HOLE NO. 17 SHEET 1 OF ____ DATE: 10-12-77 LOGGED BY: DL-DR COLLAR: ____ TD: 0361

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
130							VERY FINE SAND N5 NON CALC. (SOME CEMENT)
140							SILTSTONE 5YR 4/1 NON CALC (SOME CEMENT)
150							SILTSTONE 5YR 4/1 NON CALC (SOME CEMENT)
160							SILTSTONE 5YR 4/1 NON CALC
170							SILTSTONE N6 NON CALC
180							VERY FINE SAND N6 NON CALC
190							SILTSTONE N4 SOME CALC
200							MED S.S. N4 NON CALC
210							MED SS N4 NON CALC
220							MED FINE SS 5YR 4/1 VERY CALC
230							MED SS N4 VERY CALC
240							MED SS. N4 VERY CALC
250							MED. SS N4 VERY CALC
260							FINE SS 5YR 4/1 SOME CALC
270							SAME
280							FINE SS 5YR 4/1 SOME CALC
290							MED. SS 5YR 4/1 CALC
300							SAME
310							SAME
320							SAME
330							SAME
340							MED SS. 5YR 4/1 SOFT CALC WITH GILSONITE
350							SAME
360							VERY FINE SAND 5Y 6/1 CALC.
370							NO CUTTINGS
380							FINE SS 5YR 4/1 CALC.
390							VERY FINE SAND 5Y 6/1 CALC
400							SILTSTONE 5YR 4/1 CALC.
410							SAME
420							SAME
430							SAME
440							SAME
450							SAME
460							SAME
470							SAME
480							SAME
490							SS & SILTSTONE 5YR 4/1 SLIGHT CALC.
500							SAME
510							SAME
520							SAME
530							SAME
540							SILTSTONE 10YR 4/2 SLIGHT CALC.
550							SAME
560							SAME
570							SAME
580							SAME
590							SAME
600							SAME
610							SILTSTONE 5YR 3/4 SLIGHT CALC
620							SAME

THE CLEVELAND CLIFFS IRON COMPANY PROJECT: NOSR 1

HOLE NO. 17 SHEET 2 OF ___ DATE: 10/13/77 LOGGED BY: D.REEVES D.LOWIK COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
630							SILTSTONE 5YR 3/2 SLIGHT CALC.
640							SILTSTONE 5YR 3/4 SLIGHT CALC
650							SILTSTONE 5YR 4/4 SLIGHT CALC
660							SILTSTONE SAME SLIGHT CALC.
670							SILTSTONE 5YR 4/4 SLIGHT CALC
680							SLTS & OIL SH. 5YR 3/4 - 5YR 3/2 GYISH
690							OIL SH. MED GRADE CALC MOD. BRN.
700							SAME
710							SAME OIL SH. 30% ±
720							SAME OIL SH. DECREASING
730							SLTS & OIL SH. SLTS. 80% ±
740							SLTS 5YR 3/4 - 5YR 3/2 GYISH - MOD BRN CALC.
750							SAME 10% OIL SH.
760							SLTS W/MINOR MARLSTONE N8 V. LT. GRAY
770							SAME
780							OIL SH. 5YR DUSKY BRN. CALC. W/SOME SLTS.
790							SAME
			BOTTOM OF ROTARY DRILLING				
790							790.0 - 791.5 OIL SH. 5YR 3/2 V. CALC WITH
791		80 .5					TUFF STRINGERS.
792							791.5 - 796.0 OIL SH. 5YR 3/2 V. CALC.
793							NATURAL FRX FILLED WITH PYRITE XLS.
794							
795		.0					
796							796.0 - 800.2 OIL SH. 5YR 5/2 CALC. WITH
797							BANDS OF TUFF 10YR 4/2 & LOOP STRUCTURES.
798							
799							
800					CORE #1		800.2 - 804.5 OIL SH 5YR 5/2 CALC.
801							
802							
803							
804							804.5 - 808.2 OIL SH 5YR 3/2 CALC.
805							
806							
807							
808					DRILL REC.		808.2 - 808.4 BED OF TUFF
809					44.0'		808.5 - 808.6 TUFF WITH NON CALC. WT XLS.
810					46.5'		808.6 - 823.5 OIL SH. 5YR 3/2 CALC
811							
812							
813					(GEOLOGRAPH ERROR!!)		
814							
815							
816							
817							
818							
819							
820							
821							

HOLE NO. 17 SHEET 3 OF ___ DATE: 10/14/77 LOGGED BY: D. LOVOIK COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
822							
823							823.5 - 824.5 OIL SH. NON CAL BLACK W/
824							SEVERAL THIN (0.01') TUFF BANDS
825		50 .5					
826							
827					CORE # 1		824.5 - 831.6 OIL SH. 5YR 3/2 CALC.
828							NAT. FRX. 825.0 - 831.0
829							
830		.0					
831							831.6 - 835.0 OIL SH. 5YR 3/2 CALC.
832		50 .2					NAT. FRX 832.2 - 834.7
833							
834		.7					
835							
836							835.0 - 868.0 OIL SH. 5YR 3/2.
837							INDUCED FRACTURES HAVE TOTALLY DESTROYED
838							CORE.
839							
840							
841							
842							
843							
844							
845							
846							
847					CORE # 2		
848							
849							
850							
851							
852							
853							
854							
855							
856							
857							
858							
859					DRILLED REC. 60.2 60.2		
860							
861							
862							
863		.4					863.2 GILSONITE IN FRX.
864							
865							
866							
867							
868							868.0 - 868.4 OIL SH. 5YR 3/2 CALC.
869							THIN EVEN LAMINATIONS.
870							868.5 0.01' TUFF
871							868.4 - 886.0 OIL SH. 5YR 3/2 CALC H. GRADE

THE CLEVELAND CLIFFS IRON COMPANY PROJECT: NOSR 1

HOLE NO. 17 SHEET 4 OF ___ DATE: 10/14/77 LOGGED BY: D LOUVIK COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
872					CORE #2		871.5 0.05' BAND TUFF
873							872.3 0.05' BAND TUFF
874							
875							
876							868.4 - 886.0 HIGH GRADE OIL SHALE
877							
878							
879							
880							
881							
882							
883							
884							
885							
886							886.0 - 889.0 LOOP STRUCT. & DISCONTINUOUS
887							BEDS.
888							888.7 0.15' BAND GRAY SILTSTONE
889							889.0 - 896.7 OIL SHALE 5YR 3/2 HIGH GRADE
890							
891							891.2 THIN SAND LAYER WITH GILSONITE
892							
893							
894							
895							
896							

NOTE: ALL CORE LOGGED TO THIS POINT MUST BE SHIFTED DOWN 0.77 FEET TO CORRECT FOR GEOLOGRAPH ERROR.

THE CLEVELAND CLIFFS IRON CO.

HOLE NO. 17 SHEET 4A OF ____ DATE: ____ LOGGED BY: P. Thacker COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
868							
869							
870							
871							
872							
873							
874							
875							
876							
877							
878							
879							
880							
881							
882							
883							
884							
885							
886							
887							
888							
889							
890							
891							
892							
893							
894							
895							
896							
897					897.47		897.47-905.75 oil shale, N7-N2, highly calc., thinly
898			.68, .69 .96				lam, med-high grade, predom. med. grade.
899							897.58-.59 layer siltstone, sl. calc.
900							898.68-.69 : lam. siltstone, noncalc. 898.96-.99 layer siltsto.
901							noncalc.
902							
903							
904							
905							905.83-906.00 six layers siltstone, non-sl. calc.,
906							.05-.3" wide 905.75-907.56 oil shale, N7-N2, sl.
907							to noncalc, thin lam, predom. high grade. 907.56-913
908							oil shale, N7-N2, sl. to highly calc, increasing w depth,
909							low-med grade.
910							
911							911.18-.23 layer siltstone, sl. calc, cont. tiny holes.
912							
913							913.0-920.07 oil shale, N7-N2, highly calc, thinly
914							lam, low-med grade, predom. low grade.
915							
916							
917							

CORE #3 CUT 52' REC. 52.01

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR #1

HOLE NO. 17 SHEET 5 OF ___ DATE: 10/15/77 LOGGED BY: P. Thacker D. PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
918							
919							
920							920.07-922.25 oil shale AA, high grade w minor
921							low grade lam.
922							922.25-929.65 oil shale AA, low grade.
923							
924							924.90-925.10 bed sandy siltstone, N4, highly calc,
925					CORE #3		massive
926							
927							
928							
929							929.65-931.65 oil shale AA, predom. high grade
930							w minor low grade beds & lam.
931		.35					931.65-939.35 oil shale AA, predom. low grade, cont.
932		90°					few lam. gilsonite
933							
934							
935		.65					935.04-936.27-4 short natural fractures, closed,
936							45° & 65°
937							
938		90° .33					
939		.37					939.35-940.92 oil shale AA, v. high grade w minor low grade lam
940							940.92-949.30 oil shale, AA, predom low grade
941							w some minor high grade lam. toward the top.
942							
943							
944							
945							
946							
947							
948							
949					949.48		Oil Shale High → Med Grade → 967'
950							.10 → .20 V Fine → Fine Sand Layer Discord, N2
951							5YR 2/2 → 5YR 3/2
952							
953							
954							
955							
956							
957							
958							
959							
960							
961							.85 Sand Stone V Fine to Fine
962							
963							
964							
965							
966							
967							

CORE #4 cored 59' Rec 60.28

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR

HOLE NO. 17 SHEET 6 OF ___ DATE: 10/16/77 LOGGED BY: D Lonnie / P Thurler COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
968							967-969 O. SH. 10R 4/2 V. CALC.
969							THIN EVEN LAM.
970							969-971 O. SH. N1 SL. CALC
971							971-974 O. SH 10R 4/2 V. CALC. LOOP STRUCT.
972							
973							974-976.5 O. SH 10YR 4/2 V. CALC.
974					C		976.5-985.8 O. SH. 5YR 3/4 V. CALC.
975							TUFF @ 982.6 (0.01), 985.4 (0.07)
976					O		
977							
978					R		
979					E		
980							
981							
982					#		
983							
984							
985					4		985.8-986.2 TUFF-SS 5YR 6/4 to 5B 5/1
986					CUT		~~FALSE MARKER~~
987					59		986.2-994.0 O. SH 5YR 3/4 V. CALC.
988					REC		TUFF @ 987.8 (0.01) 989.1 (0.01)
989					60.28		989.7 (0.1) 990.2 (0.3) 992.9 (0.1)
990							993.1 (0.01) 993.3 (0.01) 993.5 (0.03)
991							
992							994.0-996.2 O. SH. 5YR 2/1 CALC.
993							
994							
995							996.2-998.0 TUFF-SS 5YR 6/4 to 5B 5/1
996							~~UPPER WAVY BED~~ No
997							
998							998.0-1009.0 O. SH 5YR 2/1 CALC.
999							TUFF @ 998.5 (0.1)
1000							999.0 (0.1)
1001							1002.0 (0.01)
1002							1002.3 (0.04)
1003							1003.0 (0.01)
1004							1006.5 (BLEBS.)
1005							
1006							
1007							
1008							
1009					1007.82		1009.0-1023.0 oil shale 10YR 6/2-N2, highly calc., thinly
1010							lam, low grade w minor med. grade lam.
1011			.07				1011.03-.15 f. to v.f.s.s., calc, porous, dk brn,
1012							unevenly bedded.
1013							
1014							
1015							
1016							1016.59-.69 f. to v.f.s.s. layer, dk brn, calc., porous,
1017							pitted.

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR 1

HOLE NO. 17 SHEET 7 OF ___ DATE: 10/16/77 LOGGED BY: P. THACKER D. PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1018							
1019							1019.50-1020 oil shale AA, w minor high grade lam
1020							
1021							1021.88 thin stringer ss (≈ .01') oozing oil
1022							
1023							1023-1029.9 oil shale, AA, very low grade
1024							
1025							1025.43-.46 irregular bedded f to v.f. ss., calc.
1026							
1027							1027.20-.25 irregular bedded f. to v.f.s.s. sl-noncalc, dk. br
1028							
1029					Core #5		1029.03-1030.82 wavy bedding
1030							1029.9-1030 oil shale, AA, low-med grade
1031							SAA, 5YR 3/2 → 5YR 3/4 TO 1042'
1032							
1033							.92 sm SAND LAYER discard TO O.Sh
1034					Raw 50.54		.83 FINE → V FINE SAND + Gilsonite STRINGER
1035							
1036					Core 50		.68 Gilsonite Patch
1037		.90					.90 → 1040.38 oil, TAR, ORGANICS All Along FRX
1038							.46-.56 mudstone LAYER
1039							
1040		.38					.45-1041 Loop ST + SSDS
1041							
1042							1042-1043.85 TUFF SAND Alternating with low GR O.Sh
1043							SANDS ARE MASSIVE, Dolomitic Bleeding TAR
1044						Wavy	Oil Sh. 5YR 2/2 → 5YR 3-4 TO 1053'
1045							Bedding MASSIVE TO sl LAM
1046							
1047							.7 DISCARD STRINGER OF SAND
1048							
1049							
1050							
1051							
1052							.64-.70 V FINE SAND STONE
1053							.23 Gilsonite PATCH in Oil Sh 5Y 4/1
1054							Oil Sh 5Y 4/1 INTER LAM + SSDS
1055							
1056							SAA with more SSDS + Loop STR
1057							
1058							
1059							
1060							Oil Sh. 10YR 4/2 → 5YR 3/2 → 5Y 5/2
1061							1060' → 1080' MUDDY SILTSTONE
1062							MOSTLY MASSIVE Comp RX sl INTER LAM
1063							Some Gilsonite PATCHES IN induced FRX
1064							
1065							
1066							
1067							

HOLE NO. 17 SHEET 8 OF ___ DATE: 10/16/77 LOGGED BY: D LOUDIK COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1068							
1069							
1070							
1071							
1072							
1073							
1074							
1075							
1076							
1077							
1078							1078.0 - 1085.5 O.SH 5YR3/2 CALC
1079							EVEN LAMINATIONS
1080					CORE #6 CUT. 60 REC 58.7		
1081							
1082							
1083							
1084							
1085							1085.5 - 1087.0 O.SH N1 N.CALC
1086							H. GRADE
1087							1087.0 - 1102.0 O.SH 5YR 3/2 CALC.
1088							
1089							
1090							
1091							
1092							
1093							
1094							
1095							
1096							
1097							
1098							
1099							
1100							
1101							
1102							1102 - 1118.0 O.SH 10YR 6/2 to 5Y 7/2
1103							LOW GRADE SL. CALC.
1104							LOOP STRUCT.
1105							~~FRX~~
1106							1112.0 SEAM OF MARCASITE
1107							1114.1 SAME
1108							1113.9 SAME
1109							1113.8, 1113.1, 1113.2 MARCASITE
1110							1114.4, 1114.5, 1114.7 SAME
1111							
1112							
1113							
1114							
1115		90 ±.6					NAT FRX 1115.6 - 1117.0
1116		±.0					
1117							

THE CLEVELAND CLIFFS IRON COMPANY PROJECT: NOSR-1

HOLE NO. 17 SHEET 9 OF ___ DATE: 9/17/77 LOGGED BY: P. Thacker COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1118							1117-1119.41 siltstone 10YR5/4-N2, noncalc, thinly lam. containing
1119							few lam. kerogen. 1118.32-.56 vuggy 1119.41-1121.16 oil shale
1120							10YR 6/2-N1, noncalc., med grade at top, v. high grade at bottom.
1121							1120.33-.40 irregular lenses tuff ss. 1121.16-1126.45 interbedded
1122							oil shale (N2), & siltstone (10YR 6/2), both sl. calc, thin lam
1123							1122.08-.15 tuff ss.
1124							
1125							1126.0-.45 irregular bedding
1126							1126.02-.15 tuff ss. 1126.45-1127.45 thick bed tuff ss
1127			.48				irregular bedding 1127.0-.04 lense oil shale. 1127.45-
1128							1131.68 interbedded oil shale & silty marlstone N2-10YR 6/
1129							highly calc., thin lam., oil shale high grade
1130					CUT 42' CORE #7		1130.11-.31 vuggy area in oil shale filled w. nahcolite
1131							1131.68-1138.0 oil shale, 10YR 6/2-N2, highly calc, thin
1132							lam, low grade predom. w some high grade lam.
1133							1132.05-.08 tuff ss
1134							
1135							
1136							
1137							
1138					REC 39.74'		1138.0-1139.65 oil shale, SAA.
1139		90°II .65 .80					1139.65-.80 silty marlstone cont. vert. frx oozing oil.
1140							1139.80-1148.48 silty marlstone interbedded w low-med
1141							grade oil shale, 10YR 6/2-N2, sl-highly calc. Marlstone
1142							layers cont. short vert. frx oozing oil.
1143							1142.81-.94 tuff ss filled w oil & some nahcolite
1144							
1145							
1146							
1147							
1148							1148.48-1149.60 oil shale, N2, sl. calc., high grade
1149							1149.60-1154.33 oil shale, 10YR 6/2-N2, highly calc, low
1150							grade w some med. grade lam, concoidal frx.
1151							
1152							
1153							1153.68-.75 & 1154.15-.30 vuggy w most nahcolite
1154							leached out.
1155							1154.33-1156.0 v. low grade oil shale or marlstone,
1156							10YR 6/2, highly calc, thin lam. 1155.15-.55 nahcolite
1157					1158.13		layer 1155.60-.76 nahcolite nodule.
1158							Lost core
1159							(Some lost core may have been picked up) 1160-1168.5
1160							Oil Sh, Hi Grade N1 → 5YR 2/2 with 10YR 4/2 Lam +
1161		.69					bedding Des throw out. Much SSDS + Loop STR
1162							Occasional Lam of Tuff Sands
1163							Pyrite Dust in FRX 1161.60 → 1163.00
1164							
1165							
1166							
1167							

THE CLEVELAND CLIFFS INC.

HOLE NO. 17 SHEET 10 OF ___ DATE: 10/17/77 LOGGED BY: D PAPP D LOUVIR COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1168							.50 - 1176.00 U calc oil Sh
1169							5YR 3/2 → 5YR 3/4 massive
1170							
1171							
1172							
1173							
1174							
1175							
1176					CORE # 8		Oil Sh of Higher Grade than Above → 1177.7, IRR bedding
1177							+ Lam of Alt 10YR 4/2 + 5YR 2/2
1178							1177.7 - 1180 Low grade oil Sh 10YR 2/2, massive,
1179							
1180							1180-1183 oil SH 10YR 2/2 wavy bedding with
1181							marcasite stringers. From 1180.8 to 1182.0
1182							
1183					CUT, 60		1183 - 1185.8 oil SH 10YR 4/2 Low Grade
1184							
1185					REC, 57		1185.8 - 1187.3 oil SH 5YR 3/2 Non calc.
1186							tuff @ 1186.7 to 1186.9
1187							1187.3 - 1190.0 oil SH 5YR 3/2 calc.
1188							
1189							1189.4 N6 siltstone 0.1'
1190							1190.0 - 1194.0 oil SH 10YR 4/2
1191							
1192							
1193							
1194					MAJORITY LOST		1194.0 - 1199.5 oil SH 10YR 4/2 Bedding inclined,
1195							inclined vugs majority of section lost.
1196							
1197							
1198							
1199							1199.5 - 1206 oil SH 10YR 2/2
1200							
1201							
1202							
1203							
1204							
1205							
1206					CORE # 8		1206 - 1208.5 oil SH 10YR 6/2 Low Grade
1207							
1208							1208.5 - 1210.0 oil SH 10YR 2/2 Hi Grade
1209							w/ vugs @ 1209-1210
1210							1210 - 1214.5 oil SH 10YR 3/2 Low Grade
1211							thin even bedding.
1212							
1213							
1214							1214.5 - 1215.5 oil SH 10R 2/2 H. Grade
1215							1214.7 Nacholite (?) band
1216							1215.5 - 1219.0 oil SH. 10R 2/2 Marcasite
1217							Bands @ 1217.2 & 1217.5.

HOLE NO. 17 SHEET 11 OF ____ DATE: 10/18/77 LOGGED BY: BLOUVIK COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1218							1219.0-1219.3 TAN POROUS ZONE 1219.3-1220 O: SH H. GR.
1219							BOTTOM OF CORE @ 1220
1220							1220-1223.7 O. SH. 5YR 4/1 MED GR ∓ INTERBED
1221							W/SILTY MARLSTONE CLOSED VERT FX W/OIL.
1222							1223.2-1223.7 OIL SH 5YR4/1 - N6
1223		40° III .23 .65					1223.7-1228.6 OIL SH 5YR4/1 CALC THIN LAM.
1224							V. LOW GR.
1225							1228.6-1230.2 SILTY FINE SS 5YR 4/1 SL-NON CALC.
1226							1230.52-1232 O. SH. 10YR4/2-N2 V. CALC. H. GR.
1227							
1228							1232.0-1242.0 O. SH. 5YR4/1 V. LOW GR. CALC.
1229			-26				GILSONITE IN FRX @ 1232
1230							N6 @ 1235.3-1236.0, 1237.7, 1239.1-1240.0,
1231							1240.4-1240.5
1232							
1233							
1234							
1235							
1236							
1237							
1238							
1239							
1240							
1241							
1242		90 I .22					1242.0-1250.0 O. SH 5YR 7/2 V. L. GR.
1243							
1244							
1245							
1246							1245-1250.4 GILSONITE FILLED V. FRX.
1247							SOME PYRITE
1248							
1249							
1250							1250.0-1266.1 O. SH. 5YR 7/2 V. L. GR. SILTY
1251		90 I .14 .33					SL. CALC. POROUS.
1252							GRAY SANDY BANDS @ 1250.6-1250.8,
1253							1253.4, 1259.3-1259.5 CONT. PYRITE &
1254							FEW SMALL VUGS.
1255							
1256							
1257							
1258							
1259							
1260							
1261							1263.76-1263.77 THIN BAND ANALCITE
1262							
1263							
1264							1266.1-1280 SILTSTONE N7 FINE GRAINED
1265							SL.-NON CALC. SEVERAL THIN
1266							MARCASITE BANDS (1274.9, 1275.0,
1267							

CORE # 9 CUT 100 REC 59.84

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSRA

HOLE NO. 17 SHEET 12 OF ___ DATE: 10/18/77 LOGGED BY: D. REEVES (DLOUIK) COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1268							1277.5, 1277.6, 1277.7, 1278.1, 1278.7, 1278.9,
1269							1279.2, 1279.3, 1279.8)
1270					CORE # 9		1269.38 Sm. VUGS
1271							
1272							
1273							
1274							1274.65 Sm. VUGS.
1275							
1276							
1277							1277.31 – 1280 SMALL VUGS W/PYRITE
1278							1279.53 – 1279.69 CORE LOSS
1279							BOTTOM OF CORE 1280.0
1280							1280 – 1285 SILTSTONE 5Y6/1 SCATTERED VUGS
1281							OF PYRITE AND BANDS OF MARCASITE
1282							
1283							
1284							
1285			1285.8				1285 – 1290 SILTSTONE 5Y6/1 VUGGY, LEACHED
1286			1286.1 1286.2				VUGS OF PYRITE SCATTERED
1287			1286.4 1287.1				
1288			1287.7 1288.1				
1289							
1290					CORE # 10		1290 – 1293 SILTSTONE 5Y6/1 SCATTERED VUGS
1291							SOME MARCASITE SEAMS SOME PYRITE IN VUGS.
1292							
1293							1293 – 1296 OIL SH 5Y6/1 LOW GR. NON CALC
1294		40 T .4					THIN LAM. VUGS OF PYRITE @ 1293.1 & 1295.9
1295		L .5					
1296							1296 – 1299 OIL SH 10YR 4/2 LOW GR. NON CALC.
1297							@ 1296.5 A LARGE VUG OF PYRITE WITH SOME
1298							STRANGE RED MATERIAL
1299							1299 – 1300.6 O.SH 5YR3/4 SL. CALC.
1300							1300.6 – 1301.6 SILTSTONE 10YR4/2 N. CALC.
1301							1301.6 – 1310.7 O.SH. 5YR2/2 N. CALC. H. GRADE
1302							WAVY LAM. to 1302 SILT LAYER @ 1303.1
1303							LOOP STRUCT & DISC. LAM.
1304					CUT REC. 61.0 60.01		
1305							
1306							
1307							
1308							
1309							
1310		2 T .7					1310.7 – 1311.3 F. SS. 5Y7/2
1311		I .1					1311.3 – 1313.6 O.SH. 10YR 4/2 M. GR. V. CALC.
1312							F. SS @ 1313.05 – 1313.3
1313							1313.6 – 1315.0 O.SH. 5YR3/2 V. CALC H. GR.
1314							
1315		8 T .7					1315.0 – 1319.8 O.SH 5YR 5/2 WAVY LAM.
1316							GILSONITE IN FRX
1317							

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR 1

HOLE NO. 17 SHEET 13 OF ___ DATE: 10/19/77 LOGGED BY: D BOUDIR COLLAR: _____ TD: _____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1318							
1319		±.7					1319.8-1325.4 OIL SH 5YR3/2 H. GR. TAR OOZING
1320							@ 1320.7
1321							
1322							
1323							
1324							
1325					CORE # 10		1325.4-1326.0 O. SH. 5YR3/2 CALC. H. GR.
1326							WAVY LAM. w/5YR2/1 BAND @ 1325.6-1325.8
1327							1326-1328 O. SH 5YR3/2 CALC. H. GR.
1328							MARCASITE STRINGERS.
1329							1328.0-1333.3 O. SH. 5YR3/2 CALC H. GR.
1330							
1331							
1332							
1333							1333.3-1333.6 F. SS N5
1334							1333.6-1334.0 O. SH. 5YR3/2 N. CALC. MASSIVE
1335							LOOP STRUCTURE
1336							1334.0-1340.01 O. SH. 5YR3/2 V. CALC.
1337							FINE SS @ 1338.0-1338.1
1338							
1339							BOTTOM OF CORE 1340.01
1340							1340.5-1341.2 OIL SH & DOLOSTONE 5YR6/1-5YR2/1
1341							BRNISH GRAY-BRNISH BLACK, NON CALC.
1342							1341.5-1346.9 DOLOSTONE AA 5YR6/1, BRNISH
1343							GRAY W/30% ± OIL SH A.A IN V THIN LAMS
1344							
1345							
1346							1346.9-1349.7 OIL SHALE & DOLOST A.A W/VTHIN
1347					CORE #11		SILTY TUFF LAMINATIONS THROUGHOUT
1348							
1349					CUT 60%		1349.7-1350.2 VERY SILTY TUFF, 5YR7/2 YELLOWISH
1350							GRAY, NON CALCAREOUS, W/EXTREMELY THIN GILSONITE LAMS.
1351					REC		1350.2-1353 OIL SHALE 5YR2/2 DUSKY BROWN, NO
1352					61%		CALC. CRYSTALLINE W/SOME V. THIN SILT LAMS
1353							1353-1356.1 OIL SHALE & DOLOSTONE AA.
1354							
1355							
1356							1356.1-.6 TUFF, VERY SILTY 5YR7/2 YELLOWISH GRAY
1357							1356.6-1367.7 DOLOSTONE N-8 VERY LIGHT GRAY
1358							TO N4 MEDIUM DARK GRAY, HARD, BRITTLE
1359							W/MANY THIN SILT LAMINATIONS SOME STRK
1360							OF OIL & TAR.
1361							
1362							
1363							
1364							
1365							
1366							
1367							

HOLE NO. 17 SHEET 14 OF ____ DATE: 10/19/77 LOGGED BY: DREEVES DRAPP COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1368							1367.7 to 1368.1 TUFF 10YR 5/4, MODERATE YELLOWISH
1369							GRAY, CALCAREOUS, SILTY
1370							1368.1-1374.0 DOLOSTONE AS BEFORE
1371							
1372							
1373							
1374							1374.0-1374.5 SILTY TUFF AA.
1375							1374.5-1401.0 DOLOSTONE 5YR 6/1 - N5 LIGHT
1376							BRNISH GRAY - MED GRAY, DENCE, HARD
1377							EXT BRITTLE, PRONE TO FRX (CONCOIDAL)
1378							FRX. HEAVY VERT FROM 1381.1-1401.0
1379					CORE		POSSIBLY SOME FRX. INDUCED >10% ±
1380					#11		OIL SHALE PREDOMINATLY THIN LAMS,
1381					CUT		5YR 3/4 MODERATE BROWN
1382					60		
1383					REC		
1384					61		
1385							
1386							
1387							
1388							
1389							HEAVILY SHATTERED ZONE
1390							
1391							
1392							
1393							
1394							
1395							
1396							
1397							
1398							
1399							
1400							BOTTOM OF CORE 1401
1401							
1402							1401-1409 muddy Silt ST. non calc. some dis Lam
1403							
1404							
1405							
1406							
1407							
1408							
1409							
1410							Silt Stone Lam SSDS
1411							SAA .71-.94 U Fine Sand → silt Layer 10 YR 5/4
1412							Oil Sh High Grade → 1415'
1413							SAA more Lam discord + SSDS
1414							
1415							Muddy Silt ST MASSIVE 5YG 4/:
1416							
1417							

Core 60.00
Recovered
60.44

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR 1

HOLE NO. 17 SHEET 15 OF ___ DATE: 10/19/77 LOGGED BY D PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1418							
1419							
1420							
1421							
1422							SAA more lam SSDS
1423							Silt stone sl arenaceous vsl calc .61 Tuff sand
1424							
1425							
1426							SAA .01-.07 v fine sand discord
1427							SAA .14-.26 " " "
1428							Oil Sh 5YR/ 3/4 variegated Lt+ Dr
1429							
1430							
1431							
1432					CORE		Argillaceous silt stone 5G 6/1
1433					#		.55 silty sand lam
1434					12		
1435					CUT		
1436					60		
1437					REC.		
1438					60.44		
1439							
1440							
1441							
1442							
1443							SAA
1444							SAA .73-1448 white sand sl calc, fine grain sub ∡,
1445							some nacholite + another Dr. min, inter bedded → lam with
1446							calc silt stone 5YR 4/4
1447							
1448							Silt stone calc
1449							SAA with Gilsonite blebs
1450							SAA .55-1453 Tuff sand 5YR 4/4
1451							
1452							
1453							Muddy Siltstone N5
1454							
1455							
1456							Sl sandy silt stone, calc, white mica, smamouts nacholite
1457							
1458							
1459							SAA inter bedded sandy siltstone + siltstone
1460						1461	SAA
1461							Sand stone coarse to fine, sub rounded, calc,
1462							
1463							
1464							
1465							
1466							
1467							

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSR1

HOLE NO. 17 SHEET 16 OF ___ DATE: 10/20/77 LOGGED BY: D. REEVES COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1468							1462-1471.9 OIL SHALE 10YR 6/2 - 5YR 5/2
1469							PALE YELLOW BROWN - PALE BROWN LOW
1470							GRADE ±40% DOLOSTONE 10YR 6/2 TO 5YR
1471							A.A. HARD BRITTLE RX, BREAKS EVENLY
1472							ALONG BEDDING
1473							
1474							1471.9-1472.2 SILTSTONE 5YR 7/2 YELLOW GRAY
1475							HARD, CALCAREOUS
1476							1472-1485 OIL SHALE & DOLOSTONE AA
1477							WITH NUMEROUS SMALL SILT BLEBS
1478							& THIN LAMS MANY VERY THIN GILSONITE
1479							OR TAR STRINGERS
1480							
1481					CORE		
1482					#13		
1483							
1484					OUT		
1485					60'		1485-1521 OIL SHALE & DOLOSTONE, 5YR 5/2
1486					REC		5YR 3/2 LIGHT OLIVE GRAY TO OLIVE GRA
1487					59.83		SLIGHTLY CALCAREOUS. OIL SHALE LOW
1488							TO MEDIUM GRADE, HARD MASSIVE, BRIT
1489							W/VERY MINOR SILT SEAMS, ALSO V. MINO
1490							GILSONITE & TAR LAMINATIONS. DOLOST
1491							IS HARD & BRITTLE
1492							
1493							
1494							
1495							
1496							
1497							
1498							
1499							
1500							
1501							1501.0 SILT SEAM, N-7, LIGHT GRAY, CALC
1502							
1503							
1504							1504.2-1505.1 SILTS & TUFF, N-8-10YR 6/2
1505							VERY LIGHT GRAY - PALE YELLOWISH BROWN
1506							SLIGHTLY CALCAREOUS
1507							
1508							
1509							
1510							
1511							
1512							
1513							
1514							
1515							
1516							
1517							

THE CLEVELAND CLIFFS IRON COMPANY PROJECT: NOJICI

HOLE NO. 17 SHEET 17 OF ____ DATE: 10/20/77 LOGGED BY: D. REEVES ~~D. PAPP~~ 2 THACKER COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1518							1518.8-1519.3 OIL SHALE & DOLOSTONE AA.
1519							THIS ZONE EXTENSIVELY SHATTERED
1520							
1521						1521	1521.0-1525.21 OIL SHALES INTERBEDDED WITH
1522			.85				MARLSTONE 5B 5/1, N-2, 5YR 6/1 CALCAREOUS
1523							THIN LAM, VERY LOW GRADE WITH MINOR HIGH
1524							GRADE
1525							1524.08-.12 PINK LENS 5YR 8/1 SLIGHTLY CALC.
1526							1525.08-.12 SANDSTONE LAYER BLUE GRAY SL CALC
1527							1525.21-1528.62 MARLSTONE 5B 5/1, 5G 6/1, 10YR 6/2
1528							CALC THIN LAM
1529		.42 .65					1528.62-1542.52 OIL SHALE 5B 5/1, N2, N7 SLIGHT
1530							TO HIGHLY CALCAREOUS VERY THIN LAM, HIGH
1531		.07					GRADE PREDOMINATLY WITH FEW LOW GRADE
1532							BEDS
1533							1529.42-.65 CLOSED FRX - OFF SET BEDDING
1534							1534.7-.78 BLUE SILTY SANDSTONE, HIGHLY CALC MASS
1535		VER					
1536							
1537							
1538							
1539							1539.45-.66 OIL SHALE INTERBEDDED W/ BLUE MARLSTONE
1540		.55	.55				1540.79-1541.05 OIL SHALE, LOW GRADE, NON CALCAREOU
1541							1541.05-.56 OIL SHALE, VERY HIGH GRADE
1542					CORE		1542.52-.83 DOLOMITE(?) 10YR 8/2 VARIEGATED, CALC
1543					#14		Oil Sh Interbedded → Lam, sl calc, to massive bedding, 5GY 6/1 →
1544							5G 4/1 1543' → 1556'
1545					CUT, 61'		
1546							
1547					REC		
1548					60.4		
1549							.47 Gilsonite Patch
1550							
1551							
1552							.32 → .64 Hematite STAIN
1553							
1554							
1555							
1556							SAND STONE med TO Fine, sub ∡, with blebs + Patches
1557							of Dolo sands) 1557' SSDS + minor Faulting in Silt Stone
1558							Silt stone SAA STREAKED by sands
1559							Silt Stone VARIEGATED, Lam TO MASSIVE → 1556
1560							
1561							
1562							
1563							
1564							
1565							
1566							
1567							Oil Sh, VAR to MASSIVE some Interb Lam 5YR 3/4 → 10YR 2/2 TO

1573'

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSRI

HOLE NO. 17 SHEET 18 OF ___ DATE: 10/21/77 LOGGED BY: D PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1568							
1569							
1570							
1571			18.65				
1572							Gilsonite STREAK .00
1573		.05-.45					.05 → .45 SANDSTONE med GRAIN sub ∠, non CALC except
1574							For CALC blebs) .42 → 15.72 Intrbd bedded SILT ST + SAND
1575							.72 → 1577 SANDSTONE AS 1573.05 → .45, w/ white MICA
1576							
1577							S.S. + SI STONE INTERLAM w/ much SSDS
1578							
1579							SI STONE w/ SAND blotches
1580							SI STONE MASSIVE
1581						1582.	SAA END CORE, BOTTOM 1582
1582							SAA TO (.85 → 1583.30 SS med GRAIN, sub ∠, 5YR 2/1
1583							SANDY SILT STONE
1584							SAA TO (.30 → 1585 SS CALC, SUB ROUND med → FINE, WHITE
1585							MICA
1586							.05 PYRITE LAM 1/4 REST SI STONE
1587							SILT STONE N5 MASSIVE → 1591'
1588							
1589							
1590							
1591							.11 → 1592 INTER LAM → (HARD CLASTS), SILT STONE → SI SANDY SILT STONE
1592							SILT STONE MANY TINY BLOBS + DARK SPOTS with some
1593							PYRITE in BLACK MATRIX min (Gilsonite?)
1594							SILT STONE MASS → VAR 5Y 4/1 TO 1603!
1595							
1596							
1597							
1598							
1599							
1600							
1601							
1602							
1603							S.S. sub ∠ → sub ROUND med → FINE SI CALC, 5B 5/1
1604							QTZ + ORGANICS
1605							SAA white MICA
1606							
1607							
1608							SANDY SILT STONE TO SILTY SAND STONE INTER LAM, + SSDS
1609							
1610							SS sub ∠ FINE TO U FINE white MICA
1611							INTER bedded non CALC S.S. + SILT STONE
1612							MUCH SSDS TO 1613
1613							SAND STONE, MED → FINE, sub ∠, N5 TO 1613.85
1614							
1615							
1616							
1617							

CORE #15 CORE 59'

RECS 8.17

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSRI

HOLE NO. 17 SHEET 19 OF ____ DATE: 10/22/77 LOGGED BY: D. PAPP ~~P. THACKER~~ COLLAR: ____ TD: ____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1618							
1619							.85 Mud Stone → Silty Mud Stone, Non Calc
1620							.30 - 1621 SS. Fine → v Fine, ✱ → Sub ✱
1621							Silt Stone, Marcaste In induced Frx Non Calc
1622							" " Massive, sl muddy, Non Calc, 5YR 2/1
1623							
1624							
1625							Mud Stone Massive
1626							
1627							Silt Stone Massive → Var.
1628							
1629							
1630							
1631							
1632							Mud Stone
1633			.00, .29, .7				
1634							.30 → 1635 v Calc, Tuff silt
1635							
1636							
1637							
1638							
1639							
1640						1641	1641 - 1644.46 Oil Shale, N-6, 10YR 4/2, 10YR 6/2 SL-MOD CAL
1641							Very Thin Lam, Cont Lam Gilsonite, V. Low Grade
1642							
1643							1644.46 - 1646.77 Marlstone N-6, 10YR 4/2, 10YR 6/2
1644							Highly Calc. Thin Lam, Cont. Lam Analcite
1645							Numerous Towards Top
1646							1646.54 - .63 Small Lens Dolomite ? & Analcite
1647							1646.77 - 1647.17 Silty SS, SB 5/1, Highly Calc
1648							1647.17 - 1655.78 N-5, 10YR 4/2, Highly-Non Calc.
1649							Massive Thin Lam Marlstone
1650							1649.2 - .39 Stringers & Displaced Bedding
1651							
1652					Core #16		
1653							
1654							
1655					Cut 60'		1655.78 - 1662.45 Oil Shale N-3, 10YR 6/2, Non Calc
1656							Very Thin Lam, Low-Med Grade
1657		.8			Rec		1657.90 - 1659.51 Frx Filling Soft Reddish Black Mine
1658		80°			59.6		1657.84 - .89, 1658.57 - .66 Gray SL Calc Marlstone
1659		.51					.31' of Core Lost
1660							
1661							
1662							1662.45 - 1669.13 Oil Shale N-7, N-4, 10YR 6/2, SL-MOD
1663							Calcareous, Very Thin Lam, Minor Lam
1664							Gilsonite Very Low Grade
1665							
1666							
1667							

HOLE NO. 17 SHEET 20 OF ___ DATE: 10/22/77 LOGGED BY: P. THACKER D PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1668							
1669							1669.13-1671.13 OIL SHALE, NUMEROUS LAM. ANALC
1670							
1671							1671.13-.52 SILTSTONE, SLIGHTLY CALC, MASSIVE 10YR 6
1672							1671.52-1674.68 OIL SHALE N-4, 10YR 6/2, MED CALC
1673							V. THIN LAM, V. LOW GRADE WITH SOME
1674							HIGHER GRADE NEAR TOP
1675							1674.68-1679.38 OIL SHALE N-4, 10YR 6/2 SLIGHTLY CALC., THIN LA
1676							LOW GRADE
1677							1674.7-1675.7 NUMEROUS LAM. ANALCITE
1678							1679.1-.4 NUMEROUS LAM ANALCITE
1679							1679.38-1686.92 SILTSTONE 10YR 6/2, 10YR 4/2 SLIG
1680					CORE		CALCAREOUS, CONT. MINOR LAM GILSONITE
1681					#		& KEROGEN, ANALCITE, THIN LAM
1682					16		
1683					CUT,		
1684					60'		
1685					REC		
1686					59.6		1686.92-1687.60 SANDY SILTSTONE 10YR 4/2 MOD. CALC.
1687							WAVY BEDDING
1688							1687.60-1688.61 SILTSTONE N-5, 10YR 4/2, MOD-HIGH
1689	90°	I .27 .93					CALC, THIN LAM MINOR LAM GILSONITE
1690							1688.61-1696.45 SILTY SANDSTONE 5YR 4/1 MOD
1691							CALC, MASSIVE WITH NUM. LAM, W/FLAKES
1692	90°	I .95 .50					OF GILSONITE 1689.27-.93 CLOSED FRX FILLE
1693							WITH WHITE NON CALCAREOUS MINERAL
1694							1691.95-1692.50 CLOSED FRX
1695							1694.41-.98 LIGHT BROWN MARLSTONE THIN LAM
1696							1696.45-1700.98 OIL SHALE N-6, 10YR 6/2 NON CALC.
1697							THIN LAM, V. LOW GRADE, CONT. NUM LAM GILSONITE
1698							1699.92-1700.17 SILTSTONE BED LTBR MASSIVE
1699							SL CALCAREOUS
1700						1701	1700.89-1701 LOST CORE ZONE
1701					CORE 60		Silt Stone 5GY 4/1 Inter Lam, non Calc,
1702					REC 60		
1703							SAA 5Y 2/1 massive
1704							sl muddy Silt Stone massive
1705					CORE		SAA varegated
1706					#		SAA massive
1707					17		
1708							
1709							Silt Stone SSDS, Patches of Sand
1710							Oil Sh med Grade massive
1711							Silt Stone VAR
1712							Silt Stone (muddy), non calc, Inter lam → massive
1713							SAA (sl sandy)
1714							SAA
1715							mud Stone massive .38→.47 sl sandy silt bed, .65→1716.9
1716							Silt Stone sl muddy SN, massive, non calc,
1717		.5-.9					SAA

HOLE NO. 17 SHEET 21 OF ___ DATE: 10/22/77 LOGGED BY D. PAPP DREEVES COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1718							
1719							
1720							Silt stone, lam, 5YR 2/2 non calc
1721							SAA 5YR 2/1
1722							
1723							
1724							
1725							
1726							Siltstone Inter lam → massive → 1737, 5N
1727							
1728							.00 → .35 Sand, stone bed discord to lam
1729							Siltstone) .87 " " Streak " "
1730							
1731							
1732							
1733							SAA massive
1734							" "
1735					Core		" variegated
1736					#17		SAA "
1737			.72		CUT		Silt stone with patches of sand des + discord, sl va
1738			.3		60		Sandstone, organics in FRX, fine grain, sub ∡
1739					REC		SAA
1740					60		Sand stone interbed with silt stone
1741							SAA
1742							SAA
1743							Sand stone, med → fine, sub ∡ → sub round,
1744							10YR 4/2) SAA organic in FRX
1745							SAA to .40, Silt stone, N5, FRX lined with white
1746							pyrite) SAA
1747							.00 → .55 Interlam sand + silt sl calc SSDS
1748							1747.55 → 1761 Silt stone, 5YR 3/4 → 5YR 2/2,
1749							Interbed lam, non calc
1750							
1751							
1752							
1753							
1754							
1755							
1756							
1757							.75-.85 Sand stone bed
1758							Silt stone massive
1759							SAA " with vert streak sand
1760						1761	
1761							1761-1762.4 Oil shale 5YR 5/2, pale brn, low grade,
1762							non calc.
1763							1762.4-1765.6 Sandstone, fine grained 5YR 3/2
1764							olive gray, clear subrounded grains w/
1765							siltstone seams, slightly calc. - non calc
1766							minor pyrites & limonite stain some gypsum
1767							filling

THE CLEVELAND CLIFFS IRON CO.

HOLE NO. 17 SHEET 22 OF ___ DATE: 10/22/77 LOGGED BY: D. REEVES / P. THACKER COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1768							1765.6-1775.05 OILSHALE 5YR 4/4 - 5YR 3/2 MOD.
1769							BROWN - GRAYISH BROWN, INTERBEDDED
1770							NON-CALCAREOUS, MED-HI GRADE, HARD,
1771							DENSE & BRITTLE W/ U. THIN SILTSTONE
1772							LAMINATIONS
1773							
1774							
1775							1775.05-1775.2 SANDSTONE LAYER, POROUS, NON CALC
1776							1775.2-1777.05 DOLOSTONE W/ ± 30% OIL SHALE
1777							LOW GRADE INTERLAMINATED & INTERBEDDED SH
1778							1777.05-1778.2 OIL SHALE A.A.
1779							1778.2-1779.3 OIL SHALE, AA. W/ SILTSTONE BLEBS & BEDDIN DISTORT
1780							1779.3-1786.5 OIL SHALE 5YR 4/4 - 5YR 3/1, MODERATE
1781							BROWN - BROWNISH BLACK MED-HI GRADE, INTER-
1782					CORE		BEDDED & INTERLAMINATED, NON CALC. HIGHLY FRX
1783							
1784					#18		
1785							
1786					CUT		1786.5-1786.7 SILTSTONE & LIMESTONE N-5, MED GRAY
1787					61		HIGHLY CALC, HARD, CRYSTALLINE.
1788					REC		1786.7-1787.2 LIMESTONE N-4 MED DK GRAY, HARD
1789					61.3		HIGHLY CALC. 1787.2-1790.6 MARLSTONE & DOLOSTONE
1790							N-5 MED GRAY
1791	90°	1.52 .92					1790.6-1791.15 SANDSTONE MEDIUM GRAINED SBF
1792							CALC, POROUS 1791.15-.47 SILTSTONE N-4, CALC.
1793	90°	1.08					1791.47-1799.75 SANDSTONE MEDIUM GR. N6-N7 HIGH
1794		.00					CALC MASSIVE 1791.52-.92 CLOSED VER. FRX. W/ WHITE MINE
1795							1791.92-1793.1 SANDSTONE AA. INTERBEDDED W/ ANALCITE
1796							& LT GRAY SILTSTONE 1793.08-1795.00 CLOSED VER. FRX W/ WHITE
1797							MINERAL 1795.00-1796.15 SANDSTONE AS ABOVE N-6 HIGHLY
1798							CALCAREOUS 1796.15-1799.75 SANDSTONE AA W/ MINOR GILSONITE
1799							199.75-1800.15 SILTSTONE 10YR 6/2 - N4 HIGHLY CALC 40° BED
1800							1800.15-1804.55 OIL SHALE N3 - 5B 5/1, MOD CALC, MED HIGH GRADE
1801			.13				1801.13-.21 ANALCITE STRINGERS
1802							
1803							
1804	40°	.10 .31					1804.55-1805.35 SILTSTONE, 10YR 7/4 F.SS 5B 5/1 SL-MOD CALC
1805							BOTTOM SS & TOP SILTSTONE WITH SS EXTENDING INTO SILTST
1806							1804.72, OIL SHALE STRINGERS EXTENDING UP TO SS. 1805.10
1807							1805.35-1808.34 OIL SHALE, N-2, MOD CALC., VERY HIGH GRADE
1808							1806.24-.37, 1808.82-.91 SILTSTONE BED 10YR 6/2 HIGHLY CALC
1809							1808.91-1811.91 OILSHALE N-2, 5YR 6/1, HIGHLY CALC, MED GRADE
1810							MINOR LAM, GILSONITE, LOW GR. NEAR BOTTOM, ANALCITE
1811							1811.48-.75) & DOLOMITE 1811.53-.57, -1811.91-1812.33 SILTSTONE
1812							N-4, NON CALC, MASSIVE
1813							1812.33-1820.85 OIL SHALE 5Y 6/1 - N2, MOD CALC., VERY THIN
1814							LAMINATION & MOSTLY MEDIUM GRADE, W/ MINOR ANAL
1815							1814.05-1818.95 WIDE STRINGERS OF VERY HARD MINERAL
1816							(1' THICK) IN OIL SHALE (CHALCEDONY)
1817							

THE CLEVELAND-CLIFFS IRON COMPANY PROJECT: NOSK #1

HOLE NO. 17 SHEET 23 OF ___ DATE: 10/23/77 LOGGED BY: P. THACKER D. PAPP COLLAR: ___ TD: ___

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1818							1820.15 - .31 SILTSTONE SILICA W/PATCHES OF ANALCIT
1819							1820.85 - 1821.63 SILTSTONE & MUDSTONE N-6-N-7
1820							HIGHLY CALC 1821.63 - .90 SILTSTONE UPPER PART
1821							FILLED W/PINK MIN. & SOME ANALCITE.
1822					1822.30		
1823							SILT STONE, NON CALC, MASSIVE, Radical vert ST of
1824							SAA, CALC, Inter bed → Lam with Siltstone 5B 7/1
1825							SAA
1826							SILTS → .65 SS. sl calc v fine ∡ → sub ∡
1827							SAND STONE cont to .64 → .00 Inter Lam Sandy Silt → Silts
1828							Sandy Silts → Silty SS. Inter bedded
1829							SAA ~~.05 STREAK~~ SSDS .78 → .33 MASSIVE SS.
1830							below .33 silt stone with Radical SSDS
1831							.10 → 1832.25 SS. v fine sub Round → Round
1832							Siltstone MASSIVE 5GY 4/1 non calc → 1837 white Pyr
1833							SAA, SSDS STRINGE of SAND
1834							SAA .05 STREAK TAR + VARIEGATED → Inter Lam
1835							
1836							SAA .24 Discord SAND STREAK
1837							SAA .75 → 1839
1838							SS Fine → Med GRAIN sub ∡ → sub Round QTZ cemented by Ci
1839							1839 - 1846 silty Mud STONE, non calc, VAR → massive → Inter
1840							Lam
1841							
1842							
1843							
1844							
1845							
1846							.30 Sandy Silt Stone, 10YR 5/4 → 1847.20
1847							.20 Inter bed → Lam, Silt Stone + Sandy silt
1848							Inter Lam → MASSIVE, → 1852 SS
1849							
1850							
1851							
1852							.55 → .70 Inter Lam Silt Stone + SAND STONE SSDS
1853							52.7 → 54.58 SS, Calc, v fine, sub ∡ → sub R
1854							.58 → 56.00 Inter Lam SAND + Silt Stone SSD
1855							
1856							Inter Lam → bed, SAND + Silt stone → 1858
1857							
1858							Dolomitic Mud STONE, MASSIVE → 60.35
1859							
1860							.35 → 1861.02 SS v calc, 10YR 6/2, Gil Patch in ind Fr
1861							.02 → 64.00 Silty SS → Sandy Silts SSDS
1862							Inter Lam → bed SSDS
1863							
1864							1864 → 1868 Muddy Silt Stone, sl calc, MASSIVE occasional
1865							Gilsonite blebs
1866							
1867							

HOLE NO. 17 SHEET 24 OF ____ DATE: 10/28/77 LOGGED BY: D. PAPP ~~D. REEVES~~ COLLAR: _____ TD: _____

DEPTH	±MM	FRX	PP	CORE INDEX	CORE REC.	LITH.	DESCRIPTION
1868			.88				Inter Lam → bed Mud Stone + Sandy Silt Stone SSDS
1869							To 1872
1870							1869.78 → 1702 small Fault + Much SSDS
1871							Mud Stone, Massive
1872							
1873							1873.4-1875.1 Sandstone, fine grained, N-4/N6 m
1874							LT GRAY - MED DARK GRAY, CALC SUBANGULA
1875							SUBROUNDED GRADING INTO SILTS
1876		.4/.7	.4				1875.1-1880 Siltstone & Dolostone 5YR 5/2 - 5YR 2
1877		2.5	.5				Pale Brown to Dusky Brown, Calc, Hard, Brittle
1878							Some FRX
1879		/.3					
1880			∞				End of Core TD 1880