

LOGGED BY: Sundberg & Kangas T.D. 958.0P

DEPTH	TEMP	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
180							
190							
200							
210							
220							
230							
240							
250							
260							SILTSTONE, light gray; slightly effervescent
270							SILTSTONE, light gray; slightly effervescent
280							SILTSTONE, light gray; slightly effervescent
290							
300							SILTSTONE & SANDSTONE, light gray
310							SILTSTONE, light gray; slightly effervescent
320							SILTSTONE, light gray; slightly effervescent
330							SILTSTONE, light gray; slightly effervescent
340							SILTSTONE, light gray, fine grained; slightly effervescent
350							SILTSTONE, light gray, fine grained; slightly effervescent
360							SILTSTONE, light gray, fine grained; slightly effervescent
370							SHALE, light brown; slightly effervescent; some GILSONITE
380							SHALE, light brown
390							SHALE, light brown
400							SHALE, light brown
410							SHALE, light brown
420							SHALE, light brown
430							SHALE, light brown
440							SHALE, light to medium brown
450							SHALE, light to medium brown
460							SHALE, light to medium brown; slightly effervescent
470							SHALE, light to medium brown; slightly effervescent
480							SHALE, light to medium brown; slightly effervescent
490							SHALE, light to medium brown; slightly effervescent
500							SHALE, with minor SANDSTONE, light to medium brown
510							SHALE, with minor SANDSTONE, light to medium brown
520							SHALE, medium to dark brown, with minor soft, white min.
530							SHALE, light to medium brown
540							SHALE, medium to dark brown
550							SHALE, medium to dark brown
560							SHALE, medium to dark brown
570							SHALE, medium to dark brown
580							SHALE, medium to dark brown
590							SHALE, medium to dark brown
600							SHALE, medium to dark brown
610							SHALE, medium to dark brown
620							SHALE, medium to dark brown
630							SHALE, medium to dark brown
640							SHALE, medium to dark brown
650							SHALE, medium to dark brown

COMMENTS:

Chip samples to 660 feet  
Coring began at 660 feet

DEPTH	+MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
660			.30.90				OIL SHALE, light to dark brown, low grade; finely laminated
661			.58.80				
662			.20.60				
663			.12.40				
664			.09				
665			.12				Same as above; badly broken - Slightly calcareous
666			.03.59				
667	+170		.40.95				
668			.54.90				
669			.35.68				
670			.18.65				OIL SHALE, light brown, low grade; slightly calcareous
671			.34.59				
672			.81.60				
673			.15.43				
674			.20.53				
675			.06.60				Same as above
676			.48				
677	+160		.37				
678			.18.70				OIL SHALE, light to medium brown
679			.17.69				OIL SHALE, light brown with minor SANDSTONE bands
680			.02.17				OIL SHALE, light brown with minor SANDSTONE bands
681			.38.85				OIL SHALE, light to medium brown
682			.50.77				OIL SHALE, light to medium brown
683			.27.66				OIL SHALE, light to medium brown
684			.58				OIL SHALE, light to medium brown
685			.26.89				OIL SHALE, light to medium brown
686			.43				OIL SHALE, light to medium brown
687	+150		.65				OIL SHALE, medium to light brown; low grade; badly fractured during drilling
688			.01.47				
689			.09.58				
690			.40.73		690.40		
691							OIL SHALE, light to medium brown, low grade; calcareous with fine laminations
692							
693							
694							OIL SHALE, light brown, low grade
695							OIL SHALE, light brown, low grade
696							OIL SHALE, light brown, low grade
697	+140						OIL SHALE, light brown
698							OIL SHALE, light brown; 698.72-698.80, SANDSTONE oil saturated
699			.32				OIL SHALE, medium brown
700							OIL SHALE, medium brown, low grade; 700.18-700.30 SANDSTONE oil saturated
701			.65				
702							OIL SHALE, light brown, low grade
703			.50				OIL SHALE, light brown, low grade
704							OIL SHALE, light brown, low grade; 704.85-704.90 SANDSTONE oil saturated
705			.64.81				OIL SHALE, light brown, low grade
706							706.77-706.85 SANDSTONE, oil saturated
707	+130		.25	10.1			OIL SHALE, light brown, low grade
708			.45.58	10.4			OIL SHALE, medium brown, medium grade
709			.	11.4			OIL SHALE, medium brown, medium grade

Drilled 31.00 Ft.  
Recovered 30.40 Ft.

Drilled 30.00 Ft.  
Recovered 30.35 Ft.

COMMENTS:

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
710				13.2			OIL SHALE, medium gray-brown
711				36.7			OIL SHALE, medium gray-brown
712			.22	16.1			SANDSTONE, oil saturated & OIL SHALE as above
713			.71	9.4			OIL SHALE, light brown, low grade
914				7.2			OIL SHALE, light brown, low grade
915			.68	1.2			OIL SHALE, medium brown, moderate grade
916			.46	5.0			OIL SHALE, medium brown, moderate grade
917	+120		.44	13.9			OIL SHALE, medium brown, moderate grade
918				24.8			OIL SHALE, medium brown, moderate grade
919			.18.55	10.4			OIL SHALE, medium brown, moderate grade
920				9.7	720.75		)
721							)
722							)
723							)
724							)
725							)
726							)
727	+110						)
728							)
729							)
730							)
731							)
732							) LOST CORE
733							)
734							)
735							)
736							)
737	+100						)
738							)
739							)
740							)
741							)
742							)
743							)
744							)
745							)
746							)
747	+90		.30.60	7.8			OIL SHALE, gray with light brown bedding
748			.30.75	14.0			OIL SHALE, low to medium
749			.18.45	19.6			
750			.15.45	12.5			OIL SHALE, medium brown, slightly calcareous
751			.18.50	8.8			OIL SHALE, medium brown, slightly calcareous
752			.18.35	8.9			OIL SHALE, medium brown, slightly calcareous
753			.18.47	8.4			OIL SHALE, medium brown, slightly calcareous
754			.17.83	10.7			OIL SHALE, medium brown, slightly calcareous
755			.25.72	14.2			OIL SHALE, medium brown, low to medium grade
756			.10.60	11.5			OIL SHALE, medium brown, low to medium grade
757	+80		.09.61	10.5			OIL SHALE, low grade, calcareous 757.39-757.43, SANDSTONE
758			.08.79	10.4			OIL SHALE, low grade, calcareous
759			.21	10.0			OIL SHALE, medium brown

Drilled 55.85 Ft.  
Recovered 30.40 Ft. \*

COMMENTS: \*Accuracy of core from this run is questionable - recovered core was badly broken and jammed in barrel (exact zone or zones represented by missing core is uncertain).

HOLE NO. X-4 SHEET 3 OF 6 DATE: 1/3/75 LOGGED BY: Kangas T.D. 958.0

DEPTH	+MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
760			21.58	12.1			OIL SHALE, medium brown, medium grade; slightly laminated
761			25.76	11.6			slight effervescence
762			22.55	11.4			" " " " " " "
763			16.53	10.7			OIL SHALE, " " " " " " "
764			16.34	10.6			OIL SHALE, " " " " " " "
765			38.69	11.5			OIL SHALE, " " " " " " "
766			32.75	13.7			OIL SHALE, " " " " " " "
767	+70		18.43	9.9			OIL SHALE, " " " " " " "
768			21.68	11.1			OIL SHALE, " " " " " " "
769			20.70	16.5			OIL SHALE, " " " " " " "
770			.51	12.0			OIL SHALE, " " " " " " "
771			20.50	9.5			OIL SHALE, medium to dark brown, medium grade
772			35.61	5.2			OIL SHALE, medium to dark brown, medium grade
773			20.80	9.2			OIL SHALE, medium to dark brown, medium grade
774			13.34	13.7			774.67-775.37 UPPER WAVY BED ?*
775			70.50	7.6	776.60		
776			05.39	15.4			
777	+60		23.88	13.9			
778			.31	9.1			
779			.50	6.5			
780			.40	8.7			
781			05.65	8.0			
782			.67	4.6			
783				14.4			
784				15.3			
785				12.1			
786			38.60	8.5			
787	+50		22.50	10.2			
788				16.5			
789				39.4			
790			.91	17.0			
791			.28	12.0			
792				12.7			
793			.46	13.6			
794				14.9			
795			.50	14.7			
796				32.9			
797	+40		.31	19.4			
798				14.0			
799			34.76	16.1			
800			.61	34.4			
801				15.1			
802			08.72	7.2			OIL SHALE, medium brown - gray
803			.75	5.7			
804			38.85	6.1			
805			47.66	3.0			
806			25.36	7.7			
807	+30		30.48	5.6	807.20		
808			55.90	4.6			OIL SHALE, medium brown, medium to high grade; faint
809			09.32	2.8			banding, weak effervescence

COMMENTS: \* A 0.70 ft. specimen exhibiting all the physical characteristics of the Upper Wavy Bed appeared in the core and was logged at this point. However, comparisons with other drill holes and with deeper identifiable zones in the same hole suggest that the proper vertical position of the Upper Wavy Bed should be approximately 760 ft.

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
810			.37.97	1.0			OIL SHALE, medium brown, medium to high grade; faint banding, weak effervescence
811			.60	1.5			OIL SHALE, " " " " " "
812			.60.89	3.5			OIL SHALE, " " " " " "
813				10.6			OIL SHALE, " " " " " "
814			.98	15.3			OIL SHALE, medium brown, medium grade; faint banding marks
815			.90	14.2			by dark bands locally - lenses of SANDSTONE with PYRITE
816			.80	35.5			- high grade zones; slight effervescence
817	+20			16.3			
818			.21	14.4			
819			.10.19	12.9			OIL SHALE, medium brown, medium grade
820			.12	28.5			OIL SHALE, medium brown, medium grade
821			.50	28.9			OIL SHALE, medium brown, medium grade; 821.50-821.70
822			.45	21.1			SANDSTONE, oil saturated; 821.70-822.0
823			.31.68	17.9			OIL SHALE, medium brown to buff, medium grade; 822.0-824.0
824				25.0			SANDSTONE bands, oil saturated
825			.50	43.4			825.5-827.5 OIL SHALE, dark brown, high grade with
826			.45	42.2			SANDSTONE lenses, irregular, oil saturated
827	+10		.40	29.6			
828				21.9			
829				20.2			OIL SHALE, light to medium brown, low grade
830			.84	14.5			OIL SHALE, light to medium brown, low grade
831			.75	10.3			OIL SHALE, light to medium brown, low grade
832				23.9			OIL SHALE, light to medium brown, low grade
833			.83	16.9			OIL SHALE, light to medium brown, low grade
834			.67	11.5			OIL SHALE, light to medium brown, low grade
835			.64	13.1			OIL SHALE, light to medium brown, low grade
836			.65	12.2			836.5-837.1 MAHOGANY MARKER (SANDSTONE, oil saturated,
837	0		.57	10.9	837.60		wavy upper & lower contacts)
838			.24	9.1			OIL SHALE, banded light brown-buff-dark brown, low grade
839			.41	11.1			
840				13.0			
841			.27	33.9			OIL SHALE, light brown-buff, calcareous; SANDSTONE lense
842				37.8			OIL SHALE, medium brown, with dark banding
843				20.9			OIL SHALE, light brown, thinly banded; slightly calcareous
844				22.6			
845			.09	16.7			OIL SHALE, light brown-buff, low to moderate grade
846				30.5			
847	-10		.54	32.3			OIL SHALE, dark brown
848				30.4			OIL SHALE, light to dark brown, distorted bedding
849			.67	49.4			OIL SHALE, light to dark brown
850			.11	45.4			OIL SHALE, dark brown, medium grade; distorted bedding
851			.30.38	66.8			OIL SHALE, dark gray, slightly calcareous
852			.68	26.7			OIL SHALE, light brown
853			.52	19.1			
854			.65.40	38.6			
855				28.2			OIL SHALE, medium brown with SANDSTONE, twisted
856			.83	20.7			OIL SHALE, medium brown
857	-20			24.3			OIL SHALE, dark brown
858				38.3			OIL SHALE, medium brown, medium grade; slightly calcareous
859				22.1			OIL SHALE, medium brown, medium grade

COMMENTS:

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
860				17.6			OIL SHALE, medium brown, medium grade; slightly calcareous
861				16.5			OIL SHALE, light brown, low grade; slightly calcareous
862			.50	15.8			OIL SHALE, light brown, low grade; slightly calcareous
863			.18	17.8			OIL SHALE, light brown, low grade; slightly calcareous
864			.25	18.3			OIL SHALE, light brown with dark brown bands
865			.30	18.5			OIL SHALE, dark brown
866			.35.70	17.2	866.70		OIL SHALE, medium brown
867	-30		.55.90	46.2			OIL SHALE, light to medium brown
868			.15.75	53.9			OIL SHALE, light to medium brown; SANDSTONE lense
869			.84	20.5			OIL SHALE, light to medium brown
870				22.0			OIL SHALE, light to medium brown
871			.24	38.0			OIL SHALE, light brown, low grade
872				17.1			OIL SHALE, light brown, low grade
873			.08	18.3			OIL SHALE, light brown with dark brown layers, SANDSTONE
874			.45	14.4			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
875				18.4			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
876			.04	19.1			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
877	-40			19.6			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
878			.66	10.6			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
879			.46	10.7			OIL SHALE, low grade with dark brown layers, SANDSTONE lense
880				11.7			OIL SHALE, light-dark brown, thin layers, low grade
881			.08	15.7			OIL SHALE, light-dark brown, thin layers, low grade
882			.00	29.5			OIL SHALE, light-dark brown, thin layers, low grade
883				34.5			OIL SHALE, light-dark brown, thin layers, low grade
884				28.9			OIL SHALE, light-dark brown, thin layers, low grade
885				23.3			OIL SHALE, light-dark brown, thin layers, low grade; 885.1
886			.50	25.1			OIL SHALE, light brown with dark brown layers, low grade
887	-50			29.9			OIL SHALE, light brown with dark brown layers, low grade
888			.96	32.7			OIL SHALE, light brown with dark brown layers, low grade
889			.38	20.5			OIL SHALE, light brown with dark brown layers, low grade
890			.15	18.9			OIL SHALE, light brown with dark brown layers, low grade
891			.10.83	12.9			OIL SHALE, light brown with dark brown layers, low grade
892			.07.59	9.4			OIL SHALE, light brown with dark brown layers, low grade
893			.27	14.8			OIL SHALE, light brown, medium to low grade
894			.12.37	24.3			OIL SHALE, light brown, medium to low grade
895			.17.83	12.6	896.70		OIL SHALE, light brown, medium to low grade
896				11.1			OIL SHALE, light brown, medium to low grade
897	-60		.33.95	8.9			OIL SHALE, light brown, low grade
898			.53.33	4.5			OIL SHALE, light brown, low grade
899			.71	5.9			OIL SHALE, light brown, low grade
900			.63	15.6			OIL SHALE, medium grade
901			.52	11.3			OIL SHALE, medium grade
902			.84.44	5.0			902.00-902.44 SANDSTONE, OIL SHALE, medium grade
903			.65	18.4			OIL SHALE, dark brown, high grade
904			.13	21.7			OIL SHALE, dark brown, high grade: 904.13, oil saturated
905			.13.71	14.7			OIL SHALE, medium brown-medium gray with dark brown bands
906			.16	12.8			OIL SHALE, medium brown-medium gray with dark brown bands
907	-70		.05.25	13.0			OIL SHALE, medium brown-medium gray with dark brown bands
908			.34	7.6			OIL SHALE, medium brown-medium gray with dark brown bands
909			.38	36.7			OIL SHALE, "oil saturated, band " " "

COMMENTS:

DEPTH	+MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
910			.09.78	29.0	Drilled 30.00 Ft. Recovered 30.00 Ft.		OIL SHALE, medium brown-medium gray with dark brown bands
911			.58.88	6.6			OIL SHALE, medium brown-medium gray with dark brown bands
912			.61.58	2.5			OIL SHALE, medium brown-medium gray with dark brown bands
913			.45.66	3.4			OIL SHALE, medium brown-medium gray with dark brown bands
914			.88.73	3.9			OIL SHALE, medium brown-medium gray with dark brown bands
915			.65	16.2			OIL SHALE, medium brown-gray
916			.18.75	26.8			OIL SHALE & SANDSTONE, oil saturated, interbedded
917	-80		.83.48	13.7			OIL SHALE & SANDSTONE, oil saturated, interbedded
918			.15	14.8			OIL SHALE, light brown, low grade
919			.09.55	11.6			OIL SHALE, light brown, low grade; 919.55-918.60 SANDSTONE, oil saturated
920			.02.62	6.9	926.70 Drilled 31.70 Ft. Recovered 30.80 Ft. *		OIL SHALE, light brown, low grade
921			.17.92	4.8			OIL SHALE, light brown, low grade
922			.40	3.9			OIL SHALE, light brown, low grade
923			.13.70	6.9			OIL SHALE, light brown, low grade
924			.52	5.2			OIL SHALE, light brown, low grade
925			.57	5.7			OIL SHALE, light brown, low grade
926			.31.87	5.4			OIL SHALE, light brown, low grade
927	-90			6.1			OIL SHALE, light brown, low grade
928				6.6			OIL SHALE, light brown-buff, low grade; a few dark bands
929			.36	9.2			OIL SHALE, light brown-buff, low grade; a few dark bands
930			.32	7.2	Drilled 31.70 Ft. Recovered 30.80 Ft. *		OIL SHALE, light brown, low grade
931				3.3			OIL SHALE, light brown, low grade
932				3.8			OIL SHALE, light brown, low grade
933				4.5			OIL SHALE, light brown, low grade
934				7.0			934.10-934.25 & 934.50-934.70 SANDSTONE layers, oil saturated
935				3.6			OIL SHALE, light brown, low grade
936			.45	5.1			OIL SHALE, light to medium brown, low to medium grade
937	-100			5.2			OIL SHALE, light to medium brown, low to medium grade
938				3.3			OIL SHALE, light to medium brown, low to medium grade
939			.70	3.6			OIL SHALE, light to medium brown, low to medium grade
940			.44	5.9	Drilled 31.70 Ft. Recovered 30.80 Ft. *		OIL SHALE, light to medium brown, low to medium grade; 940.65-940.80 SANDSTONE, oil saturated
941			.40	4.2			OIL SHALE, light brown, low grade
942			.92	2.9			OIL SHALE, light brown, low grade
943			.92	3.1			OIL SHALE, light brown, low grade
944				2.7			OIL SHALE, light brown, low grade
945			.13.27	4.6			OIL SHALE, light to medium brown, low grade
946			.80	4.9			OIL SHALE, light to medium brown, low grade; 946.80, SANDSTONE, oil saturated
947	-110			2.2			OIL SHALE, light brown, low grade
948				1.0			OIL SHALE, light brown, low grade
949				0.8			OIL SHALE, light brown, low grade
950			.48	1.9	Drilled 31.70 Ft. Recovered 30.80 Ft. *		OIL SHALE, light brown, low grade
951			.63	1.1			OIL SHALE, light brown, low grade
952			.90	2.0			OIL SHALE, light brown, low grade
953				2.0			OIL SHALE, light brown, low grade
954			.22	1.5			OIL SHALE, light brown, low grade
955				1.9			OIL SHALE, light brown, low grade
956				1.6			OIL SHALE, light brown, low grade
957	-120						OIL SHALE, light brown, low grade
							Bottom 958.0 Ft.

COMMENTS: \* 0.9 Ft. of core lost between 957 & 958 ft. - split core was hanging out below the core lifter when the run was pulled.