

THE CLEVELAND-CLIFFS IRON CO.

27-105-24E

U-066

PROJECT: White River Shale Project

12/14/74

Bjorne &

HOLE NO. X-9

SHEET 1 OF 2

DATE: 1/4/75

LOGGED BY: Moulton T.D. 1068.0

DEPTH	FRX	PP	CAL/TON	CORE REC.	LITH.	DESCRIPTION
0						OVERBURDEN
26						SANDSTONE, light brown-light gray; slightly calcareous
30						SANDSTONE, light brown-light gray; some biotite
40						SANDSTONE, light gray, fine-grained; moderate
50						same as above - very fine - grained
60						SANDSTONE, light brown to light gray, fine-grained; calcareous
70						SANDSTONE, light brown to light gray, moderately calcareous
80						Same as above; very fine-grained
90						SANDSTONE, light brown-light gray, fine-grained; slightly calcareous
100						Same as above; very fine-grained
110						SANDSTONE, light gray, fine-grained; slightly calcareous
120						SANDSTONE, light gray, fine-grained; moderately calcareous
130						Same as above; very fine-grained
140						SANDSTONE, light brown-light gray
150						Same as above; very fine-grained
160						SANDSTONE, light brown-light gray; very fine grained;
170						SANDSTONE, light brown-light gray; very fine grained;
180						No Sample - mostly cement
190						No Sample - mostly cement
200						Very fine dust type material
210						Very fine, light gray to dark brown
220						Very fine, light gray to dark brown
230						Very fine, light gray to dark brown
240						Very fine, light gray to dark brown
250						Very fine, light gray to dark brown
260						Very fine dusty material; dark brown to reddish brown
270						Very fine dusty material; dark brown to reddish brown
280						Very fine dusty material; dark brown to reddish brown
290						Very fine dusty material; dark brown to reddish brown
300						Same as above; hit aquifer at 305-307 (contact between SANDSTONE & SHALE)
310						No Sample - cutting blocked by wet zone
320						No Sample - cutting blocked by wet zone
330						No Sample - cutting blocked by wet zone
340						No Sample - cutting blocked by wet zone
350						No Sample - cutting blocked by wet zone
360						No Sample - cutting blocked by wet zone
370						No Sample - cutting blocked by wet zone
380						No Sample - cutting blocked by wet zone
390						SANDSTONE & SHALE, light gray to green
400						SANDSTONE & SHALE, light gray to green
410						SANDSTONE & SHALE, light gray to green
420						SANDSTONE & SHALE, light gray to green
430						SHALE, dark brown to reddish brown
440						SHALE, dark brown to reddish brown
450						SHALE, dark brown to reddish brown
460						SHALE, dark brown to reddish brown
470						SHALE, dark brown to reddish brown
480						SHALE, dark brown to reddish brown
490						SHALE, dark brown to reddish brown
500						SHALE, dark brown to reddish brown

COMMENTS:

430 - 510, very few chips as bit grinds rock into very fine material.

THE CLEVELAND-CLIFFS IRON CO.

PROJECT: White River Shale ProjectHOLE NO. X-9 SHEET 1 OF 6 DATE: 1/6/75 LOGGED BY: Moulton T.D. 1068.0

DEPTH	+ N°	FRX	PP	GR./ TON	CORE REC.	LITH.	DESCRIPTION
816				7.6			Oil Shale, light to medium brown to black (high grade); 1
817	+110		14	7.9			to medium grade with a few zones of high grade; some th
818		90°	00.41	10.9			SAND layers present
819			07.35	13.3			
820			11	8.0			
821			31	9.3			
822			55	10.3			
823				10.1			823.0-823.2 SANDSTONE layer with sulfide inclusions
824			72	6.5			
825		90°		7.7			
826			36.91	8.9			826.36-828.0. OIL SHALE, black: higher grade zone
827	+100		28	12.1			
828				31.5			
829				9.2			
830				6.2			
831				2.3			
832				6.1			
833			85	20.3			833.35-835.0 OIL SHALE, dark brown; higher grade zone
834				76.2			
835				9.4			
836				9.6			836.40-836.55 SANDSTONE layer
837	+90			10.4			
838			68	16.5			838.55-839.00 SANDSTONE layer, oil saturated
839				15.8			839.17-839.37 SANDSTONE layer, oil saturated
840				12.3			
841				9.4			
842			32	9.2			842.00-842.25 SANDSTONE layer with sulfide mineral inclusions
843				8.4			
844				9.2			
845			28	7.9	846.28		845.00-845.20 SANDSTONE layer with sulfide mineral inclusions
846				18.4			846.65-847.10 SANDSTONE layer, oil saturated
847	+80			12.6			
848				10.2			
849				10.7			OIL SHALE, low grade
850			00	9.9			
851			69	10.6			
852				12.2			
853			10	11.2			
854				10.5			854.65-854.80 SANDSTONE layer, oil saturated
855				10.3			
856				11.1			856.00-856.35, SANDSTONE layer, oil saturated
857	+70			10.4			
858				12.5			
859				12.4			
860				8.8			
861			46	11.0			
862				15.4			
863				11.0			
864			23	8.4			
865			23	6.1			

Drilled 30.28 Ft.
Recovered 30.28 Ft.

Drilled 30.25 Ft.
Recovered 30.25 Ft.

COMMENTS:

THE CLEVELAND-CLIFFS IRON CO.

PROJECT: White River Shale ProjectHOLE NO. X-9 SHEET 2 OF 6 DATE: 1/7/75 LOGGED BY: Moulton T.D. 1068.0

DEPTH	+ - FT	FRX	PP	GAL/ TON	CORE REC.	LITH.	DESCRIPTION
866			90	5.0			OIL SHALE, low to medium grade
867	+60			12.7			
868				14.6			
869				10.5			
870			47	9.0			
871			42	9.2			
872				10.1			
873				16.3			873.85-875.75 UPPER WAVY BED. SANDSTONE, tuffaceous;
874				8.1			contorted; oil saturated
875				6.9			
876				11.4	876.53		876.53-877.50 OIL SHALE, dark brown; high grade zone
877	+50		.53	10.6			
878				12.6			
879				16.1			
880			.05	15.6			OIL SHALE, low grade; hard & heavy
881				19.5			
882				15.4			
883				10.6			
884				8.7			
885				6.4			
886				9.6			
887	+40			14.0			
888			.01	10.8			
889				8.9			
890			.35	6.8			
891				8.5			
892				4.7			
893			.77	12.5			
894				15.0			OIL SHALE, low to medium grade
895				10.9			
896				9.3			
897	+30			10.4			
898			.82	24.4			898-900, OIL SHALE - higher grade zone
899				29.9			
900				11.6			
901				12.6			
902				13.5			OIL SHALE, medium grade zone
903			.00	13.3			
904				14.8			
905			.30	37.5			
906				15.0	906.86		
907	+20			15.1			OIL SHALE, low grade with some thin, richer zones
908				22.1			
909				28.8			
910			.76	8.8			
911			.99	6.2			
912				5.4			
913			.05.90	2.8			
914			30.60	4.4			
915				6.5			Vug filled with white material

Drilled 30.33 Ft.
Recovered 30.33 Ft.

COMMENTS:

THE CLEVELAND-CLIFFS IRON CO.

PROJECT: White River Shale Project

HOLE NO. X-9 SHEET 3 OF 6 DATE: 1/7/75 LOGGED BY: Moulton T.D. 1068.0

DEPTH	±	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
916			.07	3.5			
917	+10		.76	4.1			OIL SHALE, low grade
918				2.3			
919			.83	1.8			
920			.10	2.9			
921				8.4			
922				14.1			
923				21.2			923.5-924.5 OIL SHALE, higher grade
924				38.4			
925			.91	15.4			925.75-926.10 SANDSTONE, cream, colored with thin sulfide stringers
926				16.0			
927	0		.06	10.0			
928			.25	17.0			
929			.11	27.9			929.11-929.51 SANDSTONE layer, oil saturated
930				32.8			
931			.32	22.4			
932				32.8			
933			.93	41.4			OIL SHALE, higher grade
934				38.1			
935			.69	22.3			
936				17.9	937.22		
937	-10		.22	12.2			
938				11.1			OIL SHALE, low to medium grade in upper part of run, high grade shale in the middle & lower part of the run (925-941)
939				20.6			
940				12.9			
941				11.6			
942			.80	9.6			942.75-943.20 MAHOGANY MARKER, sandstone, tuffaceous, cream colored; not typical - not oil saturated
943			.00	34			
944			.57	88			
945			.21	50			
946				12.1			
947			.49	26.8			OIL SHALE, higher grade zone
948	-20		.34	41.0			
949			.63	18.7			
950				26.8			950.2-950.4 SANDSTONE, oil saturated; 950.0 start high grade
951			.78	42.3			MAHOGANY Zone.
952				31.4			
953			.91	41.2			
954			.05	90			
955			.14	77			
956			.93	81.8			
957	-30		.40	52			
958			.60	82			
959				39.5			
960			.27	19.4			
961				23.0			OIL SHALE, medium grade
962			.17	38.3			
963				21.1			
964				36.2			
965				53.0			964.65-964.75 SANDSTONE lens
965			.89	38.3			

Drilled 30.36 Ft.
Recovered 30.36 Ft.Drilled 30.78 Ft.
Recovered 28.67 Ft.

COMMENTS:

THE CLEVELAND-CLIFFS IRON CO.

PROJECT: White River Shale Project

HOLE NO. X-9 SHEET 4 OF 6 DATE: 1/8/75 LOGGED BY: Moulton T.D. 1068.0

DEPTH	TEMP	FRN	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
966							Lost Core
967	-40				968.00		Lost Core
968				51.8			968-972, OIL SHALE, higher grade zone, dark brown-black
969				23.6			
970				27.9			
971				45.8			
972				19.3			OIL SHALE, low to medium grade
973				19.2			
974				14.1			
975				14.5			975-978, OIL SHALE, higher grade zone; banded dark brown
976			.73	38.8			black
977	-50		.96	20.4			
978				13.0			
979			.58	13.0			OIL SHALE, low to medium grade
980			.00	11.8			
981			.22	12.2			
982				22.4			
983				35.2			
984				32.1			
985				23.5			
986			.26	24.1			
987	-60			38.5			
988				27.2			
989			.91	22.0			
990				17.9			
991				12.9			
992			.70	9.4			OIL SHALE, low grade
993				16.7			
994				20.6			
995				12.4			
996			.70	9.9			
997	-70			9.4)
998				3.6	999.00) Broken zone (mechanical breaks)
999				5.3)
1000			.13.34	9.6			
1001				8.2			
1002			.57.80	7.5			1002.57-1002.92 SANDSTONE layer, oil saturated
1003		I 90°	.30	14.1			1003.3-1005.00 OIL SHALE, dark brown to black; higher
1004				32.5			grade zone
1005				15.4			
1006				8.5			OIL SHALE, cream colored to light brown, low grade
1007	-80			6.8			
1008			.18.95	12.5			
1009				34.3			
1010			.62	21.5			
1011			.97	6.5			
1012			.12.48	3.1			
1013			.00.22	2.9			
1014			.58.73	4.3			
1015			.36	9.1			

COMMENTS:

Lost core in the Mahogany Zone - ground up (according to drilled depth) at 968. Total loss is 2.11 ft., say from 965.89 to 968.00 ft.

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HOLE NO. X-9 SHEET 5 OF 6 DATE: 1/9/75 LOGGED BY: Moulton T.D. 1068.0

DEPTH	IN	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
1016			06.71	23.7			OIL SHALE, cream colored to light brown; low grade
1017			37.77	22.9			1017.39-1018.80, SANDSTONE layer with interbedded SHALE
1018			32.80	11.0			
1019			30	12.3			
1020				7.3			
1021			31	5.6			
1022	-80		63	3.5			
1023				5.3			
1024			65	4.4			OIL SHALE, cream colored to light brown, low grade
1025				5.1			
1026			36	5.0			
1027				6.3			
1028				4.2	1029.33		Lost 0.50 ft. of core at bottom of hole
1029			33	10.3			
1030				6.2			
1031				3.0			OIL SHALE, low grade, thinly bedded with thin layers of
1032	-90			2.7			oozing dead oil - mostly in thin SAND layers
1033				3.4			
1034			58	4.8			
1035				3.9			SILTSTONE (low grade OIL SHALE), cream to light brown, but
1036				5.3			in thin layers, very thinly laminated; lighter zones are
1037				5.4			calcareous; minor tar oozes from thin zones below 1036.5
1038			57	6.4			SILTSTONE with interspersed zones of SANDSTONE, very fine
1039			71	5.8			cream to light brown, banded; low kerogen content; finer
1040			25	5.4			grained, lighter colored zones are very calcareous
1041				4.7			(MARLSTONE); many zones oozing varying amounts of tar
1042	-100			4.4			separated by light-colored calcareous zones.
1043				5.6			
1044				3.9			OIL SHALE, low grade
1045			53	7.5			
1046			37.80	11.0			1046.37-1046.80 SANDSTONE layer, oil saturated
1047				6.2			
1048				2.0			
1049				3.0			
1050				3.4			
1051				5.3			OIL SHALE, low grade
1052	-110			1.8			
1053				1.5			
1054				1.6			
1055			77	1.5			
1056				0.9			
1057				1.2			
1058			58.91	2.2	1059.53		
1059			48.55	6.4			
1060				2.1			OIL SHALE, cream colored to dark brown to black, mostly
1061			89.70	2.1			grade with zones of medium to high grade
1062	-120		42.62	11.7			
1063				12.6			
1064			37				
1065			10				OIL SHALE, higher grade zone

Drilled 30.20 Ft.
Recovered 30.20 Ft.

Drilled 8.47 Ft.
Recovered 8.47 Ft.

COMMENTS:

PROJECT: White River Shale Project

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COMMENTS: