

HOLE NO. P-4 SHEET 1 OF 11 DATE: 10/24/74 LOGGED BY: Carnahan T.D. 916.78

DEPTH	+NM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
410					410.40		0.10' SANDSTONE layer (tuffaceous)
411			.80				OIL SHALE, dark brown, medium to high grade
412							SANDSTONE, thin tuffaceous layer with calcite
413			.60				OIL SHALE, silty, laminated; moderate to low grade
414							SANDSTONE, thin tuffaceous layer with calcite
415							OIL SHALE, silty, medium to low grade, laminated
416			.30				
417			.60				Irregular break in very thin; black, carbonaceous materia
418							Irregular break along small blebs of tuffaceous SANDSTONE
419							OIL SHALE, silty, mostly low grade with medium grade stre
420							
421							
422							
423							
424							Slight bedding distortion
425							SHALE, silty; mostly low grade with carbonaceous streaks
426							
427							
428							
429							
430					430.40		
431							OIL SHALE, silty, thinly laminated, low grade with carbon
432			.38.97				aceous (bitumen) flecks; moderately calcareous
433			.20.55				433.55-433.56 SANDSTONE, thin tuffaceous layer
434			.95				
435							OIL SHALE, as above
436			.74				
437			.80				437.8-438.6 SILTSTONE, sandy with carbonate pods
438							438.6-440.7, Slightly higher carbonaceous content; darker band
439							440.72, SANDSTONE (0.2') tuffaceous, dark-may contain
440			.72				hydrocarbons although MAGNETITE noted with magnet
441			.45				441.45-441.48 SANDSTONE, tuffaceous
442			.70				
443							
444							444.05-444.10 SANDSTONE, tuffaceous
445			.75				
446							
447							
448			.83				
449			.36				
450			.30		450.40		OIL SHALE, silty-generally reddish brown as above
451							451.5-451.8 SILTSTONE, sandy with small calcium nodules
452							452.3-453.5, SILTSTONE, as above, with higher hydrocarbo
453			.30				content
454				6.5			
455			.05	6.5			
456				5.8			
457				5.8			457.1-458.1 SILTSTONE, sandy with small calcium nodules
458			.15	13.5			458.1-458.4 CLAY seams, buff colored less hydrocarbons
459				13.5			458.7-459.8 SHALE, darker colored-higher hydrocarbon cont

COMMENTS: * Due to discrepancy in driller's calculations depths were off by 1 foot - readjusted depths were used on this run (430.40 Ft. to 450.40 Ft.); locations of parting planes have been adjusted accordingly.

HOLE NO. P-4 SHEET 2 OF 11 DATE: 10/24/74 LOGGED BY: Carnahan T.D. 916.78

DEPTH	SEC	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
460				8.7	Drilled 20.10 Ft. Recovered 20.20 Ft. 3:00 PM.		
461				8.7			
462			60	6.8			462.6-463.0, Higher hydrocarbon content
463	+240			6.8			
464				8.7			464.50-464.55 SANDSTONE, dark tuffaceous?; probable hydrocarbon content
465				8.7			
466				8.6			
467			90	8.6			
468				5.0			
469				5.0			
470				7.3	Drilled 16.64 Ft. Recovered 16.89 Ft. 5:30 PM.		OIL SHALE, silty (as above), low grade, thinly laminated with BITUMEN flecks; slightly calcareous
471				7.3			472.1-475.18, increased hydrocarbon content throughout - more abundant dark laminations & BITUMEN flecks
472				8.7			474.2, thin (0.05') bed of SANDSTONE tuffaceous with hydrocarbons, thin bands of higher hydrocarbon
473	+230			8.7			475.20-482.58 OIL SHALE, continued silty, thinly laminated with moderate amount of hydrocarbons-increasing lower in interval
474				13.7			
475				13.7			
476				6.8			
477				6.8			
478			70	7.0			
479				7.0			
480				9.0	Drilled 20.02 Ft. Recovered 20.00 Ft. 11:15 PM.		482.58-482.82 SANDSTONE tuffaceous with BITUMEN
481				9.0			482.82-483.60 OIL SHALE, thinly laminated with moderate amounts of hydrocarbon
482			80	11.6			483.6-487.14 leaner section of hydrocarbons, occasional BITUMEN flecks
483	+220			11.6			
484				8.2			
485				8.2			
486				14.2			
487				14.2			
488				10.8			OIL SHALE, silty; mostly medium to low grade-very hard, conchoidal fracture; thinly laminated; consistent texture & grain size; occasional thin, high grade zones
489			20	10.8			
490				6.9	Drilled 20.02 Ft. Recovered 20.00 Ft. 1:20 AM.		
491			00.75	6.9			
492				8.4			
493	+210			8.4			SANDSTONE, tuffaceous, very thin
494				14.4			
495				14.4			
496				8.5			
497				8.5			
498				11.5			
499				11.5			
500				14.4	1:20 AM.		OIL SHALE, similar to above, but overall grade appears to be less - no high grade zones
501			60	14.4			
502				10.0			
503	+200			10.0			Plant fragment
504				11.7			
505			20	11.7			SANDSTONE, tuffaceous, very thin; zone of weakness
506			10	13.1			SANDSTONE, tuffaceous; slightly transverse upper & lower contacts; irregular break within tuff zone
507				13.1			
508				14.1			OIL SHALE, uniform dark brown; fine grained silty; consistent texture
509				14.1			

COMMENTS:

*Recovery which amounts to 0.1 Ft. more than cored interval is still due to driller's discrepancy; hopefully, the problem is eliminated from here on - had driller remeasure all rods.

THE CLEVELAND-CLIFFS IRON CO.

PROJECT: White River Shale Project

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HOLE NO. P-4 SHEET 3 OF 11 DATE: 10/24/74 LOGGED BY: Carnahan T.D. 916.78

DEPTH	GR	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
510				12.8			OIL SHALE as above
511				12.8			
512				11.8			
513	+190		.00.60	11.8			
514				13.3			
515			.50	13.3			
516				12.7			
517			.50	12.7			OIL SHALE as above, but interspersed with numerous thin t
518			.70	11.7			very thin, slightly contorted SANDSTONE seams
519			.70	11.7			
520				12.3			
521				12.3			0.1' SANDSTONE, tuffaceous; irregular upper & lower bound
522			(.50	11.7)
523	+180		(.00.60	11.7) Parting planes are associated with thin SANDSTONE seams
524			(.70	12.3)
525			(.70	12.3)
526			(.30	15.4)
527				15.4			
528				19.1			OIL SHALE (still somewhat silty) with numerous very thin
529				19.1			SANDSTONE (tuffaceous) seams throughout; small CLAY fleck
530				19.9			(<1 mm) noted throughout section; grade appears to be incre
531				19.9			SANDSTONE, thin (<0.01', tuffaceous seams; thinner ones presen
532				18.7			
533	+170			18.7			SANDSTONE, as above
534				11.6			
535				11.6			OIL SHALE, as above
536			.10	10.6			
537				10.6			SANDSTONE, tuffaceous seams (<0.05')
538				9.5			538.25, Grade of hydrocarbons drips off below this depth
539				9.5			542.2
540				8.6			
541		**	.74	8.6			
542				18.3			542.2-543.0, higher grade zone; 0.1' SANDSTONE, tuffaceou
543	+160		.60	18.3			543.68, 0.02' of SANDSTONE; 543.0-546.0, less hydrocarbon
544				8.4			material throughout; SHALE still finely laminated with
545				8.4			occasional SAND seams & CLAY flecks which become less
546		**		9.5			abundant below 545.0
547				9.5			
548			.50	10.2			OIL SHALE, similar to above; still has occasional SANDSTO
549				10.2			seams & CLAY flecks - both decrease in number by 550.0
550				6.0			
551				6.0			
552				7.5			OIL SHALE, still finely laminated
553	+150			7.5			
554			.10	13.7			
555				13.7			555.0-556.0 OIL SHALE, higher grade (approximately 1.4')
556				9.2			
557				9.2			
558				8.7			
559				8.7			

COMMENTS: * Parting planes are associated with thin sandstone seams

** Note: where core was mechanically broken by driller a fractur patter
 was noted on the core: at 541.74 (45-60° & 0.02' apart)
 at 546.55 (60° & 0.03' apart)

DEPTH	±	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
560			.70	15.7			560.7-561.5, OIL SHALE, higher grade
561				15.7			
562				7.3			
563	+140			7.3			
564				6.7			
565				6.7			
566				6.0	567.10		
567				6.0			OIL SHALE (basically silty shale), finely laminated
568				19.4			568.5-569.4, OIL SHALE, higher grade
569				19.4			569.4-575.2 OIL SHALE, fairly uniform grade
570			.70	8.8			
571				8.8			
572				8.4			
573	+130		.85	11.1			
574				14.2			
575				35.8			OIL SHALE, dark colored, high grade
576			.25	10.3			576.1, 0.1' layer of SANDSTONE, tuffaceous
577				7.5			576.1-587.0 (bottom of run), OIL SHALE, fairly uniform, medium grade
578				7.3			
579				6.1			
580			.60	3.3			
581				10.3			
582				13.5			582.0, SANDSTONE, tuffaceous, thin
583	+120		.60	11.6			583.6-583.8 SANDSTONE, tuffaceous
584				9.5			
585				9.8			
586				11.5	587.05		
587				17.9			OIL SHALE, uniform, medium grade
588				24.6			0.1' SANDSTONE, tuffaceous
589				9.9			
590			.80	6.8			OIL SHALE, uniform medium grade; slightly silty
591				2.0			
592				5.3			
593	+110		.40	12.3			
594				18.4			
595				10.2			
596			.90	9.6			
597			.70	8.9			
598				10.8			
599			.10	14.3			599.3-599.7 SANDSTONE, tuffaceous; interval break at 599
600				13.5			SANDSTONE, tuffaceous, broken at base
601				11.7			Plant fragments
602				10.3			602.8-603.75 SANDSTONE, tuffaceous, oily
603	+100			10.4			
604				8.9			OIL SHALE, medium to low grade (Subtle change); slight
605				8.8			increase in siltiness
606				10.8	607.00		
607				5.6			OIL SHALE, light brown, low grade; very silty
608			.90	12.0			608.20-608.70, SANDSTONE, tuffaceous; oil saturated
609				11.5			SANDSTONE, tuffaceous; thin, oily

COMMENTS:

DEPTH	+MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
610			30	11.1	Drilled 19.85 Ft. Recovered 19.85 Ft.		OIL SHALE, as above with considerable uniformity throughout
611			40	11.1			the run; minor zones of tuffaceous SANDSTONE appear
612			80	10.0			frequently (thin stringers to discontinuous blebs -
613	+90			12.0			slightly undulating contacts)
614			50	11.0			
615				11.1			
616			00	12.0			616.00-616.30, SANDSTONE, tuffaceous, oily
617			80	13.7			617.4-617.8, SANDSTONE, tuffaceous
618				10.0			OIL SHALE, light brown silty; low grade
619				12.7			SANDSTONE, tuffaceous thin
620				12.3			
621			10	9.5		SANDSTONE, tuffaceous, thin	
622				9.2			
623	+80			15.5			
624				12.6			
625			60	8.8		0.1' SANDSTONE, tuffaceous; internal break	
626				7.9	626.85		
627				4.3	11:00 AM	OIL SHALE, thinly laminated, low to medium grade, with	
628				9.5		occasional higher grade zones; occasional tuffaceous	
629			10	15.1		SANDSTONE seams - most contain hydrocarbons - most	
630				11.6		prominent are noted	
631			85	9.9			
632				9.7			
633	+70			8.7			
634				13.5		634.25-634.80, SANDSTONE, tuffaceous; bleeding hydrocarb	
635			00	5.9		634.80-637.7 WAVY TUFF BED. SANDSTONE, tuffaceous; high	
636			80	5.4		distorted, easily recognizable, bleeds hydrocarbons in	
637			13	7.2	porous patches or zones; besides distorted bedding there		
638			00	11.1	is a mixture of beds of various sand-silt ratios		
639			28	11.7	639.28, SANDSTONE, tuffaceous, thin (0.03'); odoriferous		
640				14.2	OIL SHALE, fairly uniform, low to medium grade with		
641			29	15.3	occasional very thin SANDSTONE seams to end of run (647		
642				17.1			
643	+60		37	14.0			
644			90	10.2			
645			26.80	8.5			
646				7.1	646.91		
647				11.0	5:25 PM	OIL SHALE, as above, finely laminated, low to medium gra	
648				13.1		(except where noted); very few SANDSTONE seams	
649				9.0			
650				6.5			
651				8.2			
652				7.1			
653	+50			5.6		653.6-660.1 OIL SHALE, medium grade	
654				15.1			
655				13.4			
656				9.2			
657				10.1			
658				11.7			
659				35.0	659.3-660.1. OIL SHALE, higher grade than above		

COMMENTS:

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
660				13.3			
661				12.6			
662				12.2			
663	+40		.50	13.4			OIL SHALE, light colored, thin; lies immediately above a thin SANDSTONE seam
664				13.3			664.5-665.6, OIL SHALE, higher grade zone
665				24.0			665.6-666.7 OIL SHALE, very high grade
666				24.0			
667				13.3			OIL SHALE, brown with thin, very dark brown bands (to 669)
668			.00	19.1			CLAYEY seam at parting plane
669			.00	28.7			669.5-676.1, SILTSTONE, banded, buff to light brown; thin
670				7.4			CLAYEY seams at parting planes; minor distortion of bed
671			10.90	5.0			at 673.8 & 675.8; small vugs at 675.7; some crenulated
672			40.60	3.5			lamination at 674.7
673	+30		.80	3.5			
674				4.1			
675			40.80	7.4			
676			20.70	3.9			OIL SHALE, brown, silty (to 684')
677				4.3			
678				2.2			
679				1.6			
680				1.9			
681				8.2			
682				17.5			
683	+20		.10	11.5			
684			10.90	11.9			OIL SHALE, darker colored
685				29.4			685.0-686.9 OIL SHALE, medium brown with several thin
686				15.6			discontinuous seams & inclusions of tuffaceous SANDSTONE
687			.80	14.9			687.0-694.5 OIL SHALE, light-dark, brown banded; silty
688				15.3			
689			.30	24.4			SANDSTONE, tuffaceous interbedded zones
690				30.6			0.25', SANDSTONE, tuffaceous
691			.40	23.9			0.20' SANDSTONE, tuffaceous
692				24.0			
693	+10			44.0			
694			.80	38.9			Parting plane is break within narrow irregular tuffaceous z
695				22.6			694.5-702.6, OIL SHALE, silty, gray to light brown
696				17.3			
697				11.8			
698			.20	13.9			
699				20.0			
700				12.3			
701			.80	12.4			
702			.70	13.3			702.60-703.05 MAHOGANY MARKER, SANDSTONE, tuffaceous,
703	0			13.6			dark brown-black; oily; stair-step break near top (see no
704			.30	11.7			
705				10.3			
706				16.3			
707			.30	16.4			707.3, SANDSTONE, tuffaceous; bleeding hydrocarbons
708				47.7			OIL SHALE, finely laminated:
709			.40	47.2			

COMMENTS:

MAHOGANY MARKER:

Slightly undulating contact at the top; more erratic at the bottom; upper zone (0.11-0.13') is mottled brown-lower portion is nearly black with dense oil appearance; lower portion contains a few very small (5mm), partially filled vugs.

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
710			.50	23.4			
711			.40	21.5) 3 parting planes occur along very thin CLAY seams
712			.70.80	20.8)
713	-10		.70	13.6			
714				26.7			
715			.80	32.9			
716		*	.50	62.2			716.42-716.94 OIL SHALE, very rich, light weight; rounded pieces - probable loss
717			.40	76.4			716.94-719.65, OIL SHALE, very rich, waxy feel on core
718				66.3			surface & parting planes: probable top of MAHOGANY BED
719				44.9			719.65-720.2 OIL SHALE, medium grade
720			.20	51.2			720.2-721.72, OIL SHALE, very rich, waxy feel
721			.50	35.9			721.72-721.84 SANDSTONE, tuffaceous, bearing hydrocarbon
722				36.0			distorted with distorted shale beds immediately above & below.
723	-20			19.6			721.84-724.20 OIL SHALE, medium grade
724				29.3			724.20-724.60 OIL SHALE, high grade
725				43.9			724.60-724.90, OIL SHALE, medium grade
726				18.6			724.90-725.90 OIL SHALE, high grade
727				16.5			725.90-729.30 OIL SHALE, medium grade
728				18.4			
729				41.3			729.30-730.3 OIL SHALE, high grade
730				43.8			730.30-731.45 OIL SHALE, medium grade
731			.03.15	43.0			730.60-730.70 SANDSTONE, tuffaceous, slightly distorted
732				36.2			731.75-732.10 OIL SHALE, high grade
733	-30			21.4			732.10-734.10 OIL SHALE, low to medium grade with occasional thin SANDSTONE seams
734				25.8			734.1-735.0 OIL SHALE, high grade
735				25.3			734.2-734.4 SANDSTONE, tuffaceous, distorted
736			.30	16.3			735.55, SANDSTONE (0.03') tuffaceous
737				16.2			OIL SHALE, low to medium grade, slightly coarser texture
738				14.8			higher CaCO ₃ content
739			.15	23.4			OIL SHALE, buff-tan-medium brown; silty, well indurated
740			.85	23.4			
741				17.3			740.0-740.8 Slightly distorted bedding
742				10.4			SANDSTONE, tuffaceous; discontinuous thin zones along bed
743	-40		.00	12.6			
744				12.1			OIL SHALE, as above
745				32.7			
746			.10.90	31.9			
747				30.3			
748			.30	21.7			
749			.70	25.6			
750				34.8			
751			.90~	21.3			
752				21.3			
753	-50		.40.90	17.1			
754			.60	13.4			
755			.20~	9.8			
756				16.0			
757				25.5			OIL SHALE, tan-light brown, silty; finely laminated with
758				9.8			dark colored bands; CLAYEY partings
759			.20	9.1			

COMMENTS:

* Top of Mahogany Bed showed 4 vertical fractures starting to develop in high grade, soft, light weight core; they only extended into core about 0.05 feet.

NOTE: Breaks induced by hammer are noted "MB" (mechanical break) on core.

DEPTH	±MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
760			60	6.2			
761			10.80	6.2			SILTSTONE, tan-light brown with thin, dark colored bands
762				5.7			
763	-60			13.6			
764			30.70	13.1			SANDSTONE, tuffaceous; undulating upper contact; black, asphaltic
765			90	8.5			SILTSTONE, sandy, tan
766			90	31.3			SILTSTONE, gray, banded
767				19.2			
768				9.1			
769				8.0			
770			80	25.0			
771			50.70	38.9			
772				6.8			SILTSTONE, tan, finely laminated; uniform
773	-70			5.8			
774			63.68	3.7			SILTSTONE, tan to pale gray to dark gray
775			00	4.2			
776			20	15.6			
777			40.78	19.2			OIL SHALE, same as above, finely laminated, medium grade
778			09.60	14.2			777.05-777.9 SANDSTONE, tuffaceous; medium grained;
779			34.50	9.0			778.8-781.7 SANDSTONE, tuffaceous; petrolierous, distorted;
780			00.50	5.4			distorted; coarse-grained--mottled appearance (appears bedded)
781			67	9.8			782.7-790.1 SILTSTONE, tan to pale gray, finely laminated
782			31	9.1			with buff clay seams (<0.01'); slightly calcareous;
783	-80		81	6.4			782.7-786.0 Laminations in core dip about 7°
784				5.7			
785				5.7			
786				6.6			
787				6.2			
788				7.1			
789			55	6.5			
790				8.6			790.1-793.3 SILTSTONE, dary gray; bedding becoming thicker
791				9.4			
792				4.2			
793	-90			2.7			793.3-794.58 SILTSTONE, light gray (thicker bedding than above)
794			58	6.0			OIL SHALE (SILTSTONE) has a browner color than OIL SHALE
795			65	10.5			795.65-795.83 SANDSTONE, tuffaceous magnetic; high in
796				10.2			hydrocarbons, strong odor, SHALE, silty; light to dark
797			45	11.9			brown, finely laminated; dark seams often contain
798				11.9			MAGNETITE; low (?) hydrocarbon content but has odor;
799				9.7			to 803.50
800				12.0			800.9-801.1 SANDSTONE, tuffaceous, black; highly
801			05	9.7			petrolierous - strong odor
802				8.5			
803	-100			5.6			803.4-804.2 SHALE, silty; finely laminated; light to dark
804			67	7.5			804.2-806.85 SHALE, buff to light brown, silty, medium gra
805	**		35	7.8			804.85-805.15 SANDSTONE, tuffaceous, calcareousness
806			85	4.0			805.3, 0.1' SANDSTONE bed, tuffaceous; brown, bleeding
807				2.1			806.85-817.0 SHALE, silty, gray; fine to medium lamina
808				4.1			(varying from buff-light gray-dark gray-black); most of
809				5.8			black laminae contain MAGNETITE, grain size coarsening

COMMENTS:

- * These two fractures are very fine & cemented shut, have offset SILTSTONE laminae, dip in opposite directions across core (each at about 30° to the horizontal).
- ** Core in this section (from 805 to 816') seemed extremely hard to break; when hit by driller's hammer it shattered rather than broke along parting planes.

DEPTH	+MM	FRX	PP	GAL/TON	CORE REC.	LITH.	DESCRIPTION
810				4.9			
811				3.2			
812				2.8			
813	-110			5.7			
814			.55	5.7			
815				8.1			
816			.69	4.1	816.79		
817				1.2			SHALE, silty, medium to dark gray; thinly laminated
818			.28	6.7			(similar to above)
819			.40.85	4.5			
820			.32.82	3.6			
821			.60	9.2			821.8-824.35 OIL SHALE, mahogany color; dark oil bearing
822				18.4			bands, distorted; medium grade
823	-120			18.4			
824			.35	13.3			824.35-827.10 SHALE, silty; thinly laminated-medium to
825			.75	13.3			dark gray
826				24.6			827.1 SANDSTONE, thin tuffaceous
827				24.6			OIL SHALE, mahogany colored, medium grade: interbedded
828				18.7			tuffaceous SANDSTONES are black & bleed hydrocarbons &
829			.60	18.7			have strong odor
830			.65	9.5			
831			.80	9.5			SHALE, silty, light colored (brown-buff), thinly laminat
832			.53	11.0			darker bands near base may carry hydrocarbons
833	-130		.45	11.0			0.01", SANDSTONE, tuffaceous, dark
834			.00.30	7.8			834.5-836.8 MIDSTONE, buff colored, (very light); medium
835			.40.83	7.8			laminations
836			.17	2.6	836.79		
837				2.6			SILTSTONE, buff-light gray-light brown with a few thin
838				8.4			dark bands
839			.80 ~	8.4			
840				10.8			
841			.60.70	10.8			SANDSTONE, tuffaceous
842				7.8			SHALE, silty, light-medium brown
843	-140			7.8			
844				14.5			
845			.15 ~	14.5			Thin layer of SHALE between SANDSTONE lenses
846			.80	8.5			
847				8.5			
848				19.0			SANDSTONE, tuffaceous
849			.30.80	19.0			SANDSTONE, tuffaceous
850			.55	11.0			SILTSTONE, buff-gray (banded), finely laminated
851			.15.65	11.0			
852				7.9			
853	-150			7.9			
854			.30.90	16.8			SANDSTONE, tuffaceous, gray
855			.70.75	16.8			
856			.70	8.3	856.79		SILTSTONE, light gray-gray with very thin darker
857			.40	8.3			colored bands
858			.50	24.5			
859			.30	24.5			SILTSTONE - OIL SHALE, with increasing amount of dark,

COMMENTS:

petroliferous material

HOLE NO. P-4 SHEET 10 OF 11 DATE: 10/29/74 LOGGED BY: Aho & Carnahan T.D. 916.78

DEPTH	±MM	FRX	PP	CAL/TON	CORE REC.	LITH.	DESCRIPTION
860				16.8			
861				16.8			
862				28.1			OIL SHALE, medium to dark brown, moderately high grade
863	-160			28.1			
864			20.45	4.9			Plant fragments, clay parting
865			85	4.9			SILTSTONE, gray to buff with very thin bands & indistinct
866			15.20	9.2			zones of darker material; local occurrences of soft
867			.70	9.2			sediment deformation
868				16.6			
869				16.6			
870			82.80	12.6			SANDSTONE, tuffaceous, thin lenses
871			85	12.6			
872				18.7			
873	-170		.70	18.7			SILTSTONE, brown-gray-buff, as above
874				14.1			
875			.30	14.1			
876			.89	35.8			
877				35.8			OIL SHALE, low to medium grade
878			.48	5.2			SILTSTONE, sandy, light gray to buff; fine to medium
879				5.2			laminae - some of fine laminae are CLAYSTONE
880			.90	3.2			
881				3.2			
882				5.2			
883	-180		.50	5.2			
884			17.50	13.9			SILTSTONE, dark gray & dark buff laminae
885				13.9			
886			.53	22.0			OIL SHALE (886.53), mahogany color, finely laminated;
887			.87	22.0			medium grade
888			32.56	8.8			SILTSTONE (888.3), buff & brown laminae, medium thick
889			13.75	8.8			bedding; a few very thin MAGNETITE seams
890			.89	2.7			
891			26.76	2.7			SILTSTONE (890.75) light buff-light gray; medium lamination
892			89.49	0.4			to 894.1' & coarse laminations below; abundant MAGNETITE
893	-190		21.52	0.4			in thin seams parallel to bedding (black) & in very thin
894				1.4			fractures cutting across bedding (vertical to sub-horizonal & very irregular lines)
895			.27	1.4			
896			.61	0.4			
897				0.4			SILTSTONE, same as above but with less vertical MAGNETITE
898				0.0			stringers - mostly all parallel to bedding; 899.0-899.9,
899				0.0			distorted bedding
900				2.8			
901				2.8			
902				1.8			SILTSTONE, buff to light brown; less magnetite bands;
903	-200			1.8			medium laminations
904				1.9			
905				1.9			
906				5.9			OIL SHALE (905.75) mahogany color; low to medium grade
907				5.9			
908				7.4			SILTSTONE (908.00-909.35) grayish brown, finely laminated
909				7.4			magnetite seams

Drilled 20.03 Ft. Recovered 20.13 Ft.

Drilled 20.00 Ft. Recovered 19.62 Ft.

Drilled 19.96 Ft. Recovered 20.16 Ft.

11:35 AM

1:35 PM

5:20 PM

See Note

COMMENTS: * This section of core shows many fine, irregular fractures filled with magnetite (healed to competency). Major dip of fractures appears to be 90° & 60°. However, pattern is basically quite irregular.

PROJECT: White River Shale Project

[illegible]

COMMENTS: