling report & summary below.

June 10

8 A.M. - 4:30 P.M.

Still shooting!

4 P.M. - 11:30 P.M.

Still shooting!

9:05 P.M. Shot hole at 3450' successfully.

Summary of shots:

- 1) 4497' - 121' formation - fired
- 2) 4439' - 191' " " - did not fire
- 3) 4379' - 251' " " - fired
- ~~4) 4077' - 531' " " - did not fire~~
- 4) 4070' - 560' " " - fired
- 5) 3760' - 870' " " - did not fire
- 6) 3760' - 870' " " - fired
- 7) 3750' - 880' " " - fired & freed  
pipe.



## Notes on cuttings - (cont)

650-710 - Similar to last but very rich in well preserved corals and mollusks and some smaller forams. Moll. fauna mostly gast. (Strombus, Cerithium, Phys, Vermetus, Turbo (opercula), etc.) suggesting intertidal or shallow lagoon conditions; many shells worn - resembling those concentrated in pockets on reef flats by hermit crabs) - polych. incl. Area, arenid, Cardium, Chama, etc.

small shells  
mostly from  
outer edge of  
wells.

680-690 particularly rich in Strombus - other moll.

buff,  
weakly cemented limestone consisting of well preserved fragments of coral and shells in matrix of fine detritus

690-780 similar to last; large moll less abundant and more fragmentary; some of samples (e.g. 770-780) have well-rounded coral pebbles

800-810 - similar to last

small shells  
mostly from  
wells.

820-840 corals and moll. similar to above, with pieces of gray carb. clay and lignitic material.

820-830 - like last but carb  
frag. rare - prob. only contamination

830-840 - coral and shells; coral  
broken and rounded (upto 1/2");  
many frag. large pelecyp.

San Joaquin  
wells

- shells (richest sample yet)  
and small frag coral; many worn  
brown lenticular forams in smallest  
fraction

840-850 similar to last - with small  
amt. gray carb. clay

850-860 - coral and shells

San Joaquin Wells 860-870

870-880

San Joaquin Wells 880-890

890-900

900-910

910-920

920-930

930-940

940-950

950-960

960-970

No essential change

1040-1050 of white limestone

Fine cuttings, consisting of small fragments  
of coral, Halimeda, thin-shelled pelecyp. and micro-  
gast, Forams like numerous + varied.

1050-1060 - white coralliferous ls - Fauna of coral & shell fragments quite different from last - many brown fragments in fine fraction prob from above [this sample and last look suspiciously young - both are small and were collected just after we regained circulation]

1060-1080 - no cuttings

1080-1090 - white ls - similar to 1050-60

1090-1100 - white coral fragments mixed with sharp fragments cream-colored dense limestone, shell fragments rare, but pieces yellow calcite - still looks much like mat. from near top of hole

1100-1110 - white, tan and cream colored ls. Higher percentage of tan & cream colored fragments than above. Gastroport mollusks, small mollusks. Marginopora, coiled foram with cony axis (Alveolina?) in vial. Rest from Homonotoma? Many brown, small fragments also many sharp edged ones.

1110-1120 - Generally similar to above -

Some red fragments are Turbidaria others Homonotoma, Echinid spines, Micro-mollusks with - Oriskany shells, Calcite xls, Textularia Rav mollusk molds, Calcium other small forams Boston planumbona (D)

1120-1130 - No change

1130-1140 - Similar to last 20 ft  
except that there is a higher  
percentage of angular, dense  
buff cream colored ls fragments.

1140-1160 - Fine fragments of cream  
colored & white ls, similar to  
above - Except sharp angular  
dense ls fragments quite  
rare & fragments with shaly  
appearance in abundance.

1160-1170 - No change

1170-1180 - Fine, cuttings, quartz  
fragments with shaly appearance.  
Practically no sharp edged  
dense fragments. Trams and  
coral fragments most numerous  
of recognizable organic  
remains but ~~not~~ even these  
relatively few. Practically  
none of the more mollusks,  
molds, red fragments as common  
in samples from 1100-1150.

1180-1190 - Similar to above - Rare  
but well preserved Exonotremia

1190-1200 - Mostly shaly, appearing  
fine fragments - Micromolluscs  
reappears. Many small forams.

1200-1210 - Similar to above - seems  
whiter. Calcium in good  
preservation.

1210-1220 - No change - from 1190-1200  
1230-1240 - No change -

1975-1978 - Mostly cream colored  
ls. fragments. Much  
contamination from cement  
for casing.

2020-2070 - Fine ls. Many  
well preserved coral fragments,  
forams, mollusk shells. Few  
dense ls fragments -  
I believe this to be principally  
contamination in the hole.  
note that core is hard  
dense ls with few fossils -  
that from 2020 to 2130 the  
cuttings are all uniformly  
hard & white - & lack fossils.

2020-2130 - Sharp angular cuttings  
white dense crystalline ls.

Little or no recognizable  
organic remains.

Sent Samples CC and DD  
from core # 15 - 4528' - 4553  
to WS Cole for age determination.  
Both samples are unoriented pieces,  
about 1 1/2" diam, ~~to~~ from immediately  
above the bottom most piece of  
oriented core.

Copper nitrate staining  
method for distinguishing  
dolomite from calcite

---

Copper nitrate is the salt of a strong acid and a weak base; consequently its aqueous solutions show pH values considerably less than 7. That is, the salt is a weak acid, and so etches calcite much more rapidly (and) than dolomite. Copper is adsorbed on the etched surface of the calcite, but not on the dolomite. This gives the calcite a light blue-green color, whereas the dolomite remains (practically) uncolored.

Treatment of the sample with a strong solution of ammonium hydroxide heightens the contrast very greatly; the calcite becomes a deep uniform blue, while the dolomite is still lightly colored, or not at all.

For best results the specimen should be compact and well polished. For such a specimen the following procedure gives the best results:

3  
100  
100  
100  
100  
100

Solutions used.

(1) Molar solution of  
copper nitrate. Prepared by  
adding 199 g. Cu(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O



### Solutions used:

(1) Molar solution of copper nitrate. Prepared by adding 188 g.  $Cu(NO_3)_2 \cdot 3H_2O$  or 255 g.  $Cu(NO_3)_2 \cdot 3H_2O$  or 332 g.  $Cu(NO_3)_2 \cdot 6H_2O$  to 1000 g. of water.

(2) Strong solution of  $H_2SO_4$  (ca. 12 normal).

### Technique of test.

The specimen is immersed in the nitrate solution in such a way that the polished surface is not against the bottom of the vessel. This can be done in a petrie dish, or similar container, with one corner, or edge, of the specimen resting on a small glass plate, rock chip or wooden wedge. If the specimen is thin enough to permit it, it is best to cover the dish to prevent evaporation. Care should be taken that no air bubbles adhere to the surface.

Immersion should be for  
time to six hours at room  
temperature with a well  
polished surface not too  
high in calcite. The poorer  
the polish and the less  
dense the material the  
more rapidly will the  
dolomite grains etch and  
adsorb the copper, and the  
less seen the distinction  
between them and calcite  
grains becomes. For such  
surfaces and materials, and  
for specimens high in  
calcite, an etching time  
considerably less than  
five hours may be re-  
quired. - It is difficult to  
give rules for the times  
required for such material,  
for a given specimen the  
time must be based on  
1) appearance of the surface  
after shorter etching time  
2) the way the material looks  
of the (polished) surface takes  
up the  $\text{Cu}(\text{NO}_3)_2$  solution  
3) previous experience with  
similar material, etc.  
If the specimen is such  
that a time much less

than two hours is required to impart sufficient staining to the calcite, then it may not be possible to make a positive distinction between calcite and dolomite on that material.

When the specimen is removed from the nitrate solution it is immersed without washing and before drying in the  $\text{NH}_4\text{OH}$ . A few seconds is enough; more will do no harm. The specimen is then washed and rubbed to remove the excess precipitate, before drying. It is important not to rub a specimen, or wash it violently before it is immersed in the  $\text{NH}_4\text{OH}$ , because the light green stain acquired in the  $\text{Cu}(\text{NO}_3)_2$  solution will come off easily.

For further details of this test, and other staining tests, see

Rodgers, John: Distinction between Calcite and Dolomite on Polished Surfaces, Am. Jour. Sci., vol. 238, pp. 788-798, 1940. (See p. 39 for results)

## Results:

Three core samples from site Flora were tested in the field, with the results recorded below, no facilities were available for giving a real polish to the specimens, but a satisfactory semi-polish was imparted as follows:

a) A plane surface was obtained by using a machined steel plate and a file. The specimen was rubbed on the plate and the high spots became colored black; these spots were then filed down until the black color was removed. The process was continued until the surface became uniformly shiny on rubbing on the plate.

b) This coating was filed off, gently and evenly and then the surface was smoothed further by rubbing it moderately with fine sandpaper.

prepared by a wooden  
block. As the sand grains  
come off the paper the  
surface of rubbing becomes  
creased and by rubbing  
for several minutes on  
the almost smooth  
sandpaper enough of a  
polish could be given to  
compact specimens so  
that a definite sheen  
was visible by reflected  
light. No polish at all could  
be obtained on granular  
soft surface by this method.

W. Joseph H. Lewis, Case No.



