001

COMPANY: ARCO ET AL

CORE HOLE: SORGHUM GULCH #17

LOCATION: 438' FWL & 181' FSL SECT. 16-35-96W

CORE SIZE: 3½"

ELEVATION: 7036'

GEOLOGIC AND ROCK STRUCTURE LOG

MARKER BEDS	DEPTH		DATUM
Top of Parachute Creek	809	E. LOGS	+6227
Base of "A" Groove	1224	E. LOGS	+5812
Top of "B" Groove	1399	E. LOGS	+5637
Top of Garden Gulch	2388	E. LOGS	+4648

NATURE OF JOINTS, FRACTURES AND PARTINGS

1. Drilling Fracture – Fresh breaks that rejoin with only a hair-line separation.
2. Rotated Fracture – Irregular surfaces that show signs of grinding in core barrel.
3. Uncertain Origin – Smooth surfaces that cannot be rejoined but are unweathered.
4. Natural Fracture – Surfaces may be clean and weathered and may show alteration, slickensides or infilling.
5. An intact joint or parting that has been rehealed

ROCK HARDNESS CLASSIFICATION

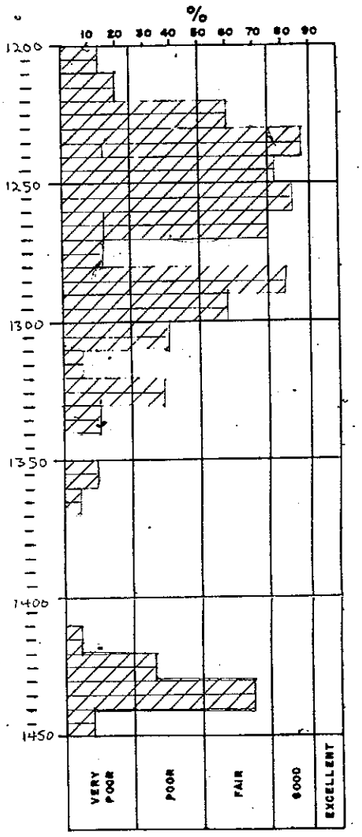
CATEGORY	DESCRIPTION
S1	Penknife penetrates core easily to hilt. Core crumbles on handling.
S2	Penknife penetrates 1/4" easily and to the hilt with difficulty. Usually breaks core at full penetration. Core can be easily broken by hand.
S3	Penknife penetrates to 1/4" with difficulty. Can be easily scratched to 1/8".
S4	Can be scratched to 1/16" and 1/8" with difficulty. Sample can be easily peeled.
R1	Material crumbles under firm blows with sharp end of a geological pick and and can be peeled off with a knife; it is too hard to cut a triaxial sample by hand.
R2	Can be scraped and peeled with a knife; indentations 1/16" to 1/8" deep can be made to show in the specimen with firm blows of the pick point.
R3	Cannot be scraped or peeled with a knife; hand-held specimen can be broken with the hammer end of a geologist pick with a single firm blow.
R4	Hand held specimen breaks with hammer end of pick under more than one blow.
R5	Specimen requires many blows with geologist pick to break through intact material

INFILLINGS

Quartz	Q
Talc	T
Marcasite	M
Carbonaceous Material	B
Slickensides	S
Clean	C
Leached / Weathered	L
Calcite	W
Clay	A
Iron Oxides	F

ρ	Density
UCS	Uniaxial Compressive Strength
TCS	Triaxial Compressive Strength
C	Cohesion
φ	Friction Angle
B	Brazilian Strength
M	Modulus

RQD
10' LENGTH
%



DEPTH	CORE: INTERVAL	CORE: RECOVERY	JOINTS: NATURE INFILLING	JOINTS: INCLINATION	PARTINGS: NATURE INFILLING	PARTINGS: DEPTH	ROCK QUALITY DESIGNATION: PIECE LENGTH	ROCK QUALITY DESIGNATION: VERY POOR 25 / POOR 50 / FAIR 75 / GOOD 90 / EXCELLENT	FRACTURE FREQUENCY: NUMBER (PER 10 FT) 10 20 30	HARDNESS	STRENGTH TEST RESULTS	LITHOLOGY	DESCRIPTION	MODIFIED FISCHER ASSAY GAL / TON 25 50 75
0													Tan, Med-F.Gr., S&P, w/15% Tan silty mudstone	
													, w/10%	
													Gray & Tan, V.F.Gr., S&P, Some Carb. Material	
													Lt. Brn, V.F.Gr., Tr. FeOxide Staining, Tr. Carb. Material	
													, Med-C., Gr.	
50													Gray & Tan, F.-C.Gr., S&P, Tr. Pyr.	
													Gray & Lt. Brn, F.-Med.Gr., S&P,	
													, ——,	
													, ——, , Some Carb. Material	
100													, ——, F.Gr., S&P, Tr. Pyr.,	
													Gray, Lt. Brn, V.F.Gr.-F.Gr., S&P,	
													Gray, F.-Med.Gr., S&P., Tr. Pyr.,	
													, V.F.Gr., ,	
150													, V.F.-F.Gr., , ——, Some Carb. Material	
													, C.Gr., S&P., Pyr.	
200													, Med-C.Gr., , Some Carb. Material, S&P	
													, F.-C.Gr., Tr. Pyr.,	
													,	
													, F.-Med Gr., ——,	
													, Tr. Pyr.,	
250													& Lt. Br., F.Gr., ,	
300													, F.C.Gr., ,	
													, F.-Med. Gr., ,	
													, ——,	
350													Gray, V.F.-Med.Gr., S&P,	
													, Some Carb. Material	
													, V.F.-C.Gr., , Tr. Pyr.	

002

300 , F.C.Gr., , F.-Med.Gr., ,

350 Gray, V.F.-Med.Gr., SEP, , Some Carb. Material , V.F.-C.Gr., , Tr. Pyr.

1. 400 Lt. Brn, , Tr. Pyr

450 Lt.Brn., V.F.Gr., w/more C.Gr., Some Carb Material , V.F.Gr.-C.Gr., SEP, Tr. Pyr. Lt Brn. & Gray, F.-Med Gr., SEP, , V.F.-Med Gr., , V.F.-Med Gr., ,

500 Gray, Med.Gr., SEP, Abund. Biotite , Gray & Lt. Brn., F.-Med.Gr, SEP, Abund: Biotite , ,

550 Gray, F. Med Gr. w/80% Lt. Brn Silty Marlstone, Tr. Pyr. Lt. Brn., F.Gr., Some Carb. Material, Pyr.

600 , Abund. Pyr. , w/10% Brn & Lt. Brn Oil Sh., Pyr. Gray & Tan, F.-Med Gr, w/30% Brn & Lt. Silty Oil Sh., Pyr. , w/40% , w/60% , w/20% , F.Gr., w/10% , F.-Med.Gr, w/10% , , Tr. Pyr.

650

700 Lt. Brn. & Tan, V.F.Gr.-F.Gr., Tr. Pyr.

750 , V.F.Gr., , F.Gr., , Carb Material , F.Gr.

800

2. CHANGE IN SCALE: 1 INCH EQUALS 5 FEET; CORE POINT @ 800 FEET

800

805 * DEPTH CORRECTION: 800' EQUALS 808'

2. #1. 810 Oil Sh., Br & Tan, streaked & reduction lly lam. some irreg. bdg., 1" thick brn anol sh., dip 0-mod lean; rubble zone - 1 4C 4L; Set, Brn. w/some irreg bdg containing Oil Sh. lamin. F.Gr., lean; rubble zone - 1, 4L, 2, 4C; rubble zone 1, 4C, 4L vertical fractu; rubble zone gravel to soil size; LOST 814.3 - 817.0'

815 #2. Oil Sh., Tan & Lt. Br, streaked, some irreg bdg, 0-40 dip, lean; Set. & Ash, Brn & Lt. Brn, some disrupted bd

820 Oil Sh., Lt. Tan, Tan, V.Lt. Brn, lamin. & streaked; rubble zone, 4C, 4L, 4T, 1; 0-3° dip, lean

3 Oil Sh., V. Drk. Brn & Drk Olive Brn, streaked, indistinctly lamin., horz. bdg., rich

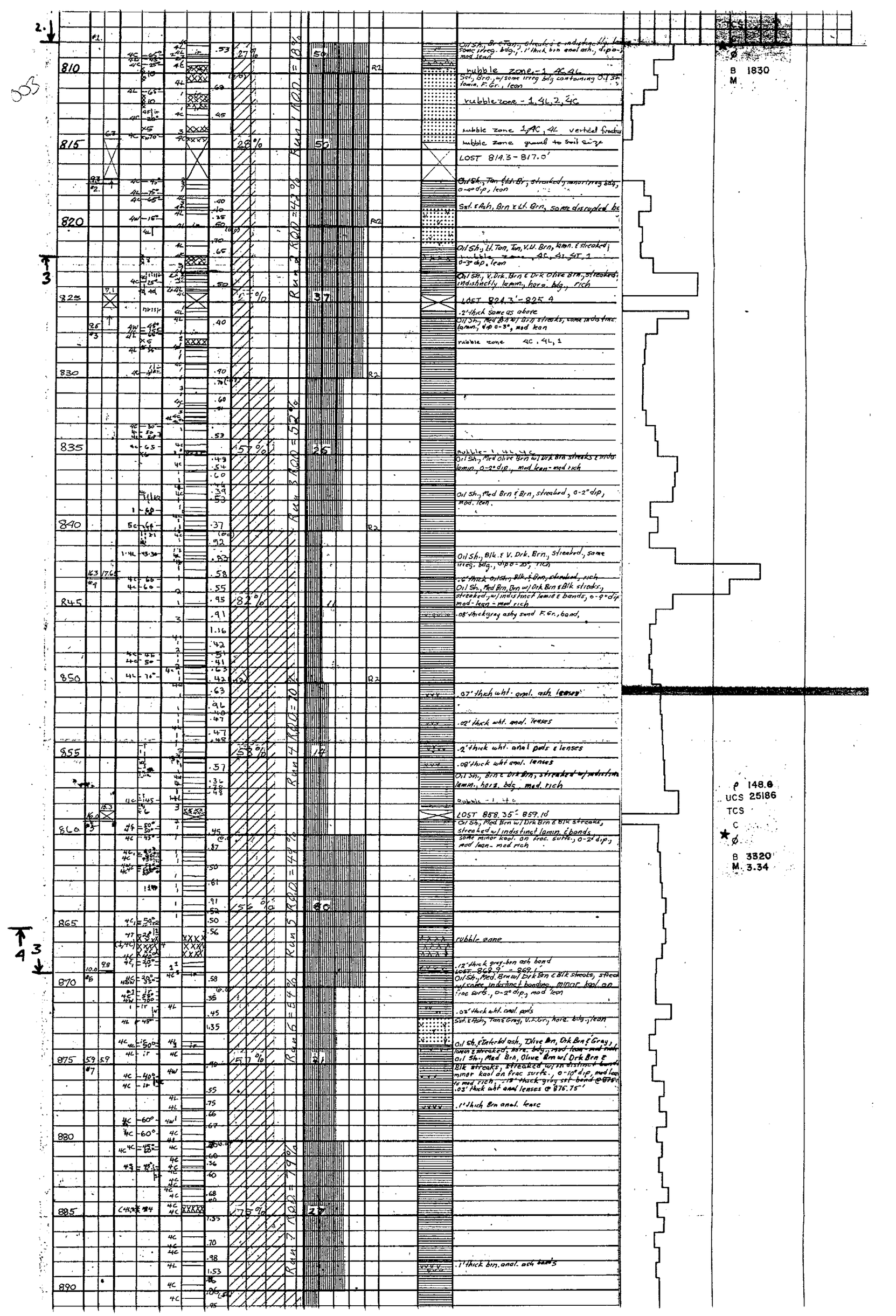
825 LOST 824.3' - 825.4; 2' thick same as above; Oil Sh., Med Brn w/ Brn streaks, some indistinc

Run 1 NQ = 18% 50

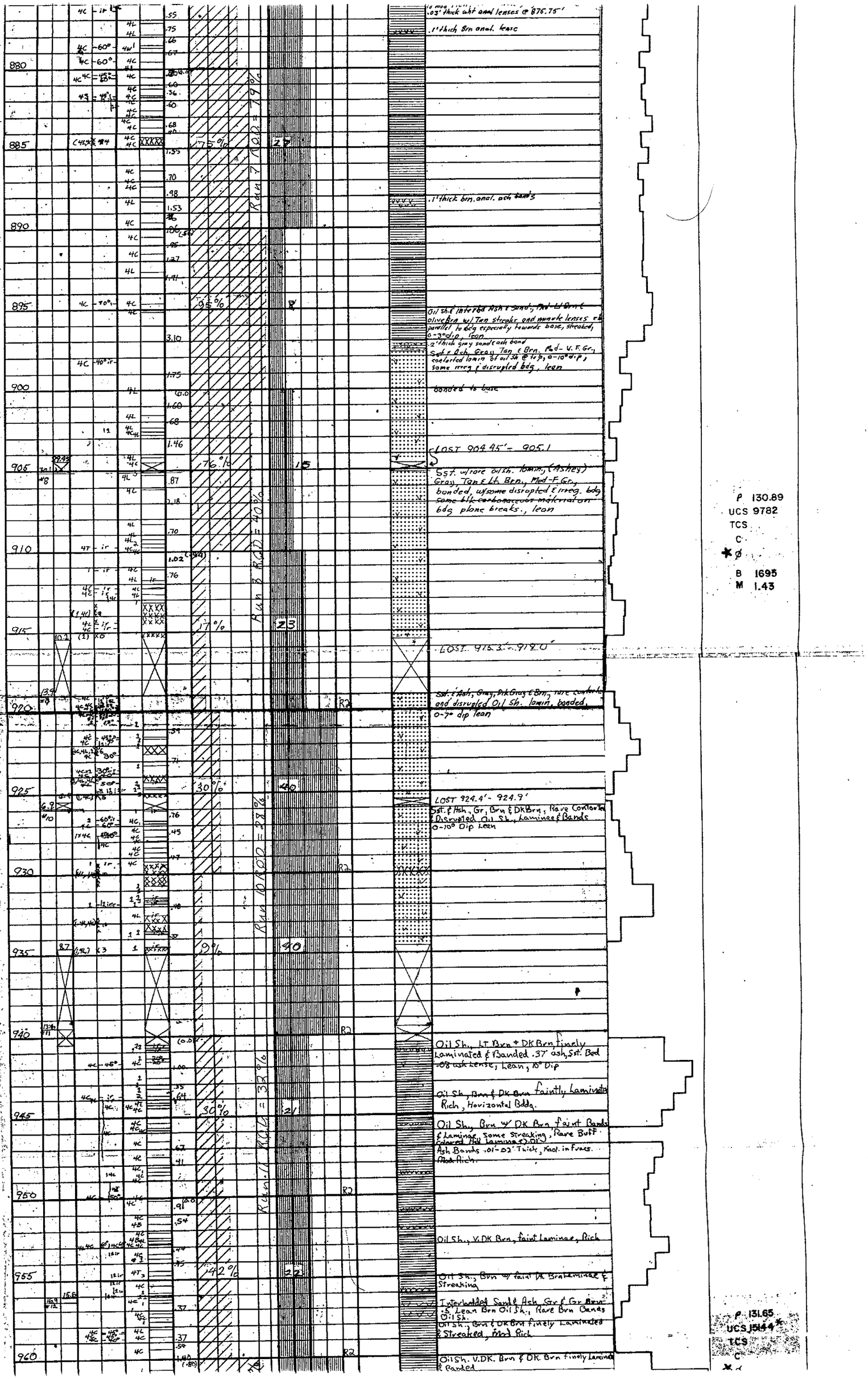
Run 2 NQ = 42% 50

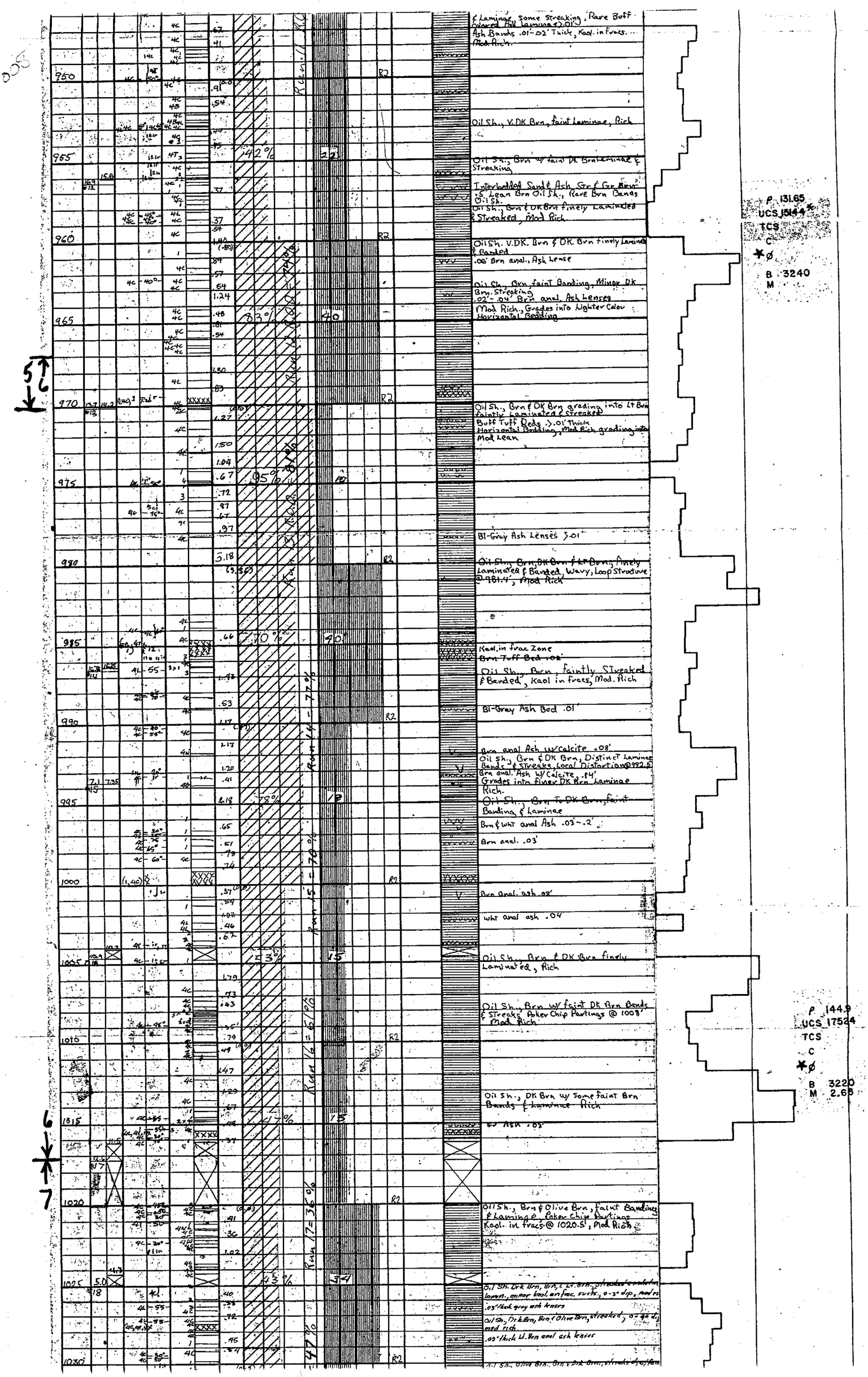
Run 3 NQ = 0% 37

B 1830
M

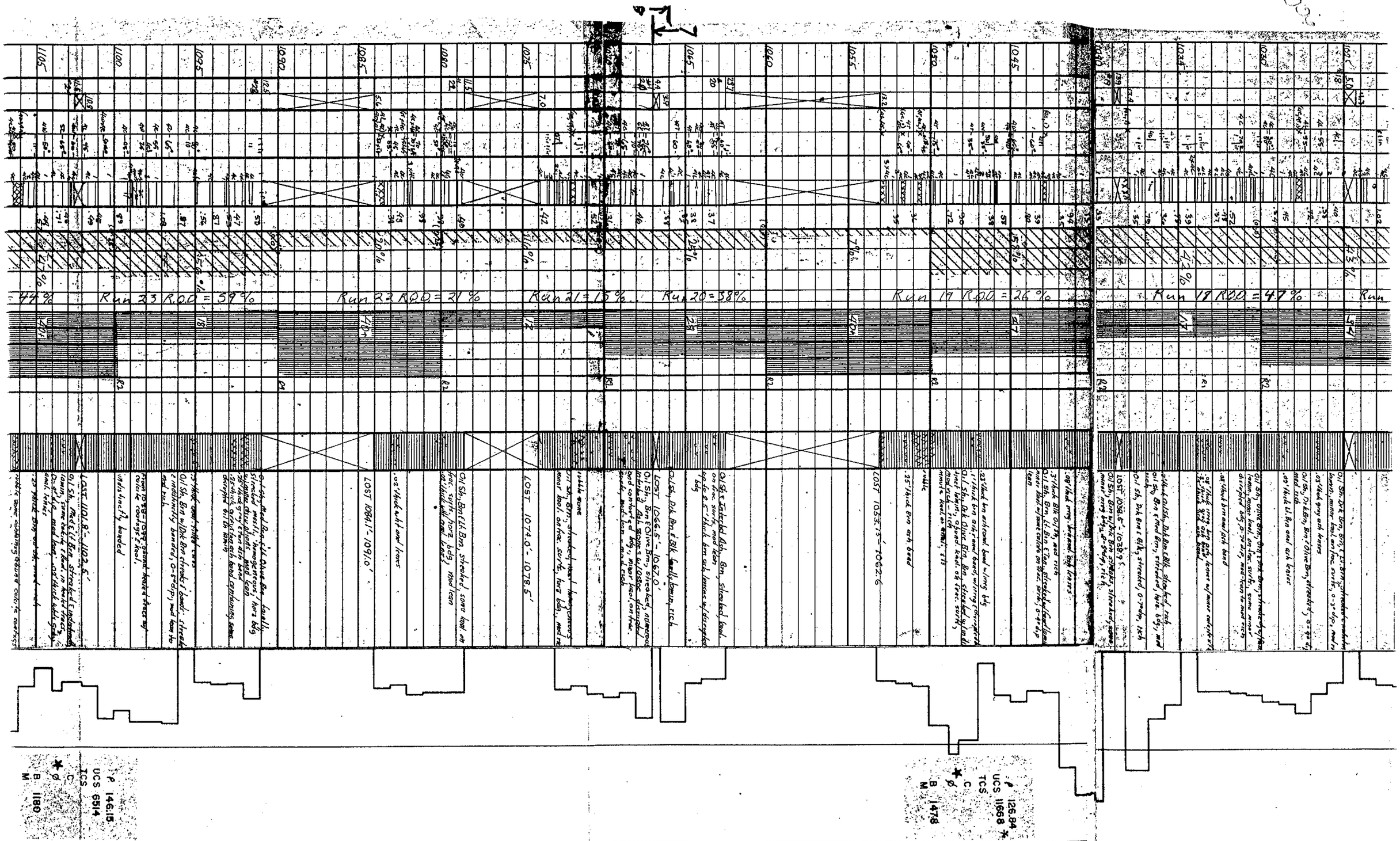


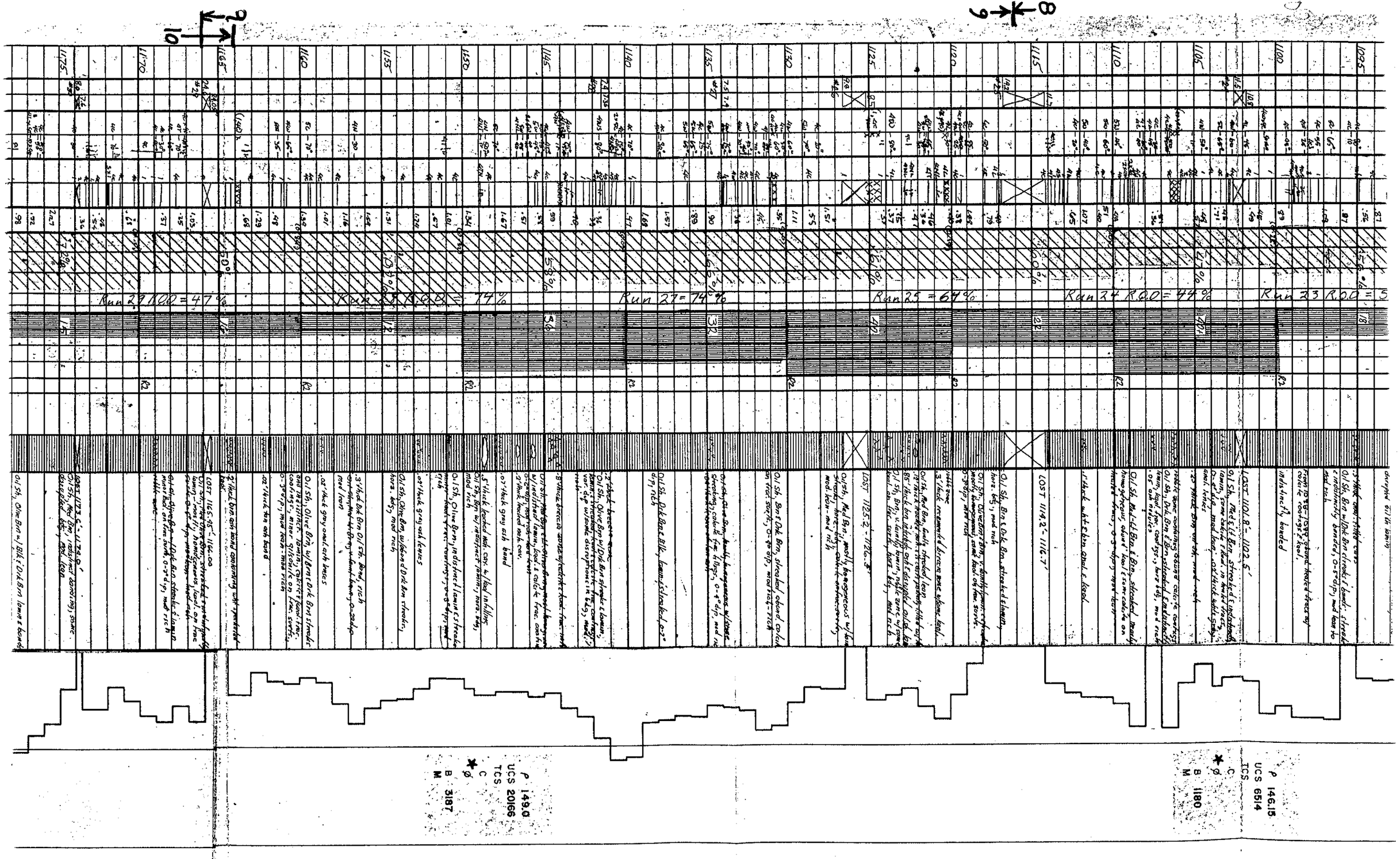
2.
3
4
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
Run 1 RQD = 18%
Run 2 RQD = 42%
Run 3 RQD = 52%
Run 4 RQD = 70%
Run 5 RQD = 48%
Run 6 = 54%
Run 7 RQD = 79%
27%
28%
57%
82%
58%
56%
57%
75%
50
50
37
25
11
14
80
21
27
R2
Oil Sh., Br & Tan, streaked & indistinctly lam., some irreg. bdg., .1' thick brn anal ash., dip 0-, mod lean
rubble zone - 1, 4C, 4L
Sst., Brn., w/some irreg bdg containing Oil Sh lamin. F. Gr., lean
rubble zone - 1, 4L, 2, 4C
rubble zone 1, 4C, 4L vertical fractu
rubble zone gravel to soil size
LOST 814.3 - 817.0'
Oil Sh., Tan & Lt. Br, streaked, minor irreg bdg, 0-4° dip, lean
Sst. & Ash, Brn & Lt. Brn, some disrupted bd
Oil Sh., Lt. Tan, Tan, V.Lt. Brn, lamin. & streaked; rubble zone, 4C, 4L, 4T, 1 0-3° dip, lean
Oil Sh., V. Drk. Brn & Drk Olive Brn, streaked, indistinctly lamin., horz. bdg., rich
LOST 824.3' - 825.4
.2' thick same as above
Oil Sh., Med Brn w/ Brn streaks, some indistinc lamin., dip 0-3°, mod lean
rubble zone 4C, 4L, 1
rubble - 1, 4L, 4C
Oil Sh., Med Olive Brn w/ Drk Brn streaks & indis. lamin., 0-2° dip., mod lean - mod rich
Oil Sh., Med Brn & Brn, streaked, 0-2° dip, mod. lean.
Oil Sh., Blk. & V. Drk. Brn., streaked, some irreg. bdg., dip 0-20°, rich
.6' thick Oil Sh., Blk. & Brn, streaked, rich
Oil Sh., Med Brn, Brn w/ Drk Brn & Blk streaks, streaked, w/ indistinct lamin & bands, 0-9° dip mod - lean - mod rich
.08' thick gray ashy sand F. Gr., band,
.07' thick wht. anal. ash lenses
.02' thick wht. anal. lenses
.2' thick wht. anal pods & lenses
.08' thick wht anal. lenses
Oil Sh., Brn & Drk Brn, streaked w/ indistinc lamin., horz. bdg., mod. rich
rubble - 1, 4C
LOST 858.35' - 859.10'
Oil Sh., Med Brn w/ Drk Brn & Blk streaks, streaked w/ indistinct lamin. & bands, some minor kaol. on frac. surfs., 0-2° dip., mod lean - mod rich
rubble zone
.12' thick gray-brn ash band
LOST 868.9' - 869.1'
Oil Sh., Med. Brn w/ Drk Brn & Blk streaks, streaked w/ some indistinct banding, minor kaol. on frac surfs., 0-2° dip., mod lean
.03' thick wht. anal. pods
Sst. & Ash, Tan & Gray, V.F. Gr., horz. bdg., lean
Oil Sh. & Interbd ash, Olive Brn, Drk Brn & Gray, lamin & streaked, horz. bdg., mod lean - mod rich
Oil Sh., Med Brn, Olive Brn w/ Drk Brn & Blk streaks, streaked w/ indistinct bands minor kaol on frac surfs., 0-10° dip, mod lean to mod rich. .13' thick gray sst band @ 875.
.03' thick wht anal lenses @ 876.75'
.1' thick Brn anal. lense
.1' thick brn. anal. ash bands
B 1830
M
ρ 148.6
UCS 25186
TCS
C
B 3320
M. 3.34

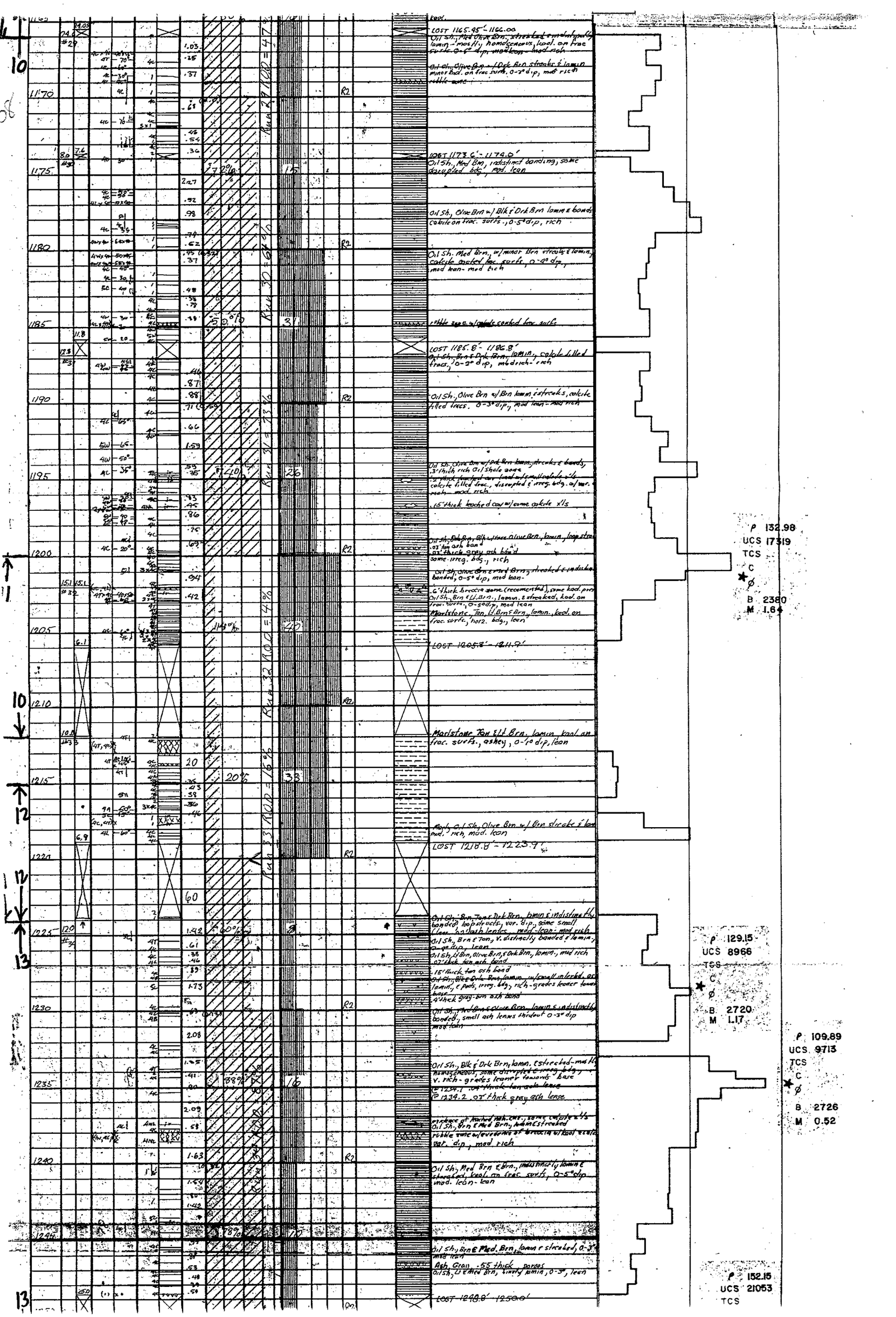

.03' thick wht anal lenses @ 876.75'
.1' thick Brn anal. lense
.1' thick brn. anal. ash band's
Oil Sh. & interbed Ash & Sandy, Med Lt Brn & olive Brn w/ Tan streaks and smooth lenses & parallel to bdg especially towards base, streaked, 0-3° dip, lean
2' thick gray sand ash band
Sst & Ash, Gray Tan & Brn. Med-V.F.Gr., contorted lamin of oil Sh @ top, 0-10° dip, some irreg & disrupted bdg, lean
bonded to base
LOST 904.45'-905.1
Sst. w/rare oil sh. lamin, (Ashey) Gray Tan & Lt. Brn., Med-F.Gr., bonded, w/some disrupted & irreg. bdg some blk carbonaceous material on bdg plane breaks., lean
LOST 915.3'-919.0'
Sst. & Ash, Gray, Dk Gray & Brn, rare contorted and disrupted Oil Sh. lamin, bonded, 0-7° dip lean
LOST 924.4'-924.9'
Sst. & Ash, Gr, Brn & DK Brn, Rare Contorted & Disrupted Oil Sh., Laminae & Bands 0-10° Dip Lean
Oil Sh., LT Brn + DK Brn finely Laminated & Banded .37' ash, Sst. Bed .08 ash lense, Lean, 10° Dip
Oil Sh, Brn & DK Brn faintly Laminated Rich, Horizontal Bdg.
Oil Sh., Brn & DK Brn faint Bands & Laminae, some Streaking, Rare Buff Colored Ash laminae, .01' Ash Bands .01-.02' Thick, Kaol. in Fracs. Mod Rich.
Oil Sh., V.DK Brn, faint Laminae, Rich
Oil Sh., Brn w/ faint Dk Brn laminae & Streaking
Interbedded Sand & Ash, Gr & Gr Brn .5 Lean Brn Oil Sh., Rare Brn Bands Oil Sh.
Oil Sh., Brn & DK Brn finely Laminated & Streaked, Mod Rich
Oil Sh. V.DK. Brn & DK Brn finely Laminated & Banded
Run 7 RQD = 79%
Run 8 RQD = 40%
Run 10 RQD = 28%
Run 11 RQD = 32%
P 130.89
UCS 9782
TCS
C
B 1695
M 1.43
P 131.65
UCS 15144
TCS
C



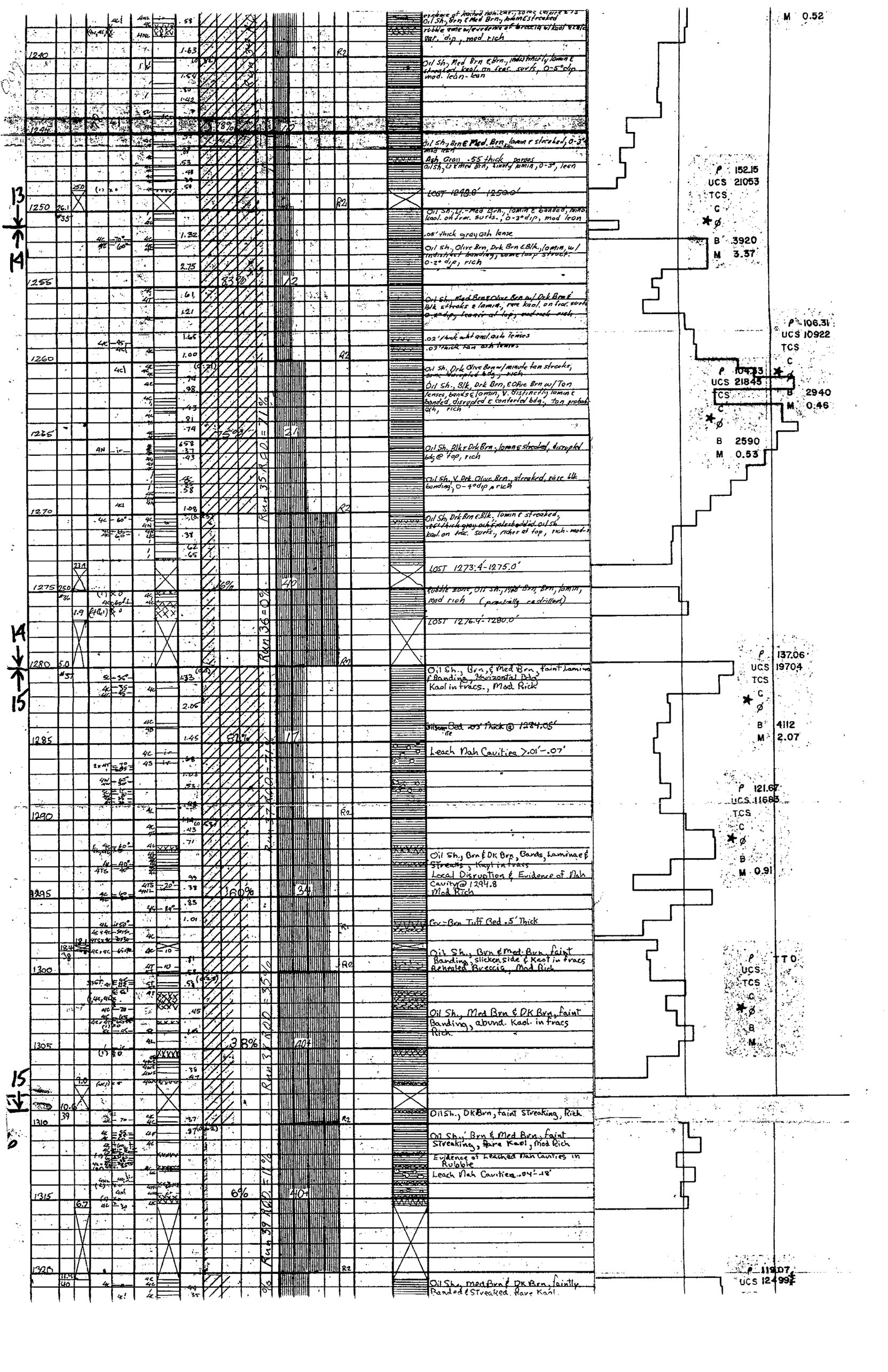
Run 11 R.Q.
Run 12 R.Q. = 74%
Run 13 R.Q. = 81%
Run 14 = 77%
Run 15 = 70%
Run 16 = 61%
Run 17 = 36%
Run 18 = 47%
950
955
960
965
970
975
980
985
990
995
1000
1005
1010
1015
1020
1025
1030
42%
83%
95%
70%
78%
53%
47%
43%
22
40
40
18
15
15
34
R2
5
6
7
Laminae, Some Streaking, Rare Buff Colored Ash Laminae >.01'
Ash Bands .01'-.02' Thick, Kaol. in fracs. Mod. Rich.
Oil Sh., V.DK Brn, faint Laminae, Rich
Oil Sh., Brn w/ faint DK Brn Laminae & Streaking
Interbedded Sand & Ash Gr & Gr Brn .5 Lean Brn Oil Sh., Rare Brn Bands Oil Sh.
Oil Sh., Brn & DK Brn finely Laminated & Streaked, Mod Rich
Oil Sh. V.DK. Brn & DK. Brn finely Laminated & Banded
.06' Brn anal., Ash Lense
Oil Sh., Brn, faint Banding, Minor DK Brn. Streaking
.02'-.04' Brn anal. Ash Lenses
Mod Rich., Grades into Lighter Color Horizontal Bedding
Oil Sh., Brn & DK Brn grading into Lt Brn faintly Laminated & Streaked
Buff Tuff Beds >.01' Thick
Horizontal Bedding, Mod Rich grading into Mod Lean
Bl-Gray Ash Lenses >.01'
Oil Sh., Brn, DK Brn & Lt Brn, finely Laminated & Banded, Wavy, Loop Structure @ 981.4', Mod Rich
Kaol. in frac Zone
Brn Tuff Bed .02'
Oil Sh., Brn, faintly Streaked & Banded, Kaol in fracs, Mod. Rich
Bl-Gray Ash Bed .01'
Brn anal Ash w/ Calcite .08'
Oil Sh., Brn & DK Brn, Distinct Laminae Bands & Streaks, Local Distortion @ 992.5'
Brn anal. Ash w/ Calcite .14'
Grades into finer DK Brn Laminae Rich.
Oil Sh., Brn To DK Brn, faint Banding & Laminae
Brn & wht anal Ash .03'-.2'
Brn anal. .03'
Brn anal. ash .08'
wht anal ash .04
Oil Sh., Brn & DK Brn finely Laminated, Rich
Oil Sh., Brn w/ faint DK Brn Bands & Streaks, Poker Chip Partings @ 1008' Mod Rich
Oil Sh., DK Brn w/ Some faint Brn Bands & Laminae Rich
Gr Ash .03'
Oil Sh., Brn & Olive Brn, faint Banding & Laminae, Poker Chip Partings
Kaol. in fracs @ 1020.5', Mod Rich
Oil Sh. Drk Brn, Brn, & Lt. Brn, streaked & mottled lamin., minor kaol. in frac. surfs., 0-3° dip, mod rich
.03' thick gray ash lenses
Oil Sh., Drk Brn, Brn & Olive Brn, streaked, 0-40 dip, mod rich
.02' thick Lt. Brn anal ash lenses
Oil Sh., Olive Brn., Brn & Drk Brn., streaked, 0-10 dip
P 131.65
UCS 15144
TCS
C
B 3240
M
P 144.9
UCS 17524
TCS
C
B 3220
M 2.68

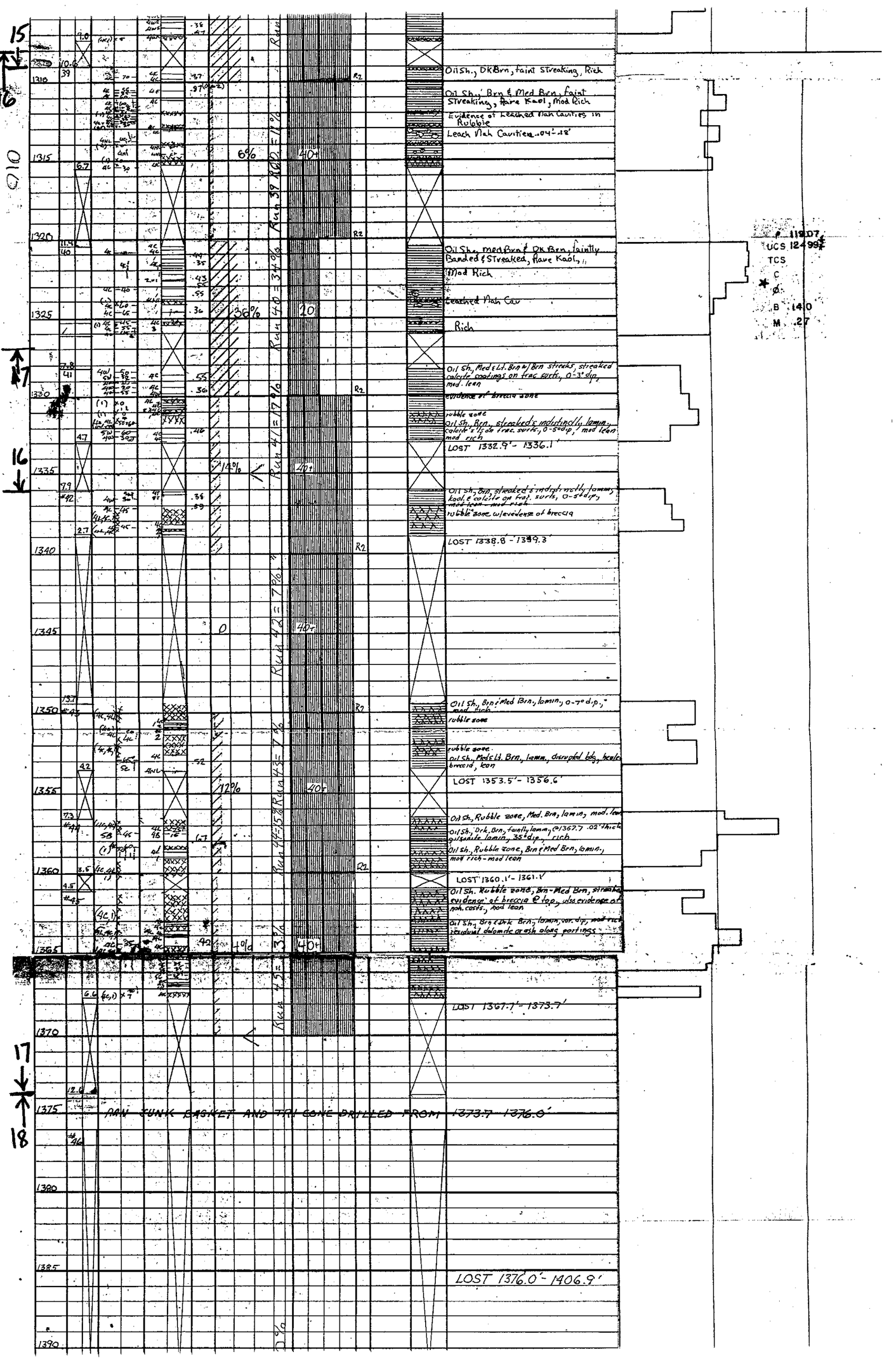

Run 23 RQD = 59%
Run 22 RQD = 21%
Run 21 = 15%
Run 20 = 38%
Run 19 RQD = 26%
Run 18 RQD = 47%
LOST 1053.15' - 1062.6'
LOST 1074.0' - 1078.5'
LOST 1084.1' - 1091.0'
LOST 1101.8' - 1102.5'
P 126.84
UCS 11668
TCS
C
B 1478
M
P 146.15
UCS 6514
TCS
C
B 1180
M

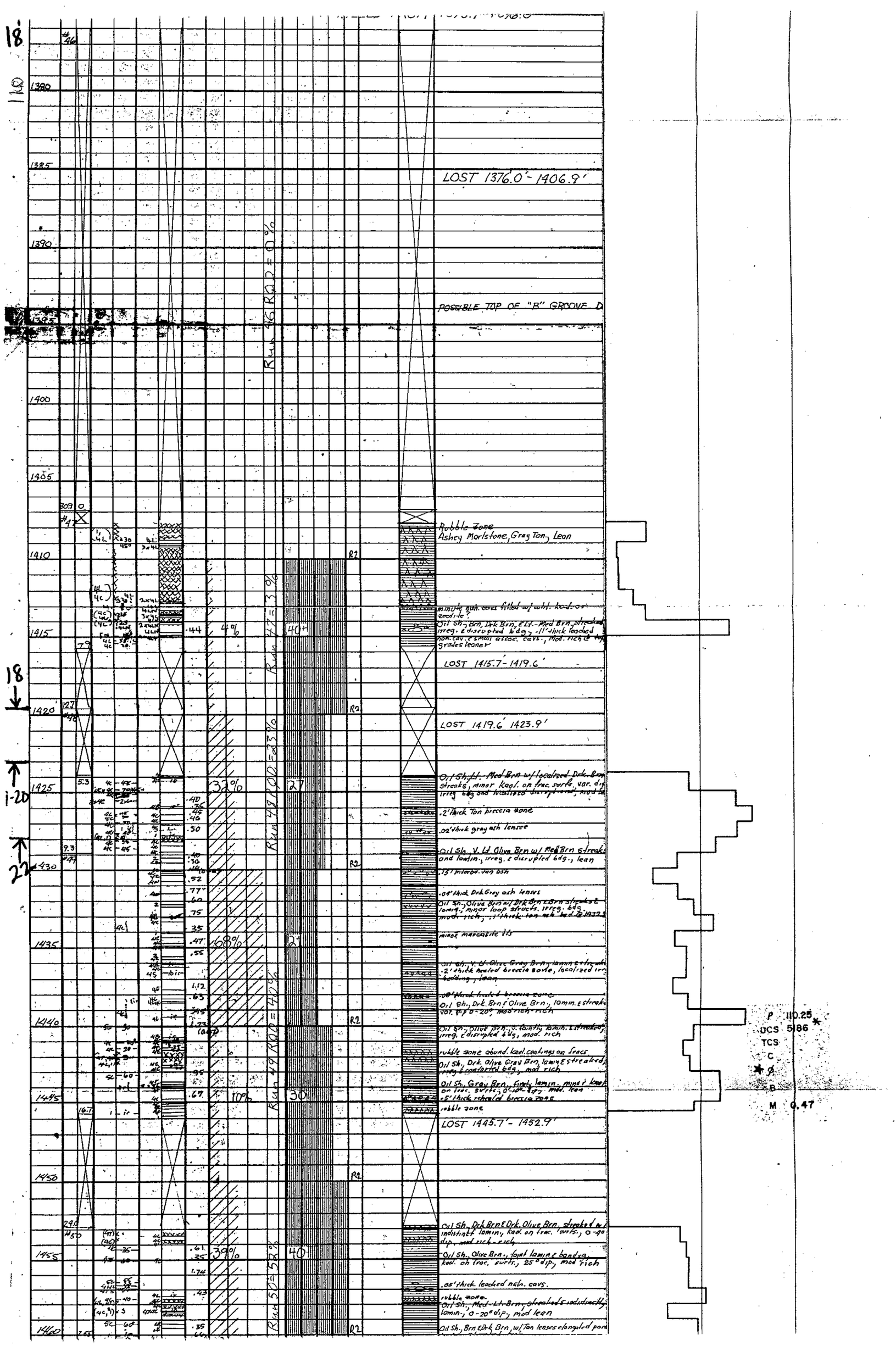

Run 23 RQD = 5
Run 24 RQD = 44%
Run 25 = 67%
Run 27 = 74%
Run 28 RQD = 74%
Run 29 RQD = 47%
P 146.15
UCS 6514
TCS
C
B 1180
M
P 149.0
UCS 20166
TCS
C
B 3187
M



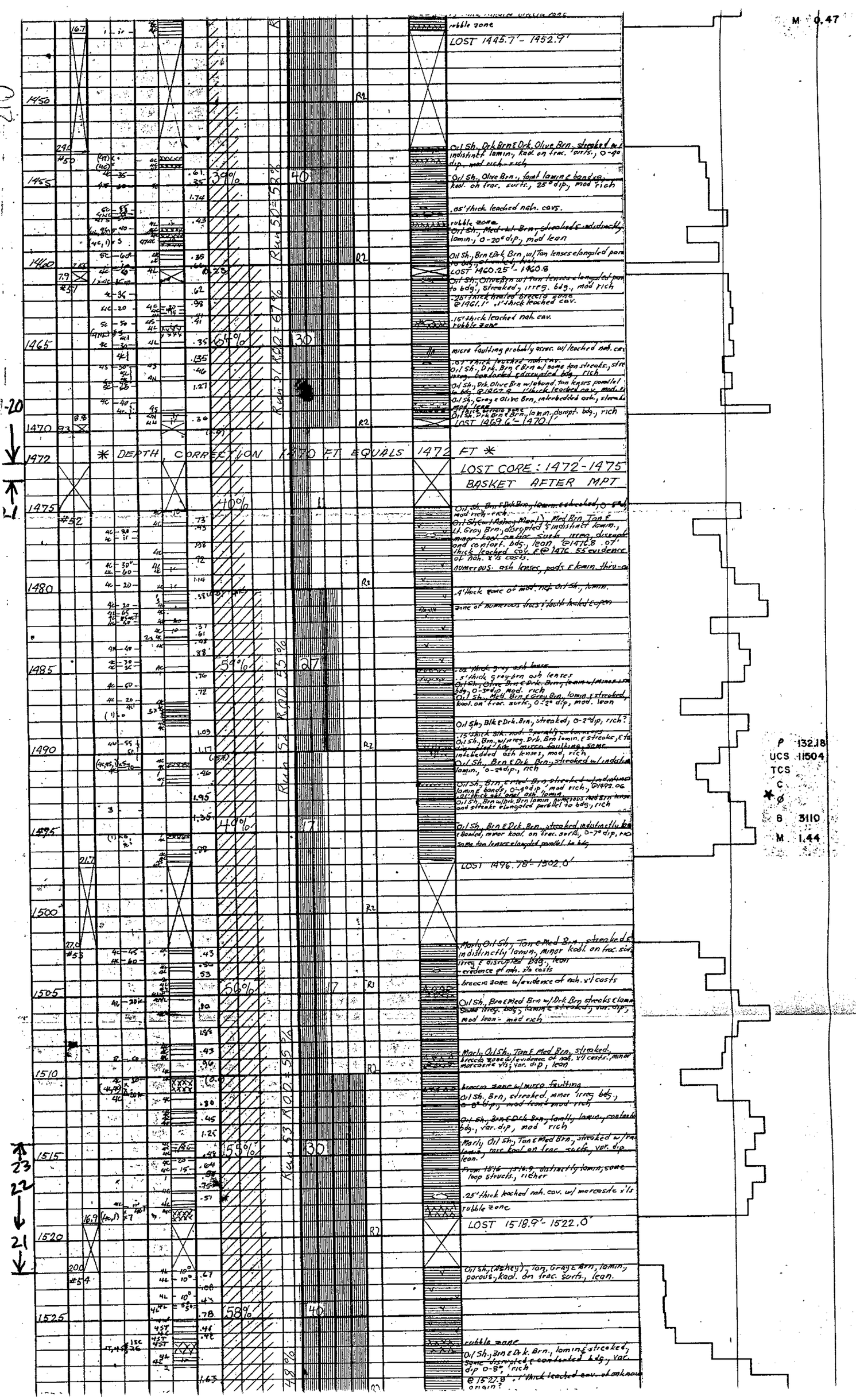
LOST 1165.45'-1166.00
Oil Sh., Med Olive Brn, streaked & indistinctly lamin - mostly homogeneous, kaol. on frac surfs. 0-5° dip, mod lean - mod rich
Oil Sh., Olive Brn w/ Dk Brn streaks & lamin minor kaol. on frac surfs. 0-2° dip, mod rich
rubble zone
LOST 1173.6'-1174.0'
Oil Sh., Med Brn, indistinct banding, some disrupted bdg., mod. lean
Oil Sh., Olive Brn w/ Blk & Drk Brn lamin & bands calcite on frac. surfs., 0-5° dip, rich
Oil Sh. Med Brn, w/ minor Brn streaks & lamin, calcite coated frac. surfs, 0-4° dip, mod lean - mod rich
rubble zone w/ calcite coated frac. surfs
LOST 1185.8'-1186.8'
Oil Sh., Brn & Drk Brn, lamin., calcite filled fracs., 0-2° dip, mod rich - rich
Oil Sh., Olive Brn w/ Brn lamin & streaks, calcite filled fracs. 0-3° dip, mod lean - mod rich
Oil Sh., Olive Brn w/ Drk Brn lamin, streaks & bands, .3' thick rich Oil Shale zone
.2' thick leached cav. lined w/ small calcite x'ls calcite filled frac., disrupted & irreg. bdg. w/ var. rich - mod rich
.15' thick leached cav w/ some calcite x'ls
Oil Sh., Drk Brn, Blk, Olive Brn, lamin., loop strat
.03' tan ash band
.03' thick gray ash band
some irreg. bdg., rich
Oil Sh., Olive Brn & Med Brn, streaked & indistinct banded, 0-5° dip, mod lean
.6' thick breccia zone (recemented), some kaol. pres
Oil Sh., Brn & Lt. Brn., lamin. & streaked, kaol. on frac. surfs., 0-5° dip, mod lean
Marlstone, Tan, Lt. Brn & Brn., lamin., kaol. on frac. surfs., horz. bdg., lean
LOST 1205.8'-1211.9'
Marlstone, Tan & Lt. Brn., lamin., kaol. on frac. surfs., ashey, 0-10° dip, lean
Marly Oil Sh., Olive Brn w/ Brn streaks & lam mod. rich, mod. lean
LOST 1218.8'-1223.9'
Oil Sh., Brn, Tan & Drk Brn., lamin & indistinctly banded, loop structs., var. dip., some small (less 1/2") ash lenses, mod. lean - mod rich
Oil Sh., Brn & Tan, V. distinctly banded & lamin., 0-4° dip, lean
Oil Sh., Lt Brn, Olive Brn, & Drk Brn., lamin., mod rich
.07' thick tan ash band
.15' thick tan ash band
Oil Sh., Blk & Drk Brn, lamin., w/ small interbd. ash lamin., & pods, irreg. bdg., rich - grades leaner towards base
.4' thick gray-brn ash band
Oil Sh., Med Brn & Olive Brn, lamin & indistinctly banded, small ash lenses thruout 0-3° dip mod lean
Oil Sh., Blk & Drk Brn, lamin. & streaked - mostly homogeneous, some disrupted & irreg. bdg., v. rich - grades leaner towards base
@ 1234.1 .04' thick tan ash lense
@ 1234.2 .03' thick gray ash lense
evidence of leached nah. cav., some calcite x'ls
Oil Sh., Brn & Med Brn., lamin & streaked
rubble zone w/ evidence of breccia w/ kaol & calc var. dip, mod rich
Oil Sh., Med Brn & Brn., indistinctly lamin & streaked, kaol. on frac. surfs, 0-5° dip mod. lean - lean
Oil Sh., Brn & Med. Brn, lamin & streaked, 0-3° mod lean
Ash, Gray, .55 thick, porous
Oil Sh., Lt & Med Brn, finely lamin, 0-3°, lean
LOST 1248.8'-1250.0'
Run 29 RQD = 47%
Run 30 = 64%
Run 31 = 73%
Run 32 RQD = 4%
Run 33 RQD = 16%
ρ 132.98
UCS 17319
TCS
C
ϕ
B 2380
M 1.64
ρ 129.15
UCS 8966
TCS
C
ϕ
B 2720
M 1.17
ρ 109.89
UCS 9713
TCS
C
ϕ
B 2726
M 0.52
ρ 152.15
UCS 21053
TCS

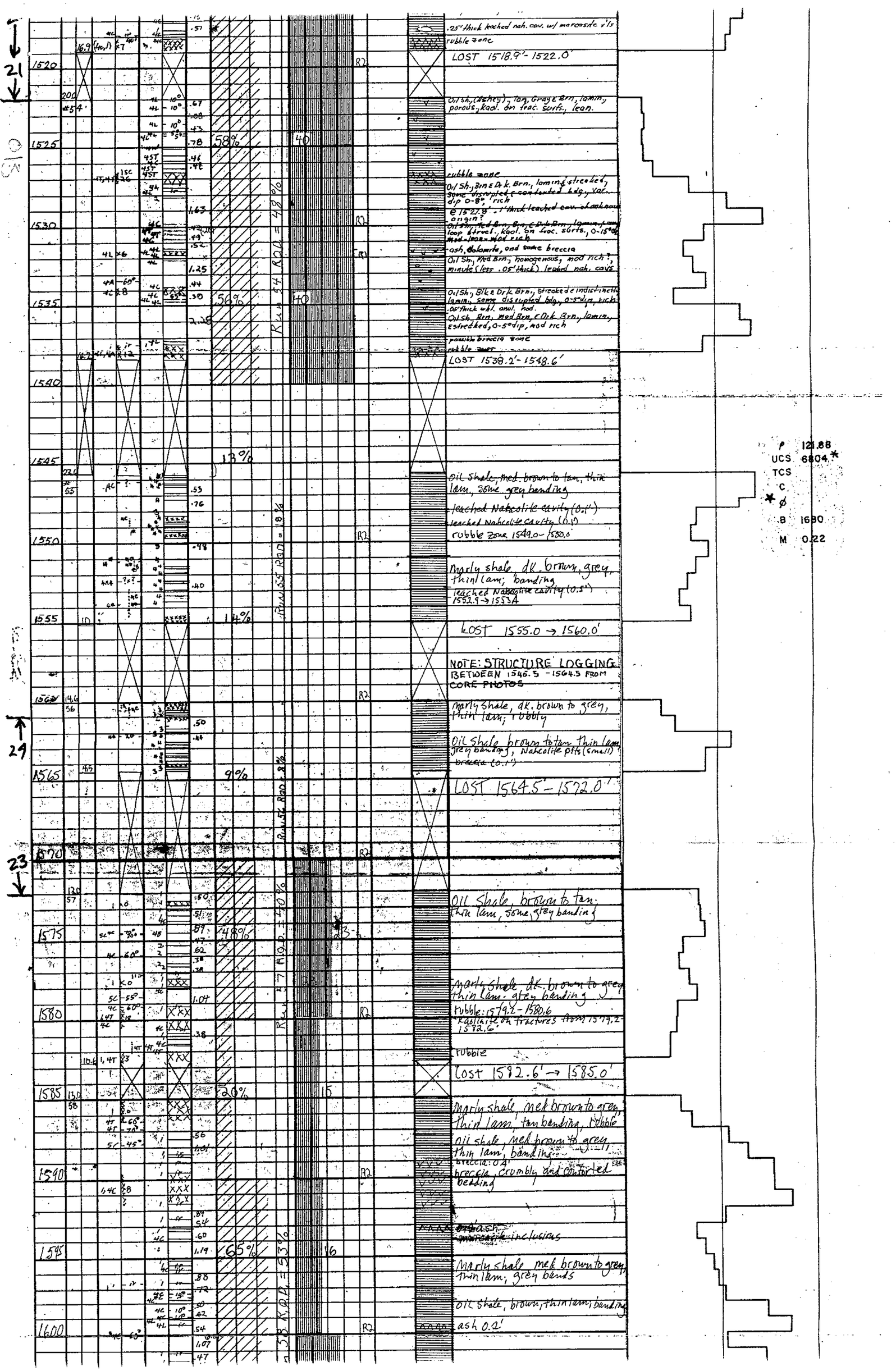

Oil Sh., Brn & Med Brn, faint lamina & streaked
rubble zone w/evidence of brecciated oil sh.
Oil Sh., Med Brn & Brn., indistinctly lamin & streaked, kaol. on frac. surfs, 0-5° dip
mod. lean-lean
Oil Sh., Brn & Med. Brn, lamin & streaked, 0-3°
mod lean
Ash Grain .55' thick porous
Oil Sh., Lt & Med Brn, faintly lamin, 0-3°, lean
LOST 1249.0'-1250.0'
Oil Sh., Lt.-Med Brn., lamin & banded, mino kaol. on frac. surfs., 0-3° dip, mod lean
.05' thick grayish lense
Oil Sh., Olive Brn, Drk Brn & Blk., lamin, w/ indistinct banding, some loop stroke 0-2° dip, rich
Oil Sh., Med Brn & Olive Brn w/ Drk Brn & Blk streaks & lamin., rare kaol. on frac. surfs 0-2° dip, lean at top, mod rich, rich
.02' thick wht anal. ash lenses
.03' thick tan ash lenses
Oil Sh., Drk Olive Brn w/ minute tan streaks, some disrupted bdg., rich
Oil Sh., Blk, Drk Brn, & Olive Brn w/ Tan lenses, bands & lamin, V. distinctly lamin & banded, disrupted & contorted bdg., tan probable ash, rich
Oil Sh., Blk & Drk Brn., lamin & streaked, disrupted bdg @ top, rich
Oil Sh., V. Drk Olive Brn., streaked, rare blk banding, 0-4° dip, rich
Oil Sh, Drk Brn & Blk., lamin & streaked, .02' thick gray ash interbedded oil sh. kaol. on frac. surfs., richer at top, rich-mod.
LOST 1273.4'-1275.0'
Rubble zone, Oil Sh., Med Brn, Brn, lamin, mod rich (partially redrilled)
LOST 1276.4'-1280.0'
Oil Sh., Brn, & Med Brn, faint lamina & Banding, Horizontal Bdg
Kaol in fracs., Mod Rich
Oil Sh. Bed .03' Thick @ 1284.05'
Leach Nah Cavities >.01'-.07'
Oil Sh., Brn & DK Brn, Bands, laminae & Streaks, Kaol in fracs
Local Disruption & Evidence of Nah Cavity @ 1294.8
Mod Rich
Cor-Brn Tuff Bed .5' Thick
Oil Sh., Brn & Med. Brn. faint Banding, slickenside & Kaol in fracs
Rehealed Breccia, Mod Rich
Oil Sh., Med Brn & DK Brn, faint Banding, abund. Kaol. in fracs
Rich.
Oil Sh., DK Brn, faint Streaking, Rich
Oil Sh., Brn & Med Brn, faint Streaking, Rare Kaol, Mod Rich
Evidence of Leached Nah Cavities in Rubble
Leach Nah Cavities .04'-.18'
Oil Sh., Med Brn & DK Brn, faintly Banded & Streaked. Rare Kaol.
Run 35 RQD = 71%
Run 36 = 0%
Run 37 RQD = 11%
Run 38 RQD = 35%
Run 39 RQD = 11%
M 0.52
ρ 152.15
UCS 21053
TCS
C
ρ
B .3920
M 3.37
ρ 106.31
UCS 10922
TCS
C
ρ
ρ 104.33
UCS 21845
TCS
C
ρ
B 2940
M 0.46
B 2590
M 0.53
ρ 137.06
UCS 19704
TCS
C
ρ
B 4112
M 2.07
ρ 121.67
UCS 11683
TCS
C
ρ
B
M 0.91
ρ
UCS
TCS
C
ρ
B
M
ρ 119.07
UCS 12499


Oil Sh., DkBrn, faint streaking, Rich
Oil Sh., Brn & Med Brn, faint streaking, Rare Kaol, Mod Rich
Evidence of Leached Nah Cavities in Rubble
Leach Nah Cavities .04'-.18'
Oil Sh., Med Brn & Dk Brn, faintly Banded & Streaked, Rare Kaol,
Mod Rich
Leached Nah Cav
Rich
Oil Sh., Med & Lt. Brn w/ Brn streaks, streaked calcite coatings on frac surfs, 0-3° dip, mod. lean
evidence of breccia zone
rubble zone
Oil Sh., Brn, streaked & indistinctly lamin., calcite's also frac. surfs, 0-5° dip, mod lean mod rich
LOST 1332.9'-1336.1'
Oil Sh., Brn, streaked & indistinctly lamin, kaol & calcite on frac. surfs, 0-5° dip, mod lean - mod rich
rubble zone w/ evidence of breccia
LOST 1338.8'-1339.3'
Oil Sh., Brn & Med Brn, lamin., 0-7° d.p., mod rich
rubble zone
rubble zone
Oil Sh., Med & Lt. Brn, lamin, disrupted bdg, local breccia, lean
LOST 1353.5'-1356.6'
Oil Sh., Rubble zone, Med. Brn, lamin, mod. lean
Oil Sh., Drk. Brn, faintly lamin, @ 1367.7 .02' thick calcite lamin, 35° dip, rich
Oil Sh., Rubble zone, Brn & Med Brn, lamin., mod rich - mod lean
LOST 1360.1'-1361.1'
Oil Sh. Rubble zone, Brn-Med Brn, streaks evidence of breccia @ top, also evidence of nah. casts, mod lean
Oil Sh., Brn & Drk Brn, lamin, var. dip, mod rich residual dolomite ash along partings
LOST 1367.7'-1373.7'
RAN JUNK BASKET AND TRI CONE DRILLED FROM 1373.7-1376.0'
LOST 1376.0'-1406.9'
Run 39 RQD = 11%
Run 40 = 34%
Run 41 = 17%
Run 42 = 7%
Run 43 = 7%
Run 44 = 15%
Run 45 = 3%
6%
36%
12%
0
12%
40+
20
40+
40+
40+
40+
R2
Ø 11207
UCS 12499
TCS
C
Ø
B 1.40
M .27

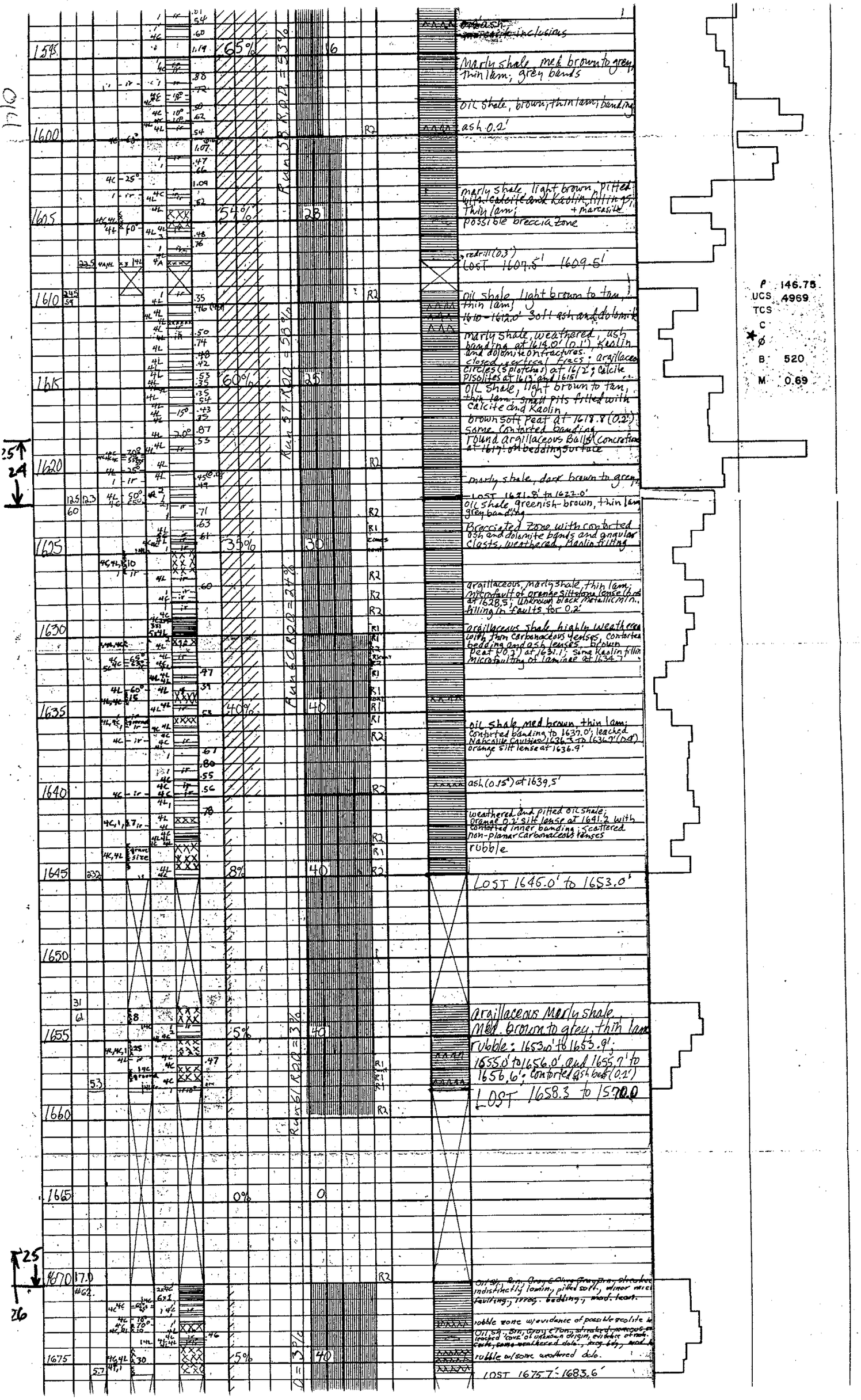


18
1380
1385
1390
1395
1400
1405
1410
1415
1420
1425
1430
1435
1440
1445
1450
1455
1460
LOST 1376.0'-1406.9'
POSSIBLE TOP OF "B" GROOVE D
Rubble Zone
Ashey Marlstone, Gray Tan, Lean
LOST 1415.7'-1419.6'
LOST 1419.6' 1423.9'
.2' thick Tan breccia zone
.02' thick gray ash lensee
.04' thick Drk Gray ash lenses
minor marcasite tts
.2' thick healed breccia zone, localized irr bedding, lean
rubble zone abund. kaol. coatings on fracs
.5' thick rehealed breccia zone
rubble zone
LOST 1445.7'-1452.9'
Oil Sh., Drk Brn & Drk. Olive Brn., streaked w/ indistinct lamin., kaol. on frac. surfs., 0-40 dip, mod rich-rich
Oil Sh., Olive Brn., faint lamin & band xg, kaol. on frac. surfs., 25° dip, mod rich
.05' thick leached nah. cavs.
rubble zone
Oil Sh., Med-Lt-Brn, streaked & indistinctly lamin., 0-20° dip, mod lean
Oil Sh., Brn & Drk Brn, w/ Tan lenses elongated pan
Run 46 RQD = 0%
Run 47 = 3%
Run 48 RQD = 23%
Run 49 RQD = 40%
Run 50 = 52%
4%
40+
32%
27
68%
21
10%
30
39%
40
R2
P 110.25
UCS 5186
TCS
C
B
M 0.47

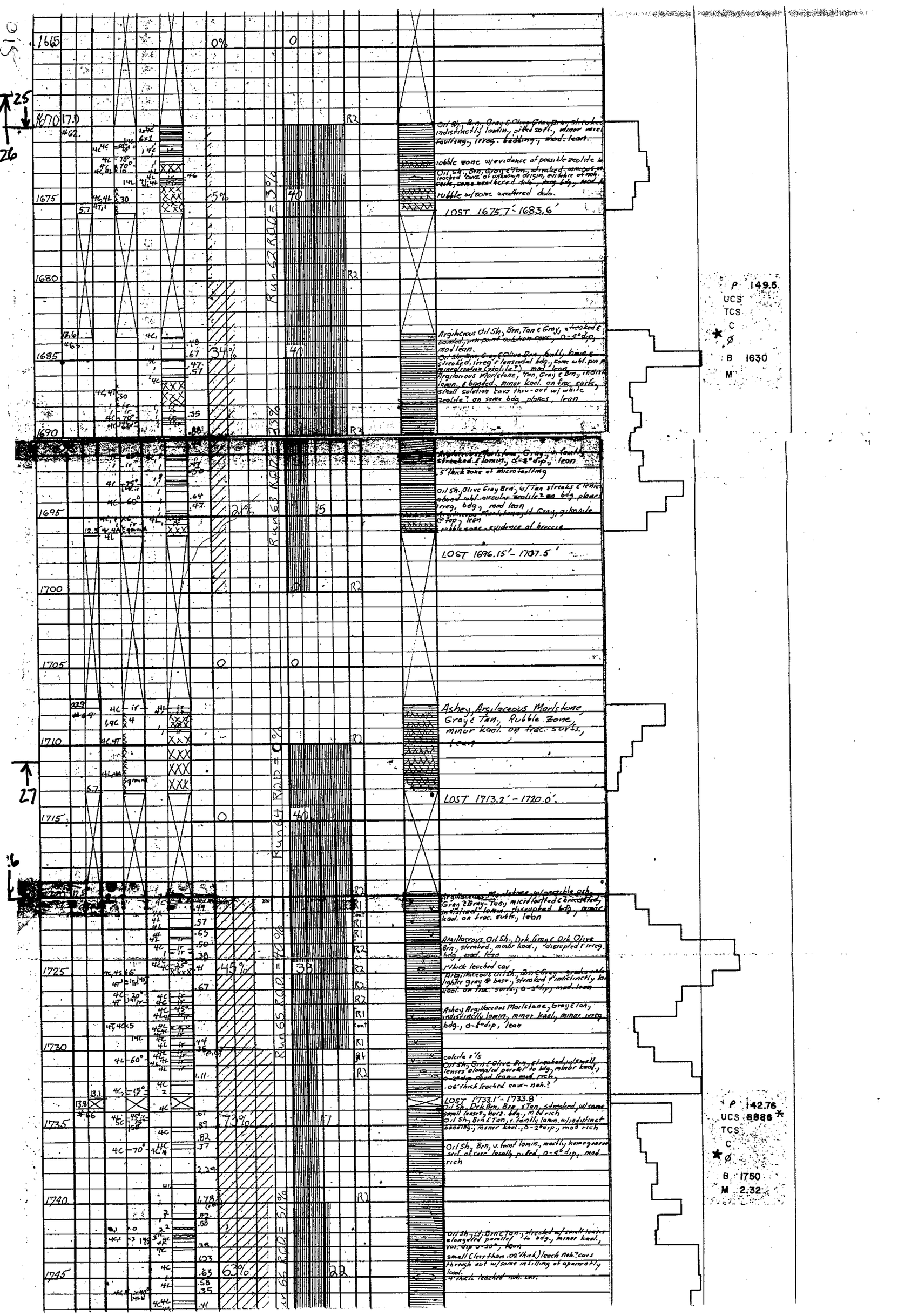

M 0.47
rubble zone
LOST 1445.7' - 1452.9'
Oil Sh. Drk Brn & Drk. Olive Brn. streaked w/ indistinct lamin., kaol. on frac. surfs., 0-4° dip, mod rich-rich
Oil Sh., Olive Brn., fomt lamina & band ex., kaol. on frac. surfs., 25° dip, mod rich
.05' thick leached nah. cavs.
rubble zone
Oil Sh., Med-Lt. Brn, streaked & indistinctly lamin., 0-20° dip, mod lean
Oil Sh., Brn & Drk. Brn, w/ Tan lenses elongated para to bdg.
LOST 1460.25' - 1460.8
Oil Sh., Olive Brn w/ tan lenses elongated para to bdg., streaked, irreg. bdg., mod rich
.25' thick fractd breccia zone @1461.1'
.1' thick leached cav.
.15' thick leached nah. cav.
rubble zone
micro faulting probably assoc. w/ leached nah. cav
.07' thick leached nah. cav.
Oil Sh., Drk. Brn & Brn w/ some tan streaks, str irreg. bdg. & discontinuous bdg., rich
Oil Sh., Drk. Olive Brn w/ abund. tan lenses parallel to bdg. @1467.8 .1' thick leached cav. mod. r
Oil Sh., Gray & Olive Brn, interbedded ash, streak
.1' thick breccia zone
Oil Sh. Drk. Brn & Brn, lamin. disrupt. bdg., rich
LOST 1469.6' - 1470.1'
* DEPTH CORRECTION 1470 FT EQUALS 1472 FT *
LOST CORE: 1472'-1475'
BASKET AFTER MPT
Oil Sh. Brn & Drk. Brn, lamin. & streaked, 0-5°, mod rich-rich
Oil Sh. w/ Ash (Marly) Med Brn Tan & Med Gray Brn, disrupted & indistinct lamin., lt. Gray Brn, disrupted streaks, irreg. discontinuous bdg., lean @1476.8 .07' thick leached cav. & @1476.55 evidence of nah. x'ls costs.
numerous ash lenses, pods & lamin. thru-out
.4' thick zone of mod. rich Oil Sh., lamin.
zone of numerous frac's, fault healed & open
.02' thick gray ash lense
.5' thick gray-brn ash lenses
Oil Sh. Olive Brn & Drk. Brn, lamin. w/ minor cross bdg., 0-3° dip, mod. rich
Oil Sh., Med Brn & Gray Brn, lamin. & streaked, kaol. on frac. surfs., 0-2° dip, mod. lean
Oil Sh., Blk & Drk. Brn, streaked, 0-2° dip, rich?
.15' thick blk. mod. to poorly carbonaceous
Oil Sh., Brn, w/ irreg. Drk. Brn lamin. & streaks, & ta
.1' thick bdg. micro faulting, some interbedded ash lenses, mod. rich
Oil Sh., Brn & Drk. Brn, streaked w/ indistinct lamin., 0-2° dip, rich
Oil Sh., Brn, & Med Brn streaked, indistinct lamin. & bands, 0-4° dip, mod rich, @1492.06
.02' thick blk. pebbl ash lamina
Oil Sh., Brn w/ Drk. Brn lamin. numerous Med Brn lenses and streaks elongated parallel to bdg., rich
Oil Sh., Brn & Drk. Brn, streaked, indistinctly lamin. & bands, minor kaol. on frac. surfs., 0-7° dip, mod some tan lenses elongated parallel to bdg.
LOST 1496.78' - 1502.0'
Marly Oil Sh., Tan & Med Brn, streaked & indistinctly lamin., minor kaol. on frac. surfs., irreg. & disrupted bdg., lean
evidence of nah. x'l costs
breccia zone w/ evidence of nah. x'l costs
Oil Sh., Brn & Med Brn w/ Drk Brn streaks & lamin. irreg. bdg., lamin. & streaks, var. dip, mod lean - med rich
Marly Oil Sh., Tan & Med Brn, streaked, breccia zone w/ evidence of nah. x'l costs., minor marcasite x'ls, var. dip, lean
breccia zone w/ micro faulting
Oil Sh., Brn, streaked, minor irreg. bdg., 0-8° dip, mod lean & mod rich
Oil Sh., Brn & Drk Brn, locally laminated, contorted bdg., var. dip, mod rich
Marly Oil Sh., Tan & Med Brn, streaked w/ fr lamin., rare kaol on frac. surfs, var. dip, lean.
From 1516 - 1516.9 distinctly lamin, some loop streaks, richer
.25' thick leached nah. cav. w/ marcasite x'ls
rubble zone
LOST 1518.9' - 1522.0'
Oil Sh., (Ashey), tan, Gray & Brn, lamin., porous, kaol. on frac. surfs., lean.
rubble zone
Oil Sh., Brn & Drk. Brn., lamin. & streaked, some disrupted & contorted bdg., var. dip 0-8°, rich
@1527.8' .1' thick leached cav. of nah. origin?
P 132.18
UCS 11504
TCS
C
Ø
B 3110
M 1.44



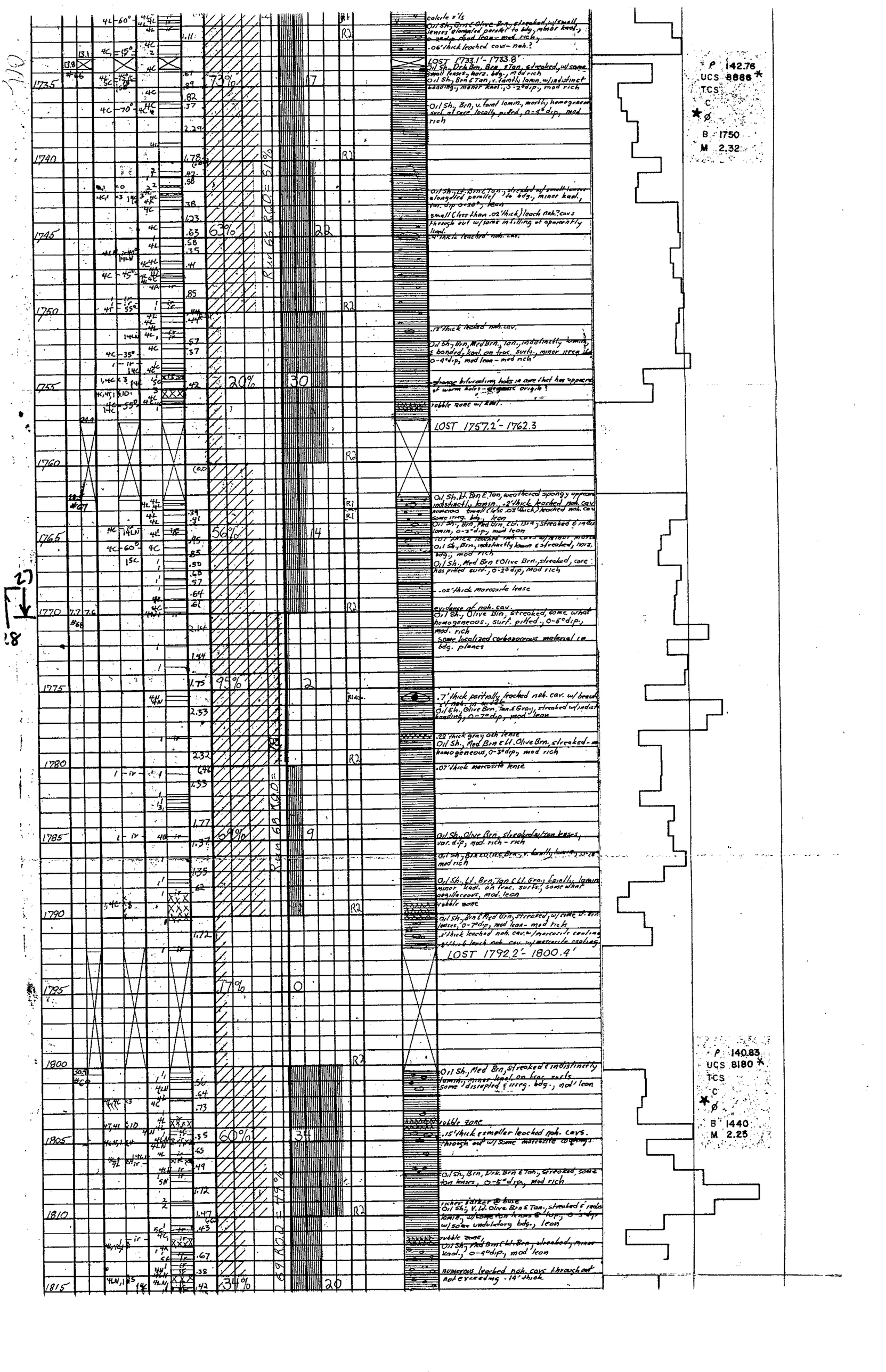
21
24
23
1520
1525
1530
1535
1540
1545
1550
1555
1560
1565
1570
1575
1580
1585
1590
1595
1600
.25' thick leached nah. cav. w/ marcasite v'ls
rubble zone
LOST 1518.9'-1522.0'
Oil Sh., (Ashey), tan, Gray & Brn, lamin., porous, kaol. on frac. surfs., lean.
58%
40
rubble zone
Oil Sh., Brn & Dk. Brn., lamin. & streaked, some disrupted & contorted bdg., var. dip 0-8°, rich
@ 1527.8' .1' thick leached cav. of unknown origin?
Oil Sh., Med Brn, Brn, & Dk Brn, lamin., loop struct. kaol. on frac. surfs., 0-15° dip, mod-lean, mod rich
ash, dolomite, and some breccia
Oil Sh., Med Brn., homogenous, mod rich?, minute (less .05' thick) leached nah. cavs
56%
40
Oil Sh., Blk & Dk Brn., streaked & indistinctly lamin., some disrupted bdg., 0-5° dip, rich
.05' thick whl. anal. nod.
Oil Sh., Brn, Med Brn, & Dk Brn., lamin., & streaked, 0-5° dip, mod rich
possible breccia zone
rubble zone
LOST 1538.2'-1548.6'
13%
Oil Shale, med. brown to tan, thin lam., some grey banding
leached Nahcolite cavity (0.1')
leached Nahcolite cavity (0.1')
rubble zone 1549.0-1550.0'
Marly shale, dk. brown, grey, thin lam; banding
leached Nahcolite cavity (0.5')
1552.9 → 1553A
14%
LOST 1555.0 → 1560.0'
NOTE: STRUCTURE LOGGING BETWEEN 1546.5 - 1564.5 FROM CORE PHOTOS
Marly Shale, dk. brown to grey, thin lam; rubbly
Oil Shale brown to tan thin lam grey banding, Nahcolite pits (small)
breccia (0.1')
9%
LOST 1564.5'-1572.0'
Oil Shale, brown to tan, thin lam, some grey banding
48%
23
Marly Shale, dk. brown to grey thin lam. grey banding
rubble: 1579.2-1580.6
Kaolinite on fractures from 1579.2-1582.6'
rubble
Lost 1582.6' → 1585.0'
20%
15
Marly shale, med brown to grey, thin lam, tan banding, rubble
Oil shale, med brown to grey, thin lam, banding
breccia: 0.4'
breccia, crumbly and contorted bedding
ash
marcasite inclusions
65%
16
Marly shale med brown to grey, thin lam; grey bands
Oil shale, brown, thin lam; banding
ash 0.2'
Run 54 RQD = 48%
Run 55 RQD = 18%
Run 56 RQD = 8%
Run 57 RQD = 40%
Run 58 RQD = 53%
ρ 121.88
UCS 6804 *
TCS
C
* ø
B 1680
M 0.22



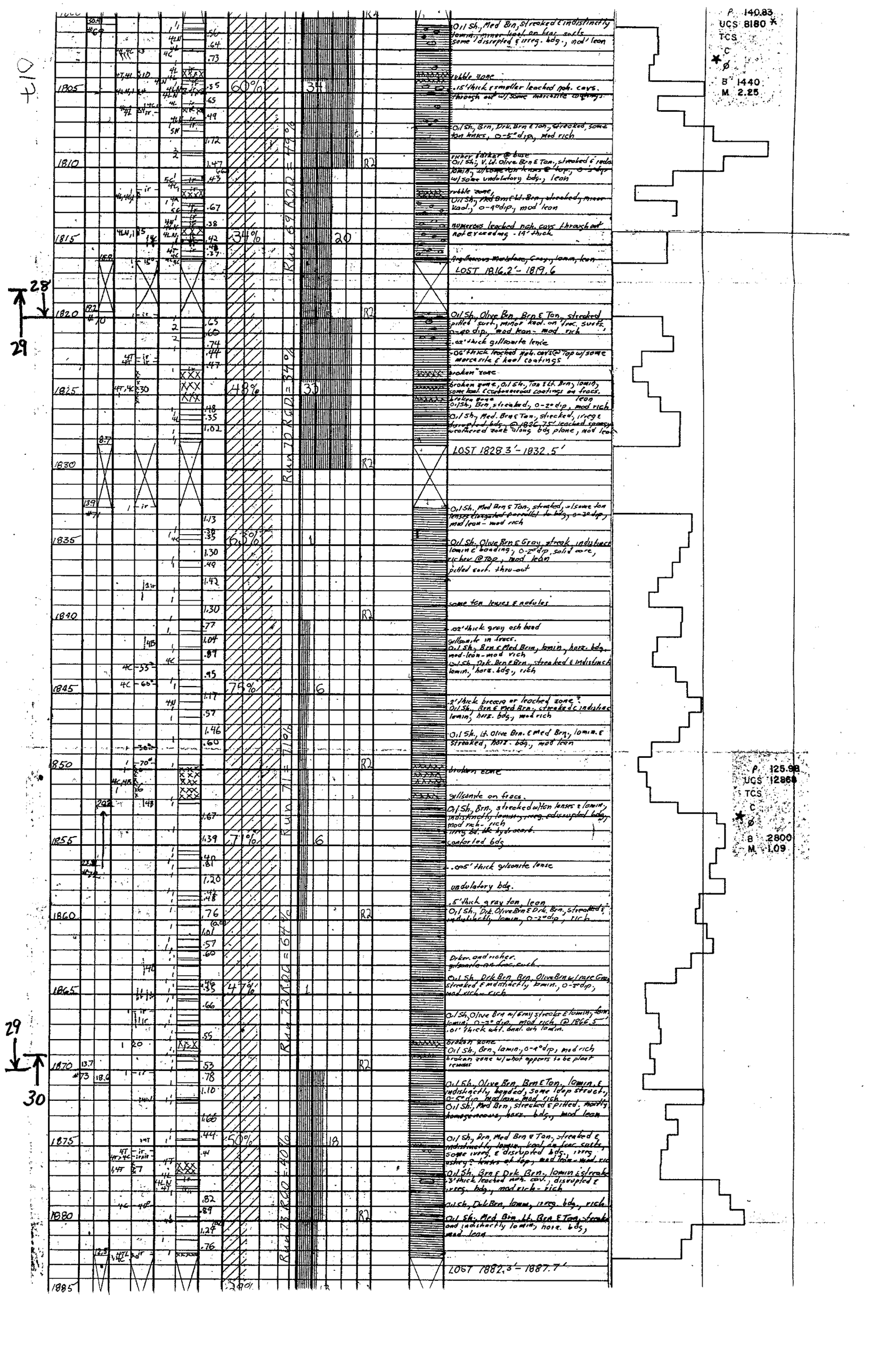
1595
1600
1605
1610
1615
1620
1625
1630
1635
1640
1645
1650
1655
1660
1665
1670
1675
65%
54%
60%
35%
40%
8%
5%
0%
5%
Run 58 RQD = 53%
Run 57 RQD = 58%
Run 60 RQD = 24%
Run 61 RQD = 3%
D = 3%
16
28
25
30
40
40
40
0
40
ash
marcasite inclusions
Marly shale, med brown to grey, thin lam; grey bands
oil shale, brown; thin lam; banding
ash 0.2'
marly shale, light brown, pitted with calcite and Kaolin, fillings, thin lam; + marcasite
possible breccia zone
redrill (0.3')
LOST 1607.5' - 1609.5'
oil shale, light brown to tan, thin lam;
1610 - 1612.0' soft ash and dolomite
marly shale, weathered, ash banding at 1614.0' (0.1'), Kaolin and dolomite on fractures. closed vertical fracs; argillaceous circles (splotches) at 1612; calcite pisolites at 1613 and 1615
oil shale, light brown to tan, thin lam; small pits filled with calcite and Kaolin
brown soft peat at 1618.8 (0.2')
some contorted banding
round argillaceous Balls (concretions) at 1617 on bedding surface
marly shale, dark brown to grey
LOST 1621.8' to 1622.0'
oil shale, greenish-brown, thin lam; grey banding
Brecciated zone with contorted ash and dolomite bands and angular clasts, weathered, Kaolin filling
argillaceous, marly shale, thin lam; microfault of orange siltstone lense (0.05') at 1628.5'; unknown black metallic min. filling in faults for 0.2'
argillaceous shale, highly weathered with thin carbonaceous lenses, contorted bedding and ash lenses. brown peat (0.2') at 1631.1'; some Kaolin filling microfaulting of laminae at 1634.7'
oil shale, med brown, thin lam; contorted banding to 1637.0'; leached Nahcolite Cavities 1636.3 to 1636.7' (0.4') orange silt lense at 1636.9'
ash (0.15') at 1639.5'
weathered and pitted oil shale; orange 0.2' silt lense at 1641.2 with contorted inner banding; scattered non-planar carbonaceous lenses
rubble
LOST 1645.0' to 1653.0'
argillaceous Marly shale, med. brown to grey, thin lam
rubble: 1653.0' to 1653.9'; 1655.0' to 1656.0', and 1655.7' to 1656.6'; contorted ash bed (0.2')
LOST 1658.3 to 1570.0
oil sh., Brn, Gray & Olive Gray Brn, streaked indistinctly lamin., pitted soft, minor micr. faulting, irreg. bedding, mod. lean.
rubble zone w/ evidence of possible zeolite
oil sh., Brn, Gray & Tan, streaked, porous, leached cavs. of unknown origin, evidence of nah. crusts, some weathered dolo., irreg. bdg., mod.
rubble w/ some weathered dolo.
LOST 1675.7' - 1683.6'
P 146.75
UCS 4969
TCS
C
Ø
B 520
M 0.69
25
24
25
26



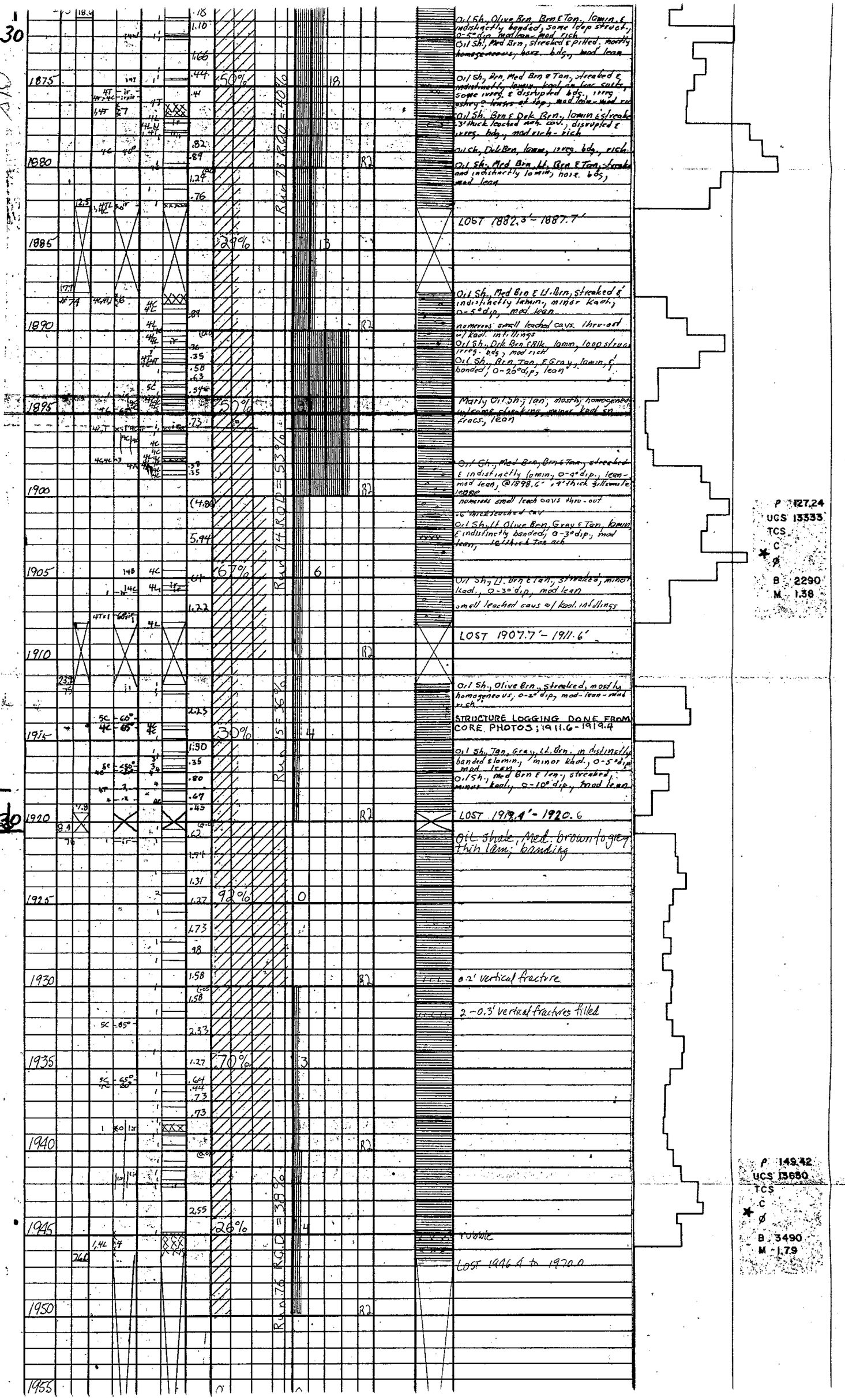
1665
1670
1675
1680
1685
1690
1695
1700
1705
1710
1715
1720
1725
1730
1735
1740
1745
25
26
27
Run 62 RQD = 3%
Run 63 RQD = 23%
Run 64 RQD = 0%
Run 65 RQD = 40%
Run 66 RQD = 51%
0%
5%
34%
21%
0
45%
73%
63%
Oil Sh., Brn, Gray & Olive Gray Brn, streaked indistinctly lamin., pitted surf., minor micro faulting, irreg. bedding, mod. lean.
rubble zone w/evidence of possible zeolite
Oil Sh., Brn, Gray & Tan, streaked, minor cavs, leached cavs of unknown origin, evidence of nah. cavs, some weathered dolo., irreg. bdg., mod. lean
rubble w/some weathered dolo.
LOST 1675.7'-1683.6'
Argilaceous Oil Sh., Brn, Tan & Gray, streaked & banded, pin point solution cavs, 0-4° dip, mod lean.
Oil Sh., Brn, Gray & Olive Brn, faintly lamin. & streaked, irreg & lensiodal bdg., some wht. pin p mineg/rotation (zeolite?) mod lean
Argilaceous Marlstone, Tan, Gray & Brn, indistinct lamin., & banded, minor kaol. on frac. surfs., small solution cavs thru-out w/ white zeolite? on some bdg planes, lean
Argilaceous Marlstone, Gray, v. faintly streaked & lamin., 0-2° dip, lean
.5' thick zone of microfaulting
Oil Sh., Olive Gray Brn, w/ Tan streaks & lenses abond wht circular zeolite? on bdg planes irreg. bdg., mod lean
Argilaceous Marlstone, Lt Gray, gibbsite @ top, lean
rubble zone - evidence of breccia
LOST 1696.15'-1707.5'
Ashey, Argilaceous Marlstone, Gray & Tan, Rubble Zone, minor kaol. on frac. surfs., lean
LOST 1713.2'-1720.0'
Argillaceous Marlstone w/ possible ash, Gray & Gray-Tan, microfaulted & brecciated, indistinct lamin., disrupted bdg., minor kaol. on frac. surfs., lean
Argillaceous Oil Sh., Drk Gray & Drk Olive Brn., streaked, minor kaol., disrupted & irreg. bdg., mod. lean
1' thick leached cav
Argillaceous Oil Sh., Brn & Gray - grades under lighter gray @ base, streaked & indistinctly lamin. kaol. on frac. surfs., 0-2° dip, mod. lean
Ashey Argillaceous Marlstone, Gray & Tan, indistinctly lamin., minor kaol., minor irreg. bdg., 0-5° dip, lean
calcite x'ls
Oil Sh., Brn & Olive Brn, streaked w/ small lenses elongated parallel to bdg., minor kaol., 0-2° dip mod lean - mod rich,
.06' thick leached cavs - nah.?
LOST 1733.1'-1733.8'
Oil Sh., Drk Brn, Brn, & Tan, streaked, w/ some small lenses, horz. bdg., mod rich
Oil Sh., Brn & Tan, v. faintly lamin. w/ indistinct banding, minor kaol., 0-2° dip, mod rich
Oil Sh., Brn, v. faint lamin., mostly homogeneous surf. at core locally pitted, 0-4° dip, mod rich
Oil Sh., Lt. Brn & Tan, streaked w/ small lenses elongated parallel to bdg., minor kaol., var. dip 0-20°, lean
small (less than .02' thick) leach nah.? cavs through out w/ some infilling of apparently kaol.
.4' thick leached nah. cav.
P 149.5
UCS
TCS
C
Ø
B 1630
M
P 142.76
UCS 8886
TCS
C
Ø
B 1750
M 2.32

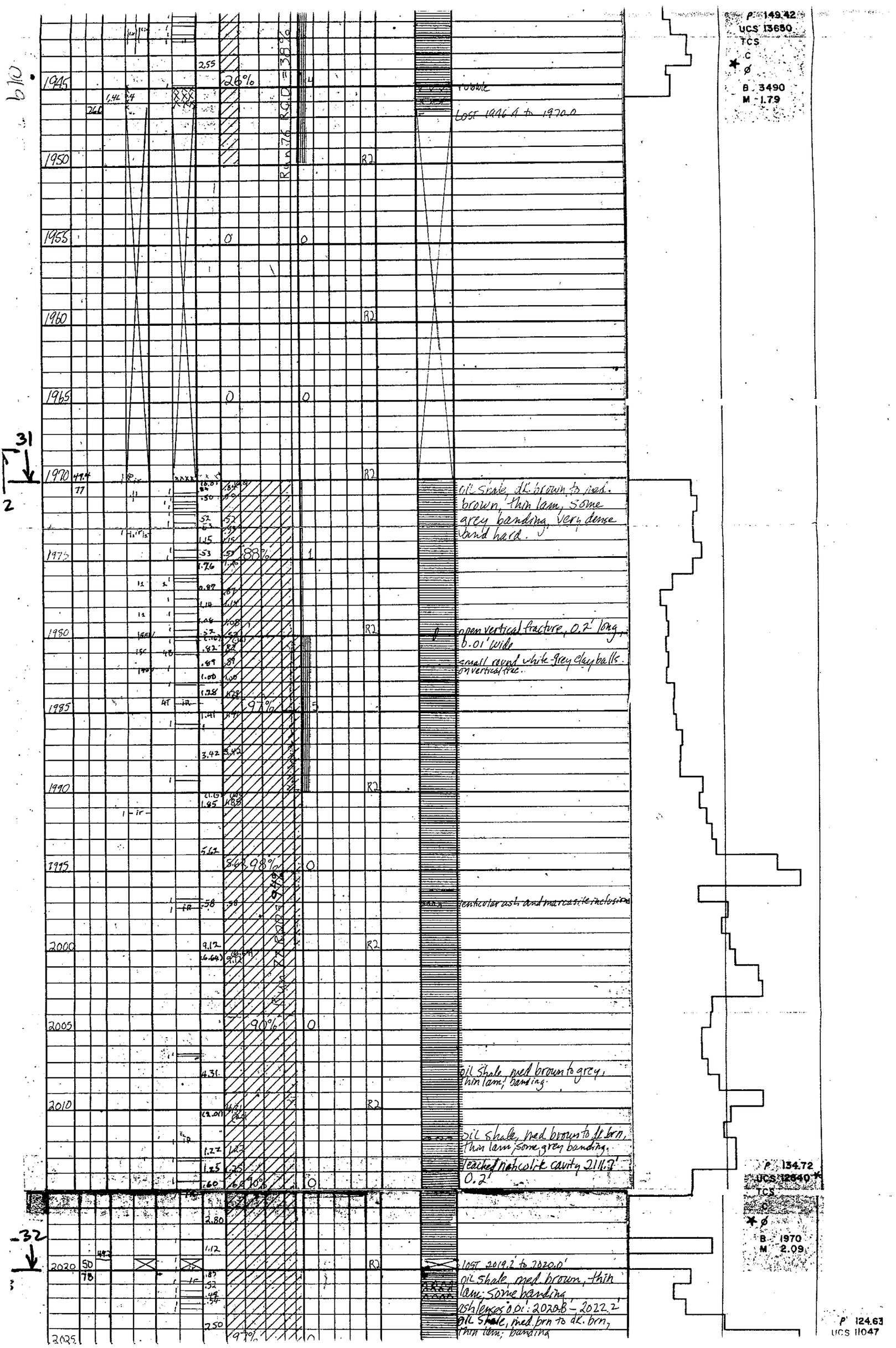


calcite v'ls
Oil Sh., Brn & Olive Brn, streaked w/small lenses elongated parallel to bdg., minor kaol., 0-2° dip, mod lean - mod rich,
.06' thick leached cavs - nah.?
LOST 1733.1' - 1733.8'
Oil Sh., Drk Brn, Brn, & Tan, streaked, w/some small lenses, horz. bdg., mod rich
Oil Sh., Brn & Tan, v. faintly lamin. w/indistinct banding, minor kaol., 0-2° dip, mod rich
Oil Sh., Brn, v. faint lamin., mostly homogeneous surf. of core locally pitted, 0-4° dip, mod rich
Oil Sh., Lt. Brn & Tan, streaked w/small lenses elongated parallel to bdg., minor kaol., var. dip 0-20°, lean
small (less than .02' thick) leach nah.? cavs through out w/some infilling of apparently kaol.
.4' thick leached nah. cav.
.13' thick leached nah. cav.
Oil Sh., Brn, Med Brn., Tan., indistinctly lamin. & banded, kaol. on frac. surfs., minor irreg. bdg. 0-4° dip, mod lean - mod rich
strange bifurcating holes in core that has appearance of worm holes - organic origin?
rubble zone w/ kaol.
LOST 1757.2' - 1762.3
Oil Sh., Lt. Brn & Tan, weathered spongy appearance indistinctly lamin., .2' thick leached nah. cav. numerous small (less .03' thick) leached nah. cav. some irreg. bdg., lean
Oil Sh., Brn, Med Brn, & Lt. Brn, streaked & indistinctly lamin., 0-3° dip, mod lean
.07' thick leached nah. cavs w/minor marcasite
Oil Sh., Brn, indistinctly lamin & streaked, horz. bdg., mod rich
Oil Sh., Med Brn & Olive Brn., streaked, core has pitted surf., 0-2° dip, mod rich
.02' thick marcasite lense
evidence of nah. cav.
Oil Sh., Olive Brn, streaked, some what homogeneous., surf. pitted., 0-5° dip., mod. rich
some localized carbonaceous material in bdg. planes
.7' thick partially leached nah. cav. w/ beautiful nah. in middle
Oil Sh., Olive Brn, Tan & Gray, streaked w/indistinct banding, 0-7° dip, mod lean
.22' thick gray ash lense
Oil Sh., Med Brn & Lt. Olive Brn, streaked - m homogeneous, 0-3° dip, mod rich
.07' thick marcasite lense
Oil Sh., Olive Brn, streaked w/tan lenses, var. dip, mod. rich - rich
Oil Sh., Brn & Olive Brn, v. faintly lamin., 0-10° mod rich
Oil Sh., Lt. Brn, Tan & Lt. Gray, faintly lamin. minor kaol. on frac. surfs., some what argillaceous, mod. lean
rubble zone
Oil Sh., Brn & Med Brn, streaked, w/some Lt. Brn lenses, 0-7° dip, mod lean - mod rich
.1' thick leached nah. cav. w/marcasite coating
.2' thick leach nah. cav. w/marcasite coating
LOST 1792.2' - 1800.4'
Oil Sh., Med Brn, streaked & indistinctly lamin., minor kaol. on frac. surfs. some disrupted & irreg. bdg., mod lean
rubble zone
.15' thick & smaller leached nah. cavs. through out w/some marcasite coatings
Oil Sh., Brn, Drk. Brn & Tan, streaked, some tan lenses, 0-5° dip, mod rich
richer & darker @ base
Oil Sh., V. Lt. Olive Brn & Tan, streaked & indistinctly lamin., w/some tan lenses @ top, 0-3° dip w/some undulatory bdg., lean
rubble zone,
Oil Sh., Med Brn & Lt. Brn, streaked, minor kaol., 0-4° dip, mod lean
numerous leached nah. cavs through out not exceeding .14' thick
73%
63%
20%
56%
95%
69%
17%
60%
34%
Run 66 RQD = 51%
Run 68 RQD = 79%
P 142.76
UCS 8886 *
TCS
C
Ø
B 1750
M 2.32
P 140.83
UCS 8180 *
TCS
C
Ø
B 1440
M 2.25

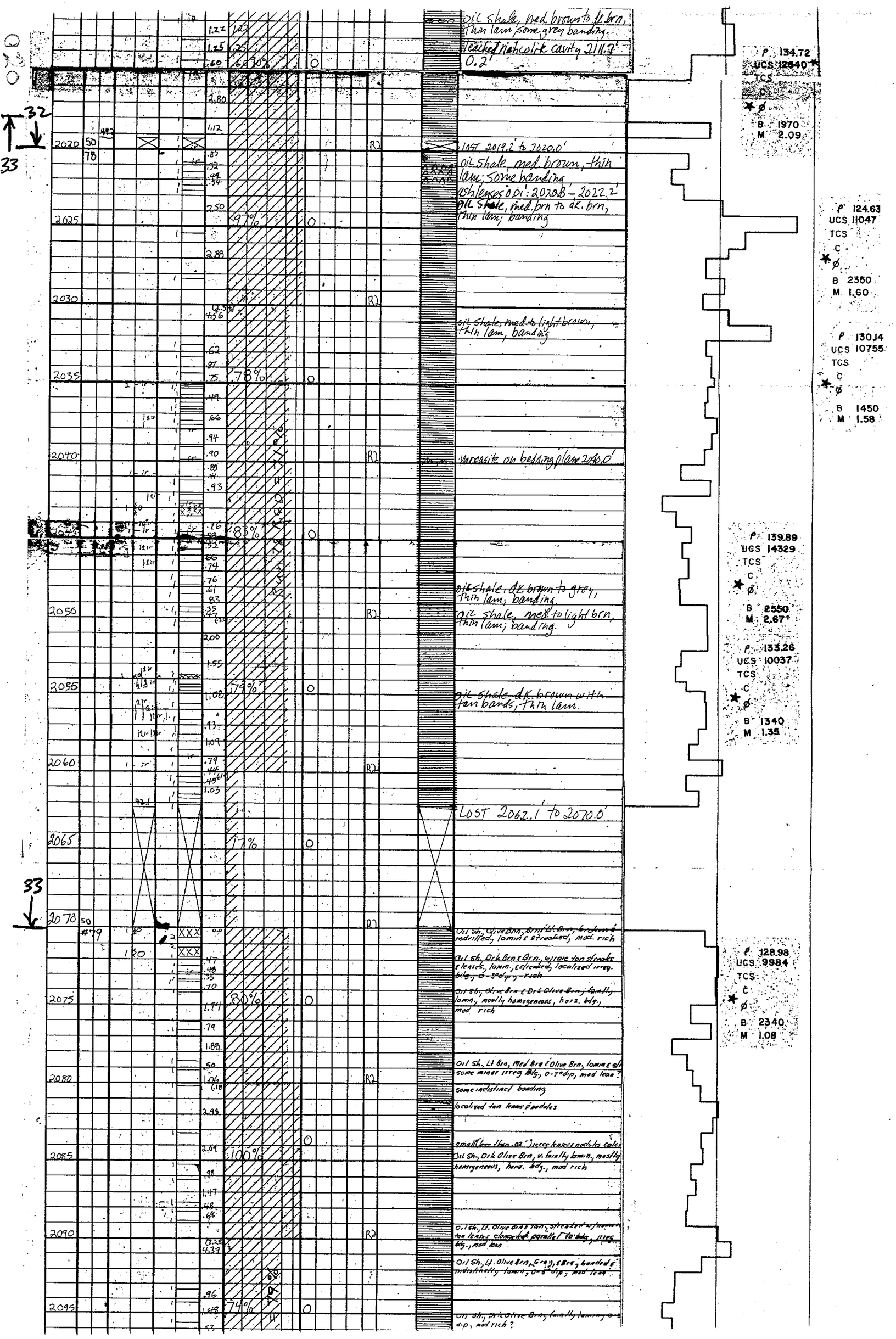


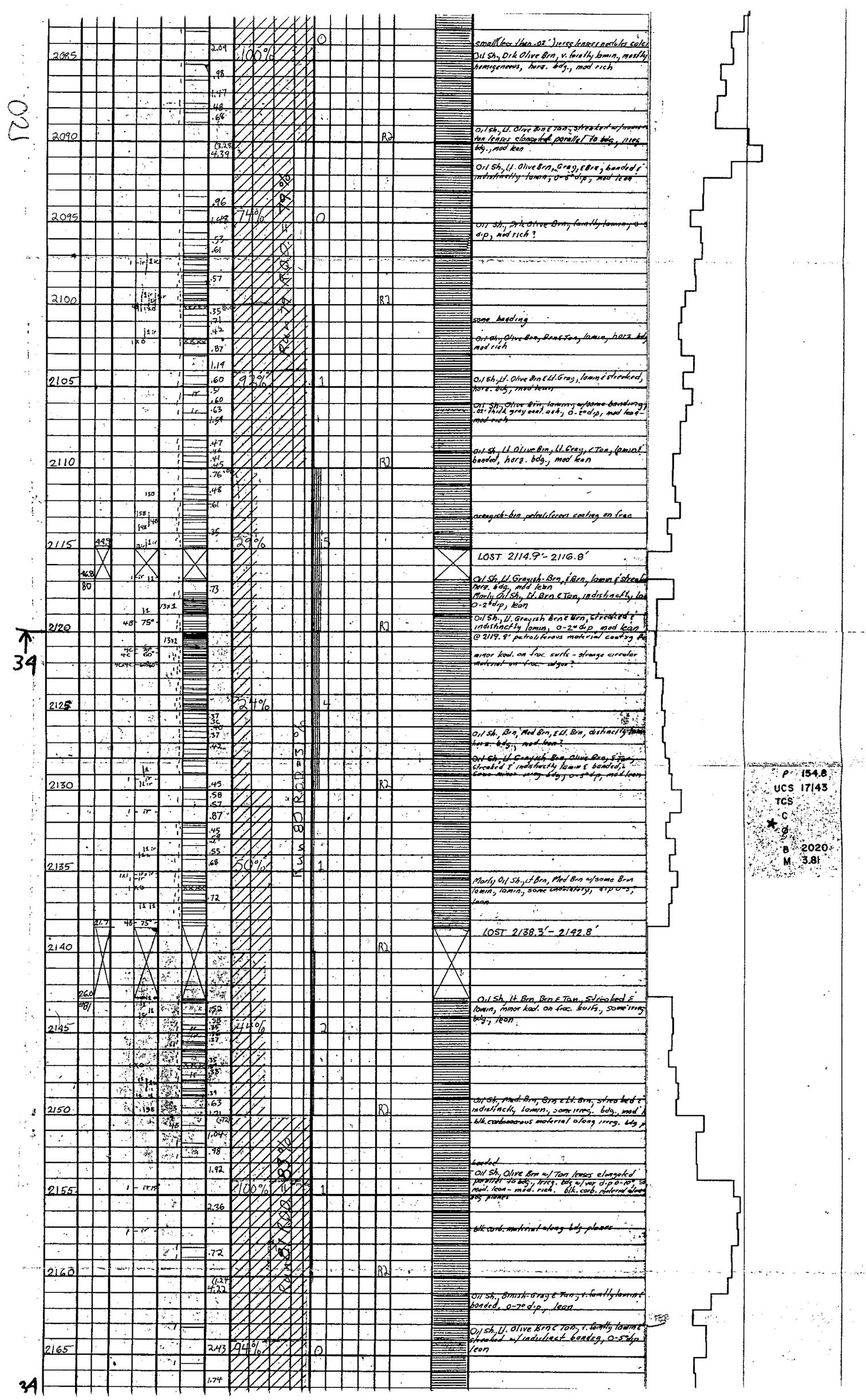
P 140.83
UCS 8180
TCS
C
Ø
B 1440
M 2.25
P 125.98
UCS 12868
TCS
C
Ø
B 2800
M 1.09
1805
1810
1815
1820
1825
1830
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
1885
60%
34%
48%
63%
75%
71%
47%
50%
Run 69 RQD = 49%
Run 70 RQD = 34%
Run 71 = 71%
Run 72 RQD = 64%
Run 73 RQD = 40%
34
20
33
1
6
6
1
18
Oil Sh., Med Brn, streaked & indistinctly lamin., minor kaol. on frac. surfs some disrupted & irreg. bdg., mod lean
rubble zone
.15' thick & smaller leached nah. cavs. through out w/ some marcasite coatings.
Oil Sh., Brn, Drk. Brn & Tan, streaked, some tan lenses, 0-5° dip, mod rich
richer & darker @ base
Oil Sh., V. Lt. Olive Brn & Tan, streaked & indis lamin., w/some tan lenses @ top, 0-3° dip w/ some undulatory bdg., lean
rubble zone,
Oil Sh., Med Brn & Lt. Brn, streaked, minor kaol., 0-4° dip, mod lean
numerous leached nah. cavs throughout not exceeding .14' thick
Argillaceous Marlstone, Gray, lamin, lean
LOST 1816.2'-1819.6
Oil Sh., Olive Brn, Brn & Tan, streaked pitted surf., minor kaol. on frac. surfs, 0-4° dip, mod lean - mod rich
.02' thick gillsonite lense
.06' thick leached nah. cavs @ Top w/ some marcasite & kaol coatings
broken zone
broken zone, Oil Sh., Tan & Lt. Brn, lamin, some kaol. & carbonaceous coatings on fracs.
broken zone
Oil Sh., Brn, streaked, 0-2° dip, mod rich
Oil Sh., Med. Brn & Tan, streaked, irreg & disrupted bdg. @ 1826.75' leached spongy weathered zone along bdg plane, mod lean
LOST 1828.3'-1832.5'
Oil Sh., Med Brn & Tan, streaked, w/ some tan lenses elongated & parallel to bdg, 0-3° dip, mod lean - mod rich
Oil Sh., Olive Brn & Gray, streak, indistinct lamin & banding, 0-2° dip, solid core, richer @ Top, mod lean
pitted surf. thru-out
some tan lenses & nodules
.02' thick gray ash band
gillsonite in fracs.
Oil Sh., Brn & Med Brn, lamin, horz. bdg, mod lean - mod rich
Oil Sh., Drk. Brn & Brn, streaked & indistinct lamin, horz. bdg, rich
.2' thick breccia or leached zone?
Oil Sh., Brn & Med Brn, streaked & indistinct lamin, horz. bdg, mod rich
Oil Sh., Lt. Olive Brn. & Med Brn, lamin. & streaked, horz. bdg., mod lean
broken zone
gillsonite on fracs.
Oil Sh., Brn, streaked w/ tan lenses & lamin., indistinctly lamin., irreg. & disrupted bdg, mod rich - rich
irreg bd. thk hydrocarb.
contorted bdg
.005' thick gilsonite lense
undulatory bdg.
.5' thick gray tan, lean
Oil Sh., Drk. Olive Brn & Drk. Brn, streaked & indistinctly lamin, 0-2° dip, rich
Drker. and richer.
gilsonite on frac. surf.
Oil Sh., Drk Brn, Brn, Olive Brn w/ rare Gray streaked & indistinctly lamin., 0-3° dip, mod rich - rich
Oil Sh., Olive Brn w/ Gray streaks & lamin., lamin, lamin, 0-3° dip, mod rich @ 1866.5'
.01' thick wht. anal. ash lamin.
broken zone
Oil Sh., Brn, lamin., 0-4° dip, mod rich
broken zone w/ what appears to be plant remains
Oil Sh., Olive Brn, Brn & Tan, lamin. & indistinctly banded, some loop struct., 0-5° dip, mod lean - mod rich
Oil Sh., Med Brn, streaked & pitted, mostly homogeneous, horz. bdg., mod lean
Oil Sh., Brn, Med Brn & Tan, streaked & indistinctly lamin., kaol. on frac. surfs, some irreg. & disrupted bdg., irreg ashey? lenses at top, mod lean - mod rich
Oil Sh., Brn & Drk Brn, lamin & streaked
.3' thick leached nah. cav., disrupted & irreg. bdg., mod rich - rich
Oil Sh., Drk Brn, lamin, irreg. bdg., rich
Oil Sh., Med Brn, Lt. Brn & Tan, streaked and indistinctly lamin, horz. bdg, mod lean
LOST 1882.3'-1887.7'
28
29
29
30

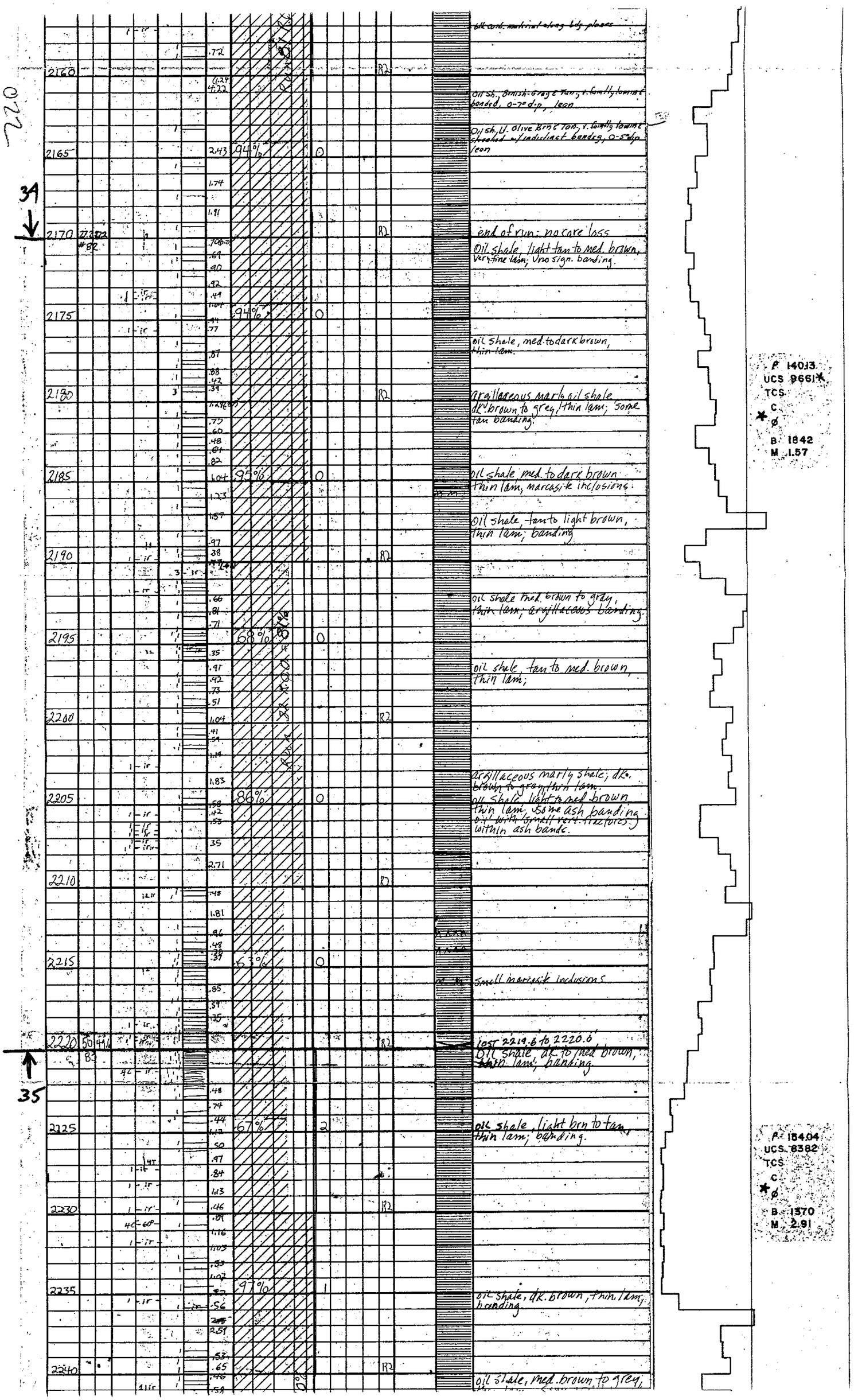

Oil Sh., Olive Brn, Brn & Tan, lamin. & indistinctly banded, some ldep struct., 0-5° dip, mod lean-mod rich
Oil Sh., Med Brn, streaked & pitted, mostly homogeneous, horz. bds., mod lean
Oil Sh., Brn, Med Brn & Tan, streaked & indistinctly lamin, local in lear carb, some irreg. & disrupted bds., irreg. ashy? textes of lap, mod lean-mod rich
Oil Sh. Brn & Dk. Brn, lamin & streaked, struck leached kah. cav., disrupted & irreg. bds., mod rich-rich
Rich, Dk Brn, lamin, irreg. bds., rich
Oil Sh., Med Brn, Lt. Brn & Tan, streaked and indistinctly lamin, horz. bds, mod lean
LOST 1882.3'-1887.7'
Oil Sh., Med Brn & Lt. Brn, streaked & indistinctly lamin, minor kah., 0-5° dip, mod lean
numerous small leached cavs. thru-out w/ kaol. infillings
Oil Sh., Dk Brn & Blk, lamin, loop streak irreg. bds, mod rich
Oil Sh., Brn Tan, & Gray, lamin. & banded, 0-20° dip, lean
Marly Oil Sh., tan, mostly homogeneous w/some clay lens, minor kah. sh. fracs, lean
Oil Sh., Med Brn, Brn & Tan, streaked & indistinctly lamin, 0-9° dip, lean-mod lean, @1898.6' .4' thick siltstone lense
numerous small leach cavs thro-out
Oil Sh., Lt Olive Brn, Gray & Tan, lamin & indistinctly banded, 0-3° dip, mod lean, 1' thick tan ash
Oil Sh., Lt. brn & tan, streaked, minor kaol., 0-3° dip, mod lean
small leached cavs w/ kaol. infillings
LOST 1907.7'-1911.6'
Oil Sh., Olive Brn, streaked, mostly homogeneous, 0-2° dip, mod-lean-mod rich
STRUCTURE LOGGING DONE FROM CORE PHOTOS; 1911.6-1919.4
Oil Sh., Tan, Gray, Lt. Brn. in distinctly banded & lamin., minor kaol., 0-5° dip mod lean
Oil Sh., Med Brn & Tan, streaked, minor kaol., 0-10° dip, mod lean
LOST 1919.4'-1920.6
Oil Shale, Med. brown to gray thin lam, banding
0.2' vertical fracture
2-0.3' vertical fractures filled
Tuffite
LOST 1946.4 to 1950.0
P 127.24
UCS 13333
TCS
C
Ø
B 2290
M 1.38
P 149.42
UCS 13660
TCS
C
Ø
B 3490
M 1.79

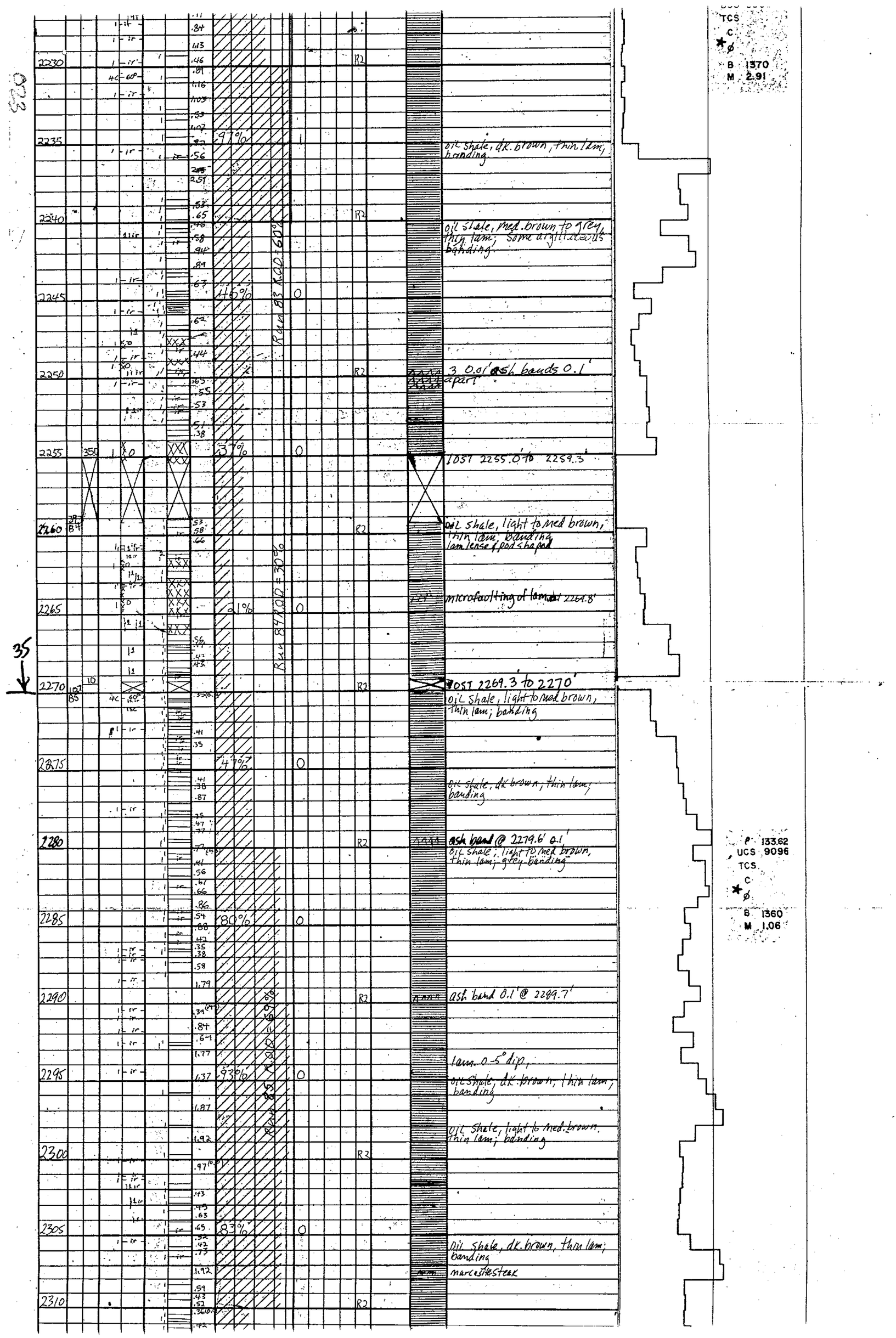


P 149.42
UCS 13650
TCS
C
Ø
B 3490
M 1.79
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2020
2025
26%
88%
97%
98%
90%
Run 76 RQD = 38%
Run 77 RQD = 94%
rubble
Lost 1946.4 to 1970.0
oil shale, dk. brown to med. brown, thin lam, some grey banding, very dense and hard.
open vertical fracture, 0.2' long, 0.01' wide
small round white-grey clay balls on vertical frac.
lenticular ash and marcasite inclusions
oil shale, med brown to grey, thin lam; banding.
oil shale, med brown to dk brn, thin lam; some grey banding.
leached nahcolite cavity 2111.7' 0.2'
lost 2019.2' to 2020.0'
oil shale, med. brown, thin lam; some banding
ash lenses 0.01': 2020.8 - 2022.2'
oil shale, med. brn to dk. brn, thin lam; banding
P 134.72
UCS 12640
TCS
C
Ø
B 1970
M 2.09
P 124.63
UCS 11047
31
2
32

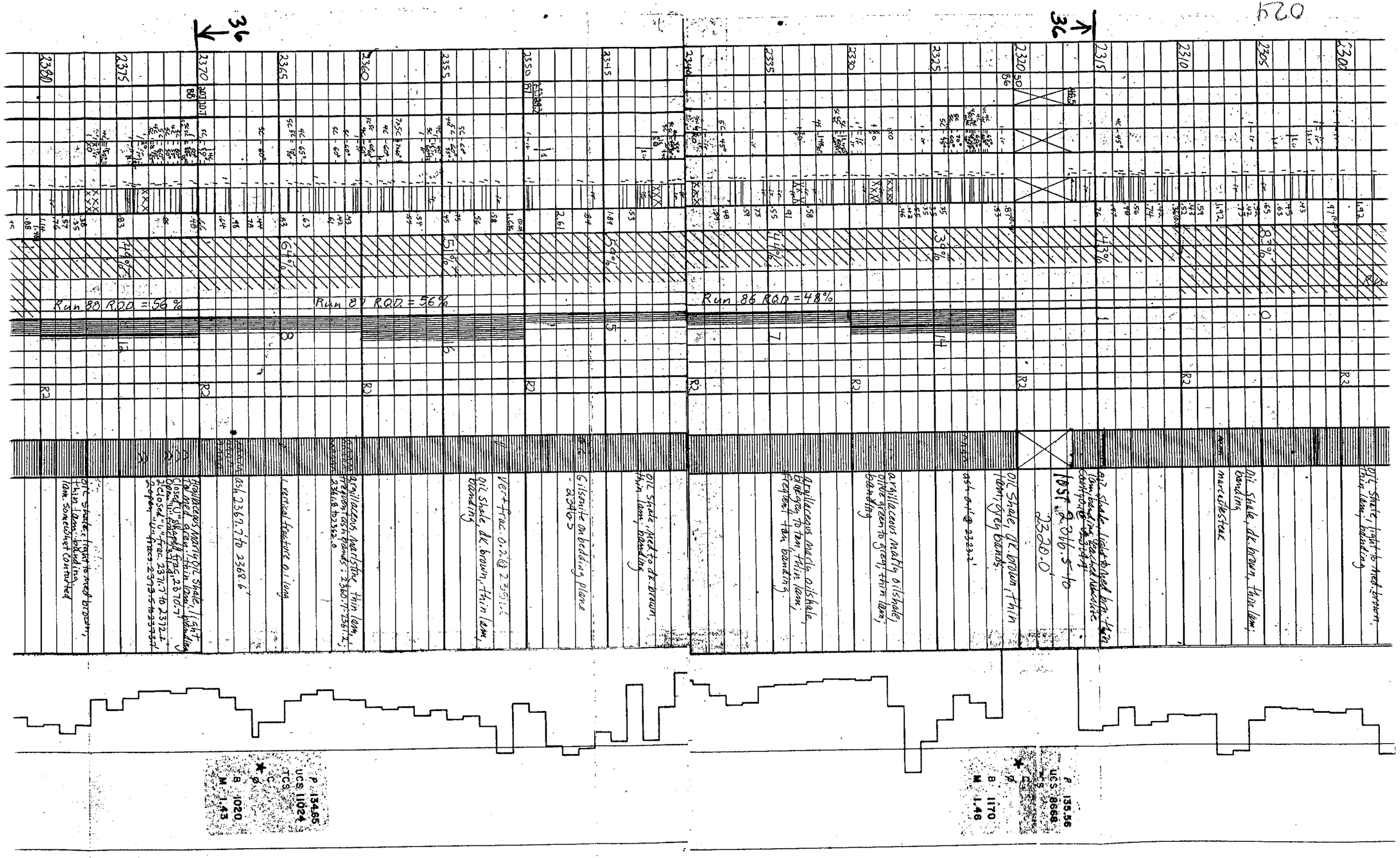

Oil Shale, med brown to lt brn, thin lam, some grey banding.
Leached nahcolite cavity 2111.7' 0.2'
P 134.72
UCS 12540
TCS
C
ø
B 1970
M 2.09
LOST 2019.2' to 2020.0'
Oil Shale, med brown, thin lam; some banding
Siltstone 0.01': 2020.8' - 2022.2'
Oil Shale, med brn to dk. brn, thin lam; banding
P 124.63
UCS 11047
TCS
C
ø
B 2350
M 1.60
Oil Shale, med to light brown, thin lam, banding
P 130.14
UCS 10755
TCS
C
ø
B 1450
M 1.58
Marcasite on bedding plane 2046.0'
P 139.89
UCS 14329
TCS
C
ø
B 2550
M 2.67
Oil Shale, dk brown to grey, thin lam; banding.
Oil Shale, med to light brn, thin lam; banding.
P 133.26
UCS 10037
TCS
C
ø
B 1340
M 1.35
Oil Shale dk brown with tan bands, thin lam.
LOST 2062.1' to 2070.0'
Oil Sh, Olive Brn, Brn & Lt Brn, brecciated & redrilled, laminae & streaked, mod. rich
Oil Sh, Dk Brn & Brn, w/ rare tan streaks & leaves, lamin., & streaked, localized irreg. bdg., 0-30 dip, rich
Oil Sh, Olive Brn & Dk Olive Brn, faintly lamin., mostly homogeneous, horz. bdg., mod rich
P 128.98
UCS 9984
TCS
C
ø
B 2340
M 1.08
Oil Sh, Lt Brn, Med Brn & Olive Brn, lamin & some minor irreg bdg., 0-70 dip, mod leaf
some indistinct banding
localized tan leaves & nodules
small bed (less .02') irreg leaves & nodules color
Oil Sh, Dk Olive Brn, v. faintly lamin., mostly homogeneous, horz. bdg., mod rich
Oil Sh, Lt. Olive Brn & tan, streaked w/ numerous tan leaves closely parallel to bdg, irreg bdg., mod lean
Oil Sh, Lt. Olive Brn, Gray, & Brn, banded & indistinctly lamin, 0-5 dip, mod lean
Oil Sh, Dk Olive Brn, faintly lamin, 0-5 dip, mod rich?
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
33
32
#79
80
50
78
RJ
O
78%
83%
79%
77%
80%
100%
74%


2085
2090
2095
2100
2105
2110
2115
2120
2125
2130
2135
2140
2145
2150
2155
2160
2165
100%
74%
93%
29%
24%
50%
44%
100%
94%
LOST 2114.9'-2116.8'
LOST 2138.3'-2142.8'
RUN 80 RECOVERY 3
RUN 80 RECOVERY 100%
small (less than .03") irreg. lenses nodules calc
Oil Sh, Dk Olive Brn, v. faintly lamin., mostly homogeneous, horz. bdg., mod rich
Oil Sh, Lt. Olive Brn & Tan, streaked w/ some tan lenses elongated parallel to bdg, irreg bdg., mod lean
Oil Sh, Lt. Olive Brn, Gray, & Brn, banded & indistinctly lamin, 0-5° dip, mod lean
Oil Sh, Dk Olive Brn, faintly lamin, 0-5 dip, mod rich ?
some banding
Oil Sh, Olive Brn, Brn & Tan, lamin, horz bdg mod rich
Oil Sh, Lt. Olive Brn & Lt. Gray, lamin & streaked, horz. bdg, mod lean
Oil Sh, Olive Brn, lamin w/ some banding, .02" thick gray anal. ash, 0-5° dip, mod lean-mod rich
Oil Sh, Lt Olive Brn, Lt Gray, & Tan, faint banded, horz. bdg., mod lean
orange-brn petroliferous coating on frac
Oil Sh, Lt Grayish-Brn, & Brn, lamin & streaked horz. bdg, mod lean
Marly Oil Sh, Lt. Brn & Tan, indistinctly lam 0-2° dip, lean
Oil Sh, Lt. Grayish Brn & Brn, streaked & indistinctly lamin, 0-2° dip mod lean
@ 2119.9' petroliferous material coating fr
minor kaol. on frac. surfs - strange circular material on frac. surfs ?
Oil Sh, Brn, Med Brn, & Lt. Brn, distinctly lam horz. bdg., mod lean ?
Oil Sh, Lt Grayish Brn, Olive Gray, & Gray streaked & indistinctly lamin & banded, some minor irreg bdg, 0-5° dip, mod lean
Marly Oil Sh, Lt Brn, Med Brn w/ some Brn lamin, lamin, some laminations, dip 0-5, lean
Oil Sh, Lt. Brn, Brn & Tan, streaked & lamin, minor kaol. on frac. surfs., some irreg bdg., lean
Oil Sh, Med Brn, Gray & Lt. Brn, streaked & indistinct, lamin, some irreg. bdg., mod blk carbonaceous material along irreg. bdg p
banded
Oil Sh, Olive Brn w/ Tan lenses elongated parallel to bdg., irreg. bdg w/ var dip 0-10°, sl kaol. lean - mod. rich. blk. carb. material along bdg planes
blk carb. material along bdg planes
Oil Sh, Brnish-Gray & Tan, faintly laminated banded, 0-7° dip, lean
Oil Sh, Lt. Olive Brn & Tan, faintly laminated streaked w/ indistinct banding, 0-5° dip lean
P 154.8
UCS 1743
TCS
C
d
B 2020
M 3.81

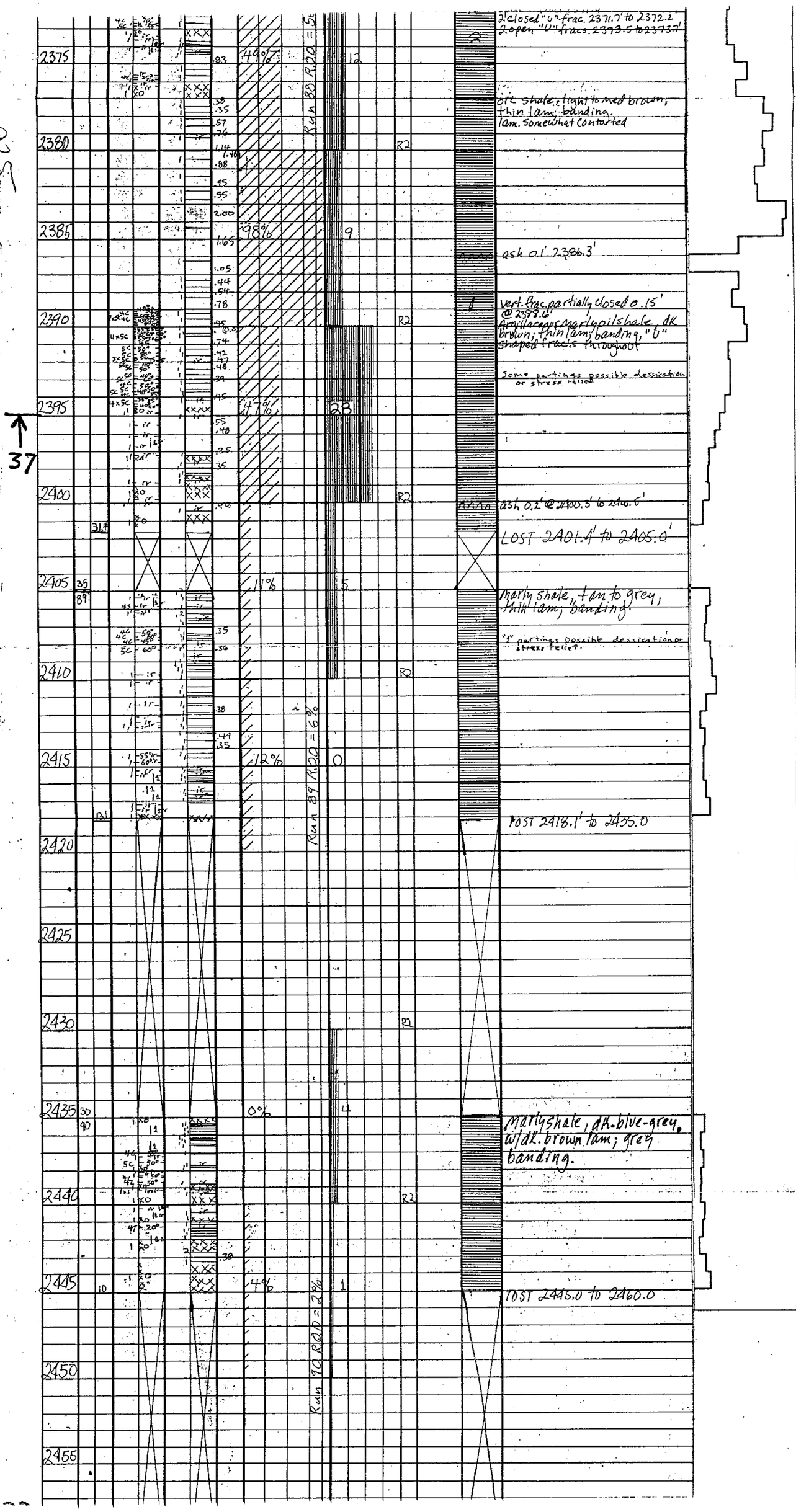

2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220
2225
2230
2235
2240
34
35
94%
94%
95%
68%
86%
63%
67%
91%
end of run: no core loss
Oil shale, light tan to med. brown, Very fine lam; Vno sign. banding.
oil shale, med. to dark brown, thin lam.
argillaceous marly oil shale dk. brown to grey, thin lam; some tan banding.
oil shale med. to dark brown thin lam, marcasite inclusions.
oil shale, tan to light brown, thin lam; banding
oil shale med. brown to gray,
oil shale, tan to med. brown, thin lam;
argillaceous marly shale; dk. brown to gray, thin lam.
oil shale, light to med brown, thin lam, some ash banding within ash bands.
small marcasite inclusions
lost 2219.6 to 2220.6
Oil shale, dk. to med brown, banding
oil shale, light brn to tan, thin lam; banding.
oil shale, dk. brown, thin lam, banding
oil shale, med. brown to grey,
P 140.13
UCS 9661
TCS
C
Ø
B 1842
M 1.57
P 184.04
UCS 8382
TCS
C
Ø
B 1570
M 2.91

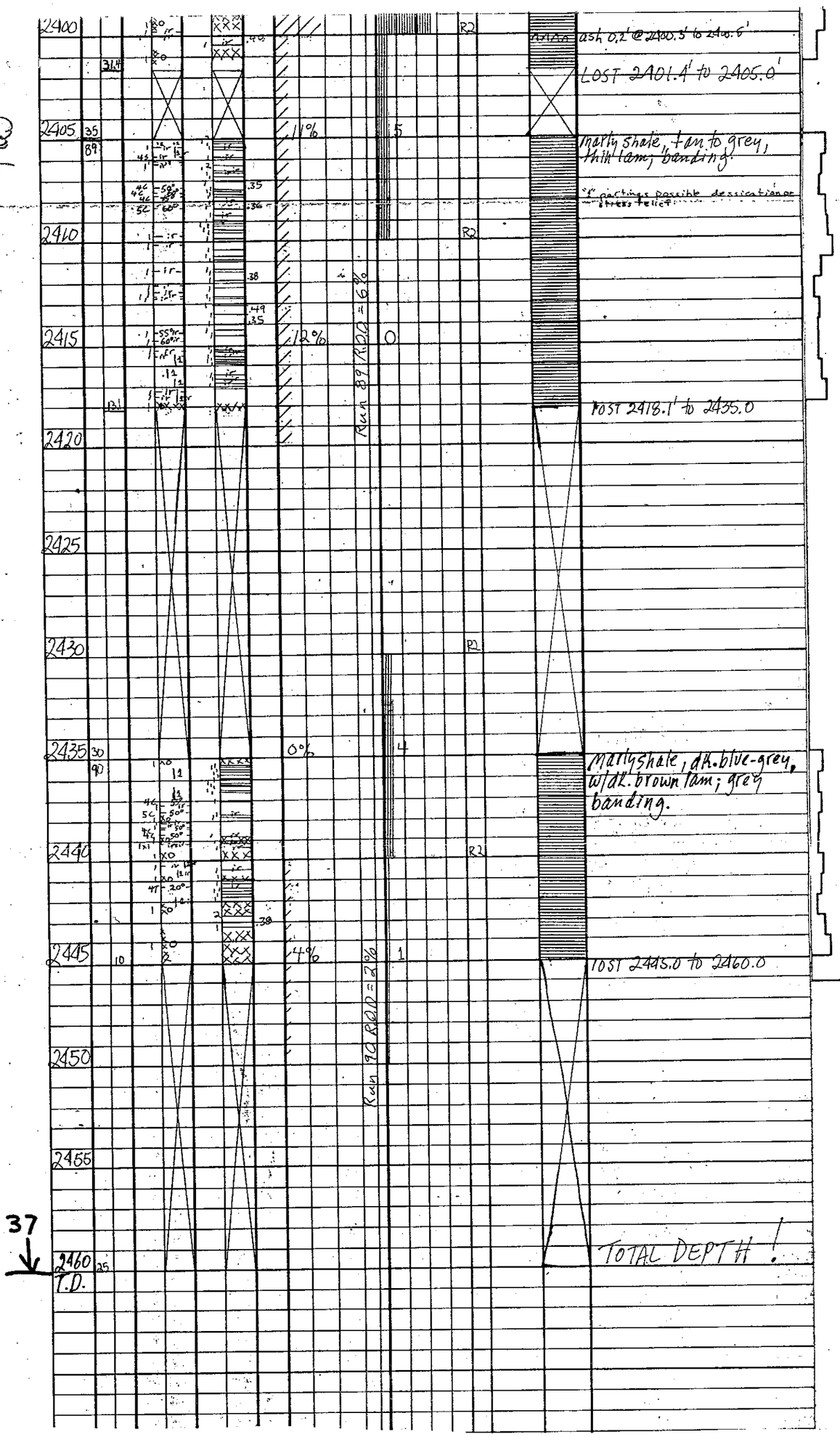


TCS
C
B 1370
M 2.91
2230
2235
2240
2245
2250
2255
2260
2265
2270
2275
2280
2285
2290
2295
2300
2305
2310
97%
46%
37%
21%
47%
80%
93%
83%
Run 83 RQD = 60%
Run 84 RQD = 30%
Run 85 RQD = 69%
R2
oil shale, dk. brown, thin lam; banding
oil shale, med. brown to grey, thin lam; some argillaceous banding
3 0.01' ash bands 0.1' apart
LOST 2255.0' to 2259.3'
oil shale, light to med brown, thin lam; banding
lam lense & pod shaped
microfaulting of lam at 2264.8'
LOST 2269.3' to 2270'
oil shale, light to med brown, thin lam; banding
oil shale, dk brown, thin lam; banding
ash band @ 2279.6' 0.1'
oil shale, light to med brown, thin lam; grey banding
ash band 0.1' @ 2289.7'
lam. 0-5° dip,
oil shale, dk. brown, thin lam; banding
oil shale, light to med. brown, thin lam; banding
oil shale, dk. brown, thin lam; banding
marcasite steak
P 133.62
UCS 9096
TCS
C
B 1360
M 1.06
35



Run 88 RQD = 56%
Run 87 RQD = 56%
Run 86 RQD = 48%
Oil shale, light to med. brown, thin lam; banding
Oil shale, dk. brown, thin lam; banding
marcasite steak
Oil shale, light to med. brn, thin lam, banding, leached nucleic cavity 0.1 @ 2314.4
lost 2316.5 to 2320.0
Oil shale, dk. brown, thin lam, grey bands.
ash 0.1' @ 2323.2'
argillaceous marly oilshale, olive green to grey, thin lam; banding
Argillaceous marly oilshale, blue grey to tan, thin lam; frequent tan banding.
Oil shale, med. to dk. brown, thin lam; banding
Gilsonite on bedding plane 2346.5
Vert frac. 0.2' @ 2351.1
Oil shale, dk. brown, thin lam, banding
argillaceous marlstone, thin lam, frequent ash bands: 2360.7-2361.2; 2361.8 to 2362.0
1 vertical fracture 0.1 long
ash 2367.7' to 2368.6'
Argillaceous marly oil shale, light to med. grey, thin lam, banding
Closed "U" shaped frac. 2370.7'
Open "U" frac. 2371.4'
2 closed "U" frac. 2371.7' to 2372.2
2 open "U" fracs. 2373.5 to 2373.7'
Oil shale, light to med. brown, thin lam, banding.
lam. somewhat contorted
P 134.65
UCS 11024
TCS
C
B 1020
M 1.43
P 135.56
UCS 8668
TCS
C
B 1170
M 1.46


2375
2380
2385
2390
2395
2400
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
49%
98%
11%
12%
0%
4%
Run 80 R20 = 5%
Run 89 R20 = 6%
Run 90 R20 = 2%
2 closed "U" frac. 2371.7' to 2372.2
2 open "U" fracs. 2373.5 to 2373.7'
Oil shale, light to med brown, thin lam. banding. lam. somewhat contorted
ash 0.1' 2386.3'
Vert. frac. partially closed 0.15' @ 2399.6'
Argillaceous marly oil shale, dk brown, thin lam. banding, "U" shaped fracs. throughout
Some partings possible dessication or stress relief
ash 0.1' @ 2400.5' to 2400.6'
LOST 2401.4' to 2405.0'
Marly shale, tan to grey, thin lam. banding.
"f" partings possible dessication or stress relief.
LOST 2418.1' to 2435.0
Marly shale, dk. blue-grey, w/dk. brown lam; grey banding.
LOST 2445.0 to 2460.0
R2
31.4
39
89
101
30
90
10
37


2400
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
T.D.
37
Ash 0.2' @ 2400.5 to 2400.6'
LOST 2401.4' to 2405.0'
marly shale, tan to grey, thin lam; banding
"c" partings possible dessication or stress relief
LOST 2418.1' to 2435.0
marlyshale, dk. blue-grey, w/dk. brown lam; grey banding.
LOST 2445.0 to 2460.0
TOTAL DEPTH !
Run 89 RQD = 6%
Run 90 RQD = 7%
11%
12%
0%
4%
R2