a

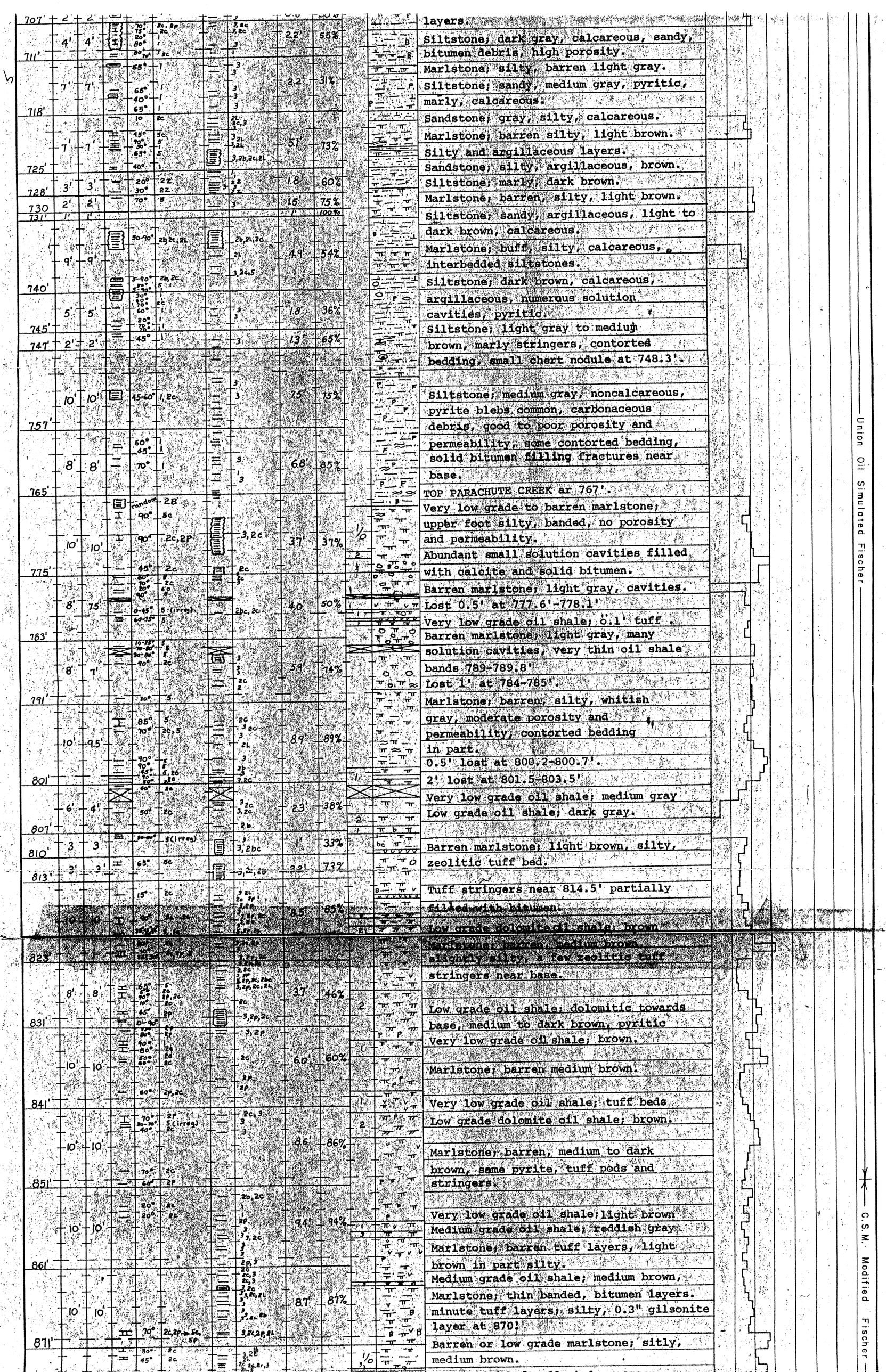
GEOLOGIC AND ROCK STRUCTURE LOG

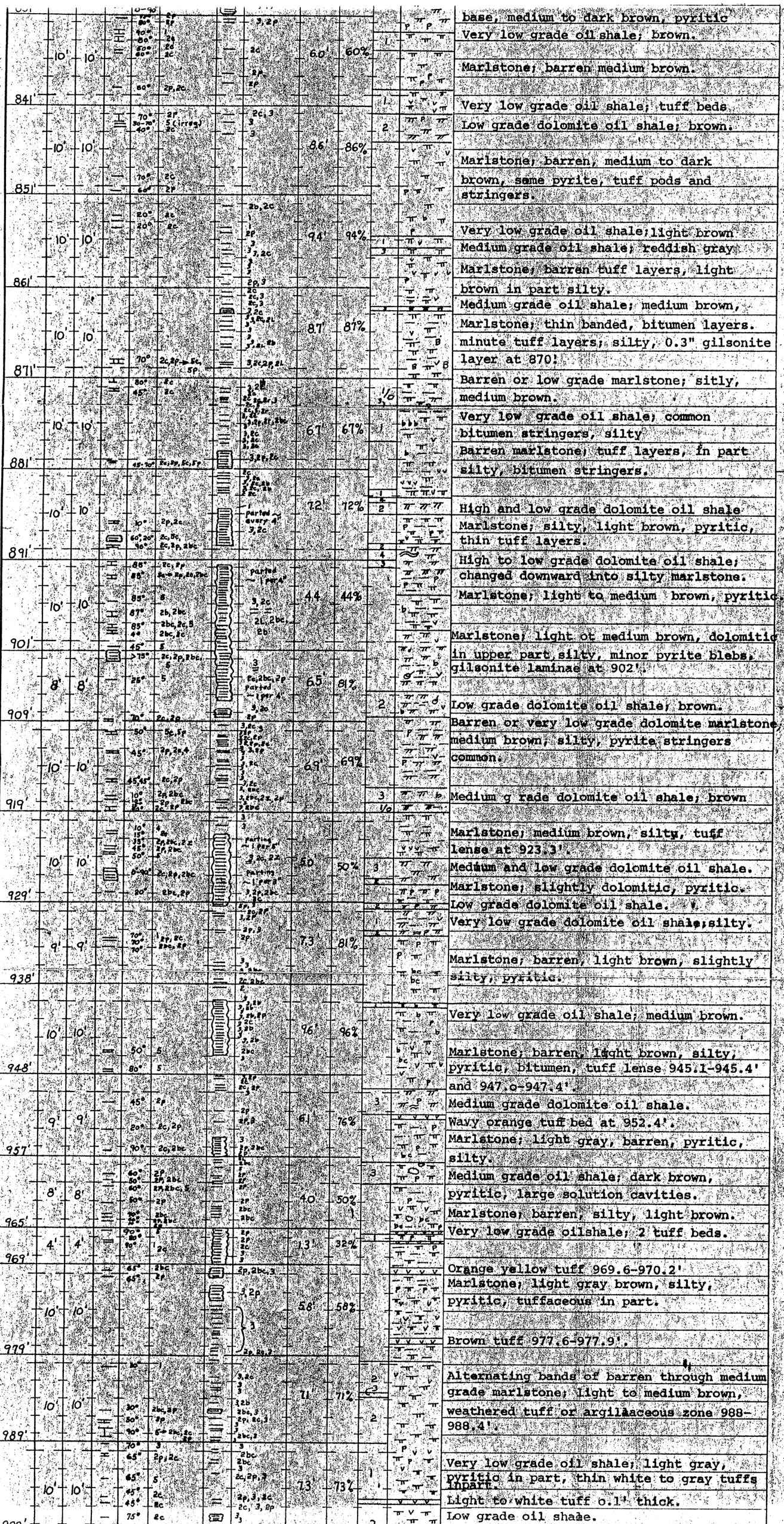
COMPANY: UNION OIL COMPANY OF CALIFORNIA
CORE HOLE: LRJ-75
LOCATION: Approx. 755' FWL and 2435' FNL, Sec.20, T5S, R95W
Approx. N653, 980' and E 1,271,680' by Colorado State Coordinate System.

CORE SIZE: NX
ELEVATION: Approx. 8175'
DESCRIBED BY: Adams, Gilmont, Adcock, Abrahamson
DATE DESCRIBED: 7/29/75 - 8/14/75

MARKER BED	DEPTH	ELEVATION
Top "A" Groove	1084'	7091'
Base "A" Groove	1095.5'	7079.5'
Mahogany Marker	1118.0'	7057'
Top 60 Mine Zone	1121.5'	7053.5'
Top "B" Groove	Not penetrated	(Approx. 1220')
Base "B" Groove	Not penetrated	

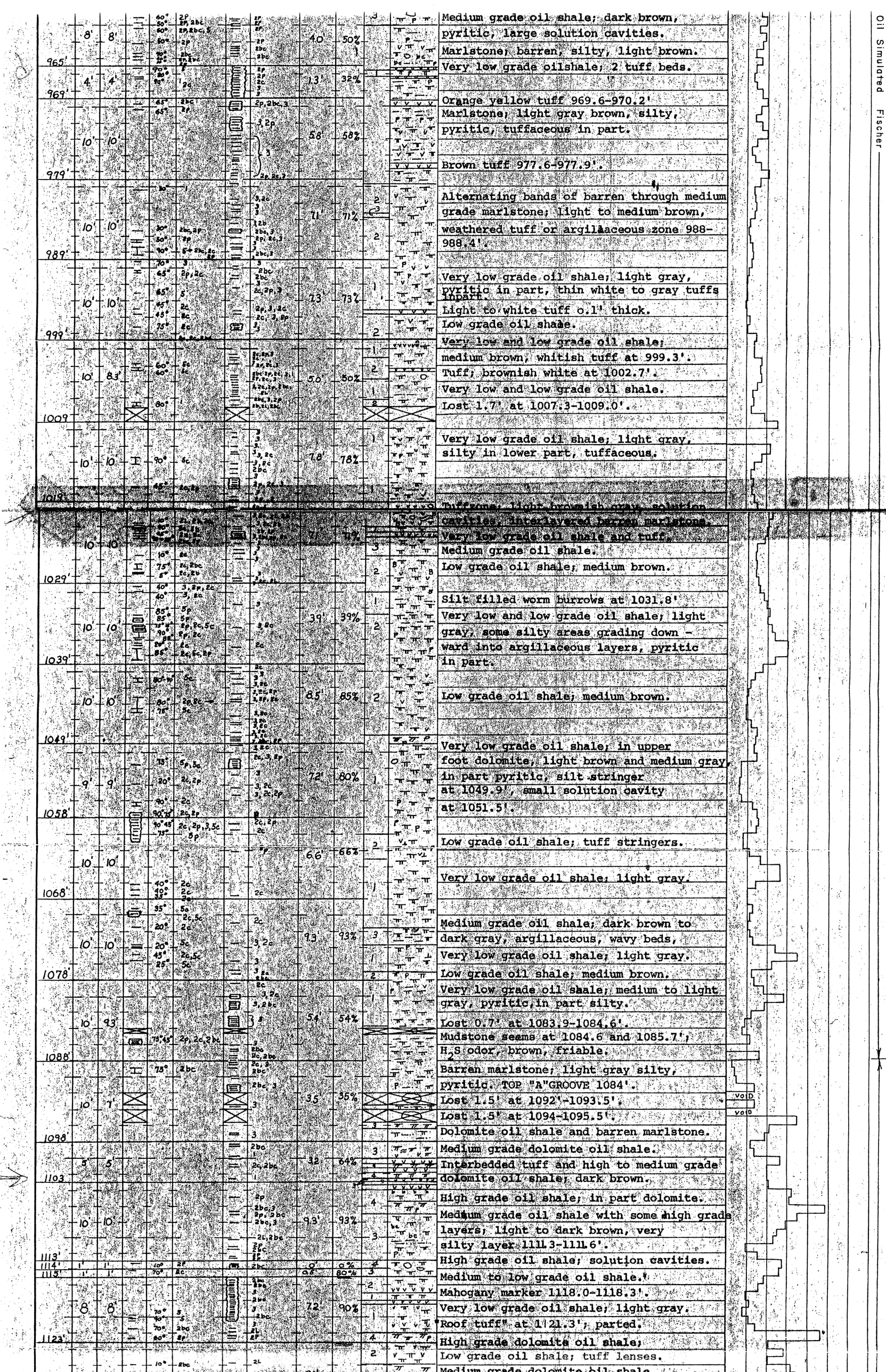
Depth	Core Footage	Core Recovery	Joints and Fractures Location	Joints and Fractures Dip	Joints and Fractures Nature	Partings Location	Partings Nature	RQD Sum of Piece Lengths ≥ 0.35'	RQD Percentage	Oil Shale Grade	Lithology	Description and Remarks	Assay Gallons Per Ton (0 20 40 60 80)
621'							2b,2c,3					Sandstone; very fine grained, calcareous.	
												Marlstone; barren, silty, light brown.	
							2c					2 feet lost at 630.6-632.6 + 632.9-634.9'	
	14'	9'	I	90° 5 80° 2P			2P	62'	44%			Marlstone; barren, silty, light brown.	
												Lost 1 foot at 638.9-639.9'	
				80° 5			3					Siltstone; medium gray, very slightly to noncalcareous, pyrite, bitumen.	
635'							3					Marlstone; barren, silty, light brown.	
				70° 5,1 88° 5			2P 3					Siltstone; marly layers, brownish gray.	
	9'	8'		70° 5,1			2L 2L	39'	43%			Blue gray tuff 0.2' thick.	
				70°			3					Marlstone; silty, barren, light brown.	
644'				90° 1,5								1' lost 651'-652'	
							2L 2b					Siltstone; medium brownish gray.	
							2L 2P					Slightly calcareous, moderate to high	
	10'	10'					3 3,2P	92'	92%			porosity and permeability,	
				70°			3					light colored marly layers, in part	
				70° 90° 80°	2P,2z 5P 2P,5P		3 3					pyritic, solution cavity at 651.7'.	
654'				90°	2P,5P								
							3,2L					Sandstone; grayish brown, fine grained,	
	10'	10'						53'	53%			high porosity and permeability, bedding	
												slightly undulating.	
												Interbedded siltstone, sandstone, and	
664'			II	15,70°	5P							argillaceous rich sections; gray to gray	
				70°			3					brown, slightly calcareous.	
				80°			3						
	8'	8'		90°	2P		3	43'	54%				
672'			I	90°	5		2L					Sandstone; light gray, very fine grained,	
							2L					silty, pyritic, noncalcareous, high porosity	
												and permeability, common carbonaceous	
	10'	10'						64	64%			fragments, a few marly layers	
				50°	2P,5P		3 once					678.5'-680.5' and 682'-683.2', in part	
682'				5 90° etc.			2L					limonitic weathered pits.	
							2L						
685'	3'	3'		5° 1 90° 5→1			3,2L 3	15'	50%			Marlstone; barren, buff to brown, silty,	
				90° 2c			3					moderate porosity and permeability.	
							3,2P,2c						
	10'	9'		80° 5			3,1-1.5 3,2P 3,2c	42'	42%			1' solution cavity 687.9-688.9'.	
							3,2c					691-691.8' many solution cavities and	
695'				90° (1) 5-45°	2c, 2z		2,2c 2b,3					breccia filled with calcite, gilsonite, pyrite.	
							3					Marlstone; medium brown, mostly barren,	
												slightly silty to silty, pyrite pods.	
	10'	10'		75° 75°	5c 3c		3,2L, 2c	63'	63%				
				45° 45°	5c 5c		3 3,2c			3		Medium grade oil shale; dark brown.	
705'				0-90°	2c,		3,2c 2c					Marlstone; barren, light brown, silty,	
707'	2'	2'		50-60°	1,2P		3	0.6'	30%			uniformly banded, a few silt pods and	
				70°	2c, 2P		3,2c					layers.	
	4'	4'		75° 20°	2c 1		3,2c 3	2.2'	55%			Siltstone; dark gray, calcareous, sandy,	
711'				80° 80°	1 2c		1					bitumen debris, high porosity.	
				55°	1		3					Marlstone; silty, barren light gray.	
	7'	7'		65° 40°	1 1		3 3	2.2'	31%			Siltstone; sandy, medium gray, pyritic,	
718'				65°	1		3					marly, calcareous.	
				10	2c		2L,3					Sandstone; gray, silty, calcareous.	
	7'	7'		45° 90°	5c 5		3 3,2L	5.1'	73%			Marlstone; barren silty, light brown.	
				30° 65°	5 5		3,2L					Silty and argillaceous layers.	
725'				40°	1		3,2b,2c,2L					Sandstone; silty, argillaceous, brown.	
728'	3'	3'		20° 30°	2z 2z		3 3	1.8'	60%			Siltstone; marly, dark brown.	
730	2'	2'		70°	5		3	1.5'	75%			Marlstone; barren, silty, light brown.	
731'	1'	1'						1'	100%			Siltstone; sandy, argillaceous, light to	


layers.
Siltstone; dark gray, calcareous, sandy, bitumen debris, high porosity.
Marlstone; silty, barren light gray.
Siltstone; sandy, medium gray, pyritic, marly, calcareous.
Sandstone; gray, silty, calcareous.
Marlstone; barren silty, light brown.
Silty and argillaceous layers.
Sandstone; silty, argillaceous, brown.
Siltstone; marly, dark brown.
Marlstone; barren, silty, light brown.
Siltstone; sandy, argillaceous, light to dark brown, calcareous.
Marlstone; buff, silty, calcareous, interbedded siltstones.
Siltstone; dark brown, calcareous, argillaceous, numerous solution cavities, pyritic.
Siltstone; light gray to medium brown, marly stringers, contorted bedding, small chert nodule at 748.3'.
Siltstone; medium gray, noncalcareous, pyrite blebs common, carbonaceous debris, good to poor porosity and permeability, some contorted bedding, solid bitumen filling fractures near base.
TOP PARACHUTE CREEK at 767'.
Very low grade to barren marlstone; upper foot silty, banded, no porosity and permeability.
Abundant small solution cavities filled with calcite and solid bitumen.
Barren marlstone; light gray, cavities.
Lost 0.5' at 777.6'-778.1'
Very low grade oil shale; 0.1' tuff.
Barren marlstone; light gray, many solution cavities, very thin oil shale bands 789-789.8'
Lost 1' at 784-785'.
Marlstone; barren, silty, whitish gray, moderate porosity and permeability, contorted bedding in part.
0.5' lost at 800.2-800.7'.
2' lost at 801.5-803.5'
Very low grade oil shale; medium gray
Low grade oil shale; dark gray.
Barren marlstone; light brown, silty, zeolitic tuff bed.
Tuff stringers near 814.5' partially filled with bitumen.
Low grade dolomite oil shale; brown
Marlstone; barren, medium brown, slightly silty, a few zeolitic tuff stringers near base.
Low grade oil shale; dolomitic towards base, medium to dark brown, pyritic
Very low grade oil shale; brown.
Marlstone; barren medium brown.
Very low grade oil shale; tuff beds
Low grade dolomite oil shale; brown.
Marlstone; barren, medium to dark brown, same pyrite, tuff pods and stringers.
Very low grade oil shale; light brown
Medium grade oil shale; reddish gray
Marlstone; barren tuff layers, light brown in part silty.
Medium grade oil shale; medium brown,
Marlstone; thin banded, bitumen layers.
minute tuff layers, silty, 0.3" gilsonite layer at 870!
Barren or low grade marlstone; sitly, medium brown.
Union Oil Simulated Fischer
C.S.M. Modified Fischer

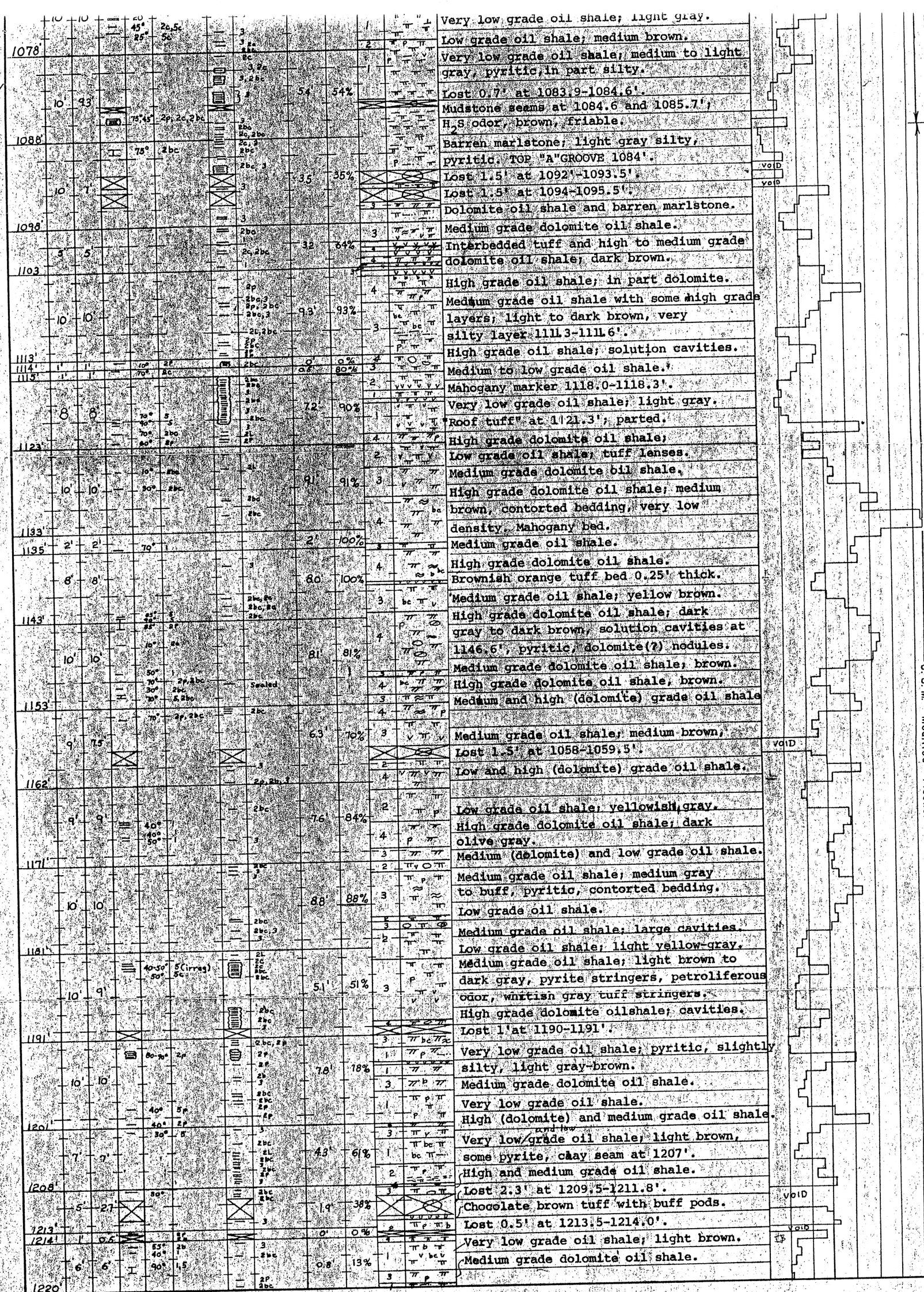


C.S.M. Modified Fischer

Union Oil Simulated Fischer



Medium grade oil shale; dark brown, pyritic, large solution cavities.
Marlstone; barren, silty, light brown.
965' Very low grade oilshale; 2 tuff beds.
969' Orange yellow tuff 969.6-970.2'
Marlstone; light gray brown, silty, pyritic, tuffaceous in part.
979' Brown tuff 977.6-977.9'.
Alternating bands of barren through medium grade marlstone; light to medium brown, weathered tuff or argillaceous zone 988-988.4'.
989'
Very low grade oil shale; light gray, pyritic in part, thin white to gray tuffs impart.
Light to white tuff 0.1' thick.
Low grade oil shale.
999' Very low and low grade oil shale; medium brown, whitish tuff at 999.3'.
Tuff; brownish white at 1002.7'.
Very low and low grade oil shale.
1009' Lost 1.7' at 1007.3-1009.0'.
Very low grade oil shale; light gray, silty in lower part, tuffaceous.
1019' Tuffzone; light brownish gray; solution cavities, interlayered barren marlstone.
Very low grade oil shale and tuff.
Medium grade oil shale.
1029' Low grade oil shale; medium brown.
Silt filled worm burrows at 1031.8'
Very low and low grade oil shale; light gray, some silty areas grading down - ward into argillaceous layers, pyritic in part.
1039'
Low grade oil shale; medium brown.
1049' Very low grade oil shale; in upper foot dolomite, light brown and medium gray, in part pyritic, silt stringer at 1049.9', small solution cavity at 1051.5'.
1058'
Low grade oil shale; tuff stringers.
1068' Very low grade oil shale; light gray.
Medium grade oil shale; dark brown to dark gray, argillaceous, wavy beds,
Very low grade oil shale; light gray.
1078' Low grade oil shale; medium brown.
Very low grade oil shale; medium to light gray, pyritic, in part silty.
Lost 0.7' at 1083.9-1084.6'.
Mudstone seams at 1084.6 and 1085.7';
1088' H_2S odor, brown, friable.
Barren marlstone; light gray silty, pyritic. TOP "A"GROOVE 1084'.
Lost 1.5' at 1092'-1093.5'.
Lost 1.5' at 1094-1095.5'.
1098' Dolomite oil shale and barren marlstone.
Medium grade dolomite oil shale.
1103' Interbedded tuff and high to medium grade dolomite oil shale; dark brown.
High grade oil shale; in part dolomite.
Medium grade oil shale with some high grade layers; light to dark brown, very silty layer 1113-1116'.
1113'
1114' High grade oil shale; solution cavities.
1115' Medium to low grade oil shale.
Mahogany marker 1118.0-1118.3'.
Very low grade oil shale; light gray.
1123' "Roof tuff" at 1121.3'; parted.
High grade dolomite oil shale;
Low grade oil shale; tuff lenses.
Medium grade dolomite oil shale.


1078'
1088'
1098'
1103'
1113'
1114'
1115'
1123'
1133'
1135'
1143'
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1162'
1171'
1181'
1191'
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Very low grade oil shale; light gray.
Low grade oil shale; medium brown.
Very low grade oil shale; medium to light gray, pyritic, in part silty.
Lost 0.7' at 1083.9-1084.6'.
Mudstone seams at 1084.6 and 1085.7'; H2S odor, brown, friable.
Barren marlstone; light gray silty, pyritic. TOP "A"GROOVE 1084'.
Lost 1.5' at 1092'-1093.5'.
Lost 1.5' at 1094-1095.5'.
Dolomite oil shale and barren marlstone.
Medium grade dolomite oil shale.
Interbedded tuff and high to medium grade dolomite oil shale, dark brown.
High grade oil shale; in part dolomite.
Medium grade oil shale with some high grade layers, light to dark brown, very silty layer 1111.3-1111.6'.
High grade oil shale; solution cavities.
Medium to low grade oil shale.
Mahogany marker 1118.0-1118.3'.
Very low grade oil shale; light gray.
"Roof tuff" at 1121.3', parted.
High grade dolomite oil shale; Low grade oil shale; tuff lenses.
Medium grade dolomite oil shale.
High grade dolomite oil shale; medium brown, contorted bedding, very low density, Mahogany bed.
Medium grade oil shale.
High grade dolomite oil shale.
Brownish orange tuff bed 0.25' thick.
Medium grade oil shale; yellow brown.
High grade dolomite oil shale; dark gray to dark brown, solution cavities at 1146.6', pyritic, dolomite(?) nodules.
Medium grade dolomite oil shale; brown.
High grade dolomite oil shale, brown.
Medium and high (dolomite) grade oil shale
Medium grade oil shale; medium brown;
Lost 1.5' at 1058-1059.5'.
Low and high (dolomite) grade oil shale.
Low grade oil shale; yellowish gray.
High grade dolomite oil shale; dark olive gray.
Medium (dolomite) and low grade oil shale.
Medium grade oil shale; medium gray to buff, pyritic, contorted bedding.
Low grade oil shale.
Medium grade oil shale; large cavities.
Low grade oil shale; light yellow-gray.
Medium grade oil shale; light brown to dark gray, pyrite stringers, petroliferous odor, whitish gray tuff stringers.
High grade dolomite oilshale; cavities.
Lost 1'at 1190-1191'.
Very low grade oil shale; pyritic, slightly silty, light gray-brown.
Medium grade dolomite oil shale.
Very low grade oil shale.
High (dolomite) and medium grade oil shale.
Very low/grade oil shale, light brown, and low some pyrite, clay seam at 1207'.
High and medium grade oil shale.
Lost 2.3' at 1209.5-1211.8'.
Chocolate brown tuff with buff pods.
Lost 0.5' at 1213.5-1214.0'.
Very low grade oil shale; light brown.
Medium grade dolomite oil shale.