14-55-95W

C360

Lithology Logs For Core Hole # 20

THE CLEVELAND-CLIFFS IRON CO. PROJECT: US NAVY

HOLE NO. 20 SHEET 1 OF 2 DATE: 9-19-77 LOGGED BY: M. P. T.D.

	DEPTH	±MM	FRX	PP	CAL/TON	CORE REC.	LITH.	DESCRIPTION
0	10							
10	20							
20	30							
30	40							(NO SAMPLES)
40	50							CALCAREOUS, SILTSTONE TO CALCAREOUS
50	60							SANDSTONE - LIGHT BROWN
60	70							@ 65' HIT A MOIST ZONE NOT MAKING WATER
70	80							POSSIBLE BROKEN ZONE
80	90							
90	100							
100	110							
110	120							
120	130							SANDSTONE - GRAY TO LT. GRAY - NON CALCAREOUS
130	140							SANDSTONE - GRAY TO LT. GRAY - SLIGHTLY CALCAREOUS
140	150							SANDSTONE - GRAY TO LT. GRAY - SLIGHTLY CALCAREOUS
150	160							SANDSTONE - GRAY TO LT. GRAY - SLIGHTLY CALCAREOUS
160	170							SANDSTONE - GRAY TO BLACK - SLIGHTLY CALCAREOUS (GILSONITE?
170	180							NO SAMPLE GEOLOGRAPH FAILED
180	190							& NO SAMPLE GEOLOGRAPH FAILED
190	200							SANDSTONE - GRAY TO LT. GRAY - SLIGHTLY CALCAREOU
200	210							SANDSTONE GRAY SLIGHTLY CALCAREOUS
210	220							SANDSTONE GRAY SLIGHTLY CALCAREOUS
220	230							SANDSTONE GRAY V FINE GRAINED SLIGHTLY CALCAREOU
230	240							SILTSTONE GRAY - BUFF CALCAREOUS
240	250							NO SAMPLE - STREAM TO POWERFUL
250	260							NO SAMPLE GEOLOGRAPH FAILED
260	270							SILTSTONE GRAY - DK GRAY - V SLIGHTLY CALCAREOU
270	280							NO SAMPLE
280	290							SILTSTONE GRAY - DK GRAY - SLIGHTLY CALCAREOUS
290	300							MUDSTONE GRAY - BRN - V. SLIGHTLY CALCAREOUS
300	310							MUDSTONE W/SOME SILT - GRAY - CALCAREOUS
310	320							MUDSTONE GRAY - BRN - CALCAREOUS.
320	330							MUDSTONE GRAY - CALCAREOUS
330	340							MUDSTONE TR. SAND - GRAY - NON CALCAREOUS
340	350							NO SAMPLE STREAM TO POWERFUL
350	360							NO SAMPLE STREAM TO POWERFUL
360	370							MUDSTONE - GRAY - NON CALCAREOUS
370	380							MUDSTONE GRAY - NON CALCAREOUS
380	390							NO SAMPLE STREAM TO POWERFUL
390	400							MUDSTONE - BROWN - CALCAREOUS
400	410							MUDSTONE - TAN - LT. BROWN - NON-CALCAREOUS
410	420							MUDSTONE - DARK BROWN - NON-CALCAREOUS
420	430							MUDSTONE - DARK BROWN - CALCAREOUS, TR. SAND
430	440							MUDSTONE - DARK BROWN - CALCAREOUS, 10% SAND
440	450							MUDSTONE - LT. BROWN - CALCAREOUS - NO SAND
450	460							MUDSTONE - GRAY - BROWN - SOME YELLOW & RED SANDS
460	470							MUDSTONE - GRAY - TR. DARK SAND - SLTLY CALCAREOUS
470	480							MUDSTONE - MED BROWN - CALCAREOUS - SOME SAND
480	490							MUDSTONE - LT GRAY - SOME SAND - SLTLY CALCAREO
490	500							MUDSTONE - LT BROWN - SLTLY CALCAREOUS

COMMENTS:

HOLE NO. 20 SHEET 2 OF ___ DATE: 9-21-77 LOGGED BY: WM T.D. ___

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
510							SILTSTONE - LT BROWN MARLSTONE - BEIGE - SLTLY CALC.
520							SILTSTONE - BROWN MARLSTONE - BEIGE - VERY CALC
530							SILTSTONE - RED - BROWN MARLSTONE - THIN - SOME SAND
540					SOULD BE OIL SHALE W/ INTER BEDDED SANDS		SILTSTONE - RED - BROWN MARLSTONE W/ REROGENE SHALE INCLUSIONS
550							SILTSTONE - DARK BROWN - CALCAREOUS
560							SILTSTONE - RED - BROWN - X-TALLINE CALCITE
570							NO SAMPLE - AIR PRESSURE TOO HIGH
580							SILTSTONE - DARK BROWN & DARK GRAY - CALCAREOUS
590							OIL SHALE - DARK REDISH BROWN FISSILE CALCAREOUS
600							OIL SHALE - DARK REDISH BROWN FISSILE, CHUNKS CALCAREOUS
610							OIL SHALE - DARK REDISH BROWN (W/ SS LT GRAY) BOTH CALCAREOUS
620							OIL SHALE - DARK REDISH BROWN, FISSILE, CALCAREOUS
630					630		OIL SHALE DARK REDISH BROWN, FISSILE, CALCAREOUS
640					CORING POINT		
650							
660							
670							
680							
690							
700							
710							
720							
730							

COMMENTS:

≈500' STARTED HITTING INTERBEDDED OIL SHALE LAYERS WITH CONTACT OF UINTA FM AND GREEN RIVER FM @ ≈540

OIL SHALE IS DARK REDISH BROWN, FISSILE, CALCAREOUS ~~[illegible]~~

WES MOULTON

THE CLEVELAND—CLIFFS IRON COMPANY

PROJECT: NOSR 1

PICTURE HOLE NO. 20 SHEET 1 OF ___ DATE: 9/22/77 LOGGED BY PUTNAM / SUNBLAD / W MOULTON COLLAR: 8380' TD

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
630		+.4'					630-630.25 SILTSTONE BROWN TO GRAY SLIGHTLY CALCAREOUS
631			+.68				MINOR ALTERATION IN JOINTS (GYPSUM?)
632			+.7				630.25-632.80 MARLSTONE LT. GRAY CALCAREOUS
633							LAMINATED W/ OIL SHALE DK BRN TO BLACK LOW-MED
634							GRADE. BLACK BLEBS (GILSONITE?) 2ND ARY MINERALI
635							ZATION ALONG JOINTS (GYPSUM?)
636							632.80-638.80 SILTY TUFF W/SOME SAND BROWN
637							CALCAREOUS. NUMEROUS VUGS SOME WITH 2ND ARY
638			+.85'				MINERALIZATION. (GYPSUM?)
639							638.80-643.6 - OIL SHALE & GRAY-DK BRN MED. GRADE, CALCAR-
640			+.34'				EOUS. UNIFORM BEDDING. LAMINAE ARE HIGH GRADE OIL
641			+.15'				SHALE DK BRN-BLACK. SLIGHT ALTERATION MINERAL DEPOSITS
642							ON PP'S
643			+.33'				643.6-645.2 - OIL SHALE DK BRN-BLACK V. SLIGHTLY
644							CALCAREOUS - VERY HIGH GRADE. 2ND ARY MINERAL ALONG
645							JOINTS (CALCITE?)
646			+.22'				645.2-650.7 - OIL SHALE GRAY-BROWN MED. GRADE CALCAR-
647			+.45 +.00				EOUS. LAMINATED W/ VEINS OF OIL SHALE. DKBRN TO
648			+.55				BLACK HIGH GRADE. SLIGHT 2ND ARY MINERALIZATION ON
649							PP'S (GYPSUM?) AND IN VUGGY VEINS AT 648.9 AND
650			+.45				650.25
651							650.7-651.75 - OIL SHALE DKBRN-BLACK HIGH GRADE
652							CALCAREOUS INTERBEDDED W/ SANDY TUFF LT.
653							BRN HIGHLY CALCAREOUS
654			+.73'				651.75-658.43 - OIL SHALE GRAY-BRN MED-LOW GRADE
655							CALCAREOUS SOME VUGS PRESENT LINED WITH
656							AT LEAST 2 MINERALS (QUARTZ?) (CALCITE?)
657		VER	W/HCO STAIN				~~[illegible] OIL SHALE LT GRAY-BRN~~
658				~~[illegible]~~ NA SALTS			658.43 668.8 OIL SHALE LT GRAY-BRN LOW-
659			+.27				MED GRADE CALCAREOUS. 2ND ARY MINERAL-
660				W/BLACK POWDER STAIN			IZATION ALONG PARTING PLANES (SULFIDES?)
661							(GYPSUM?) (CALCITE?)
662			+.50				
663							
664			+.70				
665			+.90				
666			+.75				
667							
668							672 ~~[illegible]~~ - SILTY TUFF LT GRAY NON CALCAR-
669							EOUS TRACE AMOUNTS OF SULFIDES PRESENT
670							670.05-671.3 - OIL SHALE LT GRAY-BRN LOW-MED
671							GRADE NON CALCAREOUS
672			+.1				671.3-677.3 OIL SHALE DK BRN-BLACK. HIGH

CUT 50.0' RED 50.0

COMMENTS:

* BUST IN MEASUREMENTS TWO 663'S (3' APART) CORRECTED (WM)

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: U.S. NAVY

HOLE NO. 2 SHEET 2 OF ___ DATE: 9-~~22~~ 23 17 LOGGED BY: W. Moulton COLLAR: ___ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
673							GRADE –
674							673-679 OIL SHALE MEDIUM TO HIGH GRADE BROWN
675							(REDISH) TO BLACK HARD ~~CALCAREOUS~~ ROCK NOT
676							CALCAREOUS
677		.00 70° JOINT					JOINT IS FILLED W/ SODIUM (CALCAREOUS) SALTS
678			WITH NA SALTS (STAIN)				
679							.2' LOST ON BOTTOM
680							679-707 OIL SHALE, MEDIUM GRADE, ~~SLIGHTLY~~
681			.15				BROWN TO REDISH BROWN, FISSILE, HARD WITH CONCOIDAL
682							FRX
683							681.7 SANDSTONE BLEB
684			.35				
685							
686							
687		36					687.7 CLOSED JOINT 45°
688							
689			.05				
690							
691							
692							
693							
694							
695		.3 VERT					695.3-696.5 VERTICAL FRX WITH CRYSTALLY OF PYRITE
696							ON EXPOSED FACE
697							696.73-697.37 BROKEN ZONE - SUSPECT MECHANICAL
698							FRX
699							697.37-703.2 VERTICAL FRX WITH REMINANT OIL AND
700		VERT					TAR -- SOME NON CALCAREOUS WHITE
701							MATTERIAL PRESENT ON BROKEN
702							SURFACE
703							
704							
705							705.65-709.3 VERTICAL FRX AT TOP FRX IS OPEN AND AT
706							BOTTOM FRX IS CLOSED
707		VERT					707.8-708 SANDSTONE BLEB
708							708 CLOSED JOINT 45°
709							707-715 OIL SHALE MEDIUM TO HIGH GRADE
710		.08					PREDOMINATELY MEDIUM GRADE, REDISH
711							BROWN TO DARK BROWN HARD ROCK WITH
712							CONCOIDAL FRX
713							
714							
715							

CUT 600' RQD 59.7

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: C.D. NAVY

HOLE NO. 20 SHEET 3 OF ____ DATE: 9-23-71 LOGGED BY: W. Bolton M. Putnam COLLAR: ____ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
716							716 - 733.51 OIL SHALE MEDIUM TO HIGH GRADE
717							PREDOMINATELY MEDIUM GRADE, REDISH BROWN
718							TO DARK BROWN, HARD COMPETENT KEROGEN
719							CONCOIDAL FRX
720							722 - 131, SANDSTONE LAYER
721							
722		70°					722 - 723.41 - 70° FRX WITH PYRITE CRYSTALS ON
723							EXPOSED SURFACES
724							
725							
726							
727							
728							
729							
730							
731							
732							
733			51				733.51 - 742.48 Oil Shale; Brown to
734							Dark Brown, Calcareous, Laminated
735							with veins of Oil Shale Dk. Brown
736							To Black
737							
738							
739			.95				
740							
741							
742							742.48 - 742.58 Sand of Sandstone
743			.67				Coarse to Medium Grain
744			.72				Poorly Sorted
745							742.58 - 753.83 Oil Shale Brn to Dk
746			.28				Brn, Calcareous Laminae are Oil
747							Shale Med to High Grade. Overall
748			.10				Section - Med to High Grade
749			.06				Some Pyritization on PP's.
750							
751			.26				
752							
753			.23				753.83 755.65 Oil Shale Dk Brn Black
754							Calcareous Laminated High Grade
755			.23				755.65 774.13 Oil Shale Brn - Dk Brn
756			.79				Calcareous, Competent Med - High Grade
757							
758			.51				

CUT 54.0', REC. 53.15

COMMENTS:

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: [illegible]

HOLE NO. 20 SHEET 4 OF ___ DATE: 9/23/77 LOGGED BY: PUTNAM COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
759			.64				
60			.27				
61			.78				
62			.61				
63			.65				
64			.73				
65			.80				765.88 – <.1' VOLCANIC TUFF
66							
67							767.85 – 769.65 – OIL SHALE AS ABOVE W/
68							NUMEROUS VUGS.
69							
70							
71							
72					CUT		
73					REC.		
74							774.13 – 775.59 OIL SHALE DK BRN BLACK
75					54.0'		NON-CALCAREOUS. HIGH GRADE. .04'
76					53.19		VEIN OF TUFF LT BRN W/ SOME SAND
77			.04				@ 774.45 – 774.49
78			.00				775.59 – 778.41. OIL SHALE BRN DK BRN, COMPETENT
79			.70				CALCAREOUS, LAMINATED, MED TO HIGH
80							GRADE, PREDOMINATELY MED. GRADE
81							778.41 – 781.6 OIL SHALE – SAME AS
82			.79				775.59 – 778.41
83			.40				781.6 – 784.35 OIL SHALE DK BRN TO BLACK
84							CALCAREOUS HIGH GRADE
85							784.35 – 786.55 OIL SHALE GRAY TO BRN
786			.55				NON-CALCAREOUS MED-LOW GRADE
187							PREDOMINANTLY MED. GRADE LITTLE TO
88							NO MINERALIZATION ON PP's.
89							786.55 – 8[illegible] OIL SHALE MEDIUM GRADE
90							BROWN TO DARK BROWN HARD FISSILE ROCK.
91							COMPETENT ROCK
92							
93							
94							
95							
96							
97					CUT		
98					REC.		
99					22.0		
800							
01							

COMMENTS:

THE CLEVELAND–CLIFFS IRON COMPANY PROJECT: LI'S NAVY

HOLE NO. ZC SHEET 5 OF ____ DATE: 9-24-77 LOGGED BY: WA BOLTON COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
802							801.8 - 810.1 OIL SHALE MEDIUM TO HIGH GRADE
803							PREDOMINATELY ~~MEDIUM~~ HIGH GRADE BROWN TO
804							DARK BROWN FISSILE HARD COMPETENT ROCK
805							804.3 - 809.93 VERTICAL FRX W/WHITE NON-CALCAREOUS
806		VR					MATERIAL - INDETERMINENT OIL.
807							
808					808.33		
809							
810							810.3 811.3 VERTICAL JOINT CLOSED
811		VR 0.5 0.3					812.7 - 813 OIL SHALE HIGHER GRADE THAN SURROUNDING
812							MATERIAL, DARK BROWN TO BLACK, SOME
813							HARD, FISSILE, NON-CALCAREOUS
814			.32				813 - ~~814~~ 814.1 OIL SHALE MEDIUM TO LOW-GRADE PREDOMIN
815							ATELY LOW GRADE LIGHT ~~BROWN~~ TO BROWN
816							HARD FISSILE ROCK
817			.17				
818			.29				818.9 - 820
819		45					819.25 - 820.5 - 45° JOINT OPEN WITH F/E/TE MINERALIZATION
820			.8				ON EXPOSED SURFACES
821							821 - 821.1 SANDSTONE LAYER W/ ~~THE~~ CALCITE INCLUSIONS
822							
823							
824							
825							
826							
827							838.0
828							828 - ~~835~~ OIL SHALE MEDIUM TO HIGH GRADE
829							BROWN TO DARK BROWN WITH WHITE NON-
830							CALCAREOUS MATERIAL ON OPEN JOINT
831		45					831.55 TO 832 - TWO 45° JOINTS OPEN ‖ HARD COMPETENT
832							ROCK
833		45					
834							
835			.15		835.1		834.3 - 835 SANDSTONE LAYER WHITE IN COLOR, SLIGHTLY
836							CALCAREOUS, FINE GRAINED
837							
838							
839							839.95 - 840.15 - SANDSTONE LAYER, REDISH BROWN, NOT
840							CALCAREOUS, MEDIUM GRAINED
841							
842			.5				838 - 840.40 Oil Shale, Dark Brown To
843							Black, Appears To Have Good Kerogen
844			.05				Content, Laminated,
							Non-Calcareous

CUT 2¢ FROM 802 TO 835.1 IN TRAYS @ NOON 9-24-77 WMN.

CUT 6¢ 835.1 TO 844 IN TRAYS @ NOON 9-24-77 WMN.

COMMENTS:

THE CLEVELAND–CLIFFS IRON COMPANY PROJECT: WLS (NEW)

HOLE NO. 26 SHEET 6 OF ____ DATE: 9-24-11 LOGGED BY: M PUTNAM / W WALTON / D. SUNDBLAD COLLAR: ____ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
845							840.4 – 845 Oil Shale, Brown To Light Brown, Thinly Laminated Brown To Dark Brown, Slightly Calcareous, Competent Rock.
846							845 – 850 Oil Shale, As Above,
847							846.85 – 847.2 Sandstone Layer, Medium To Fine G
848							
849			.05				850 – 861 Oil Shale, Brown To Light Brown, Laminae Ace Mostly Dk Brown, Slightly Calcareous.
850							
851							
852							
853							853.4 – .6 Sandstone Layer
854							854.0 – .4 Sandstone Layer
855							
856							
857							857.4 – .6 Tuffaceous Layer
858							
859							
860							B
861							861 – 864 Oil Shale, Dark Brown High Grade, Non Calcareous, Laminated.
862							864 – 867.21 – Marlstone, Lt. Gray, Calcareous
863							864.18 – 864.22 Tu Analcitized Tuff Bed
864							864.44 – 864.49 – Analcitized Tuff Bed
865							864.86 – 864.90 – Analcitized Tuff Bed
866							865.34 – 865.41 – Analcitized Tuff Bed
867							865.50 – 865.53 – Analcitized Tuff Bed
868							867.21 – 868.89 – Oil Shale, Black, Calcareous High Grade, Laminated
869		70					868.89 – 875.0 – Oil Shale, Brn. To Dk Brn., Non-Calcareous, Laminated
870							875.0 – 886.65 Oil Shale, Lt Gray – Brn Low–Med. Grade, Laminated
871							875.36 – 875.52 – Tuff
872							877.1 – Vugs < .1' Thick
873							877.27 – 877.4 – Tuff
874							Numerous Tuff Lenses Between
875							882.0 & 883.0
876			.5				
877							
878							
879							
880							
881							
882							
883							
884							
885							
886							
887							886.65 – 893.39 – Oil Shale Dk Brn, Calcareous, Med Grade, Laminated

COMMENTS: Wes: – .6 of a Foot Missing (Dust) 850 – 851 ?

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: USN

HOLE NO. 20 SHEET 7 OF ___ DATE: 9 LOGGED BY: PUTNAM COLLAR: ___ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
888							SOME (CALCITE?) ALONG JOINTS.
889			.16				
890							890.75 – 893.39 CORE IS HIGHLY BROKEN UP.
91							NOT ABLE TO PIECE TOGETHER. SAME
92							LITHOLOGY AS ~~886~~ ABOVE. WRAPED +
93							PACKED IN RUBBLE FORM TO VERIFY
94							LACK OF LOST CORE IN LAB.
95							
96							
97							
98							
99							
900			.87				900–912.13 – OIL SHALE BRN W/ BLACK LAMINAE
01							OF HIGH GRADE OIL SHALE, SLIGHTLY
02							CALCAREOUS OVERALL SECTION – MED GRADE
03							SOME GILSONITE BLEBS SEEN ON
04							FRACTURUED (ARTIFICIAL + NATURAL) SURFACES
05							
06							
07		.25 65°					
8							
9							
10							
11							911.48 – 911.56 – TUFF LENSES
12							912.13 – 912.75 – OIL SHALE AS ABOVE
13							INTERBEDDED W/ TUFFACEOUS MATERIAL
14			.40				912.75 – 913.99 – SAME AS 912.13 – 912.75 BUT
15							MORE TUFFACEOUS MATERIAL PRESENT.
16							913.99 – 914.78 – UPPER WAVY BED.
17		60°					914.78 – 919.48 – OIL SHALE OK BRN, LAMI-
18							NATED MED GRADE, CALCAREOUS
19			.92				GILSONITE BLEBS, SOME MINERALIZATION
20							ON FRX'S (CALCITE?)
21							919.48 – 922.0 OIL SHALE BLACK CALCAREOUS
22					CNTG 25' RQD 60.0 LOS 2 AZ FT 12 to 9-25-77 WWM		HIGH GRADE, VERY COMPETENT ROCK
23							922.0 – 930 OIL SHALE, MEDIUM GRADE, BROWN TO
24							DARK BROWN, HARD COMPENTENT ROCK
25							NO PP'S OR FRX IN THIS SECTION
26							
27							
28							
29							
30							

COMMENTS: * 7.0' adjustment as per E.R.C. Core # 7 according to geolograph ran from 900.0 – 922.0 lith log was adjusted so as to correspond to geolograph △ core #6 ends at 893.39 on lith and core #7 begins at 900.0. Future logging shall be done using geolograph

THE CLEVELAND–CLIFFS IRON COMPANY PROJECT: CLINAUX

HOLE NO. 300 SHEET 8 OF ___ DATE: 9-24-77 LOGGED BY: W MOULTON COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
930							930-937.35, OIL SHALE LOW TO MEDIUM GRADE LIGHT TO DARK BROWN, HARD COMPETENT ROCK
931							
932							
933							
934							
935							
936							
937							937.35-939.21 OIL SHALE HIGH GRADE DARK BROWN TO BLACK, COMPETENT ROCK
938							
939							939.21-941.63 LOST CORE ZONE (BROKEN UP)
940							
941							941.63-942 VERT FRX @ 942 AT JOINT BOTH FILLED WITH A WHITE CALCAREOUS MATERIAL
942		I					
943							
944		I					944.55-945.8 VERTICAL FRX FILLED WITH OIL SHALE
945							
946		I					946.9 JOINT @ 70°
947							941.63-948.5 OIL SHALE LOW TO MEDIUM GRADE LIGHT TO DARK BROWN HARD NOT CALCAREOUS BUT PREDOMINANTLY MEDIUM GRADE
948							
949							
950							
951		I					951 JOINT @ ~~45°~~ 60° OPEN W/ TWO CLOSED
952							948.5-961 OIL SHALE, MEDIUM TO HIGH GRADE BROWN TO DARK BROWN, PREDOMINANTLY MEDIUM GRADE, HARD COMPETENT ROCK
953							
954							
955							
956							
957							
958							
959							
960							961-965 OIL SHALE LOW TO MEDIUM GRADE LIGHT BROWN TO BROWN, HARD COMPETENT ROCK
961							
962							
963							
964							
965							965-972 OIL SHALE MEDIUM GRADE LIGHT BROWN TO BROWN HARD COMPETENT ROCK
966							
967							
968							
969							
970			.430				970.04 THIN SANDSTONE LAYER
971							JOINT 60°
972		I	.155				972.5 JOINT @ 60° W/ WHITE CALCAREOUS MATERIAL ON BEDDING SURFACE

CUT 42.5 FEET OF CORE, LOST 2.42' IN OVERBURDEN 1:30 PM 9-25-77

RUN # 3

HOLE MUDDY WATER @ 940-970?

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: [illegible]

HOLE NO. 30 SHEET 9 OF ____ DATE: 9-25-77 LOGGED BY: W MOULTON M PUTNAM COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
973			.13.4	.8			973-984 POSSIBLE A-GROOVE LOW, VERY LOW
974			.40.70				GRADE SHALE WITH NUMEROUS PP'S & FRX LIGHT
975							BROWN TO BAGE
976							976.80 GILSONITE ON PP & VER FRX
977			.45.65	.84			975.3 CLAY MATERIAL
978			.36.52				
979		I	.14.36	.87			975.57 JOINT HEALED FILLED WITH WHITE NON CALCAREOUS
980							MATERIAL
981			.43		Run #8		
982							
983							Vugs?
984					984.5		984 - VUGS FILLED WITH NON CALCAREOUS
985							MATERIAL.
986							984 - 992 Oil Shale, Dk. Brown to Black, Med. To
987		.0 60					High Grade, Non Calcareous, Competent
988							rock, GILSONITE Found on Exposed Fractures
989		.5					Numerous Sandstone lenses.
990							
991							False Mahogany Marker.
992							992 - 998 Oil Shale as above, Med. to high
993							grade.
994							
995			.35	.5			
996			.8				996.8 - Parting Plane on Sandstone band.
997							997.75 - Gilsonite blebs.
998							998 - 1010 Oil Shale Brown to light Brown,
999							low to Med. grade, Slightly
1000							Calcareous, Competent rock.
1001							
1002							
1003							
1004							
1005			.65	.9			1005.8 - Gilsonite bleb
1006							
1007							1007.65 - .9 MAHOGANY MARKER Tuffaceous Sandstone
1008			(.1)(.3)				1008.9 - TUFF BAND (.1 Thickness)
1009							1009.75 - TUFF BAND (.1 Thickness)
1010							1009.85 - 1017.80 MARLSTONE GRAY, CALCAREOUS,
1011							UNIFORM BEDDING, LAMINATED, COMPETENT
1012							ROCK.
1013					1013.20		
1014							
1015					1014.28		1015.78 - SANDY TUFF LENS BRN CALCAREOUS

Run 9 Cut 47.5 Rec. 45.99 MTP

COMMENTS:

THE CLEVELAND–CLIFFS IRON COMPANY PROJECT: 0310

HOLE NO. 20 SHEET 10 OF ____ DATE: 9/25/77 LOGGED BY: PUTNAM COLLAR: ____ TD: ____

DEPTH	±MM	RX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1016					RUN #9 TO 1031.5		1016.3 TUFF LENS BRN NON CALCAREOUS
1017							1017.15 TUFF BED DRK BRN, .01' THICK CALCAREOUS
1018							1017.35 - 1017.8 NUMEROUS TUFFACEOUS LENSES. SOME CALCAREOUS SOME NOT
1019							1017.80 - 1021.33 OIL SHALE, BRN - DK BRN, CALCAREOUS MED - HIGH GRADE, UNIFORM BEDDING
1020							
1021							
1022							1021.33 - 1026.05 OIL SHALE BRN - BLACK CALCAREOUS HIGH GRADE, BEDDING HIGHLY
1023							
1024							DISTORTED W/ NUMEROUS SANDY TUFF
1025							BEDS TAN - BRN, ≥ <.01' EACH
1026							1026.05 - 1031.50 - OIL SHALE, DK BRN, NON
1027							CALCAREOUS, HIGH GRADE, UNIFORMLY
1028							BEDDED EXCEPT FOR 8-12 SANDY
1029							TUFF LENSES ALL <.02' THICK, GILSONITE
1030							BEBS ON BROKEN SURFACES
1031							1031.50 - 1031.95 LOST CORE
1032							1031.95 - 1042.50 OIL SHALE DK BRN - BLACK
1033							HIGH GRADE, CALCAREOUS, VERY COMPETENT ROCK
1034		.5					
1035			.87				
1036							
1037							
1038							
1039							
1040							
1041							
1042							1042.3 - SANDSTONE STRINGER & LENS.
1043			.67				1042.5 - 1051.5 - Oil Shale light Brown to Gray, Med. to low grade, Thinly laminated, Very Comp. No PP or Frac., Calcareous.
1044							
1045							
1046							
1047							
1048							
1049							
1050							
1051							1051.5 - 1056.0 - Oil Shale DK. Brn., to Black, Med to high Grade, Competent rock
1052							1052.9 - TUFF Lens.
1053							
1054							
1055			.92				1056 - 1061 ~~Oil Shale~~ Mudstone, Gray to light brown, Calcareous, Variegated, Competent rock
1056							
1057							
1058							

FM 1032.5 - 1042.5 RUN 11 CUT 60.0 REC 60.00

COMMENTS: CORE RUN # 10 FROM 1031.5 - 1032.5
1.0' CUT
.65' REC.
OTHER .45' RECOVERED IN RUN #11

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: CWV

HOLE NO. 20 SHEET 11 OF ___ DATE: 9/26/77 LOGGED BY: DCS. PUTNAM COLLAR: ___ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1059							
1060							
1061							1061 - .8 Oil Shale as above & .8 - Vugs of Nahcolite,
1062		.22					1061.8 - 1062.2 False M.M., Very fine Tuffaceous Sandstone.
1063		.5)					1062.2 - 1067 ; Oil Shale ; Dark Brown, Med to
1064							high grade, Slightly Calcareous,
1065		.	.66				Highly Fractured from 1062.2 - 1063.5
1066							laminations not visible.
1067							1067 - 1074 Oil Shale gray to light brown,
1068							laminated, Calcareous, Few thin
1069							laminations of Black Kerogen,
1070							1067.15 - 1067.4 Wavy Tuffaceous S.S.
1071							
1072							1072 - 1074 High degree of fracturing
1073							
1074							1074 - 1079.5 Oil Shale as above
1075							1074 - 1075.85 High degree of fracturing
1076							
1077							
1078		.	.15	.25			
1079							1079.5 1081.1 Oil Shale Dk Brown to Black, Massive,
1080			.1				Non Calcareous
1081							1081.1 - 1081.55 Mahogany Marker, Poorly Sorted
1082							Tuffaceous S.S. - Base of Shale 1081.2
1083			.9				1081.55 - 1089 Oil Shale, Brown to Dark Brown
1084							Med to High grade - Grade inc.
1085							down the hole, Laminated,
1086			.00				Non Calcareous, Competent.
1087							1085.65 - Vug
1088							1083.1 Thin layer of Tuff.
1089							1089 - 1091.79 OIL SHALE - BROWN - MED GRADE
1090							1089.87 - TUFF LENS
1091							1090.39 - 1090.41 TUFF BED CALCAREOUS BUFF
1092							1091.79 - 1093.28 OIL SHALE LT BRN BRN LOW -
1093							MED GRADE, SLIGHTLY CALCAREOUS, LAMINATED
1094							1093.28 1094.07 SILTY TUFF INTERBEDDED W/
1095							OIL SHALE GRAY - DK BRN HIGHLY DISTORTED
1096							BEDDING TUFF MORE CALCAREOUS THAN
1097							OIL SHALE.
1098							1094.07 - 1097.55 OIL SHALE, BRN - BLACK MED -
1099							HIGH GRADE, NON CALCAREOUS, LAMINATED
1100							1094.32 - 1094.43 VUGGY LENS FILLED W/
1101							(GILSONITE?)

RUN 11 CUT FROM 1032.5 - 1092.5 60' CUT - 60' REC.

RUN 12 CUT 33.0' REC 31.36

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY

HOLE NO. 20 SHEET 12 OF ____ DATE: 9/26/77 LOGGED BY: PUTNAM COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1102							1095.52 - 1095.63 SANDY TUFF BED DISTORTING
03							BEDDING IN OIL SHALE TAN-BUFF
04							NON CALCAREOUS
05							1097.30 - 1097.50 NUMEROUS TUFFACEOUS
06							LENSES
07							1097.55 - 1098.2 TUFF, BRN, NON CALCAREOUS
08							NUMEROUS VUGS FILLED W/ WHITE
09							SOFT 2ND ARY MINERAL (GYPSUM?)
10							GILSONITE BLEBS ON BROKEN SURFACE
11							1098.2 1102.04 - OIL SHALE BRN - TAN-BUFF
12							SLIGHTLY CALCAREOUS FEW SMALL SANDY
13							TUFFACEOUS LENSES ALL <.05', LT TAN
14							NON CALCAREOUS
15							1105.45 - 1105.55 ~~VUGGY~~ VUGGY ZONE
16							SOME SULPHUR FILLING
17							1106.28 SANDSTONE BED <.01'
18							1106.8 - 1106.95 SANDY TUFF SULPHUR FILLING
19			.09				ON BROKEN SURFACES ALSO SOME
20							WHITE SOFT MINERAL (ASSOC. W/ SULPHUR?)
21							(GYPSUM?) ON BROKEN SURFACES
22							1107.04 - 1114.83 - MARLSTONE LT. BRN - BRN,
23							NON CALCAREOUS LAMINATED
24							1114.83 - 1115.05 - TUFF - TAN - DK. GRAY, CALCITE
25							AND SULFIDES ON BROKEN SURFACES
26				LOST CORE			1115.05 - 1116.37 MARLSTONE SAME AS 1107.04 -
27							1114.83
28							1117.51 - 1118.94 MARLSTONE - LT BRN - BRN
29							CALCAREOUS, LAMINATED
30							1118.94 - 1119.09 TUFF - DK GRAY - BLACK NON
31							CALCAREOUS
32							1119.09 - 1124.79 MARLSTONE TAN, LAMINATED
33							NON CALCAREOUS
34							1124 - 1148 VERY LOW GRADE OIL SHALE WITH INTER-
35							BEDDED MUDSTONE LAYERS - MUDSTONE
36				LOST CORE			LAYERS CONTAIN METALLIC MINERALS. SOME ZONES
37							ARE SOFT & CRUMBLY WITH NUMEROUS
38							PARTING PLANES - SOME LAMINAE SEEN IN HARDER
39							ZONES - GILSONITE FILLED BLEBS SOME
40							PARTING PLANES. SOME ZONES HAVE IRREGULAR
41				LOST CORE			BEDDING INDICATING WARPING OR VUGS - SOME
42							SMALL VUGS CONTAIN METALLIC MINERALS
43		2					CORE EMPTY
44							

COMMENTS:

THE CLEVELAND–CLIFFS IRON COMPANY PROJECT: C-510

HOLE NO. 20 SHEET 13 OF ___ DATE: 9/26/77 9/27/77 LOGGED BY: PUTNAM ~~HAMILTON~~ COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1145							
46							
47							
48				BROKEN & HOLLED			1146 - 1152.5 OIL SHALE HIGH GRADE DARK BROWN TO BLACK, IRREGULAR BEDDING WITH SOME NUMEROUS EMPTY VUGS
49							
1150					#13		
51							
52							1152.95 - 15 #53 SANDSTONE & VUGS, BOTH EMPTY AND FILLED WITH NAHCOLITE & NON CALCAREOUS WHITE MATERIAL
53					1152.5		
54							
55							1155.95 - 157 LOST CORE ZONE
56							1152.5 - 1164.92 OIL SHALE MEDIUM TO HIGH GRADE SHALE BROWN TO BLACK HARD CALCAREOUS ROCK
57							
58							
59							
1160							1160.1 - 5 SANDSTONE LAYER BACK IN CLICK COULD BE CLASSIFIED AS MUDSTONE VERY FINE GRAINED
61			.45				
62							
63							
64							1168.52 - 1168.77 LOST CORE ZONE LOST CORE
65							
66							
67							
68							1168 - CLAY ZONE SOFT & WITH LOST CORE
69							~~1169~~ 1167.77 - 1181.60 OIL SHALE MEDIUM GRADE BROWN TO DARK BROWN WITH FINER PARTING PLANES CALCAREOUS KOMPONENT ROCK
1170							
71							
72		0-60°	JOINT				1173-1174 VUGS - EMPTY & W/SOME FILLED WITH NAHCOLITE
73							
74							
75			.22				
76		45 - 60°	JOINT				1176.45 60°/JOINT OPEN
77							
78							1181.60 - 1188.90 OIL SHALE MEDIUM TO HIGH GRADE BROWN TO DARK BROWN HARD COMPETENT ROCK CALCAREOUS W/JOINTS TOWARDS BOTTOM OF IRON
79			.1				
1180			.19				
81			.60				
82							
83							
84							
85							
86		45°	.27				1186.45 45° JOINT 1186.45-15 SANDSTONE LAYER OIL SATURATED
87		45°					1187.45 45° JOINT

CORE #14 1152.5 - 1188.9 (36.4') SIDEARM 9-27-77 WM

COMMENTS:

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: U.S. NAVY NOSEL

HOLE NO. 20 SHEET 14 OF ____ DATE: 9-27-77 LOGGED BY: ____ COLLAR: ____ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1188							1188.58 - .90 LOST CORE
1189		.95			1188.70		~~1189~~ 1189 - 1195.4 Oil Shale; Dk Brown to
1190							Black, Calcareous, Wavy Irregular laminatio
1191							Competent rock.
1192							1192.1 - Stringer of Tuffaceous Material
1193							
1194							
1195							1195.4 - 1197, Oil Shale; gray to light brown, Calcareous,
1196							regular laminations,
1197							1197 - 1199, Oil Shale; dk. brown to black, laminated,
1198			.95				Slightly Calcareous.
1199			.67				1199 - 1205.32, Oil Shale, gray to light brown, Slightly
1200							Calcareous, laminated,
1201							
1202							.4 - Vug
1203							.0 - Gilsonite lens.; .6 - .75 Band of fine grained Tuffaceous S.S
1204							1204.92 - 1205.32 lost Core.; 1204.2 Vug of Nahcolite
1205							1205.32 - 1208 Oil Shale, Dk. Brown to Black,
1206							Wavy laminations, Non Calcareous,
1207							Numerous lenses of Tuff.
1208							1208 - 1209.7 Oil Shale as above uniform
1209							laminations
1210							1209.7 - 1211 - Oil Shale as above, wavy lamination
1211							Numerous Tuff lenses.
1212							1211 - 1212 Oil Shale, laminated, Dk Brown to Black
1213							1212 - 1216 Oil Shale, light brown to gray, laminated,
1214							Calcareous, Gilsonite on break @ 1214.52
1215							1214.8 - 1215.2 - Vug of Nahcolite.
1216							
1217							
1218							
1219							
1220							
1221							1221 - 1227 OIL SHALE MEDIUM TO HIGH GRADE BROWN
1222							TO DARK BROWN, HARD COMPETENT ROCK
1223							1223.8 - .6 SANDSTONE LAYER OIL SATURATED
1224							1224.3 - .5 " " " "
1225							
1226							
1227							1227 - 1242 OIL SHALE LOW GRADE WITH SOME ZONES
1228							OF INTERBEDDED HIGH GRADE, LIGHT BROWN TO DARK BRO
1229							
1230							

CORE ROD 15 CUT 32' RQD 32.1

CORE #16 1221 - 1235.16 CUT 6.06

COMMENTS:

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: US NAVY [illegible]

HOLE NO. 20 SHEET 15 OF ____ DATE: 9-28-77 LOGGED BY: [illegible] COLLAR: ____ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1231							1231-1242 OIL SHALE LOW GRADE WITH SOME
1232							MEDIUM GRADE INTERBEDDED BROWN
1233							HARD COMPENTENT ROCK
1234							
1235		vcr \ .7					
1236			.35				
1237							
1238							
1239							
1240							
1241							
1242		|||	.26		1221-1281.6		1242-1244 SERIES OF VERTICAL FRX WITH BITHAM ON
1243		|||					SURFACE (CLOSED)
1244		|||					1242-1248 OIL SHALE ~~MEDIUM~~ LOW TO MEDIUM GRADE
1245							PREDOMINATELY MEDIUM GRADE LIGHT TO DARK
1246							BROWN HARD COMPENTENT ROCK
1247							
1248							
1249		\ .6 .57	.01				1249.6 & .57 ~~S~~ JOINTS @ 45°
1250		\ .48	.30				1248-1252 OIL SHALE LOW GRADE LIGHT BROWN TO
1251			.05 .15				BROWN NUMEROUS PPs
1252							1252.5-.7 SANDSTONE LAYER OIL SATURATED
1253							1252-1254 OIL SHALE HIGH GRADE DARK BROWN
1254							1254-1262 OIL SHALE LOW GRADE LIGHT BROWN
1255							
1256							1256.85 CLOSED JOINT VERTICAL |||
1257							.90 " " "
1258							1258.65 " " "
1259							
1260							
1261							
1262							1262-1267 OIL SHALE HIGH GRADE DARK BROWN
1263							HARD COMPENTENT ROCK WHITE STREAKS
1264							& BLEBS OF NON CALCAREOUS MATERIAL
1265							
1266							
1267							1267-1275 OIL SHALE LOW GRADE LIGHT BROWN
1268							HARD ROCK WITH NUMEROUS PP.
1269							
1270			.20 .30 .70 .93				
1271			.22 .30 .53				
1272			.35 .53				
1273							

COMMENTS:

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: [illegible]

HOLE NO. 212 SHEET 16 OF ____ DATE: 9-28-77 LOGGED BY: [illegible] COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1274			00 10				
1275							1275-1281.6 OIL SHALE ~~[illegible]~~ MEDIUM TO HIGH GRADE
1276							BROWN TO DARK BROWN - SECTION IS
1277							SOME WHAT BROKEN UP - JOINING &
1278							VERTICAL FRX
1279							
1280							1280.2 - 1281.24 LOST CORE ZONE
1281					125 [illegible]		1281.6 - 1296.3 ~~Oil Shale~~, low grade, light Brn.
1282							to gray, Calcareous, laminated, ~~highly~~
1283		.2	~~[illegible]~~				~~fractured~~, MARLSTONE Vertical
1284							fracturing
1285							
1286							
1287							
1288							
1289							
1290		.4	~~[illegible]~~				
1291							
1292							
1293							
1294							
1295							
1296							1296.3 - 1305.5 Siltstone, non Calcareous, gray
1297		.0					to light brown, laminated, Vertical
1298							fracturing; 1302 - 1305.5 - laminae
1299							~~[illegible]~~ here contrasting coloration from
1300							gray to brown.
1301							
1302							
1303							
1304							
1305							1305.5 - 1306.45 Oil Shale Dk. Brown to Black, Massive,
1306		.7					non Calcareous.
1307							1306.45 - 1311 - Marlstone, Calcareous, mostly gray,
1308			.3				Massive to few laminations,
1309							Competent rock,
1310			.1	.95			
1311							1311 - 1315 - Marlstone, Massive, mostly gray,
1312							Calcareous Competent Rock.
1313							1314 - white XTALS IN VUGS OF KEROGEN - NON-CALC.
1314							1315 - 1316 MARLSTONE SLTLY LAMINATED, CALCAREOUS
1315			.1				1315.1 - PP - OILY - NON-CALC. GRAY-GREEN POWDER
1316							1316 - 1318 OIL SHALE - DARK BRN W/ GRAY

CORE 17

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: U.S. NAVY (WORK)

HOLE NO. 20 SHEET 17 OF ___ DATE: 9-28-77 LOGGED BY: DCS. COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1317		.6					& BLACK LENSES - LOOPS - SAND STRUCTURE
1318		↓					1317-1318 - OIL SHALE - GRAY - DK BRN LAMINAE
1319		↓	.1				MINOR CROSS-BEDDING
1320		.9					1318-1320 OIL SHALE - LT BROWN - CALC
1321							
1322							1320-1323 - OIL SHALE - VERTICAL FRX. - 1320
1329		↓					LT BRN LAMINAE, SAND LOOP STRT'S
1324		↓					
1325		↓					1323-1323.7 - OIL SHALE - TAN - LT BRN - CALC
1326							1323.7-1324 - MARLSTONE - NO LAMINAE - FRX
1327							1324-1326 - INTERLAMINATED BLACK-DK BRN
1328							OIL SHALE & BEIGE BANDS OF CALC.
1329							1326-1329 - OIL SHALE - DRK BRN - GRAY
1330							LAMINAE
1331		↓					1329-1324.5 - MARLSTONE
1332		↓					1329.5-1332 - OIL SHALE LT - MED BRN
1333							331.5 SLIGHT VERT. FRX. 13
1334		.3					1332-1335 - OIL SHALE - DRK BRN
1335		↓					LAMINAE - CALC.
1336		↓					1334.3-1335 - VERT FRX
1337		↓					1335-1341.6 - OIL SHALE - LT - MED
1338		↓					BRN
1339							1341 - LUGS OF BROWN-WAXY MINERAL
1340							DOES NOT REACT WITH ACETIC ACID
1341							
1342							1341-1347 OIL SHALE TAN - DARK BRN
1343							1342.1 - 1342.5 - INTERBEDDED
1344							SAND - OIL SATURATED
1345							
1346							
1347							1347-1353.3 OIL SHALE - HIGH CONTENT
1348							COMPETENT ROCK - DRK BRN - GRN - BLK
1349							
1350							
1351							
1352							
1353							1353.3-1358 MARLSTONE - LT BEIGE -
1354							HIGHLY CALCEROUS - COMPETENT
1355							
1356							
1357							
1358							1358-1362.4 OIL SHALE - MED GRADE
1359							TAN - MED-BRN, SLTLY CALC.

CORE 18

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT:

HOLE NO. 30 SHEET 18 OF ___ DATE: 9-28-77 LOGGED BY: CLP PUTNAM COLLAR: ___ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1360							1359.6 DARK METALLIC? BLEBS
1361							1359 - PYRITE - XTALS & SMEARED
1362							1360.7 E.8 ¼" SAND LENSES - OIL SAT.
1363							1362.4 POROUS SAND LENSE ½" TK.
1364							1362 - 1366.9 - OIL SHALE - TAN - DRK BRN SLTLY CALC.
1365							1365.9 - 1367.7 LT BRN OIL SHALE VERY CALCAREOUS - VERY LITTLE KEROGEN
1366							1367.7 - 1370.4 OIL SHALE
1367							
1368							
1369							
1370			.4				1370.4 - 1371 OIL SHALE HIGH GRADE - DRK BRN - NON-CALCAREOUS
1371							
1372							1371 - 1381.5 OIL SHALE DK BRN - MED GRADE NON-CALCAREOUS
1373							1376 - ¼" SAND LENSE - OIL SAT
1374			0				1379.3 - ½" SAND LENSE " "
1375							
1376							
1377							
1378							
1379							
1380							
1381							1381.5 - OIL SHALE - MED. BRN.
1382							1385.9 SAND LENSES - OIL SAT.
1383							1386 - MARCASITE LENSE & GILSONITE
1384							
1385							
1386		4					1386.4 JOINT VERTICAL & CLOSED
1387							1387 - 1392 MARLSTONE OR LOW GRADE OIL SHALE
1388			.30				BLEEDS TO BROWN HARD COMPACT
1389		5T					1389.5 - 1390.1 VERTICAL FRX W/ IRON SALTS ON SURFACE
1390		.1					
1391			.25				
1392							1392 - ~~1396~~ SILTSTONE LIGHT BROWN W/ NUMEROUS LAYERS & BLEBS OF NON-CALCAREOUS
1393							~~MEDIUM~~ FINE GRAINED SANDSTONE
1394							1395 - 1402.2 SILTSTONE LIGHT BROWN HARD W/ LAYERS
1395							OF METALLIC MINERALS
1396							
1397							
1398							
1399		55					1398.65 JOINT VERTICAL CLOSED
1400							1400 BLEBS OF MARCASITE & PYRITE
1401		.	.14	45			
1402			.20				1402.2 - 1425.36 ~~SILTSTONE~~ SHALE LT GRAY-BRN NON

CORE ID

COMMENTS:

THE CLEVELAND—CLIFFS IRON COMPANY PROJECT: USN

HOLE NO. 20 SHEET 19 OF ____ DATE: 9/29/77 LOGGED BY: PUTNAM COLLAR: ____ TD:

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1403							CALCAREOUS, SOME LIMONITE STAINS
1404							ON FRESH SURFACES, LAMINATED -
1405							LAMINAE ARE OIL SHALE DK BRN -
1406							BLACK, ENTIRE SECTION - LOW GRADE
1407							TO VERY LOW GRADE. INTERBEDDED
1408							SILTY TUFF THROUGHOUT SECTION -
09							TAN - LT. BRN ALL MDS < .1'
1410							
11							
1412							
13							
1414							
15							
1416							
17							
1418							
19							
1420							
21		1420.07					
1422		87					
23		1423.1					
1424							1424.05 - 1424.11 SANDY TUFF BED, BROWN, NON -
25							CALCAREOUS
1426							1425.36 - 1430.71 - SANDSTONE w/ SOME SILT
27							GRAY, CALCAREOUS, FINE GRAINED, SUB ANGULA
1428		[illegible]					MINUTE CARBONACEOUS ~~[illegible]~~ FLAKES, IRREGULAR
29							BEDDING (LOCAL DISTORTIONS), HIGHLY COMPETENT
1430							ROCK
31							1430.71 - 1455.63 SILTSTONE - GRAY - DK GRAY,
1432							NON CALCAREOUS, REGULAR BEDDING,
33							COMPETENT ROCK, LAMINATED LAMINAE ARE
1434							① OIL SHALE DK BRN BLACK, MED GRADE
35							SLIGHTLY CALCAREOUS (1446.1 - KEROGENOUS LEAF
1436							② SILTY TUFF TAN, CALCAREOUS 1451.3 - LEAF PYRITE
37							1455.63 - 1457.23 OIL SHALE - DK GRAY - GRAY, NON
1438							CALCAREOUS, LAMINATED, LOW GRADE
39							1456.9 - 1457.3 - IRREGULAR BEDDING.
1440							1457.23 - 1460.75 - MARLSTONE GRAY, SLIGHTLY
41							CALCAREOUS, INTERLAMINATED w/ v. THIN
1442							BANDS OF HIGH GRADE OIL SHALE.
43							
1444							
45							

CORE 19

CUT 56.80 RRD 56.20

COMMENTS:

THE CLEVELAND CLIFFS IRON COMPANY

HOLE NO. 20 SHEET 20 OF ____ DATE: 9/30/77 LOGGED BY: ____ COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1446							
1447							
1448							
1449							
1450							
1451							
1452							
1453							
1454							
1455							
1456							
1457							
1458							
1459							[redacted]
1460							OIL SHALE - GRAY & TAN LAM (THIN)
1461							SLIGHTLY CALC.
1462							
1463							
1464							
1465							
1466							
1467							OIL SHALE - GRAY & TAN LAM (THIN) CALC.
1468							
1469							
1470							
1471							
1472							
1473							
1474							
1475							
1476							
1477							
1478							
1479							
1480							
1481							
1482							1482-1490 Siltstone, Thinly laminated to
1483							massive, noncalcareous.
1484							Competent rock, light gray - gray
1485							
1486							
1487							
1488							
1489							
1490							1490 - 1493 Oil Shale, Dk. Brown to Black
1491							laminated, non Calcareous.
1492							1491.3 Clay lens.
1493							1493-1494 Wavy Tuffaceous SS Non Calcareous
1494							

CORE 17

CORE 20 CUT 44.4 - 45.2

THE CLEVELAND CLIFFS IRON COMPANY

HOLE NO. 20 SHEET 21 OF ___ DATE: 9/30/77 LOGGED BY: DCS (PUTNAM) COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1495					CORE #20		1494-1496 Oil Shale low grade, gray to brown laminated non calcareous.
1496							1496-1499 Oil Shale DK Brown to Black, laminated, non calcareous. Competent with Some tuff lenses.
1497							1499-1504 Marlstone, Massive, Calcareous, gray to brown, frosty gray,
1498							1501.7 Tuff lens, 1502.35 Tuff lens.
1499							
1500							
1501							
1502							
1503							
1504							1504.0 - 1509.1 - DOLOSTONE, GRAY-BRN, INTERLAMINATED W/ OIL SHALE DK BRN SLIGHTLY CALCAREOUS, MED-HI GRADE, REGULARLY BEDDED
05							
1506							
07							
1508							
09							1509.1 - 1510.35 - DOLOSTONE SAME AS 1504.0 - 1509.1 BUT IRREGULARLY BEDDED
1510							1510.35 - 1517.2 - DOLOSTONE AS ABOVE W/O LAMINATIONS
11							
1512							
13							
1514							
15							
1516							
17					CORE #21 REC 10'		1517.2 - 1521.65 - OIL SHALE, DK BRN-BLACK, NON-CALCAREOUS, HIGH TO EXTRA HIGH GRADE W/ MINOR TUFF LENSES LT. BRN. CALCAREOUS
1518							
19							
1520							
21							
1522							
23							
1524							
25							
1526							
27							
1528							
29							
1530							1530.1 - 1542.7 - OIL SHALE, LT. BRN-BLACK NON-CALCAREOUS, MED-HIGH GRADE, LAMINAT UNIFORM BEDDED
31							1430.1 - 1431.2 S.S. TAN - DK GRAY NON-CALCAREOUS, IRREGULARLY BEDDED W/ LIGNENITE STAINING
1532							
33							
1534							
35							
1536							
37							
1538							
39							
1540							
41							
1542							1542.7 - 1543.8 - OIL SHALE AS 1530.1 - 1542.7 W/ NUMEROUS SS LENSES, GRAY,
43							CALCAREOUS

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT

HOLE NO. 20 SHEET 22 OF ____ DATE: 9/8/77 LOGGED BY: Rotolo COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1544							1542.8 - 1546.2 OIL SHALE, BRN - DK BRN, NON-CALCAREOUS, BEDDING ~~DISTURBED~~ DISTORTED IN NUMEROUS ZONES BY SAND LENSES, LT. GRAY - DK. GRAY, HIGHLY CALCAREOUS
45							
1546							
47							
1548							1546.2 - 1564.0 OIL SHALE, BRN - DK BRN, HIGH GRADE, EVENLY BEDDED, ~~FRX~~
49							
1550							
51							
1552							
53							1553 - 1564 CORE FELL OUT OF TRAY OFF RIG AND MAY BE DISORIENTED TO SOME DEGREE.
1554							
55							
1556							
57							
1558							
59							
1560							
61							
1562							
63							
1564							
65							1564 - 1570.0 OIL SHALE - DK BROWN HIGH GRADE - THIN, EVEN LAMINATIONS
1566							
67							
1568							
69							
1570							1570.0 - 1571.6 - OIL SHALE - DARK BROWN SLIGHTLY CALCAREOUS.
71							1571.7 - 1572.5 NATURAL LIGHT FRACT
1572							1572.6 - 1573 SANDSTONE - BROWN w/ INCLUSIONS OF SOFT ALLOCHTHON XLS (FELDSPAR?)
73							
1574							
75							1573.6 - 1575.2 NATURAL VERTICAL FRACTURE
1576							
77							1575 - 1581.2 TAN & DK BROWN THIN BEDS OF OIL SHALE
1578							
79							
1580							1581.2 CALCAREOUS OIL SHALE
1581							1581.2 - 1585 - Limestone, Massive, fine limestone, Calcareous, Light brn to gray, Competent
1582							
1583							
1584							
1585							1585 - 1588.2 Oil Shale, Brown to Dk Brown, non-Calc., laminated
1586							

Core 60 Rec 60 100% Rec

COMMENTS:

1585-9 - Tuffaceous Sandstone with some mineralization

THE CLEVELAND-CLIFFS IRON CO. PROJECT: CSIV

HOLE NO. 20 SHEET 23 OF ___ DATE: 10/1/17 LOGGED BY: MJP T.D. ___

DEPTH	+-MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
1587							
1588		.25					1588.2 - 1590.6 Fluorescent Kerk Rich Beds of Siderite and Tuff Not Free. Calcareous.
1589							
1590		.21					1590.6 - 1591.7 Mudstone, Calcareous Massive, Tan to Brown
1591							
1592							
1593							
1594							
95							
1596							1596.7 TO 1598.5 Oil Shale Laminated Non Calcareous, Dk Brown to Black Competent.
97							
1598							
99							1598.5 - 1601 Siltstone, non Calcareous, Massive Tan to Gray Competent
1600							
1601		.07					1601 - 1603 Siltstone non Calcareous, Massive (5 ton - 9 units on ripped fracture
02		.5					1603 - 1607 Siltstone as above Competent with several losses of full fluorescent
1603							
04							
1605							
06							
1607							1607 - 1611 Oil Shale Laminated, non-Calcareous, Brown to Dark Brown, non Calcareous.
08							
1609							
10							
1611							1611 - 1613 Mudstone, gray to tan, Massive, Competent
12							
1613							1613 - 1617 Oil Shale, Laminated, Brown to Dark Brown, non Calcareous.
14							
1615							
16							
1617							1617 - 1623 Mudstone, gray to tan, Calcareous massive, Competent rock
18							
1619							
20							
1621							
22							
1623					1624.00		1623 - 1625.4 - DOLOSTONE GRAY-BRN NON-CALCAREOUS LAMINATED W/ OIL SHALE DK BRN MED GRADE
24							
1625							
26							
27							
28							1625.4 - 1630.7 - OIL SHALE BRN - DK BRN MED - HIGH GRADE AT TOP GRADING TO MED AT BOTTOM, NON CALCAREOUS BEDDING DISTURBED BY NUMEROUS SS LENSES, LT BRN NON CALCAREOUS
29							
30							
31							
32							
33							1630.7 - 1631.05 - DOLOSTONE SAME AS 1623 - 1625.4
34							
35							1631.05 - 1633.75 - OIL SHALE BRN - BLACK, HIGH
36							GRADE, NON CALC, UNEVENLY BEDDED

COMMENTS:

THE CLEVELAND-CLIFFS IRON CO. PROJECT:

HOLE NO. 20 SHEET 24 OF ___ DATE: 10/1/77 LOGGED BY: MJP T.D. ___

DEPTH	± MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
1633							1633.75 – 1634.6 OIL SHALE GRAY - LT BRN, NON - CALCAREOUS LOW GRADE BEDDING DISTURBED BY NUMEROUS SS LENSES LT BRN CALCAREOUS
34							
1635							
36							
1637							
38							
1639							
40							
1641							1634.6 – 1644.2 - OIL SHALE - LT. BRN TO BLACK HIGH GRADE AT TOP TO MED GRADE AT BOTTOM UNIFORMLY BEDDED, LAMINATED
42							
1643							
44							
1645							
46							1646.13 – 1646.23 - SILTY, SANDY, TUFF BED TAN SLIGHTLY CALC. POROUS
1647							1644.2 – 1669.7 – OIL SHALE, GRAY - DK BRN., MED - LOW GRADE, NON CALC, LAMINATIONS OF OIL SHALE DK BRN TO BLACK - V. HIGH GRADE
48							
1649							
50							
1651							
52							
1653							
54							
1655							
56							
1657							
58							
1659							
60							
1661							
62							
1663							
64							
1665							1666.13 – 1666.20 - OIL SHALE, BLACK, NON CALC XTREMLY HIGH GRADE BED.
66							
1667							
68							1669.7 – 1673.25 MARLSTONE LT GRAY, CALC., BEDDING ENTIRELY DISRUPTED BY NUMEROUS SS LENSES GRAY TO TAN, FINE - V FINE GRAINED; SUB - ROUNDED
1669							
70							
1671							
72							
1673							
74							
1675							1673.25 – 1679.6 - OIL SHALE BRN - DK BRN, HIGH - MED GRADE, NON CALC., BEDDING DISRUPTED IN UPPER 1/3 TO EVEN IN LOWER 2/3, LAMINATED
76							
1677							
78							
1679							1679.6 – 1683.0 - OIL SHALE, GRAY - BRN, LOW - MED GRADE, CALC, INTERBEDDED W/ SS, GRAY, MED - FINE GRAINED, V. CALC., SUB - ANGULAR, & SOME BEDDING SURFACES ARE REGULAR SOME ARE DISTORTED
80							
1681							
82							
1683							1683.0 – 1684.0 OIL SHALE W/ [illegible] THIN SANDY INTERB
84							1684.0 – 1685.5 OIL SHALE TAN TO DK BR. LAMI - SLIGHTLY CALCAREOUS
1685							
86							

CORE 2 3/4" DIA. CUT 55.0', REC. 55.0', 100

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY

HOLE NO. 20 SHEET 25 OF ___ DATE: 10/1 LOGGED BY: PUTNAM COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1687							
1688							1688.5 - 1689.2 WAVY, SOFT, TAN - BROWN
1689							SANDSTONE
1690							1689.2 - 1692.5 OIL SHALE - CALCAREOUS
1691							MICACEOUS - GRAY - PP @ 1691.1
1692							1692.5 - 1693.4 - OIL SHALE - DISCONTINUOUS
1693							LAMINAE - TAN SANDSTONE TO DK BR.
1694							1693.4 - 1695.7 - OIL SHALE - GRAY BROWN TO
1695							DARK BROWN - EVEN, THIN LAMINAE
1696							1695.6 - 1695.7 TAN SANDSTONE BED -
1697							CALCAREOUS
1698							
1699							1698.7 - 1701.5 OIL SHALE - BROWN - THIN
1700							LAMINAE, SLIGHT CALCAREOUS
1701							
1702							1701.5 - 1705.4 OIL SHALE, BROWN TO DK BROWN
1703							CALCAREOUS
1704							
1705							1705.4 - 1706.7 OIL SHALE - TAN TO BROWN
1706							CALCAREOUS - THIN LAMINAE
1707							1706.7 - 1709.3 SANDY BED NON CALCAREOUS
1708							TAN TO GRAY BROWN
1709							1709.3 - 1710.0 TAN TO BROWN WAVY SANDY
1710							OIL SHALE CALCAREOUS
1711							1710.0 - 1713.2 OIL SHALE THIN LAMINAE
1712							TAN TO GRAY-BROWN - TAN WAVY STRINGS
1713							@ 1713.0
1714							1713.2 - 1713.4 NON CALCAREOUS SANDSTONE
1715							1713.4 - 1715.6 OIL SHALE DK BROWN NON CALC
1716							1715.6 - 1716.8 SAME - VERTICAL FRACT. (INDUCED)
1717							1716.8 - 1721.9 OIL SHALE DK BROWN NON CALC
1718							GRADING TO GRAY BROWN THIN
1719							LAMINAE
1720							
1721							1721.9 - 1723.9 SANDSTONE - HIGHLY FRACTURED
1722							GRAY TO BROWN - NON CALCAREOUS
1723							WAVY COARSE GRAINED BEDDING.
1724							1723.9 - 1728.7 OIL SHALE GRAY TO BROWN
1725							SLIGHTLY CALC.
1726							1724.7 - 1725.0 NATURAL VERT. FRACT.
1727							1727.1 - 1727.2 TAN SAND LENSE
1728							
1729							1728.7 - 1730.0 CORE LOSS.
1730							1730.0 - 1730.3 - OIL SHALE, LT BRN - DK BRN
1731							NON-CALC., MED GRADE, LAM, BEDDING DISRUP
32							BY SS BEDS - LT BRN, MED GRAINED, SUB-ANG
33							CALC.
34							1730.8 - 1738.1 OIL SHALE, GY, LOW GRADE,
35							CALC, LAM, UNIFORMLY BEDDED.
36							

RUN #24 CUT 47.00' REC 45.70' 97% REC.

1730.0

THE CLEVELAND-CLIFFS IRON CO. PROJECT:

HOLE NO. 20 SHEET 26 OF ___ DATE: 10/2 LOGGED BY: PUTNAM + T.D. REEVES

DEPTH	± MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
1737					RUN #25 CUT 56.25' REC. 56.25' 100%		
38							1733.1-1738.5 - MRLST, W/ INTERBEDDED SS, MRLST - LT BRN, SL CALC, FSS - LT GY - DK GY, CALC, & IRREGULARLY BEDDED
1739							
40							
1741							1738.5 - 1742.3 - OIL SHALE, LT BRN - BLK, INCRE
42							ING FROM LOW TO HIGH GRADE W/ DCPTH
1743							NCN-CALC., LAMINATED UNIFORMLY BEDDED.
44							1742.3 - 1748.2 - OIL SHALE, GY - DK BRN, MED
1745							TO LOW GRADE CALC., LAM.
46							1742.9 - 1743.2 - SAA (1742.3 - 1748.2) W/
1747							NUMEROUS FSS - MSS LENSES, GRAY,
48							CALC., IRREGULARLY BEDDED.
1749							1745.0 - 1745.15 - OIL SHALE, DK BRN TO
50							BLACK, V HIGH GRADE, CALC.
1751							1748.2 - 1757.7 - OIL SHALE, GY - BLK, MED -
52							HIGH GRADE, CALC, LAM.
1753							1748.2 - 1748.9 - IRREGULARLY BEDDED
54							1748.9 - 1757.7 - UNIFORMLY BEDDED
1755							
56							
1757							1757.7 - 1761.9 - OIL SHALE, LT BRN - GRAY, LOW
58							MED GRADE, CALC., LAM, MINOR BEDDING
1759							DISTORTION DUE TO MSS, LT BRN - GRAY,
60							CALC.
1761							1761.9 - 1765.95 - OIL SHALE, LT BRN - BLK,
62							HIGH GRADE, NCN-CALC., LAM, UNIFORMLY
1763							BEDDED
64							
1765							1765.95 - 1772.5 - OIL SHALE, LT BRN - DK BRN
66							MED GRADE, CALC, LAM, UNIFORMLY BEDDED
1767							
68							
1769							
70							
1771							
72							1772.5 - 1772.9 - INTERBEDDED OIL SHALE
1773							AND FSS
74							OIL SHALE - SAA (1765.95 - 1772.5)
1775							FSS - LT BRN, CALC.
76							1772.9 - 1783.8 - OIL SHALE, LT - DK BRN,
1777							MED GRADE, CALC, LAM, MINOR STRUCTURE
78							DISCONTINUITIES.
1779							
80							
1781							
82							
1783							1783.8 - 1786.25 - OIL SHALE, DK BRN - BLACK
84							VERY HIGH GRADE, CALC., MASSIVELY BEDDED
1785					1786.25		
86							

COMMENTS:

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT:

HOLE NO. 20 SHEET 27 OF ___ DATE: 10/2 LOGGED BY: ___ COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1787							1786.25 - 1787.5 HIGH GRADE OIL SHALE DK BR BRN L
1788							1787.5 - 1789.7 OIL SHALE - HIGH GRADE DK BR
1789							WITH TAN SANDSTONE LAYERS
1790							1789.7 - 1792.2 OIL SHALE - DK BR HIGH GRADE, CALC.
1791							
1792							1792.2 - 1792.6 TAN SANDSTONE, CALC.
1793							1792.6 - 1794.8 CALC OIL SHALE WITH SANDSTONE
1794							LAMINATIONS DK. BR. TO TAN
1795							1794.8 - 1803.4 DK BR OIL SHALE - CALC.
1796							
1797							1796.8 CLOSED INCLINED FRACTURE
1798							
1799							
1800							
1801							
1802							
1803							1803.4 - 1804.5 OIL SHALE GRAY TO BROWN, CALC.
1804							CLOSED INCLINED FRACTURES.
1805							1804.5 - 1805.0 SANDSTONE - & MED. GRADE OIL SH.
1806							1805.0 - 1807.2 OIL SHALE - LT. BROWN, CALC.
1807							1807.2 GILSONITE STREAK
1808							1807.2 - 1813.3 OIL SHALE - DK BR. HIGH GRADE
1809							CALC. - EVEN LAMINATIONS.
1810							
1811							
1812							1813.3 - 1914.0 WAVY DISCONTINUOUS BEDS OF DK
1813							BROWN OIL SHALE. CALC.
1814							1814.0 - 1818.8 OIL SHALE HIGH GRADE - DK BROWN
1815							SLIGHTLY CALC.
1816							
1817							1818.8 - 1822.0 OIL SHALE MED. BROWN, CALC.
1818							BEDDING BECOMING UNDULATING.
1819							
1820							
1821							1822.0 - 1829.6 OIL SHALE, DK BROWN
1822							EVEN LAMINAE - CALC.
1823							
1824							
1825							
1826							
1827							
1828							1829.6 - 1833
1829							Oil Shale, Dk Brown to Black, Lam. to Lt
1830							with Stringers
1831							
1832							
1833							1833 - 1837.2 Oil Shale, Brown to Dk Brown
1834							Siltstone Stringers, laminated to thin beds
1835							of Siltstone & Sh

CORE REC. 43.35
CUT 43.5

THE CLEVELAND-CLIFFS IRON CO. PROJECT: [illegible]

HOLE NO. 20 SHEET 28 OF ___ DATE: 10/3 LOGGED BY: SUNBLAD / PUTNAM T.D. ___

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
1837							1837.3 - 1839 Oil Shale as above except
1838		8.6	.02				Dk. Brown to Black [illegible] as noted
1839							[illegible] - 1842 Oil Shale, Brown to light
1840							Brown, Laminated, Ostracodes
1841							
1842							
1843							
1844							
1845							1845 - 1846.5 Lenses of [illegible] Sandstone
1846							
1847							
1848							1848 1852 - Oil Shale Dk Brown to black
1849			.7				Laminated non Calcareous.
1850							
1851							
1852							1850 - 1851.7 Numerous Fractures, Some
1853		2.6	0-.45				dk. [illegible].
1854		.6	.				1852 - 1858 Oil Shale, Brown to Dk. Brown
1855		.1					Laminated, Slightly Calcareous.
1856		.5					
1857							
1858							1858 - 1868.3 OIL SHALE LT BRN TO GY,
1859							MED - LOW GRADE, SLTY CALC, INTERBEDDED
1860							WITH SILTY TUFF BEDS THROUGHOUT -
1861							TAN, SLIGHTLY CALC.,
1862							ENTIRE SECTION UNIFORMLY BEDDED AND
1863							NOT VERY COMPETENT (FRACTURES W/
1864							LITTLE FORCE)
1865							
1866							
1867							1868.3 - 1870 - INTERBEDDED OIL SHALE +
1868							fSS not tuffaceous (BLUE MARKER ?)
1869							OIL SHALE - BRN, LOW GRADE, V. CALC
1870							fSS - GRAY, V CALC., SUB ANGULAR -
							ANGULAR
							ENTIRE SECTION SHOWS DISRUPTED BEDDING
							ALONG WITH NUMEROUS BLEBS OF
							(GILSONITE ?)

(Written vertically in CORE REC. column:) CORE CUT / CUT 1854 FOR ASSAY

COMMENTS: